



## **SD500** *ACCESORIES*

*LONWORKS BOARD*



**GETTING STARTED MANUAL**



# ***SD500***

A C C E S O R I E S

LonWorks Option Board  
**Accessories Manual**

**Edition: January 2018**

SD50MA02AI



## ABOUT

### PURPOSE

This manual contains important instructions for the installation and maintenance of the optional Lonworks communication module for Power Electronics SD500 variable speed drives.

### AUDIENCE

This manual is intended for qualified customers who will install, operate and maintain Power Electronics SD500 variable speed drives.

Only trained electricians approved by Power Electronics may install and commission the drives. The instructions assume that the installer is familiar with electrical installation rules and regulations.

### REFERENCE MANUALS

The following reference guide is available for the SD500 variable speed drives:

- Hardware and Installation Manual
- Programming and Software Manual

### POWER ELECTRONICS CONTACT INFORMATION

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# TABLE OF CONTENTS

<b>1. INTRODUCTION .....</b>	<b>13</b>
<b>2. TECHNICAL FEATURES OF LONWORKS .....</b>	<b>14</b>
<b>3. INSTALLATION GUIDELINE .....</b>	<b>15</b>
<b>4. NETWORK CONNECTION .....</b>	<b>17</b>
<b>5. NETWORK TERMINATION .....</b>	<b>18</b>
<b>6. NETWORK CABLE .....</b>	<b>20</b>
<b>7. LONWORKS RELATED KEYPAD PARAMETER .....</b>	<b>21</b>
<b>8. FUNCTIONAL PROFILE .....</b>	<b>24</b>
Node Object .....	24
Network Input Variables .....	24
Drive Object .....	25
Network Input Variables .....	26
Network Output Variables .....	28
Network Configuration Variable .....	31
User Object (User Function Profile Type) .....	43
Network Input Variables .....	44
Network Output Variables .....	45
Network Configuration Variables .....	47
<b>9. LED INFORMATION .....</b>	<b>51</b>

## SAFETY SYMBOLS

Always follow safety instructions to prevent accidents and potential hazards from occurring.

In this manual, safety messages are classified as follows:

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### WARNING

Identifies potentially hazardous situations where dangerous voltage may be present, which if not avoided, could result in minor personal injury, serious injury or death.

Be extremely careful and follow the instructions to avoid the risk of electrical shocks.

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### CAUTION

Identifies potentially hazardous situations, which if not avoided, could result in product damage, or minor or moderate personal injury.

Read the message and follow the instructions carefully.

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### NOTICE

Identifies important measures to take in order to prevent damage equipment and warranty lost, as well as encouraging good use and environmental practices

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The following CAUTION symbols can be used in this manual and they symbolize:

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Hot surface. Be careful and follow the instructions to avoid burns and personal injuries.

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Risk of fire. Be careful and follow the instructions to prevent causing an unintentional fire.

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Caution, risk of electric shock. Energy storage timed discharge. Wait for the indicated time to avoid electrical hazards.

---



Caution, risk of hearing damage. Wear hearing protection.

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# SAFETY INSTRUCTIONS

## IMPORTANT

Read carefully this manual to maximize the performance of the product and to ensure its safe use.

In order to appropriately use the drive, please, follow all instructions described in the installation manual which refer to transportation, installation, electrical connection and commissioning of the equipment.

Power Electronics accepts no responsibility or liability for partial or total damages resulting from incorrect use of equipment.



### WARNING

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**Be cautious when handling the CMOS components of the communication board.** Static may lead to product malfunctioning.

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**Turn the drive power off before changing the communication cable.** Otherwise, you may damage the module or a communication error may occur.

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**Make sure to insert precisely the communication module connector to the drive.** Otherwise, you may damage the module or a communication error may occur.

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**Check the parameter unit before setting up the parameters.** Otherwise, a communication error may occur.

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**Do not remove the cover while the power is applied or the unit is in operation.** Otherwise, electric shock could occur.

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**Do not remove the cover while power supply is connected or the drive is operating.** Otherwise, you may get an electric shock.

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**Do not run the drive with the front cover removed.**

Otherwise, you may get an electric shock.

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**The drive does not remove the voltage from the input terminals. Before working on the drive, isolate the whole drive from the supply.**

If you do not remove the power supply, you may get an electric shock.

---

**Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.** Otherwise, you get an electric shock.

---

**Operate the drive with dry hands.**

Otherwise, you may get an electric shock.

---

**Do not use cables with damaged insulation.**

Otherwise, you may get an electric shock.

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**Do not subject the cables to abrasions, excessive stress, heavy loads or pinching.** Otherwise, you may get an electric shock.

---

**CAUTION**

**Install the drive on a non-flammable surface.** Do not place flammable material nearby. Otherwise, a fire could occur.



**Disconnect the input power if the drive is damaged.** Otherwise, it could result in a secondary accident or fire.

**Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the drive.**

Otherwise, a fire or an accident could occur.



**The drive becomes hot during operation. Wait until it cools down before performing any actions.**

Touching hot parts may result in skin burns.



**Do not apply power to a damaged drive or to a drive with parts missing, even if the installation is complete.**

Otherwise, you may get an electric shock.

**NOTICE****RECEPTION**

- The SD500 are carefully tested and perfectly packed before delivering.
- In the event of transport damage, please ensure to notify the transport agency and POWER ELECTRONICS: 902 40 20 70 (International +34 96 136 65 57), or your nearest agent, within 24hrs from receiving the goods.

**UNPACKING**

- Make sure model and serial number of the variable speed drive are the same on the box, delivery note and unit.
- Each variable speed drive is delivered with Hardware and Software technical manuals.

## RECYCLING

Equipment packaging must be recycled. Separate all different materials (plastic, paper, cardboard, wood...) and place them in the corresponding containers. Ensure waste collection is properly managed with a Non-Hazardous Waste Agent.



To guarantee health and natural environmental sources protection, the European Union has adopted the WEEE directive concerning discarded electric and electronic equipment (SEEA).

**Waste of electrical and electronic equipment (WEEE) must be collected selectively for proper environmental management.**

Our products contain electronic cards, capacitors and other electronic devices that should be separated when they are no longer functional. These WEEEs should be managed accordingly with a Hazardous Waste Agent.

Power Electronics promotes good environmental practices and recommends that all its products sold outside of the European Union, once they reach the end of their life, are separated and the WEEE managed according to the particular country applicable legislation (especially: electronic cards, capacitors and other electronic devices)

If you have any questions about the electric and electronic equipment waste, please contact Power Electronics.

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## CYBER SECURITY DISCLAIMER

This product is designed to be connected to and to communicate information and data via a network interface. The customer is the sole responsible for providing and continuously ensuring a secure connection between the product and customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as, but not limited to, the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Power Electronics and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

## ELECTROMAGNETIC COMPATIBILITY (EMC)

- The drive is intended to be used in industrial environments (Second Environment). It achieves compliance with C3 category defined in IEC/EN 61800-3 standard when the installation recommendation within this manual are followed.
  - Select communication and control system according to the drive EMC environment. Otherwise, systems could suffer from interferences due to a low EMS level.
- 

## SAFETY

Before operating the drive, read this manual thoroughly to gain an understanding of the unit. If any doubt exists, please contact POWER ELECTRONICS, (902 40 20 70 / +34 96 136 65 57) or your nearest agent.

- Wear safety glasses when operating the drive with power applied or for when the front cover is removed.
- Handle and transport the drive following the recommendations within this manual.
- Install the drive according to the instructions within this manual and local regulations.
- Do not place heavy objects on the drive.
- Ensure that the drive is mounted vertically and keeping the minimum clearance distances.
- Do not drop the drive or subject it to impact.
- The SD500 drives contain static sensitive printed circuits boards. Use static safety procedures when handling these boards.

Avoid installing the drive under conditions that differ from those described in the Environmental Ratings section.

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## CONNECTION PRECAUTIONS

- To ensure a correct operation of the drive, it is recommended to use a SCREENED CABLE for the control wiring.
  - The motor cable should comply with the requirements within this manual. Due to increased leakage capacitance between conductors, the external ground fault protection threshold value should be adjusted ad hoc.
  - Do not disconnect motor cables if the input power supply remains connected.
  - The internal circuits of the SD500 Series will be damaged if the incoming power is connected and applied to the output terminals (U, V, W).
-

- Do not use power factor correction capacitor banks, surge suppressors, or RFI filters on the output side of the drive. Doing so may damage these components.
  - Before wiring the terminals, make sure that the drive keypad display is turned off and the front cover is off as well. The drive may hold a high voltage electric charge long after the power supply has been turned off.
- 

## **EARTH CONNECTION**

- Ground the drive and adjoining cabinets to ensure a safe operation and to reduce electromagnetic emission.
  - Connect the input PE terminal only to the dedicated PE terminal of the drive. Do not use the case, nor chassis screws for grounding.
  - Ground the drive chassis through the labelled terminals. Use appropriate conductors to comply with local regulations. The ground conductor should be connected first and removed last.
  - Motor ground cable must be connected to the PE output terminal of the drive and not to the installation's ground. We recommend that the section of the ground conductor (PE) is equal or greater than the active conductor (U, V, W).
- 

## **TRIAL RUN**

- Verify all parameters before operating the drive. Alteration of parameters may be required depending on application and load.
  - Always apply voltage and current signals to each terminal that are within the levels indicated in this manual. Otherwise, damage to the drive may occur.
- 

## **CAPACITORS DEPLETION**

If the drive has not been operated for a long time, capacitors lose their charging characteristics and are depleted. To prevent depletion, once a year run the device under no-load conditions during 30-60 minutes. For further information, please contact Power Electronics.

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# INTRODUCTION

## 1

LonWorks technology is made by Power Electronics. and LonWorks Network is often used in factory or building automation. In LonWorks Network, Master/Slave concept doesn't exist and all nodes (Device) of the Network communicate each other by LonTalk protocol. And LonWorks Nodes are independent not depending on the other manufacturing companies. This independency is possible by using Standard Network Variable Type (SNVT) offered by LonWorks.

All Network variables are categorized into input and output variables and if the connection is made between input variable and output variable at first by Installation Tool, data communication can be done automatically. When input variable and output variable are connected, be sure to make the same Network variable Type.

# TECHNICAL FEATURES OF LONWORKS

## 2

Protocol	LonTalk
LonWorks Comm. Chip	FT3150-P20 chip from Echelon
LonWorks transceiver	FT-X1
Data types	Peer-to-peer Communication
LonWorks Connector	Pluggable Connector
Channel Type	TP/FT-10
Transfer cable	Free Topology Twisted Pair
Baud rate	78 Kbit/s
Topology	Free Topology (Bus, Star, Loop, combination of these)



# INSTALLATION GUIDELINE

## 3

Follow these instructions for installing LonWorks board.

1. Take away the packing material of LonWorks Comm. card and check if LonWorks Comm. card isn't apparently damaged.
2. Feed power to the board and check if the functions are operated correctly. Conducting keypad operation, check the inverter operation.
3. After turning off the board power wait at least 10 minutes until the charged voltage of inverter will be discharged. Measuring DC Link voltage, make sure it can reach to safe voltage level.
4. Install LonWorks comm. card to the inverter's.
  - Remove the inverter cover, install LonWorks comm. card. Connect Comm. Cable (A, B). As there is no polarity in LonWorks Comm. Cable, you can connect without considering polarity.
  - If present Node is connected to the last of the Network, using terminating resistance setting switch, conduct terminating setting.
5. For the configuration of LonWorks Comm. card, download the External Interface file and Resource file from <http://www.lsis.biz>
6. After feeding power to inverter, using the keypad, check if CNF-30 Option-1 Type is set automatically as LonWorks.
7. Conduct LonWorks comm. related parameter setting.
8. Examine the status LED in LonWorks comm. card. If the configuration hasn't been done before, SERVICE LED will be flicked as 0.5Hz.
9. After turning off the inverter power, wait at least 10 minutes until DC Link voltage is discharged. When concluding the installation of LonWorks comm. card, close the cover of inverter.
10. After feeding power to the inverter once again, using the network tool, conduct the configuration.

**Note:** For communicating with inverter through LonWorks first time, you have to do the configuration at least once. If LonWorks comm. card is installed in the inverter and the configuration isn't conducted, LonWorks comm. can't be done.

11. For Configuration, turn SVC switch OFF after switching ON.

**Note:** When you do the LonWorks comm. card configuration of for the first time at Lon network using LonMaker, and as the configuration time of the LonMaker itself is long, the communication between inverter and communication card can't be done during that time, Option-1 Trip can happen. In this case, after the configuration is completed, push RESET button on the keypad for removing Option-1 Trip.



#### WARNING

**Turn the power supply off before connecting a communication network. If the LonWork communication module is removed or installed, the power supply should be switched off.**

Otherwise, the SD500 drive may get damaged and warranty will be voided.

**Install or remove the LonWork communication module when the drive capacitor is fully discharged.**

When installing the LonWork communication module, ensure that the connectors of the drive body and the communication module are correctly aligned.



#### CAUTION

**Acceptable supply voltage range for the 24 V external source is -15% to +20%.** Ensure that the power source meets this requirement before connecting it to the communication module.

**The 24 V external power source supplies power only to the communication module.** Do not use it to power neither the drive nor the keypad.

# NETWORK CONNECTION

## 4

LonWorks Comm. card offers Pluggable connector. Table below explains connector. LonWorks Comm. cable can be connected to connector number 1 and 2. AS LonWorks Comm. doesn't have the polarity, the cable can be connected without considering polarity.

Switch location		Terminating Type
1	A	Network cable connection (No polarity in communication wire)
2	B	
2	S	Shield connection

# NETWORK TERMINATION

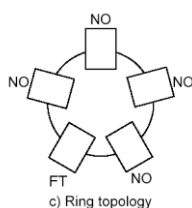
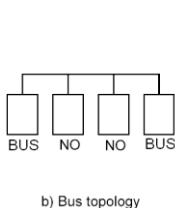
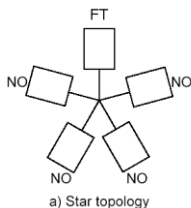
## 5

Set up the terminal to guarantee the reliability of communication data.

The communication terminal may be set up at both ends (BUS Topology) or with a communication card at one side (Free Topology).

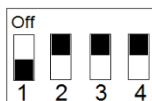
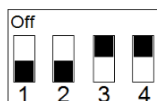
LonWorks communication card contains a terminal resistance. It can be determined whether to use a terminal resistance by DIP switch in the SV-LonWorks communication card. Set up one or two terminal resistance according to network topology. Free topology uses 50 Ohm resistance and there will be one LonWork device that will be terminated with a resistance in the network. In case of Bus topology, it will have 100 Ohm as a terminal resistance and two LonWorks devices. This table describes terminated types according to the switch location.

Switch position	Terminating Type
FT	Terminating with Free Topology Using 50 Ohm resistor Only one LonWorks device is terminated in Network.
NO	Non-terminating
BUS	Terminating with Bus Topology Using 100 Ohm resistor Only 2 LonWorks devices at the last of Network are terminated.





① Terminal resistance

② Bus Topology terminal  
(100 Ohm)③ Free Topology terminal  
(50 Ohm)

Terminal switch configuration for LonWorks comm. Card

# NETWORK CABLE

6

- Belden 85102, unshielded
- Belden 8471, unshielded
- Level IV 22AWG, unshielded
- JY (St) 2x2x0.8, shielded
- TIA568A Cat.5 24AWG

# LONWORKS RELATED KEYPAD PARAMETER

## 7

The table below contains Inverter parameters that show LonWorks information.

LonWorks related Keypad parameter		
Code Number	Parameter Name	Description
CNF-30	Option-1 Type	Comm. card name installed in inverter is displayed. (When LonWorks comm. card is installed, 'LonWorks' is displayed.)
COM-06	FBus S/W Ver	The version of comm. card installed in inverter is displayed.
COM-09	FBus Led	LED ON/OFF information of LonWorks Comm. card is displayed.
COM-10	Opt Parameter1	Neuron ID information is displayed.
COM-11	Opt Parameter2	
COM-12	Opt Parameter3	
COM-94	Comm Update	Comm. Related Keypad parameter is Updated.

- 1) **Option Type (Option card information, CNF-30)**  
Type of Comm. card installed is displayed automatically. When LonWorks comm. card is installed, "LonWorks" is displayed automatically.
- 2) **Option Version (Option version information, COM-06)**  
Version of Comm. card installed is displayed automatically.
- 3) **FBus Led (COM-09) – Comm. card LED Information Display**
  - It displays On/Off status of LED at COM-09 parameter on the keypad which is SVC, COM, ERR and CPU LED on the LonWorks communication card.
  - The order of SVC, COM, ERR and CPU LED (left -> right) which is on COM-09 FBus LED on the keypad displays the information.

- In orderly SVC, COM, ERR and CPU LED (left -> right) which is the parameter at COM- 09 FBus LED on the keypad displays the information.
- \* COM-09 LED state example



•

SVC LED	COM LED	ERR LED	CPU LED
ON	OFF	ON	OFF

•

#### 4) Neuron ID1~6 (COM-10~12)

Neuron ID is a 6 bytes value which displays the Neuron ID of Neuron Chip on the keypad. The order of COM-10, 11, 12 displays Upper -> Lower information of Neuron ID.

#### 5) Comm UpDate (COM-94)

When modifying the parameter that is related to the configuration variables of the Drive Object on the keypad, you have to set Comm. Update to 'Yes', in order to write it on the communication card. Comm. Update automatically changes to 'No'.

The Keypad parameters to Comm. Update are as follows.

Code	Code Description
DRV-03	Acc. Time
DRV-04	Dec. Time
DRV-18	Base Freq
DRV-19	Start Freq
DRV-20	Max Freq
BAS-11	Pole Number

※ After finishing the commission to LonWorks communication card, you have to set COM-94 Comm.Update 'Yes'. Follow this process, Configuration Property can be applied with the value of the keypad.



✖ If input of the Max. Freq is more than 163.835 % of Base Freq.Max Freq, nciMaxSpeed is applied with 163.835% after Comm. Update.

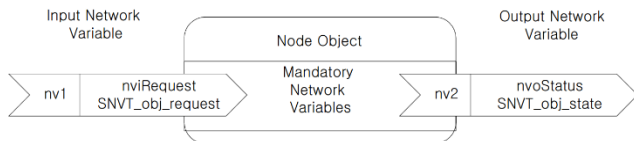
✖ When the first configuration of LonWorks communication car on Lon NetWork through LonMaker, Option-1 trip will be occurred because communication does not complete between inverter and communicated card caused by configuration time of LonMaker itself. After configuration completion, Option-1 Trip will be released by click the RESET button on keypad.

✖ When commissioning, binding (connecting the wire) through LonMaker, it is operated by Network Process of Neuron chip. In this case, Option-1 Trip will be occurred for communication loss time between inverter and LownWorks communication card that the amount of time is same as the time of network process on Neuron chip. Option-1Trip will be released by click the RESET button on keypad.

# FUNCTIONAL PROFILE

8

## Node Object



## Network Input Variables

Function	Variable Name	SNVT Type	Min. Value	Max. Value
Node Object Request	nviRequest	SNVT_obj_request	-	-

### 1) nviRequest

The input variable of nviRequest is used to Enable or Update Command from network. This input variables support RQ\_ENABLE, RQ\_DISABLE, RQ\_CLEAR\_ALARM, RQ\_NORMAL, RQ\_CLEAR\_STATUS, RQ\_UPDATE\_STATUS, RQ\_REPORT\_MASK.

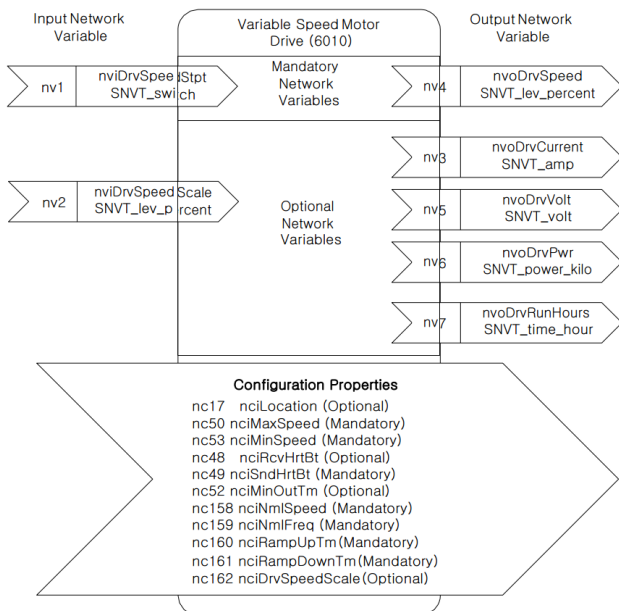
Function	Variable Name	SNVT Type	Min. Value	Max. Value
Node Object Status	nvoStatus	SNVT_obj_status	-	-

### 1) nvoStatus

The output variable 'nvoState' reports Node Object status as follows.

<b>Invalid ID</b>	Invalid node ID requested
<b>Report mask</b>	Reporting supported fields
<b>Disables</b>	If RQ_DISABLE active
<b>Electrical_fault</b>	Drive is faulted
<b>Manual_control</b>	Drive is in local control
<b>In-alarm</b>	Drive has an alarm

## Drive Object



## Network Input Variables

Function	Variable Name	SNVT Type	Min. Value	Max. Value
Drive Speed Setpoint	nviDrvSpeedStpt	SNVT_switch	n/a	n/a
Drive Speed Setpoint Scaling	nviDrvSpeedScale	SNVT_lev_percent	-163.840%	163.835%

- 1) **nviDrvSpeedStpt**
- 2) **nviDrvSpeedScale**

### ➤ Definition

Network input SNVT\_switch      nviDrvSpeedStpt

Network input SNVT\_lev\_percent   nviDrvSpeedScale

### ➤ Description

nviDrvSpeedStpt and nviDrvSpeedScale are used for the inverter run and speed command. The state variable of nviDrvSpeedStpt is a value that decides the command to whether run or stop the inverter. If the state of nviDrvSpeedStpt is 0, the inverter will stop and the inverter will run when the state value is 1.

nviDrvSpeedScale offers information of the operative direction. If a value of the nviDrvSpeedScale is positive, the motor runs clockwise and if the nviDrvSpeedScale is negative, the motor runs counterclockwise.

Frequency command consists of a combination of nviDrvSpeedScale and nviDrvSpeedStpt. nviDrvSpeedScale and nviDrvSpeedStpt are in % units and the multiplied value of the two is the input for the frequency command of Base Freq. nviDrvSpeedScale provides the scale information of nviDrvSpeedStpt value. For example, if nviDrvSpeedStpt is 100%, nviDrvSpeedScale is -80%. The actual speed is -80% ( $1 \times 0.8 = 0.8$ ). Therefore inverter runs counterclockwise at a speed of Base frequency times 0.8. So, If base frequency is 60.00 Hz, the frequency command value would be 48 Hz (60.00 Hz X 0.8). The input range of nviDrvSpeedScale is -163.840% ~ 163.835%. The resolution of nviDrvSpeedScale is 0.005%. If a value more than +163.84% or lower than -163.845% is put in, this value would be a invalid data.

**\*Caution:** If Run command is put in while a combination of nviDrvSpeedScale and nviDrvSpeedStpt is more than nciMaxSpeed, Run command may not operate. In this case, put in the combination value of nviDrvSpeedScale and nviDrvSpeedStpt lower than nciMaxSpeed.

➤ **Variable information of state of NviDrvSpeedStpt**

State	Value	Operation freq. and state of inverter
0	-	Stop
1	0	0% freq. command of Base freq.
1	0.5~100.0	0.5 ~ 100.0 % freq. Command of Base freq.
1	100.0	100.0 % freq. Command of Base freq.
0xFF	-	Auto

When you want to do the run commands or frequency command with LonWorks, you should set up the DRV-06 Cmd source of PAR mode to 'FieldBus' and DRV-07 Freq Ref Src of PAR mode to 'FieldBus' by using keypad.

Code Number/ Common Area Address	Code Description	Initial value	Setting range
DRV-06	Cmd Source	Fx/Rx-1	Keypad
			Fx/Rx-1
			Fx/Rx-2
			Int. 485
			FieldBus
			PLC
DRV-07	Freq Ref Src	Keypad-1	Keypad-1
			Keypad-2
			V1
			I1
			V2

Code Number/ Common Area Address	Code Description	Initial value	Setting range
			I2
			Int. 485
			Encoder
			FieldBus
			PLC

nviDrvSpeedScale Range                    -163.840% ~ +163.835%

nviDrvSpeedScale Default                0.000%

➤ **Inverter parameters of NviDrvSpeedStpt and nviDrvSpeedScale**

Code Number/ Common Area Address	Code Description	Initial value	Setting range
0x0005	Frequency Command	0.00 Hz	0.00 ~ 400.00
0x0006	Run Command	Refer to the description of common area	
DVR-18	Base Frequency	60.00 Hz	30.00 ~ 400.00

**Cf.)** On network input variable, nviDrvSpeedStpt and nviDrvSpeedScale, you may use Lost Command by using nciRcvHrtBt.

## Network Output Variables

Function	Variable Name	SNVT Type	Min. Value	Max. Value
Drive Speed Feedback	nvoDrvSpeed	SNVT_lev_percent	-163.84 %	163.830 %
Actual Motor Current	nvoDrvCurrt	SNVT_amp	0.0 A	3276.6 A
Drive Output Voltage	nvoDrvVolt	SNVT_volt	0.0 V	3276.7 V
Actual Drive Power	nvoDrvPwr	SNVT_power_kilo	0.0 kW	6553.4 kW

Function	Variable Name	SNVT Type	Min. Value	Max. Value
Drive total running hours	nvoDrvRunHours	SNVT_time_hour	0 h	65535 h

## 1) nvoDrvSpeed

### ➤ Definition

Network output SNVT\_lev-percent                      nvoDrvSpeed

### ➤ Description

nvoDrvSpeed outputs the inverter's current operation speed by the percentage value of the base frequency. When the inverter runs clockwise (counterclockwise), the value of nvoDrvSpeed gets a positive (negative) value. For example, if the base frequency is 60.00Hz and the inverter is running counterclockwise with 30.00Hz, nvoDrvSpeed output the value of - 50.00%.

Typical Range                      -163.835 ~ 163.835 % (0.005 %)

### ➤ Inverter parameter of nvoDrvSpeed

Code Number/ Common Area Address	Code Description	Initial value	Setting range
0x000A	Output Frequency	-	
0x000E	Status of Inverter (FWD, REV)		
DRV-18	Base Frequency	60.00 Hz	30.00~400.00

## 2) nvoDrvCurnt

### ➤ Definition

Network output SNVT\_amp                                      nvoDrvCurnt

### ➤ Description

NvoDrvCurnt displays the output current value of the inverter by the unit of Ampere.

➤ **Inverter parameter of nvoDrvCurrt**

Code Number/ Common Area Address	Code Description
0x0009	Current

**3) nvoDrvVolt**➤ **Definition**

Network output SNVT\_volt

nvoDrvVolt

➤ **Description**

nvoDrvVolt displays the output voltage value of the inverter by the unit of Voltage.

Typical Range      -0.0 ~ 700.0 V (0.1 V)

➤ **Inverter parameter of nvoDrvVolt**

Code Number/ Common Area Address	Code Description
0x000B	Output Voltage

**4) nvoDrvPwr**➤ **Definition**

Network output SNVT\_power\_kilo

nvoDrvPwr

➤ **Description**

Output variable of nvoDrvPwr NetWork displays the value of the inverter output power by the unit of kW.

Typical Range      0.0 ~ 6553.4 kW (0.1 kW)



➤ **Inverter parameter of nvoDrvPwr**

Code Number/ Common Area Address	Code Description
MAK-01 0x0001	Inverter Capacity

**5) nvoDrvRunHours**➤ **Definition**

Network output SNVT\_time\_hur

nvoDrvRunHours

➤ **Description**

It displays the whole operation time of inverter.

➤ **Inverter parameter of nvoDrvRun Hours**

Code Number/ Common Area Address	Code Description
0x0342 0x0343	Whole operation time of inverter 0x0342 – per day 0x0343 – per minute

## Network Configuration Variable

Function	Variable Name	Optional/ Mandatory	SNVT Type
Location Label	nciLocation	Optional	SCPTlocation
Maximum Motor Speed	nciMaxSpeed	Mandatory	SCPTmaxSetpoint
Minimum Motor Speed	nciMinSpeed	Mandatory	SCPTminSetpoint
Receive Heartbeat Time	nciRcvHrtBt	Optional	SCPTmaxRcvTime
Send Heartbeat Time	nciSndHrtBt	Mandatory	SCPTmaxSndTime
Minimum Send Time	nciMinOutTm	Optional	SCPTMinOutTime
Nominal Motor Speed in RPM	nciNmI Speed	Mandatory	SCPTnomRPM
Nominal Motor Frequency	nciNmIFreq	Mandatory	SCPTnomFreq
Minimum Ramp Up Time	nciRampUpTm	Mandatory	SCPTrampUPTm

Function	Variable Name	Optional/ Mandatory	SNVT Type
Minimum Ramp Down Time	nciRampDownTm	Mandatory	SCPT rampDownTm
Default Value for nviDrvSpeedScale	nciDrvSpeedScale	Optional	SCPT defScale

**Cf.)** When you modify the parameter that is related with Configuration variable by keypad and set COM-94 Comm Update parameter to 'Yes' the modified value gets written to the configuration variable.

Code Number/ Common Area Address	Code Description	Initial value	Setting range
COM-94	Comm UpDate	No	No Yes

## 1) Location Label (Optional)

### ➤ Definition

Network config input SNVT\_str\_asc                      nciLocation

### ➤ Description

nciLocation uses 6 bytes Location string of Neuron Chip and saves the information of physical location into nciLocation.

Default                      Empty spaces

## 2) Maximum Motor Speed (Mandatory)

### ➤ Definition

Network config input SNVT\_lev\_percent                      nciMaxSpeed

### ➤ Description

nciMaxSpeed is the value to set the max. speed of the motor. nciMaxSpeed is inputted by the percentage of the nominal frequency (nciNmIFreq) configuration value. For example, if nciNmIFreq 60.00 Hz and nciMaxSpeed is 120%, the max. frequency will be converted from % unit to Hz unit and 72.0 Hz (60.0 x 1.2). The value, 72.00 Hz, is written in the DRV-20 Max Freq and it will be shown on the keypad.

nciMaxSpeed value is not able to modify while the inverter runs. You should stop the inverter first then you can modify the nciMaxSpeed.

The initial value of the nciMaxSpeed is the percentage value, which compares to the Base Freq. of DRV-18 and Max. Freq. of DRV-20. Therefore, the initial value of the nciMaxSpeed will be 100.00 %.

nciMaxSpeed must satisfy the formula below.

$$0 \leq \text{Minimum Speed} \leq \text{Maximum Speed} \leq 163.835$$

Typical Range                      100.000 ~ 150.000 % (0.005 %)

Default                                100.000 %

※ As shown above, DRV-20 Max Freq is changed by nciMaxSpeed (% value) of nciNmIFreq. Since 40 ~ 400.00 Hz is setting range of Max. Freq., original setting range is preserved when nciNmIFreq has to change below 40 Hz (ex. nciNmIFreq 30Hz, nciMaxSpeed 100.00 %).

### ➤ Inverter parameter of nciMaxSpeed

Code Number/ Common Area Address	Code Description	Initial value	Setting range
DRV-18	Base Frequency	60.00 Hz	30.00 ~ 400.00
DRV-20	Max Frequency	60.00 Hz	40.00 ~ 400.00

### 3) Minimum Motor Speed (Mandatory)

#### ➤ Definition

Network config input SNVT\_lev\_percent      nciMinSpeed

#### ➤ Description

nciMinSpeed is the value to set the min. speed of the motor. nciMinSpeed is inputted by the percentage of the nominal frequency (nciNmlFreq) configuration value. For example, nciNmlFreq is 60.0 Hz and nciMinSpeed is 10%, the maximum frequency will be 6.0 Hz (60.0 x 0.1). The value, 6.00 Hz, is written in the DRV-19 Start Freq. and it will be shown on the keypad.

nciMinSpeed value is not able to modify while the inverter runs. You should stop the inverter first and then modify the nciMinSpeed value.

The initial value of nciMinSpeed is the percentage value of the Base Freq. of DRV-18 and Start Freq. of DRV-19. Therefore, the initial value of the nciMinSpeed will be 0.83%.

nciMinSpeed must satisfy the formula below.

$$0 \leq \text{Minimum Speed} \leq \text{Maximum Speed} \leq 163.835$$

Typical Range      0.000 ~ 40.000 % (0.005 %)

Default      0.830 %

#### ➤ Inverter parameter of nciMinSpeed

Code Number/ Common Area Address	Code Description	Initial value	Setting range
DRV-18	Base Frequency	60.00 Hz	30.00 ~ 400.00
DRV-19	Start Frequency	0.50 Hz	0.01 ~ 10.00

#### 4) Receive Heart Beat Time (Optional)

##### ➤ Definition

Network config input SNVT\_time\_sec                      nciRcvHrtBt

##### ➤ Description

Decide the maximum update cycle time of the network input variables, nviDrvSpeedStpt and nviDrvSpdScale. If update of of nviDrvSpeedStpt and nviDrvSpdScale does not occur during the (nciRcvHrtBt + PRT-13 Lost Cmd Time) time, it recognizes it as a condition of the communication command loss and starts to run as the mode in the communication command loss of PRT-12 Lost Cmd Mode.

If you want to run with mode which is set in the communication command loss, you have to set the DRV-06 Cmd Source to 'Fieldbus' or the DRV-07 Freq Ref Src to 'Fieldbus' as a value, not the value '0.0 sec' of nciRcvHrtBt. Furthermore, PRT 12 Lost Cmd Mode has to be set the value, not 'None'.

If the value of nciRcvHrtBt is to be set 0.0 sec, the function of communication command loss will be disable.

Typical Range	0.0 ~ 120.0 sec (0.1 sec) Invalid data, when input value 0xFFFF (6553,6 sec)
Default	0.0 sec (not using Receive Heart Beatfunction)

## ➤ Inverter parameter nciRcvHrtBt

Code Number/ Common Area Address	Code Description	Initial value	Setting range
DRV-06	Cmd Source	Fx/Rx-1	Keypad
			Fx/Rx-1
			Fx/Rx-2
			Int. 485
			FieldBus
			PLC
DRV-07	Freq Ref Src	Keypad-1	Keypad-1
			Keypad-2
			V1
			I1
			V2
			I2
			Int. 485
			Encoder
			FieldBus
			PLC
PRT-12	Lost Cmd Mode	None	None
			FreeRun
			Dec
			Hold Input
			Hold Output
			Lost Preset
PRT-13	Lost Cmd Tlme	1.0 sec	0.1~120.0sec

**Caution)** When communicating with LonWorks, communication command loss time of the inverter, (nciRcvHrtBt +PRT-13 Lost Cmd Time) will be applied. If the value of nciRcvHrtBt is to be set 0.0 sec, the function of communication command loss will be disabled.

## 5) Send Heart Beat Time (Mandatory)

### ➤ Definition

Network config input SNVT\_time\_sec                      nciSndHrtBt

### ➤ Description

Variable nciSndHrtBt means the time of update while the value of data has not changed. It determines the maximum output time of network output variables, such as nvoDrvSpeed, nvoDrvCurnt, nvoDrvVolt, nvoDrvPwr, nvoDrvRunHours.

Typical Range	0.0 ~ 6553.5 sec
	Invalid data, when input value 0xFFFF (6553,6 sec)
Dedfault	0.0 sec (ot using Send Heart Beat function)

## 6) Minimum Out Time (Optional)

### ➤ Definition

Network config input SNVT\_time\_sec                      nciMinOUTm

### ➤ Description

It decides the minimum time that network variables, such as nvoDrvSpeed, nvoDrvCurnt, nvoDrvVolt, nvoDrvPwr and nvoDrvRunHours have to wait until they get sent through communication.

The network value does not change by every little variation but it sends out the changed value every nciMinOutTm time. It is used to reduce network traffic.

Typical Range	0.0 ~ 6553.5 sec (0.1 sec)
	Invalid data, when input value 0xFFFF (6553,6 sec)
Default	0.0 sec (not using Minimum Out Time function)

## 7) Nominal Motor Speed in RPM (Mandatory)

### ➤ Definition

Network config input SNVT\_freq:hz                      nciNmISpeed

### ➤ Description

nciNmISpeed sets up the Base freq. of inverter.

The initial value of nciNmISpeed will become 1800.00 rpm because it is converted from DRV- 18 Base Freq into rpm (Base on 60 Hz of the Base Freq and 4 pole number). When the nciNmISpeed value is modified, the value of nciNmISpeed, which is converted from rpm into Hz is reflected in DRV-18 Base Freq.

The below is the formula to convert RPM into Hz. The inverter parameter, BAS-11 Pole Number, means the pole number of the motor. You should set it properly.

$$rpm = \frac{Base\ Freq\ (Hz) \times 120}{number\ of\ poles}$$

Valid Range                      0.0 ~ 6553.5 sec (0.1 sec)

Default                          1800 rpm

### ➤ Inverter parameter of nciNmISpeed

Code Number/ Common Area Address	Code Description	Initial value	Setting range
BAS-11 0x001B	Pole Number	4	2 ~ 48
DRV-18	Base Frequency	60.00 Hz	30.00 ~ 400.00



➤ **Caution**

nciNmIFreq is automatically changed when you modify nciNmISpeed. For example, when nciNmISpeed is 1800 rpm, nciNmIFreq is 60.00 Hz, BAS-11 Pole Number is 4, and if you change nciNmIFreq to 1700 rpm, then nciNmIFreq will be 56.7 Hz (DRV-18 Base Frequency is rounded up) and DRV-18 Base Frequency of keypad will be 56.66 Hz.

DRV-19 Start Frequency and DRV-20 Max Frequency will be changed together when you modify nciNmISpeed and nciNmIFreq. Referring to the above to the above example, if nciMaxSpeed is 100.00 % and nciMinSpeed 10.000%, DRV-19 Start Frequency will be 5.67 Hz and DRV-20 Max Frequency will be 56.66 Hz.

## 8) Nominal Motor Frequency (Mandatory)

➤ **Definition**

Network config input SNVT\_freq\_hz     nciNmIFreq

➤ **Description**

nciNmIFreq sets up the Base Freq of inverter. The nciNmIFreq is an indispensable value to set the minimum (nciMinSpeed) and maximum (nciMaxSpeed) frequency of the motor. (nciMinSpeed and nciMaxSpeed are percentage values of the nciNmIFreq.) The initial value of nciNmIFreq is 60.00Hz, which is same as DRV-18 Base Freq.

Valid Range                      30.0 ~ 400.0 Hz (0.1 Hz)

Default                            60.0 Hz

➤ **Inverter parameter of nciNmIFreq**

Code Number/ Common Area Address	Code Description	Initial value	Setting range
DRV-18	Base Frequency	60.00 Hz	30.00 ~ 400.00

**9) Minimum Ramp Up Time (Mandatory)****➤ Definition**

Network config input SNVT\_time\_sec                      nciRampUpTm

**➤ Description**

nciRampUpTm sets up the acceleration time. 'DRV-03 Acc. Time' value will be changed into nciRampUpTm when nciRampUpTm is modified. The initial value of the nciRampUpTm is same as DRV-03 Acc. Time. Therefore, the initial value is 20.0 sec.

Valid Range                      0.0 ~ 600.0 sec (0.1 sec)

Default                      20.0 sec

**➤ Inverter parameter of nciRampUpTm**

Code Number/ Common Area Address	Code Description	Initial value	Setting range
0x0007/DRV-03	Acc. Time	20.0 sec	0.0 ~ 600.00

**10) Minimum Ramp Down Time (Mandatory)****➤ Definition**

Network config input SNVT\_time\_sec                      nciRampDownTm

**➤ Description**

nciRampDownTm sets up the deceleration time.

Time value will be changed into nciRampDownTm when nciRampDownTm is modified.

The initial value of nciRampDownTm is same as DRV-04 Dcc.Time. Therefore, the initial value is 30.0 sec.

Valid Range                      0.0~600.0 sec (0.1 sec)

Default                      30.0 sec

➤ **Inverter parameter od nciRampDownTm**

Code Number/ Common Area Address	Code Description	Initial value	Setting range
0x0008/DRV-04	Dec. Time	30.0 sec	0.0 ~ 600.00

**11) Default for nviDrvSpeedScale (Optional)**➤ **Definition**

Network config input SNVT\_time\_sec                      nciRampDownTm

➤ **Description**

nciDrvSpeedScale is applied to the initial value of the network output variable, nviDrvSpeedScale.

Valid Range                      -163.840~ +163.835 (0.005 %)

Default                      0.000 %

**Cf.)**

DRV-18 Base Freq, DRV-19 Start Freq, DRV-20 Max Freq, BAS-11 Pole Num, DRV-03 Acc Time, and DRV-04 Dec Time are keypad parameter that are closely related to the configuration property variable of Drive Object, such as nciNmIFreq, nciNmISpeed, nciMaxSpeed, nciMinSpeed, nciRampUPTm, and nciRampDownTm.

To modify DRV-18 Base Freq, DRV-19 Start Freq, DRV-20 Max Freq, BAS-11 Pole Num, DRV-03 Acc Time, and DRV-04 Dec Time by keypad and save them into the configuration property variable, such as nciNmIFreq, nciNmISpeed, nciMaxSpeed, nciMinSpeed, nciRampUPTm, and nciRampDownTm, turn off the inverter and turn it on again or you have to set COM-94 Comm Update to 'Yes'.

For example, if you change the keypad parameters as the table below, nciMaxSpeed is 150.000%, nciMinSpeed is 8.555%, nciNmISpeed is 1370rpm,

nciNmlFreq is 45.7Hz, nciRampUpTm is 19.0 sec, and nciRampDownTm is 29.0 sec.

Code	Parameter name	Value	Code	Parameter name	Code
DRV-03	Acc. Time	19.0 sec	DRV-14	Dec. Time	29.0 sec
BAS-11	Pole Num	4	DRV18	Base Freq	45.68 Hz
DRV-19	Start Freq	3.91 Hz	BAS-20	Max Freq	68.52 Hz

1. nciNmlFreq is down to the first decimal place and DRV-18 is down to the second decimal point place. Therefore, nciNmlFreq is 45.7, because it rounds off at the second decimal place of DRV-18.
2. 
$$nciNmlSpeed = \frac{BaseFreq \times 120}{number\ of\ motor\ poles} - \frac{45.68 \times 120}{4} = 1370rpm$$
3. 
$$nciMaxSpeed = \frac{MaxFreq}{BaseFreq} \times 100(\%) = \frac{68.52}{45.68} \times 100(\%) = 150.000\%$$
4. 
$$nciMinSpeed = \frac{StartFreq}{BaseFreq} \times 100(\%) = \frac{3.91}{45.68} \times 100(\%) = 8.555\% (8.559544 \dots)$$

All the Base Freq used in the calculation uses DRV-18 Base Freq.

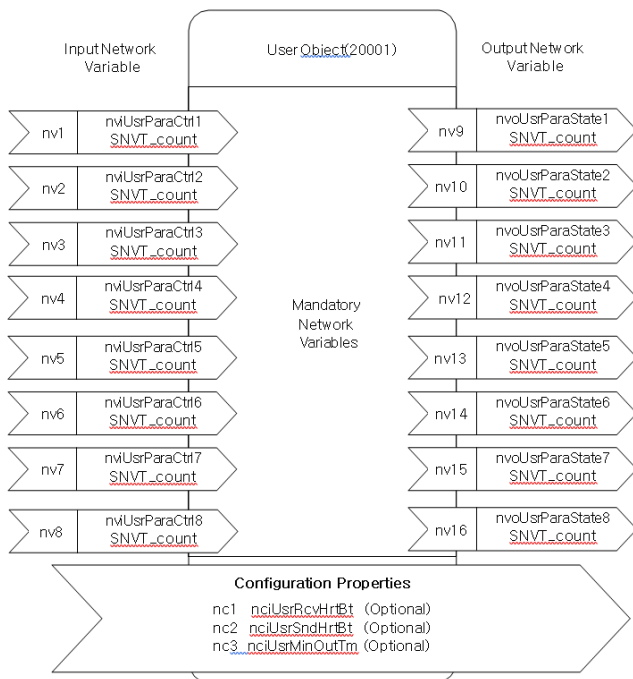
The Max Freq value should not exceed 163.840 % of the Base Freq. The Maximum value of nciMaxSpeed is 163.840%.

Max. value of nciMaxSpeed is 163.835%.

**Cf.)** When motor runs to positive direction (in case of Base Freq is 60Hz), nviDrvSpeedScale is 100% and nviDrvSpeedStpt is 100% as 1, the nciDrvSpeedScale will be changed to 50% therefore nviDrvSpeedScale will be changed to 50% (when monitoring) and motor still runs to positive direction with 60Hz. To apply the changed value, the value of nciDrvSpeedScale will be

applied to 50% after writing the value of `nviDrvSpeedScale` or stop and then run the motor. The motor runs to the positive direction with 30Hz.

## User Object (User Function Profile Type)



## Network Input Variables

Function	Variable Name	SNVT Type	Min. Value	Max. Value
User Parameter Control1	nviUsrParaCtrl1	SNVT_count	0	65535
User Parameter Control2	nviUsrParaCtrl2	SNVT_count	0	65535
User Parameter Control3	nviUsrParaCtrl3	SNVT_count	0	65535
User Parameter Control4	nviUsrParaCtrl4	SNVT_count	0	65535
User Parameter Control5	nviUsrParaCtrl5	SNVT_count	0	65535
User Parameter Control6	nviUsrParaCtrl6	SNVT_count	0	65535
User Parameter Control7	nviUsrParaCtrl7	SNVT_count	0	65535
User Parameter Control8	nviUsrParaCtrl8	SNVT_count	0	65535

### 1) **nviUsrParaCtrl1 ~ nviUsrParaCtrl8**

#### ➤ **Definition**

Network input SNVT\_count nviUsrParaCtrl1 (identical until nviUsrParaCtrl8)

#### ➤ **Description**

nviUsrParaCtrl1 ~ nviUsrParaCtrl8 are added network input variables to provide the LS inverter user with more flexible functions.

The strength of the function is the ability for the user to change the inverter parameter that the user actually wants to change and not the fixed parameter value of the inverter.

When the user puts in the address in parameter COM51 ~ 58 using the keypad, it corresponds one to one to the network variable nviUsrParaCtrl1 ~ nviUsrParaCtrl8 and could change the set up parameter value.

For example, if the user sets COM51 as 0x0005 (freq. setting), COM52 as 0x0006 (Operation command setting) and COM53 as 0x0007 (accelerating time), the user could set the frequency setting through nviUsrParaCtrl1, set the operation command through nviUsrParaCtrl2 and change the accelerating speed through nviUsrParaCtrl3. If you want to make the inverter run counterclockwise at a speed of 60.00 Hz with an accelerating time of 10.00

sec., put in 6000 for nviUsrParaCtrl1, 0x0004 for nviUsrParaCtrl2 and 100 for nviUsrParaCtrl3.

➤ **Inverter parameter of nviUsrParaCtrl1 ~ nviUsrParaCtrl8**

Code Number/ Common Area Address	Code Description	Min. Value	Max. Value
COM-50	Parameter Control Number	8	8
COM-51	Parameter Control 1	0x0005	0~0xFFFF
COM-52	Parameter Control 2	0x0006	0~0xFFFF
COM-53	Parameter Control 3	0x0000	0~0xFFFF
COM-54	Parameter Control 4	0x0000	0~0xFFFF
COM-55	Parameter Control 5	0x0000	0~0xFFFF
COM-56	Parameter Control 6	0x0000	0~0xFFFF
COM-57	Parameter Control 7	0x0000	0~0xFFFF
COM-58	Parameter Control 8	0x0000	0~0xFFFF

※ Cf.) When communicating with LonWorks, the COM-50 User Parameter Control Number gets fixed to 8.

## Network Output Variables

Function	Variable Name	SNVT Type	Min. Value	Max. Value
User Parameter State1	nvoUsrParaState1	SNVT_count	0	65535
User Parameter State2	nvoUsrParaState2	SNVT_count	0	65535
User Parameter State3	nvoUsrParaState3	SNVT_count	0	65535
User Parameter State4	nvoUsrParaState4	SNVT_count	0	65535

Function	Variable Name	SNVT Type	Min. Value	Max. Value
User Parameter State5	nvoUsrParaState5	SNVT_count	0	65535
User Parameter State6	nvoUsrParaState6	SNVT_count	0	65535
User Parameter State7	nvoUsrParaState7	SNVT_count	0	65535
User Parameter State8	nvoUsrParaState8	SNVT_count	0	65535

### 1) **nviUsrParaState1 ~ nviUsrParaState8**

#### ➤ **Definition**

Network output SNVT\_count      nvoUsrParaState1  
(identical until nvoUsrParaState8)

#### ➤ **Description**

nvoUsrParaState1 ~ nvoUsrParaState8 are added network variables to provide the LS inverter user with more flexible functions. The strength of this function is the ability for the user to change the inverter parameter that the user actually wants to monitor and monitor the value of it. Not the fixed parameter value of the inverter.

When the user puts in the address parameter COM31 ~ COM38 using the eypad, it corresponds one to one to the network variable nvoUsrParaState1 ~ nvoUsrParaState8 and the inverter's parameter value gets displayed.

For example, if the user sets COM31 as 0x000A (Output Freq.), COM32 as 0x000B (Inverter Output Voltage) and COM33 as 0x941E (Jog Freq.), the variable nvoUsrParaState1 will display the Output Freq value, the variable nvoUsrParaState2 will display the Inverter Output Voltage and nvoUsrParaState3 will display the Jog Freq. If the inverter runs at a speed of 30.00 Hz, the DC link voltage is 150.0V and if the Jog Freq. is set to 20.00, then would be the value for nviUsrParaState1 is 3000, nviUsrParaState2 is 1500, and nviUsrParaState3 is 2000.



➤ Inverter parameter of **nviUsrParaState1 ~ nviUsrParaState8**

Code Number/ Common Area Address	Code Description	Min. Value	Max. Value
COM-30	Parameter Status Number	8	8
COM-31	Parameter Status 1	0x000A	0~0xFFFF
COM-32	Parameter Status 2	0x000E	0~0xFFFF
COM-33	Parameter Status 3	0x000F	0~0xFFFF
COM-34	Parameter Status 4	0x0000	0~0xFFFF
COM-35	Parameter Status 5	0x0000	0~0xFFFF
COM-36	Parameter Status 6	0x0000	0~0xFFFF
COM-37	Parameter Status 7	0x0000	0~0xFFFF
COM-38	Parameter Status 8	0x0000	0~0xFFFF

※ Cf.) When communicating with LonWorks, the COM-30 Parameter Status Number gets fixed to 8.

## Network Configuration Variables

Function	Variable Name	Optional/ Mandatory	SNVT Type
Receive Heartbeat Time for User Object	nciUsrRcvHrtBt	Optional	SCPTmaxRcvTime
Send Heartbeat Time for User Object	nciUsrSndHrtBt	Optional	SCPTmaxSndTime
Minimum Send Time for User Object	nciUsrMinOutTm	Optional	SCPTMinOutTime

### 1) Receive Heart Beat Time for User Object (Mandatory)

## ➤ Definition

Network config input SNVT\_time\_sec                      nciUsrRcvHrtBt

➤ **Description**

Decide the maximum Update cycle time of the User Object's network input variables, nviUsrParaCtrl1 ~ nviUsrParaCtrl8. If Update of nviUsrParaCtrl1 and nviUsrParaCtrl8 does not occur during the (nciUsrRcvHrtBt + PRT-13 Lost Cmd Time), it recognized as communication command loss and starts to run as the mode set in communication command loss of PRT-12.

If you want to use the communication command loss, you have to set the DRV-06 or DRV-07 as a 'FieldBus', not '0.0 sec' of nciUsrPcvHrtBt. Furthermore, the RRT-12 command lost mode has to be set as a value also.

If the value of nciUsrRcvHrtBt is '0.0 sec', communication command loss function is disabled.

Typical Range            0.0 ~ 120.0 sec (0.1 sec)

Invalid data, when input value is 0xFFFF (6553.6 sec)

Default                    0.0 sec (not using Receive Heart Beat function)

➤ **Inverter parameter of nciUsrRcvHrtBt**

Code Number/ Common Area Address	Code Description	Min. Value	Setting Range
DRV-06	Cmd Source	Fx/Rx-1	Keypad
			Fx/Rx-1
			Fx/Rx-2
			Int. 485
			FieldBus
			PLC
DRV-07	Freq Ref Src	Keypad-1	Keypad-1
			Keypad-2
			V1
			I1
			V2

Code Number/ Common Area Address	Code Description	Min. Value	Setting Range
			I2
			Int. 485
			Encoder
			FieldBus
			PLC
PRT-12	Lost Cmd Mode	None	None
			FreeRun
			Dec
			Hold Input
			Hold Output
			Lost Preset
PRT-13	Lost Cmd Time	1.0sec	0.1~120.0sec

**Caution)** When communicating with LonWorks, communication command loss time of inverter, (nciUsrRcvHrtBt +PRT-13 Lost Cmd Time) value does gets applied. If the value of nciUsrRcvHrtBt is 0.0 sec, communication command loss function is disabled.

## 2) Send Heart Beat Time for User Object (Mandatory)

### ➤ Definition

Network config input SNVT\_time\_sec                      nciUsrSndHrtBt

### ➤ Description

It decides maximum output time of the User Object network output variable, User Object nvoUsrParaState1 ~ nvoUsrParaState8.

Typical Range                      0.0 ~ 6553.5 sec

Invalid data, when input value is 0xFFFF (6553.6 sec).

Default                      0.0 sec (not using Send Heart Beat function)

### 3) Minimum Out Time for User Object (Mandatory)

#### ➤ Definition

Network config input SNVT\_time\_sec                      nciUsrMinOutTm

#### ➤ Description

It decides the minimum time that the User Object network variable, nvoUsrParaState1 ~ nvoUsrParaState8 has to wait until it gets sent through communication.

The network value does not changed by every little variable but it sends out the changed nci UsrMinOutTm time. It is used to reduce network traffic.

Typical Range	0.0 ~ 6553.5 sec (0.1 sec) Invalid data, when input value is 0xFFFF (6553.6 sec)
Default	0.0 sec (not using Minimum Out Time function)

# LED INFORMATION

## 9

There are 4 LED on LonWorks communication card that indicate the present status of the LonWorks communication card and are lined up as follows on it.



LED name	Color	Function
SERVICE	Green	<b>OFF</b> – Indicates that the LonWorks communication card is configured. <b>Flickering (0.5Hz)</b> – Indicates that the communication card is not configured. <b>ON</b> – Indicates SERVICE LED is ON when SVC switch is On. Change the SVC switch to Off. Indicates that the LonWorks communication card has no application and that it is not configured when SERVICE LED is On even though SVC switch is Off.
CPU ERROR	Green Red	<b>CPU, ERROR LED flickering at the same cycle</b> – Indicates the error of CAN communication between LonWorks communication card and . It is able to check the Option error message through keypad.
COMM	Green	<b>OFF</b> – Indicates that LonWorks is not communicating. <b>Flickering</b> – Indicates that it is communicating When COMM LED is flickering, 'On' means that it is transmitting and 'Off' means that it is receiving data.



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