

TOSVERT VF-S11 series

LONWORKS[®] option unit

Communication Function Manual

NOTICE

1. Read this manual before installing or operating the LONWORKS option unit. Keep it in a safe place for reference.
2. All information contained in this manual are subject to change without notice. Please confirm the latest information on TOSVERT series web site "www.inverter.co.jp".

Introduction

Thank you for purchasing the “LONWORKS option unit” for TOSVERT VF-S11 series inverter.




Before using this LONWORKS option unit, carefully read this function manual in order to completely and correctly utilize its excellent performance.

After reading this function manual, please keep it handy for future reference.




For details of its general handling, see an instruction manual attached with the option unit.

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■ Handling in general

 Danger	
 Prohibited	▼ Do not connect or disconnect a network cable while the inverter power is on. It may lead to electric shocks or fire.
 Mandatory	▼ See the instruction manual attached with the option unit for cautions the handling. Otherwise, it may lead to electric shocks, fire, injuries or damage to product.

■ Network control

 Danger	
 Prohibited	▼ Do not send the value out of the valid range to network variables. Otherwise, the motor may suddenly start/stop and that may result in injuries.
 Mandatory	<ul style="list-style-type: none"> ▼ Use an additional safety device with your system to prevent a serious accident due to the network malfunctions. Usage without an additional safety device may cause an accident. ▼ Set up “Communication error trip function (see below)” to stop the inverter when the option unit is deactivated by an unusual event such as tripping, an operating error, power outage, failure, etc. <ul style="list-style-type: none"> - Receive heart beat timer See the “nciRcvHrtBt (Receive Heartbeat Time)” for details. Deactivated option unit may cause an accident, if the “Communication error trip function” is not properly set up. ▼ Make sure that the operation signals are STOP before clearing the inverter fault. The motor may suddenly start and that may result in injuries.

■ Notes on operation

Notes	
	<ul style="list-style-type: none"> ▼ When the control power is shut off by the instantaneous power failure, communication will be unavailable for a while. ▼ The Life of EEPROM is approximately 10000 times. Avoid writing data more than 10000 times to the same parameter of the inverter and configuration properties on LONWORKS option unit.

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1. Scope

1.1. Overview

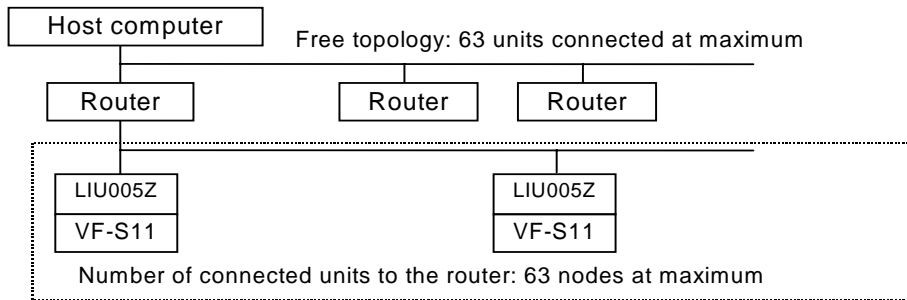
LONWORKS technology is a network control system concept developed by Echelon Corporation, LONWORKS network provides Local Operating Network that is superior in the distributed control. it is featured by peer to peer communication between the LONWORKS nodes. This LONWORKS option is equipped with the LONWORKS Smart Transceiver (Neuron Chip) and LonTalk protocol in its firmware.

This network has following features.

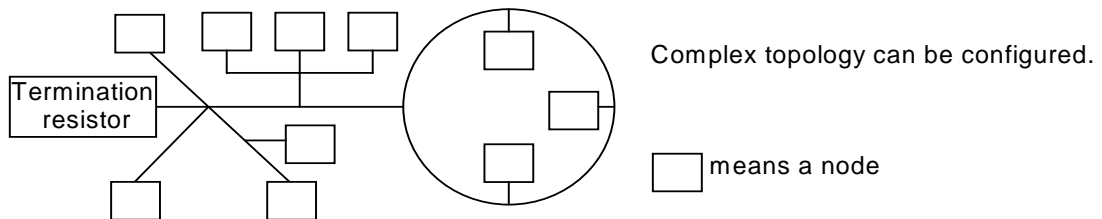
1. Features the merit of distributed control. It enables to configure the network without Host computer.
2. The free topology wiring supported by the TP/FT-10 channel type accommodates bus, star, loop, or several combinations of these topologies.
3. Network construction tools are commercially available, and desirable network environment can be designed.
4. Products of the other manufacturer can also be laid out by open and non-exclusive network.

1.2. System configuration

- Network configuration example



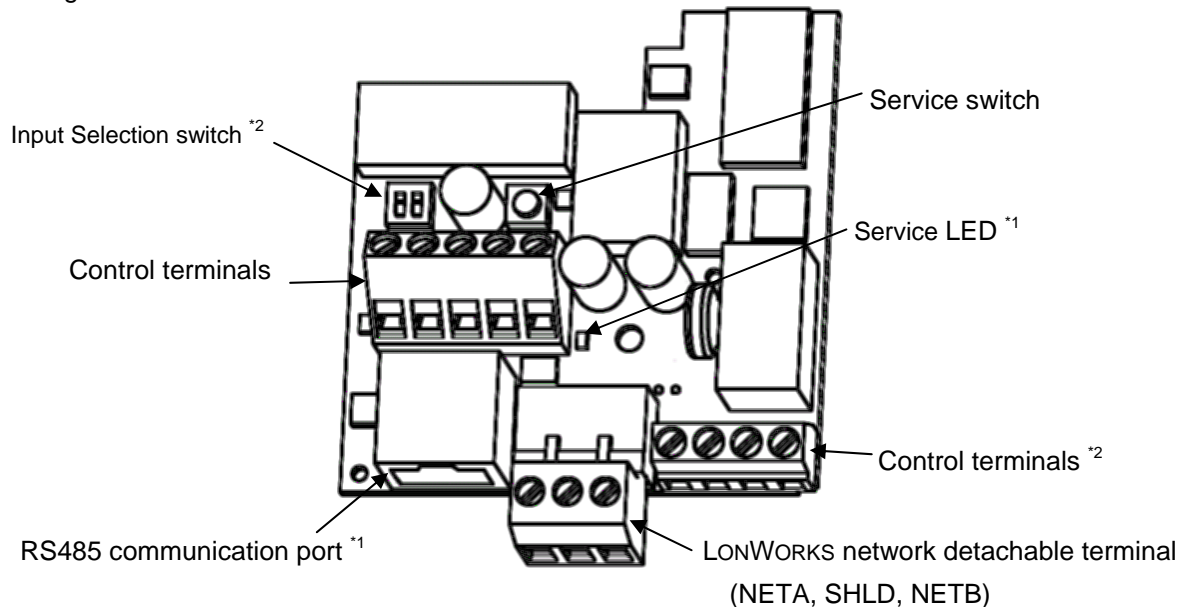
- The free topology wiring example



2. Names and functions of main parts

2.1. Outline view

The drawings below show names of main parts. Refer to each instruction manual for installing and wiring.



*1: Refer to following section.

*2: Refer to LIU005Z instruction manual (E6581465) for details.

2.2. Service pin (Service switch)

Service pin is used for commissioning device. Use SW2 on the option board.

⚠ Danger	
! Mandatory	<ul style="list-style-type: none"> ▼ Operate Service switch only when a cover for the main circuit terminal is attached. Otherwise, it may lead to electric shocks. ▼ Operate Service switch using the non-conductive stick. When it is operated with a conductive stick. Otherwise, it may lead to electric shocks.

2.3. Use of RS485 communication port

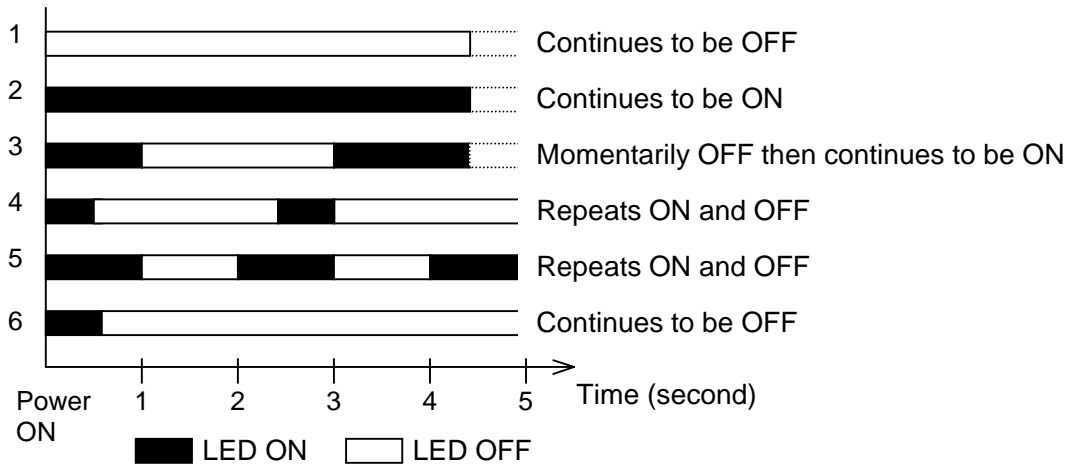
RS485 port is useful for RS485 serial communication option (USB001Z) or Remote Keypad (RKP002Z). Refer to the inverter instruction manual for details.

N.B.:

When a RS485 port is used for RS485 serial communication option, the communication option interrupts and disables the communication line between LONWORKS option unit and the inverter. At that time LONWORKS option unit propagates the abnormality as bit8 in “nvoDrvAlarm.value” to the network. This abnormality will automatically cancel itself if the RS485 serial communication option is disconnected.

2.4. Service LED

Service LED indicates the node condition.



No	Phenomenon	Problem & Solutions
1	Although the inverter is turned on, LED remains OFF.	Check the connection between the inverter and the LONWORKS option unit. If abnormality is not found after checking, it needs to be repaired.
2	LED continues to be ON after the inverter is turned on.	
3	LED is ON then OFF when the inverter is turned on, and it continues to be ON.	Internal application program is abnormal. If the same indication appears after resetting the power, it needs to be repaired.
4	LED flashes every 0.5 second.	
5	LED flashes every 1 second.	This is a normal action of the "Unconfigured" device. If the device is not "Unconfigured", Internal application program is broken. It needs to be repaired.
6	LED momentarily turns ON then continues to be OFF.	When the program is in the condition of "Configures" status, LED momentarily turns ON when the inverter is turned on. Then the LED continues to be OFF for some seconds. The node indicates "Configured" status that means the normal condition.
-	Flicker of LED (Approximately 10Hz to 30Hz)	CPU is abnormal. It needs to be repaired.
-	LED turns ON while holding down service switch.	This is normal action while holding down service switch.

The phone numbers for a service call are listed on the back cover of the inverter instruction manual or on its catalog.

3. Configurations

3.1. Neuron ID

LONWORKS device has the individual Neuron ID. The ID is indicated on the option unit as the barcode (EAN128). Products have 3 sticker labels where the Neuron ID is indicated.

3.2. Device interface (XIF) file

Device interface (XIF) files are the files that define the network-visible interface for one or more LONWORKS devices. The device interface is the interface to a device that is exposed over a LONWORKS network. The device interface includes the device's self-documentation information, the number of address table entries, the number of message tags, and the number, types, and directions of network variables.

XIF file for LIU005Z is distributed on TOSVERT series web site "www.inverter.co.jp".

3.3. Reference parameter of the inverter

Reference parameter of the inverter is listed below.

Title	Name	Description
<i>ACC</i>	Acceleration time	Do not change these parameters, because the LONWORKS option unit using them.
<i>DEC</i>	Deceleration time	
<i>FH</i>	Maximum frequency	
<i>UL</i>	Upper limit frequency	
<i>LL</i>	Lower limit frequency	
<i>CNOd</i>	Command mode selection	Local command (<i>CNOd</i>) and setpoint (<i>FNOd</i>) are used until receiving them from LONWORKS network.
<i>FNOd</i>	Setpoint mode selection	
<i>F111</i> <i>F112</i>	Logic input terminal function	Set proper value if use (See the inverter instruction manual).
<i>F603</i>	Emergency stop selection	For "nviEmergOverride"
<i>F800</i>	Communication baud rate	"4" (19200bps) is recommended for the purpose of earlier reply.
<i>F801</i>	Communication parity	"0" (ODD) or "1" (EVEN) is recommended.
<i>F803</i>	Communication error trip time	Set properly value.
<i>F829</i>	Communication protocol	Set "0" (Toshiba inverter protocol, default value).

Danger

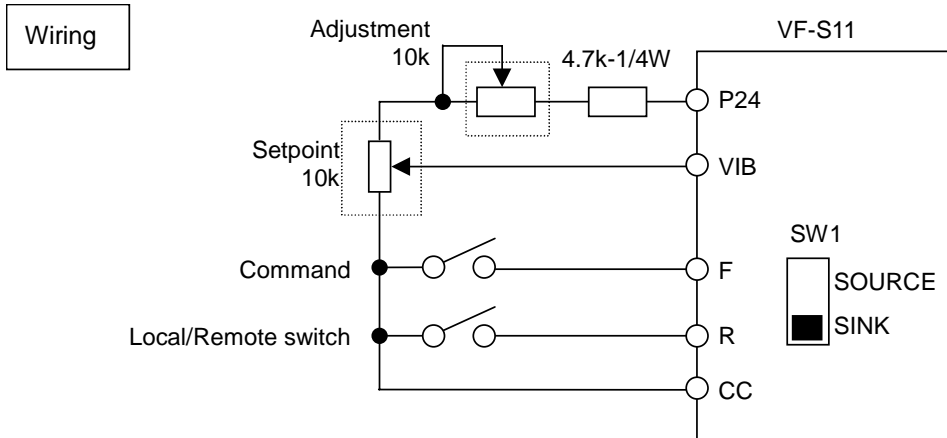


- ▼ Set up "Communication error trip function (*F803*, see the inverter instruction manual for details)" to stop the inverter when this option unit is deactivated by an unusual event such as tripping, an operating error, power outage, failure, etc. Deactivated option unit may cause an accident, if the "Communication error trip function" is not properly set up.

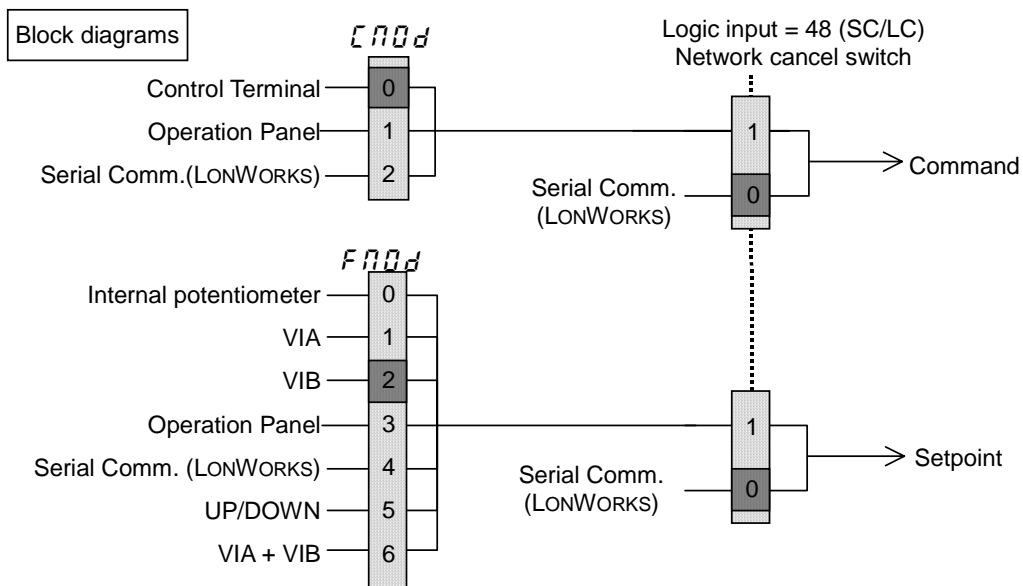
3.4. Command & Setpoint selection (Local/Remote)

In case of switching setpoint and command between Local (terminal) and Remote (LONWORKS network), set the wiring like below figure and set the parameter as follows.

$CNOd = 0$
 $FNOd = 2$
 $F112 = 48$



Note) If using VIB terminal for setpoint input, insert the proper resistor between P24 terminal and setpoint potentiometer, because this option has no PP(10V) terminal.



*1: After the inverter power turned on and reset, $CNOd$ command and $FNOd$ setpoint are activated until setting the command or setpoint from LONWORKS network. Set $CNOd$ and $FNOd$ to "Serial communication" to prevent this problem.

4. Network variables

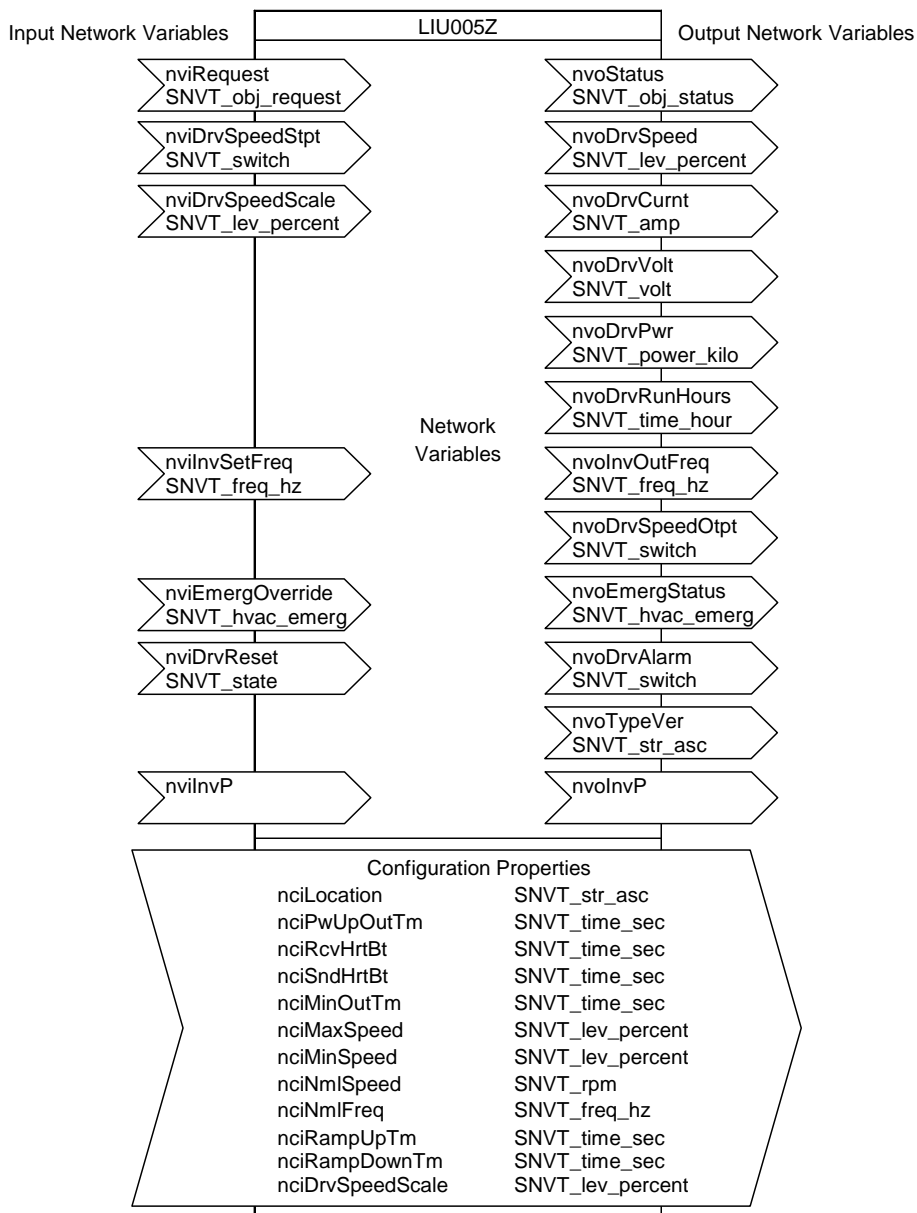
This LONWORKS option has the network variables to set and monitor the status, and the configuration properties to set the configurations.

- Header nci: Configuration properties
- nvi: Input network variables
- nvo: Output network variables

N.B.: Never set the value out of valid range to network variables and configuration properties.

4.1. Object map

This figure shows the LIU005Z object map.



4.2. Network variables list

Below table shows all network variables on LIU005Z.

Index	variable name	SNVT type	Unit	Default value
0	nviRequest	SNVT_obj_request	-----	-----
1	nvoStatus	SNVT_obj_status	-----	-----
2	nciLocation	SNVT_str_asc	Ascii	Null
3	nciPwUpOutTm	SNVT_time_sec	0.1s	0.0s
4	nciRcvHrtBt	SNVT_time_sec	0.1s	0.0s
5	nciSndHrtBt	SNVT_time_sec	0.1s	0.0s
6	nciMinOutTm	SNVT_time_sec	0.1s	0.5s
7	nciMaxSpeed	SNVT_lev_percent	0.005%	100.000%
8	nciMinSpeed	SNVT_lev_percent	0.005%	0.000%
9	nciNmlSpeed	SNVT_rpm	1min ⁻¹	1800min ⁻¹
10	nciNmlFreq	SNVT_freq_hz	0.1Hz	60.0Hz
11	nciRampUpTm	SNVT_time_sec	0.1s	10.0s
12	nciRampDownTm	SNVT_time_sec	0.1s	10.0s
13	nciDrvSpeedScale	SNVT_lev_percent	0.005%	100.000%
14	nviDrvSpeedStpt	SNVT_switch	0.5%,1	{0.0%, -1}
15	nviDrvSpeedScale	SNVT_lev_percent	0.005%	nciDrvSpeedScale
16	nviInvSetFreq	SNVT_freq_hz	0.1Hz	3276.7Hz (Invalid)
17	nviEmergOverride	SNVT_hvac_emerg	binary	EMERG_NORMAL
18	nviDrvReset	SNVT_state	boolean	-----
19	nvoDrvSpeed	SNVT_lev_percent	0.005%	-----
20	nvoDrvCurnt	SNVT_amp	0.1A	-----
21	nvoDrvVolt	SNVT_volt	0.1V	-----
22	nvoDrvPwr	SNVT_power_kilo	0.1kW	-----
23	nvoDrvRunHours	SNVT_time_hour	1h	-----
24	nvoInvOutFreq	SNVT_freq_hz	0.1Hz	-----
25	nvoDrvSpeedOtp	SNVT_switch	0.5%,1	-----
26	nviEmergStatus	SNVT_hvac_emerg	binary	-----
27	nvoDrvAlarm	SNVT_switch	0.5%,1	-----
28	nvoTypeVer	SNVT_str_asc	Ascii	Version
29	nviInvP	specific	-----	-----
30	nvoInvP	specific	-----	-----

4.3. Object status variables

4.3.1. nviRequest (Object Request)

SNVT type: SNVT_obj_request (92)

This is the variable to request the node status response. LONWORKS option unit supports some requests shown in the table below.

Value	Request	Description
0	RQ_NORMAL	Just report "mvoStatus". The state of the object is unchanged.
2	RQ_UPDATE_STATUS	It requests the status of the object to be sent to the "nvoStatus" output network variable. The state of the object is unchanged.
	RQ_REPORT_MASK	It requests a status mask reporting the status bits that are supported by the object to be sent to the "nvoStatus" output network variable. A one bit in the status mask means that the device may set the corresponding bit in the object status when the condition defined for that bit occurs.
10	RQ_CLEAR_ALARM	It requests the alarm state of the object to be cleared. If any alarm conditions are still present for the object, the alarms are reported again as they are detected.

N.B.: This option does not use the object ID, so it works according to the request in spite of received value of object ID.

N.B.: In case that receiving the request other than above, this option unit sets "1" to "invalid_request" bit of "nvoStatus" output network variable.

4.3.2. nvoStatus (Object Status)

SNVT type: SNVT_obj_status (93)

This is the variable to inform the object status. LONWORKS option unit supports some status shown in the table below.

Bit	Request	Description
---	object_id	object_id of requested object
0	invalid_id	Set to "1" if a request is received for an object ID that is not defined in the device. However, this is always "0" because this option does not deal with the ID.
1	invalid_request	Set to "1" if an unsupported request code (RQ_xxx) is received on the "nviRequest" input network variable.
17	in_alarm	Set to "1" if the inverter fault occurred or Communication fault between the LONWORKS option unit and the inverter occurred.
19	report_mask	Set to "1" if an RQ_REPORT_MASK request is received by the "nviRequest" input network variable.

4.4. Configuration properties

4.4.1. nciLocation (Location Label)

SNVT type: SNVT_str_asc (36)

It can be used to provide physical location information.

- Valid Range:

Any NULL (“\0”) terminated ASCII string of 31 bytes total length. In fact 30 bytes are available because Null terminator has to be set the last byte.

- Default Value:

The default value is an ASCII string containing all Null (“\0”).

4.4.2. nciPwUpOutTm (Power up delay time).

SNVT type: SNVT_time_sec (107)

It defines the time until starting transmission after the device powered up (including option reset). It is useful to improve network traffic at power-up.

- Valid range: 0.0 to 300.0 sec (If the value exceed 300.0, the internal value is limited to 300.0 sec)

- Unit: 0.1 sec.

- Default value: 0.0 sec.

4.4.3. nciRcvHrtBt (Receive Heartbeat Time)

SNVT type: SNVT_time_sec (107)



It is used to control the maximum period of time that elapses after the last update of the network variables (“nviDrvSpeedStpt”, “nviDrvSpeedScale”, “nviInvSetFreq”) before detecting the network malfunction and initializing the command and setpoint values. Refer to “5.4:Communication health management” for the inverter behavior in that case.

- Valid range: 0.0 to 6553.4 sec.

- Unit: 0.1s

- Default value: 0.0 sec.

A value of 0.0 sec disables the Receive Heartbeat mechanism.

 Danger	
 Mandatory	<p>▼ Set up “nciRcvHrtBt” to stop the inverter when occurring network abnormality or this option unit is disconnected from network. The option unit out of network control may cause an accident, if “nciRcvHrtBt” is not set up properly.</p>

4.4.4. nciSndHrtBt (Send Heartbeat Time)

SNVT type: SNVT_time_sec (107)

It defines the maximum period of time that expires before the network variables specified for heartbeat in some monitor values will automatically be updated. This timer restarts to count just after sending network variables. Refer to “5.4:Communication health management” for details.

- Valid range: 0.0 to 6553.4 sec.
- Unit: 0.1s
- Default value: 0.0 sec.

A value of 0.0sec disables the automatic update.

4.4.5. nciMinOutTm (Minimum Send Time)

SNVT type: SNVT_time_sec (107)

It defines the minimum period of time between automatic network variable transmissions. This function is prior to “nciSndHrtBt”. This timer starts to count just after sending the last variable. Refer to “5.4:Communication health management” for details.

- Valid range: 0.0 to 6553.4 sec.
- Unit: 0.1s
- Default value: 0.5 sec.

Setting 0.0sec disables transmission limitation.



4.4.6. nciMaxSpeed (Maximum Speed)

SNVT type: SNVT_lev_percent (81)

It is used to define the maximum speed of the inverter output. The value is entered as a percentage of nominal frequency (nciNmIFreq). The value of the maximum speed must be validated against the value of the minimum speed as follows:

- Valid range: $0.000\% \leq \text{minimum speed} \leq \text{maximum speed} \leq 100.000\%$
(Limited within the value of the inverter parameter “ U_L ” limitation)
- Unit: 0.005% (the resolution is depends on the inverter’s specification)
- Default Value: 100.000%

N.B.: After resetting the option, it updates the inverter parameter “ U_L ”.

 Danger	
 Prohibited	<p>▼ Do not set the value out of valid range. Setting the value out of valid range may result in injuries by motor running with unexpected speed.</p>



4.4.7. nciMinSpeed (Minimum Speed)

SNVT type: SNVT_lev_percent (81)

It is used to define the minimum speed of the inverter output. The value is entered as a percentage of nominal frequency (nciNmlFreq). The value of the minimum speed must be validated against the value of the maximum speed as follows:

- Valid range: $0.000\% \leq \text{minimum speed} \leq \text{maximum speed} \leq 100.000\%$
(Limited within the value of the inverter parameter “L L” limitation)
- Unit: 0.005% (the resolution is depends on the inverter’s specification)
- Default Value: 0.000%

N.B.: After resetting the option, it updates the inverter parameter “L L”.

 Danger	
 Prohibited	<ul style="list-style-type: none"> ▼ Do not set the value out of valid range. Setting the value out of valid range may result in injuries by motor running with unexpected speed.

4.4.8. nciNmlSpeed (Nominal Motor Speed in min⁻¹)

SNVT type: SNVT_rpm (102)

It is used to provide the nominal speed of the inverter output in min⁻¹. This value is not used in the option

- Valid range: 0 to 65534 min⁻¹
- Unit: 1 min⁻¹
- Default value: 1800 min⁻¹



4.4.9. nciNmlFreq (Nominal Motor Frequency)

SNVT type: SNVT_freq_hz (76)

This configuration property is used to provide the nominal speed of the inverter output in Hz. This value is used as the base speed on this option.

- Valid range: 30.0 to 500.0 Hz
- Unit: 0.1 Hz
- Default value: 60.0 Hz

N.B.: After resetting the option, it updates the inverter parameter “F H”.

 Danger	
 Prohibited	<ul style="list-style-type: none"> ▼ Do not change this value while the motor is running. Otherwise, It may result in injuries by motor running with unexpected speed. ▼ Do not set the value out of valid range. Otherwise, It may result in injuries by motor running with unexpected speed.

4.4.10. nciRampUpTm (Ramp Up Time)

SNVT type: SNVT_time_sec (107)

It determines the ramp up time of the motor.

- Valid range: 0.1 to 3200.0 sec.
- Unit: 0.1 sec.
- Default value: 10.0 sec.

N.B.: By editing this variable, this option unit changes the inverter parameter “ R_{Σ} ” automatically.

4.4.11. nciRampDownTm (Ramp Down Time)

SNVT type: SNVT_time_sec (107)

It determines the ramp down time of the motor.

- Valid range: 0.1 to 3200.0 sec.
- Unit: 0.1 sec.
- Default value: 10.0 sec.

N.B.: By editing this variable, this option unit changes the inverter parameter “ d_{Σ} ” automatically.

4.4.12. nciDrvSpeedScale (Default value for nviDrvSpeedScale)

SNVT type: SNVT_lev_percent (81)

It is used as the default value for “nviDrvSpeedScale”. When this option unit is initialized, it will be updated.

- Valid range: -163.840 to 163.830%
- Unit: 0.005%
- Default value: 100.000%

4.5. Input network variables

4.5.1. nviDrvSpeedStpt (Drive Speed Setpoint)

SNVT type: SNVT_switch (95)

It provides start/stop control and a low resolution speed setpoint as a percentage of nominal speed.

Output frequency = "nciNmlFreq" x "nviDrvSpeedStpt.value" x "nviDrvSpeedScale"

- Valid range

nviDrvSpeedStpt		Operation
value	state	
N/A	-1	Invalid (default value)
N/A	0	Stop
0.0 to 100.0%	1	Drive at the speed from 0.5% to 100%
100.5 to 127.5%	1	Drive at 100% speed

- Unit (nviDrvSpeedStpt.value): 0.5%

- Default value: 0.0% (value), -1 (state)

Default value will be adopted at power-up and in case of not receiving an update of "nviSpeedStpt", "nviDrvSpeedScale" or "nviInvSetFreq" within the specified Receive Heartbeat time (nciRcvHrtBt).

Speed reference set by "nviInvSetFreq" will override "nviDrvSpeedStpt" (refer to "nviInvSetFreq").

N.B. The value exceeded to the inverter setpoint resolution will be rounded.

4.5.2. nviDrvSpeedScale (Drive Speed Setpoint Scaling)

SNVT type: SNVT_lev_percent (81)

This input network variable provides scaling for "nviDrvSpeedStpt". Negative values indicate a motor direction in reverse.

- Valid range: -163.840 to 163.830%

- Unit: 0.005%

- Default value: "nciDrvSpeedScale"

Default value will be adopted at power-up and in case of not receiving an update of "nviSpeedStpt", "nviDrvSpeedScale" or "nviInvSetFreq" within the specified Receive Heartbeat time (nciRcvHrtBt).

N.B. The value exceeded to the inverter setpoint resolution will be rounded.

4.5.3. nviInvSetFreq (Frequency Setpoint)

Input network variable

SNVT type: SNVT_freq_hz (76)

It provides speed setpoint in Hz. The rotation direction is provided by "nviDrvSpeedScale" (Negative value means in reverse).

- Valid range: 0.0 Hz to 500 Hz

- Unit: 0.1Hz

- Default value: 3276.7Hz (In this case, nviDrvSpeedStpt enables to provide the setpoint)

Default value will be adopted at power-up and in case of not receiving an update of "nviSpeedStpt", "nviDrvSpeedScale" or "nviInvSetFreq" within the specified Receive Heartbeat time (nciRcvHrtBt).

4.5.4. nviEmergOverride (Emergency stop)

SNVT type: SNVT_have_emerg (103)

It provides an emergency stop of the motor. Emergency stop can be configured by Emergency stop selection (F503) to coast stop, slow down stop or emergency DC braking (refer to the inverter instruction manual for details).

- Valid range

Value	Command	Description
0	Remove emergency	EMERG_NORMAL (No Emergency mode)
1	Emergency stop	EMERG_PRESSURIZE (Emergency pressurize mode)
2		EMERG_DEPRESSURIZE (Emergency depressurize mode)
3		EMERG_PURGE (Emergency purge mode)
4		EMERG_SHUTDOWN (Emergency shutdown mode)
5		EMERG_FIRE (Emergency fire mode)
6 to 255		---

N.B.: "Remove emergency" command clears a fault and resets the inverter.

4.5.5. nviDrvReset (Reset command)

SNVT type: SNVT_state (83)

It provides a reset function for the inverter or the option unit. Reset is valid when the variable is sent after setting specified bit.

- Valid range:

Field	Operation
bit0	Reset the inverter (when the inverter is faulted)
bit1	Reset the option unit
bit2 to15	Invalid

N.B.: if both of bit0 and bit1 are set, it resets the option unit.

4.6. Output network variables

4.6.1. Output network variable update

Normally, output network variables are updated when the inverter status was changed. Automatic transmission function is also prepared by “nciSndHrtBt (Send Heartbeat Time)”, “nciMinOutTm (Minimum Send Time)” configuration properties.

See section 5.4 “Communication health management” for detail.

4.6.2. nvoDrvSpeed (Drive Speed Feedback)

SNVT type: SNVT_lev_percent (81)

It provides the motor speed as a percentage of the nominal speed. Negative value means a speed in reverse.

- Valid range: -163.840 to 163.830%
- Unit: 0.005% (The resolution depends on the inverter specification)

N.B.: It indicates the rotating direction at the time of a stop, only when at the time of the operation starts after changing rotating direction. However, the rotating direction of the inverter performs correctly.

4.6.3. nvoDrvCurnt (Drive Output Current)

SNVT type: SNVT_amp (1)

It provides the inverter output current in amperes.

- Valid range: 0.0 to 3276.6 A (It is overwritten 0.0A when the inverter faulted).
- Unit: 0.1 A

4.6.4. nvoDrvVolt (Drive Output Voltage)

SNVT type: SNVT_volt (44)

It provides the inverter output voltage in volt.

- Valid range: 0.0 to 3276.6 V (It is overwritten 0.0V when the inverter faulted).
- Unit: 0.1 V

4.6.5. nvoDrvPwr (Drive Output Power)

SNVT type: SNVT_power_kilo (28)

It provides the inverter output power in kilo-Watt.

- Valid range: 0.0 to 6553.5 kW (It is overwritten 0.0kW when the inverter faulted).
- Unit: 0.1 kW

4.6.6. nvoDrvRunHours (Drive Total Running Hours)

SNVT type: SNVT_time_hour (124)

This output network variable provides the total operation time for the motor in running hours.

- Valid range: 0 to 65534 h (The overflow caused the value to return 0).
- Unit: 1 h

4.6.7. nvoInvOutFreq (Frequency Feedback)

SNVT type: SNVT_freq_hz (76)

It provides the inverter output frequency.

- Valid range: 0.0Hz to 500.0Hz
- Unit: 0.1Hz

4.6.8. nvoDrvSpeedOtp (Inverter drive status)

SNVT type: SNVT_switch (95)

It provides Stopped / Running status and low resolution output speed of the motor.

- Specification

nvoDrvFeedback		Operation
value	state	
N/A	0	Stop
0.0 to 127.5%	1	Drive at 0.0 to 127.5% speed.

N.B.: It is not deal with the speed that exceeds the 127.5%.
The value exceeded to the resolution will be rounded.

4.6.9. nvoEmergStatus (Emergency Status)

SNVT type: SNVT_have_emerg (103)

It provides the response against an emergency stop of the inverter (nviEmergOverride). When the node received "nviEmergOverride" network variable, it propagates the information to the network.

- Valid range

Value	Status	Description
0	Trip release	EMERG_NORMAL (No Emergency mode)
1	Emergency stop	EMERG_PRESSURIZE (Emergency pressurize mode)
2		EMERG_DEPRESSURIZE (Emergency depressurize mode)
3		EMERG_PURGE (Emergency purge mode)
4		EMERG_SHUTDOWN (Emergency shutdown mode)
5		EMERG_FIRE (Emergency fire mode)
6 to 255		---

4.6.10. nvoDrvAlarm (Alarm)

SNVT type: SNVT_switch (95)

It provides the inverter fault.

- Status

nvoDrvAlarm		Status
value	state	
0%	0	No fault
Fault code*1	1	Fault

*1: Lower 7bits show the inverter fault code. As the fault code may be indicated in 0.5% unit on network tool, correct value is twice value as it. 8th bit shows the communication error between the inverter and the option (including RS485 port connection, "1" means abnormal.).

<Example>

In under emergency stop, the fault code of the inverter is set to 0x11 (the method of decimal numeral 17). It is displayed as 17x0.5%=8.5%. When communication is in abnormal state, it is set to 128 because the 8th bit is set to 1, and its value is set to 128x0.5%=64%.

4.6.11. nvoTypeVer (Identification)

SNVT type: SNVT_str_asc (36)

It provides the option software version by Ascii code. The string is ended by Null terminator (“\0”). This variable can be read only with polling.

4.7. Parameter access

4.7.1. nvilnvP (Parameter access command)

It provides the inverter parameter access method. This variable consists of special structure shown in below.

nvilnvP		Description
field	size	
mode_usi	1byte	1: Read 2: Write RAM 3: Write EEPROM
parano_usl	2byte	Parameter communication number (Hex.) ^{*1*2}
paradat_usl	2byte	Parameter data (Hex.) ^{*2}

*1: Refer to the inverter instruction manual for detail of communication number. It is shown as hexadecimal value on the manual.

*2: “parano_usl” and “paradat_usl” is shown as most significant byte and least significant byte on the network tool.

4.7.2. nvolnvP (Parameter access reply)

It provides the inverter parameter access response. This variable consists of special structure shown in below.

nvolnvP		Description
field	size	
mode_usi	1byte	1: Read 2: Write RAM 3: Write EEPROM FFh: Abnormal access ^{*3}
parano_usl	2byte	Parameter communication number (Hex.) ^{*1*2}
paradat_usl	2byte	Parameter data (Hex.) ^{*2}

*1: Refer to the inverter instruction manual for detail of communication number. It is shown as hexadecimal value on the manual.

*2: “parano_usl” and “paradat_usl” is shown as most significant byte and least significant byte on the network tool.

*3: When “FFh” command (abnormal access) is returned, the value of “paradat_usl” field is invalid.

4.7.3. Parameter access method

- Example 1: Read access

A controller node reads the value of Input terminal information (address *F 4 0 5*). Now, Only R terminal turns ON (value equals 0002h). The controller node sends/receives the following data.

field	Transmit (nvlInvP)	Receive (nvlInvP)
mode_usi	1	1
parano_usl	FD06h	FD06h
paradat_usl	0000h	0002h

- Example 2: Write access

In case of controlling FL relay terminal, the controller node writes *F A 5 0* parameter (In this case, set *F 1 3 2* = 38 before the access). The data value is 0001 hex. The controller node sends/receives the following data.

field	Transmit (nvlInvP)	Receive (nvlInvP)
mode_usi	2	2
parano_usl	FA50h	FA50h
paradat_usl	0001h	0001h

- Example 3: Illegal access

Illegal data is written to the inverter parameter *F 1 7 1*, (Base frequency voltage, address 0171). The upper limit value is 330.0V (200V class). In case of writing 360.0V, the unit of this parameter is 0.1V and the data value is converted to hexadecimal, so the value is 0E10 hex. The controller node sends/receives the following data.

field	Transmit (nvlInvP)	Receive (nvlInvP)
mode_usi	3	FFh
parano_usl	0171h	0171h
paradat_usl	0E10h	xxxx

5. Example usage

5.1. Procedure

Lower example shows the procedure to send the 100% speed drive command to the inverter.

1. Commission

Make a network tool to identify this option by using service pin function (refer to network tool manual in detail).

2. Binding

Refer to next section.

3. Configurations

Set correct value into the configuration properties.

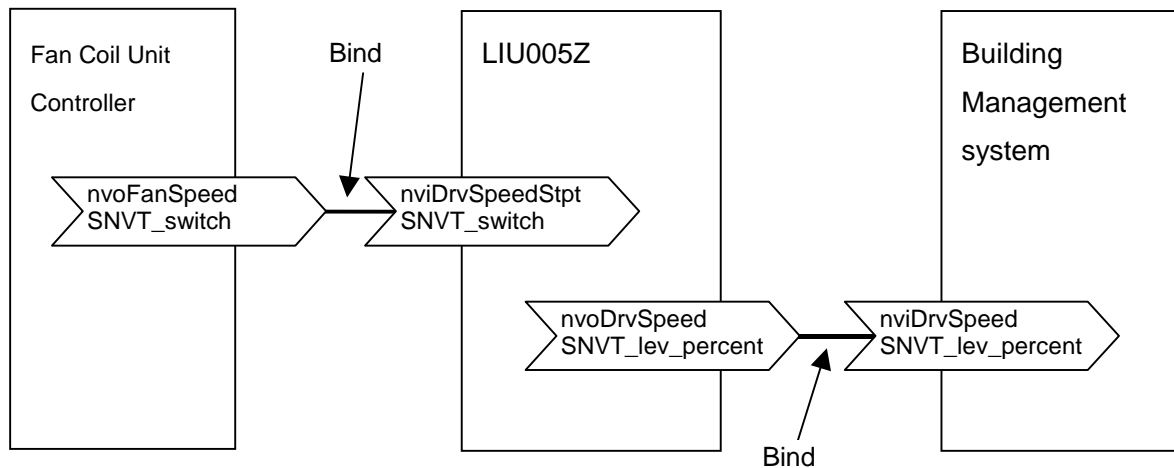
4. Drive command and setpoint

Set the {200, 1} (100% speed drive) into the nviDrvSpeedStpt and propagate it.

5.2. Binding

Network variable bound to the other network variable can transmit/receive the data. "Binding" can be made by network tool. Network variable has a direction (Input/Output) and individual type (SNVT_type). Binding to the same direction variable or the different type is prohibited.

■ Example connection



5.3. Option unit reset method

There are 3 methods to reset the option unit.

1. Cycle the inverter power source.
2. Use reset command by network tool.
3. Use reset command by nviDrvReset network variable.

5.4. Communication health management

This option unit has communication health management function.

1. Communication time out function (nciRcvHrtBt)

This value manages the communication time out function. This option unit would initialize the drive command/setpoint variables and try to stop the motor in case of not receiving an update of the following variables within the specified Receive Heartbeat time (nciRcvHrtBt).

- nviDrvSpeedStpt
- nviDrvSpeedScale
- nviInvOutFreq

In this case, the inverter controls to stop the motor.

2. Node health transmission function (nciSndHrtBt, nciMinOutTm)

This option unit informs the network manager to its own health. Network variables controlled by this function are shown in the table below.

Variable name	nciSndHrtBt	nciMinOutTm
nvoStatus	----	----
nvoDrvSpeed	v	v
nvoDrvCurnt	v	v
nvoDrvVolt	v	v
nvoDrvPwr	v	v
nvoDrvRunHours	v	v
nvoInvOutFreq	v	v
nvoDrvSpeedOtp	v	v
nvoEmergStatus	----	----
nvoDrvAlarm	v	v
nvoTypeVer	----	----
nvoInvP	----	----

v: controlled by nciSndHrtBt and nciMinOutTm

6. Specifications

Item	Specification	Description
Number of domains	2	
Number of address entries	31	
Number of alias tables	8	
Communication transceiver	Free topology transceiver TP/FT-10 channel type	ANSI/EIA/CEA 709.3
Baudrate	78kbps	
Protocol	LonTalk	ANSI/EIA 709.1
Communication signal	2 wires and shield	NETA, Shield, NETB
Transmission distance	Free topology: Between devices: 400m or less Total cable length: 500m or less Bus topology (both terminated): Total cable length: 1400m or less Stub length: 3m or less	When recommended cable is used: Level 4/22AWG
Number of Network variables	Input network variables: 7 Output network variables: 12 Configuration properties: 12	
Number of connected nodes	64 nodes at maximum / segment	However, a host and a router are counted as one node.
Service pin function	Mechanical switch (SW2)	Used for notification of Neuron ID to the host.
Terminal block	Detachable terminal block 3-pole	Applicable terminal block Manufacturer: PHOENIX CONTACT Type-Form : MSTB 2,5/3-ST-5,08