WE HAVE MORE THAN 30 YEARS OF EXPERIENCE, DEVELOPING DIRECT CURRENT COMPRESSORS AND HELPING CUSTOMERS BENEFIT FROM THE OPPORTUNITIES OF MOBILE REFRIGERATION TECHNOLOGY.

WITH A DEEP INSIGHT OF THE USAGE ACROSS VARIOUS APPLICATIONS WE HAVE EARNED A POSITION AS MARKET LEADER, WORKING WITH OEM-CUSTOMERS .

CONTROLLER FOR BD1.4F-VSD/-FSD COMPRESSORS

SECOP

OPERATING INSTRUCTIONS

101N2100, 12-24 V DC
101N2600, 12-24 V DC

TOOL4COOL®
Flexible control settings

Частное предприятие "Юдилен-Холод" || +375296803378 || https://купизапчасть.бел || Минская обл., Минский р-н, Щомыслицкий с/с, 92/4

TABLE OF CONTENTS

1. INTRODUCTION

Applications

The BD1.4F-VSD 12/24 V DC compressor system is introduced mainly to be used in the leisure market. The operating conditions are Low/Medium/High Back Pressure (LBP/MBP/HBP). The system is able to operate in ambient temperatures up to +55 °C (131 °F).
The BD1.4F-FSD compressor operates with a fixed speed at Low/Medium Back Pressure (LBP/MBP).

Typical applications for BD1.4F-VSD could be:
- Truck refrigerators
- Boat refrigerators
- Bus refrigerators
- Portable boxes
- Car minibars (high end)
- Car minibars (SUV, MPV)
- Solar cabinets
- Agriculture

Typical applications for BD1.4F-FSD could be:
- Portable boxes

Most Important Functions

The main functions of BD1.4F-VSD/-FSD compressor systems are:
- Motor / Compressor speed control
- Thermostat control (ON / OFF or electronic via NTC temperature sensor)
- Input for set point reference (potentiometer)
- Condenser fan control including speed setting
- Communication interface
- Monitoring function
- Error & event Log
- Battery protection functions
- Main Switch (via Tool4Cool®)
- Via PC software optimize specific parameters before going into mass production
- Parameter setting via PC or resistors

2. ELECTRICAL HARDWARE KEY-PARAMETERS

Below is a list of key parameters for electronic unit 101N2100 (BD1.4F-VSD) and 101N2600 (BD1.4F-FSD).

Name	Reference / Value / Standards
Type code	101N2100
IP class	IP Class 42
Humidity test passed according to	Static humidity according to IEC 60068-2-3
Damp heat	According to EN60068-2-30 test Db
Salt mist test passed according to	VW Standard VW 80101 dated 2009-03
Maximum Operating temperature	55 °C
Minimum Operating temperature	-10 °C
Storage temperature	- 40 °C to 90 °C
EMC approval/ conformity	According to 2004/104/EC
External fuse required	Max. 15 A Slow blow
Leakage current	3 mA
Fan output	5 W, nominal voltage 12 V • Use an approved fan with over/under-voltage protection • A 12V fan must also be used in 24V systems
NTC type to be connected	Epcos M800/5K
Input voltage	9.6 - 32 V DC
Starting Current	17 A @ 12 V DC
Current consumption under running conditions	Refer section 22

Name	Reference / Value / Standards
Type code	101N2600
Maximum Operating temperature	55 °C
Minimum Operating temperature	-10 °C
Storage temperature	- 40 °C to 90 °C
EMC approval/ conformity	According to 2004/104/EC
External fuse required	Max. 15 A Slow blow
Leakage current	3 mA
Fan output	5 W, nominal voltage 12 V • Use an approved fan with over/under-voltage protection • A 12V fan must also be used in 24V systems
NTC type to be connected	Epcos M800/5K
Input voltage	9.6 - 32 V DC
Starting Current	17 A @ 12 V DC
Current consumption under running conditions	Refer section 23

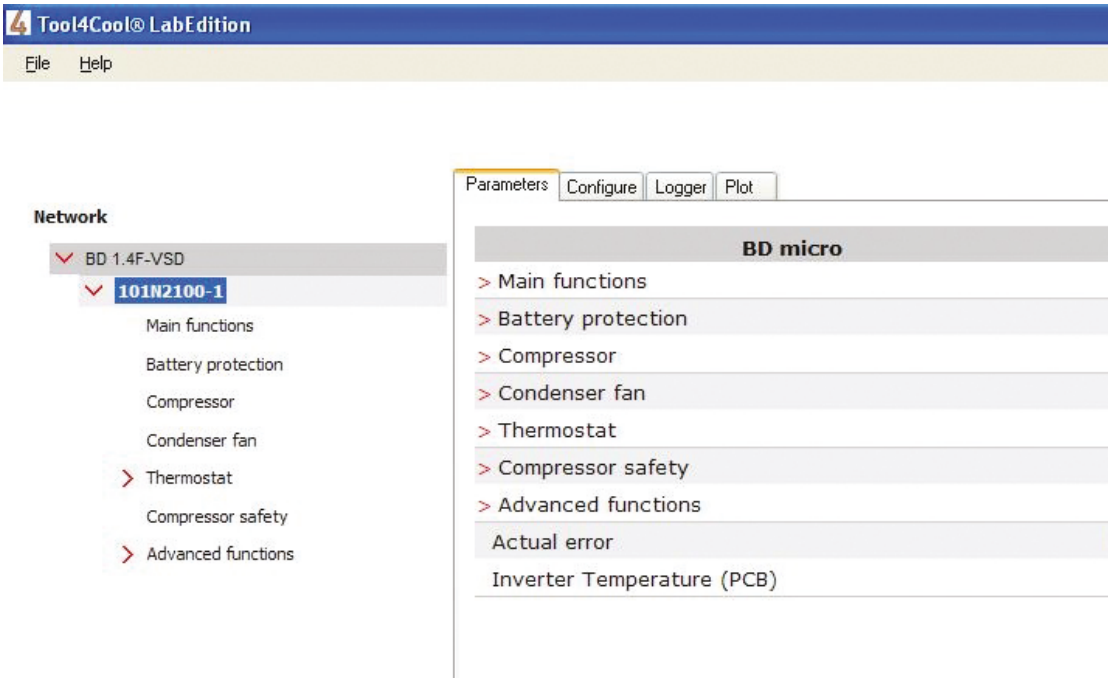
Частное предприятие "Юдилен-Холод" || +375296803378 || https://купизапчасть.бел || Минская обл., Минский р-н, Щомыслицкий с/с, 92/4

3.
MENU OVERVIEW

Operation of the Compressor control unit can be done through the Secop PC software Tool4Cool®
The menu structure is shown below.

On the following pages each separate menu is explained in detail.

For installation and operation of Tool4Cool®, please refer to the manual for PC software which can be downloaded from http://www.secop.com (Menu --> Products --> Tool4Cool).



4. MAIN SWITCH FUNCTION

Main Functions

In order to start and stop the compressor the main switch can be set to ON or OFF. OEMs making an interface with custom design electronics via Modbus must be able to control the ECU.

ON / OFF via the Main Switch.

ON: All functions are active.

OFF: All main functions are inactive, however
- Battery monitoring active
- NTC temperature sensor monitoring active
- PCB inverter temperature monitoring active

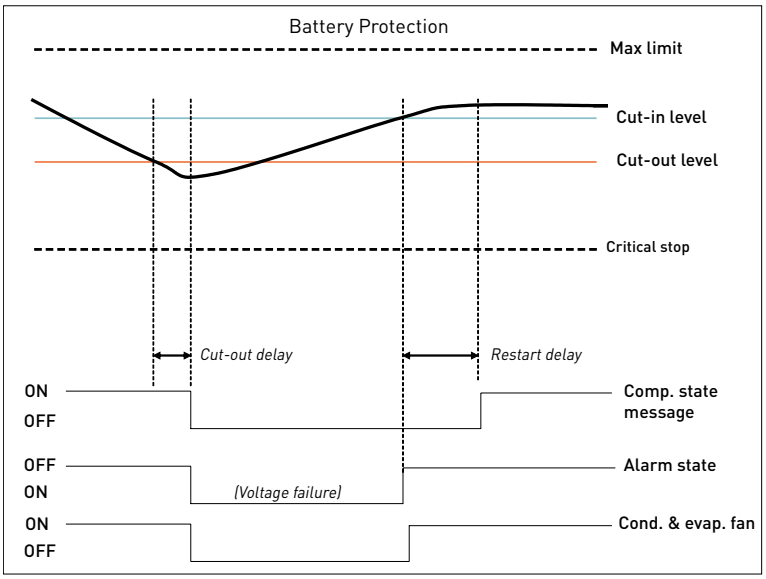
Settings

Name	Default	Max value	Min value	Step	Unit
Main Switch	ON	ON	OFF	1	

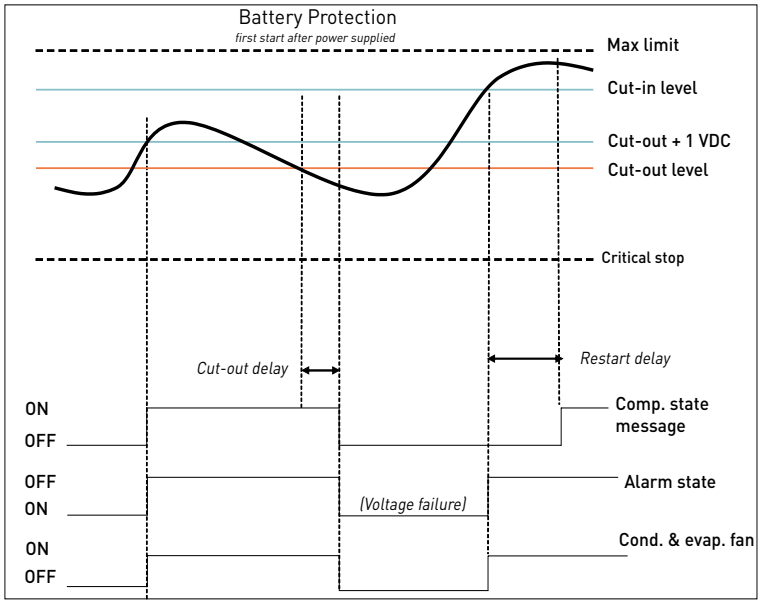
5. BATTERY PROTECTION

The battery protection serves to avoid permanent damage to the battery due to discharge.

The setting range is 9.6-17 V DC for 12V DC systems, and 19 to 27 V DC for 24V DC systems.
If the voltage remains below the cut-out voltage for the time specified in the parameter "Cut-out delay" (default 3s), compressor and Fan is stopped.
Compressor and fan is stopped immediately, if the voltage drops below 8V in 12V systems and below 18V in 24V systems (critical stop).



For initial startup after power ON, extra protection has been provided by allowing cut-in only when the voltage exceeds cut-out + 1 V DC.



Settings

Name	Default	Max value	Min value	Step	Unit
Battery cut-out level - 12V	10.4	17.0	9.6	0.1	Volt
Battery cut-in diff.	1.3	10.0	0.5	0.1	Volt
Battery cut-out level - 24V	21.3	27.0	19.0	0.1	Volt
Cut-out delay	3	60	0	1	Seconds

Measurements

Name	Description	Step	Unit
Cut-in level	Calculated value. Cutin = Cutout + Diff	0.1	Volt
Supply voltage	Actual voltage measured on + - terminals	0.1	Volt

6. SOLAR MODE (101N2100)

In order to let the compressor run on solar panels, the system must have the solar mode enabled. When the solar mode is enabled, the battery protection settings let the compressor run in the entire voltage range from 9.6 to 34 V DC.

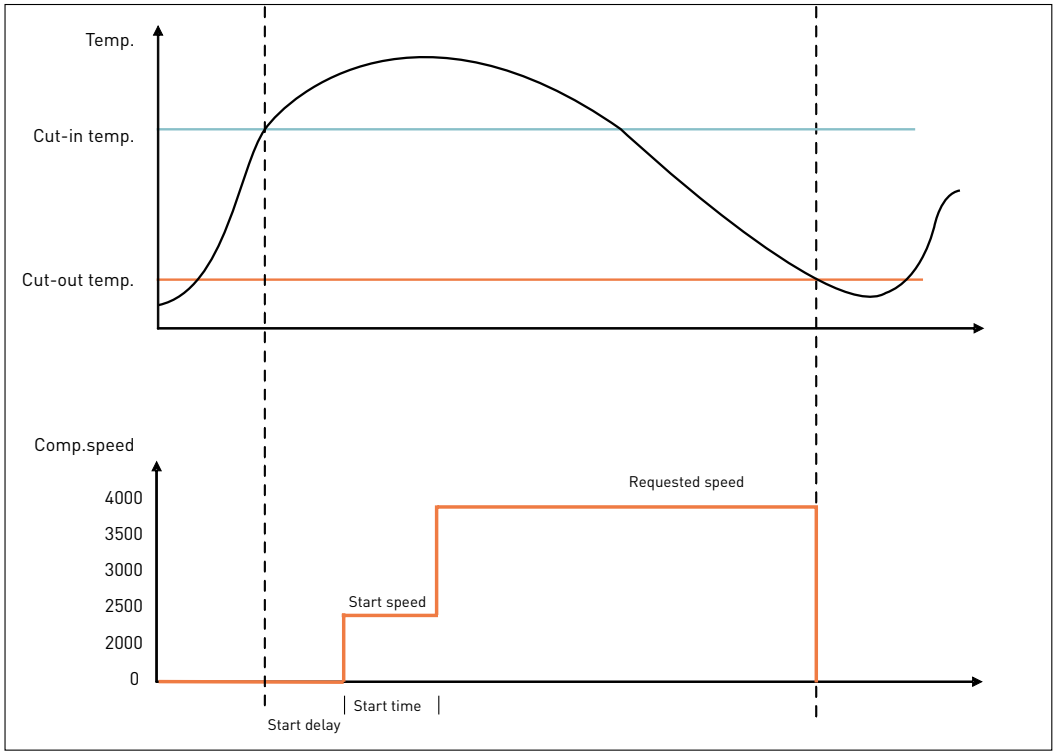
Settings

Name	Default	Max value	Min value	Step	Unit
Solar mode	OFF	ON	OFF		

Note: This feature is only available in electronic unit 101N2100.

7. COMPRESSOR SPEED (101N2100)

The speed and thereby the capacity of the compressor is set using the requested speed parameter. During start up, the compressor will run at a lower speed, 2500rpm. The duration of the period running at start speed is set using the start time parameter.
This speed and cooling capacity selection can be done via communication interface (e.g. PC with Tool4Cool®, or an external electronic) or with an external resistor connected once or permanent to the electronics.
The below diagram shows the compressor speed after a start up.



Settings

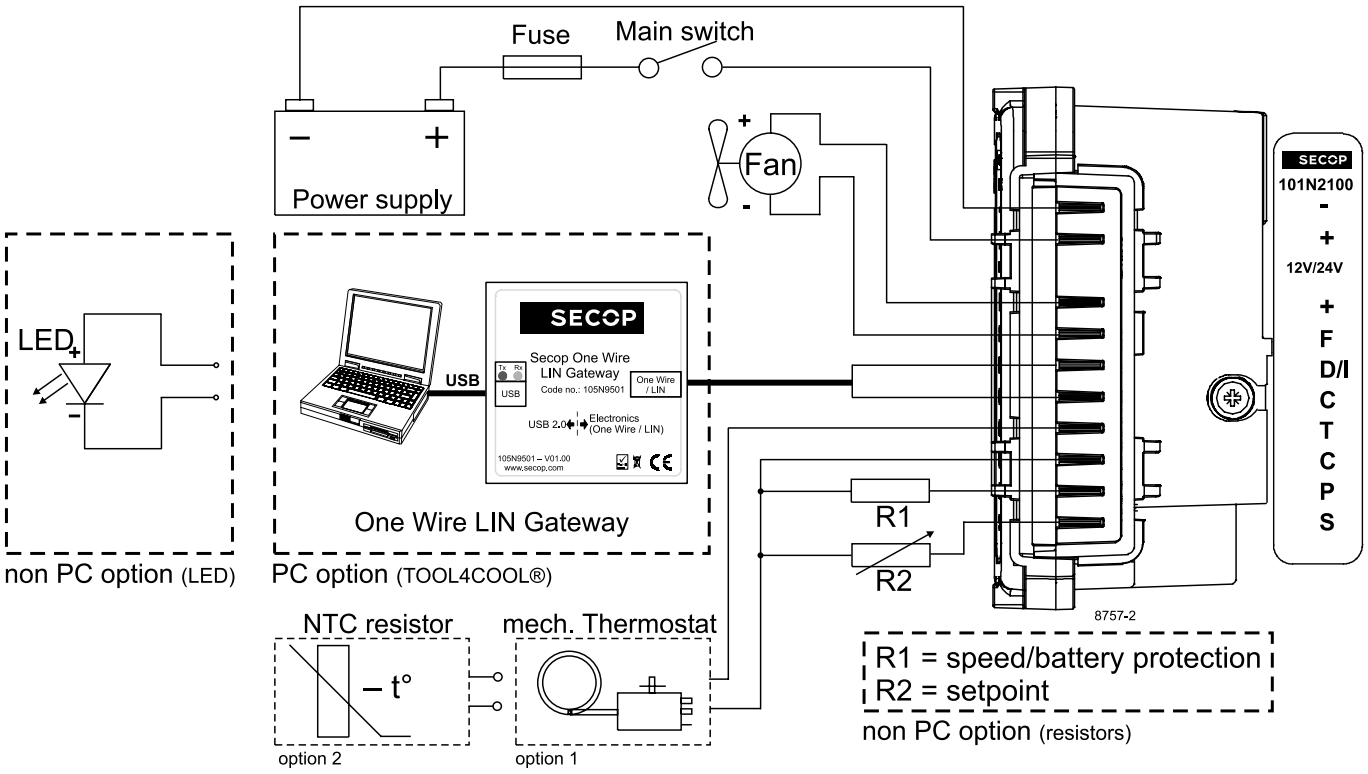
Name	Default	Max value	Min value	Step	Unit
Default requested speed	4000	4000	2000	10	rpm
Start delay	4	240	2	1	Seconds
Start time	30	600	30	1	Seconds

Measurements

Name	Description	Step	Unit
Compressor speed	Actual speed (+/-10%)	1	rpm

Note: This feature is only available in electronic unit 101N2100.

8.
WIRING (101N2100 & 101N2600)



9. BATTERY PROTECTION AND SPEED SELECTION - VIA HARDWARE SETTING/ RESISTORS (101N2100)

The user can reprogram the unit settings either with Tool4Cool® or with external resistors. To reprogram the unit with resistors, connect a resistor according to the table below.
Connect the resistor between P (Program) and C (Common) terminals. If the unit is powered, the unit will store the new setting after 5-10 seconds. After that period the resistor can stay connected or it can be removed.
Instead of a resistor, a PWM signal can also be connected between P (Program) and C (Common) with an open collector. The PWM frequency has to be above 5 kHz.

R1 [kΩ]	Duty Cycle [%]	Speed [RPM]	Cut-in level [V]	Cut-out level [V]	Cut-in level [V]	Cut-out level [V]	
open	0	Maintain	Maintain current value. Can be changed via Modbus				
220	3	-	Maintain current value. Can be changed via Modbus				
130	6	-	Maintain current value. Can be changed via Modbus				
91	9	-	Maintain current value. Can be changed via Modbus				**ECO**
68	12	-	Maintain current value. Can be changed via Modbus				**ECO off**
51	15		9.6 - 34 V DC				**Solar**
43	18		Default				**Solar off**
36	21		Reset battery only				
30	24		Reset battery and speed to default value				
27	27	4000	Maintain current value. Can be changed via Modbus				
22	30	4000	10.9	9.6	22.6	21.3	
20	33	4000	11.4	10.1	23.6	22.3	
18	36	4000	12.4	11.1	24.6	23.3	
15	39	4000	13.4	12.1	25.6	24.3	
13	42	3500	Maintain current value. Can be changed via Modbus				
12	45	3500	10.9	9.6	22.6	21.3	
11	48	3500	11.4	10.1	23.6	22.3	
9.1	51	3500	12.4	11.1	24.6	23.3	
8.2	54	3500	13.4	12.1	25.6	24.3	
7.5	57	3000	Maintain current value. Can be changed via Modbus				
6.2	60	3000	10.9	9.6	22.6	21.3	
5.6	63	3000	11.4	10.1	23.6	22.3	
5.1	66	3000	12.4	11.1	24.6	23.3	
4.3	69	3000	13.4	12.1	25.6	24.3	
3.9	72	2500	Maintain current value. Can be changed via Modbus				
3.3	75	2500	10.9	9.6	22.6	21.3	
2.7	78	2500	11.4	10.1	23.6	22.3	
2.2	81	2500	12.4	11.1	24.6	23.3	
1.8	84	2500	13.4	12.1	25.6	24.3	
1.5	87	2000	Maintain current value. Can be changed via Modbus				
1.0	90	2000	10.9	9.6	22.6	21.3	
0.68	93	2000	11.4	10.1	23.6	22.3	
0.36	96	2000	12.4	11.1	24.6	23.3	
0.051	99	2000	13.4	12.1	25.6	24.3	

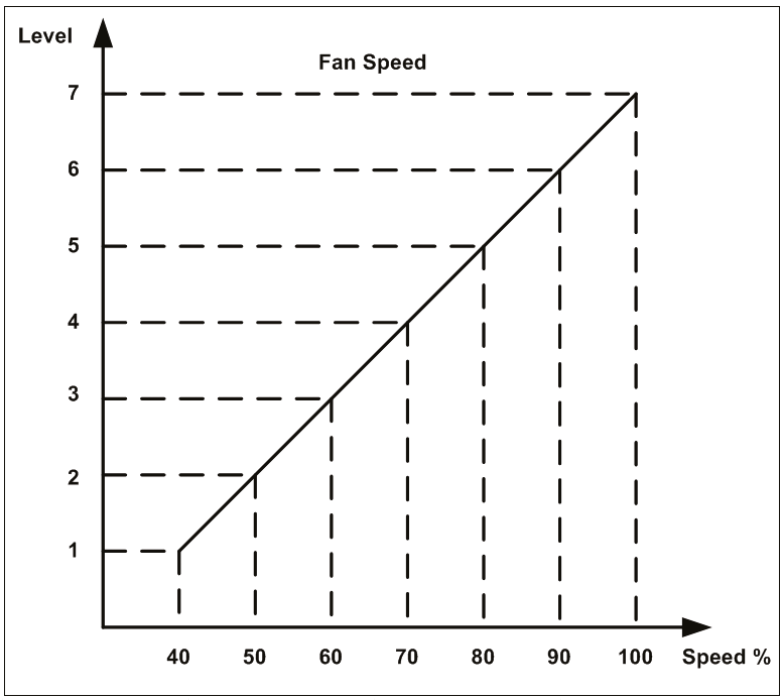
10. BATTERY PROTECTION AND SPEED SELECTION - VIA HARDWARE SETTING/ RESISTORS (101N2600)

The user can reprogram the unit settings either with Tool4Cool® or with external resistors. To reprogram the unit with resistors, connect a resistor according to the table below.
Connect the resistor between P (Program) and C (Common) terminals. If the unit is powered, the unit will store the new setting after 5-10 seconds. After that period the resistor can stay connected or it can be removed.
Instead of a resistor, a PWM signal can also be connected between P (Program) and C (Common) with an open collector. The PWM frequency has to be above 5 kHz.

R1 [kΩ]	Duty Cycle [%]	Speed [RPM]	Cut-in level [V]	Cut-out level [V]	Cut-in level [V]	Cut-out level [V]
open	0	3000	Maintain current value. Can be changed via Modbus			
36	21	3000	Reset battery to default value			
30	24	3000	Reset battery to default value			
7.5	57	3000	Maintain current value. Can be changed via Modbus			
6.2	60	3000	10.9	9.6	22.6	21.3
5.6	63	3000	11.4	10.1	23.6	22.3
5.1	66	3000	12.4	11.1	24.6	23.3
4.3	69	3000	13.4	12.1	25.6	24.3

11. CONDENSER FAN

The speed of the condenser fan can be controlled in order to save energy, reduce noise and optimize the fan operation.
The fan is synchronized with the compressor operation. Start and stop delays can be set up as a function of the state of the parameter Thermostat. Furthermore, the fan can be set to run continuously (forced ON operation).
Some fan defects including a missing fan can be detected,these defects can be displayed in the Error log.
The speed of the fan can be controlled in the range from 40% to 100%.
Enable detect missing fan parameter to allow ECU to detect missing fan from F and C terminals.



Settings

Name	Default	Max value	Min value	Step	Unit
Requested fan speed	100	100	40	1	%
Fan start delay	0	240	0	1	Seconds
Fan stop delay	0	240	0	1	Seconds
Fan forced ON	OFF	ON	OFF	1	
Detect missing fan	OFF	ON	OFF	1	

Measurements

Name	Description	Value	Unit
Condenser fan speed	Actual fan speed	0 - 100	%

12. THERMOSTAT

Thermostat type
Two types of thermostat can be used for temperature control.

Electronic thermostat (NTC sensor)
The electronic thermostat provides active temperature control.
A disconnected sensor error alarm (NTC sensor failure) is sent when the measured temperature is > +100°C
A short circuited sensor error alarm (NTC sensor failure) is sent when the measured temperature is < -50°C
NTC sensor error will only be detected when the Thermostat is set to "NTC". A NTC error is not detectable when the Thermostat input is operating in automatic thermostat selection mode.
A NTC sensor is recommended for the whole application temperature range.

Mechanical thermostat
A mechanical ON/OFF thermostat can be connected at terminals C & T.
No detection of faulty thermostat is provided when an ON/OFF thermostat is used.

Automatic thermostat selection
The Thermostat parameter displays the type of thermostat connected to the controller: either a mechanical thermostat or NTC temperature sensor.
Note: A NTC sensor error is not detectable when the NTC sensor is operating in automatic thermostat selection mode. Select Electronic Thermostat instead, if this error must be detected.

The temperature setpoint and hysteresis can be selected via Communication interface.
At "Cut-out temperature" the (lower) switch-off temperature must be entered (e.g. 5°C).
A "Difference" the hysteresis must be entered (e.g. 2°C). The compressor will then start, once the temperature raises above 7°C and would stop if the temperature would be below 5°C.
With "Forced on" the user can set the compressor to run continuously even when the temperature is below cut-out.

Settings

Name	Default	Max value	Min value	Step	Unit
Type	Auto	Auto	Mechanical		
Cut-out temperature	5	40	-40	1	Deg C
Cut-in Difference	2	15	1	1	Deg C
Forced on	OFF	ON	OFF	1	

Measurements

Name	Description	Value	Unit
Cut in time	Cut-in time will show the time for the last cooling period (thermostat cut-in period). Cut-in time is reset at every start of cooling ON period		min
Thermostat temperature	Real time air temperature when a NTC sensor is used. When a mechanical thermostat is used, only thermostat status ON or OFF is displayed		Deg C

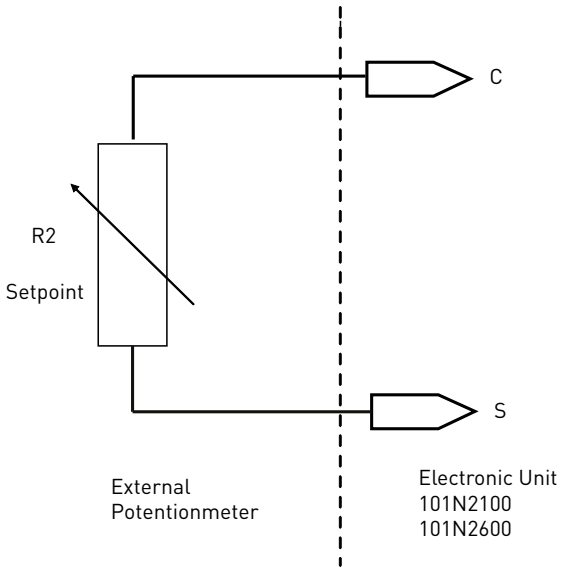
SETPOINT SELECTION during standalone operation (without Tool4Cool®)
In order to utilize the integrated temperature control, connect a 10k potentiometer between S and C (R2). Via this potentiometer, a temperature setpoint between -20 and 10 deg C can be selected as per the table below.
The potentiometer resistance adjusts the temperature setpoint around which the cut-in and cut-out occurs. It is defined as the average value between cut-in and cut-out.

The temperature setpoint will not change the cut-in difference, but only adjust the cut-out based on the temperature setpoint and the actual cut-in diff setting.

Cut-out = temperature setpoint – cut-in diff / 2

Settings

Set point	R2 [ohm]
-20	0
-19	333
-18	667
-17	1000
-16	1333
-15	1667
-14	2000
-13	2333
-12	2667
-11	3000
-10	3333
-9	3667
-8	4000
-7	4333
-6	4667
-5	5000
-4	5333
-3	5667
-2	6000
-1	6333
0	6667
1	7000
2	7333
3	7667
4	8000
5	8333
6	8667
7	9000
8	9333
9	9667
10	10000



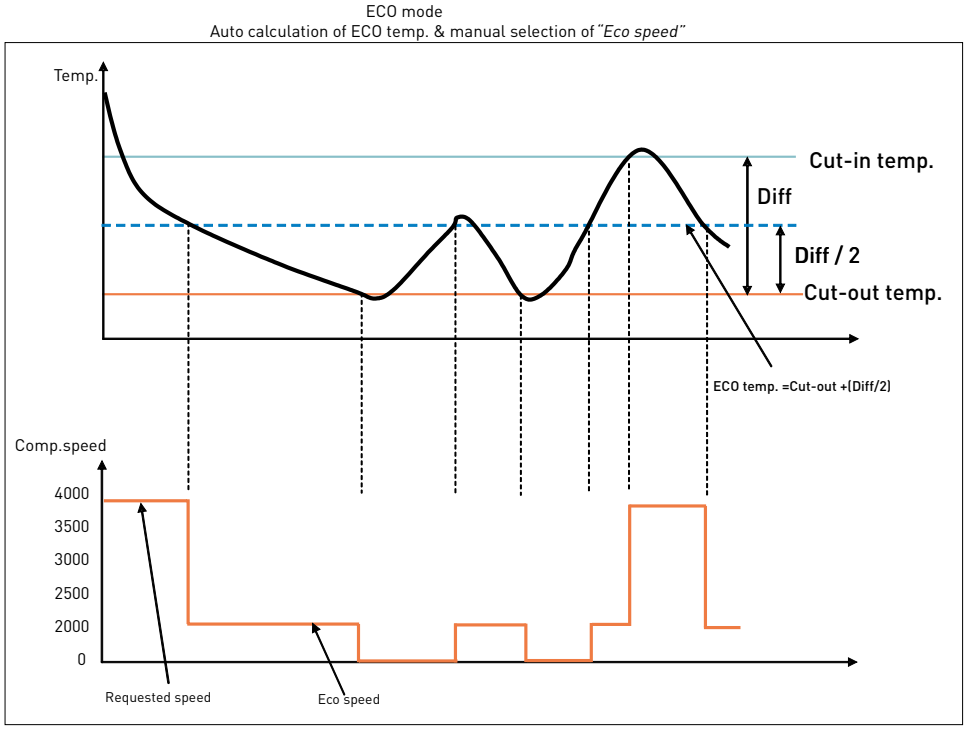
13. ECO FUNCTION (101N2100)

Operation in ECO mode reduces energy consumption and noise by controlling the compressor speed as a function of temperature. ECO mode can only be selected when using an NTC temperature sensor.

The cooling capacity of the compressor can be varied by enabling the ECO-Speed function. When NTC temperature is below ECO temperature, the cooling capacity is reduced. Thus, the supercooling and superheating is reduced, which increases the coefficient of performance (COP). This enables a better energy classification, while the application still has the full cooling capacity above ECO temperature.

In ECO mode,

- when operating below ECO temperature, compressors run at the set ECO speed.
- when operating above ECO temperature, the compressors run at Requested speed.



Settings

Name	Default	Max value	Min value	Step	Unit
ECO mode	OFF	ON	OFF		
ECO speed	2000	4000	2000	10	rpm

Measurements

Name	Default	Max value	Min value	Step	Unit
ECO temperature				0.1	Deg C

Note: This feature is only available in electronic unit 101N2100.

14. COMPRESSOR SAFETY

In order to prevent the compressor from short cycling, a min restart time is implemented. After timeout of the compressor restart time a new start of the compressor is permitted.

If the system pressure is equalized very slowly in the specific system, increasing the restart time will help to reduce the back pressure and help to ease the starting condition.

Settings

Name	Default	Max value	Min value	Step	Unit
Restart Delay	60	120	60	1	Seconds

15. COMMUNICATION

Lost communication
In a network system with custom designed interface modules acting as the master on the Modbus, it is desirable to stop the compressor from running when communication to the master is lost.
When "Set main switch to off when communication timeout occurs" is enabled, the Main-Switch will be set to off. The function will stop the compressor after a certain time, (Communication time out) when there is no contact to the master controller. The stop is realized through the Main Switch. The Main Switch will be set to OFF. It will remain OFF until the master controller sets it back to ON via the Modbus.
The compressor will only be stopped due to lost communication if there has been a communication with the unit after power on. If there hasn't been any communication with the electronic at all, it will run as a stand alone unit and will not stop due to missing communication.

Communication setting description
Node number - Address of the electronic unit on the Modbus. It must be ensured that each address on the BUS is used only once.
Bits per second - Is equivalent to the communication speed on the Modbus. All devices on one bus-line must share the same speed.
Set main switch to off when communication time-out occurs - When enabled shall set Main Switch to off when communication time-out occurs.
Communication time-out - Defines the duration of communication time-out.

Protection of settings
A coded privacy function protects customers' settings from being read by third parties. The code must be verified by entering it twice.

Settings

Name	Default	Max value	Min value	Step	Unit
Node number	1	247	1	1	
Bits per second	19200	19200	9600	9600	bps
Set main switch to off when communication timeout occurs	0	1	0	1	0 = disabled 1 = enabled
Communication timeout	900	7200	15	1	seconds
Setting protection code & status	0	9999	0	1	

16. PRODUCT INFORMATION

Secop labels on electronic units consist of a 2D Data Matrix Code area and a number of lines with information.
The 2D Data Matrix Code is always built up with 62 characters containing information about type, code number, product version, product revision, unit ID, supplier, part number and text.

Text information on the label:
Line 1: ID: PLYYWWssssss (unique number)
Line 2: Date: YYWW
Line 3: Ver.: VV
Line 4: Text: text

Meaning:
PL Production location, 01 ... 99
YY Year, 12 = 2012
WW Week number, 01 ... 52
ssssss Serial number, 000001 ... 999999
VV Version, 00 ... 99

Settings

Name	Description
Unit name	Possible to fill in customer name for the unit when presented in PC software program Tool4cool®.

Measurements

Name	Description
Vendor name	Vendor name
Product code no.	Secop product code number
Firmware version	Controller software version
Unit ID	Secop unit ID
Production date	Secop production date
Serial no.	Secop serial no.

17. CUSTOMER REGISTER

In order to have the possibility to change and set values in a custom designed interface module, a custom register is implemented. Change and interaction will be via communication interface (e.g. Tool4Cool® , a customer display or customer specific electronic). The parameters are visible even when in protected mode. Please consult Secop contact person for further information.

Settings

Name	Default	Max value	Min value	Step	Unit
Register 1	65535	65535	0	1	
to					
Register 10	65535	65535	0	1	

18. ERRORS IN ELECTRONIC UNIT

The purpose of the alarm function is to notify the user when there is an error in the system, in order to take measures to prevent damage on the refrigeration system.

Measurements

Name	Description
Actual error	0 = No error 1 = Battery protection failure 2 = Fan failure 3 = Motor failure 4 = Speed failure 5 = Thermal failure 6 = NTC failure 7 = Communication error

19. EVENT LOGGING

In order to assist in service and fault situations, an event log is implemented in ECU, the log is read out via Tool4Cool®. The log contains parameters and events when parameter changes and on Power up.

Each event contains the following information:

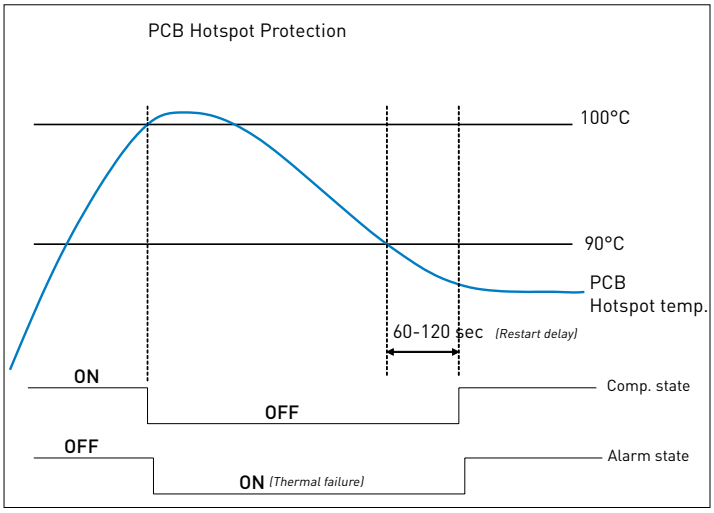
- Time of occurrence related to compressor power up, with 1 sec as sample time
- The sequence of occurrence (Event list reference)
- Parameter/Event description
- The value of the parameter
- Number of occurrence (when no value is related to the parameter)
- The value of the parameter which caused the failure (if connected to a parameter); it is possible to clear the event log via a clear function.

20. TEMPERATURE PROTECTION

Electronic unit overheating protection

The protection system ensures that the controller does not operate at extremely high temperatures, because under these conditions the quality of the soldered joints will be endangered. When the unit reaches 100 °C(measured by PCB NTC) the system will shut down and an alarm error (Thermal failure) will be raised.

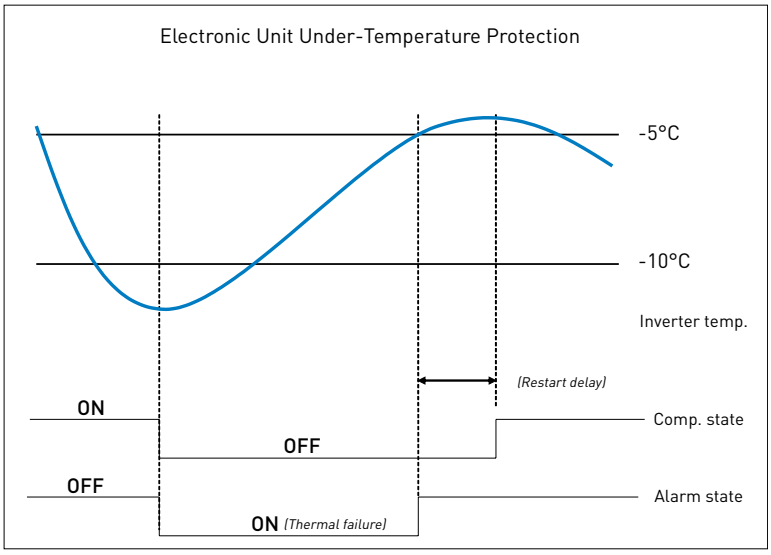
After the temperature has dropped below 90°C and the setting "Compressor restart delay" has elapsed, the compressor is restarted automatically.



Electronic unit under temperature protection

The protection system ensures that the compressors, including the magnets in the motor, are not damaged by excessively low temperatures. When the unit reaches -10°C on PCB the system will shut down and an alarm error (Thermal failure) will be raised.

After the temperature has risen above -5°C and the setting "Compressor restart delay" has elapsed, the compressor is restarted automatically (default 60 sec).



21. PARAMETERS

Parameter Group	Parameter	Description	Default	Max value	Min value	Step	Unit	Type
Main functions								
	Main switch	The compressor start and stop is realized through the Main Switch. 0 = Off 1 = On	1	1	0	1		Setting
Battery protection								
	Battery cut-out level	Current battery protection cut-out voltage level				0.1	volt	Setting
	Battery cut-in diff.	Current voltage difference between battery cut-in and cut-out	1.3	10	0.5	0.1	volt	Setting
	Cut-in level	Calculated value. Cut-in = Cut-out + Diff.				0.1	volt	Measure ment
	Battery cut-out level - 12V	Battery protection cut-out voltage level for 12V	10.4	17	9.6	0.1	volt	Setting
	Battery cut-in diff. - 12V	Voltage difference between battery cut-in and cut-out for 12V	1.3	10	0.5	0.1	volt	Setting
	Battery cut-out level - 24V	Battery protection cut-out voltage level for 24V	21.3	27	19	0.1	volt	Setting
	Battery cut-in diff. - 24V	Voltage difference between battery cut-in and cut-out for 24V	1.3	10	0.5	0.1	volt	Setting
	Cut-out delay	To avoid stopping the motor due to a short, undervoltage event. It is desired to ignore the supply voltage for the time "Cut-out delay", until Battery protection goes active	3	60	0	1	sec	Setting
	Solar mode *	Turn ON/Off Solar mode 0 = Off 1 = On	0	1	0	1		Setting
	Supply voltage					0.1	volt	Measure ment

*** Note:** This feature is only available in electronic unit 101N2100.

Parameter Group	Parameter	Description	Default	Max value	Min value	Step	Unit	Type
Compressor								
	Default requested speed *	Compressor speed and therefore capacity definition	4000	4000	2000	10	rpm	Setting
	Start delay	The time that the compressor should wait after the thermostat is switched on.	4	240	2	1	sec	Setting
	Start speed	Start speed is fixed at 2500 rpm, to ensure reliable start performance.	2500					Readout
	Start time	Period of time for which the Start Speed should be effective before switching to Requested Speed.	30	600	30	1	sec	Setting
	Compressor speed	Real-time speed (+/-10%)				1	rpm	Measurement
	Compressor runtime	The Compressor Runtime shows the time for the last compressor running period. Compressor runtime is reset at every start of a compressor				1	min	Measurement
Condenser fan								
	Requested fan speed	Fan speed	100	100	40	1	%	Setting
	Fan start delay	The time that the fan should wait after the thermostat is switched on.	0	240	0	1	sec	Setting
	Fan stop delay	The time that the fan should run after the thermostat is switched off.	0	240	0	1	sec	Setting
	Fan forced on	To run the fan continuously (forced ON operation) irrespective of thermostat state. 0 = Disabled 1 = Enabled	0	1	0	1		Setting
	Detect missing fan	Detect whether fan is connected. 0 = Disabled 1 = Enabled	0	1	0	1		Setting
	Condenser fan speed	Real-time fan speed					%	Measurement

*** Note:** This feature is only available in electronic unit 101N2100.

Parameter Group	Parameter	Description	Default	Max value	Min value	Step	Unit	Type
Thermostat								
	Type	Detect mechanical or electronic sensor thermostat 0 = Mechanical 1 = Electronic (NTC) 2 = Auto (Both NTC & Mechanical)	2	2	0	1		Setting
	Cut-out Temperature	Compressor cuts out below cutout temperature	5	40	-40	1	°C	Setting
	Cut-in difference		2	15	1	1	°C	Setting
	Cut-in Temperature					1	°C	Readout
	Forced on	Force thermostat operation to continuously on irrespective of actual thermostat state	0	1	0	1		Setting
	ECO mode *	Turns the ECO mode on and off	0	1	0	1		Setting
	ECO speed *	Speed applied when temperature falls below ECO temperature	2000	4000	2000	1	rpm	Setting
	ECO temperature *	Temperature where ECO speed is applied						Readout
	Thermostat	Thermostat state 0 = Off 1 = On				1		Measurement
	Thermostat temperature						°C	Measurement
	Cut in time	Cut-in time will show the time for the last cooling period (thermostat cut-in period). Cut-in time is reset at every start of cooling ON period.				1	min	Measurement
Compressor safety								
	Restart delay	The time that the unit should wait before attempting a restart, after an error has occured.	60	120	60	1	sec	Setting
Communication								
	Node number	Modbus address	1	247	1	1		Setting
	Bits per second		19200	19200	9600	9600	bps	Setting
	Set main switch to off when communication timeout occurs	Enable/disable funtion "Set main switch to off when communication timeout occurs" 0 = Disabled 1 = Enabled	0	1	0	1		Setting
	Communication timeout	Maximum duration of each communication attempt	900	7200	15	1	sec	Setting
	Settings protection code	Privacy function code must be entered twice	0	9999	0			Setting
	Settings protection status	Read the status of unit -1 = Unlocked -2 = Locked -3 = Verify code	-1	-2	-1	1		Measurement

*** Note:** This feature is only available in electronic unit 101N2100.

Parameter Group	Parameter	Description	Default	Max value	Min value	Step	Unit	Type
Product information	Unit name	The user's own identification name for the unit can be entered here (optional)						Setting
	Product Code	Secop product code number						Readout
	Firmware version	Controller software version						Readout
	Unit ID	Secop unit ID						Readout
	Production Date	Secop production date						Readout
	Serial	Secop serial no.						Readout
	Vendor Name	Vendor name						Readout
Custom registers	Register 1	Custom-designed interface parameter	65535	65535	1	1		Setting
	Register 2	Custom-designed interface parameter	65535	65535	1	1		Setting
	Register 3	Custom-designed interface parameter	65535	65535	1	1		Setting
	Register 4	Custom-designed interface parameter	65535	65535	1	1		Setting
	Register 5	Custom-designed interface parameter	65535	65535	1	1		Setting
	Register 6	Custom-designed interface parameter	65535	65535	1	1		Setting
	Register 7	Custom-designed interface parameter	65535	65535	1	1		Setting
	Register 8	Custom-designed interface parameter	65535	65535	1	1		Setting
	Register 9	Custom-designed interface parameter	65535	65535	1	1		Setting
	Register 10	Custom-designed interface parameter	65535	65535	1	1		Setting

Частное предприятие "Юдилен-Холод" || +375296803378 || https://купизапчасть.бел || Минская обл., Минский р-н, Щомыслицкий с/с, 92/4

22.
PERFORMANCE DATA BD1.4F-VSD COMPRESSOR

Capacity (EN 12900 Household/CECOMAF) 12V DC, static cooling **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	7.2	10	15
2,000		9	11	15	22	31	42	54	69	76	86	106
2,500	7	13	15	20	30	41	55	70	87	96	109	134
3,000	9	16	19	26	37	51	67	85	105	116	131	161
3,500	10	20	23	31	45	61	80	101	124	137	154	190
4,000	12	23	27	36	52	71	92	116	144	158	178	218

Capacity (ASHRAE LBP) 12V DC, static cooling **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	7.2	10	15
2,000		12	14	19	28	39	52	68	86	95	107	132
2,500	9	16	19	25	37	51	68	87	109	120	135	167
3,000	11	20	24	32	47	64	84	106	131	144	163	201
3,500	13	24	29	39	56	76	99	125	155	170	192	237
4,000	15	29	34	45	65	88	114	144	179	197	222	272

Power consumption 12V DC, static cooling **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	7.2	10	15
2,000		16	17	19	22	25	29	34	40	42	43	45
2,500	16	20	21	24	28	32	37	42	48	50	52	54
3,000	19	24	26	29	34	39	45	50	57	59	61	63
3,500	23	29	31	35	41	47	53	59	66	69	72	77
4,000	27	34	36	41	48	55	61	68	76	79	83	90

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

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	7.2	10	15
2,000		1.25	1.33	1.48	1.74	2.02	2.32	2.65	2.74	2.85	3.00	3.28
2,500	1.25	1.53	1.63	1.83	2.15	2.48	2.84	3.22	3.69	3.84	4.00	4.20
3,000	1.49	1.84	1.96	2.20	2.59	2.98	3.40	3.82	4.38	4.56	4.77	5.09
3,500	1.77	2.19	2.34	2.63	3.07	3.53	4.00	4.47	5.06	5.26	5.51	5.89
4,000	2.08	2.58	2.75	3.08	3.59	4.10	4.63	5.16	5.87	6.07	6.31	6.63

COP (EN 12900 Household/CECOMAF) 12V DC, static cooling **W/W**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	7.2	10	15
2,000		0.59	0.66	0.81	1.03	1.24	1.43	1.60	1.72	1.83	1.99	2.36
2,500	0.43	0.64	0.72	0.86	1.08	1.29	1.48	1.67	1.83	1.94	2.10	2.46
3,000	0.45	0.67	0.74	0.89	1.10	1.30	1.50	1.69	1.84	1.97	2.14	2.54
3,500	0.46	0.68	0.75	0.89	1.10	1.30	1.51	1.70	1.88	1.99	2.15	2.47
4,000	0.45	0.68	0.75	0.89	1.09	1.30	1.50	1.70	1.88	1.99	2.14	2.42

COP (ASHRAE LBP) 12V DC, static cooling **W/W**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0	5	7.2	10	15
2,000		0.74	0.83	1.01	1.29	1.55	1.79	2.01	2.17	2.31	2.52	2.98
2,500	0.54	0.80	0.89	1.07	1.34	1.60	1.84	2.08	2.29	2.43	2.64	3.10
3,000	0.57	0.84	0.93	1.11	1.37	1.62	1.87	2.11	2.35	2.47	2.70	3.20
3,500	0.58	0.85	0.94	1.11	1.36	1.62	1.87	2.12	2.36	2.49	2.69	3.11
4,000	0.58	0.85	0.94	1.11	1.36	1.61	1.87	2.12	2.36	2.50	2.68	3.05

23.
PERFORMANCE DATA BD1.4F-FSD COMPRESSOR

Capacity (EN 12900 Household/CECOMAF) 12V DC, static cooling **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0
3,000	4.7	13.2	16.4	23.3	35.2	49.4	66.0	85.4

Capacity (ASHRAE LBP) 12V DC, static cooling **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0
3,000	6.4	16.8	20.8	29.2	44.0	61.5	82.2	106

Power consumption 12V DC, static cooling **watt**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0
3,000	15.7	22.6	24.8	28.8	34.5	39.6	44.4	48.7

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

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0
3,000	1.30	1.73	1.88	2.16	2.57	2.98	3.37	3.76

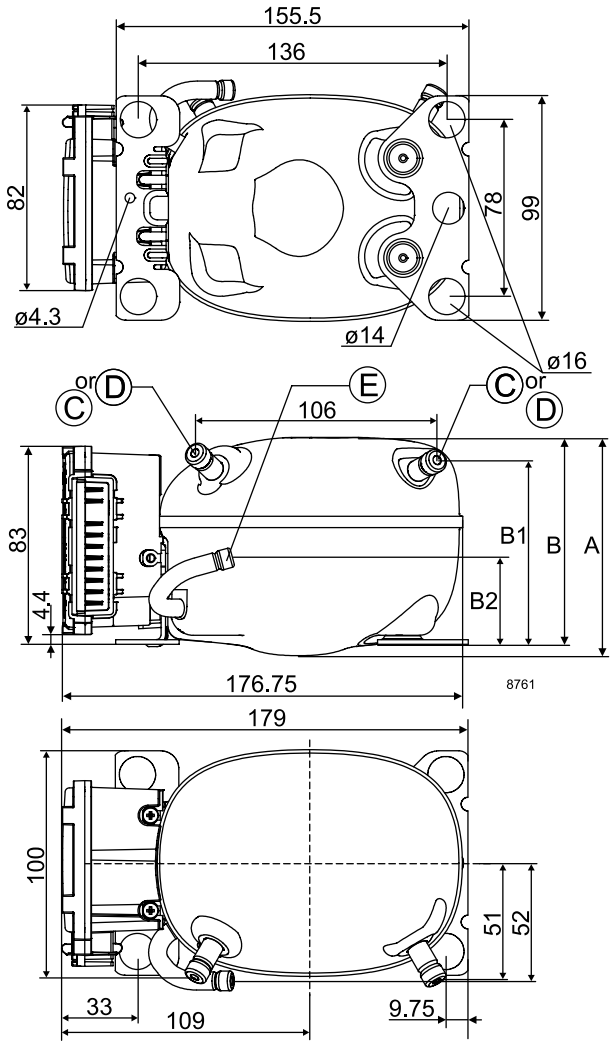
COP (EN 12900 Household/CECOMAF) 12V DC, static cooling **W/W**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0
3,000	0.30	0.58	0.66	0.81	1.02	1.25	1.49	1.75

COP (ASHRAE LBP) 12V DC, static cooling **W/W**

rpm \ °C	-30	-25	-23.3	-20	-15	-10	-5	0
3,000	0.40	0.74	0.83	1.01	1.28	1.56	1.86	2.19

24.
DIMENSIONS
BD1.4F-VSD/-FSD COMPRESSOR



Height	mm	A	96.25
		B	91.25
		B1	87.70
		B2	38.50
Suction connector	location/I.D. mm | angle	C	6.2 | 15°
	material | comment		Cu-plated steel | Al cap
Process connector	location/I.D. mm | angle	D	6.2 | 25°
	material | comment		Cu-plated steel | Al cap
Discharge connector	location/I.D. mm | angle	E	5.0 | 15°
	material | comment		Cu-plated steel | Al cap
Connector tolerance	I.D. mm		±0.09, on 5.0 +0.12/+0.20
Remarks			

BD1.4F–VSD/-HD – NEW MILESTONES IN MOBILE COOLING

The new **BD1.4F-VSD** from Secop is 60% smaller than previous models and weighs in at only 2.3 kilograms. Perfect for 10-20 litre in-car/van/boat cabinets or portable boxes that need to fit into tight spaces without compromising storage space.

Specially designed for maximum efficiency and reliability this powerhouse of a compressor makes it easier than ever to provide leading class mobile fridges. Enabling the variable speed function increases the system's COP. Low energy consumption is beneficial for car/van/boat batteries – as well as the environment. The optimized, low noise motor ensures outstanding performance when you want to provide that extra degree of luxury on the move. The electronic thermostat provides an accurate temperature while the failure detection allows a prompt fault diagnosis. The computer interface makes it easier for customization via TOOL4COOL®. Cool beverages on demand make your journey so much more of an excellent experience.

The Heavy Duty version **BD1.4F-VSD-HD** can handle extreme vibrations.




OUR JOURNEY SO FAR

1956
Production facility and headquarters in Flensburg, Germany founded

1958
Start up production of PW compressors.

1970
Introduction of SC compressors.
The birth of a standard setting platform in the light commercial market.

1972
Introduction FR compressors.

1977
Introduction TL and BD compressors.

1990
Introduction NL compressors.

1992
Introduction PL compressors.

1993
Start of production with natural refrigerant R600a (Isobutane)

Production facility in Crnomelj, Slovenia founded.

1999
Start of production with natural refrigerant R290 (Propane).

2002
Production facility in Zlate Moravce, Slovakia founded.

2005
Introduction GS compressors.

2008
Production facility in Wuqing, China founded.

2010
Introduction SLV-CNK.2 and SLV-CLK.2 variable speed compressors.
Introduction BD1.4F Micro DC compressor.
Introduction of DLX and NLU compressors.

2013
Introduction of the XV compressor. Opening a new chapter in refrigeration history.

Secop GmbH · Mads-Clausen-Str. 7 · 24939 Flensburg · Germany · Tel: +49 461 4941 0 · **www.secop.com**

Produced by Secop | June 2013

DES.S.100.E1.02

Частное предприятие "Юдилен-Холод" || +375296803378 || https://купизапчасть.бел || Минская обл., Минский р-н, Щомыслицкий с/с, 92/4