

HIGH TEMPERATURE

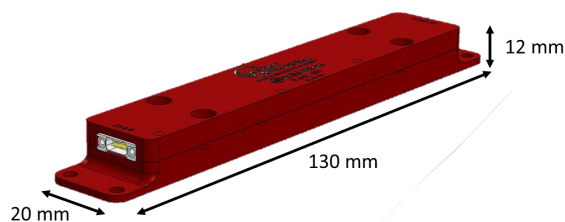
OIL & GAS APPLICATION

OVERVIEW

Nar Motion XS is a complete motor control solution suited for one inch tool. It is part of the Nar motion series.

Nar Motion is our innovative high-temperature motor controller series, providing optimal operation **and high-reliability in harsh environment.**

Nar Motion XS (also known as Tiny Nar Motor Controller, TNMC) is a Universal Motor Controller driver for DC brushless motors (BLDC, PMSM) with hall effect sensor, speed mode control in a small form factor. Nano-D 15 pins connector on each side.



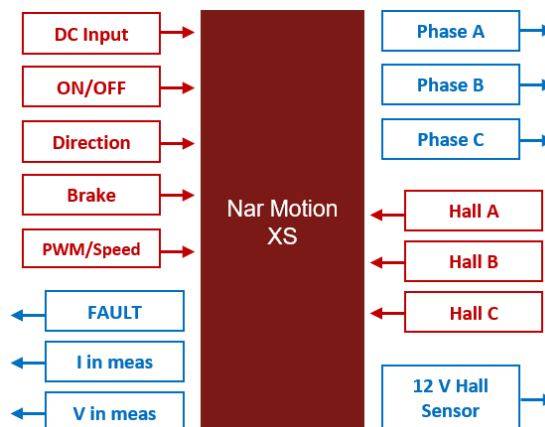
DIMENSION

Units	LxWxH
mm	130 x 20 x 12
inches	5.11 x 0.78 x 0.51

FEATURES

- 🔧 Capability to drive DC brushless with hall sensor
- 🔧 DC input range: 14 V - 48 V
- 🔧 Phase Current: up to 2 ARMS
- 🔧 Power drive capability up to 50 W at 150 °C (302 °F)
- 🔧 Maximum operating temp: 175 °C (347 °F)
- 🔧 Two directions of rotation
- 🔧 Speed Variation capability by sending an analog signal between 0 V and 1 V
- 🔧 Hall effect sensor configurable: 120° by default, 60° - available on demand

BLOCK DIAGRAM



VERSION

	Rotor position sensor
NM-20-48-2-HALL	Hall Effect

APPLICATION

- 🔧 Downhole
- 🔧 Harsh environments
- 🔧 High temperature applications

**WARNING**

This equipment operates at voltages and currents that can result in electrical shock, fire hazard and/or personal injury if not properly handled or applied. Equipment must be used with necessary caution and appropriate safeguards employed to avoid personal injury or property damage.

This board must be used only by qualified engineers and technicians' familiar with risks associated with handling high voltage electrical and mechanical components, systems and subsystems.

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1. Absolute maximum ratings

Parameter	Condition	Min	Max	Units
HV Input Voltage (motor driver supply)		0	50	V
Operating Temperature		5	175	°C
Long term storage Temperature		5	85	°C
Temperature change rate			5	°C/min

Table 1: Absolute maximum ratings

2. Electrical Characteristics

All specifications are given for the full temperature range unless otherwise noted.

Parameter	Condition	Value			Units
		Min	Typ	Max	
General					
HV Input Voltage (motor driver supply)		14	-	48	V
Motor Type		BLDC motor			
Driver continuous output power	T = 175 °C T = 150 °C	-	-	10 50	W
Driver Efficiency	V _{HV} = 50V, P _{out} = 50W Test made at 25 °C		90		%
Phase continuous output current		-	2	-	Arms
Minimum Speed	With 2 pole pairs motor (consult factory for other values)			500	rpm
Maximum Speed		8000			rpm
Switching frequency			30		kHz
Hall effect sensor excitation			12		V

Table 2: Electrical characteristics

3. Input signals

Parameter	Condition	Value			Units
		Min	Typ	Max	
General					
Logic inputs positive-going input threshold voltage	Signals : ON/OFF Direction Brake	2	3.3	5	V
Logic inputs negative-going input threshold voltage	Signals : ON/OFF Direction Brake			0.8	V
Voltage command	Dc signal to change the speed rotation between two limits	0	-	1	V
Hall A/B/C	Compatible CMOS or Open Collector outputs (pull-up resistor included)	-	-	-	

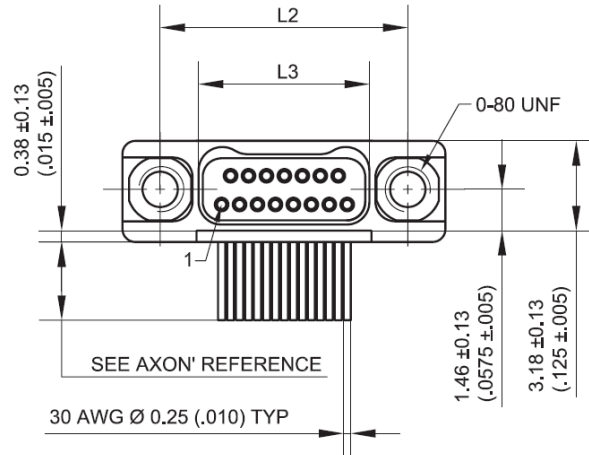
4. Output signals

Parameter	Condition	Value			Units
		Min	Typ	Max	
General					
Fault	Fault declared for OVLO and OCP		3.3	-	V
12V Hall sensors signal		-	-	15	mA
Speed feed back PWM frequency			7.5		kHz
Speed feed back PWM voltage level			3.3		V
Speed feed back PWM duty cycle range		0		100	%

5. Wiring connections

The connectors described in this section are used on each side of the product.

	Connector reference	Mating connector reference
J1 (15 pins)	ND2A315SCBRBG1	ND2A315PWX2W150BX
J2 (15 pins)	ND2A315SCBRBG1	ND2A315PWX2W150BX



5.1. Connectors J1

Pin	Signal Name	Details	Type
1	Rsvd	Reserved for future use	-
2	Vin_48	Input voltage	Power
3	Vin_48	Input voltage	Power
4	Vin_48	Input voltage	Power
5	Rsvd	Reserved (for optional external 12V power supply)	-
6	GND	GND	Power
7	GND	GND	Power
8	GND	GND	Power
9	Rsvd	Reserved for future use	-
10	Fault_Ext	Fault signal	Output
11	Speed_Feedback	Speed feedback	Output
12	Speed_Command	Speed command signal	Input
13	Sens_Ext	Sens command signal	Input
14	Brake_Ext	Brake command signal	Input
15	On/Off_Ext	On/Off Signal	Input

5.2. Connectors J2

Pin	Signal Name	Details	Type
1	PH_C	Phase C	Power
2	PH_C	Phase C	Power
3	PH_B	Phase B	Power
4	PH_B	Phase B	Power
5	PH_B	Phase B	Power
6	PH_A	Phase A	Power
7	PH_A	Phase A	Power
8	PH_A	Phase A	Power
9	PH_C	Phase C	Power
10	HC	Hall sensor C	Input
11	VCC_12	12V Hall Sensor power supply	Power
12	HB	Hall sensor B	Input
13	GND	GND	Power
14	HA	Hall sensor A	Input
15	Rsvd	Reserved for future use	-

6. Theory of operation

The control implemented on Nar Motion-XS is a six step control with hall effect sensor. There are two possible configurations for speed control

- External speed loop : the speed command controls the motor phase voltage amplitude. The speed feedback can then be used to implement an external control loop (see Figure 1). Alternatively, a voltage open-loop control can also be used in this configuration. This is the default factory setting
- Internal PID control by software using the controller. Please consult factory for this setting

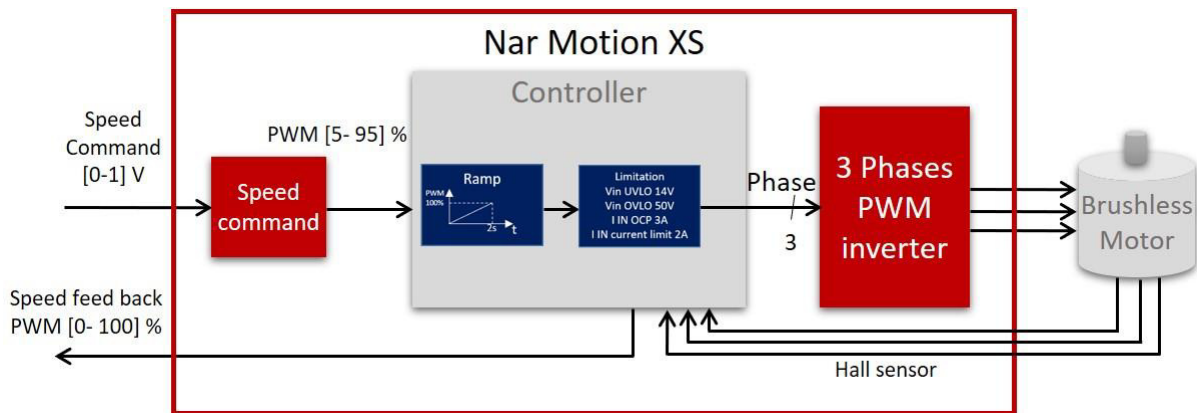
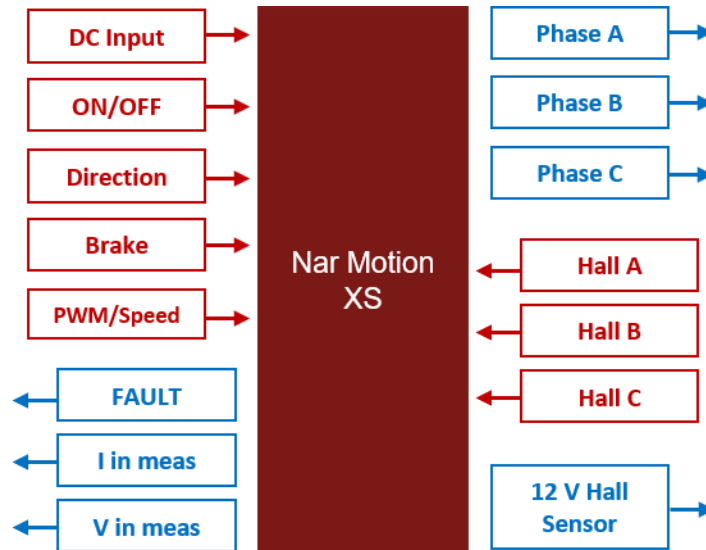


Figure 1: Speed control

7. Block Diagram



Inputs

- 🔌 ON/OFF: Compatible 5 V/3.3 V logic
- 🔌 Direction: Compatible 5 V/3.3 V logic
- 🔌 Brake: Compatible 5 V/3.3 V logic
- 🔌 PWM/Speed: input voltage command 0 – 1 V to command speed
- 🔌 HALL A/B/C: Compatible CMOS or Open Collector outputs (pull-up resistor included)

Outputs

- 🔌 Phase A/B/C: Phase of the motor
- 🔌 Fault: 3.3 V logic
- 🔌 12 V hall sensors power supply

8. Mechanical specifications

The package is in aluminium and has the following size :

Length : 130mm

Large : 20mm

High : 12mm

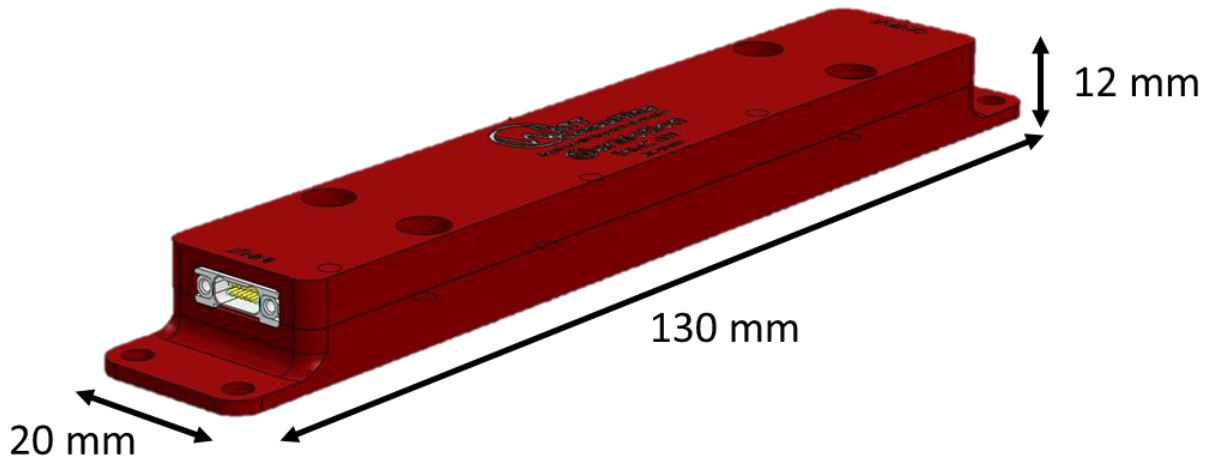


Figure 2: First draft of customer interface mechanical specifications

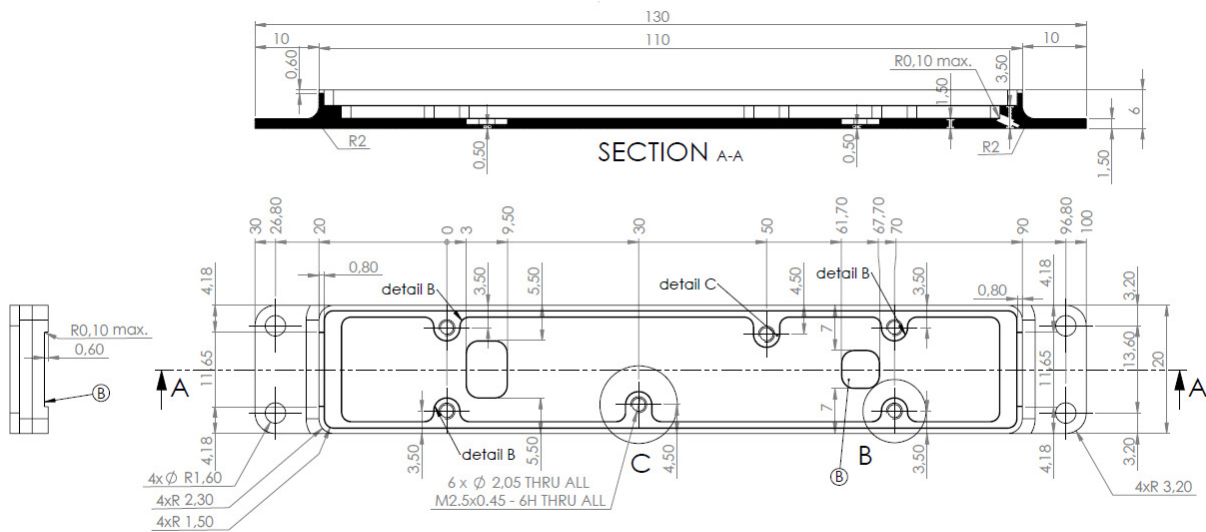


Figure 3 : Holes fixation placement

9. Ordering information

Product Reference	Rotor position sensor
NM-20-48-2-HALL	Hall Effect

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