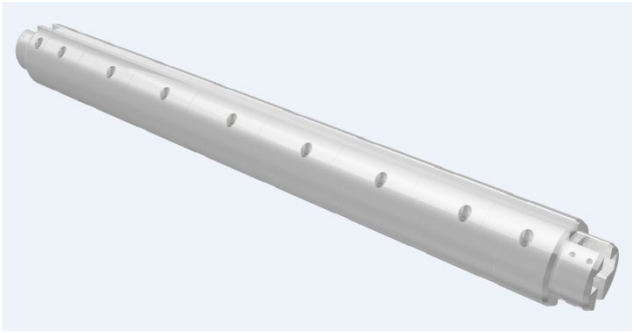
Features

- Operational input voltage range is 150 – 1000Vdc
- Maximum survival voltage is **1200Vdc**
- Up to 450W output
- 90-120 Vdc Output voltage (Factory set)
- 18Vdc auxiliary output (optional)
- High temperature – 177degC
- High efficiency ~97%
- Short circuit output protection
- Input overvoltage protection
- CNC machined aluminum housing
- CANbus interface



Product Description

The **NSE DCDC 90-120V 5A/1000V** is a high performance, high temperature DCDC converter for demanding applications. It is targeted at downhole wireline and drilling tools in addition to other industrial applications where high temperature and large variation in input voltage may occur.

The **NSE DCDC 90-120V 5A/1000V s** has a specified input voltage range of 100 (50) – 1000Vdc. Outputs available are 90, 100, 120Vdc and the converter can provide up to 5A output current over the entire operating temperature. Input voltage above this limit will cause it to shut down in protective mode. Maximum survival voltage is 1200Vdc for one second.

The **NSE DCDC 90-120V 5A/1000V** is equipped with output short circuit protection that will protect the converter from failing even though its outputs are directly short circuited.

In order to operate reliably at high temperature, the DCDC has high efficiency (> 96%), reducing the dissipated power to a minimum.

The **NSE DCDC 90-120V 5A/1000V** PCB layout is made with ruggedness in mind. A CNC machined aluminum chassis provides maximum mechanical support to allow the board to operate in a very high shock and vibration environment. The board has rugged power input and output connectors.

Revision History

REV	DATE	DESCRIPTION	PREP	APPR
PA1	09.11.2021	PRELIMINARY Release (Superseeding NSE-500214-002-pA2)	TKK	GLK

Content

1 Product Specification

OUTPUT VOLTAGE	**90Vdc**			**120Vdc**	**Option**	**Unit**
Art.no: NSE-5002-14	**-90V**			**-120V**		
INPUT VOLTAGE						
Input voltage range	150 1000		TBA 1000		P1=B	Vdc (Min) Vdc (Min) Vdc (Max)
Overvoltage trig voltage	1000 1050 1075					Vdc (Min) Vdc (Typ) Vdc (Max)
Input startup voltage	150		TBA		P1=B	Vdc (Min)
Shut down voltage	125		TBA		P1=B	Vdc (Typ)
Max transient voltage *(Max 1sec/minute)*	1200					V
Negative voltage protection	No					
OUTPUT VOLTAGE						
Voltage setpoint	90			120		Vdc
Voltage range	88 90 93			TBA		Vdc (Min) Vdc (Typ) Vdc (Max)
Max output current @ 125°C @ 177°C	 5 5			 5 5		 Amp. (Max) Amp. (Max)
Max output power @ 125°C @ 177°C	 450 450			 450 450		 W W
Current triggering limit	5 5.2 5.4			5 5.2 5.4		Amp. (Min) Amp. (Typ) Amp. (Max)
Max capacitive load	1000					uF (Max)
AUXILIARY OUTPUT (OPTIONAL)						
Voltage setpoint	18					Vdc
Voltage range	17 18 19					Vdc (Min) Vdc (Typ) Vdc (Max)
Max output current @ 125°C @ 177°C	 250 250					 mA (Max) mA (Max)
Max output power @ 125°C @ 177°C	 4.5 4.5					 W W
CHARACTERISTICS						
Dynamics: 5 – 0A load change, 1msec recovery time						
Voltage Drop Voltage Overshoot	3 3					Vdc (Max) Vdc (Max)
Switching frequency	120 160 200					kHz (Low) kHz (Typ) kHz (High)
EFFICIENCY (%)						
Efficiency over full temperature range						
I_out = 5A, Vin=**300V**	97.5					% (Typ)

I_out = 5A, Vin=**600V**	97					% (Typ)
CANBUS INTERFACE						
Baud rate Configurable Termination resistance	125 250 136					kbits/s (Default) kbits/s (Max) Ohm
THERMAL PROPERTIES						
Max Temperature on the surface of outer housing given that thermal resistance is within the specification						
Operating ambient temperature	0 177					°C (Min) °C (Max)
*Surface of OUTER HOUSING to NSE UNIT. *Refer to the Section "Thermal properties" for further definition*						
Thermal resistance	0.5					°C/W
CONFORMAL COATING						
Conformal coating	No					
OPERATIONAL LIFETIME						
Guaranteed lifetime *@ <125°C* *@ 125-150°C* *@ 150-177°C*	 2000 500 250					 Hours Hours Hours
MECHANICAL SIZE						
38-series	OD=38mm L=364mm				P2=B	
42-series	W=35mm H=23.5mm L=366mm				P2=A	
OPTION CODES – COMMON FOR ALL UNITS						
P1:	Input voltage range				P1	Option code 1
- A	Reserved	Reserved	Reserved	Reserved		Reserved
- B	Applicable	Applicable	Applicable	Applicable	P1=B	150-1000V (standard)
- C	Reserved	Reserved	Reserved	Reserved		Reserved
P2:	Mechanical size					Option code 2
- <blank>	Fits inside inner diameter of 42mm				<blank>	
- A	Fits inside inner diameter of 42mm				P2=A	
- B	Fits inside inner diameter of 38mm				P2=B	

NSE-5002-*XX*-*YYY*-*P1*-*P2*
XX – Identifier for DCDC version (two-digit number)
YYY – Output voltage
P1 – Option Code (letter)

Example:
If you want to order a 90V power supply with wider start-up window in a 42mm housing (i.e. 150-1000V, option code P1 = "B" and 42mm housing, option code P2 = "A"), simply bundle article number with option code. For the above example the correct naming will be **NSE-5002-14-90V-B-A**

2 Functional Description

2.1 Functional Block Diagram

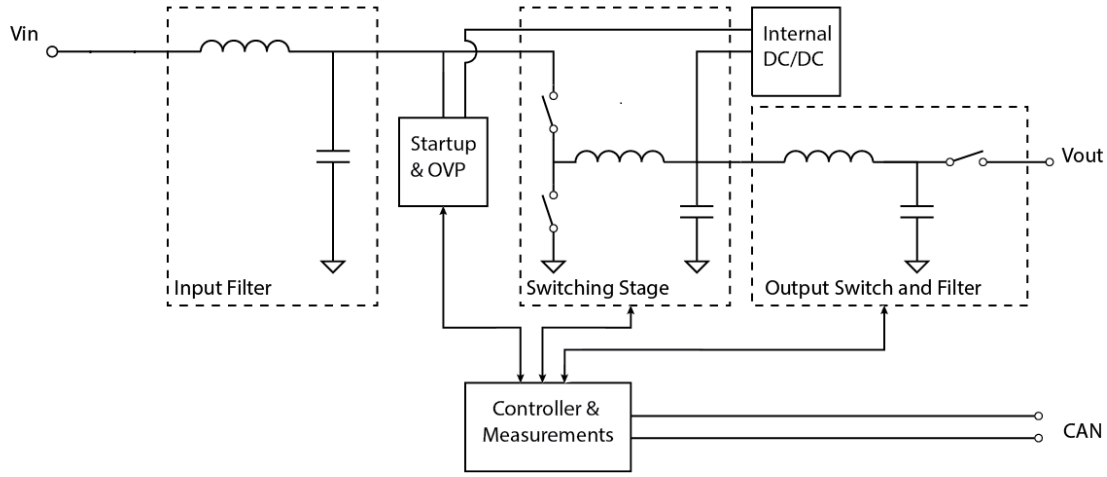


Figure 1 Functional Block Diagram

2.2 Integrated Sensors

The **NSE DCDC 38/42-series** has the following integrated sensors that are continuously sampled and can be distributed over CANbus:

1. Temperature Sensor
2. Input Voltage Measurement
3. Output Voltage Measurement
4. Output Current Measurement

2.3 Over Voltage Protection

The over-voltage protection will activate if the input voltage goes above the threshold voltage of the over-voltage circuit. When the over voltage is activated the circuit will cut off the power to the board and thereby shut it down.

When the board has been shut down by the over-voltage circuit, the input voltage has to decrease into the valid operational voltage range before the unit will attempt restart.
After re-start the unit will resume normal operation.

2.4 Output Power Switch

The **NSE DCDC 38/42-series** has an output switch that will disconnect the output in the case of the following event:

1. Output over-current
2. Output short circuit
3. Input over voltage range
4. Input under voltage range

During startup the switch is off until the converter is within the valid input voltage range.

2.5 CANbus

The **NSE DCDC 38/42-series** has a CANbus interface for communications with other systems. Typically, the DCDC converter will act like a slave on a CANbus network. It has a defined protocol for reading its internal registers. The CANbus is available as long as internal start-up is activated. Internal start-up will occur typically when approximately 30V is applied on the input.

2.5.1 CAN-bus termination

The CAN bus has a configurable termination resistor of 136 ohms that can be activated by the customer during system set-up. The CAN termination setting is either on or off. The setting is non-volatile. Available through the NSE Node manager.

2.6 Startup circuit

The **NSE DCDC 38/42-series** has a dedicated start up circuit in order to allow proper powering and protection during startup of the unit.

The unit will start up as long as it is within the specified voltage range.

2.7 Output Short Circuit Protection

The unit is protected against overload and short circuits with a current limiting feature and a short circuit detect.

If the current rises above the current triggering limit, the converter will turn off its output switch in order to protect its circuitry.

If a short circuit is detected (output voltage drop below the short circuit triggering level) the output switch will be turned off.

In both cases (current protection and short circuit detection), the unit will try to restart and resume to normal operation when the short circuit or overload is removed.

2.8 Bootloader

The **NSE DCDC 38/42-series** can be firmware upgraded through its CANbus interface using the NSE bootloader software. Bootloader is activated during startup when a low voltage, typically 50Vdc is applied on the input terminals.

Consult NSE for further information.

3 Typical Performance Characteristics

3.1.1 Efficiency at 450W load

Efficiency is measured at 25°C Room temperature 125°C and 150°C at 177°C at full load (5A).

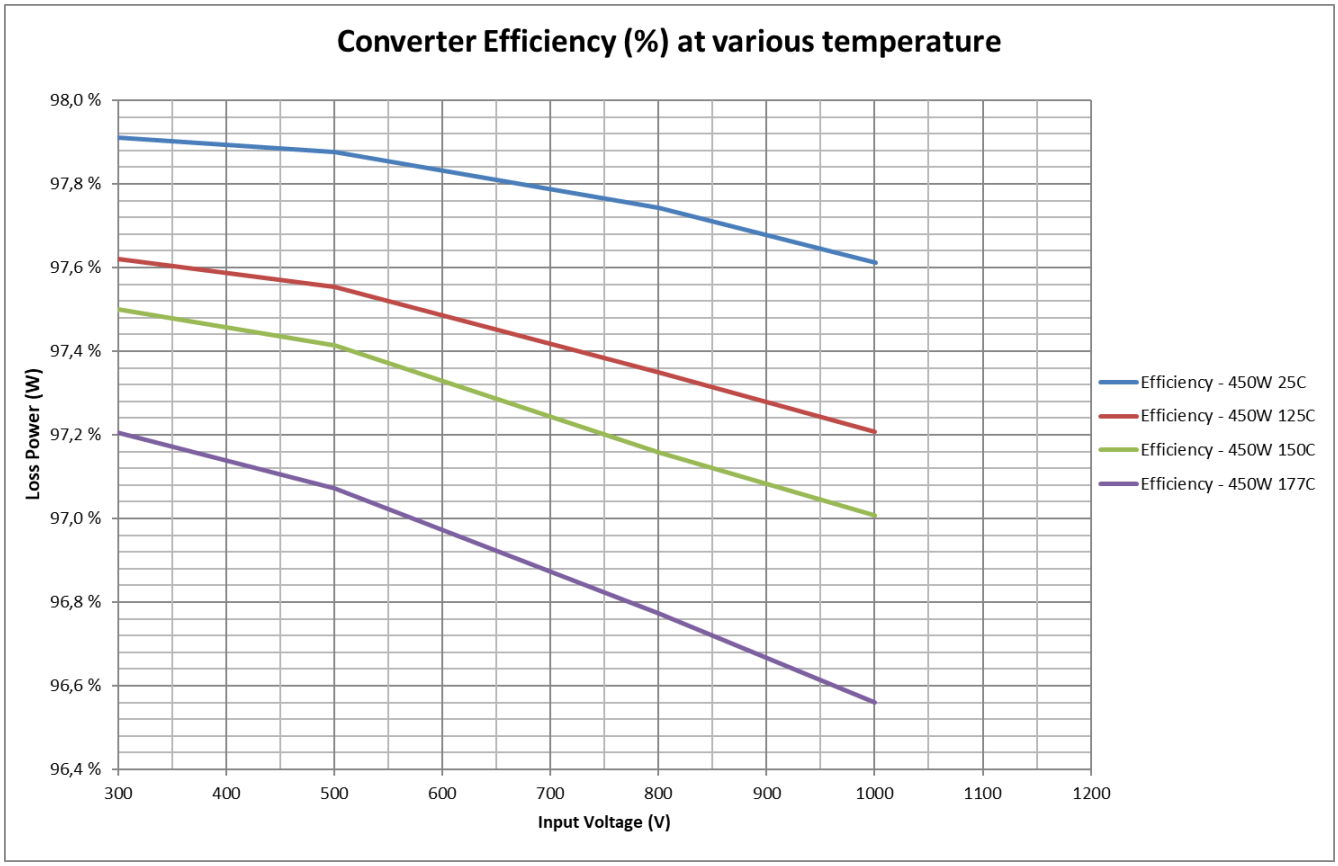


Figure 2 Measured efficiency (typical numbers) for different input voltages in room temperature and high temperatures

4 Connectors

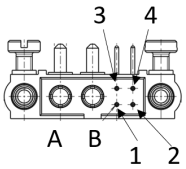
4.1.1 Input

DCDC connector: Harwin M80-5000000M5-02-333-00-000 2 pin connector.
Mating connector: Harwin M80-4000000F1-02-325-00-000

Pin	Signal name	Description / Function	Connector Pinout
A	GND	GROUND	 Face-view of PCBA connector
B	HVin	HV Input Voltage	

4.1.2 Output

DCDC connector on PCBA: Harwin M80-5L10405M5-02-333-00-000 - 6 pin connector.
Mating connector (plug): Harwin M80-4C10405F1-02-325-00-000

Pin	Signal name	Description / Function	Connector Pinout
A	Vmain	Main Output Voltage	
B	GND	GROUND	 Face-view of PCBA connector
1	CANH	CAN High	
2	Vaux	+18Vdc (AUX)	
3	CANL	CAN Low	
4	GND	GND (AUX)	

5 Mechanical Dimensions

5.1 42mm ID

Option code: P2=A

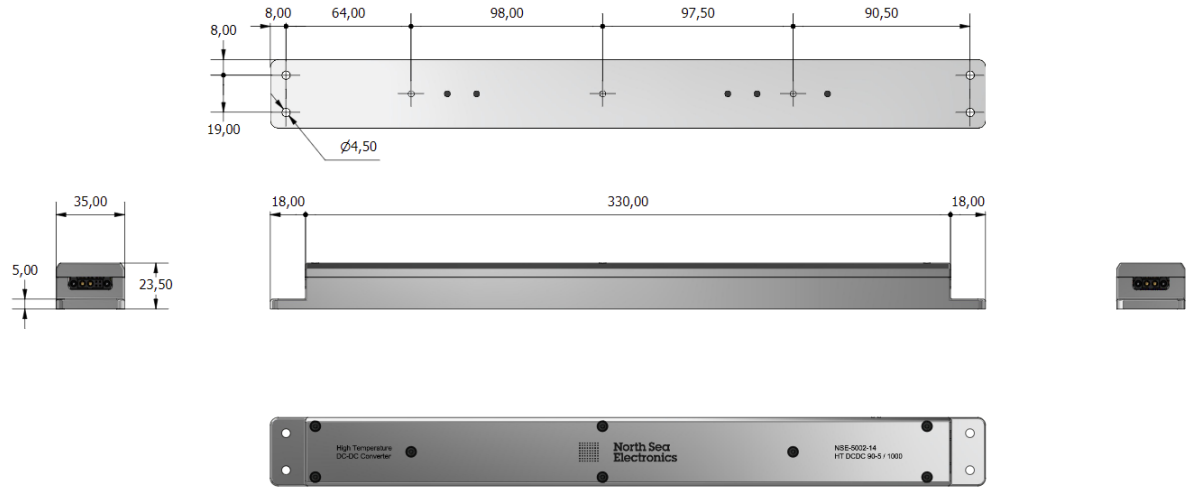


Figure 3 Mechanical dimensions

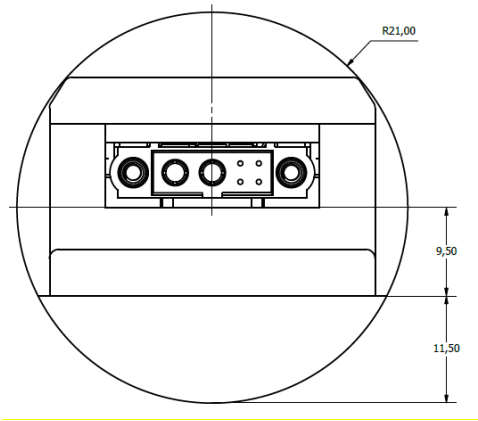
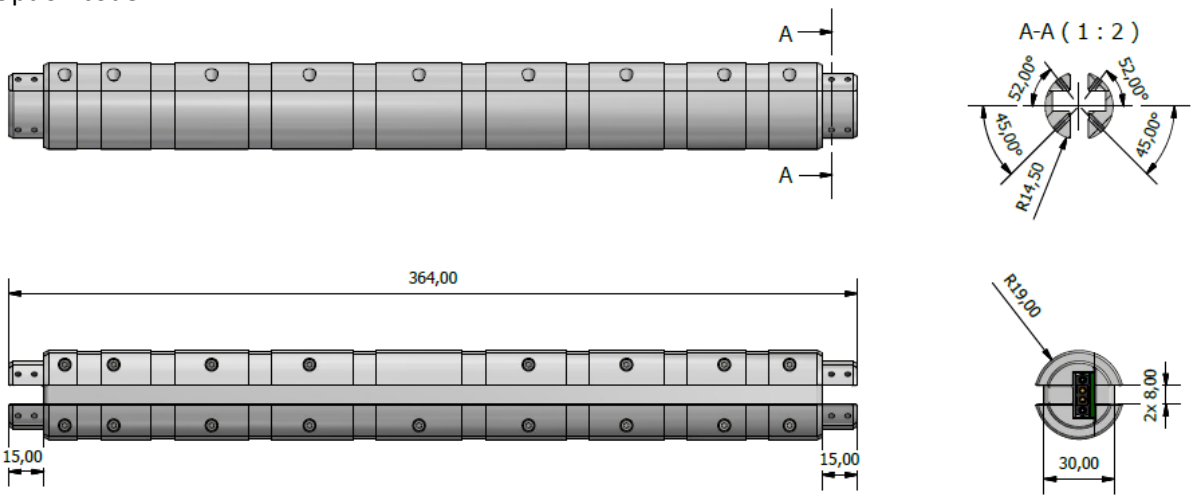


Figure 4 Unit inside ID=42mm

5.2 38mm ID

Option code: P2=B



6 Thermal properties

The NSE High Temperature DCDC is designed to operate in a 177°C environment.

In a typical assembly, the **NSE UNIT** is mounted to a **MOUNTING PROFILE** that is located inside an **OUTER HOUSING**.

The **OUTER HOUSING** surface temperature should not rise above the specified maximum ambient temperature, and the mechanical design and interface between the **OUTER HOUSING, MOUNTING PROFILE** and the **NSE UNIT** should be such that the thermal resistance specification is achieved.

Figure 5 Mounting