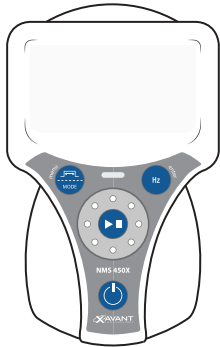
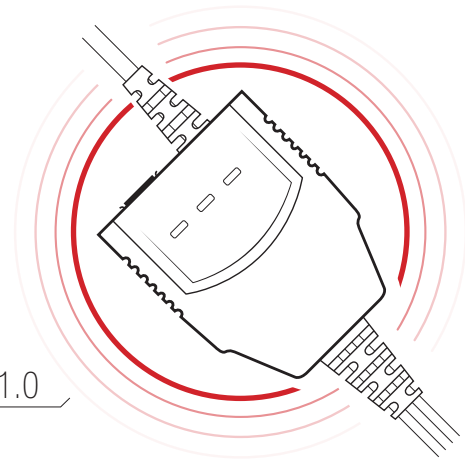


STIMPOD NMS 450X

Communication and Data Transfer



STIMPOD Data Cable 1.0



XM400-200A04 v1.0

STIMPOD **NMS 450X**

Communication and Data Transfer

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STIMPOD NMS 450X | Communication and Data Transfer

Technical Data Sheet | October 2018

Model

Stimpod NMS450 (Version 10.0 or X).

Prior versions of the Stimpod NMS450 do not feature communications and data transfer capabilities.

Communications and Data Transfer Summary

The Stimpod NMS450X, when utilized with the Stimpod Data Cable 1.0, allows for both real time and summarized case data to be transferred to a computer, EMR System, or certified ancillary third-party monitors. The data transferred is the associated metrics case information, such as Train of Four ratio, stimulation mode and timing, stimulation current level, depth of neuromuscular blockade, and more.

Outputs

Please note that the Stimpod cannot be controlled via its external connection. The Stimpod does only transmit stimulation data such as TOF ration, TOF count and PTC count. The Stimpod does not have the ability to enter patient specific data and as such the output data never contains any Protected Health Information.

The Stimpod NMS450X and the Data Cable 1.0 has the following output hardware options:

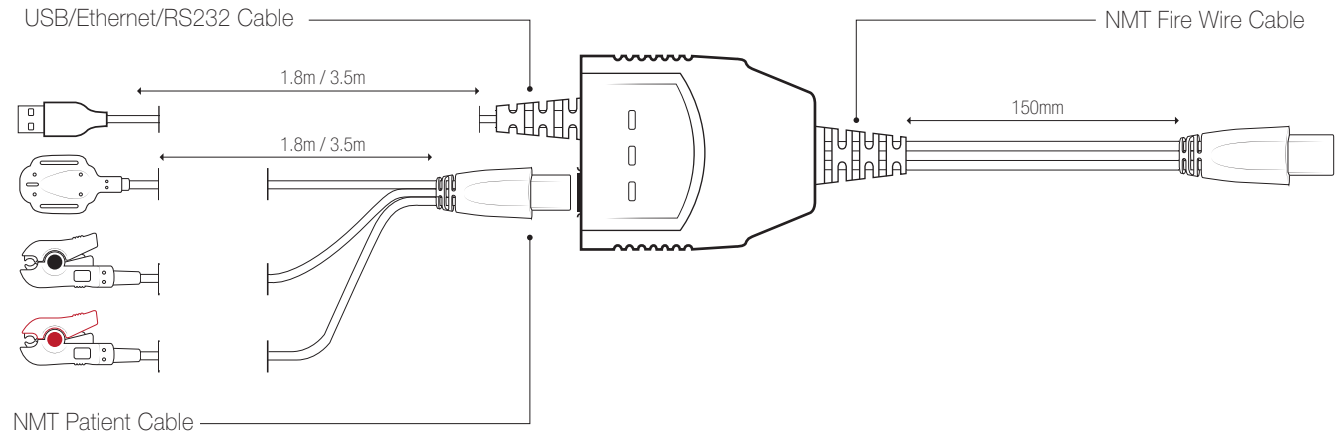
- A fixed USB cable allows the data cable to be connected to any computing host such as a laptop, PC, patient monitor, etc.
- A standard RS232
- A standard Ethernet port implemented over and industry standard RJ45 Connector

Inputs

- A fixed firewire interface is used to connect the data cable to the Stimpod NMS450X.
- A fire wire receptacle embedded in the data cable allows for a standard Xavant NMT patient cable (including electrodes and AMG sensor) to be connected to the Stimpod NMS450X.

Stimpod Data Cable 1.0

The Stimpod Data Cable consists of the following:



Stimpod Case Management Software

For real-time data transfer or case summary file transfer, the Stimpod software can be installed on a local computer, local EMR computer.*

Real Time Data Integration Elements

When the Stimpod NMS450X is connected to a computer/monitor – the NMS450X will transmit the case data onscreen in real time. An associated procedure clock can be utilized to provide case date and time elements to case data. Additionally, the Stimpod NMS450X can be connected to third-party monitors to transfer data in real time for display.**

Data Connectivity Cable Messaging Protocol

The Data Cable, once inserted into the Stimpod NMS450X, shall continue to broadcast NMT data over the USB interface to a connected host. The data shall include:

1. The stimulation mode, settings and status of the Stimpod NMS450X.
2. The measured response data of the patient for each pulse of a stimulation sequence.

Please note that the data shall be streamed to the host automatically. The host cannot request the data to be sent nor can it change the manner in which it is sent. Data transmitted by the host shall be ignored by the Data Cable, and shall in no way affect or influence the operation of the Stimpod.

* The Stimpod NMS450X contains no patient identification data. Exported files do not contain any patient identification data.

** Certification of third-party systems currently in process. This technical sheet will be updated with certified manufacturers when available.

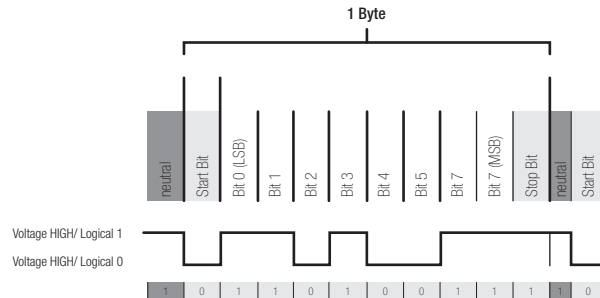
Data Cable Part Numbers

Data Cable Part Numbers		
Name	Part No	Description
Data Cable, USB	XT-45100A	USB Data Cable Only
Data Cable, Ethernet	XT-45100B	Ethernet Data Cable Only
Data Cable, RS232	XT-45100C	RS232 Data Cable Only
Data Cable Kit, USB	XT-45101A	USB Data Cable with Stimpod Case Management Software
Data Cable Kit, Ethernet	XT-45101B	Ethernet Data Cable with Stimpod Case Management Software
Data Cable, RS232	XT-45101C	RS232 Data Cable with Stimpod Case Management Software

Communication Settings

The data shall adhere to the following communications settings:

57600bps, 1 Start Bit, 1 Stop Bit, 8 Data Bits, Par None



Message Structure

Each Message broadcast by the Data Cable shall adhere to the following message structure:



Status Messages:

The status message is sent every 500ms, regardless of the current operational state of the Stimpod and is structured as follows:

Status Message Structure			
Byte	Name	Comment/Description	
0	SOM	0x55	
1	DEV_ID	Smart Cable ID = 0x10	
2	MSG_ID	DTA_MSG = 0x60	
3	MSG_LEN	0x0C	
4	Message Identifier	STS_DTA = 0x01	
5	Stimulation Mode	Bits 3.0	0x0: No Cable Connected 0x01: MAP 0x02: LOC 0x03: TOF 0x04: DB 0x05: TET 0x06: TWI 0x07: PTC 0x08: SMC 0x09: AUTO
6	Stimulation Status	Bit 0	0x00: Device is in idle mode 0x01: Stimulation Busy

Status Message Structure			
Byte	Name	Comment/Description	
7	Cable Status	Bit 0	0x00: Disconnected 0x01: Connected
8	Electrode Status	Bit 0	0x00: Open Circuit 0x01: Closed Circuit
9	Status Byte: TET/TWI mode: Frequency of the current mode. Auto Mode: Depth of the block	Bits 2:0	TET/TWI Mode: Frequency 0x00: 1Hz 0x01: 2Hz 0x02: 5Hz 0x03: 50Hz 0x04: 100Hz Auto Mode: Depth of Block 0x00: Performing SMC 0x01: Recovered 0x02: Minimal 0x03: Shallow 0x04: Moderate 0x05: Deep 0x06: Profound

Status Message Structure			
Byte	Name	Comment/Description	
10-11	Refractory/Repeat Timer	Bits 15:0	Bit 15 = MSB Bit 0 = LSB Refractory /Repeat Timer = (Byte10 << 8) Byte11 Refractory /Repeat Timer range = 0 - 65535 seconds (resolution = 1 second).
12-13	Excitation Voltage	Bits 15:0	Bit 15 = MSB Bit 0 = LSB Excitation Voltage = (Byte12 << 8) Byte13 Excitation Voltage = 0 – 500V (Resolution = 10V)
14 - 15	Supply Voltage	Bits 15:0	Bit 15 = MSB Bit 0 = LSB Supply Voltage = (Byte14 << 8) Byte15 Supply Voltage = 0 – 7500mV (Resolution = 1mV).
16-17	CRC	CCITT CRC 16	
18	EOM	0xAA	

Status Message Example:

Example of a status message as issued by the Data Cable:

Status Message Example: 55 10 60 0C 01 06 00 01 01 02 00 00 00 C8 19 C8 2B 0C AA		
Byte	Value	Interpretation
0	0x55	Start of message byte
1	0x10	Smart Cable Response
2	0x60	Data Message Response
3	0x0C	Length = 12 bytes
4	0x01	Status Data
5	0x06	TWI mode
6	0x00	Device is in idle mode
7	0x01	Stimulation cable connected
8	0x01	Closed Circuit
9	0x02	TWI Mode: 5 Hz Frequency
10-11	0x0000	Refractory/Repeat Time = 0s
12-13	0x00C8	200V
14-15	0x19C8	Supply Voltage = 6600mV
16-17	0x2B0C	CRC16
18	0xAA	End of message byte

Data Messages:

The data message is sent after each pulse in a TOF, DB, PTC, TWI-1HZ, SMC and AUTO stimulation sequence, and is structured as follows:

Data Message Structure			
Byte	Name	Comment/Description	
0	SOF	0x55	
1	DEV_ID	Smart Cable ID = 0x10	
2	MSG_ID	DTA_MSG = 0x60	
3	MSG_LEN	0x0D	
4	Message Identifier	STIM_DTA = 0x02	
5	Stimulation Mode	Bits 3:0	0x00: No Cable Connected 0x01: MAP 0x02: LOC 0x03: TOF 0x04: DB 0x05: TET 0x06: TWI 0x07: PTC 0x08: SMC 0x09: AUTO
6	Pulse Count	Bits 7:0	Bit 7 = MSB Bit 0 = LSB Pulse count range = 0 – 255. Data of the nth pulse.

Data Message Structure			
Byte	Name	Comment/Description	
7	Status Byte: TET/TWI mode: Frequency of the current mode. Auto Mode: Depth of the block	Bits 2:0	TET/TWI Mode: Frequency 0x00: 1Hz 0x01: 2Hz 0x02: 5Hz 0x03: 50Hz 0x04: 100Hz Auto Mode: Depth of Block 0x00: Performing SMC 0x01: Recovered 0x02: Minimal 0x03: Shallow 0x04: Moderate 0x05: Deep 0x06: Profound
8	Total Pulse Count	Bits 7:0	bit 7 = MSB Bit 0 =LSB Total pulse count range = 0 – 255. Indicates total number of pulses in stimulation sequence.

Data Message Structure			
Byte	Name	Comment/Description	
9	Stimulation current	Bits 7:0	Bit 7 = MSB Bit 0 = LSB Stimulation current range = 0 - 80 mA (resolution = 1mA).
10-11	Measured Current	Bits 15:0	Bit 15 = MSB Bit 0 = LSB Measured Current = ((Byte10 << 8) Byte11) / 100. Measured Current = 0.00 – 100.0mA (Resolution = 0.01mA)
12	Measured Charge	Bits 7:0	Bit 7 = MSB Bit 0 = LSB Measured charge range = 0-100 μ C (resolution = 1 μ C).
13	Exceedance Warning	Bit 0	0x0: Current not exceeding limits 0x1: Current exceeding 10% limits.
14-15	Accelerometer Magnitude	Bits 15:0	Bit 15 = MSB Bit 0 = LSB Accelerometer Magnitude = ((Byte14 << 8) Byte15) / 10. Accelerometer Magnitude = 0.0 – 441.6 (Resolution = 0.1).
16	Reserved	Bits 7:0	Reserved
17-18	CRC	CCITT CRC 16	
19	EOM	0xAA	

Data Message Example:

Example of a data message as issued by the Data Cable after the 3rd pulse in a TOF sequence:

Data Message Example: 55 10 60 0D 02 03 03 00 04 14 08 0D 04 01 05 14 00 EA AB AA		
Byte	Value	Interpretation
0	0x55	Start of message byte
1	0x10	Smart Cable Response
2	0x60	Data Message Response
3	0x0D	Length = 13 bytes
4	0x02	Stimulation Data
5	0x03	TOF mode
6	0x03	Pulse count = 3. Third pulse in the sequence.
7	0x00	Status = N/A in TOF mode
8	0x04	Total pulse count = 4. There is 4 pulses in the sequence.
9	0x14	Required stimulation current = 20mA
10-11	0x080D	Measured current of pulse 3/4 = 20.61mA
12	0x04	Measured charge = W4u Coulomb
13	0x00	Current not exceeded 10% limit
14-15	0x0514	Accelerometer Magnitude
16	0x00	Reserved
17-18	0xEAAB	CRC16
19	0xAA	End of message byte

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