

User Guide

# Intelligent Purger System (IPS 8) for Ammonia

Technical data, installation and use



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## Legal notice

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This product information should be supplemented with the information about the industrial safety and health related regulations at the site of installation of the product. The regulations vary from place to place as a result of the statutory regulations applicable at the site of installation and are therefore not considered in this product information.

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## EU DECLARATION OF CONFORMITY

### Danfoss A/S Refrigeration & Air Conditioning Controls

declares under our sole responsibility that the

**Product category:** Intelligent Purger System (Air Purger)

**Type designation(s):** IPS 8

Covered by this declaration is in conformity with the following directive(s), standard(s) or other normative document(s), provided that the product is used in accordance with our instructions.

#### Machine Directive 2006/42/EC

EN 378-2:2016 Refrigerating systems and heat pumps - Safety and environmental requirements - Part 2: Design, construction, testing, marking and documentation

IEC 60204-1:2018 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

#### Pressure Equipment Directive 2014/68/EU (PED)

EN 378-2:2016 Refrigerating systems and heat pumps - Safety and environmental requirements - Part 2: Design, construction, testing, marking and documentation

Ammonia side (R717): Category A4P3. Fluid group: 1. PS = 40 bar. TS: -40 °C to 60 °C  
R452A side: Category 1. Fluid group: 2. PS = 28 bar. TS: -40 °C to 60 °C

Ambient temperature: -10 °C to 43 °C

#### Electromagnetic Compatibility Directive 2014/30/EU (EMC)

IEC 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments (IEC77/488/CDV:2015)

EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Note: EMC test performed with cable length < 30m.

|                                   |   |                                   |   |
|-----------------------------------|---|-----------------------------------|---|
| Date: YYYYMMDD<br>Place of issue: | Issued by<br><br><b>Signature:</b><br><b>Name: Su Cheong Ho</b><br><b>Title: Lead Design Engineer</b> | Date: YYYYMMDD<br>Place of issue: | Approved by<br><br><b>Signature:</b><br><b>Name: Behzad Parastar</b><br><b>Title: Product Manager</b> |
|-----------------------------------|---|-----------------------------------|---|

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## Introduction

The Danfoss Intelligent Purger System (IPS 8) is a stand-alone, self-contained purging unit designed to remove non-condensable gases (NC gases = air and other unwanted foreign gases) from industrial ammonia refrigeration systems.

The IPS control can handle up to 8 purge points automatically.

The ingress of NC gases into a refrigeration system is inevitable, regardless of the refrigerant, pressures, or temperatures. NC gases in the system will result in a decrease in system efficiency, both in terms of an increase in power consumption and reduced cooling capacity.

Due to having a different density than ammonia, the ingressed air will accumulate in specific areas of the system, where it can be removed using the Danfoss IPS 8.

The accumulation areas are identified in the Connection locations section, along with recommended connection principles.

The purger unit is an electronic-controlled, self-employed R452A refrigerant system that runs

independent of the main ammonia system and with only one flange connection to the ammonia plant.

This flanged opening allows access of the ammonia gas/NC gas mix to the purger evaporator, where it is divided into ammonia condensate and NC gases. The ammonia condensate is returned by gravity to the main plant, while the NC gases are purged to the atmosphere through a water bath.

Through the flanged opening, the purger unit has access to all parameters from the ammonia plant required for full electronic control.

The unit runs automatically in 24-hour cycles, checking for the presence of NC gases and, if present, removed.

To regain the design capacity of the main ammonia system and prevent future air accumulation, it is highly recommended to install the Danfoss IPS 8.

## Features

- State-of-the-art electronic controlled unit based on the Danfoss MCX controller platform
- Reduced power consumption
- Automatic purging response to NC gases in the refrigeration system
- Continuous monitoring of differential pressure between system refrigerant and purger refrigerant
- Electronic purging that minimizes refrigerant (ammonia) relief to the environment
- Self-contained unit operation, which functions independently from the main plant
- An operation log for easy purging cycle data monitoring
- Self-diagnostics for unit and system operation to shut down in case of malfunction of air purger components
- Cost-effective installation with few mechanical and electrical connection interfaces
- A fully brazed R452A cooling system, which minimizes leakage risks
- A plug-and-play stand-alone design, which eases installation and commissioning with low risk of potential errors
- No need for advanced settings
- A compact and easy-to-handle design
- Patent pending on IPS 8

## Working principle

The Danfoss IPS 8 is factory-tested and ready for use in ammonia plants with a condenser pressure of more than 6 bar (87 psi). The purger is charged with 900 gram (31.7 oz) of R452A.

Only 2 mechanical connections are needed for the purger (see fig. 1). The exchange of ammonia/NC gases with the main plant is done through the flange for ammonia access (see 13 in figure below), while the NC gas purge is done through the blow-off pipe after the purge restrictor (18).

Through the flange for ammonia access (13), a mixture of ammonia gas and NC gases enters the evaporator (12) of the purger.

This ammonia/NC mix is cooled down below the condensing temperature of the ammonia by the R452A circuit. At this point, ammonia gas condenses and returns to the ammonia plant via gravity, whereas the NC gases accumulates in the evaporator (12) for subsequent purging.

By condensing the ammonia gas, a new ammonia/NC gases mix is naturally pulled through. This new mix is separated through a continuous process.

While the NC gas concentration in the evaporator (12) increases, the R452A evaporator pressure and temperature will continuously lower.

The controller monitors R452A evaporator pressure and ammonia pressure and temperature and when R452A pressure reaches a predefined pressure differential to the ammonia pressure/temperature, it prepares to purge the NC gases through the solenoid valve (16). The blow-off is activated by the solenoid (16) and through appropriate piping/hosing, it is led into a water bath. This process is done to retain small amounts of ammonia (see Installation section).

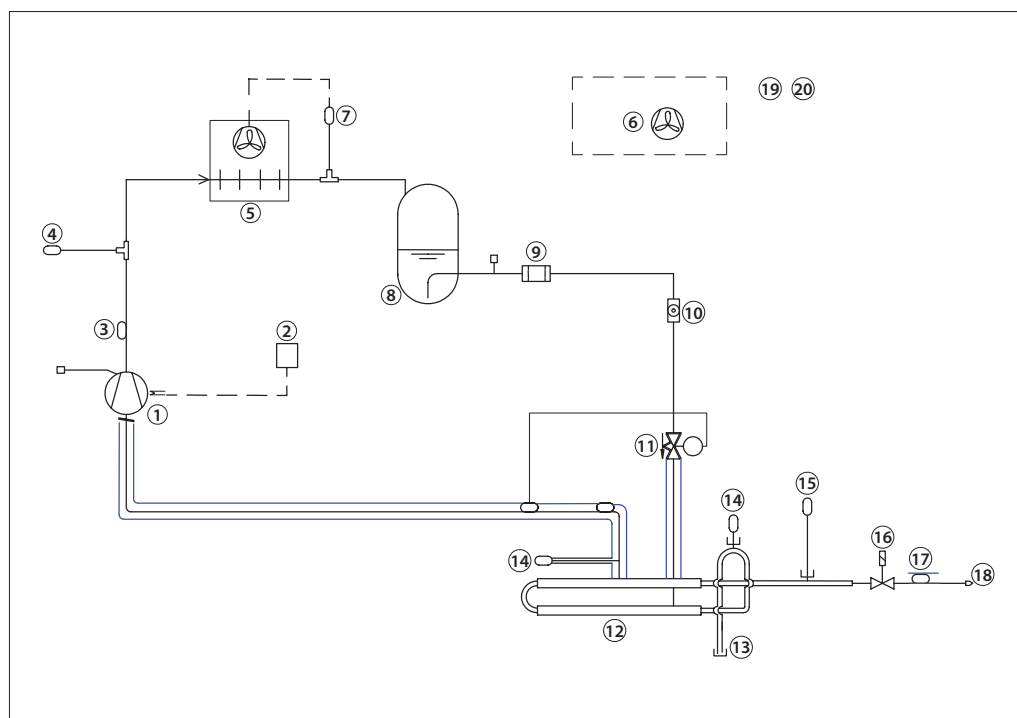


Fig. 1 - Purger R452A lay-out

|    |   |    |                                 |
|----|---|----|---------------------------------|
| 1  | Compressor R452A                        | 11 | Expansion valve, R452A          |
| 1  | Compressor Crankcase heater             | 12 | Evaporator, R452A               |
| 2  | Thermostat for crankcase heater control | 13 | Welding Flange                  |
| 3  | Compressor Hi-temp sensor               | 13 | Flange blind blank              |
| 4  | Pressure safety switch                  | 14 | Pressure transmitter evaporator |
| 5  | Condenser coil assy                     | 15 | Pressure transmitter - R717     |
| 5  | Fan motor for condenser                 | 16 | Solenoid coil, 24V              |
| 6  | Extraction Fan                          | 16 | Purger solenoid kit             |
| 6  | Air grid with filter (2 pieces)         | 17 | Temperature sensor - R717       |
| 7  | Pressure switch for Fan                 | 18 | Restrictor, purge line          |
| 8  | Receiver                                | 19 | MCX 15 Pre-programmed           |
| 9  | Filter                                  | 20 | PSU, 24V                        |
| 10 | Sight glass                             |    | 900 gram (31.7 oz) R452A        |

## Working cycle

The Danfoss IPS 8 operates in 24-hour cycles, of which 45 minutes are dedicated to a R452A pull down. At power on, the pull down is initiated immediately. If no NC gases are detected during the 45 minute pull down, the system will close the solenoid valve at purge point 1 and open the solenoid valve at point 2. After a cycle time of 24 hours/N (Number of purge points), the compressor will pull down again condensing the ammonia. After 24 hours all purge points has been vented one time.

To identify NC gases, the controller utilizes upper and lower thresholds for R452A evaporating temperature. If, during pull down, the temperature continues decreasing and the lower threshold is passed, the controller consider

this to be a high concentration of NC gases and opens the purge solenoid valve. The purge valve will stay open until sufficient condensing ammonia is present to lift the R452A evaporating temperature above the upper threshold.

The compressor will continue running and if the temperature again decreases below the lower threshold, a new purging will be performed. This process will be repeated until the evaporator temperature stays above the lower threshold for 45 minutes after the previous closing of the purge valve.

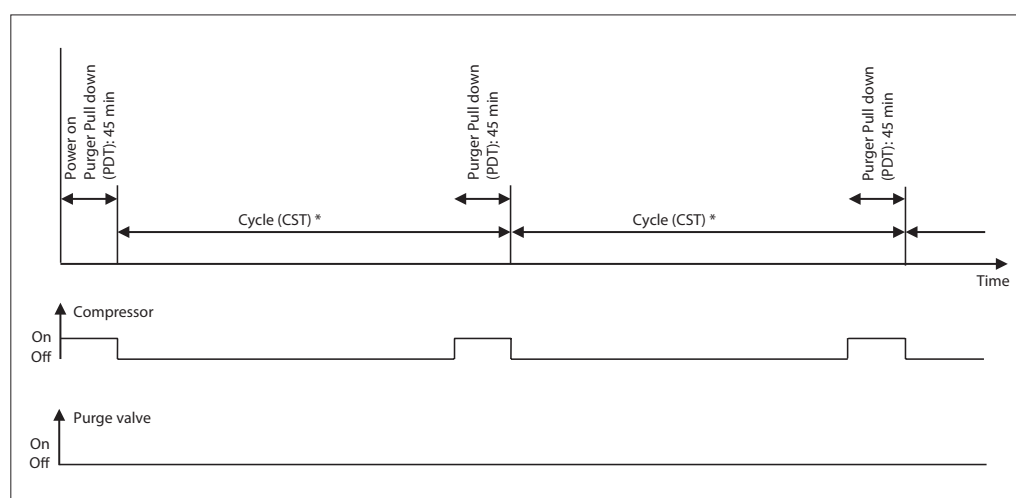


Fig. 2 - Power on & Cycle at no NC gases present: CST (compressor start time) and PDT (pull down time) are configurable  
\* Cycle (CST) = 24 hours/N (number of purge points)

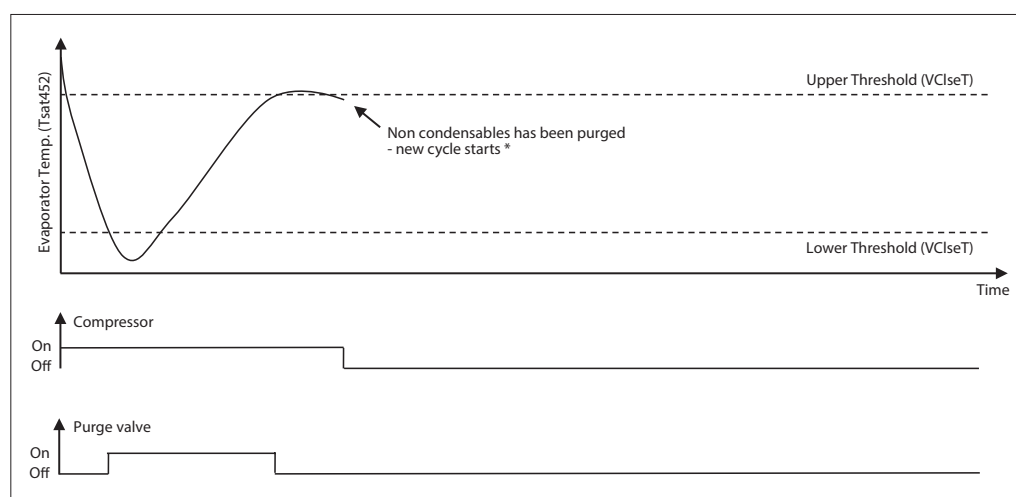


Fig. 3 - Purging procedure - Low R452A evap. temperature detected during PDT: Thresholds are configurable  
\* If low evaporator temperature is detected (passing lower threshold), the purging procedure will be repeated immediately

## Air traps

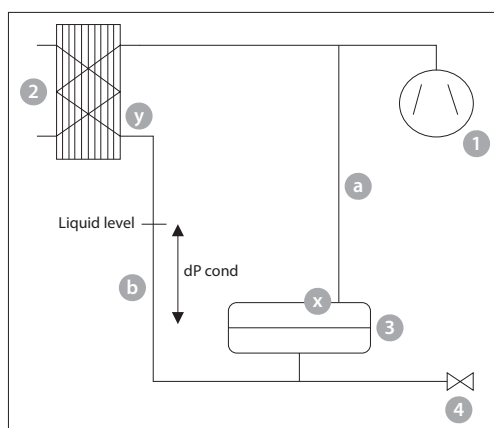


Fig. 4 Liquid level. Bottom connected receiver

For systems with low pressure liquid level control, the proper installation of the condenser/ receiver is as shown in fig. 4 and 5.

The discharge gas from the compressor (1) is led to the condenser (2) where it is condensed. The receiver (3) holds the liquid until there is a demand for liquid from the LP side, e.g., until the expansion valve (4) opens. If the expansion valve is closed, the liquid condensed in the condenser will need to be stored in the receiver and the level will increase. To secure a free flow to the receiver, the gas must be allowed to leave the receiver; this process is accomplished through the pressure equalizing line (a). The pressure equalizing line makes the pressure in the receiver the same as in the compressor discharge line. The pressure in the condenser outlet is lower due to the pressure loss in the condenser. Since the pressure is lower than in the receiver, it is necessary to mount the condenser higher than the receiver and allow for a higher liquid level in the piping between the condenser and the receiver (b).

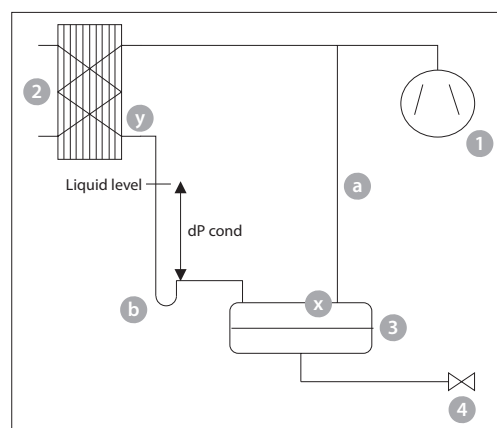


Fig. 5 Liquid level. Top connected receiver

This liquid column in the line (b) compensates for the pressure difference.

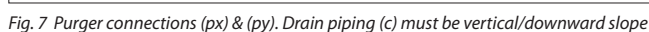
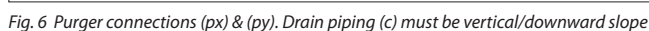
Fig. 4 shows the connection to the bottom of the receiver.

If the liquid from the condenser is connected to the top of the receiver (fig. 5), a slightly different arrangement must be made. The liquid line (b) from the condenser to the receiver will need to have a goose neck/liquid trap to secure the additional liquid column to be established.

While air is heavier than ammonia gas, the air will collect in two locations in this type of installation: On top of the liquid in the receiver (x) or on top of the liquid in the drop leg from the condenser (y).

### Air purger installation in a low-pressure liquid level controlled installation

When the purger is connected to the receiver, the liquid level in the air purgers drop leg (c) will be equal to the receiver level (3); when it is connected to the condenser outlet, the level will be equal to the level in the condenser drop leg (b).



**Connection locations**  
*(continued)*
**Air purger installation in a high-pressure liquid level controlled installation**

For systems with a high-pressure liquid level control, the air will collect in the float valve (3). (See fig. 8).

For this reason, all float valves have been fitted with a small bypass to avoid the air affecting the function of the float valve. The compressor (1) supplies high-pressure gas to the condenser (2), where it is condensed.

The float valve (3) will flash any liquid back to the LP side. The air purger (5) must be connected to the float valve through a solenoid valve (pv). The ammonia liquid condensed in the air purger must be drained through drain pipe (c) to the LP side through a float valve (6).

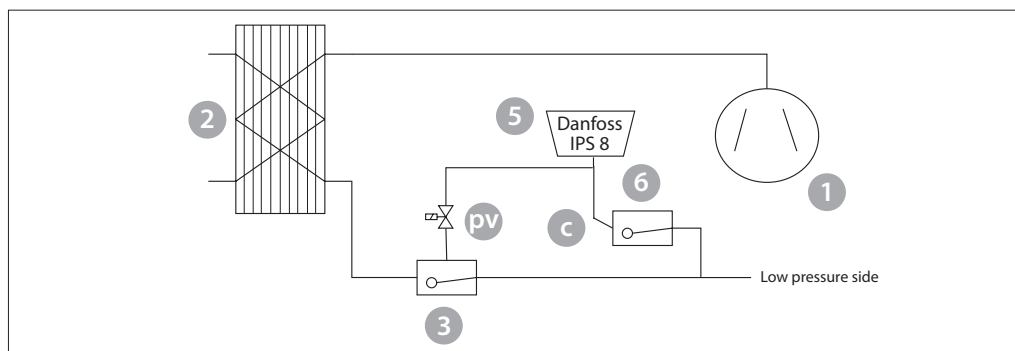


Fig. 8 Purger connections (pv). Drain Piping (c) must be vertical/downward slope

**General**


The air purger must always be mounted above the highest liquid level to be able to drain the ammonia condensed in it. Otherwise, the air purger will be flooded and it can potentially purge ammonia liquid.

The purger liquid return legs (c) must always be vertical or with a downward slope. Never let drain liquid flow upwards.

The solenoid valves at the connection points must never be activated at the same time. Finalize purging at one location before switching to the next.



# WARNING !

Cod. 99000572

Follow the installation guide strictly during Purger installation. Install the Purger unit in a location where the bottom flange level and any gas inlet connection level is above any possible ammonia liquid level.

Liquid drain piping from the purger must always have a downward slope.

Install a shut off valve close to the bottom flange entrance to enable removal of the unit and closing for high pressure ammonia gas.

Connect proper resistant piping to the purging outlet pipe and make sure the purged non-condensables is discharged into a water bath of max. 200 liter.

## Connection points

### Single point or multi-point purging

Single point purging is the basic setup in the Danfoss IPS 8 unit.  
The installation should be done as shown in fig. 9 on top of the receiver or a float valve. (See connection locations).  
The supply and drainage are mechanically controlled, with no special configuration in the purger control required.

The purger unit is able to handle up to 8 purge points in total (see fig. 10).  
Separate control of the supply solenoids must be setup.  
This control should be based on a timer and must be established at site.

$N$  = number of purge points

The solenoid activation control must activate/deactivate each individual solenoid in a sequence of  $24/N$  hour (example 3 purge points –  $24/3 = 8$  hour).

**NEVER HAVE MORE THAN 1 POINT OPEN AT A TIME.**

**Always close one valve before opening the next.**

The integrated Danfoss purger control needs to be adapted to the actual number of purging points during configuration.

This is done by activating the multipurger (label y02) and entering the number of actual purge points in the program. See section "Programming/configuration".  
Please contact Danfoss for instructions on multi-point purging activation.

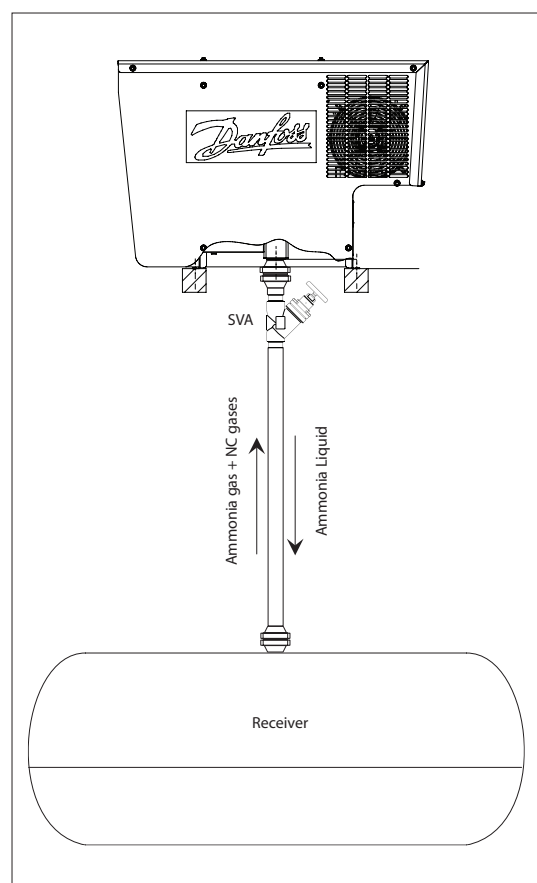


Fig. 9 Single point purging from receiver

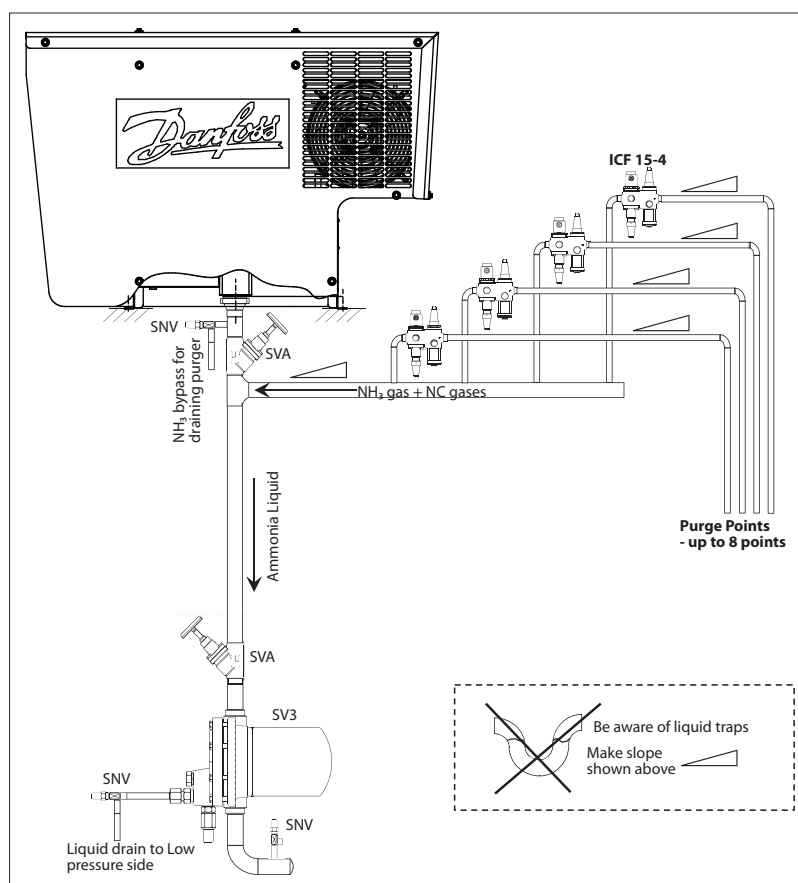


Fig. 10 Multi-point purging from up to 8 purging points

## Installation

The Danfoss IPS 8 should be installed in accordance with locations recommended in the Connection locations and Connection points sections.

The unit is IP55 and can be installed outside, where it will operate from -10 °C to 43 °C (14 °F to 109 °F) ambient temperature. Avoid installation in direct sunlight as this might cause too high ambient temperature. For ambient temperatures below -10 °C (14 °F) the air purger shall be installed in a heated and ventilated area. The unit shall be installed in a non-ATEX atmosphere as the purger unit is not explosion proof

The purger unit should be kept in an upright position all the way from receipt to final installation.

Use all 4 lifting eyes and appropriate lifting gear during installation (unit weight 100 kg/220 lbs).

Install the unit on a horizontal construction 0.05 to 1.1 meter (2 to 43 in) above a service platform with sufficient support and allowing the purger subframe to be bolted to the support (see example in fig. 12). Maintain recommended distances in all directions (fig. 12) to allow fan cooling and service.

Always leave the unit 12 hours from finished installation before first time switching on



It is important that the support construction is level to ensure the internal liquid trap is properly filled.  
**Angle to horizontal < 2 degrees**

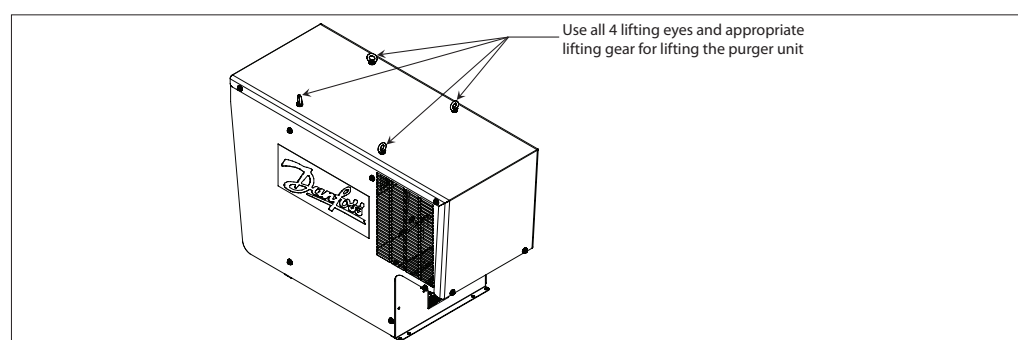


Fig. 11

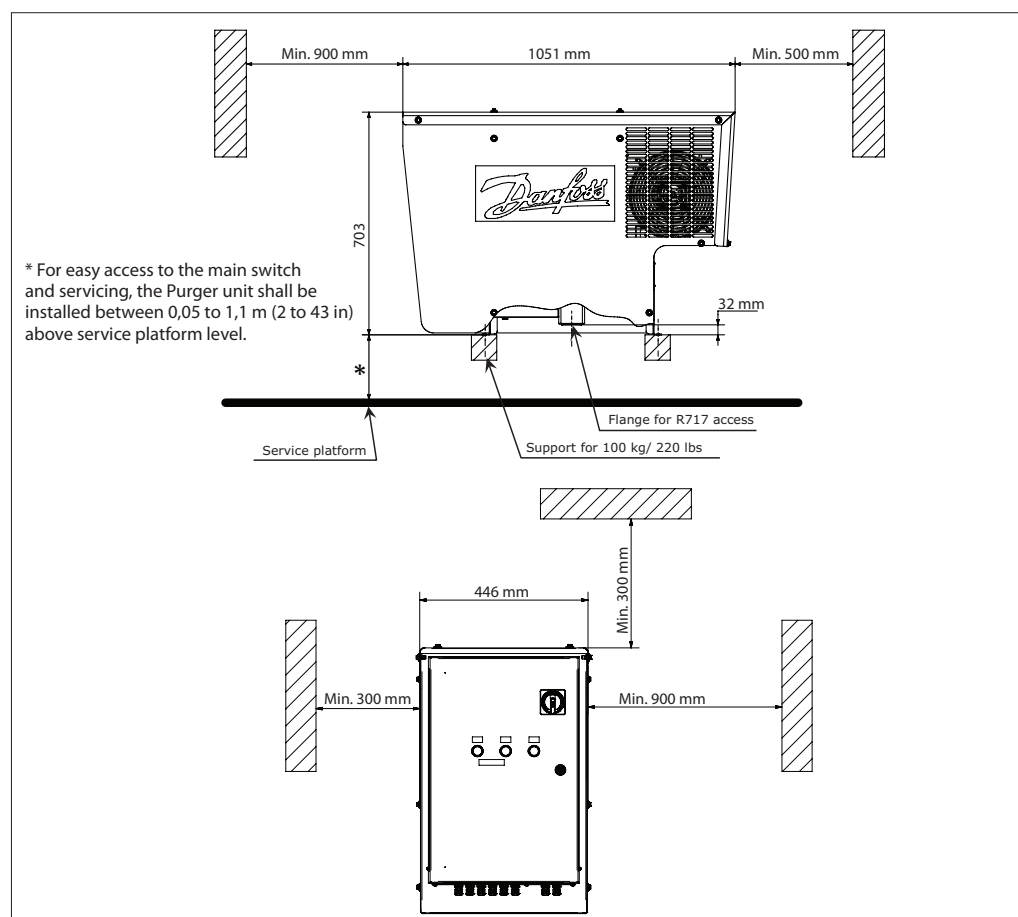
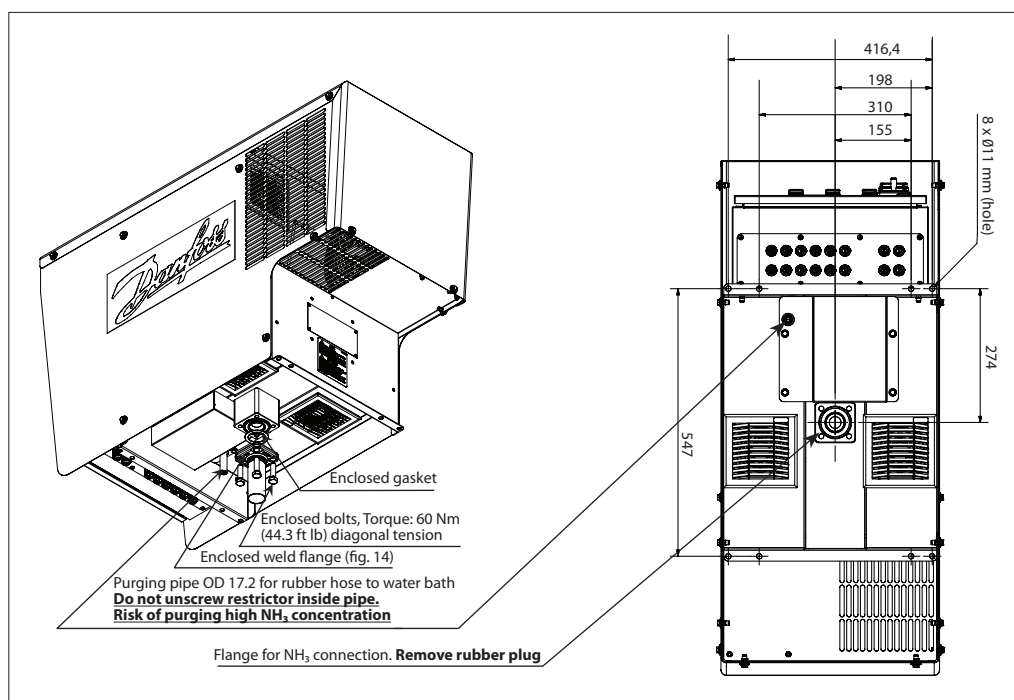
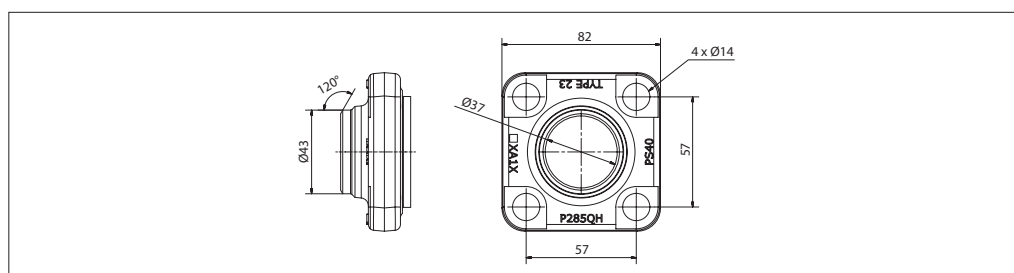


Fig. 12 Installation dimensions

## Installation (continued)



*Fig. 13 Ammonia connection*



*Fig. 14 Enclosed weld flange*

Prepare the ammonia pipe work with the weld flange according to fig. 13 and 14. The main/drain piping should never be smaller than inner diameter Ø37 mm (1.5 in).

Establish the support construction able to carry 100 kg (221 lbs).

Lift the purger into position using the lifting eyes on each side of the cabinet.  
Remove the rubber plug from the flange opening.

Connect the weld flange with the purger flange using the enclosed flat gasket and tighten the 4 bolts diagonally to a torque of 60 Nm (44.3 ft-lb).

Insert 4 bolts through the purger frame and the support construction and tighten.

Perform a leak test to ensure tight connection.

In case the purger unit needs to be dismantled please contact Danfoss for instructions.

Establish a proper pipe/hose from the purge solenoid valve for blow-off of NC gases according to local or national regulations.

Prepare an outside water tank with a maximum of 200 liters (53 gal.) and make sure the piping allows the purged gas to be immersed in the water.

Regularly check the Ph value of the tank's contents.

The Ph value should never exceed 12.6 else the content must be renewed.

Dispose of highly concentrated waste water according to local/national regulations.



Note: Prior to replacing the water in the water tank it must be secured that the purger is switched off and the shut off valve at the flanged purger inlet is closed. Leave the unit in this condition for a period to allow the remaining gas in the piping to be dissolved/escaped.

**Watch out for bubbles.**

Establish a procedure for regular check of Ph and bubble pattern.

If continuous bubbles are observed in the water tank during "stand by" (Green light indicator) in normal operation the purge solenoid valve needs repair or replacement.

## Electrical wiring

The internal wiring of the purger is done at the factory. Only the electrical wiring for the main power supply, the purge point solenoids and optional bus communication must be done on site.

It is recommended to protect all external cables from the IPS 8 to the power supply and to all purge point solenoids by metallic pipes.

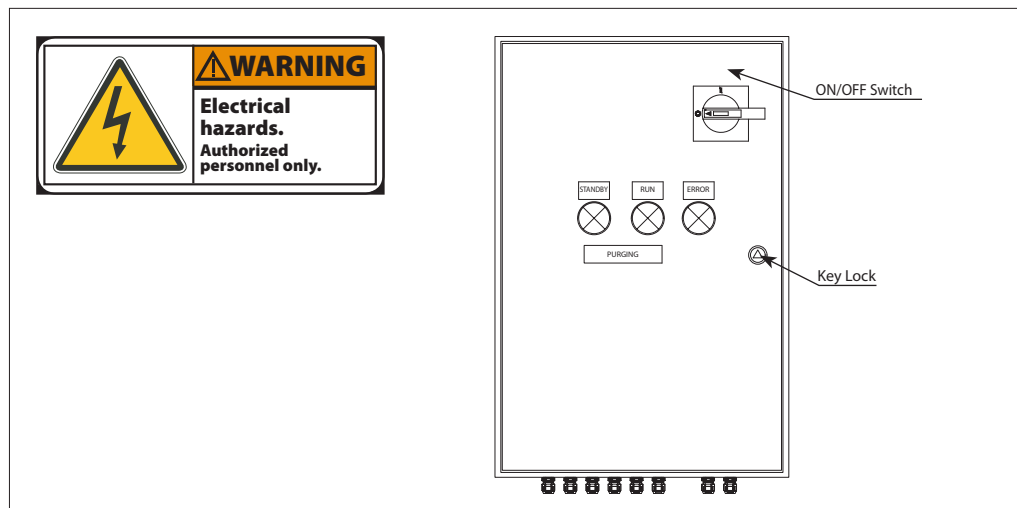


Fig. 15 Controller box external

Controller box cover can only be opened at key unlock and main switch off.

**Note: Authorized personnel only**

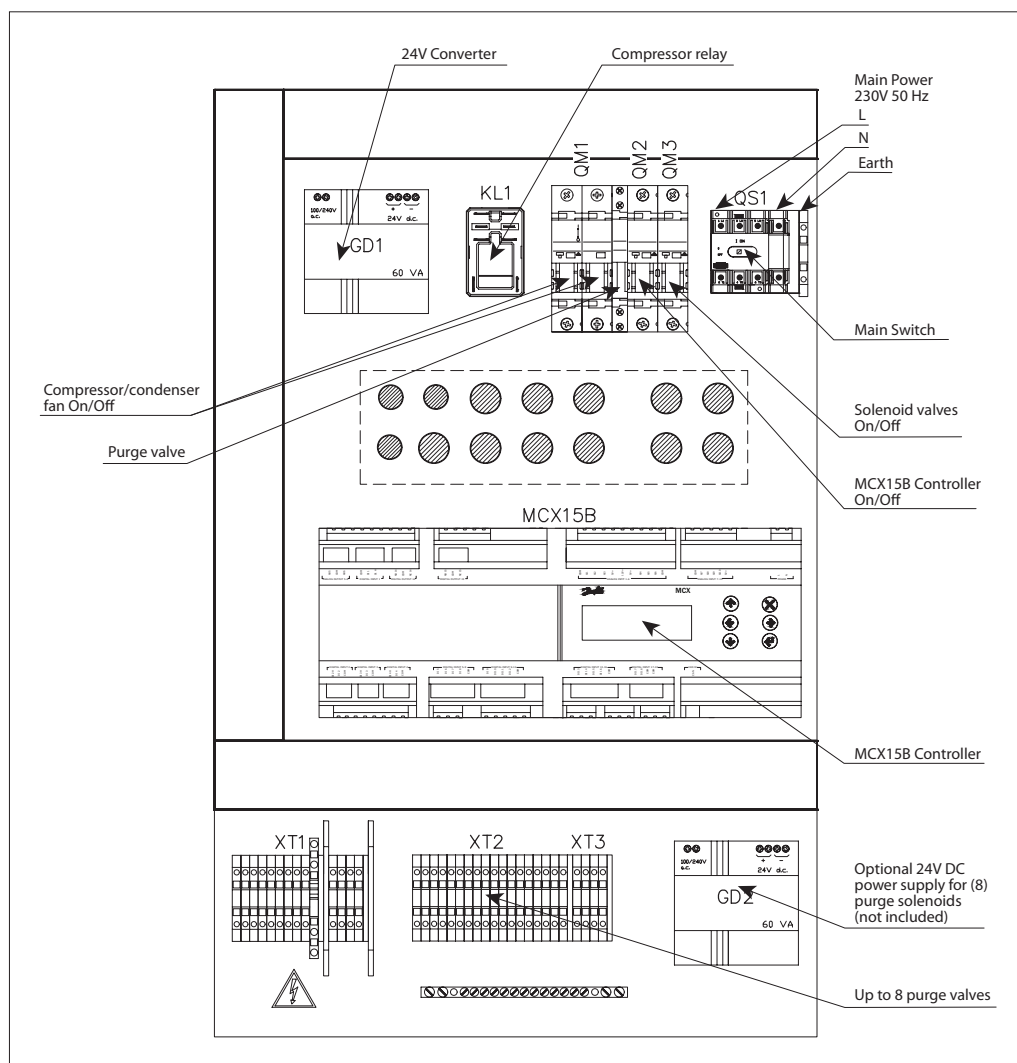


Fig. 16 Controller box internal

# Electrical wiring (continued)

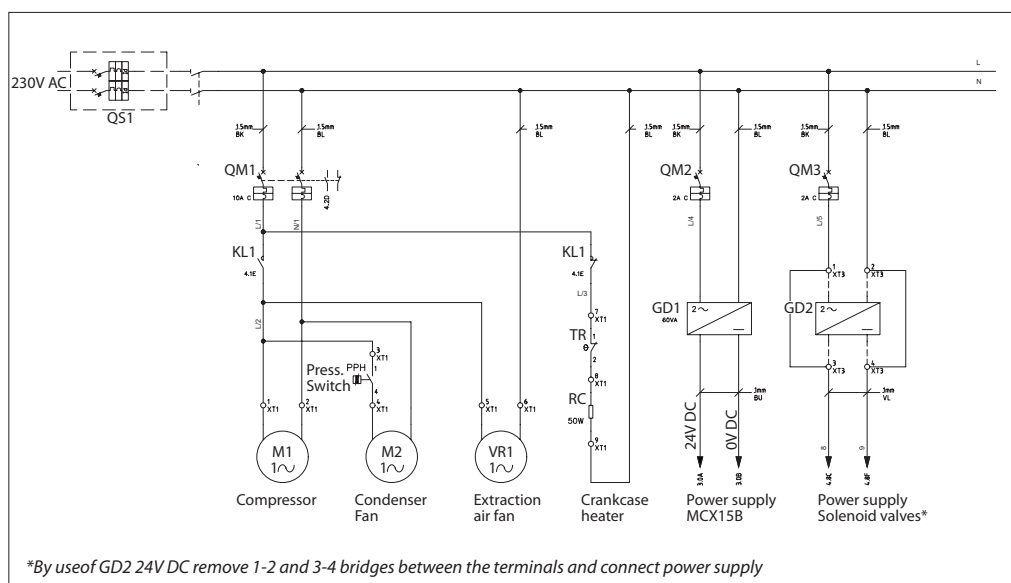


Fig. 17 Power Supply

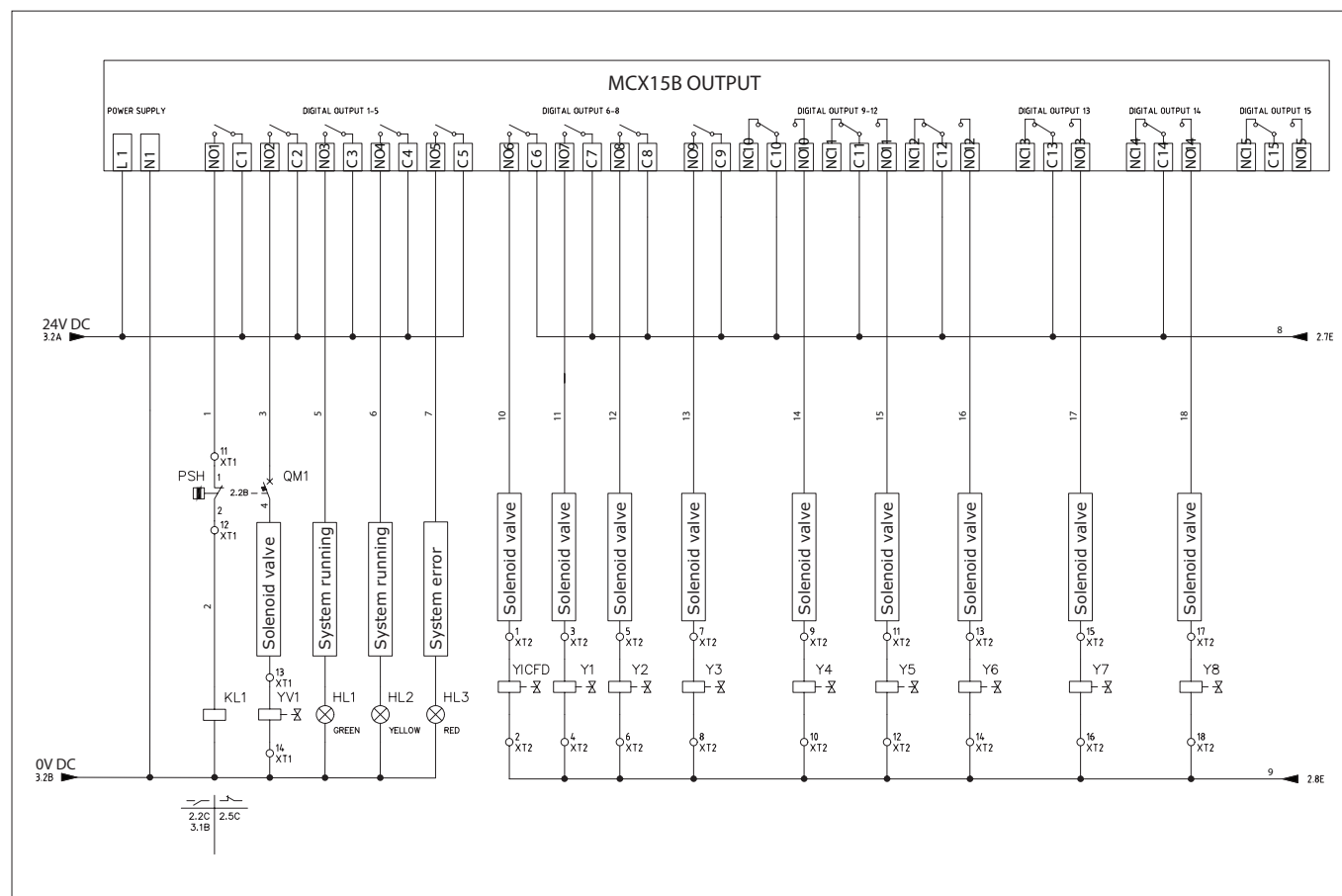


Fig. 18 Controller MCX15B Inputs and Outputs

## Electrical wiring (continued)

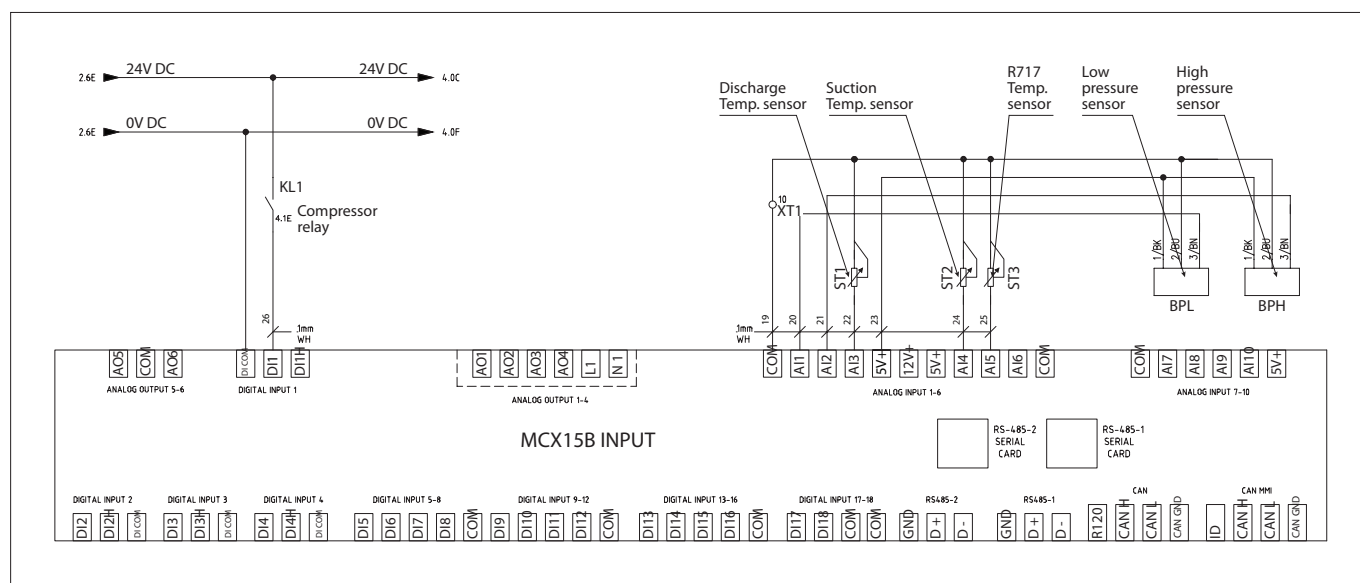


Fig. 19 Controller MCX15B Inputs

## Light Indicators

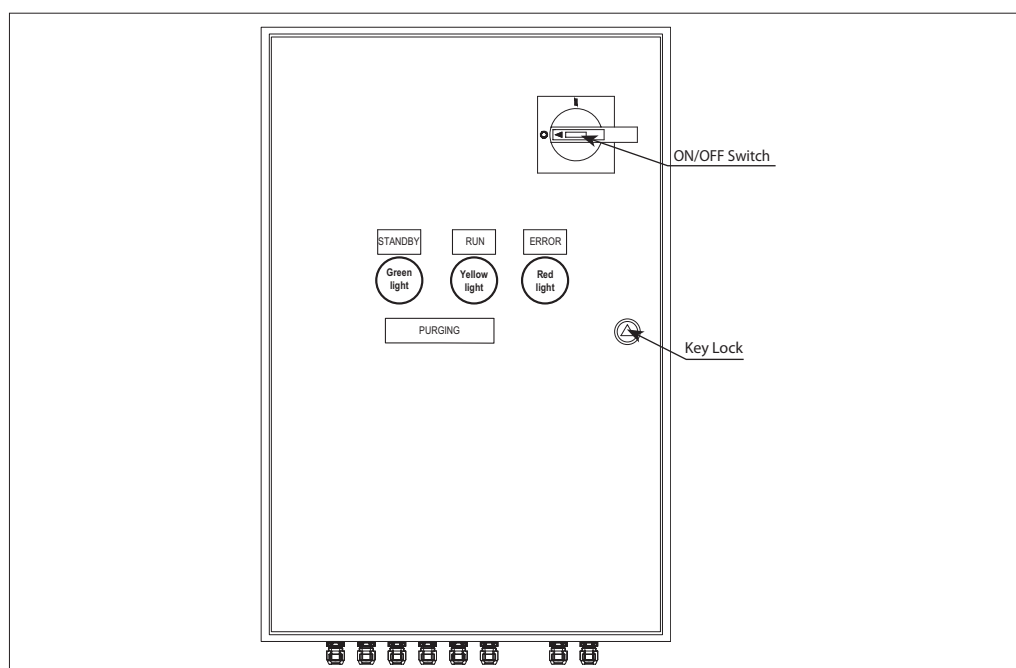


Fig. 20

| Lights ON            | Status  | Compressor ON | Compressor OFF | Purge Valve ON | Purge Valve OFF | Alarm |
|----------------------|---|---------------|----------------|----------------|-----------------|-------|
| Green                | Stand by                                      |               | X              |                | X               |       |
| Yellow               | Run   | X             |                |                | X               |       |
| Green & Yellow       | Purging                                       | X             |                | X              |                 |       |
| Green & Yellow & Red | Uninterrupted Long time purging (> 150 h)     | X             |                | X*             |                 |       |
| Red                  | Occurs when: Check list of alarms description | (X**)         | X**            |                |                 | X     |

\* The purger continuous purging until max running period (default 160 h) is reached and the purger compressor will stop

\*\* The purger compressor stops when alarm occurs

## Display

After switching on the controller, a display window will momentarily show the actual software version, followed by the default main operating window shown in fig. 21.

While in operation mode, the Up/Down arrows lead to the status windows mentioned in the table below.

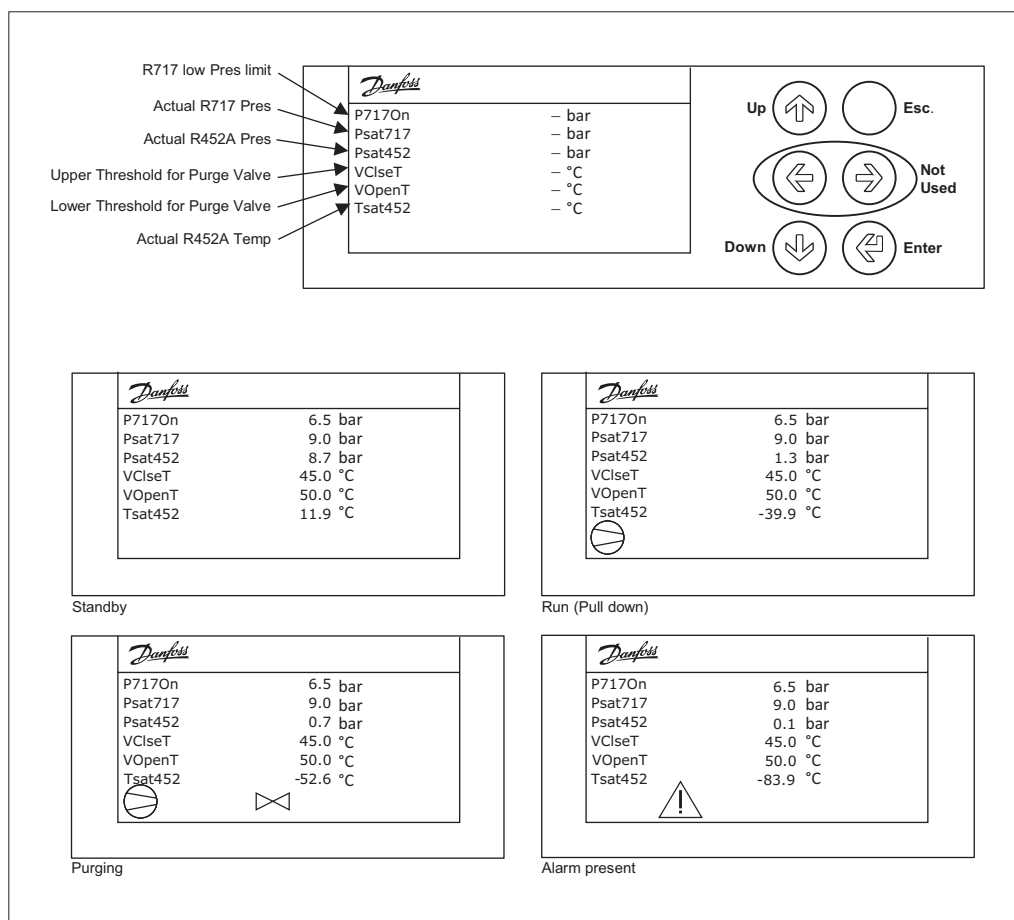



Fig. 21 - Default main window. Operating (start) mode. (Examples only)

|                        |         |  |
|------------------------|---------|--|
| Purge Point percentage | ↑       | Distribution of the actual purging on the various purge points |
| Dis. temp.             | ↑       | Actual R452A discharge temperature (°C)                        |
| Main Window            | default | See above  |
| Cycle info             | ↓       | Acc. time Purge valve open (h)                                 |
| Past events            | ↓       | Last 7 purging events (min)                                    |

**Programming/Configuration**

By pressing  the main menu will show up with below options

| Main Menu    | Submenu           | Submenu/status                    | Submenu/status | Min      | Max       | Default   | Description   | Label |
|--------------|-------------------|-----------------------------------|----------------|----------|-----------|-----------|---|-------|
| Alarms       | Active alarms     | No alarm                          |                |          |           |           |   |       |
|              |                   | up to 15 alarms (see table below) |                |          |           |           | Up to 15 possible alarms listed by arrow up/down    |       |
|              |                   | Reset alarms                      |                |          |           |           | Reset all actual alarms                             |       |
|              | Log history       |                                   |                |          |           |           | View log history                                    |       |
|              | Clear log history |                                   |                |          |           |           | Clear log history                                   |       |
| Login        | Password          | ***                               |                |          |           | 200       | N/A   |       |
| Start        | Turn On           |                                   |                |          |           |           | Main switch ON                                      |       |
|              | Turn Off          |                                   |                |          |           |           | Main switch OFF                                     |       |
| Parameters   | Unit config       | Compressor                        |                | 0 sec    | 100 sec   | 20 sec    | SDT (Compressor start delay)                        | CM2   |
|              |                   |                                   |                | 5 min    | 2000 min  | 45 min    | PDT (Pull down time)                                | CM3   |
|              |                   |                                   |                | 180 min  | 2000 min  | 1440 min  | CST (Cycle time)                                    | CM4   |
|              |                   |                                   |                | 24 hours | 768 hours | 160 hours | PLT (Endless purging max time)                      | VA5   |
|              | Limits settings   |                                   |                | 0 bar    | 5 bar     | 0.5 bar   | Comp Diff (Hysteresis min allowed ammonia pressure) | CM5   |
|              |                   |                                   |                | 0 bar    | 12 bar    | 6.5 bar   | Setpoint (Min allowed ammonia pressure)             | CM1   |
| Input/Output |                   |                                   |                |          |           |           | Input / Output Display & Config                     |       |

**Occurring active alarms, possible reasons and recommended action**

| Code | Modbus address | Alarm                  | Description                                   | Possible reason                         | Recommended action  |
|------|----------------|------------------------|---|---|---|
| A01  | 1901 .08       | General alarm          | Adjustable external alarm (default not used)  | Fault in system connected to the DIO4   | Contact contractor  |
| E01  | 1901 .09       | Temp. Sensor Fault     | Electrical failure to R452A Temp. sensor      | Cut wire                                | Repair the wiring   |
| E02  | 1901 .10       | BPL Sensor Fault       | Electrical failure to Ammonia Pressure sensor | Cut wire                                | Repair the wiring   |
| E03  | 1901 .11       | BPH Sensor Fault       | Electrical failure to R452A Pressure sensor   | Cut wire                                | Repair the wiring   |
| E04  | 1901 .12       | Low temperature        | R452A Temp. too low                           | Low ambient temperature                 | Wait for higher ambient temp. or move IPS to a place with high ambient temp.. |
| E05  | 1901 .13       | Hi temperature         | R452A Temp. too high                          | Hi ambient temperature                  | Wait for lower ambient temp. or move IPS to a place with lower ambient temp.  |
| E06  | 1901 .14       | Low pressure BPL       | Ammonia Pressure too low                      | Closed stop valve                       | Open inlet stop valve   |
| E07  | 1901 .15       | Hi pressure BPL        | Ammonia Pressure too high                     | Ammonia system pressure too high        | Wait for lower pressure   |
| E08  | 1901 .00       | Low pressure BPH       | R452A Pressure too low                        | Low R452A charge                        | Find and repair leak, evacuate and recharge with R452A                        |
| E09  | 1901 .01       | Hi pressure BPH        | R452A Pressure too high                       | Ammonia system pressure too high        | Wait for lower pressure   |
| E10  | 1901 .02       | System is OFF          | System is Off (*)                             | Main switch is OFF                      | Switch ON the main switch   |
| E11  | 1901 .03       | Memory is full         | Memory is full                                | Memory is full from long time operation | Clean the memory in the MCX   |
| E12  | 1901 .04       | Total purge time error | Total purge time exceeded                     | Restrictor is plugged                   | Replace the restrictor  |
| E13  | 1901 .05       | Compressor error       | No feedback from KL1 relay                    | Wiring from MCX is cut                  | Repair the wiring   |

| Code | Possible reason                                    | Recommended action                                     | Possible reason                       | Recommended action                              | Possible reason          | Recommended action              |
|------|--|--|---------------------------------------|---|--------------------------|---------------------------------|
| E01  | Faulty sensor                                      | Replace sensor   | Measurement out of range              | Check actual pressure. Replace sensor if needed |                          |                                 |
| E02  | Faulty sensor                                      | Replace sensor   | Measurement out of range              | Check actual pressure. Replace sensor if needed |                          |                                 |
| E03  | Faulty sensor                                      | Replace sensor   | Measurement out of range              | Check actual pressure. Replace sensor if needed |                          |                                 |
| E05  | Low R452A charge                                   | Find and repair leak, evacuate and recharge with R452A |                                       |   |                          |                                 |
| E06  | Rubber plug in flange not removed                  | Remove rubber plug                                     |                                       |   |                          |                                 |
| E08  | Expansion valve may be clogged or have lost charge | Replace expansion valve                                |                                       |   |                          |                                 |
| E09  | Expansion valve may be clogged or have lost charge | Replace expansion valve                                | Condenser fan is not running properly | Clean or Replace fan or fan motor               | Air in the R452A circuit | Empty vacuum and recharge R452A |
| E12  | Large hole in ammonia system                       | Isolate the hole and close it                          |                                       |   |                          |                                 |

All alarms except (\*) activates red light on box outside

For alarms not resettable and/or cause not identified please contact Danfoss

**Programming/Configuration**
*(continued)*
**Bus and Map**

| Label                     | Description                      | Value  | Unit | Decimals | Level | R/W Mode | Enumeration | Modbus Address (ADU) |
|---------------------------|----------------------------------|--------|------|----------|-------|----------|-------------|----------------------|
| <b>GENERAL &gt; SETUP</b> |                                  |        |      |          |       |          |             |                      |
| <b>y01</b>                | ON/OFF                           | 1 = ON |      | 0        | 0     | R/W      | OFF;ON      | 3001                 |
| <b>y02</b>                | Activate Multipurger             | 0 = NO |      | 0        | 3*    | R/W      | NO;YES      | 3002                 |
|                           | UNIT CONFIG > COMPRESSOR         |        |      |          |       |          |             |                      |
| <b>CM3</b>                | PDT                              | 45     | min  | 0        | 0     | R/W      |             | 3015                 |
| <b>CM4</b>                | CST                              | 1440   | min  | 0        | 0     | R/W      |             | 3016                 |
| <b>VA5</b>                | PLT                              | 160    | h    | 0        | 0     | R/W      |             | 3017                 |
|                           | UNIT CONFIG > LIMITS SETTINGS    |        |      |          |       |          |             |                      |
| <b>CM5</b>                | Comp Diff                        | 0,5    |      | 1        | 0     | R/W      |             | 3033                 |
| <b>CM1</b>                | Setpoint                         | 6,5    | bar  | 1        | 0     | R/W      |             | 3034                 |
|                           | STATUS VAR > MCX DESIGN HOTSPOTS |        |      |          |       |          |             |                      |
| <b>C01</b>                | Reset Alarms                     | 0      |      | 0        | 0     | R/W      |             | 1859                 |
| <b>V02</b>                | SystemOnOff                      | 0      |      | 0        | 0     | Read     |             | 8101                 |
| <b>V03</b>                | ValveStatus                      | 0      |      | 0        | 0     | Read     |             | 8102                 |
| <b>V04</b>                | CompressorStatus                 | 0      |      | 0        | 0     | R/W      |             | 8103                 |
| <b>V05</b>                | ALARActive                       | 0      |      | 0        | 0     | Read     |             | 8104                 |
| <b>V06</b>                | PressTotemp                      | 0      |      | 1        | 0     | Read     |             | 8105                 |
| <b>V07</b>                | ValveCount                       | 0      |      | 0        | 0     | Read     |             | 8106                 |
| <b>V08</b>                | ComprTime                        | 0      |      | 0        | 0     | Read     |             | 8108                 |
| <b>V09</b>                | COMprStartAfter                  | 0      |      | 0        | 0     | Read     |             | 8110                 |
| <b>V10</b>                | ResetMem                         | 0      |      | 0        | 0     | R/W      |             | 9901                 |
| <b>V11</b>                | ValveHour                        | 0      |      | 1        | 0     | Read     |             | 8112                 |
| <b>V12</b>                | StatusKL                         | 0      |      | 0        | 0     | Read     |             | 8114                 |
| <b>V13</b>                | WaringCompr                      | 0      |      | 0        | 0     | Read     |             | 8115                 |
| <b>V14</b>                | ValveSetpoint                    | 0      |      | 0        | 0     | Read     |             | 8116                 |
| <b>V15</b>                | ValveClose                       | 0      |      | 0        | 0     | Read     |             | 8117                 |
| <b>V16</b>                | Event1                           | 0      |      | 1        | 0     | Read     |             | 8119                 |
| <b>V17</b>                | Event2                           | 0      |      | 1        | 0     | Read     |             | 8120                 |
| <b>V18</b>                | Event3                           | 0      |      | 1        | 0     | Read     |             | 8121                 |
| <b>V19</b>                | Event4                           | 0      |      | 1        | 0     | Read     |             | 8122                 |
| <b>V20</b>                | Event5                           | 0      |      | 1        | 0     | Read     |             | 8123                 |
| <b>V21</b>                | Event6                           | 0      |      | 1        | 0     | Read     |             | 8124                 |
| <b>V22</b>                | Event7                           | 0      |      | 1        | 0     | Read     |             | 8125                 |
| <b>V23</b>                | PP1                              | 0      |      | 0        | 0     | Read     |             | 8126                 |
| <b>V24</b>                | PP2                              | 0      |      | 0        | 0     | Read     |             | 8128                 |
| <b>V25</b>                | PP3                              | 0      |      | 0        | 0     | Read     |             | 8130                 |
| <b>V26</b>                | PP4                              | 0      |      | 0        | 0     | Read     |             | 8132                 |
| <b>V27</b>                | PP5                              | 0      |      | 0        | 0     | Read     |             | 8134                 |
| <b>V28</b>                | PP6                              | 0      |      | 0        | 0     | Read     |             | 8136                 |
| <b>V29</b>                | PP7                              | 0      |      | 0        | 0     | Read     |             | 8138                 |
| <b>V30</b>                | PP8                              | 0      |      | 0        | 0     | Read     |             | 8140                 |
| <b>V31</b>                | Val1                             | 0      |      | 0        | 0     | Read     |             | 8142                 |
| <b>V32</b>                | Val2                             | 0      |      | 0        | 0     | Read     |             | 8143                 |
| <b>V33</b>                | Val3                             | 0      |      | 0        | 0     | Read     |             | 8144                 |
| <b>V34</b>                | Val4                             | 0      |      | 0        | 0     | Read     |             | 8145                 |
| <b>V35</b>                | Val5                             | 0      |      | 0        | 0     | Read     |             | 8146                 |
| <b>V36</b>                | Val6                             | 0      |      | 0        | 0     | Read     |             | 8147                 |
| <b>V37</b>                | Val7                             | 0      |      | 0        | 0     | Read     |             | 8148                 |
| <b>V38</b>                | Val8                             | 0      |      | 0        | 0     | Read     |             | 8149                 |
| <b>V39</b>                | RangedVal                        | 0      |      | 0        | 0     | Read     |             | 8150                 |

*Level legend: 0 = Read view, 2 = Installer view (code 200) 3 = Danfoss Service view (Contact Danfoss)*

**Maintenance/Service/  
Disposal**
**Maintenance minimum once per year**

|   |  |
|---|--|
| 1 | Use P&I diagram and check that all powered components is working properly                                      |
| 2 | Check for alarms in the MCX controller   |
| 3 | Fans and fins shall be cleaned for dirt and dust   |
| 4 | Expansion valve shall be inspected and shall be replaced if damaged  |
| 5 | Ensure expansion valves sensor bulb has good contact with suction line   |
| 6 | Replace water in water bubble bath. Check Ph level frequently and replace when Ph > 12.6                       |
| 7 | Check cover is mounted correctly and all bolts are tightened   |
| 8 | Check and verify the amperage of the unit  |
| 9 | Check for compressor noises in normal operating conditions (may indicate loos bolts, worn bearings or pistons) |

**Procedure to isolate IPS for service**

|   | <b>Multipoint</b>   | <b>Single point</b>   |
|---|---|---|
| 1 | Close the individual supply of gas line(s) from the ammonia system.<br>Do not close any stop valve between IPS 8 and float valve  | Restart the controller to force pump down   |
| 2 | Restart the controller to force pump down   | Wait 10 – 20 minutes  |
| 3 | Wait 10 – 20 minutes  | Close the stop valve in the ammonia drain line under the IPS 8  |
| 4 | Stop the compressor by switching of the compressor fuse   | Stop the compressor by switching of the compressor fuse   |
| 5 | Close the stop valve in the ammonia drain line under the IPS 8  | Close the stop valve in the ammonia drain line under the IPS 8  |
| 6 | Relief the remaining system pressure down to ambient pressure by opening the AKVA using a permanent magnet or a possible SNV purge valve mounted in the inlet line (see fig.10) | Relief the remaining system pressure down to ambient pressure by opening the AKVA using a permanent magnet or a possible SNV purge valve mounted in the inlet line (see fig.10) |

**Disposal of the IPS 8**

If an IPS 8 unit is worn out and has to be replaced the disposal must be done in accordance with national legislation and only done by competent personnel.

## User Guide | Intelligent Purger System (IPS 8) for Ammonia - Technical data, installation and use

### Technical data

|                                     |   |
|-------------------------------------|---|
| Supply voltage                      | 230V AC, 1 ph, 50Hz                             |
| Current                             | 5.7 A (max. 6.5 A)                              |
| Power consumption                   | max. 1.3 kW                                     |
| Short-circuit current rating        | Icc 10kA  |
| Temperature range ambient           | -10 °C to +43 °C (14 °F to 109 °F)              |
| Temperature range transport/storage | -30 °C to +60 °C (-22 °F to 140 °F)             |
| Enclosure                           | IP55  |
| Weight                              | max. 100 kg (221 lbs)                           |
| Dimensions (LxWxH)                  | 1051 x 441 x 703 mm (41.4 x 17.4 x 27.7 inches) |
| Purger refrigerant                  | R452A 900 gram (31.7 oz)                        |
| Max. operating pressure (PS) R452A  | 28 bar (406 psi)                                |
| System refrigerant                  | R717  |
| Min. operating pressure R717        | 6.5 bar (94 psi)                                |
| Max. operating pressure R717        | 40 bar (580 psi)                                |
| Operating temperature R717          | -40 °C to +60 °C (-40 °F to 140 °F)             |

### Ordering

| Unit   | Code number     |
|--|-----------------|
| Danfoss Intelligent Purger System IPS 8 unit | <b>084H5001</b> |

| Accessories/Spare parts   | Accessory | Spare part | Code              |
|---|-----------|------------|-------------------|
| Flange blind blank incl Bolts, nuts and Gaskets*                      | x         |            | <b>084H5053</b>   |
| SV3 Float Valve   | x         |            | <b>027B2023</b>   |
| ICF 15-4 solenoid, DIN  | x         |            | <b>027L4543</b>   |
| ICF 15-4 solenoid, ANSI   | x         |            | <b>027L4538</b>   |
| Welding Flange incl Bolts, nuts and Gaskets                           | x         |            | <b>084H5055</b>   |
| Purger solenoid kit (Armature, tube, Sealing, Orifice, Filter insert) | x         |            | <b>084H5051</b>   |
| Solenoid coil, 220 – 230V, 50 HZ for AKV                              | x         |            | <b>018F6801</b>   |
| Solenoid coil, 24V for AKV  | x         |            | <b>018F6757</b>   |
| PSU, 24V - optional for powering purge points                         | x         |            | <b>080Z0055</b>   |
| Restrictor, purge line  |           | x          | <b>084H5054</b>   |
| Compressor Cranck case heater   |           | x          | <b>084H5058</b>   |
| Condenser coil assy incl screws                                       |           | x          | <b>084H5059</b>   |
| Fan motor for condenser Incl fan grid and screws                      |           | x          | <b>084H5060</b>   |
| Extraction Fan  |           | x          | <b>084H5056</b>   |
| Air grid with filter (2 pieces)                                       |           | x          | <b>084H5057</b>   |
| Pre-programmed MCX 15   |           | x          | <b>084H5052</b>   |
| Pressure transmitter evaporator, soldered (AKS 32R)                   |           | x          | <b>060G3552</b>   |
| Compressor including Start relay box and Start and Run Capacitor      |           | x          | <b>123F2126</b>   |
| Compressor Hi-temp sensor   |           | x          | <b>084N2003</b>   |
| Expansion valve, R452A  |           | x          | <b>068U3881</b>   |
| Sigth glass   |           | x          | <b>014-0191</b>   |
| Pressure transmitter - R717, Threaded, AKS2050                        |           | x          | <b>060G5750</b>   |
| Thermostat for crankcase heater control                               |           | x          | <b>060L111166</b> |
| Temperature sensor - R717, AKS 21M                                    |           | x          | <b>084N2003</b>   |
| Pressure switch for Fan   |           | x          | Contact Danfoss   |
| Pressure safety switch  |           | x          | Contact Danfoss   |

\* For closing system flange during system pressure testing



