

NANO

Refrigerant dryers



VDR 6350, VDR 8450

Instruction book

nano

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VDR 6350, VDR 8450

Instruction book

Original instructions

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This instruction book is valid for CE, non-CE as well as UKCA labelled machines. It meets the requirements for instructions specified by the applicable European directives or UK statutory instruments as identified in the Declaration of Conformity.

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The logo for NANO, consisting of the word "nano" in a stylized, lowercase, blue font. The letters are bold and have a modern, sans-serif appearance.

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1 Safety precautions

1.1 Safety icons

Explanation

	Danger to life
	Warning
	Important note

1.2 Safety precautions, general

General precautions

1. The operator must employ safe working practices and observe all related work safety requirements and regulations.
2. If any of the following statements does not comply with the applicable legislation, the stricter of the two shall apply.
3. Installation, operation, maintenance and repair work must only be performed by authorized, trained, specialized personnel.
4. The dryer is not considered capable of producing air of breathing quality. For air of breathing quality, the compressed air must be adequately purified according to the applicable legislation and standards.
5. Before any maintenance, repair work, adjustment or any other non-routine checks, stop the dryer, press the emergency stop button, switch off the voltage and depressurize the dryer. In addition, the power isolating switch must be opened and locked.
6. Never play with compressed air. Do not apply the air to your skin or direct an air stream at people. Never use the air to clean dirt from your clothes. When using the air to clean equipment, do so with extreme caution and wear eye protection.
7. The owner is responsible for maintaining the unit in safe operating condition. Parts and accessories shall be replaced if unsuitable for safe operation.
8. It is not allowed to walk or stand on the roof of the dryer canopy.
9. The service switch should only be operated by a trained service specialist from the manufacturer.

1.3 Safety precautions during installation

	All responsibility for any damage or injury resulting from neglecting these precautions, or non-observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the manufacturer.
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Precautions during installation

1. The machine must only be lifted using suitable equipment in accordance with the applicable safety regulations. Loose or pivoting parts must be securely fastened before lifting. It is strictly forbidden to dwell or stay in the risk zone under a lifted load. Lifting acceleration and deceleration must be kept within safe limits. Wear a safety helmet when working in the area of overhead or lifting equipment.
2. The unit is designed for indoor use. If the unit is installed outdoors, special precautions must be taken; consult the manufacturer.
3. Place the machine where the ambient air is as cool and clean as possible. If necessary, install a suction duct. Never obstruct the air inlet. Care must be taken to minimize the entry of moisture at the inlet air.
4. Any blanking flanges, plugs, caps and desiccant bags must be removed before connecting the pipes.
5. Air hoses must be of correct size and suitable for the working pressure. Never use frayed, damaged or worn hoses. Distribution pipes and connections must be of the correct size and suitable for the working pressure.
6. The aspirated air must be free of flammable fumes, vapors and particles, e.g. paint solvents, that can lead to internal fire or explosion.
7. Arrange the air intake so that loose clothing worn by people cannot be sucked in.
8. Ensure that the discharge pipe from the dryer to the air net is free to expand under heat and that it is not in contact with or close to flammable materials.
9. No external force may be exerted on the air outlet valve; the connected pipe must be free of strain.
10. If remote control is installed, the machine must bear a clear sign stating: DANGER: This machine is remotely controlled and may start without warning.

The operator has to make sure that the machine is stopped and that the isolating switch is open and locked before any maintenance or repair. As a further safeguard, persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the start equipment.

11. Air-cooled machines must be installed in such a way that an adequate flow of cooling air is available and that the exhausted air does not recirculate to the air inlet or cooling air inlet.
12. The electrical connections must correspond to the applicable codes. The machines must be earthed and protected against short circuits by fuses in all phases. A lockable power isolating switch must be installed near the dryer.
13. On machines with automatic start-stop system or if the automatic restart function after voltage failure is activated, a sign stating "This machine may start without warning" must be affixed near the instrument panel.

14. Never remove or tamper with the safety devices, guards or insulation fitted on the machine. Every pressure vessel or auxiliary installed outside the machine to contain air above atmospheric pressure must be protected by a pressure-relieving device or devices as required.
15. Pipework or other parts with a temperature in excess of 80°C (176°F) and which may be accidentally touched by personnel in normal operation must be guarded or insulated. Other high-temperature pipework must be clearly marked.
16. For water-cooled machines, the cooling water system installed outside the machine has to be protected by a safety device with set pressure according to the maximum cooling water inlet pressure.
17. If the ground is not level or can be subject to variable inclination, consult the manufacturer.

	<p>Also consult following safety precautions: Safety precautions during operation and Safety precautions during maintenance.</p> <p>These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein.</p> <p>Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.</p>
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1.4 Safety precautions during operation

	<p>All responsibility for any damage or injury resulting from neglecting these precautions, or non-observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the manufacturer.</p>
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Precautions during operation

1. Never touch any piping or components of the machine during operation.
2. Use only the correct type and size of hose end fittings and connections. When blowing through a hose or air line, ensure that the open end is held securely. A free end will whip and may cause injury. Make sure that a hose is fully depressurized before disconnecting it.
3. Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.
4. Never operate the machine when there is a possibility of taking in flammable or toxic fumes, vapors or particles.
5. Never operate the machine below or in excess of its limit ratings.
6. Keep all bodywork doors shut during operation. The doors may be opened for short periods only, e.g. to carry out routine checks. Wear ear protectors when opening a door.
7. People staying in environments or rooms where the sound pressure level reaches or exceeds 90 dB(A) shall wear ear protectors.
8. Periodically check that:
 - All guards are in place and securely fastened
 - All hoses and/or pipes inside the machine are in good condition, secure and not rubbing
 - There are no leaks

- All fasteners are tight
 - All electrical leads are secure and in good order
 - Safety valves and other pressure-relief devices are not obstructed by dirt or paint
 - Air outlet valve and air net, i.e. pipes, couplings, manifolds, valves, hoses, etc. are in good repair, free of wear or abuse
9. If warm cooling air from dryers is used in air heating systems, e.g. to warm up a workroom, take precautions against air pollution and possible contamination of the breathing air.
 10. Do not remove any of, or tamper with, the sound-damping material.
 11. Never remove or tamper with the safety devices, guards or insulations fitted on the machine. Every pressure vessel or auxiliary installed outside the machine to contain air above atmospheric pressure shall be protected by a pressure-relieving device or devices as required.

	<p>Also consult following safety precautions: Safety precautions during installation and Safety precautions during maintenance.</p> <p>These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein.</p> <p>Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.</p>
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1.5 Safety precautions during maintenance or repair

	<p>All responsibility for any damage or injury resulting from neglecting these precautions, or non-observance of the normal caution and care required for installation, operation, maintenance and repair, even if not expressly stated, will be disclaimed by the manufacturer.</p>
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Precautions during maintenance or repair

1. Always use the correct safety equipment (such as safety glasses, gloves, safety shoes, etc.).
2. Use only the correct tools for maintenance and repair work.
3. Use only genuine spare parts.
4. All maintenance work shall only be undertaken when the machine has cooled down.
5. A warning sign bearing a legend such as "work in progress; do not start" shall be attached to the starting equipment.
6. Persons switching on remotely controlled machines shall take adequate precautions to ensure that there is no one checking or working on the machine. To this end, a suitable notice shall be affixed to the remote start equipment.
7. Close the dryer air outlet valve before connecting or disconnecting a pipe.
8. Before removing any pressurized component, effectively isolate the machine from all sources of pressure and relieve the entire system of pressure.
9. Never use flammable solvents or carbon tetrachloride for cleaning parts. Take safety precautions against toxic vapors of cleaning liquids.
10. Scrupulously observe cleanliness during maintenance and repair. Keep dirt away by covering the parts and exposed openings with a clean cloth, paper or tape.
11. Never weld on, or in any way modify, pressure vessels.

12. Whenever there is an indication or any suspicion that an internal part of a machine is overheated, the machine shall be stopped but no inspection covers shall be opened before sufficient cooling time has elapsed; this to avoid the risk of spontaneous ignition of the oil vapor when air is admitted.
13. Never use a light source with open flame for inspecting the interior of a machine, pressure vessel, etc.
14. Make sure that no tools, loose parts or rags are left in or on the machine.
15. All regulating and safety devices shall be maintained with due care to ensure that they function properly. They may not be put out of action.
16. Before clearing the machine for use after maintenance or overhaul, check that operating pressures, temperatures and time settings are correct. Check that all control and shut-down devices are fitted and that they function correctly.
17. Protect the motor, electrical and regulating components, etc. to prevent moisture from entering them, e.g. when steam-cleaning.
18. Make sure that all sound-damping material and vibration dampers, e.g. damping material on the bodywork, is in good condition. If damaged, replace it by genuine material from the manufacturer to prevent the sound pressure level from increasing.
19. Never use caustic solvents which can damage materials of the air net, e.g. polycarbonate bowls.
20. **The following safety precautions are stressed when handling refrigerant:**
 - Never inhale refrigerant vapours. Check that the working area is adequately ventilated; if required, use breathing protection.
 - Always wear special gloves. In case of refrigerant contact with the skin, rinse the skin with water. If liquid refrigerant contacts the skin through clothing, never tear off or remove the latter; flush abundantly with fresh water over the clothing until all refrigerant is flushed away; then seek medical first aid.

	<p>Also consult following safety precautions: Safety precautions during installation and Safety precautions during operation.</p> <p>These precautions apply to machinery processing or consuming air or inert gas. Processing of any other gas requires additional safety precautions typical to the application which are not included herein.</p> <p>Some precautions are general and cover several machine types and equipment; hence some statements may not apply to your machine.</p>
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1.6 Dismantling and disposal

Dismantling

Once the end of life of the machine is reached, please follow next steps:

1. Stop the machine.
2. Check all safety precautions mentioned in the previous chapters to secure safe handling (for example, LOTO, cool-down, depressurize and discharge).
3. Separate the harmful from the safe components (for example, drain oil from oil containing parts).
4. Refer to the disposal topic mentioned below.

Disposal of electrical and electronic appliances (WEEE)

This equipment falls under the provisions of the European Directive 2012/19/EU on waste electrical and electronic appliances (WEEE) as well as under the UKCA Waste Electrical and Electronic Equipment regulations 2013 and may not be disposed as unsorted waste.



The equipment is labelled in accordance with the European Directive 2012/19/EU and the UKCA Waste Electrical and Electronic Equipment regulations 2013 with the crossed-out wheeled bin symbol.

At the end of life-time of the electric and electronic equipment (EEE) it must be taken to separate collection.

For more information check with your local waste authority, customer center or distributor.

Disposal of other used material

Used filters or any other used material (for example, filter bags, filter media, desiccant, lubricants, cleaning rags and machine parts) must be disposed of in an environmentally friendly and safe manner, and in line with the local recommendations and environmental legislation.

2 General description

2.1 Introduction

Description

The air dryer removes moisture from compressed air by cooling the air to near freezing point. This causes water to condense. The condensate is automatically drained. The air is warmed up before leaving the dryer (approx. 5 °C (9 °F) below the incoming air temperature).

The electronic regulator keeps the pressure dew-point stable by controlling the electronic valves.

On air-cooled dryers, the condenser has cooling fans controlled by a pressure sensor.

Water-cooled dryers have a water regulating valve in the water outlet of the condenser.

The descriptions mentioned in this book are valid for both air-cooled and water-cooled dryers.

General view



Figure 1: Air-cooled dryer



Figure 2: Water-cooled dryer

Position of components

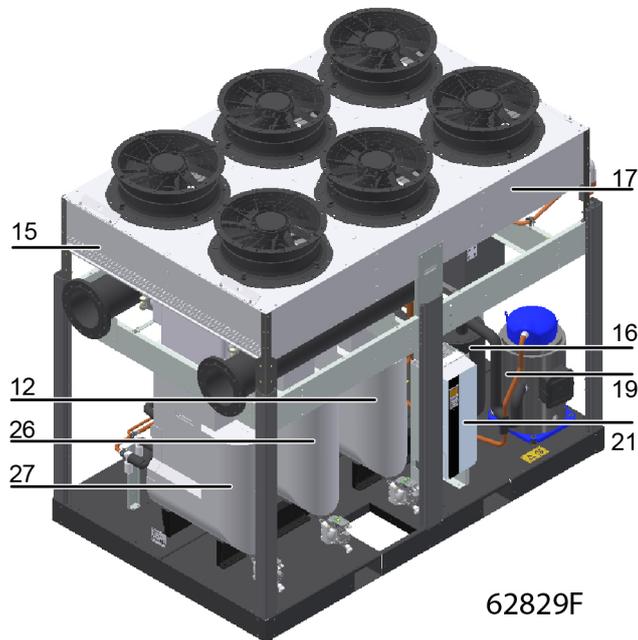
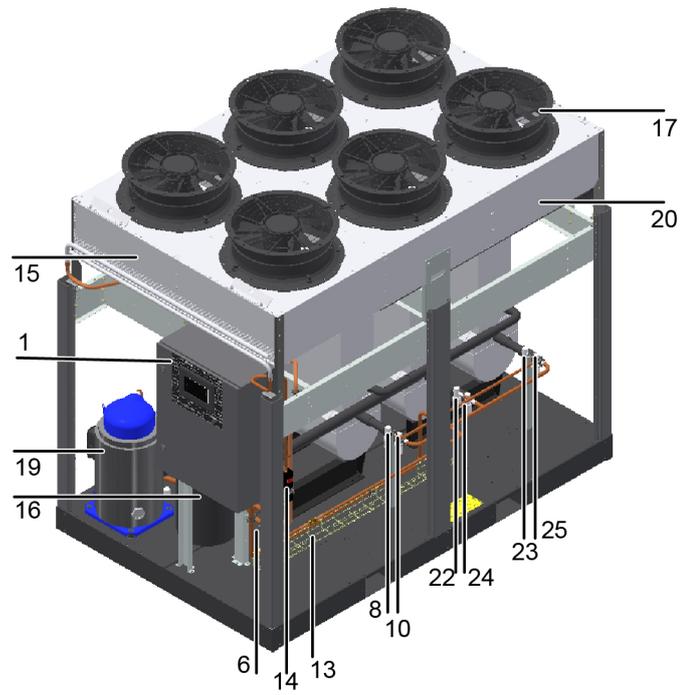


Figure 3: Air-cooled VDR 6350

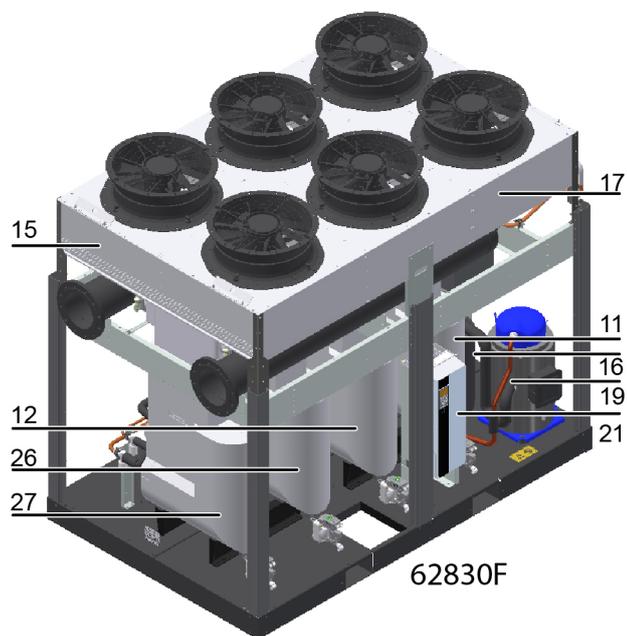
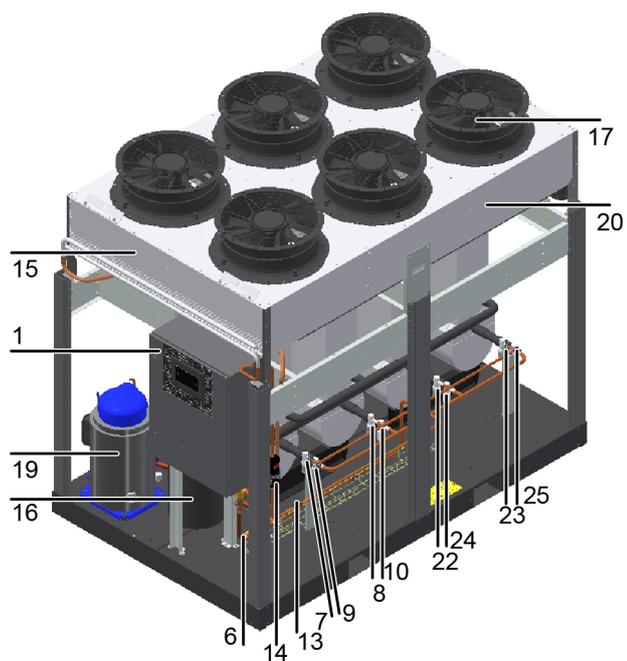


Figure 4: Air-cooled VDR 8450

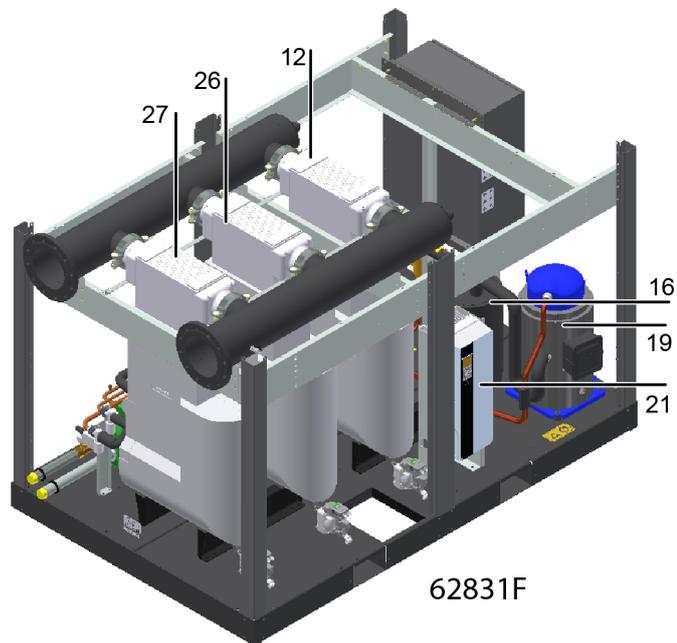
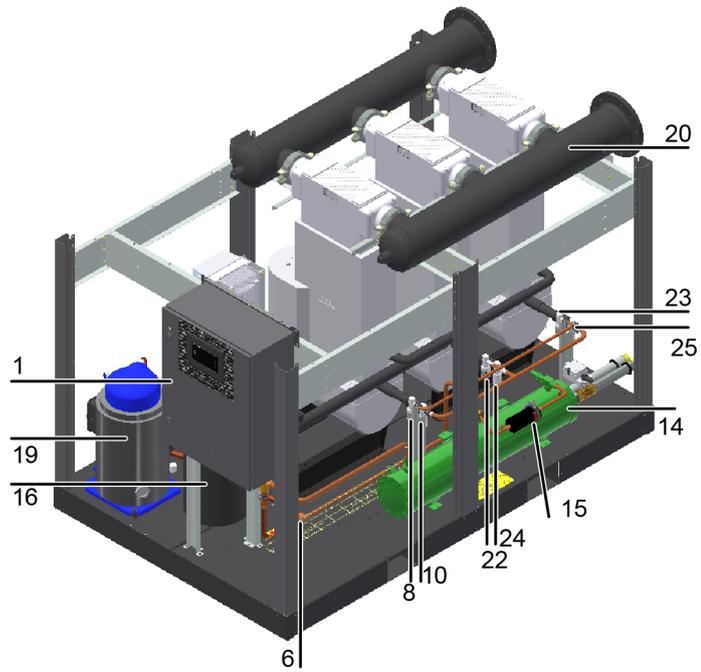


Figure 5: Water-cooled VDR 6350

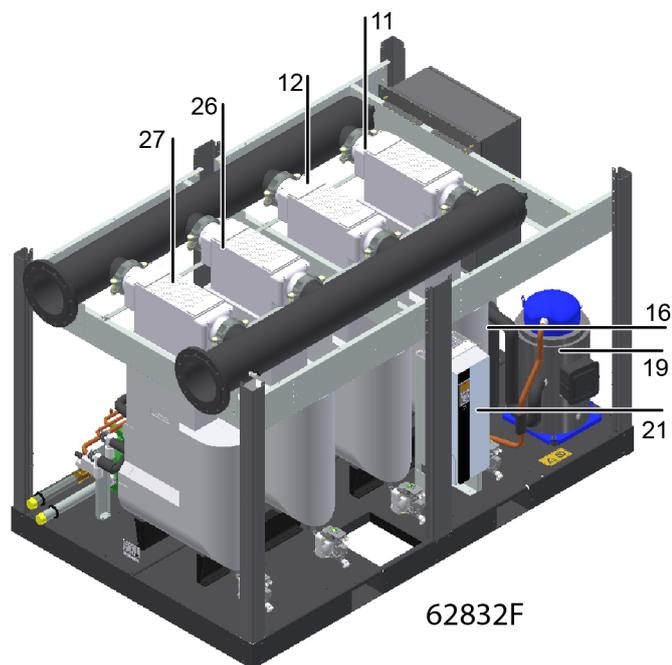
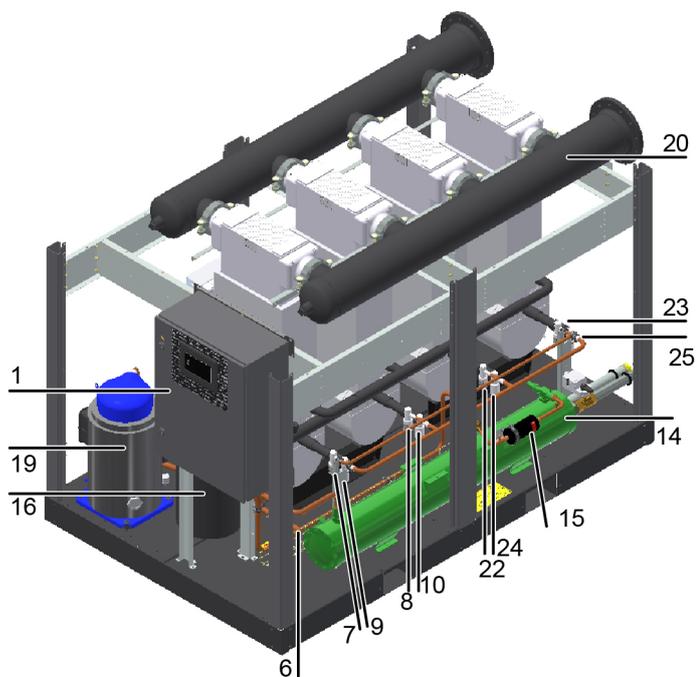


Figure 6: water-cooled VDR 8450

1	Cubicle
6	Non return valve
7	Electronic expansion valve 1
8	Electronic expansion valve 2
9	Electronic hot-gas by-pass valve 1
10	Electronic hot-gas by-pass valve 2

11	Heat exchanger 1
12	Heat exchanger 2
13	Sight glass
14	Refrigerant dryer/filter
15	Condensor
16	Liquid separator
17	Fan
19	Compressor
20	Flow switch
21	Frequency convertor
22	Electronic expansion valve 3
23	Electronic expansion valve 4
24	Electronic hot-gas by-pass valve 3
25	Electronic hot-gas by-pass valve 4
26	Heat exchanger 3
27	Heat exchanger 4

Connections

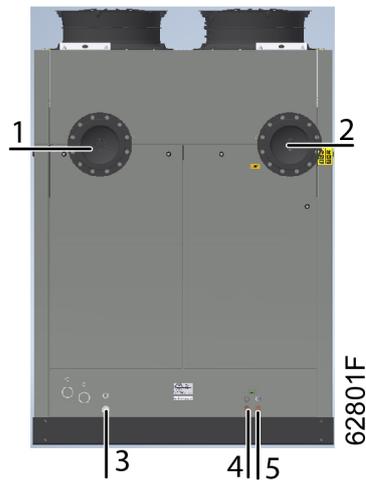


Figure 7: Rear view of air-cooled dryer

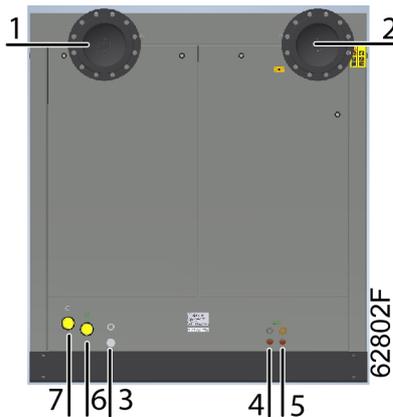


Figure 8: Rear view of water-cooled dryer

1	Compressed air outlet
2	Compressed air inlet
3	Cable gland, electrical connection
4	Automatic drain hose
6	Cooling water inlet (Only on water-cooled dryers)
7	Cooling water outlet (Only on water-cooled dryers)

2.2 Air system

Air flow diagram

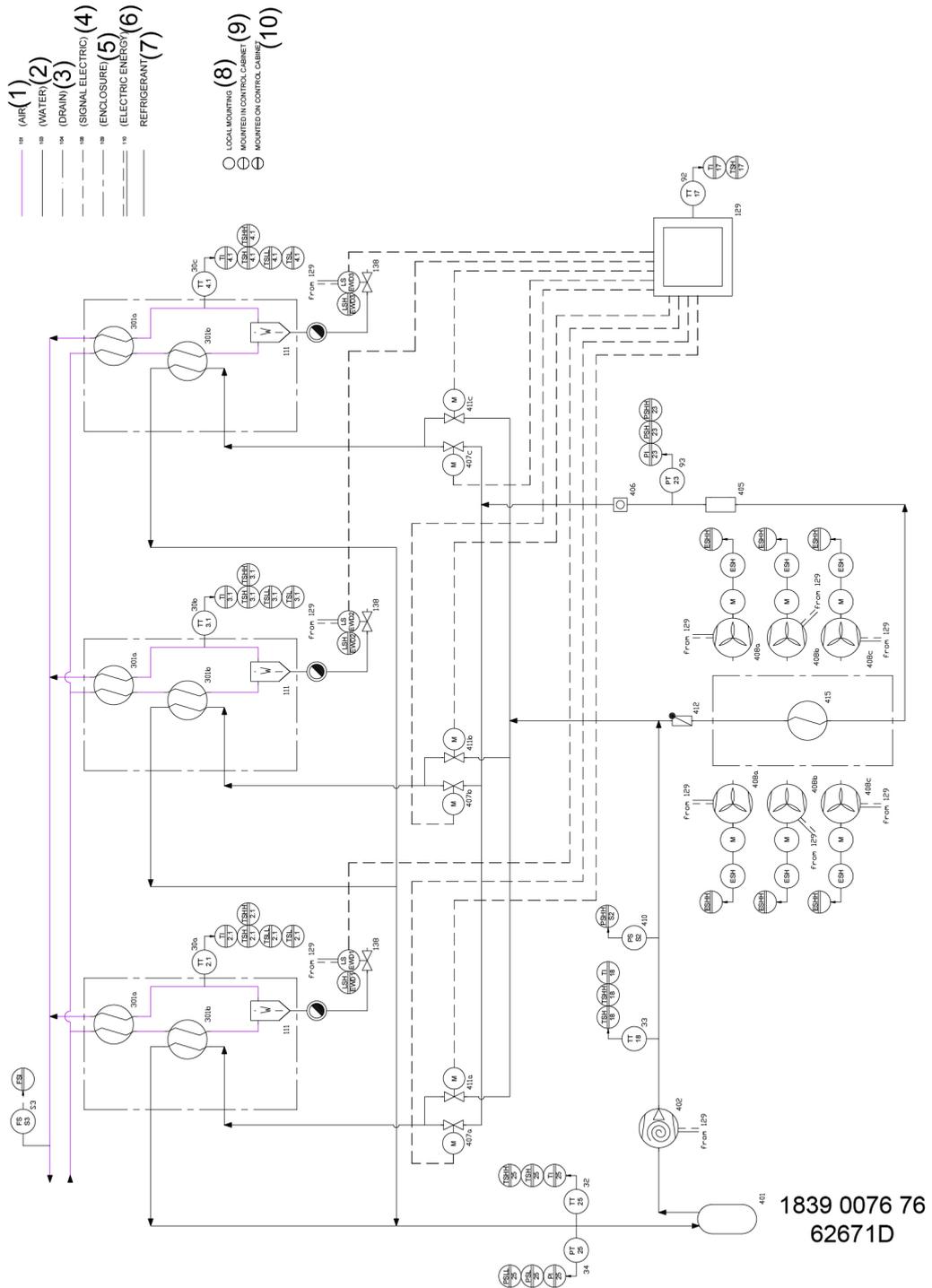


Figure 9: Air and refrigerant flow diagram for air-cooled VDR 6350

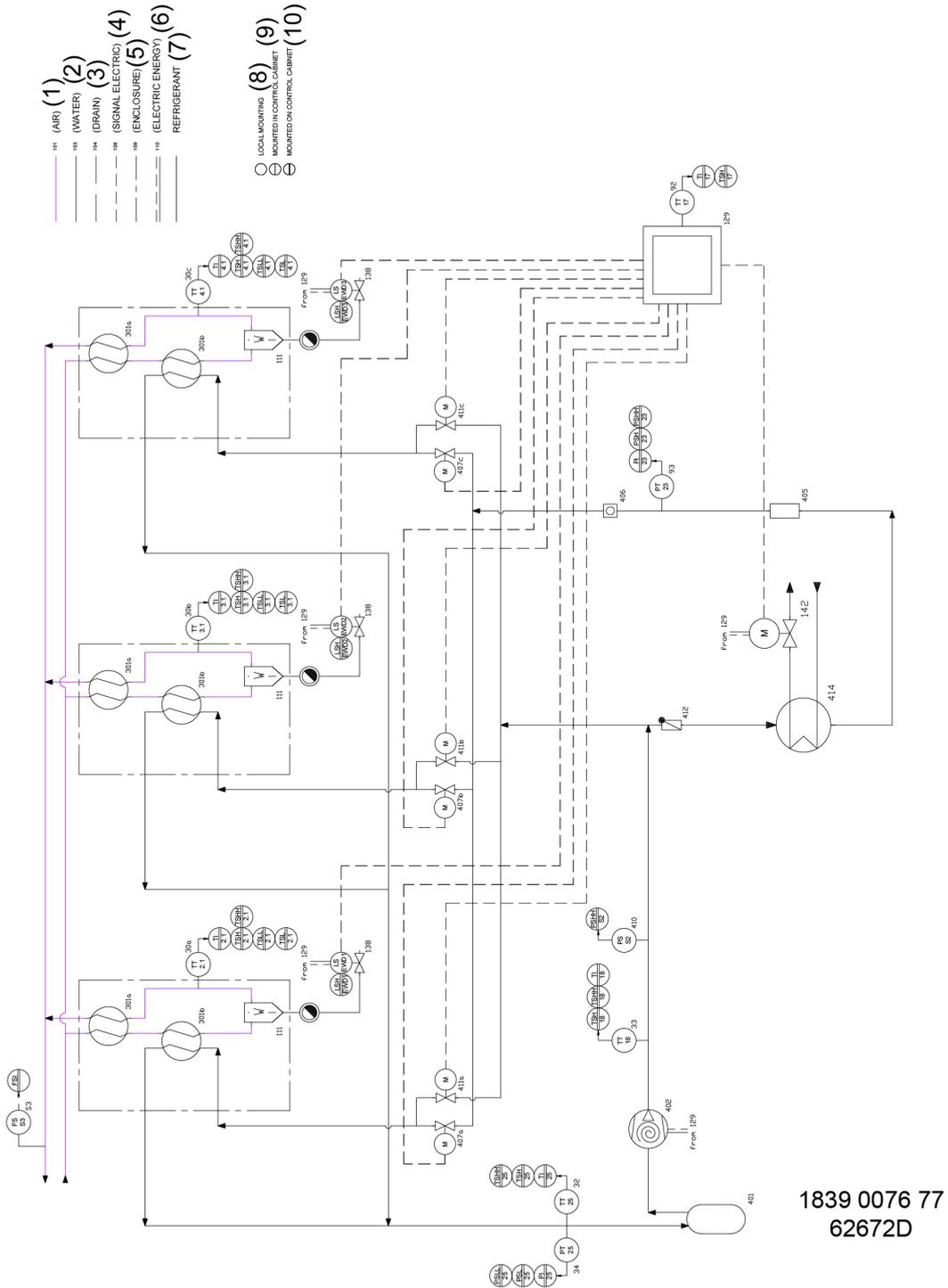
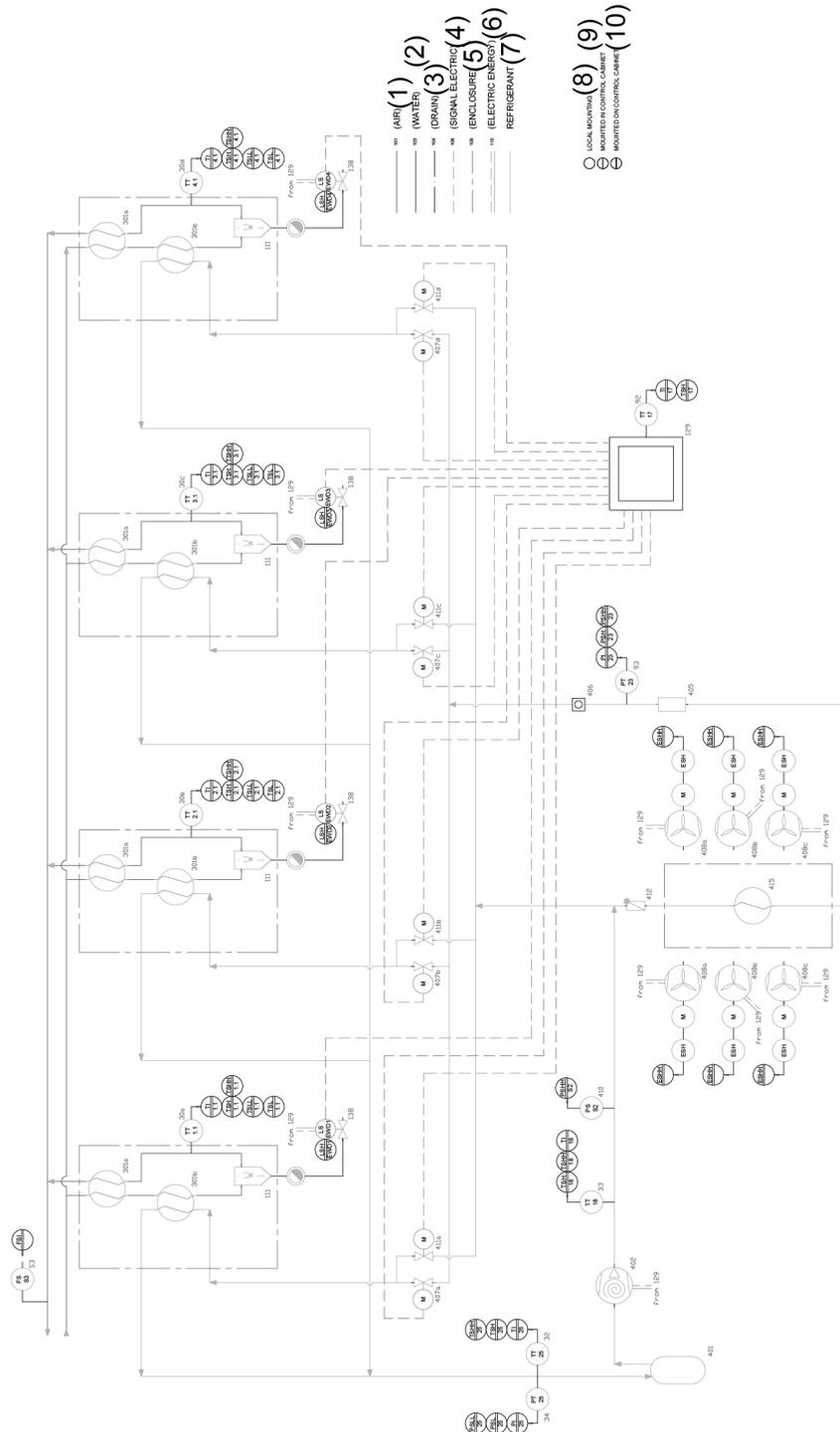
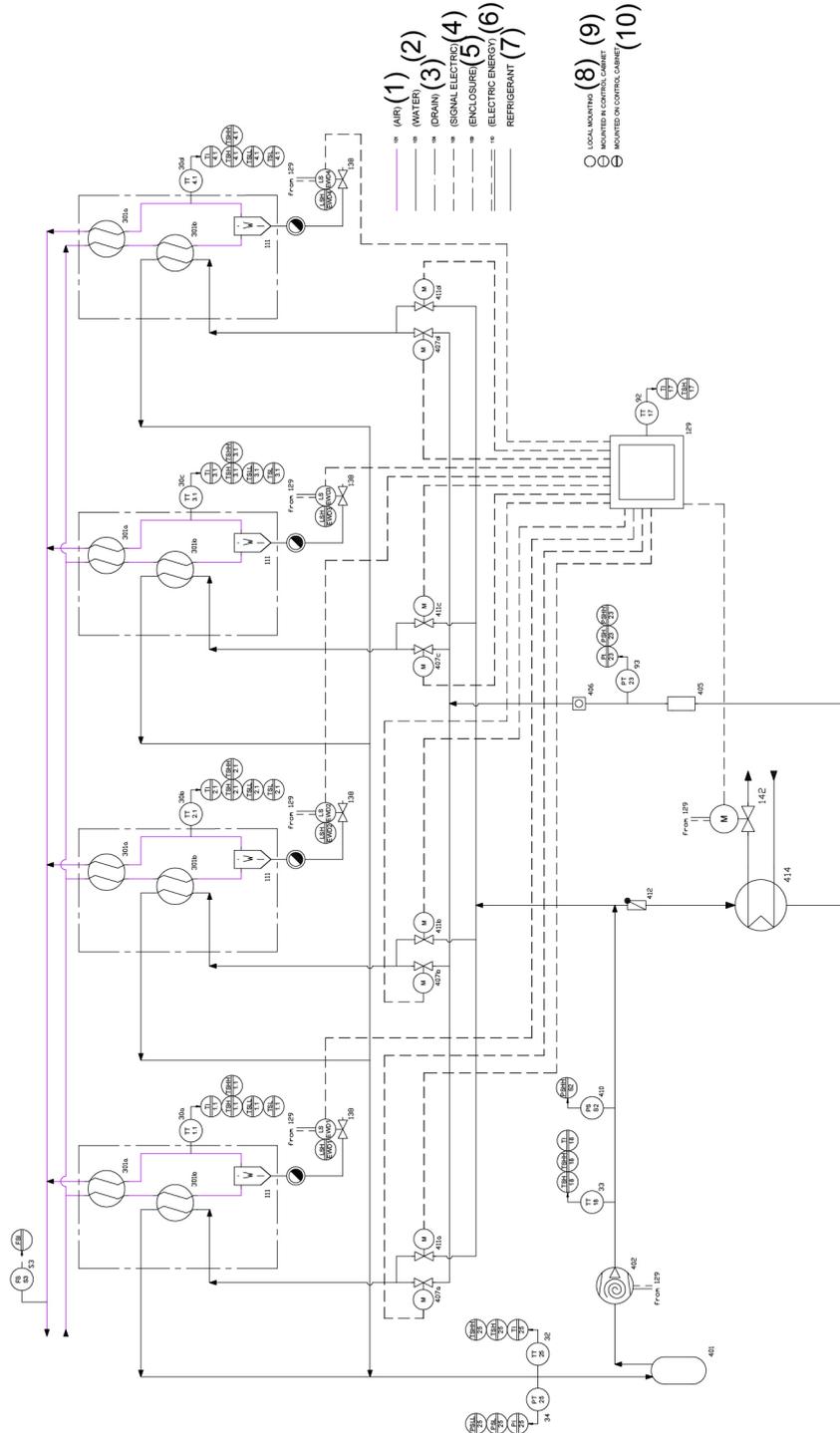


Figure 10: Air and refrigerant flow diagram for water-cooled VDR 6350



1839 0076 75
62670D

Figure 11: Air and refrigerant flow diagram for air-cooled VDR 8450



1839 0076 74
62669D

Figure 12: Air and refrigerant flow diagram for water-cooled VDR 8450

Reference	Name
30a-c (VDR 6350) 30a-d (VDR 8450)	Dryer LAT
32	Inlet of refrigerant compressor

Reference	Name
33	Outlet of refrigerant compressor
34	Evaporating pressure at compressor inlet
92	Ambient temperature
93	Condensing pressure
111	Water separator
129	Cubicle
138	Automatic drain
142	Water cooling valve
401	Liquid separator
402	Refrigerant compressor
405	Liquid filter-dryer
406	Sightglass
410	Pressure shut-down switch
412	Non-return valve
414	Water-cooled condensor
415	Air-cooled condensor
301a	Heat exchanger (air-air)
301b	Heat exchanger (air-refrigerant)
407a-c (VDR 6350) 407a-d (VDR 8450)	Electronic expansion valve
408a-c	Speed of dryer fan
411a-c (VDR 6350) 411a-d (VDR 8450)	Electronic hot-gas by-pass valve
S3	Flow switch
(1)	Air
(2)	Water
(3)	Drain
(4)	Electric signal
(5)	Enclosure
(6)	Electric energy
(7)	Refrigerant
(8)	Local mounting
(9)	Mounted in control cabinet
(10)	Mounted on control cabinet

Description

Compressed air enters heat exchanger (301a) and is cooled by the outgoing, cold, dried air. Water in the incoming air starts to condense. The air then flows through heat exchanger/evaporator (301b) where the refrigerant evaporates causing the air to be further cooled to close to the evaporating temperature of the refrigerant. More water in the air condenses. The cold air then flows through separator (111) where all the condensate is separated from the air.

The condensate collects in the electronic water drain (138) and is automatically drained. The cold, dried air flows through heat exchanger (301a), where it is warmed up by the incoming air to approx. 5 °C (9 °F) below the incoming air temperature.

Condensation in the air net cannot occur unless the air is cooled to below the pressure dew-point indicated on the control panel.

2.3 Refrigeration system

Refrigerant flow diagram

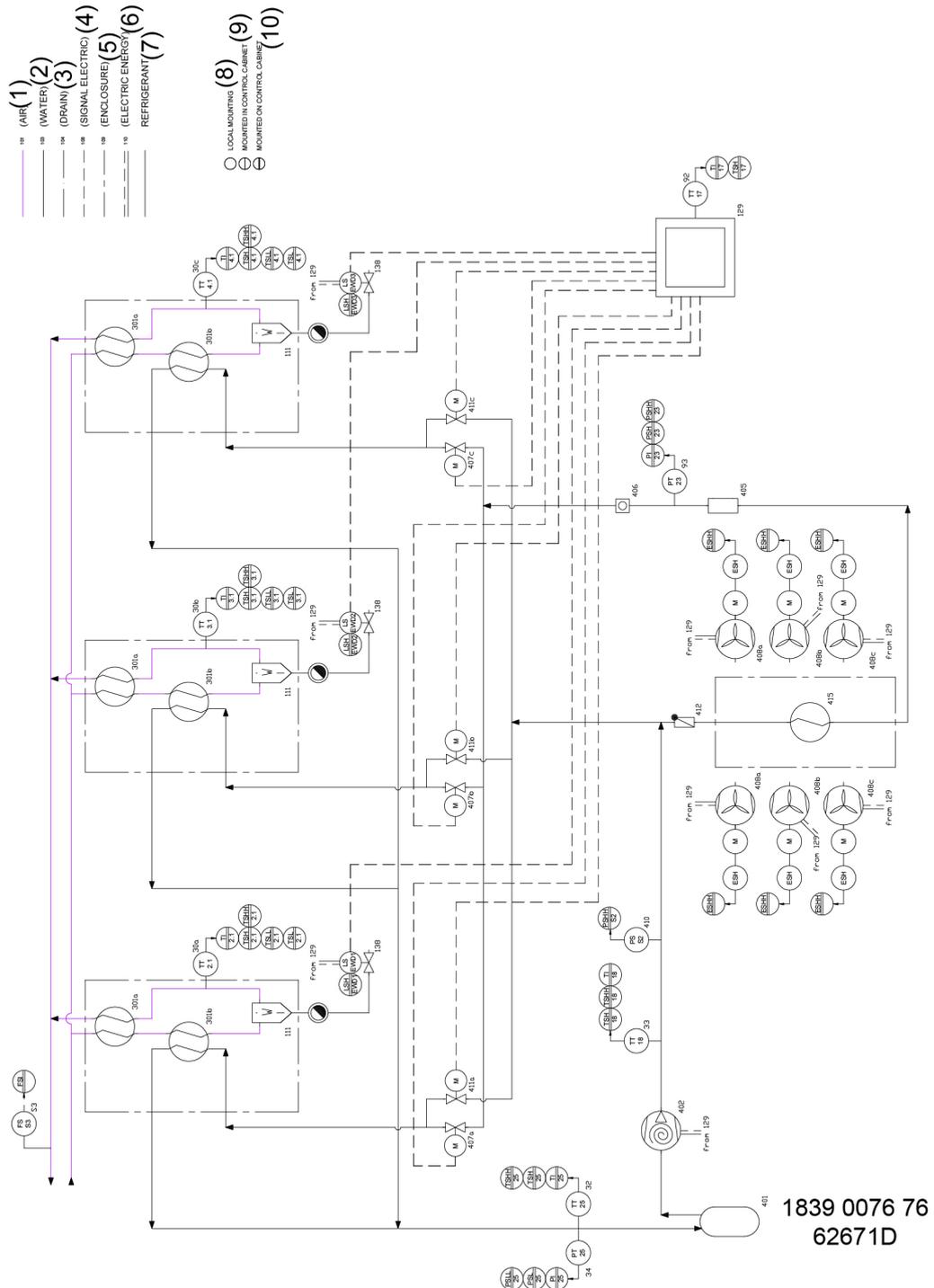
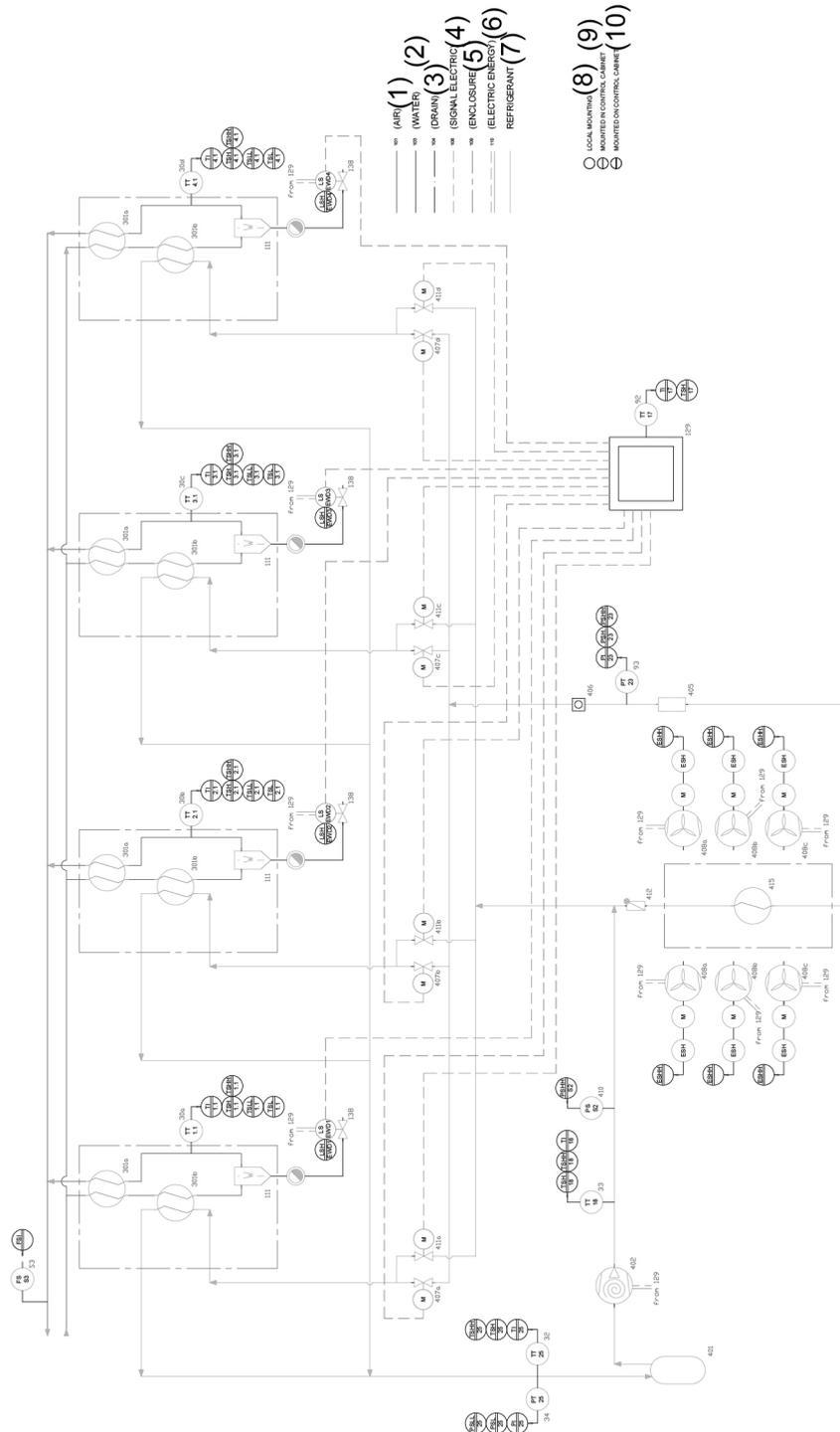
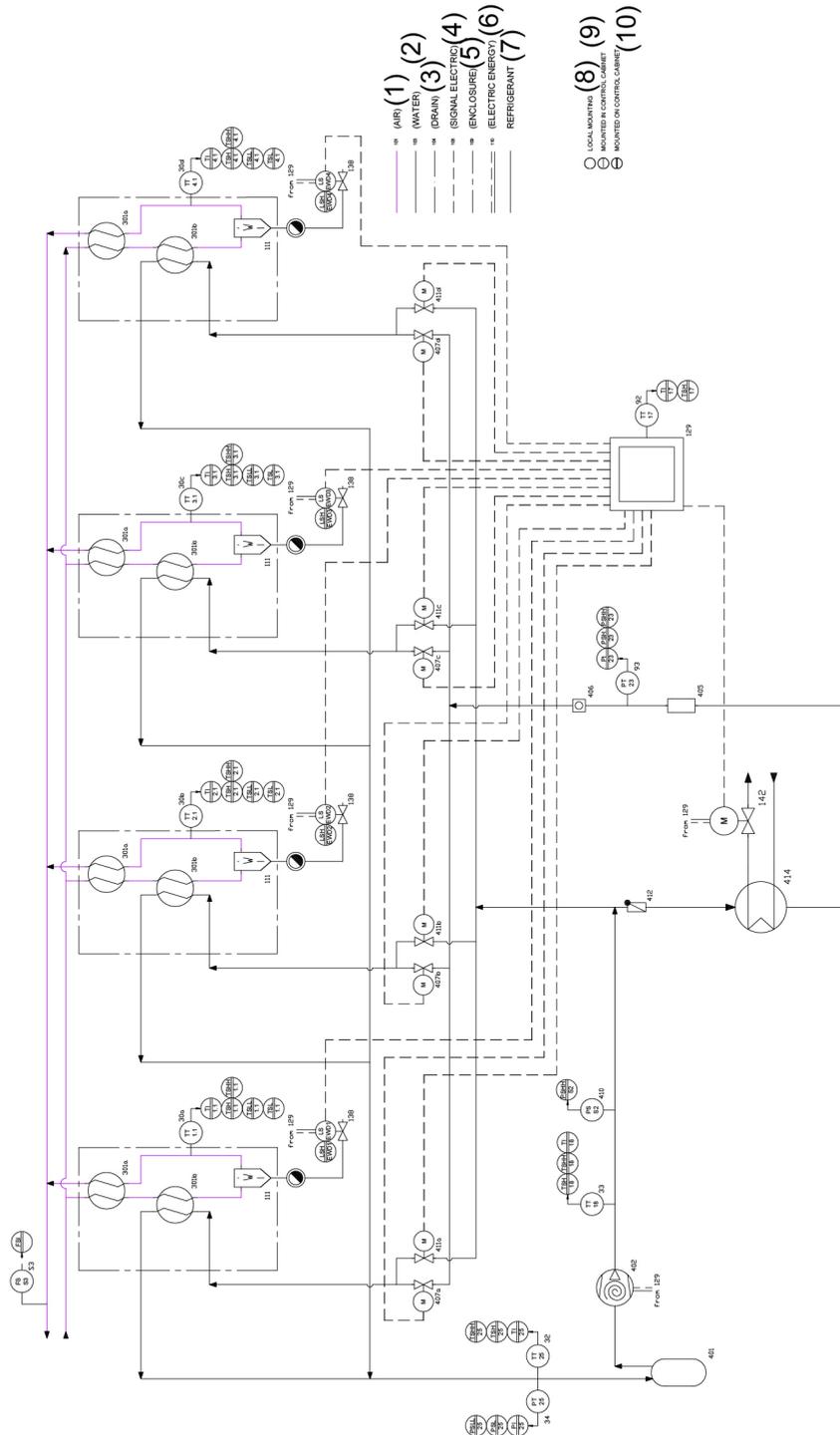


Figure 13: Air and refrigerant flow diagram for air-cooled VDR 6350



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62670D

Figure 15: Air and refrigerant flow diagram for air-cooled VDR 8450



1839 0076 74
62669D

Figure 16: Air and refrigerant flow diagram for water-cooled VDR 8450

See Air system for explanation of the references in the flow diagram.

Description

Refrigerant compressor (402) delivers hot, high-pressure refrigerant gas, which flows through air-cooled condenser (415) or water-cooled condenser (414), where most of the refrigerant condenses.

The liquid flows through liquid filter-dryer (405) to expansion valve (407) via sight-glass (406). The refrigerant leaves the expansion valve at evaporating pressure.

The refrigerant enters evaporator (301b), where it withdraws heat from the compressed air by further evaporation at constant pressure. The heated refrigerant leaves the evaporator and is sucked in by refrigerant compressor (402) via liquid separator (401).

The dryers are provided with a sight-glass (406). The sight-glass allows the refrigerant flow in the line to be checked. During normal operation, the liquid flow must be clear. In general, vapor bubbles indicate a shortage of refrigerant. Note that fluctuations in the load may cause bubbles to pass in the flow for a short time. The centre of the glass is provided with a moisture indicator which is green when the liquid refrigerant is free of moisture. It will turn yellow when the refrigerant contains moisture, indicating that the liquid filter-dryer (405) needs to be replaced.

2.4 Automatic regulation system

Air and refrigerant flow diagram

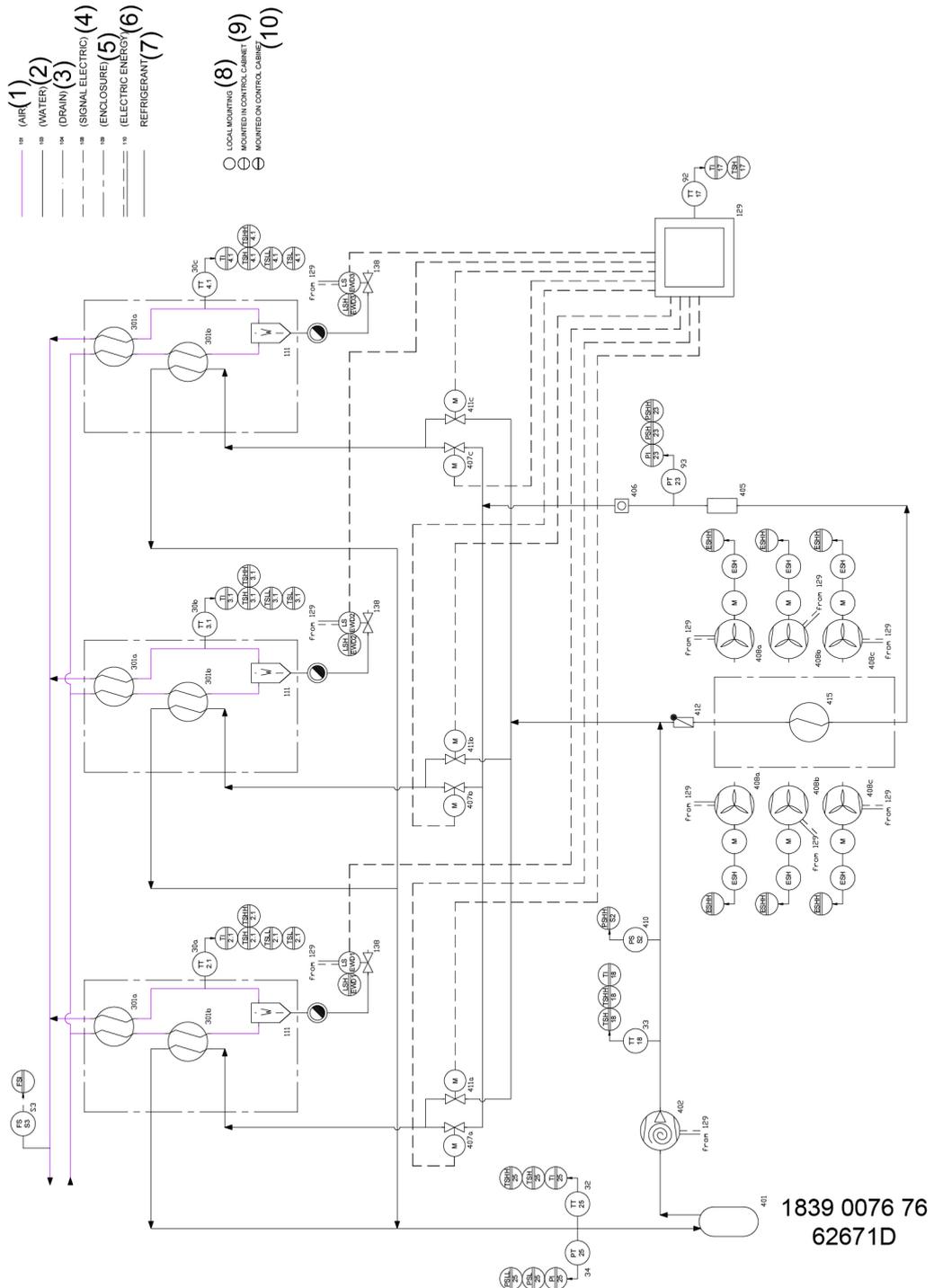


Figure 17: Air and refrigerant flow diagram for air-cooled VDR 6350

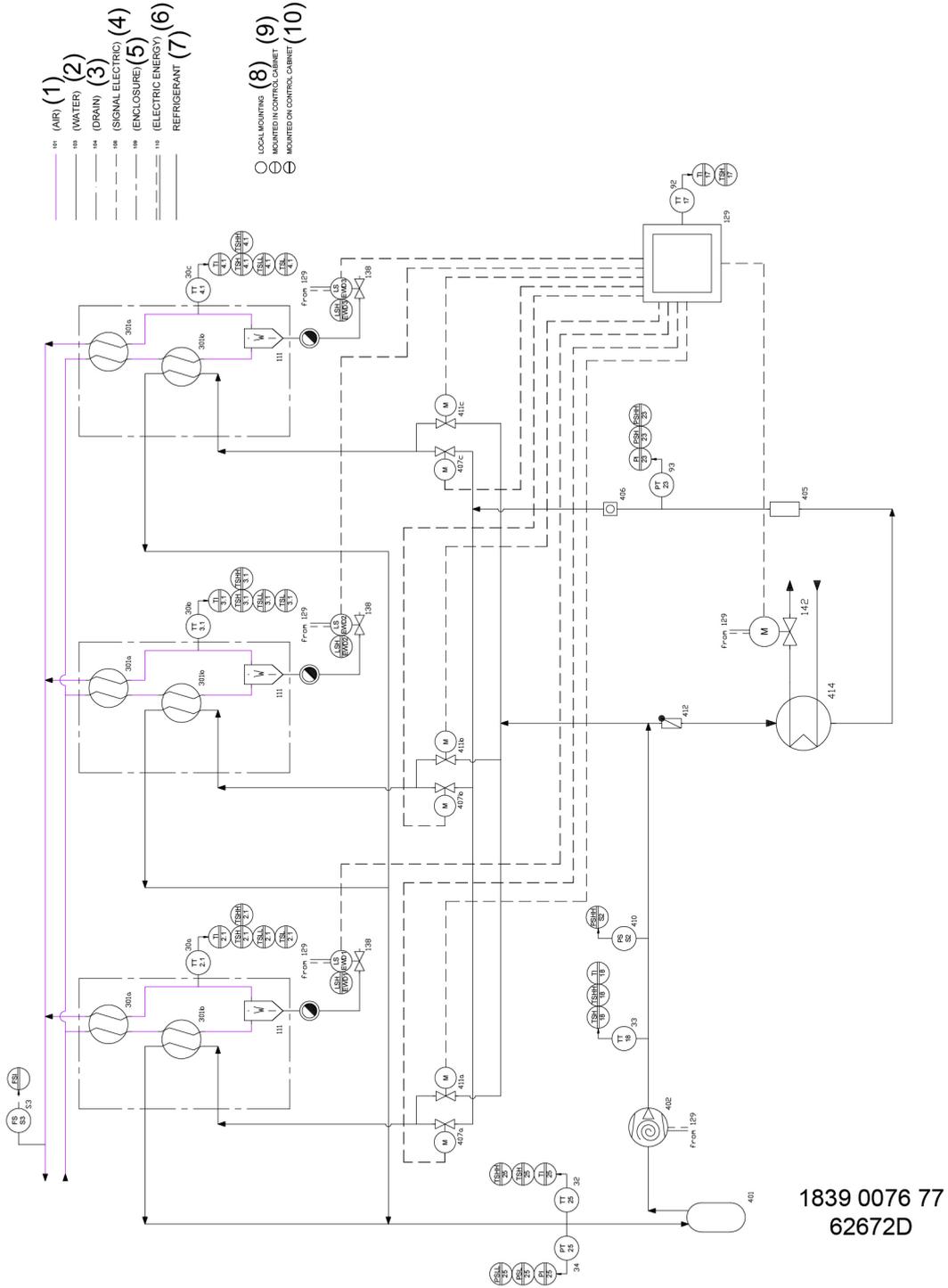
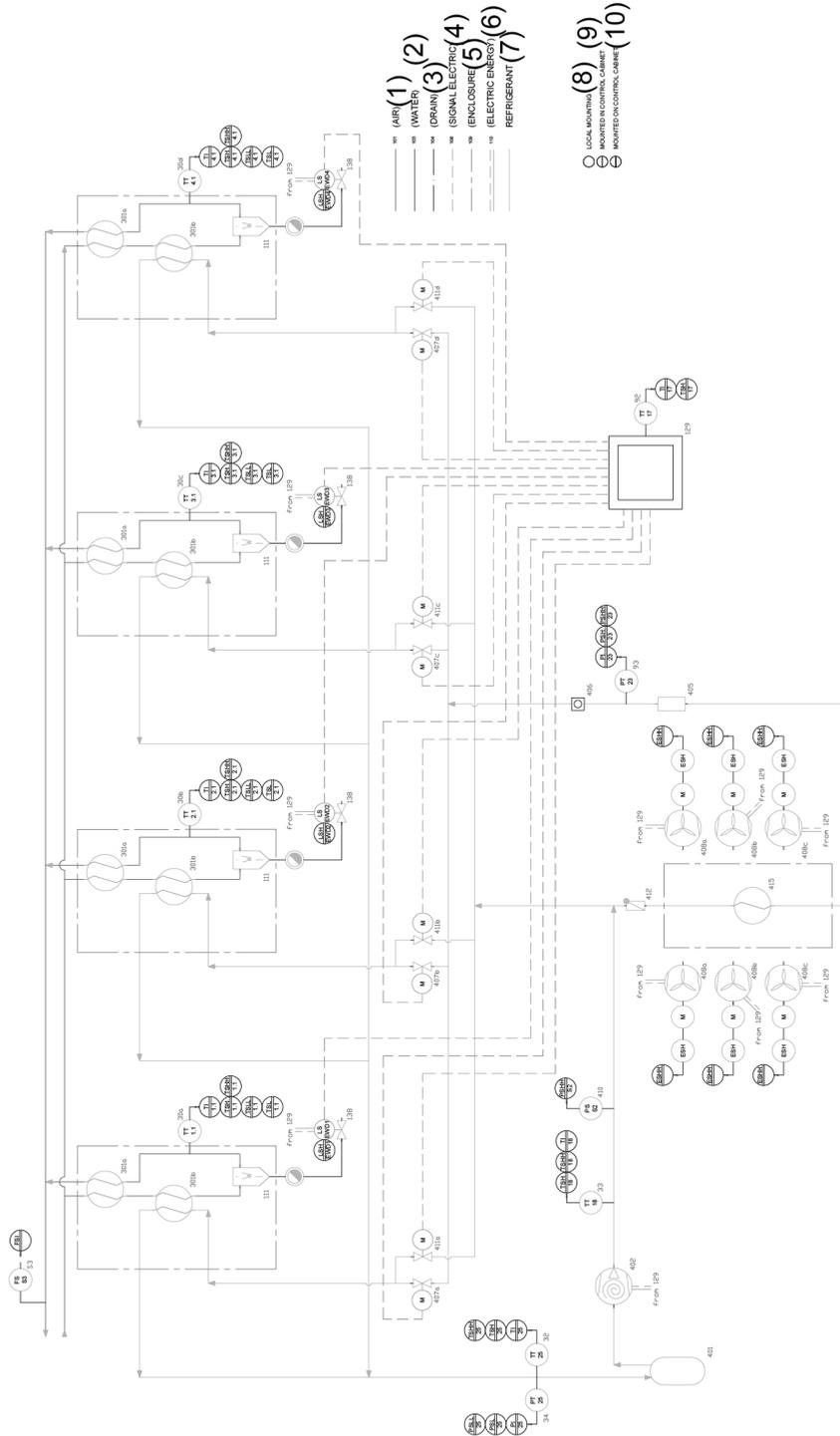
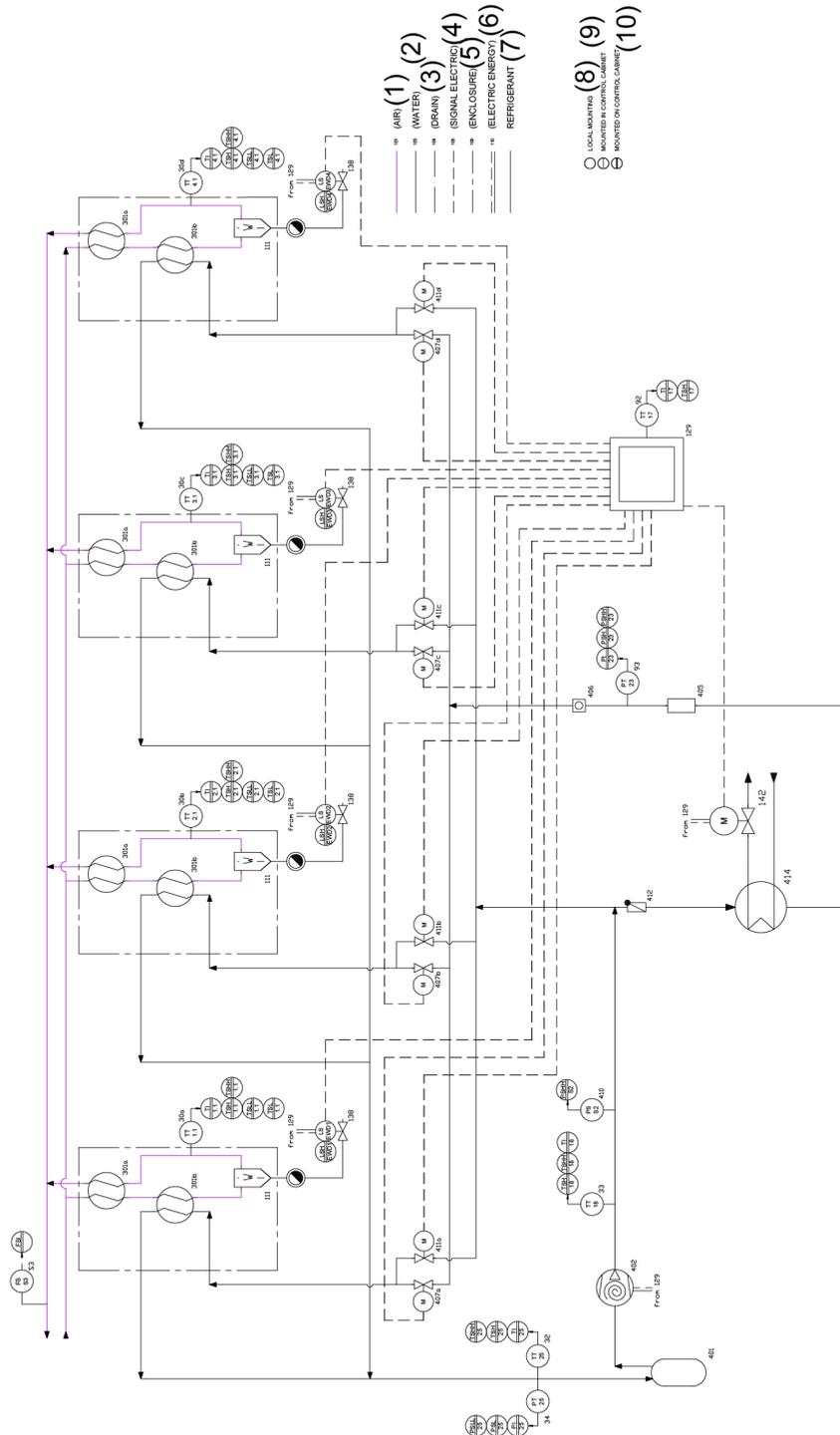


Figure 18: Air and refrigerant flow diagram for water-cooled VDR 6350



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62670D

Figure 19: Air and refrigerant flow diagram for air-cooled VDR 8450



1839 0076 74
62669D

Figure 20: Air and refrigerant flow diagram for water-cooled VDR 8450

See Air system for explanation of the references in the flow diagram.

Description

The condenser pressure must be kept as constant as possible to obtain stable operation, therefore:

- For air-cooled versions: The regulator stops and starts the cooling fans.

- For water-cooled versions: The water regulating valve in the water outlet regulates the cooling water flow.

When at partial or no load the dew-point pressure stays below the set-point, the regulator opens the electronic hot-gas by-pass valve (411) to the evaporator circuit to prevent the evaporator temperature from dropping below 0 °C (32 °F).

2.5 Condensate drain system

Description



Figure 21: Electronic water drain location (1)

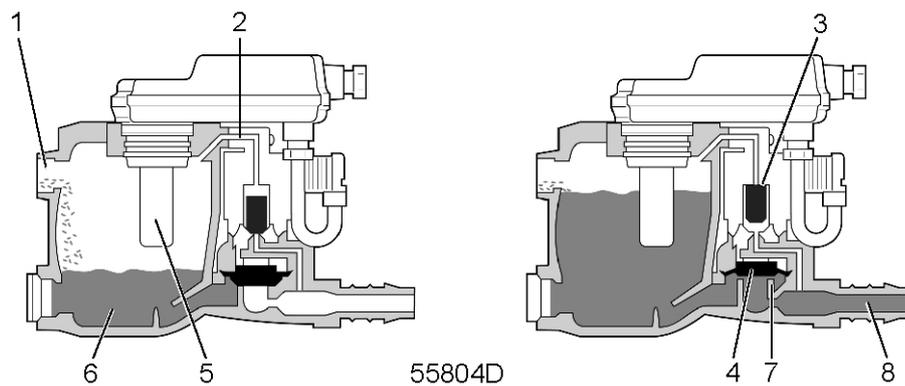


Figure 22: Electronic water drain functioning

1	Inlet
2	Supply line
3	Pilot valve
4	Diaphragm
5	Sensor

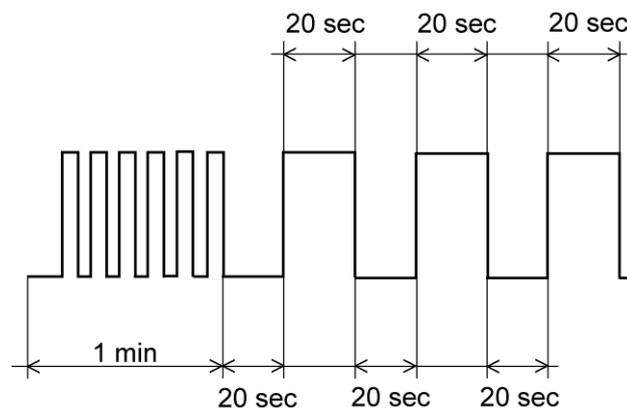
6	Collector
7	Valve seat
8	Outlet

The condensate enters the electronic water drain via inlet (1) and accumulates in collector (6). A capacitive sensor (5) continuously measures the liquid level.

The pilot valve (3) is activated as soon as the collector is filled up to a certain level. Diaphragm (4) opens outlet (8), discharging the condensate.

When the collector has been emptied, the outlet closes quickly without wasting compressed air.

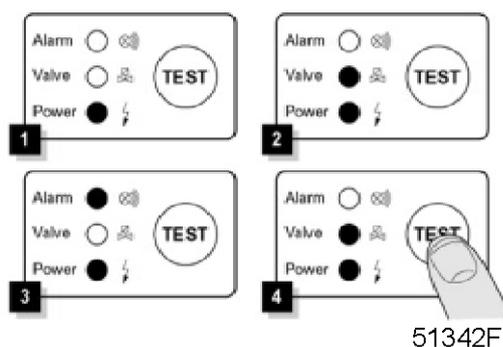
When the controller registers a malfunction, the red alarm LED on the control panel of the electronic water drain starts flashing, a warning appears on the display of the regulator and the electronic drain valve will automatically change to the alarm mode, opening and closing the valve according to a sequence as shown below. This condition continues until the fault is remedied. If the fault is not remedied automatically, maintenance is required.



59646D

Figure 23: Drain frequency during alarm condition

Testing the Electronic water drain



51342F

Figure 24: Control panel

Briefly press the TEST button and check that the valve opens for condensate discharge.

Checking the alarm signal

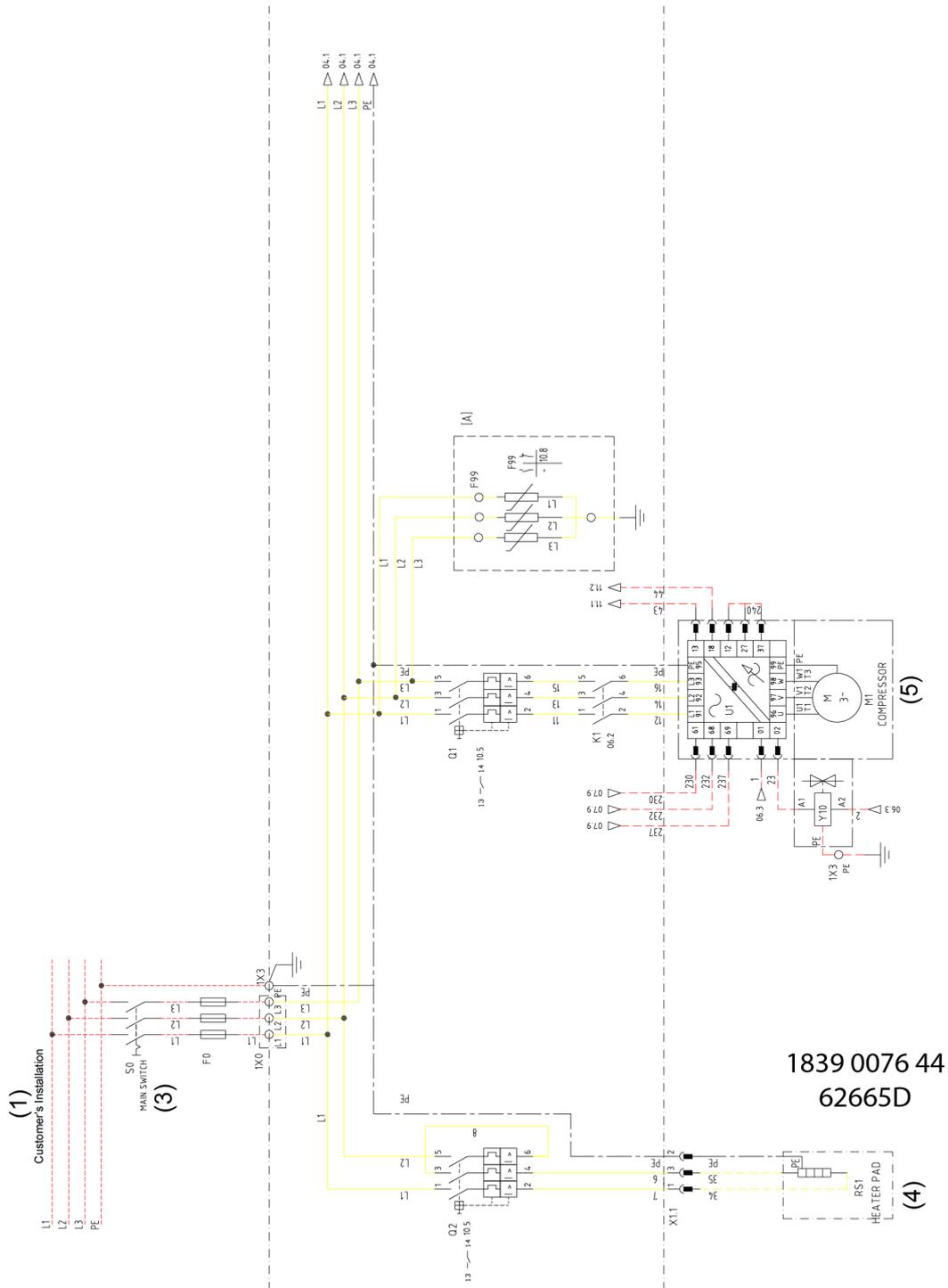
- Press and hold the test button for at least 1 minute.
- Check that the alarm LED flashes.
- Check that a warning is generated on the display of the regulator.
- Release the test button.

2.6 Electrical system

Electrical diagram

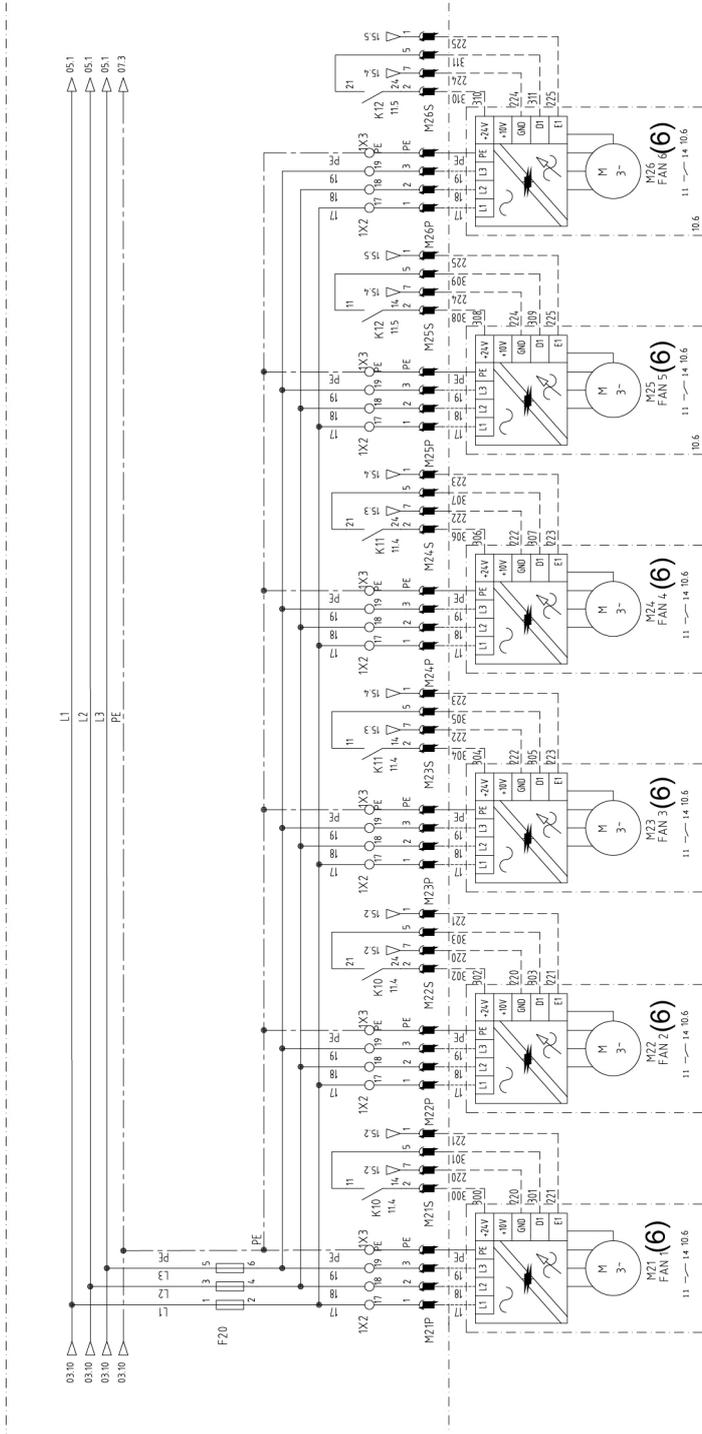


Working with machinery controlled by a frequency converter requires special safety precautions. These safety precautions depend on the kind of network used (TN or TT system). Consult Nano.
The dryer has not been designed for an IT network.



1839 0076 44
62665D

Figure 25: Electrical diagram

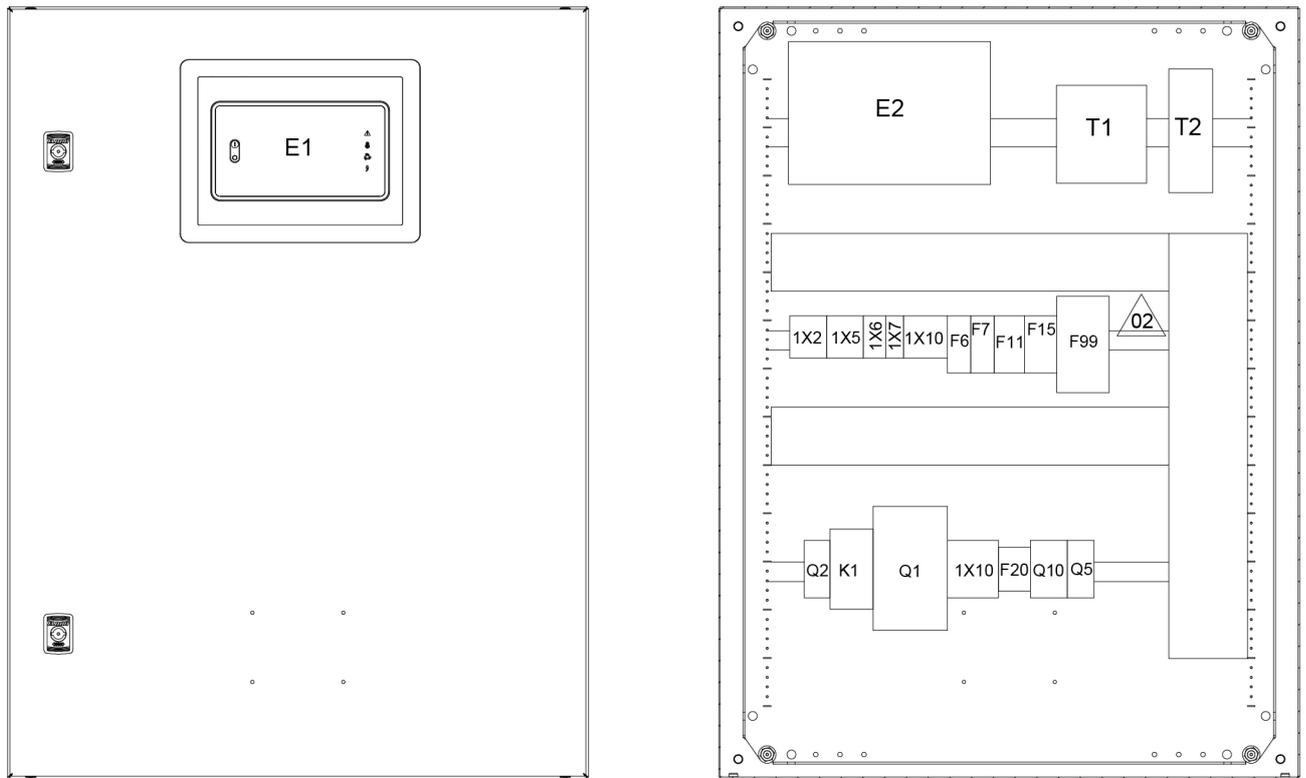


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62407D

Figure 26: Electrical diagram

Reference	Description
1	Customer's installation
3	Main switch
4	Heater pad
5	Compressor motor
6	FAN motor 1, 2, 3, 4, 5, 6

Position of components



1830 0329 92
62408D

Figure 27: Electric cubicle (door)

Ref.	Description
E1	Electronic regulator
E2	Regulator, expansion module
F11	Circuit breaker, stepper motors
F20	Fuse, fans (only for air-cooled dryer)
F6	Circuit breaker, Mk5 and expansion module
F7, F15	Circuit breaker, other components
K1	Contactora, dryer running
Q1	Circuit breaker, dryer motor
Q2	Circuit breaker, heater
Q5	Circuit breaker, transformer T1
Q10	Circuit breaker, transformer T2
T1	Transformer, Mk5, expansion module and other
T2	Transformer, stepper motor
F99	Surge suppressor

Dryer protection

The high-pressure shut-down switch (S1) stops the compressor motor when the pressure in the refrigerant circuit reaches the upper set-point of the switch.

After tripping:

- The switch must be reset manually by pressing its reset knob and by pressing reset key (//) on the regulator (electronic regulator).

The compressor motor has a built-in thermic protection. If the thermic protection trips, the compressor motor will be stopped. The compressor will restart when the motor windings have cooled down, which may take up to 3 hours.

2.7 Connectivity and ICONS

General

The machine comes with a Touch controller which has an internal connectivity device. The Touch controller allows read-out of a number of parameters of the machine on a user login-protected web site called ICONS. The Touch controller has an integrated antenna.

Safety precautions

It is important to follow all regulations regarding the use of radio equipment, in particular regarding the possibility of radio frequency (RF) interference. Please follow the safety advice given below carefully.

- Respect restrictions on the use of radio equipment in fuel depots, chemical plants or other explosive environments.
- Avoid operation close to inadequately protected personal medical devices such as hearing aids and pacemakers. Consult the manufacturers of the medical device to determine if it is adequately protected.
- Avoid operation close to other electronic equipment which may also cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturer recommendations.
- Respect a distance from the human body of at least 20 cm (8 inch) during operation.
- Do not operate the device in areas where cellular modems are not advised without proper device certifications. These areas include environments where cellular radio can interfere, such as explosive atmospheres, medical equipment, or any other equipment which may be susceptible to any form of radio interference. The modem can transmit signals that could interfere with this equipment.

ICONS

The machine is ICONS-ready.

ICONS is a web-based platform to monitor compressed air installations. It is available in 3 product levels:

- ICONS Service

ICONS Service rules out all uncertainties. Scheduling maintenance visits becomes as simple and easy as it should be; the service log book is always just one click away and the online link with the supplier allows to request and quickly receive quotes for spare parts or additional services.

This product level is free of charge and available for 3 years following the machine purchase.
- ICONS Uptime

ICONS Uptime keeps your compressors up and running. By e-mail and/or text, you receive all relevant machine indications (warnings and shutdowns) in advance. Based on this

information, you can then take all necessary actions and measures to avoid the risk of a breakdown.

This product level is available as a free of charge 3-month trial.

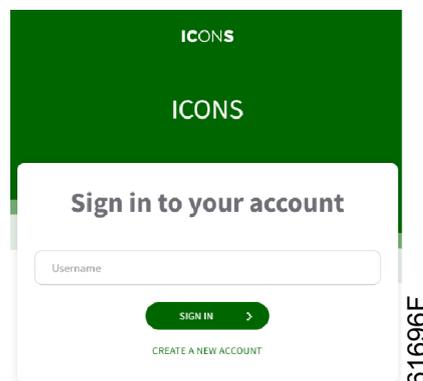
- ICONS Energy

ICONS Energy safeguards the performance of your equipment. It enables you to continuously monitor and analyze the energy efficiency of the compressor room. You decide which performance indicators, benchmarks and reports are created. You can make accurate and immediate improvements when needed. The results can be used for energy monitoring according to ISO50001.

This product level is available as a free of charge 3-month trial.

Once an ICONS level is chosen, gaining access is the next step. To gain access at least one machine ICONS-ready component (compressor, dryer, ...) is required. Follow the next steps:

- Gather the information about the ICONS-ready machine(s) (e.g. picture of the data plate; invoice,...)
- Go to the ICONS web site <http://portal.connectivityicons.com>.
- Click on the lowest button in the screen below.



- Use the data of the ICONS-ready machine to register as a user.

- You will receive an e-mail with login credentials.
- Go to the ICONS web site <http://portal.connectivityicons.com>, log in with the user credentials.
- Enjoy ICONS!
- In case more ICONS-ready machines are available, you can add these via *My Profile*.

3 Vision⁰¹ Touch controller

3.1 Controller



Figure 28: The Vision⁰¹ Touch controller

Introduction

The controller has the following functions:

- Controlling the unit
- Protecting the unit
- Monitoring components subject to service
- Automatic restart after voltage failure (ARAVF)

Automatic control of the unit

The controller maintains a stable dew-point during operation by automatically adjusting the cooling water flow (only water-cooled units).

The controller maintains a stable dew-point during operation by automatically adjusting the cooling air flow (only air-cooled units).

A number of modes can be selected so the machine best fulfills the customers needs. See Machine settings menu.

	<p>A number of time based automatic start/stop commands may be programmed. Take into account that a start command will be executed (if programmed and activated), even after manually stopping the unit.</p>
--	--

Protecting the unit

Shutdown

Several sensors are provided on the unit. If one of the measured signals exceeds the programmed shutdown level, the unit will be stopped.

The unit will shut down if:

- The pressure in the refrigerant circuit is too high
- The dryer compressor overloads
- The fan motor overloads (air-cooled units)

	<p>Before remedying, consult the Safety precautions Before resetting a warning or shutdown message, always solve the problem. Frequently resetting these messages without remedying may damage the unit.</p>
---	--

Shutdown warning

A shutdown warning level is a programmable level below the shutdown level.

If one of the measurements exceeds the programmed shutdown warning level, a message will appear on the display and the general alarm LED will light up to warn the operator before the shutdown level is reached.

The message disappears as soon as the warning condition disappears.

When the shutdown warning is shown, press stop button to stop the unit and wait until the unit has stopped. Switch off the voltage, inspect the unit and remedy if necessary. The warning message will disappear as soon as the warning condition disappears.

Service warning

A number of service operations are grouped as a Service Plan. Each Service Plan has a programmed time interval. If the service timer exceeds a programmed value, this will be indicated on the display to warn the operator to carry out the service actions belonging to that Service Plan.

When the service warning is shown, stop the unit, switch off the voltage and contact your supplier to schedule the necessary maintenance actions.

If the unit is equipped with a voltage surge protector device (F99): Replace the damaged cartridges as soon as possible, to avoid damage to the frequency converter if the voltage surge alarm warning appears.

Automatic restart after voltage failure (ARAVF)

The controller has a built-in function to automatically restart the unit when the voltage is restored after voltage failure. For units leaving the factory, this function is made inactive. If desired, the function can be activated. Consult your supplier.

	<p>If the function is activated and provided the regulator was in the automatic operation mode, the unit will automatically restart if the supply voltage to the module is restored. The (ARAVF) label (see section Pictographs) shall be glued near to the controller.</p>
---	--

3.2 Control panel



Figure 29: The Vision⁰¹ Touch controller

Parts and functions

Reference	Designation	Function
1	Touchscreen	Shows the unit operating condition and a number of icons to navigate through the menu. The screen can be operated by touch.
2	Warning sign	Flashes in case of a shut-down, is lit in case of a warning condition.
3	Service sign	Is lit when service is needed.
4	Operation sign	Is lit when the unit is running in automatic operation.
5	Voltage sign	Indicates that the voltage is switched on.
6	Stop button	This button stops the unit.
7	Start button	This button starts the unit. The operation sign (4) lights up. The controller is operative.

3.3 Icons used

Menu icons

Menu	Icon	Menu	Icon	Menu	Icon
Data	 85233D	Status	 85239D		
		Inputs	 85240D		
		Outputs	 85241D		
		Counters	 85242D		
		Aux. Equipment Parameters	 85243D	Converters	 85251D
Service	 85234D	Service		Overview	 85252D
				Service Plan	 85253D
				Service History	 85254D
		Service functions	 85244D		
		Clean Screen	 85302D		
Week Timer	 85235D			Week	 85303D
				Remaining Running Time	 85304D
Event History	 85238D	Saved Data	 85245D		

Menu	Icon	Menu	Icon	Menu	Icon	
Machine Settings	 85237D	Alarms	 85239D			
		Regulation	 85346D			
		Control Parameters	 85347D			
		Aux. Equipment Parameters	 85243D	Converter(s)	 85251D	
				Fan	 85255D	
				Internal SmartBox	 85256D	
Auto Restart	 85274D					
Controller Settings	 85238D	Network Settings	 85246D	Ethernet Settings	 85257D	
				CAN Settings	 85258D	
		Localisation	 85247D	Language	 85259D	
				Date/Time	 85260D	
				Units	 85261D	
		User Password	 85248D			
		Help	 85249D			
		Information	 85250D			

Status icons

Icon	Description
 85262D	Motor Stopped
 85263D	Motor Stopped Wait

 85264D	Running Unloaded
 85265D	Manual Unload
 85266D	Running Unloaded Wait
 85267D	Running Loaded
 85268D	Failed to Load
 85269D	Running Loaded Wait
 85270D	Manual Stop
 85271D	Machine Control Mode, Local
 85272D	Machine Control Mode, Remote
 85273D	Machine Control Mode, LAN
 85274D	Automatic Restart After Voltage Failure
 85275D	Week Timer Active

System icons

Icon	Description
 85276D	Basic User
 85277D	Advanced User
 85278D	Service User
 85279D	Antenna 25%
 85280D	Antenna 50%
 85281D	Antenna 75%

 85282D	Antenna 100%
 85283D	Change between screens (indication)
 85284D	Energy recovery
 85285D	Dryer
 85286D	Element
 85287D	Drain(s)
 4-20mA 85288D	Analogue Output
 85289D	Menu
 85290D	Reset
 85291D	Auto Restart
 85292D	Filter(s)
 85293D	Cooler
 85294D	Valve(s)
 85295D	Power Meter

Input icons

Icon	Description
 85296D	Pressure
 85297D	Temperature
 85298D	Special Protection
 85299D	Open

 <small>86300D</small>	Closed
--	--------

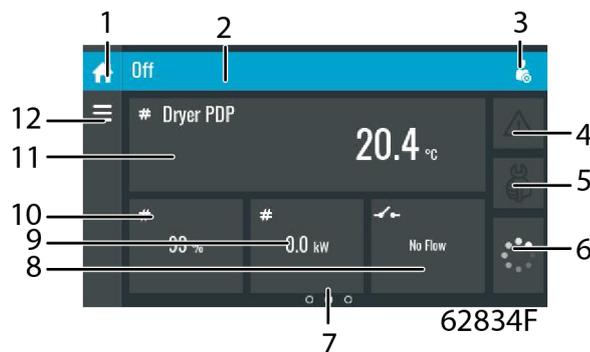
	This chapter gives a general survey of available icons. Not all icons mentioned in this chapter are applicable to every machine.
---	--

3.4 Main screen

Function

The Main screen is the screen that is shown automatically when the voltage is switched on. It is switched off automatically after a few minutes when there is no touch input.

Description



Reference	Designation	Function
1	Home button	The home button is always shown and can be tapped to return to the main screen.
2	Screen information	On the main screen, the screen information bar shows the serial number of the machine. When scrolling through menus, the name of the current menu is shown.
3	Access level button	The access level button is always shown and can be tapped to change the current user access level.
4	Alarm button	The alarm button can be tapped to show the current alarms. If an alarm occurs, the icon on the button will be red.
5	Service button	The service button can be tapped to show the service information.
6	Status	This icon shows the current status of the unit.

Reference	Designation	Function
7	Page indicator	Indicates which page you currently see. The middle indication is the main screen, left is the menu screen and at the right the quick access screen. Swipe left or right to go to another screen.
8, 9, 10, 11	These fields can contain a history chart, an input or a counter value, depending on the type of the machine.	Tap the field to view the type of measurement. This will be shown in the screen information bar. Examples of inputs: <ul style="list-style-type: none"> • Ambient temp • Outlet • Dryer dewpoint Examples of counters: <ul style="list-style-type: none"> • Running hours • Load relay • Loaded hours
12	Menu button	The menu button is always shown and can be tapped to go to the menu.

3.5 Quick access screen

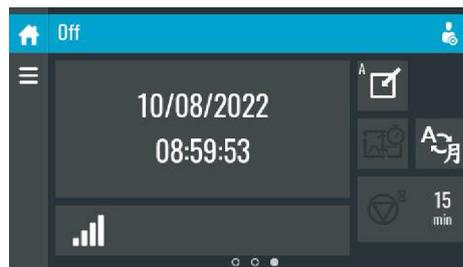
Function

The screen is used to directly access some frequently used functions.

Procedure

The Quick access screen can be viewed by swiping left, starting from the main screen.

Description



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Through this screen, several important settings can be viewed and modified.

Function	Description
Setpoints	Several setpoints can be modified by tapping this icon.

Function	Description
Control mode	<p>The control mode can be changed by tapping this icon.</p> <ul style="list-style-type: none"> Local control via start/stop buttons Remote control via digital input(s) LAN control via the network. <p>When in Remote or LAN control, the start/stop buttons on the controller will not work.</p>
Display language	The display language of the controller can be changed by tapping this icon.
Week timer	Week timers can be set by tapping this icon.
Remaining running time	The Remaining running time can be set and modified by tapping this icon.
Internal SmartBox	<p>The reception quality of the internal antenna can be monitored.</p>  <p>Each bar represents 25% reception strength. If the four bars are filled, the reception strength is 100%. If only one bar is filled, the reception strength is just 25%.</p>
Auto restart	Auto restart can be activated by tapping this icon.

3.6 Menu screen

Function

This screen is used to display the different menus where settings can be viewed or changed.

Procedure

The Menu screen can be viewed by tapping the Menu button or by swiping right, starting from the main screen.

Description



Reference	Designation	Function
(1)	Data	The data menu contains the status of the unit, information about the Inputs, Outputs and Counters. The Auxiliary equipment can also be viewed through this menu.

Reference	Designation	Function
(2)	Service	The service menu contains the Service information. The 'Clean screen' function can be used to clean the touchscreen.
(3)	Week timer	Multiple Week timers and a Remaining running time can be set through this menu.
(4)	Event history	In case of an alarm, the Status information of the unit is saved and can be viewed through this menu.
(5)	Machine settings	Alarms settings, Regulation settings and Control parameters can be changed through this menu. Auxiliary equipment parameters can also be changed. The Auto restart function can be set through this menu. This function is password protected.
(6)	Controller settings	Network settings, Localisation settings and a User password can be set through this menu. There is also a Help page available and the Controller information can be shown.

Menu structure

Operating the controller can be done by swiping through screens and tapping icons or menu items.



This is the main menu structure. The structure can be different depending on the configuration of the unit.

3.7 Data menu

Function

This screen is used to display the following submenus:

- Status
- Inputs
- Outputs
- Counters
- Aux. Equipment
- Internal Data

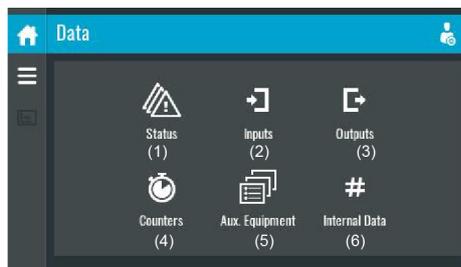
These submenus can be entered by tapping the icons.

Procedure

To enter the Data menu screen:

1. Tap the Menu button
2. Tap the Data icon

Description

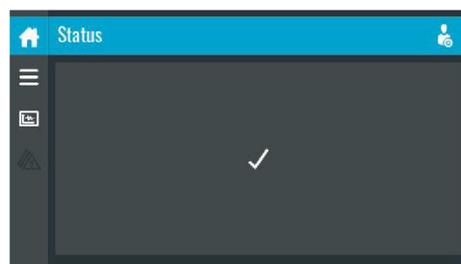


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Reference	Designation
(1)	Status menu
(2)	Inputs menu
(3)	Outputs menu
(4)	Counters menu
(5)	Aux. Equipment menu
(6)	Internal Data menu

Status menu

Tap the Status icon to enter the Status menu.



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This menu shows the current status of the unit.

If an alarm is active, it can be viewed by tapping the alarm message. To reset an alarm, tap the reset button.

	<p>Before remedying, consult the Safety precautions. Before resetting a warning or shutdown message, always solve the problem. Frequently resetting these messages without remedying may damage the unit.</p>
--	---

Inputs menu

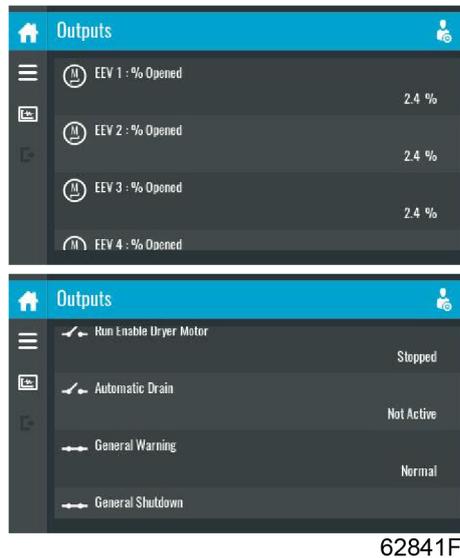
Tap the Inputs icon to enter the Inputs menu.



This menu shows information about all the inputs.

Outputs menu

Tap the Outputs icon to enter the Outputs menu.



This menu shows all the outputs of the controller, here information can be found about the expansion valves, water valve, fans and more.

	<p>Voltage-free outputs may only be used to control or monitor functional systems. They should NOT be used to control, switch or interrupt safety related circuits. Check the maximum allowed load on the label.</p>
	<p>Stop the unit and switch off the supply before connecting external equipment. Check the Safety precautions.</p>

Counters menu

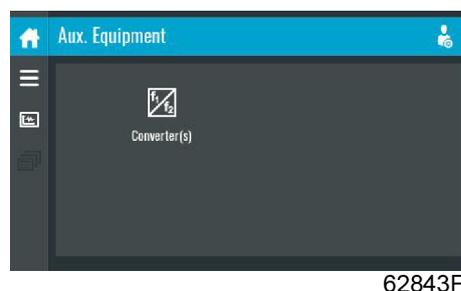
Tap the Counters icon to enter the Counters menu.



This menu shows an overview of all actual hours and counters of the unit and controller.

Aux. Equipment menu

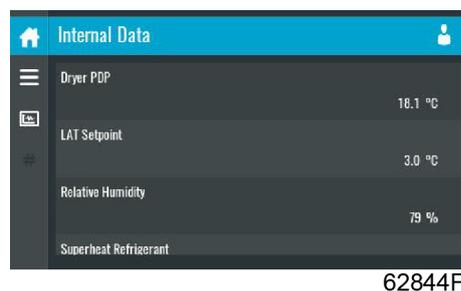
Tap the Aux. Equipment icon to enter the Aux. equipment menu.



This menu shows an overview of all auxiliary equipment fitted.

Internal Data menu

Tap the Internal Data icon to enter the Internal Data menu.



This menu shows useful data among which are dryer dewpoint, LAT setpoint, relative humidity and more.

3.8 Service menu

Function

This screen is used to display the following submenus:

- Service
- Service functions (Only visible as advanced user)
- Clean screen

These submenus can be entered by tapping the icons.

Procedure

To enter the Service menu screen:

1. Tap the Menu button
2. Tap the Service icon

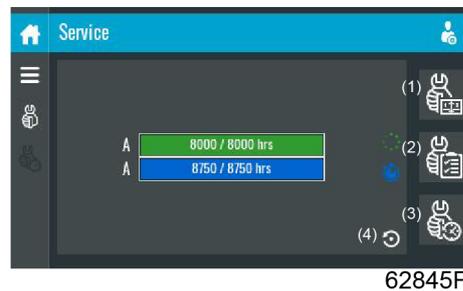
Description



Reference	Designation
(1)	Service
(2)	Service functions (Only visible as advanced user)
(3)	Clean screen

Service menu

Tap the Service icon to enter the Service menu.



This menu shows the remaining Running Hours and the remaining Real Time Hours until the next service. The first row (A) shows the Running Hours when the first service is needed (green), the second row shows the Real Time Hours (blue)

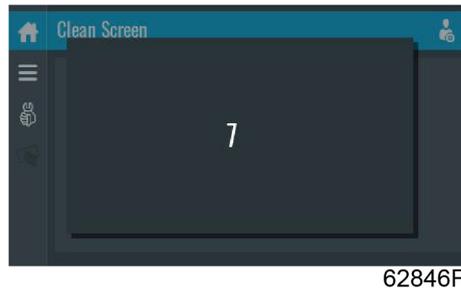
A service overview can be viewed by tapping icon (1).

The service history can be viewed by tapping icon (3).

When a service plan interval is reached, a message will appear on the screen.

Clean screen

Tap the Clean Screen icon to start the 15 seconds countdown to perform cleaning of the touchscreen.



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The touchscreen and the start and stop button become inactive for 15 seconds.

A counter will count down from 15 to 0 at which point the touchscreen will become active again.

3.9 Week timer menu

Function

This screen is used to set up to 4 different week timers with each up to 8 settings per day.

The week timers can be activated through this screen.

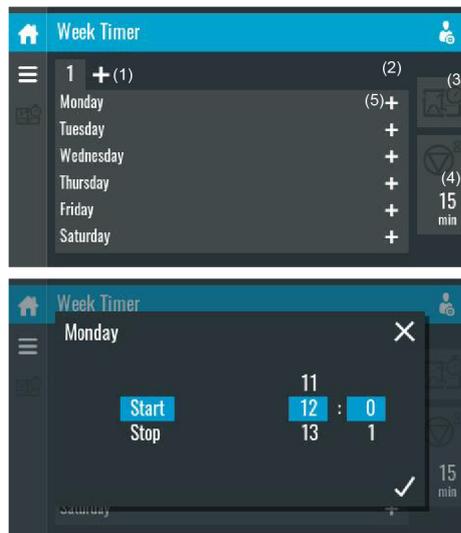
A Remaining Running Time can be set from 5 up to 240 minutes.

Procedure

To enter the Week Timer menu screen:

1. Tap the Menu button
2. Tap the Week Timer icon

Description



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Reference	Designation	Function
(1)	Add or select week	If less than 4 weeks are programmed, tap the '+' button to add a week.
(2)	Remove week	Tap to remove a programmed week timer.

Reference	Designation	Function
(3)	Activate week timer	A selection screen pops up. The user can choose the correct week by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.
(4)	Remaining running time	A selection screen pops up. The user can change the remaining time by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.
(5)	Add setting	A selection screen pops up. The user can change the setting by swiping up or down and confirm by tapping 'V' or decline by tapping 'X'.

3.10 Event history menu

Function

This screen is used to display the saved data in case of an alarm.

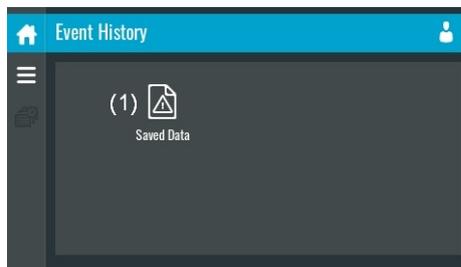
These submenus can be entered by tapping the icons.

Procedure

To enter the Event history menu screen:

1. Tap the Menu button
2. Tap the Event History icon

Description



85216D

Reference	Designation
(1)	Saved Data

Saved data

Tap the Saved Data icon to enter the Saved Data menu.



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Scroll through the items swiping up and down in this list. The event date and time is shown at the right side of the screen.

Press on one of the items in the list for more information reflecting the status of the unit when the shutdown occurred.

3.11 Machine settings menu

Function

This screen is used to display the following submenus:

- Alarms
- Regulation
- Extra
- Aux. Equipment parameters
- Auto Restart

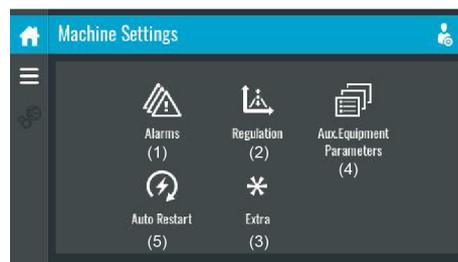
These submenus can be entered by tapping the icons.

Procedure

To enter the Machine settings menu screen:

1. Tap the Menu button
2. Tap the Machine Settings icon

Description



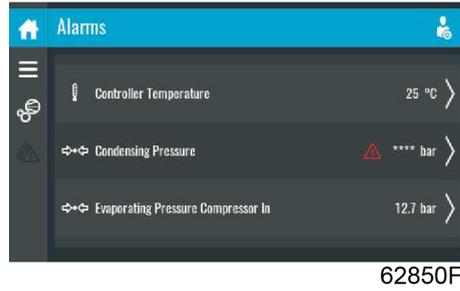
62849F

Reference	Designation
(1)	Alarms menu
(2)	Regulation menu
(3)	Extra menu
(4)	Aux. Equipment Parameters menu

Reference	Designation
(5)	Auto Restart menu

Alarms menu

Tap the Alarms icon to enter the Alarms menu.



A list of all alarms is shown.

When pressing on one of the items in this list, the warning and/or shutdown levels are shown for this alarm.

Regulation menu

Tap the Regulation icon to enter the Regulation menu.



Dryer modes can be changed as well as alarms can be modified through this menu.

Flow Switch Mode can be set to active in the menu, when active the dryer will go in standby mode when there is no compressed air flow detected.

Modify a setting

When tapping a list item, a selection screen pops up. The user can modify the setting by tapping ‘-’ or ‘+’ and can confirm by tapping ‘V’ or decline by tapping ‘X’.

Change operation mode



It is possible to select one of three dryer operation modes:

- Lowest Dewpoint: The lowest possible dewpoint will be maintained at all times but not lower than 3 °C
- Economy: Lower energy consumption but dewpoint will be higher in some cases
- Maximum Saving: Lowest energy consumption but dewpoint will be higher in some cases



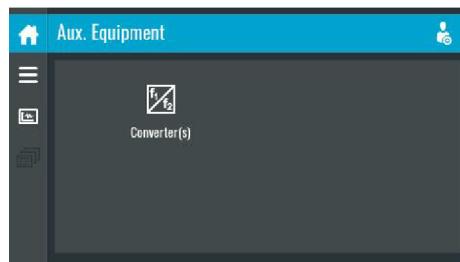
62853F

It is possible to select two dewpoint alarm modes:

- Variable: An alarm will be given when the dewpoint exceeds a selected amount of degrees above the setpoint
- Fixed: An alarm will be given when the dewpoint exceeds a selected value

Auxiliary equipment parameters menu

Tap the Aux. Equipment Parameters icon to enter the auxiliary equipment parameters menu.



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This menu shows an overview of all the auxiliary equipment fitted.

Through this menu, the parameters of the auxiliary equipment can be changed.

Modify a setting

When tapping a list item, a selection screen pops up. The user can modify the setting by tapping ‘-’ or ‘+’ and can confirm by tapping ‘V’ or decline by tapping ‘X’.

Auto restart menu

	<p>If the function is activated and provided the regulator was in the automatic operation mode, the unit will automatically restart if the supply voltage to the module is restored.</p> <p>The ARAVF label shall be glued next to the controller.</p>
---	--

Tap the Auto restart icon to enter the Auto Restart menu.

The controller has a built-in function to automatically restart the unit when the voltage is restored after voltage failure. For units leaving the factory, this function is made inactive. If desired, the function can be activated. Consult your supplier.



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Through this menu, the automatic restart can be activated. The activation is password protected. The automatic restart settings can also be changed.

Enter a password

When tapping a password protected item, a selection screen pops up. The user can enter the password by swiping up or down to select the desired number. Once the 4 digits are entered, the user can confirm by tapping 'V' or decline by tapping 'X'.

Modify a setting

When clicking a list item, a selection screen pops up. The user can modify the setting by tapping '-' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

3.12 Controller settings menu

Function

This screen is used to display the following submenus:

- Network Settings
- Localisation
- User Password
- Help
- Information

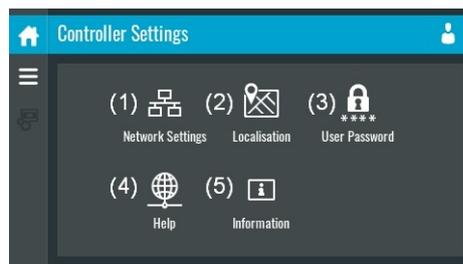
These submenus can be entered by tapping the icons.

Procedure

To enter the Controller Settings menu screen:

1. Tap the Menu button
2. Tap the Controller Settings icon

Description

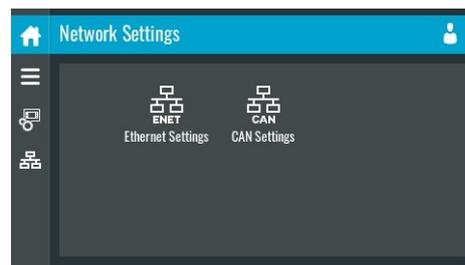


85228D

Reference	Designation
(1)	Network Settings menu
(2)	Localisation menu
(3)	User Password menu
(4)	Help menu
(5)	Information menu

Network settings menu

Tap the Network Settings icon to enter the Network Settings menu.



85223D

Ethernet Settings

The list of Ethernet Settings is shown. When ethernet is turned off, the settings can be modified.

CAN Settings

The list of CAN Settings is shown. When CAN is turned off, the settings can be modified.

Modify a setting

When tapping a list item, a selection screen pops up. The user can modify the setting by tapping '–' or '+' and can confirm by tapping 'V' or decline by tapping 'X'.

Change a selection

When tapping a list item, a selection screen pops up. The user can change the selection by swiping up or down and confirm by tapping 'V' or decline by tapping 'X'.

Localisation menu

Tap the Localisation icon to enter the Localisation menu.



62856F

Language

The language setting of the controller can be modified through this menu.

Date/Time

The date and time settings of the controller can be modified through this menu.

Units

The units displayed can be modified through this menu.

Modify a setting

When tapping a list item, a selection screen pops up. The user can modify the setting by tapping ‘-’ or ‘+’ and can confirm by tapping ‘V’ or decline by tapping ‘X’.

Change a selection

When tapping a list item, a selection screen pops up. The user can change the selection by swiping up or down and confirm by tapping ‘V’ or decline by tapping ‘X’.

User password menu

Tap the User Password icon to enter the User Password menu.



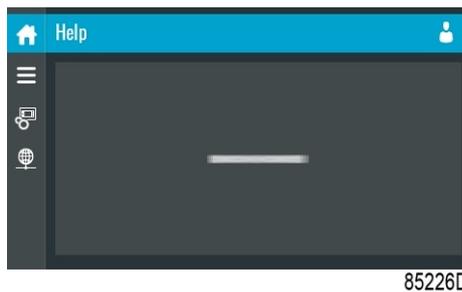
The user password can be activated or deactivated through this menu. Enter and confirm a user password to activate, repeat to deactivate.

Enter a password

When tapping a password protected item, a selection screen pops up. The user can enter the password by swiping up or down to select the desired number. Once the 4 digits are entered, the user can confirm by tapping ‘V’ or decline by tapping ‘X’.

Help menu

Tap the Help icon to enter the Help menu.



This menu can show a link to the web page of your supplier, a helpdesk phone number or other helpful information.

Information menu

Tap the Information icon to enter the Information menu.



This menu shows information about the controller.

3.13 Access level

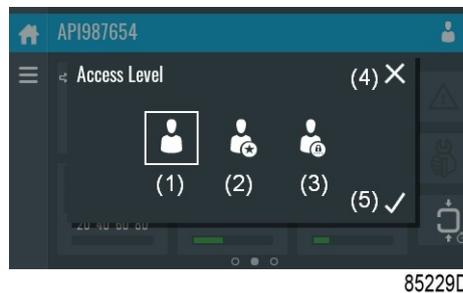
Function

Through this pop-up screen the access level settings can be viewed or changed.

Procedure

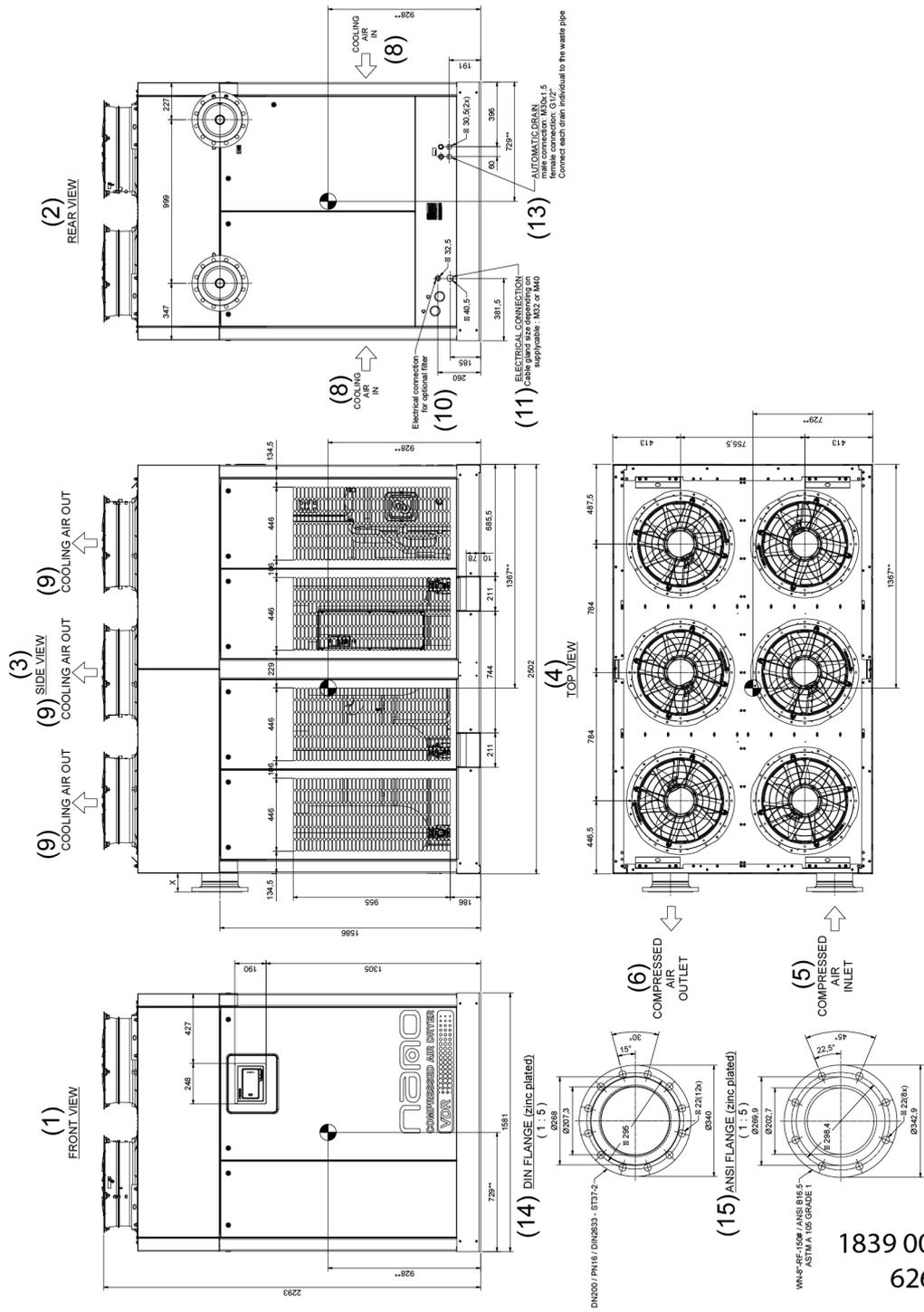
The Access Level screen can be viewed or changed by tapping the Access Level button at the upper right corner of the screen.

Description



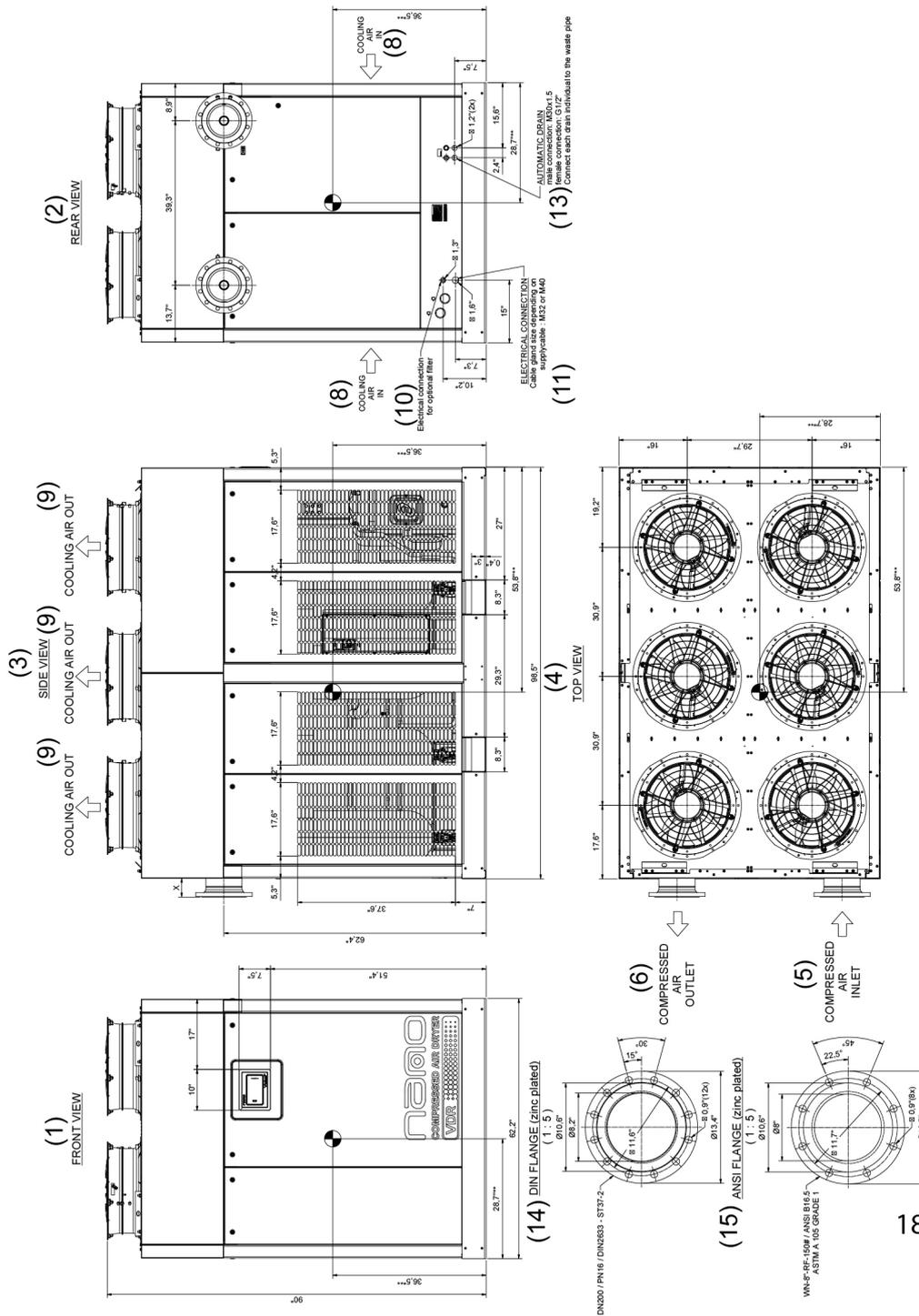
Reference	Designation	Function
(1)	User	A basic set of parameters is visualized, no password required.
(2)	Service	This access level is only to be used by certified technicians.
(3)	Full	This access level is only to be used by certified technicians.
(4)	Decline	Tap to decline the selected user level.
(5)	Confirm	Tap to confirm the selected user level.

Dimension drawing of air-cooled dryer (metric units)



1839 0076 71-01
62678D

Dimension drawing of air-cooled dryer (imperial units)



1839 0077 71-02
62679D

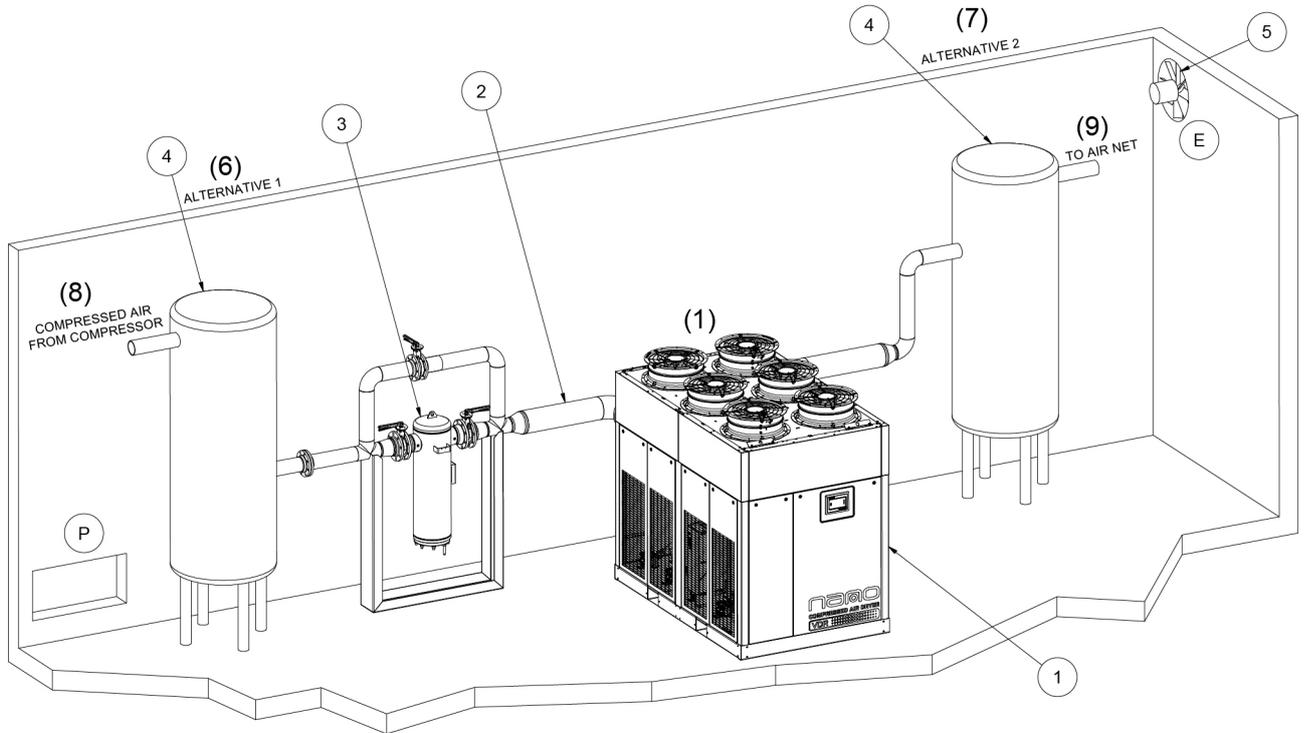
Reference	Description
(1)	Front view
(2)	Rear view
(3)	Side view
(4)	Top view
(5)	Compressed air inlet
(6)	Compressed air outlet

Reference	Description
(7)	Water connections and electrical connections(water-cooled dryer)
(8)	Cooling air inlet (air-cooled dryer)
(8)	Cooling water inlet (water-cooled dryer)
(9)	Cooling air outlet (air-cooled dryer)
(9)	Cooling water outlet (water-cooled dryer)
(10)	Electrical connection for optional filter
(11)	Electrical connection
(12)	Drain connections
(13)	Automatic drain
(14)	DIN flange
(15)	ANSI flange

4.2 Installation proposal

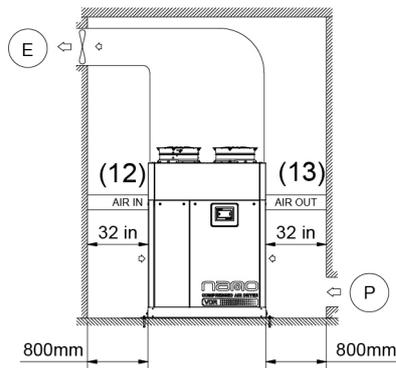
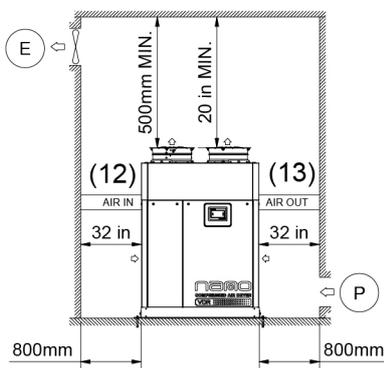
Example

	<p>Working with machinery controlled by a frequency converter requires special safety precautions. These safety precautions depend on the kind of network used (TN or TT system). Consult Nano.</p> <p>The dryer has not been designed for an IT network.</p>
--	---



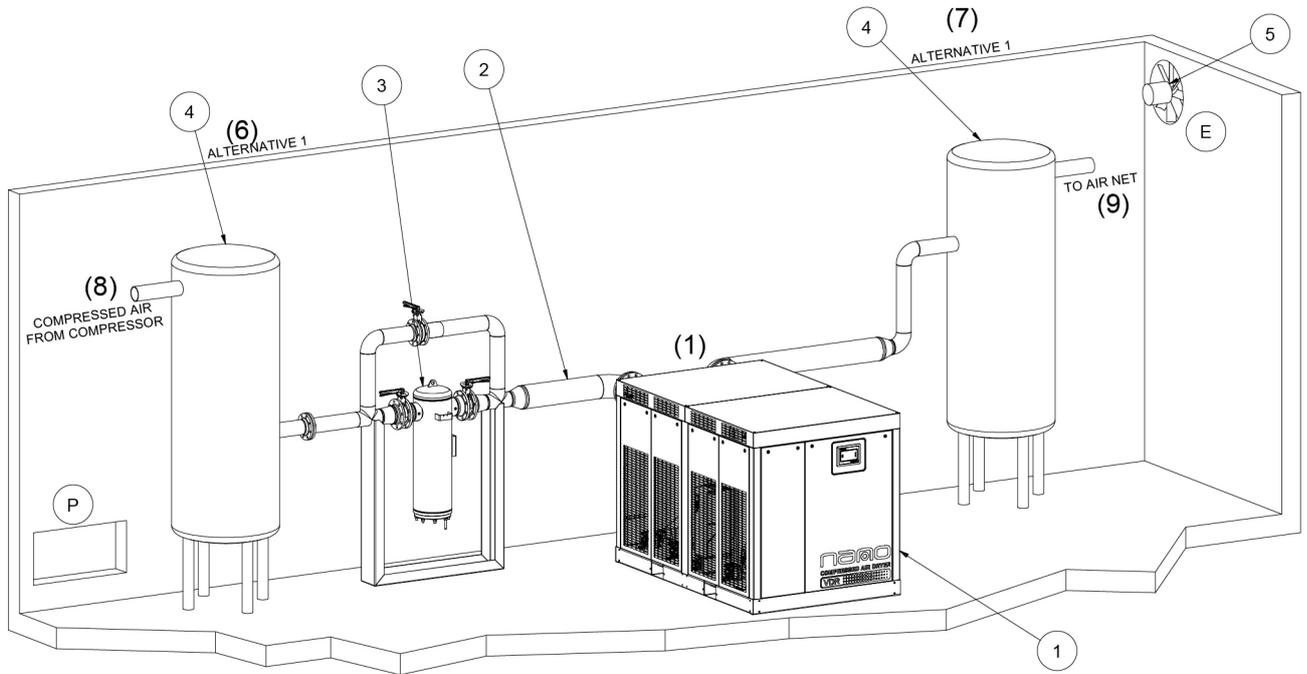
(10)
VENTILATION PROPOSAL 1

(11)
VENTILATION PROPOSAL 2

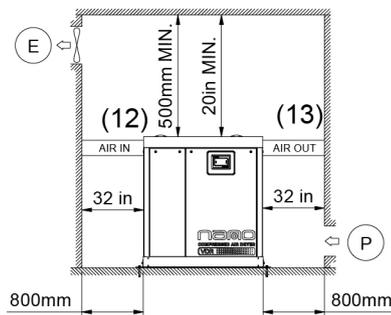


1839 0076 72-01
62677D

Figure 30: Air-cooled dryer



(10)
VENTILATION PROPOSAL



1839 0076 72-01
62682D

Figure 31: Water-cooled dryer

Drain pipes to the drain collector must not dip into the water. For draining of pure condensate water, install an oil / water separator. Consult Nano.

All drains need a separated draining to the environment and may not be connected with each other.

Reference	Description	
1	Dryer unit	<ul style="list-style-type: none"> The unit should be installed on a level floor capable of taking the weight of the dryer. Distances between units and walls stated are minimum. There must be a free space of 800 mm / 32 inch around the dryer.

Reference	Description	
2	Compressed air pipes	<p>All pipes should be installed stress free to the dryer unit. All pipes should be installed so that there is no obstruction accessing the unit when the panels are removed.</p> <p>The inlet pipe orientation must be straight or with a 90° upward bend to ensure equal air flow to all internal heat exchangers.</p> <p>The compressed air pressure should never exceed the dryer's design pressure. It is recommended to install a full flow safety valve at the dryer inlet.</p> <p>The maximum total pipe length (including interconnecting piping between dryer and receiver) can be calculated as follows:</p> <ul style="list-style-type: none"> • $\Delta p = (L \times 450 \times Q_c) / (d \times p)$ • L = length of pipe (m) • Δp = pressure drop (recommended maximum = 0.1 bar / 1.5 psi) • d = inner diameter of pipe (mm) • p = absolute pressure at dryer outlet (bar(a)) • Qc = Free air delivery of the compressor (l/s)
3	Filter (optional)	<p>It is recommended to install a compressed air filter at the dryer inlet to achieve air purity class: ISO 8573 - 1 : 2010 [2 : - : -].</p> <p>The air filter has to be supported and can't be mounted to the dryer directly without extra supports.</p>
4	Air receiver (optional)	<p>Should be installed in a frost free room on a solid, level floor.</p> <p>The preferred position is where the air flow fluctuates the most:</p> <ul style="list-style-type: none"> • Alternative 1 (6): In front of the dryer when the air flow from the compressor fluctuates the most. • Alternative 2 (7): Behind the dryer when the air demand fluctuates the most.

Reference	Description	
5	Ventilation (Only for air-cooled dryers)	<p>The inlet grids (P) and ventilation fan (E) (if applicable) should be installed in such a way that natural circulation of air is guaranteed and recirculating of cooling air is avoided.</p> <p>The required ventilation to limit the dryer room temperature is noted in the ventilation requirement table.</p> <p>In ventilation proposal 2 (11) the fan (E) capacity should match the dryer fan capacity at a pressure head equal to the pressure drop caused by cooling air ducting. Maximum allowable pressure drop in ducting after the dryer = 30 Pa.</p> <p>The air velocity to the grid(s) has to be limited to 5 m/s. The direction of the cooling flows may never be inverted.</p>
6	Alternative 1	-
7	Alternative 2	-
8	Compressed air from compressor	-
9	compressed air to air net	-
10	Ventilation proposal 1	-
11	Ventilation proposal 2	-
12	Air inlet pipe	-
13	Air outlet pipe	-

Type	Cooling air temperature limits (°C)	Maximum cooling air flow (m³/h)	Cooling air temperature limits (°F)	Maximum cooling air flow (ft³/h)
VDR 6350	0 - 40	48000	32 - 104	28240
VDR 8450	0 - 40	48000	32 - 104	28240

Table 1: Ventilation requirements

Reference	Description
(1)	Anchor kit
(2)	Anchor bolt
(3)	Anchor plate
(4)	Anchor bolt (8x)
(5)	Bolt and washer M10 (8x)

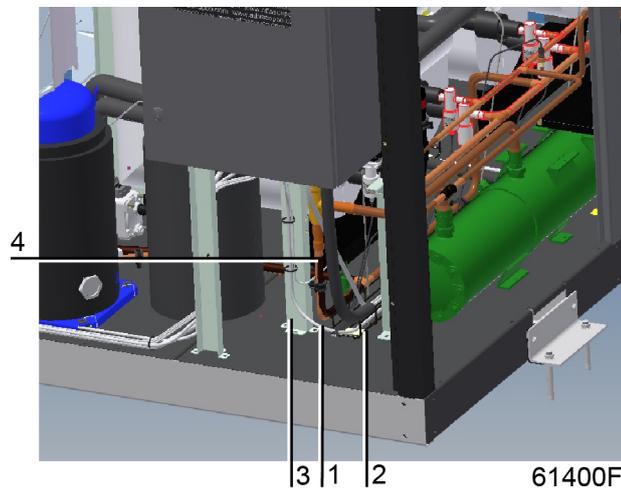
4.3 Electric cable size and fuses

	<p>Local regulations remain applicable if they are stricter than the values proposed. For calculations, an undervoltage of 10% is considered and according to EN60364-5-523, table 52-C11 with installation method E.</p> <p>Grouping: distance between cables is equal to the cable diameter.</p> <p>For IEC dryers, the settings of the main fuses below are according to Directive 2014/35/EU (low-voltage directive) EN60204-1. The cable size is valid for cable PVC 70 °C (158 °F) at an ambient temperature of 40 °C (104 °F) / 46°C (114.8°F).</p> <p>For cULus dryers, the settings of the main fuses below are according to CSA standards C22.1 and NFPA70. The cable size is valid for cable PVC 75°C (167°F) at an ambient temperature of 40°C (104°F) / 46°C (114.8°F).</p>
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Power cable

The power supply cable has to be sized and installed by a qualified electrician.

The power supply cable (1) has to be placed in the raceway (2) and strapped to the support (3) to make sure it does not touch the hot copper pipe (4).



IEC air-cooled dryers with an ambient temperature of 40 °C / 104 °F

Dryer type	Supply voltage (V)	Fuse (A)	Fuse type	Supply cable
VDR 6350	380	3x80	gG	1 x (3x 25mm ² + 16mm ²)
VDR 6350	400	3x80	gG	1 x (3x 25mm ² + 16mm ²)
VDR 6350	460	3x80	Type RK1 KTS-R / type J JKS / type T JJS (Bussman)	1 x (3x 3AWG + 8AWG)
VDR 8450	380	3x80	gG	1 x (3x 25mm ² + 16mm ²)
VDR 8450	400	3x80	gG	1 x (3x 25mm ² + 16mm ²)

Dryer type	Supply voltage (V)	Fuse (A)	Fuse type	Supply cable
VDR 8450	460	3x80	Type RK1 KTS-R / type J JKS / type T JJS (Bussman)	1 x (3x 3AWG + 8AWG)

TT/TN.

IEC water-cooled dryers with an ambient temperature of 46 °C / 114.8 °F

Dryer type	Supply voltage (V)	Fuse (A)	Fuse type	Supply cable
VDR 6350	380	3x80	gG	1 x (3x 25mm ² + 16mm ²)
VDR 6350	400	3x80	gG	1 x (3x 25mm ² + 16mm ²)
VDR 6350	460	3x80	Type RK1 KTS-R / type J JKS / type T JJS (Bussman)	1 x (3x 3AWG + 8AWG)
VDR 8450	380	3x80	gG	1 x (3x 25mm ² + 16mm ²)
VDR 8450	400	3x80	gG	1 x (3x 25mm ² + 16mm ²)
VDR 8450	460	3x80	Type RK1 KTS-R / type J JKS / type T JJS (Bussman)	1 x (3x 3AWG + 8AWG)

TT/TN.

cULus air-cooled dryers with an ambient temperature of 40 °C / 104 °F

Dryer	Supply voltage (V)	Fuse (A)	Fuse type	Supply cable
VDR 6350	460	3x80	Type RK1 KTS-R / type J JKS / type T JJS (Bussman)	1 x (3x 3AWG + 8AWG)
VDR 8450	460	3x80	Type RK1 KTS-R / type J JKS / type T JJS (Bussman)	1 x (3x 3AWG + 8AWG)

TT/TN.

cULus water-cooled dryers with an ambient temperature of 46 °C / 114.8 °F

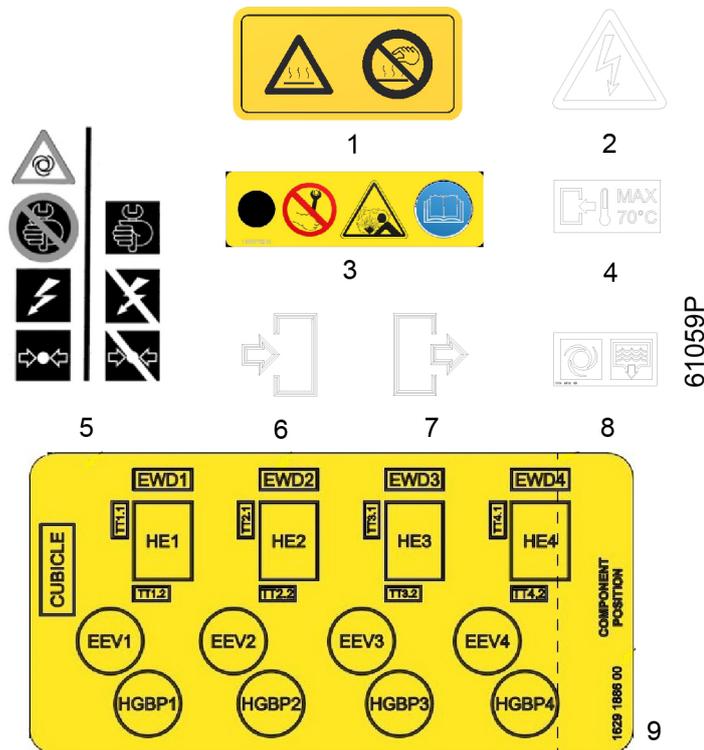
Dryer	Supply voltage (V)	Fuse (A)	Fuse type	Supply cable
VDR 6350	460	3x80	Type RK1 KTS-R / type J JKS / type T JJS (Bussman)	1 x (3x 3AWG + 8AWG)

Dryer	Supply voltage (V)	Fuse (A)	Fuse type	Supply cable
VDR 8450	460	3x80	Type RK1 KTS-R / type J JKS / type T JJS (Bussman)	1 x (3x 3AWG + 8AWG)

TT/TN.

4.4 Pictographs

Explanation of pictographs



Reference	Name
1	Warning: hot surface, do not touch
2	Warning: voltage
3	Warning: the compressor inlet temperature sensor cannot be removed when the dryer is filled with refrigerant
4	Maximum air inlet temperature of 70 °C (158 °F)
5	Switch off and depressurize the dryer before starting maintenance or repair
6	Compressed air and cooling water inlet (for water-cooled dryers)
7	Compressed dry air and cooling water outlet (for water-cooled dryers)
8	Automatic condensate drain
9	Component position

4.5 Cooling water requirements

General

Cooling water needs to fulfill requirements in order to avoid problems of scaling, fouling, corrosion or bacterial growth. No general recommendation can encompass the effects of all combinations of the various compounds, solids and gases typically found in cooling water in interaction with different materials. Therefore the recommendations formulated in our cooling water specifications are a general guide line for acceptable coolant quality. However, where strict limits apply, a statement is made in the specification.

The water requirements refer to untreated water. When water is treated, some parameters will change. Water treatments should be carried out by a specialized water treatment company, taking the responsibility for the performance of the treated cooling water and the compatibility with the materials in the cooling circuit. This includes not only the selection of the appropriate additives, but also the correct application, monitoring of concentrations and properties, prevention of sludge formation and maintenance of the system. This applies also to treatment with anti-freeze products. They should be provided with suitable stabilizers and inhibitors.

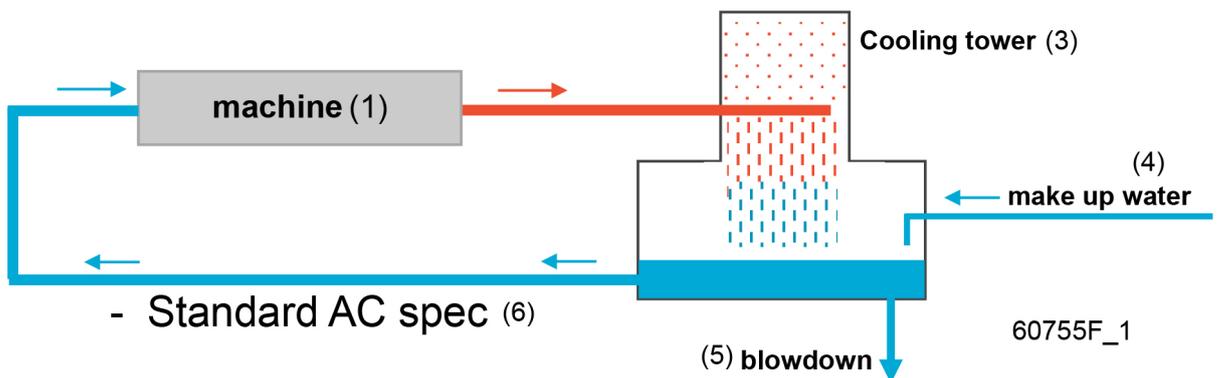
Specifications also depend on the criteria mentioned below:

- the type of cooling circuit:
 - open

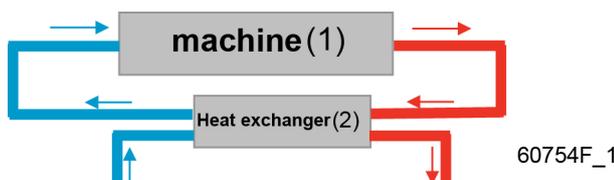
- Single Pass



- recirculation with cooling tower



- closed loop



Reference	Description
(1)	Machine
(2)	Heat exchanger
(3)	Cooling tower
(4)	Make up water
(5)	Blowdown
(6)	Standard Nanospecification

- the application:
 - standard (max water temperature 65°C / 149°F at the outlet)

Water quality

A full instruction for handling cooling water data is available at Nano.

In case water is not in line with recommended values or if any doubt, please refer to Nano.

Technical specifications

	Parameter	Unit	Single Pass (65°C / 149°F)	Single Pass (95°C / 203°F)	Recirculating (65°C / 149°F)	Closed System (65°C / 149°F)	Closed System (95°C / 203°F)	
1	pH		6.8 - 9.3	6.8 - 9.3	6.8 - 9.3	7.5 - 9.3	7.5 - 9.3	
2	Conductivity	µS / cm	< 1500	< 600	< 4000	< 1500	50 - 600	
3	Total Dissolved Solids	mg / L	TDS to be measured for calculating RSI.					
4	Ca-hardness	ppm CaCO ₃	< 500	< 2	< 500	< 1000	< 50	
5	Total Alkalinity	ppm CaCO ₃	No limits indicated. To be measured for calculating RSI.					
6	Ryznar Stability Index (RSI)		5.6 - 7.5	N.A.	5.6 - 7.5	5.6 - 7.5	5.6 - 7.5	
7	Chlorine	ppm	< 0.5	—	< 0.5	—	—	
8	Chlorides	ppm	< 500 (*)	< 100	< 500 (*)	< 500 (*)	< 100	
9	Nitrates	ppm	No limits indicated. To be measured for calculating RSI.					
10	Sulphates	ppm	< 1000	< 200	< 1000	< 400	< 200	
11	Chemical Corrosion Index		< 5	< 1	< 5	< 1	< 1	
12	Iron	ppm	< 1	< 0.2	< 1	< 1	< 0.2	
13	Manganese	ppm	< 0.2	< 0.05	< 0.2	< 0.2	< 0.05	
14	Copper	ppm	< 1	< 0.2	< 1	< 1	< 0.2	
15	Ammonium	ppm	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
16	Suspended Solids (max 10µ)	ppm	< 10	< 1	< 10	< 10	< 1	

	Parameter	Unit	Single Pass (65°C / 149°F)	Single Pass (95°C / 203°F)	Recirculating (65°C / 149°F)	Closed System (65°C / 149°F)	Closed System (95°C / 203°F)
17	Oil or Grease	ppm	< 1	< 1	< 1	< 1	< 1
18	Biology	CFU / mL	< 10 ⁵	< 10 ³	< 10 ⁵	< 10 ³	< 10 ³

	Parameter	Remarks
1	pH	For stainless steel systems without other materials, pH can be down to 6. For closed loop systems, higher pH values are possible
2	Conductivity	Conductivity and TDS linked with conversion factor (theoretical factor possible, but practical determination recommended at least once)
6	Ryznar Stability Index (RSI)	Recommended actions : see table for RSI
7	Chlorine	or shock treatment max. 2 ppm for 30 min/day
8	Chlorides	(*) Limit 200 ppm applicable when RSI < 5.6 or RSI > 7.5
10	Sulphates	Rejection < 2000 ppm. To be measured for calculating RSI.
11	Chemical Corrosion Index	Index = (Chlorides + Sulphates + Nitrates) / (M-Alkalinity) (all expressed in meq/l)
15	Ammonium	limit not applicable for Cu-free systems
16	Suspended Solids (max 10µ)	No particles > 10µ allowed. (Particles <0.5µ not considered).
18	Biology	Anaerobic biology in closed system never allowed.

Table 2: Remarks on the technical specifications

Ryznar Stability Index (RSI)

The Ryznar Stability Index (RSI) is a parameter for predicting whether water will tend to dissolve or precipitate calcium carbonate. The adhesion of scaling deposits and their effect are different on different materials, but the equilibrium of the water (scaling or corrosive) is only determined by its actual pH value and by the saturation pH value (pH_s).

The saturation pH value is determined by the relationship between the calcium hardness, the total alkalinity, the total solids concentration and the temperature.

The Ryznar Stability Index is calculated as follows :

$$RSI = 2 * pH_s - pH$$

Symbol	Explanation
pH	Measured pH (at room temperature) of water sample
pH _s	pH at saturation

The pH_s is calculated by using :

$$pH_s = (9.3 + A + B) - (C + D)$$

Symbol	Calculation
A	$(^{10}\log(\text{TDS}) - 1) / 10$
B	$13.12 \times ^{10}\log(^{\circ}\text{C}+273) + 34.55$
C	$^{10}\log(\text{Ca}^{2+}) - 0.4$ (Ca^{2+} expressed as ppm CaCO_3)
D	$^{10}\log(\text{M-Alkalinity})$ (M-Alkalinity expressed as ppm CaCO_3)

RSI and chloride limitation

RSI	Chloride limit	Water condition	Maximum 65°C / 149°F	Maximum 95°C / 203 °F
RSI<3.9	200 ppm	Very high scale formation	Water cannot be used.	Not applicable.
4.0<RSI<5.5	200 ppm	High scale formation	Regular control and descaling operation necessary. Not recommended for plate heat exchangers	Not applicable.
5.6<RSI<6.2	350 ppm	Slight scale formation	Water treatment not necessary. Occasional inspection recommended.	Not applicable.
6.3<RSI<6.8	500 ppm	Neutral water	Water treatment not necessary. Occasional inspection recommended.	Water treatment not necessary. Occasional inspection recommended.
6.9<RSI<7.5	350 ppm	Slight corrosion	Water treatment not necessary. Occasional inspection recommended.	Water treatment not necessary. Occasional inspection recommended.
7.6<RSI<9.0	200 ppm	Strong corrosion	Regular control necessary. Avoid interruption of operation	Regular control necessary. Avoid interruption of operation
9.1<RSI<11	200 ppm	Very strong corrosion	Regular control necessary. Avoid interruption of operation	Regular control necessary. Avoid interruption of operation
RSI>11	200 ppm	Very strong corrosion	Regular control necessary. Avoid interruption of operation	Regular control necessary. Avoid interruption of operation

Table 3: Single Pass system

RSI	Chloride limit	Water condition	Maximum 65°C / 149°F
RSI<3.9	200 ppm	Very high scale formation	Water cannot be used.
4.0<RSI<5.5	200 ppm	High scale formation	Regular control and descaling operation necessary. Not recommended for plate heat exchangers
5.6<RSI<6.2	350 ppm	Slight scale formation	Water treatment not necessary. Occasional inspection recommended.
6.3<RSI<6.8	500 ppm	Neutral water	Water treatment not necessary. Occasional inspection recommended.
6.9<RSI<7.5	350 ppm	Slight corrosion	Water treatment not necessary. Occasional inspection recommended.
7.6<RSI<9.0	200 ppm	Strong corrosion	Regular control necessary. Use of corrosion inhibitor recommended
9.1<RSI<11	200 ppm	Very strong corrosion	Regular control necessary. Use of corrosion inhibitor recommended
RSI>11	200 ppm	Very strong corrosion	Water cannot be used.

Table 4: Recirculating system, with cooling tower

RSI	Chloride limit	Water condition	Maximum 65°C / 149°F and 95°C / 203°F
RSI<3.9	200 ppm	Very high scale formation	Water cannot be used.
4.0<RSI<5.5	200 ppm	High scale formation	Treat water to reduce scaling character
5.6<RSI<6.2	350 ppm	Slight scale formation	Water treatment not necessary. Occasional inspection recommended.
6.3<RSI<6.8	500 ppm	Neutral water	Water treatment not necessary. Occasional inspection recommended.
6.9<RSI<7.5	350 ppm	Slight corrosion	Water treatment not necessary. Occasional inspection recommended.

RSI	Chloride limit	Water condition	Maximum 65°C / 149°F and 95°C / 203°F
7.6<RSI<9.0	200 ppm	Strong corrosion	Regular control necessary. Use of corrosion inhibitor recommended
9.1<RSI<11	200 ppm	Very strong corrosion	Regular control necessary. Use of corrosion inhibitor recommended
RSI>11	200 ppm	Very strong corrosion	Water cannot be used.

Table 5: Closed loop system

5 Operating instructions

5.1 Warnings

Safety precautions

The operator must apply all relevant safety precautions, including those mentioned in this manual.

Altitude operation

Consult your supplier if operating above 1000 m (3281 ft).

5.2 Initial start

Control panel



Description

Step	Action
1	At least 10 minutes before starting, the main supply to the dryer must be switched on to initialize the controller and flow switch.
2	For water-cooled versions: Open the water inlet and outlet valves (customer's installation). Press start button (7).

5.3 Starting

Control panel



Description

Step	Action
-	At least 10 minutes before starting, the main supply to the dryer must be switched on to initialize the controller and flow switch.
-	Close the dryer by-pass valve, if installed.
-	For water-cooled versions: Open the water inlet and outlet valves (customer's installation). Press start button (7).
-	Open the dryer air inlet valve (customer's installation).
-	Approx. 5 minutes later, open the dryer air outlet valve (customer's installation).
-	Approx. 10 minutes later, the nominal dew-point will be reached.

5.4 During operation

Control panel



Description

Regularly check:

- The pressure dew-point on the display of the control panel. The pressure dew-point will deviate from nominal if the air inlet conditions or volume flow differ from nominal.
- That condensate is discharged. The amount depends on the operating conditions.

5.5 Stopping

Control panel



Procedure

Step	Action
1	Close dryer inlet and outlet valves (customer's installation).
2	Press stop button (6). The electronic valves will go to 0% opening and then the dryer stops. Voltage on sign (5) remains lit. Leave the voltage on if the dryer has to remain on stand-by. The fans can keep running. For water-cooled versions: Close the water inlet and outlet valves of the cooling water circuit (customer's installation). If the dryer is installed in a room where freezing temperatures are expected, drain the cooling water circuit.

6 Maintenance

6.1 Maintenance instructions

Important

	<p>The dryers contain refrigerant HFC.</p> <p>When the automatic operation LED is lit, starting and stopping of the dryer are controlled automatically.</p> <p>If the dryer start/stop timer is active, the dryer may start automatically, even if it was stopped manually.</p> <p>The compressor inlet temperature sensor cannot be removed when the dryer is filled with refrigerant.</p>
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Safety precautions

When handling refrigerant R410A, all applicable safety precautions must be observed. The following points are stressed:

- Contact of refrigerant with the skin will cause freezing. Special gloves must be worn and, if there is contact with the skin, the skin should be rinsed with water. On no account may clothing be removed.
- Fluid refrigerant will also cause freezing of the eyes; therefore, safety glasses must be worn.
- Refrigerant R410a is poisonous. Do not inhale refrigerant vapors. Check that the working area is adequately ventilated.
- When the dryer is filled with refrigerant, it is forbidden to remove the refrigerant compressor inlet sensor.

When removing the side panels of the dryer, be aware that internal elements such as the pipes can reach a temperature of 120 °C (248 °F). Therefore, wait until the dryer has cooled down before removing the side panels.

Before starting any maintenance or repairs, switch off the voltage. Isolate the dryer from the air net and depressurize by opening valve (5) on outlet collector (6).

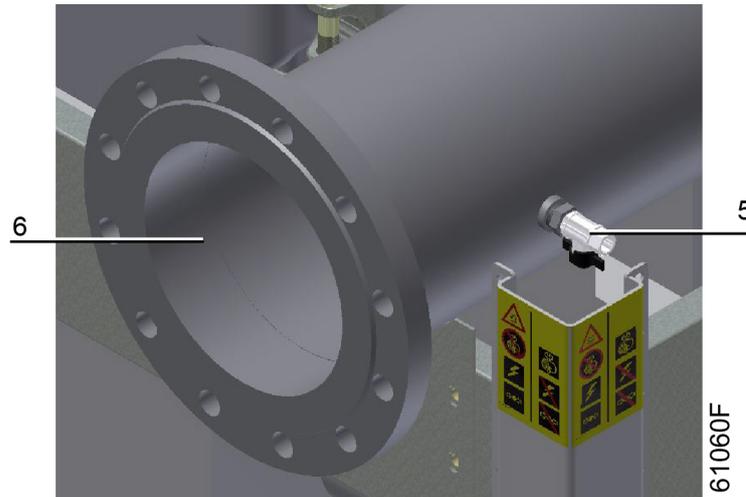


Figure 32: Valve on the outlet collector

Local legislation

Local legislation may impose that:

- Work on the refrigerant circuit of the cooling dryer or on any equipment which influences its function must be carried out by an authorized control body.
- The installation should be checked once a year by an authorized control body.

Warranty and product liability

Use only authorized genuine parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.

Service agreements

Customer Centers have a range of service agreements to suit your needs:

- An Inspection Plan.
- A Preventive Maintenance Plan.
- A Total Responsibility Plan.

Contact your Customer Center to arrange a tailor-made service agreement. This will ensure optimum operational efficiency, minimize downtime and reduce the total life cycle costs.

General

The following remarks should be kept in mind:

- Keep the dryer clean.
- Brush or blow off the finned surface of the condenser regularly.
On water-cooled dryers: Regularly check for water leaks.
- Inspect and clean the electronic water drain once a year .

For dryers equipped with optional filter(s)

- Regularly check differential pressure indicators.
- Change the filter element yearly or when the pressure drop reaches approx. 0.35 bar (5 psi), as indicated by the differential pressure indicators.

7 Problem solving

7.1 Problem solving

Valve on outlet collector

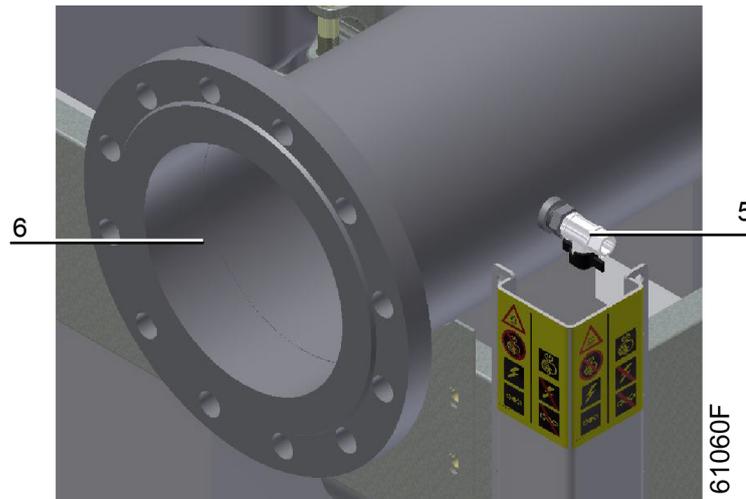


Figure 33: Valve on the outlet collector

Attention

	Use only authorized parts. Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability. Apply all relevant <i>Safety precautions</i> .
	Before carrying out any maintenance or repairs on the dryer, stop the dryer and switch off the voltage. Open the isolating switch to prevent an accidental start. Isolate the dryer from the air net and depressurize by opening valve (5) on inlet collector (6).

Faults and remedies (general)

Condition	Fault	Remedy
Pressure dew-point too high	Air inlet temperature too high	Check and correct; if necessary, install a pre-cooler
	Ambient temperature too high	Check and correct; if necessary, draw cooling air via a duct from a cooler place or relocate dryer
	Air inlet pressure too low	Increase inlet pressure
	Dryer capacity exceeded	Reduce air flow
	Shortage of refrigerant	Have circuit checked for leaks and recharged

Condition	Fault	Remedy
	Refrigerant compressor does not run	See below
	Evaporator pressure too high	See below
	Condenser pressure too high	See below
	Automatic drain system clogged	Have the system cleaned
Condenser pressure too high or too low on air-cooled dryers	Fan or fan motor out of order	Check fan/fan motor
	Fan control switch out of order	Replace
	Ambient temperature too high	Check and correct; if necessary, draw cooling air via a duct from a cooler place or relocate dryer
	Condenser externally clogged	Clean condenser
Condenser pressure too high or too low on water-cooled dryers	Cooling water system clogged	Have cooling water system cleaned
	Cooling water temperature too high	Check and correct as necessary
Compressor stops or does not start	Electric power supply to compressor is interrupted	Check and correct as necessary
	Motor overload protection of refrigerant compressor motor has tripped	Have motor checked For resetting: see the section Electrical system
	High-pressure switch tripped	See above
Condensate drain remains inoperative	Automatic drain system clogged	Flush the assembly by opening manual drain valve. Have system inspected
Condensate trap continuously discharges air and water	Automatic drain system out of order	Have system checked. If necessary replace automatic drain
Evaporator pressure is too high or too low at unload	Condenser pressure too high or too low	See above
	Shortage of refrigerant	Have circuit checked for leaks and recharged
	Incorrect working of electronic hot gas by-pass valve (steering)	Check electrical connection of valve or contact Nano

Faults and remedies (controller)

Condition	Fault	Remedy
Drain alarm	No pressure in the air net	Error disappears when the pressure in the air net is restored
	Drain was not able to drain all the water	Push drain button manually. When this occurs frequently the drain should be replaced
	No voltage supply to the drain	Check and correct supply to the drain
High pressure switch has shut down the dryer	Condensing pressure too high	Push the small button of the high pressure switch
		Clean condenser
		Improve ventilation of the cooling air
Dryer does not start	Circuit has not cooled down	Wait 1 minute before restarting the dryer
Too high flow or inlet temperature too high	Dryer sizing too small	Try running in regular mode
Refrigerant compressor inlet or Superheat refrigerant temperature too high	Too high load	Reduce air flow
	Shortage of refrigerant	Have circuit checked for leaks and recharged
	Incorrect working of electronic expansion valve (steering)	Check electrical connection of valve or contact Nano
Superheat refrigerant temperature too low	Incorrect working of electronic expansion valve (steering)	Check electrical connection of valve or contact Nano

8 Technical data

8.1 Reference conditions

Specification	Unit	Value
Absolute air inlet pressure	bar(a)	8
Absolute air inlet pressure	psi(a)	116.0
Ambient temperature	°C	25
Ambient temperature	°F	77
Air inlet temperature	°C	35
Air inlet temperature	°F	95
Effective working pressure	bar(g)	7
Effective working pressure	psi(g)	101.5
Cooling water inlet temperature	°C	25
Cooling water inlet temperature	°F	77
Cooling water temperature rise	°C	5
Cooling water temperature rise	°F	9

8.2 Limitations

Specification	Unit	Value
Minimum absolute inlet pressure	bar(a)	3
Minimum absolute inlet pressure	psi(a)	43.5
Maximum absolute inlet pressure	bar(a)	15
Maximum absolute inlet pressure	psi(a)	217.6
Minimum ambient temperature	°C	0
Minimum ambient temperature	°F	32
Maximum ambient temperature (40 °C version)	°C	40
Maximum ambient temperature (104 °F version)	°F	104
Maximum ambient temperature (46 °C version)	°C	46
Maximum ambient temperature (114.8 °F version)	°F	114.8
Minimum air inlet temperature	°C	0
Minimum air inlet temperature	°F	32
Maximum air inlet temperature	°C	70
Maximum air inlet temperature	°F	158
Minimum cooling water inlet temperature	°C	0
Minimum cooling water inlet temperature	°F	32
Maximum cooling water inlet temperature	°C	40
Maximum cooling water inlet temperature	°F	104
Minimum cooling water inlet pressure	bar(g)	1.2
Minimum cooling water inlet pressure	psi(g)	17.4
Maximum cooling water inlet pressure	bar(g)	10
Maximum cooling water inlet pressure	psi(g)	145.0

Specification	Unit	Value
Maximum temperature of dryer inlet air	°C	70
Maximum temperature of dryer inlet air	°F	158
Maximum temperature of dryer outlet air	°C	70
Maximum temperature of dryer outlet air	°F	158
Maximum temperature of cooling refrigerant	°C	120
Maximum temperature of cooling refrigerant	°F	248
Maximum pressure of cooling refrigerant (air-cooled)	bar(g)	43
Maximum pressure of cooling refrigerant (air-cooled)	psi(g)	623.7
Maximum pressure of cooling refrigerant (water-cooled)	bar(g)	33
Maximum pressure of cooling refrigerant (water-cooled)	psi(g)	478.6

8.3 Air dryer data

Specification	Unit	Value
Weight, VDR 6350, 40 °C	kg	1690
Weight, VDR 6350, 104 °F	lb	3725
Weight, VDR 8450, 40 °C	kg	1820
Weight, VDR 8450, 104 °F	lb	4012
L_{pWSAd} (the declared A-weighted emission sound pressure level at workstation)	dB(A)	75.6

Table 6: Air-cooled dryers

Reference number of the noise test code: EN ISO 2151:2008.

Specification	Unit	Value
Weight, VDR 6350	kg	1410
Weight, VDR 6350	lb	3108
Weight, VDR 8450	kg	1540
Weight, VDR 8450	lb	3395
L_{pWSAd} (the declared A-weighted emission sound pressure level at workstation)	dB(A)	73.7

Table 7: Water-cooled dryers

Reference number of the noise test code: EN ISO 2151:2008.

Refrigerant gas and global warming potential

The refrigerant gas for the dryer is R410a and the global warming potential is 2088.

Dryer	Amount (kg)	Amount (lbs)	CO ₂ equivalent
VDR 6350	19.0	41.9	39.6
VDR 8450	21.0	46.2	43.8

Table 8: Amount of refrigerant gas and tonnes of CO₂ equivalent for 50 Hz, air-cooled dryers and an ambient temperature of 40 °C (104 °F)

Dryer	Amount (kg)	Amount (lbs)	CO ₂ equivalent
VDR 6350	19.0	41.9	39.6
VDR 8450	21.0	46.2	43.8

Table 9: Amount of refrigerant gas and tonnes of CO₂ equivalent for 60 Hz, air-cooled dryers and an ambient temperature of 40 °C (104 °F)

Dryer	Amount (kg)	Amount (lbs)	CO ₂ equivalent
VDR 6350	16.5	36.3	34.5
VDR 8450	21.0	46.2	43.8

Table 10: Amount of refrigerant gas and tonnes of CO₂ equivalent for 50 Hz, water-cooled dryers and an ambient temperature of 46 °C (115 °F)

Dryer	Amount (kg)	Amount (lbs)	CO ₂ equivalent
VDR 6350	16.5	36.3	34.5
VDR 8450	21.0	46.2	43.8

Table 11: Amount of refrigerant gas and tonnes of CO₂ equivalent for 60 Hz, water-cooled dryers and an ambient temperature of 46 °C (115 °F)

9 Pressure equipment directives

Overall rating

This machine is a pressure assembly of category III according to 2014/68/EU .

Parts of article 4.3 of 2014/68/EU are subject to Sound Engineering Practice (SEP).

Parts of category I according to 2014/68/EU are integrated into the machine and fall under the exclusion of article 1.2, (f)(i).

Parts subject to the Simple Pressure Vessel Directive 2014/29/EU are excluded from 2014/68/EU according to article 1.2 (c).

The following pressure bearing parts are of category higher than I:

Description	PED Class
Water-cooled condenser VDR 6350	II
Water-cooled condenser VDR 8450	III
Liquid separator	II
High-pressure switch	IV
Compressor	II
Heat exchanger	III

10 Documentation

Declaration of conformity

Typical example of a Declaration of Conformity document

EU DECLARATION OF CONFORMITY

1 We,(1)....., declare under our sole responsibility, that the product

2 Machine name

3 Machine type

4 Serial number

5 Which falls under the provisions of article 12.2 of the EC Directive 2006/42/EC on the approximation of the laws of the Member States relating to machinery, is in conformity with the relevant Essential Health and Safety Requirements of this directive.

The machinery complies also with the requirements of the following directives and their amendments as indicated.

Directive on the approximation of laws of the Member States relating to(2).....	Harmonized and/or Technical Standards used(3).....	Att' mnt

6 The harmonized and the technical standards used are identified in the attachments hereafter

7(4)..... is authorized to compile the technical file.

	Conformity of the specification to the directives	Conformity of the product to the specification and by implication to the directives
8 Issued by	Engineering	Manufacturing
9 Name
10 Signature
11 Date
12 Place

Form 5009 xxxxxx xx
ed. xx, xxxxx-xx-xx

.....(5).....

58397_3D

Figure 34:

- (1): Manufacturer
- (2): Applicable directives

(3): Standards used

(4): Technical file holder

(5): Contact address of the manufacturer

On the Declaration of Conformity, the harmonized and/or other standards that have been used for the design are shown and/or referred to.

The Declaration of Conformity is part of the documentation that is supplied with this device.

Experience. Customer. Service.

nano

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