

## Installation guide

## NeoCharge Solution

EKE 450, NeoCharge clamp, NeoCharge sensor and NeoCharge relay

080R9500

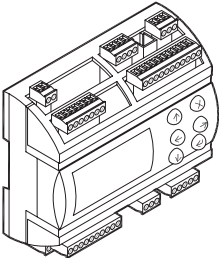
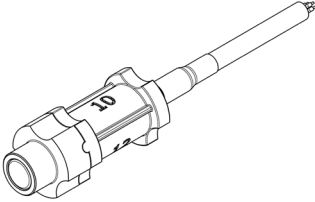
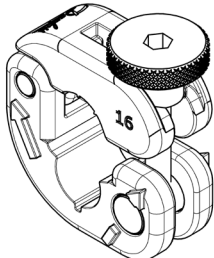
080R9500

## Identification-NeoCharge solution

|                 |                                                                                        |
|-----------------|----------------------------------------------------------------------------------------|
| <b>084H1150</b> | EKE 450 24 V AC/DC, 10, 12, 16 mm NeoCharge clamp, sensor, NeoCharge solid state relay |
| <b>084H1151</b> | EKE 450 230 V AC, 10, 12, 16 mm NeoCharge clamp, sensor, NeoCharge solid state relay   |
| <b>084H1152</b> | EKE 450 24 V AC/DC, 20, 22, 27 mm NeoCharge clamp, sensor, NeoCharge solid state relay |
| <b>084H1153</b> | EKE 450 230 V AC, 20, 22, 27 mm NeoCharge clamp, sensor, NeoCharge solid state relay   |

Spare part code numbers are listed below

## Parts included in solution

| EKE 450 with HMI                                                                  | NeoCharge sensor                                                                  | NeoCharge clamp                                                                    | NeoCharge solid state relay                                                         |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |
| <b>080G5007</b> = 230 V AC<br><b>080G5008</b> = 24 V AC/DC                        | <b>084H1101</b> = 10, 12, 16 mm<br><b>084H1102</b> = 20, 22, 27 mm                | <b>084H1103</b> = 10, 12, 16 mm<br><b>084H1104</b> = 20, 22, 27 mm                 | <b>080G5011</b>                                                                     |

| Accessories                                | Ordering                                                                                                              |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Remote display (HMI), type MMIGRS2         | <b>080G0294</b><br><b>Note:</b> the remote display cannot be used with Russian, Chinese, Korean or Japanese languages |
| Cable between EKE 450 and HMI              | <b>080G0075</b> = 1.5 m<br><b>080G0076</b> = 3.0 m                                                                    |
| AK-PS 130 24 V DC Power Supply             | <b>080Z0058</b>                                                                                                       |
| Pressure transmitter                       | AKS 33, AKS 32, AKS 32R<br>or compatible. Use CoolSelector®2 to find correct version                                  |
| Temperature sensor (for "S2 suction pipe") | AKS 21 A or compatible. Use CoolSelector®2 to find correct version                                                    |

For configuring the NeoCharge solution, use the CoolConfig software:

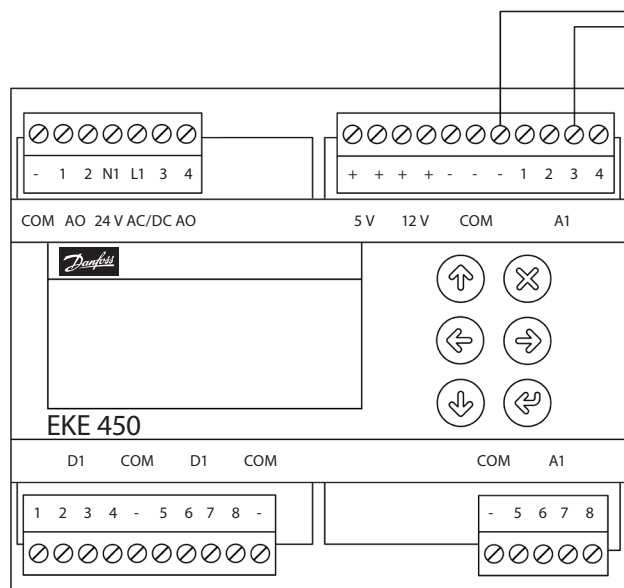
<https://coolconfig.danfoss.com>

Імпортёр: ТОВ з іі "Данфосс ТОВ" 04080, Київ 80, п/с 168, Україна

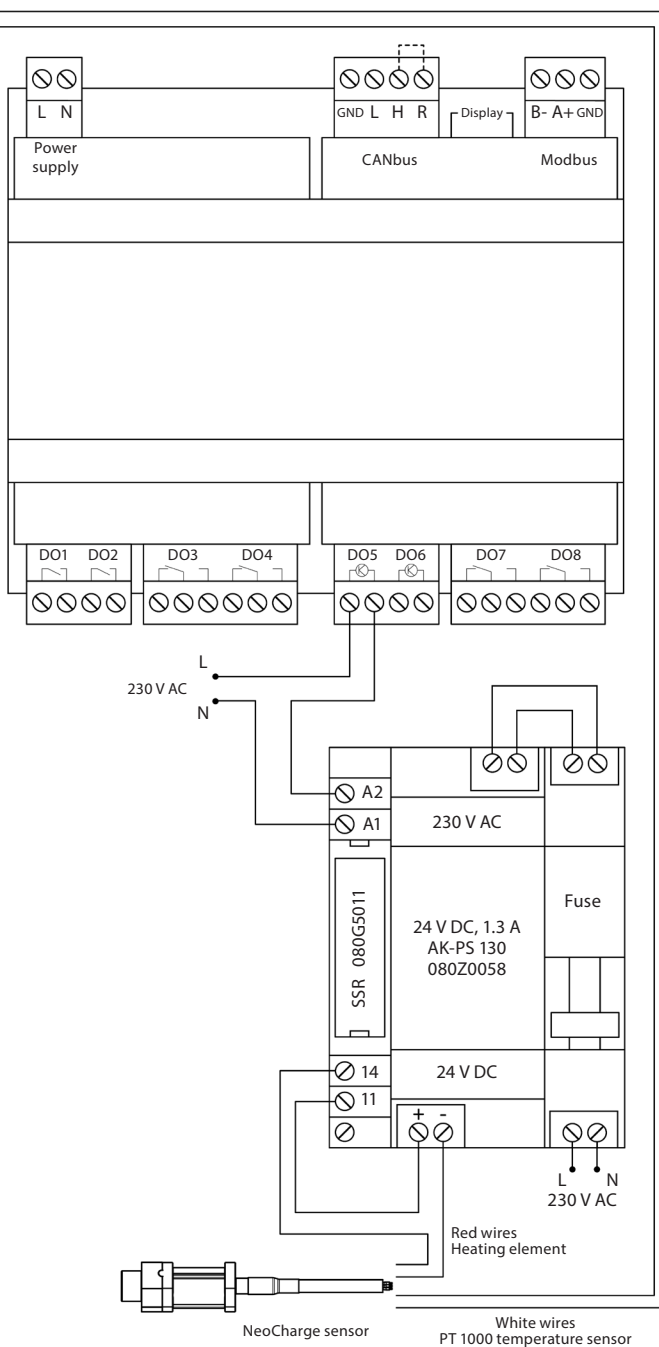
Info for UK customers only : Danfoss Ltd., 22 Wycombe End, HP9 1NB, GB

## Connections. EKE 450, NeoCharge sensor and NeoCharge solid state relay

### Connections, upper level of EKE 450



### Connections, lower level of EKE 450



Use CoolConfig (<https://coolconfig.danfoss.com>) for configuring the EKE 450. See the EKE 400/450 data sheet, and the NeoCharge application manual for detailed setup for different applications.

## EKE 450

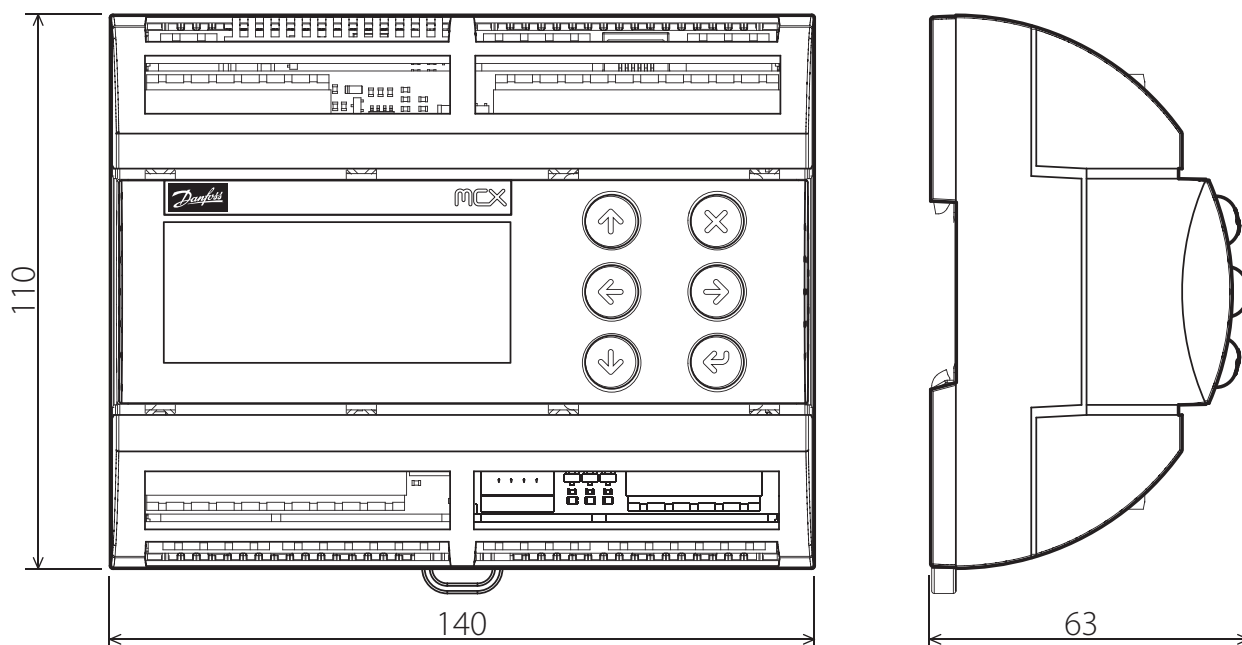
### Technical data

|                       |                                                                                                                                                                                                                                                                                                            |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Supply voltage        | Depending on model:<br>85–265 V AC, 50/60 Hz. Maximum power consumption 20 VA<br>20–60 V DC and 24 V AC $\pm$ 15% 50/60 Hz. Maximum power consumption 10 W, 17 VA.                                                                                                                                         |
| Communication, Modbus | It is important that the installation of the data communication cable is done correctly. See separate literature No. RC8ac (AN234886440486en-000901). Remember termination at the bus terminals.                                                                                                           |
| Communication, CANbus | H-R connection must be made on the first and the last local EKE 450.<br>Connection as close as possible to the connector.                                                                                                                                                                                  |
| Power supply +5 V     | On upper level. Use to power analog inputs, 100 mA max. 50 mA max for 4/20 mA transmitter (total on all outputs).                                                                                                                                                                                          |
| Power supply +12 V    | On upper level. Use to power analog inputs, 120 mA max. 80 mA max for 0/5 V transmitter (total on all outputs).                                                                                                                                                                                            |
| Electrical noise      | Signal cables for sensors, digital inputs, data communication and display must be kept separate from high voltage (230 V) electric cables: <ul style="list-style-type: none"> <li>- Use separate cable trays</li> <li>- Keep a distance between high voltage and signal cables of at least 10 m</li> </ul> |



IP20  
-20–60 °C (0–140 °F)  
RH max. 90% non condensing

### Dimensions in mm



| I/O                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analog inputs      | Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| AI1, AI2, AI3, AI4 | <p>Universal analog inputs selectable via HMI or CoolConfig between:</p> <p><b>General</b></p> <ul style="list-style-type: none"> <li>- 0–5 V, 2–10 V, 0–10 V : impedance is greater than 1 MΩ</li> <li>- 0–20 mA, 4–20 mA</li> </ul> <p><b>Pressure transmitters</b></p> <ul style="list-style-type: none"> <li>- AKS 32R 5 V. Ratiometric 10 – 90% of supply</li> <li>- AKS 32. 1–5 V, 0–10 V</li> <li>- AKS 33. 4–20 mA (supply = 12 V)</li> </ul> <p><b>Temperature sensors</b></p> <ul style="list-style-type: none"> <li>- NTC (10 kΩ at 25 °C)</li> <li>- PT1000</li> </ul> <p>12 V+ power supply 12 V DC, 50 mA max for 4/20 mA transmitter (total on all outputs)<br/>5 V+ power supply 5 V DC, 80 mA max for 0/5 V transmitter (total on all outputs)</p> |
| AI5, AI6, AI7, AI8 | <p>Function defined via the HMI or CoolConfig in the parameter list:</p> <p><b>General</b></p> <ul style="list-style-type: none"> <li>- 0–5 V, 2–10 V, 0–10 V : impedance is greater than 1 MΩ</li> </ul> <p><b>Pressure transmitters</b></p> <ul style="list-style-type: none"> <li>- AKS 32R 5 V. Ratiometric 10–90% of supply</li> <li>- Ratiometric: 10–90% of supply, AKS 32R 1–5 V, AKS 32</li> </ul> <p><b>Temperature sensors</b></p> <ul style="list-style-type: none"> <li>- PT1000 ohm, AKS 11 or AKS 21</li> </ul> <p>NTC 86K ohm @ 25 °C</p>                                                                                                                                                                                                           |

| Analog outputs    | Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 pcs. AO1 to AO4 | Function defined via HMI or CoolConfig                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| AO1, AO2          | 0–10 V DC minimum load 1 kΩ (10 mA) for each output                                                                                                                                                                                                                                                                                                                                                                                                                          |
| AO3, AO4          | <p>Opto-insulated 0–10 V DC minimum load 1 kΩ (10 mA) for each output. Referenced to contact N1. External power supply 24 V AC/DC on N1 and L1 in upper level of controller.</p> <p><b>OBSERVE:</b><br/>Connect 24 V on N1 and L1 (separate supply). Avoid earth fault current. Use double-insulated transformer. The secondary side must not be earthed.<br/>Obtain 0–10 V from terminals N1 and AO3, respectively N1 and AO4.<br/>PAY ATTENTION TO THE POLARITY of N1.</p> |

| Digital inputs    | Specifications                                                                                                                                                                                                                                                        |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8 pcs. DI1 to DI8 | <p>Voltage free contact. Current consumption 5 mA.</p> <p>The connection may be a shut-down or interruption function. Select what is to be activated during configuration in HMI or CoolConfig.</p>                                                                   |
| Cables            | <p>Cables longer than 10 m (33 ft) is not recommended. With cables longer than 10 m (33 ft), it is recommended to use auxiliary relays, placed within 10 m (33 ft) of the EKE 450. Typically, these auxiliary relays are placed in the same panel as the EKE 450.</p> |

| Digital outputs    | Specifications                                                                                                                                                                                                                                                                                                                 |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DO1 to DO8         | <p>Function defined via HMI or CoolConfig</p> <p>Total current load limit: 32 A</p>                                                                                                                                                                                                                                            |
| DO1, DO2           | <p>High inrush current (80 A–20 ms) normally open contact relays 16 A</p> <p><b>Characteristics of each relay</b></p> <ul style="list-style-type: none"> <li>- 10 A 250 V AC for resistive loads – 100.000 cycles</li> <li>- 3.5 A 250 V AC for inductive loads – 230.000 cycles with <math>\cos(\phi) = 0.5</math></li> </ul> |
| DO3, DO4, DO7, DO8 | <p>Changeover contacts relay 8 A.</p> <p><b>Characteristics of each relay</b></p> <ul style="list-style-type: none"> <li>- 6 A 250 V AC for resistive loads – 100.000 cycles</li> <li>- 3.5 A 250 V AC for inductive loads – 100.000 cycles with <math>\cos(\phi) = 0.6</math></li> </ul>                                      |
| DO5, DO6           | <p><b>Build in Solid State Relays</b></p> <ul style="list-style-type: none"> <li>- <math>I_{max} = 0.5</math> A</li> <li>- <math>I_{min} = 50</math> mA</li> <li>- Leakage current &lt; 1.5 mA</li> <li>- Not short-circuit protected</li> <li>- <b>OBSERVE:</b> AC only</li> </ul>                                            |

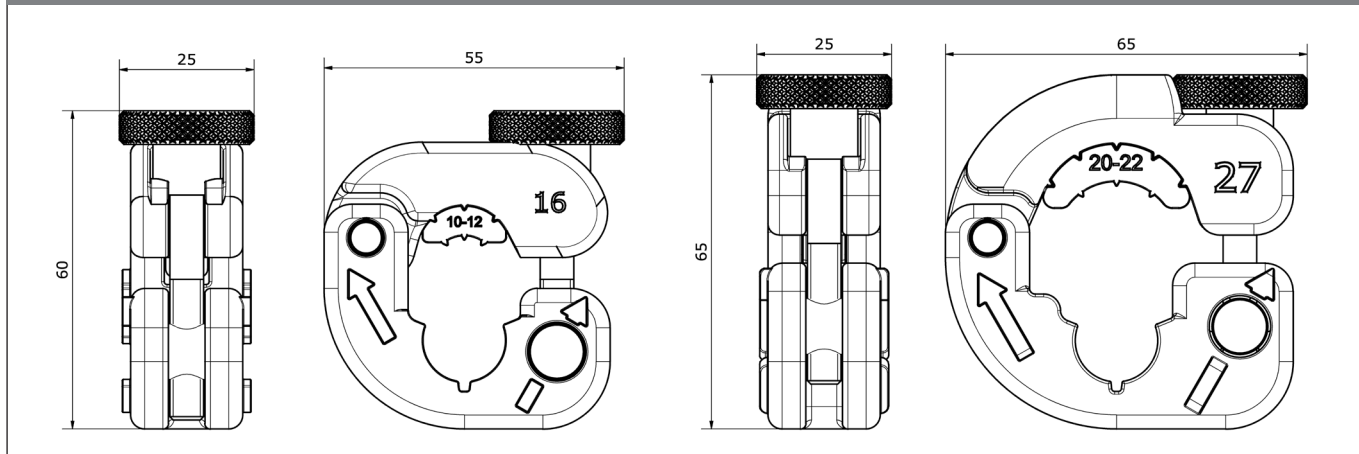
## NeoCharge Clamp

### Technical data

|                               |              |
|-------------------------------|--------------|
| Operating/storage temperature | -50 °C–90 °C |
| Material                      | PA12         |

There are two types of clamps, depending on the outer diameter of evaporator tubes, evaporator tube diameters 10-, 12- and 16-mm and evaporator tube diameters 20-, 22- and 27-mm:

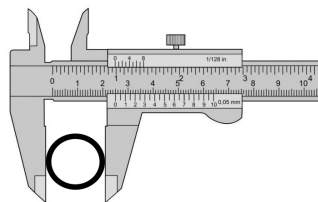
### Dimensions in mm



### Mounting NeoCharge sensor in the clamp

#### STEP 1

Identify the outer diameter of the evaporator tubes

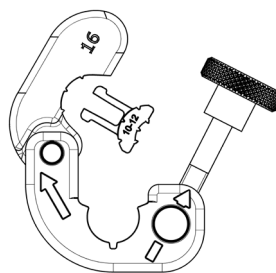


#### STEP 2

Add the additional insert to the clamp to fit to the measured pipe size (if necessary):

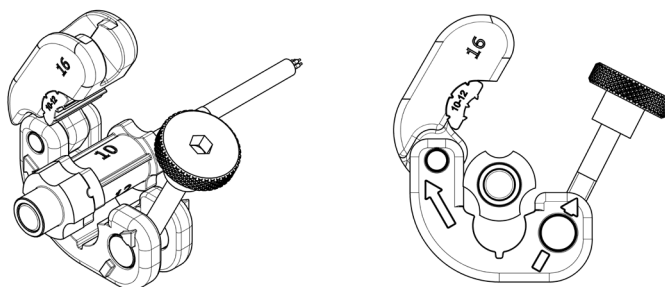
Size 10-, 12-, and 16-mm clamp: insert needed for evaporator tube size 10 and 12 mm

Size 20-, 22-, and 27-mm clamp: insert needed for evaporator tube size 20 and 22 mm



#### STEP 3

Click the NeoCharge sensor into the clamp



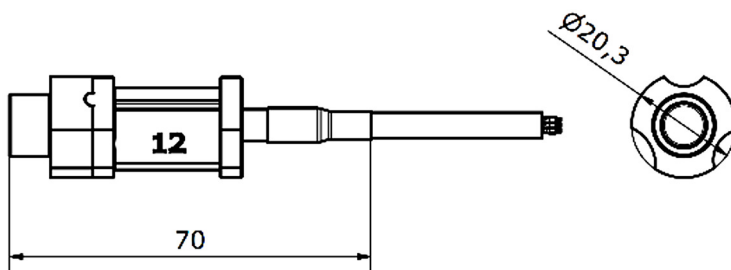
## NeoCharge Sensor

### Technical data

|                               |                                                                                 |
|-------------------------------|---------------------------------------------------------------------------------|
| Operating voltage             | 24 V DC                                                                         |
| Power                         | 14 W. For UL compliance, PSU must be <15 VA                                     |
| Material                      | Stainless/aluminum/EPX82                                                        |
| Cable size                    | 4 x 0.25 mm <sup>2</sup> / AWG 23. Bootlace Ferrules 1 mm <sup>2</sup> / AWG 17 |
| Cable length                  | 10 m*                                                                           |
| Red wires                     | Heating element                                                                 |
| White wires                   | Pt1000 Temperature sensor                                                       |
| Operating/storage temperature | -50 °C to 90 °C                                                                 |
| Prot. type / Prot. Class      | IP67                                                                            |

\* Distance longer than 10 m between NeoCharge sensor and power supply is not recommend. Always check voltage at NeoCharge sensor if longer cables are used.

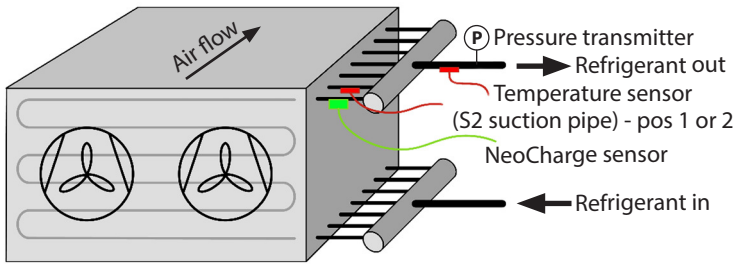
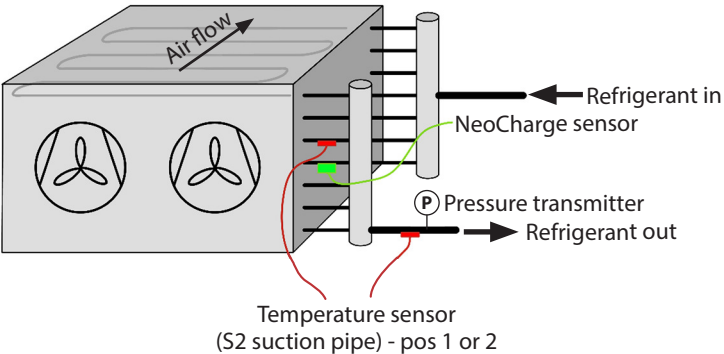
### Dimensions in mm

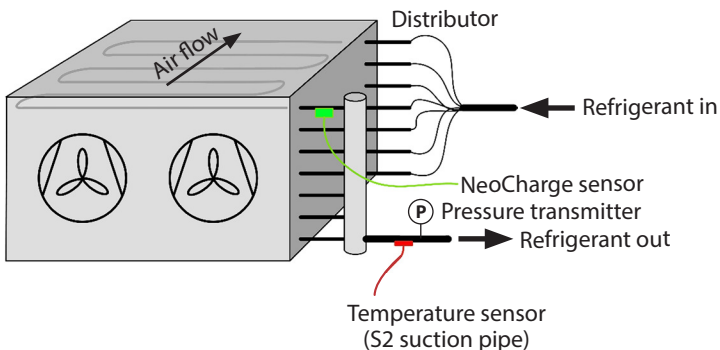


### Selection of evaporator tube

The NeoCharge sensor must be mounted on one of the evaporator tubes just before the outlet manifold as shown in the following sketches.

When the sensor is mounted, it is very important to insulate the sensor and clamp – for example using 16 mm Armaflex.

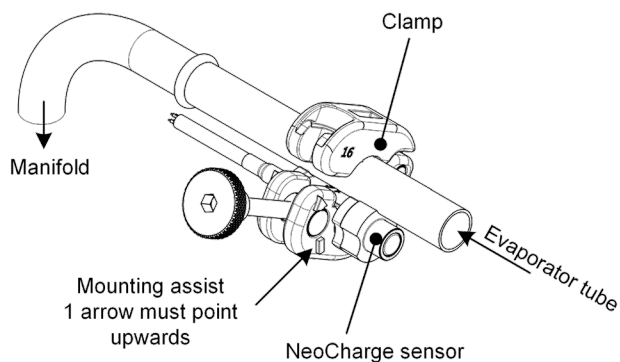
| Pump system with Controlled Circulation Rate (CCR systems) |                                                                                                                               |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| General                                                    | Place sensor on most loaded tube (the tube with most gas in the outlet). This will give the most liquid in evaporator outlet. |
| Bottom feed pump circulation evaporator                    |                                             |
| Side feed pump circulation evaporator                      |                                             |

| Direct expansion system with controlled amount of liquid out of evaporator (WDX) |                                                                                                                                  |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| General                                                                          | Place sensor on least loaded tube (the tube with least gas in the outlet). This will give the least liquid in evaporator outlet. |
| WDX evaporator                                                                   |                                              |

## Mounting on selected evaporator tube

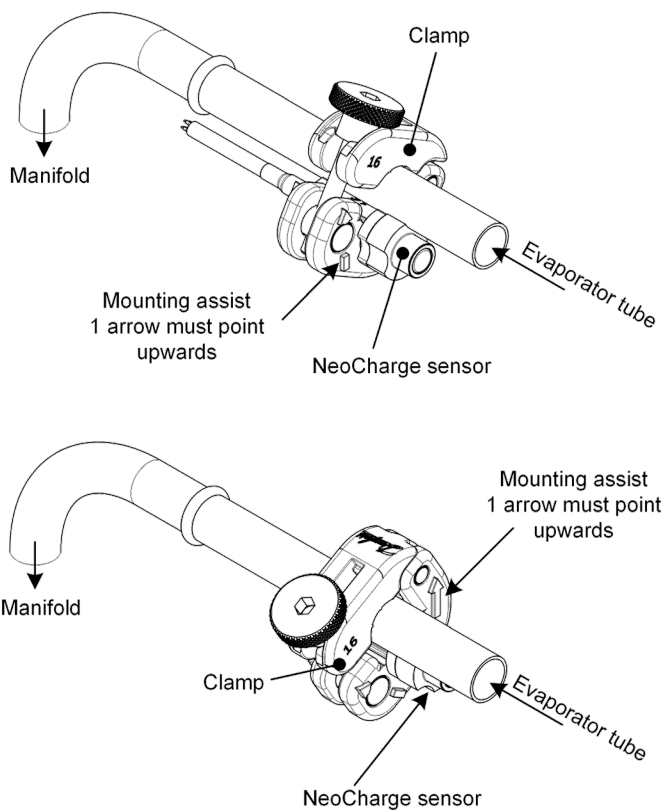
### STEP 1

Open clamp and close around evaporator tube



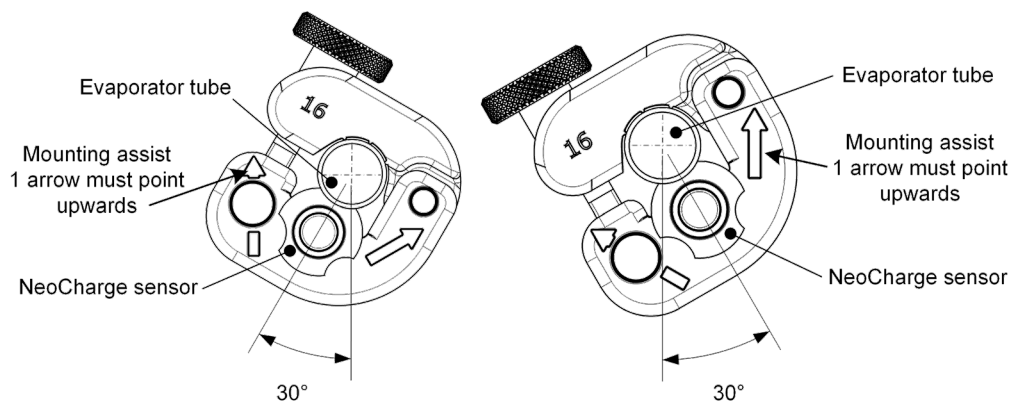
### STEP 2

Close screw on clamp and tighten



### STEP 3

Check position on tube



## Safety information



### Risk of injury due to hot surface

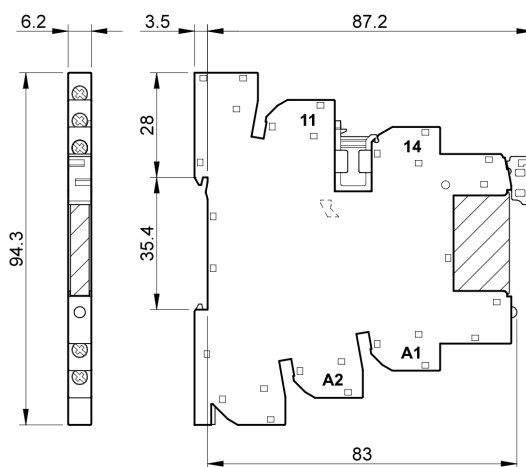
The heating element in the NeoCharge sensor can reach temperatures up to 100 °C during operation. When touching the NeoCharge sensor there is a risk of injury. Before servicing the NeoCharge sensor, it must cool to room temperature.

## NeoCharge Solid State Relay (external SSR)

### Technical data

|                           |                              |
|---------------------------|------------------------------|
| Input voltage             | 230 V AC                     |
| Output voltage            | 24 V DC                      |
| Ambient temperature range | -20–70 °C                    |
| Prot. type / Prot. Class  | IP20                         |
| Wire strip length         | 10 mm                        |
| Screw torque              | 0.5 Nm                       |
| Min. wire size            | AWG 21 / 0.5 mm <sup>2</sup> |
| Max. wire size            | AWG 14 / 2.5 mm <sup>2</sup> |
| Approvals                 | CE EAC cUL <sup>®</sup> US   |

## Dimensions in mm



### IMPORTANT:

- The NeoCharge Solid State Relay has a built-in leakage current suppression circuit, which stops the relay from switching to "On" position due to the leakage current from the EKE 450. It is strongly recommended that you use the NeoCharge Solid State Relay when connecting the NeoCharge sensor.
- Because of the built-in leakage current suppression circuit, it is very important that the relay is used to break the +24 V line. DO NOT connect the relay to break the "-" (negative) line as this will leave the relay in constant "On" position.

See connection diagram in **Connections, lower level of EKE 450**.

### Danfoss A/S

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