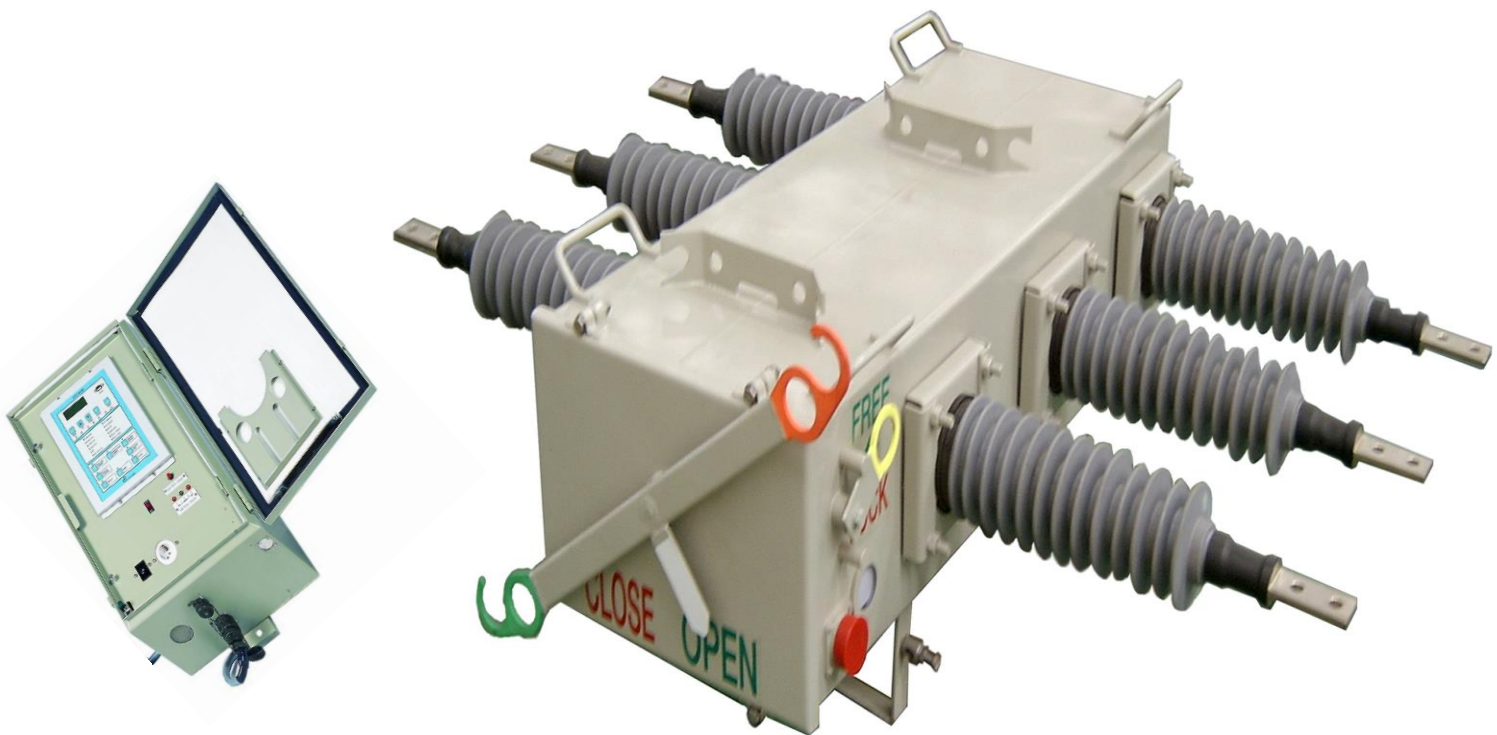




## Pole Mounted Sectionalizer with RTU integrated



# Sugs Lloyd Energy Pvt. Ltd.

Plot No. 178, Patparganj Industrial Area, Delhi - 110092, India

Tel: +011-45768737

E-mail: [info@sugslloyds.com](mailto:info@sugslloyds.com)

## GENERAL

Sugs Lloyd's Type JK SF<sub>6</sub> Insulated Load Break Switch is designed to meet the increasing requirements of the electric utility industry, providing a safe, low-maintenance, long life, economical, alternative device to perform load switching on overhead electrical distribution feeders.

The switch is designed to be crossarm mounted and is applicable to 15kV, 25.8kV and 38kV overhead distribution systems. It can be operated electrically (from the control panel and remote location) or manually.

## RATING & SPECIFICATIONS

Description		Unit	Rating & specification		
Rated voltage		kV	12(15)	24(25.8)	36(38)
Rated normal current		A	400/630	400/630	400/630
Rated frequency		Hz	50/60	50/60	50/60
Rated short time current(1s, RMS)		kA	12.5/16/20	12.5/16/20	12.5/16/20
Rated short circuit making current(Peak)		kA	32/40/50	32/40/50	32/40/50
Interrupting capacity	Load current	A	400/630		400/630
	Closed loop current	A	400/630		400/630
	Cable charging current	A	25		20
	Magnetizing current	A	14/22		14/22
	Line charging current	A	1.5		2
Number of switching at rated current		C-O	Min. 200		
Number of making at rated making current		C	5		
Number of no-load switching		C-O	Min.5000		
Power frequency Insulation level	Terminal to ground	kV	40	60	70
	Terminal to terminal	kV	40	60	70
	Between open phase	kV	45	60	80
Impulse insulation Level((1.2x50 μs)	Terminal to ground	kV	110	150	170
	Terminal to terminal	kV	110	150	170
	Between open phase	kV	110	150	195
Rated control voltage(Auto/SCADA type)		V	AC 220(110)V/ DC24 V		
Rated gas pressure at 20°C		kgf/cm <sup>2</sup>	0.5		
Switch type			JK-SGS		
Applied standard			IEC60265-1, ANSI C37.71, JIS4605,		

## CHARACTERISTICS

The Type JK SF<sub>6</sub>-Insulated Load Break Switch is designed to be maintenance-free, to meet the growing requirements for distribution automation applications.

The Type JK switch offers the following:

- SF<sub>6</sub> insulation and interruption
- Stainless steel permanently-sealed enclosure
- Rated insulation and interruption at zero psig.
- Safety features:
  - Low pressure interlocking device & indicator
  - High pressure bursting membrane
- Safety mechanical locking device
- Available options for controller :
  - Reserved RTU space
  - Remote Terminal Unit (R.T.U)
  - Integrated controller (Controller + R.T.U)

## CONSTRUCTIONS

### Switch Case

The switch case is made of stainless steel, sealed for long life, maintenance free life. The switch case is constructed of 3.0mm stainless steel.

### Over pressure releasing device

An expulsion screen has been incorporated into the design of the type JK switch to prevent permanent damage to the tank in the event an internal pressure rise (1.0~2.0 kgf/cm<sup>2</sup>G) caused by an abnormal condition, occurs. The expulsion screen is located on the rear side of the unit which is opposite the operator handle. Discharge is vented away from the opposite direction of the operator.

### Contacts

The tips of the tulip contacts are made of an arc-resistance material (Cu-W), which ensures long contact life and a high fault close capability.

**Low Pressure Interlocks** The type JK switch utilizes gas, both as the insulation medium and as the switching medium. Normal gas

pressure at the time of manufacture is 0.5 kg f/cm<sup>2</sup> G at 20°C. Two safety interlocks automatically prevent switching during low pressure conditions (i.e., when internal gas pressure drops to 0.1~0.2 kg f/cm<sup>2</sup> G), by locking the type JK switch in its active state (either its current "ON" or "OFF" position).

The mechanical interlocks prevent operation of the switch, manually or from the control panel.

A red target indicates the interlocks have operated and have disabled the switch; an auxiliary contact for remote status is provided to signal this "disabled" condition via SCADA.

### Toggle mechanism

The Type JK switch employs toggle mechanism and it is capable of manual, or motor actuation. The toggle mechanism is a simple and economic solution for distribution switching application. The mechanism can be operated manually, by hook-stick, or from an optional control panel. The switch can also be supplied with a motor for automated switch applications.

**Switching Medium** Load switching is accomplished by the use of a puffer switching principle, which extinguishes the arcs in the SF<sub>6</sub> gas.

**Bushing & Termination** The Type JK switch bushings are constructed of high quality insulator silicon (as an option), resistant to moisture, external shock, and thermo-cycling.

The bushings also provide the leakage resistance and high dielectric strength required for operation of the switch in contaminated environments.

The bushing consists of the insulator body, internal conductor, and mold-cone lead wire or eye bolt, Nema-2 holes flat terminal.

The bushing are assembled using a screw and bonding assembly process. The insulated copper lead wire, mold cone lead wire has an EP rubber insulation, which has high resistance to tracking. The lead wire is sized to the rated capacity of the application.

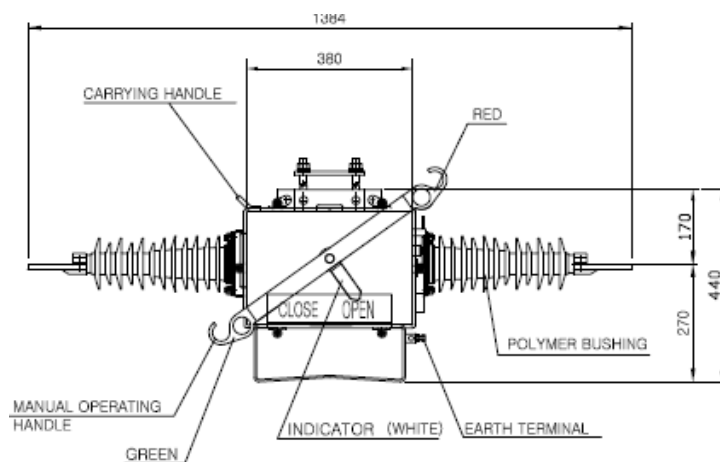
Various kinds of bushing and termination is shown in another page in detail.

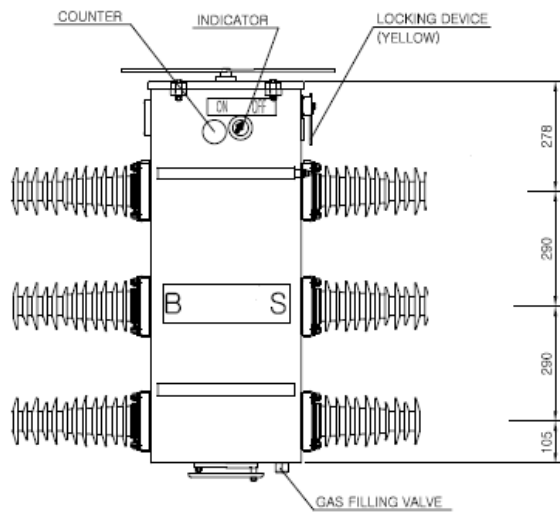
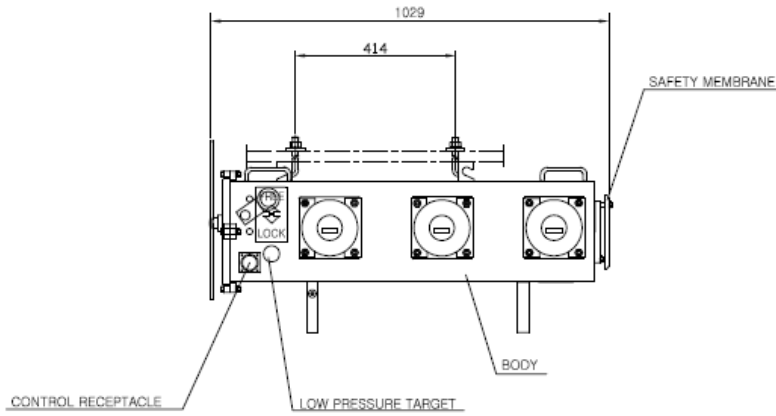
### Motor operation

The automated switch can be operated on the control panel or remote location via SCADA.

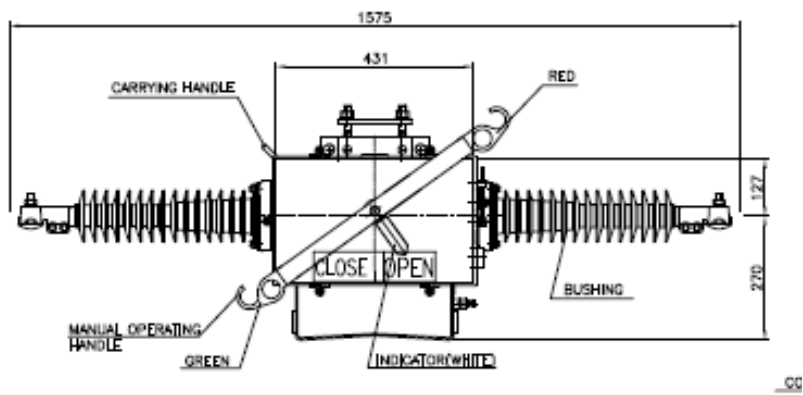
The JK switches can be operated by motor operating mechanism. Motor operating mechanism is designed by 24V DC operation. When supplied, the battery and charger for the motor operators are powered by PT.

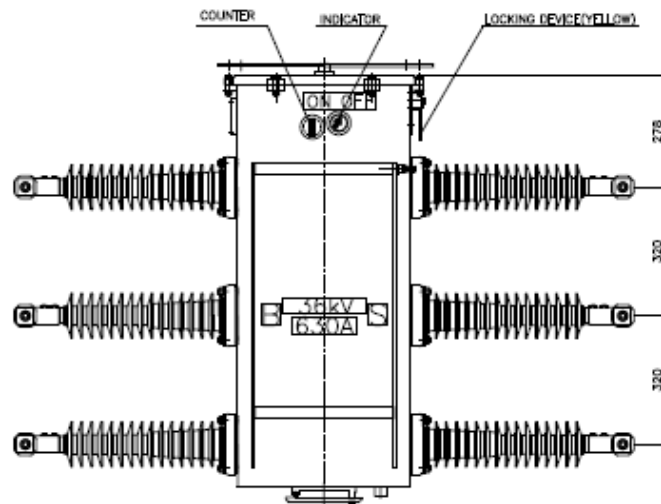
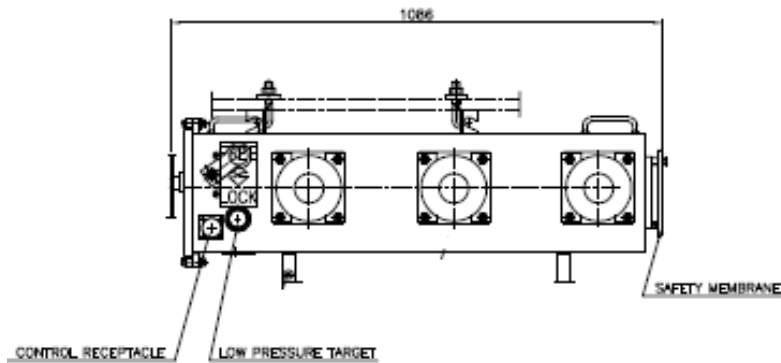
- **24 kV LBS**





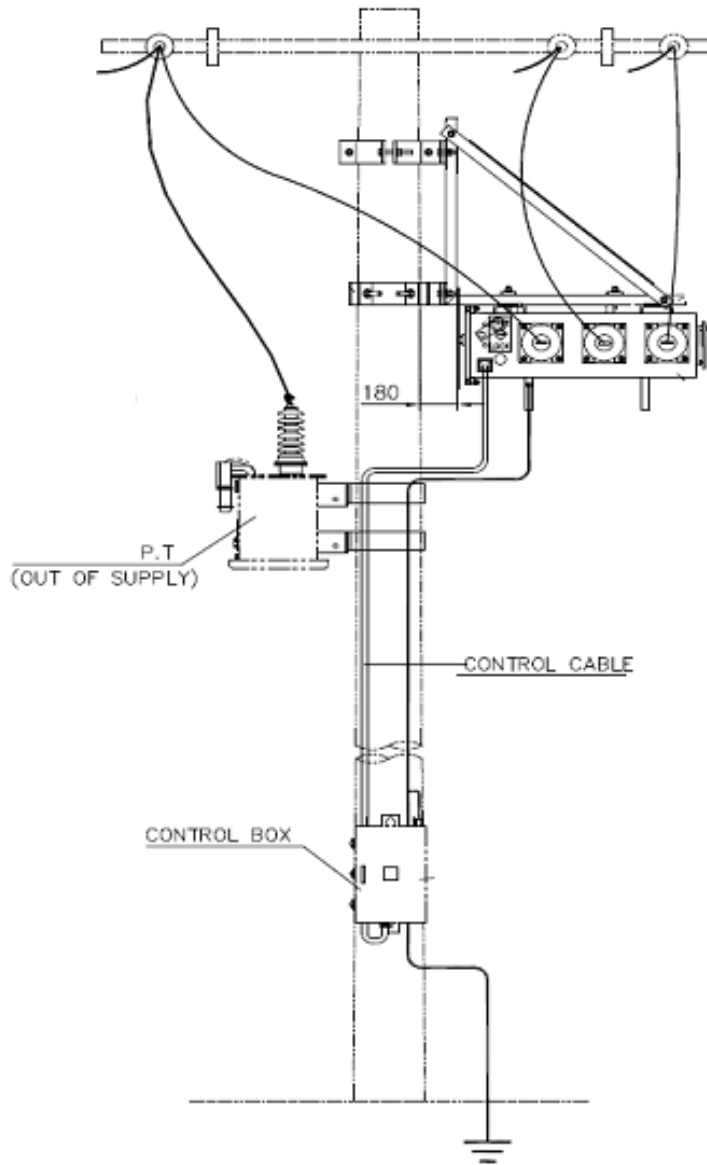
- 33 kV LBS



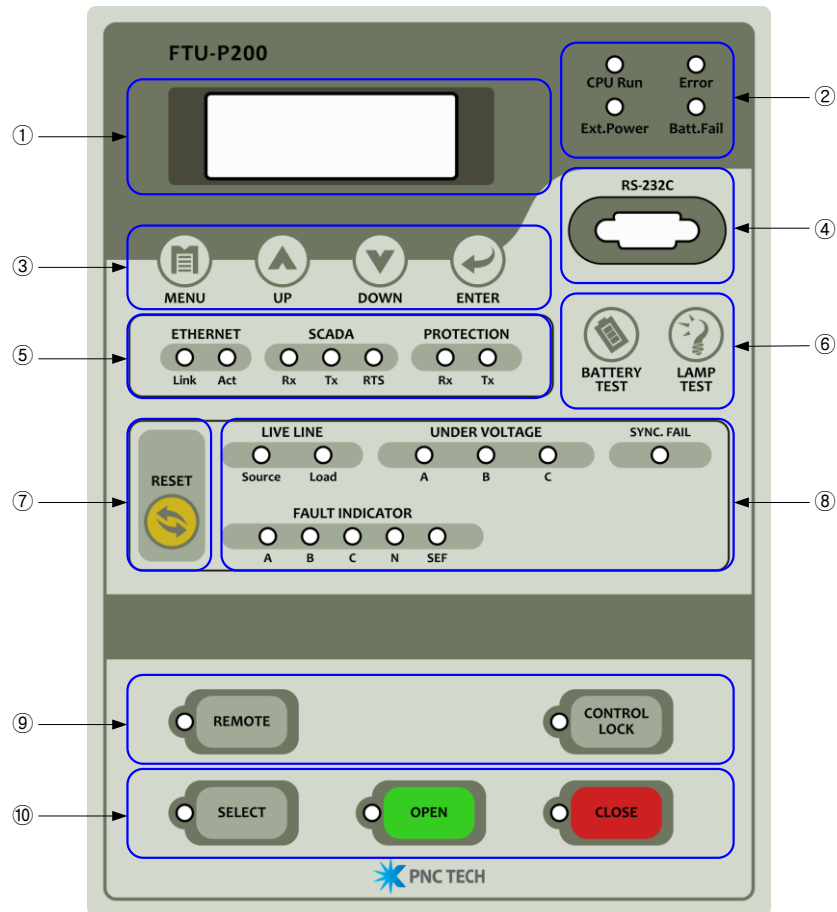


- **CARRYING HANDLE** to carry or handle the switch body
- **MANUAL OPERATING HANDLE** to close or open the switch with NEMA hook-stick manually.
- **INDICATOR** to indicate switch position(ON/OFF, CLOSE/OPEN)
- **EARTH TERMINAL** to connect grounding cable for switch earthing.
- **CONTROL RECEPTACLE** to be interfaced with control unit for electrical signals
- **LOW PRESSURE TARGET** to indicate the status of low gas pressure
- **SAFETY MEMBRANE** to lease the high pressure in case of abnormal internal gas pressure
- **COUNTER** to record the number of switch operation
- **LOCKING DEVICE** to lock the switch mechanically

**TYPICAL INSTALLATION**



**CONSTRUCTION – Microprocessor-based RTU-integrated Control(FTU-P200)**



1. LCD Display
2. LED indicator for CPU Run, System Error, External AC power supply and Battery fail
3. Up/Down(LCD Menu Operation) Buttons
4. RS232 port for Maintenance use
5. Ethernet / SCADA / Protection communication LED indicators
6. Battery & Lamp test button
7. Rest button for detection, Self-diagnosis error LED
8. LED indicators for Live line(source and load side), under voltage, Sync. Fail, fault current
9. Remote/Local operation mode and Controller lock/unlock selector switches and its LED indicators
10. Select(Two Step Control Command) Button & LED and Close/open switches and its LED indicators.



**DETECTION***Phase/Ground Fault Detection*

Item	Phase Fault		Earth Fault		Step	Unit
	Range	Def.	Range	Def.		
Pickup Level	10~900	400	3~900	60	1	A
Detection Time	0.05~10.00	0.05	0.05~10.00	0.05	0.01	sec
Inrush Multiplier	2~20	2	2~20	2	1	
Inrush Time	0.0~180.0	1.0	0.0~180.0	1.0	0.1	sec
Inrush Block	NO/YES	YES	NO/YES	YES		
Function In Use	OFF/ON	ON	OFF/ON	ON		

*Negative Phase Sequence(NPS) Detection*

Item	Range	Def.	Step	Unit
Pickup Level	3~900	60	1	A
Detection Time	0.05~10.00	0.05	0.01	sec
Inrush Multiplier	2~20	2	1	
Inrush Time	0.0~180.0	1.0	0.1	sec
Inrush Block	NO/YES	YES		
Function In Use	OFF/ON	OFF		

*Sensitive Earth Fault(SEF) Detection*

Item	Range	Def.	Step	Unit
Pickup Current(3I <sub>0</sub> )	2~20	5	1	A
Pickup Voltage(-3V <sub>0</sub> )	10~80	30	1	%
Max. Torque Angle	0~345	90	15	Degree
Detection Time	0.1~30.0	1.0	0.1	sec
Inrush Block	NO/YES	YES		
Function in Use	ON/OFF	OFF		

**Directional Blocking Detection**

Item	Range	Def.	Step	Unit	Comment
Phase Detection					
3V <sub>1</sub> Threshold	0~100	20	1	%	
3I <sub>1</sub> Threshold	0~100	20	1	%	
3I <sub>1</sub> Max. Torque Angle	0~355	60	5	Degree	
Earth Detection					
-3V <sub>0</sub> Threshold	0~100	20	1	%	
3I <sub>0</sub> Threshold	0~100	20	1	%	
3I <sub>0</sub> Max. Torque Angle	0~355	60	5	Degree	

**Inrush restraints**

Item	Range	Def.	Step	Unit
2 <sup>nd</sup> Harmonic	5~50	20	1	%
Detection Time	0.02~1.00	0.02	0.01	sec
Function In Use	OFF/ON	ON		

**Open Line Detection(Loss of Phase)**

Item	Range	Def.	Step	Unit
Volt ON Level	50~90	80	5	%
Volt OFF Level	35~75	50	5	%
Delay Time	0.1~30.0	0.4	0.1	sec
Function In Use	OFF/ON	ON		

**Phase Sync. Check**

Item	Range	Def.	Step	Unit
Phase Difference	5~60	30	1	Degree
Delay Time	0.1~30.0	0.1	0.1	sec
Function In Use	OFF/ON	ON		

**Under Voltage Detection**

Item	Range	Def.	Step	Unit
Pickup Level	0.30~0.95	0.80	0.01	PU
Delay Time	0.0~180.0	1.0	0.1	sec
Function In Use	OFF/ON	OFF		

**Over Voltage Protection**

Item	Range	Def.	Step	Unit
Pickup Level	1.05~1.50	1.20	0.01	PU
Delay Time	0.0~180.0	1.0	0.1	sec
Function In Use	OFF/ON	OFF		

**Under Frequency Protection**

Item	Range	Def.	Step	Unit
Pickup	47.00~59.98	49.80	0.01	Hz
Delay Time	0.03~10.00	0.10	0.01	sec
Function In Use	OFF/ON	OFF		

**MEASUREMENT****Current**

RMS(A) & Phase angle(°)	I <sub>a</sub> , I <sub>b</sub> , I <sub>c</sub> , I <sub>n</sub>	
Sequence Component	I <sub>1</sub> , I <sub>2</sub> , I <sub>0</sub>	
True RMS	I <sub>a</sub> , I <sub>b</sub> , I <sub>c</sub>	
Reading Range	2~12, 500A(External CT Ratio 1,000 : 1)	
Accuracy	2~600A	±0.5% or ±1A
	600~12,000A	±3%

**Voltage**

RMS(kV) & Phase angle(°)	V <sub>a</sub> , V <sub>b</sub> , V <sub>c</sub> , V <sub>r</sub> , V <sub>s</sub> , V <sub>t</sub>
Sequence Component	V <sub>1s</sub> , V <sub>2s</sub> , V <sub>0s</sub> , V <sub>1L</sub> , V <sub>2L</sub> , V <sub>0LS</sub>
True RMS	V <sub>a</sub> , V <sub>b</sub> , V <sub>c</sub> , V <sub>r</sub> , V <sub>s</sub> , V <sub>t</sub>
Phase Angle Difference(°)	∠V <sub>a</sub> - ∠V <sub>r</sub>
Reading Range	0.1~26kV
Accuracy	±0.5% or ±0.1kV

<b>Power</b>	
Active Power(kW)	A-Phase, B-Phase, C-Phase, 3-Phase Total
Reactive Power(kVAR)	A-Phase, B-Phase, C-Phase, 3-Phase Total,
Apparent Power(kVA)	A-Phase, B-Phase, C-Phase, 3-Phase Total
Reading Range	-32767~32767
Accuracy	±1%

<b>Power Factor</b>	
A-Phase, B-Phase, C-Phase, 3-Phase Total	
Lead/Lag Display	
Reading Range	0~1.0
Accuracy	±2%

<b>Frequency</b>	
Reading Range	45 ~ 55Hz (System Frequency : 50Hz)
	55 ~ 65Hz (System Frequency : 60Hz)
Accuracy	±0.02%

<b>Energy</b>	
Positive kWh	A-Phase, B-Phase, C-Phase, 3-Phase Total
Negative kWh	A-Phase, B-Phase, C-Phase, 3-Phase Total
Capacitive Positive kVARh	A-Phase, B-Phase, C-Phase, 3-Phase Total,
Capacitive Negative kVARh	A-Phase, B-Phase, C-Phase, 3-Phase Total,
Inductive Positive kVARh	A-Phase, B-Phase, C-Phase, 3-Phase Total,
Inductive Negative kVARh	A-Phase, B-Phase, C-Phase, 3-Phase Total,
Reading Range	0~65535(Rollover)
Accuracy	±2%

<b>Harmonic</b>	
Total Harmonic Distortion (%)	3-Phase Current THD ( $I_a, I_b, I_c, I_{3ph}$ )
	Source side 3-Phase Voltage THD ( $V_a, V_b, V_c, V_{3ph}$ )
2 <sup>nd</sup> ~31 <sup>st</sup> Harmonic RMS(A, kV)	$I_a, I_b, I_c, V_a, V_b, V_c$

<b>Demand Current and Power</b>	
Configurable Demand Interval	5, 10, 15min (Default 15min)
2 <sup>nd</sup> ~31 <sup>st</sup> Harmonic RMS(A, kV)	$I_a, I_b, I_c, P_a, P_b, P_c, P_{3ph}, Q_a, Q_b, Q_c, Q_{3ph}$

Daily Max Current and Power are Stored

---

**COMMUNICATION**

<i>Telecommunication port</i>	
<b>RS232C</b>	
9-Pin Male Connector	DCD(1), Rx(2), Tx(3), DTR(4), GND(5) DSR(6), RTS(7), CTS(8), NC(9)
Speed(Baud Rate)	1200, 2400, 4800, 9600, 19200 BPS
Suppots Modam Control	CTS, DCD Signal Timeout Configurable
	RTS Off-delay Configurable
Optical Isolation	
ESD, Transient Noise Protection	
 <b>Rs232C/RS485C</b>	
RS232C Mode	Rx(2), Tx(3), GND(4), GND(5)CTS(8),
RS485C Mode	DATA-(3) DATA+(7)
Speed(Baud Rate)	1200, 2400, 4800, 9600, 19200 BPS
Optical Isolation	
ESD, Transient Noise Protection	

<i>TCP/IP</i>	
Ethernet Port	10/100 Base-T

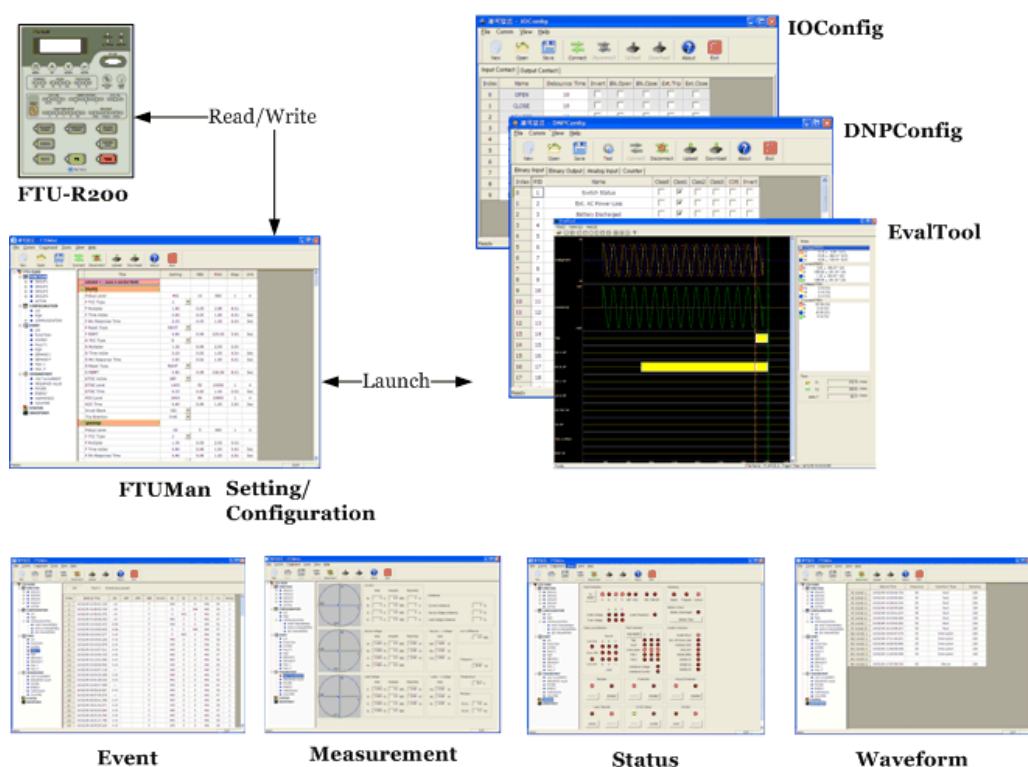
<i>Protocol for SCADA</i>	
DNP3.0	
IEC60870-5-101	
IEC60870-5-104	

**EVNET RECORDING**

Event List	Sub Items	Max.
I/O Events	Status change of binary Input/Output	1023
Function Events	Operated status of Protection Function	1023
System Events	Setting change, Reset, Self Dignosis	255
Fault I Events	Latest fault current, phase and time	255
Demand I,P,Q Events	Each phase daily average load current, active power and reactive power with time	1023
Max. I,P,Q Events	Each phase daily Peak load current, active power and reactive power with time	1023

**MAINTENANCE SOFTWARE (FTUMan)**

- ✓ Setting & Configuration changes
- ✓ Event & Waveform load
- ✓ Measurement & Status display
- ✓ Waveform File upload and convert
- ✓ SCADA monitors protocol data frame between devices



**ENVIRONMENTAL CONDITIONS**

Ambient Temperature	- 25 ~ +70°C, KSC 0220/1
Storage Temperature	- 40 ~ +85°C
Humidity	< 95%RH
Dielectric withstand	IEC 60255-5, 2kV
Impulse voltage	IEC 60255-5, 6kV for current input circuit
	IEC 60255-5, 4kV for voltage, power input & Contacts I/O
Insulation resistance	IEC 60255-5, >500MΩ (DC500V)
High frequency disturbance	IEC 61000-4-12 class 3 (2.5kV)
Fast transient noise	IEC61000-4-4 class 4 (4kV)
Radio frequency noise	IEC 61000-4-3 10V/m
Vibrations	IEC 60255-21-1 class 2
Mechanical Shock	IEC 60255-21-2 class 2
Enclosure protection	IP54

