



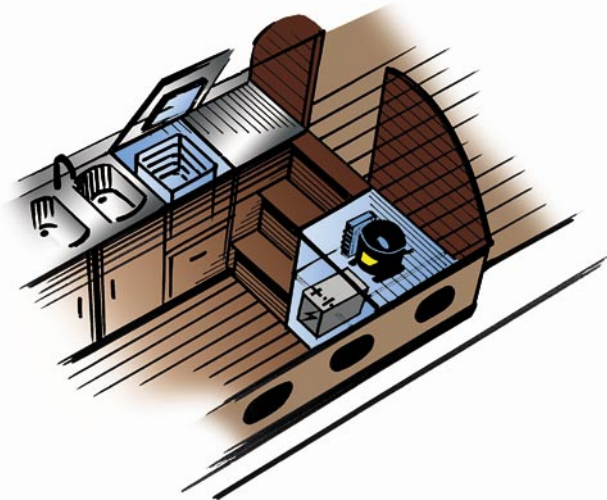
## Application Note

### Cooling in maritime appliances

The **BD compressor** series is specially designed for refrigeration in boat applications. A sturdy design enables it to resist vibrations, hard impacts and heavy sea.

It is available in two different types, BD 35F and 50F using R134a as refrigerant.

BD 35F and 50F are applicable for 12 and 24 V DC.



The compressors cover a capacity range from 20 to 180 W. Low, medium and high back pressure applications. (See specification sheet on the next page).

Refrigerator sizes up to 160 liters and freezers up to 90 liters.

It is possible to adjust the capacity of the compressor manually.

A special version of the electronic unit will adapt the capacity of the compressor automatically to the actual load on the refrigeration system. The algorithm will adjust the speed of the compressor so that a running time of approximately 30 minutes is achieved. This is the most energy efficient way to operate the compressor.

Furthermore it will protect the compressor from short cycling in low load situations and it will also reduce the number of starts and thereby protect the battery from being drained.

An optional LED (diode) will flash and the following faults will be indicated by means of a flash pattern.

- Low battery voltage
- Fan overload
- Minimum speed exceeded
- Thermal cut out
- Motor start error

The electronic unit provides a protection against electro magnetic interference (EMI) which will allow communication and navigation equipment to work unproblematically without any disturbance.



#### Features

- High efficiency/Low current consumption/high COP
- Compact design
- Low noise
- Variable capacity (manually adjustable or automatic)
- Adaptive energy optimization (AEO)
- Dedicated products for US market available

Also available for solar power. For further information please contact Danfoss.

## Technical data BD35F

### General

| Compressor   | BD35F    | BD50F    |
|--|----------|----------|
| Code number: Comp. without electronic unit                           | 101Z0200 | 101Z1220 |
| Code number: Electronic unit 12-24 V DC, single packing              | 101N0220 |          |
| Code number: Electronic unit 12-24 V DC, industrial packing, 30 pcs. | 101N0221 |          |

### Application

|   |                       |  |
|---|-----------------------|--|
| Application                             | LBP/MBP/(HBP)         |  |
| Evaporating temperature range °C        | -30 to 0 (10)         |  |
| Voltage                                 | 12 - 24 V DC          |  |
| Max. voltage                            | 31.5 V                |  |
| Max. machine compartment temperature °C | 55                    |  |
| Comp. cooling at ambient temp. 43°C     | S or F <sub>1</sub> * |  |

\* depending on application

### Design

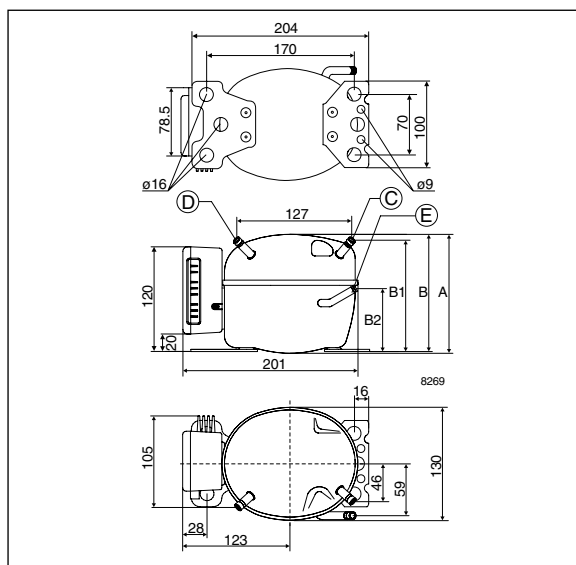
|                                     |                 |          |      |
|-------------------------------------|-----------------|----------|------|
| Displacement                        | cm <sup>3</sup> | 2.00     | 2.50 |
| Oil quantity                        | cm <sup>3</sup> | 150      |      |
| Maximum refrigerant charge          | g               | 300      |      |
| Free gas vol. in compressor housing | cm <sup>3</sup> | 870      |      |
| Weight: Compressor/Electronic unit  | kg              | 4.3/0.25 |      |

### Motor

|                                   |                         |     |     |
|-----------------------------------|-------------------------|-----|-----|
| Motor type                        | Variable Speed          |     |     |
| Resistance, all 3 windings (25°C) | Ω                       | 2.3 | 2.0 |
| Approvals                         | E4 72/245 95/54 0277 00 |     |     |

### Dimensions

|                         |                  |     |                 |
|-------------------------|------------------|-----|-----------------|
| <b>Height</b>           | <b>mm</b>        | A   | 137             |
|                         |                  | B   | 135             |
|                         |                  | B1  | 128             |
|                         |                  | B2  | 73              |
| Suction connector       | location/I.D. mm | C   | 6.2±0.09        |
| Process connector       | location/I.D. mm | D   | 6.2±0.09        |
| Discharge connector     | location/I.D. mm | E   | 5.0 +0.12/+0.20 |
| Compressors on a pallet | pcs.             | 120 |                 |



## Performance data BD35F

### Capacity (EN 12900/CECOMAF)

watt

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5   | 10  |
|----------|------|------|-------|------|------|------|------|------|-----|-----|
| 2,000    | 15.8 | 23.9 | 26.9  | 33.1 | 43.8 | 56.6 | 71.7 | 89.9 | 111 | 136 |
| 2,500    | 20.2 | 29.9 | 33.5  | 41.2 | 54.6 | 70.7 | 89.7 | 112  | 139 |     |
| 3,000    | 22.5 | 32.4 | 36.5  | 45.4 | 61.8 | 81.7 | 105  | 133  |     |     |
| 3,500    | 26.2 | 35.9 | 40.4  | 50.5 | 69.8 | 93.6 | 122  |      |     |     |

### Power consumption

watt

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5    | 10   |
|----------|------|------|-------|------|------|------|------|------|------|------|
| 2,000    | 17.6 | 23.4 | 25.3  | 28.7 | 33.6 | 38.3 | 43.0 | 48.0 | 53.4 | 59.5 |
| 2,500    | 23.3 | 30.9 | 33.3  | 37.8 | 44.1 | 50.2 | 56.2 | 62.3 | 68.7 |      |
| 3,000    | 29.9 | 36.0 | 38.3  | 43.0 | 50.7 | 58.7 | 66.8 | 74.8 |      |      |
| 3,500    | 36.0 | 42.8 | 45.4  | 50.8 | 59.5 | 68.9 | 78.5 |      |      |      |

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

A

| rpm \ °C | -30 | -25 | -23.3 | -20 | -15 | -10 | -5  | 0   | 5   | 10  |
|----------|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|
| 2,000    | 1.5 | 2.0 | 2.1   | 2.4 | 2.8 | 3.2 | 3.6 | 4.0 | 4.5 | 5.0 |
| 2,500    | 1.9 | 2.6 | 2.8   | 3.2 | 3.7 | 4.2 | 4.7 | 5.2 | 5.8 |     |
| 3,000    | 2.5 | 3.0 | 3.2   | 3.6 | 4.2 | 4.9 | 5.6 | 6.2 |     |     |
| 3,500    | 3.0 | 3.6 | 3.8   | 4.3 | 5.0 | 5.7 | 6.5 |     |     |     |

### COP (EN 12900/CECOMAF)

W/W

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5    | 10   |
|----------|------|------|-------|------|------|------|------|------|------|------|
| 2,000    | 0.90 | 1.02 | 1.06  | 1.15 | 1.31 | 1.48 | 1.67 | 1.87 | 2.08 | 2.29 |
| 2,500    | 0.87 | 0.97 | 1.01  | 1.09 | 1.24 | 1.41 | 1.60 | 1.80 | 2.02 |      |
| 3,000    | 0.75 | 0.90 | 0.95  | 1.06 | 1.22 | 1.39 | 1.58 | 1.78 |      |      |
| 3,500    | 0.73 | 0.84 | 0.89  | 1.00 | 1.17 | 1.36 | 1.55 |      |      |      |

## Performance data BD50F

### Capacity (EN 12900/CECOMAF)

watt

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10  | -5   | 0    | 5    | 10   |
|----------|------|------|-------|------|------|------|------|------|------|------|
| 2,000    | 20.1 | 31.0 | 34.9  | 42.8 | 56.3 | 42.2 | 91.6 | 115  | 144* | 178* |
| 2,500    | 27.0 | 39.0 | 43.4  | 52.7 | 68.9 | 88.9 | 113  | 144* | 181* |      |
| 3,000    | 31.0 | 45.4 | 50.6  | 61.5 | 80.7 | 104  | 134* | 171* |      |      |
| 3,500    | 38.1 | 53.2 | 59.1  | 71.9 | 95.0 | 124* | 159* |      |      |      |

### Power consumption

watt

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10   | -5    | 0     | 5     | 10    |
|----------|------|------|-------|------|------|-------|-------|-------|-------|-------|
| 2,000    | 25.1 | 31.8 | 34.0  | 38.2 | 44.7 | 51.3  | 58.3  | 65.8  | 74.2* | 83.5* |
| 2,500    | 34.1 | 40.5 | 42.9  | 47.8 | 55.8 | 64.7  | 74.3  | 84.8* | 96.1* |       |
| 3,000    | 39.9 | 49.2 | 52.2  | 57.8 | 66.5 | 76.4  | 88.4* | 104*  |       |       |
| 3,500    | 50.2 | 59.3 | 62.5  | 69.0 | 80.2 | 93.4* | 109*  |       |       |       |

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

A

| rpm \ °C | -30 | -25 | -23.3 | -20 | -15 | -10  | -5   | 0    | 5    | 10   |
|----------|-----|-----|-------|-----|-----|------|------|------|------|------|
| 2,000    | 2.2 | 2.6 | 2.8   | 3.1 | 3.8 | 4.4  | 5.1  | 5.8  | 6.4* | 6.9* |
| 2,500    | 2.9 | 3.4 | 3.6   | 4.0 | 4.7 | 5.4  | 6.2  | 7.0* | 7.8* |      |
| 3,000    | 3.5 | 4.2 | 4.4   | 4.9 | 5.6 | 6.5  | 7.4* | 8.5* |      |      |
| 3,500    | 4.2 | 4.9 | 5.2   | 5.8 | 6.7 | 7.8* | 9.0* |      |      |      |

### COP (EN 12900/CECOMAF)

W/W

| rpm \ °C | -30  | -25  | -23.3 | -20  | -15  | -10   | -5    | 0     | 5     | 10    |
|----------|------|------|-------|------|------|-------|-------|-------|-------|-------|
| 2,000    | 0.80 | 0.98 | 1.03  | 1.12 | 1.26 | 1.41  | 1.57  | 1.75  | 1.94* | 2.13* |
| 2,500    | 0.79 | 0.96 | 1.01  | 1.10 | 1.24 | 1.37  | 1.53  | 1.70* | 1.88* |       |
| 3,000    | 0.78 | 0.92 | 0.97  | 1.06 | 1.21 | 1.37  | 1.51* | 1.65* |       |       |
| 3,500    | 0.76 | 0.90 | 0.95  | 1.04 | 1.19 | 1.32* | 1.45* |       |       |       |

\* Fan cooling of electronic unit compulsory

### Test conditions

Condensing temperature  
Ambient and suction gas temp.  
Liquid temperature  
Static cooling, 12 V DC  
1 Watt = 0.86 kcal/h

|                         |               |
|-------------------------|---------------|
| <b>EN 12900/CECOMAF</b> | <b>ASHRAE</b> |
| 55°C                    | 55°C          |
| 32°C                    | 32°C          |
| 55°C                    | 32°C          |

## Danfoss Compressors GmbH

Mads-Clausen-Strasse 7  
P.O.Box 1443, D-24939 Flensburg  
Phone: +49 461 4941-0  
Telefax: +49 461 44715  
[www.danfoss.com/compressors](http://www.danfoss.com/compressors)