

19D-34C

Three Phase Energy Meter(CTs)



Version: 1.0

Revision 2023.04

Read me

When you use 19D-34C single phase energymeter, be sure to read this user manual carefully, and be able to fully understand the implications, the correct guidance of operations in accordance with user manual, which will help you make better use of 19D-34C single phase energy meter, and help to solve the various problems at the scene.

1. Before the meter turning on the power supply, be sure that the power supply within the provisions of the instrument;
2. When installation, the current input terminal must non-open, voltage input terminals must Non-short circuit;
3. Communication terminal (RS232/RS485) is strictly prohibited to impose on high pressure;
4. Be sure the instrument wiring consistent with the internal system settings;
5. When communicating with the PC, instrument communication parameters must be consistent with the PC.



- **Please read this user manual carefully**
- **Please save this document**

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1. - SUMMARIZE

The three-phase din rail electric energy meter adopts a pen-segment LCD screen, which is a combined AC power measurement terminal. It is a highly integrated product for the application of AC parameter measurement. It has three-phase AC power measurement and calculation, energy accumulation, and harmonic analysis. Voltage and current imbalance analysis, multi-rate electric energy metering, maximum demand metering, 4-way switch input, 2-way relay output and other functions.

The 19D-34C three-phase energy meter is a 4M width din rail energy meter, which uses an external CT to extend the current range up to 999A. 19D-34C also provides a communication interface to connect with the computer monitoring system, supports RS485 interface MODBUS communication protocol, and can upload the data collected by measurement and equipment status. This three-phase digital energy meter is suitable for electric power, communication, railway, transportation, environmental protection, petrochemical, steel and other industries, used to monitor the power consumption of AC equipment.

FEATURES

- Maximum 999A, 1A/5A, CT connection;
- Provide energy import and export measurement (IMP & EXP);
- With one port energy pulse output;
- RS485 Modbus communication (optional);
- Standard 35mm din rail mounting, width 4m size;
- Detect voltage, current, active/reactive energy, power, frequency, max demand etc.

APPLICATIONS

- All power parameter measurement;
- Energy measurement and electrical fire monitor and control;
- Transformers, generators, capacitors and electric motors distributed detection;
- Medium and low pressure systems;
- SCADA, EMS, DCS integrators.

2. - TECHNICAL PARAMETERS

Voltage measurement	Rated 110V, 380V RMS value, Accuracy 0.2%,
Current measurement	Rated 5A, optional 1A, CT connection
Frequency	50/60Hz, Accuracy $\pm 0.01\text{Hz}$
Display	LCD with white backlit
Maximum display value	99,999,999MWh
Energy accuracy	Class 0.5, IEC 62053-21
Digital port	RS-485 MODBUS-RTU
Working environment	-25~55°C Altitude $\leq 2500\text{m}$, 0~95%RH, non-condensing, non-corrosive gas
Pulse port	1600imp/kWh
Storage environment	-40~70C
Voltage tolerance	2KV 1min
Shock voltage	6KV-1.2uS waveform
Insulation	Input, output, power supply to Shell $> 5\text{M}\Omega$

3. - INSTALLATION AND START-UP



The manual you hold in your hand contains information and warnings that the user should respect in order to guarantee a proper operation of all the instrument functions and keep it in safety conditions. The instrument must not be powered on and used until its definitive assembly is on the cabinet's door.

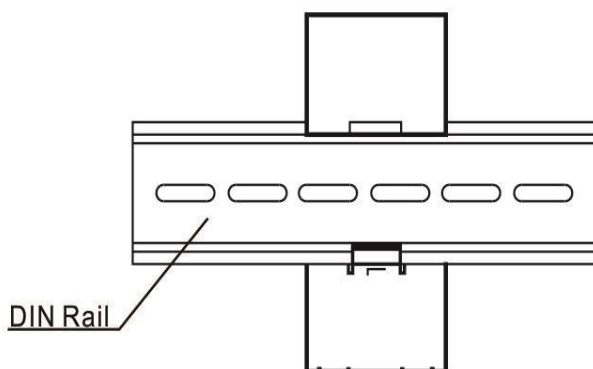
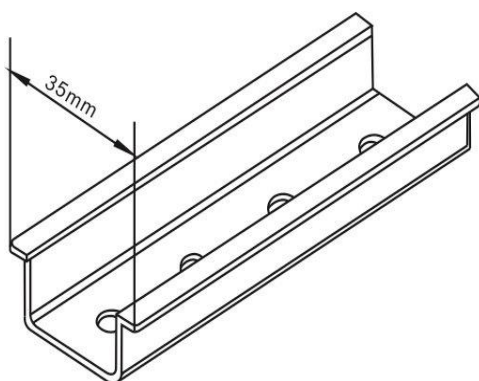
If the instrument is not used as manufacturer's specifications, the protection of the instrument will be damaged.

When any protection failure is suspected to exist (for example, it presents external visible damages), the instrument must be immediately powered off. In this case contact a qualified service representative.

3.1.- Installation

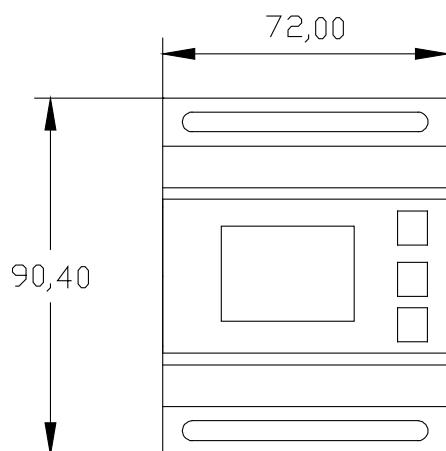
Mounting

Instrument is to be mounted on 35mm Din-rail. Keep all connections into the cabinet. Please note that with the instrument powered on, the terminals could be dangerous to touch and cover opening actions or elements removal may allow accessing dangerous parts. Therefore, the instrument must not be used until this is completely installed.

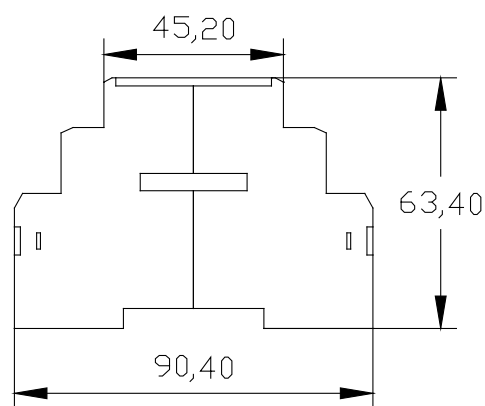


Dimension:

Unit: mm



Front view



Side view

Notes:

Input signal: 19D-34C using a separate acquisition calculate for each measurement channel, to ensure consistent in use, for different load forms, it's a variety of connection mode. Access wire shall be met the current is 2.5 square millimeters and the voltage is 1.5 square millimeters.

A. Voltage input

Input voltage should not exceed the rated input voltage products 450V.
Otherwise, you should use external VT. Suggest 1A fuse be installed in the voltage input side.

B. Current Input

Standard input current is 5A or 1A, if greater than 5A/1A should use external CT.
When the CT is connected with other meters, make sure wiring methods be used in series.

Warning: Forbid to install a CT on the live feeder wire with open secondary leads. This can be extremely dangerous!

Before remove the current input connection, must be sure to disconnect the primary circuit or shorted secondary circuit of CT.

C. Sequence of wire

Warning: Please make sure that the input voltage and current corresponding to the same phase, sequence, and the same direction; Otherwise, the Values and symbols will be wrong! (Power and Energy)

Always observe the physical orientation of CT (P1 - P2) when installing on the feeder wire.
Always pay attention to wiring polarity and phasing when terminating the CT leads to the 19D-34C.
S1 connect to Ix*, S2 connect to Ix.

The input network configuration of instrument depends on the CT number of the system:
in the condition of 2 CT, select the three-phase, three-lines two components;
in the condition of 3 CT, select the three-phase, four-lines three component mode.

Instrument connection mode, set of the instrument (programming input network NET) should be the same load wiring as measured wiring. Otherwise, the measurement instrument will lead to incorrect voltage or power.

In three-phase 3 wire mode, measurement and shows the line voltage;
In three-phase 4 wire mode, measurement and shows the phase voltage and line voltage both.

D. Auxiliary power

19D-34C with universal (AC / DC) power input, if not for a special statement, we provide the 90-240AC/DC power interface for standard products, please ensure that the auxiliary power can match with meter to prevent unexpected damage.

A. Suggest install 1A fuse in the fire line side.

B. For the areas with poor power quality, suggest install lightning surge suppressor and rapid burst suppressor to prevent lightning strikes.

3.2. - Connection Terminal

Upper connection terminal

20	19	70	71	72	48	47	60	59	58	2	1
DO1	COM	D11	D12	RP-	RP+	⊥	B	A	N	L	

19,20: Switching output(DO1)

60:RS485 (GND)

70,71,72: 2-way switching input

59. RS-485 (-)

48:Pulse output-

58. RS-485 (+)

49:Pulse output+

1,2: Power supply

Lower connection terminal

4	5	6	7	8	9	11	12	13	14	21	22
IA*	IA	IB*	IB	IC*	IC	UA	UB	UC	UN	DO2	IA*

4,5,6,7,8,9: current input

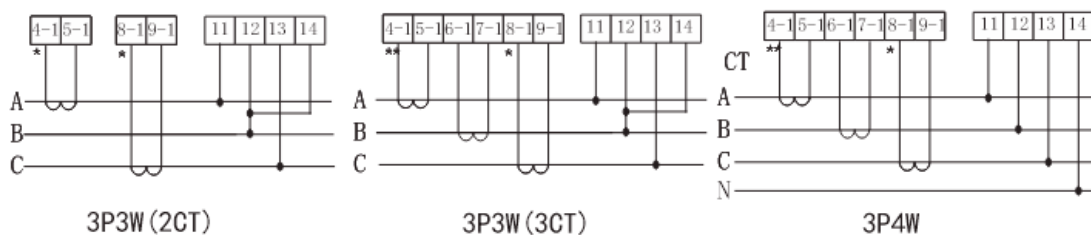
11,12,13,14: voltage input

21,22: Switching output

Note:

The terminal pin definition may change depends on customer order; please refer to the label on the meter!

3.3. – Typical Wiring



Note:

This connection drawing is for reference only; the actual connecting terminal please refer to the label on the rear part.

WARNINGS!

If power = -0.01 is shown for any of the phases and voltage and current are not zero for this phase, check out following points:

- Assure that A, B and C phases coincide in voltage and current.
- Correct polarity? Reverse the current transformer placed at this phase.

4. - SCREEN DISPLAY

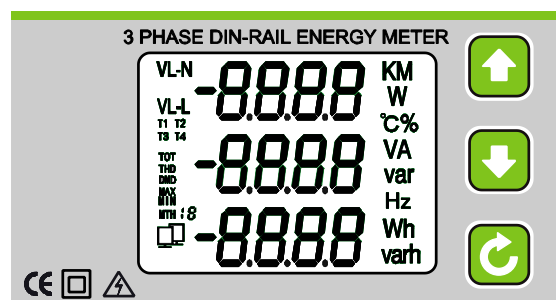
4.1.- Screen description:

1. The top row is reverse display information characters.



Indicates that the device is communicating with the host computer.

2. The three rows in the middle are the real-time display of measurement data.



4.2 Button description



Short press is the up button, turning the page to display the measurement data, displaying voltage, current, power, electric energy and other measurement data.

Short press is the down key, the function is the same as the up key, but the page turning direction is opposite;

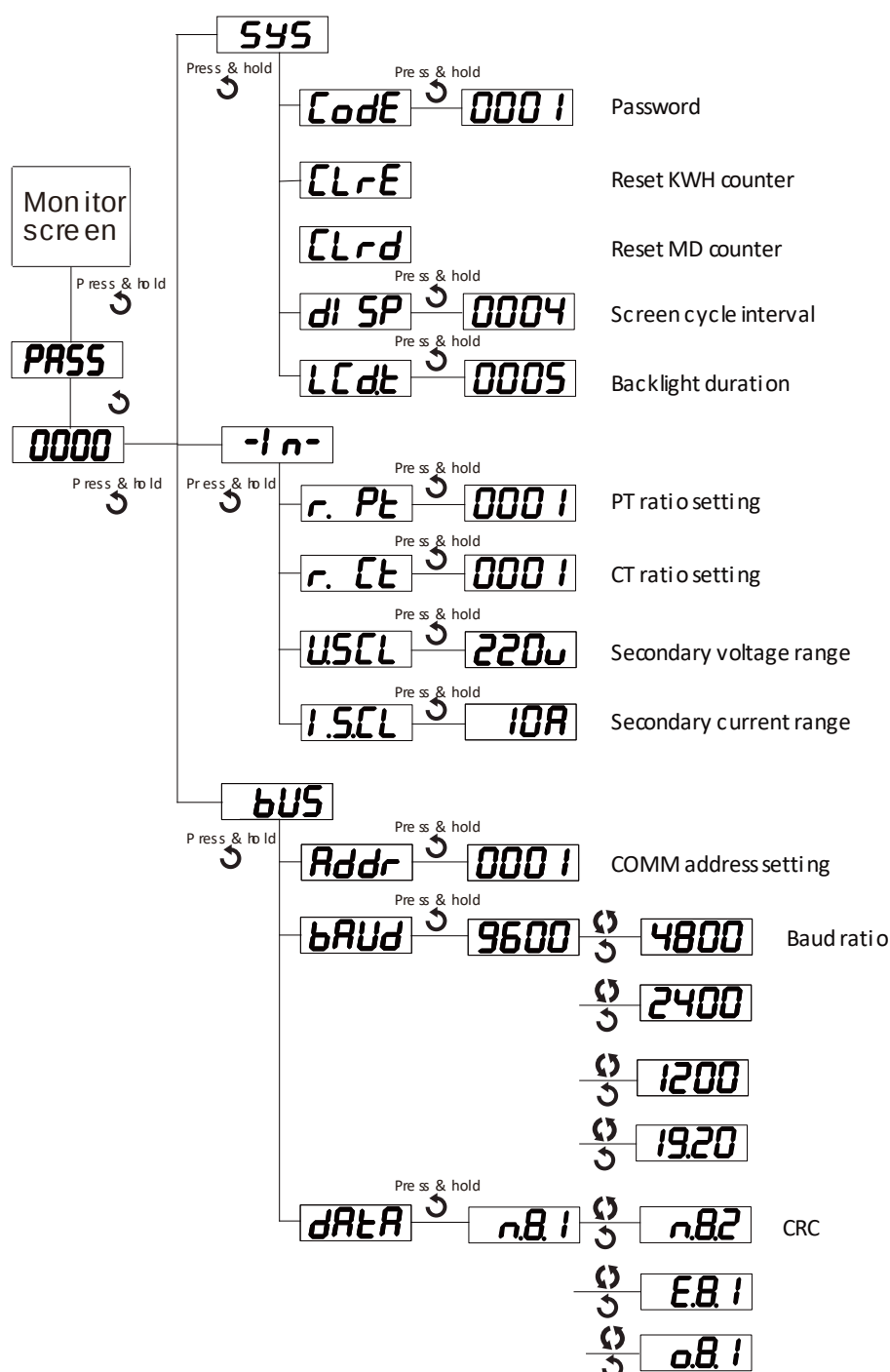
Long press is the menu key to enter the programming menu, and it is also a function key to exit the menu step by step.

Short press is the confirmation key to confirm and save the entered information or displayed settings.

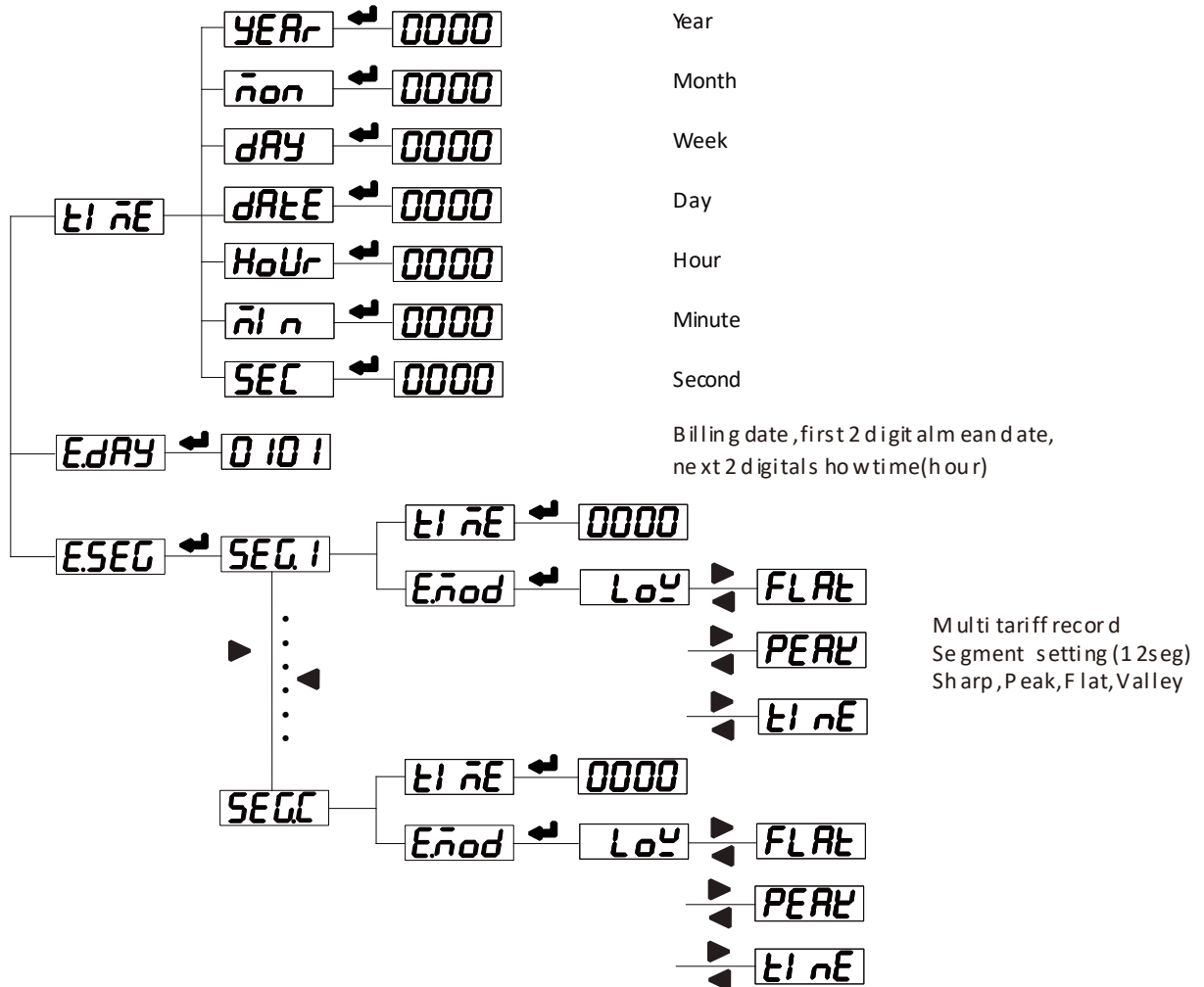
5. OPERATION MENU DESCRIPTION

5.1 Main menu

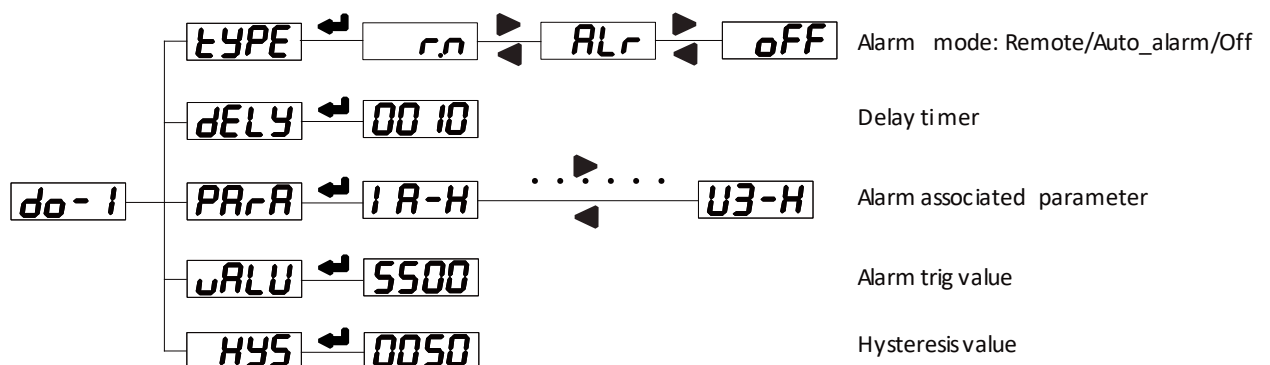
In the case of measuring data, press the "menu" button, and the prompt of "PASS" (that is, "password") will appear, press the "OK" button to enter the user-level password (default is 0001), press the button to enter the programming in this state, the instrument provides three types of input setting menu items: system factory commissioning (SYS), input (-IN-), and communication (bus). Adopt LCD display layered menu structure management.



5.1.1 Multi-tariff menu (optional)



5.1.2 Digital output menu (optional)



5.2 Description of menu characters:

PASS	(Password) User password
Error	(Error) Wrong input information
-I n-	(Input) User Display data settings menu
bUS	(Bus) Communication settings menu
SYS	(System) System settings menu (for factory debugging, not open yet)
Code	(Code) Enter password
dAtA	(Data) Communication parameter setting
Addr	(Address) Local communication address setting
bAUd	(Baud) Communication baud rate
oB.1	(o.8.1) Indicates 8 data bits, 1 stop bit, odd parity
eB.1	(e.8.1) Indicates 8 data bits, 1 stop bit, even parity
nB.1	(n.8.1) Indicates 8 data bits, 1 stop bit, no parity bit
USCL	(U.scl) Select rated input voltage
ISCL	(I.scl) Select rated input current
r. Ct	(R.ct) Set the current multiplier
r. Pt	(R.pt) Set voltage ratio
SYS	(System) System settings menu (for factory debugging, not open yet)

TYPE	(Type) What parameters to set
PARA	(Para Corresponding parameter selection
VALU	(Value) Set the corresponding alarm value
CODE	(Code) Modify password value
YEAR	(Year) Set year
MON	(Month) Set month
DAY	(Day) Set day
DATE	(Date) Set date
Hour	(Hour) Set hour
MIN	(Min.) Set minute
SEC	(Second) Set second
ESeg	(Seg,) Set segment
Enod	Rate
FLAt	Flat
LoV	Valley
ShnE	Sharp
PEAK	Peak
EDAY	Meter reading time setting

6.- PULSE OUTPUT (OPTIONAL)

19D-34C provides 1* pulse output for the active energy.

The host / PLC / DI module can cumulative the data of both the active and reactive power energy sent by the pulse from opt coupler relay.

1). Electrical specification: voltage $VCC \leq 48V$, $I_z \leq 50mA$.

2). Pulse: 5000 imp / kWh, pulse up to 80ms.

This means: When the device detects 1 kWh, the port will generate 5000 pulse

Note:

1 kWh energy is for secondary side energy data, if there have PT and CT accessed; primary side energy data is "1 kWh $\times$ PT ratio $\times$ CT ratio".

Voltage (V)	Current (A)	Pulse constant (imp / kWh)
380 or 220	5	5000
	1	20000
100	5	20000
	1	80000

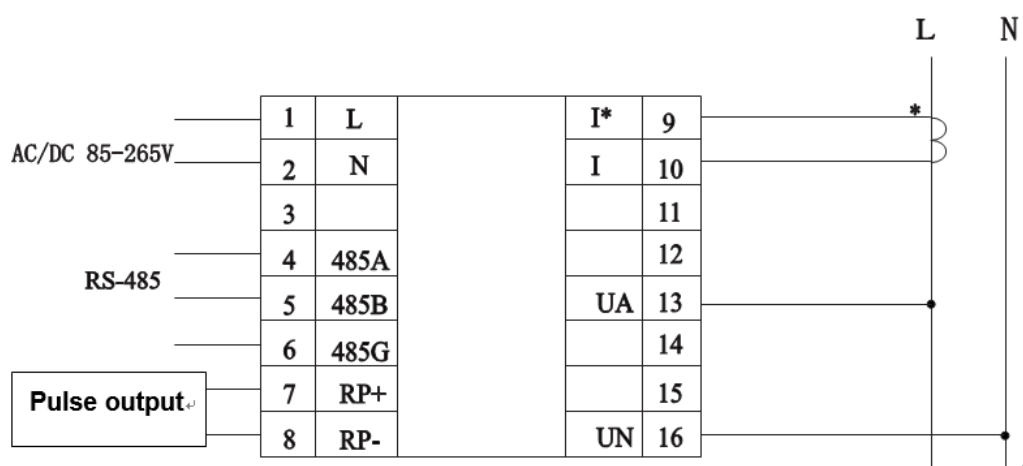
Example: In measure time "T", the received total pulse is "N",
Primary side input of voltage is 10Kv
Primary side input of current is 400A.
Secondary side measurement range is 100V and 5A.

In the time "T", energy accumulated is: $N / 20000 \times 100 \times 80$

7 - COMMUNICATION INTERFACE

7.1.- Connection for RS485 BUS

The composition of the RS-485 cabling must be carried out with a meshed screen cable (minimum 3 wire), diameter of not less than 0.5mm², with a maximum distance of 1,200 m between the 19D-34C... and the master unit. This Bus may connect a maximum of 32pcs .



Notes:

- For communication with the master unit, user can choose RS-485 to RS-232 converter or RS485 to USB adapter to use.
- For expand the number of devices in the communication network, a signal repeater can be used.
- RS485 PIN number is 58,59,60
- Due to product modifications or special requirements, the interface pin place may be change. For details, please refer to product label on the rear side

7.2.- MODBUS © Protocol

Modbus RTU Frame Format:

Address code	1 BYTE	<i>Slave device address 1-247</i>
Function code	1 BYTE	<i>Indicates the function codes like read coils / inputs</i>
Data code	4 BYTE	<i>Starting address, high byte Starting address, low byte Number of registers, high byte Number of registers, low byte</i>
Error Check code	2 BYTE	<i>Cyclical Redundancy Check (CRC)</i>

MODBUS FUNCTIONS:

Code	Meaning	Description
FUNCTION 01	Read Coil Status	<i>Only valid when equipped DO port</i>
FUNCTION 02	Read Input Status	<i>Only valid when equipped DI port</i>
FUNCTION 03	Reading of n Words	<i>This function permits to read all the electrical parameters</i>
FUNCTION 05	Force Single coil	<i>When DO in remote control mode can work</i>
		<i>Disable in default</i>
FUNCTION 06	Preset Single register	<i>If need valid this code, please contact Blue Jay Sales Team before your order!</i>

Note: Float data follow **IEEE754**, float low bit first, high bit next. **(CD AB)**

7.3.- Register Map

7.3.1.- Basic power data—Primary Side

Add.	Data	Byte		Instruction
0x00	Ua	float	2	Phase to Line Voltage, Unit: V
0x02	Ub	float	2	
0x04	Uc	float	2	
0x06	Uab	float	2	Phase to Phase Voltage, Unit: V
0x08	Ubc	float	2	
0x0a	Uca	float	2	
0x0c	Ia	float	2	Three phase Current, Unit: A
0x0e	Ib	float	2	
0x10	Ic	float	2	
0x12	Pa	float	2	Active power, Unit: kW
0x14	Pb	float	2	
0x16	Pc	float	2	
0x18	$P\Sigma$	float	2	
0x1a	Qa	float	2	Reactive power, Unit: kVar
0x1c	Qb	float	2	
0x1e	Qc	float	2	
0x20	$Q\Sigma$	float	2	
0x22	Sa	float	2	Apparent power, Unit: kVA
0x24	Sb	float	2	
0x26	Sc	float	2	
0x28	$S\Sigma$	float	2	
0x2a	PFa	float	2	Power factor, 0~1.000
0x2c	PFb	float	2	
0x2e	PFc	float	2	
0x30	$PF\Sigma$	float	2	
0x32	FR	float	2	Frequency, Unit:0.01Hz
0x34	Ep+	float	2	Positive active energy, Unit: kWh
0x36	Ep-	float	2	Negative active energy, Unit: kWh
0x38	Eq+	float	2	Inductive reactive power, Unit: kVarh
0x3a	Eq-	float	2	Capacitive reactive power

7.3.2.- Basic power data—Secondary Side

Add.	Data	Byte		Instruction
0x100	Ua	int	1	Phase to Line Voltage, Unit: 0.1V
0x101	Ub	int	1	
0x102	Uc	int	1	
0x103	Uab	int	1	Phase to Phase Voltage, Unit: 0.1V
0x104	Ubc	int	1	
0x105	Uca	int	1	
0x106	Ia	int	1	Three phase Current, Unit: 0.001A
0x107	Ib	int	1	
0x108	Ic	int	1	
0x109	Pa	int	1	Active power, Unit: W
0x10a	Pb	int	1	
0x10b	Pc	int	1	
0x10c	$P\Sigma$	int	1	
0x10d	Qa	int	1	Reactive power, Unit: Var
0x10e	Qb	int	1	
0x10f	Qc	int	1	
0x110	$Q\Sigma$	int	1	
0x111	Sa	int	1	Apparent power, Unit: VA
0x112	Sb	int	1	
0x113	Sc	int	1	
0x114	$S\Sigma$	int	1	
0x115	PFa	int	1	Power factor, 0~1.000
0x116	PFb	int	1	
0x117	PFc	int	1	
0x118	$PF\Sigma$	int	1	
0x119	FR	int	1	Frequency, Unit:0.01Hz
0x11a	Ep+	int	2	Positive active energy, Unit: Wh
0x11c	Ep-	int	2	Negative active energy, Unit: Wh
0x11e	Eq+	int	2	Inductive reactive power, Unit:Varh
0x120	Eq-	int	2	Capacitive reactive power
0x200	DO	int	1	Remote control relay output status Bit0~1 1st~2nd output status
0x201	DI	int	1	Switch input information Bit0~3 Channel 1~4 switch-in state
0x20A	TIME.year	int	1	Internal RTC real-time time: year-month-day-hour-minute-second-week (integer number, the last char is not used)

7.3.3.- Meter status

Add.	Data	Byte		Instruction
0x200	DO	int	1	Remote control relay output status Bit0~1 1st~2nd output status
0x201	DI	int	1	Switch input information Bit0~3 Channel 1~4 switch-in state
0x20A	TIME.year	int	1	Internal RTC real-time time: Year-Month- Day-Hour-Minute-Second-Week (integer, the last char is not used)
0x20B	TIME.month	int	1	
0x20C	TIME.date	int	1	
0x20D	TIME.hour	int	1	
0x20E	TIME.minute	int	1	
0x20F	TIME.second	int	1	
0x210	TIME.day	int	1	

7.3.4.- Advanced electrical parameter

Add.	Data	Byte		Instruction
0x300	Pde	float	2	Active power demand, Unit: W
0x302	Qde	float	2	Reactive power demand, Unit: var
0x304	Sde	float	2	Apparent power demand, Unit: var
0x306	Pdmax	float	2	active power demand in this month
0x308	Qdmax	float	2	reactive power demand in this month
0x30a	Sdmax	float	2	apparent power demand in this month
0x30c		float	2	active power demand in last month
0x30e		float	2	reactive power demand in last month
0x310		float	2	apparent power demand in last month
0x312		float	2	active power demand in month before last month
0x314		float	2	reactive power demand in month before last month
0x316		float	2	Maximum demand for apparent power last month
0x318- 0x31F		float	2	Reserve
0x320		float	2	Primary side positive sequence voltage
0x322		float	2	Primary side negative sequence voltage
0x324		float	2	Primary side zero sequence voltage
0x326		float	2	Primary side positive sequence current
0x328		float	2	Primary side negative sequence current

0x32A		float	2	Primary side zero sequence current
0x32C		float	2	Negative sequence voltage percentage
0x32E		float	2	Negative sequence current percentage
0x330		float	2	Phase A voltage deviation
0x332		float	2	Phase B voltage deviation
0x334		float	2	phase C voltage deviation
0x336		float	2	frequency deviation

7.3.5.- Multi- tariffs ratio data (secondary side)

Register	Data	Byte mode		Instruction
0x400	Cumulative_tol(Total)	long	2	The total energy
0x402	Cumulative_T1(Sharp)	long	2	The total sharp energy
0x404	Cumulative_T2(Peak)	long	2	The total peak energy
0x406	Cumulative_T3(Flat)	long	2	The total flat energy
0x408	Cumulative_T4(Vally)	long	2	The total valley energy
0x40a	Current_tol(Total)	long	2	Total energy of this month
0x40c	Current_T1(Sharp)	long	2	Sharp energy of this month
0x40e	Current_T2(Peak)	long	2	Peak energy of this month
0x410	Current_T3(Flat)	long	2	Flat energy of this month
0x412	Current_T4(Vally)	long	2	Valley energy of this month
0x414	Prior_tol(Total)	long	2	Total energy of last month
0x416	Prior_T1(Sharp)	long	2	Sharp energy of last month
0x418	Prior_T2(Peak)	long	2	Peak energy of last month
0x41a	Prior_T3(Flat)	long	2	Flat energy of last month
0x41c	Prior_T4(Vally)	long	2	Valley energy of last month
0x41e		long	2	Total energy of the month before last month
0x420		long	2	Sharp energy of the month before last month
0x422		long	2	Peak energy of the month before last month
0x424		long	2	Flat energy of the month before last month
0x426		long	2	Valley energy of the month before last month

7.3.6.- Harmonic measurement parameters

Register	Data	Byte mode		Instruction
0x500	THDUa	int	1	A-phase Voltage THD
0x501	THDUb	int	1	B-phase Voltage THD
0x502	THDUc	int	1	C-phase Voltage THD
0x503	THDia	int	1	A-phase Current THD
0x504	THDib	int	1	B-phase Current THD
0x505	THDic	int	1	C-phase Current THD
0x508-0x545	HUa	int	62	Three phase voltage individual harmonic 2 th -31 th
0x548-0x585	HUb	int	62	
0x588-0x5c5	HUc	int	62	
0x5c8-0x605	Hla	int	62	Three phase current individual harmonic 2 th -31 th
0x608-0x645	Hlb	int	62	
0x648-0x685	Hlc	int	62	
0x688	TOHDUa	int	1	Three phase voltage total odd harmonic distortion, unit 0.1%
0x689	TOHDUb	int	1	
0x68a	TOHDUc	int	1	
0x68b	TEHDUa	int	1	Three phase voltage total even harmonic distortion, unit 0.1%
0x68c	TEHDUb	int	1	
0x68d	TEHDUc	int	1	
0x68e	THFFUa	int	1	Three phase voltage telephone harmonic form factor, unit 0.1%
0x68f	THFFUb	int	1	
0x690	THFFUc	int	1	
0x691	CFUa	int	1	Three phase voltage crest factor, unit 0.001
0x692	CFUb	int	1	
0x693	CFUc	int	1	
0x694	TOHDla	int	1	A phase current total odd harmonic distortion, unit 0.1%
0x695	TOHDlb	int	1	
0x696	TOHDlc	int	1	
0x697	TEHDla	int	1	Three phase current total even harmonic distortion, unit 0.1%
0x698	TEHDlb	int	1	
0x699	TEHDlc	int	1	
0x69a	KFla	int	1	Three phase current K factor, unit 0.01
0x69b	KFlb	int	1	
0x69c	KFlc	int	1	

7.3.6.- SOE record

Register	Data	Byte mode		Instruction
0x700-0x7F9	I/O Event 1~20	int	5	BYTE0: Fault type BYTE2: fault value, low byte BYTE3: Fault value, high byte (2, 3 two bytes need to be read continuously) BYTE4: year BYTE5: month BYTE6: day BYTE7: time BYTE8: minutes BYTE9: seconds

Byte 0	Byte 1	
1:DI1 Closed	100: 100: remote action	126:DI1 close alarm
2:DI2 Closed	101:UA upper alarm	127:DI2 close alarm
3:DI3 Closed	102:UB upper alarm	128:DI3 close alarm
4:DI4 Closed	103:UC upper alarm	129:DI4 close alarm
5:D15 Close	104:UAB upper alarm	130:DI5 close alarm
6 D:I6Close	105:UBC upper alarm	
	106:UCA upper alarm	131:DI6close alarm
101:DO1 Closed	107:UA/UB/UC upper alarm	132:UA lower alarm
102:DO2 Closed	108:IA upper alarm	133:UB lower alarm
103:O1 Closed	109:IB upper alarm	134:UC lower alarm
104:O2 Closed	110:IC upper alarm	
	111:IA/IB/IC3 upper alarm	
	112:PA upper alarm	
	113:PB upper alarm	
	114:PC upper alarm	
	115:total active power upper alarm	
	116:QA upper alarm	
	117:QB upper alarm	
	118:QC upper alarm	
	119:total reactive power upper alarm	
	120:SA upper alarm	
	121:SB upper alarm	
	122:SC upper alarm	
	123:total apparent power upper alarm	
	124:total power factor upper alarm	
	125:frequency upper alarm	

Notes:

1. The data can be read out depends on your multi-function meter model, please refer to the corresponding product manual before build your software.
2. Some software has different definitions of the start bit of register address, there will be offset, please add 1 for the right address. To get more info, please contact technical support.

7.4.- Example

Host inquiry slave device

Addr.	Func.	Data Address high	Data Address low	Data Number high	Data number low	CRC16 low	CRC16 high
0CH	03H	00H	00H	00H	06H	C4H	D5H

PC user ask upload UA, UB, UC, IA, IB, IC

Slave device response

Addr.	Func.	Byte count	Data1 high	Data1 low	Data2 high	Data2 low	Data3 high	Data3 low
0CH	03H	0CH	03H	E8H	03H	E9H	03H	E8H
Data4 high	Data4 low	Data5 high	Data5 low	Data6 high	Data6 low	CRC16 low	CRC16 high	
13H	84H	13H	88H	13H	8AH	A6H	D6H	

Show the data:

UA=3E8H (100.0)

UB=3E9H (100.1)

UC=3E7H (99.9)

IA=1384H (4.996)

IB=1388H (5.000)

IC=138AH (5.002)

Notes:

1. Blue Jay disable the 06 function in default setting, if Activated the write command, please check the host device program to avoid the meaningless write operation, that may reduce the reduce the register working life.
2. When the write is unsuccessful, no return data from the slave device. In this addition, please re-send write inquiry again.

8. - SAFETY CONSIDERATIONS



All installation specification described at the previous chapters named:
INSTALLATION AND STARTUP, INSTALLATION MODES and SPECIFICATIONS.

Please note that with the instrument powered on, the terminals could be dangerous to touching and cover opening actions or elements removal may allow accessing dangerous parts. This instrument is factory-shipped at proper operation condition.

- ◆ The device must have a professional installation and maintenance
- ◆ Any operation of the device, you must cut off the input signal and power;

9. - MAINTENANCE

The 19D-34C single phase energy meter does not require any special maintenance. No adjustment, maintenance or repairing action should be done when the instrument is open and powered on, should those actions are essential, high-qualified operators must perform them.

Before any adjustment, replacement, maintenance or repairing operation is carried out, the instrument must be disconnected from any power supply source.

When any protection failure is suspected to exist, the instrument must be immediately put out of service. The instrument's design allows a quick replacement in case of any failure.

10. - TECHNICAL SERVICE

FAQ's

- 1.-** Once cabled and connected is seen to give a correct voltage and current reading, but shows negative values for active power (generation).

This is an error with the cabling for the current transformer secondary; the direction of the transformer current has to be respected as shown in the connection diagram. The current transformers have a two face primary; the current must pass from P1 to P2 giving the result in secondary (S1 and S2) of 5 amps.

The error stems from:

- a).** The current transformers have been incorrectly installed. As a result, it gives the direction of the current as passing from P2 to P1; to resolve this problem, the current transformer does not have to be dismantled and installed again, but the transformer secondary (S1 and S2) just has to be inverted.
 - b).** The connection of the current secondary in the current transformers have been incorrectly connected; to resolve this problem just connect the S1 transformer secondary to the S1 on the meter and the S2 on the current transformer to the S2 on the meter .
- 2.-** Once cabled and connected, is seen to give an incoherent Power factor and $\cos\Phi$ reading (-0.01 or similar).

This is again a current transformer and voltage phase connection error phase A, must correspond to the current transformer installed in phase A; phase B, must correspond to the current transformer installed in phase B; and phase C, must correspond to the current transformer installed in phase C.

This connection terminal is clearly shown on the area side of the device.

- 3.-** The measuring voltage and is displaying the secondary voltage (for example 110 volts).
Ensure that the voltage Transformer ratio has been correctly set.
- 4.-** Device does not correctly display the current reading. It shows values varying between 0 to 5 amps of current.
Ensure that the Current Transformer ratio has been correctly set.

Calculation formula of electrical parameter

Formula	Parameter
$U = \sqrt{\frac{1}{N} \sum_{n=0}^N u_n^2} \quad n = 0, 1, 2 \dots N$	Voltage RMS value
$I = \sqrt{\frac{1}{N} \sum_{n=0}^N i_n^2} \quad n = 0, 1, 2 \dots N$	Current RMS value
$P = \frac{1}{N} \sum_{n=1}^N (i_{an} u_{an} + i_{bn} u_{bn} + i_{cn} u_{cn})$	Total active power cycle average
$P_s = UI$	Single-phase apparent power cycle average
$\cos \theta = \frac{P_p}{P_s}$	Power factor
$P_q = \sqrt{P_s^2 - P_p^2}$	Reactive power (P _q is positive and the direction cannot be determined; P algorithm can be used to shift the voltage component by 90°)
$W = \int P * dt$	Electric energy

Note: In above formula, N for sampling points in one AC wave.

For any inquiry about the instrument performance or any failure, contact to Blue Jay's technical service.

Blue Jay - After-sales service

E-mail: tech@cqbluejay.com