Collection of Datasheets

Direct Current Compressors
R134a • 12-24V • 10-45V (Solar)
R600a • 10-45V (Solar)

REFRIGERATION AND
AIR CONDITIONING

Contents

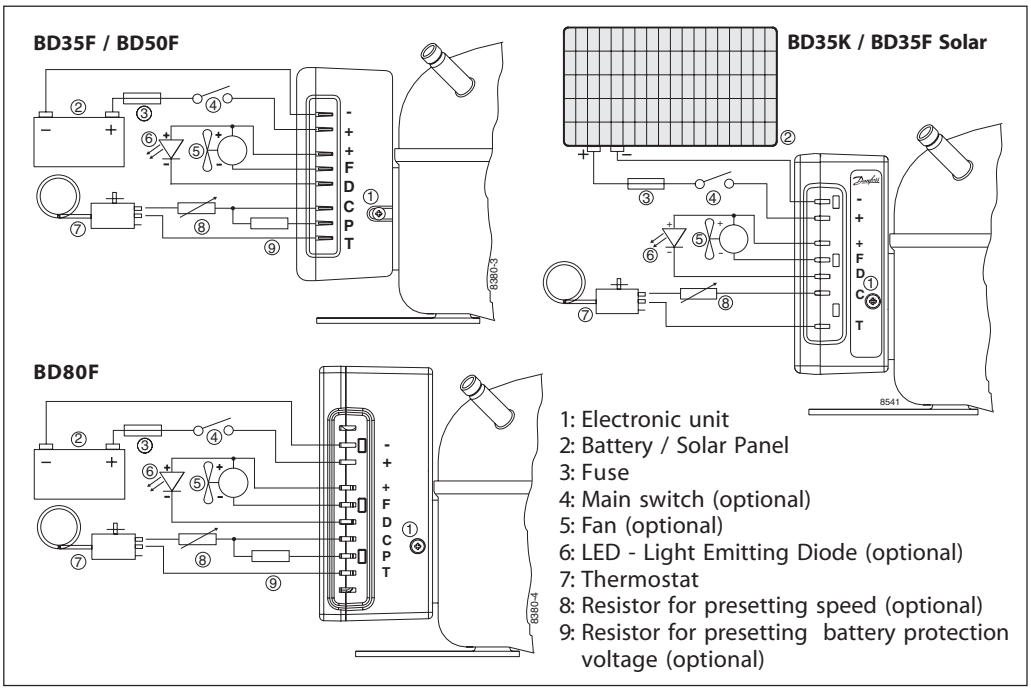
General

Danfoss variable speed refrigeration compressors type BD35F, BD50F and BD80F are designed for connection to 12V and 24V DC power supply and for refrigerant R134a (CF_3-CH_2F).
The compressors are intended especially for use in mobile applications, e.g. cooling boxes, boats, caravans, trucks, vans, buses, etc. Due to their low energy consumption and the option for a wide supply voltage range, the compressors are also very suitable for stationary applications powered by photovoltaic solar panels.
The compressors can be used in refrigerators and freezers designed for capillary tube and TEV as the throttling device.
The BD35K is especially designed for refrigeration systems using isobutane, refrigerant R600a (C_4H_{10}). R600a is classified as a flammable refrigerant of class A3 according to ANSI/ASHRAE 34. Accordingly, special safety regulations must be complied with. For domestic appliances a special Test Schedule has been integrated in the European Standard EN 60335-2-24 and IEC 60335-2-24. For commercial refrigerators IEC 60335-2-89 will include flammable refrigerants.
The BD35K must only and exclusively be used in appliances certified for R600a according to these or later regulations. This means that the compressors must not be used in appliances which are not originally designed and certified for R600a.
This compressor was designed for stationary use only.
The BD compressor concept includes an electronic unit which features overload protection and battery protection. The electronic unit has internal voltage recording and calibration to the applied voltage. The electronic unit may also be powered directly from certain types of electronic power supply units and thus no battery is required.
In addition to being especially quiet in operation, the compressors have a high COP value. They will operate under continual heeling of 30° such as occurs on boats.
The BD compressors must be mounted in a dry and clean place. The compressors will withstand storage temperatures down to -35°C.
Condensing temperatures:
Max. 60°C at stable conditions and max. 70°C at peak load.
Ambient temperatures: Min. -10°C, max. 55°C

Electric circuit

The BD compressors are fitted with a brushless direct current motor which is electronically commutated by an electronic unit.
The electronic unit is delivered separately and must be mounted on the compressor, please see instructions page 20. The electronic unit must always be connected directly to the battery poles or power supply unit terminals. For the protection of the installation an external fuse must be installed in the power supply cable close to the battery or power supply unit. Establish a special wiring for the BD power supply using direct one-piece cables and avoid to use the existing wiring.
If the chassis is used as a conductor, a proper connection between cable and chassis must be established.
Wrong polarity applied to the electronic unit does not destroy the unit, however, the compressor does not work.
If the compressor is planned to be stopped for a longer period, a main switch can be installed. The switch must have a contact system rated min. 20A, otherwise the voltage drop over the contacts will cause the battery protection to cut off the compressor earlier than intended.

Wiring diagram



Voltage range

BD35/50/80F: 12V systems: From 10.4V (9.6V) to 17V; 24V systems: From 22.8V (21.3V) to 31.5V.
BD35F/BD35K: Solar systems: 10V - 45V

The low voltage limits stated in brackets () can be established if a connection is made between the terminals C and P, please see also the passage **Optional battery protection settings** page 5.

The electronic unit will calibrate to the applied voltage. This means that if the battery voltage is less than 17V, the electronic unit assumes that it is working in a 12V system. If the voltage is higher than 17V, the electronic unit assumes that it is working in a 24V system. Consequently, the compressor does not run at power supply voltages between about 17V and the desired battery protection cut-out voltage for 24V systems.

A continuous voltage range from 9.6V to 31.5V can be established if a 220kΩ resistor (wiring diagram item 9) is connected between the terminals C and P. This wide voltage range makes the BD compressors very suitable for photovoltaic powering.

Cable dimensions

To ensure correct start and operating conditions, the following cable dimensions must be observed:

BD35F / BD50F / BD35K Solar / BD35F Solar

Cross section mm^2	Max length* m 12V operation	Max length* m 24V operation
2.5	2.5	5
4	4	8
6	6	12
10	10	20

BD80F

Cross section mm^2	Max length* m 12V operation	Max length* m 24V operation
6	2.5	5

*Length between battery and electronic unit

Thermostat connection

BD compressors can operate with normal mechanical type thermostats as used in refrigeration appliances, or with electronic thermostats. Always use new thermostats.
The thermostat is connected between the terminals C and T of the electronic unit.
The compressor current does not flow through the thermostat contacts.
When the thermostat is cut out there will still be power on to the electronic unit.
A system with no stand-by power consumption can be established if the thermostat (7) is replaced by a jumper between the terminals C and T, and the main switch (4) is replaced by a thermostat. In this case the full current to the compressor flows through the thermostat, which must be rated accordingly.

Compressor speed

Without any resistor in the control circuit, the compressor will run with a fixed speed of **2,000 rpm** when the thermostat is switched on, depending on the electronic unit version (see tables below).
Other fixed speeds in the range between **2,000** and **3,500/4,400rpm** can be obtained when a resistor (8) is installed to adjust the current (mA) of the contol circuit, please see wiring diagrammes page 3.

In AEO (Adaptive Energy Optimizing) speed mode the BD compressor will always adapt its speed to the actual cooling demand.

BD80F

Electronic unit	Resistor R1 (8) Ω	Motor speed rpm	Contr.circ. current mA
101N0280 with AEO	0	AEO	6
	203	2,500	5
	451	3,100	4
	867	3,800	3
	1700	4,400	2

BD35F / BD50F

Electronic unit	Resistor R1 (8) Ω	Motor speed rpm	Contr.circ. current mA
101N0210 101N0220	0	2,000	5
	277	2,500	4
	692	3,000	3
	1523	3,500	2
101N0300 with AEO	0	AEO	6
	173	2,000	5
	450	2,500	4
	865	3,000	3
	1696	3,500	2

BD35F Solar / BD35K Solar

Electronic unit	Resistor R1 (8) Ω	Motor speed rpm	Contr.circ. current mA
101N0400 with AEO	0	AEO	6
	173	2,000	5
	450	2,500	4
	865	3,000	3
	1696	3,500	2

LED connection

A 10mA Light Emitting Diode (LED) for compressor operation monitoring can be connected between the terminals + and D.
Operational errors will cause the LED to flash a number of times. The number of flashes depends on what kind of operational error was recorded.
Each flash will last ¼ second. After the actual number of flashes there will be a delay with no flashes, so that the sequence for each error recording is repeated every 4 seconds.

Operational errors shown by LED (optional):

BD35F / BD50F / BD35K Solar / BD35F Solar

Number of flashes	Error type
5	**Thermal cut-out of electronic unit** (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	**Minimum motor speed error** (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed at approximately 1,850 rpm).
3	**Motor start error** (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	**Fan over-current cut-out** (The fan loads the electronic unit with more than $1A_{peak}$).
1	**Battery protection cut-out** (The voltage is outside the cut-out setting).

BD80F

Number of flashes	Error type
5	**Thermal cut-out of electronic unit** (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	**Minimum motor speed error** (If the refrigeration system is too heavily lo-aded, the motor cannot maintain minimum speed at approximately 2,450 rpm).
3	**Motor start error** (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	**Fan over-current cut-out** (The fan loads the electronic unit with more than $1A_{peak}$).
1	**Battery protection cut-out** (The voltage is outside the cut-out setting).

Fan connection

If a fan is to be used, it must be connected to the electronic unit terminals + and F.
Always use a 12V fan, also in 24V systems, as the electronic unit will automatically reduce the applied voltage to 12V for the fan.
Using the special solar electronic unit 101N0400, the fan runs with input voltage always.
The max. load on the electronic unit is $0.5A_{average}$ or $1A_{peak}$. The fan is allowed to start with a higher current for the first 2 seconds.
If the fan becomes overloaded, both fan and compressor will be cut out by the overload protection.

Troubleshooting

To diagnose why a compressor comes to an unintended stop, it is recommended to have a Light Emitting Diode (LED) installed between the terminals + and D, please see page 3 and 4. Provided that the electronic unit is properly connected to the power supply, and the thermostat is on, the number of flashes emitted by the LED will give a hint about the reason for the interruption of the compressor operation.
The motor windings can be checked for defects by measuring the resistance between the current lead-in pins. If the measured values between all 3 pins are approximately the same, the motor is most likely all right.
The electronic unit is not to be repaired, it should not be opened at all.

Protection systems

The BD compressor protection system facilitates protection against compressor overload and start failure, fan overload and electronic unit overheating as well as destructive battery discharge.
When an overload protection is activated, the compressor enters a cycle in which it makes start attempts at about 60 seconds intervals until a successfull start is achieved.

Overload protections

The compressor overload and start protection cuts off power to the compressor if the compressor speed drops below approximately 1,850 rpm (BD35F/BD50F/BD35K) or 2,450 rpm (BD80F) or this motor speed is not reached during the start sequence. Possible reasons for overload protection activating could be excess refrigeration system pressures during operation or too high pressure difference. The fan overload protection stops the compressor and fan if the fan current exceeds $0.5A_{average}$ or $1A_{peak}$.
An overheating of the electronic unit heat sink will cause the compressor to stop. Restart will occur automatically when the temperature has dropped.
If a fan is installed, it will continue to run if the compressor stops due to overload or electronic unit overheating.

Voltage protection

If a voltage outside the specified range is applied to the electronic unit, the compressor does not start, or it stops if the voltage limit is exceeded during operation. The compressor will restart automatically about 1 minute after the supply voltage has reached the reset voltage within the range in question. If a fan is installed, it will start to operate without a delay as soon as the reset voltage is reached.

Battery protection (BD35F / BD50F / BD80F)

To ensure sufficient battery power for proper compressor operation or to avoid permanent damage to the battery because of heavy discharge, the BD electronic unit facilitates also a battery protection.
The compressor is stopped and restarted again according to the decided voltage limits measured on the + and - terminals of the electronic unit.

Standard battery protection settings

12V cut-out V	12V cut-in V	24V cut-out V	24V cut-in V
10.4	11.7	22.8	24.2

Other battery protection settings are optional if a connection, which includes a resistor, is established between terminals C and P, please see the wiring diagram page 3.

Optional battery protection settings

Resistor (R9) kΩ	12V cut-out V	12V cut-in V	12V max. voltage	24V cut-out V	24V cut-in V	24V max. voltage
0	9.6	10.9	17.0	21.3	22.7	31.5
1.6	9.7	11.0	17.0	21.5	22.9	31.5
2.4	9.9	11.1	17.0	21.8	23.2	31.5
3.6	10.0	11.3	17.0	22.0	23.4	31.5
4.7	10.1	11.4	17.0	22.3	23.7	31.5
6.2	10.2	11.5	17.0	22.5	23.9	31.5
8.2	10.4	11.7	17.0	22.8	24.2	31.5
11	10.5	11.8	17.0	23.0	24.5	31.5
14	10.6	11.9	17.0	23.3	24.7	31.5
18	10.8	12.0	17.0	23.6	25.0	31.5
24	10.9	12.2	17.0	23.8	25.2	31.5
33	11.0	12.3	17.0	24.1	25.5	31.5
47	11.1	12.4	17.0	24.3	25.7	31.5
82	11.3	12.5	17.0	24.6	26.0	31.5
220	9.6	10.9				31.5

BD35F
Direct Current Compressor
R134a
12 - 24V

Data Sheet (Replaces CD.46.A7.02)

Code numbers

BD35F without electronic unit	101Z0200
Electronic unit 12-24V DC - standard	single: 101N0210, 30 pcs: 101N0211
Electronic unit 12-24V DC - w. metal shielding	single: 101N0220, 30 pcs: 101N0221
Electronic unit 12-24V DC - with AEO	single: 101N0300, 30 pcs: 101N0301

Application

Application		LBP/MBP/(HBP)
Evaporating temperature range	°C	-30 to 0 (10)
Voltage range / max. voltage		12 - 24V DC / 31.5V DC
Max. machine compartment temperature	°C	55
Comp. cooling at ambient temp.	43°C	S or F_1*

Design

* depending on application

Displacement	cm^3	2.00
Oil quantity	cm^3	150
Maximum refrigerant charge	g	300
Free gas vol. in compressor	cm^3	870
Weight: Compressor/Electronic unit	kg	4.3/0.25

Motor

Motor type		Variable speed
Resistance, all 3 windings (25°C)	Ω	2.3
Approvals		E4 72/245 95/54 0277 00, UL984, CSA-C22.2

Dimensions

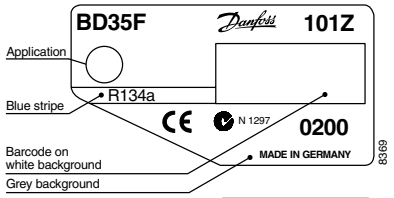
Height	mm	A	137
		B	135
		B1	128
		B2	73
Suction connector	location/I.D. mm	C	6.2 ±0.09
Process connector	location/I.D. mm	D	6.2 ±0.09
Discharge connector	location/I.D. mm	E	5.0 +0.12/+0.20
Compressors on a pallet	pcs.		150

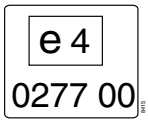
Standard battery protection settings (no connection C - P)

12V cut-out [V]	12V cut-in [V]	24V cut-out [V]	24V cut - in [V]
10.4	11.7	22.8	24.2

Optional battery protection settings

Resistor (R2) [kΩ]	12V cut-out [V]	12V cut-in [V]	12V max. Voltage	24V cut-out [V]	24V cut-in [V]	24V max. Voltage
0	9.6	10.9	17.0	21.3	22.7	31.5
1.6	9.7	11.0	17.0	21.5	22.9	31.5
2.4	9.9	11.1	17.0	21.8	23.2	31.5
3.6	10.0	11.3	17.0	22.0	23.4	31.5
4.7	10.1	11.4	17.0	22.3	23.7	31.5
6.2	10.2	11.5	17.0	22.5	23.9	31.5
8.2	10.4	11.7	17.0	22.8	24.2	31.5
11	10.5	11.8	17.0	23.0	24.5	31.5
14	10.6	11.9	17.0	23.3	24.7	31.5
18	10.8	12.0	17.0	23.6	25.0	31.5
24	10.9	12.2	17.0	23.8	25.2	31.5
33	11.0	12.3	17.0	24.1	25.5	31.5
47	11.1	12.4	17.0	24.3	25.7	31.5
82	11.3	12.5	17.0	24.6	26.0	31.5
220	9.6	10.9				31.5

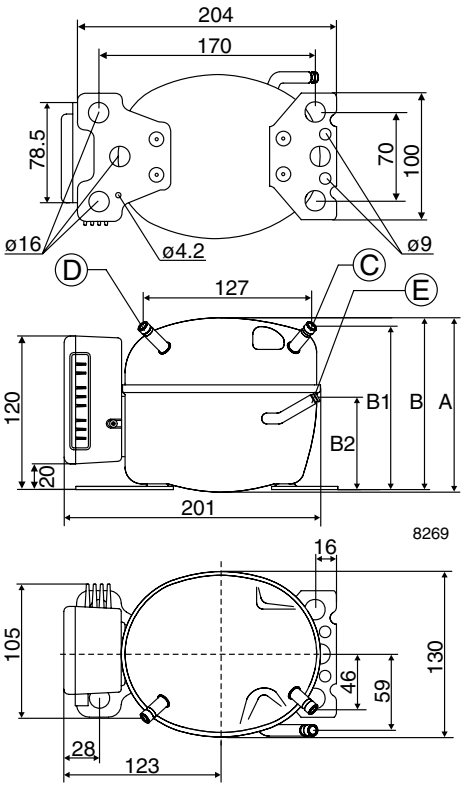




EC approval mark (electronic unit)

Approval mark

S = Static cooling normally sufficient
O = Oil cooling
F_1 = Fan cooling 1.5 m/s (compressor compartment temperature equal to ambient temperature)
F_2 = Fan cooling 3.0 m/s necessary



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			

Capacity (ASHRAE) **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	19.5	29.4	33.1	40.7	54.0	69.8	88.6	111	137	169
2,500	24.9	36.8	41.3	50.7	67.3	87.1	111	139	172	
3,000	27.7	39.9	44.9	55.9	76.1	101	130	164		
3,500	32.2	44.2	49.7	62.2	86.0	115	150			

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 24V applications the following 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**

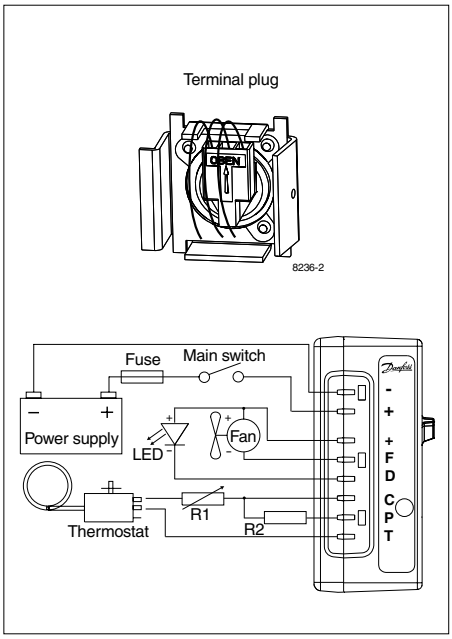
rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	0.90	1.02	1.06	1.15	1.31	1.48	1.67	1.87	2.08	2.29
2,500	0.87	0.97	1.01	1.09	1.24	1.41	1.60	1.80	2.02	
3,000	0.75	0.90	0.95	1.06	1.22	1.39	1.58	1.78		
3,500	0.73	0.84	0.89	1.00	1.17	1.36	1.55			

COP (ASHRAE) **W/W**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	1.10	1.25	1.31	1.42	1.61	1.82	2.06	2.31	2.57	2.84
2,500	1.07	1.19	1.24	1.34	1.53	1.74	1.97	2.23	2.50	
3,000	0.93	1.11	1.17	1.30	1.50	1.72	1.95	2.20		
3,500	0.89	1.03	1.09	1.23	1.44	1.68	1.91			

Test conditions	EN 12900/CECOMAF	ASHRAE
Condensing temperature	55°C	55°C
Ambient and suction gas temp.	32°C	32°C
Liquid temperature	55°C	32°C

Static cooling, 12V DC
1 Watt = 0.86 kcal/h



Compressor speed

Electronic unit	Resistor (R1) Ω	Motor speed rpm	Contr.circ. current mA
101N0210 101N0220	0	2,000	5
	277	2,500	4
	692	3,000	3
	1523	3,500	2
101N0300 with AEO	0	AEO	6
	173	2,000	5
	450	2,500	4
	865	3,000	3
	1696	3,500	2

In AEO (Adaptive Energy Optimizing) speed mode the BD compressor will always adapt its speed to the actual cooling demand.

Accessories

Devices	BD35F
Standard automobile fuse DIN 7258 12V: 15A 24V: 7.5A	Not deliverable from Danfoss
Mounting accessories	
Bolt joint for one compressor	118-1917
Bolt joint in quantities	118-1918
Snap on in quantities	118-1919

Wire dimensions

Size AWG	Size Cross section	Max length* 12V operation		Max length* 24V operation	
Gauge	mm²	ft.	m	ft.	m
12	2.5	8	2.5	16	5
12	4	13	4	26	8
10	6	19.5	6	39	12
8	10	32.8	10	65.6	20

***Length between battery and electronic unit**

Operational errors shown by LED (optional)

Number of flashes	Error type
5	**Thermal cut-out of electronic unit** (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	**Minimum motor speed error** (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed at approximately 1,850 rpm).
3	**Motor start error** (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	**Fan over-current cut-out** (The fan loads the electronic unit with more than $1A_{peak}$).
1	**Battery protection cut-out** (The voltage is outside the cut-out setting).

BD35F (Inch Connectors)
Direct Current Compressor
R134a, 12 - 24V

Data Sheet (Replaces CD.46.C1.22)

Code numbers

BD35F without electronic unit	101Z0204
Electronic unit 12-24V DC - standard	single: 101N0210, 30 pcs: 101N0211
Electronic unit 12-24V DC - w. metal shielding	single: 101N0220, 30 pcs: 101N0221
Electronic unit 12-24V DC - with AEO	single: 101N0300, 30 pcs: 101N0301

Application

Application	LBP/MBP/ [HBP]
Evaporating temperature range °F (°C)	-22 to 32 [50] (-30 to 0 [10])
Voltage range / max. voltage	12 - 24V DC / 31.5V DC
Max. machine compartment temp. °F (°C)	131 (55)
Comp. cooling at ambient temp. 110°F (43°C)	S or F_1*

* depending on application

Design

Displacement cu.in. (cm^3)	0.12 (2.00)
Oil quantity fl.oz. (cm^3)	5.1 (150)
Maximum refrigerant charge oz. (g)	10.5 (300)
Free gas vol. in compressor fl.oz. (cm^3)	29.6 (870)
Weight: Compressor/Electronic unit lbs. (kg)	9.5/0.55 (4.3/0.25)

Motor

Motor type	Variable speed
Resistance, all 3 windings (77°F) Ω	2.3
Approvals (electronic unit)	E4 72/245 95/54 0277 00, UL984, CSA-C22.2

Dimensions

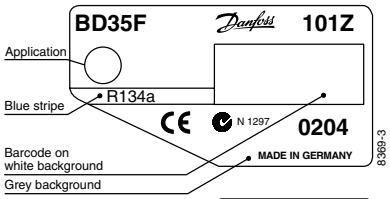
Height in. (mm)	A	5.39 (137)
	B	5.32 (135)
	B1	5.04 (128)
	B2	2.87 (73)
Suction connector location/I.D. in. (mm)	C	0.252-0.259 (6.5±0.09)
Process connector location/I.D. in. (mm)	D	0.252-0.259 (6.5±0.09)
Discharge connector location/I.D. in. (mm)	E	0.202-0.205 (5.0+0.12/0.20)
Compressors on a pallet pcs.		150

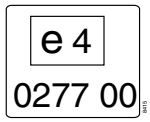
Standard battery protection settings (no connection C - P)

12V cut-out [V]	12V cut-in [V]	24V cut-out [V]	24V cut - in [V]
10.4	11.7	22.8	24.2

Optional battery protection settings

Resistor (R2) [kΩ]	12V cut-out [V]	12V cut-in [V]	12V max. Voltage	24V cut-out [V]	24V cut-in [V]	24V max. Voltage
0	9.6	10.9	17.0	21.3	22.7	31.5
1.6	9.7	11.0	17.0	21.5	22.9	31.5
2.4	9.9	11.1	17.0	21.8	23.2	31.5
3.6	10.0	11.3	17.0	22.0	23.4	31.5
4.7	10.1	11.4	17.0	22.3	23.7	31.5
6.2	10.2	11.5	17.0	22.5	23.9	31.5
8.2	10.4	11.7	17.0	22.8	24.2	31.5
11	10.5	11.8	17.0	23.0	24.5	31.5
14	10.6	11.9	17.0	23.3	24.7	31.5
18	10.8	12.0	17.0	23.6	25.0	31.5
24	10.9	12.2	17.0	23.8	25.2	31.5
33	11.0	12.3	17.0	24.1	25.5	31.5
47	11.1	12.4	17.0	24.3	25.7	31.5
82	11.3	12.5	17.0	24.6	26.0	31.5
220	9.6	10.9				31.5

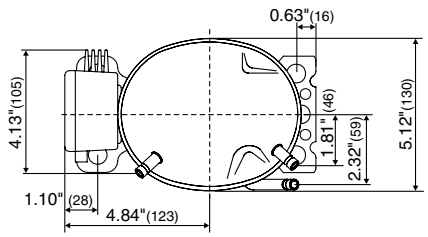


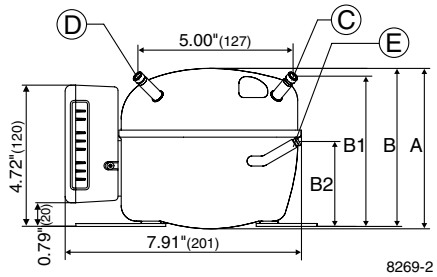


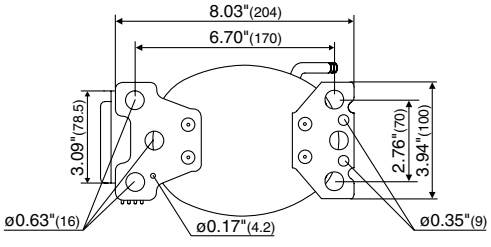
EC approval mark (electronic unit)

Approval mark

S = Static cooling normally sufficient
O = Oil cooling
F_1 = Fan cooling 1.5 m/s (compressor compartment temperature equal to ambient temperature)
F_2 = Fan cooling 3.0 m/s necessary







Capacity (ASHRAE) **Btu/h**

rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	74	101	113	159	214	280	361	458	514	575
2,500	95	127	142	199	268	351	452	573	643	
3,000	104	138	155	222	307	410	535	681		
3,500	119	153	171	248	349	473	619			

Capacity (EN 12900/CECOMAF) **watt**

rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	17.5	23.9	26.8	37.6	50.6	66.4	85.5	109	122	136
2,500	22.2	29.9	33.4	46.9	63.2	83.0	107	136	152	
3,000	24.5	32.4	36.4	52.3	72.4	97.0	126	161		
3,500	27.9	35.9	40.3	58.5	82.5	112	147			

Power consumption **watt**

rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	19.1	23.5	25.3	30.8	36.1	41.3	46.6	52.5	55.7	59.1
2,500	25.2	31.0	33.3	40.7	47.4	54.0	60.7	67.7	71.5	
3,000	31.0	35.8	38.0	45.9	54.5	63.4	72.2	80.6		
3,500	37.5	42.9	45.4	54.5	64.4	74.9	85.7			

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

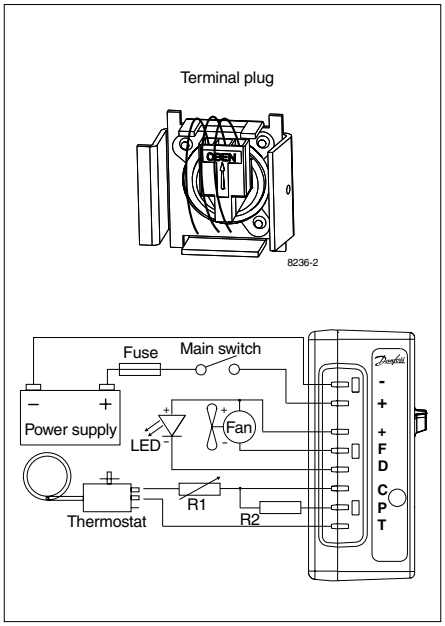
rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	1.59	1.96	2.10	2.57	3.01	3.44	3.89	4.37	4.64	4.93
2,500	2.10	2.58	2.77	3.38	3.95	4.49	5.05	5.63	5.95	
3,000	2.61	3.01	3.19	3.86	4.58	5.32	6.06	6.76		
3,500	3.14	3.58	3.79	4.55	5.38	6.25	7.15			

EER (ASHRAE) **Btu/Wh**

rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	3.87	4.29	4.48	5.16	5.93	6.80	7.74	8.73	9.23	9.73
2,500	3.75	4.09	4.26	4.89	5.64	6.50	7.45	8.47	8.99	
3,000	3.36	3.86	4.07	4.83	5.63	6.48	7.41	8.44		
3,500	3.16	3.56	3.77	4.56	5.42	6.31	7.23			

COP (EN 12900/CECOMAF) **W/W**

rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	0.92	1.02	1.06	1.22	1.40	1.60	1.82	2.06	2.17	2.29
2,500	0.89	0.97	1.01	1.15	1.33	1.53	1.76	2.00	2.12	
3,000	0.79	0.90	0.96	1.13	1.32	1.52	1.74	1.98		
3,500	0.75	0.84	0.89	1.07	1.28	1.49	1.70			



Test conditions	ASHRAE	EN 12900
Condensing temperature	130°F (54,4°C)	55°C (131°F)
Ambient & suction gas temp.	90°F (32°C)	32°C (90°F)
Liquid temperature	90°F (32°C)	55°C (131°F)

Static cooling, 12V DC
1 Watt = 3.41 Btu/h = 0.86 kcal/h

Operational errors shown by LED (optional)

Number of flashes	Error type
5	**Thermal cut-out of electronic unit** (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	**Minimum motor speed error** (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed at approximately 1,850 rpm).
3	**Motor start error** (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	**Fan over-current cut-out** (The fan loads the electronic unit with more than $1A_{peak}$).
1	**Battery protection cut-out** (The voltage is outside the cut-out setting).

Compressor speed

Electronic unit	Resistor (R1) Ω	Motor speed rpm	Contr.circ. current mA
101N0210 101N0220	0	2,000	5
	277	2,500	4
	692	3,000	3
	1523	3,500	2
101N0300 with AEO	0	AEO	6
	173	2,000	5
	450	2,500	4
	865	3,000	3
	1696	3,500	2

In AEO (Adaptive Energy Optimizing) speed mode the BD compressor will always adapt its speed to the actual cooling demand.

Wire dimensions

Size AWG	Size Cross section	Max length* 12V operation		Max length* 24V operation	
Gauge	mm²	ft.	m	ft.	m
12	2.5	8	2.5	16	5
12	4	13	4	26	8
10	6	19.5	6	39	12
8	10	32.8	10	65.6	20

***Length between battery and electronic unit**

Accessories

Devices	BD35F
Standard automobile fuse DIN 7258 12V: 15A 24V: 7.5A	Not deliverable from Danfoss
Mounting accessories	
Bolt joint for one compressor	118-1917
Bolt joint in quantities	118-1918
Snap on in quantities	118-1919

BD50F
Direct Current Compressor
R134a
12 - 24V

Data Sheet (Replaces CD.46.B5.02)

Code numbers

BD50F without electronic unit	101Z1220
Electronic unit 12-24V DC - standard	single: 101N0210, 30 pcs: 101N0211
Electronic unit 12-24V DC - w. metal shielding	single: 101N0220, 30 pcs: 101N0221
Electronic unit 12-24V DC - with AEO	single: 101N0300, 30 pcs: 101N0301

Application

Application		LBP/MBP/(HBP)
Evaporating temperature range	°C	-30 to 0 (10)
Voltage range / max. voltage		12 - 24V DC / 31.5V DC
Max. machine compartment temperature	°C	55
Comp. cooling at ambient temp. 43°C		S or F_1*

Design

* depending on application

Displacement	cm^3	2.50
Oil quantity	cm^3	150
Maximum refrigerant charge	g	300
Free gas vol. in compressor	cm^3	870
Weight: Compressor/Electronic unit	kg	4.3/0.25

Motor

Motor type		Variable speed
Resistance, all 3 windings (25°C)	Ω	2.0
Approvals (electronic unit)		E4 72/245 95/54 0277 00, UL984, CSA-C22.2

Dimensions

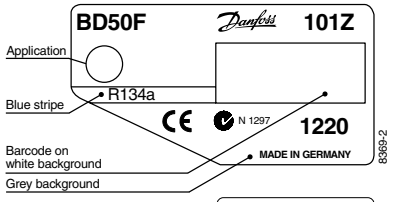
Height	mm	A	137
		B	135
		B1	128
		B2	73
Suction connector	location/I.D. mm	C	6.2 ±0.09
Process connector	location/I.D. mm	D	6.2 ±0.09
Discharge connector	location/I.D. mm	E	5.0 +0.12/+0.20
Compressors on a pallet	pcs.		150

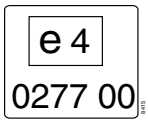
Standard battery protection settings (no connection C - P)

12V cut-out [V]	12V cut-in [V]	24V cut-out [V]	24V cut - in [V]
10.4	11.7	22.8	24.2

Optional battery protection settings

Resistor (R2) [kΩ]	12V cut-out [V]	12V cut-in [V]	12V max. Voltage	24V cut-out [V]	24V cut-in [V]	24V max. Voltage
0	9.6	10.9	17.0	21.3	22.7	31.5
1.6	9.7	11.0	17.0	21.5	22.9	31.5
2.4	9.9	11.1	17.0	21.8	23.2	31.5
3.6	10.0	11.3	17.0	22.0	23.4	31.5
4.7	10.1	11.4	17.0	22.3	23.7	31.5
6.2	10.2	11.5	17.0	22.5	23.9	31.5
8.2	10.4	11.7	17.0	22.8	24.2	31.5
11	10.5	11.8	17.0	23.0	24.5	31.5
14	10.6	11.9	17.0	23.3	24.7	31.5
18	10.8	12.0	17.0	23.6	25.0	31.5
24	10.9	12.2	17.0	23.8	25.2	31.5
33	11.0	12.3	17.0	24.1	25.5	31.5
47	11.1	12.4	17.0	24.3	25.7	31.5
82	11.3	12.5	17.0	24.6	26.0	31.5
220	9.6	10.9				31.5

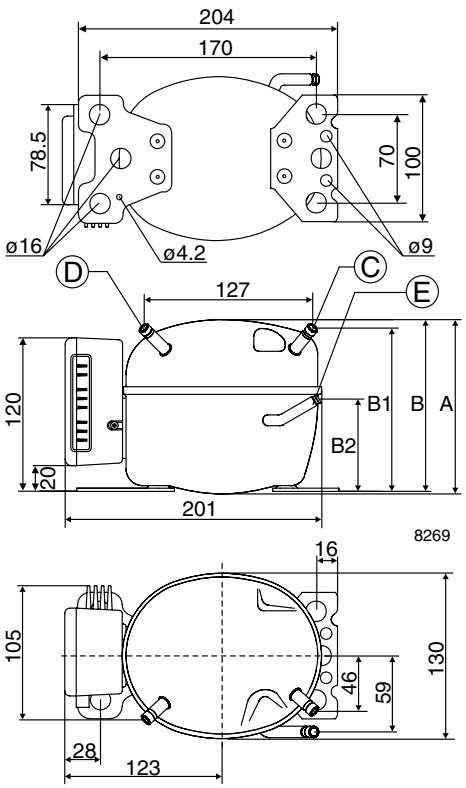




EC approval mark (electronic unit)

Approval mark

S = Static cooling normally sufficient
O = Oil cooling
F_1 = Fan cooling 1.5 m/s (compressor compartment temperature equal to ambient temperature)
F_2 = Fan cooling 3.0 m/s necessary



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	72.2	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*			

Capacity (ASHRAE) **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	24.7	38.3	43.1	52.9	69.5	89.3	113	143	178*	221*
2,500	33.3	48.1	53.6	65.0	85.1	110	140	178*	224*	
3,000	38.2	56.0	62.5	75.9	100	129	166*	212*		
3,500	47.0	65.7	72.9	88.7	117	153*	196*			

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 24V applications the following 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*			

COP (ASHRAE) **W/W**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	0.99	1.21	1.27	1.38	1.56	1.74	1.94	2.16	2.40*	2.65*
2,500	0.98	1.19	1.25	1.36	1.53	1.70	1.89	2.10*	2.33*	
3,000	0.96	1.14	1.20	1.31	1.50	1.69	1.87*	2.04*		
3,500	0.94	1.11	1.17	1.28	1.46	1.64*	1.80*			

Test conditions	EN 12900/CECOMAF	ASHRAE
Condensing temperature	55°C	55°C
Ambient and suction gas temp.	32°C	32°C
Liquid temperature	55°C	32°C

Static cooling, 12V DC

***** Fan cooling of electronic unit compulsory

1 Watt = 0.86 kcal/h

Compressor speed

Electronic unit	Resistor (R1) Ω	Motor speed rpm	Contr.circ. current mA
101N0210 101N0220	0	2,000	5
	277	2,500	4
	692	3,000	3
	1523	3,500	2
101N0300 with AEO	0	AEO	6
	173	2,000	5
	450	2,500	4
	865	3,000	3
	1696	3,500	2

In AEO (Adaptive Energy Optimizing) speed mode the BD compressor will always adapt its speed to the actual cooling demand.

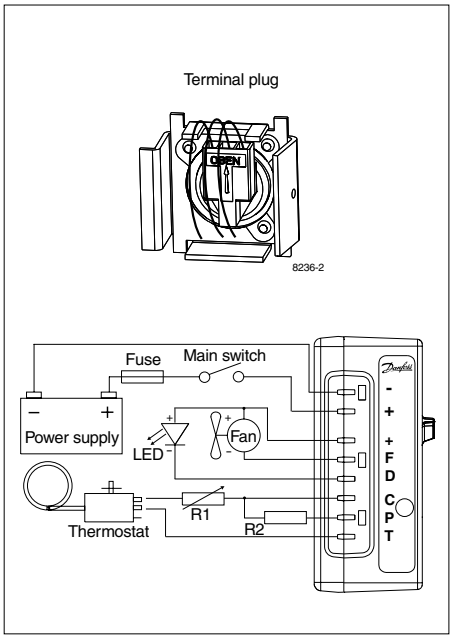
Accessories

Devices	BD50F
Standard automobile fuse DIN 7258 12V: 15A 24V: 7.5A	Not deliverable from Danfoss
Mounting accessories	
Bolt joint for one compressor	118-1917
Bolt joint in quantities	118-1918
Snap on in quantities	118-1919

Wire dimensions

Size AWG Gauge	Size Cross section mm²	Max length* 12V operation ft.	Max length* 12V operation m	Max length* 24V operation ft.	Max length* 24V operation m
12	2.5	8	2.5	16	5
12	4	13	4	26	8
10	6	19.5	6	39	12
8	10	32.8	10	65.6	20

***Length between battery and electronic unit**



Operational errors shown by LED (optional)

Number of flashes	Error type
5	**Thermal cut-out of electronic unit** (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	**Minimum motor speed error** (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed at approximately 1,850 rpm).
3	**Motor start error** (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	**Fan over-current cut-out** (The fan loads the electronic unit with more than $1A_{peak}$).
1	**Battery protection cut-out** (The voltage is outside the cut-out setting).

BD50F (Inch Connectors)
Direct Current Compressor
R134a, 12 - 24V

Data Sheet (Replaces CD.46.D1.22)

Code numbers

BD50F without electronic unit	101Z0203
Electronic unit 12-24V DC - standard	single: 101N0210, 30 pcs: 101N0211
Electronic unit 12-24V DC - w. metal shielding	single: 101N0220, 30 pcs: 101N0221
Electronic unit 12-24V DC - with AEO	single: 101N0300, 30 pcs: 101N0301

Application

Application	LBP/MBP/ [HBP]
Evaporating temperature range °F (°C)	-22 to 32 [50] (-30 to 0 [10])
Voltage range / max. voltage	12 - 24V DC / 31.5V DC
Max. machine compartment temp. °F (°C)	131 (55)
Comp. cooling at ambient temp. 110°F (43°C)	S or F_1*

* depending on application

Design

Displacement cu.in. (cm^3)	0.15 (2.50)
Oil quantity fl.oz. (cm^3)	5.1 (150)
Maximum refrigerant charge oz. (g)	10.5 (300)
Free gas vol. in compressor fl.oz. (cm^3)	29.6 (870)
Weight: Compressor/Electronic unit lbs. (kg)	9.5/0.55 (4.3/0.25)

Motor

Motor type	Variable speed
Resistance, all 3 windings (77°F) Ω	2.0
Approvals (electronic unit)	E4 72/245 95/54 0277 00, UL984, CSA-C22.2

Dimensions

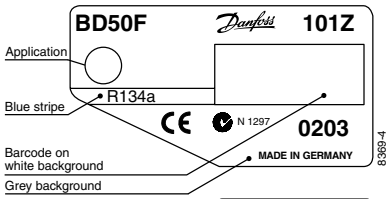
Height in. (mm)	A	5.39 (137)
	B	5.32 (135)
	B1	5.04 (128)
	B2	2.87 (73)
Suction connector location/I.D. in. (mm)	C	0.252-0.259 (6.5±0.09)
Process connector location/I.D. in. (mm)	D	0.252-0.259 (6.5±0.09)
Discharge connector location/I.D. in. (mm)	E	0.202-0.205 (5.0+0.12/0.20)
Compressors on a pallet pcs.		150

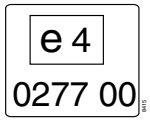
Standard battery protection settings (no connection C - P)

12V cut-out [V]	12V cut-in [V]	24V cut-out [V]	24V cut - in [V]
10.4	11.7	22.8	24.2

Optional battery protection settings

Resistor (R2) [kΩ]	12V cut-out [V]	12V cut-in [V]	12V max. Voltage	24V cut-out [V]	24V cut-in [V]	24V max. Voltage
0	9.6	10.9	17.0	21.3	22.7	31.5
1.6	9.7	11.0	17.0	21.5	22.9	31.5
2.4	9.9	11.1	17.0	21.8	23.2	31.5
3.6	10.0	11.3	17.0	22.0	23.4	31.5
4.7	10.1	11.4	17.0	22.3	23.7	31.5
6.2	10.2	11.5	17.0	22.5	23.9	31.5
8.2	10.4	11.7	17.0	22.8	24.2	31.5
11	10.5	11.8	17.0	23.0	24.5	31.5
14	10.6	11.9	17.0	23.3	24.7	31.5
18	10.8	12.0	17.0	23.6	25.0	31.5
24	10.9	12.2	17.0	23.8	25.2	31.5
33	11.0	12.3	17.0	24.1	25.5	31.5
47	11.1	12.4	17.0	24.3	25.7	31.5
82	11.3	12.5	17.0	24.6	26.0	31.5
220	9.6	10.9				31.5

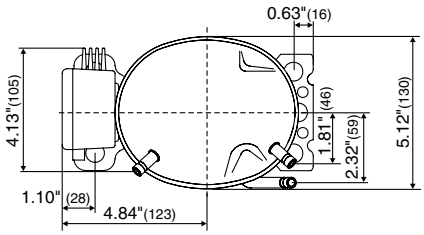


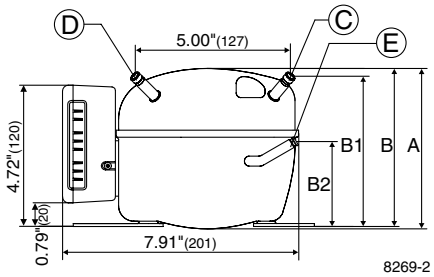


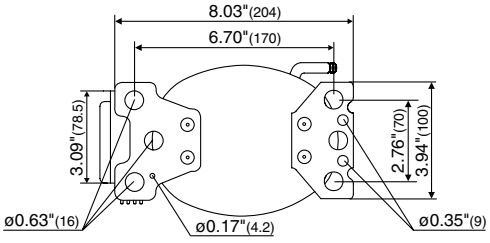
EC approval mark (electronic unit)

Approval mark

S = Static cooling normally sufficient
O = Oil cooling
F_1 = Fan cooling 1.5 m/s (compressor compartment temperature equal to ambient temperature)
F_2 = Fan cooling 3.0 m/s necessary







Capacity (ASHRAE) **Btu/h**

rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	95	126	142	201	273	359	458	570	632*	697*
2,500	119	157	176	247	335	442	570	723*	809*	
3,000	142	189	211	296	401	529	682*	863*		
3,500	167	220	245	342	464	612*	790*			

Capacity (EN 12900/CECOMAF) **watt**

rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	22.6	30.0	33.6	47.7	64.9	85.2	109	135	150*	165*
2,500	28.2	37.3	41.7	58.5	79.3	105	135	171*	191*	
3,000	33.7	44.8	50.1	70.4	95.2	125	161*	204*		
3,500	39.8	52.2	58.2	81.3	110	145*	187*			

Power consumption **watt**

rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	27.4	32.5	34.6	41.7	49.0	56.8	65.4	75.1	80.4*	86.2*
2,500	34.3	41.4	44.3	54.0	63.4	73.0	82.8	93.1*	98.6*	
3,000	41.4	50.1	53.7	65.2	76.2	87.4	98.9*	111*		
3,500	49.6	58.8	62.6	75.5	88.7	103*	119*			

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

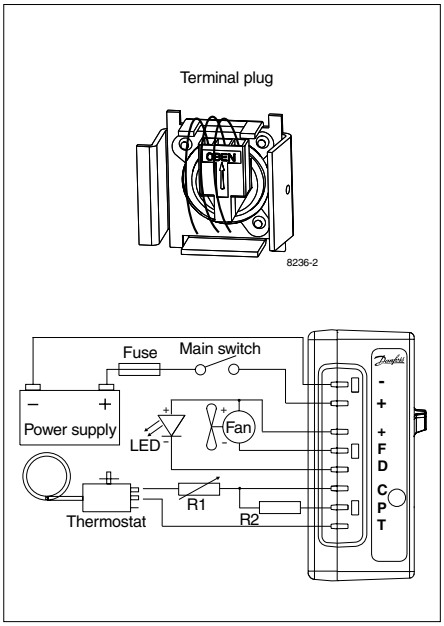
rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	2.28	2.69	2.87	3.50	4.18	4.90	5.65	6.45	6.87*	7.29*
2,500	2.86	3.41	3.65	4.45	5.26	6.10	6.94	7.81*	8.25*	
3,000	3.52	4.16	4.43	5.37	6.33	7.31	8.32*	9.34*		
3,500	4.20	4.88	5.18	6.24	7.39	8.61*	9.91*			

EER (ASHRAE) **Btu/Wh**

rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	3.49	3.89	4.09	4.81	5.57	6.31	7.00	7.60	7.85*	8.09*
2,500	3.47	3.81	3.97	4.58	5.28	6.05	6.88	7.76*	8.21*	
3,000	3.43	3.77	3.93	4.55	5.26	6.05	6.89*	7.76*		
3,500	3.37	3.74	3.91	4.54	5.23	5.94*	6.66*			

COP (EN 12900/CECOMAF) **W/W**

rpm \ °F	-20	-13	-10	0	10	20	30	40	45	50
2,000	0.82	0.92	0.96	1.13	1.31	1.48	1.64	1.78	1.84*	1.90*
2,500	0.82	0.90	0.94	1.08	1.24	1.42	1.62	1.82*	1.93*	
3,000	0.81	0.89	0.93	1.07	1.24	1.42	1.62*	1.82*		
3,500	0.80	0.88	0.92	1.07	1.23	1.40*	1.56*			



Test conditions	ASHRAE	EN 12900
Condensing temperature	130°F (54,4°C)	55°C (131°F)
Ambient & suction gas temp.	90°F (32°C)	32°C (90°F)
Liquid temperature	90°F (32°C)	55°C (131°F)

Static cooling, 12V DC

***** Fan cooling of electronic unit compulsory

1 Watt = 3.41 Btu/h = 0.86 kcal/h

Operational errors shown by LED (optional)

Number of flashes	Error type
5	**Thermal cut-out of electronic unit** (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	**Minimum motor speed error** (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed at approximately 1,850 rpm).
3	**Motor start error** (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	**Fan over-current cut-out** (The fan loads the electronic unit with more than $1A_{peak}$).
1	**Battery protection cut-out** (The voltage is outside the cut-out setting).

Compressor speed

Electronic unit	Resistor (R1) Ω	Motor speed rpm	Contr.circ. current mA
101N0210 101N0220	0	2,000	5
	277	2,500	4
	692	3,000	3
	1523	3,500	2
101N0300 with AEO	0	AEO	6
	173	2,000	5
	450	2,500	4
	865	3,000	3
	1696	3,500	2

In AEO (Adaptive Energy Optimizing) speed mode the BD compressor will always adapt its speed to the actual cooling demand.

Wire dimensions

Size AWG Gauge	Size Cross section mm²	Max length* 12V operation ft.	Max length* 12V operation m	Max length* 24V operation ft.	Max length* 24V operation m
12	2.5	8	2.5	16	5
12	4	13	4	26	8
10	6	19.5	6	39	12
8	10	32.8	10	65.6	20

***Length between battery and electronic unit**

Accessories

Devices	BD50F
Standard automobile fuse DIN 7258 12V: 15A 24V: 7.5A	Not deliverable from Danfoss
Mounting accessories	
Bolt joint for one compressor	118-1917
Bolt joint in quantities	118-1918
Snap on in quantities	118-1919

BD80F
Direct Current Compressor
R134a
12 - 24V

Data Sheet (Replaces (CD.46.F1.02)

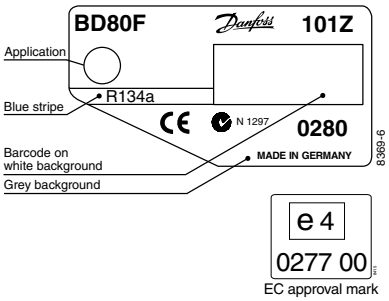
Code numbers

BD80F without electronic unit	101Z0280
Electronic unit 12-24V DC - standard	single: 101N0280, 28 pcs: 101N0281

Application

Application		LBP
Evaporating temperature range	°C	-30 to -5
Voltage range / max. voltage		12 - 24V DC / 31.5V DC
Max. machine compartment temperature	°C	43
Comp. cooling at ambient temp. 43°C		S or F_1 *

* depending on application



S = Static cooling normally sufficient
O = Oil cooling
F_1 = Fan cooling 1.5 m/s (compressor compartment temperature equal to ambient temperature)
F_2 = Fan cooling 3.0 m/s necessary

Design

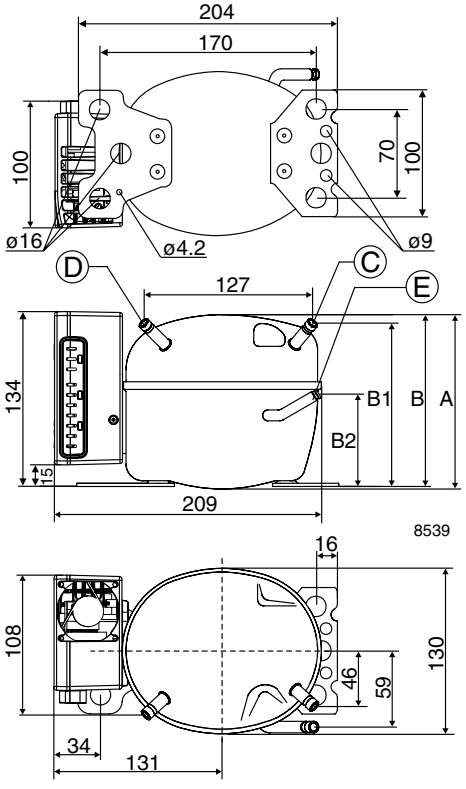
Displacement	cm^3	3.00
Oil quantity	cm^3	150
Maximum refrigerant charge	g	300
Free gas vol. in compressor	cm^3	870
Weight: Compressor/Electronic unit	kg	4.3/0.3

Motor

Motor type		Variable speed
Resistance, all 3 windings (25°C)	Ω	2.0
Approvals (electronic unit)		E4 72/245 95/54 0277 00

Dimensions

Height	mm	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.		150



Standard battery protection settings (no connection C - P)

12V cut-out [V]	12V cut-in [V]	24V cut-out [V]	24V cut - in [V]
10.4	11.7	22.8	24.2

Optional battery protection settings

Resistor (R2) [kΩ]	12V cut-out [V]	12V cut-in [V]	12V max. Voltage	24V cut-out [V]	24V cut-in [V]	24V max. Voltage
0	9.6	10.9	17.0	21.3	22.7	31.5
1.6	9.7	11.0	17.0	21.5	22.9	31.5
2.4	9.9	11.1	17.0	21.8	23.2	31.5
3.6	10.0	11.3	17.0	22.0	23.4	31.5
4.7	10.1	11.4	17.0	22.3	23.7	31.5
6.2	10.2	11.5	17.0	22.5	23.9	31.5
8.2	10.4	11.7	17.0	22.8	24.2	31.5
11	10.5	11.8	17.0	23.0	24.5	31.5
14	10.6	11.9	17.0	23.3	24.7	31.5
18	10.8	12.0	17.0	23.6	25.0	31.5
24	10.9	12.2	17.0	23.8	25.2	31.5
33	11.0	12.3	17.0	24.1	25.5	31.5
47	11.1	12.4	17.0	24.3	25.7	31.5
82	11.3	12.5	17.0	24.6	26.0	31.5
220	9.6	10.9				31.5

Capacity (EN 12900/CECOMAF) **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5
2,500	35.3	49.5	55.0	66.6	87.1	112	140
3,100	41.8	59.0	65.6	79.6	104	133	168
3,800	49.6	70.5	78.5	95.3	125	159	200
4,400	54.8	78.0	86.7	105	138	176	221

Capacity (ASHRAE) **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5
2,500	43.5	61.1	67.8	82.2	108	138	174
3,100	51.5	72.8	80.9	98.2	129	165	207
3,800	61.1	87.0	96.8	118	154	197	248
4,400	67.6	96.1	107	130	170	218	274

Power consumption **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5
2,500	40.0	50.0	53.4	60.3	71.3	83.1	96
3,100	48.7	61.2	65.4	73.8	87.0	101	118
3,800	59.5	75.0	80.2	90.3	106	124	145
4,400	69.0	87.0	93.0	105	123	144	168

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

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5
2,500	3.3	4.2	4.5	5.0	5.9	6.9	8.0
3,100	4.1	5.1	5.5	6.1	7.2	8.5	9.8
3,800	5.0	6.3	6.7	7.5	8.9	10.3	12.1
4,400	5.8	7.2	7.7	8.7	10.3	12.0	14.0

COP (EN 12900/CECOMAF) **W/W**

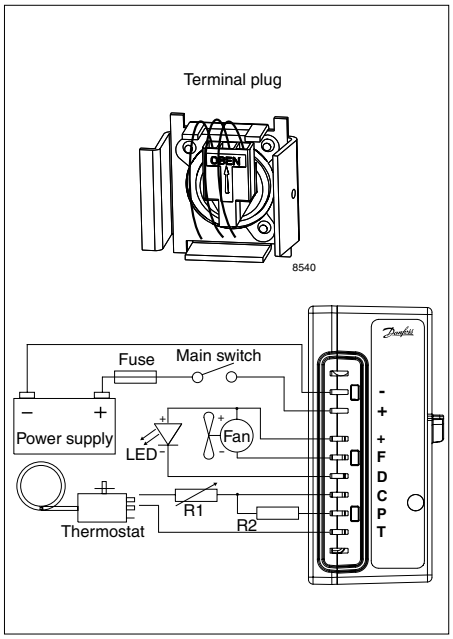
rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5
2,500	0.88	0.99	1.03	1.10	1.22	1.34	1.46
3,100	0.86	0.96	1.00	1.08	1.20	1.31	1.42
3,800	0.83	0.94	0.98	1.06	1.17	1.28	1.39
4,400	0.79	0.90	0.93	1.01	1.12	1.22	1.32

COP (ASHRAE) **W/W**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5
2,500	1.09	1.22	1.27	1.36	1.51	1.66	1.81
3,100	1.06	1.19	1.24	1.33	1.48	1.62	1.76
3,800	1.03	1.16	1.21	1.30	1.45	1.59	1.71
4,400	0.98	1.11	1.15	1.24	1.38	1.51	1.63

Test conditions	EN 12900/CECOMAF	ASHRAE
Condensing temperature	55°C	55°C
Ambient and suction gas temp.	32°C	32°C
Liquid temperature	55°C	32°C

Static cooling, 12V DC
Fan cooling of electronic unit integrated
1 Watt = 0.86 kcal/h



Compressor speed

Electronic unit	Resistor (R1) Ω	Motor speed rpm	Contr.circ. current mA
101N0280 with AEO	0 203 451 867 1700	AEO 2,500 3,100 3,800 4,400	6 5 4 3 2

In AEO (Adaptive Energy Optimizing) speed mode the BD compressor will always adapt its speed to the actual cooling demand.

Wire dimensions

Cross section mm^2	Max length* m 12V operation	Max length* m 24V operation
6	2.5	5

***Length between battery and electronic unit**

Accessories

Devices	BD80F
Standard automobile fuse DIN 7258 12V: 30A 24V: 15A	Not deliverable from Danfoss
Mounting accessories	
Bolt joint for one compressor	118-1917
Bolt joint in quantities	118-1918
Snap on in quantities	118-1919

Operational errors shown by LED (optional)

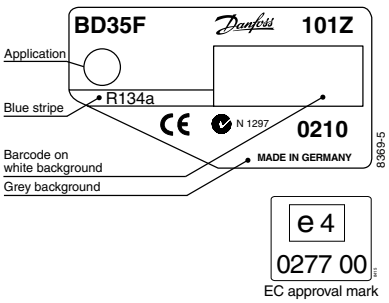
Number of flashes	Error type
5	**Thermal cut-out of electronic unit** (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	**Minimum motor speed error** (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed at approximately 2,450 rpm).
3	**Motor start error** (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	**Fan over-current cut-out** (The fan loads the electronic unit with more than $1A_{peak}$).
1	**Battery protection cut-out** (The voltage is outside the cut-out setting).

BD35F
Direct Current Compressor for Solar Applications
R134a
10 - 45V

Data Sheet

Code numbers

BD35F without electronic unit	101Z0210
Electronic unit 10-45V DC	single: 101N0400, 30 pcs: 101N0401



Application

Application		LBP/MBP/(HBP)
Evaporating temperature range	°C	-30 to 0 (10)
Voltage range / max. voltage		10 - 45V DC
Fan output		same as input voltage
Max. machine compartment temperature	°C	55
Comp. cooling at ambient temp. 43°C		S or F_1*

* depending on application

S = Static cooling normally sufficient
O = Oil cooling
F_1 = Fan cooling 1.5 m/s (compressor compartment temperature equal to ambient temperature)
F_2 = Fan cooling 3.0 m/s necessary

Design

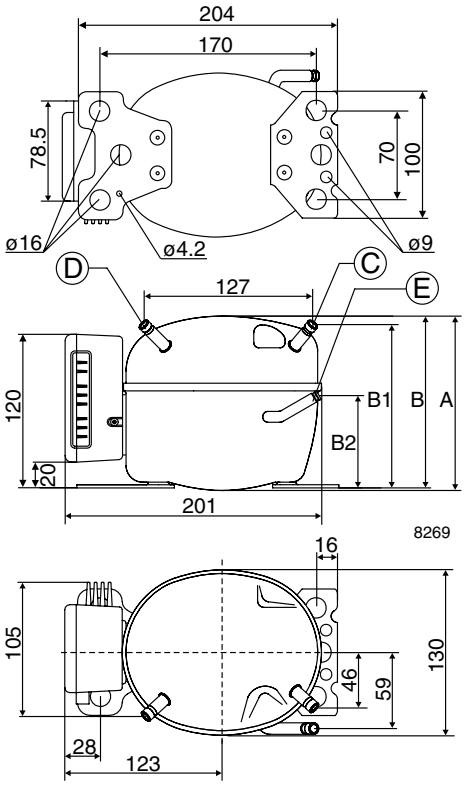
Displacement	cm^3	2.00
Oil quantity	cm^3	150
Maximum refrigerant charge	g	300
Free gas vol. in compressor	cm^3	870
Weight: Compressor/Electronic unit	kg	4.3/0.25

Motor

Motor type		Variable speed
Resistance, all 3 windings (25°C)	Ω	2.3
Approvals (electronic unit)		E4 72/245 95/54 0277 00

Dimensions

Height	mm	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.		150



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			

Capacity (ASHRAE) **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	19.5	29.4	33.1	40.7	54.0	69.8	88.6	111	137	169
2,500	24.9	36.8	41.3	50.7	67.3	87.1	111	139	172	
3,000	27.7	39.9	44.9	55.9	76.1	101	130	164		
3,500	32.2	44.2	49.7	62.2	86.0	115	150			

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 24V applications the following 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**

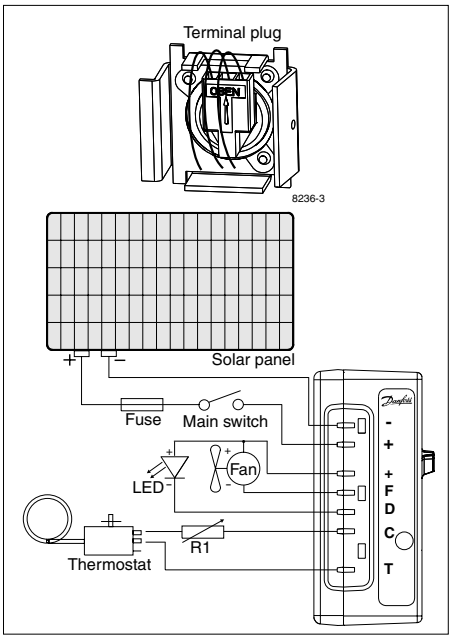
rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	0.90	1.02	1.06	1.15	1.31	1.48	1.67	1.87	2.08	2.29
2,500	0.87	0.97	1.01	1.09	1.24	1.41	1.60	1.80	2.02	
3,000	0.75	0.90	0.95	1.06	1.22	1.39	1.58	1.78		
3,500	0.73	0.84	0.89	1.00	1.17	1.36	1.55			

COP (ASHRAE) **W/W**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	1.10	1.25	1.31	1.42	1.61	1.82	2.06	2.31	2.57	2.84
2,500	1.07	1.19	1.24	1.34	1.53	1.74	1.97	2.23	2.50	
3,000	0.93	1.11	1.17	1.30	1.50	1.72	1.95	2.20		
3,500	0.89	1.03	1.09	1.23	1.44	1.68	1.91			

Test conditions	EN 12900/CECOMAF	ASHRAE
Condensing temperature	55°C	55°C
Ambient and suction gas temp.	32°C	32°C
Liquid temperature	55°C	32°C

Static cooling, 12V DC
1 Watt = 0.86 kcal/h



Compressor speed

Electronic unit	Resistor (R1) Ω	Motor speed rpm	Contr.circ. current mA
101N0400 with AEO	0	AEO	6
	173	2,000	5
	450	2,500	4
	865	3,000	3
	1696	3,500	2

In AEO (Adaptive Energy Optimizing) speed mode the BD compressor will always adapt its speed to the actual cooling demand.

Accessories

Devices	BD35F
Standard automobile fuse DIN 7258 15A	Not deliverable from Danfoss
Mounting accessories	
Bolt joint for one compressor	118-1917
Bolt joint in quantities	118-1918
Snap on in quantities	118-1919

Wire dimensions

Size AWG	Size Cross section	Max length* 12V operation		Max length* 24V operation	
Gauge	mm²	ft.	m	ft.	m
12	2.5	8	2.5	16	5
12	4	13	4	26	8
10	6	19.5	6	39	12
8	10	32.8	10	65.6	20

***Length between battery and electronic unit**

Operational errors shown by LED (optional)

Number of flashes	Error type
5	**Thermal cut-out of electronic unit** (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	**Minimum motor speed error** (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed at approximately 1,850 rpm).
3	**Motor start error** (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	**Fan over-current cut-out** (The fan loads the electronic unit with more than $1A_{peak}$).

BD35K
Direct Current Compressor for Solar Applications (for stationary use only)
R600a
10 - 45V

Data Sheet

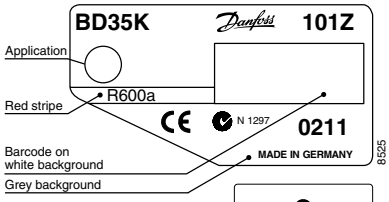
Code numbers

BD35K without electronic unit	101Z0211
Electronic unit 10-45V DC	single: 101N0400, 30 pcs: 101N0401

Application

Application		LBP/MBP/(HBP)
Evaporating temperature range	°C	-30 to 0 (10)
Voltage range / max. voltage		10 - 45V DC
Fan output		same as input voltage
Max. machine compartment temperature	°C	55
Comp. cooling at ambient temp.	43°C	S or F_1*

* depending on application



Yellow warning label

S = Static cooling normally sufficient
O = Oil cooling
F_1 = Fan cooling 1.5 m/s (compressor compartment temp. equal to ambient temp.)
F_2 = Fan cooling 3.0 m/s necessary

EC approval mark

Design

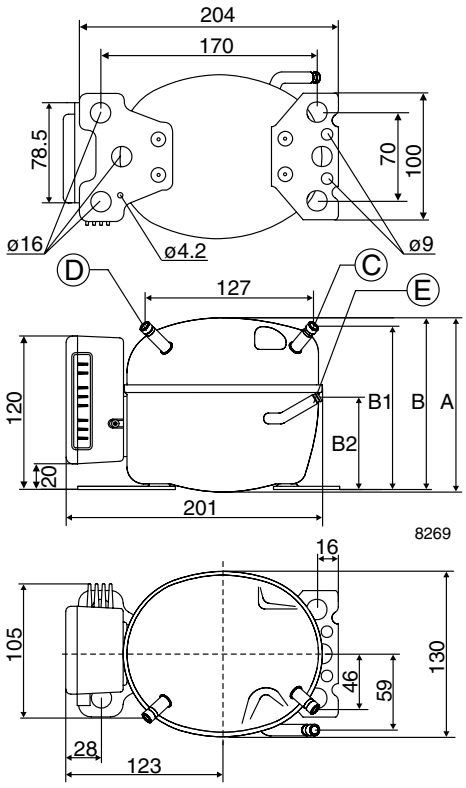
Displacement	cm^3	3.00
Oil quantity	cm^3	150
Maximum refrigerant charge	g	120
Free gas vol. in compressor	cm^3	870
Weight: Compressor/Electronic unit	kg	4.3/0.25

Motor

Motor type		Variable speed
Resistance, all 3 windings (25°C)	Ω	1.8
Approvals (electronic unit)		E4 72/245 95/54 0277 00

Dimensions

Height	mm	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.		150



Capacity (EN 12900/CECOMAF) **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	13.2	21.0	23.8	29.7	39.6	51.0	64.0	79.1	96.3	116
2,500	16.8	25.5	28.8	35.6	47.5	61.3	77.5	96.2	118	
3,000	20.7	30.5	34.3	42.3	56.3	72.9	92.4	115		
3,500	24.9	36.0	40.2	49.3	65.1	83.8	106			

Capacity (ASHRAE) **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	16.0	25.5	29.0	36.1	48.2	62.1	78.0	96.4	118	142
2,500	20.4	31.0	35.0	43.4	57.8	74.7	94.4	117	144	
3,000	25.2	37.1	41.7	51.4	68.5	88.7	113	140		
3,500	30.3	43.8	49.0	59.9	79.2	102	129			

Power consumption **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	18.5	22.5	23.9	26.4	30.3	34.2	38.0	41.8	45.7	49.6
2,500	23.8	28.5	30.0	32.9	37.2	41.5	45.8	50.2	54.9	
3,000	29.5	35.9	38.0	41.8	47.4	52.9	58.6	64.6		
3,500	35.1	42.7	45.2	49.7	56.4	63.0	69.7			

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

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	1.54	1.88	1.99	2.20	2.53	2.85	3.17	3.48	3.81	4.13
2,500	1.98	2.37	2.50	2.75	3.10	3.46	3.82	4.19	4.58	
3,000	2.46	2.99	3.16	3.48	3.95	4.41	4.88	5.38		
3,500	2.93	3.56	3.76	4.15	4.70	5.25	5.81			

COP (EN 12900/CECOMAF) **W/W**

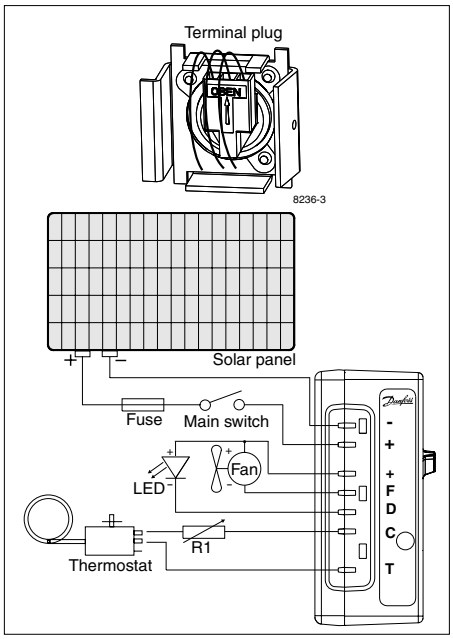
rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	0.71	0.93	1.00	1.12	1.31	1.49	1.69	1.89	2.11	2.34
2,500	0.71	0.90	0.96	1.08	1.28	1.48	1.69	1.92	2.15	
3,000	0.70	0.85	0.90	1.01	1.19	1.38	1.58	1.78		
3,500	0.71	0.84	0.89	0.99	1.15	1.33	1.52			

COP (ASHRAE) **W/W**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	10
2,000	0.87	1.13	1.21	1.37	1.59	1.82	2.05	2.31	2.57	2.86
2,500	0.86	1.09	1.17	1.32	1.55	1.80	2.06	2.34	2.62	
3,000	0.85	1.03	1.10	1.23	1.44	1.68	1.92	2.17		
3,500	0.86	1.03	1.08	1.21	1.40	1.62	1.85			

Test conditions	EN 12900/CECOMAF	ASHRAE
Condensing temperature	55°C	55°C
Ambient and suction gas temp.	32°C	32°C
Liquid temperature	55°C	32°C

Static cooling, 12V DC
1 Watt = 0.86 kcal/h
preliminary data



Compressor speed

Electronic unit	Resistor (R1) Ω	Motor speed rpm	Contr.circ. current mA
101N0400 with AEO	0	AEO	6
	173	2,000	5
	450	2,500	4
	865	3,000	3
	1696	3,500	2

In AEO (Adaptive Energy Optimizing) speed mode the BD compressor will always adapt its speed to the actual cooling demand.

Accessories

Devices	BD35K
Standard automobile fuse DIN 7258 15A	Not deliverable from Danfoss
Mounting accessories	
Bolt joint for one compressor	118-1917
Bolt joint in quantities	118-1918
Snap on in quantities	118-1919

Wire dimensions

Size AWG	Size Cross section	Max length* 12V operation		Max length* 24V operation	
Gauge	mm^2	ft.	m	ft.	m
12	2.5	8	2.5	16	5
12	4	13	4	26	8
10	6	19.5	6	39	12
8	10	32.8	10	65.6	20

***Length between battery and electronic unit**

Operational errors shown by LED (optional)

Number of flashes	Error type
5	**Thermal cut-out of electronic unit** (If the refrigeration system has been too heavily loaded, or if the ambient temperature is high, the electronic unit will run too hot).
4	**Minimum motor speed error** (If the refrigeration system is too heavily loaded, the motor cannot maintain minimum speed at approximately 1,850 rpm).
3	**Motor start error** (The rotor is blocked or the differential pressure in the refrigeration system is too high (>5 bar)).
2	**Fan over-current cut-out** (The fan loads the electronic unit with more than $1A_{peak}$).

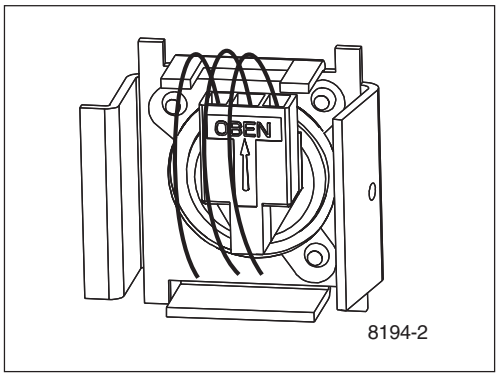
Data stamping

The data stamping is placed on the top of the compressor, e.g.

Z02007 (6 characters)
114A01F (7 characters)
Composition of line 1
Z0200: Compressor type information (101Z0200 = Z0200)
7: internal Danfoss code
Composition of line 2
11: Production week
4: Production year
A: Production day
A = Monday, B = Tuesday, C = Wednesday, etc.
01: Production hour 00 to 23 or shift code -1, -2, -3
F: Danfoss Compressors internal production location code
A to G: Germany / K to N: Slovenia / R, S: Mexico

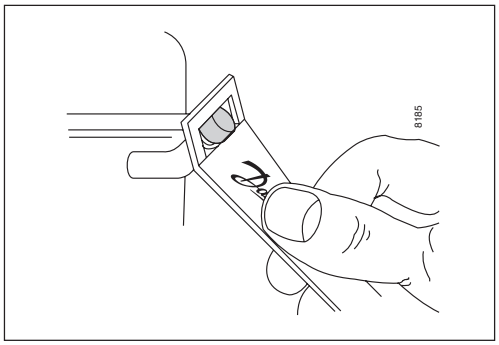
For the electronic unit, the code for date of manufacture is located on the printed circuit board, visible through the opening on the backside of the housing, where the cables get out.

Mounting the electronic unit



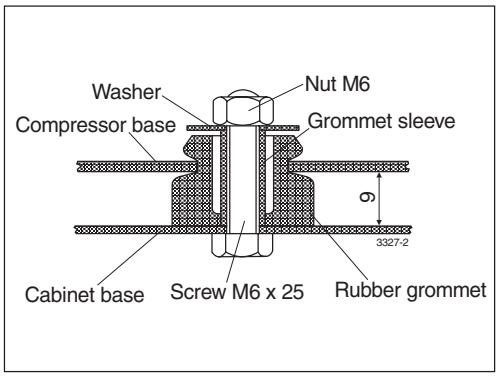
The cable plug of the electronic unit is mounted on the pins of the current lead-in on the compressor. Then the electronic unit itself is mounted on the bracket of the compressor. At first the left side is mounted, then the right side is pressed over the screw on the bracket. The electronic unit snaps on to the bracket and is now securely mounted on the compressor.
In case the electronic unit must be removed from the compressor, the screw has to be loosened.

Connectors



The compressor is equipped with DANCON connectors which consist of a thick-walled, copper-plated steel tube with high corrosion resistance, and a solderability equal to that of conventional copper connectors.
DANCON connectors are equipped with an aluminium cap (Capsolut) which gives a tight sealing.
The seal cap is easily removed with an ordinary pair of pliers or with a special tool.

Mounting accessories



Mounting accessories for BD compressors are supplied as a screw and nut assembly 118-1917. Each assembly 118-1917 is supplied in a bag containing four screws, nuts, washers, grommet sleeves and rubber grommets for mounting one compressor. The screw and nut assembly can be obtained in quantities under code no 118-1918.

Filter drier selection

Only filter driers which are declared by the manufacturer to be suitable for mobile applications must be used in refrigeration systems with BD35F, BD50F and BD80F compressors. Filter material powder ending up in the compressor will lead to excessive wear of the piston and transmission parts, and metal particles deposited in the motor windings will cause the compressor to stop because the electric signal back to the electronic unit is disturbed.

BD50F / Electronic Unit 101N0210

BD50F / Electronic Unit 101N0300

BD50F / Electronic Unit 101N0220

BD35F Solar / Electronic Unit 101N0400

BD35K Solar / Electronic Unit 101N0400

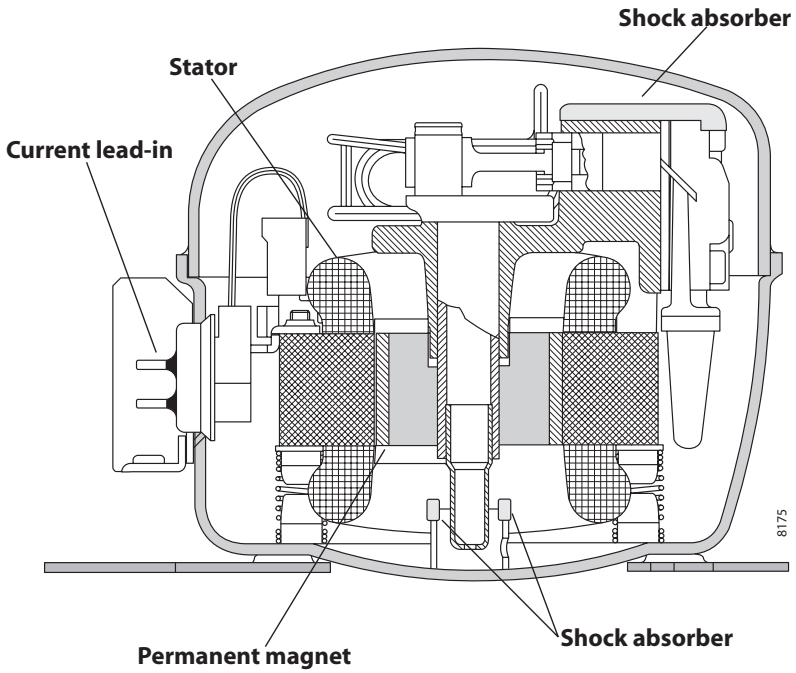
BD80F / Electronic Unit 101N0280

Compressors	Code no	Description
• BD35F mm Standard	101Z0200	Standard compressor, mm tube connectors, UL recognized
• BD35F mm Solar	101Z0210	Standard compressor, mm tube connectors
• BD35F inch	101Z0204	Same as 101Z0200, inch tube connectors, UL recognized
• BD35K (R600a)	101Z0211	For stationary use only, mainly solar applications, mm tube connectors
• BD50F mm	101Z1220	Standard compressor, mm tube connectors, UL recognized
• BD50F inch	101Z0203	Same as 101Z1220, inch tube connectors, UL recognized
• BD80F mm	101Z0280	Standard compressor, mm tube connectors

Electronic Single Pack	Code no	Description
• Electronic standard	101N0210	for BD35F/BD50F, speed setting, battery protection
• Electronic EMI	101N0220	for BD35F/BD50F, radiation extra shielded, speed setting, battery protection
• Electronic extended EMI	101N0900	for BD35F/BD50F, radiation extra shielded, conduction extra shielded, speed setting, battery protection
• Electronic AEO	101N0300	for BD35F/BD50F, Adaptive Energy Optimization, speed setting, battery protection
• Electronic solar	101N0400	for BD35F/BD35K, optimized for direct solar panel operation, speed setting
• Electronic BD50F high start	101N0230	for BD50F only, extra high start performance, speed setting, battery protection
• Electronic BD80F	101N0280	for BD80F only, Adaptive Energy Optimization, speed setting, battery protection

Electronic I-pack	Code no	Description
• Electronic standard	101N0211	for BD35F/BD50F, speed setting, battery protection, 30 pcs.
• Electronic EMI	101N0221	for BD35F/BD50F, radiation extra shielded, speed setting, battery protection, 30 pcs.
• Electronic AEO	101N0301	for BD35F/BD50F, Adaptive Energy Optimization, speed setting, battery protection, 30 pcs.
• Electronic solar	101N0401	for BD35F/BD35K, optimized for direct solar panel operation, speed setting, 30 pcs.
• Electronic BD50F high start	101N0231	for BD50F only, extra high start performance, speed setting, battery protection, 30 pcs.
• Electronic BD80F	101N0281	for BD80F only, Adaptive Energy Optimization, speed setting, battery protection, 28 pcs.

Compressor sectional view



The Danfoss product range for the refrigeration and air conditioning industry

Appliance Controls

General temperature controls for the home appliance industry. The product range comprises CFC-free electromechanical and electronic thermostats for refrigerators and freezers produced to customer specifications as well as service thermostats for all refrigeration and freezing appliances.

Commercial Compressors

Large hermetic reciprocating and scroll compressor technologies for commercial air conditioning and refrigeration. The compressors and condensing units are used in a large array of applications in both businesses. This ranges from water chillers, large packaged air conditioners as well as medium and low temperature refrigeration systems for food storage and processing.

Danfoss Compressors

Hermetic compressors and fan-cooled condensing units for refrigerators, freezers and light commercial applications such as bottle coolers and display counters. Danfoss also produces compressors for heating pump systems as well as 12 and 24 volt compressors for refrigerators and freezers used in mobile applications and solar power. The division has a leading position within energy utilisation, noise filtering and know-how about environment-friendly compressors.

Refrigeration and air conditioning controls

A comprehensive and highly reputed range of self-acting valves, electronic valves and regulators as well as system protectors and line components for the refrigeration and air conditioning market. These products include thermostatic expansion valves, solenoid valves, thermostat and pressure controls, modulation pressure regulators, filter driers, shut-off valves, sight glasses, check valves, non-return valves and water valves. Decentralised electronic systems for full regulation and control of refrigeration applications are also developed and produced at Danfoss.

Industrial Controls

Products and customer specific solutions for industrial monitoring and controls systems based on the principles of pressure and temperature measurement, electrical power and fluid control. Products include a wide range of automatic controls for process control and regulation such as contactors and motor starters, electrically, pneumatically and temperature activated valves as well as temperature and pressure transmitters and switches.

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