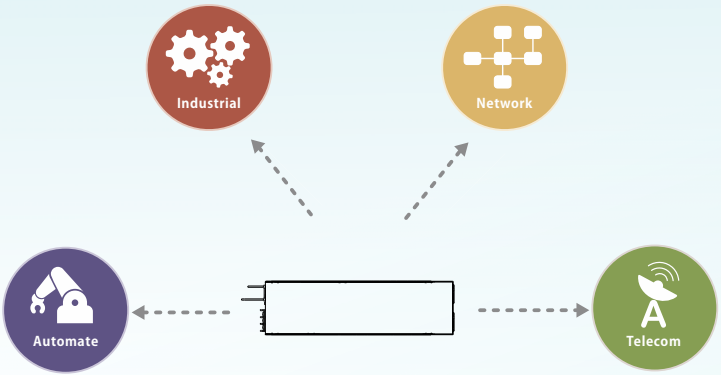
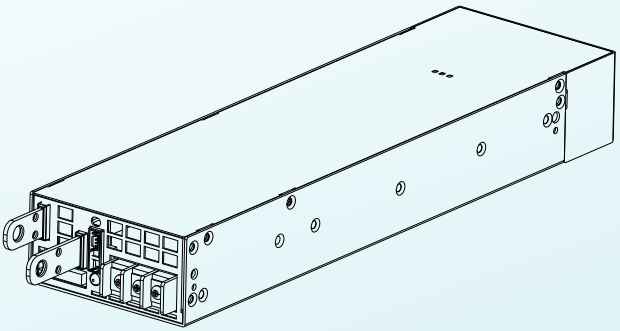
NSP-1600 Communication Note



1600W AC/DC High Reliable Industrial Enclosed Type Power Supply

- *Output voltage 40~125% programmable*
- *Built-in constant current limiting circuit*



Contents

2025.06 Ver 0

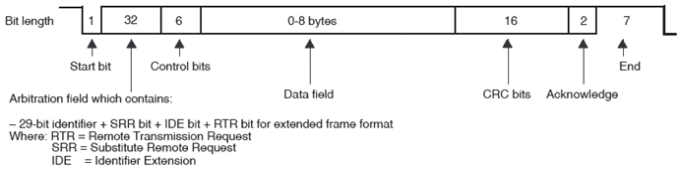
1.CANBus Communication Interface

- Physical layer specification

  This protocol follows CAN ISO-11898 with Baud rate of 250Kbps.

- Data Frame

  This protocol uses Extended CAN 29-bit identifier frame format or CAN2.0B.

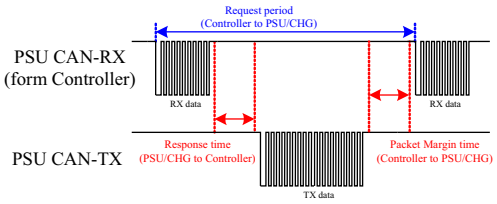


- Communication Timing

  Min. request period (Controller to NSP-1600): 50mSec。

  Max. response time (NSP-1600 to Controller): 12.5mSec。

  Min. packet margin time (Controller to NSP-1600): 12.5mSec。



- Data Field Format

  Controller to NSP-1600

  Write: please refer to section 4.1 for an actual

  Data filed bytes

0	1	2	3
COMD. low byte	COMD. high byte	Data low byte	Data high byte

  Read: please refer to section 4.2 for an actual example

  Data filed bytes

0	1
COMD. low byte	COMD. high byte

NSP-1600 to Controller

Response: please refer to section 4.2 for an actual example

Data filed bytes

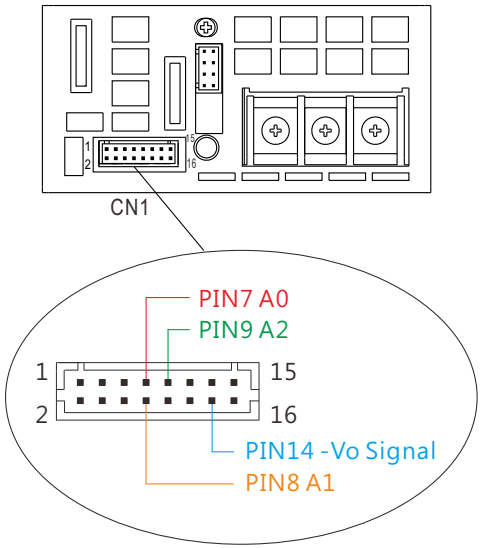
0	1	2	·····	7
COMD. low byte	COMD. high byte	Data low 1		Data high 6

NOTE: NSP-1600 will not send data back when writing parameters, such as VOUT_SET

2.Message ID definition

Message ID	Description
0x000C00XX	NSP-1600 to Controller Message ID
0x000C01XX	Controller to NSP-1600 Message ID
0x000C01FF	Controller broadcasts to NSP-1600

XX represents the CAN ID, which can be assigned through A0, A1, and A2 bits. These three bits are defined through PIN7 (A0), PIN8 (A1) and PIN9 (A2) on CN1. There are up to 8 different addresses are available to be assigned. When connecting one of these pins, for example, PIN8 with PIN14 (-Vo(Signal)), the corresponding bit, A1, is set to logic "0"; when it is left open, for instance, PIN7, the corresponding bit, A0, is set to logic "1". Please refer to the below table for detailed setup.



Module No.	Device address		
	A0	A1	A2
	Control Pin No.		
	7	8	9
0	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
7	1	1	1

3.CANBus Command list

Command Code	Command Name	Transaction Type	# of data Bytes	Description
0x0000	OPERATION	R/W	1	ON/OFF control
0x0020	VOUT_SET*	R/W	2	Output voltage set (Factor=0.1)
0x0030	IOUT_SET*	R/W	2	Output current set (Factor=0.1)
0x0040	FAULT_STATUS	R	2	Abnormal status
0x0050	READ_VIN	R	2	Input voltage read value (Factor=0.1)
0x0060	READ_VOUT	R	2	Output voltage read value (Factor=0.1)
0x0061	READ_IOUT	R	2	Output current read value (Factor=0.1)
0x0062	READ_ TEMPERATURE_1	R	2	Internal ambient temperature (Factor=0.1)
0x0070	READ_FAN_SPEED_1	R	2	Fan speed 1 reading value (Factor=1)
0x0071	READ_FAN_SPEED_2	R	2	Fan speed 2 reading value (Factor=1)
0x0080	MFR_ID_B0B5	R	6	Manufacture's name
0x0081	MFR_ID_B6B11	R	6	Manufacture's name
0x0082	MFR_MODEL_B0B5	R	6	Manufacture model name
0x0083	MFR_MODEL_B6B11	R	6	Manufacture model name
0x0084	MFR_REVISION_B0B5	R	6	Firmware version
0x0085	MFR_LOCATION_B0B2	R/W	3	Manufacture place
0x0086	MFR_DATE_B0B5	R/W	6	Manufacture date
0x0087	MFR_SERIAL_B0B5	R/W	6	Manufacture serial number
0x0088	MFR_SERIAL_B6B11	R/W	6	Manufacture serial number
0x00C0	SCALING_FACTOR	R	6	Scaling ratio
0x00C1	SYSTEM_STATUS	R	2	System status
0x00C2	SYSTEM_CONFIG	R/W	2	System configuration

Note: Setting commands with * at the end support the EEP_OFF function.
For detailed information on how to enable them, please refer to SYSTEM_CONFIG (0x00C2).

Data conversion:
The calculation for setting and reading values is defined as:
Actual Value = Communication Read Value × Factor Value,
where the factor value is used for both writing and reading during communication for data conversion. Each command may have a different factor value, which can be found in the command list or retrieved from the SCALING_FACTOR (0x00C0) command.
For Example:
Vo_real (actual DC voltage) = READ_VOUT x Factor.
If the Factory of READ_VOUT of a certain mode is 0.1, the communication reading value is 0x00F0(hexadecimal)→240(decimal), then VDC_real = 240 x 0.1 = 24.0V.

◎Definition of FAULT_STATUS (0x0040) :

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
High byte	-	-	-	-	-	-	-	-
Low byte	HI_TEMP	OP_OFF	AC_FAIL	SHORT	OLP	OVP	OTP	FAN_FAIL

Low byte

Bit 0 FAN_FAIL : Fan locked flag
0 = Working normally
1 = Fan locked

Bit 1 OTP : Over temperature protection
0 = Internal temperature normal
1 = Internal temperature abnormal

Bit 2 OVP : DC over voltage protection
0 = DC voltage normal
1 = DC over voltage protected

Bit 3 OLP : DC over current protection
0 = DC current normal
1 = DC over current protected

Bit 4 SHORT : Short circuit protection
0 = Shorted circuit do not exist
1 = Shorted circuit protected

Bit 5 AC_FAIL : AC abnormal flag
0 = AC input range normal
1 = AC input range abnormal

Bit 6 OP_OFF : DC status
0 = DC output turned on
1 = DC output turned off

Bit 7 HI_TEMP：Internal high temperature alarm
0 = Internal temperature normal
1 = Internal temperature abnormal

Note: Unsupported settings displays with "0"

◎MFR_ID_B0B5 (0x0080) is the first 6 codes of the manufacturer's name (ASCII); MFR_ID_B6B11 (0x0081) is the last 6 codes of the manufacturer's name (ASCII)
EX: Manufacturer's name is MEANWELL MFR_ID_B0B5 is MEANWE ;
MFR_ID_B6B11 is LL

MFR_ID_B0B5					
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0x4D	0x45	0x41	0x4E	0x57	0x45

MFR_ID_B6B11					
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0x4C	0x4C	0x20	0x20	0x20	0x20

◎MFR_MODEL_B0B5 (0x0082) is the first 6 codes of the manufacturer's model name (ASCII); MFR_MODEL_B6B11 (0x0083) is the last 6 codes of the manufacturer's model name (ASCII)
EX: Model names is NSP-1600-48 → MFR_MODEL_B0B5 is NSP-16 ;
MFR_MODEL_ B6B11 is 00-48

MFR_MODEL_B0B5					
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0x4E	0x43	0x50	0x2D	0x31	0x36

MFR_ID_B6B11					
Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
0x30	0x30	0x2D	0x34	0x38	0x20

◎MFR_REVISION_B0B5 (0x0084) is the firmware revision (hexadecimal). A range of 0x00 (R00.0)~0xFE (R25.4) represents the firmware version of an MCU; 0xFF represents no MCU existed.
EX: The supply has two MCUs, the firmware version of the MCU number 1 is version R25.4 (0xFE), the MCU number 2 is version R10.5 (0x69)

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0xFE	0x69	0xFF	0xFF	0xFF	0xFF

◎MFR_DATE_B0B5 (0x0086) is manufacture date (ASCII)
EX: MFR_DATE_B0B5 is 180101, meaning 2018/01/01

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0x31	0x38	0x30	0x31	0x30	0x31

◎MFR_SERIAL_B0B5 (0x0087) and MFR_SERIAL_B6B11 (0x0088) are defined as manufacture date and manufacture serial number (ASCII)
EX: The first unit manufactured on 2018/01/01→MFR_SERIAL_B0B5: 180101 ; MFR_SERIAL_B6B11: 000001

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0x31	0x38	0x30	0x31	0x30	0x31

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
0x30	0x30	0x30	0x30	0x30	0x31

◎SCALING_FACTOR(0x00C0) :

Bit7~Bit0								
byte4~5	Reserved							
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
byte3	Reserved				Reserved			
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
byte2	Reserved				TEMPERATURE_1 Factor			
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
byte1	FAN_SPEED Factor				VIN Factor			
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
byte0	IOUT Factor				VOUT Factor			

byte0:
Bit 0:3 VOUT Factor：The factor of output voltage
0x0=Output voltage relevant commands not supported
0x4=0.001
0x5=0.01
0x6=0.1
0x7=1.0
0x8=10
0x9=100

Bit 4:7 IOUT Factor：The Factor of DC current
0x0=Output current relevant commands not supported
0x4=0.001
0x5=0.01
0x6=0.1
0x7=1.0
0x8=10
0x9=100

byte1:
Bit 0:3 VIN Factor：The Factor of AC input voltage
0x0=AC input relevant commands not supported
0x4=0.001
0x5=0.01
0x6=0.1
0x7=1.0
0x8=10
0x9=100

Bit 4:7 FAN_SPEED Factor：The Factor of fan speed
0x0=Fan speed relevant commands not supported
0x4=0.001
0x5=0.01
0x6=0.1
0x7=1.0
0x8=10
0x9=100

byte2:
Bit 0:3 TEMPERATURE_1 Factor：The Factor of internal ambient temperature
0x0=internal ambient temperature relevant commands not supported
0x4=0.001
0x5=0.01
0x6=0.1
0x7=1.0
0x8=10
0x9=100

◎SYSTEM_STATUS(0x00C1)：

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
High byte	-	-	-	-	-	-	-	-
Low byte	-	EEPER	INITIAL_ STATE	-	-	-	DC_OK	M/S

Low byte
Bit 0: M/S : Parallel mode status
0 = Current device is Slave
1 = Current device is Master

Bit 1 DC_OK：Secondary DD output voltage status
0 = Secondary DD output voltage status TOO LOW
1 = Secondary DD output voltage status NORMAL

Bit 5 INITIAL_STATE：Device initialized status
0 = NOT in initialization status
1 = In initialization status

Bit 6 EEPER：EEPROM data access error
0 = EEPROM data access normal
1 = EEPROM data access error

Note: Unsupported settings displays with "0"

◎SYSTEM_CONFIG(0x00C2)：

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
High byte	-	-	-	-	-	EEP_OFF	-	-
Low byte	-	-	-	-	-	OPERATION_INIT		CAN_CTRL

Low byte:

Bit 0 CAN_CTRL：CANBus communication control status

0 = The output voltage/current defined by control over SVR/PV/PC

1 = The output voltage, current, ON/OFF control defined by control over CANBus (VOUT_SET, IOUT_SET, OPERATION)

Bit 1:2 OPERATION_INIT：Pre-set value of power on operation command

0b00 = Power OFF, pre-set 0x00(OFF)

0b01 = Power ON, pre-set 0x01(ON)

0b10 = Pre-set is previous set value

0b11 = not used, reserved

High byte:

Bit 2 EEP_OFF:EEPROM storage function ON/OFF

0: Enable. Parameters to be saved into EEPROM (factory default)

1: Disable. Parameters NOT to be saved into EEPROM

Note: Unsupported settings displays with "0"

4.Communication Examples

The following provides examples of command sending and data and reading for the CANBus protocol.

4.1 Sending command

The master adjusts output voltage of the unit with address "01" to 30V.

CAN ID	DLC (data length)	Command code	Parameters
0x000C0101	0x4	0x2000	0x2C01

Command code: 0x0020 (VOUT_SET) → 0x20(Lo) + 0x00(Hi)

Parameters: 30V → 300 → 0x012C → 0x2C(Lo) + 0x01(Hi)

NOTE: Conversion factor for VOUT_SET is 0.1, so $\frac{30V}{F=0.1}$ =300

4.2 Reading data or status

The master reads operation setting from the unit with address "00".

CAN ID	DLC (data length)	Command code
0x000C0100	0x2	0x0000

The unit with address "00" returns data below

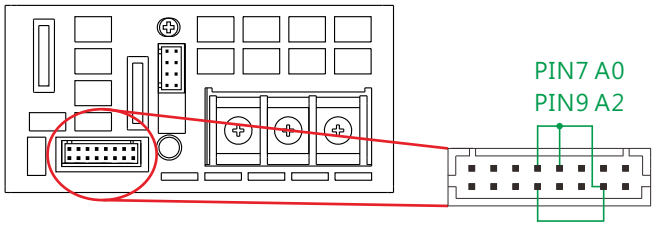
CAN ID	DLC (data length)	Command code	Parameters
0x000C0000	0x3	0x0000	0x01

Parameters: 0x01 ON, meaning that the unit with address "00" is operating.

4.3 Communication Example - Practical Operation

The following steps will describe how to set the NSP-1600-48 to 56V.

1.Set the ID of the power supply to "0". Connect the A0(PIN7), A1(PIN8) and A3(PIN9) to –Vo Signal(PIN14), all on the CN1.



2.Connect the CANH/CANL pins of the master to the corresponding CANH(PIN7) and CANL(PIN8)pins of the CN2 connector on the power supply. It is recommended to establish a common ground for the communication system to increases its communication reliability by using GND-AUX (PIN2) of CN1.

◎Set baud rate: 250kbps, type: extended

◎Adding a 120Ω terminal resistor to both the controller and power supply ends can increase communication stability

3.Communication function can be accessed immediately after the power supply is connected to AC. First set it to communication mode.

CAN ID	DLC(data length)	Command Code	Parameters
0x000C0100	0x04	0xC200	0x0300

Command code: 0x00C2 (SYSTEM_CONFIG)
Data: 03(Lo) + 00(Hi)。Please refer to definition of SYSTEM_CONFIG for detailed information.

4.Set output voltage at 56V.

CAN ID	DLC(data length)	Command Code	Parameters
0x000C0100	0x04	0x2000	0x3002

Command code: 0x0020(VOUT_SET)
Data: 56V → 560 → 0x0230 → 0x30(Lo) + 0x02(Hi)
NOTE: Conversion factor for VOUT_SET is 0.1, so $\frac{56V}{F=0.1}$ =560

5.It is recommended to review all of the settings and parameters using the appropriate commands. In the event that they do not meet your requirements, you may rewrite them as needed. EX: Read VOUT_SET to check whether output voltage was set to a proper level.

Read VOUT_SET

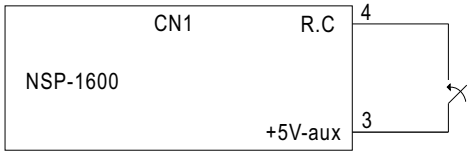
CAN ID	DLC(data length)	Command Code
0x000C0100	0x02	0x2000

The unit returns data below

CAN ID	DLC(data length)	Command Code	Parameters
0x000C0000	0x04	0x2000	0x3002

Data: 0x30(Lo) + 0x02(Hi) → 0x0230 → 560 x 0.1= 56V

6.Finally, check whether R.C (PIN4) and +5V-aux (PIN3) pins of the CN1 connector are short circuited if there is no output voltage.



5.Value Range and Tolerance

(1)Display parameters

Table 5-1

Command Name		Model	Display value range	Tolerance
0x0050	READ_VIN	ALL	80~264V	±10V
0x0060	READ_VOUT	12V	0~15V	±0.18V
		24V	0~30V	±0.36V
		36V	0~45V	±0.4V
		48V	0~60V	±0.48V
0x0061	READ_IOUT (Note. ii)	12V	0~150A	±2.5A
		24V	0~80A	±1.34A
		36V	0~53.4A	±0.89A
		48V	0~40A	±0.67A
0x0062	READ_ TEMPERATURE_1	ALL	-40~110℃	±5℃
0x0070	READ_FAN_SPEED_1	ALL	0 ~ 26500 RPM	±2000 RPM
0x0071	READ_FAN_SPEED_2	ALL	0 ~ 26500 RPM	±2000 RPM

(2)Control parameters

Table 5-2

Command Name		Model	Adjustable range	Tolerance	Default
0x0000	OPERATION	ALL	00h(OFF)/01h(ON)	N/A	ON
0x0020	VOUT_SET	12V	7.2 ~ 15V	±0.18V	12V
		24V	9.6 ~ 30V	±0.36V	24V
		36V	14.4 ~ 45V	±0.4V	36V
		48V	19.2 ~ 60V	±0.48V	48V
0x0030	IOUT_SET	12V	25~137.5A	±2.5A	137.5A
		24V	13.4~73.7A	±1.34A	73.7A
		36V	8.9~49A	±0.89A	49A
		48V	6.7~36.9A	±0.67A	36.9A
0x00C2	SYSTEM_ CONFIG	ALL	N/A	N/A	02h

Note:

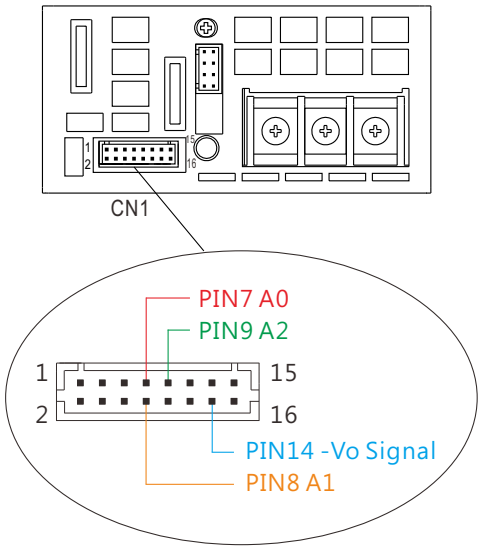
i.READ_IOUT will display ZERO amp when output current is less than values in the table below.

Model	Minimum readable current
12V	5A±1A
24V	2.7A±1A
36V	1.8A±1A
48V	1.3A±1A

ii. Due to the limited write cycles of the EEPROM, it is advisable to consider using the SYSTEM_CONFIG (0x00C2) command to select an appropriate EEPROM writing logic, especially if communication settings are frequently altered.

6.Factory Resetting

- Users can follow the steps below to restore factory settings for commands 0x0000, 0x0020, 0x0030, 0x00C2
- Reset to factory settings :
  ① Connect CN1's PIN 7/8/9 to CN1's PIN14.
  ② Power on in REMOTE OFF mode (no output at this step)
  ③ Within 15 seconds, disconnect CN1's PIN 7/8/9 from CN1's PIN14 → connect CN1's PIN 7/8/9 to CN1's PIN14 again.
  ④ Green LED will flash 3 times if set successfully.
  ⑤ If the EEPROM storage function was DISABLE (high byte bit 2 set to "logic 1" in SYSTEM_CONFIG(0x00C2)), please perform step ①-④ again to fully restore the parameters back to factory settings.



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