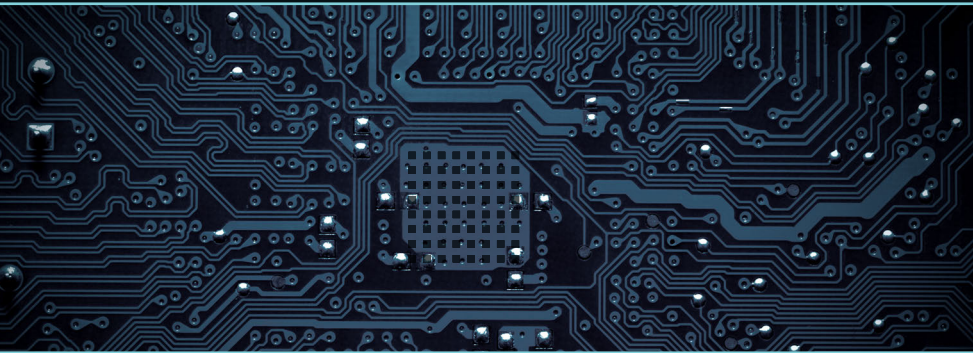
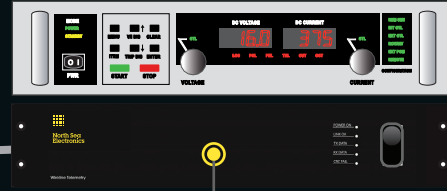
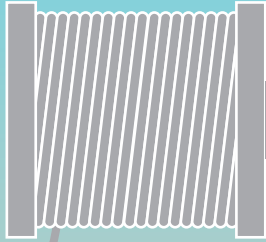


Electronics for the harshest environments

Product Portfolio 2023



**North Sea
Electronics**



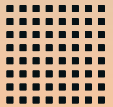
Telemetry



DC-DC Converters

Processor Boards

Motor Controllers



North Sea
Electronics

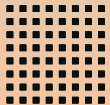
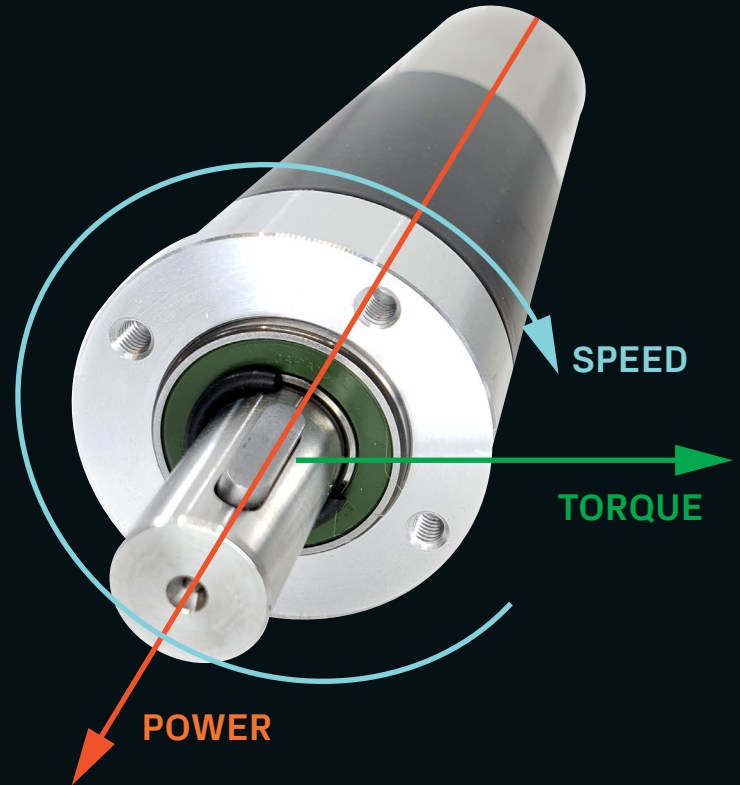
About NSE

North Sea Electronics (NSE) was established in 2005, located in Bergen, Norway, and is an independent privately owned high-tech design-house. NSE specialises in high-temperature electronics and can offer a complete portfolio of modular electronics with open protocols. NSE offers services for hardware, firmware, software and mechanical design.

After years of experience dedicated to high temperature electronics, we offer a catalogue of state-of-the-art motor controllers, telemetry (modem), processor boards and power converters. Given our heritage of working for the downhole energy industry, you'll get off-the-shelf products that are rugged and field proven. NSE products have been used in wireline and drilling operation all over the world for nearly two decades, and more than 14,000 high-temperature boards/units have been delivered. NSE has built a strong reputation for ruggedness and reliability of its' products and has grown organically year on year. Our products are used by all, from small startups to the major service companies.



Motor Controllers



North Sea
Electronics

NSE has through several years of dedication to high temperature electronics, developed a family of high efficient - state of the art motor controllers.

NSE controllers support hall encoders, resolver feedback and sensorless running. The controllers are set up to run Field Oriented Control (FOC), in order to have maximum control of torque, speed and power.

NSE is continuously developing the motor controller platform. Firmware updates are made available to our customers for free, and upgrading can easily be done through the bootloader system.

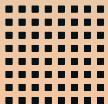
Motor Controllers

Setting up the NSE Motor Controllers



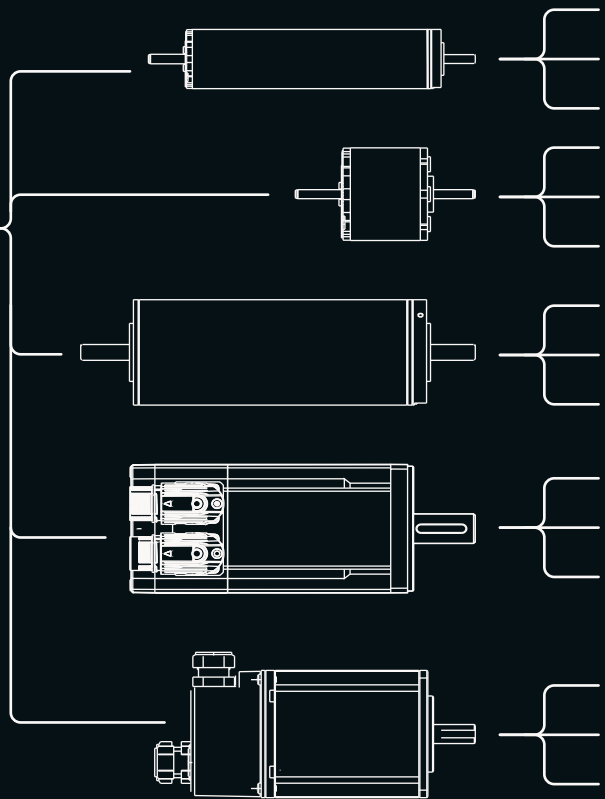
Setting up the NSE Motor controllers for a wide range of motors and applications can be done through the node manager software.

Once a configuration is established it can be downloaded and replicated to other controllers.



North Sea
Electronics

One controller for a wide range of applications



electro-hydraulic pumps

wheel / belt drive systems

torque screws

drilling

positioning systems

cooling pumps

release tools

transducer head positioning

stroker

valve control

isolation barrier tools

propulsion systems

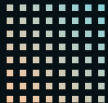
generator control

tractoring

linear displacement

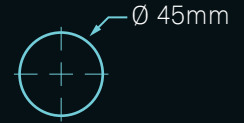
Motor controllers Overview

Class	Product Number	Input Voltage		Maximum Output Power (W)	Control	Feedback
		Min	Max			
HIGH VOLTAGE 600V DC bus *900V on request	NSE-5002-08 HT 600V BLDC Controller MKIII	0	600	3000	CANbus/ RS485	Sensorless/ Hall Encoder/ Resolver
LOW VOLTAGE 50/60V DC bus	NSE-5001-07 HT 60V BLDC Controller / Ø22mm	18	60	240	CANbus/ RS485/ Analog	Sensorless/ Hall Encoder/ Resolver
	NSE-5001-12 HT 60V BLDC Controller MKII	18	60	240	CANbus/ RS485/ Analog	Sensorless/ Hall Encoder/ Resolver
	NSE-5001-11 HT NANO BLDC Controller	18	50	50	CANbus/ Analog	Sensorless/ Hall Encoder/

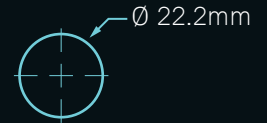




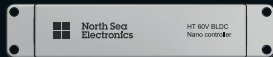
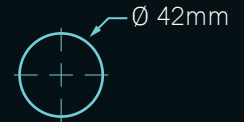
281.5 x 37 x 28mm



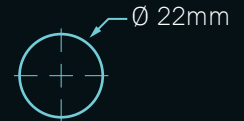
285 x 22.2mm



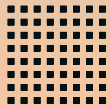
228 x 38 x 17mm



100 x 20 x 11mm



TELEMETRY



North Sea
Electronics



The NSE Telemetry is the most versatile telemetry system for downhole (wireline, coiled tubing, hepta cables) and subsea use. It has proven to work with the majority of downhole tools in the market and will provide a reliable data link even on the most demanding cables and conditions in the industry.

NSE Wireline Telemetry Systems are deployed worldwide and cover all applications from power tools, such as tractor and stokers, to low power sensors and data acquisition tools. The reliability of the link allows data transfer in very noisy conditions over difficult cables and the system will optimize data rates for the given setup.

The system requires very little user interaction. In most cases, the modems will autotune to the correct gain and frequency settings for a cable. During operation, the system is continuously adapting to the conditions on the line to optimize the signal to noise ratio.

TELEMETRY



NSE Topside Modem

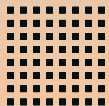
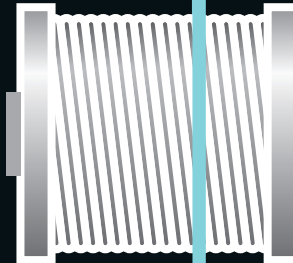


USB Data



Power & Communication

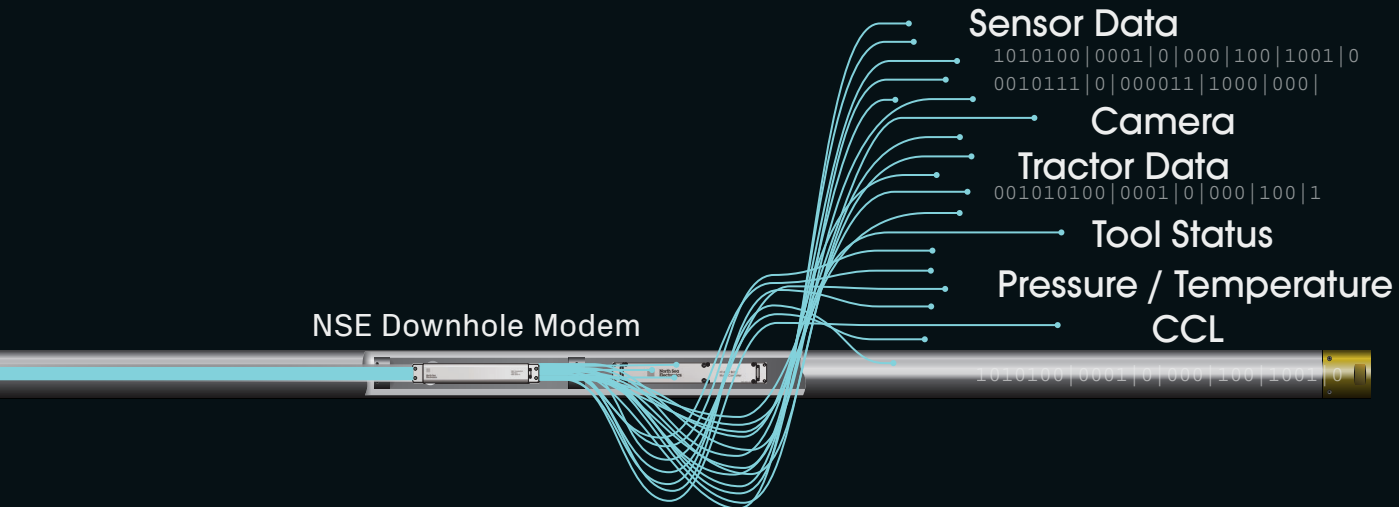
Wireline
Powerline
Coiled Tubing
Single Wire



North Sea
Electronics

The transparent datalink from the downhole modem(s) to topside, makes integration of the NSE Telemetry system easy. The system use CANbus or serial data downhole to communicate with the tool connected and data is streamed out on USB topside. A dedicated downhole gateway processor can be programmed to handle specific user defined behavior.

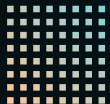
The system is addressable so several downhole modems can communicate with one topside modem and it has a broad input voltage- and power range.



Topside Modems Overview

Product Number	Maximum DC Volt (V)	Maximum DC Cur. (A)	Data Interface	Data Rates
NSE-5004-01 Topside Wireline Telemetry 19" 2U	1200*	8*	USB Data USB Status RS485 Data	200kbps UP 14kbps DOWN
NSE-5004-16 Topside Wireline Telemetry – Portable Unit	600	2	USB Data x 2 USB Status RS485 Data	200kbps UP 14kbps DOWN
NSE-5004-21 Topside Wireline Telemetry – Eurocard	600	2	USB Data x 2 USB Status RS485 Data	200kbps UP 14kbps DOWN

**Consult NSE for other options if required*

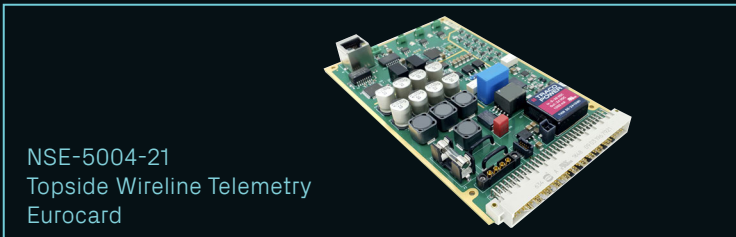




2U 19" x 330mm



314 x 113 x 71.5mm

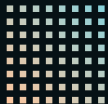


100 x 160mm (eurocard)

Downhole Modems Overview

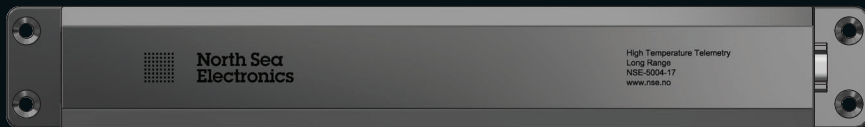
Product Number	Maximum DC Volt (V)	Maximum DC Cur. (A)	Data Interface	Noise Attenuation	Internal DCDC
NSE-5004-17 HT DH Telemetry 51mm Long Range	600 900*	5 8*	CANbus/ Serial TTL	High	No
NSE-5004-11 HT DH Telemetry 32mm	600	2	CANbus/ Serial TTL	Medium	No
NSE-5004-16 HT DH Telemetry 32mm with PSU	600	2	CANbus/ Serial TTL	Medium	Yes
NSE-5004-10 HT DH Telemetry 38mm	600	4	CANbus/ Serial TTL	Medium	No

**On request - Consult NSE*

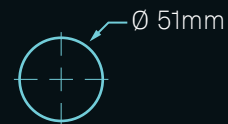


**North Sea
Electronics**

NSE-5004-17 HT DH Telemetry 51mm Long Range



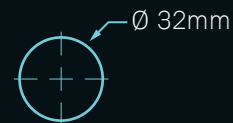
318 x 45 x 32mm



NSE-5004-11 HT DH Telemetry 32mm



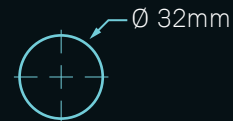
304 x 32 x 16mm



NSE-5004-16 HT DH Telemetry 32mm with PSU



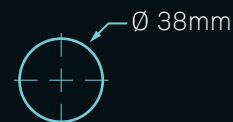
304 x 32 x 16mm



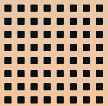
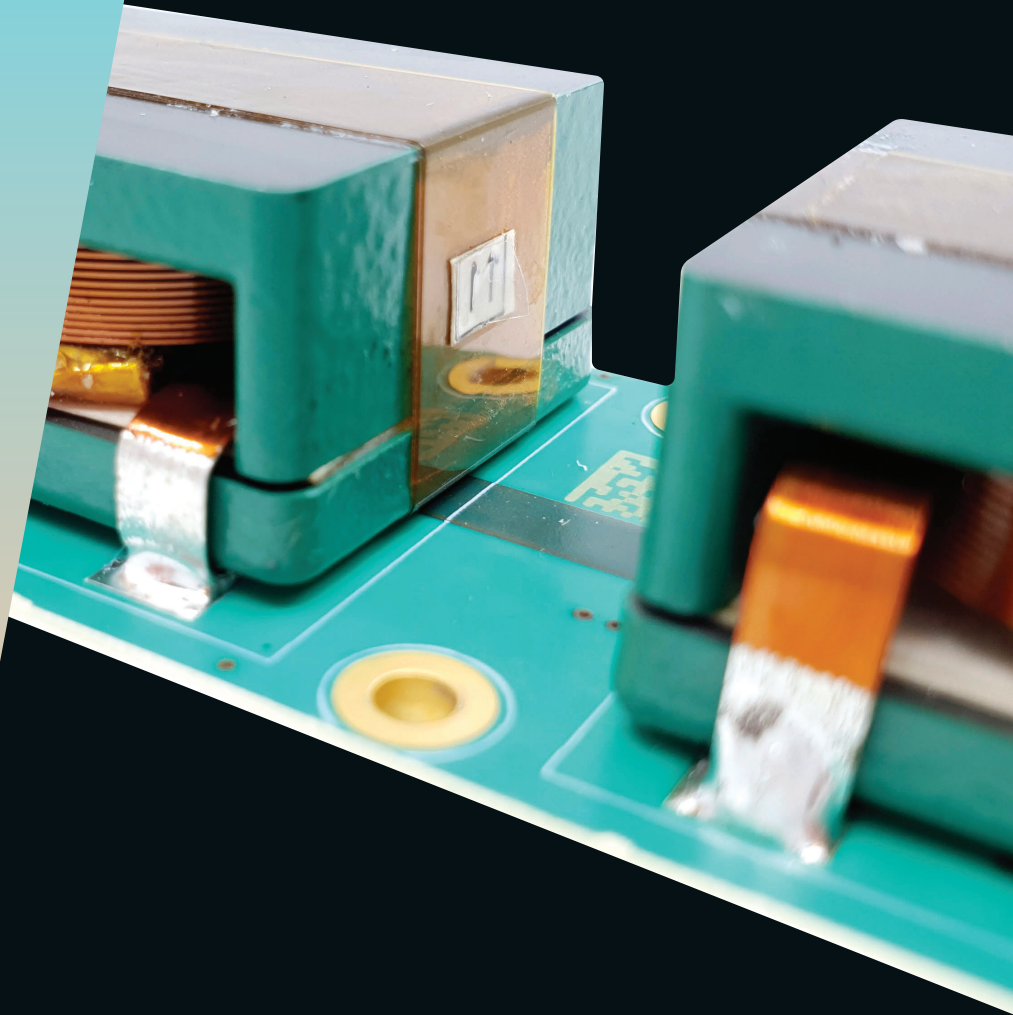
NSE-5004-10 HT DH Telemetry 38mm



243 x 37 x 22mm



DCDC Converters



North Sea
Electronics

Having a reliable power source for your downhole tool is crucial in order to achieve success.

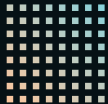
NSE has designed a series of high performance DCDC converters that covers a broad range of power levels.

All NSE DCDC converters have short circuit and overvoltage protection to ensure reliable operation and the ability to handle unforeseen situations.

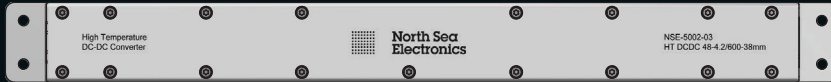
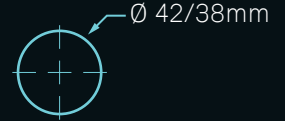
Operating in harsh environments implies that the input voltage is fluctuating and that voltage and current transients are very likely to occur. Even under these conditions, and with rapid load transients the NSE DCDC converters provide a stable output voltage.

DCDC Converters Overview

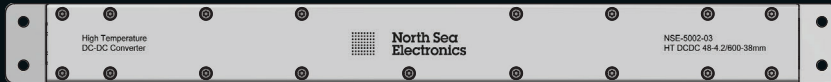
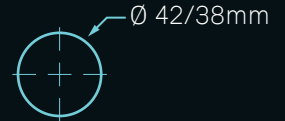
Class	Product Number	Maximum Input Voltage (V)	Output Voltage		Maximum Output Current (A)	Maximum Output Power (W)
			Min	Max		
HIGH POWER (>1000W)	NSE-5002-09 - HT-DCDC-HP1 400-600V 5.0A	1200	400	600	5.0	3000
MEDIUM POWER (100 - 1000W)	NSE-5002-14 - HT-DCDC-MP2 90-120V 5.0A	1000	90	120	5.0	600
	NSE-5002-18 - HT-DCDC-MP2 24-60V 6.0A	1000	24	60	6.0	360
MEDIUM POWER (100 - 1000W)	NSE-5002-15 - HT-DCDC-MP1 40-60V 4.2A	600	40	60	4.2	250
	NSE-5002-17 - HT-DCDC-MP1 20-40V 4.2A	600	20	40	4.2	170
	NSE-5002-22 - HT-DCDC-MP1 40-60V 3.3A	600	40	60	3.3	198
	NSE-5002-23 - HT-DCDC-MP1 20-40V 3.3A	600	20	40	3.3	132
LOW POWER (<100W)	NSE-5002-24 - HT-DCDC-LP2 20-30V 2.0A	650	20	30	2.0	60



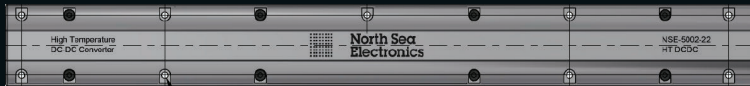
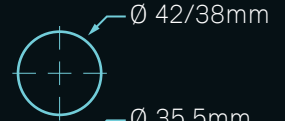
592 x 36 x 33mm
(581mm x ø38.1mm)



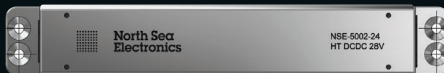
366 x 35 x 23.5mm



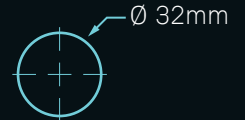
366 x 35 x 23.5mm



330 x 35 x 21mm



192 x 32 x 17,5mm



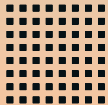
Processor Boards

The NSE Processor boards are designed to operate in a harsh downhole or industrial environment and provides a flexible platform for control and monitoring.

The boards are equipped with the most common sensor-, communication- and control interfaces required for typical downhole logging and drilling tools.

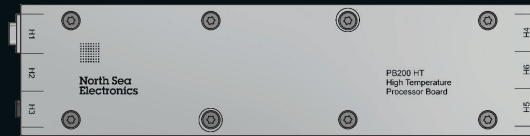
By choosing an NSE processor board, you get a proven and tested hardware platform, combined with firmware support that allows for rapid development and deployment of your tool.

NSE offers to develop custom firmware for the processor boards or to assist you with your own firmware development.

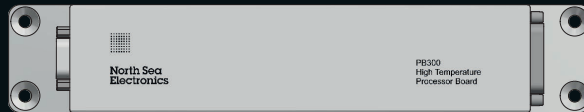


North Sea
Electronics

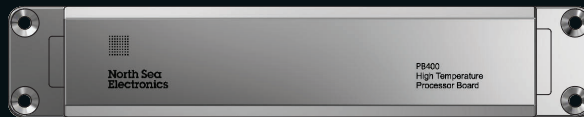
NSE 5003-02



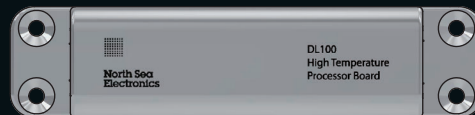
NSE 5003-03



NSE 5003-05



NSE 5003-04



PB200 Processor Board

Dimensions 177,5 x 45 x 11mm

- CAN / RS485
- 4 x Push-Pull out
- 7 x GPIO pins
- Accelerometer
- User Programmable DSP
- 4 x Bridge sensor inputs
- EEPROM Memory
- IEPE Interface

PB300 Processor Board

Dimensions 200 x 37 x 14mm

- CAN / RS485
- 2 x Open Drain
- 4 x GPIO pins
- Accelerometer
- User Programmable DSP
- 2 x Bridge sensor inputs
- EEPROM Memory
- Flash memory (Optional)

PB400 Processor Board

Dimensions 195 x 37 x 13mm

- CAN / UART
- 18 - 60V input
- 3 x RTD interface
- Accelerometer
- DSP processor
- 4 x Bridge sensor inputs
- Flash / FRAM memory
- Magnetometer interface

DL100 Data Logger

Dimensions 98 x 23 x 12mm

- CAN interface
- 18 - 60V input
- 1 x RTD interface
- Accelerometer
- DSP processor
- 2 x Bridge sensor inputs
- Flash memory
- Low power consumption

Casing Collar Locator

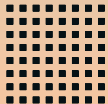
The NSE CCL is an active Casing Collar Locator for downhole applications. The CCL features a sophisticated measuring principle that allows for high-resolution locator data at both high and low speeds. The sensor can detect changes in both the casing material properties and geometry. Due to its unique sensitivity it reacts to both electric and magnetic properties of the materials.

The CCL detects geometrical variations in:

- Non-magnetic, conductive materials
- Conductive magnetic materials
- Non-conductive magnetic materials

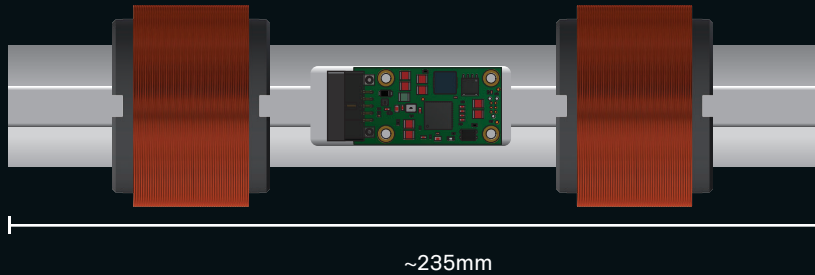
The NSE CCL can be directly integrated into the customer's tool or used as a stand-alone unit. The CCL can stream data through the NSE telemetry system or provide data on CANbus to any third-party system with CANbus interface. Both solutions are easy to integrate into new or existing systems. The sensor may have a flow path through its center which makes it very suitable for coiled tubing applications in addition to all e-line/wireline applications. The mechanical design is compact and cost efficient.

The CCL is rated for temperatures up to 177°C (350°F) with a ruggedized design which allows for use in extremely harsh environments.

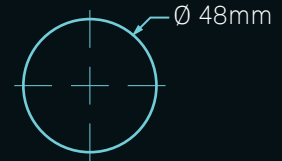
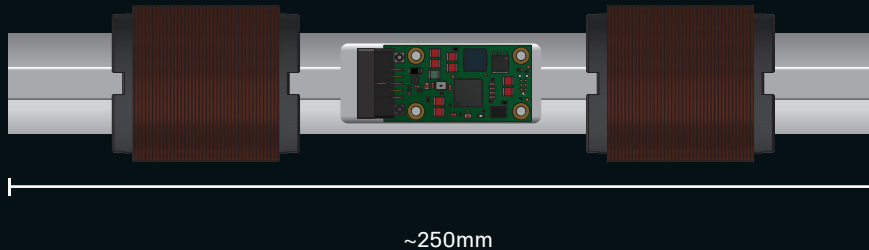


Casing Collar Locator Overview

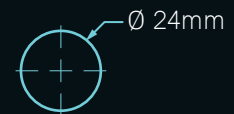
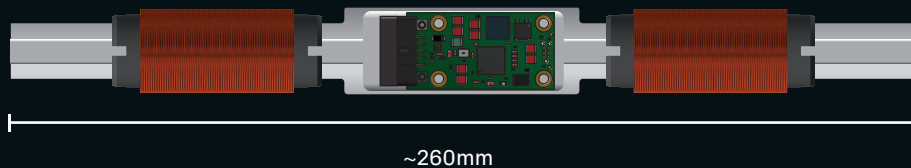
NSE-5007-03 - NSE CCL - Digital PCBA - OD 60mm

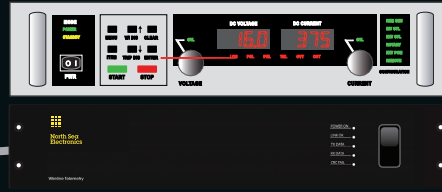
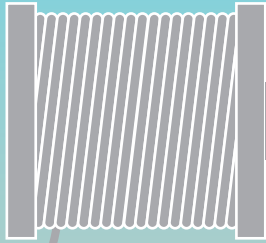


NSE-5007-04 - NSE CCL - Digital PCBA - OD 48mm



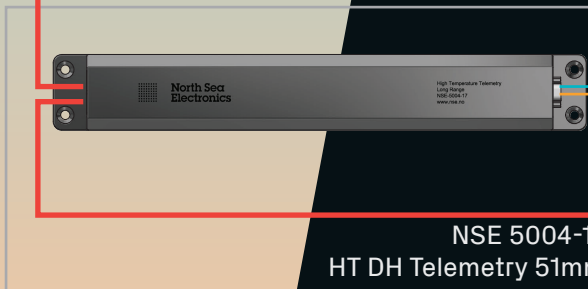
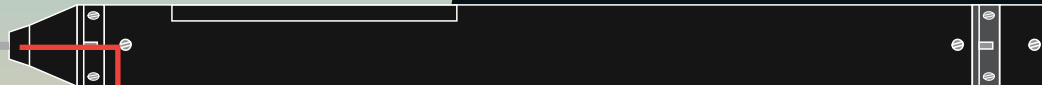
NSE-5007-06 - NSE CCL - Digital PCBA - OD 24mm



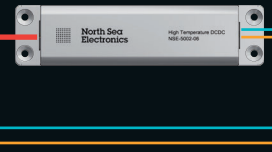


NSE 5004-01
Topside Wireline Telemetry 19" 2U

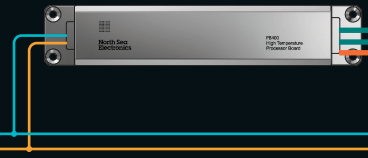
Topside User Interface



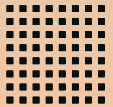
NSE 5004-17
HT DH Telemetry 51mm



NSE 5002-24
HT-DCDC-LP2 20-30V 2.0A



NSE 5003-05
NSE PB400 Processor Board



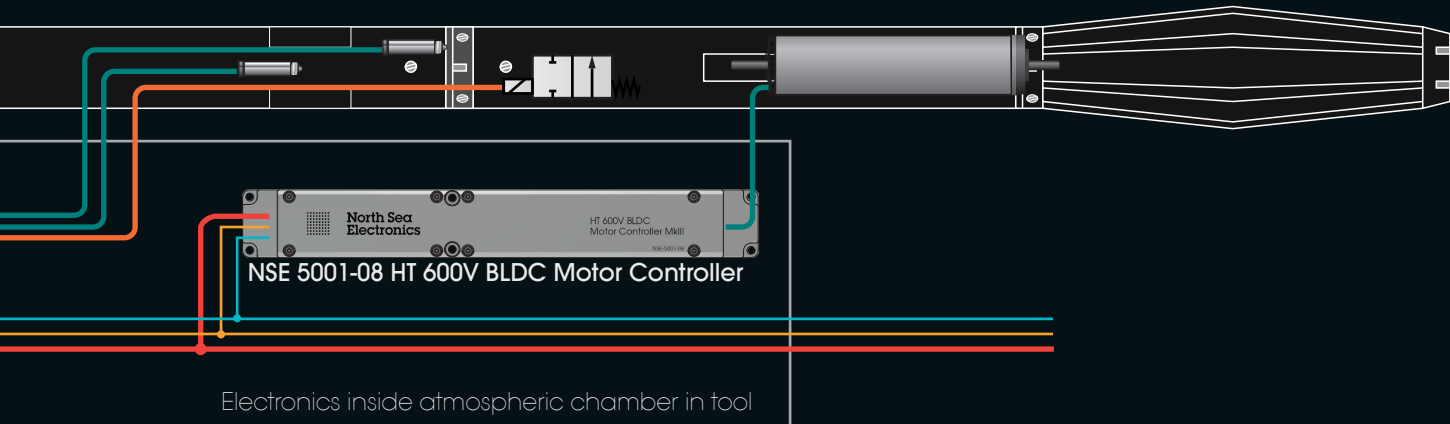
North Sea
Electronics

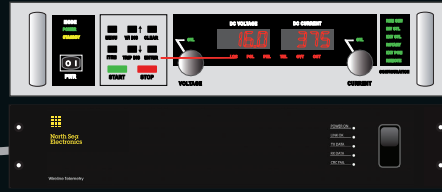
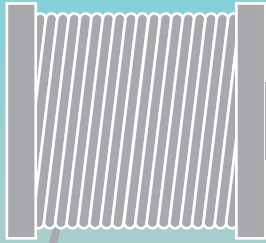
Reference Design#1 - High Power Tool

NSE electronics is well suited for typical power tool applications such as conveyor tools, stokers or high power electrohydraulic pumps.

Below is a typical reference design that shows how NSE electronics can be used to power and control a high power tool. It is assumed here that there will be used a high voltage, high power (>1kW) motor, and the electronics are chosen accordingly.

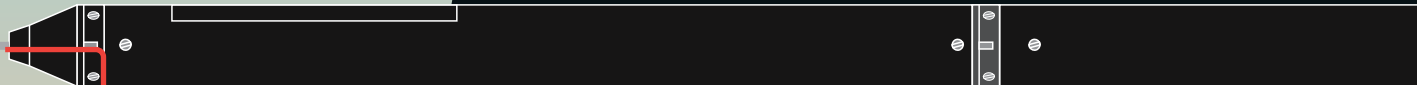
This reference design is shown with only one HT 600V BLDC Motor Controller, but several motor controllers and motors can be added if needed.





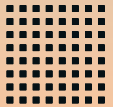
NSE 5004-01
Topside Wireline Telemetry 19" 2U

Topside User Interface



NSE 5002-09
NSE HT DCDC 600-5.0/1200 with integrated telemetry

NSE 5003-05
NSE PB400 Processor Board



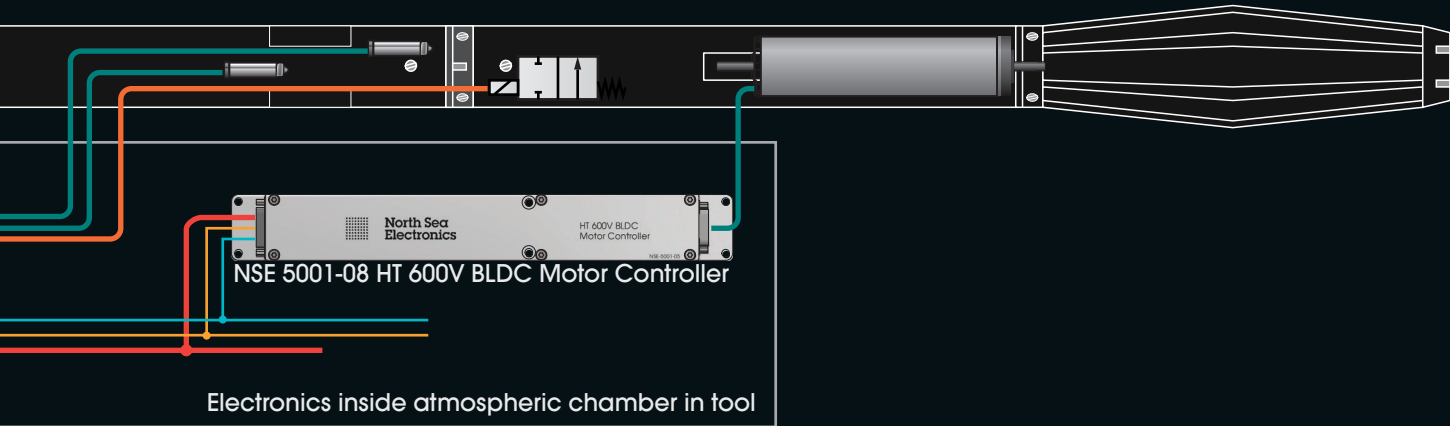
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Reference Design#2 - High Power Tool

Below shows a reference design using the NSE 5002-09 HT DCDC converter with integrated telemetry. The NSE 5002-09 HT DCDC will maintain a steady output voltage from a wide 600-1200Vdc input voltage and will compensate for voltage variations- and voltage drops over the cable.

Not only does it make the operation of the tool more reliable and less dependent on the topside power supply and cable type used. It also maximizes the power transfer to the tool so high power operation can be achieved for even long wirelines.

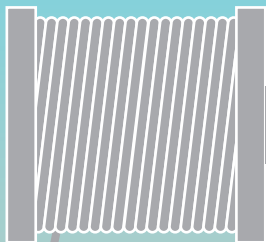
The downhole telemetry is integrated in the DCDC and allow for easy interface to other units in the tool. The reference design is shown with one HT 600V BLDC Motor Controller, but several motor controllers and motors can be added if needed.



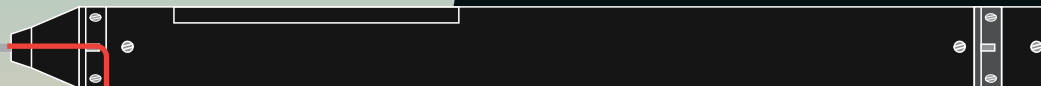
Topside Power Supply
(Small benchtop / portable PSU)



Topside User Interface



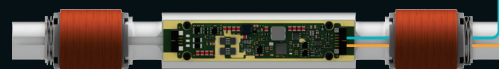
NSE 5004-21
Topside Wireline Telemetry – Portable Unit



Low Voltage bus (18V)

CAN bus

NSE 5004-16
HT DH Telemetry 32mm with PSU



NSE 5007-03/04/06
NSE CCL 60mm/48mm/24mm

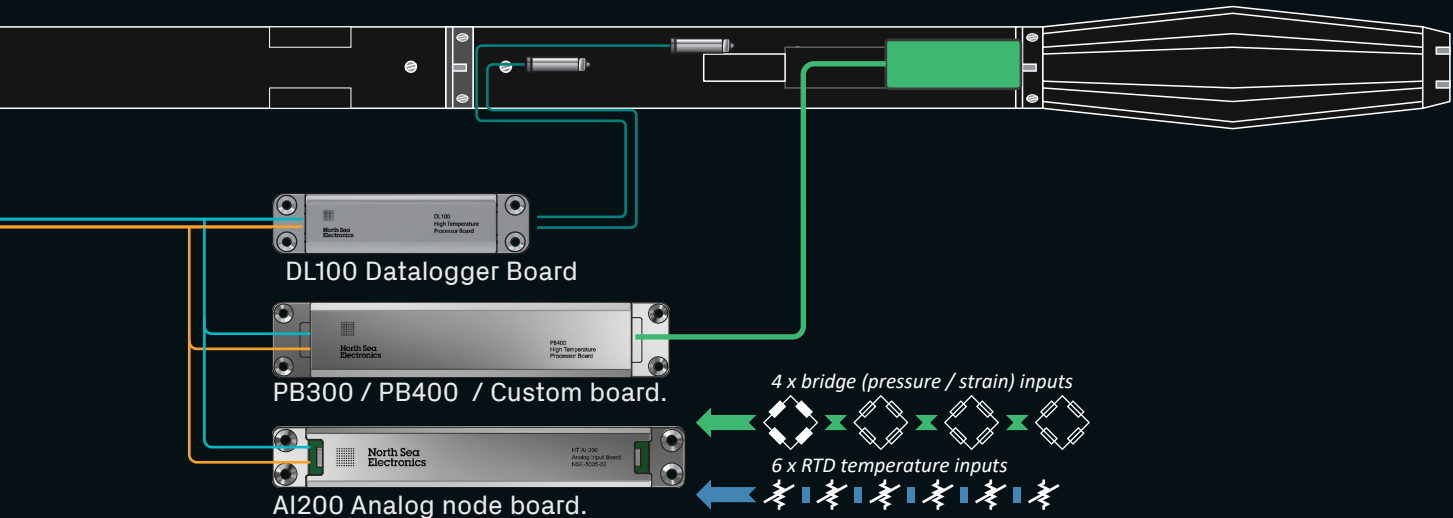


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Reference Design#3 - Logging Tool

Below is a typical reference design that shows how NSE electronics can be used to power and control a logging or camera tool. The unsurpassed NSE Telemetry provides a reliable and stable communication link with data rates up to 200kbps, and a proven performance on even the longest and most difficult cables. The topside modem can also be provided as a portable unit or a Eurocard board for integration into user topside equipment.

The 32mm downhole modem with integrated DCDC Converter works with a broad input voltage range, and outputs a reliable and regulated voltage. This integration of DH telemetry and DCDC converter allow for very slim and short tool designs. If more power is required - one can add more powerful DCDC converters in the system.



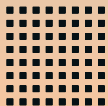
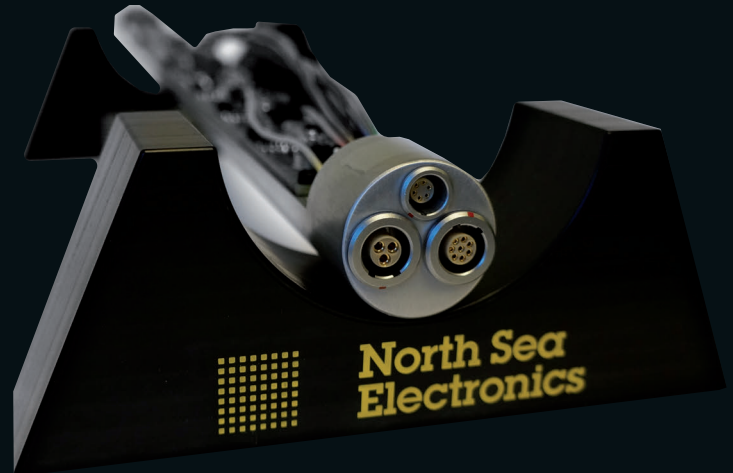
Custom Designs

Advanced Custom Solutions

NSE work with a variety of customers in different industries such as oil and gas, marine, renewable energy and automotive.

In addition to the “off-the-shelf” portfolio, NSE offer custom designs. This can be complete solutions specified by the customer, firmware features, or minor changes to existing products.

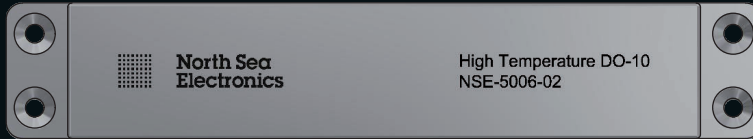
NSE has a dedicated staff of highly skilled engineers with an extensive knowledge in design of electronics for harsh environments. Together with our production partners, NSE can offer development and production that meet the highest standards.



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Node IO Boards

NSE 5006-02

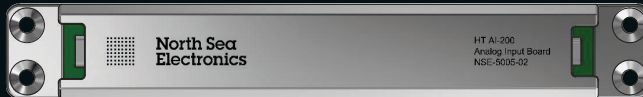


The DO-10 is a 10 channel Digital Output (Open Drain / Sinking current) board. The board is conformal coated and rated for operation in an ambient atmosphere up to 177°C / 15.000Psi. This allows flexible installation close to the solenoids/valves that are operated.

DO-10 Digital Output Module

Dimensions Housing	184 x 33 x 13.9mm
Max. Current / Ch.	1Adc
Max. Total Current	5Adc
Open Drain Channels	10
GPIO Channels	2
Communication	CANBus
Input Voltage Range	18-36Vdc
Temp / Pressure rating	177°C / 15.000Psi

NSE 5005-02



The AI-200 is a versatile analog input node board, designed to interface RTD thermocouplers, strain gauges, pressure sensors or other bridge type sensors.

The board is conformal coated and rated for operation in up to 177°C / 15.000Psi ambient pressure, allowing flexible installation close to the sensors. This reduces cabling, increases accuracy and reduces the noise influence.

AI-200 Analog Input Module

Dimensions	185 x 27 x 10mm
Bridge Channels	4
RTD Channels	6
0-5V analog Input	2
GPIO Channels	2
Communication	CANBus
Input Voltage Range	18-36Vdc
Temp / Pressure rating	177°C / 15.000Psi

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