



Modbus RTU
RI-F220-G-C

M-Bus
RI-F220-G-MB

Pulse SO

UK CA CE

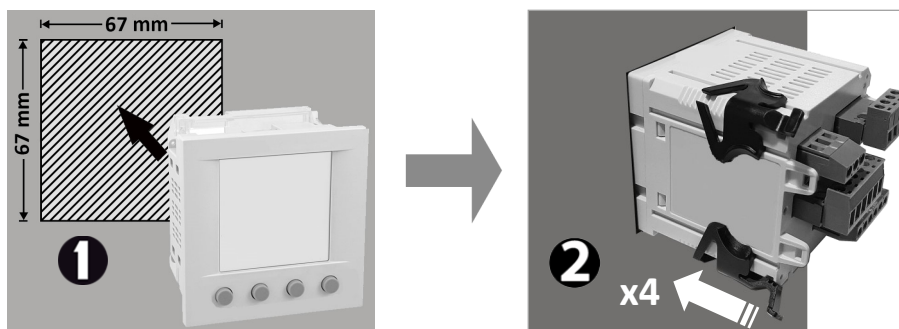
X 4

X 1

X 1

Specifications		Accuracy						
Wiring Input	3Ø 4 wire, 3Ø 3 wire, 2Ø 3 wire, 1Ø 2 wire	Voltage V L-N and V L-L	±0.5% of full scale					
Rated Input Voltage	3x 11...300V AC (L-N), 19...519V AC (L-L)	Current	±0.5% of full scale					
Frequency Range	45...65Hz	Frequency for L-N >20V, L-L >35V	±0.1% of full scale					
CT Primary	1A/5A...10,000A configurable	Active, Reactive and Apparent Power	1%					
CT Secondary	1A or 5A (max rating x1.2)	Power Factor	±0.01 of Unity					
VT Primary	100...500kV configurable	Active Energy	Class 1 (IEC/EN 62053-21)					
VT Secondary	100...500V AC (L-L) configurable	Reactive Energy	Class 2 (IEC/EN 62053-23)					
Auxiliary / Power consumption	85...270V AC 45...65Hz / < 8VA							
Display Update Rate	1 sec all parameters	Wh Resolution and Default Pulse Weight						
Operating / Storage Temperature	-10...55°C / -20...75°C	CT Ratio x VT Ratio	<15	<150	<1500	<15k	<150k	≥150k
Humidity	0...85% non-condensing	Wh / VAh / VAh	0.01k	0.1k	1k	0.01M	0.1M	1M
Protection Degree (IEC/EN60529)	IP54 Front only (rubber gasket fitted)	INT	0.01k	0.1k	1k	0.01M	0.1M	1M
Pulse Output	External 5...27V DC / 100mA max		0.001k	0.01k	0.1k	1k	0.01M	0.1M
Pulse Resolution / Duration	0.01...99.99kWh per imp / 0.1...2 sec	Example						
Communication	Modbus RTU over RS485 MBus (EN13757)	If CT = 100/5A (CT ratio = 20) & VT = 350/350V (VT Ratio = 1) Wh resolution = 0.1kWh (20 x 1 = <150) Pulse O/P default = 0.1kwh/pulse						

MECHANICAL INSTALLATION



Installation & Environmental

Panel mounted, indoor used only.

Installation category: III

Altitude: up to 2000 m

Protection Class: II

Pollution degree: II

All terminal covers must be fitted after wiring

PRODUCT SAFETY

Safety related notification, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of personnel as well as the instrument. If the equipment is not used in a manner specified by the manufacturer it may impair the protection provided by the equipment

- Do not use the equipment if there are mechanical damage
- Do not exceed the stated maximum ratings of the device
- No repairs, maintenance or adjustments are possible
- Read the complete instruction manual prior to installation or operating the unit
- The equipment in its installed state must not come into close proximity to any heating sources, oils, steam, caustic vapours or other unwanted process by-products
- Do not use in hazardous or classified location where explosion or other dangers can be triggered by the device

INSTALLATION PRECAUTIONS

- Risk of electric shock!
Only to be installed by a competent person
- To prevent the risk of electrocution, always isolate and lock-off the power supply to the equipment prior to undertaking any work
 - Always confirm absence of electricity prior to starting work using appropriate voltage detection equipment
 - Wiring shall be done strictly according to the terminal layout
 - Confirm that all connections are correct before energizing the equipment
 - Routing of cables shall be way from any internal EMI source
 - Copper cable should be used
 - All wiring to be in accordance with applicable local standards

WIRING

**3P4W
3 CTs**

**3P3W
2 CTs**

**2P3W
2 CTs**

**3P4W
3 CTs
3 VTs**

**3P3W
2 CTs
2 VTs**

**2P3W
2 CTs
2 VTs**

**1P2W
1 CT**

⚠ Voltage and current must be from same phase

2

5 - 27Vdc

PLC

1 Fuse class CC UL / fast acting 600V Rating 0.5A

2 For 'Volt-free' PLC or digital input, voltage must be provided by the addition of a DC PSU

Single Core
0.5 > 4mm²
Ø 2.5mm max

Stranded
0.5 > 2.5mm²

0.6 Nm Max

Modbus / MBus

Typical Modbus configuration shown
For MBus interface follow Wiring Topology below

RS232 ↔ RS485

A ——— B

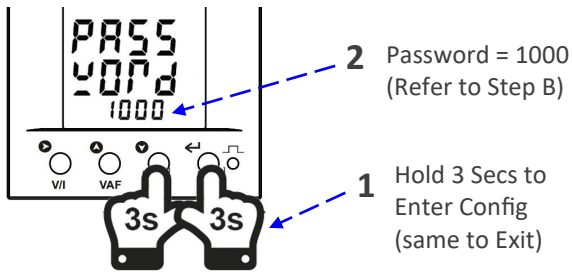
500m Max, ≤ 32 meters

Recommended termination resistor 120 Ω

Wiring Topology	A B		
Modbus	+ -	✓	✗
MBus	1 2	✓	✓

CONFIGURATION

Step A: Enter Configuration Menu

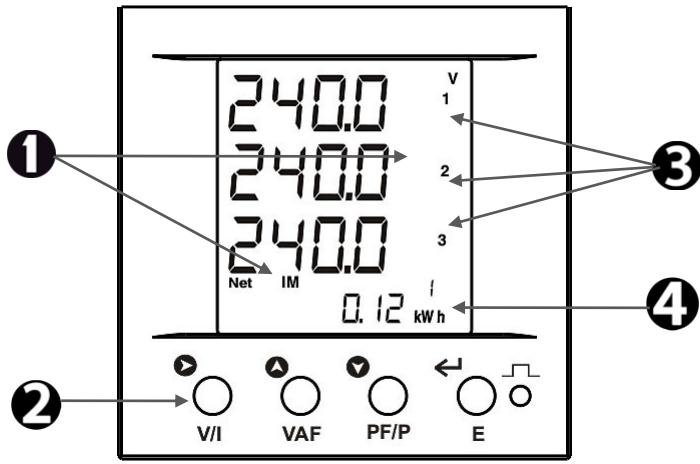


Step B: Configure each setting, as required, referring to Settings Table below, using the buttons as follow:

1		Press button once to make digit or option flash, press again to move flashing cursor
2		Press to change digit or option, press to move cursor position as required
3		Press to save and move to next setting option, Exit menu once all settings are configured (see Step 1)

F220-G-C	F220-G-MB	Setting	Default 	Adjustment Range 	Network & CT Must configure	VT Adjust if Using VT	Comms Modbus / MBus	Pulse O/P Adjust if utilised	System Settings Optional
1	1	Change Password	1000	NO / YES (0000 - 9998)					✓
2	2	Phase Network Selection	3P4W	3P4W 3P3W 1P2r (Phase 1) 1P2Y (Phase 2) 1P2b (Phase 3)	✓				
3	3	CT Secondary (see CT Label)	5	1A / 5A	✓				
4	4	CT Primary (see CT Label)	5	1A/5A to 10,000A	✓				
5	5	PT Secondary	350	100V > 500V		✓			
6	6	PT Primary	350	100V > 500kV		✓			
7	7	Demand interval method	Sliding	Sliding / Fixed					✓
8	8	Demand interval duration	15	1 > 30					✓
9	9	Demand interval length	1	1 > 30 min					✓
10	10	Pulse Weight	0.10	0.01 > 99.99 kWh/imp				✓	
11	11	Pulse Duration	0.1	0.1 > 2.0 Sec				✓	
12	12	Run Hour Selection	0	0 > 10%					✓
13	13	Slave ID <i>Modbus:</i> <i>MBus (Primary ID):</i>	1 1	1 > 255 1 > 250			✓		
14	14	Baud rate <i>Modbus:</i> <i>MBus:</i>	9600 2400	300 > 19200 bps 1200 > 9600			✓		
15	15	Parity <i>Modbus:</i> <i>MBus:</i>	None Even	None / Odd / Even Even			✓		
16	16	Stop Bit <i>Modbus:</i> <i>MBus:</i>	1 1	1 / 2 1			✓		
17	17	Back Light Off (0000 = Never)	0000	0 > 7200 Sec					✓
X	18	MBus Secondary ID	Serial #	0000 0000 > 9999 9999			✓		
18	19	Factory Default	No	No / Yes	Does not reset energy & demand values				✓
19	20	Reset Energy & Demand	No	No / Yes (Password +1)	Once entered, reset each value individually				✓

OPERATION



1 Functions & displayed measurement indicators:

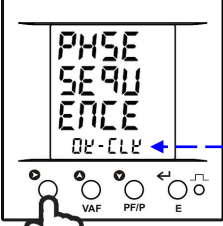
- RS485 communication in progress
- 1,2,3** Phase L-N
- 12,23,13** Phase L-L
- IM** Imported Energy (positive value)
- EP** Exported Energy (negative value)
- Total** Sum of 3-phase
- DMD** Max/Min Demand
- TH** Total Harmonic Distortion (THD)
- Net** Sum of 3-Phase Energy

2 Function buttons and function symbols

3 Phase, total or average instantaneous measurements (V, A, PF, Hz, kW, kVAr, kVA) >> **V/I/VAF/PF/P** buttons

4 Accumulative Energy (kWh/kVArh/kVAh) >> **E** button

No. of Presses	V/I	VAF	PF/P	E	
x1	Voltage (L-N)	L1: V/A/Hz	Power Factor	L1 IM Active Energy - kWh	
x2	Voltage (L-L)	L2: V/A/Hz	L1: kW/kVAr/kVA/PF	L2 IM Active Energy - kWh	
x3	Voltage THD (L-N)	L3: V/A/Hz	L2: kW/kVAr/kVA/PF	L3 IM Active Energy - kWh	
x4	Voltage THD (L-L)	Avg: V/A/PF/Hz (L-N)	L3: kW/kVAr/kVA/PF	L1 EP Active Energy - kWh	
x5	Current	Avg: V/A/PF/Hz (L-L)	Σ: kW/kVAr/kVA/PF	L2 EP Active Energy - kWh	
x6	Current THD		Max DMD: kW/kVAr/kVA	L3 EP Active Energy - kWh	
x7	Current Max DMD		Min DMD: kW/kVAr	Net IM Active Energy - kWh	
<ul style="list-style-type: none"> ◇ L-N parameters not displayed For 3P3W ◇ Parameters in BOLD not displayed for 1P2W 				x8	Net EP Active Energy - kWh
				x9	Net Active Energy - kWh (IM+EP)



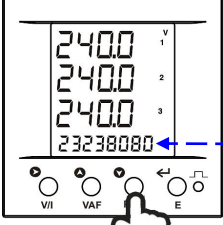
Voltage Phase Sequence

OK-CLK = L1 → L2 → L3 ✓

ANTI-CK = Incorrect Order ✗

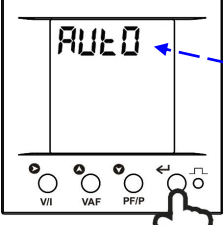
INVAL Id = Missing Phase ✗

Hold 3 sec



Serial Number

Hold 10 sec



Page Scroll

deft = Display Voltage Screen after 60 sec of non-activity

AUTO = Automatic page scroll Change every 5 sec

MANL = Manually change page only

Hold 3 sec
Hold again to change

x10	L1 IM Reactive Energy - kVArh
x11	L2 IM Reactive Energy - kVArh
x12	L3 IM Reactive Energy - kVArh
x13	L1 EP Reactive Energy - kVArh
x14	L2 EP Reactive Energy - kVArh
x15	L3 EP Reactive Energy - kVArh
x16	Net IM Reactive Energy - kVArh
x17	Net EP Reactive Energy - kVArh
x18	Net Reactive Energy - kVArh (IM+EP)
x19	L1 Apparent Energy - kVAh
x20	L2 Apparent Energy - kVAh
x21	L3 Apparent Energy - kVAh
x22	Net Apparent Energy - kVAh
x23	Run Hour (0.01 hr = 36 sec)
x24	Number of Auxiliary Switch ON