Growatt Inverter Communication Command

Growatt

2010-10-19

Version	Date	Notes
1.0	2010/08/19	New
2.0	2010/10/19	For design personal & company

Content

1 Communication mode

Mode 1: **Automatic Return Periodically**: Send one command, the inverter will return data automatically in a regular interval.

Mode 2: **Communicate with COM Address**: Send command with inverter address, the inverter whose address is the same will return the data;
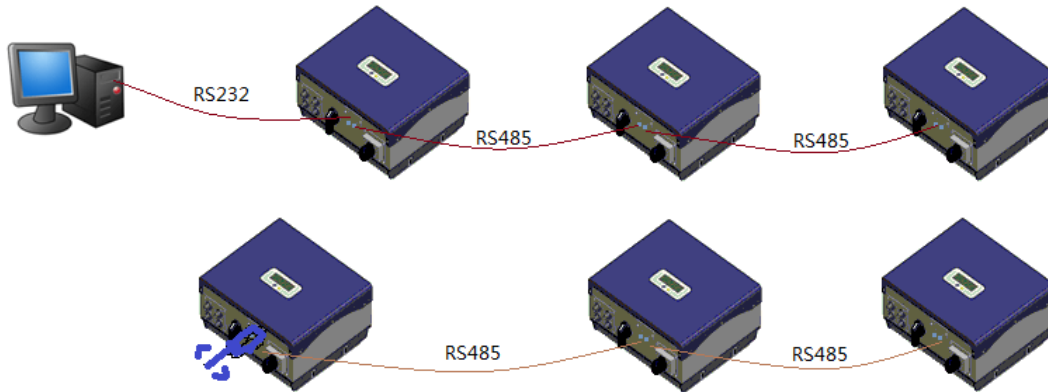
RS232 Settings: baud rate: 9600 bps, data bit: 8, stop bit: 1, parity bit: none, flow control: none.

RS232 cable: DB9 direct through cable.

2 Mode 1; Automatic Return Periodically (mode for one inverter communication)

2.1 Format of commands

3F	23	7E	34	C1	7E	C2	C3	T0	T1	T2	T3	23	3F

C1: command type; It is '0x41' or '0x42' generally;

C2: read data type; It is '0x32' generally;

C3: enable return periodically; It is '0x59' generally;

T0~T3: periodic return interval; for example: 1000ms,then string is '1000', field T0~T3 must be '0x31' '0x30' '0x30' '0x30';

(1) Communication procedure

Step1: Computer send Read Command, for example: periodic return interval= 1500ms;

3F	23	7E	34	41	7E	32	59	31	35	30	30	23	3F

Step2: If the connection is OK, inverter will return some data. Do not care about what are they except there was no data returned;

Step3: Computer send Start Command;

3F	23	7E	34	42	7E	23	3F

Step4: Inverter return data periodically (every 1500ms);

57	D1	D2	D3	…	D28	D29	D30

D1D2: PV1 voltage (10 times value); Vpv = (D1*256 + D2)/10;

D3D4: do not care;

D5D6: PV2 voltage (10 times value as well. Only 2 MPPT machine have this parameter)

D7D8: Grid voltage (10 times value);

D9D10: Grid frequency (100 times value);

D11D12: Output power [w] (10 times value);

D13D14: Temperature (10 times value);

D15: Inverter status;

D16: Inverter fault code;

D17D18: do not care;

D19D20: do not care;

D21D22: Energy produced today (10 times value);

D23D24D25D26:Energy produced since installation (10 times value);

Etotal = ((D23*256+D24)*65536 + (D25*256+D26)) / 10;

D27D28D29D30: total time worked (second);

3 Mode 2: Communicate with COM address

3.1 Format of commands

Computer send format:

3F	23	addr	C0	C1	DL	D0	D1	…	D(dl-1)	S0	S1			

Inverter return data format:

23	3F	addr	C0	C1	DL	D0	D1	…	D(dl-1)	S0	S1			

Note:

Addr: inverter communication address;

C0: command type 0;

C1: command type 1;

DL: data length; for example: DL = 8; so the data field is D0, D1, … , D6, D7;

S0S1: check sum;

```
S0S1 = sCalStringSum(bExterTxBuffer,0, (DL+5));
INT16U sCalStringSum(INT8U *bpString,INT8U bStartN,INT8U bEndN)
{
    INT8U i;
    INT32U wStringSum=0;
    for(i=bStartN;i<=bEndN;i++)
        wStringSum += (INT8U)((INT8U)(*(bpString+i))^i);
    if(wStringSum==0||wStringSum>0xFFFF)
        wStringSum = 0xFFFF;
    return((INT16U)wStringSum);
}
```

3.2 Set inverter COM address

There are two types of COM address, dynamic address and static address. You can set a static address for each inverter, by knock the sound control panel or admeasure an address by command from software run in computer.

Knock the sound control panel to display item "COM Address:XX" in LCD screen, then quick double knocks to change address type.

For example, static address: COM Address:1. Dynamic address: COM Address: MOVE.

3.2.1 Static address

Set a static address for each inverter (value range 1~125 or 127~254). Knock the sound control panel to display item "COM Address:xxx", then knock to change static value.

3.2.2 Dynamic address

This procedure is only for inverter use dynamic address.

1) Knock the sound control panel, switch LCD display item to "COM Address: MOVE".

2) Admeasure address by computer

Note: for two types, the address value must in range of 1~125 or 127~254. Address 1, 125, 127 and 254 are OK

The inverter address type must constant in a communication system.

Step1: Computer send frame to read serial number of inverter

3F	23	addr=0	31	41	DL=0	S0	S1

Step2: Computer deal with inverter returned dada and admeasure an address to this inverter.

23	3F	addr=FF	31	41	DL=0A	D6	D7	…	D15	S0	S1
3F	23	addr=0	31	42	DL=0B	D6	D7	…	D16	S0	S1

D6~D15 is inverter serial number; D16 is the admeasured address;

Step3: Computer check the admeasure operation result according to feedback data from inverter;

23	3F	addr	31	42	DL=1	D6	S0	S1

If D6 = 0x4F, it indicate admeasure is OK; else indicate admeasure is failed;

Note:

1) About the read serial number command. As there are many inverters connected to the RS232 port, so the inverter can only return data in turn, according to the algorithm of inverter firmware. So maybe you need to resend Step1 command if there is no data returned or check sum of returned data is not right.

2) About inverter address. If an inverter already had been admeasured an address, the inverter will not reply Step1 command any more. However, still reply to address '0x7E'. And inverter will reset its address to '0xFF' if there is no command form computer within 10 minutes, so you must admeasure address before your can connect to this inverter.

3) About inverter address reset command. If you want to reset the address of an inverter, use this command:

3F	23	addr	31	43	DL=0	S0	S1

If you want to reset all the inverters' address on the RS232 port, use this command:

3F	23	addr=7E	31	44	DL=0	S0	S1

3.3 Read and write inverter data

Computer can read inverter data by sending the following commands to inverter.

Read data commands					Write data commands				
C0	C1	DL	Return DL	Meanings	C0	C1	DL	Return DL	Meanings
0x32	0x41	0	35	Read power [w]	0x33	0x42	5	1(ACK or NAK)	Set parameters?
	0x42	0	21	Read energy					
	0x43	0	31	Read spec					
	0x44	0	19	Read settings					
	0x53	0	10	Read S/N					

3.3.1 Write data (Send by computer) meanings:

Computer can change parameters of inverter by sending the following commands to inverter.

DX	C1=0x42	Remark
D0	0	
D1	LCD language (0~4)	
D2	LCD contrast (0~5)	
D3	Clear history energy and time when 1 (1 or other)	
D4	Start "Auto Test Function when 1"	

3.3.2 Read data (Inverter return) meanings:

Data type: H: Higher 8bit; L: Lower 8bits; HH: Higher 8bits of higher 16bits; HL: Lower 8bits of higher 16bits; LH: Higher 8bits of lower 16bits; LL: Lower 8bits of lower 16bits;
Units: Voltage: [V], current: [A], power: [W] energy: [KWh], frequency: [Hz], temperature: [°C] (degree centigrade), time: [s].

Dx	C1 = 0x41	C1 = 0x42	C1 = 0x43	C1=0x44	C1 = 0x53
D0	Inverter status	0	0x31	0	Serial number
D1	Vpv1*10 H (Input Voltage of the 1st tracker)	0	Pmax*10 HH	LCD language	
D2	Vpv1*10 L	0	Pmax*10 HL	LCD Contrast	
D3	Vpv2*10 H (Input Voltage of the 2nd tracker)	0	Pmax*10 LH	Vpv start*100 H	
D4	Vpv2*10 L	0	Pmax*10 LL	Vpv start *100 L	
D5	Ppv*10 H (Input power)	0	Vdc nor*10 H	Time start(s) H	
D6	Ppv*10 L	0	Vdc nor *10 L	Time start(s) L	
D7	Vac*10 H (The grid volt)	Energy today *10 H	Model H	Vac low *100 H	
D8	Vac*10 L	Energy today *10 L	Model L	Vac low *100 L	
D9	Iac*10H	Energy total *10 HH	FW version	Vac high *100 H	
D10	Iac*10L	Energy total *10 HL		Vac high *100 L	
D11	Fac*100 H (the grid frequence)	Energy total *10 LH		Fac low *100 H	
D12	Fac*100 L	Energy total *10 LL		Fac low *100 L	
D13	Pac*10 H (Output power)	Time total (hour) HH		Fac high *100 H	
D14	Pac*10 L	Time total (hour) HL		Fac high *100 L	

D15	ISO fault Value H	Time total (hour) LH	Manufacturer Information	Model H	
				Model L	
D16	ISO fault Value L	Time total (hour) LL		0	
				0	
D17	gfci fault Value H	0			
D18	gfci fault Value L	0			
D19	DCI fault Value H	0			
D20	DCI fault Value L	0			
D21	Vpv fault Value H				
D22	Vpv fault Value L				
D23	Vac fault Value H				
D24	Vac fault Value L				
D25	Fac fault Value H				
D26	Fac fault Value L				
D27	Temperature fault Value H				
D28	Temperature fault Value L				
D29	Fault type H				
D30	Fault type L				
D31	Temperature*10 H		0		
D32	Temperature*10 L				
D33	0				
D34	0				

Inverter status:

> 0: waiting
>
> 1: Normal
>
> 3: Fault

Inverter fault type:

Fault type value	Means(The message showed on the inverter when the inverter has fault)
1~23	" Error: 99+x \0", // 0, example: Error:100 or Error:122
24	"Auto Test Failed\0", // 1
25	"No AC Connection\0", // 2

26	"PV Isolation Low\0",	// 3
27	" Residual I High\0",	// 4
28	" Output High DCI\0",	// 5
29	" PV Voltage High\0",	// 6
30	" AC V Outrange \0",	// 7
31	" AC F Outrange \0",	// 8
32	" Module Hot \0"	// 9

LCD language: 0~4 are: Italian, English, German, Spanish and French.

LCD Contrast: 0~5;

Inverter Model: A , could be show: "P7 U1 M5 S1"

$$Px=(A\&0xF000)>>12$$
$$Ux=(A\&0x0F00)>>8$$
$$Mx=(A\&0x00F0)>>4$$
$$Sx=(A\&0x000F)$$

ACK : 0x4F
NAK : 0x4E

4 Note

1. We use static address of mode 2 always.
2. Automatically read function run only in daytime as the inverter will power off at night.
3. Designers can use static address of mode 2 for inverter communication

5 Working flow

SF flow example

Fixed Add Mode: Only need the red part
Dynamic Add Mode: Need all the part

Dynamic add : Start

Reset all add

Read SerNo

New inverter — N → Time to read

Y

admeasure add for it

OK? — N → Cancel this add

Y

Fixed add: Start

Get Next operate address

Need to Write — Y

N

Read all data (C1:0x41~0x44)

Write data

All inverter Read end

Fixed

Dynamic