



Features

- High temperature rated – 177°C
- Output voltage range (factory set):
 - NSE-5002-14-XXV: 90-120Vdc
 - NSE-5002-18-XXV: 24-60Vdc
- Output current
 - NSE-5002-14-XXV: 5Adc
 - NSE-5002-18-XXV (24-48V): 5Adc
 - NSE-5002-18-XXV (48-60V): 6Adc
- 95-98% efficiency
- Operating Input voltage: 150 – 900Vdc
- 18Vdc auxiliary output
- CAN Bus interface
- Short circuit output protection
- Input overvoltage protection
- CNC Machined aluminum housing



Product Description

The **NSE HT-DCDC-MP2** Family is a high performance, high temperature DCDC converter design 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 DCDC converter has a specified input voltage range of 100 – 900Vdc. Outputs available are in the range between 24 to 60Vdc and 90 to 120Vdc, and the converter can provide up to 5A for 24-48V and 90-120Vdc. In the 48-60Vdc output range – the design can provide up to 6Adc output. The unit has no derating and will deliver full output power up to 177°C. Maximum voltage for short intervals is 1000Vdc. Voltages above this limit will cause the unit to shut down. Survival voltage is 1050Vdc for maximum one second.

The **NSE HT-DCDC-MP2** Family is equipped with output short circuit protection that will protect the converter from failing even though its outputs are directly short circuited. Efficiency of the converter is above 94% (at full output power) for the entire temperature range.

The **NSE HT-DCDC-MP2** Family 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.

1 Product Specification

1.1 Electrical characteristics

Parameter	Conditions / Comments	NSE-5002-14	NSE-5002-18	Unit
ARTICLE NUMBER	XX = Voltage	NSE-5002-14-XXV	NSE-5002-18-XXV	
INPUT CHARACTERISTICS				
Operational Input Voltage	Minimum input voltage	150	150	Vdc
	Maximum input voltage	900	900	Vdc
Input Startup Voltage	Min. startup voltage	150	150	Vdc
Overvoltage trig voltage	Minimum trig. Voltage	1000	1000	Vdc
	Typical trig. Voltage	1025	1025	Vdc
	Recovery trig. Voltage	1000	1000	Vdc
Undervoltage shutdown		80	80	Vdc
Max transient voltage	Max 1sec / min.	1050	1050	V
Negative Voltage Protection		NO	NO	
MAIN OUTPUT CHARACTERISTICS				
Voltage setpoint	Factory set to XX volt.	XX	XX	Vdc
Output Voltage range		90 – 120	24 – 60	Vdc
Voltage accuracy		+/- 3	+/- 3	%
Max output current	90-120Vdc Output	5.0	-	Adc
	24-48Vdc Output	-	5.0	Adc
	48-60Vdc Output	-	6.0	Adc
Max output power	90-120Vdc Output	450-600		W
	24-48Vdc Output		120 – 240	W
	48-60Vdc Output		288 – 360	W
Over-current trigger limit	90-120Vdc Output	5.25	-	A
	24-48Vdc Output	-	5.25	A
	48-60Vdc Output	-	6.3	A
Max capacitive load		1000	1000	uF
AUXILIARY OUTPUT CHARACTERISTICS				
Voltage setpoint		18	18	Vdc
Voltage accuracy		+/- 0.5	+/- 0.5	Vdc
Maximum output current		500	500	mA
Maximum output power		9	9	W
Short circuit protection		NO	NO	

DYNAMIC CHARACTERISTICS				
Max Voltage Drop	0 -> 5A load step.	1.5	1.5	V
Max Voltage Overshoot	5A -> 0A load step.	1.5	1.5	V
Switching frequency	Dynamically adjusted			
	Minimum frequency	120	120	kHz
	Maximum frequency	260	260	kHz
EFFICIENCY				
Min. Converter efficiency	Room temperature			
	$I_{OUT} = 5.0A$ $V_{IN} = 300VDC$	97	96	%
	$I_{OUT} = 5.0A$ $V_{IN} = 800VDC$	96	95	%
	@177°C			
	$I_{OUT} = 5.0A$ $V_{IN} = 300VDC$	96	95	%
	$I_{OUT} = 5.0A$ $V_{IN} = 800VDC$	96	95	%
CANBUS INTERFACE				
Baud Rate	Default	125	125	kbits/s
	Maximum	500	500	kbits/s
Programmable bus termination	(120 ohm)	Yes	Yes	
ENVIRONMENTAL AND THERMAL*				
	*Ref thermal spec. for more information			
Ambient temperature	Minimum	0	0	°C
	Maximum	177	177	°C
Min. Thermal Resistance	Outer housing to unit	0.5	0.5	°C/W
OPERATIONAL LIFETIME				
Expected Lifetime	< 125°C	2000	2000	Hours
	125 - 150°C	500	500	Hours
	150- 177°C	250	250	Hours

1.2 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.



1.3 Conformal Coating

This product is delivered with no conformal coating.

1.4 Environmental requirements

NSE boards must be installed in dry air at atmospheric pressure (1atm). Avoid humid atmosphere or under / overpressure. Refer to general NSE installation guidelines for more information.

2 Connectors

2.1 Input

DCDC Connector: Harwin M80-5000000M5-02-333-00-000 2 pin connector.
 Mating connector: Harwin M80-4000000F1-02-325-00-000
 NSE connector kit: NSE-5002-03-CON

Pin	Signal name	Description / Function	NSE Connector kit wire type	NSE Connector kit wire color
A	GND	GROUND	120cm 20AWG 600V	BLACK
B	HV in	HV Input Voltage	120cm 20AWG 600V	RED

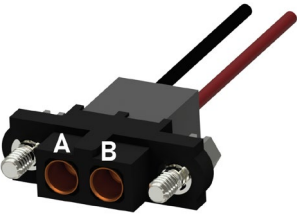
DCDC connector

(Note – the guide slot is facing down)



Mating cable connector

(NOTE - the guide slot is facing up)



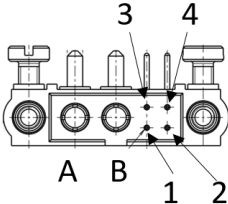
2.2 Output

DCDC Connector: Harwin M80-5L10405M5-02-333-00-000 - 6 pin connector
 Mating connector: Harwin M80-4C10405F1-02-325-00-000
 NSE connector kit: NSE-5002-03-CON

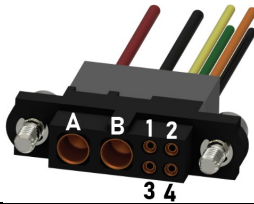
Pin	Signal name	Description / Function	NSE Connector kit wire type	NSE Connector kit wire color
A	Vmain	Main output voltage	120cm 20AWG 600V	RED
B	GND	Ground	120cm 20AWG 600V	BLACK
1	CAN H	CAN High	120cm 26AWG 600V	YELLOW
2	Vaux	+18Vdc (AUX)	120cm 26AWG 600V	ORANGE
3	CAN L	CAN Low	120cm 26AWG 600V	GREEN
4	GND	GND (AUX)	120cm 26AWG 600V	BLACK

DCDC connector

(Note – the guide slot is facing down)



Mating cable connector



3 Features

Feature	Description
Integrated Sensors	The NSE HT-DCDC-MP2 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
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 must decrease into the valid operational voltage range before the unit will attempt restart. After re-start the unit will resume normal operation.
Output Power Switch	The NSE HT-DCDC-MP2 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.
CAN Bus interface	The NSE HT-DCDC-MP2 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.
Startup circuit	The NSE HT-DCDC-MP2 has a dedicated start up circuit 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.
Temperature sensing	There is one embedded temperature sensor on the PCB. The internal temperature of the unit can be read out through the CAN communication interface.

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 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.
Bootloader	The NSE HT-DCDC-MP2 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.

4 Mechanical Dimensions

4.1 A - Chassis version - Rectangular Ø42mm

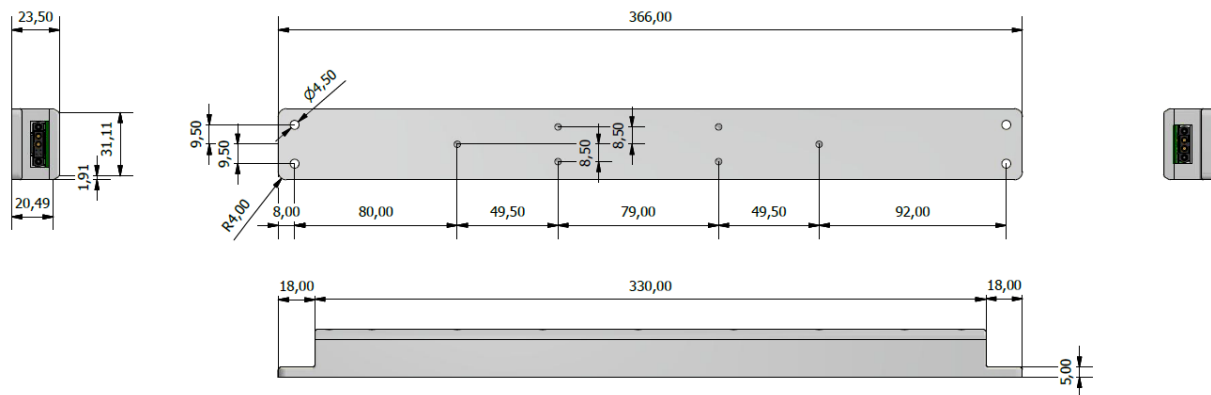


Figure 1 Mechanical dimensions

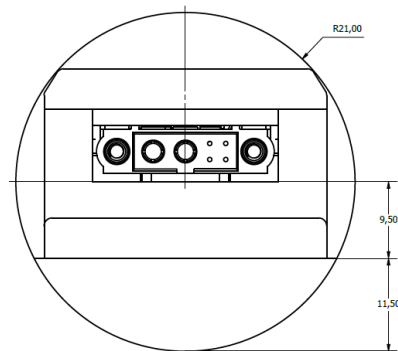


Figure 2 Unit inside ID=42mm

4.2 B - Chassis version - Circular housing Ø38mm



5 Ordering

5.1 Order code

Order code:			NSE-5002-	-XX	-XXV	-X
Category	NSE-5002	= NSE DCDC Converters				
Model	- 14	= 90-120Vdc @ 5.0A				
	- 18	= 24-60Vdc @ 5.0A/6.0A				
Output	XX	= Desired output voltage (Factory set)				
Chassis	-A	= Rectangular Ø42mm				
	-B	= Circular Ø38mm				

5.2 Where to buy

Email: sales@nse.no
Web: www.nse.no
Phone: +47 406 48 400

6 Revision History

REV	DATE	DESCRIPTION	PREP	APPR
A	27.01.2023	Initial revision	RFY	TKK
B	17.02.2023	Fixed typos	GLK	RFY
C	22.10.2024	Updated Connector type, max baudrate & switching frq.	GLK	AJA
D	16.09.2024	Added info about programmable CANbus termination.	EEN	GLK