

Application Note

Using an NT3S to Communicate with an Omron Yaskawa Inverter

An NT3S with RS422/485 connection is required. The NT3S used in this example is an NT3S-ST123B-E with RTC, RS485 on port 1 and RS232 on port 2.

This application note describes in detail the setup procedure for establishing communication and controlling an Omron/Yaskawa V1000 inverter from an NT3S. The setup procedure required is described in the following steps.

1. **Wiring.**
2. **Inverter Settings.**
3. **NT3S Network Settings.**
4. **NT3S Tags**
5. **Project details.**

1. Wiring.

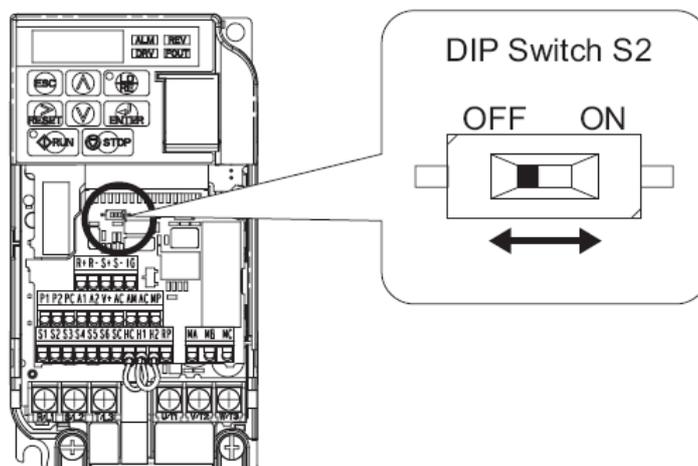
Port 1 of the NT3S has RS485 so this is the port that connects to the inverter. Connect:

NT3S Port 1		V1000
Pin 1 Tx+	➔	R+
Pin 4 Rx+	➔	S+
Pin 8 Tx-	➔	R-
Pin 9 Rx-	➔	S-

Ensure the termination resistor at the inverter end is turned on. (Dip Switch SW2)

Table 3.15 MEMOBUS/Modbus Switch Settings

S2 Position	Description
ON	Internal terminal resistance ON
OFF	Internal terminal resistance OFF (no terminal resistance); default setting



2. Inverter Settings.

Memobus uses a fixed frame of 8 data bits and 1 stop bit. The parity can be selected to either None, Odd or Even. The baud rate can be set as required from 9600 baud to 115200 baud. This example utilizes the V1000's high speed communication capability, so the baud rate will be set to 115200. Even parity will also be used.

Set the following inverter parameters as a minimum, either with CX-Drive or from the built in operator. (Refer to V1000 manual for details of how to change parameters via the digital operator)

Parameter	Description	Set to:	
B1-01	Reference Source	02	(Memobus)
B1-02	Run Command Select	02	(Memobus)
H5-01	Node Address	01	(Node Address 1)
H5-02	Baud Rate	08	(115200 baud)
H5-03	Parity Select	01	(Even Parity)

After changing the communications parameters (H5) the inverter requires power to be cycled for the new settings to take effect.

3. NT3S Network Settings.

Note: familiarity with the NT-XS software is assumed.

Create a new project using the NT-XS Version 1.04 software. Select the appropriate model of panel and then select network Configuration.

Add a new network on port 1 and select Omron/Yaskawa Inverters.

Set the network nodes as follows:

The screenshot shows the 'Network Configuration' dialog box. It contains a table with the following data:

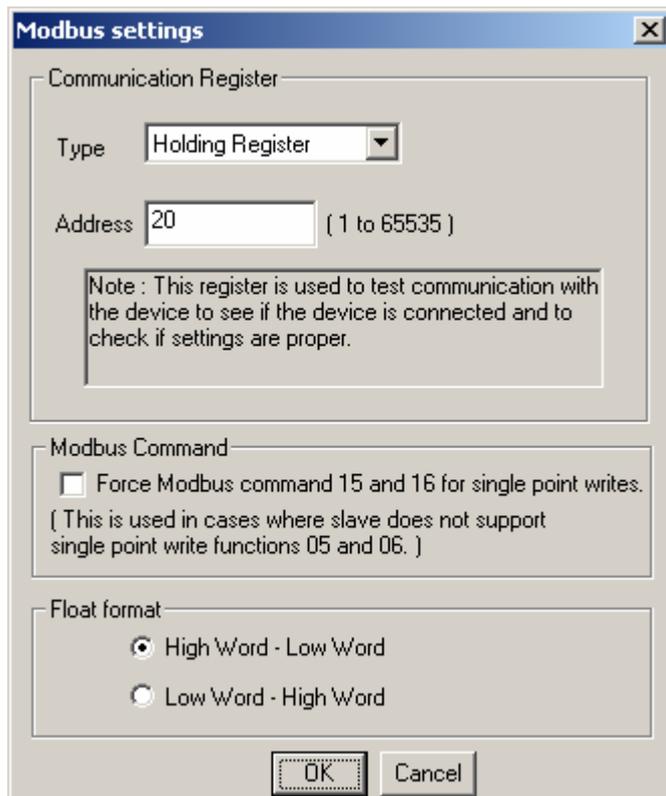
Node address		Name	NTXS / PLC	Blocks
Com1	Com2			
000	000	Node0	NT3S-ST123B-E	00007
001	----	Node1	Omron/Yaskawa Inverters [Yaskawa]	00004

Below the table, there are configuration options for a new node:

- Port: Com1 (dropdown)
- Protocol: Omron/Yaskawa Inverters (dropdown) with a 'Comm settings' button.
- Model: Yaskawa (dropdown)
- Node section:
 - Address: 01 (input field) with a range of [0 - 32] and a 'PLC specific data' button.
 - Name: Node1 (input field) with a note '(Max 15 characters)'.

Buttons on the right side include 'Add', 'Delete', 'Change', 'Close', and 'Help'.

After adding the new network, the following screen will appear.

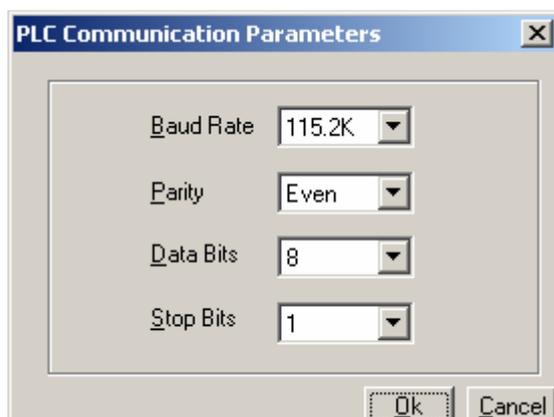


Accept the defaults on this screen.

Memobus requires each of the nodes on the network to be interrogated repeatedly by the master (HMI in this case). If the slave sees no active communication on the network for a certain time (2s is the default for the V1000) the inverter will enter an alarm state and will display CE (Communications Error) on the operator. By default, the inverter will ramp to stop for safety.

As changing the run command or the frequency reference happens infrequently, the master will 'poll' the slave repeatedly for data when no active commands are being given. This screen is asking for the data address to poll. Address 20 is a status address on the V1000.

Also set the Comm. Settings as follows:



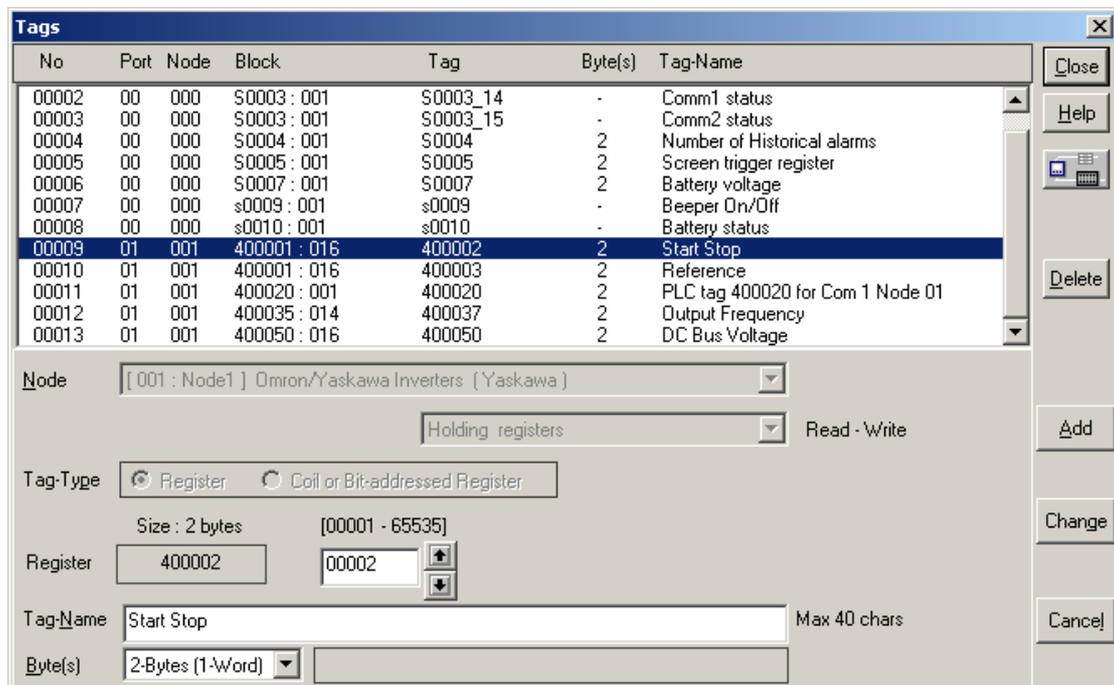
4. NT3S tags.

Memobus can only be used to read and write holding registers, not bits.
All the tags used will be word values of 16 bits.

Create the following tags:

Tag Address	Tag Name
00002	Start Stop
00003	Reference
00037	Output frequency
00050	DC Bus Voltage

Note that address 20 has been added automatically during network setup.



Important note on addressing.

Modbus identifies holding registers as beginning with 4xxxxx. Holding register addresses begin at 400001. This means that address 0 in the inverter is identified as address 00001.

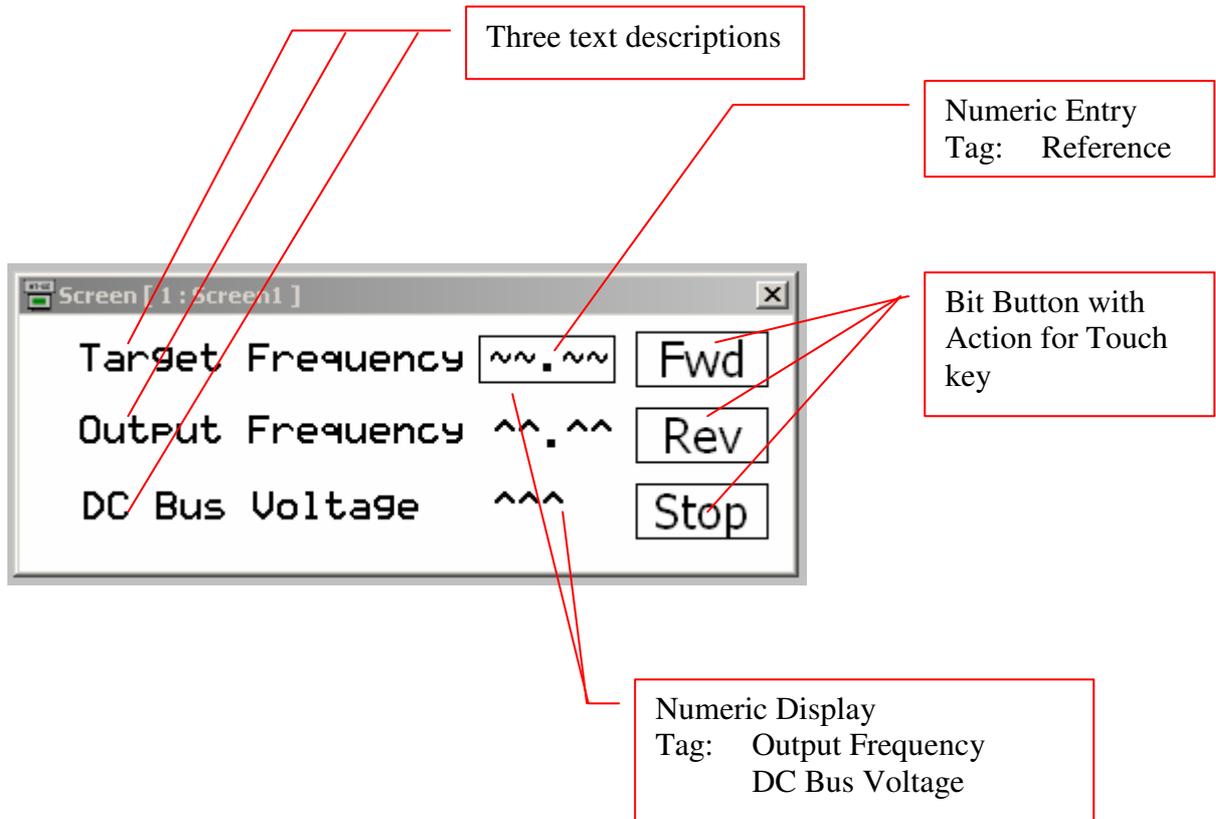
Inverter Address	Modbus/Memobus address
#0000	400001
#0001	400002
#0002	400003
....	...
#0045	400045 etc...

In addition, the addresses given in the V1000 manual are also specified as Hexadecimal. The NT3S requires that the address is given as a decimal.

- I.e. The monitor address which holds the DC bus voltage is shown in the V1000 manual as 31H. This converts to 49 decimal. However, remember to add 1 to the address as Modbus addressing begins at 00001. The correct address to use to read this register would be 00050, which is represented as a Modbus holding register address as 400050.

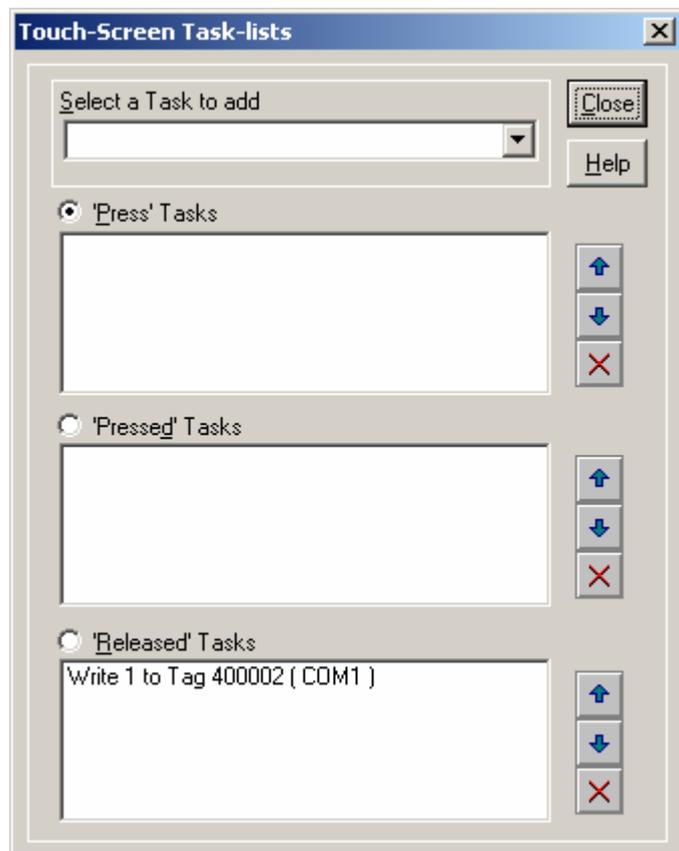
4. Project details.

As an example the following screen has been created.



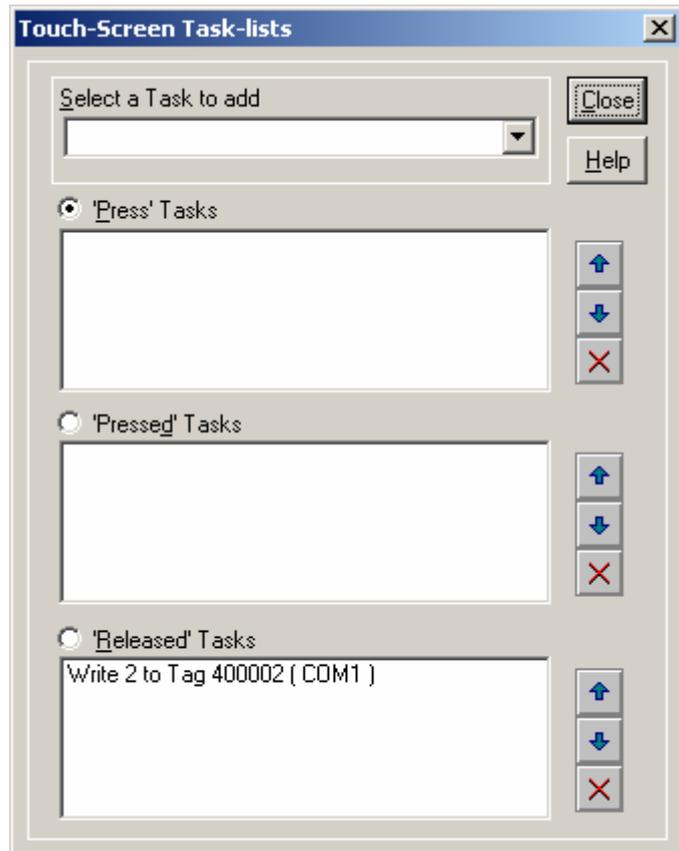
Action for Fwd Button.

This writes a value of 1 to inverter address 0001 (Run Command) and turns on bit 0 (run forward)



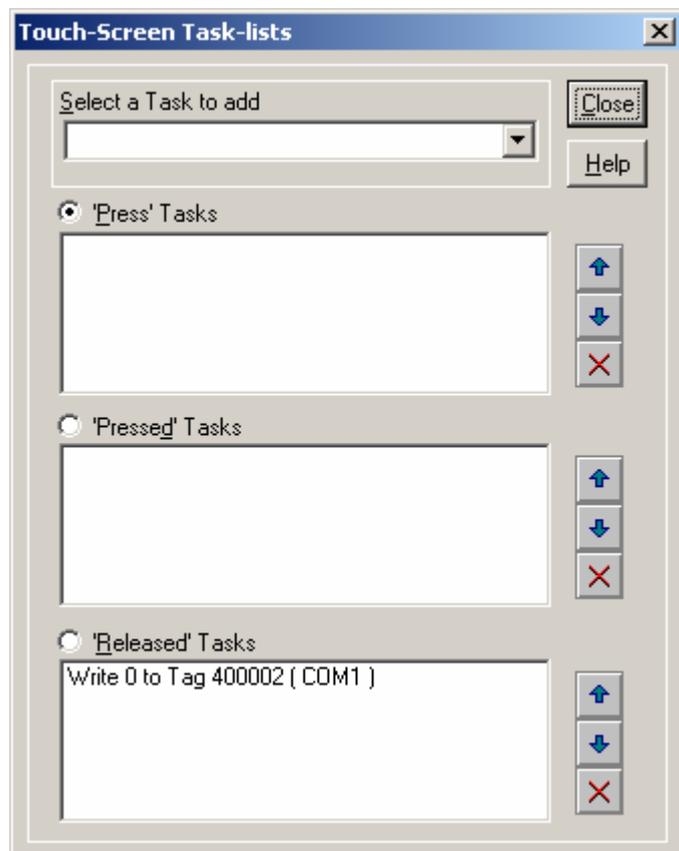
Action for Rev Button.

This writes a value of 2 to inverter address 0001 (Run Command) and turns on bit 1 (run reverse)



Action for Stop Button.

This writes a value of 0 to inverter address 0001 (Run Command) and turns off all bits (stop)



Download the firmware and the project to the NT3s and connect the inverter to Com1.

Power on the inverter and the operator display will show a message flashing Call. This indicates that the inverter is waiting for communications from the master. Once communications have been established, this message will disappear, to be replaced by the frequency reference. The NT3S may need to be power cycled, before communications are established.

Once communications start, the frequency reference can be set and the inverter can be set running in either direction or stopped.

Any monitor parameters can be displayed once the correct V1000 address has been set.