

## BDN45F Direct Current Compressor R134a, R1234yf 12/24V DC



### General

|                                       |                            |
|---------------------------------------|----------------------------|
| Code number (without electronic unit) | 109Z0400                   |
| Electronic unit - Leisure             | 101N2740, 40 pcs: 101N2741 |
| Compressors on pallet                 | 240                        |

### Approvals

UL / CB



### Application

|                   |                        |
|-------------------|------------------------|
| Application range | LBP/MBP                |
| Voltage range     | VDC 9.6 - 17 / 19 - 34 |

### Cooling requirements

|                    |     |     |
|--------------------|-----|-----|
| Application        | LBP | MBP |
| 32°C / 38°C / 43°C | S   | S   |

### Absolute maximum ratings

|                                                                                                                                                                                                                                                                                       |    |                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--------------------------|
| Machine compartment temperature for compressor operation                                                                                                                                                                                                                              | °C | -10 to 50                |
| Max. compressor tilt angle for temporary operation                                                                                                                                                                                                                                    |    | ±30°                     |
| Operating pressure range                                                                                                                                                                                                                                                              |    | see diagram to the right |
| Any levels of stress exceeding the absolute maximum value of machine compartment temperature range or operating pressure range or tilt angle may damage the device. Prolonged exposure to stress above the recommended operating conditions may also affect the device's reliability. |    |                          |

### Motor

|                                               |                               |
|-----------------------------------------------|-------------------------------|
| Motor type                                    | permanet magnet, brushless DC |
| Speed                                         | rpm variable speed            |
| Resistance, each of the three windings (25°C) | Ω 3.1                         |

### Design

|                                     |                 |                  |
|-------------------------------------|-----------------|------------------|
| Displacement                        | cm <sup>3</sup> | 1.42             |
| Oil quantity (type)                 | cm <sup>3</sup> | 53 (polyolester) |
| Maximum refrigerant charge          | g               | 70               |
| Free gas volume in compressor       | cm <sup>3</sup> | 472              |
| Weight - Compressor/Electronic unit | kg              | 1.37 / 0.14      |

### Standard battery protection settings

| Voltage (0.1 steps)       |               | Default  | Min. value | Max. value |
|---------------------------|---------------|----------|------------|------------|
| 12V ± 0.3V DC, all values | Cut out level | VDC 10.4 | 9.6        | 17         |
| 24V ± 0.3V DC, all values | Cut out level | VDC 22.8 | 19         | 32         |
| Battery cut-in difference | VDC           | 1.3      | 0.5        | 10         |

### Dimensions

|                                                                                              |                          |    |                               |
|----------------------------------------------------------------------------------------------|--------------------------|----|-------------------------------|
| Height                                                                                       | mm                       | A  | 89.0                          |
|                                                                                              |                          | B  | 82.4                          |
|                                                                                              |                          | B1 | 48.7                          |
|                                                                                              |                          | B2 | 45.8                          |
| Suction connector                                                                            | location/I.D. mm   angle | C  | 6.2   5°                      |
|                                                                                              | material   comment       |    | Copper   Rubber plug          |
| Process connector                                                                            | location/I.D. mm   angle | D  | 6.2   77.9°                   |
|                                                                                              | material   comment       |    | Copper   Rubber plug          |
| Discharge connector                                                                          | location/I.D. mm   angle | E  | 5.0   86.9°                   |
|                                                                                              | material   comment       |    | Cu-plated steel   Rubber plug |
| Connector tolerance                                                                          | I.D. mm                  |    | ±0.09, on 5.0 +0.12/+0.20     |
| Remarks:<br>Please follow the brazing instructions on page 4 (Product Bulletin DES.N.101.M). |                          |    |                               |

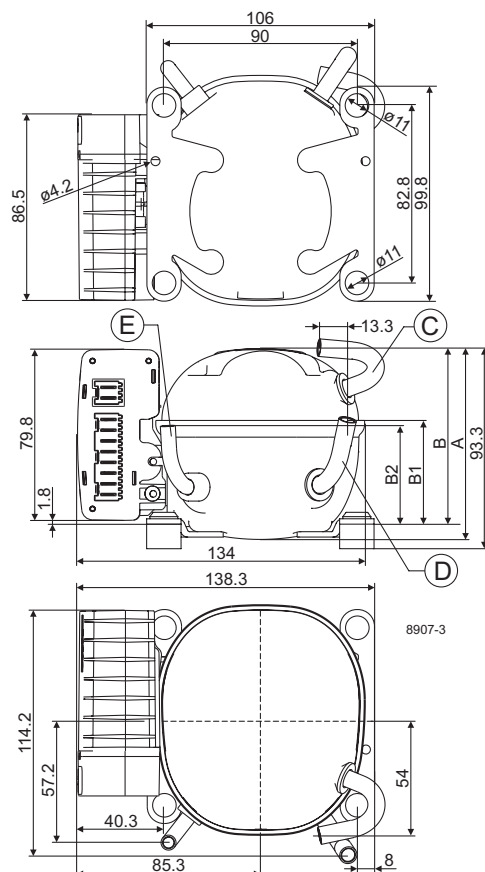
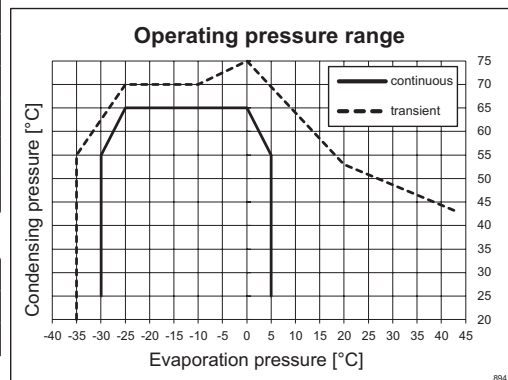


Approvals and warning label

S = Static cooling normally sufficient

Note: In case fan cooling is used:

condenser => fan => electronic => compressor



## Performance Data with Refrigerant R134a

Capacity (EN 12900 Household/CECOMAF)

12V DC, static cooling

watt

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5    | 0     | 5    |
|----------|------|------|-------|------|------|------|-------|-------|------|
| 2,300    | 14.3 | 19.9 | 22.2  | 27.1 | 36.0 | 47.0 | 60.1  | 75.6  | 93.8 |
| 3,000    | 18.5 | 26.2 | 29.4  | 36.4 | 49.0 | 64.0 | 81.5  | 102   |      |
| 4,000    | 25.2 | 36.6 | 41.2  | 50.9 | 67.6 | 86.5 | 107.4 | 129.9 |      |
| 4,500    | 28.7 | 42.0 | 47.3  | 58.4 | 77.4 | 98.4 | 121.2 |       |      |

Capacity (ASHRAE LBP)

12V DC, static cooling

watt

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10   | -5    | 0     | 5     |
|----------|------|------|-------|------|------|-------|-------|-------|-------|
| 2,300    | 17.9 | 24.9 | 27.6  | 33.7 | 44.8 | 58.4  | 74.7  | 94.1  | 116.7 |
| 3,000    | 23.1 | 32.7 | 36.6  | 45.2 | 60.8 | 79.5  | 101.3 | 126.3 |       |
| 4,000    | 31.4 | 45.5 | 51.1  | 63.1 | 83.8 | 107.3 | 133.3 | 161.4 |       |
| 4,500    | 35.7 | 52.2 | 58.7  | 72.4 | 95.9 | 122.0 | 150.4 |       |       |

Power consumption

12V DC, static cooling

watt

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5    |
|----------|------|------|-------|------|------|------|------|------|------|
| 2,300    | 15.9 | 19.0 | 20.2  | 22.6 | 26.5 | 30.8 | 35.3 | 40.1 | 45.1 |
| 3,000    | 19.2 | 23.3 | 24.8  | 28.0 | 33.1 | 38.4 | 43.6 | 48.6 |      |
| 4,000    | 25.1 | 31.3 | 33.5  | 37.9 | 44.7 | 51.4 | 57.6 | 62.9 |      |
| 4,500    | 28.8 | 36.1 | 38.7  | 43.9 | 51.8 | 59.3 | 66.2 |      |      |

Current consumption (for 24V applications the following must be halved)

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5    |
|----------|------|------|-------|------|------|------|------|------|------|
| 2,300    | 1.40 | 1.70 | 1.81  | 2.03 | 2.40 | 2.79 | 3.21 | 3.66 | 4.12 |
| 3,000    | 1.62 | 1.98 | 2.11  | 2.39 | 2.83 | 3.29 | 3.75 | 4.18 |      |
| 4,000    | 2.10 | 2.61 | 2.79  | 3.15 | 3.71 | 4.26 | 4.77 | 5.21 |      |
| 4,500    | 2.39 | 2.99 | 3.21  | 3.64 | 4.28 | 4.91 | 5.47 |      |      |

COP (EN 12900 Household/CECOMAF)

12V DC, static cooling

W/W

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5    |
|----------|------|------|-------|------|------|------|------|------|------|
| 2,300    | 0.90 | 1.05 | 1.10  | 1.20 | 1.36 | 1.52 | 1.70 | 1.88 | 2.08 |
| 3,000    | 0.96 | 1.13 | 1.18  | 1.30 | 1.48 | 1.67 | 1.87 | 2.09 |      |
| 4,000    | 1.00 | 1.17 | 1.23  | 1.34 | 1.51 | 1.68 | 1.86 | 2.06 |      |
| 4,500    | 1.00 | 1.16 | 1.22  | 1.33 | 1.49 | 1.66 | 1.83 |      |      |

COP (ASHRAE LBP)

12V DC, static cooling

W/W

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5    |
|----------|------|------|-------|------|------|------|------|------|------|
| 2,300    | 1.13 | 1.31 | 1.37  | 1.49 | 1.69 | 1.90 | 2.11 | 2.34 | 2.59 |
| 3,000    | 1.20 | 1.40 | 1.47  | 1.62 | 1.84 | 2.07 | 2.32 | 2.60 |      |
| 4,000    | 1.25 | 1.45 | 1.53  | 1.66 | 1.87 | 2.09 | 2.31 | 2.56 |      |
| 4,500    | 1.24 | 1.45 | 1.52  | 1.65 | 1.85 | 2.06 | 2.27 |      |      |

Operational errors (TOOL4COOL® or LED flashes)

| Error code or LED flashes | Error type                                                                                                                                                |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           | Can be read out in the software TOOL4COOL®                                                                                                                |
| 7                         | <b>Communication error</b><br>(Communication of master controller stopped for 15 minutes (default))                                                       |
| 6                         | <b>Thermostat failure</b><br>(If a NTC thermistor is short-circuit or has no connection, the electronic unit will enter manual mode).                     |
| 5                         | <b>Thermal cut-out of electronic unit</b><br>(PCB or machine compartment temperature exceeds minimum or maximum limits).                                  |
| 4                         | <b>Minimum motor speed error</b><br>(If the refrigeration system is too heavily loaded, the motor cannot maintain min. speed at approximately 2,150 rpm). |
| 3                         | <b>Motor start error</b><br>(The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).                         |
| 2                         | <b>Fan over-current cut-out</b><br>(The fan is overloading the electronic unit).                                                                          |
| 1                         | <b>Battery protection cut-out</b><br>(The voltage is outside the cut-out setting).                                                                        |

Wire Dimensions DC

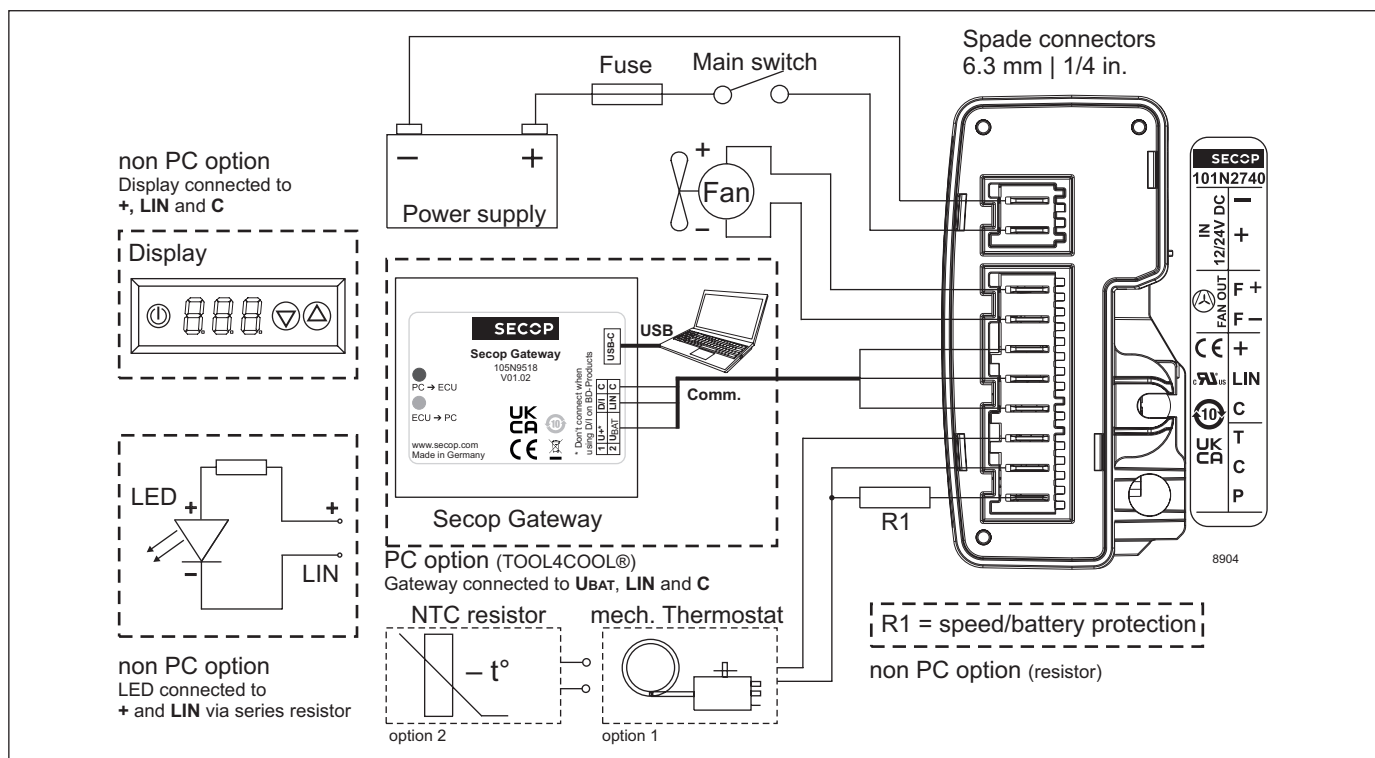
| Size               |         | Max. length*<br>12V operation |       | Max. length*<br>24V operation |       |
|--------------------|---------|-------------------------------|-------|-------------------------------|-------|
| Cross section      | AWG     |                               |       |                               |       |
| [mm <sup>2</sup> ] | [Gauge] | [m]                           | [ft.] | [m]                           | [ft.] |
| 2.5                | 12      | 2.5                           | 8     | 5                             | 16    |
| 4                  | 12      | 4                             | 13    | 8                             | 26    |
| 6                  | 10      | 6                             | 20    | 12                            | 39    |
| 10                 | 8       | 10                            | 33    | 20                            | 66    |

\*Length between battery and electronic unit

Accessories for BDN45F

| Mounting                      | Code number |
|-------------------------------|-------------|
| Bolt joint for one compressor | 118-1960    |
| Secop Gateway                 | 105N9518    |

| Test conditions         | EN 12900 CECOMAF | ASHRAE LBP |
|-------------------------|------------------|------------|
| Condensing temperature  | 55°C             | 54.4°C     |
| Ambient temperature     | 32°C             | 32°C       |
| Suction gas temperature | 32°C             | 32°C       |
| Liquid temperature      | no subcooling    | 32°C       |



# Performance Data with Refrigerant R1234yf

## Capacity (EN 12900 Household/CECOMAF)

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5    | 0     | 5    |
|----------|------|------|-------|------|------|------|-------|-------|------|
| 2,300    | 15.8 | 21.2 | 23.4  | 28.1 | 36.5 | 46.7 | 58.8  | 72.9  | 89.2 |
| 3,000    | 20.4 | 28.0 | 31.0  | 37.7 | 49.6 | 63.7 | 79.8  | 98.0  |      |
| 4,000    | 27.8 | 39.0 | 43.4  | 52.7 | 68.5 | 86.1 | 105.1 | 125.3 |      |
| 4,500    | 31.7 | 44.8 | 49.8  | 60.4 | 78.2 | 97.7 | 118.5 |       |      |

## Capacity (ASHRAE LBP)

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15   | -10   | -5    | 0     | 5     |
|----------|------|------|-------|------|-------|-------|-------|-------|-------|
| 2,300    | 20.6 | 27.7 | 30.5  | 36.5 | 47.5  | 60.7  | 76.4  | 94.8  | 116.2 |
| 3,000    | 26.6 | 36.3 | 40.3  | 48.9 | 64.4  | 82.6  | 103.6 | 127.4 |       |
| 4,000    | 36.1 | 50.6 | 56.3  | 68.3 | 88.7  | 111.5 | 136.4 | 162.9 |       |
| 4,500    | 41.2 | 58.0 | 64.5  | 78.2 | 101.2 | 126.5 | 153.7 |       |       |

## Power consumption

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5    |
|----------|------|------|-------|------|------|------|------|------|------|
| 2,300    | 18.0 | 20.9 | 21.9  | 24.1 | 27.6 | 31.5 | 35.6 | 39.9 | 44.2 |
| 3,000    | 21.6 | 25.4 | 26.9  | 29.8 | 34.5 | 39.3 | 44.0 | 48.4 |      |
| 4,000    | 28.3 | 34.1 | 36.2  | 40.3 | 46.6 | 52.6 | 58.1 | 62.7 |      |
| 4,500    | 32.5 | 39.3 | 41.8  | 46.6 | 53.8 | 60.6 | 66.6 |      |      |

## Current consumption (for 24V applications the following must be halved)

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5    |
|----------|------|------|-------|------|------|------|------|------|------|
| 2,300    | 1.60 | 1.86 | 1.96  | 2.16 | 2.50 | 2.86 | 3.24 | 3.63 | 4.04 |
| 3,000    | 1.83 | 2.16 | 2.29  | 2.54 | 2.95 | 3.37 | 3.78 | 4.16 |      |
| 4,000    | 2.37 | 2.85 | 3.02  | 3.35 | 3.87 | 4.36 | 4.81 | 5.19 |      |
| 4,500    | 2.70 | 3.26 | 3.46  | 3.86 | 4.45 | 5.01 | 5.51 |      |      |

## COP (EN 12900 Household/CECOMAF)

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5    |
|----------|------|------|-------|------|------|------|------|------|------|
| 2,300    | 0.88 | 1.02 | 1.07  | 1.17 | 1.32 | 1.48 | 1.65 | 1.83 | 2.02 |
| 3,000    | 0.94 | 1.10 | 1.15  | 1.27 | 1.44 | 1.62 | 1.81 | 2.03 |      |
| 4,000    | 0.98 | 1.14 | 1.20  | 1.31 | 1.47 | 1.64 | 1.81 | 2.00 |      |
| 4,500    | 0.98 | 1.14 | 1.19  | 1.30 | 1.45 | 1.61 | 1.78 |      |      |

## COP (ASHRAE LBP)

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5    |
|----------|------|------|-------|------|------|------|------|------|------|
| 2,300    | 1.15 | 1.33 | 1.39  | 1.52 | 1.72 | 1.93 | 2.15 | 2.38 | 2.63 |
| 3,000    | 1.23 | 1.43 | 1.50  | 1.64 | 1.87 | 2.10 | 2.36 | 2.63 |      |
| 4,000    | 1.28 | 1.48 | 1.55  | 1.69 | 1.90 | 2.12 | 2.35 | 2.60 |      |
| 4,500    | 1.27 | 1.47 | 1.54  | 1.68 | 1.88 | 2.09 | 2.31 |      |      |

## Operational errors (TOOL4COOL® or LED flashes)

| Error code or LED flashes | Error type                                                                                                                                                |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           | Can be read out in the software <b>TOOL4COOL®</b>                                                                                                         |
| 7                         | <b>Communication error</b><br>(Communication of master controller stopped for 15 minutes (default))                                                       |
| 6                         | <b>Thermostat failure</b><br>(If a NTC thermistor is short-circuit or has no connection, the electronic unit will enter manual mode).                     |
| 5                         | <b>Thermal cut-out of electronic unit</b><br>(PCB or machine compartment temperature exceeds minimum or maximum limits).                                  |
| 4                         | <b>Minimum motor speed error</b><br>(If the refrigeration system is too heavily loaded, the motor cannot maintain min. speed at approximately 2,150 rpm). |
| 3                         | <b>Motor start error</b><br>(The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).                         |
| 2                         | <b>Fan over-current cut-out</b><br>(The fan is overloading the electronic unit).                                                                          |
| 1                         | <b>Battery protection cut-out</b><br>(The voltage is outside the cut-out setting).                                                                        |

## Wire Dimensions DC

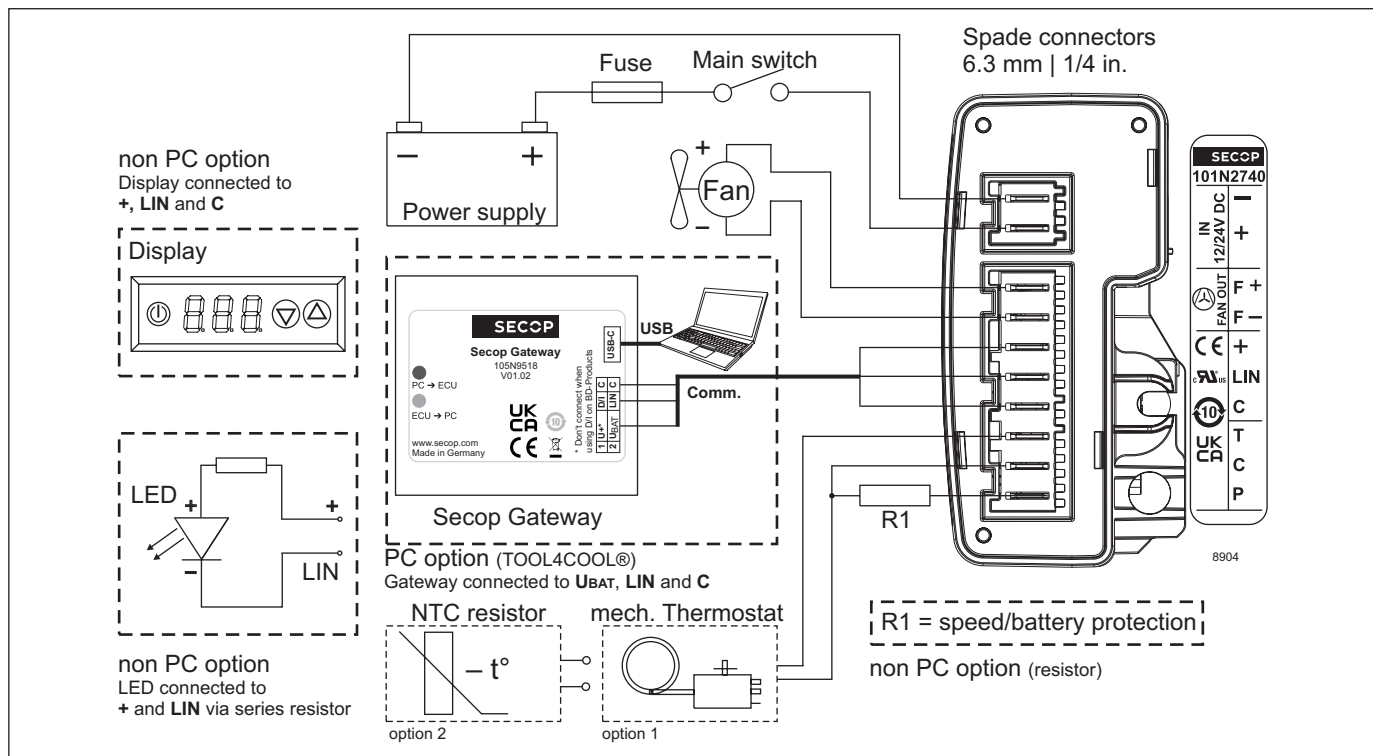
| Size             |         | Max. length*<br>12V operation |       | Max. length*<br>24V operation |       |
|------------------|---------|-------------------------------|-------|-------------------------------|-------|
| Cross<br>section | AWG     |                               |       |                               |       |
| [mm²]            | [Gauge] | [m]                           | [ft.] | [m]                           | [ft.] |
| 2.5              | 12      | 2.5                           | 8     | 5                             | 16    |
| 4                | 12      | 4                             | 13    | 8                             | 26    |
| 6                | 10      | 6                             | 20    | 12                            | 39    |
| 10               | 8       | 10                            | 33    | 20                            | 66    |

\*Length between battery and electronic unit

## Accessories for BDN45F

| Mounting                      | Code number |
|-------------------------------|-------------|
| Bolt joint for one compressor | 118-1960    |
| Secop Gateway                 | 105N9518    |

| Test conditions         | EN 12900 CECOMAF | ASHRAE LBP |
|-------------------------|------------------|------------|
| Condensing temperature  | 55°C             | 54.4°C     |
| Ambient temperature     | 32°C             | 32°C       |
| Suction gas temperature | 32°C             | 32°C       |
| Liquid temperature      | no subcooling    | 32°C       |



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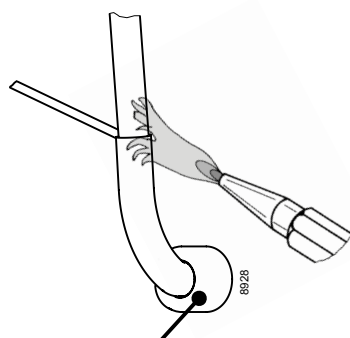
## Brazing on BD Nano Discharge Connector (BDN45F, BDN50K, BDN45F-A, BDN50K-A, MB3CKV, and BDN-EV)

Secop BDN45F/-A, BDN50K/-A, MB3CKV, BDN-EV compressors use a special discharge connector element (see figure 2) that is directly connected to the discharge tube to optimize energy consumption.

This element is made from plastic and sensitive to high heat exposure.

When brazing a tube into the discharge connector (see figure 1) please ensure that the area with the discharge connector element never exceeds 150°C / 302°F.

Don't heat up the bottom of the connector directly.



**! max. 150°C/302°F !  
at socket**

brazing solder: silver with flux

Use a fork burner (see figure 3) and/or a damp cloth, if necessary. A protective plate can also serve to protect the discharge connector element from direct heat from a flame.

Do not braze longer than 10 seconds and wait for 5 minutes for the next soldering attempt.

### Further information:

Product Bulletin – Brazing Technique for Compressor Connectors (DES.N.600.A1.02)



Fig.1 BDN45F discharge connector

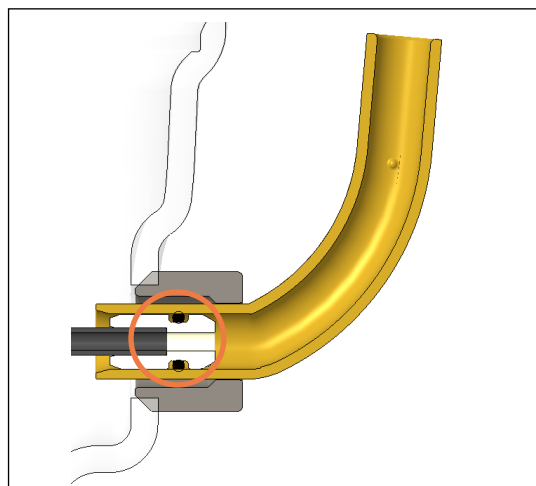


Fig.2 Discharge connector element

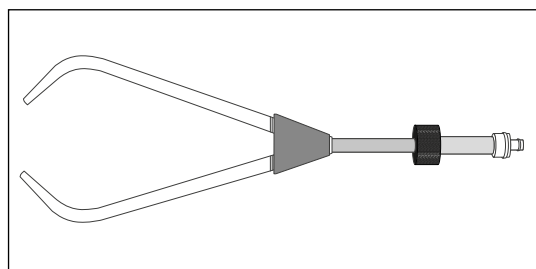


Fig.3 Fork burner