Nitrogen Membrane Modules

User Guide

EN Original Language

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

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1 Safety Information

Do not operate this equipment until the safety information and instructions in this user guide have been read and understood by all personnel concerned.

USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorised distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyse all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalogue and in any other materials provided from Parker or its subsidiaries or authorised distributors.

To the extent that Parker or its subsidiaries or authorised distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

Only competent personnel trained, qualified should perform installation, commissioning, service and repair procedures.

The pressure envelope of the Nitrogen Membrane Module must not be breached under any circumstances. Failure to comply may result in an unplanned release of pressure, and may cause serious personal injury or death. All maintenance procedures that require the pressure envelope to breached must only be performed by competent personnel.

Due to the nature of operation there is a possibility of oxygen enrichment surrounding the Nitrogen Membrane Module. Ensure that the area is adequately ventilated. Where the risk of oxygen enrichment is high, such as a confined space or poorly ventilated room, the use of oxygen monitoring equipment is advisable.

With the exception of oxygen, any gas can cause asphyxiation in high enough concentrations. Always ensure that the Nitrogen Membrane Module is operated in a well ventilated area and all of the vent ports on the rear of the generator are kept clear and free from blockages.

Use of the equipment in a manner not specified within this user guide may result in an unplanned release of pressure, which may cause serious personal injury or damage.

When handling, installing or operating this equipment, personnel must employ safe engineering practices and observe all related regulations, health & safety procedures, and legal requirements for safety.

Ensure that the equipment is depressurised prior to carrying out any of the scheduled maintenance instructions specified within this user guide.

Parker Hannifin can not anticipate every possible circumstance which may represent a potential hazard. The warnings in this manual cover the most known potential hazards, but by definition can not be all-inclusive. If the user employs an operating procedure, item of equipment or a method of working which is not specifically recommended by Parker Hannifin the user must ensure that the equipment will not be damaged or become hazardous to persons or property.

Most accidents that occur during the operation and maintenance of machinery are the result of failure to observe basic safety rules and procedures. Accidents can be avoided by recognising that any machinery is potentially hazardous.

Parker Hannifin will not accept any liability in case:

- The instructions in this manual are ignored.
- The membranes are operated incorrectly.
- The system is fed with other gasses than air.
- The membranes are modified without notification and authorization of the manufacturer.
- Maintenance and repair are not carried out according to the instructions.

Details of your nearest Parker Hannifin sales office can be found at www.parker.com/dhfns

Retain this user guide for future reference.

1.1 Abbreviations

CO_2	Carbon dioxide	N_2	Nitrogen
ISO	International Organisation for Standards	O_2	Oxygen
H_2O	Water	OEA	Oxygen enriched air
H_2	Hydrogen	OD	Outside diameter
NEA	Nitrogen enriched air	RH	Relative humidity

1.2 Markings and Symbols

The following markings and international symbols are used on the equipment or within this manual:

	Caution, Read the User Guide.		Wear ear protection
 Warning	Highlights actions or procedures which, if not performed correctly, may lead to personal injury or death.		Risk of fire Oxygen-enriched air leads to an increased risk of fire in the event of contact with inflammable products
 Caution	Highlights actions or procedures which, if not performed correctly, may lead to damage to this product.		Instructions with respect to the environment
	Warning Risk for death due to suffocation		Pressurised air inlet
	Product side; Nitrogen Enriched Air (NEA) Outlet		Membrane permeate side: Oxygen Enriched Air (OEA) outlet

1.3 General

Correct use of the nitrogen membrane modules is important for your personal safety and for trouble-free functioning of the nitrogen membrane modules. Incorrect use can cause damage to the nitrogen membrane modules or can lead to incorrect gas supply.


Warning

- Read this manual before you start the installation and putting into operation of the membrane modules. Prevent accidents and damage to this equipment.
- Contact your supplier if you detect a problem that you cannot solve with this manual.
- Use the nitrogen membrane modules in accordance with its purpose.
- Only service-engineers, that are qualified to work on pneumatic equipment, are allowed to do the installation, maintenance and repairs.
- Use correct tools for lifting the nitrogen membrane modules. Follow the legislation and instructions for hoisting this kind of equipment.
- Do not tamper or experiment with the equipment. Do not exceed the technical specifications of the nitrogen membrane modules.

1.4 Nitrogen and Oxygen

The nitrogen membrane modules generate nitrogen enriched air as a product. Oxygen enriched air is released as waste.

- Nitrogen can cause suffocation!

- Oxygen-enriched air leads to increased risk of fire in the event of contact with inflammable products. Make sure that there is adequate ventilation at all times!

1.5 Safety precautions

- Lead the enriched oxygen air (permeate) to safe area.
- Make sure that the ventilation rate is sufficient in the room where the membrane modules are installed.
- Keep the ambient temperature for the nitrogen membrane modules between 2 and 50 °C (36 and 122°F).
- Install the peripheral equipment, piping and nitrogen storage vessels according to standard procedures. Parker Hannifin Manufacturing Netherlands (Filtration and Separation) BV cannot take responsibility for this.
- Make sure that instructions concerning health and safety are compliant with the local legislation and regulations.

1.6 Environmental aspects

The use and maintenance of the nitrogen membrane modules does not include environmental dangers. Most parts are made of metal/aluminum and can be disposed of in the regular way. Optimal installation according to instructions and according to good craftsmanship will result in minimal energy consumption and maximal life of your system.

Make sure that instructions concerning health, safety and environment are compliant with the local legislation and regulations.

To minimize the power consumption of your installation and thus minimizing the effects on the environment, keep in mind the following;

- Preferably use frequency controlled compressors. Especially, in those situations with strongly fluctuating demand, it has an enormous positive effect on the total power consumption.
- Try to operate your equipment on the lowest possible pressure. Pressure reducing equipment destroys expensive energy and is not environment friendly.
- Design your pressure pipes with enough diameter, resulting in lower pressure drops.
- Apply compressors with low oil emission or preferably oil-free. Condensate from compressors, filters and/or dryers is contaminated with oil, and such must be disposed of following the local legislation.

1.7 Approvals

Pressure Equipment Directive (97/23/EC) - Refer to “Declaration of Manufacturer” on page 17

Other

Stainless steel versions can be supplied with material certificates for the housing material in accordance with EN10204-3.1

2 Description

Nitrogen membrane modules enable you to make nitrogen enriched air out of normal pure ambient air. Air is composed of nitrogen (78,1%), oxygen (20.9%), argon (1%) and some traces of other inert noble gasses. The membranes are capable of separating oxygen from air, thus producing nitrogen enriched air. A complete system based on nitrogen membrane modules is referred to as a nitrogen generator.

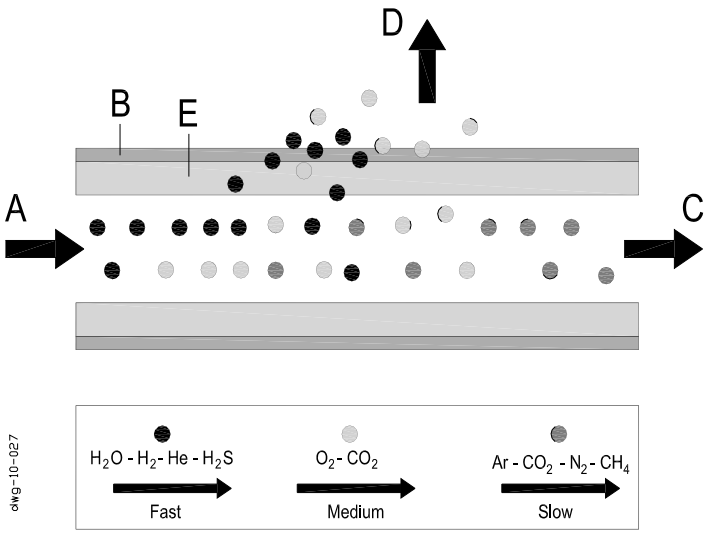
To get a complete working system you need a pressurised air system or a stand-alone compressor of prescribed capacity and a system where the membranes are built in. Ambient air is compressed and then led through the nitrogen membrane modules. The separated oxygen enriched air stream is collected at atmospheric pressure and vented to ambient. Pressurised nitrogen enriched air is released at the outlet of the membrane modules

The composition of the product gas can be measured by determining the residual oxygen content in percent by volume. The nitrogen content is calculated by subtracting the measured residual oxygen content from 100%.

e.g. residual oxygen content: 1 % nitrogen content: 100 - 1 = 99%

It should be born in mind that this value is called the nitrogen content but that it actually is the inert gas content as it is not only composed of nitrogen but also of other noble gasses (see above).

Nitrogen enriched air is produced by feeding the nitrogen membrane modules with compressed air. The nitrogen membrane modules are composed of bundles of hollow fibres in which the actual separation occurs (see figure 3.1). Pressurised air is led through the internal lumen of the fibres. At the end of the fibres nitrogen enriched air is delivered in pressurised state. Oxygen enriched air permeates through the wall of the fibres and is collected at atmospheric pressure.



A	Pressurised feed air inlet
B	Hollow fiber membrane
C	Nitrogen enriched air outlet (retentate)
D	Oxygen enriched air outlet (permeat)
E	Supporting layer

2.1 Technical Specification

Model	Maximum Operating Pressure	Operating Temperature	Design Pressure	Design Temperature
ST/SA/DT/DA/TT 304/504/604/704	13 barg (189 psig)	+2°C to +50°C (+36°F to +122°F)	15 barg (218 psig)	+65°C (+149°F)
ST/SA 608/708/1506(SS)/1508(SS)	13 barg (189 psig)	+2°C to +50°C (+36°F to +122°F)	15 barg (218 psig)	+65°C (+149°F)
ST6010	13 barg (189 psig)	+2°C to +50°C (+36°F to +122°F)	15 barg (218 psig)	+50°C (+122°F)
SA6010	10 barg (145 psig)	+2°C to +40°C (+36°F to +104°F)	15 barg (218 psig)	+50°C (+122°F)
DT1506(-8) DT1508	13 barg (189 psig)	+2°C to +50°C (+36°F to +122°F)	13 barg (189 psig)	+50°C (+122°F)
DT1508(SS)	13 barg (189 psig)	+2°C to +50°C (+36°F to +122°F)	15 barg (218 psig)	+65°C (+149°F)
ST15020	8 barg (116 psig)	+2°C to +50°C (+36°F to +122°F)	8 barg (116 psig)	+65°C (+149°F)
ST15020-1 SA15020 / ST16020-1	9 barg (131 psig)	+2°C to +50°C (+36°F to +122°F)	14 barg (203 psig)	+65°C (+149°F)

Inlet Parameters

Minimum Temperature	+2°C (+36°F)
Maximum Temperature	+50°C (+122°F)

Environmental Parameters

Ambient Temperature	+2°C - +50°C (+36°F to +122°F)
Relative Humidity	<100% (Non Condensing)
Radiation	Avoid exposing membrane modules to direct sunlight and away from heat source.

2.2 Feed Air conditions

Air Quality	Clean air without contaminents
Maximum particle size	Filtered at 0,01 µm cut off ISO8573-1:2010 Solid Particulate class 1
Pressure dewpoint	Must be 5°C (3 °F) lower than lowest possible ambient temperature
Residual oil content	< 0.01 mg/m³ ISO8573-1:2010 Oil class 1
Inlet temperature	Operating temperature specified on nitrogen membrane modules set label

Caution

Make sure that always an activated carbon adsorber (adsorber bed containing granulate carbon) is installed in the feed air towards the membranes. Active carbon adsorbs a numerous variety of chemicals, but is typically suitable for removing oil vapors, other hydrocarbons and even ozone is filtered out through chemical reaction.

For assistance on pre-filtration see document K3.1.247.

Prevent pressure increases and peaks with velocity >4 barg/sec.

This assures long-lasting trouble free operation of the membranes.

2.3 Weights and Dimensions

	Model		Dimensions mm / (ins)			Weight Kg / (lbs)
			H	W	D	
HiFluxx	ST304	-	386 (15.2)	80 (3.15)	63 (2.48)	2.3 (5.1)
	DT304	-	386 (15.2)	145 (5.7)	63 (2.48)	4.0 (8.8)
	TT304	-	388 (15.3)	200 (7.9)	63 (2.48)	5.7 (12.6)
	ST504	-	520 (20.5)	80 (3.15)	63 (2.48)	2.6 (5.7)
	ST604	-	757 (29.8)	80 (3.15)	63 (2.48)	3.2 (7)
	DT604	-	758 (29.84)	145 (5.7)	63 (2.48)	6.0 (13.2)
	TT604	-	758 (29.84)	200 (7.9)	63 (2.48)	8.3 (18.3)
	ST606	-	751 (29.6)	110 (4.3)	84 (3.3)	6.4 (14.1)
	DT606	-	751 (29.6)	190 (7.5)	83 (3.3)	10.8 (23.8)
	TT606	-	751 (29.6)	270 (10.6)	83 (3.3)	15 (33.1)
	ST608	-	736 (29.0)	Ø114 (4.49)		5.3 (11.7)
	ST704	-	804 (31.7)	80 (3.15)	63 (2.48)	3.2 (7)
	ST708	-	782 (30.8)	Ø114 (4.49)		5.5 (12.1)
	ST6010	-	736 (29.0)	Ø139 (5.5)		8.1 (17.9)
	ST1506	-	1655 (65.12)	Ø100 (3.9)		5.7 (12.6)
	ST1506SS	-	1655 (65.12)	Ø100 (3.9)		14 (30.9)
	DT1506	-	1705 (67.1)	296 (11.7)	201 (7.9)	14 (30.9)
	DT1506-8	4 - 8 barg	1705 (67.1)	296 (11.7)	208 (8.2)	15 (33.1)
		9 - 13 barg	1732 (68.2)	296 (11.7)	208 (8.2)	15 (33.1)
	ST1508	-	1655 (65.12)	Ø114 (4.49)		6.8 (15)
	ST1508(SS)	-	1655 (65.12)	Ø114 (4.49)		18 (40)
	DT1508	4 - 8 barg	1705 (67.1)	296 (11.7)	201 (7.9)	16 (35.3)
		9 - 13 barg	1705 (67.1)	296 (11.7)	145 (5.7)	16 (35.3)
	DT1508SS	-	1734 (68.3)	296 (11.7)	145 (5.7)	39 (86)
	ST15020-1	-	1740 (68.50)	Ø280 (11.02)		46 (102)
SmartFluxx	SA604	-	758 (29.84)	80 (3.15)	63 (2.48)	3.2 (7)
	SA708	-	782 (30.8)	Ø114 (4.49)		5.5 (12.1)
	SA6010	-	736 (29.0)	Ø139 (5.5)		8.1 (17.9)
	SA1508	-	1655 (65.12)	Ø114 (4.49)		6.8 (15)
	SA1508SS	-	1655 (65.12)	Ø114 (4.49)		18 (40)
	SA15020	-	1740 (68.50)	Ø280 (11.02)		46 (102)

3.4 Receiving and Inspecting the Equipment

The nitrogen membrane modules are supplied in a sturdy wooden crate or cardboard box designed to be moved using a forklift truck or pallet truck. There may be more than one membrane modules packed in one crate.

On delivery of the equipment check the packaging and its contents for damage.

If there are any signs of damage to the packaging, or there are any parts missing please inform the delivery company immediately and contact your local Parker domnick hunter office.

3.4.1 Storage

The equipment should be stored, within the packaging, in a clean dry environment. If the packaging is stored in an area where the environmental conditions fall outside of those specified in the technical specification, it should be moved to its final location (installation site) and left to stabilise prior to unpacking. Failure to do this could cause condensing humidity and potential failure of the equipment.

3.4.2 Unpacking

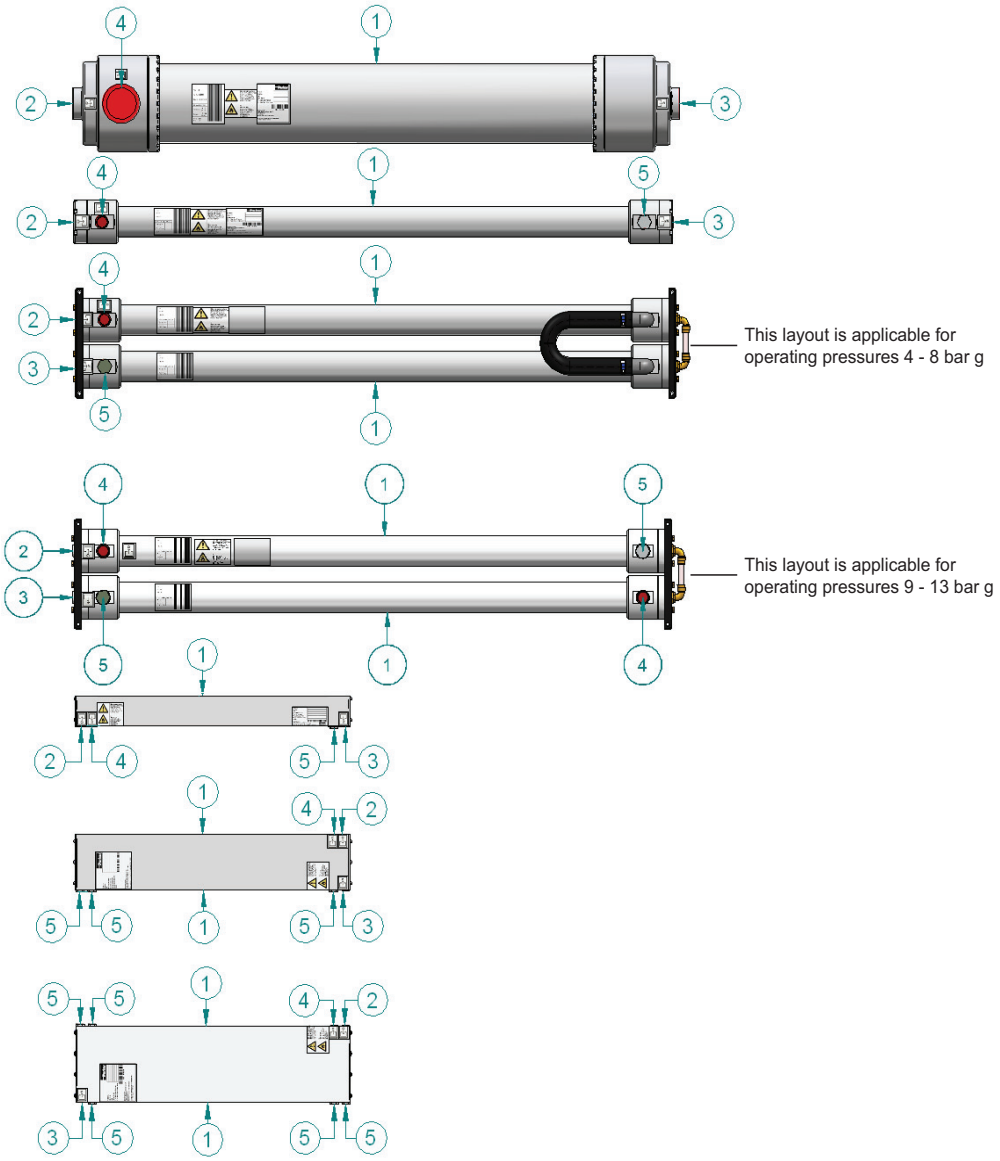
Membrane modules with a weight of less than 20kg (<44lbs) can be taken out by one person. Other models must be taken out by two persons or by using an overhead crane and suitable slings.

Carefully move the membrane module(s) to its final location. When using a forklift truck or pallet truck always protect housing with clothing to prevent damaging the housing. Prevent membrane modules from rolling off during transport.

WARNING;

- Remove any loose parts before hoisting.
- Due to symmetry the centre of gravity of the nitrogen membrane modules will be approximately in the middle of the tube length.
- Only lift the equipment using certified lifting slings.
- Do not go under the hoisted equipment!
- If forklift is used, follow the legislation and instructions for operating the forklift.

3.5 Overview of the equipment



Key:

Ref	Description
1	Nitrogen membrane module
2	Feed air inlet
3	Nitrogen Enriched Air (NEA) outlet
4	Oxygen Enriched Air (OEA) outlet
5	Plug (not to be removed)

Note: The actual length and diameter of your membrane module can differ from the images above. However principles, connection location and connection types are identical.

Warning	**All red protection caps must to be removed during installation**

4.6 Locating the Equipment

The equipment can be located indoors or outdoors in an environment that protects it from direct sunlight, moisture, and dust. Changes in temperature, humidity, and airborne pollution will affect the environment in which the equipment is operating and may impair the safety and operation. It is the customers' responsibility to ensure that the environmental conditions specified for the equipment are maintained.

For marine applications, special requirements may be applicable. Where a separate compartment is provided, it is to be positioned outside the cargo area and is to be fitted with an independent mechanical extraction ventilation system to enable sufficient ventilation. A separate compartment is to be treated as one of 'other machinery spaces' with respect to fire protection. The compartment is to have no direct access to accommodation spaces, service spaces and control stations, and is to be provided with oxygen level detection equipment with a low oxygen level alarm.

4.6.1 Environment

The environment conditions must stay within the limits mention within the “Technical Specification” on page 6.

It is the customers responsibility to ensure that the environment conditions specified for the equipment are maintained,

4.6.2 Space Requirements

There must be adequate space around the equipment to allow airflow and access for maintenance purposes and lifting equipment.

4.6.3 Ventilation Requirements

Due to the nature of operation there is a possibility of oxygen enrichment surrounding the generator. Ensure that the area is adequately ventilated. Where the risk of oxygen enrichment is high, such as a confined space or poorly ventilated room, the use of oxygen monitoring equipment is advisable.

Nitrogen is not a poisonous gas but, in a concentrated form, there is a risk of asphyxiation. Depending upon the membrane modules type and operating pressure, nitrogen flow rates, up to 300 m^3/hr per membrane module, are possible. If the membrane modules are operated within a confined space ensure that adequate ventilation and oxygen monitoring equipment is fitted.

For marine applications, special requirements may be applicable. Where a separate compartment is provided, it is to be positioned with an independent mechanical extraction ventilation system to enable sufficient ventilation.

5 Installation and Commissioning

Warning

Only competent personnel trained and qualified should perform installation, commissioning, service and repair procedures.

5.1 Mechanical Installation

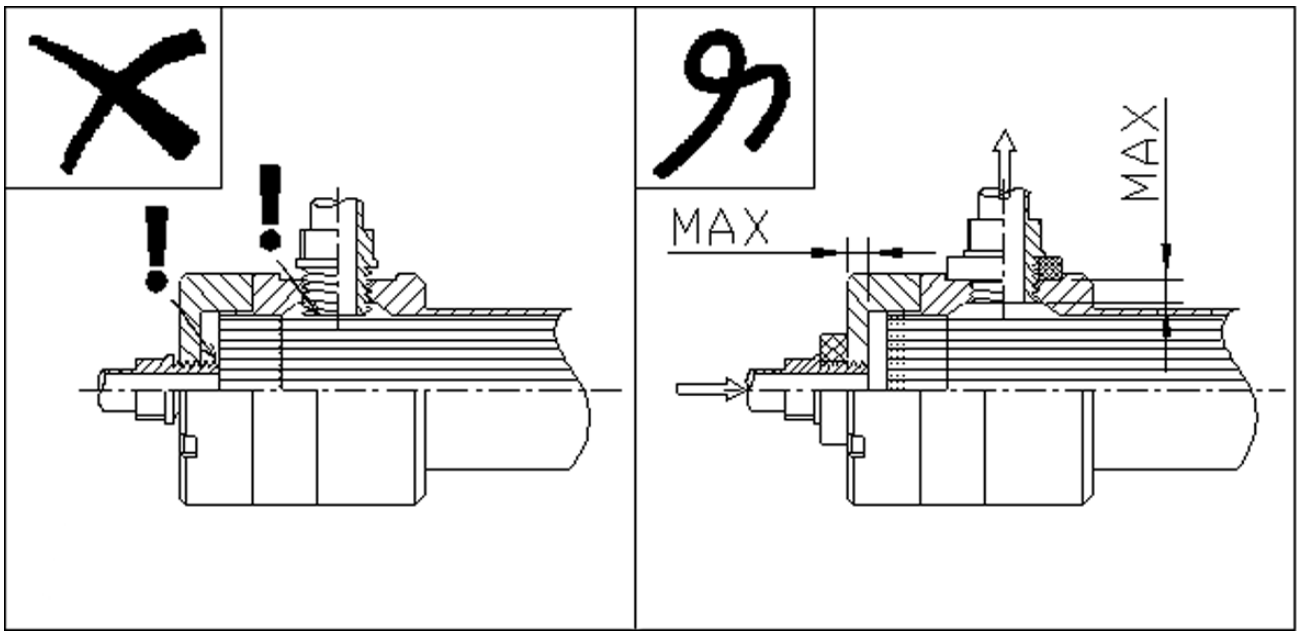
The feed-air and NEA-connections are always internal cylindrical threads where pressure-tight joints are not made on the threads (in accordance with ISO R/228). A pressure-tight joint is achieved by the compression of a soft material (such as an o-ring or a gasket).

The OEA-connection in the smaller modules is also an internal cylindrical thread but in the larger modules it is an OD-pipe connection.

When making the connections, take following remarks into account;

- "Remove protection caps
- "Inspect thread connections for damage, corrosion and/or dirt. Clean if necessary.
- "Make sure connections are well tight, although do not over-tighten the connection since it can damage the membrane module
- "Ensure stress-free installation of Membrane Module and pipe connections.

Unions, plugs etc. screwed in the inlet and outlet ports of the membrane modules may not go deeper than the end of the threaded hole to prevent irreparable mechanical damage of the fibres behind these holes.



It is important to ensure that all piping materials are suitable for the application, clean and debris free. The diameter of the pipes must be sufficient to allow unrestricted inlet air supply to the equipment and outlet air supply to the application.

When routing the pipes ensure that they are adequately supported to prevent damage and leaks in the system.

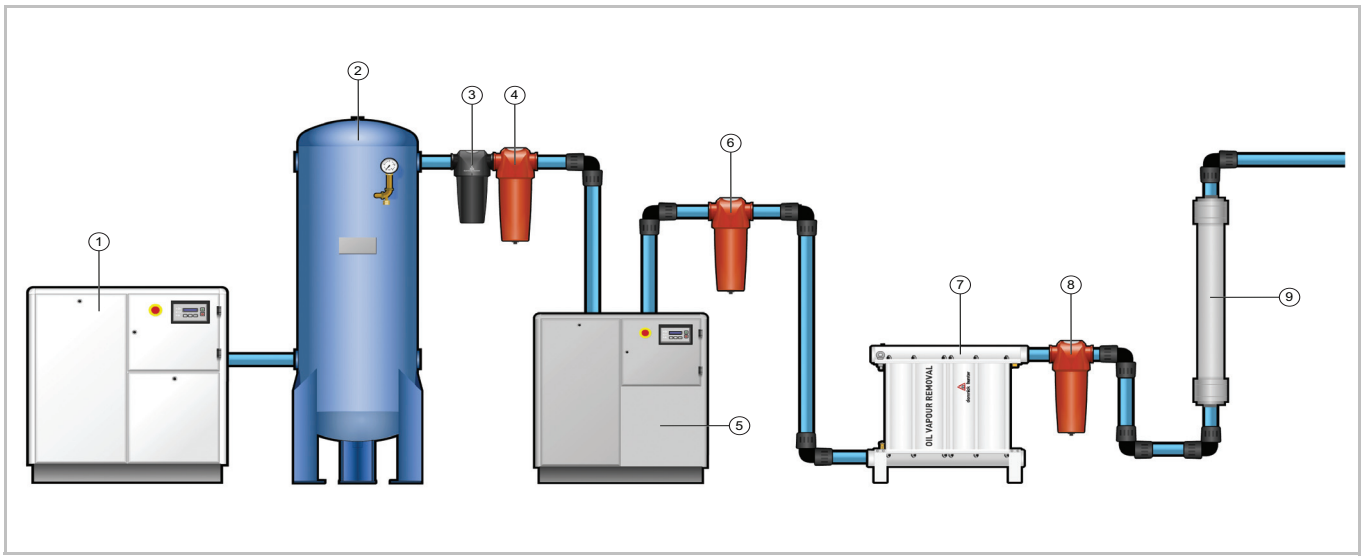
All components used within the system must be rated to at least the maximum operating pressure of the equipment. It is recommended that the system be protected with suitably rated pressure relief valves.

5.1.1 General remarks piping installations

- All piping parts must meet safety prescriptions
- When choosing material type for the piping take into account the requirements from the directives
- Take care of corrosion protection
- Effectively compensate for heat elongation
- Piping must be well supported
- Univocal marking of piping
- Choose as much as possible straight pipes with short lengths
- Ensure proper grounding of installation

5.2 Example System Layout

For assistance and recommendations on system layout please contact division for more detailed information. Compressed air entering the nitrogen membrane module must comply with “Feed Air conditions” on page 6



Ref	Description	Ref	Description	Ref	Description
1	Compressor	4	General purpose filter (AO)	7	Activated carbon adsorber bed type (OVR)
2	Air receiver	5	Dryer	8	Dust filter (AAR)
3	Water separator	6	High efficiency filter (AA)	9	Membrane module

For more information please refer to Bulletin K3.1.247 - Required Filtration for Parker Membrane modules.

6 Operating the Equipment

6.1 Influence of process parameters

The performance of the nitrogen membrane modules depends on the way they are operated. The influence of the most important process parameters are explained below:

1. Influence of flow rate: on changing the nitrogen flow rate the oxygen content will change. With decreasing NEA-flow rate the residence time of the air in the equipment will increase and as a result the oxygen content will be lowered. You can adjust the nitrogen purity by tuning the nitrogen flow rate.

2. Influence of temperature: The nitrogen membrane modules will operate optimally at a temperature of 15-25°C (59-77°F). Increasing temperature will result in higher pressurized air consumption. You are advised to place the membranes in an environment where the temperature will not become unnecessarily high. See bulletin "Correction Factors HiFluxx®" or "Correction Factors SmartFluxx®" for more information on temperature influence on capacity and Feed-Air consumption.

3. Influence of membrane pressure (inside hollow fibre): when increasing membrane pressure the capacity of your system will increase; as a result the pressurized air consumption will increase proportionally and consequently the energy consumption will increase.

4. Influence of pressure outside hollow fibres: the pressure outside the hollow fibres must be atmospheric; if it is higher, the capacity and selectivity of the system will drop dramatically. If it is lower, for example when using the membrane modules above 1000 m (3000 ft) sea-level, contact your supplier, the performance of your membrane modules will change.

With respect to this it is very important to follow this installation process in “Mechanical Installation” on page 11.

6.2 Starting and stopping

The membrane modules are passive components and can only be operated as a subpart within a machine. For starting and stopping of the machine, we refer to the instruction and operation manual of this particular machine.

It should be prevented that compressors starts and stops at a high frequent interval. In that particular case the compressor cannot reach the required optimal working temperature which results in spitting out excess of oil lubricant which could result in overloading an active carbon adsorber.

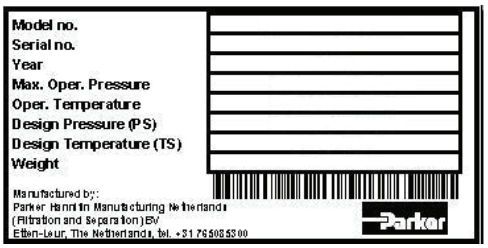
Prevent pressure increases and peaks with velocity >4 barg/sec on the membrane modules.

7 Servicing

7.1 Identification

The identification plate is located on the outside of the NITROGEN MEMBRANE MODULE. The identification plate shows the serial number, production year, operating and design pressure and operating and design temperature of the module.

For service and technical assistance, please contact your supplier.



7.2 Model numbers

This manual covers several model numbers. Although the technical design can be the same, the products can have different names. Find below an explanation of how the model name is build up:

S	T	1	5	0	2	0	-	1	S	S	-	S	P	1
1	2	3	4	5	6	7	8	9	10	11		12	13	14

Position	Explanation
1.	S = single tube D = dual tube T = triple tube
2.	T = Module with Hifluxx ©-fibres A = Module with Smartfluxx ©-fibres Remark In case the membrane is especially developed for oxygen enrichment, position 1 and 2 is left out and replaced by text "EnOxy®"
(3.)/(4.)/5./(6.)/7.	Base model designation. Position (3.)/(4.)/5. used for indication of length in cm and position (6.)/7. used for diameter indication in cm.
8./9.	-1 = Revision of former model -8 = Two different diameters are used in dual-tube module
(10.)/(11.)	SS = housing made from stainless steel When left blank, the housing is made from aluminium
(12.)/(13.)/(14.)	These positions can be used for customer/market related products (E.g. C, US, etc.) In combination with Smartfluxx ©-fibres, these positions are used to specify a specific performance (E.g. SP1, SP2, SP3, SP4).

7.3 Cleaning

The housing may be cleaned with dry clothing. Don't use aggressive cleaners.

7.4 Service Intervals

Since membrane modules itself are passive elements build in a machine, we refer to the maintenance intervals prescribed for this machine.

The performance of the membrane modules however is highly dependent on the correct pre-filtration. Therefore filter elements and activated carbon should be exchanged on periodic maintenance intervals.

Read out differential pressure indicators on filters on a daily basis. If indicators turn to red, filter elements have to be changed.

Description of Service Required		Service recommended every:		
Component	**Operation**	**Week**	**12-month**	**24-month**
Complete Assembly	Check for air leaks.			
Filtration	Replace the adsorption filters - Activated Carbon [1] **Recommended Service**	**See Note (1)**		
				
Filtration	Replace the coalescing filter elements and automatic drains			

1. Unlike oil aerosol removal filters which are changed annually to guarantee compressed air quality, the lifetime of an oil vapour removal filter can be attributed to various factors and require more frequent changes. Factors affecting the lifetime of adsorption filters are:
***Oil vapour concentration -** The higher the inlet concentration of oil vapour, the faster the activated carbon capacity will expire.*
***Bulk oil -** Adsorption filters are designed to remove oil vapour and odours, not liquid oil or aerosols. Poorly maintained or non-existent pre-filtration will cause the OVR filter capacity to quickly expire.*
***Temperature -** Oil vapour content increases proportionally to inlet temperature, reducing element life. Additionally, as temperature increases, the adsorption capacity decreases, again reducing element life.*
***Relative Humidity or Dewpoint -** Wet air reduces the adsorptive capacity of the carbon.*
***Compressor oil changes -** When compressor oil is changed, the new lubricant burns off "light ends" which increases the oil vapour content for hours or even weeks afterwards significantly reducing its adsorptive life.*

Key:

	Check		Replace

8 Troubleshooting

In the unlikely event that a problem occurs on the equipment, this troubleshooting guide can be used to identify the probable cause and remedy.

Warning

Troubleshooting should only be attempted by competent personnel. All major repair, and calibration work should be undertaken by a Parker, qualified and approved engineer.

Fault	Probable Cause	Remedy
Too low NEA-flow	Inlet pressure too low	Check inlet pressure and correct and correct if necessary. Possibly the compressor capacity does not meet the required feed air consumption of the module.
		Check if the feed-air temperature and/or ambient air is too high.
		Check if there is a blockage in feed-air inlet.
	Leakages in piping	Check piping and connections.
	Ambient temperature too high	Check whether ambient temperatures are within specification. Check if the compressor is sized for high ambient temperatures.
	Inlet temperature too high	Check whether feed-air inlet temperatures are within specification.
	O_2-Purity in NEA-flow is too low	See too low O_2-Purity
	Outlet is restricted	Check outlet piping for blockages.
	Water in membrane modules	Dependant of quantity of water present in the membrane module, the membrane module must be dried or exchanged. Restart machine after cause has been found and resolved.
	Balancing valve wrongly set (contact Parker)	Re-set balancing valve
	Contaminated with oil	Exchange modules
Too high NEA-flow	O_2-Purity in NEA-flow too high	See too high O_2-Purity in NEA-flow
	Inlet pressure too high	Check inlet pressure and correct if necessary.
Too high air consumption	Ambient temperature too high	Check whether ambient temperatures are within specification.
	Inlet temperature too high	Check whether feed-air inlet temperatures are within specification.
	Damaged module	Exchange modules
Too high O_2-purity in NEA-flow	Check oxygen analyser on correct operation	Calibrate analyser with span gas and calibration gas periodically
	Wrong setting purity control valve	Check setting and change if necessary
	Permeat outlet blocked or restricted	Check piping and remove blockage
	Insufficient feed-air supply	Check feed-air supply
	Damaged module	Exchange modules
Too low O2-purity in NEA-flow	Check oxygen analyser on correct operation	Calibrate analyser with span gas and calibration gas periodically
	Wrong setting purity control valve	Check setting and change if necessary
	Damaged module	Exchange modules
Noise	In- or outlet (piping) partly blocked	Check piping and remove blockage
	Leakage	Check piping and connections
Moisture or high RH of outlet gas	Inlet humidity too high	Check inlet pressure dewpoint
	Damaged module	Exchange modules
Too high pressure drop	In- or outlet (piping) partly blocked	Check piping and remove blockage
	Fibres clogged (which also affects purity and flow)	Exchange membrane modules

9 Declaration of Manufacturer

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DECLARATION OF MANUFACTURER

Parker Hannifin Manufacturing Netherlands (Filtration & Separation) BV declares that its products

304, 504, 604, 704
1506, 608, 708, 1508, 6010
15020 and 16020

exclusive for the following products

	Design Pressure (PS)	Design Temp. (TS)	Max.Oper. Pressure	Max.Oper. Temp.
	barg	°C	barg	°C
ST/DT/TT/SA/DA 304, 504, 604, 704	15	65	13	50
ST/SA1506	15	65	13	50
DT1506/1506-08/1508	13	50	13	50
DT1506/1506-08/1508 SS	15	65	13	50
SA/ST 608, 708, 1508 (SS)	15	65	13	50
SA 6010	15	50	10	40
ST 6010	15	50	13	50
ST 15020	8	65	8	50
SA 15020	14	65	9	50
ST 15020-1, 16020-1	14	65	9	50

Design Pressure (PS)	Design Temp. (TS)	Max.Oper. Pressure	Max.Oper. Temp.
psi	°F	psi	°F
218	149	189	122
218	149	189	122
189	122	189	122
218	149	189	122
218	149	189	122
218	122	145	104
218	122	189	122
116	149	116	122
203	149	131	122
203	149	131	122

comply with the EC Pressure Equipment Directive 97/23/EC of May 29, 1997.

Notes

1) These products are multi-chamber vessels for gasses in fluid group 2 (annex 2, table 2 of the directive). They are designed and manufactured with SEP (sound engineering practice of European member state The Netherlands) in order to ensure safe use as prescribed in article 3, section 3 of the directive. Thus the CE mark must not be applied on the product.

2) The products are supplied for incorporation in pressure equipment or assemblies and should not be put into service until an appropriate conformity assessment procedure has been carried out.

3) The above declaration applies to the products listed in the table above including their derivatives having identical structural design but with customer specific performance requirements. The derivatives can be distinguished by an extra addition behind the model number.

Etten-Leur, November 26th 2013

Hans Kamp, MSc,
Manager Product Development

K3.1.278d Declaration of manufacturer

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