

# DIN Rail Power Meter ADL3000-E

## Operation Manual

VERSION: 20091215



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# Contents

1. GENERAL .....	1
2. DESIGNATION .....	1
3. TECHNICAL FEATURE.....	1
4. INSTALLATION AND WIRING.....	2
4.1 Installation and Wiring .....	2
4.2 Attentions of installation and application.....	3
5. OPERATION GUIDE.....	3
5.1 PANEL.....	3
5.2 FUNCTION.....	4
5.3 DISPLAY.....	5
5.4 COMMUNICATION.....	6
5.5 ATTENTIION.....	9
6. TYPICAL APPLICATION.....	9

**1. GENERAL**

ADL3000E DIN power analyzer is a kind of smart power meter. It can measure all the data of electrical data, including V, I, F, PF, P, Q, S, kWh, kvarh, max demands etc.

It has several LEDs to indicate the state of network. And by its RS485 communication, it can transfer its data to computer. It is designed complying with international standard IEC 62052 and IEC 62053..

**2 SPECIFICATION**

MODEL	TYPE	class	Un (V)	In (A)	Pulse constant (imp/kWh)
ADL3000	With CT	1.0	3×230/400V	1.5 (6)	6400
	Without			5 (20)	1600
				10 (40)	800
				20 (80)	400
				25 (100)	400

**3. TECHNICAL FEATURE**

Parameter		Value
Accuracy		1.0
Un		3×230/400V
In		1.5(6)A, 5(20)A, 10(40)A, 20(80)A
Frequency		50Hz or 60Hz
Voltage supply		normal: 0.9 ~ 1.1Un ; maximal: 0.7 ~ 1.2Un
Starting current	With CT	0.004Ib
		0.002In
Consumption	For voltage	≤5VA / phase
	For current	<4VA / phase
Output of pulse		Width of pulse: 80ms±20ms open-collector photo-coupler pulse
Digital communication		RS485, MODBUS-RTU
Clock error		≤0.5s/d
Environment		normal: -10C ~ +45C, maximal: -20C ~ +55C, storage: -40C ~ +70C
Relative humidity		≤95% (without dewing)
Outline (L×W×H)		126×89×74 (mm)

4. INSTALLATION AND WIRING

4.1 Installation photo and Wiring photo

4.1.1 Outline (unit: mm)

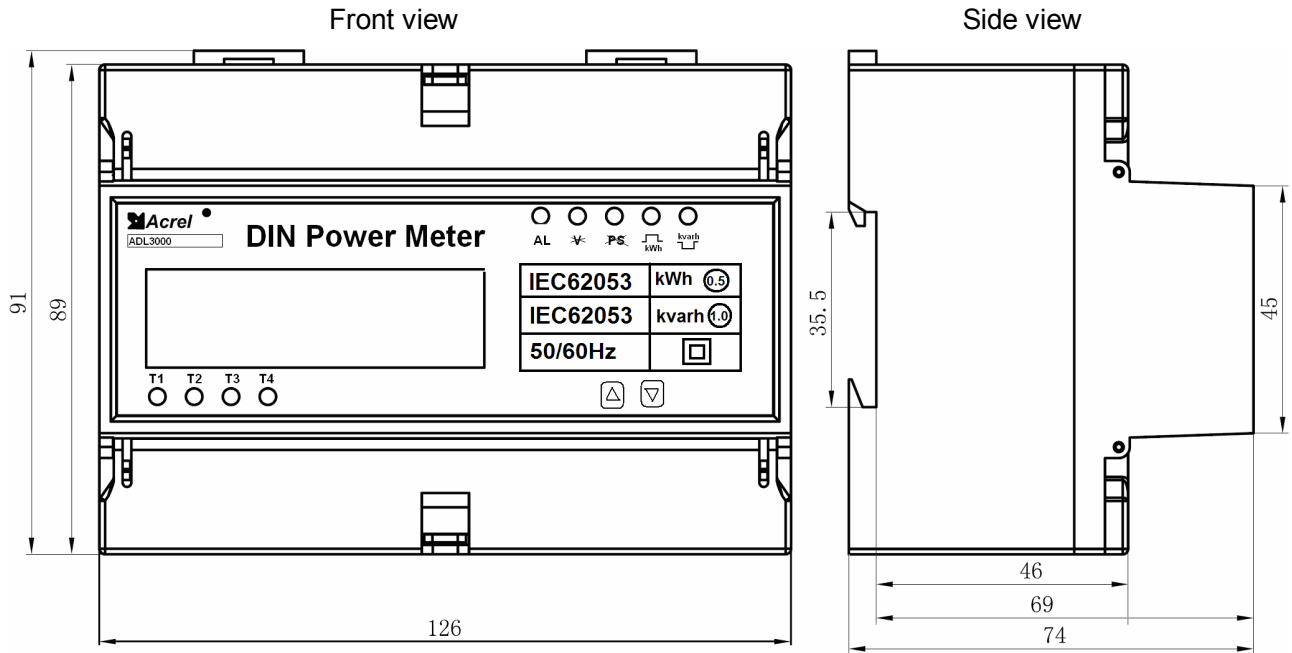


Photo 1 3-phase ADL3000 outline

4.1.2 Installation photo

ADL series watt-hour meter is installed by standard 35mm DIN rail, as photo 3

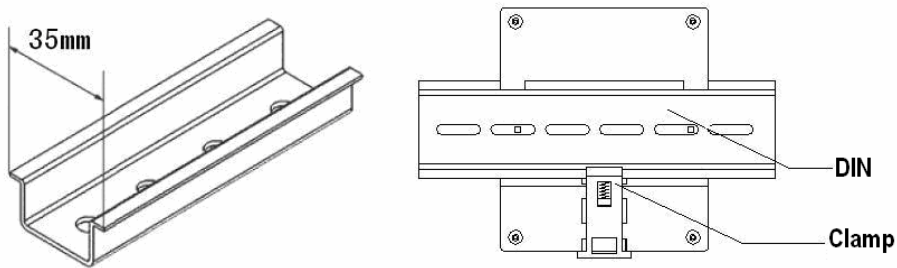


Photo 2

4.1.3 Wiring photo

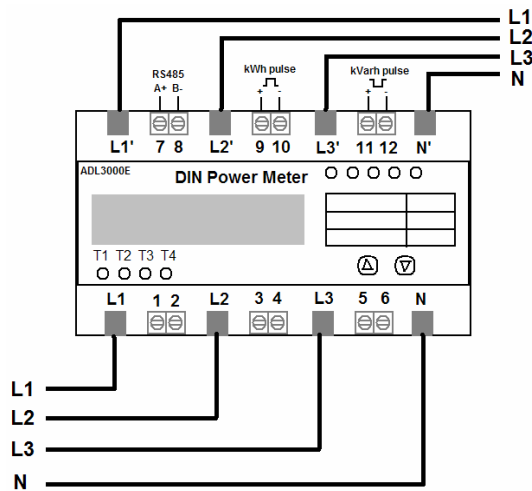


Photo 3 In 3-phase without CT

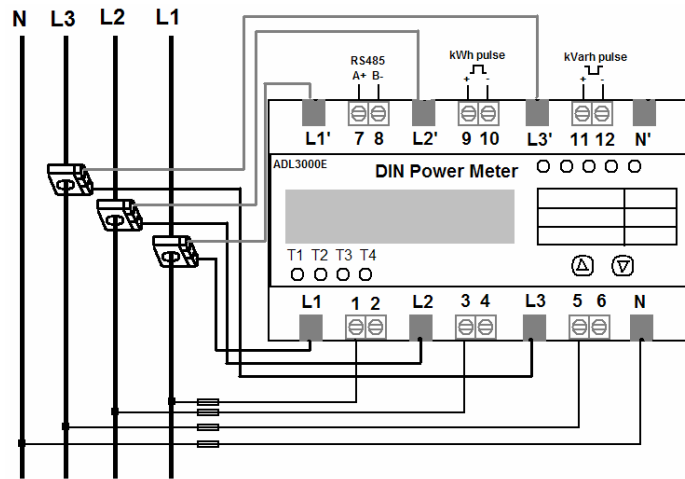


Photo 4 In 3-phase with CT

**4.2 Attention of wiring**

4.2.1 This meter has to be installed on the drying indoor, and in the standard 35mm DIN rail.

4.2.2 Please wire according to the wiring photo. If the meter is wired directly, you must have attention of the direction of input and output line. If the meter is wired by CT, you must have attention of polarity of secondary.

**5. Operation guide**

**5.1 The front**

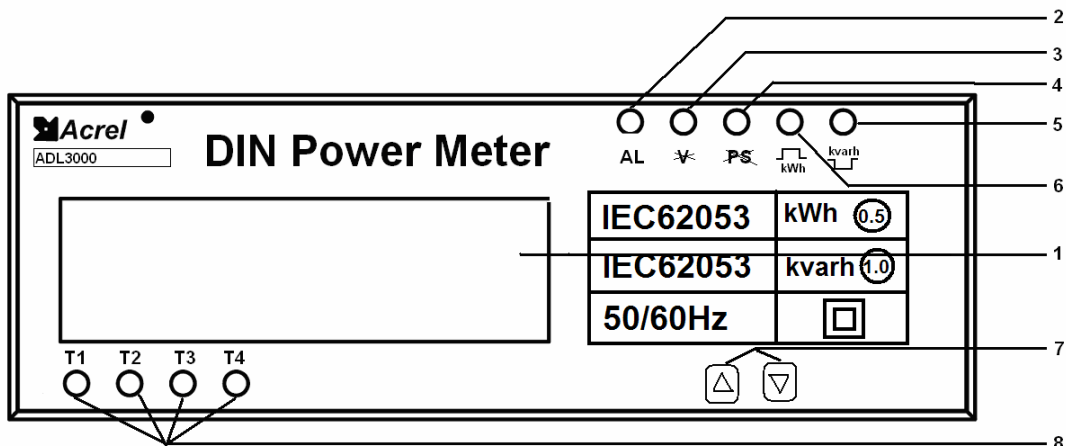


Photo 5 3 phases ADL3000 panel

Code	Name	Description
1	LCD	LCD display
2	AL	Under/over voltage, over current Alarm
3		Loose voltage alarm
4		The error of phase of sequence
5		kvarh pulse output indication LED
6		kWh pulse output indication LED
7		The buttons of choosing the read values
8	T1,T2,T3,T4	4 Tariffs indication LED

Description of panel:

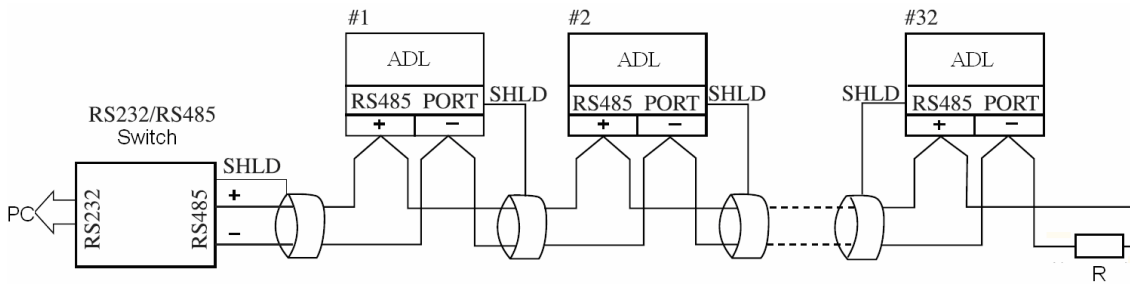
5.3 Display

Program version	V02.4	005	Slave address
Phase L1 voltage	VA 230.0 <sup>v</sup>	00000.00	Export reactive energy
Phase L2 voltage	VB 230.0 <sup>v</sup>	00000.00	Export active energy
Phase L3 voltage	VC 230.0 <sup>v</sup>	00000.00	Import reactive energy
Phase L1 current	IA 05.00 <sup>A</sup>	00032.25	Import active energy
Phase L2 current	IB 05.00 <sup>A</sup>	PF 0.99	Total power factor
Phase L3 current	IC 05.00 <sup>A</sup>	PFC 0.99	Phase L3 power factor
Phase L1 active power	PA001.15 <sup>kW</sup>	PFB 0.99	Phase L2 power factor
Phase L1 reactive power	QA000.00 <sup>kvar</sup>	PFA 0.99	Phase L1 power factor
Phase L2 active power	PB001.15 <sup>kW</sup>	49.9 <sup>Hz</sup>	Frequency
Phase L2 reactive power	QB000.00 <sup>kvar</sup>	QT000.00 <sup>kvar</sup>	Total reactive power
Phase L3 active power	PC001.15 <sup>kW</sup>	PT003.45 <sup>kW</sup>	Total active power
Phase L3 reactive power	QC000.00 <sup>kvar</sup>		

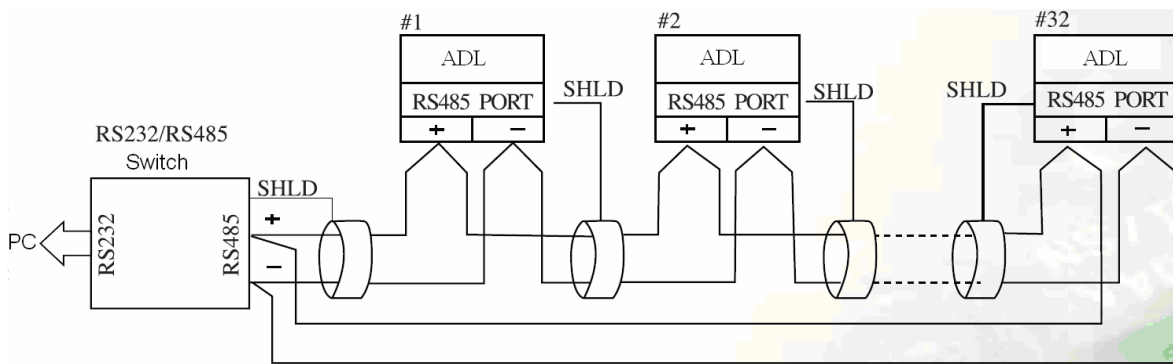
5.4 Communications

5.4.1 Wiring

- wiring linearly



- Wiring loop



5.4.2 Protocol (MODBUS-RTU)

- Transmission mode

- 1 start bit
- 8 data bits
- No parity
- 1 stop bit

- Frame format

Address code	Function code	Data area	CRC check code
1byte	1byte	n bytes	2 bytes

Address code is at beginning of frame, with 1 byte, decimal is 0~255. 1~247 can be used, the other is reserved. Each address code is unique.

Function code figures the functions of meters. .

Function	Definition	Operation
03H/04H	Read register	Obtain current binary system value of one or multiple register
10H	Multi register	Set binary system value into a series multi-register

Data area includes the measured data by ADL or the ADL's parameters.

CRC code occupies 2 bytes, including 1 hex value. CRC value is calculated by transmission device, and then it is attached to the data frame. While receiving, the receiving device calculates the CRC value again. If these 2 values is not equal, it shows a error..

**5.4.3 Function code**

(1) Function code 03H: Read register

This function permits user to obtain data and system parameters collected and recorded by the device. The data number requested by host computer for each time has no limit, but does not exceed the address range specified by Definition.

The following example is No. 01 slave computer Read 1 collected basic data (data frame every address occupy 2 byte). The measure data is total energy (4 bits), its address is 00H.

Request			Response		
Device Address		01H	Device Address		01H
Function code		03H	Function code		03H
Initial Code	Hi	00H	Byte quantity		04H
	Lo	00H	Register quantity	Hi	00H
Data quantity	Hi	00H		Lo	12H
	Lo	02H	Register quantity	Hi	D6H
CRC code	Hi	C4H		Lo	87H
	Lo	0BH	CRC code	Hi	44H
				Lo	34H

(2) Function code 10H: Read-in register

Function code 10H permit user to change content of multiple registers, System parameters, switching output condition etc. may be written by using the function. Maximum once read-in data for the host computer is 16 (32 byte) data.

As below: device address 01 is meter's date February 1st 2008 and time 12 o'clock.

Request			Response		
Device Address		01H	Device Address		01H
Function code		10H	Function code		10H
Initial Code	Hi	00H	Initial Code	Hi	00H
	Lo	12H		Lo	12H
Data quantity	Hi	00H	Data quantity	Hi	00H
	Lo	03H		Lo	03H
Byte quantity		06H	CRC code	Hi	20H
0012H Code	Hi	08H		Lo	0DH
	Lo	02H			
0013H Code	Hi	01H			
	Lo	0CH			
0014H Code	Hi	00H			
	Lo	00H			
CRC code	Hi	FFH			
	Lo	A8H			



## 5.4.4 The list of communication address and their applications.

Codes	Values	Read Write	Data format	Type
0000H 0001H	Total kWh	R/W	4 bytes / kWh Val_s=Val_t/100	Dword
000AH 000BH	Total import kWh	R/W	4 bytes / kWh Val_s=Val_t/100	Dword
0014H 0015H	Total export kWh	R/W	4 bytes / kWh Val_s=Val_t/100	Dword
001EH 001FH	Total kvarh	R/W	4 bytes / kWh Val_s=Val_t/100	Dword
0028H 0029H	Total import kvarh	R/W	4 bytes / kWh Val_s=Val_t/100	Dword
0032H 0033H	Total export kvarh	R/W	4 bytes / kWh Val_s=Val_t/100	Dword
003CH	Year Month	R/W	YY.MM.DD HH.mm.ss	word
003DH	Day Time	R/W		word
003EH	Minute Second	R/W		word
003FH High	Communication address	R/W	0001-0247	char
003FH Low	Baud rate	R/W	1 = 9600bps (default) 2 = 4800bps 3 = 2400bps 4 = 1200bps	char
0061H	Phase A voltage	R	2 bytes / voltage Val_s=Val_t/100	word
0062H	Phase B voltage	R	2 bytes / voltage Val_s=Val_t/100	word
0063H	Phase C voltage	R	2 bytes / voltage Val_s=Val_t/100	word
0064H	Phase A current	R	2 bytes / current Val_s=Val_t/1000	word
0065H	Phase B current	R	2 bytes / current Val_s=Val_t/1000	word
0066H	Phase C current	R	2 bytes / current Val_s=Val_t/1000	word
0067H	Phase A kW	R	2 bytes / current Val_s=Val_t/1000	word
0068H	Phase B kW	R	2 bytes / active Val_s=Val_t/100	word
0069H	Phase C kW	R	2 bytes / active Val_s=Val_t/100	word
006AH	Total kW	R	2 bytes / active Val_s=Val_t/100	word
006BH	Phase A kvar	R	2 bytes / reactive Val_s=Val_t/100	word
006CH	Phase B kvar	R	2 bytes / reactive Val_s=Val_t/100	word
006DH	Phase C kvar	R	2 bytes / reactive Val_s=Val_t/100	word
006EH	Total kvar	R	2 bytes / reactive Val_s=Val_t/100	word
006FH	Phase A kva	R	2 bytes / apparent Val_s=Val_t/10	word
0070H	Phase B kva	R	2 bytes / apparent Val_s=Val_t/10	word
0071H	Phase C kva	R	2 bytes / apparent Val_s=Val_t/10	word
0072H	Total kva	R	2 bytes / apparent Val_s=Val_t/10	word
0073H	Phase A power factor	R	2 bytes / PF Val_s=Val_t/10000	word
0074H	Phase B power factor	R	2 bytes / PF Val_s=Val_t/10000	word
0075H	Phase C power factor	R	2 bytes / PF Val_s=Val_t/10000	word

0076H	Total power factor	R	2 bytes / PF Val_s=Val_t/10000	word
0077H	Frequency	R	2 bytes / freq Val_s=Val_t/1000	word
014BH	CT ratio	R	9999 (CT ratio = primary /secondary)	Dword

**5.5 Attention:**

5.5.1 Its capacity of charge is 0.05Ib ~ Imax (directly) or 0.02Ib ~ Imax (with CT) .And if the capacity overload them, the measurement won't be accurate.

5.5.2 If the meter is wired the network directly, the value is real energy value; If the meter is wired with CT, **the real value has to be multiplied the ratio of CT.**

**6. Typical application**

