

Multi-function Meter SMART 7KT

7KT0310



Please read and understand these instructions before installing, operating, or maintaining the equipment.



DANGER

Hazardous voltage. Will cause death or serious injury. Turn off and lock out all power supply to this device before working on this device.

Replace all covers before power supplying this device is turned on.

Technical Specification

DISPLAY

- Large backlit Liquid Crystal display
- 4 Lines with 4 digits each to show measured values
- 5th Line with 8 digits to show energy values
- Bar graph for current indication

LCD INDICATIONS

- Integration of energy
- Unit is in configuration menu
- Communication in progress
- MAX DMD** - Maximum and Minimum Demand Power

WIRING INPUT

3 Ø - 4 wire, 3 Ø - 3 wire,

RATED INPUT VOLTAGE

11 to 300V AC (L-N); 19 to 519V AC (L-L);
Installation Category III (600V)

FREQUENCY RANGE: 45-65 Hz

RATED INPUT CURRENT

Nominal 1A / 5A AC (Min-11mA , Max-6A for 5A)

BURDEN: 0.5 VA@5A per phase

CURRENT TRANSFORMER TYPE: Measurement C.T, FS 10

CT PRIMARY

- 1A / 5A to 10,000A (Programmable for any Value)
- 1A to 10,000A when CT secondary is 1
- 5A to 10,000A when CT secondary is 5

CT SECONDARY: 1A or 5A (Programmable)

PT PRIMARY: 100V to 500kV (Programmable for any value)

PT SECONDARY

100V to 500V AC (L-L)(Programmable for any value)

DISPLAY UPDATE TIME

1 sec. for all parameters

DISPLAY SCROLLING

Automatic or Manual (Programmable)

POWER CONSUMPTION

Less than 8VA

ENVIRONMENTAL CONDITIONS

- Indoor use
- Altitude of up to 2000 meters
- Pollution degree II

Temperature : Operating : -10°C to 55°C
Storage : -20°C to 75°C

Humidity : Up to 85% non-condensing

PROTECTION CLASS: II

IP 65 (Front Panel Door); IP 20 (Rear Side)

OVERVOLTAGE CATEGORY : III

MOUNTING: Panel mounting

WEIGHT: 360gms

ORDER CODE INFORMATION

Product	Supply
7KT0310	95V to 240V AC, ±10%, 50/60Hz (±5%)

SERIAL COMMUNICATION

Interface standard and protocol	RS485 and MODBUS RTU
Communication address	1 to 255
Transmission mode	Half duplex
Data types	Float and Integer
Transmission distance	500m maximum
Transmission Speed	300, 600, 1200, 2400, 4800, 9600, 19200 (in bps)
Parity	None, Odd, Even
Stop bits	1 or 2
Response Time	100ms Max & Independent, at Baud rate

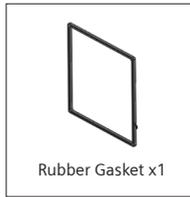
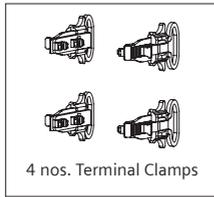
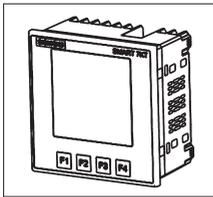
Technical Specification (Continued)

ACCURACY, as per IEC 62053-21

Measurement	Accuracy
Voltage V_{L-N}	$\pm 0.5\%$ of Full scale (300V AC)
Voltage V_{L-L}	\pm Full scale 0.5%
Current	$\pm 0.5\%$ of Full scale (6A)
Frequency	$\pm 0.1\%$ For L-N Voltage >20V, For L-L Voltage >35V
Power factor	$\pm 0.01\%$ Digit
Active energy	Class 1
Reactive energy	Class 1
Apparent energy	Class 1

Measurement	Accuracy
MAX / MIN Active	1%
MAX / MIN Reactive	1%
MAX Apparent Power	1%
Active Power	1%
Apparant Power	1%
Reactive Power	1%

Contents



Required Tools

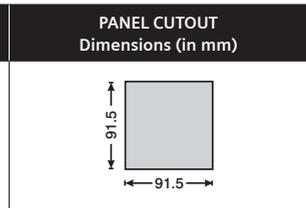
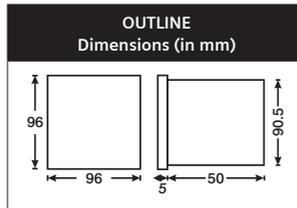
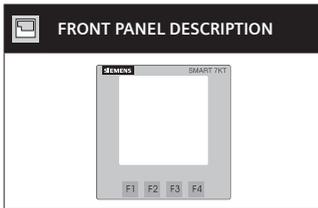


Cross recessed Phillips head

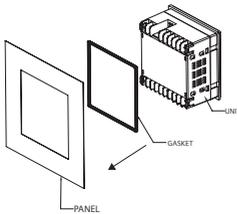
Installation

For installing the meter

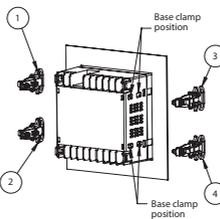
Prepare the panel cutout with proper dimensions as shown below.



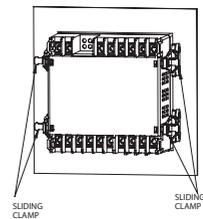
1. Insert unit into the panel



2. Position the clamps (as shown in the figure) and push the same into the slots in their respective locations.



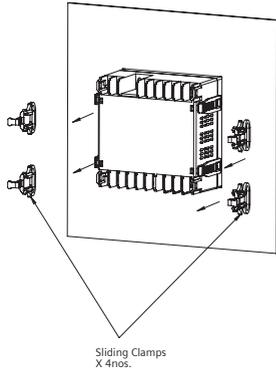
3. Push/Slide all 4 clamps towards the panel evenly till the lowest possible tooth of the clamp is engaged. **Ensure the meter is properly tightened and it does not move.**



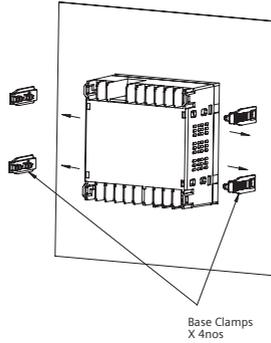
Note: Terminal screw tightening torque: 0.7 N-m to 0.8 N-m (6 In-Lb to 7 In-Lb)

For demounting the meter

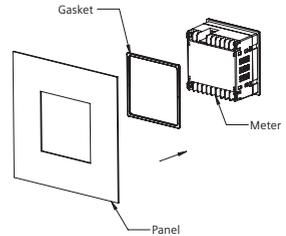
Pull the arm of the sliding clamps in outward direction (opposite to meter) and drag the sliding clamps away from the panel.



Dis-assemble the snap fitted base clamps from the meter using a screw-driver



Push the meter from back side out of the panel window and remove the gasket from the meter

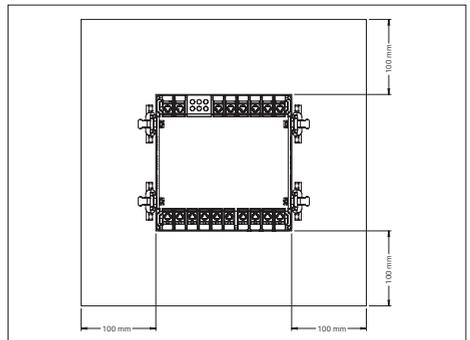


Installation Guidelines

1. This equipment, being built-in-type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and internal wiring.
2. Conductors must not come in contact with the internal circuitry of the equipment or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.
3. Circuit breaker or mains switch must be installed between power source and supply terminals to facilitate power 'ON' or 'OFF' function. However this switch or breaker must be installed in a convenient position normally accessible to the operator.
4. Before disconnecting the secondary of the external current transformer from the equipment, make sure that the current transformer is short circuited to avoid risk of electrical shock and injury.
5. The equipment shall not be installed in environmental conditions other than those mentioned in this manual.
6. The equipment does not have a built-in-type fuse. Installation of external fuse of rating 275V AC / 0.5Amp for electrical circuitry is highly recommended.
7. Remove the scratch-guard from the meter display during commissioning of the panel.

Mounting distance

The distance to be maintained between two meters while mounting on a panel door should be at least 100 mm.

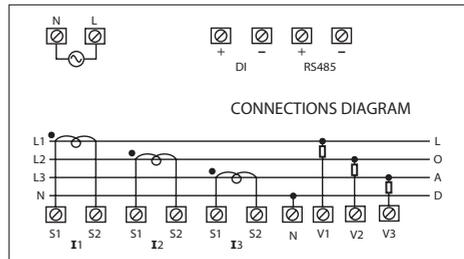


Wiring Guidelines

1. To prevent the risk of electric shock, power supply to the equipment must be kept OFF while doing the wiring arrangement.
2. Wiring shall be done strictly according to the terminal layout. Confirm that all connections are correct.
3. Use lugged terminals.
4. To reduce electromagnetic interference use of wires with adequate ratings and twists of the same in equal size shall be made with shortest connections.
5. Layout of connecting cables shall be away from any internal EMI source.
6. Cable used for connection to power source, must have a cross-section of 1mm^2 to 2.5mm^2 . These wires shall have current carrying capacity of 6A.
7. Copper cable should be used (Stranded or Single core cable).

Maintenance

1. The equipment should be cleaned regularly to avoid blockage of ventilating parts.
2. Clean the equipment with a clean dry or damp cloth. Do not use any cleaning agent other than water.



Safety Precautions

All safety related codifications, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.

If the equipment is not used in a manner specified by the manufacturer it might impair the protection provided by the equipment.

- Do not use the equipment if there is any mechanical damage.
- Ensure that the equipment is supplied with correct voltage.



CAUTION:

1. Read complete instructions prior to installation and operation of the unit.
2. Risk of electric shock.
3. The equipment in its installed state must not come in close proximity to any heating sources, oils, steam, caustic vapors or other unwanted process by products.

Configuration

There are 4 dedicated keys labelled as F1, F2, F3, F4. Use these 4 keys to read meter parameters. Simply press these keys to read the parameters.

KEY PRESS	ONLINE PAGE DESCRIPTION
Press "F1"	<p>The first screen: Displays line to neutral voltage of three phase and average line to neutral voltage.</p> <p>The second screen: Displays line to line voltage of three phase and average line to line voltage.</p> <p>The third screen: Displays total percentage harmonics of line to neutral voltage of three phase and average line to neutral voltage.</p> <p>The fourth screen: Displays total percentage harmonics of line to line voltage of three phase and average line to line voltage.</p> <p>Note: 1) For 3 Ø 3 wire system, only second and fourth screens will be available. 2) For 1 Ø 2 wire system, only first and third screens will be available.</p> <p>The fifth screen: Displays phase current of three phase and neutral current.</p> <p>The sixth screen: Displays phase maximum current demand of three phase and average current.</p> <p>The seventh screen: Displays total percentage harmonic of current of three phase and average phase current.</p> <p>Note: 1) For 3 Ø 3 wire system only fifth, sixth and seventh screen will be available. Displays average current instead of neutral current. 2) For 1 Ø 2 wire system only fifth sixth and seventh screen will be available.</p>
Press "F2"	<p>The first screen: Displays voltage, current, power factor of first phase and frequency.</p> <p>The second screen: Displays voltage, current, power factor of second phase and frequency.</p> <p>The third screen: Displays voltage, current, power factor of third phase and frequency.</p> <p>The fourth screen: Displays average value of voltage, current and power factor of three phase and frequency.</p> <p>Note: 1) For 3 Ø 3 wire system voltage, current, power factor and frequency will be line to line. 2) For 1 Ø 2 wire system only first screen will be available.</p>
Press "F3"	<p>The first screen: Displays power factor of three phase and average power factor.</p> <p>The second screen: Displays phase angle of three phase and average angle</p> <p>Note: 1) For 3 Ø 3 wire system, only average power factor and average angle will be available on this screen.</p> <p>The third screen: Displays active power of three phase and total active power.</p> <p>The fourth screen: Displays reactive power of three phase and total reactive power.</p> <p>The fifth screen: Displays apparent power of three phase and total apparent power.</p> <p>The sixth screen: Displays active, reactive, apparent power and power factor of first phase.</p> <p>The seventh screen: Displays active, reactive, apparent power and power factor of second phase.</p> <p>The eighth screen: Displays active, reactive, apparent power and power factor of third phase.</p> <p>The ninth screen: Displays total active, reactive, apparent power and average power factor of three phase.</p> <p>The tenth screen: Displays maximum active power demand, reactive power demand and apparent power demand.</p> <p>The eleventh screen: Displays minimum active power demand and reactive power demand.</p> <p>Note: 1) For 3 Ø 3 wire system only ninth, tenth and eleventh screen will be available. 2) In 1Ø 2 wire system only first, second, third, fourth, fifth, sixth, ninth, tenth, eleventh screen will be display</p>

KEY PRESS	ONLINE PAGE DESCRIPTION
Press "F4"	<p>The first screen: Displays import active energy of first phase.</p> <p>The second screen: Displays import active energy of second phase.</p> <p>The third screen: Displays import active energy of third phase.</p> <p>The fourth screen: Displays export active energy of first phase.</p> <p>The fifth screen: Displays export active energy of second phase.</p> <p>The sixth screen: Displays export active energy of third phase.</p> <p>The seventh screen: Displays total import active energy of three phase.</p> <p>The eighth screen: Displays total export active energy of three phase.</p> <p>The ninth screen: Displays total net active energy of three phase.</p> <p>The tenth screen: Displays import reactive energy of first phase.</p> <p>The eleventh screen: Displays import reactive energy of second phase.</p> <p>The twelfth screen: Displays import reactive energy of third phase.</p> <p>The thirteenth screen: Displays export reactive energy of first phase.</p> <p>The fourteenth screen: Displays export reactive energy of second phase.</p> <p>The fifteenth screen: Displays export reactive energy of third phase.</p> <p>The sixteenth screen: Displays total import reactive energy of three phase.</p> <p>The seventeenth screen: Displays total export reactive energy of three phase.</p> <p>The eighteenth screen: Displays total net reactive energy of three phase.</p> <p>The nineteenth screen: Displays apparent energy of first phase.</p> <p>The twentieth screen: Displays apparent energy of second phase.</p> <p>The twenty first screen: Displays apparent energy of third phase.</p> <p>The twenty second screen: Displays total net apparent energy of three phase.</p> <p>The twenty third screen: Displays ON hour.</p> <p>Note: 1) In 3 Ø 3 wire system only seventh, eighth, ninth, sixteenth, seventeenth, eighteenth, twenty second and twenty third screens will be available. 2) In 1Ø 2 wire system first, fourth, seventh, eighth, ninth, tenth, thirteenth, sixteenth, seventeenth, eighteenth, nineteenth, twenty second and twenty third screens will be available.</p>

AUTOMATIC / MANUAL MODE DESCRIPTION

Press F4 key for 3 seconds to toggle between Automatic and Manual mode.

Note: By default unit operates in automatic mode.

In automatic mode online pages scroll automatically at the rate of 5 seconds per page.

In automatic mode when any key is pressed, unit temporarily switches to manual mode and the appropriate page is displayed, also if any key is not pressed for 5 sec, unit resumes automatic mode.

SERIAL NUMBER DESCRIPTION

Press F3 key for 5 sec. to display 8 digit serial number only for 5 sec. at 5th line of display

Configuration (Continued)

There are 4 dedicated keys F1, F2, F3, F4. Use these 4 keys to enter into configuration menu / change setting.

Note: The settings should be done by a professional, after going through this user's manual and after having understood the application situation.

For the configuration setting mode:

- Use F3 + F4 keys for 3 sec. to enter or exit from the configuration menu.
- Use F1 keys to move cursor left or right by one digit each time.
- Use F2 or F3 keys for increasing or decreasing parameters value.
- Use F2 + F4 key to go back to previous page.

Config. page	Function	Range or Selection	Factory Setting
	Password	0000 to 9998	1000
1	Change Password	No / Yes	No
1.1	New Password	0000 to 9998	1000
2	Network Selection	3P4W, 3P3W, 1P2W-P1, 1P2W-P2 and 1P2W-P3	3P4W
3	CT Secondary	1A or 5A	5
4	Ct Primary	1A, 5A to 10,000A	5
5	Pt Secondary	100V to 500V	350
6	Pt primary	100V to 500kV	350
7	Slave Id	1 to 255	1
8	Baud Rate	300, 600, 1200, 2400, 4800, 9600 and 19200 (bps)	9600
9	Parity	None, Odd, Even	None
10	Stop Bit	1 or 2	1
11	Back Light	0 to 7200 sec.	0000
12	Demand interval method	Sliding / Fixed	Sliding
13	Demand interval duration	1 to 30	15
14	Demand interval length	1 to 30 min	1
15	Max Page Auto	1 to 22	22
16	Change Page Sequence	No / Yes	No
16.01	Page sequence 1	1 to 22	1
16.02	Page sequence 2	1 to 22	2
16.03	Page sequence 3	1 to 22	3
16.04	Page sequence 4	1 to 22	4
16.05	Page sequence 5	1 to 22	5
16.06	Page sequence 6	1 to 22	6
16.07	Page sequence 7	1 to 22	7
16.08	Page sequence 8	1 to 22	8
16.09	Page sequence 9	1 to 22	9
16.10	Page sequence 10	1 to 22	10
16.11	Page sequence 11	1 to 22	11
16.12	Page sequence 12	1 to 22	12
16.13	Page sequence 13	1 to 22	13

Config. page	Function	Range or Selection	Factory Setting
16.14	Page sequence 14	1 to 22	14
16.15	Page sequence 15	1 to 22	15
16.16	Page sequence 16	1 to 22	16
16.17	Page sequence 17	1 to 22	17
16.18	Page sequence 18	1 to 22	18
16.19	Page sequence 19	1 to 22	19
16.20	Page sequence 20	1 to 22	20
16.21	Page sequence 21	1 to 22	21
16.22	Page sequence 22	1 to 22	22
17	Factory default	No / Yes	No
18	Reset energy and MAX demand	No / Yes	No
18.1	Password	0001 to 9999	1001
18.01 ¹⁾	Reset active energy	No / Yes	No
18.02	Reset reactive energy	No / Yes	No
18.03	Reset apparent energy	No / Yes	No
18.04	Reset MAX	No / Yes	No
18.05	Reset ON hour	No / Yes	No

NETWORK SELECTION and WIRING INPUT	
Network selection in configuration mode	Wiring
3P4W	3P4W, 2P3W
3P3W	3P3W
1P2W (P1/P2/P3)	1P2W (P1/P2/P3)

Note: P1, P2 and P3 are Three Phase.

- 1) For resetting energy parameters user will be prompted the password. If correct password is entered, the user will be able to reset all energy parameters. This password will be value which will be greater than the configuration password by 1.

MODBUS REGISTER ADDRESSES LIST

Readable Parameters: [Length (Register): 2; Data Structure: Float]

Address	Hex Address	Parameter
30000	0x00	Voltage V1N
30002	0x02	Voltage V2N
30004	0x04	Voltage V3N
30006	0x06	Average Voltage LN
30008	0x08	Voltage V12
30010	0x0A	Voltage V23
30012	0x0C	Voltage V31
30014	0x0E	Average Voltage LL
30016	0x10	Current I1
30018	0x12	Current I2
30020	0x14	Current I3
30022	0x16	Average Current
30024	0x18	kW1
30026	0x1A	kW2
30028	0x1C	kW3
30030	0x1E	kVA1
30032	0x20	kVA2
30034	0x22	kVA3
30036	0x24	kVAr1
30038	0x26	kVAr2
30040	0x28	kVAr3
30042	0x2A	Total KW
30044	0x2C	Total KVA
30046	0x2E	Total KVAr
30048	0x30	PF1
30050	0x32	PF2
30052	0x34	PF3
30054	0x36	Average PF
30056	0x38	Frequency
30058	0x3A	Total net kWh
30060	0x3C	Total net kVAh
30062	0x3E	Total net kVArh
30064	0x40	kW Max Active Power
30066	0x42	kW Min Active Power
30068	0x44	kVAr Max Reactive Power
30070	0x46	kVAr Min Reactive Power
30072	0x48	kVA Max Apparent Power
30122	0x7A	Neutral Current
30124	0x7C	THD of 1st Phase Voltage
30126	0x7E	THD of 2nd Phase Voltage
30128	0x80	THD of 3rd Phase Voltage
30130	0x82	THD of Voltage V12
30132	0x84	THD of Voltage V23
30134	0x86	THD of Voltage V13
30136	0x88	THD of Current I1
30138	0x8A	THD of Current I2
30140	0x8C	THD of Current I3

Address	Hex Address	Parameter
30684	0x2AC	Serial no. (Data Structure: Hex)
30692	0x2B4	MAX I1 Demand
30694	0x2B6	MAX I2 Demand
30696	0x2B8	MAX I3 Demand
30698	0x2BA	MAX Avg. I Demand
30700	0x2BC	Phase Sequence Indication (0-OK Clockwise, 1-Anticlockwise, 2-Invalid)
30702	0x2BE	Existing KW MAX Active Power
30704	0x2C0	Existing KW MIN Active Power
30706	0x2C2	Existing KVAr MAX Reactive Power
30708	0x2C4	Existing KVAr MIN Reactive Power
30710	0x2C6	Existing KVA MAX Apparent Power
30712	0x2C8	Existing MAX I1 Demand
30714	0x2CA	Existing MAX I2 Demand
30716	0x2CC	Existing MAX I3 Demand
30718	0x2CE	Existing MAX Avg. I Demand
30724	0x2D4	DI Status
30726	0x2D6	DI Count

Formula to find address of individual Harmonic

Constant Parameter	Meaning
0	Voltage V1N
1	Voltage V2N
2	Voltage V3N
3	Voltage V12
4	Voltage V23
5	Voltage V31
6	Current I1
7	Current I2
8	Current I3

$\{143 + [(\text{Harmonic no-2}) \times 2] + 60 \times \text{Constant Parameter}\}$

For Example,

To find the 14th Harmonic address of Voltage V31 following formula can be used:

Formula with the parameter:

$\{143 + [(\text{Harmonic no-2}) \times 2] + 60 \times C P\}$

Eg. $\{143 + [(14-2) \times 2] + 60 \times 5\} = 467$

So, Check the 14th Harmonic of Voltage V31 at 467 address.

MODBUS REGISTER ADDRESSES LIST (Continued)

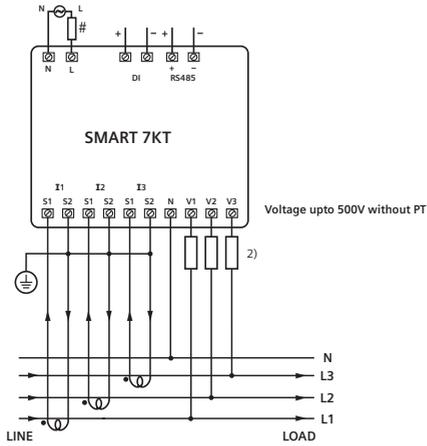
Readable / writable parameters: [Data Structure: Integer]

Address	Hex Address	Parameter	Range		Length (Register)
40000	0x00	Password	Min value: 0	Max value: 9998	1
40001	0x01	N/W Selection	Value: 0	Meaning: 3P4W	1
			Value: 1	Meaning: 3P3W	1
			Value: 2	Meaning: 1P2W-P1	1
			Value: 3	Meaning: 1P2W-P2	1
			Value: 4	Meaning: 1P2W-P3	1
40002	0x02	CT Secondary	Min value: 1	Max value: 5	1
40003	0x03	CT primary (CT Secondary=5)(A)	Min value: 5	Max value: 10000	1
		CT primary (CT Secondary=1)(A)	Min value: 1	Max value: 10000	
40004	0x04	PT Secondary	Min value: 100	Max value: 500	1
40006	0x06	PT primary	Min value: 100	Max value: 500kV	2
40007	0x07	Slave id	Min value: 1	Max value: 255	1
40008	0x08	Baud rate	Value: 0x0000	Meaning: 300	1
			Value: 0x0001	Meaning: 600	
			Value: 0x0002	Meaning: 1200	
			Value: 0x0003	Meaning: 2400	
			Value: 0x0004	Meaning: 4800	
			Value: 0x0005	Meaning: 9600	
			Value: 0x0006	Meaning: 19200	
40009	0x09	Parity	Value: 0x0000	Meaning: None	1
			Value: 0x0001	Meaning: Odd	
			Value: 0x0002	Meaning: Even	
40010	0x0A	Stop bit	Value: 0x0000	Meaning: 1	1
			Value: 0x0001	Meaning: 2	1
40011	0x0B	Backlight OFF	Min Value: 0	Max Value: 7200	1
40012	0x0C	Factory Default	Value: 1	Meaning: Set to factory setting range	1
40016	0x10	Auto Mode Pages	Min Value: 1	Max Value: 22	
			Page No	Meaning	
40017	0x11	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40018	0x12	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40019	0x13	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40020	0x14	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40021	0x15	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40022	0x16	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40023	0x17	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40024	0x18	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40025	0x19	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40026	0x1A	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40027	0x1B	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40028	0x1C	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40029	0x1D	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40030	0x1E	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40031	0x1F	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40032	0x20	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40033	0x21	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40054	0x36	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40055	0x37	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40059	0x3B	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40060	0x3C	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40061	0x3D	Page Address Sequence	1-22	1-First Page; 22-Last Page	1
40034	0x22	Demand Interval Method	Value: 0x0000	Meaning: Sliding	1
			Value: 0x0001	Meaning: Fixed	1
40035	0x23	Demand Interval Duration	MIN Value: 1	MAX Value: 30	1
40036	0x24	Demand Interval Length	MIN Value: 1	MAX Value: 30	1
40043	0x2B	Reset Max	Value: 1	Meaning: Reset all Max power	1
40044	0x2C	Reset Energy	Value: 1	Meaning: Reset all energyto factory setting range	1
40046	0x2E	Reset ON Hour	Value: 1	Meaning: Reset ON hour	1

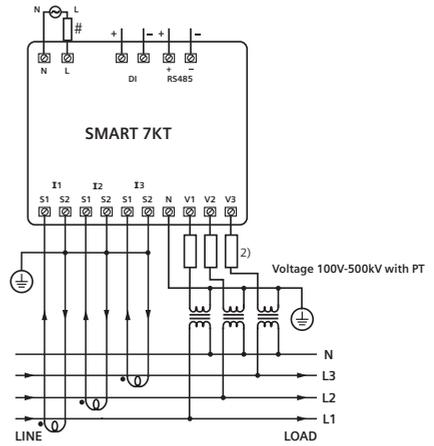
Circuit Diagram

3 Phase 4-Wire (commonly used)

3 Ø - 4 Wire, 3 CT'S

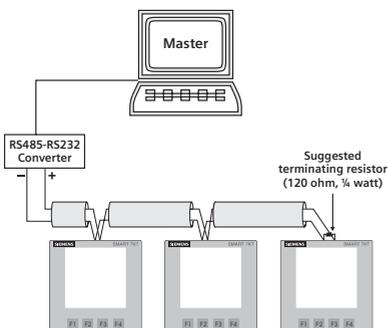


3 Ø - 4 Wire, 3 CT'S and 3 PT'S



2) All Fuse Type: 0.5A, Class gG

Connection diagram for communication



Contact sales for PC based monitoring software to communicate with the meters.

These instructions do not purport to cover all details or variations in equipment, or to provide for every possible contingency in connection with installation, operation, or maintenance. Should additional information be desired, please contact the local Siemens sales office. The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole

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