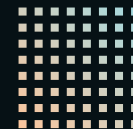
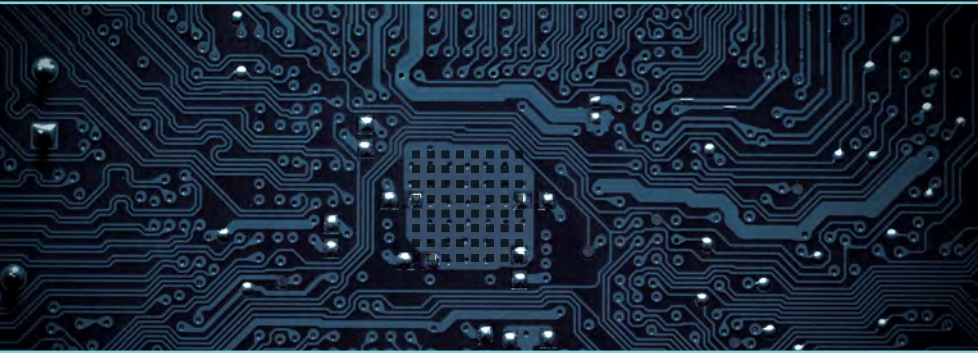
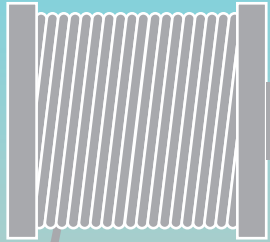


Electronics for the harshest environments

Product Portfolio 2024



**North Sea
Electronics**



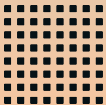
Telemetry



DC-DC Converters

Processor Boards

Motor Controllers



North Sea
Electronics

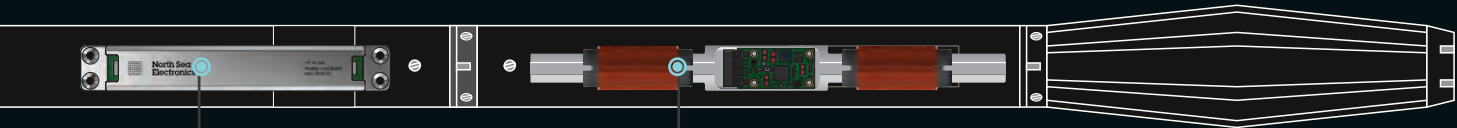
Your Tool - Powered by NSE

North Sea Electronics (NSE) is the innovative, reliable partner making your tools work better!

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.

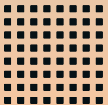
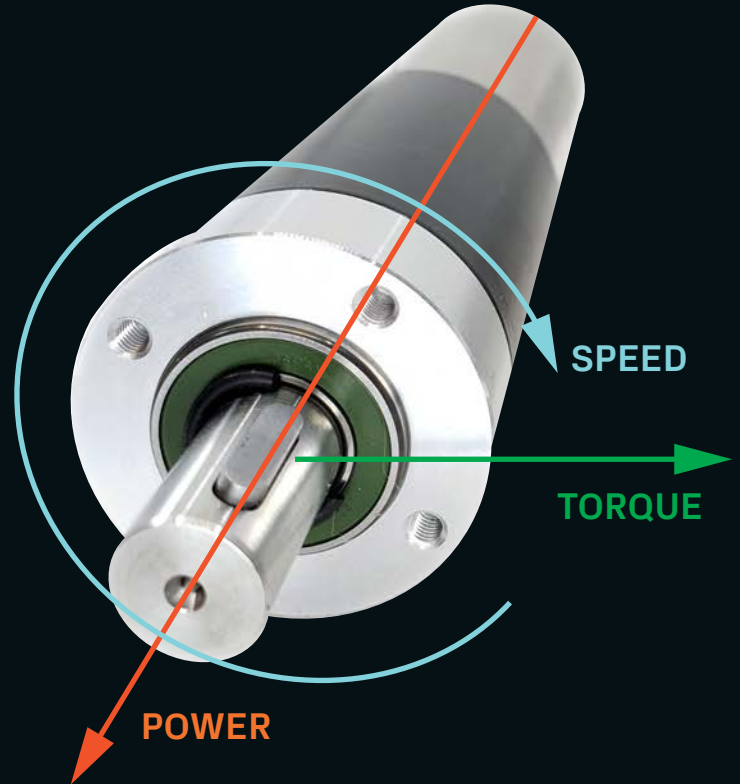
NSE products have been used in wireline and drilling operation all over the world for nearly two decades, and more than 14,000 high-temperature boards/units have been delivered. NSE has built a strong reputation for ruggedness and reliability of its' products and has grown organically year on year. Our products are used by all, from small startups to the major service companies.



Analog & Digital IO Boards

Casing Collar Locator

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.

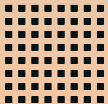
Motor Controllers

Setting up the NSE Motor Controllers



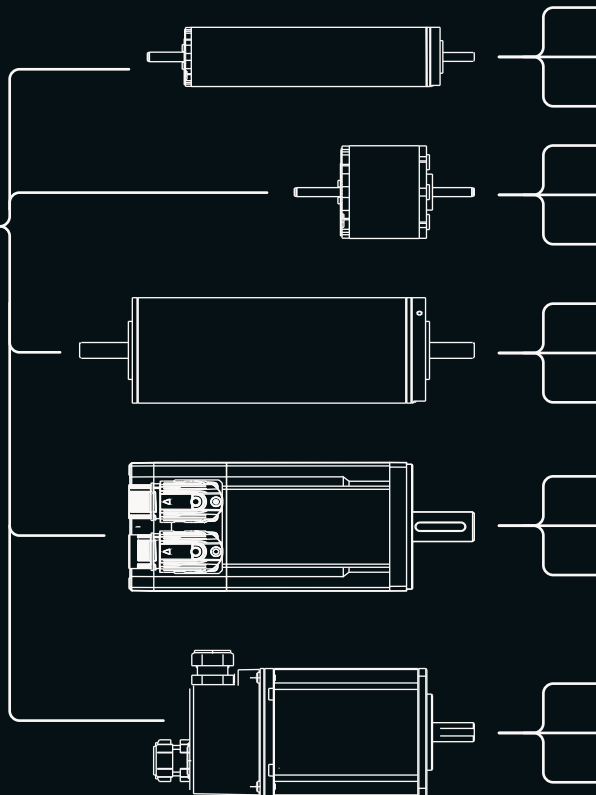
Setting up the NSE Motor controllers for a wide range of motors and applications can be done through the node manager software.

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

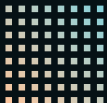
generator control

tractoring

linear displacement

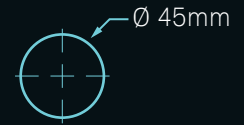
Motor controllers Overview

| 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-5001-15 LT 60V BLDC Controller | 18 | 60 | 1000 | CANbus/ RS485/ Analog | Sensorless/ Hall Encoder/ Resolver |
| | 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/ |

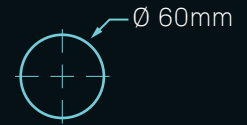




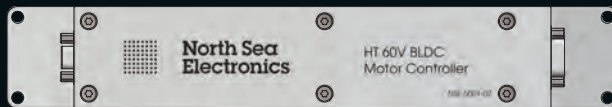
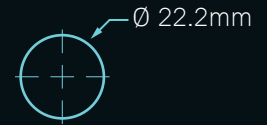
281.5 x 37 x 28mm



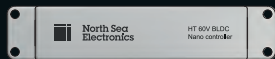
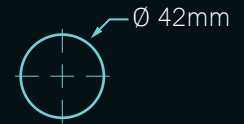
195 x 54 x 20mm



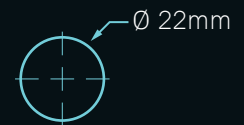
285 x 22.2mm



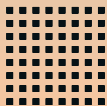
228 x 38 x 17mm



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.

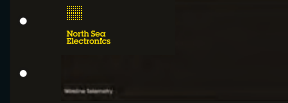
NSE Wireline Telemetry Systems are deployed worldwide and cover all applications from power tools, such as tractor and stokers, to low power sensors and data acquisition tools. The reliability of the link allows data transfer in very noisy conditions over difficult cables and the system will optimize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

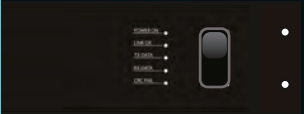
TELEMETRY



NSE Topside Modem

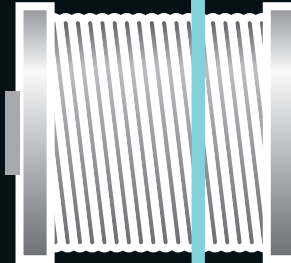


USB Data

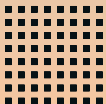


Power & Communication

Wireline
Powerline
Coiled Tubing
Single Wire



Cable lengths
up to 40,000ft+



North Sea
Electronics

Unlock the power of advanced telemetry solutions with the NSE Telemetry System, designed to revolutionize downhole data transmission.

Reliability & Robustness

Built to withstand harsh downhole conditions, our telemetry system ensures consistent and reliable data transmission, even in the most challenging environments and on the longest cables in the market.

Real-Time Data

Gain instant access to real-time downhole data, enabling prompt decision-making and proactive tool or reservoir management.

Compatibility

Our system integrates with existing downhole equipment, making it a versatile choice for both new and retrofit projects.

Sensor Data

1010100|0001|0|000|100|1001|0
0010111|0|000011|1000|000|

Camera

Tractor Data

001010100|0001|0|000|100|1

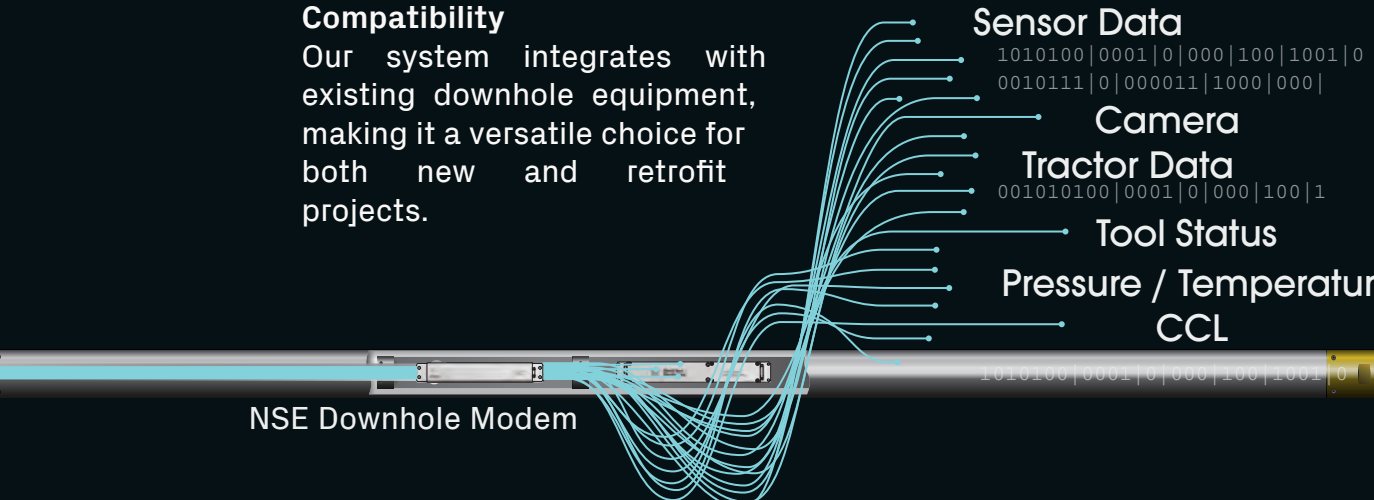
Tool Status

Pressure / Temperature

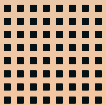
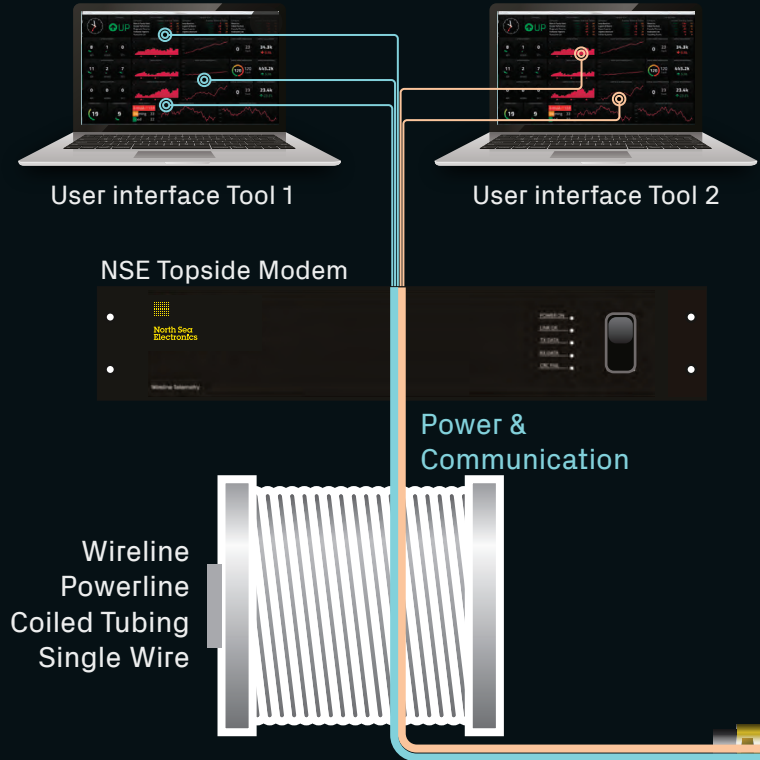
CCL

1010100|0001|0|000|100|1001|0|1

NSE Downhole Modem



TELEMETRY



North Sea
Electronics

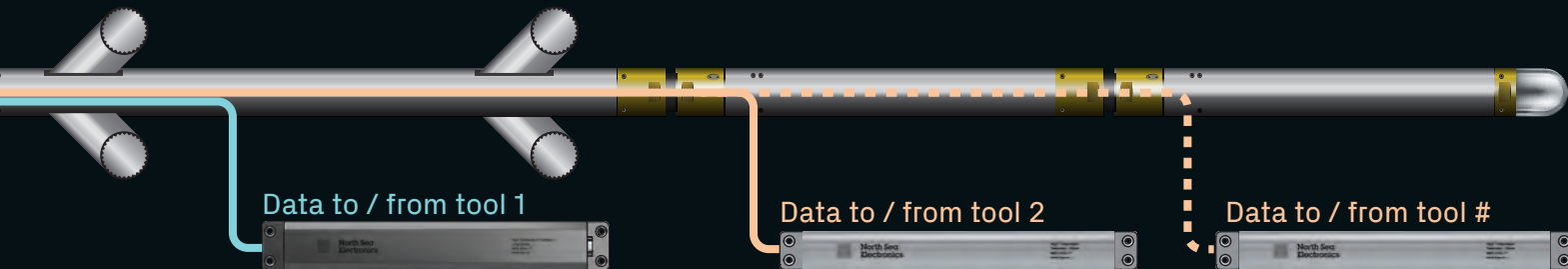
Our cutting-edge technology harnesses the potential of multidrop addressable downhole modems, bringing you unparalleled efficiency, accuracy, and control in the field.

Multidrop Capability

NSE Telemetry System offers the versatility of multidrop communication, allowing multiple downhole modems to connect to a single surface unit. This means improved scalability and reduced installation complexity.

Addressable Downhole Modems

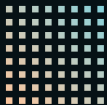
With our state-of-the-art addressable downhole modems, you can individually access and manage each tool section. Two data streams can be transmitted simultaneously and distributed to separate dataports on the topside modem.



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*

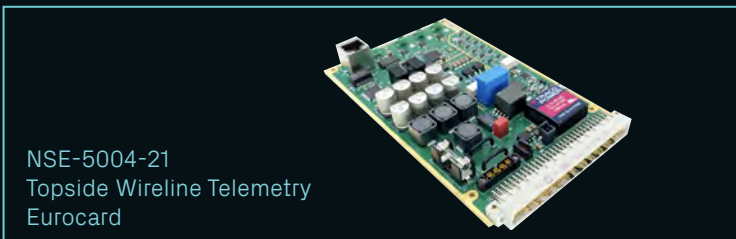




2U 19" x 330mm



314 x 113 x 71.5mm

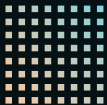


100 x 160mm (eurocard)

Downhole Modems Overview

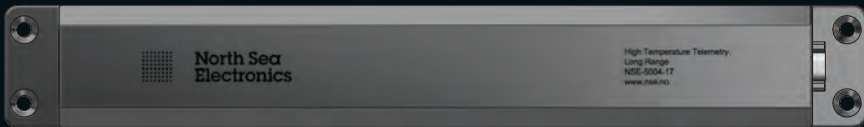
| Product Number | Maximum DC Volt (V) | Maximum DC Cur. (A) | Data Interface | Noise Attenuation | Internal DCDC |
|---|---------------------|---------------------|-----------------------|-------------------|---------------|
| NSE-5004-17 HT DH Telemetry 51mm Long Range | 600 900* | 5 8* | CANbus/ Serial 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*

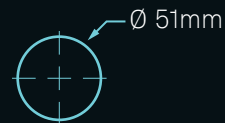


**North Sea
Electronics**

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



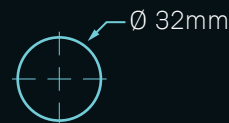
318 x 45 x 32mm



NSE-5004-11 HT DH Telemetry 32mm



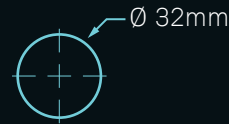
304 x 32 x 16mm



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



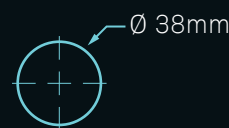
304 x 32 x 16mm



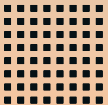
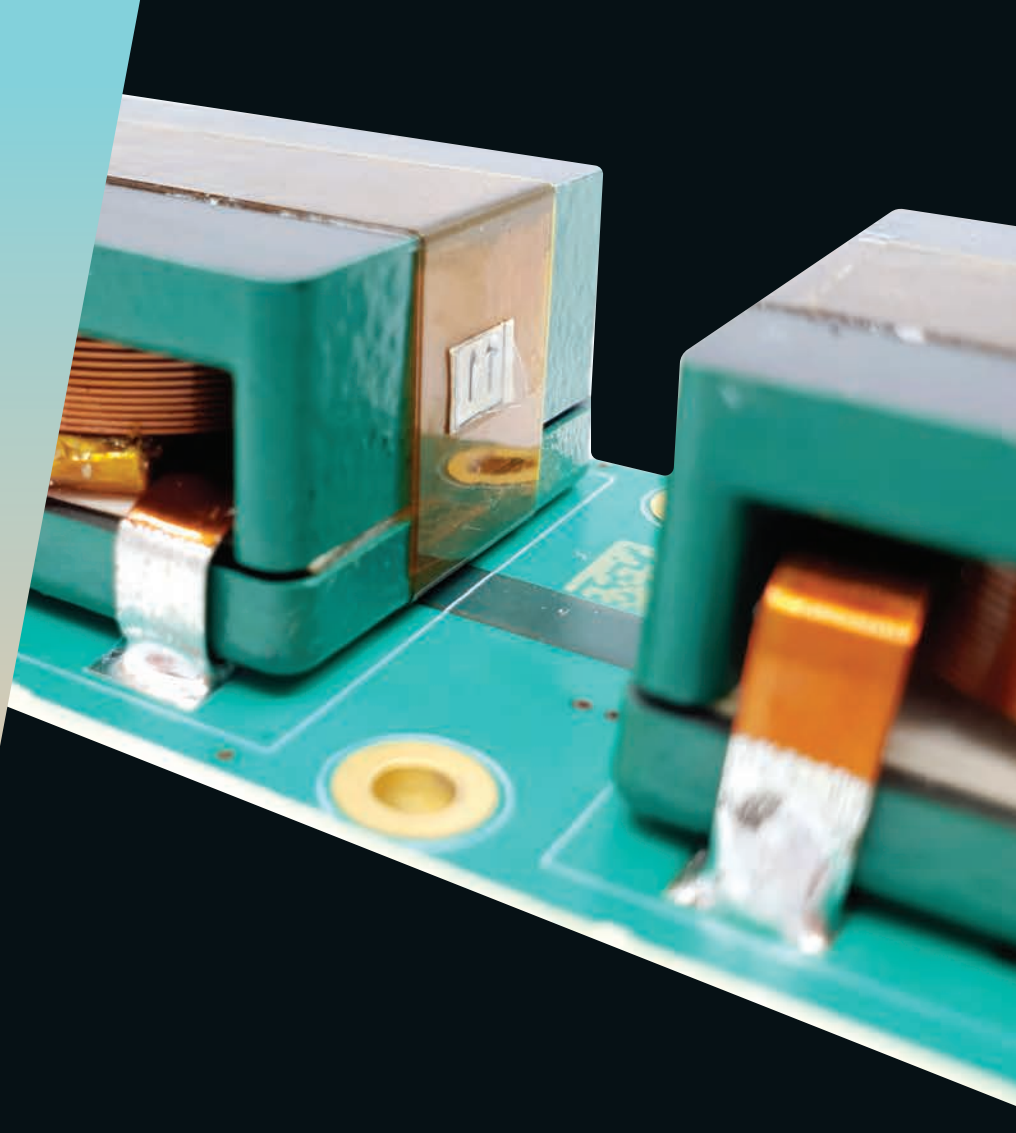
NSE-5004-10 HT DH Telemetry 38mm



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.

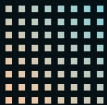
NSE has designed a series of high performance DCDC converters that covers a broad range of power levels.

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

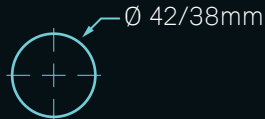
Operating in harsh environments implies that the input voltage is fluctuating and that voltage and current transients are very likely to occur. Even under these conditions, and with rapid load transients the NSE DCDC converters provide a stable output voltage.

DCDC Converters Overview

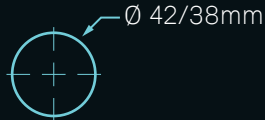
| Class | Product Number | Maximum Input Voltage (V) | Output Voltage | | Maximum Output Current (A) | Maximum Output Power (W) |
|--|---|---------------------------|----------------|-----|----------------------------|--------------------------|
| | | | Min | Max | | |
| HIGH POWER (>1000W) | NSE-5002-09 - 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 | 900 | 90 | 120 | 5.0 | 600 |
| | NSE-5002-18 - HT-DCDC-MP2 24-60V 6.0A | 900 | 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 |



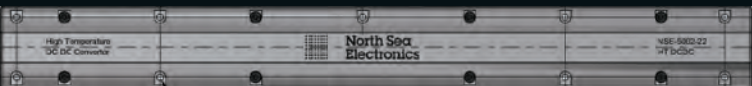
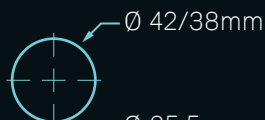
592 x 36 x 33mm
(581mm x ø38.1mm)



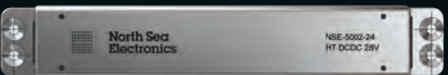
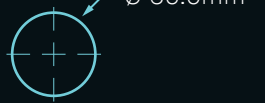
366 x 35 x 23.5mm



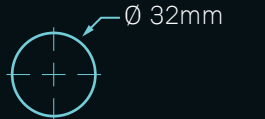
366 x 35 x 23.5mm



330 x 35 x 21mm



192 x 32 x 17,5mm



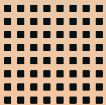
Processor Boards

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.

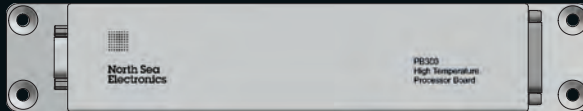


North Sea
Electronics

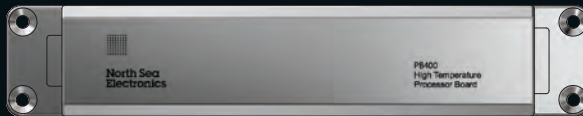
NSE 5003-02



NSE 5003-03



NSE 5003-05



NSE 5003-04



PB200 Processor Board

Dimensions 177,5 x 45 x 11mm

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

PB300 Processor Board

Dimensions 200 x 37 x 14mm

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

PB400 Processor Board

Dimensions 195 x 37 x 13mm

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

DL100 Data Logger

Dimensions 98 x 23 x 12mm

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

Casing Collar Locator

Discover the NSE CCL

Are you searching for cutting-edge technology Casing Collar Location and detection? The NSE CCL design has sophisticated measuring principles that sets the benchmark for high-resolution locator data at both high and low speeds, ensuring unmatched precision in downhole operations.

Unleash the Power of Precision

The NSE CCL is designed to excel in a wide range of scenarios, thanks to its unique sensitivity and measurement principles to the electric and magnetic properties of materials. Whether you're dealing with standard or non-magnetic tubing, the NSE CCL rises to the challenge and detects geometrical variations like no other tool on the market.

Versatile Integration Options

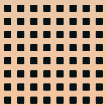
The NSE CCL can seamlessly be integrated into your existing tools or employed as a stand-alone unit. Its data streaming capabilities through the NSE telemetry system or CANbus compatibility for third-party systems make it incredibly versatile. Integration has never been easier, whether you're working with new or existing systems.

Coiled Tubing Compatibility

Our engineers have designed the NSE CCL with practicality in mind. Its unique flow path through the center makes it perfect for coiled tubing applications. But don't worry; it's just as at home in e-line/wireline applications.

Extreme Environment Ready

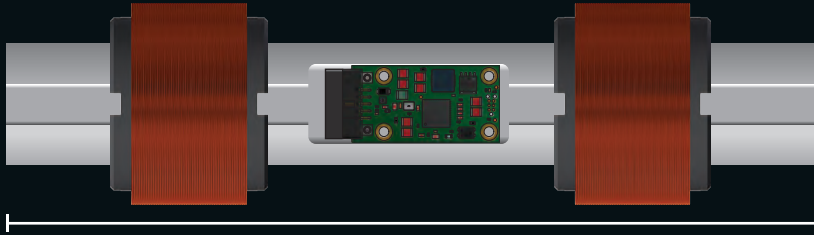
With a robust design rated for temperatures up to 177°C (350°F), the NSE CCL is built to thrive in the harshest environments. No matter how challenging your conditions may be, you can rely on the NSE CCL to deliver exceptional results consistently.



**North Sea
Electronics**

Casing Collar Locator Overview

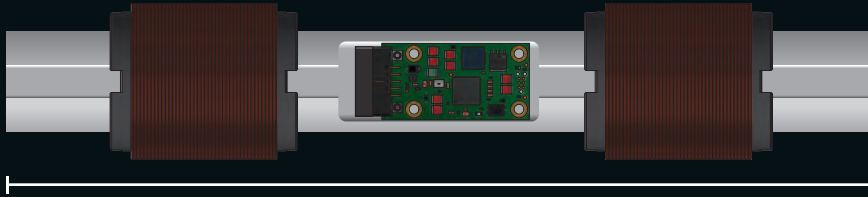
NSE-5007-03 - NSE CCL - Digital PCBA - OD 60mm



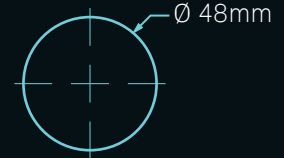
~235mm



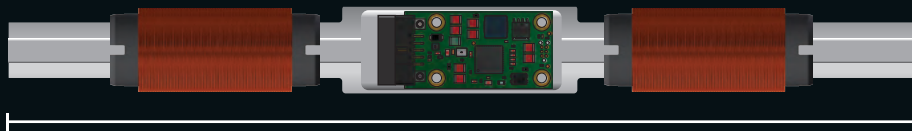
NSE-5007-04 - NSE CCL - Digital PCBA - OD 48mm



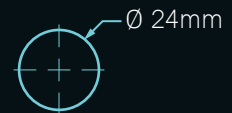
~250mm

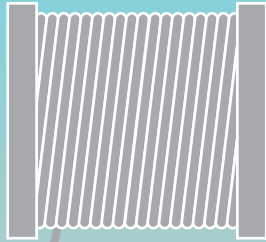


NSE-5007-06 - NSE CCL - Digital PCBA - OD 24mm



~260mm

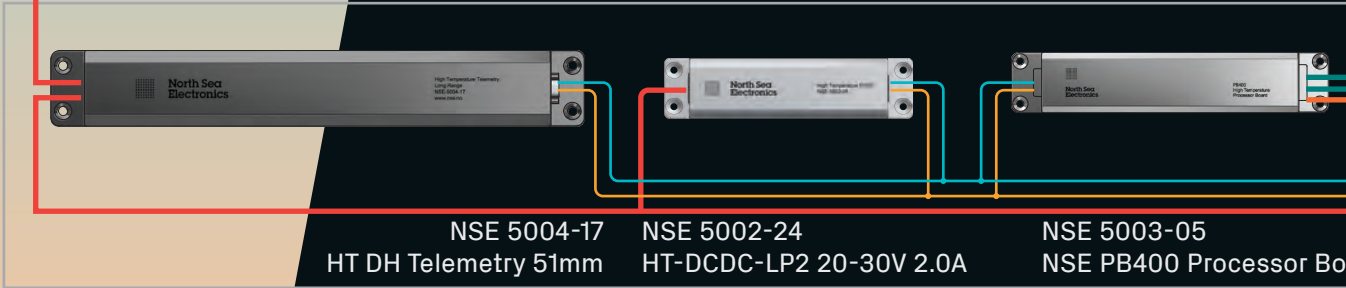




NSE 5004-01
Topside Wireline Telemetry 19" 2U



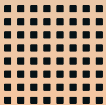
Topside User Interface



NSE 5004-17
HT DH Telemetry 51mm

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

NSE 5003-05
NSE PB400 Processor Board



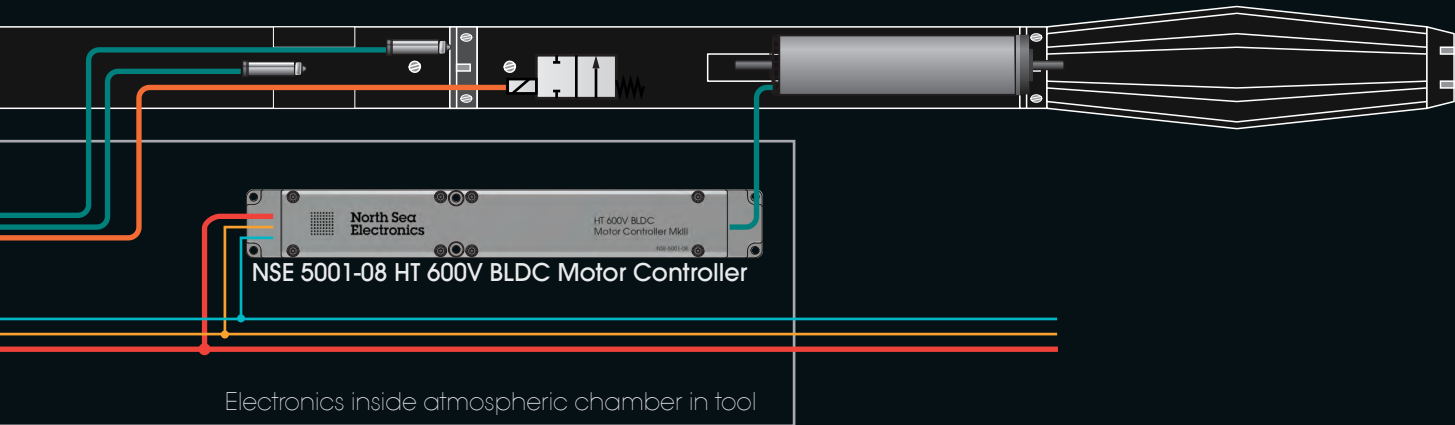
North Sea
Electronics

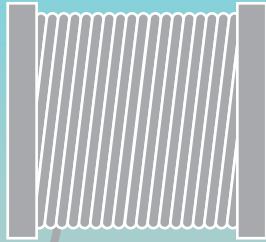
Reference Design#1 - High Power Tool

NSE electronics is well suited for typical power tool applications such as conveyor tools, strokers 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.

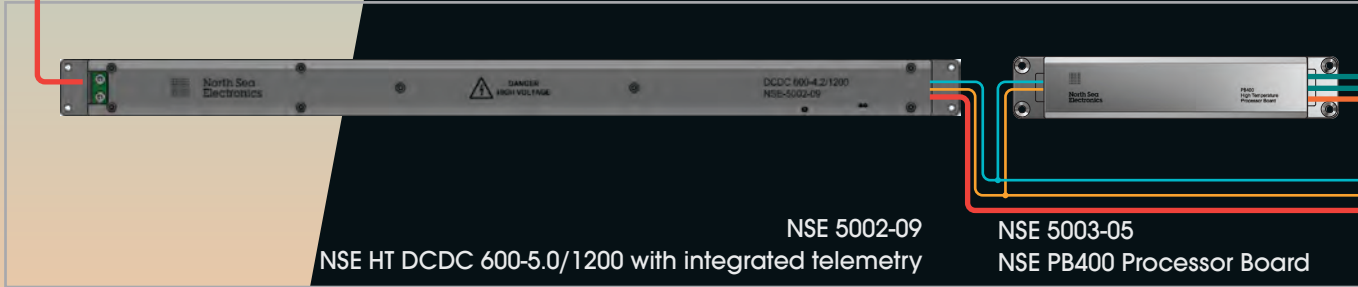
This reference design is shown with only one HT 600V BLDC Motor Controller, but several motor controllers and motors can be added if required.





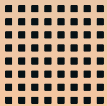
NSE 5004-01
Topside Wireline Telemetry 19" 2U

Topside User Interface



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

NSE 5003-05
NSE PB400 Processor Board



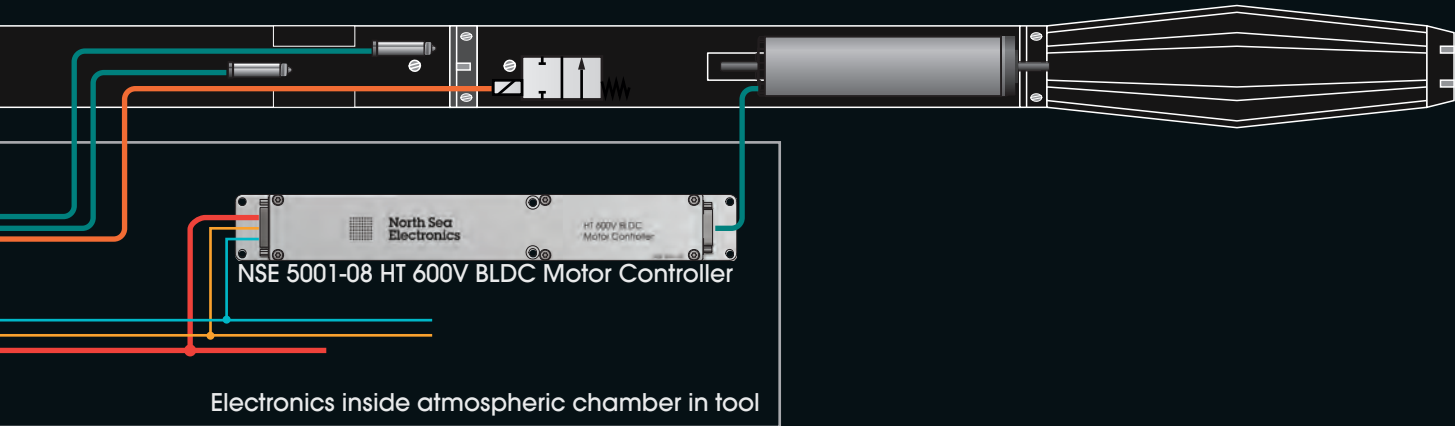
North Sea
Electronics

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.

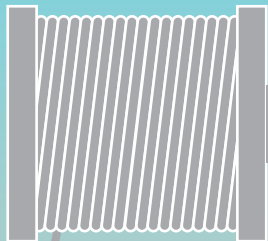
The downhole telemetry is integrated in the DCDC and allow for easy interface to other units in the tool. The reference design is shown with one HT 600V BLDC Motor Controller, but several motor controllers and motors can be added if required.



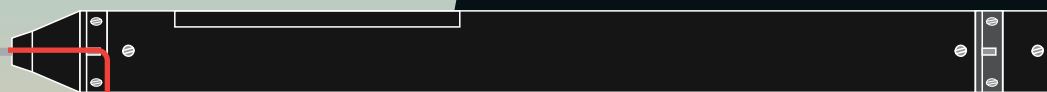
Topside Power Supply
(Small benchtop / portable PSU)



Topside User Interface



NSE 5004-21
Topside Wireline Telemetry – Portable Unit



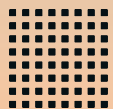
NSE 5004-16
HT DH Telemetry 32mm with PSU

Low Voltage bus (18V)

CAN bus



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

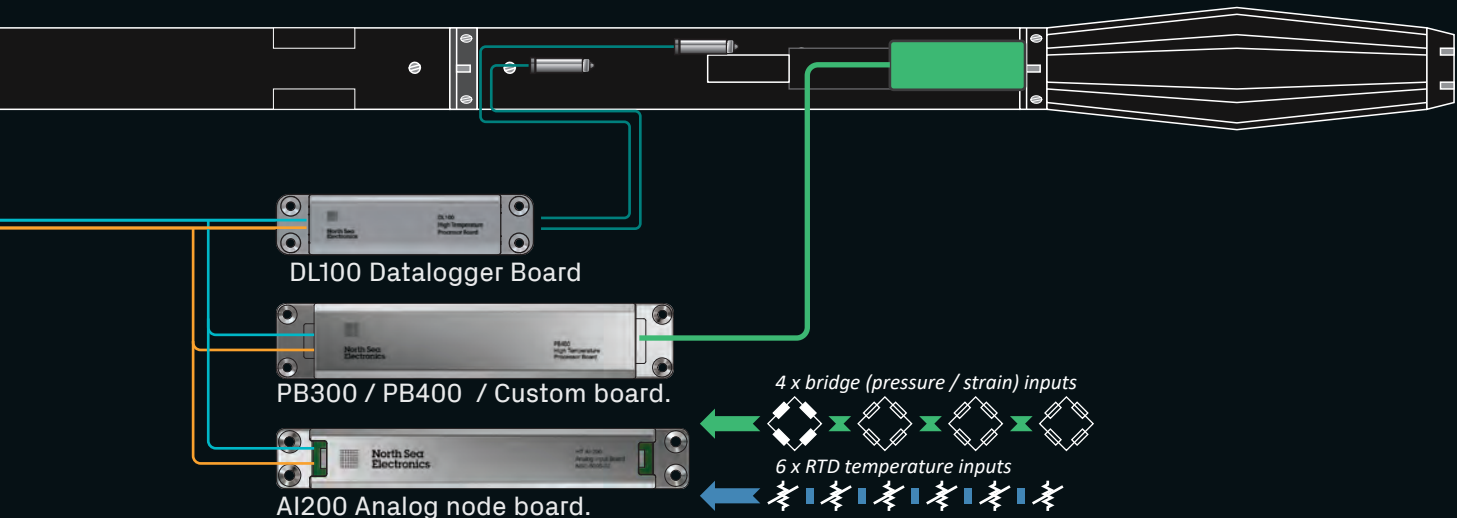


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Reference Design#3 - Logging Tool

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 demanding 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.



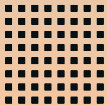
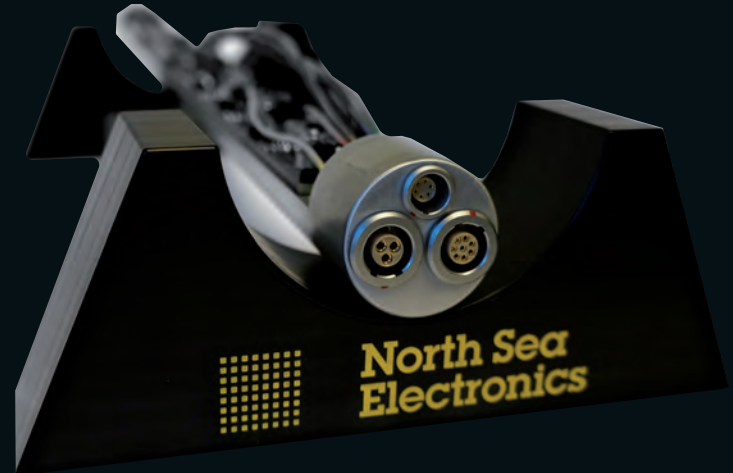
Custom Designs

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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