XP Power HDA
Communication Protocol

Revision 1.0, 6th February 2025

XP Power

POWERING THE WORLD'S CRITICAL SYSTEMS

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1. HDA MODBUS (-MOD)

1-1. Overview

HDA series use MODBUS protocol with RS-485 physical layer for communication.

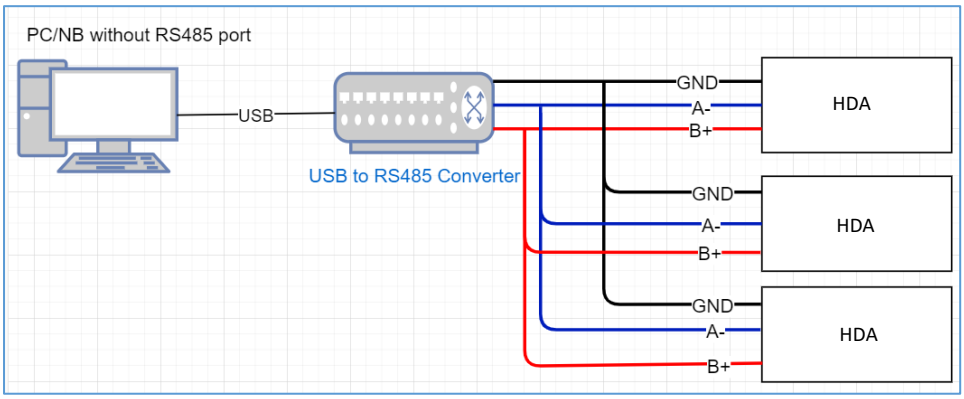
Transmission mode of MODBUS protocol is supported only by MODBUS-RTU (MODBUS-ASCII is not supported).MODBUS use the single master / multi-slave communication method. In MODBUS protocol, only the master device sends the query, and the slave device specified (unicasted) by master device return the response.

In the case of queries to all slave devices (broadcast), each slave device performs query processing but does not return the response.

If the slave device receives the incorrect query frame, the slave device discards the query and waits for the next query.

HDA operates as a MODBUS slave device.

By MODBUS communication, it is possible to monitor the operation status and to change various settings of HDA.



Wiring / connection of communication system

1-2. MODBUS protocol

Communication on a MODBUS network is initiated by a master with a query to a slave. After receiving and processing the query, the slave returns a reply to the master. The master can address individual slaves or uses a special broadcast address (0x00) to initiate a broadcast message to all slaves. No response is returned to broadcast requests.

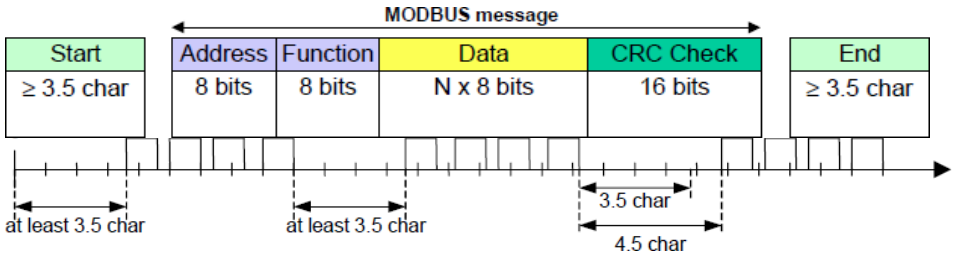
The HDA only supports MODBUS RTU. ASCII mode is not supported. A MODBUS register is always 2 bytes of data (MSB first) even if the command table in chapter 4 specifies only 1 byte (# bytes column). In this case, MSB byte will always be 0.

1-3. MODBUS Physical Communication

Physical Interface	Comments
RS485Half-duplex (Standard with different Setting)	Default Baud Rate:19200 baud, none parity,1 stop bit
UART(TTL level, Optional)	Default Baud Rate:19200 baud, none parity,1 stop bit
RS232(Optional)	Default Baud Rate:19200 baud, none parity,1 stop bit

1-4. MODBUS Message RTU Framing

In RTU mode, messages (request or response) frames are separated by a silent interval of at least 3.5 character times. Each character is 11 bits (1 start, 8 bits data, 1 bit parity and 1 stop). 2 stops bits is required if no parity is used.



MODBUS RTU Message Frame

The entire message frame must be transmitted as a continuous stream of characters. If a silent interval of more than 1.5 character times occurs between 2 characters, the frame is declared incomplete and should be discarded by the receiver.

For baud rates greater than 19200 Bps, fixed values for the 2 timers should be used: it is recommended to use a value of 750μs for the inter-character time-out (t1.5) and a value of 1.750ms for inter-frame delay (t3.5).

The CRC field is appended as the last field of the message. The LSB is appended first followed by the MSB. The CRC calculation is started by first pre-loading a 16 bits register to all 1s.

Reading the value of 2 successive commands/registers is not supported.

1-5. MODBUS Register

Function Description	Function Code
Read Coils	0X01
Read Holding Registers	0X03
Read Input Registers	0X04
Write Single Coil	0X05
Write Single Register	0X06

1-6. MODBUS Function Code Read Coils Registers (0x01)

The coils in the response message are packed as one coil per bit of the data field. Status is indicated as 1= ON and 0= OFF. The LSB of the first data byte contains the output addressed in the query. The other coils follow toward the high order end of this byte, and from low order to high order in subsequent bytes.

Request Frame:

	Length	Description
Slave Address	1Byte	0XA0(Default Address)
Function Code	1Byte	0x01
Starting Address MSB	1Byte	0x00
Starting Address LSB	1Byte	0x01
Quantity of Coils MSB	1Byte	0x00
Quantity of Coils LSB	1Byte	0x01 (number of word to read)
CRCLSB	1 Byte	
CRCMSB	1Byte	

Response Frame:

	Length	Description
Slave Address	1Byte	0XA0 (AD Default Address)
Function Code	1Byte	0x01
Byte count	1Byte	2 *N(N= Quantity of Register in Request)
Register Value	N*2 Bytes	Data
CRCLSB	1Byte	
CRCMSB	1 Byte	

1-7. Read Coils Registers

FUNC CODE	Starting Address	Description	Write number of byte	CMD AND RESPONSE	Value
1	0X0001	Read the power ON/Off status	2	A0 01 00 01 00 01 B5 7B A0 01 02 00 00 04 25	1: power on 0: power off

1-8. MODBUS Function Code Read Holding Registers (0x03)

This function code is used to read the contents of a contiguous block of holding registers in a remote device. The Request PDU specifies the starting register address and the number of registers. In the PDU Registers are addressed starting at zero. Therefore registers numbered1-4 are addressed as 0-3

The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.

Request Frame:

	Length	Description
Slave Address	1Byte	0XA0(AD Default Address)
Function Code	1Byte	0x03
Starting Address MSB	1Byte	0x00
Starting Address LSB	1Byte	0x01to0x11
Quantity of Register MSB	1Byte	0x00
Quantity of Register LSB	1Byte	0x01 (number of word to read)
CRCLSB	1 Byte	
CRCMSB	1Byte	

Response Frame:

	Length	Description
Slave Address	1Byte	0XA0 (AD Default Address)
Function Code	1Byte	0x03
Byte count	1Byte	2*N(N= Quantity of Register in Request)
Register Value	N*2 Bytes	Data
CRCLSB	1Byte	
CRCMSB	1 Byte	

1-9. Read Holding Registers

FUNC CODE	Starting Address	Description	Number of word to read	CMD AND RESPONSE	Value
3	0X0001	Read the Setting output voltage (SV?)	1	A0 03 00 01 00 01 CC BB A0 03 00 01 04 B0 0E 0F	0x04B0 =1200 12.00 V
	0X0002	Read the Setting output current (SI?)	1	A0 03 00 02 00 01 3C BB A0 03 02 17 70 0B 89	0X1770 = 6000 For model 12~57V,it's 60.00A. For model 120V~400V model, it's 6.000A
	0X0004	Read master or slave id (ID?)	1	A0 03 00 04 00 01 DC BA A0 03 00 04 00 00 1D 7A	0X0000 = 0
	0X0006	Read MODBUS ID	1	A0 03 00 06 00 01 7D 7A A0 03 00 06 00 00 BC BA	0X0000 = 0
	0X0007	Read PMBUS ID	1	A0 03 00 07 00 01 2C BA A0 03 02 00 50 05 A1	0X01~0X7F (Default 0x50)

	0X0008	Read POWER SOFTSTART	1	A0 03 00 08 00 01 1C B9 A0 03 02 00 19 C4 57	
	0X0009	Read SV SOFTSTART	1	A0 03 00 09 00 01 4D 79 A0 03 02 00 06 85 9F	ramp up time 0 to 100% volt in millisecond
	0X000B	Read SI SOFTSTART	1	A0 03 00 0B 00 01 EC B9 A0 03 02 00 06 85 9F	ramp up time 0 to 100% current in millisecond
	0x000C	Read Control Mode	1	A0 03 00 0C 00 01 5D 78 A0 03 02 00 01 C4 5D	0:local mode 1:remote mode
	0x000D	Read Power ON Rule	1	A0 03 00 0D 00 01 0C B8 A0 03 02 00 02 84 5C	0~2 Ref.6
	0x000E	Read Multi/Single Mode	1	A0 03 00 0E 00 01 FC B8 A0 03 02 00 01 C4 5D	0:Single 1:Milti
	0X000F	Read CAN with/without ID	1	A0 03 00 0F 00 01 AD 78 A0 03 02 00 01 C4 5D	0:without ID 1:with ID
	0x0010	Read Power OK Signal mode	1	A0 03 00 10 00 01 9C BE A0 03 02 00 01 C4 5D	0: Set Power OK Signal active HIGH 1: Set Power OK Signal active LOW
	0x0011	Read Power OK Signal active type	1	A0 03 00 11 00 01 CD 7E A0 03 02 00 01 C4 5D	0 : Set Power OK Signal active HIGH 1 : Set Power OK Signal active LOW

1-10.MODBUS Function Code Read Input Registers (0x04)

This function code is used to read from 1 to 125 contiguous input registers in a remote device. The Request PDU specifies the starting register address and the number of registers. In the PDU Registers are addressed starting at zero. Therefore input registers numbered 1-16are addressed as 0-15.

The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.

Request Frame:

	Length	Description
Slave Address	1Byte	0XA0(AD Default Address)
Function Code	1Byte	0x04
Register Address MSB	1Byte	0x00
Register Address LSB	1Byte	0x30to0x74
Quantity of Register MSB	1Byte	0x00
Quantity of Register LSB	1Byte	0x01to0x18 (number of word to read)
CRCLSB	1 Byte	
CRCMSB	1Byte	

Response Frame:

	Length	*Description*
Slave Address	1Byte	0XA0(AD Default Address)
Function Code	1Byte	0x04
Byte count	1Byte	2*N(N= Quantity of Register in Request)
Register Value	N* 2 Bytes	Data
CRCLSB	1Byte	
CRCMSB	1 Byte	

1-11. Read Input Register(R)

FUNC CODE	Starting Address	Description	Number of word to read	Command and Response	Example calculation of value
4	0x0030	Real time output voltage (RV?)	1	A0 04 00 30 00 01 28 B4 A0 04 00 30 04 DB AB EF	0X04DB = 1243 12.43V
	0X0031	Real time output current (RI?)	1	A0 04 00 31 00 01 79 74 A0 04 02 0B B6 82 6F	0X0BB6 = 2998 For model12~57V,it's 29.98A For model 120V~400V ,it's 2.998A
	0x0032	Response output power (RP?)	1	A0 04 00 32 00 01 89 74 A0 04 00 32 00 96 C8 DA	0X0096 = 150 150W
	0x0033	Temperature of NTC1 on PFC (NTC1?)	1	A0 04 00 33 00 01 D8 B4 A0 04 00 33 FF EC 19 49	0XFFEC (It is negative number) 0XFFFF-0XFFEC=0X13 -20℃
	0x0034	Temperature of NTC2 on PFC (NTC2?)	1	A0 04 00 34 00 01 69 75 A0 04 00 34 00 1E 28 BD	0X001E = 30 30℃
	0x0035	Temperature of NTC3 on PFC (NTC3?)	1	A0 04 00 35 00 01 38 B5 A0 04 00 35 00 1E 79 7D	0X001E = 30 30℃
	0x0036	Temperature of NTC1 on DD (NTC4?)	1	A0 04 00 36 00 01 C8 B5 A0 04 00 36 00 22 89 6C	0X0022 = 34 34℃
	0x0037	Temperature of NTC2 on DD (NTC5?)	1	A0 04 00 37 00 01 99 75 A0 04 00 37 00 3A D8 A6	0X003A = 58 58℃
	0X0038	Real time environment temperature (RAMB?)	1	A0 04 00 38 00 01 A9 76 A0 04 00 38 0F 2B 2D 59	0X0F3A = 3898 38.98℃

	0X0039	Response error code Primary side error code (ERR1?)	1	A0 04 00 39 00 01 F8 B6 A0 04 00 39 00 00 39 76	0X0000 = 0
	0X003A	Response error code secondary error code (ERR2?)	1	A0 04 00 3A 00 01 08 B6 A0 04 00 3A 00 00 C9 76	0X0000 = 0
	0X003B	Response voltage rate (VRATE?)	1	A0 04 00 3B 00 01 59 76 A0 04 00 3B 04 B0 9B C2	0X04B0 = 1200 12.00V
	0X003C	Response current rate (IRATE?)	1	A0 04 00 3C 00 01 E8 B7 A0 04 00 3C 30 D4 3D 28	0X30D4 = 12500 125.00A
	0X003D	Response fan speed (RFSP?)	1	A0 04 00 3D 00 01 B9 77 A0 04 00 3D 00 00 78 B7	0X0000 = 0 0 RPM
	0X003E	Read primary bus voltage (VBUS?)	1	A0 04 00 3E 00 01 49 77 A0 04 00 3E 01 7D 49 06	0X017E = 382 382V
	0X003F	Read primary AC input voltage (VAC?)	1	A0 04 00 3F 00 01 18 B7 A0 04 00 3F 5D E0 E0 6F	0X5DDD = 24029 240.29V
	0X0040	Read primary AC input current voltage (IAC?)	1	A0 04 00 40 00 01 29 6F A0 04 00 40 02 80 E8 6F	0X0280 = 640 6.40A
	0X0041	AC in type 0: input is AC 1: input is DC (VINT?)	1	A0 04 00 41 00 01 78 AF A0 04 00 41 00 01 78 AF	0X0001 = 1 0:AC 1:DC
	0X0043	Real Time Power Rating (RRATE?)	1	A0 04 00 43 00 01 D9 6F A0 04 02 00 64 05 02	
	0X0061	Read Manufacture company information(INFO0)	8	A0 04 00 61 00 08 B9 63 A0 04 10 58 50 31 32 33 34 35 36 37 38 39 30 41 8C BD	58 50 20 50 6f 77 65 72 20 4C 74 64 **XP Power Ltd**
	0X0062	Read Model name information(INFO1)	8	A0 04 00 62 00 08 49 63 A0 04 10 48 44 41 31 35 30 30 2d 31 32 56 2d 31 32 35 41 95 90	48 44 41 31 35 30 30 2d 31 32 56 2d 31 32 35 41 **HDA1500-12**V-125A

	0X0063	Read Revision information (INFO3)	8	A0 04 00 63 00 08 18 A3 A0 04 10 32 32 30 37 2E 32 20 20 20 20 20 20 20 20 20 00 25 E2	32 31 30 38 30 35 2D 49 4E 54 45 52 41 54 45 00 **210805_INTERATE**
	0X0064	Read Date of MFG (INFO4)	8	A0 04 00 64 00 08 A9 62 A0 04 10 32 30 32 31 31 31 30 39 20 20 20 20 20 20 20 20 D0 95	32 30 32 31 30 33 31 39 20 20 20 20 20 20 20 20 **20210319**
	0X0065	Read Serial number (INFO5)	8	A0 04 00 65 00 08 F8 A2 A0 04 10 54 32 31 43 35 30 30 30 30 35 30 00 00 00 00 00 09 84	
	0X0066	Read Country of MFG (INFO6)	8	A0 04 00 66 00 08 08 A2 A0 04 10 00 6F 74 65 6B 2D 54 61 69 77 61 6E 20 20 20 20 3C EA	54 61 69 77 61 6E 20 20 20 20 **Taiwan**
	0X0067	CANBUS ONLINE DEVICE & ERROR Status	1	A0 04 00 67 00 01 99 64 A0 04 02 FEF044 CD	**0xFE** :slave online status **0xF0**:slave error status
	0X0068	Read MODBUS ID of Slave (Master only)	4	A0 04 00 68 00 04 69 64 A0 04 08 A0 00 00 00 00 00 C7 E8 7A F5	
	0X0069	Read All Output Voltage (Master Only,M&1~7Slave)	8	A0 04 00 69 00 08 38 A1 A0 04 10 12 BD 00 00 00 00 00 00 00 00 00 00 12 BC 12 BF B2 99	
	0X0070	Read All Output Current (Master Only)	8	A0 04 00 70 00 08 E9 66 A0 04 10 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0B C9	

	0X0071	Read ID code and S/N	7	A0 04 00 71 00 07 F8 A2 A0 04 0D 4D 30 54 32 32 35 35 31 30 32 37 37 30 D0 B1	
	0X0072	Read Slave S/N1~4 (Master Only)	24	A0 04 00 72 00 18 49 6A A0 04 30 54 32 32 35 35 31 30 32 37 37 31 A2 00 00 00 00 00 00 00 00 00 00 00 00 54 32 32 35 35 31 30 32 37 37 33 A3 54 32 32 35 35 31 30 32 37 37 34 A4 EE 33	54 32 32 35 35 31 30 32 37 37 31(hex) Slave1 SN:T2255102771 A2 Slave1 ID:A2(hex)->162 etc.
	0X0073	Read Slave S/N5~7 (Master Only)	18		
	0X0074	Read All Output Voltage (Vcap, Master command only)	8	A0 04 00 74 00 08 A8 A7 A0 04 10 00 AF 00 96 00 00 00 00 00 00 00 00 00 00 00 ED 22	00 AF ->175 Master Voltage 1.75v 00 96->150 Slave1 Voltage 1.5V etc.

1-12. MODBUS Function Code Write Coils Registers (0x05)

This function code is used to write a single output to either ON or OFF in a remote device. The requested ON/OFF state is specified by a constant in the request data field. A value of FF 00 hex requests the output to be ON. A value of 00 00 requests it to be OFF. All other values are illegal and will not affect the output.

Request Frame:

	Length	Description
Slave Address	1Byte	0XA0(AD Default Address)
Function Code	1Byte	0x05
Starting Address MSB	1Byte	0x00
Starting Address LSB	1Byte	0x01
Register Value MSB	1Byte	0x00
Register Value LSB	1Byte	0x01
CRCLSB	1 Byte	
CRCMSB	1Byte	

Response Frame:

	Length	Description
Slave Address	1Byte	0XA0 (AD Default Address)
Function Code	1Byte	0x05
Starting Address MSB	1Byte	0X00
Starting Address LSB	1Byte	0x01
Register Value MSB	1Byte	0X00
Register Value LSB	1Byte	0x01
CRCLSB	1Byte	
CRCMSB	1 Byte	

FUNC CODE	Starting Address	Desc	Write number of byte	CMD AND RESPONSE	Value
5	0X0001	force to remote control & setting power ON/Off (POWER x)	2	Power on A0 05 00 01 00 01 44 BB A0 05 00 01 00 01 44 BB Power off A0 05 00 01 00 00 85 7B A0 05 00 01 00 00 85 7B	1: power on 0: power off

1-13. MODBUS Function Code Write Single Registers (0x06)

This function code is used to write a single holding register in a remote device.

The Request PDU specifies the address of the register to be written. Registers are addressed starting at zero. Therefore register numbered 1 is addressed as 0.

The normal response is an echo of the request, returned after the register contents have been written.

Request Frame:

	Length	Description
Slave Address	1Byte	0XA0(AD Default Address)
Function Code	1Byte	0x06
Register Address MSB	1Byte	0x00
Register Address LSB	1Byte	0x01to0x11
Register Value MSB	1Byte	0x00 to0xFF
Register Value LSB	1Byte	0x00 to0xFF
CRCLSB	1 Byte	
CRCMSB	1Byte	

Response Frame:

Slave Address	1Byte	0XA0(AD Default Address)
Function Code	1Byte	0x06
Register Address MSB	1Byte	0x00
Register Address LSB	1Byte	0x00to0xFF
Register Value MSB	1Byte	0x00to0xFF
Register Value LSB	1Byte	0x00to0xFF
CRCLSB	1 Byte	
CRCMSB	1Byte	

1-14. Write Single Register

FUNC CODE	Starting Address	Desc	Write number of byte	CMD AND RESPONSE	Value
6	0X0001	Setting output voltage	2	A0 06 00 01 04 B0 C2 0F A0 06 00 01 04 B0 C2 0F	Set 12.00V 1200(DEC)=0X04B0(HEX)
	0X0002	Setting output current	2	A0 06 00 02 03 E8 31 C5 A0 06 00 02 03 E8 31 C5	For model 12~57V. It's Set 10.00A For model 120~400V.It's Set 1.000A 1000(DEC)=0X03E8(HEX)
	0X0004	Set CAN ID	1	A0 06 00 04 00 01 10 BA A0 06 00 04 00 01 10 BA	0x00~0x07
	0X0006	Set MODBUS ID	1	A0 06 00 06 00 A0 70 C2 A0 06 00 06 00 A0 70 C2	0x01~0xFA
	0X0007	Set PMBUS ID	1	A0 06 00 07 00 50 21 46 A0 06 00 07 00 50 21 46	0X01~0X7F
	0X0008	SET POWER SOFTSTART	2	A0 06 00 08 00 19 D0 B3 A0 06 00 08 00 19 D0 B3	0X0000~0X01F4
	0X0009	SET SV SOFTSTART	2	A0 06 00 09 00 06 C0 BB A0 06 00 09 00 06 C0 BB	0X0000~0X03E8
	0X000A	SET Vref SOFTSTART	2	A0 06 00 0A 00 24 B0 A2 A0 06 00 0A 00 24 B0 A2	0X0000~0X03E8

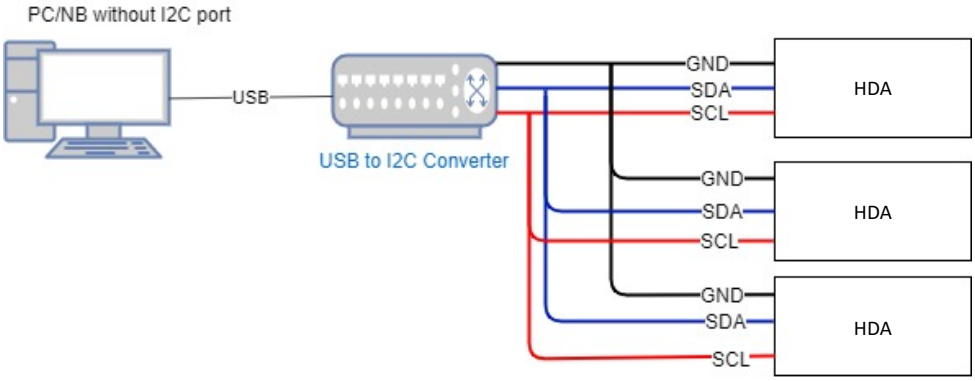
	0X000B	SET SI SOFTSTART	2	A0 06 00 0B 00 06 61 7B A0 06 00 0B 00 06 61 7B	0X0000~0X2710
	0x000C	SET CONTROL MODE	1	A0 06 00 0C 00 01 91 78 A0 06 00 0C 00 01 91 78	0:LOCAL 1:REMOTE
	0X000D	Set Power On Rule	1	A0 06 00 0D 00 00 01 78 A0 06 00 0D 00 00 01 78	0~2 Ref.6
	0X000E	Set MULTI/SINGLE Mode	1	A0 06 00 0E 00 00 F1 78 A0 06 00 0E 00 00 F1 78	0:Single 1:Multi
	0x000F	Set CANID mode	1	A0 06 00 0F 00 00 A0 B8 A0 06 00 0F 00 00 A0 B8	0:Without ID 1:CANID Mode
	0x0010	Set Power OK signal mode	1	A0 06 00 10 00 00 91 7E A0 06 00 10 00 00 91 7E	0: DC ok active 1:Power good active
	0x0011	Set Power OK signal active type	1	A0 06 00 11 00 00 C0 BE A0 06 00 11 00 00 C0 BE	0:Set high with DC OK 1:Set low with DC OK

2. HDA PMBUS (-PMB)

2-1. Overview

PMBus is a cost effective, two-wire interface that is an extension of the SMBus standard, which is built from the I²C protocol. Similar to SMBus, PMBus requires a minimum of two wires for communication, including the clock signal, SMBCLK, and data signal, SMBDAT.

2-2. Wiring / connection of communication system



2-3. PMBUS Addressing

Device	Slave Address	Address Bits(MSB to LSB)							
AD	0x50	1	0	1	0	0	0	0	R/W

2-4. PMBUS Clock Speed

HDA supports I^2C clock speed up to 100 KHz. Faster speed can be used if signal rise time for SDA and SCL meet I^2C specification.

2-5. PMBus Data Format

The module receives and reports data in LINEAR format.

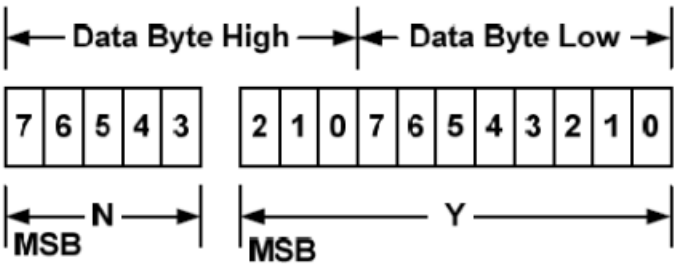
The Linear Data Format is typically used for commanding and reporting the parameters such as (but not only) the following:

- Output Current,
- Input Voltage,
- Output Voltage,
- Operating Temperatures,

The Linear Data Format is a two bytes value with:

- An 11 bit, two's complement mantissa and
- A 5 bit, two's complement exponent (scaling factor).

The format of the two data bytes is illustrated below:



The relation between Y, N and the "real world" value is:

$X = Y \cdot 2N$

Where, as described above:

X is the "real world" value;

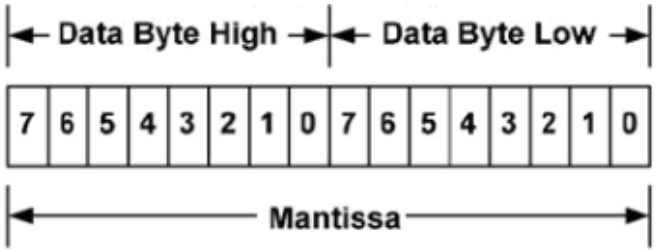
Y is an 11 bit, two's complement integer; and N is a 5 bit, two's complement integer.

Devices that use the linear format must accept and be able to process any value of N.

The Exponent of the data words is fixed at a reasonable value for the command. The detail exponent and resolution of main parameter is summarized as below:

Exponent Resolution

For commands that report the output voltage, the module supports the linear data format consisting of a two bytes value with a 16-bit, unsigned mantissa, and a fixed exponent of -12. The format of the two data bytes as shown below:



The equation can be written as:

Vout = Mantissa x 2^{-12}

2-6. Supported PMBus Commands

Cmd Code	Command Name	Type	#bytes	Default	Comments
0x01	OPERATION	R/W-E	1	0x00	0x80: Turn ON, 0x00: Turn OFF
0x10	WRITE_ PROTECT	R/W-E	1	0x80	Write protected at power up by default 0x80: Disable all writes except WRITE_PROTECT 0x00: Enable writes to all commands **Needs to be 0x00 to enable write commands**
0x16	RESTORE_USER_ALL	W-E	1		Reset to Default
0x20	VOUT_MODE	RO	1		Use linear format mode, may vary from different model, N=-8 (1/256v), used by all commands related to output voltage
0x21	VOUT_COMMAND	R/W-E	2		linear format, 0x6400 for 100v model, based on VOUT_MODE exponent
0x78	STATUS_BYTE	RO	1		Summary of most critical faults
0x79	STATUS_ WORD	RO	2		Summary of unit's fault condition
0x88	READ_VIN	RO	2		linear format
0x8B	READ_VOUT	RO	2		linear format
0X8C	READ_IOUT	RO	2		linear format
0X8D	READ_TEMPERATURE_1	RO	2		linear format, °C

<table>
<tr><td>0X8E</td><td>READ_TEMPERATURE_2</td><td>RO</td><td>2</td><td></td><td>linear format, °C</td></tr>
<tr><td>0X8F</td><td>READ_TEMPERATURE_3</td><td>RO</td><td>2</td><td></td><td>linear format, °C</td></tr>
<tr><td>0X90</td><td>READ_FAN_SPEED_1</td><td>RO</td><td>2</td><td></td><td>linear format, RPM</td></tr>
<tr><td>0X98</td><td>PMBUS_
REVISION</td><td>RO</td><td>1</td><td>0x00</td><td>Table 25. PMBus Revision Data Byte Contents
<table><tr><th>Bits [7:5]</th><th>Part I Revision</th><th></th><th>Bits [3:0]</th><th>Part II Revision</th></tr><tr><td>0000</td><td>1.0</td><td></td><td>0000</td><td>1.0</td></tr><tr><td>0001</td><td>1.1</td><td></td><td>0001</td><td>1.1</td></tr><tr><td>0002</td><td>1.2</td><td></td><td>0002</td><td>1.2</td></tr></table></td></tr>
<tr><td>0X99</td><td>MFR_ID</td><td>RO</td><td>16</td><td></td><td>Write protected</td></tr>
<tr><td>0X9A</td><td>MFR_MODEL</td><td>RO</td><td>16</td><td></td><td>Write protected</td></tr>
<tr><td>0X9B</td><td>MFR_REVISION</td><td>RO</td><td>16</td><td></td><td>Write protected</td></tr>
<tr><td>0X9C</td><td>MFR_
LOCATION</td><td>RO</td><td>16</td><td></td><td>Write protected</td></tr>
<tr><td>0X9D</td><td>MFR_DATE</td><td>RO</td><td>16</td><td></td><td>Write protected</td></tr>
<tr><td>0X9E</td><td>MFR_SERIAL</td><td>RO</td><td>16</td><td></td><td>Write protected</td></tr>
<tr><td>0XD0</td><td>Operation Mode</td><td>R/W-E</td><td>1</td><td></td><td>Write protected
0:local mode 1:remote mode</td></tr>
<tr><td>0XD1</td><td>SLAVE ID</td><td>R/W-E</td><td>1</td><td></td><td>Write protected
Device ID for PMBUS</td></tr>
<tr><td>0XD2</td><td>Power soft start</td><td>R/W-E</td><td>2</td><td>50</td><td>Write protected 50~1000 ms</td></tr>
<tr><td>0XD3</td><td>SV soft start</td><td>R/W-E</td><td>2</td><td>6</td><td>Write protected 50~1000 ms</td></tr>
<tr><td>0XD5</td><td>SI soft start</td><td>R/W-E</td><td>2</td><td>60</td><td>Write protected 50~1000 ms</td></tr>
<tr><td>0XD6</td><td>Power on rule</td><td>R/W-E</td><td>1</td><td>0</td><td>Write protected 0~2</td></tr>
<tr><td>0XD7</td><td>Current setting</td><td>R/W-E</td><td>2</td><td></td><td>Write protected</td></tr>
<tr><td>0XD8</td><td>Multi/Single</td><td>R/W-E</td><td>1</td><td>0</td><td>0:single 1:multi</td></tr>
<tr><td>0XD9</td><td>CAN with ID</td><td>R/W-E</td><td>1</td><td>0</td><td>0:CAN ID Check 1:CAN ID without Check</td></tr>
</table>

STATUS_BYTE (0x78)

This command returns an abbreviated status for fast reads.

Bit#	Status Bit Name	Description
7	Not Used	
6	Not Used	
5	VOUT_OV_FAULT	An output overvoltage fault has occurred
4	IOUT_OC_FAULT	An output over current fault has occurred
3	VIN_UV_FAULT	An input over voltage fault has occurred
2	TEMPERATURE	A temperature fault or warning has occurred
1	CML	A communications, memory or logic fault has occurred
0	NONE_OF_THE_ABOVE	A fault or warning not listed in bits [7:1] has occurred

STATUS_WORD (0x79)

Command returns the general status information used to indicate subsequent status to be read for more detail.

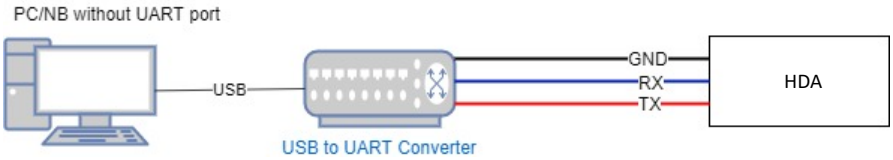
Bit#	Status Bit Name	Description
15	VOUT	An output voltage fault or warning has occurred
14	IOUT/POUT	An output current or output power fault or warning has occurred
13	INPUT	An input voltage, input current, or input power fault or warning has occurred
12	MFR_SPECIFIC	A manufacturer specific fault or warning has occurred
11	POWER_GOOD#	The POWER_GOOD signal, if present, is negated[1]
10	FANS	A fan or airflow fault or warning has occurred
9	OTHER	A bit in STATUS_OTHER is set
8	UNKNOWN	A fault type not given in bits[15:1] of the STATUS_WORD has been detected
7	BUSY	A fault was declared because the device was busy and unable to respond.
6	OFF	This bit is asserted if the unit is not providing power to the output, regardless of the reason, including simply not being enabled.
5	VOUT_OV_FAULT	An output over voltage fault has occurred
4	IOUT_OC_FAULT	An output over current fault has occurred
3	VIN_UV_FAULT	An input under voltage fault has occurred
2	TEMPERATURE	A temperature fault or warning has occurred
1	CML	A communications, memory or logic fault has occurred
0	NONE_OF_THE_ABOVE	A fault or warning not listed in bits [7:1] has occurred

3. HDA RS485 (-RS4)

3-1. Overview

Compatible with versions after 09-0000-1743 (INFO3?)

3-2. Wiring / connection of communication system



3-3. XP –RS4 Physical Communication

Physical Interface	Comments
RS485 Half-duplex (Standard with different Setting)	Default baud rate:19200 baud, none parity,1 stop bit
UART(TTL level, Optional)	Default baud rate:19200 baud, none parity,1 stop bit
RS232(Optional)	Default baud rate:19200 baud, none parity,1 stop bit

3-4. XP RS485 Protocol

FOR USER ITEM	ELEMENT	Reference
SV xx.xx	Setting local or remote mode output voltage	
SI xxx.xx	Setting local or remote mode output current	
POWER x	x = 0: force to remote control & setting power Off	Ref.1
	x = 1: force to remote control & setting power On	
REMS	0: operation in Local mode	Ref.2
	1: operation in Remote mode	
REMS?	response REMS setting	
MODID?	READ MODBUS & STD ID	
MODID xxx	SET MODBUS & STD ID	
PMID?	READ PMBUS ID	
PMID xxx	SET PMBUS ID	
RV?	Real time output voltage	
RI?	Real time output current	
RP?	Response output power	
SI?	Output current command (no matter operation in local / remote	
SV?	Output voltage command(no matter operation in local / remote	

NTC4?	x = 1: response secondary NTC1 value	
NTC5?	x = 2: response secondary NTC2 value	
NTC1?	x = 3: response Primary NTC1 value	
NTC2?	x = 4: response Primary NTC2 value	
NTC3?	x = 5: response Primary NTC3 value	
RAMB?	Real time environment temperature	
ERR1?	Response error code Primary side error code	Ref.3
ERR2?	Response error code secondary error code	Ref.4
STUS?	Status of Power	Ref.5
RRATE?	Real Time Power Rating	
SFT?	Power soft start ask	
SFT	Power soft start 50~1000 ms	
VSLE?	SV soft start	
VSLE	SV soft start 10~1000 ms	
ISLE?	SI soft start	
ISLE	SI soft start 10~1000 ms	
FOR USER ITEM	**MACHINE PARAMETER**	
RATE?	Response Voltage / current rating	
VRATE?	Response rated voltage	
IRATE?	Response rated current	
INFO 0?	Manufacture company information	
INFO 1?	Model name information	
INFO 2?	Output voltage rate information	
INFO 3?	Revision information (20xx.x)	
INFO 4?	Date of MFG	
INFO 5?	Serial number	
INFO 6?	Country of MFG	
INFO 7?	Part Number	
ID-NAME xxxx	(16 word) Setting ID name (by user define)	
ID-NAME?	(16 word) Read ID name (by user define)	
RFSP1?	Response fan1 speed	
RFSP2?	Response fan2 speed	
SAVE	Write parameter to EEPROM	
ID x	x = 0 : Setting master	
ID?	Response master or slave 1~7	

SAVE	x = 1 ~ 7 : Setting slave 1 ~ 7	
*RST	UER SETTING RESET TO DEFAULT	
POR?	Read POWER ON RULE 0~2	Ref.6
POR x	x = 0:Set POWER ON RULE	
POR?	x = 1:	
POR x RESSN? SETIDS	x = 2: remote only	
POR x	Read all Devices Serial Number	
RESSN?	Set ID with Serial Number	
SETIDS SOK x	x = 0 DC OK	
SETIDS	x = 1 Power OK	
SOK? SOKL x	Read SOK status	
SOK?	x = 0 POK pin active HIGH	
SOKL x SOK?	x = 1 POK pin active LOW	
SOKL?	Read SOKL status	

FOR USER ITEM	PFC	
VAC?	Read primary AC input voltage	
VINT?	AC in type 0: input is AC 1: input is DC	
FOR USER ITEM	**PARALLEL**	
MS_MODE x	x = 0:Single mode	
	x = 1:Parallel mode	
MS_MODE?	Response Single or Parallel mode	
CANID_MODE x	0: The master partially controls the slave.	
	1: The master has full control over the slave.	
CANID_MODE?	Read the master control mode.	
CANFLAG?	Slave online & error Status	Master Only
RVCALL?	real time voltage of all device	Master only
RVAALL?	real time voltage of all device	Master only
RIALL?	real time current of all device	Master only
ERR3?	CANbus error	Ref. 7
IDALL?		Ref. 8
MSNx		Master only

Ref.1	**POWER x**	
	0	setting power "off" and force to remote control
	1	setting power "on" and force to remote control

Ref.2	**REMS x**	
	0	Setting operation in Local mode
	1	Setting operation in Remote mode
	2	Setting operation in Charger mode (Reserved or coming soon!)
	3	Setting operation in Programmable mode (Reserved or coming soon!)

Ref.3	**ERR1?**			
	bit	**Decimal**	**ERROR**	**LED Status**
	0	1	Communication Fail	Power_Fail
	1	2	Primary side PFC stage build bus time out(P_PFC_TOUT)	Power_Fail
	2	4	Primary side Rectifier stage build bus time out(P_REC_TOUT)	Power_Fail
	3	8	Primary side Bus Over Voltage Protect(P_BUS_OVP)	Power_Fail
	4	16	Primary side Grid Over Load Protect(P_GOLP)	AC_Fail
	5	32	Primary side Grid Over Current Protect(P_GOCP)	AC_Fail
	6	64	Primary side Grid Under Voltage Protect(P_GUVP)	AC_Fail
	7	128	Primary side Grid Over Voltage Protect(P_GOVP)	AC_Fail
	8	256	Hardware fault (P_Hw)	AC_Fail
	9	512	PFC OCP(P_OC)	AC_Fail

	ERR2?			
	bit	Decimal	ERROR Content	LED State
Ref.4	0	1	Primary side NTC1 over temperature protection (P_OTP_NTC1)	OTP/UTP FAIL
	1	2	Primary side NTC2 over temperature protection (P_OTP_NTC2)	OTP/UTP FAIL
	2	4	Primary side NTC3 over temperature protection (P_OTP_NTC3)	OTP/UTP FAIL
	3	8	NTC4 Over Temperature protection (D_OTP_NTC4)	OTP/UTP FAIL
	4	16	NTC5 Over Temperature protection (D_OTP_NTC5)	OTP/UTP FAIL
	5	32	Ambient Over Temperature protection (AMB_OTP)	OTP/UTP FAIL
	6	64	Ambient Under Temperature protection (AMB_UTP)	OTP/UTP FAIL
	7	128	Output Power Over load protection (D_OLP)	OLP FAIL
	8	256	Over Load protection (D_OPP)	OLP FAIL
	9	512	Over voltage protection (by Ti internal compare) (D_OVP_S)	OVP FAIL
	10	1024	Vafter Over voltage protection	OVP FAIL
	11	2048	Vrmt Over voltage protection	OVP FAIL
	12	4096	Vcap Over voltage protection	OVP FAIL
	13	8192	FAN_FAIL (F_Err)	FAN FAIL
	14	16384	EEPROM Fail	OVP FAIL

	STUS	Status of output
Ref.5	0	power off
	1	power on

Ref.6	**0 OR (Parallel Connection)**	REMS =1 , "1" = Enable , "0" = Disable , if EN+&- is 1=ON				
		Time sequence	1	2	3	4
		CMD (POWER)	0	1	0	1
		EN+&-	0	0	1	1
		Output status	OFF	**ON**	**ON**	**ON**
		When REMS =0 , CMD will not function, no matter if Power 0/1				
	1 AND (Series Connection)	Time sequence	1	2	3	4
		CMD (POWER)	0	1	0	1
		EN+&-	0	0	1	1
		Output status	OFF	OFF	OFF	**ON**
		REMS =1 , "1" = Enable , "0" = Disable , if EN+&- is 1=ON				
	2	REMS =1 , "1" = Enable , "0" = Disable , if EN+&- is 1=ON				

		Time sequence	1	2	3	4
		CMD (POWER)	0	1	0	1
		EN+&-(don't care)	0	0	1	1
		Output status	OFF	**ON**	OFF	**ON**
		When REMS =0 , CMD will not function, no matter if Power 0/1				

	ERR3?			
	bit	**Decimal**	**ERROR Content**	**LED State**
Ref.7	0	1	Different TYPE	
	1	2	SAME ID	
	2	4	CANBUS Communication fail	
	3	8	Slave error	
	4	16	REV.	

IDALL?		
Ref.8	byte	description
	0	M :Master S:Slave O:Single
	1	,comma
	2~12	Serial Number (11 characters)

3-5. XP RS485 PROTOCOL WITH ID

ID address format

Address	Command	Termination code
N N N	Refer to XP Standard Protocol	CR LF
3 BYTE	N BYTE	2BYTE

Address:

1. Address from 001~250
2. Address 000 Global broadcast, the device will not respond after receiving, but will execute according to the command.

Communication Protocol:

1. Per XP Standard Protocol

EXAMPLE

PC request AD		
160	RV?	\r\n
AD Response to PC		
160	12.00	\r\n

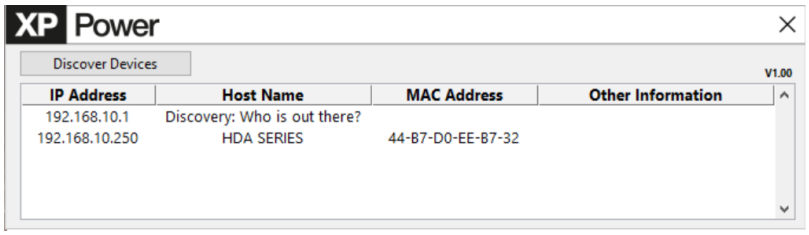
4. HDA Ethernet (-ETH)

4-1. HDA Ethernet CARD Specifications

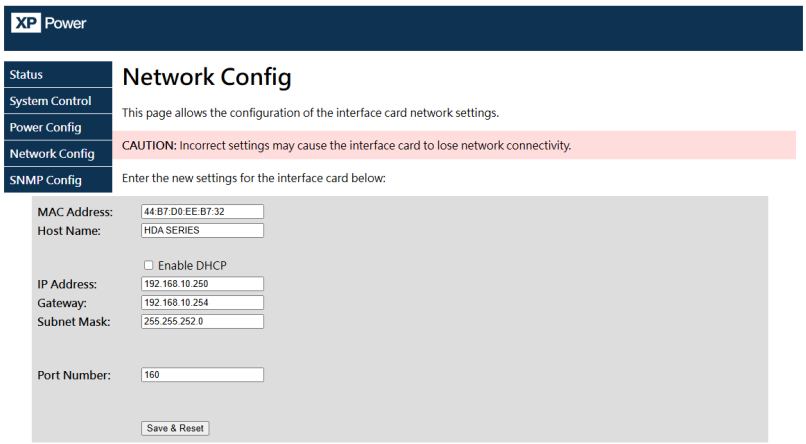
Specifications	
CPU	32bit
FLASH	512KB
RAM	128KB
Ethernet Interface	
10/100BaseT(X) Ports, Auto MDI/MDI-X	8-pin RJ45
Magnetic Isolation Protection	1.5 kV (built-in)
Ethernet Software Function	
Configuration Options	Web Console (HTTP), Windows Utility
Management	ARP, Device Search Utility (DSU), DHCP Client, IPv4,SNMP, TCP, UDP, ICMP

4-2. Ethernet Support Solution

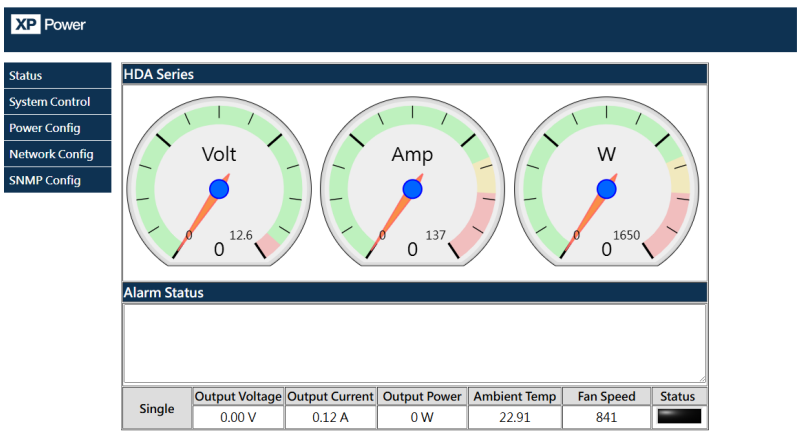
Windows Utility



DHCP Client



HTTP (WEB SERVER



4-3. Important Safety Instructions

4-3-1Appropriate Usage

-ETH is Ethernet module of HDA Series.

-ETH makes the data available via the integrated web server and a user interface.

Additionally, -ETH can be used for remote diagnostics and the configuration of

connected devices in -ETH Series via the computer.

Only use -ETH exclusively for the purposes described in the manual.

Carefully read the documentation belonging to -ETH before you commission -ETH.

4-3-2 Support Products

-ETH supports the following XP Power products:

• HDA Series

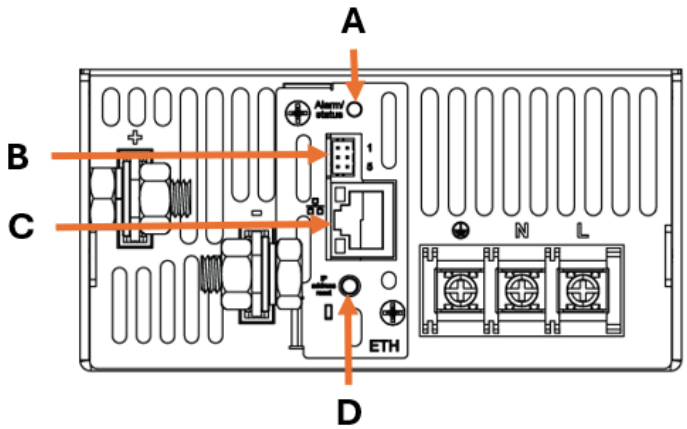
4-4. Device Overview

4-4-1 LED Status Description

Condition	LED status	LED signal	Description
DC output OK	G SOLID	G	DC output is ON/enabled in local mode
DC output OK (remote)	O SOLID	O	DC output is ON/enabled in remote mode
DC output disabled	MEDIUM FLASH		DC output is OFF/diabled (standby) in local mode
DC output disabled (remote)	MEDIUM FLASH		DC output is OFF/disabled (standby) in remote mode
Over voltage	FAST FLASH		DC output over voltage protection mode
Over load	R SOLID	R	DC output over current protection mode
Over temperature	R SLOW BLINK	R	High temperature at an internal measurement point
Fan fail	DOUBLE FLASH		Fan failure
AC failure	SLOW FLASH		AC input is below the start up voltage
Internal fault	TRIPLE FLASH		Internal failure*
Parallel connection	ALTERNATE FLASH		Establishing parallel connection

*Please contact XP Power for further details

4-5. Connection Area Overview



Position	Description
A	LED
B	Pin out
C	RJ45
D	Reset Button

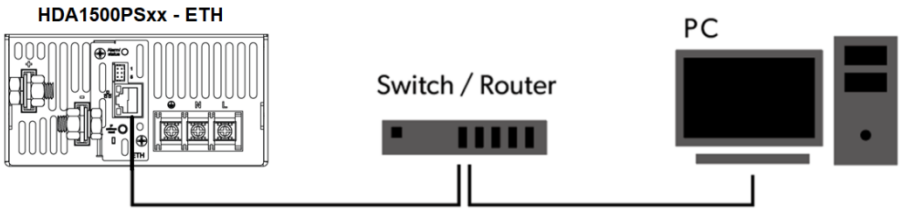
4-5-1Connecting -ETH to the CANBUS

This section describes how to connect –ETH to the CANBUS. It will be assumed that the -ETH is located at the start /end of the CANBUS. Please observe the termination of your CANBUS.

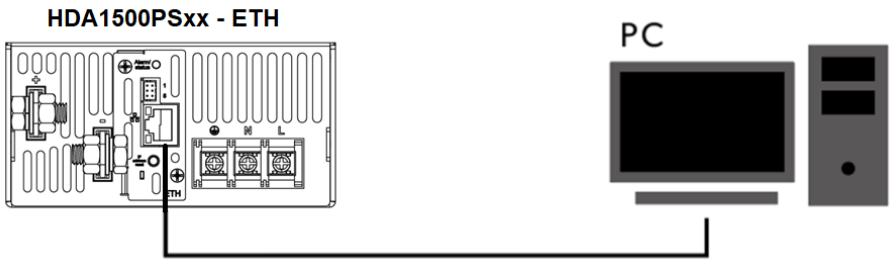
4-5-2 Connecting -ETH to the Ethernet Network

-ETH has an integrated network terminal. This allows you to connect –ETH to a 10/100MBit Ethernet network. The speed is switched automatically using the connected switch, router or PC.

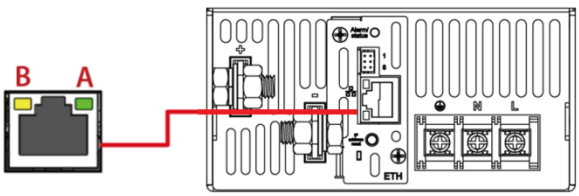
- **Connecting -ETH within a local network**



- **Connecting -ETH directly to PC**

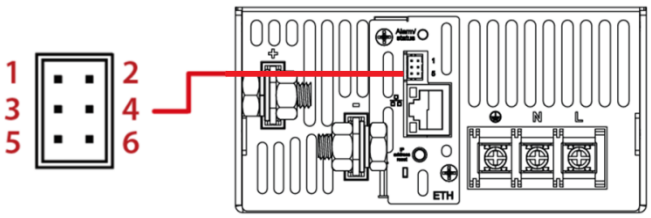


4-5-3 Overview of the LEDs on the Network Connection



Position	LED	State	Meaning
A	Green	On	Active when Power On.
B	Yellow	On	Active when linked in 100Base-TX mode.
		Flashing	-ETH is currently transmitting or receiving data (activity).
		Off	No connection established

4-5-4 Position B Pin Assignment



pin	Function	Description
1	H_TERM	Short pin 1&2 to Enable CANBUS Terminator
2	L_TERM	
3	CANH	CAN HIGH
4	CANL	CAN LOW
5	POK	Power OK
6	GND	Communication Ground

4-6. Mounting the Device

4-6-1 Mounting and Installation Location Requirements

4-7. Configuring Network Settings on the Computer

4-7-1 Information on Network Settings on the Computer

Before you commission -ETH for the first time, set the computer to the network area of the -ETH. Read the following subsection, which describes the procedure for your operating system. If you use an operating system, for which the procedure is not described, refer to the manual of your operating system to find out how to set the computer IP address to **192.168.10.1** and the Subnet mask to **255.255.255.0**. You can then configure the -ETH for a local network via the user interface.

4-7-2 Windows 10, Windows 11

1. Start the computer.
2. In Windows, select”Start”
3. Enter”ncpa.cpl” in the search field and press enter.
4. Double click on the LAN connection via which -ETH is connected.

   – If Windows displays several LAN connections, there are probably several network connections installed in the computer. Ensure that you select the correct network connection, which the computer is connected to -ETH. If necessary, refer to the manual of your computer.
5. Select [Properties].
6. Mark”Internet protocol version 4 (TCP/IPv4)” and select [Properties].
7. In the”Internet Protocol Version 4 (TCP/IPv4) Properties” window enter the following properties and confirm with [OK]:

   ”IP address:” 192.168.10.1”

   Subnet mask” 255.255.255.0
8. Select [OK] in order to save the settings.
9. Close an open dialog with [OK].

You can now log in for the first time to -ETH user interface. Configure the device after the log in for a local network or choose additional settings.

4-8. Configuring -ETH for the Local Network

4-8-1 Information on Integrating -ETH into a Local Network

The following sections describe how to integrate -ETH via static network settings into your local network with a router.

In rare cases further network settings are necessary. You must configure further network settings in the following cases.

- You want to connect the -ETH via DHCP to the local network.
- A Proxy server is in the network.
- You want to make -ETH available via the Internet.

4-8-2 Applying Static Network Settings to -ETH

1. Select -ETH in the tree at the left windows.
2. Select the”NETWORK” in the device menu.
3. De-select the “Enable DHCP” item.
4. In the”Primary DNS” field, enter the IP address of the DNS server (Domain Name System Server). Usually, this is the address of the router.
5. Enter the Gateway IP address of your network into the ”Gateway” field. Usually, this is the address of the router.
6. In the”IP Address” field, enter the static IP address, under which -ETH is to be accessed in the local network.
7. In the ”Subnet mask” field, enter the subnet mask of your network. Normally you can find this information in the router manual.
8. Select [Save Config]. -ETH saves the network settings. The save procedure can take up to 10 seconds. Do not separate -ETH from the electricity supply during the save procedure. If you disconnect -ETH from the energy supply during the save procedure, your data can get lost.
9. When the save procedure is completed, remove the plug-in power supply of -ETH from the plug socket.
10. Remove the network cable.

You may now connect -ETH to the local network.

4-8-3 Activating/Deactivating DHCP

-ETH can obtain its network settings via a DHCP server (Dynamic Host Configuration Protocol). -ETH automatically obtains the IP address, the subnet mask, gateway and the DNS address from the DHCP server in order to establish -ETH in your network.

- Activating DHCP
  1. Select -ETH in the tree and select “NETWORK” in the device menu.
  2. Select the “Enable DHCP” item.
  3. Select [Save Config].
- Deactivating DHCP
  1. Select -ETH in the tree and select “NETWORK” in the device menu.
  2. De-select the “Enable DHCP” item.
  3. Select [Save Config].

4-8-4 Resetting -ETH Using the Default Button

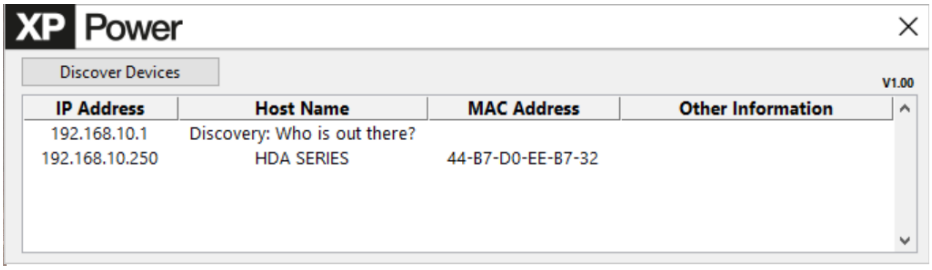
You can reset -ETH using your Default Button. The Default Button is positioned behind a small hole on the front panel of -ETH. Press the Default button and remove the power for few seconds and repower -ETH in order to reset it.

4-9. USER INTERFACE

4-9-1 TCP/IP Discoverer

The XP TCP/IP Discoverer PC project (formerly known as the -ETH Ethernet Device Discoverer) will aid in embedded product device discovery (with the Announce protocol) and will demonstrate how to write PC applications to communicate to -ETH devices.

When the "Discover Devices" button is clicked, this application will transmit a broadcast UDP packet containing the message. If any embedded devices with the Announce protocol enabled are connected to the network, they will respond with a UDP packet containing their host name (NBNS) and MAC address.



Use the mouse to click on the correct HOST NAME to start the WEB browser and display the HDA webpage.

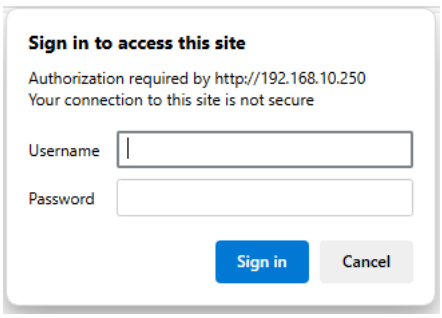
4-9-2 WEB Device Menu

The device menu shows the settings options and instantaneous values of a given device. You must select the device in the device tree in advance. The menu items change according to the device selected.

Tabs	Relevance
Status	This page provides information about the device or system. Here you will find an overview of the most important device data as well as the actual status display.
System Control	You can use the settings option to look at and adjust various parameters.
Power Config	You can use the settings option to look at and adjust the communication and remote module.
Network Config	You can use the settings option to look at and adjust various parameters.
SNMP Config	Configure multiple community names.

- **Authorized access and Password**

  After logging in with the password, you can simultaneously configure in -ETH.



- **Access security of -ETH**

  Each Device set and control is protected by a freely selectable password.

- **Password**

  The default user name/password is “admin” and “0000”.

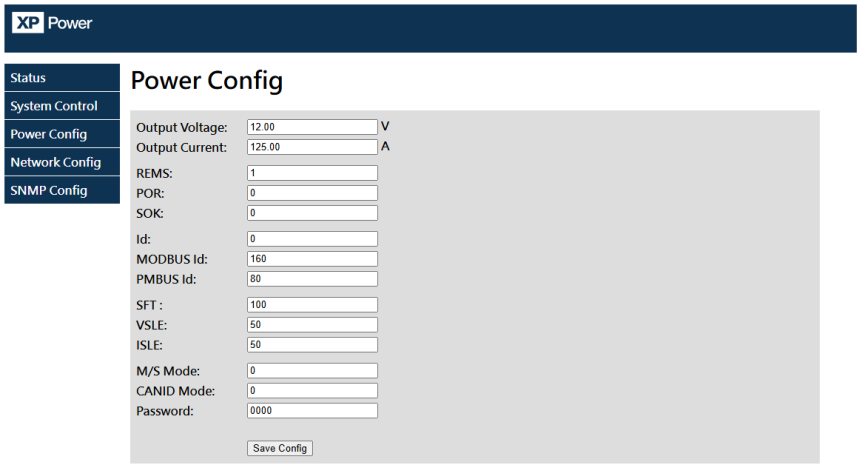
- **Change Password**

  Password can be changed at “POWER CONFIG” Tag in -ETH Device.

- **Password forgotten**

  You can reset Password using your Reset Button. The Reset Button is positioned behind a small hole on the front panel of -ETH.

  Press the Reset Button and remove the power for a few seconds and repower -ETH in order to reset it.



4-9-3 Power Config

- **Output Voltage**

  Setting local or remote mode output voltage

- **Output Current**

  Setting local or remote mode output current

- **REMS**

  Remote or Local mode (0: Local mode 1: Remote mode)

- **POR**

  Set POWER ON Rule

- **SOK**

  Set POWER OK PIN Function Mode

- **Con type**

  NO Function

- **Id**

  CANBUS ID 0: Master 1~7: Slave

- **MODBUS Id**

  Set MODBUS & STD ID

- **PMBUS Id**

  Set PMBUS Id

- **SFT**

  Power up soft start (milliseconds)

- **VSLE**

  Controls the time when power startup the output voltage reaches the set voltage. (milliseconds)

- **ISLE**

  Controls the time when EUT startup until the output current reaches the set current. (milliseconds)

- **VRSL**

  No Function

- **M/S Mode**

Parallel mode 0: standalone mode 1: parallel mode

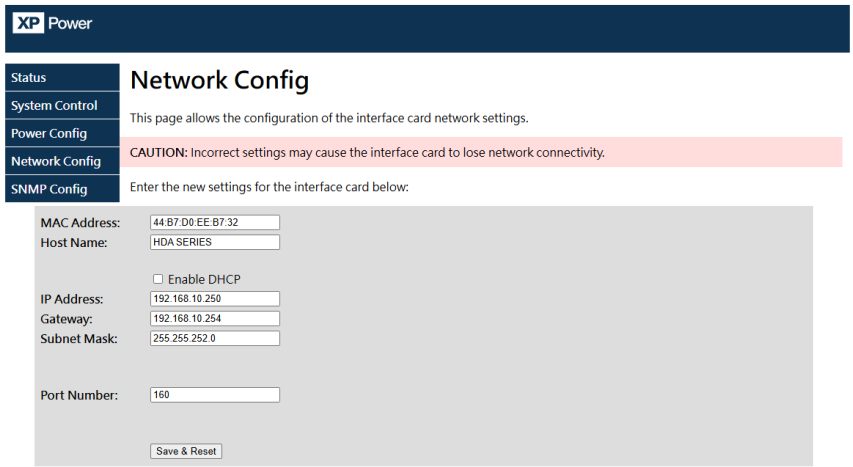
- **CANID Mode**

The Master control mode 0: The master partially controls the slave

1: The master has full control over the slave

- **Password -** Login password setting.

4-9-4 Network Config



- **MAC Address**

  A MAC address (media access control address) is a 12-digit hexadecimal number assigned to each device connected to the network. Primarily specified as a unique identifier during device manufacturing. A MAC address is required when trying to locate a device or when performing diagnostics on a network device.

  The MAC address is set by the device manufacturer at their factory. It can’t change.

- **Host Name**

  A host name is a unique name or label assigned to any device that is connected to a specific computer network. It facilitates the differentiation of different machines or devices connected to the Internet, a network and/or both. Allotted and assigned host names are based on the naming system used.

- **IP Address**

  An IP address is a unique address that identifies a device on the internet or a local network. IP stands for "Internet Protocol," which is the set of rules governing the format of data sent via the internet or local network.

- **Gateway**

  A gateway is a network node used in telecommunications that connects two networks with different transmission protocols together.

- **Subnet Mask**

  A sub network is a logical subdivision of an IP network. The practice of dividing a network into two or more networks is called sub netting.

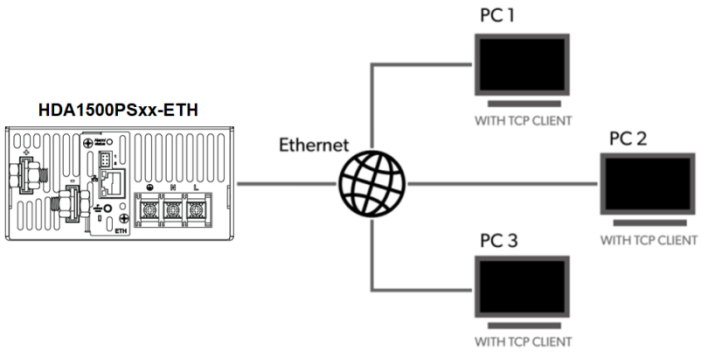
- **Port Number**

  Direct Mode Port

4-9-3 DIRECT MODE

-ETH works in TCP Server mode will listen network connections and build network connections, commonly be used for communication with TCP clients on a LAN.

According to the TCP protocol, TCP Server has connection/disconnection status differences to ensure reliable data transmission. -ETH works in TCP Server mode will listen local port which user set and build connection after receiving connection request. Serial data will be sent to all TCP Client devices connected to -ETH in TCP Server mode simultaneously. -ETH works in TCP Server mode supports 8 client connections at most.



- **Connect to -ETH**

  Select the IP Address of the Server and Server's Port Number (Default 160) to connect -ETH with TCP CLIENT software

- **Authorized access and Password**

  Input command **DIRECT <password>** to enable direct communication. (password is same with WEB)

  Input command **DIRECT END** to disable direct communication.

- **Monitor & Control Command**

  The command is same XP STANDARD PROTOCOL

4-10-1 SNMP MODE

SNMP is used to monitor and manage HDA Series on networks.

- **-ETH supports SNMPV2C version.**
- **MIB File**

AD-Series comes with so-called MIB files that describe the parameters and readings which are available for monitoring via SNMP.

4-10. Technical Data

Communication Baud Rate

CANBUS	500K
ETHERNET	10/100M

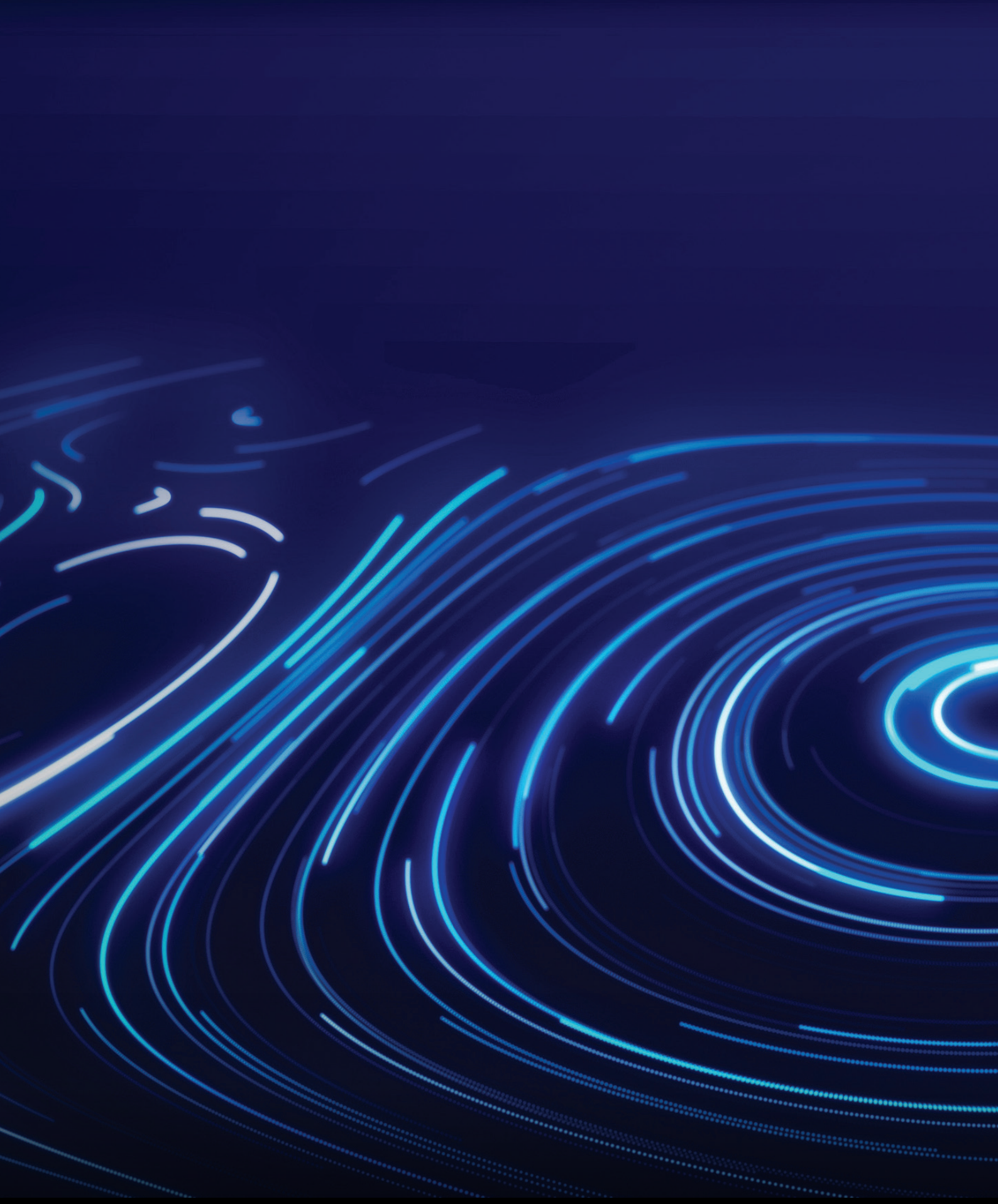
4-11. Maintenance

Very little maintenance is required for your -ETH.

You should clean the exterior of the unit periodically with a damp cloth to pre-vent accumulation of dust and dirt. At the same time, tighten the screws on the DC input terminals.

4-12. Warranty

Refer to XP Power Ltd standard warranty policy.



XP Power