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RS 485 Communication Protocol for Single-Phase Inverter

(GCI-1.5K/GCI-2K/GCI-3K/GCI-3.6K/GCI-4.6K/GCI-5K)

Jun. 13, 2014 Ver.6

1. Communication Base Format

The baud rate is 9600; no check bit; data bit is 8; the stop bit is 1.

2. Communication Protocol Format

2.1 Query Information Command

PC→Inverter				Inverter→PC			
Item	**Code**	**Length**	**Example**	**Item**	**Code**	**Length**	**Example**
Symbol	SDLC/HDLC	1	7E	Symbol	SDLC/HDLC	1	7E
Slave Address	ADDR	1	01	Slave Address	ADDR	1	01
Control Command	Function Code	1	A1	Control Command	Function Code	1	A1
Data Length	LEN	1	1E	Data Length	LEN	1	1E
Data	DATA（D00-D49）	50	00	Data	DATA（D00-D49）	50	Data
Check Bit	Check Sum	1	ACCL	Check Bit	Check Sum	1	ACCL

2.1.1 PC Sent to Inverter Format

Item	Parameter	Length	Example
Symbol	SDLC/HDLC	1	7E
Slave Address	Slave Address	1	01
Control Command	Command	1	A1
Data Length	Length	1	00
Data	Data	50	D0-D49
Check Bit	Check	1	ACCL

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Symbol: When receive the data7E(symbol data) , the data frames is beginning.
Slave Address: Different inverter have the different address. The range is 01-63H.
Control Command: Different control have the different command, query information control command is A1.
Data Length: The available data length.
Data: All is 0.
Check Bit : The summation of slave address bit, control bit, data length and 50 data.
NOTE: only the low 8 bit is check.

2.1.2 Inverter Receiving from PC Format

Item	Parameter	Length	Example
Symbol	SDLC/HDLC	1	7E
Slave Address	Slave Address	1	01
Control Command	Command	1	A1
Data Length	Length	1	1C
Data	Data	50	D0-D49
Check Bit	Check	1	ACCL

2.1.3 Data Definition

Data	Means
D0	DC Input Voltage1 Low 8 Bit (×10)
D1	DC Input Voltage1 High 8 Bit (×10)
D2	DC Input Current1 Low 8 Bit (×10)
D3	DC Input Current1 High 8 Bit (×10)
D4	Grid Voltage Low 8 Bit (×10)
D5	Grid Voltage High 8 Bit (×10)
D6	Grid Current Low 8 Bit (×10)
D7	Grid Current High 8 Bit (×10)
D8	Inverter Temperature Low 8 Bit (×10)
D9	Inverter Temperature High 8 Bit (×10)
D10	Total Energy kWH 1
D11	Total Energy kWH 2
D12	Total Energy kWH 3
D13	Total Energy kWH 4

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D14	The Inverter State Low 8 Bit
D15	The Inverter State High 8 Bit
D16	None
D17	None
D18	Model NO.
D19	DSP Software Version
D20	The Grid Frequency Low 8 bit (×100)
D21	The Grid Frequency High 8 Bit (×100)
D22	The Country Standard
D23	Power Curve NO.
D24	DC Input Voltage 2 Low 8 Bit (×10)
D25	DC Input Voltage 2 High 8 Bit (×10)
D26	DC Input Current 2 Low 8 Bit (×10)
D27	DC Input Current 2 High 8 Bit (×10)
D28	Grid On/Off Status
D29	This Month kWH Low 8 Bit
D30	This Month kWH High 8 Bit
D31	Last Month kWH Low 8 Bit
D32	Last Month kWH High 8 Bit
D33	This Day kWH Low 8 Bit (×10)
D34	This Day kWH High 8 Bit (×10)
D35	Last Day kWH Low 8 Bit (×10)
D36	Last Day kWH High 8 Bit (×10)
D37-D49	0

2.1.4 The State Parameter

D15D14	Means	Display
0000	Operation OK	Generating
0001	Operation OK	Generating
0002	Low Sunlight/Low Wind	Waiting
0003	At the Initializing	Initializing
1004	Control Stop	Grid Off
1010	Grid Over Voltage	OV-G-V
1011	Grid Under Voltage	UN-G-V
1012	Grid Over Frequency	OV-G-F

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1013	Grid Under Frequency	UN-G-F
1014	Grid Impedance Over	G-IMP
1015	No Grid	NO-Grid
1016	Grid Unbalance	G-PHASE
1017	Grid Frequency Fluctuation	G-F-FLU
1018	Grid Over Current	OV-G-I
1020	DC Over Voltage	OV-DC
1021	DC Bus Over Voltage	OV-BUS
1022	DC Bus Unbalance	UNB_BUS
1023	DC Bus Under Voltage	UN_BUS
1024	DC Bus Unbalance 2	UNB2_BUS
1030	Short Circuit Protection	GRID-INTF.
1031	The Initial Protection	INI-FAULT
1032	Temperature Protection	OV-TEM
1033	Ground Fault	GROUND-FAULT
1034	Leakage Current Protection	ILeak-FAULT
1035	Relay Protection	Relay-FAULT
1036	DSP_B Protection	DSP-B-FAULT
1037	DC Injection Protection	DCInj-FAULT
1038	12V Under Voltage Faulty	12Power-FAULT
1039	Leakage Current Check Protection	ILeak-Check
1040	AFCI Check Fault	AFCI-Check
1041	AFCI Fault	AFCI-FAULT

2.1.5 The Country Standard

Country Standard	Date D22
G83/2 / G59/3	01
UL-240V	02
VDE0126	03
AS4777	04
AS4777-NQ	05

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CQC	06
ENEL	07
UL-208V	08
MEX-CFE	09
Defined by User	0A
VDE4105	0B
EN50438DK	0C
EN50438IE	0D
EN50438NL	0E
EN50438T	0F
EN50438L	10
UL-240V-A	11
UL-208V-A	12
	13
	14
	15

2.1.6 Example

The PC sends data:

7E 02 A1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 A3

And receives data:

7E 02 A1 1C
72 06 21 00 FF 08 18 00 20 01
61 10 00 00 00 00 71 71 01 02
88 13 01 01 3B 0B 00 00 00 00
00 01 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 D2

It means:

DC voltage1 is 0672H----1650----165V.
DC current1 is 0021H---33----3.3A
Grid voltage is 08FFH---2303---230.3V
Grid current is 0018H---24----2.4A
The total kWH is 00001061H----4193kWH.
The stage is 0000H---Generating
The grid frequency is 1388H---5000---50Hz
The country standard is 01---G83.
DC voltage2 is 0000H----0000---0V.

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DC current2 is 0000H---0000----0A

2.2 Grid On Control Command

PC→Inverter				Inverter→PC			
Item	**Code**	**Length**	**Example**	**Item**	**Code**	**Length**	**Example**
Symbol	SDLC/HDLC	1	7E	Symbol	SDLC/HDLC	1	7E
Slave Address	ADDR	1	01	Slave Address	ADDR	1	01
Control Command	Function Code	1	02	Control Command	Function Code	1	02
Data Length	LEN	1	00	Data Length	LEN	1	00
Data	DATA-D00	1	BE	Data	DATA（D00-D49）	/	/
	DATA（D01-D49）	49	00				
Check Bit	Check Sum	1	ACCL	Check bit	Check Sum	/	/

2.2.1 Example

When you want to grid on the inverter, the PC sends data:
7E 02 02 0 BE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 C2
And receives data:
7E 02 02 00

2.3 Grid Off Control Command

PC→Inverter				Inverter→PC			
Item	**Code**	**Length**	**Example**	**Item**	**Code**	**Length**	**Example**
Symbol	SDLC/HDLC	1	7E	Symbol	SDLC/HDLC	1	7E
Slave Address	ADDR	1	01	Slave Address	ADDR	1	01
Control Command	Function Code	1	03	Control Command	Function Code	1	03
Data Length	LEN	1	00	Data Length	LEN	1	00
Data	DATA-D00	1	DE	Data	DATA（D00-D49）	/	/
	DATA	49	00				

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	（D01-D49）						
Check Bit	Check Sum	1	ACCL	Check Bit	Check Sum	/	/

2.3.1 Example

When you want to grid off the inverter, the PC sends data:

7E 02 03 0 DE 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 E3

And receives data:

7E 02 03 00