Operating Instructions

CONTROLLERS FOR NLV-CN COMPRESSORS

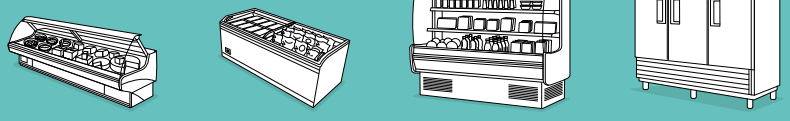
SECOP

105N4760 Multi Voltage · 100–240 V | 50/60 Hz
105N4710 Standard · 220–240 V | 50/60 Hz

°CCD®
VARIABLE SPEED DRIVE

TOOL4COOL®

COMMERCIAL
APPLICATIONS



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1 INTRODUCTION

Compressors are a vital element in cooling appliances, ensuring that the entire system runs smoothly and efficiently. Looking into the core of any machine, the effectiveness of a compressor is the optimization of all components, including motor type, pump type, and controller type.

When it comes down to compressors, a variable speed drive control is almost exactly the same as a variable frequency drive (VFD) in the way it controls a DC motor. However, variable speed compressors utilize a brush-less permanent magnet motor for improved efficiency and longevity.

Full load operation is rare in most cooling applications, restricted to a few days per year.

Since a compressor must fulfill the full load operation, a standard compressor is far too big for normal conditions, leading to poor energy efficiency.

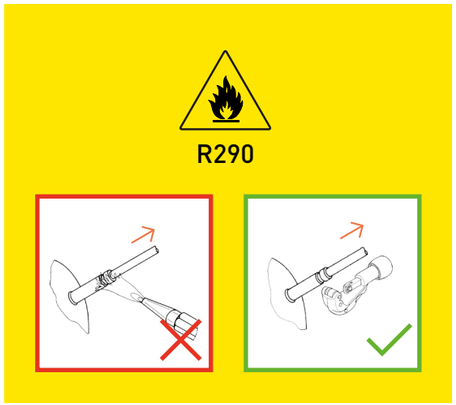
The variable speed technology makes capacity adapt to your actual requirement. The compressor runs at low speed most of the time, minimizing energy consumption.

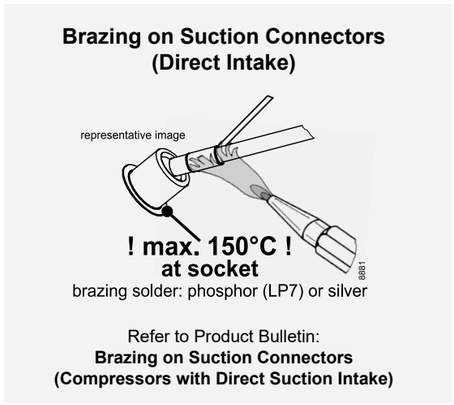
In addition to this, system efficiency is greatly improved thanks to reduced loss when less heat is transferred via the evaporator and condenser. Altogether, substantial energy savings can be achieved.

Secop NLV variable-speed compressors are designed for refrigeration systems using the designated refrigerants R290 (propane).

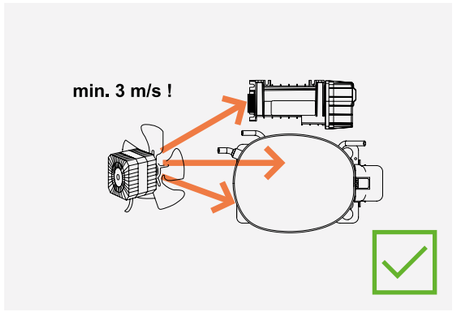
2 INSTALLATION

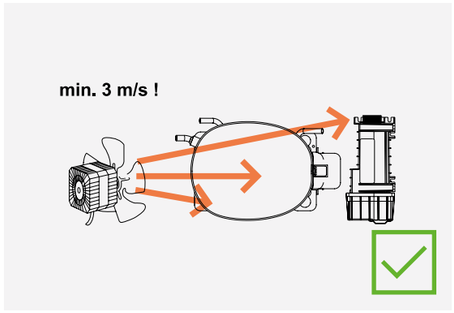
WARNING!

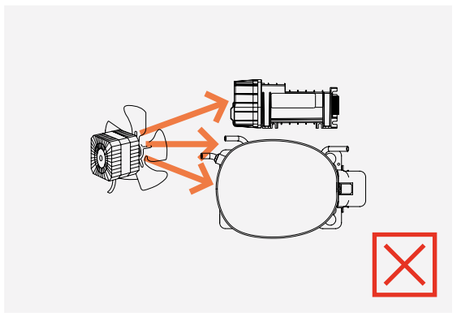


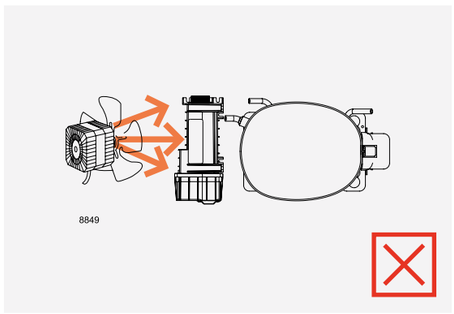


2.1 AIRFLOW



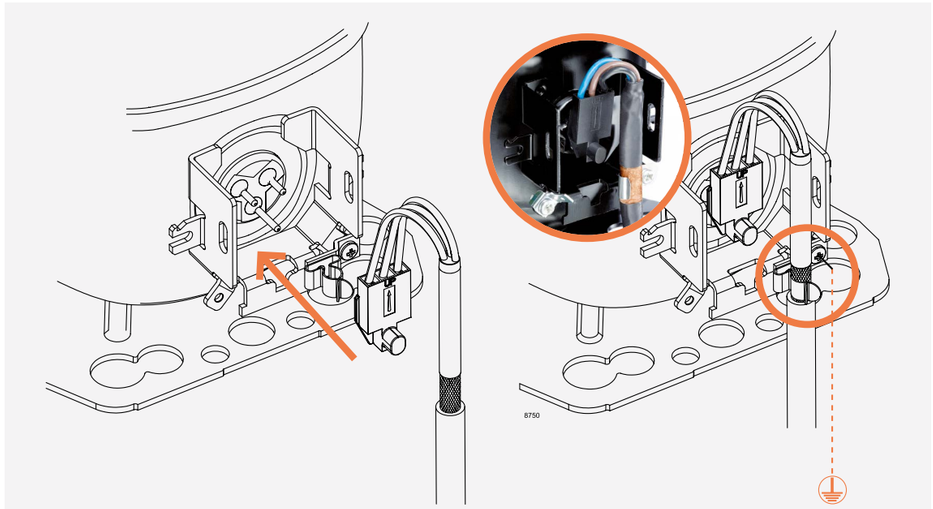






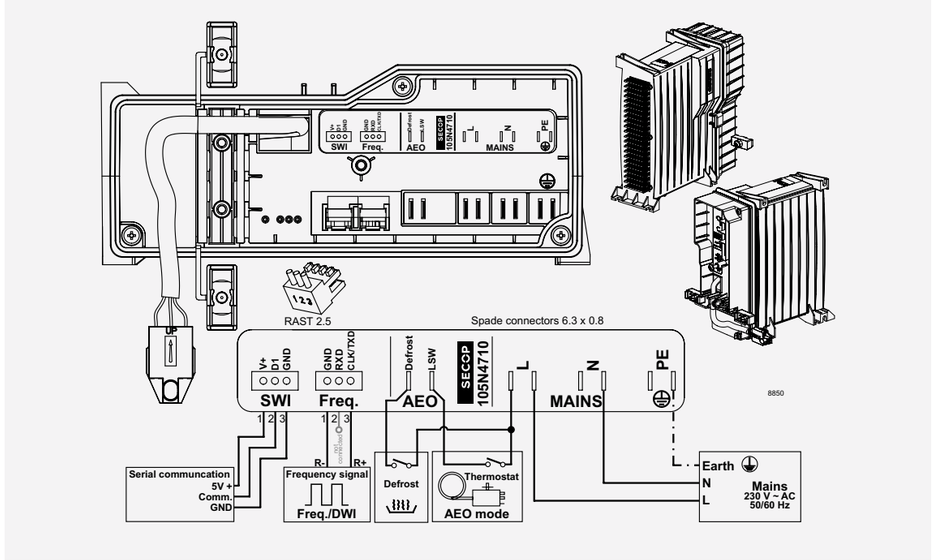
Ensure proper airflow of 3 m/s at both compressor and electronic unit.

2.2 EARTHING THE COMPRESSOR AND CONTROLLER



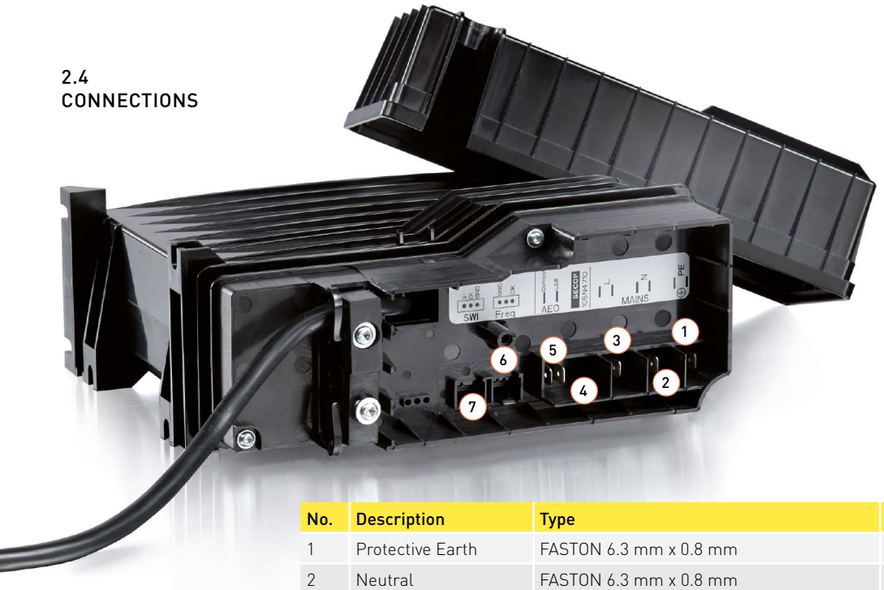
- For optimum EMC performance, the copper shield of the controller cable must be fastened properly in the clip at the compressor.
- Compressor and controller must be connected to PE (Protective Earth) to avoid risk of electrical hazard.
- All protective earth lines, PE, in the application must be collected to one star point. This prevents loop currents which could cause problems concerning the electronic components, communication lines and sensors. The star-point is normally a screwed terminal on the chassis

2.3 WIRING DIAGRAM



- Installation must only be done by trained personal.
- Do not remove cover of the controller when the unit is powered on.
- Disconnect from power and wait 30 seconds before accessing terminals.
- The maximum cable length should not exceed 3 meters for signal connections. A cable length of more than 3 m could alter the EMI performance.
- Signal lines must be separated from power lines.

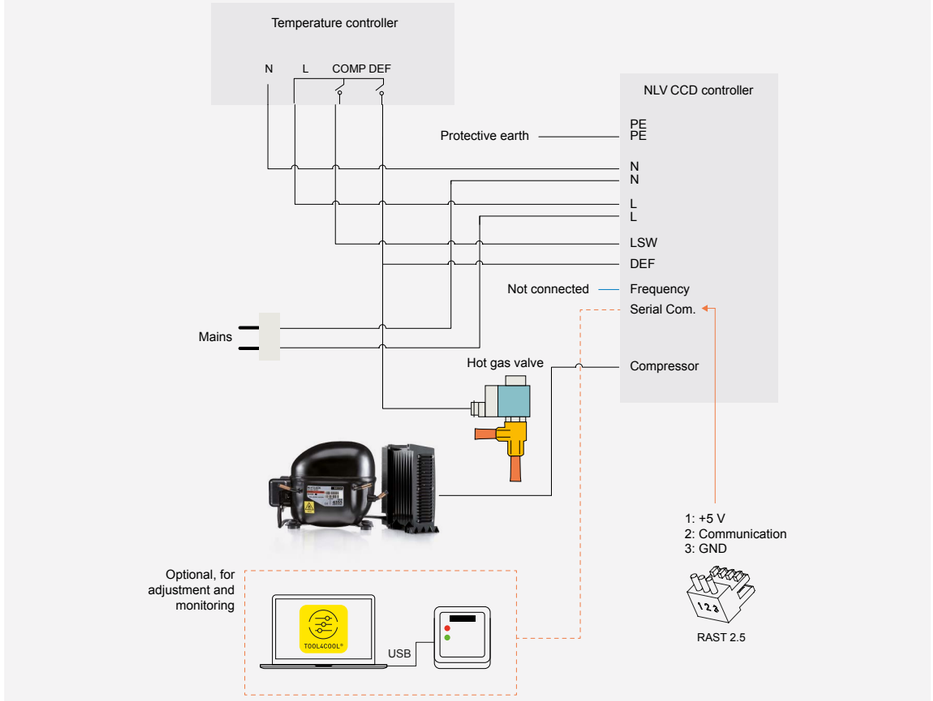
2.4 CONNECTIONS



1. 2x Protective Earth
2. 2x Neutral
3. 2x Line
4. Thermostat/AEO
5. Defrost
6. Frequency and DWI Communication Input
7. SWI Serial Communication

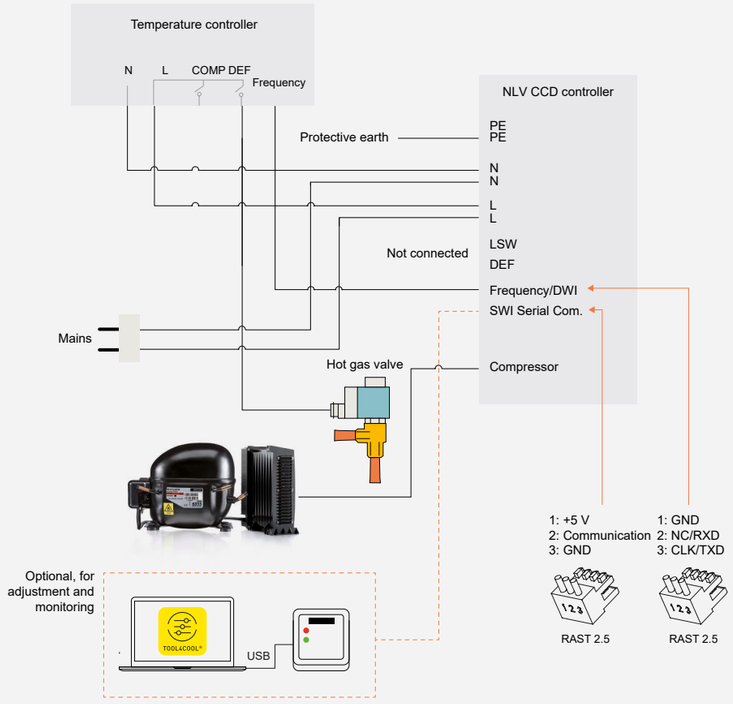
No.	Description	Type	Note
1	Protective Earth	FASTON 6.3 mm x 0.8 mm	Mandatory. Must be connected.
2	Neutral	FASTON 6.3 mm x 0.8 mm	Mandatory. Must be connected.
3	Line	FASTON 6.3 mm x 0.8 mm	Mandatory. Must be connected.
4	Thermostat	FASTON 6.3 mm x 0.8 mm	For AEO only (see chapter 2.5 , 3.1)
5	Defrost	FASTON 6.3 mm x 0.8 mm	For AEO and defrost only (see chapter 2.5 ,3.2)
6	Frequency/DWI	RAST-2. 5, Ex: Lumberg 3521 03 K00	For frequency or DWI only (see chapter 2.6, 3.3, 3.4)
7	SWI Serial comm.	RAST-2. 5, Ex: Lumberg 3521 03 K00	For Tool4Cool®, or SWI only (see chapter 2.7, 3.5)

2.5 WIRING FOR THERMOSTATIC OPERATION

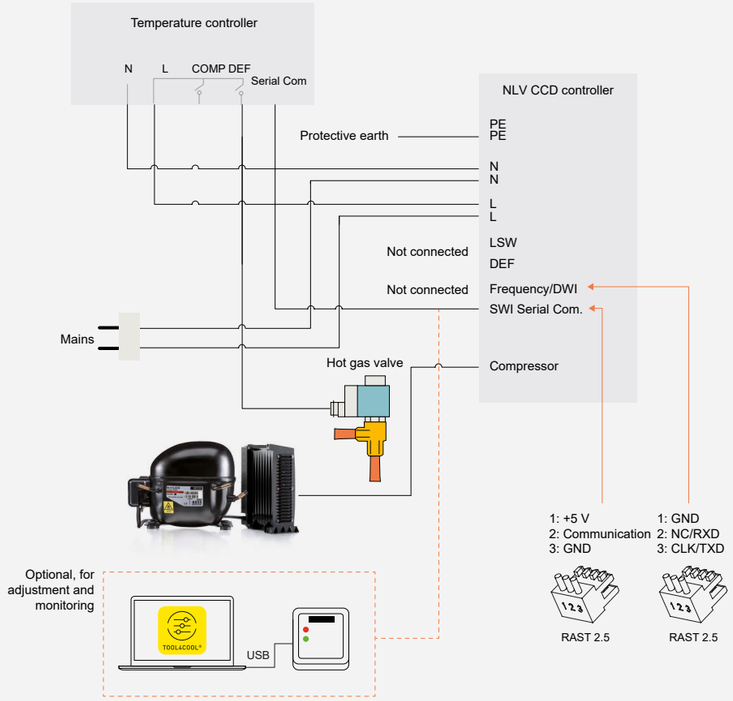


For optimal hot-gas defrost performance, the relay output of the controller should be connected to the DEF input of the controller. This ensures that the compressor operates at full speed when the hot-gas valve is activated.

2.6 WIRING FOR FREQUENCY OPERATION/DWI COMMUNICATION



2.7 WIRING FOR SWI COMMUNICATION



3 SPEED CONTROL

The Secop °CCD® controller is equipped with four different inputs for speed control to ensure easy integration.

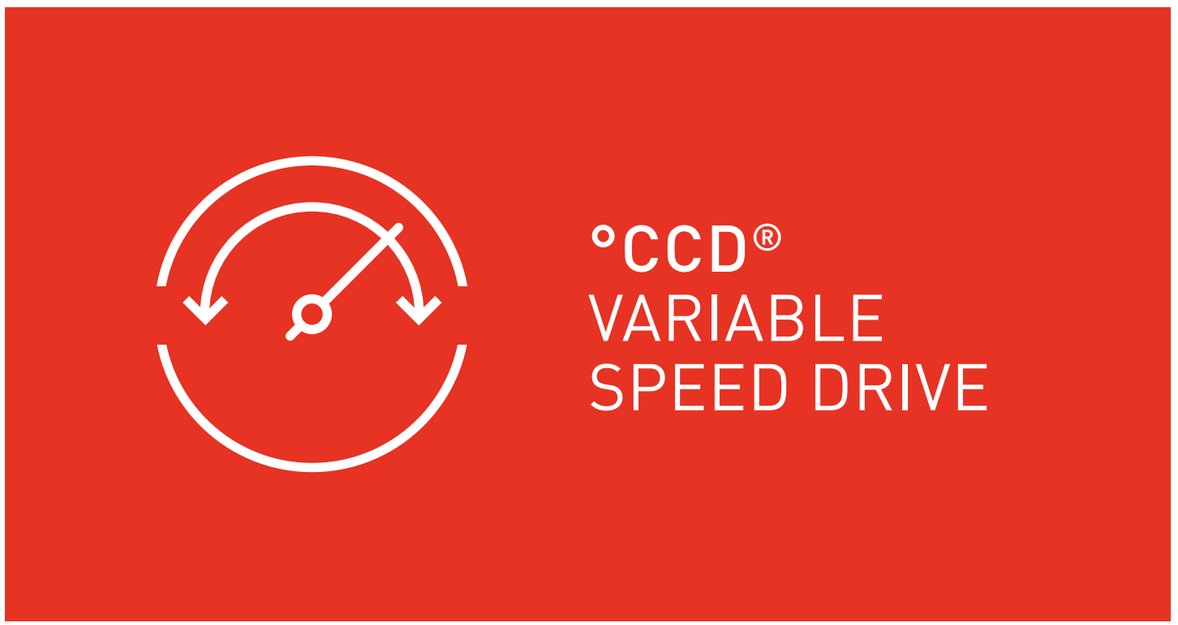
Almost any temperature controller can be used to control the speed without needing to change the setup.
The °CCD® controller has automatic input detection and will automatically select the input which is active.

1. DWI, Dual Wire Interface with separated RX and TX lines
2. Frequency signal
3. Thermostatic operation with AEO, Adaptive Energy Optimization.
4. SWI, Single Wire Interface w. Modbus protocol

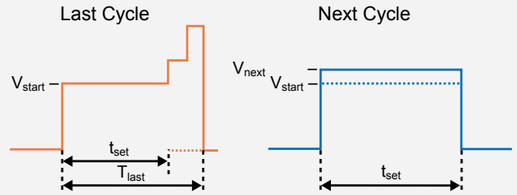
→ If more signals are connected, the input with highest priority (1–4) will be used.

→ Modbus input has the lowest priority and can be used for monitoring in combination with the other inputs.

→ If Tool4Cool® sends an active start command, the Modbus input will change priority to 1 and overrule all other input signals. The Modbus input will then remain selected until Tool4Cool® is closed.



3.1 THERMOSTATIC OPERATION WITH AEO



% Runtime	% Speed
100	105
110	110
120	120
140	130
160	140
190	180
220	225

AEO is the only control mode where there is no direct relation between speed and input signal.
The speed is automatically calculated based on the runtime (time between cut-in and cut-out).

The AEO can be interfaced by a normal thermostat or relay.

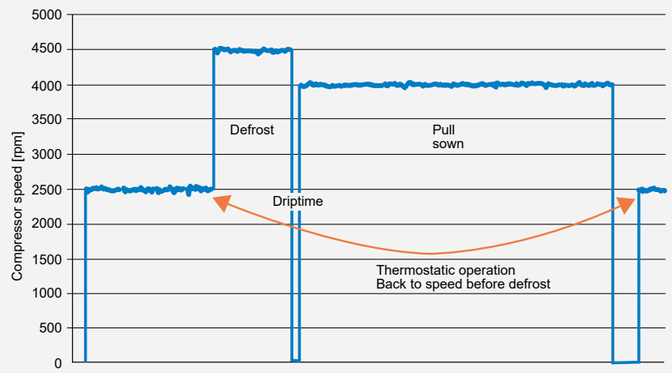
Advantages of the AEO:

→ Easy to interface
→ Electromechanical thermostat
→ Electronic control with relay output
→ Perfect for applications with stable conditions, such as freezers, catering equipment

The AEO operates with a target runtime and will automatically adapt the speed until the target runtime is met.

→ If the compressor runtime is shorter than the target time, the speed in the next cycle will be reduced
→ If the runtime is longer than the target time, the speed in the current cycle will be increased until the cut-out is reached. The next cycle is calculated as the average speed for the last cycle.
→ Settings can be changed by Tool4Cool®

3.2 DEFROST CONTROL WITH AEO



When variable speed compressors are used in self-adapting capacity modes, defrosting might not work properly since the compressor speed cannot be controlled during defrost: The compressor lacks capacity for hot gas and the following pull-down.

To improve defrost when AEO is used, the °CCD® controller has an extra input that can be connected to the defrost relay output of the temperature controller.

→ Hot-gas defrosting: When the defrost and AEO input are activated simultaneously, the °CCD® controller switches to a defined fixed speed, maximum 4500 rpm

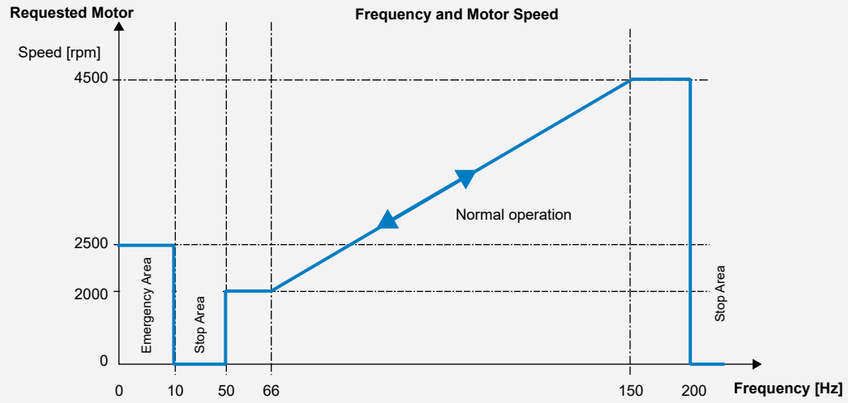
→ Electrical defrosting: When only the defrost input is activated, the compressor will remain stopped, but the information is used to trigger pull-down after defrosting.

→ After defrosting, the °CCD® controller will run the first cycle at high speed to ensure that the heat is removed as fast as possible.

→ After the pull-down it reverts to the speed it had before defrost.

→ Settings can be changed by Tool4Cool®

3.3 FREQUENCY SPEED CONTROL

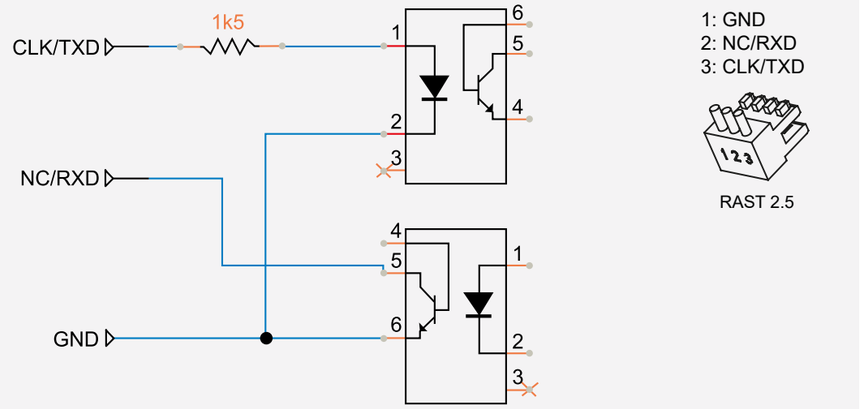


Parameter/Limiting values	Min.	Max.	Typical	Unit
Signal Amplitude (high level)	4.5	12	5	V DC
Signal Amplitude (low level)	-5	1	0	V DC
Signal Current	2.5	8	3	mA
Signal Max. Rise and Fall Time	0	50	—	µs
Minimum Pulse Length	1.5	—	—	ms

The speed can be controlled by applying a low voltage frequency signal to the frequency input

- → The speed is changed linearly between 66 Hz and 150 Hz.
- → 66 Hz corresponds to 2000 rpm, 150 Hz to 4500 rpm
- → If the frequency is below 50 Hz, the compressor stops.
- → A frequency of 25-30 Hz must be applied during stop.
- → If the frequency is lower than 10 Hz, the signal is considered faulty and the compressor will go into emergency mode and operate at a fixed speed or switch to AEO (default disabled)
- → The parameters for the frequency are fully programmable and can easily be changed by Tool4Cool®

3.4 DWI SERIAL COMMUNICATION



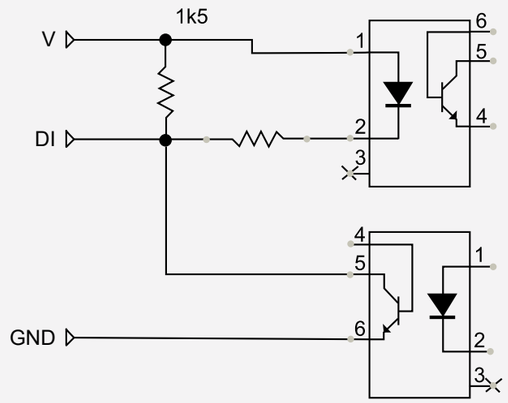
Communication Specification	
Baud Rate:	600 Baud
Start Bits:	1
Data Bits:	8
Stop Bits:	1
Parity:	No
Frame Size:	5 Bytes
Appliance Controller:	Master
Compressor Controller:	Slave
Start Bit:	1 --> 0 (logic level)
Data Bits:	Inverted logic (0V --> "1")
Stop Bit:	0 --> 1 (logic level)
Control Mode:	Half duplex

The DWI, Dual Wire interface, is a bidirectional communication protocol that allows the temperature controller to communicate with the compressor controller.

Beside speed, the temperature controller can get different information from the controller, like power-consumption, actual speed, electronic temperature, and fault status.

The communication interface is shared with the frequency interface. A full description of the interface and a list of supported commands can be requested at Secop.

3.5 SWI SERIAL COMMUNICATION



The serial communication is implemented as a single wire half-duplex line—transmitting and receiving on the same line.

The input port is galvanic isolated from the controller and must be supplied from the application board by a 5 V to 12 V DC. The signal level follows the supply voltage.

Up to 3 units can be wired in parallel for multi-compressor systems, but it must be ensured that the controller has sufficient drive capability.

→ The communication is based on the MODBUS Serial Line protocol.

→ The °CCD® controller operates as a slave. A slave node will never transmit data without receiving a request from the master node.

→ Only one master can be connected to the bus, and up to 3 °CCD® controllers' slave nodes can be connected to the same serial bus.

→ Each °CCD® controller must have an individual address which is unique. The °CCD® controllers will never communicate with each other.

→ The master must always send a message which includes an address – even if only one unit is connected to the bus.

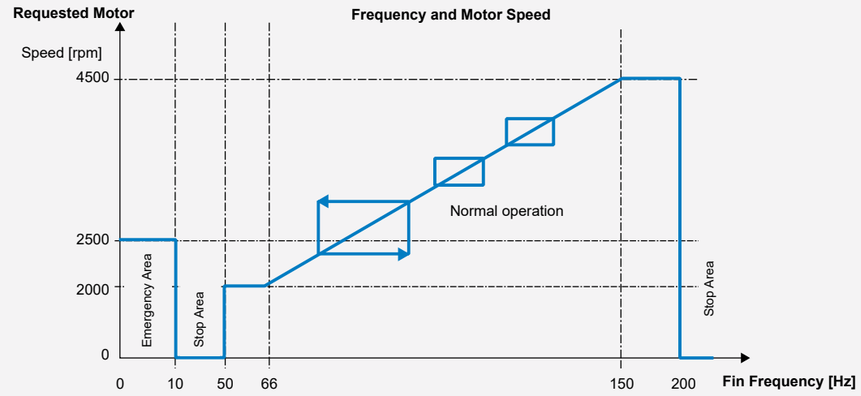
→ The slave will always return a reply message to the master (unless it is a broad cast message).

→ All Modbus transactions consist therefore of two messages—a request from the master and a reply from the °CCD® controllers.

→ The communication must be refreshed every 10 seconds for safety reasons. If this is not done, the communication is considered lost and the compressor will stop or go into emergency mode where it will run with a preset capacity.

A full description of the interface and a list of supported commands can be requested from Secop.

3.6 AVOIDING RESONANCE



→ In some situations vibration at certain speeds can make the tubes and plates rattle and vibrate

→ Those speeds can be blocked by defining "forbidden speeds" at which the compressor is not allowed to operate.

→ If the tubes have a resonance point at 2500 rpm, a minimum speed and a maximum speed must be defined for the area. For instance from 2400 to 2600 rpm.

→ Up to 3 speeds can be programmed.

4 TECHNICAL DATA

4.1 CONTROLLER DATA

	Electronic unit	105N4760	105N4710
Power supply	Nominal voltage	100 - 240 V AC	220 - 240 V AC
	Minimum operating voltage	80 V AC	160 V AC
	Minimum starting voltage	90 V AC	180 V AC
	Maximum voltage	270 V AC	
	Frequency	50–60 Hz	
	Max power input	1000 W	
	Power Factor Corrector	Yes, active, PF ≥ 0.95	
	Motor cable length	700±20 mm / 26.8-28.3 in.	
Environment	IP class	IP54	
	Humidity	30–90 % rH	
	Maximum operating temperature	50 °C / 120 °F	
	Minimum operating temperature	0 °C / 32 °F	
	Storage temperature	- 30 to 70 °C / -22 °F to 158 °F	
Approvals/Safety	Compressor protection	Internal in compressor	
	Safety Approval	UL 60335-2-34 with Annex AA, CB IEC 60335-2-34	EN 60335-2-34 with Annex AA, CCC
	EMC conformity	According to 2004/104/EC	
	RoHs Conformity	2011/65/EU	
Speed-Control	Frequency input	5–12 V, max. 8 mA, 0–200 Hz Galvanic isolated, short and reverse protected	
	AEO Thermostat input (Lsw)	80–264 V AC, non-isolated	150–264 V AC, non-isolated
	AEO Defrost input (Def)	80–264 V AC, non-isolated	150–264 V AC, non-isolated
	RX/TX interface (DWI)	5–12 V, max. 8 mA, 600 baud galvanic isolated	
	Single Wire Interface (SWI)	Modbus Communication port , 9600 Baud galvanic isolated	

4.2 COMPRESSOR DATA

	NLV8.0CN / NLV 10CN / NLV12.6CN		Multi Voltage	Standard
Compressor	Application		LBP/MBP	LBP/MBP
	Evaporating temperature	°C (°F)	-40 to 7.2 (-40 to 45)	-40 to 7.2 (-40 to 45)
	Voltage range/frequency	V/Hz	90–270/50/60	180–270/50/60
	Speed range	rpm	2000–4500	2000–4500

4.3 CAPACITY AND PERFORMANCE DATA NLV12.6CN

LBP: ASHRAE	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	422	481	541	597	653	748	843	938
Capacity [BTU/h]	1442	1644	1846	2039	2232	2556	2880	3204
Power cons. [W]	251	280	309	340	371	436	501	566
Current cons. [A]	1.23	1.36	1.49	1.63	1.77	2.06	2.35	2.64
COP [W/W]	1.68	1.72	1.75	1.76	1.76	1.72	1.68	1.66
EER [BTU/Wh]	5.75	5.87	5.97	5.99	6.02	5.86	5.75	5.66

Test conditions		
Evaporation pressure	-23.3°C	-10°F
Condensing presssure	54.4°C	130°F
Liquid temperature	32.2°C	90°F
Return gas temp.	32.2°C	90°F

LBP: CECOMAF	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	316	360	404	448	492	562	633	703
Capacity [BTU/h]	1080	1230	1379	1529	1679	1920	2160	2401
Power cons. [W]	243	269	296	326	357	419	482	545
Current cons. [A]	1.19	1.31	1.43	1.57	1.70	1.99	2.27	2.55
COP [W/W]	1.30	1.34	1.37	1.37	1.38	1.34	1.31	1.29
EER [BTU/Wh]	4.45	4.57	4.67	4.69	4.71	4.58	4.48	4.41

Test conditions		
Evaporation pressure	-25°C	-13°F
Condensing presssure	55°C	131°F
Liquid temperature	55°C	131°F
Return gas temp.	32°C	90°F

LBP: EN12900	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	253	278	302	329	355	424	494	563
Capacity [BTU/h]	865	948	1031	1122	1213	1449	1686	1922
Power cons. [W]	181	195	208	229	250	298	346	394
Current cons. [A]	0.91	0.98	1.04	1.13	1.22	1.44	1.66	1.87
COP [W/W]	1.40	1.43	1.45	1.44	1.42	1.43	1.43	1.43
EER [BTU/Wh]	4.77	4.87	4.96	4.90	4.85	4.87	4.87	4.88

Test conditions		
Evaporation pressure	-35°C	-31°F
Condensing presssure	40°C	104°F
Liquid temperature	40°C	104°F
Return gas temp.	20°C	68°F

MBP: ASHRAE	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	753	852	952	1044	1137	1316	1495	1675
Capacity [BTU/h]	2572	2911	3250	3566	3882	4495	5107	5719
Power cons. [W]	348	394	441	481	520	620	719	818
Current cons. [A]	1.66	1.87	2.08	2.26	2.44	2.89	3.33	3.78
COP [W/W]	2.17	2.16	2.16	2.17	2.19	2.12	2.08	2.05
EER [BTU/Wh]	7.40	7.39	7.37	7.42	7.46	7.25	7.10	6.99

Test conditions		
Evaporation pressure	-6.7°C	20°F
Condensing presssure	54.4°C	130°F
Liquid temperature	46.1°C	115°F
Return gas temp.	35°C	95°F

MBP: CECOMAF	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	598	679	760	832	905	1046	1188	1329
Capacity [BTU/h]	2041	2318	2595	2842	3089	3572	4056	4539
Power cons. [W]	330	375	419	456	493	585	677	769
Current cons. [A]	1.58	1.78	1.99	2.15	2.32	2.73	3.15	3.56
COP [W/W]	1.81	1.81	1.81	1.83	1.83	1.79	1.75	1.73
EER [BTU/Wh]	6.19	6.19	6.19	6.23	6.26	6.11	5.99	5.90

Test conditions		
Evaporation pressure	-10°C	14°F
Condensing presssure	55°C	131°F
Liquid temperature	55°C	131°F
Return gas temp.	32°C	90°F

MBP: EN12900	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	673	755	836	914	992	1161	1329	1497
Capacity [BTU/h]	2299	2577	2855	3122	3389	3963	4538	5112
Power cons. [W]	305	342	378	413	448	532	616	700
Current cons. [A]	1.47	1.64	1.80	1.96	2.12	2.49	2.87	3.25
COP [W/W]	2.21	2.21	2.21	2.21	2.22	2.18	2.16	2.14
EER [BTU/Wh]	7.54	7.54	7.54	7.56	7.57	7.45	7.37	7.30

Test conditions		
Evaporation pressure	-10°C	14°F
Condensing presssure	45°C	113°F
Liquid temperature	45°C	113°F
Return gas temp.	20°C	90°F

4.4 CAPACITY AND PERFORMANCE DATA NLV10CN

LBP: ASHRAE	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	352	395	439	477	514	593	671	749
Capacity [BTU/h]	1202	1350	1498	1627	1756	2024	2291	2559
Power cons. [W]	203	223	243	266	289	334	380	425
Current cons. [A]	1.08	1.16	1.24	1.35	1.45	1.71	1.96	2.21
COP [W/W]	1.74	1.78	1.81	1.79	1.78	1.77	1.77	1.76
EER [BTU/Wh]	5.93	6.06	6.18	6.12	6.07	6.05	6.03	6.02

Test conditions		
Evaporation pressure	-23.3°C	-10°F
Condensing presssure	54.4°C	130°F
Liquid temperature	32.2°C	90°F
Return gas temp.	32.2°C	90°F

LBP: CECOMAF	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	264	296	329	357	385	444	502	561
Capacity [BTU/h]	900	1012	1124	1220	1315	1515	1715	1914
Power cons. [W]	195	214	234	256	278	321	365	408
Current cons. [A]	1.03	1.11	1.19	1.29	1.39	1.63	1.87	2.11
COP [W/W]	1.35	1.38	1.41	1.40	1.39	1.38	1.38	1.37
EER [BTU/Wh]	4.61	4.72	4.81	4.77	4.74	4.72	4.7	4.69

Test conditions		
Evaporation pressure	-25°C	-13°F
Condensing presssure	55°C	131°F
Liquid temperature	55°C	131°F
Return gas temp.	32°C	90°F

LBP: EN12900	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	195	220	245	269	293	333	373	412
Capacity [BTU/h]	665	752	838	920	1002	1137	1273	1408
Power cons. [W]	137	154	171	186	201	234	267	299
Current cons. [A]	0.62	0.75	0.87	0.96	1.04	1.18	1.31	1.44
COP [W/W]	1.42	1.43	1.44	1.45	1.46	1.42	1.40	1.38
EER [BTU/Wh]	4.85	4.88	4.91	4.95	4.98	4.86	4.78	4.71

Test conditions		
Evaporation pressure	-35°C	-31°F
Condensing presssure	40°C	104°F
Liquid temperature	40°C	104°F
Return gas temp.	20°C	68°F

MBP: ASHRAE	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	636	708	781	855	929	1072	1215	1357
Capacity [BTU/h]	2172	2419	2665	2919	3173	3661	4148	4635
Power cons. [W]	289	315	341	374	408	476	544	612
Current cons. [A]	1.51	1.66	1.81	1.95	2.08	2.47	2.86	3.25
COP [W/W]	2.21	2.25	2.29	2.28	2.28	2.25	2.23	2.22
EER [BTU/Wh]	7.53	7.68	7.81	7.8	7.79	7.69	7.63	7.57

Test conditions		
Evaporation pressure	-6.7°C	20°F
Condensing presssure	54.4°C	130°F
Liquid temperature	46.1°C	115°F
Return gas temp.	35°C	95°F

MBP: CECOMAF	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	505	563	621	679	737	850	964	1077
Capacity [BTU/h]	1725	1923	2121	2318	2515	2903	3291	3680
Power cons. [W]	275	300	324	356	387	450	513	577
Current cons. [A]	1.44	1.58	1.71	1.84	1.97	2.34	2.70	3.06
COP [W/W]	1.84	1.88	1.92	1.91	1.90	1.89	1.88	1.87
EER [BTU/Wh]	6.28	6.42	6.54	6.52	6.50	6.45	6.41	6.38

Test conditions		
Evaporation pressure	-10°C	14°F
Condensing presssure	55°C	131°F
Liquid temperature	55°C	131°F
Return gas temp.	32°C	90°F

MBP: EN12900	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	555	621	688	756	824	945	1067	1188
Capacity [BTU/h]	1894	2121	2348	2581	2813	3228	3642	4057
Power cons. [W]	242	269	295	325	355	417	479	541
Current cons. [A]	1.25	1.41	1.56	1.70	1.84	2.15	2.47	2.78
COP [W/W]	2.29	2.31	2.33	2.33	2.32	2.27	2.23	2.20
EER [BTU/Wh]	7.83	7.90	7.95	7.94	7.93	7.75	7.61	7.50

Test conditions		
Evaporation pressure	-10°C	14°F
Condensing presssure	45°C	113°F
Liquid temperature	45°C	113°F
Return gas temp.	20°C	90°F

4.5 CAPACITY AND PERFORMANCE DATA NLV8.0CN

LBP: ASHRAE	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	266	306	346	365	384	442	500	558
Capacity [BTU/h]	907	1044	1182	1247	1313	1510	1708	1905
Power cons. [W]	153	171	188	202	217	252	288	324
Current cons. [A]	0.70	0.82	0.94	0.98	1.03	1.26	1.49	1.72
COP [W/W]	1.73	1.79	1.84	1.81	1.78	1.75	1.74	1.72
EER [BTU/Wh]	5.91	6.11	6.28	6.16	6.06	5.98	5.92	5.88

Test conditions		
Evaporation pressure	-23.3°C	-10°F
Condensing presssure	54.4°C	130°F
Liquid temperature	32.2°C	90°F
Return gas temp.	32.2°C	90°F

LBP: CECOMAF	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	198	229	260	273	286	329	372	415
Capacity [BTU/h]	677	782	887	931	975	1122	1269	1416
Power cons. [W]	148	165	181	195	208	242	277	311
Current cons. [A]	0.66	0.78	0.90	0.94	0.98	1.20	1.43	1.65
COP [W/W]	1.34	1.39	1.43	1.40	1.38	1.36	1.34	1.33
EER [BTU/Wh]	4.59	4.75	4.89	4.79	4.70	4.63	4.59	4.55

Test conditions		
Evaporation pressure	-25°C	-13°F
Condensing presssure	55°C	131°F
Liquid temperature	55°C	131°F
Return gas temp.	32°C	90°F

LBP: EN12900	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	148	171	194	207	220	252	284	316
Capacity [BTU/h]	505	583	661	706	750	860	970	1080
Power cons. [W]	104	120	135	144	154	178	202	226
Current cons. [A]	0.45	0.52	0.58	0.67	0.75	0.82	0.89	0.96
COP [W/W]	1.42	1.43	1.44	1.43	1.43	1.42	1.41	1.40
EER [BTU/Wh]	4.85	4.88	4.90	4.89	4.88	4.84	4.81	4.78

Test conditions		
Evaporation pressure	-35°C	-31°F
Condensing presssure	40°C	104°F
Liquid temperature	40°C	104°F
Return gas temp.	20°C	68°F

MBP: ASHRAE	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	489	553	616	667	718	828	939	1049
Capacity [BTU/h]	1671	1887	2103	2278	2453	2829	3205	3581
Power cons. [W]	216	239	262	284	306	357	407	458
Current cons. [A]	1.09	1.22	1.35	1.46	1.56	1.85	2.13	2.41
COP [W/W]	2.27	2.31	2.35	2.35	2.35	2.32	2.31	2.29
EER [BTU/Wh]	7.74	7.89	8.02	8.02	8.02	7.93	7.87	7.82

Test conditions		
Evaporation pressure	-6.7°C	20°F
Condensing presssure	54.4°C	130°F
Liquid temperature	46.1°C	115°F
Return gas temp.	35°C	95°F

MBP: CECOMAF	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	387	439	490	528	567	654	740	827
Capacity [BTU/h]	1322	1498	1673	1805	1936	2232	2528	2824
Power cons. [W]	206	228	249	270	291	338	386	434
Current cons. [A]	1.03	1.15	1.27	1.37	1.47	1.74	2.01	2.27
COP [W/W]	1.88	1.93	1.96	1.96	1.95	1.93	1.92	1.91
EER [BTU/Wh]	6.42	6.58	6.71	6.68	6.66	6.60	6.55	6.51

Test conditions		
Evaporation pressure	-10°C	14°F
Condensing presssure	55°C	131°F
Liquid temperature	55°C	131°F
Return gas temp.	32°C	90°F

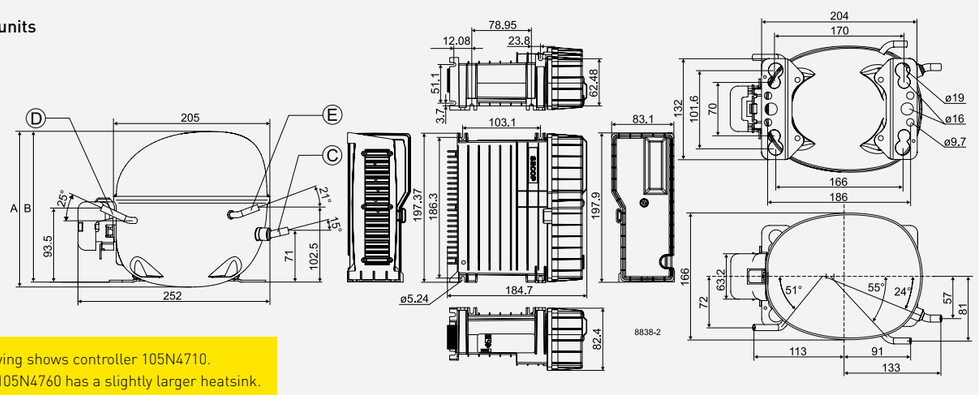
MBP: EN12900	115/220V, 50/60Hz, fan cooling F_2							
Speed (rpm)	2000	2250	2500	2750	3000	3500	4000	4500
Capacity [W]	431	487	542	592	641	741	841	941
Capacity [BTU/h]	1472	1662	1852	2021	2189	2530	2871	3212
Power cons. [W]	184	206	227	248	269	316	363	411
Current cons. [A]	0.92	1.02	1.12	1.25	1.38	1.62	1.87	2.11
COP [W/W]	2.35	2.37	2.39	2.38	2.38	2.34	2.31	2.29
EER [BTU/Wh]	8.01	8.08	8.14	8.14	8.14	8.00	7.90	7.82

Test conditions		
Evaporation pressure	-10°C	14°F
Condensing presssure	45°C	113°F
Liquid temperature	45°C	113°F
Return gas temp.	20°C	90°F

5 DIMENSIONS

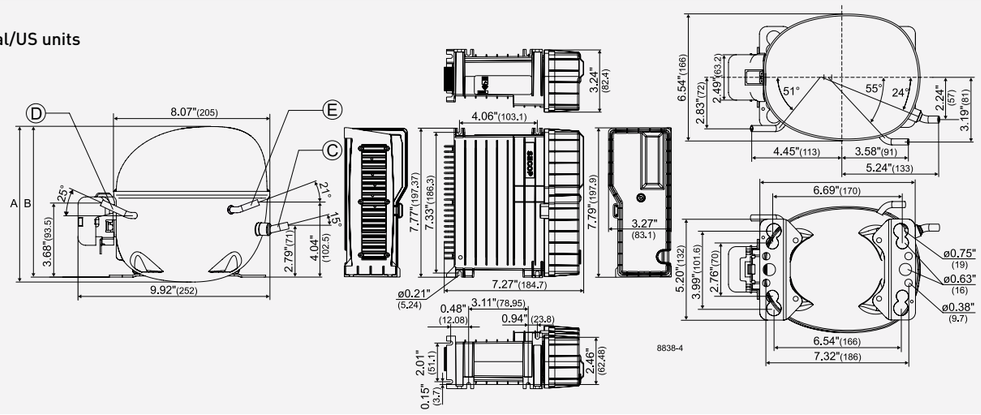
Compressor dimensions NLV8.0CN / NLV10CN / NLV12.6CN		105H7800 / 105H7000 / 105H6355 (metric connectors)	105H7801 / 105H7001 / 105H6356 (inch connectors)
Height	mm (in.)	A 203	203 (7.99)
		B 197	197 (7.76)
Suction connector	location/I.D. mm (in.) | angle	C 8.2 | 15°	8.2 (0.320-0.327) | 15°
	material | seal	Copper | Rubber plug	Copper | Rubber plug
Process connector	location/I.D. mm (in.) | angle	D 6.2 | 25°	6.5 (0.252-0.259) | 25°
	material | seal	Copper | Rubber plug	Copper | Rubber plug
Discharge connector	location/I.D. mm (in.) | angle	E 6.2 | 21°	6.5 (0.252-0.259) | 21°
	material | seal	Copper | Rubber plug	Copper | Rubber plug
Connector tolerance	I.D. mm	±0.09	–

Metric units



NOTE: Drawing shows controller 105N4710.
Controller 105N4760 has a slightly larger heatsink.

Imperial/US units



6 ORDERING

	Item	Code No.	Comment
Controller	Electronic controller (°CCD®), 220–240 V AC	105N4710	single unit
		105N4711	industrial pack
	Electronic controller (°CCD®), Multi Voltage, 100–240 V AC	105N4760	single unit
		105N4761	industrial pack
Compressor/Accessories	NLV12.6CN compressor	105H6355	compressor w. metric connectors
		105H6356	compressor w. inch connectors
	NLV10CN compressor	105H7000	compressor w. metric connectors
		105H7001	compressor w. inch connectors
	NLV8.0CN compressor	105H7800	compressor w. metric connectors
		105H7801	compressor w. inch connectors
	Cover for compressor	103N2008	
	Bolt joint for one compressor	118-1917	
	Bolt joint in quantities	118-1918	
	Snap-on in quantities	118-1919	
	RAST-2.5 connector 1 pcs	105B4232	Lumberg 3521-03
Lab tool	Tool4Cool® (free of charge)	https://www.secop.com/tool4cool	
	Secop Gateway	105N9518	USB communication interface
Literature	Compressor data sheet	https://selector.secop.com/data-sheet-search	
	°CCD® interface description	on request	
	Tool4Cool® Operating Instructions	https://www.secop.com/tool4cool	

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Secop's variable speed NLV-CN propane compressor solution provides perfect cooling efficiency, tailor-made features, and easy integration within a single unit while ensuring considerable energy savings.

It is the right choice if you are looking for a green solution using the environmentally-friendly refrigerant propane (R290) with a low global warming potential (GWP 3).

The new °CCD® controller features a high IP54 protection class and easy integration by using speed control through Adaptive Energy Optimization (AEO), frequency signal or serial communication.

The controller also provides a high starting torque and can start against a differential pressure.

Only the variable speed design can obtain energy savings of up to 40% when compared to fixed speed compressors in on/off operation mode.

The new 105N4760 °CCD® controller with its wide operating voltage range can be used for all voltages and frequencies globally.

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Secop is the expert for advanced hermetic compressor technologies and cooling solutions in commercial refrigeration. We develop high performance stationary and mobile cooling solutions for leading international commercial refrigeration manufacturers and are the first choice when it comes to leading hermetic compressors and electronic controls for refrigeration solutions for light commercial and DC-powered applications.

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