

SMI – Standard Motor Interface Driver for Tridium Niagara

User Guide

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Figure 1: Types of window coverings

1 Introduction to SMI

SMI or Standard Motor Interface is a protocol for electric drives used for sun protection devices: shutters, roller blinds, awnings, exterior and interior venetian blinds, pleated blinds, roman shades. For blinds and shutters SMI is the same, as DALI is for lights. Same as DALI, SMI allows to combine products of various manufacturers and to use open standard technology.

Key features:

- Up to 16 drives can be wired and controlled in parallel
- A single five-wire line is used for power and communication
- High-precision intermediate positioning
- Query current motor positions
- Motor feedback with diagnostic information

2 Niagara and SMI

SMI driver for Niagara can be deployed in any Niagara-compatible embedded device like Tridium JACE8000, Honeywell WEB8000, Distech Controls EC-BOS-8, Johnson Controls FX80 etc. Niagara device connects via RS-485 port to one to sixteen Vestamatic IF SMI RS-485 interfaces (further referred to as “serial interface”), each of which communicates with up to 16 SMI motors. This allows to control and monitor up to 256 motors per RS-485 port.

In the next driver version an IP gateway will be supported. Then Niagara device will be able to communicate with many hundreds of motors via IP backbone.

SMI driver for Niagara allows to discover all connected serial interfaces and SMI motors, periodically read motor points, send commands to an individual motor or multiple motors at once. In addition, SMI driver allows to initiate motor auto-addressing to resolve address conflicts and manually change motor SMI addresses.

After all SMI points are discovered and added to Niagara station, they can be used as any other driver point: * to build mobile-friendly user interfaces, * to translate them into other communication protocols (BACnet, Lonworks, Modbus, MQTT etc.), * to integrate into complex control strategies using position of the sun, weather services, indoor and outdoor climate, lighting.

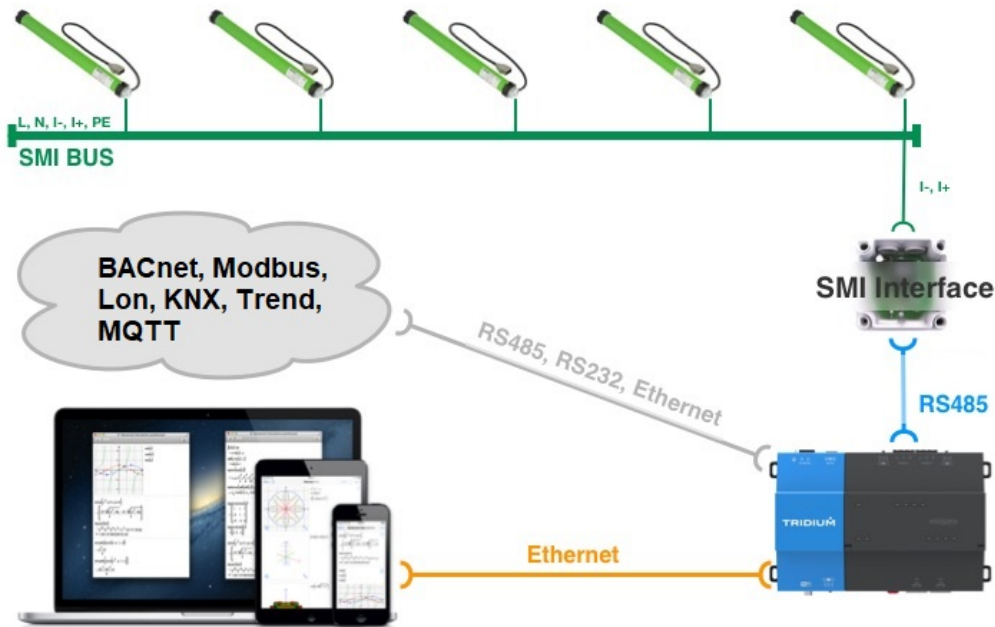


Figure 2: SMI - Niagara physical architecture

3 Requirements

- Niagara-powered device with software v4.0 and later for N4 or v3.8 for AX, including JACE8000 and all its OEM versions
- smi-rt.jar driver module and license
- one or many SMI / RS-485 serial interfaces
- SMI motors, commissioned and wired to serial interfaces according to SMI guidelines

Niagara JACE is connected to daisy-chained serial interfaces (up to 16) via its RS-485 port (pending support for IP-serial converter).

4 Quick Start

1. Copy smi-rt.jar (N4) to WorkPlace *modules* folder
2. Restart WorkPlace software
3. Deploy smi-rt.jar to JACE from *Software Manager*
4. Restart JACE station
5. Add **Smi Network** to JACE station
6. Enter license code in **License** property under **Smi Network**
7. Select COM port **Serial Config / Port Name** property
8. Open **Smi Network** and **Discover** devices. The driver will show all serial interfaces connected to the COM port with their unique addresses and hardware versions. Add discovered interfaces to the station. The added interface will instantly display how many motors it is connected to as **Motors Present**.

9. Open device points extension and **Discover** motors. The driver will display connected motors, each with a logical address (0-15) and manufacturer hexadecimal serial number. The motor is represented as a container with points: motor position, tilt and status.
10. Add points to the station database and Niagara starts reading their values. Writable points (position, tilt) can be modified, which initiate command to the motors. That allows to control blinds individually. For the group control, which is the recommended way, use **SmiCommand** component from the palette.

5 SMI Network

SMI Network contains many standard Niagara properties, including:

- **License** – the code which allows the driver to run on your Host ID.
- **Serial Config / Port Name** – JACE serial port name to which meters are connected.
- **Serial Config** – serial port settings. Defaults are 19200 / 8 / 1 / None.
- **Monitor / Ping Frequency** – how often to check communication with each serial interface
- **Tuning Policies / Default Policy / Write On** – whether the commands should be re-sent on station restart and interface enabling

6 SMI Interface

Each SMI Interface (SMI Device) contains the following properties:

- **Address** – unique device address (0-15) set with DIP switches in serial interfaces.
- **Motors Present** – how many motors are currently communicating with the interface.
- **Poll Frequency** – how often all interface points are polled, refer to **SmiNetwork / Poll Scheduler**

Every SMI motor contains information about its vendor (Manufacturer ID), its unique serial number and logical address (also called SMI ID). The logical address shall be from 0 to 15 and there shall be no identical addresses connected to one serial interface. It is expected that all SMI motors are fully commissioned and properly addressed using vendor tools before integrated into Niagara. Still, it is possible to change motor addresses from the driver.

There are two special actions available in each SMI Device:

- **Auto Addressing** – initiate SMI auto-addressing procedure, useful to resolve duplicated address. May take up to 60 seconds to finish.
- **Set Motor Address** – assign motor logical address given its vendor id and hexadecimal serial number. Both vendor id and serial number can be found on motor label. Serial number is also shown during point discovery. This function is useful when a broken motor is replaced.

7 SMI Points

Every SMI motor contains three points: position (0% to 100%), tilt (-128 to +127) and status.

Position 0% – top, 50% – middle, 100% – bottom.

Tilt -128 – slats completely closed in up direction, 0 – slats completely open (horizontal), +127 – slats completely closed in down direction.

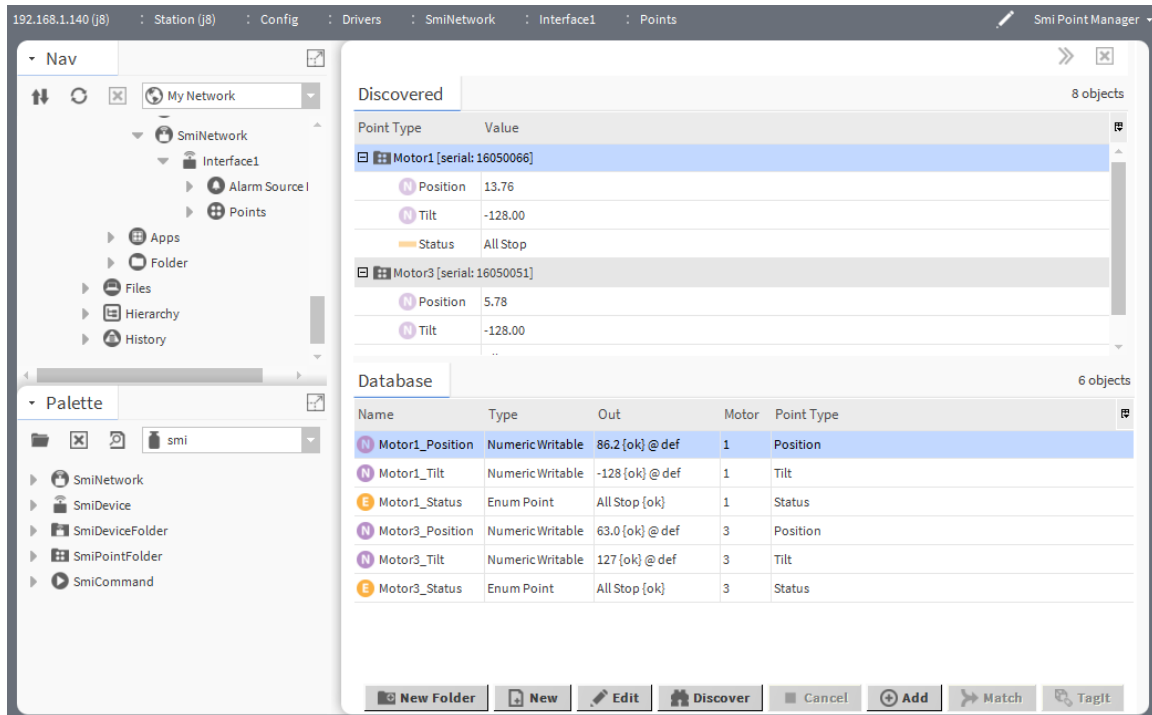


Figure 3: SMI devices and points

Status – enumeration value showing whether the motor is moving, stopped or in fault. It could be used to determine loss of communication with the motor – just add **EnumChangeOfStateAlarmExt** to generate alarm when status value is **Invalid Response**.

The points are periodically polled when they are assigned a *subscribed* status by Niagara framework. That happens in one of the following cases:

- point has alarm, history or any other extension, except for proxy extension
- point is linked to another Niagara component
- point is used on Niagara graphics page *and* this page is open now

8 SMI Command

A very powerful SMI protocol feature is group commands. It allows multicasting: sends one command to any combination of SMI motors from one to 16. The group commands are supported by the SMI driver.

In order to send group commands, drag and drop one or a few **SMICommand** components from the driver palette into **points** extension under serial interface. **SMICommand** has two properties:

- **Motor Mask** – 16-digit binary mask, numbering from right to left. Examples: **1111111111111111** – all motors connected to the interface, **10011** – motors number 4, 1 and 0.
- **Status** – whether the last command was sent successfully or failed.

Property **Motor Mask** is to configure recipients of the command. Actual commands are sent when one of component actions is invoked:

		Motor 1	Motor 2	
Up	Position	86.2	63.0	Position
Stop	Tilt	-128	127	Tilt
Down	Status	All Stop	All Stop	

Figure 4: Example of PX graphics

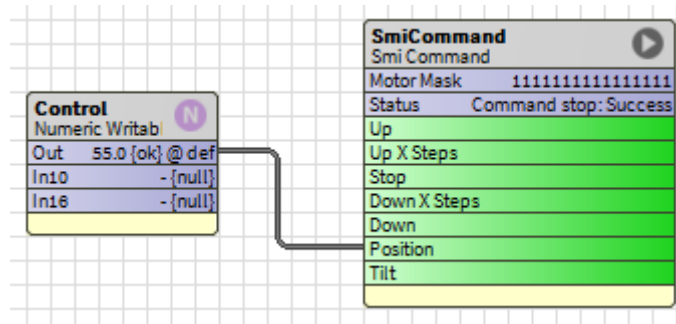


Figure 5: SMI Command on wiresheet

- **Up** – move up until it reaches the top position or any other command is received.
- **Up X Steps** – move up for a number of steps (1-255). One step is defined as 2° rotation of the output shaft of the SMI motor (same for **Down X Steps**).
- **Stop** – stop all movements.
- **Down** – move down until it reaches the bottom position or any other command is received.
- **Down X Steps** – move down for a number of steps (1-255).
- **Position** – move to an absolute position (0-100%, where 0% is top and 100% is bottom).
- **Tilt** – move venetian blinds to an absolute tilt orientation (-128 to 127). This command uses a manufacturer specific SMI command, which is currently only supported by Vestamatic SMI motors.

There are many ways how these actions can be invoked in Niagara. For example:

- Initiate actions to control all or some blinds during commissioning
- Add few **Action Button** widgets (from kitPx palette) to PX graphics and assign their *ord* properties to **up**, **down** and **stop** actions. Users will be able to manually open, close and stop blinds from their computers or mobile phones.
- Do the same for **position** or **tilt** and set *actionArg* property to preset value or activate *Prompt user*. Users will be able to move / tilt blinds to an absolute position.
- Make a link from control logic components to **SmiCommand**. Group commands will be sent when the link source is changed and the source value will be used as an argument (e.g. requested position).