PRO EX

Digital Panel Meter

User manual

V3.4

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PREFACE

Thank you for choosing our products.
The product range of our electrical metering products include: PRO transducer, PRO EX digital panel meter, DNS/DNXS9000 active/reactive energy meter, MDM3000/MDM3100 multi digital meter.

Please read the user manual before installing, operating, and maintaining the instruments.

 The sign indicates there is potential electrical power danger, which might result in the harm if not following the rule.

 Te safety warning sign is to remind you the potential danger.

For your safety reason, please properly use our products. It is strongly recommended that you follow the instructions:

1. Please connect to the power and load as rated in label.
2. Please make sure that the wire is connected correct to avoid the harm resulted from the wrong connection.
3. Please turn off the power system before the maintenance.
4. Please allow enough space between motor protector and other equipments.

Declaration

This manual represents your PRO EX as manufactured at the time of publication. Special versions of software may be fitted, in which case you will be provided with additional details.
Every effort has been made to ensure that the information in this manual is complete and accurate. We revised this manual but cannot be held responsible for errors or omissions.
We reserve the right to make changes and improvements to the product without obligation to incorporate these changes and improvements into units previously shipped.

I. User Manual for Meter

1.1 Profile

PRO EX digital panel meter is an intelligent instrument that has integrated with modular design of digital display, analog output, RS485, over limit alarm record and relay output. The instrument fulfills GB/T13978-2008, GB/T 13850-1998 standard, GB/T 17626.5-2008, IEC1010 and EN61010 standard.

1.2 PRO EX

PROEX U51/I51/DU51/DI51/P51/F51/T51/L51/L53 (EX51 series is for short)；
PROEX U53/I53/P53/Q53/S52 (EX53 series is for short).

1.3 Technical Standard

Accuracy class: Class 0.2, Class 0.5, Class 1.0
Auxiliary power supply: 85V~265V AC/DC
Power consumption: ≤ 3VA (48×96mm); ≤ 5VA (96×96mm)
Long term stability: annual change ≤ ±0.2%
Temperature drifting factor: 100ppm
Input overcapacity: Continuously overload capacity ≤ X 1.2(overload X 1.2)
Transient overload capacity Voltage ≤ X 3, Current ≤ X30
Analog output: Constant Voltage output, Rext ≥ 250Ω (0-5V output)
Constant Current output, Rext ≤ 500Ω (4-20mA output)
Rext=∞, Voltage limit ≤ 20V
Alternating wave ≤18mV (peak-peak)
Response time ≤ 300mS (special ≤ 100mS)
Output: 4-20mA, 0-20mA, 0-10mA, 0-1mA, 4-12-20mA, 0-1V, 0-5V, 0-10V.
Digital output: RS-485 com, Modbus-RTU protocol
Relay output: Constant open, capacity of contact: 5A/250VAC, 10A/24VDC
Upper limit alarm: input > upper limit setup value, relay H is close, LED H is on. Indicator is flicker.
Auto release upper limit alarm: input ≤ Upper limit setup value minus true Fall back value, relay H is open, LED H is off. Indicator could return to normal display by pressing random key.
Lower limit alarm: input < lower limit setup value, relay L is close, LED L is on.
Auto release lower limit alarm: input ≥ lower limit setup value add true Fall back value, relay L is open, LED L is off. Indicator could return to normal display by pressing random key.
Material of terminal: PPO, flammability accords to UL94V0
Anti-Voltage capability: 2500V
Insulated resistor: ≥100MΩ
Operation temperature: -10℃~55℃; **Operation Humidity:** ≤ 95% (non-condensing)
Storage temperature: -40℃~85℃; **Storage humidity:** ≤ 95%
Dimensional Size: EX51: 48*96*76mm; EX53: 96*96*76
Installation: Panel mounting. EX51 Installation size: 46*94mm
EX53 Installation size: 91*91mm

1.4 Each Type of Digital Panel Meter

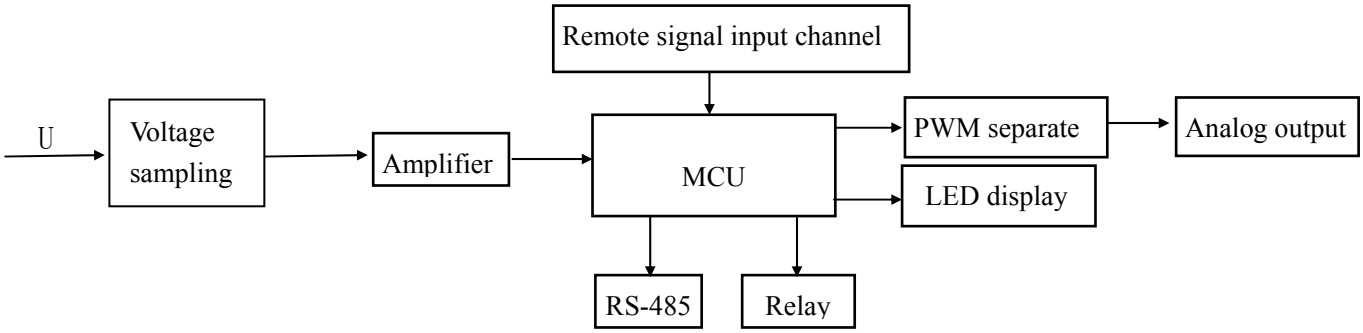
1.4.1 PROEX U51 AC Voltage Digital Panel Meter

1.4.1.1 Technical Data

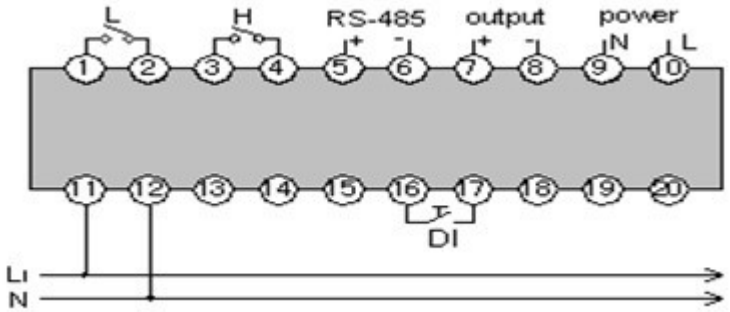
Connection: Single phase
Input: 57.7～600VAC
PT scope: 0.1 ~ 6500
Alarm limit setup: upper value setup (≤ 1.2 X full scale), Lower limit (< upper limit value). After changing PT value, Upper limit and Lower limit should be changed manually. Please pay attention to the unit. For details of shifting between V and KV, please refer to Chapter 5.2.10.
Fall back value setup: 0.1~25.5, and≤ 1/2 (Upper limit-Lower limit), true Fall back value=Fall back value setup*PT.

1.4.1.2 PROEX U51 Wiring Diagram

1) Operational principle diagram



2) Wiring diagram



PROEX U51 Wiring Diagram

Note: DI shows remote signal input, the same as below.

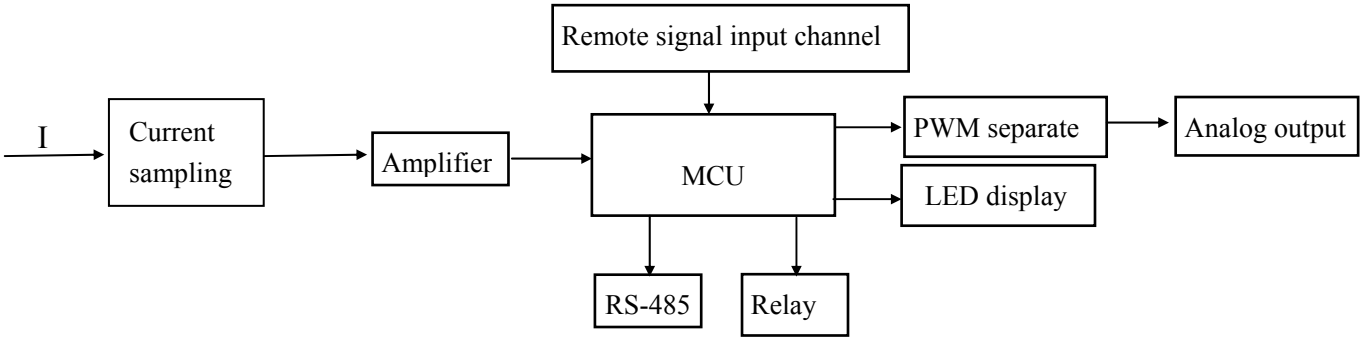
1.4.2 PRO EX I51 AC Current Digital Panel Meter

1.4.2.1 Technical Data

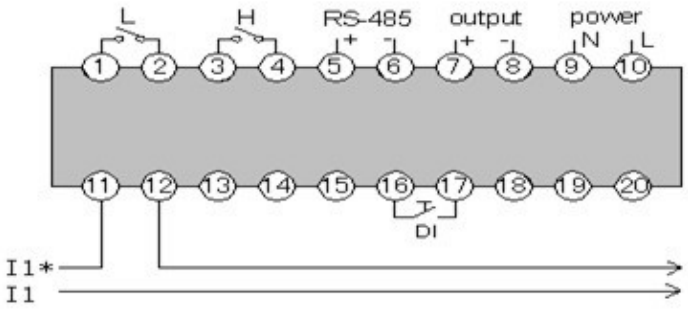
Connection: Single phase
Input: 0~ 5A
CT scope: 0.1 ~ 6500
Alarm limit setup: Upper limit (≤ 1.2X full scale), Lower limit (< upper limit value). After changing PT value, Upper limit and Lower limit should be changed manually. Please pay attention to the unit. For details of shifting between A and kA, please refer to Chapter 5.2.10.
Fall back value setup: 0.001~0.255, and ≤ 1/2 (Upper limit-Lower limit), true Fall back value=Fall back value setup*CT.

1.4.2.2 Operational Principle Diagram and Wiring Diagram

1) Operational principle diagram



2) Wiring diagram



PRO EX I51 Wiring Diagram

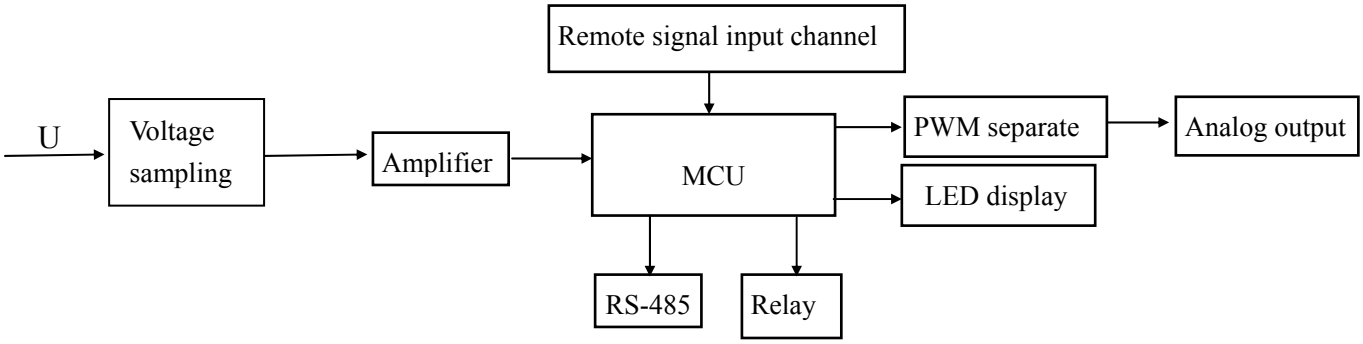
1.4.3 PRO EX DU51 DC Voltage Digital Panel Meter

1.4.3.1 Technical Data

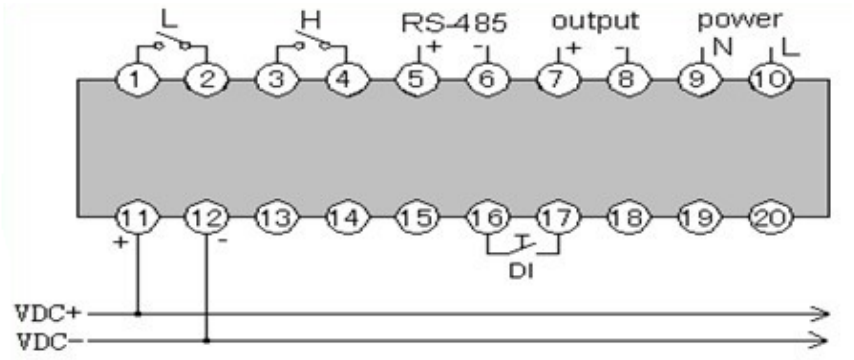
Connection: Single phase
Input: 57.7~ 600VDC
Alarm limit setup: Upper limit (≤ 1.2X full scale), Lower limit (< upper limit value).
Fall back value setup: 0.1~25.5, and ≤ 1/2 (Upper limit-Lower limit), true Fall back value= setup Fall back value.

1.4.3.2 Operational Principle Diagram and Wiring Diagram

1) Operational principle diagram



2) Wiring diagram



PRO EX DU51 Wiring Diagram

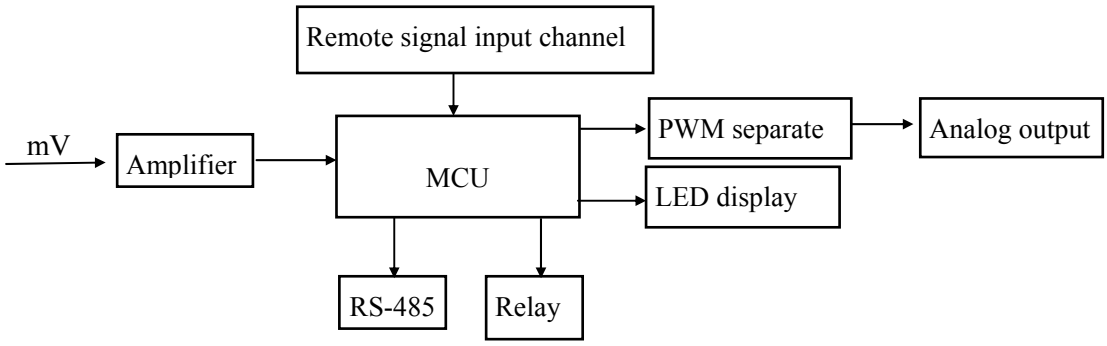
1.4.4 PRO EX DI51 DC Current Digital Panel Meter

1.4.4.1 Technical Data

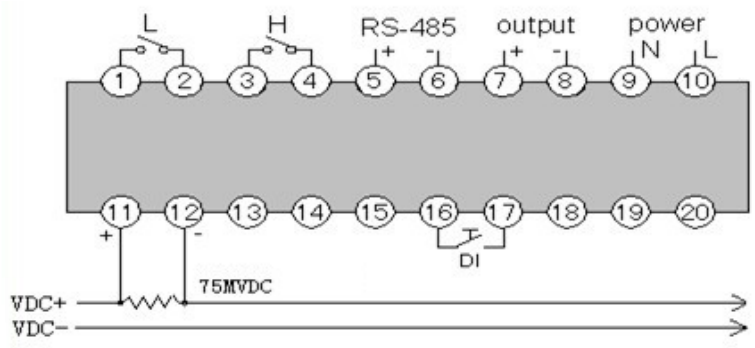
Connection: Single phase
Input: 0~75mV
CT scope: 0.1 ~ 6500
Alarm limit setup: Upper limit (≤ 1.2X full scale), Lower limit (< upper limit value). After changing PT value, Upper limit and Lower limit should be changed manually. Please pay attention to the unit. For details of shifting between A and kA, please refer to Chapter 5.2.10.
Fall back value setup: 0.1~25.5, and ≤ 1/2 (Upper limit-Lower limit), true Fall back value= setup Fall back value.

1.4.4.2 Operational Principle Diagram and Wiring Diagram

1) Operational principle diagram



2) Wiring diagram



PRO EX DI51 Wiring Diagram

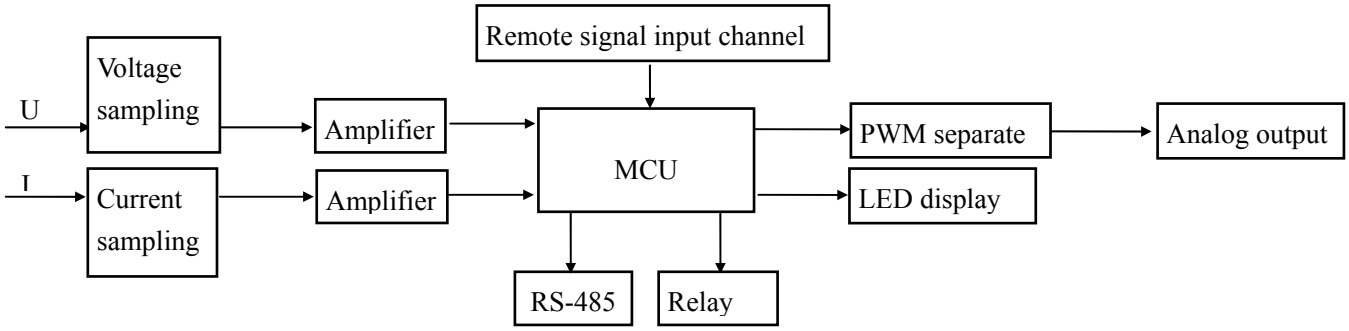
1.4.5 PRO EX P51 Digital Active Power Panel Meter

1.4.5.1 Technical Data

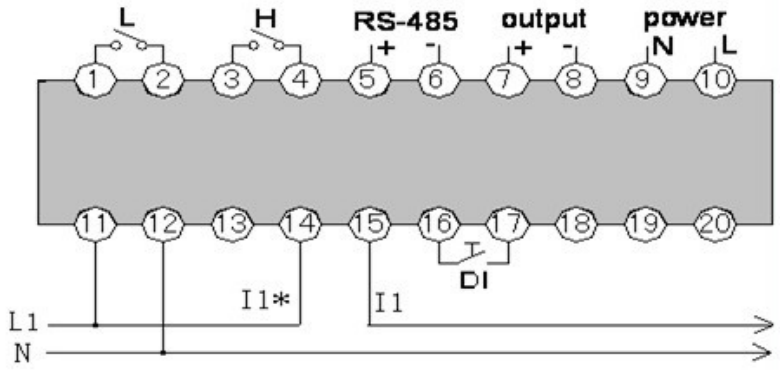
Connection: Single phase
V input: 57.7~600VAC
I input: 0~ 5A
CT scope: 0.1 ~ 6500
PT scope: 0.1 ~ 6500
Alarm limit setup: Upper limit (≤ 1.2X full scale), Lower limit (< upper limit value). After changing PT value, Upper limit and Lower limit should be changed manually. Please pay attention to the unit. For details of shifting between kW and MW, please refer to Chapter 5.2.10.
Fall back value setup: 0.1~25.5, and ≤ 1/2 (Upper limit-Lower limit), true Fall back value=setup Fall back value*CT*PT.

1.4.5.2 Operational Principle Diagram and Wiring Diagram

1) Operational principle diagram



2) Wiring diagram



PRO EX P51 (Single) Wiring Diagram

Note: L1 is for Voltage of Phase A, N for Zero line, I1 for Current of Phase A. Current is input from Terminal 14 and output from Terminal 15, the same as combinations of Voltage and Current of Phase B/C.

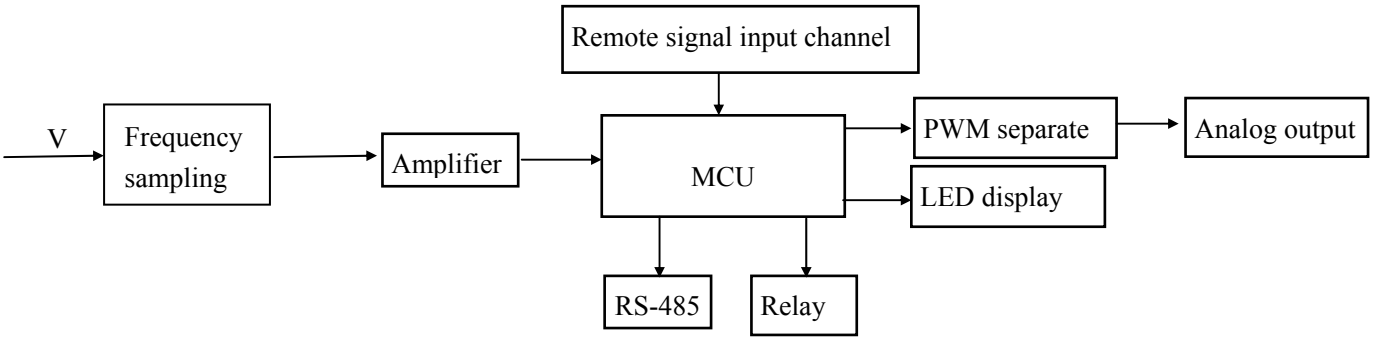
1.4.6 PRO EX F51 Frequency Digital Panel Meter

1.4.6.1 Technical Data

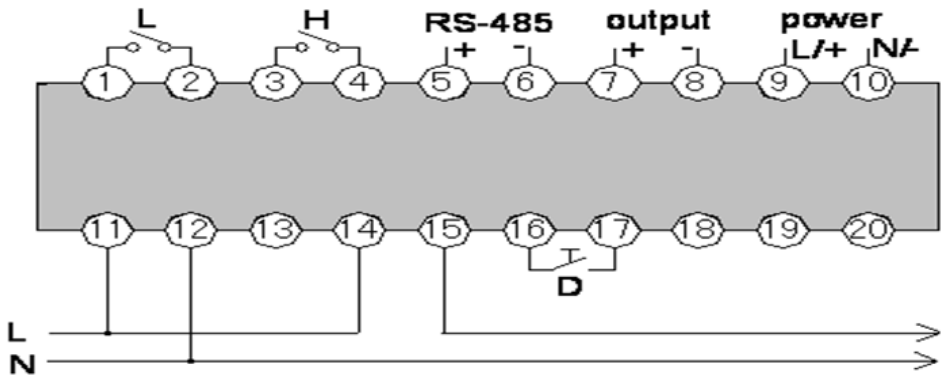
Connection: Single phase
Input: 57.7～600VAC
Test Frequency input: 45～65Hz
Alarm limit setup: Upper limit (≤ full scale), Lower limit (< upper limit value)
Fall back value setup: 0.01~2.55, and ≤ 1/2 (Upper limit-Lower limit), true Fall back value=setup Fall back value.

1.4.6.2 Operational Principle Diagram and Wiring Diagram

1) Operational principle diagram



2) Wiring diagram



PRO EX F51 Wiring Diagram

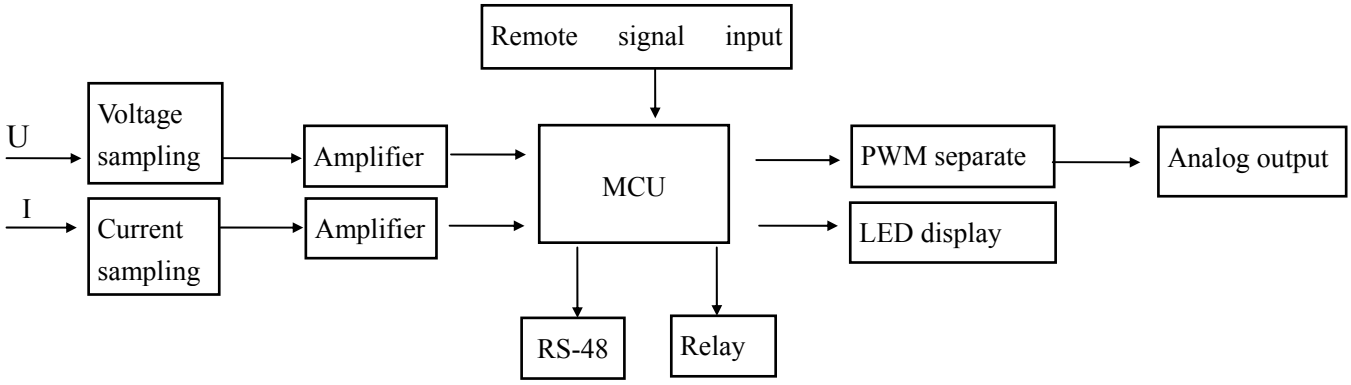
1.4.7 PRO EX L51 Power Factor digital panel meter

1.4.7.1 Technical Data

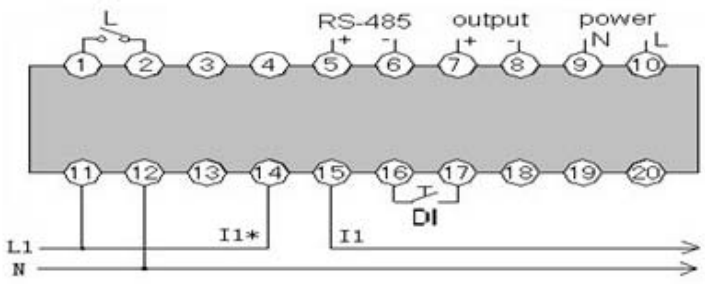
Connection: Single phase
Input: Voltage: 57.7~ 600VAC
Current: 0~ 5A
Test range: -0.5～1～+0.5, -0～1～+0
Alarm limit setup: the inductive district Lower limit (+0.5≤ the value< 1 or 0≤ the value< 1), the capacitive district Lower limit (-1≤ the value< 0 or -1≤ the value< -0.5).
Fall back value setup: 0.001~0.255, true Fall back value=setup Fall back value.

1.4.7.2 Operational Principle Diagram and Wiring Diagram

1) Operational principle diagram



2) Wiring diagram



PRO EX L51 (Single) Wiring Diagram

Note: When the capacitive/inductive district lower limit alarms, relay L closes, L and minus indicators are on. When 360^{o} > Phase Angle ≥ 180^{o}, minus indicator is on, otherwise, minus indicator is off.
L1 is for Voltage of Phase A, N for Zero line, I1 for Current of Phase A. Current is input from Terminal 14 and output from Terminal 15.

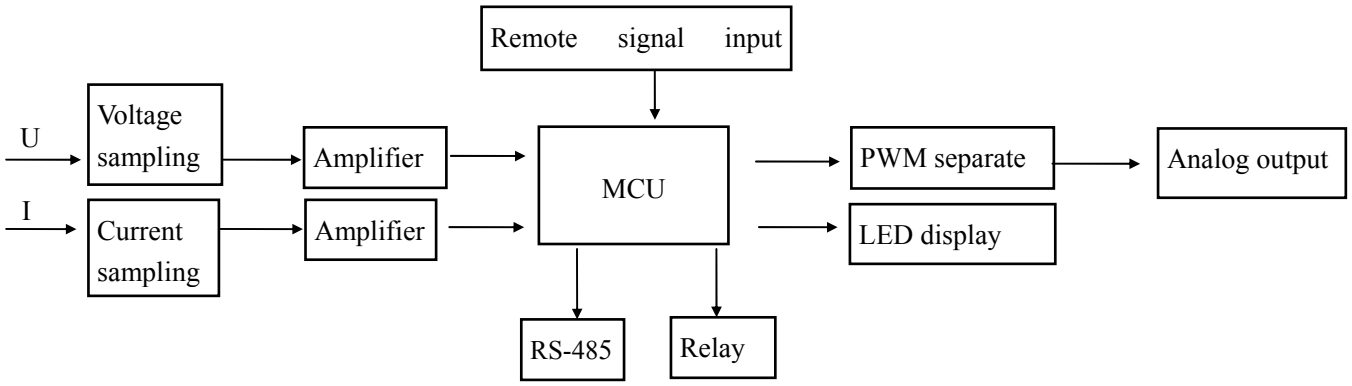
1.4.8 PRO EX L53 Power Factor Digital Panel Meter

1.4.8.1 Technical Data

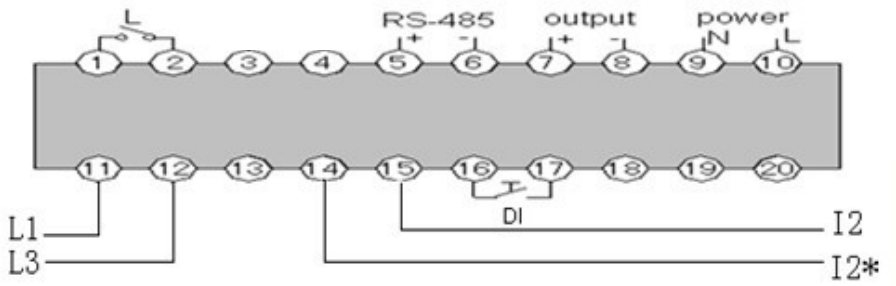
Connection: 3 Phase
Input Voltage: 57.7~ 600VAC
Current：0~ 5A
Test range: -0.5～1～+0.5, -0～1～+0
Alarm limit setup: the inductive district Lower limit (+0.5≤ the value< 1 or 0≤ the value< 1), the capacitive district Lower limit (-1≤ the value< 0 or -1≤ the value< -0.5).
Fall back value setup: 0.001~0.255, true Fall back value=setup Fall back value.

1.4.8.2 Operational Principle Diagram and Wiring Diagram

1) Operational principle diagram



2) Wiring diagram



PRO EX L53 (3P4W) Wiring Diagram

Note: When the capacitive/inductive district lower limit alarms, relay L closes, L and minus indicators are on. When 360^{o} > Phase Angle ≥ 180^{o}, minus indicator is on, otherwise, minus indicator is off.
L1 is for Voltage of Phase A, L3 for Voltage of Phase C, I2 for Current of Phase B. Current is input from Terminal 14 and output from Terminal 15.

1.4.9 PRO EX T51 Temperature Digital Panel Meter

1.4.9.1 Technical Data

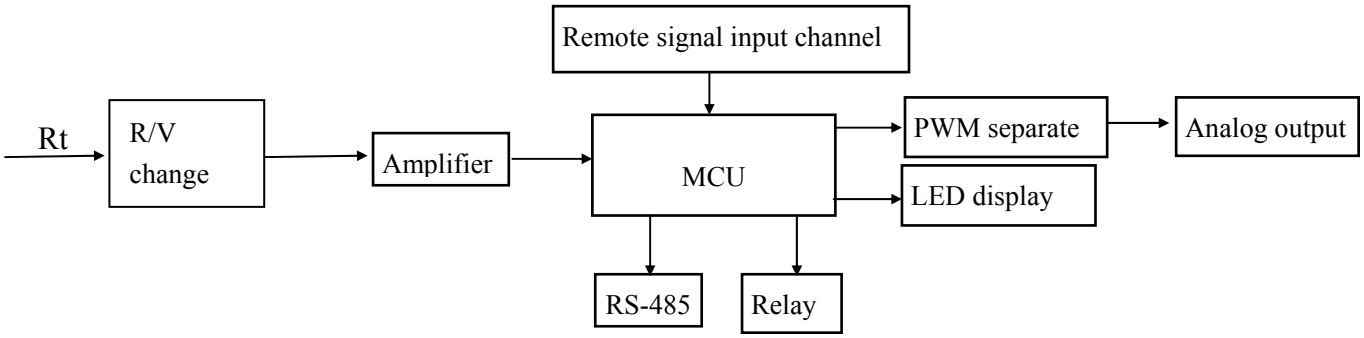
Input: PT50, PT100, CU50, CU100

Alarm limit setup: true Fall back value=setup Fall back value. setup upper limit value (≤ max rating), setup lower limit value (< setup upper limit value).

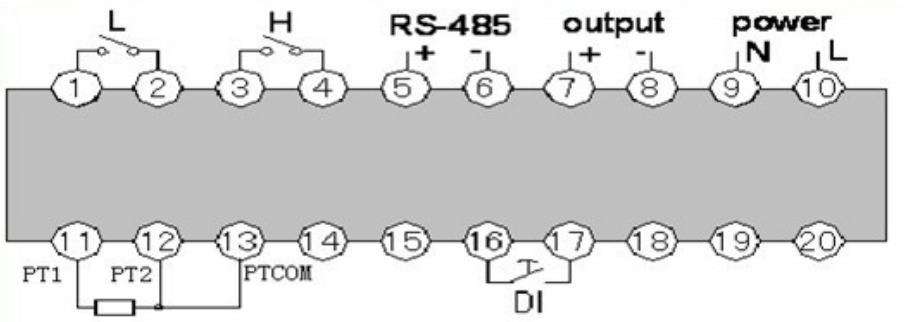
Fall back value setup: 0.1~25.5, and ≤ 1/2 (Upper limit-Lower limit), true Fall back value=setup Fall back value.

1.4.9.2 Operational Principle Diagram and Wiring Diagram

1) Operational principle diagram



2) Wiring diagram



PRO EXT51 Wiring Diagram

1.4.10 PRO EX U53 AC Voltage Panel Meter

1.4.10.1 Technical Data

Connection: 3P3W, 3P4W

Input Voltage: 57.7~600VAC

PT Scope: 0.1~6500

1.4.10.2 Alarm limit value and Full back value setup:

Alarm limit setup: upper value setup (≤ 1.2 X full scale), Lower limit (< upper limit value). After changing PT value, Upper limit and Lower limit should be changed manually. Please pay attention to the unit. For details of shifting between V and kV, please refer to Chapter 5.2.10.

Fall back value setup: 0.1~25.5, true Fall back value=Fall back value setup*PT, and true Fall back value < 1/2 (Upper limit-Lower limit).

1.4.10.3 Alarm and Release

(1) Upper limit and release

Alarm: When any of voltage for L1, L2 and L3 is bigger than upper limit, the meter starts to alarm. The indicator of alarm (H) will be on, LED will flicker and upper limit relay (H) will close. For details of clearing LED flickering, please refer to Chapter 5.2.12.

Release: When all voltages for L1, L2 and L3 are smaller than the value of upper limit alarm minus fall back value, the meter releases alarming. The indicator of alarm (H) will be off, upper limit relay (H) will open and pressing any key, LED will stop flickering.

(2) Lower limit and release

Alarm: When any of voltage for L1, L2 and L3 is smaller than lower limit, the meter starts to alarm. The indicator of alarm (L) will be on, LED will flicker and lower limit relay (L) will close. For details of clearing LED flickering, please refer to Chapter 5.2.12.

Release: When all voltages for L1, L2 and L3 are bigger than the value of lower limit alarm plus fall back value, the meter releases alarming. The indicator of alarm (L) will be off, lower limit relay (L) will open and pressing any key, LED will stop flickering.

1.4.10.4 Remote Signal (DI) Input

Input contact: dry contact
Input resistor: ≤ 1kΩ
Remote signal wiring diagram is shown in Fig. 1

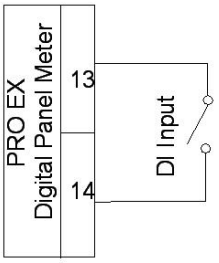


Fig. 1

For contact status data uploaded, please refer to Part 3, PRO EX Communication Protocol Instruction.

1.4.10.5 Analog Output Setting (Details of output ports, please see Fig. 2)

V_M, the voltage of full output for analog, is set through Menu M (See Table 1). It is the true full value of input.
Output of Analog A1 is Voltage for Phase A;
Output of Analog A2 is Voltage for Phase B;
Output of Analog A3 is Voltage for Phase C;
The full Voltage of analog output, $V_H=V_M*PT$

1.4.10.6 Wiring Diagram

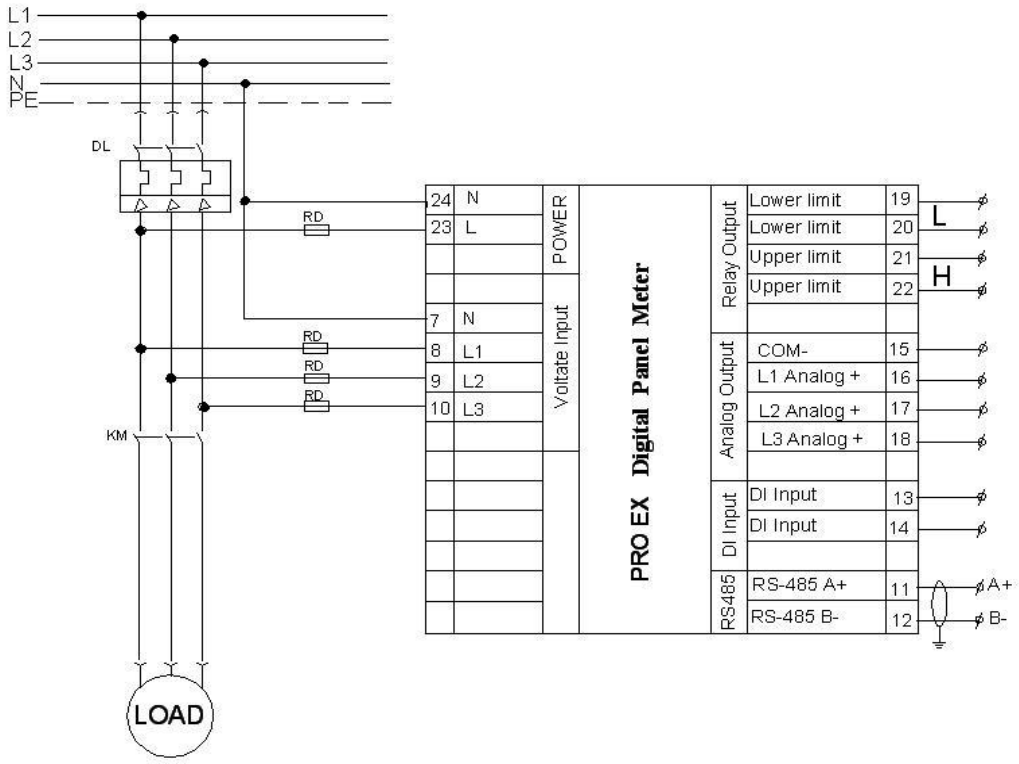


Fig. 2 PRO EX U53 3P4W

Note: When it is 3P3W, Line N can not be connected and Terminal 7# (N) is short circuited with Terminal 9# (L2)

1.4.10.7 Display Panel

(1) PRO EX U53 display panel

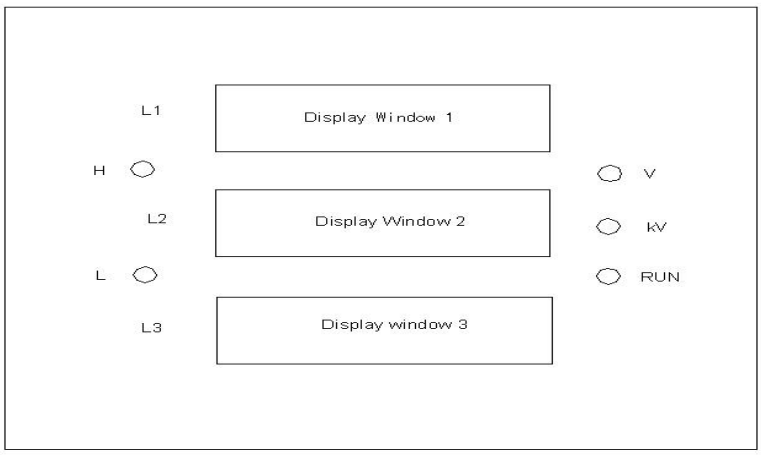


Fig. 3 PRO EX U53 Display Panel

(2) Indicator definition

H: Upper limit indicator L: Lower limit indicator RUN: Run indicator

V: Volt unit indicator kV: Kilovolt unit indicator

(3) Display window definition

1. 3P4W

Display window 1: L1 Voltage; Display window 2: L2 Voltage; Display window 3: L3 Voltage

2. 3W3P

Display window 1: L12 Voltage; Display window 2: L23 Voltage; Display window 3: L31 Voltage

3. When the meter goes into setup interface, display window 1 will show function items (See Table 1), display window 2 will show function setting values and display window 3 will not show.

4. When the meter is running, the units can be shifted automatically.

1.4.11 PRO EX I53 AC Current Panel Meter

1.4.11.1 Technical Data

Connection: 3P

Input Current: 0~5A

CT Scope: 0.1~6500

1.4.11.2 Alarm Limit Value and Full Back Value Setup

Alarm limit setup: upper value setup (≤ 1.2 X full scale), Lower limit (< upper limit value). After changing CT value, Upper limit and Lower limit should be changed manually. Please pay attention to the unit. For details of shifting between A and KA, please refer to Chapter 5.2.10.

Fall back value setup: 0.001~0.255, true Fall back value=Fall back value setup*CT, and true Fall back value < 1/2 (Upper limit-Lower limit).

1.4.11.3 Alarm and Release

(1) Upper limit and release

Alarm: When any of Current, I1, I2 or I3 is bigger than upper limit, the meter starts to alarm. The indicator of alarm (H) will be on, LED will flicker and upper limit relay (H) will close. For details of clearing LED flickering, please refer to Chapter 5.2.12.

Release: When all Currents, I1, L2 and L3 are smaller than the value of upper limit alarm minus fall back value, the meter releases alarming. The indicator of alarm (H) will be off, upper limit relay (H) will open and pressing any key, LED will stop flickering.

(2) Lower limit and release

Alarm: When any of Current, I1, I2 or I3 is smaller than lower limit, the meter starts to alarm. The indicator of alarm (L) will be on, LED will flicker and lower limit relay (L) will close. For details of clearing LED flickering, please refer to Chapter 5.2.12.

Release: When all Currents, I1, L2 and L3 are bigger than the value of lower limit alarm plus fall back value, the meter releases alarming. The indicator of alarm (L) will be off, lower limit relay (L) will open and pressing any key, LED will stop flickering.

1.4.11.4 Remote Signal (DI) Input (Wiring diagram is shown in Fig. 1)

Input contact: dry contact

Input resistor: ≤1kΩ

For contact status data uploaded, please refer to Part 3, PRO EX Communication Protocol Instruction.

1.4.11.5 Analog Output Setting (Details of output ports, please see Fig. 4)

I_M, the Current of full output for analog, is set through Menu N (See Table 1). It is the true full value of input.

Output of Analog A1 is Current for Phase A;

Output of Analog A2 is Current for Phase B;

Output of Analog A3 is Current for Phase C;

The full Current of analog output, $I_H=I_M*CT$

1.4.11.6 Wiring Diagram

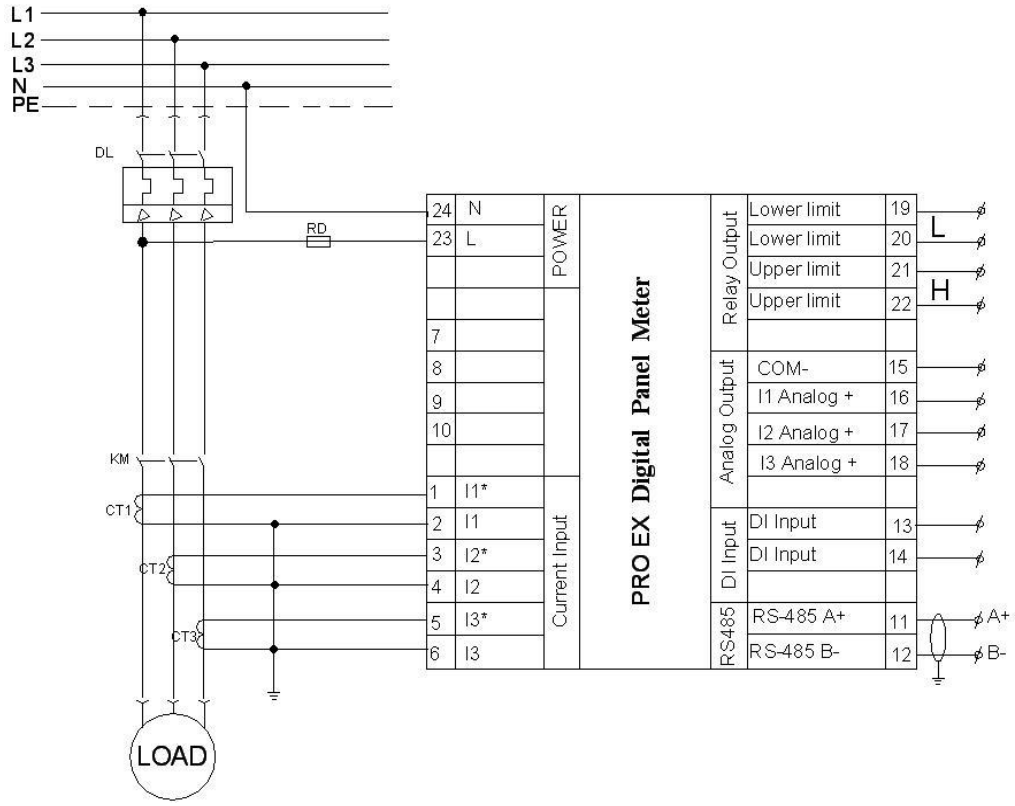


Fig. 4 PRO EX I53Wiring Diagram

1.4.11.7 Display Panel

(1) PRO EX I53 display panel

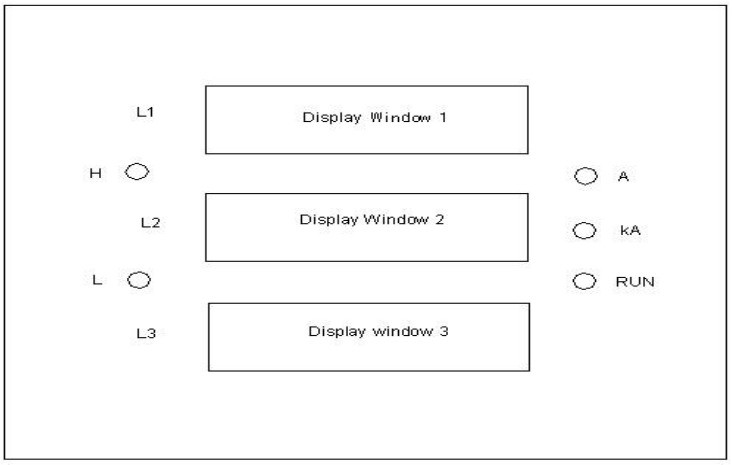


Fig. 5 PRO EX I53 Display Panel

(2) Indicator definition

H: Upper limit indicator L: Lower limit indicator RUN: Run indicator

A: Ampere unit indicator kA: Kilo ampere unit indicator

(3) Display window definition

1. Display window 1: I1 Current; Display window 2: I2 Current; Display window 3: I3 Current
2. When the meter goes into setup interface, display window 1 will show function items (See Table 1), display window 2 will show function setting values and display window 3 will not show.
3. When the meter is running, the units can be shifted automatically.

1.4.12 PRO EX P53 Active Power Panel Meter

1.4.12.1 Technical Data

Connection: 3P3W, 3P4W
Input Voltage: 57.7~600VAC
Input Current: 0~5A
PT Scope: 0.1~6500
CT Scope: 0.1~6500

1.4.12.2 Alarm Limit Value and Full Back Value Setup

Alarm limit setup: upper value setup (≤ 1.2 X full scale), Lower limit (< upper limit value). After changing PT and CT value, Upper limit and Lower limit should be changed manually. Please pay attention to the unit. For details of shifting between KW and MW, please refer to Chapter 5.2.10.

Fall back value setup: 0.1~25.5, true Fall back value=Fall back value setup*PT*CT, and true Fall back value < 1/2 (Upper limit-Lower limit).

1.4.12.3 Alarm and Release

(1) Upper limit and release

Alarm: When total Power, P is bigger than upper limit, the meter starts to alarm. The indicator of alarm (H) will be on, LED will flicker and upper limit relay (H) will close. For details of clearing LED flickering, please refer to Chapter 5.2.12.

Release: When total Power, P is smaller than the value of upper limit alarm minus fall back value, the meter releases alarming. The indicator of alarm (H) will be off, upper limit relay (H) will open and pressing any key, LED will stop flickering.

(2) Lower limit and release

Alarm: When total Power, P is smaller than lower limit, the meter starts to alarm. The indicator of alarm (L) will be on, LED will flicker and lower limit relay (L) will close. For details of clearing LED flickering, please refer to Chapter 5.2.12.

Release: When total Power, P is bigger than the value of lower limit alarm plus fall back value, the meter releases alarming. The indicator of alarm (L) will be off, lower limit relay (L) will open and pressing any key, LED will stop flickering.

1.4.12.4 Remote Signal (DI) Input

Input contact: dry contact

Input resistor: ≤1kΩ

Remote signal wiring diagram is shown in Fig. 1

For contact status data uploaded, please refer to Part 3, PRO EX Communication Protocol Instruction.

1.4.12.5 Analog Output Setting (Details of output ports, please see Fig. 6)

P_M, the power of full output for analog, is set through Menu Q (See Table 1). It is the true full power value of input.

V_M, the voltage of full output for analog, is set through Menu M (See Table 1). It is the true full value of input.

I_M, the voltage of full output for analog, is set through Menu N (See Table 1). It is the true full value of input.

Output of Analog A1 is total Power;

Output of Analog A2 is Voltage for Phase A (Phase A is default, which can be set through Menu M by user.)

Output of Analog A3 is Current for Phase A (Phase A is default, which can be set through Menu N by user.)

The full Power of analog output, $P_H=P_M*PT*CT$

The full Voltage of analog output, $V_H=V_M*PT$

The full Current of analog output, $I_H=I_M*CT$

1.4.12.6 Wiring Diagram

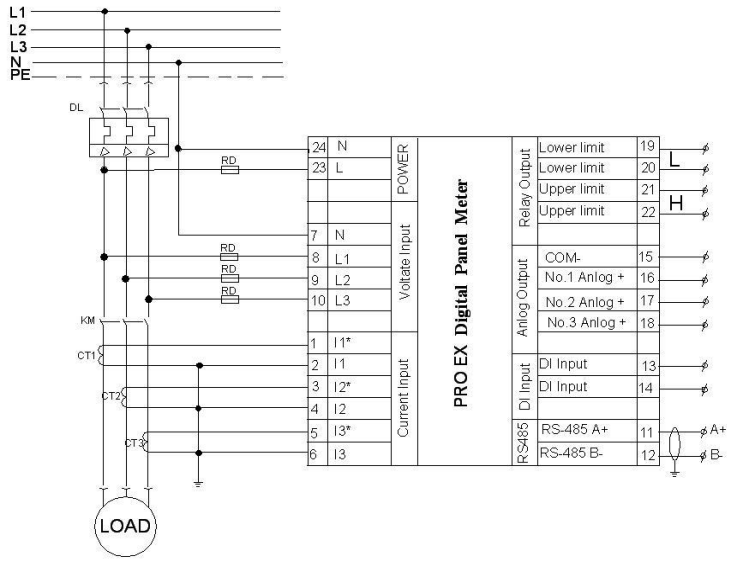


Fig.6 PRO EX P53/Q53/S52 3P4W

Note: When it is 3P3W, Line N can not be connected. Terminal 7# (N) is short circuited with Terminal 9# (L2) and B (I2) phase current can be connected or not.

1.4.12.7 Display Panel

(1) PRO EX P53 display panel

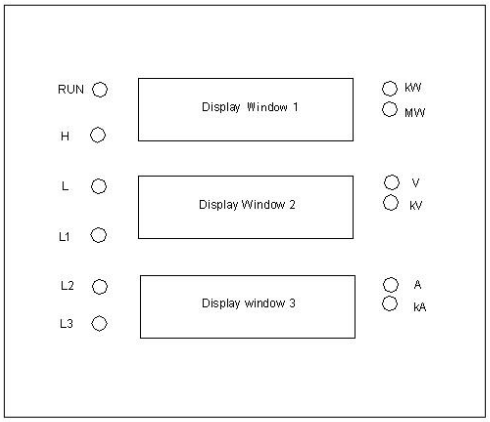


Fig. 7 PRO EX P53 Display Panel

(2) Indicator definition

RUN: Run indicator. Indicator on means the system runs well.

H: Upper limit indicator L: Lower limit indicator

L1: Display information of display window 2 and display window 3. When L1 is on under 3P4W, display window 2 shows Voltage of L1 and display window 3 shows Current I1, when under 3P3W, display window 2 shows Voltage of L12 and display window 3 shows Current I1.

L2: Display information of display window 2 and display window 3. When L2 is on under 3P4W, display window 2 shows Voltage of L2 and display window 3 shows Current I2, when under 3P3W, display window 2 shows Voltage of L23 and display window 3 shows Current I2.

L3: Display information of display window 2 and display window 3. When L3 is on under 3P4W, display window 2 shows Voltage of L3 and display window 3 shows Current I3, when under 3P3W, display window 2

shows Voltage of L31 and display window 3 shows Current I3.

kW: Kilowatt unit indicator MW: Megawatt unit indicator

V: Volt unit indicator kV: Kilovolt unit indicator

A: Ampere unit indicator kA: Kilo ampere unit indicator

(3) Display window definition

1. Display window 1: Total Active Power; Display window 2: L1, L2 and L3 show one by one repeatedly (3P4W), L12, L23 and L31 show one by one repeatedly (3P3W); Display window 3: I1, I2 and I3 show one by one repeatedly

2. When the meter goes into setup interface, display window 1 will show function items (See Table 1), display window 2 will show function setting values and display window 3 will not show.

3. When the meter is running, the units can be shifted automatically.

1.4.13 PRO EX Q53 Reactive Power Panel Meter

1.4.13.1 Technical Data

Connection: 3P3W, 3P4W

Input Voltage: 57.7~600VAC

Input Current: 0~5A

PT Scope: 0.1~6500

CT Scope: 0.1~6500

1.4.13.2 Alarm Limit Value and Full Back Value Setup

Alarm limit setup: upper value setup (≤ 1.2 X full scale), Lower limit (< upper limit value). After changing PT and CT value, Upper limit and Lower limit should be changed manually. Please pay attention to the unit. For details of shifting between Kvar and Mvar, please refer to Chapter 5.2.10.

Fall back value setup: 0.1~25.5, true Fall back value=Fall back value setup*PT*CT, and true Fall back value < 1/2 (Upper limit-Lower limit).

1.4.13.3 Alarm and Release

(1) Upper limit and release

Alarm: When total Power, Q is bigger than upper limit, the meter starts to alarm. The indicator of alarm (H) will be on, LED will flicker and upper limit relay (H) will close. For details of clearing LED flickering, please refer to Chapter 5.2.12.

Release: When total Power, Q is smaller than the value of upper limit alarm minus fall back value, the meter releases alarming. The indicator of alarm (H) will be off, upper limit relay (H) will open and pressing any key, LED will stop flickering.

(2) Lower limit and release

Alarm: When total Power, Q is smaller than lower limit, the meter starts to alarm. The indicator of alarm (L) will be on, LED will flicker and lower limit relay (L) will close. For details of clearing LED flickering, please

refer to Chapter 5.2.12.

Release: When total Power, Q is bigger than the value of lower limit alarm plus fall back value, the meter releases alarming. The indicator of alarm (L) will be off, lower limit relay (L) will open and pressing any key, LED will stop flickering.

1.4.13.4 Remote Signal (DI) Input

Input contact: dry contact

Input resistor: ≤1kΩ

Remote signal wiring diagram is shown in Fig. 1

For contact status data uploaded, please refer to Part 3, PRO EX Communication Protocol Instruction.

1.4.13.5 Analog Output Setting (Details of output ports, please see Fig. 6)

Q_M, the power of full output for analog, is set through Menu R (See Table 1). It is the true full power value of input.

V_M, the voltage of full output for analog, is set through Menu M (See Table 1). It is the true full value of input.

I_M, the voltage of full output for analog, is set through Menu N (See Table 1). It is the true full value of input.

Output of Analog A1 is total Power;

Output of Analog A2 is Voltage for Phase A (Phase A is default, which can be set through Menu M by user.)

Output of Analog A3 is Current for Phase A (Phase A is default, which can be set through Menu N by user.)

The full Power of analog output, $Q_H=Q_M*PT*CT$

The full Voltage of analog output, $V_H=V_M*PT$

The full Current of analog output, $I_H=I_M*CT$

1.4.13.6 Wiring Diagram

The wiring diagram of PRO EX Q53 is as shown in Fig. 6.

1.4.13.7 Display Panel

(1) PRO EX Q53 display panel

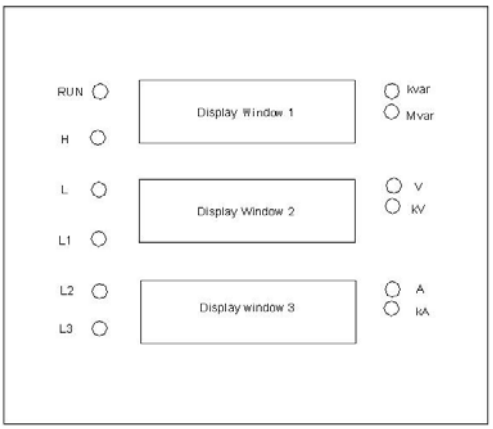


Fig. 8 PRO EX P53 Display Panel

(2) Indicator definition

RUN: Run indicator. Indicator on means the system runs well.

H: Upper limit indicator L: Lower limit indicator

L1: Display information of display window 2 and display window 3. When L1 is on under 3P4W, display window 2 shows Voltage of L1 and display window 3 shows Current I1, when under 3P3W, display window 2 shows Voltage of L12 and display window 3 shows Current I1.

L2: Display information of display window 2 and display window 3. When L2 is on under 3P4W, display window 2 shows Voltage of L2 and display window 3 shows Current I2, when under 3P3W, display window 2 shows Voltage of L23 and display window 3 shows Current I2.

L3: Display information of display window 2 and display window 3. When L3 is on under 3P4W, display window 2 shows Voltage of L3 and display window 3 shows Current I3, when under 3P3W, display window 2 shows Voltage of L31 and display window 3 shows Current I3.

kvar: Kilovar unit indicator Mvar: Megavar unit indicator

V: Volt unit indicator kV: Kilovolt unit indicator

A: Ampere unit indicator kA: Kilo ampere unit indicator

(3) Display window definition

1. Display window 1: Total Reactive Power; Display window 2: L1, L2 and L3 show one by one repeatedly (3P4W), L12, L23 and L31 show one by one repeatedly (3P3W); Display window 3: I1, I2 and I3 show one by one repeatedly

2. When the meter goes into setup interface, display window 1 will show function items (See Table 1), display window 2 will show function setting values and display window 3 will not show.

3. When the meter is running, the units can be shifted automatically.

1.4.14 PRO EX S52 Combination Panel Meter for Active/Reactive Power

1.4.14.1 Technical Data

Connection: 3P3W, 3P4W

Input Voltage: 57.7~600VAC

Input Current: 0~5A

PT Scope: 0.1~6500

CT Scope: 0.1~6500

1.4.14.2 Alarm Limit Value and Full Back Value Setup

The user can choose Active Power or Reactive Power as alarm value. (See Z3 of Table 1)

Alarm limit setup: upper value setup (≤1.2 X full scale), Lower limit (< upper limit value). After changing PT and CT value, Upper limit and Lower limit should be changed manually. Please pay attention to the unit. For details of shifting between KW and MW or Kvar and Mvar, please refer to Chapter 5.2.10.

Fall back value setup: 0.1~25.5, true Fall back value=Fall back value setup*PT*CT, and true Fall back value < 1/2 (Upper limit-Lower limit).

1.4.14.3 Alarm and Release

(1) Upper limit and release

Alarm: When total Power, P or Q (Set through Menu N) is bigger than upper limit, the meter starts to alarm. The indicator of alarm (H) will be on, LED will flicker and upper limit relay (H) will close. For details of clearing LED flickering, please refer to Chapter 5.2.12.

Release: When total Power, P or Q is smaller than the value of upper limit alarm minus fall back value, the meter releases alarming. The indicator of alarm (H) will be off, upper limit relay (H) will open and pressing any key, LED will stop flickering.

(2) Lower limit and release

Alarm: When total Power, P or Q (Set through Menu N) is smaller than lower limit, the meter starts to alarm. The indicator of alarm (L) will be on, LED will flicker and lower limit relay (L) will close. For details of clearing LED flickering, please refer to Chapter 5.2.12.

Release: When total Power, P or Q is bigger than the value of lower limit alarm plus fall back value, the meter releases alarming. The indicator of alarm (L) will be off, lower limit relay (L) will open and pressing any key, LED will stop flickering.

1.4.14.4 Remote signal (DI) input (Wiring diagram is shown in Fig. 1)

Input contact: dry contact

Input resistor: ≤1kΩ

Remote signal wiring diagram is shown in Fig. 1

For contact status data uploaded, please refer to Part 3, PRO EX Communication Protocol Instruction.

1.4.14.5 Analog Output Setting (Details of output ports, please see Fig. 6)

P_M, the power of full output for analog, is set through Menu Q (See Table 1). It is the true full power value of input.

Q_M, the power of full output for analog, is set through Menu R (See Table 1). It is the true full power value of input.

I_M, the voltage of full output for analog, is set through Menu N (See Table 1). It is the true full value of input.

Output of Analog A1 is total Active Power;

Output of Analog A2 is total Reactive Power;

Output of Analog A3 is Current for Phase A (Phase A is default, which can be set through Menu N by user.)

The full Active Power of analog output, $P_H=P_M*PT*CT$

The full Reactive Power of analog output, $Q_H=Q_M*PT*CT$

The full Current of analog output, $I_H=I_M*CT$

1.4.14.6 Wiring Diagram

The wiring diagram of PRO EX S52 is as shown in Fig. 6.

1.4.14.7 Display Panel

(1) PRO EX S52 display panel

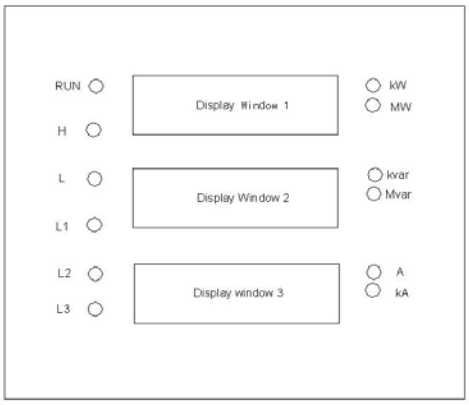


Fig. 9 PRO EX S52 Display Panel

(2) Indicator definition

RUN: Run indicator. Indicator on means the system runs well.

H: Upper limit indicator L: Lower limit indicator

L1: Display information of display window 3. When L1 is on, it shows Current I1.

L2: Display information of display window 3. When L2 is on, it shows Current I2.

L3: Display information of display window 3. When L3 is on, it shows Current I3.

kW: Kilowatt unit indicator MW: Megawatt unit indicator

kvar: Kilovar unit indicator Mvar: Megavar unit indicator

A: Ampere unit indicator kA: Kilo ampere unit indicator

(3) Display window definition

1. Display window 1: Total Active Power; Display window 2: Total Reactive Power; Display window 3: I1, I2 and I3 show one by one repeatedly

2. When the meter goes into setup interface, display window 1 will show function items (See Table 1), display window 2 will show function setting values and display window 3 will not show.

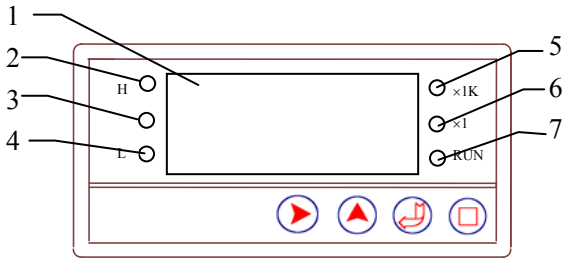
3. When the meter is running, the units can be shifted automatically.

1.5 Panel Operation and Installation

1.5.1 Panel Instruction (Display LED, indicator and button)

Button description:

1. Display window
2. Upper limit LED
3. Minus LED
4. Lower limit LED
5. 1K unit indicator LED
6. 1unit indicator LED
7. Run indicator LED



Meter front graph

Note: when run 1unit indicator LED every light, PT (or CT or PT * CT) *meter range >=1000, **1K** unit indicator LED light. Minus indicator has instruction in L51 and L53.

1.5.2 Key Description

1. —— In the parameter modification mode, the cursor moves to the right digit.
2. —— '+'button. In the parameter modification mode, the digit adds 1.
   When setting Baud rate, you can press the key to shift between 19200, 9600, 4800, 2400, and 1200.
   When setting connection, you can press the key to shift between 3P3W and 3P4W.
3. —— '-'button. In the parameter modification mode, the digit reduces 1.
   When setting Baud rate, you can press the key to shift between 19200, 9600, 4800, 2400, and 1200.
   When setting connection, you can press the key to shift between 3P3W and 3P4W.
   When setting alarm value (S32), you can press the key to shift between P and Q. (**Only applies to EX53 series**)
4. —— In the setup mode, when in the main menu, the meters enter in the parameter modification status.
5. —— In the setup mode, when the main menu appears, the meter scrolls to the next submenu by pressing it. In the parameter modification mode, the meter exits the current setup without saving parameter and return to the main menu by pressing it.
6. —— In the setup mode, when the main menu appears, press the key, it will go to next page. In the parameter modification mode, press the key to cancel or save modification and go back to main menu. (**Only applies to EX 53 series**)
7. —— In the setup mode, when the main menu appears, press the key to enter the menu and go to parameters modification page. In the parameter modification mode, press the key to save modification and go to next page of main menu. (**Only applies to EX 53 series**)
8. + —— Press and hold both keys over 3 seconds, meter changes to setup page from run status.
9. + —— Press and hold both keys over 3 seconds, meter changes to setup page from run status. (**Only applies to EX 53 series**)
10. + —— The meter metric unit changes between 1 and 1K.
11. + —— When alter parameter, the cursor loop moves to the right digit.
    When Alarm limit, relieve alarm.
12. + —— In the parameter modification mode, press and hold both keys over 3 seconds, the cursor loop moves to the right digit. In alarm status, press and hold both keys over 3 seconds, the flicker of LED stops. (**Only applies to EX 53 series**)
13. + —— Press and hold both keys over 3 seconds, □□□□ appears, the user is required to input password (the initial password is "1111"). Pressing to confirm and enters the setup mode.

1.5.3 Example

Example 1:

PRO EX U51 AC Voltage digital panel meter, with 0~600V input Voltage and RS485. Meter address is 5, baud rate 9600bps. When meter input Voltage>5000V upper limit alarm, and < 4950V upper limit, relay open. When meter input Voltage<1000Vlower limit alarm, and >1050V lower limit, relay open. When analog full range match along with Voltage is 500V, the password is changed from 0000 to 1234. The steps are as follows.

1. Press and hold + key for 3 S, till 0000 appears, the 1st digit shimmers, press to "I" appears, then press key to the 2nd digit, press key to "1"appears, and so on when the 4 digits are all "1", press key to Confirm the setting, Table 1 menu A is appears.
2. When item 1- A shown as in the table 1-A shows, press key or key to modify the meter address to 0005, press key to confirm the current setup and the meter goes to the item B.
3. When item 1- B is baud rate appears, press key to choose the baud rate 9600 and press key to confirm.
4. Press to display item 1-I, and press key to enter PT setup. Press or key to modify CT to 0010 , and press key to confirm.
5. Press menu 1-C is appears, and press key to enter upper limit value, press or key to modify to " 500.0" Confirm the setting.
6. Press menu 1-D is appears, and press key to enter lower limit value, press or key to modify to "100.0" Confirm the setting.
7. Press menu 1-E is appears, and press key to enter Fall back value, Press or key to"5.000" Confirm the setting.
8. Press menu 1-M is appears, and press key to modify the max analog value with AC current input, Press or key to the "5.000" Confirm the setting.
9. Press menu 1-F is appears, and press key to modify "1234" Confirm the setting.
10. Press menu 1-G is appears then press key to exit the setting up.

(**Note:** Please remember the password, if the password is lost, please contact manufacturer).

Example 2:

PRO EX P53 Active Power panel meter, with 57.7-600VAC input voltage, 0-5A input current, 3P4W, and RS485. When meter address is 5, baud rate 9600bps, PT 1, CT 1, upper limit 10kW, lower limit 300W, fall back value 20, and analog full value for Voltage 600V, for Current 5A, for Active Power 9kW, the password is changed from 1111 to 0001. The steps are as follows.

1. Press and hold + key for 3 S, till appears, the 1st digit shimmers, press till "1" appears, then press key and move to the 2nd digit, press key till "1" appears, and so on. When the 4 digits are all "1", press key to save the setting, Table 1 menu A is appears. (In setup mode, the first row LEDs indicate functions, while the second ones indicate parameters set)
2. When menu A shows, press key to modify the meter address to 005, press key to save the current setup and the meter goes to the menu B.
3. When menu B shows, it indicates Baud Rate. Press key till9600 , then press to save.
4. When menu I shows, it indicates PT value. Press till 001.0 , then press to save.
5. When menu J shows, it indicates CT value. Press till 001.0, then press to save.
6. When menu Z2 shows, it indicates phase options. Press till3P4W, then press to save.
7. When menu C shows, it indicates upper limit value. Press till 01 0.0, then press and to active kW indicator, and press to save.
8. When menu D shows, it indicates upper limit value. Press till 0300 , then press and till kW and MW indicators are off, and press to save. When kW and MW are off, it indicates W.
9. When menu E shows, it indicates fall back value. Press till20.0 .
10. When menu Z1 shows, press to go to menu M. It indicates analog full value of voltage. Press till 600.0 , then press to save.
11. After setting analog full value of voltage, then go to menu N. It indicates analog full value of current. Press till5.000, then press to save.
12. After setting analog full value of current, then go to menu Q. It indicates analog full value of active power. Press till9000, then press to save.
13. When menu F shows, it indicates password. Press till0001, then press to save. Now the password is changed to0001. Please remember the password.
14. When menu G shows, press to exit setup page.

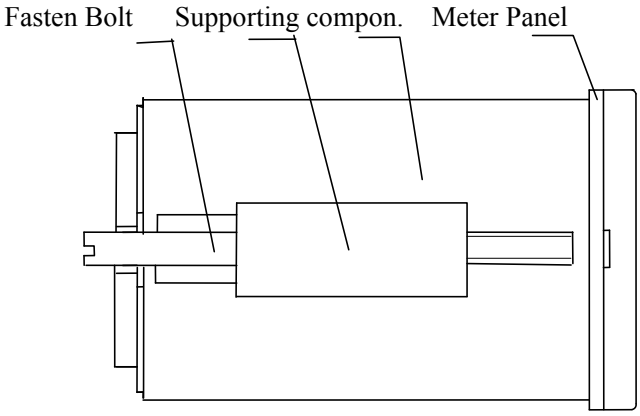
Table 1: Menu display List

A	AddF	Com. address setup	Scope: 1~255
B	bAUd	Baud rate setup	19200, 9600, 4800, 2400, 1200 optional table
C	HI GH	Alarm Upper value setup	
D	Lo Y	Alarm Lower Value setup	
E	bACH	Alarm fall back value	Scope: 0~1/2 (Upper limit-Lower limit)
F	PI n	Parameter modification setup	Enter parameter modification setup
G	QUI t	Exit setup mode	Exit setup
H	ErrO	Error	
I	Pt	PT setup	Scope: 0.1~6500
J	Ct	CT setup	Scope: 0.1~6500
K	LLoY	The inductive district Lower limit	Select type L meter setup
L	CLoY	The capacitive district Lower limit	Select type C meter setup
M	UoUt	Analog full range match along with AC Voltage input	Scope: 0~600V
N	IoUt	Analog full range match along with AC current input	Scope: 0~5A
O	dUot	Analog full range match along with DC Voltage input	Scope: 0~600V
P	dI ot	Analog full range match along with DC Current input	Scope: -75~75mV
Q	PoUt	Analog full range match along with Active Power input	Scope: 0~3000W
R	FoUt	Analog full range match along with Freqency input	Scope: 45~65Hz , 360~440Hz
S	dEtC	Temperature transducer type select	Enter next menu, PT100, PT50, Cu100, Cu50 select
T	P 100	Temperature transducer PT100	
U	Pt50	Temperature transducer PT50	
V	C 100	Temperature transducer Cu100	
W	CU50	Temperature transducer Cu50	
X	toUt	Analog full range match along with temperature input	

1.5.4 Meter Installation

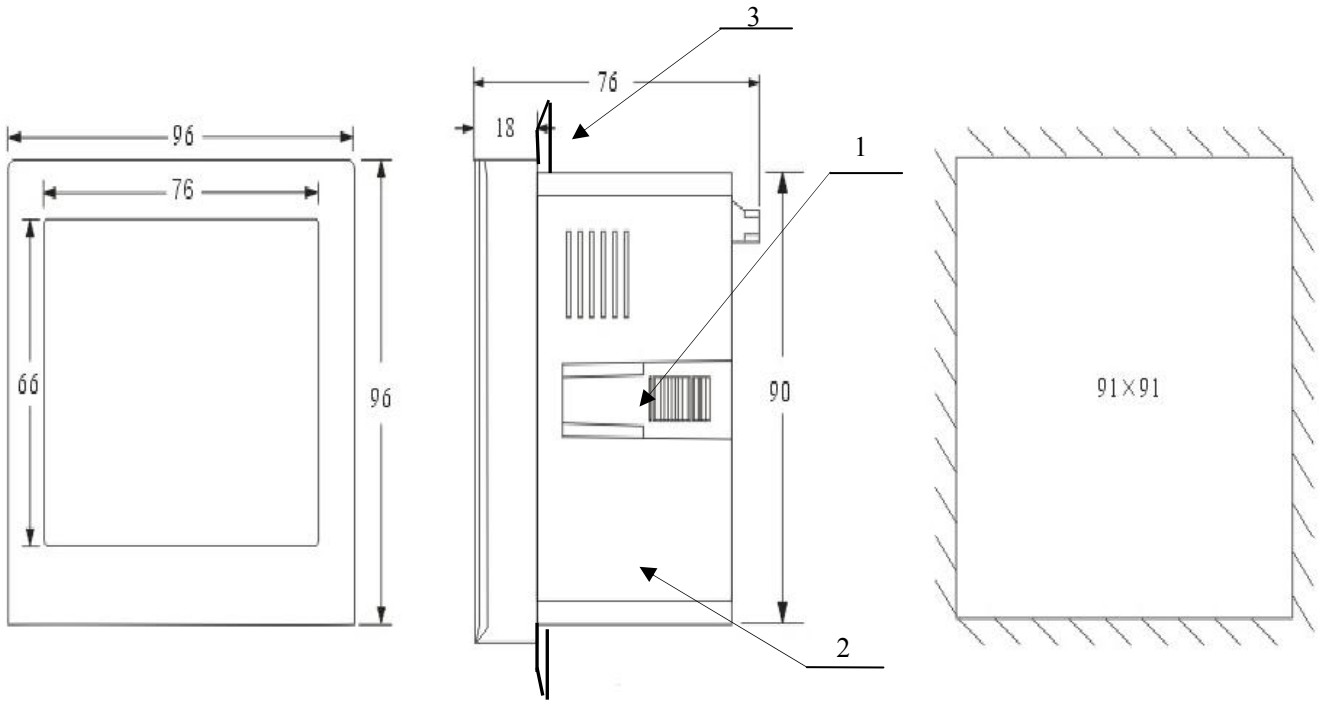
1.5.4.1 Installation for EX51 Series

1) Please install the meter in the hole of the panel, and install the fastening and supporting components on the side of meter.
2) Fasten the screw clockwise so that the meter is in the panel.



1.5.4.2 Installation for EX53 Series

1) Put support 1 on the side 2 of meter
2) Fix the meter on the panel 3.



Front view **Side view** **Installation size**

1.6 PRO EX Operation and Trouble Shooting

1.6.1 How to Operate PRO EX Digital Meter Properly?

We suggest the user use the product under the right environment according to the user manual. Otherwise, the user is responsible for the risks occurred.

1.6.2 Warning

1) Please do not disassemble the product. If any problem occurs, please contact after-sales service of Artel immediately.
2) Please make sure the environment temperature is -10℃~55℃.
3) Please connect the wires correctly, referring to the wiring diagram and make sure input values do not exceed 1.2 times of specified measurement scopes.

1.6.3 Trouble Shooting

No.	Trouble	Trouble-shooting
1	No display when the power is on	1. Check if the power line is connected with the auxiliary supply input terminal. 2. Check if the power line is connected to socket closely. 3. According to your mode, check if the auxiliary supply is 85V-265VAC/DC 4. If still no display, please contact Artel.
`2	Incorrect measured values	1. Check if the input wires are connected to the corresponding input terminals correctly and closely. 2. If the product is PRO EX U51/U53, please make sure PT value is set correctly. 3. If the product is PRO EX I51/DI51/I53, please make sure CT value is set correctly 4. If the product is PRO EX P51/P53/Q53/S52, please make sure PT and CT values are set correctly 5. If the product is PRO EX T51, please make sure the type of temperature sensor is the same as the one connected. 6. If the value is still incorrect, please contact Artel.
3	No access to setup mode	1. Make sure the password is correct. The default password is 1111. 2. If you forget the reset password, please contact Artel.
4	No analog output	1. Make sure the product that you purchased has analog output function. 2. Check connecting lines are connected to corresponding analog output terminals correctly and closely. 3. If the product is PRO EX U51/U53, please make sure analog full value (UoUt) is correct. For example, the input voltage is 57.7~600VAC and the analog output is 4~20mA. If UoUt is 500V, the analog output will be 20mA

		when the input voltage is 500VAC. 4. If the product is PRO EX I51/53, please make sure analog full value (IoIt) is correct. 5. If the product is PRO EX DU51, please make sure analog full value (DUot) is correct. 6. If the product is PRO EX DI51, please make sure analog full value (DIot) is correct. 7. If the product is PRO EX P51, please make sure analog full value (PoUt) is correct. 8. If the product is PRO EX F51, please make sure analog full value (FoUt) is correct. 9. If the product is PRO EX T51, please make sure analog full value (toUt) is correct. 10. If the product is PRO EX P53, please make sure analog full values (PoUt, UoUt and IoUt) are correct. 11. If the product is PRO EX Q53, please make sure analog full values (qoUt, UoUt and IoUt) are correct. 12. If the product is PRO EX S52, please make sure analog full values (qoUt, PoUt and IoUt) are correct. 13. If you make sure the wiring connecting and settings are correct, please contact Artel.
5	Communication can not connect	1. Make sure the product that you purchased has RS485 function. 2. Check if the communication line is connected to corresponding RS-485 communication terminal correctly and closely. Please make sure the negative and positive terminals are connected correctly. 3. Check if the Baud Rate and address of meter are the same as the ones of PC when the meter communicates with PC. 4. If you make sure the wiring connecting and settings are correct, please contact Artel.
6	Alarm waning fault	1. Make sure the product that you purchased has relay output function. 2. Check connecting lines are connected to corresponding relay alarm output terminals correctly and closely. 3. Check if the upper limit and lower limit values fit for the requirement. 4. If you make sure the wiring connecting and settings are correct, please contact Artel.

II. Software Instruction

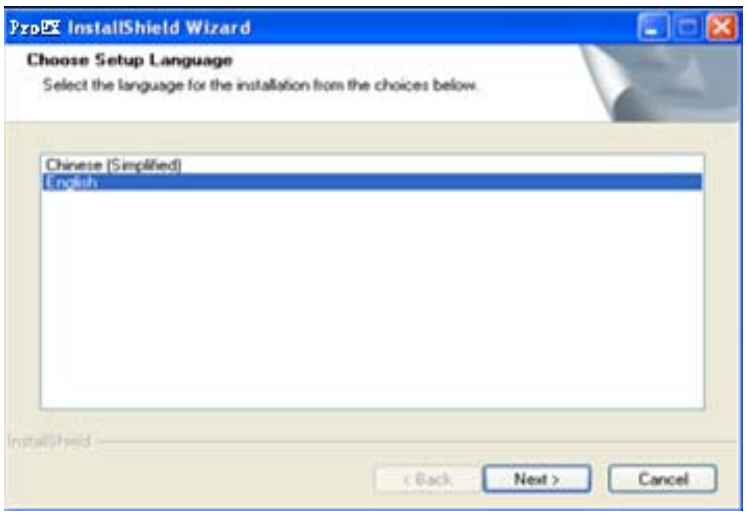
2.1 Function Description

The PRO EX transducer can read sampling data , real time monitoring and displaying the data, and remote set up parameters, including communication Address, baud rat, PT, CT, upper/lower limit, Fall back value and wiring connections. (Different products have different parameters)

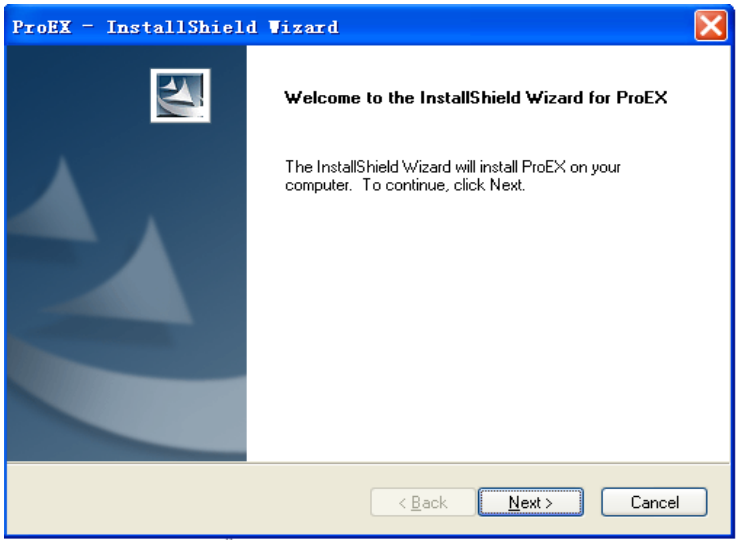
2.2 PROEX PC Software Installation

2.2.1 Operation environment: Windows98/me/2003/xp

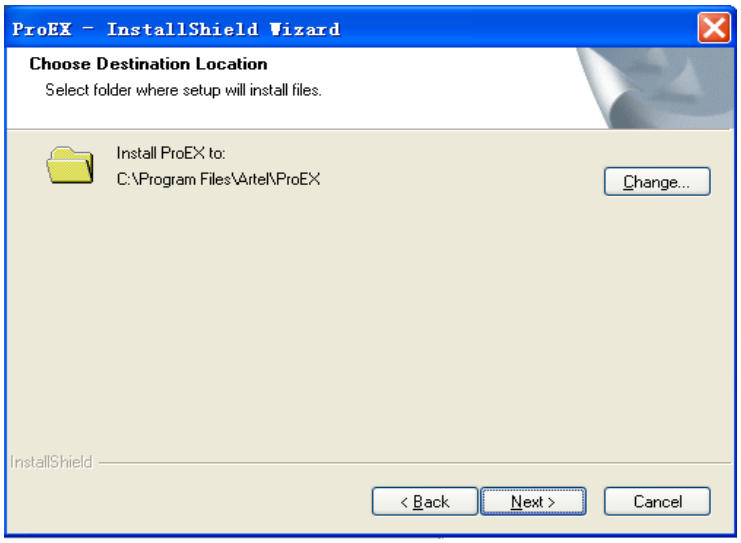
2.2.2 Insert the disc which we send you with the product, and open the disc file in " my computer", after that, double click【AT-UPS-Ex5Series】for entering the setup progress as following Fig., and then choose English to setup.



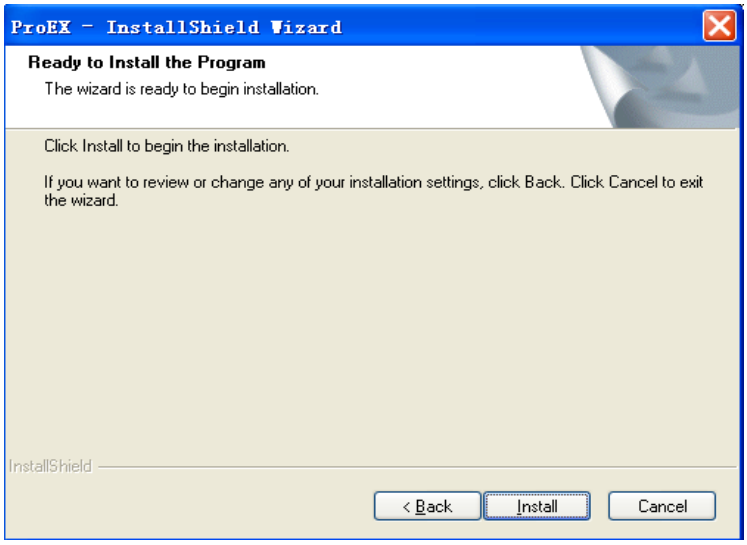
1) Enter the interface as following Fig by clicking "next";



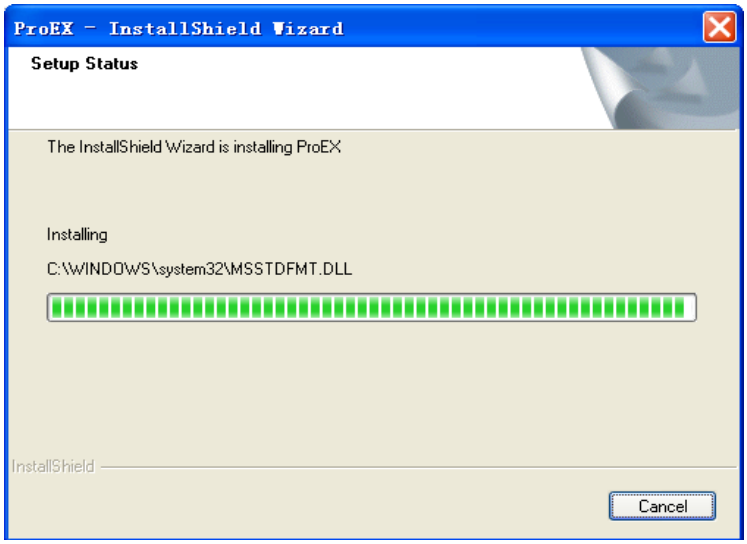
2) Click “next”;



3) Change the installation file by clicking “Change”, if not, the progress is instalLED in the file C as \ProgrameFiles\Artel\ProEX automatically. Click “Next” to enter the next page;

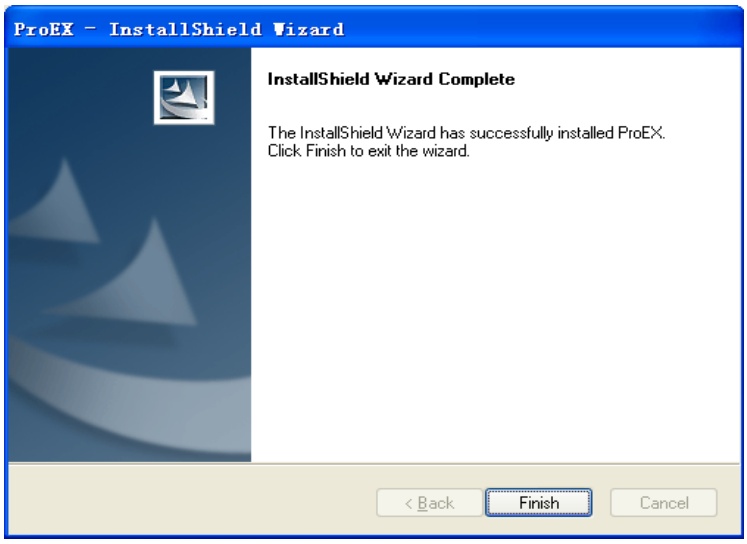


4) Click “Install” to enter the following page;



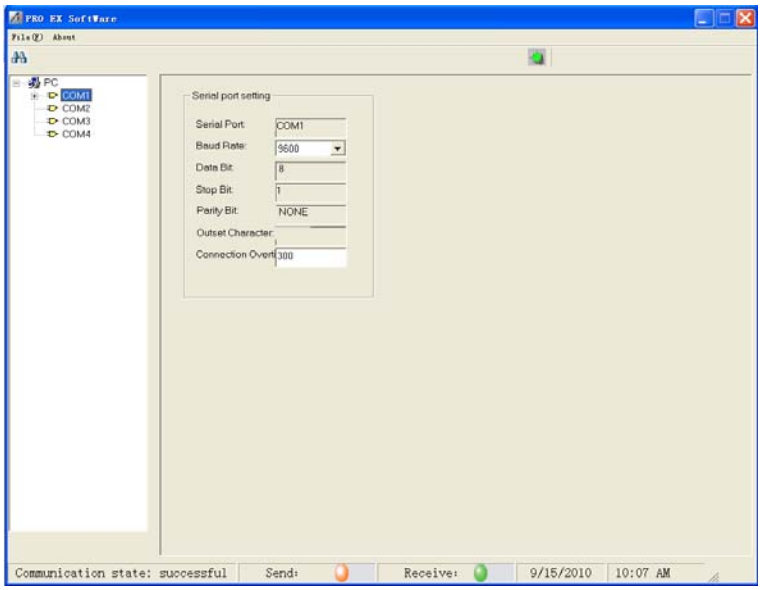
The software is installing, please wait…

5) The following interface will appear when the installation is finished;

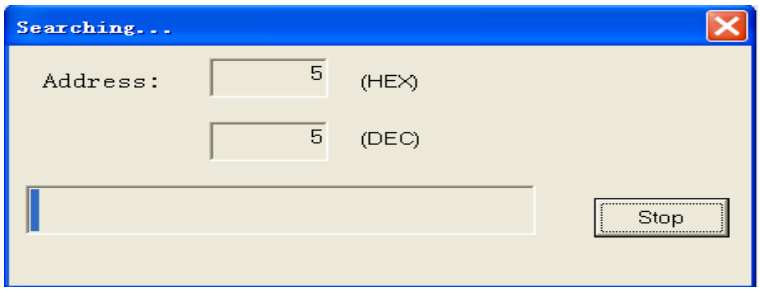


6) Pro EX PC software is installED successfully by clicking“Finish”.

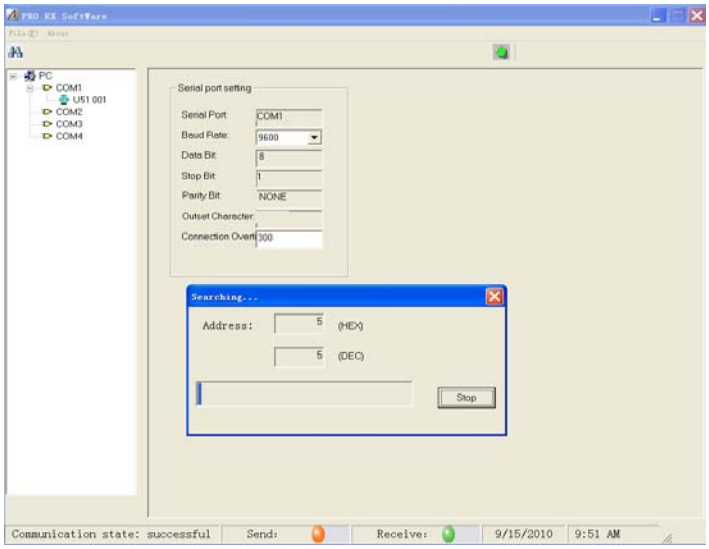
2.2.3 Start PRO EX for enter in data collecting operation interface as following Fig.: there are five standard value for chosen in baud rate option that default value is 9600bps; connection overtime option is used in setting up connection responds time. For example: the connection overtime is set as 200ms in the Fig., it means that if the firmware doesn’t responds to PC when the PC send signal to it, then PC will send signal circularly.



2.2.3.1. The up right indicator turns green when click COM1, then following interface appears. Please click COM2 if RS485 connecting with it, and then click  , the following interface appears. Please make sure that click COM1 first，and then click  for searching.

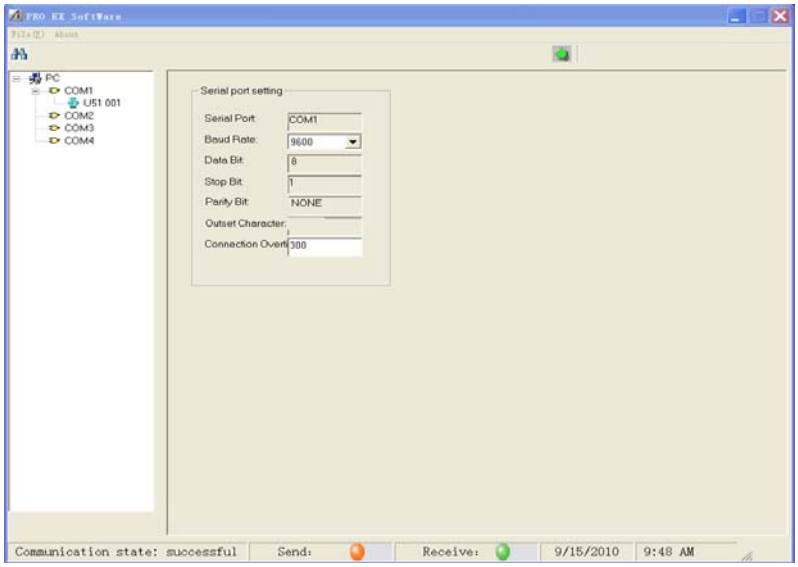


The user can choose the number without address for start to searching the corresponding firmware meter which had been set. 5 can be chosen as start address if the known smallest number for firmware address as 5, and the software will search meters between 5 and 255. The progress as following:

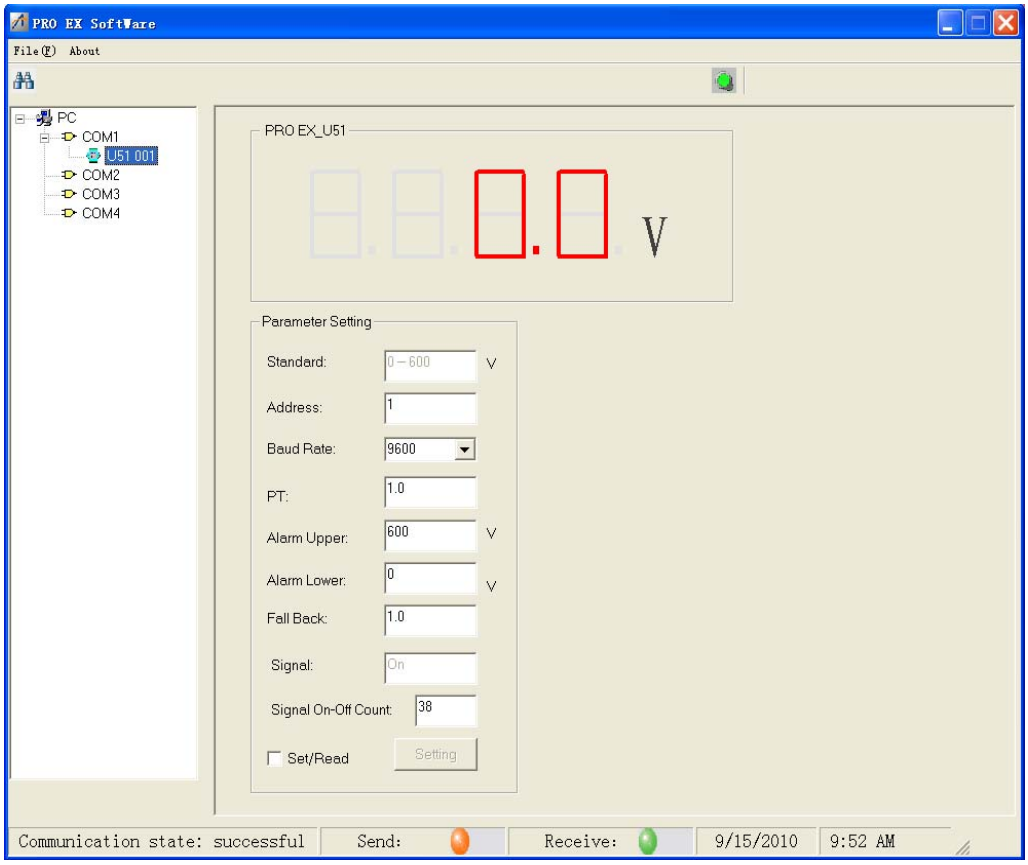


Note: When meters connect with com. at the same time, please make sure all the meters addresses are different, if not, please setup different address in the firmware, after that, It can be searched from the known smallest address. Click “stop” for stopping searching when it searching over the biggest address,

2.2.3.2 The following Fig. will appear after the searching finished, and the searched meters will be displayed on the up left.



Click U51 001 for enter in EX U51 parameter display interface which display real data. As following Fig: the interface can be changed to the display interface by clicking corresponding searched address when there are some meters at the same time.



In the parameters setup box, the user can setup the parameters as PT, CT, upper limit, lower limit, and fall back value. Click “setup” (First, please choose “Set/Read”) after fill in the value and the following Fig appears:

The meter will operate as the new setup value after click “OK”.

III. PRO EX Communication Protocol

3.1 MODBUS RTU Protocol

The data format as：

Address (8bit) + function code (8bit) + Register (16bit) + Data area (N×8bit) + CRCH + CRCL

Address code: The 1st byte. The byte indicates the serving meter shall receive the information from the master meter. Every meter can only have 1 address code. Sending and receiving information must address to each meter's own address code. The master meter shall indicate the address code for the serving meter, and the serving meter shall indicate the reply address code.

Function code: The 2nd byte. Modbus Protocol defines that the function no. is between 1 and 127. Pro Ex use a part of the code (see table blow). The master meter commands the serving meter the executions by sending the function code. When the serving meter receives the commands, it responds the master meter by sending back the same function code.

Register: The designated data storing place.

Data area: Data areas are different according to different function code, different sending or responding command. The data in each register is 2 bytes, indicated as: No. of register H + No. of registering data L + bytes + read/write data 1H + read/write data 1L + read/write data 2H + read/write data 2L…

CRC code: 2 bytes error checking code. First send high 8bit, then send low 8bit.

3.2 PRO EX Functional Code

3.2.1 03H (04H) Function Code -------Read single and multiple register data, can only read 01xxH register data

Send command format (fixed 8 bytes) and example:

No.	00	01	02	03	04	05	06	07
Description	Address	Code	RegAddH	RegAddL	WordsH	WordsL	CRCH	CRCL
Example	01H	03H	01H	00H	00H	02H	CRCH	CRCL

Example explanation: Read consecutive 2 register data starting from 0100H (WordsH WordsL = 0002H) in 01 meter

Send command format and example:

No.	00	01	02	03	04	05	06	07	08
Description	Address	Code	Bytes	Data1H	Data1L	Data2H	Data2L	CRCH	CRCL
Example	01H	03H	04H	12H	34H	56H	78H	CRCH	CRCL

Example explanation: Reply data 1234H in 0100 Register and 5678H (grey part) in 0101 Register. In command WordsH WordsL = 02, each register has 2 Bytes, No. 02 byte is 2*2=4 bytes.

3.2.2 06H Function Code ---------- Write single register value (01xx register)

Send command format: (Fixed 8 bytes, Data H and Data L as written data) and example:

No.	00	01	02	03	04	05	06	07
Description	Address	Code	RegAddH	RegAddL	DataH	DataL	CRCH	CRCL

Example	01H	06H	01H	00H	12H	34H	CRCH	CRCL

Example explanation: Write 1234H in meter 01's 0100 register.

Send command: (total 8 bytes): If writing data is successfully, then send back the same data.

No.	00	01	02	03	04	05	06	07
Description	Address	Code	RegAddH	RegAddL	DataH	DataL	CRCH	CRCL
Example	01H	06H	01H	00H	12H	34H	CRCH	CRCL

Example explanation: the meter 01 executes 03H code successfully, writing 1234H data in 0100 register.

3.2.3 10H Function Code--------Write multiple register continuously

Send command format and example:

No.	00	01	02	03	04	05	06	07	08	09	0A	0B	0C
Description	Add	Code	RegAddH	RegAddL	WordsH	WordsL	Bytes	Data1H	Data1L	Data2H	Data2L	CRCH	CRCL
Example	01H	10H	01H	01H	00H	02H	04H	12H	34H	56H	78H	CRCH	CRCL

Example explanation: Write 2 Continuous data 1234H and 5678H in meter 01 starting from 0101 register.

Send command format and example:

No.	00	01	02	03	04	05	06	07
Instruction	Address	Code	RegAddH	RegAddL	WordsH	WordsL	CRCH	CRCL
Example	01H	10H	01H	01H	00H	02H	CRCH	CRCL

Example explanation: Execute command 10H successfully.

3. 2.4 99H Function Code-------- Meter searching

Send command format (fixed 8 bytes) and example:

No.	00	01	02	03	04	05	06	07
Instruction	Address	Code	Code1H	Code1L	Code2H	Code2L	CRCH	CRCL
Example	01H	99H	00H	02H	00H	02H	CRCH	CRCL

Example explanation: Searching No.01 Meter

Send command format (fixed 11 bytes) and example:

No.	00	01	02	03	04	05	06	07	08	09	0A
Instruction	Add	Code	Code2	HWVerH	HWVerL	SWVerH	SWVerL	TypeH	TypeL	CRCH	CRCL
Example	01H	99H	04H	00H	3A	00H	69	00H	00H	CRCH	CRCL

Example explanation: Send back data as: hardware version: V5.8, software version: V1.05, type: PRO_EXU51

3.3 PRO EX Register Explanation (R means read, W means write)

Address (Hex)	Type	Description	Byte	Content	Register Explanation
0100	R W	Address	Byte1	————	Meter address:1~255
			Byte0	Address	
0101	R W	Baud rate	Byte1	————	0：19200　1：9600　2：4800 3：2400　4：1200。
			Byte0	Baud rate	
0102	R W	CT	Byte1	CTvalue H	CT scope:0.1~6500，1 decimal fraction. Registers value=CT*10，CT= Registers value /10.
			Byte0	CTvalue L	
0103	R W	PT	Byte1	PT　H	PT scope:0.1~6500，1 decimal fraction. Registers value=PT*10，PT= Registers value /10.
			Byte0	PT　L	
0104	RW	mode of connection	Byte1	————	Mode of connection (U53，P53，Q53，S52，L51) 0：3P3W； 1：3P4W； 2：3P3W balance；(invalid for L51) 3：3P4W balance；(invalid for L51)
			Byte0	mode of connection	
0105	R W	Upper-limit alarm real number	Byte1	Upper -limit alarm value	Upper -limit alarm data = metrical data*10^N, the highest bit of upper-limit alarm real number is a sign bit, 1 is Negative; 0 is Positive. The highest bit of N byte (Byte0) is a sign bit, 1 is Negative; -N; 0 is Positive. Real number and index register must be written in the same time, but can be read separately.
			Byte0	Upper -limit alarm value	
0106	RW	Upper -limit alarm index	Byte1	————	
			Byte0	index E	
0107	R W	Lower-limit alarm real number	Byte1	Lower-limit alarm value	Lower-limit alarm data = metrical data*10^N, the highest bit of lower-limit alarm real number is a sign bit, 1 is Negative; 0 is Positive. The highest bit of N byte (Byte0) is a sign bit, 1 is Negative: -N; 0 is Positive. Real number and index register must be written in the same time, but can be read separately. The alarm value is C (capacitive)/L (inductive) in PRO EX L51.
			Byte0	Lower-limit alarm value	
0108	RW	Lower-limit alarm index	Byte1	————	
			Byte0	index N	
0109	R W	Fall back value	Byte1	Fall back value H	3 decimal fraction, Fall back value =Register value/1000。 F51：0.01~2.55。 L51/I51/I53：.001~0.255。 Other fall back value：0.1~25.5。
			Byte0	Fall back value L	

Address (Hex)	Type	Description	Byte	Content	Register Explanation
010A	RW	Remote event times	Byte1	H byte	Remote event times.
			Byte0	L byte	
010B	RW	Remote mark/ remote status	Byte1	Remote mark 0/1	Byte1: 0: Remote signal back to 0 when disconnection, back to 1 when close. 1: Remote signal back to 1 when disconnection, back to 0 when close. 0: Byte0: (invalid when write operation) Normally open/closed contact 1/0: decide by Byte1.
			Byte0	Remote data 0/1	
010C	R	Metrical data 1 real number	Byte1	the high byte of Metrical data1, the highest bit is a sign bit	Metrical data = Metrical data1*10^N, the highest bit of Metrical data1 Byte1 is a sign bit, 1 is Negative; 0 is Positive. The highest bit of N Byte0 is a sign bit, 1 is Negative: -N; 0 is Positive. (The metrical data not multiply by PT/CT).
			Byte0	the low byte of Metrical data1	
010D	R	Metrical data 1 index number	Byte1	————	
			Byte0	Index N	
010E	R	Metrical data 2 real number	Byte1	the high byte of Metrical data2, the highest bit is a sign bit	Metrical data = metrical data 2*10^N, the highest bit of metrical data 2 Byte1 is a sign bit, 1 is Negative; 0 is Positive. The highest bit of N byte (Byte0) is a sign bit, 1 is Negative:-N; 0 is Positive. (The metrical data not multiply by PT/CT).
			Byte0	the low byte of Metrical data2	
010F	R	Metrical data 2 index number	Byte1	————	
			Byte0	Index N	
0110	R	Metrical data 3 real number	Byte1	the high byte of Metrical data3, the highest bit is a sign bit	Metrical data = metrical data3*10^N, the highest bit of metrical data3 Bybte1 is a sign bit, 1 is Negative; 0 is Positive. The highest bit of N byte (Byte0) is a sign bit, 1 is Negative; -N; 0 is Positive. (The metrical data not multiply by PT/CT).
			Byte0	the low byte of Metrical data3	

Address (Hex)	Type	Description	Byte	Content	Register Explanation
0111	R	Metrical data 3 index number	Byte1	————	
			Byte0	Index N	
0112	R	Metrical data 4 real number	Byte1	the high byte of Metrical data4, the highest bit is a sign bit	Metrical data = metrical data4*10^N, the highest bit of metrical data 4 Bybte1 is a sign bit, 1 is Negative; 0 is Positive. The highest bit of N byte (Byte0) is a sign bit, 1 is Negative; -N; 0 is Positive. (The metrical data not multiply by PT/CT).
			Byte0	the low byte of Metrical data4	
0113	R	Metrical data 4 index number	Byte1	————	
			Byte0	Index N	
0114	R	Metrical data 5 real number	Byte1	the high byte of Metrical data5, the highest bit is a sign bit	Metrical data = metrical data 5*10^N, the highest bit of metrical data5 Bybte1 is a sign bit, 1 is Negative; 0 is Positive. The highest bit of N byte (Byte0) is a sign bit, 1 is Negative; -N; 0 is Positive. (The metrical data not multiply by PT/CT).
			Byte0	the low byte of Metrical data5	
0115	R	Metrical data 5 index number	Byte1	————	
			Byte0	Index N	
0116	R	Metrical data 6 real number	Byte1	the high byte of Metrical data6, the highest bit is a sign bit	Metrical data = metrical data 6*10^N, the highest bit of metrical data 6 Bybte1 is a sign bit, 1 is Negative; 0 is Positive. The highest bit of N byte (Byte0) is a sign bit, 1 is Negative; -N; 0 is Positive. (The metrical data not multiply by PT/CT).
			Byte0	the low byte of Metrical data6	
0117	R	Metrical data 6 index number	Byte1	————	
			Byte0	Index N	
0118	R	Metrical data 7 real number	Byte1	the high byte of Metrical data7, the highest bit is a sign bit	Metrical data = metrical data 7*10^N, the highest bit of metrical data 7Bybte1 is a sign bit, 1 is Negative; 0 is Positive. The highest bit of N byte (Byte0) is a sign bit, 1 is Negative: -N; 0 is Positive. (The metrical data not multiply by PT/CT).
			Byte0	the low byte of Metrical data7	
0119	R	Metrical data 7	Byte1	————	

Address (Hex)	Type	Description	Byte	Content	Register Explanation
		index number	Byte0	Index N	

Ex53 big table a side measurement data register table

Measurement data register (Real value = register value/x, x is the multiple, Voltage 10, Current 1000 and Power 1000.)			
Register no.	**Type**	**Description**	**Explanation**
1800	RO	L1 phase Voltage Hi	*10
1801	RO	L1 phase Voltage Lo	
1802	RO	L2 phase Voltage Hi	As same on
1803	RO	L2 phase Voltage Lo	
1804	RO	L3 phase Voltage Hi	As same on
1805	RO	L3 phase Voltage Lo	
1806	RO	I1 Current Hi	*1000
1807	RO	I1 Current Lo	
1808	RO	I2 Current Hi	As same on
1809	RO	I2 Current Lo	
180A	RO	I3Current Hi	As same on
180B	RO	I3 Current Lo	
180C	RO	Active powr Hi	*1000
180D	RO	Active powr Mi	
180E	RO	Active powr Lo	
180F	RO	Reactive power Hi	*1000
1810	RO	Reactive power Mi	
1811	RO	Reactive power Lo	

The original configuration changes to register

0212	RW	Corresponding phase of analog for P31/Q31/S32	Byte1	Hi (Retain)	Meter: Corresponding phase of analog for P31/Q31/S32 i.e., P, U (A, B, C), I (A, B, C) means corresponding phase of analog for Phase A, Phase B or Phase C.
			Byte0	Corresponding Voltage U for Hi of Lo 0:Ua/3P3L-Uab 1:UB/3P3L-Ubc 2:UC/3P3L-Uca Corresponding Current I for Lo of Lo 0:Ia 1:IB 2:IC	

3.4 Metrical Data Chart

Mode	Metrical data 1	Metrical data 2	Metrical data 3	Metrical data 4	Metrical data 5	Metrical data 6	Metrical data 7

Mode	Metrical data 1	Metrical data 2	Metrical data 3	Metrical data 4	Metrical data 5	Metrical data 6	Metrical data 7
U51	AC Voltage	————	————	————	————	————	————
I51	AC Current	————	————	————	————	————	————
DU51	DC Voltage	————	————	————	————	————	————
DI51	DC Current	————	————	————	————	————	————
P51S	Active Power	————	————	————	————	————	————
L51	Power factor	————	————	————	————	————	————
F51	Power net frequency	————	————	————	————	————	————
T51	Temperature	————	————	————	————	————	————
U53	AC Voltage A	AC Voltage B	AC Voltage C	————	————	————	————
I53	AC Current A	AC Current B	AC Current C	————	————	————	————
P53	AC Voltage A	AC Voltage B	AC Voltage C	AC Current A	AC Current B	AC Current C	Active Power
Q53	AC Voltage A	AC Voltage B	AC Voltage C	AC Current A	AC Current B	AC Current C	Reactive Power
S52	AC Current A	AC Current B	AC Current C	Active Power	Reactive Power	————	————

APPENDIX: Packing List

Meter	1unit
Fasten the screw clockwise	1piece
Manual	1copy
Software CD	1piece (if select RS-485comm)
Qualification	1copy