

DIGITAL METERING SYSTEMS

TE'S CROMPTON INSTRUMENTS



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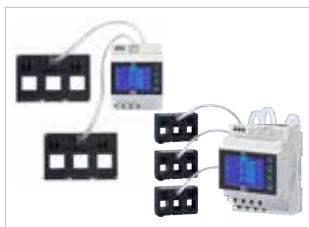
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Chapter I

Integra 12xx

Digital metering systems – panel mounted

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Integra 1221 digital metering system

With an optional RJ12 wiring solution

FEATURES

- DIN 96 enclosure
- Backlit LCD screen
- Voltage IN-OUT connections
- CT measurement 5A/1A
- Plug and socket connections
- Programmable VT, CT ratios
- Modbus™ RTU
- Individual harmonics to 63rd
- Non-volatile memory 1MB



DISPLAYED PARAMETERS

- Voltage per phase L-N, L-L
- Current per phase and Max Demand
- Power Factor – per phase and system
- Total Harmonic Distortion – Voltage and Current per phase
- Neutral current
- Frequency system
- Phase Sequence
- Active Power (P) per phase, total and Max Demand
- Reactive Power (Q) per phase, total and Max Demand
- Apparent Power (S) per phase, total and Max Demand
- Energy – Active and Reactive Importing and Total
- Energy – Active and Reactive Exporting and Total

APPROVALS

- IEC BS EN 61010-1:2010
- BS EN 61326-1:2013
- IEC 62053-22 Class 0.5
- IEC 62053-24 Class 0.5

DISPLAY

High definition screen features programmable backlight for high contrast visibility in low light and direct sunlight applications. The light can be programmed to automatically dim after set period of time for energy saving.

New “petal” array icons shows the percentage of full scale power of the measured system and the instantaneous power factor (PF) measurement gives clear PF indication. Total power consumption is displayed on the screen at all time.

RJ12 PLUG AND SOCKET WIRING SOLUTION

INTEGRA 1221 dms and the 3-in-1 current transformers include RJ12 plugs and sockets for easy connectivity and installation and the solution is available with wired looms to reduce assembly time and connection errors. IN-OUT voltage connections reduce wiring and installation time.

COMMUNICATION

Modbus RTU (RS485) available on all models. Two pulsed outputs available on self powered only.

PRODUCT CODES

Description	Part number
Integra 1221 multifunction panel meter - Self powered. Backlit LCD HD Display Input 100-277 V AC L-N / 173-480V AC L-L - 2 Pulsed outputs. RJ12 CT input 100mA. Modbus RS485 output. RJ12 CT connectivity.	INT-1221-S-010
Optional Ethernet Module (1221 & 1222) for Modbus IP and BACnet IP	OPT-1222-070
Optional Data Logger Module (1221 & 1222)	OPT-1222-020
Optional Sealing gasket & push fixing clamps for IP64 (1221 & 1222)	OPT-1222-IP64

INTEGRA-122X OPTIONAL EXTRAS AVAILABLE

Integra 122X has the option to attach an Ethernet, BacNET or Datalogger module to the product.

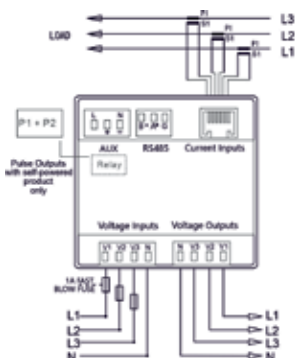
Optional modules available.



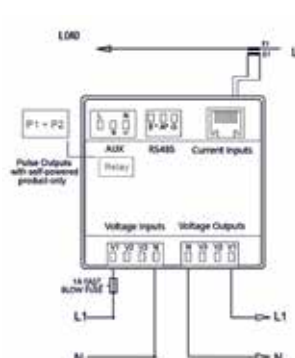
IP64 sealing kit available.



WIRING DIAGRAMS



3-phase 4-wire



1-phase 2-wire

Integra 1221 digital metering system

PARAMETERS

SPECIFICATIONS

Button	Scr	Parameter	Input	
ESC Ph S	1	Watts L1	Nominal input voltage	57.7 – 276 V AC L-N (100-480 V L-L) 576 V L-L MAX
		Volts L1	Max. continuous input overload voltage	120% of nominal
		Current L1	Max. short duration input voltage	2 x nominal voltage for 1 second
		Active Energy L1	Nominal input voltage burden	< 0.2 VA per phase
	2	Watts L2	Nominal input current	100 mA
		Volts L2	Nom. Input current burden	< 0.1 VA
		Current L2	Max. continuous input overload current	120% of nominal
		Active Energy L2	Max. short duration input current	20 x nominal current for 1 second
	3	Watts L3	Auxiliary Powered	
		Volts L3	Operating range	57.7-276 V L-N (100-480 L-L) AC/DC 50/60 Hz or Self powered from any phase
		Current L3	Supply burden	<5 VA
		Active Energy L3	Accuracy	
	4	Watts L1	Voltage (V)	+/- 0.5% of range maximum
		Volts L1	Current (A)	+/- 0.5% of range maximum
		Current L1	Frequency (Hz)	+/- 0.2% of mid-frequency
		Reactive Energy L1	Power factor (PF)	+/- 1% of unity (0.01)
	5	Watts L2	Active power (W)	+/- 0.5% of reading
		Volts L2	Reactive power (VAR)	+/- 0.5% of reading
		Current L2	Apparent power (VA)	+/- 0.5% of reading
		Reactive Energy L2	Active energy (kWh)	+/- 0.5% of reading to IEC 62053-22
V/A	6	Watts L3	Reactive energy (kVarh)	+/- 0.5% of reading to IEC 62053-24
		Volts L3	THD	2% to 63rd harmonic
		Current L3	Measured Range	
		Reactive Energy L3	Voltage (V)	5 – 120% of nominal (Min 100 V – self powered)
	1	L-N Volts L1, L2, L3	Current (A)	5 – 120% of nominal
	2	L-L Volts L1, L2, L3	Frequency (Hz)	44 – 66 Hz
	3	Current L1, L2, L3, N	Power (W, VAR, VA)	5 – 144% of nominal (bi-directional)
	4	V-THD% per line	Energy	8 digit, upto 9999999.9 MWh
	5	I-THD% per line	Power factor	4 quadrant
	6	Phase Sequence V&I	THD	0 – 40% upto 63rd harmonic
	MD PF Hz	PF and System Freq	Environment	
		PF per phase	Operating temperature	-25 °C to +70 °C
		MD per phase	Storage temperature	-40 °C to +80 °C
		System Max demand P, Q, S.	Relative humidity	0 to 95%, non-condensing
	P	Active Power (P) L1, L2, L3	Shock	30 g in 3 planes
		Reactive Power (Q) L1, L2, L3	Vibration	10 Hz to 50 Hz, IEC 60068-2-6, 2 g
		Apparent Power (S) L1, L2, L3	Surge voltage	4 kV (IEC 61000-4-5)
		System Powers P,Q,S	Impulse voltage	6 kV (IEC 60060-1)
E	1	Active Power (P) L1, L2, L3	Electromagnetic immunity	80 MHz - 2 GHz at 10 V/m IEC 61000-4-3
		Reactive Power (Q) L1, L2, L3	Electrostatic discharge	15 kV (IEC 61000-4-2)
		Apparent Power (S) L1, L2, L3	Altitude	3000 m
		System Powers P,Q,S	Warm-up	1 minute
	2	Active Power (P) L1, L2, L3	Outputs	
		Reactive Power (Q) L1, L2, L3	Pulsed outputs (self powered only)	Opto-coupled, potential-free SPST-NO contact
		Apparent Power (S) L1, L2, L3	Contact rating current	50 mA at 230 V AC 27 mA at 27 V DC
		System Powers P,Q,S	Contact rating voltage	5 – 27 V DC
	3	Active Power (P) L1, L2, L3	Pulse width	60/100/200 ms
		Reactive Power (Q) L1, L2, L3	Pulse rate	0.001/0.01 /0.1/1/10/100/1000 kWh/kVarh
		Apparent Power (S) L1, L2, L3	Pulsed output relay (non-configurable)	2400IMP/kWh
		System Powers P,Q,S	Communications	
	4	Active Power (P) L1, L2, L3	Modbus RTU (RS485)	
		Reactive Power (Q) L1, L2, L3	Type	2-wire half duplex
		Apparent Power (S) L1, L2, L3	Baud rate	2400, 4800, 9600, 19200, 38400
		System Powers P,Q,S	Address	1 to 247
	5	Active Power (P) L1, L2, L3	Enclosure	
		Reactive Power (Q) L1, L2, L3	Enclosure style	DIN 96 panel mount
		Apparent Power (S) L1, L2, L3	Dimensions	96 x 96 x 62 mm
		System Powers P,Q,S	Panel cut-out	92 x 92 mm
	6	Active Power (P) L1, L2, L3	Panel thickness	1-5 mm
		Reactive Power (Q) L1, L2, L3	Protection rating	Front IP54, Rear IP30, IP65 (with panel gasket)
		Apparent Power (S) L1, L2, L3	Material	UL 94 – VO
		System Powers P,Q,S	Weight	340 g
	7	Active Power (P) L1, L2, L3	Cable size	0.05 mm ² – 2.5 mm ² stranded wire
		Reactive Power (Q) L1, L2, L3	Terminals	Voltage and Current : Shrouded screw clamp

Integra DMS - RJ12 Wiring Loom Solution



INTEGRA-1221
RJ12 Connector



FEATURES

- DIN 96 enclosure
- Backlit LCD screen
- Voltage IN-OUT connections
- RJ12 connection 100mA
- Programmable VT
- Modbus™ RTU
- Individual harmonics to 63rd
- Non-volatile memory 1MB

BENEFITS

- Reduced installation time
- Eliminates potential cost of errors in electrical connections or programming
- Tidy solution for cable management



Description	Part number
Integra 1221 multifunction panel meter - Self powered. Backlit LCD HD Display Input 100-277 V AC L-N / 173-480V AC L-L - 2 Pulsed outputs. RJ12 CT input 100mA. Modbus RS485 output. RJ12 CT connectivity.	INT-1221-S-010

Choose your requirements

Select:

Step 1 choose

- Self Powered or Auxiliary Meter

Step 2 choose

- RJ12 Current Transformer

Step 3 choose

- Voltage wiring loom

Step 4 choose

- Optional modules if required
e.g BACnet, Ethernet,
Data Logger, IP64 Sealing Kit



Voltage Meter to Open Loom	Length	Part Number
The meter to open loom connects the voltage supply from the fused connections to the meter using high quality LSZH cable fitted with suitable plugs and socket for safe and easy voltage connections. Compatible with all versions of INT 12XX meters.	600 mm	Q2C-VFO-0600-01
	1000 mm	Q2C-VFO-1000-01
	1200 mm	Q2C-VFO-1200-01
	1500 mm	Q2C-VFO-1500-01
	Other lengths available	



Voltage Meter to Meter Loom	Length	Part Number
The meter to meter loom connects the voltage for upto 32 meters using high quality LSZH cable fitted with suitable plugs and socket for safe and easy voltage connections. Compatible with all versions of INT-12XX meters.	600 mm	Q2C-VMM-0600-01
	1000 mm	Q2C-VMM-1000-01
	1200 mm	Q2C-VMM-1200-01
	1500 mm	Q2C-VMM-1500-01
	2000 mm	Q2C-VMM-2000-01
	Other lengths available	

Integra 1222 digital metering system

With an optional Q2C wiring solution

FEATURES

- DIN 96 enclosure
- Backlit LCD screen
- Voltage IN-OUT connections
- CT current measurement 5A/1A
- Plug and socket connections
- Programmable VT, CT ratios
- Modbus™ RTU
- Individual harmonics to 63rd
- Non-volatile memory 1MB



APPROVALS

- IEC BS EN 61010-1:2010
- BS EN 61326-1:2013
- IEC 62053-22 Class 0.5
- IEC 62053-24 Class 0.5

DISPLAY

High definition screen features programmable backlight for high contrast visibility in low light and direct sunlight applications. The light can be programmed to automatically dim after set period of time for energy saving.

New “petal” array icons shows the percentage of full scale power of the measured system and the instantaneous PF measurement gives clear PF indication. Total power consumption is displayed on the screen at all times.

Q2C WIRING SOLUTION

INTEGRA 1222 dms and the 3-in-1 current transformers feature Q2C wiring solution for simple yet fast installation utilising plug and socket connections and pre-cut wiring looms, which allow to reduce assembly time and connection errors. IN-OUT voltage connections reduce wiring and installation time.

COMMUNICATION

Modbus RTU (RS485) available on all models. Two pulsed outputs available on self powered only.

PRODUCT CODES

Description	Part number
Integra 1222 multifunction panel meter Self powered. Backlit LCD HD Display Input 100-277 V AC L-N / 173-480V AC L-L - 2 Pulsed outputs. CT input 5A or 1A selectable. Modbus RS485 output.	INT-1222-S-010
Integra 1222 multifunction panel meter Auxiliary powered. Backlit LCD HD Display Input 57.7-277 V AC L-N / 100-480V AC L-L CT input 5A or 1A selectable. Modbus RS485 output. 100-250V AC/DC +/- 20%	INT-1222-M-010

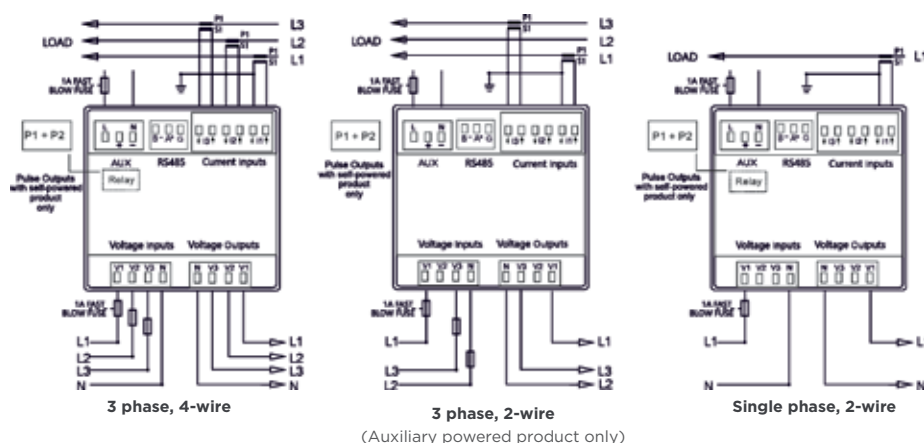
DIMENSIONS



DISPLAYED PARAMETERS

- Voltage per phase L-N, L-L
- Current per phase and Max Demand
- Power Factor – per phase and system
- Total Harmonic Distortion – Voltage and Current per phase
- Neutral current
- Frequency system
- Phase Sequence
- Active Power (P) per phase, total and Max Demand
- Reactive Power (Q) per phase, total and Max Demand
- Apparent Power (S) per phase, total and Max Demand
- Energy – Active and Reactive Importing and Total
- Energy – Active and Reactive Exporting and Total

WIRING DIAGRAMS



Integra 1222 digital metering system

PARAMETERS

Button	Scr	Parameter
ESC Ph S	1	Watts L1 Volts L1 Current L1 Active Energy L1
	2	Watts L2 Volts L2 Current L2 Active Energy L2
	3	Watts L3 Volts L3 Current L3 Active Energy L3
	4	Watts L1 Volts L1 Current L1 Reactive Energy L1
	5	Watts L2 Volts L2 Current L2 Reactive Energy L2
	6	Watts L3 Volts L3 Current L3 Reactive Energy L3
V/A	1	L-N Volts L1, L2, L3
	2	L-L Volts L1, L2, L3
	3	Current L1, L2, L3, N
	4	V-THD% per line
	5	I-THD% per line
	6	Phase Sequence V&I
MD PF Hz	1	PF and System Freq
	2	PF per phase
	3	Max Current Demand per phase
	4	System Max demand P, Q, S.
P	1	Active Power (P) L1, L2, L3
	2	Reactive Power (Q) L1, L2, L3
	3	Apparent Power (S) L1, L2, L3
	4	System Powers P,Q,S
E	1	Imp Active Energy Exp Active Energy
	2	Imp Reactive Energy Exp Reactive Energy
	3	Total Active Energy Total Reactive Energy

SPECIFICATIONS

Input	
Nominal input voltage	57.7 – 276 V AC L-N (100-480 V L-L) 576 V L-L MAX
Max. continuous input overload voltage	120% of nominal
Max. short duration input voltage	2 x nominal voltage for 1 second
Nominal input voltage burden	< 0.2 VA per phase
Nominal input current	1 A AC or 5 A AC
Nom. Input current burden	< 0.1 VA
Max. continuous input overload current	120% of nominal
Max. short duration input current (300 msec)	20 x nominal current for 1 second
Auxiliary Powered	
Operating range	57.7-276 V L-N (100-480 L-L) AC/DC 50/60 Hz or Self powered from any phase
Supply burden	<5 VA
Accuracy	
Voltage (V)	+/- 0.5% of range maximum
Current (A)	+/- 0.5% of range maximum
Frequency (Hz)	+/- 0.2% of mid-frequency
Power factor (PF)	+/- 1% of unity (0.01)
Active power (W)	+/- 0.5% of reading
Reactive power (VAR)	+/- 0.5% of reading
Apparent power (VA)	+/- 0.5% of reading
Active energy (kWh)	+/- 0.5% of reading to IEC 62053-22
Reactive energy (kVArh)	+/- 0.5% of reading to IEC 62053-24
THD	2% to 63rd harmonic
Measured Range	
Voltage (V)	5 – 120% of nominal (Min 100 V – self powered)
Current (A)	5 – 120% of nominal
Frequency (Hz)	44 – 66 Hz
Power (W, VAR, VA)	5 – 144% of nominal (bi-directional)
Energy	8 digit, upto 9999999.9 MWh
Power factor	4 quadrant
THD	0 – 40% upto 63rd harmonic
Environment	
Operating temperature	-25°C to +70°C
Storage temperature	-40°C to +80°C
Relative humidity	0 to 95%, non-condensing
Shock	30 g in 3 planes
Vibration	10 Hz to 50 Hz, IEC 60068-2-6, 2 g
Surge voltage	4 kV (IEC 61000-4-5)
Impulse voltage	6k V (IEC 60060-1)
Electromagnetic immunity	80 MHz - 2 GHz at 10 V/m IEC 61000-4-3
Electrostatic discharge	15 kV (IEC 61000-4-2)
Altitude	3000 m
Warm-up	1 minute
Outputs	
Pulsed output relay (self powered only)	Opto-coupled, potential-free SPST-NO contact
Contact rating current	50 mA at 230 V AC 27 mA at 27 V DC
Contact rating voltage	5 – 27 V DC
Pulse width	60 / 100 / 200 ms
Pulse rate	0.001/0.01/0.1/1/ 0/100/1000 kWh/kVArh
Pulsed output relay (non-configurable)	2400IMP/kWh
Communications	
Type	Modbus RTU (RS485)
Baud rate	2400, 4800, 9600, 19200, 38400
Address	1 to 247
Enclosure	
Enclosure style	DIN 96 panel mount
Dimensions	96 x 96 x 62 mm
Panel cut-out	92 x 92mm
Panel thickness	1 – 5 mm
Protection rating	Front IP54, Rear IP30, IP65 (with panel gasket)
Material	UL 94-VO
Weight	340 g
Cable size	0.05 mm ² – 2.5 mm ² stranded wire
Terminals	Voltage and Current : Shrouded screw clamp
Display characters	6.2 mm

Integra DMS - Q2C Wiring Loom Solution



INTEGRA-1222
Q2C

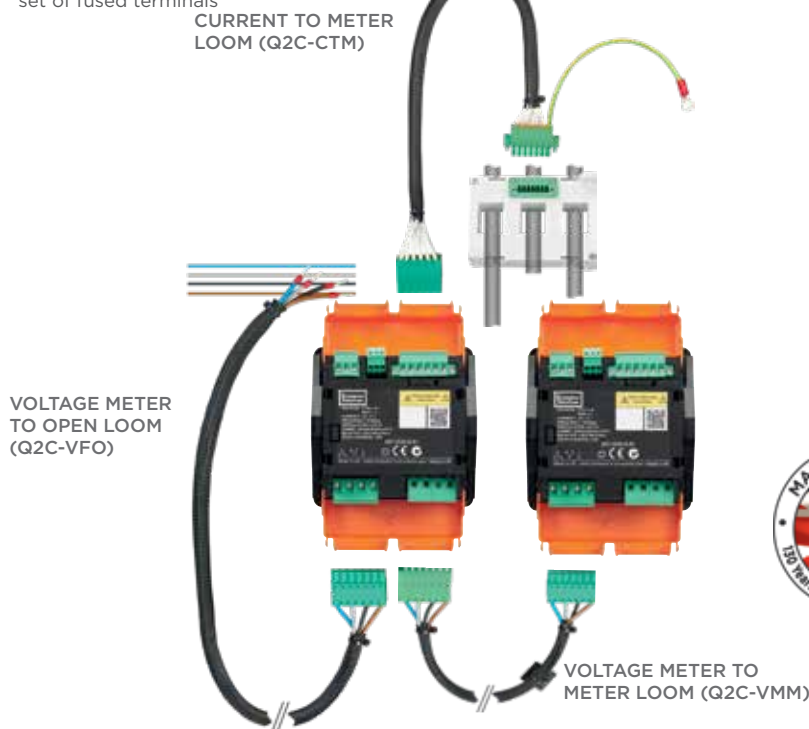


FEATURES

- A complete Quick 2 Connect wiring solution with integral connectors and earthing
- Screwless terminal connections, vibration proof and maintenance free
- Up to 32 meters can be supplied from one set of fused terminals

BENEFITS

- Reduced installation time
- Eliminates potential cost of errors in electrical connections or programming
- Tidy solution for cable management



Choose your requirements

Select:

Step 1 choose

- Self Powered or Auxiliary Meter

Step 2 choose

- Current Transformer e.g Q2C or hard wired

Step 3 choose

- Voltage/Current wiring loom

Step 4 choose

- Optional modules if required e.g BACnet, Ethernet, Data Logger, IP64 Sealing Kit



Description	Part number
Integra 1222 multifunction panel meter - Self powered. Backlit LCD HD Display Input 100-277 V AC L-N / 173-480V AC L-L - 2 Pulsed outputs. CT input 5A or 1A selectable. Modbus RS485 output.	INT-1222-S-010
Integra 1222 multifunction panel meter - Auxiliary powered. Backlit LCD HD Display Input 57.7-277 V AC L-N / 100-480V AC L-L CT input 5A or 1A selectable. Modbus RS485 output. Auxiliary powered - 100-250V AC/DC +/- 20%	INT-1222-M-010

Voltage Meter to Open Loom	Length	Part number
The meter to open loom connects the voltage supply from the fused connections to the meter using high quality LSZH cable fitted with suitable plugs and socket for safe and easy voltage connections.	600 mm	Q2C-VFO-0600-01
	900 mm	Q2C-VFO-0900-01
	1200 mm	Q2C-VFO-1200-01
	1500 mm	Q2C-VFO-1500-01
Voltage Meter to Meter Loom	Length	Part number
The meter to meter loom connects the voltage for upto 32 meters using high quality LSZH cable fitted with suitable plugs and socket for safe and easy voltage connections.	600 mm	Q2C-VMM-0600-01
	900 mm	Q2C-VMM-0900-01
	1200 mm	Q2C-VMM-1200-01
	1500 mm	Q2C-VMM-1500-01
Current to Open Loom	Length	Part number
Loom is opened at the CT end to allow hard wired connection to any CT and wired at the meter end	600 mm	Q2C-CMO-0600-01
	900 mm	Q2C-CMO-0900-01
	1200 mm	Q2C-CMO-1200-01
	1500 mm	Q2C-CMO-1500-01
	2000 mm	Q2C-CMO-2000-01
Current to Meter Loom	Length	Part number
The current to meter loom connects the current from the CT to the current input on the meter using high quality LSZH cable fitted with suitable plugs and socket for safe and easy current connections.	600 mm	Q2C-CTM-0600-01
	900 mm	Q2C-CTM-0900-01
	1200 mm	Q2C-CTM-1200-01
	1500 mm	Q2C-CTM-1500-01

Q2C 3-in-1 current transformers

FEATURES

- Reversible mounting LHS and RHS
- Internal grounding/earthing facility
- Supplied with connector

BENEFITS

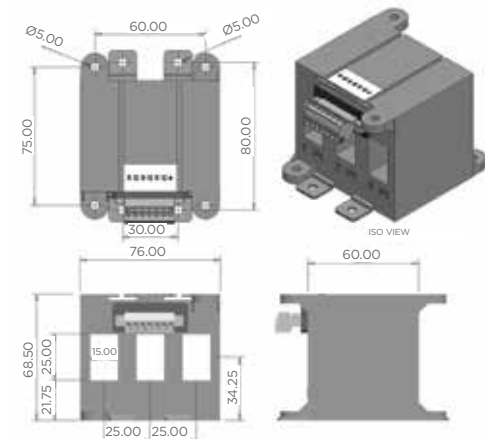
- Simple, easy and error free installation and wiring
- Applicable for most standard MCCB manufacturers



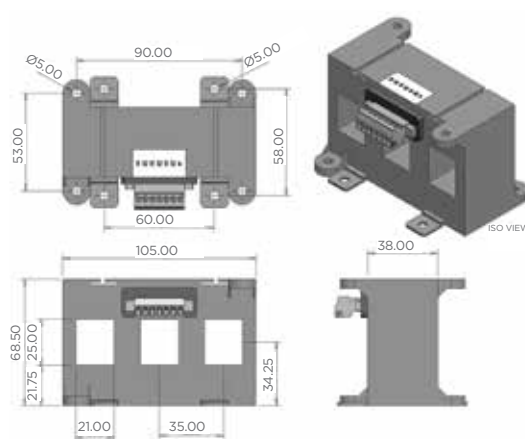
PRODUCT CODES

Part number	Ratio	Burden VA against class index			Aperture (mm)
		Class 0.5	Class 1	Class 3	
QC3N1-25-60/5	60/5	-	1	2	3 @ 15 x 25 mm
QC3N1-25-100/5	100/5	-	1.5	2.5	3 @ 15 x 25 mm
QC3N1-25-125/5	125/5	-	1.5	2.5	3 @ 15 x 25 mm
QC3N1-25-160/5	160/5	1.5	1.5	2.5	3 @ 15 x 25 mm
QC3N1-35-100/5	100/5	-	1.5	2	3 @ 21 x 25 mm
QC3N1-35-125/5	125/5	-	1.5	2.5	3 @ 21 x 25 mm
QC3N1-35-160/5	160/5	1.5	1.5	2.5	3 @ 21 x 25 mm
QC3N1-35-250/5	250/5	1.5	1.5	2.5	3 @ 21 x 25 mm
QC3N1-45-250/5	250/5	-	2.5 VA	-	3 @ 32 x 27 mm
QC3N1-45-400/5	400/5	-	2.5 VA	-	3 @ 32 x 27 mm
QC3N1-45-630/5	630/5	2.5 VA	5 VA	-	3 @ 32 x 27 mm
QC3N1-70-400/5	400/5	-	2.5 VA	-	3 @ 52 x 40 mm
QC3N1-70-630/5	630/5	2.5 VA	2.5 VA	-	3 @ 52 x 40 mm
QC3N1-70-800/5	800/5	2.5 VA	5 VA	-	3 @ 52 x 40 mm

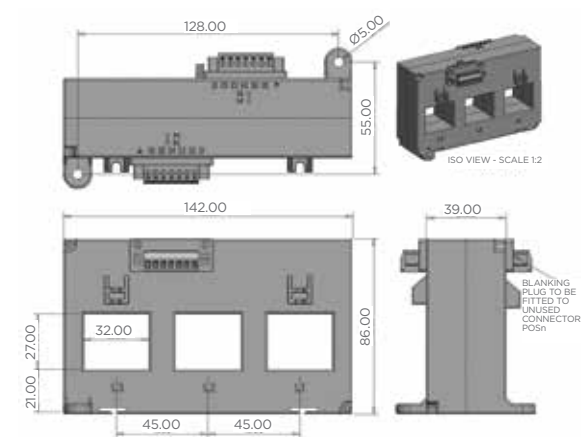
DIMENSIONS



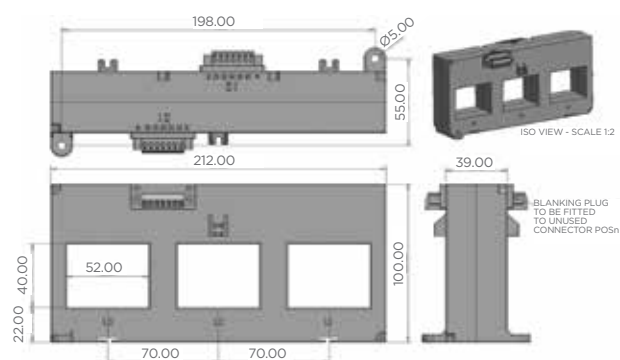
Qc3n1-25



Qc3n1-35



Qc3n1-45



Qc3n1-70

3-in-1 current transformers

FEATURES

- Cost effective three-phase moulded case
- Ratio's ranging from 60/5 to 630/5
- Integrated wire sealable terminal cover
- Busbar, DIN-rail and metal feet mounting hardware supplied
- Combined M4 posi/slot screw



BENEFITS

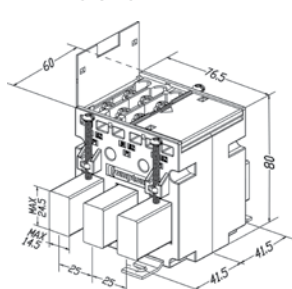
- Isolated output for safety
- Faster installation
- Compact size
- Ex-stock delivery

A range of 3-in-1 current transformers combine three traditional current transformers in one moulded case. 3-in-1 current transformers can be directly installed next to a three-phase moulded case circuit breaker, thus saving installation time where fitting three standard individual current transformers would be required. The M3N1 range of current transformers offers primary currents between 60-630A with 5A secondaries with up to Class 0.5 accuracy performance.

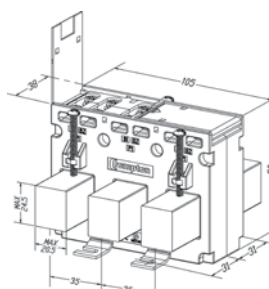
PRODUCT CODES

Part number	Ratio	Burden VA against class index			Aperture (mm)
		Class 0.5	Class 1	Class 3	
M3N1-25-60/5	60/5	-	1	2	3 @ 15 x 25 mm
M3N1-25-100/5	100/5	-	1.5	2.5	3 @ 15 x 25 mm
M3N1-25-125/5	125/5	-	1.5	2.5	3 @ 15 x 25 mm
M3N1-25-160/5	160/5	1.5	1.5	2.5	3 @ 15 x 25 mm
M3N1-35-100/5	100/5	-	1	2	3 @ 21 x 25 mm
M3N1-35-125/5	125/5	-	1.5	2.5	3 @ 21 x 25 mm
M3N1-35-150/5	150/5	-	1.5	2.5	3 @ 21 x 25 mm
M3N1-35-160/5	160/5	1.5	1.5	2.5	3 @ 21 x 25 mm
M3N1-35-200/5	200/5	1.5	1.5	2.5	3 @ 21 x 25 mm
M3N1-35-250/5	250/5	1.5	1.5	2.5	3 @ 21 x 25 mm
M3N1-45-250/5	250/5	1.5	1.5	2.5	3 @ 31 x 31 mm
M3N1-45-300/5	300/5	2.5	2.5	3.75	3 @ 31 x 31 mm
M3N1-45-400/5	400/5	2.5	2.5	3.75	3 @ 31 x 31 mm
M3N1-45-500/5	500/5	2.5	2.5	3.75	3 @ 31 x 31 mm
M3N1-45-600/5	600/5	2.5	2.5	3.75	3 @ 31 x 31 mm
M3N1-45-630/5	630/5	2.5	2.5	3.75	3 @ 31 x 31 mm

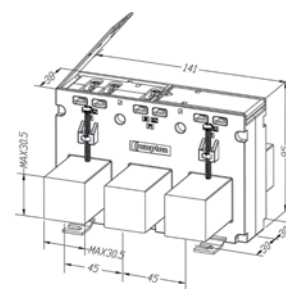
DIMENSIONS



M3n1-25



M3n1-35



M3n1-45

Integra 1232 digital metering system

MID approved DMS with an optional Q2C wiring solution

FEATURES

- MID approved
- Programmable backlit LCD screen
- Voltage IN-OUT connections
- CT current measurement 5 A/1 A
- Plug and socket connections
- Programmable VT, CT ratios
- Modbus™ RTU
- 2 pulsed outputs with led indication
- PF bar indicator
- 3P4W, 3P3W, 1P2W system types
- Individual harmonics to 63rd



APPROVALS

- BS EN 50470-1
- BS EN 50470-3
- IEC 62053-22 Class 0.5
- IEC 62053-24 Class 0.5

BENEFITS

- Cost effective
- Easy installation
- Q2C wiring solution

DISPLAY

High definition screen features programmable backlight for high contrast visibility in low light and direct sunlight applications. The light can be programmed to automatically dim after set period of time for energy saving.

New “petal” array icons shows the percentage of full scale power of the measured system and the instantaneous PF measurement gives clear PF indication. Total power consumption is displayed on the screen at all times.

The DIN 96 enclosure includes integral panel mounting clips for quick and easy fitting and the range includes single-phase, three-phase three-wire and three-phase four-wire capability, all selectable at the point of installation.

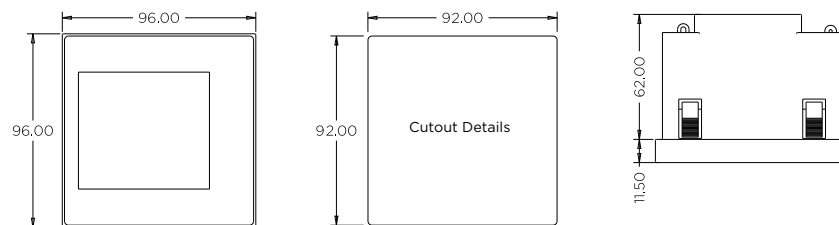
PRODUCT CODES

Description	Part number
INTEGRA 1232 multifunction panel meter LCD Input 480 V L-L, 5 A / 1 A AC Modbus RS485 Self-powered	INT-1232-S-01

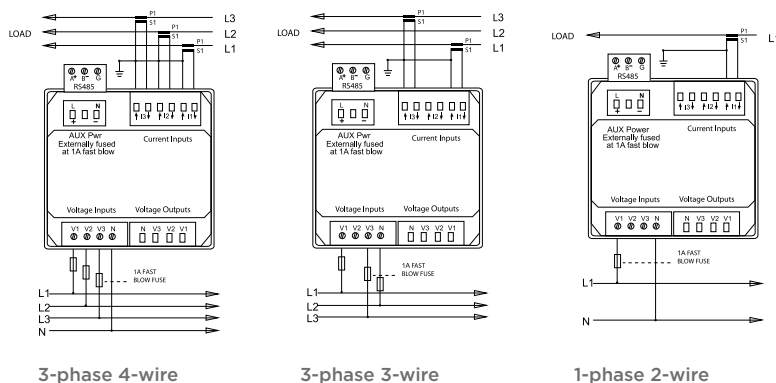
DISPLAYED PARAMETERS

- Voltage per phase L-N, L-L
- Current per phase and Max Demand
- Power Factor – per phase and system
- Total Harmonic Distortion – Voltage and Current per phase
- Neutral current
- Frequency system
- Phase Sequence
- Active Power (P) per phase, total and Max Demand
- Reactive Power (Q) per phase, total and Max Demand
- Apparent Power (S) per phase, total and Max Demand
- Energy – Active and Reactive Importing and Total
- Energy – Active and Reactive Exporting and Total

DIMENSIONS



WIRING DIAGRAMS



Integra 1232 digital metering system

PARAMETERS

Button	Scr	Parameter
ESC Ph S	1	Watts L1 Volts L1 Current L1 Active Energy L1
		Watts L2 Volts L2 Current L2 Active Energy L2
		Watts L3 Volts L3 Current L3 Active Energy L3
		Watts L1 Volts L1 Current L1 Reactive Energy L1
	5	Watts L2 Volts L2 Current L2 Reactive Energy L2
		Watts L3 Volts L3 Current L3 Reactive Energy L3
	V/A	L-N Volts L1, L2, L3
		L-L Volts L1, L2, L3
		Current L1, L2, L3, N
		V-THD% per line
		I-THD% per line
		Phase Sequence V&I
	MD PF Hz	PF and System Freq
		PF per phase
		Max Current Demand per phase
		System Max demand P, Q, S.
	P	Active Power (P) L1, L2, L3
		Reactive Power (Q) L1, L2, L3
		Apparent Power (S) L1, L2, L3
		System Powers P,Q,S
	E	Imp Active Energy Exp Active Energy
		Imp Reactive Energy Exp Reactive Energy
		Total Active Energy Total Reactive Energy

SPECIFICATIONS

Input	
Nominal input voltage	57.7 – 276 V AC L-N (100 – 480 V L-L) 576 V L-L MAX
Max. continuous input overload voltage	120% of nominal
Max. short duration input voltage	2 x nominal voltage for 1 second
Nominal input voltage burden	< 0.2 VA per phase
Nominal input current	1 A AC or 5 A AC
Nom. Input current burden	< 0.1 VA
Max. continuous input overload current	120% of nominal
Max. short duration input current (300 msec)	20 x nominal current for 1 second
Auxiliary	
Operating range	Self powered (from any of the three phases)
Auxiliary range	65 – 480 V AC / 80 – 600 V DC
Supply burden	< 10 VA
Accuracy	
Voltage (V)	+/- 0.5% of range maximum
Current (A)	+/- 0.5% of range maximum
Frequency (Hz)	+/- 0.2% of mid-frequency
Power factor (PF)	+/- 1% of unity (0.01)
Active power (W)	+/- 0.5% of reading
Reactive power (VAr)	+/- 0.5% of reading
Apparent power (VA)	+/- 0.5% of reading
Active energy (kWh)	+/- 0.5% of reading to IEC 62053-22
Reactive energy (kVArh)	+/- 0.5% of reading to IEC 62053-24
THD	2% to 63rd harmonic
Measured Range	
Voltage (V)	5 – 120% of nominal (Min 100 V – self powered)
Current (A)	5 – 120% of nominal
Frequency (Hz)	44 – 66 Hz
Power (W, VAr, VA)	5 – 144% of nominal (bi-directional)
Energy	8 digit, upto 9999999.9 MWh
Power factor	4 quadrant
THD	0 – 40% upto 63rd harmonic
Environment	
Operating temperature	-25°C to +55°C
Storage temperature	-40°C to +70°C
Relative humidity	0 to 95%, non-condensing
Shock	30 g in 3 planes
Vibration	10 Hz to 50 Hz, IEC 60068-2-6, 2 g
Dielectric Voltage	4 kV between voltage and current to earth
Altitude	3000 m
Warm-up	1 minute
Outputs	
Pulsed output relay (configurable)	Opto-coupled, potential-free SPST-NO contact
Contact Rating current	2 – 27 mA at 27 V DC
Contact Rating voltage	5 – 27 V DC
Pulse Width	60/100/200 ms
Pulse rate	0.001/0.01 /0.1/1/10/100/1000 kWh/kVArh
Pulsed output relay (non-configurable)	3200IMP/kWh
Communications	Modbus RTU (RS485)
Type	2-wire half duplex
Baud rate	2400, 4800, 9600, 19200, 38400
Address	1 to 247
Enclosure	
Enclosure Style	DIN 96 panel mount
Dimensions	96 x 96 x 62 mm
Panel cut-out	92 x 92 mm
Panel thickness	1 – 5 mm
Protection rating	Front IP54, Rear IP30
Material	UL 94-VO
Weight	340 g
Cable size	0.05 mm ² – 2.5 mm ² stranded wire
Terminals	Voltage and Current : Shrouded screw clamp
Display characters	6.2 mm

For Integra 1232 dms Q2C Wiring Solution see page 11. For Wiring diagrams see page 6.





Chapter 2

Integra digital metering system - DIN-rail mounted with RJ12 wiring solution

Integra SL1 single load metering system.....	18-19
Integra DL1 dual load multifunction metering system.....	20-21
Integra TL1 tri load multifunction metering system.....	22-23
3-in-1 current transformer.....	24-25

Integra SL1 single load metering system

FEATURES

- Modbus RTU RS485 as standard
- User-programmable CT ratio and system configuration
- True rms measurement
- Continuous busbar or individual busbar metering

APPROVALS

- IEC 61326
- IEC 61010-1
- IEC 62053-22
- RoHS Compliant

BENEFITS

- Cost-effective
- UK manufactured
- CL0.5 accuracy
- Modbus communications
- Fully configurable
- Additional facility to accumulate the total system power/kWhs - displaying the combined system total parameters



Designed, developed and manufactured in the UK, the Integra SL1 is a digital metering system which provides measurement, isolation and conversion of all main electrical parameters from a three-phase load, in a single meter. It can be used in single and three-phase unbalanced four-wire electrical systems and as an accuracy of CL0.5.

The Integra SL1 has an integrated microprocessor for exceptional waveform handling of distorted waveforms, and is ideal for low voltage applications. It provides a cost effective way of metering split load distribution and panel boards, in a single metering solution.

PRODUCT CODES

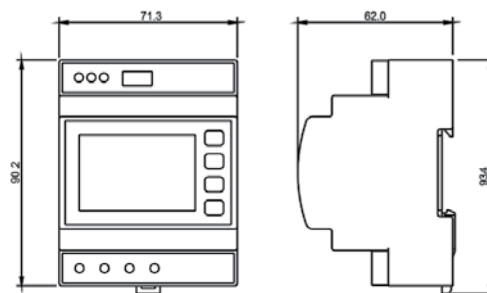
Description	Part number
Integra SL1 multifunction DIN-rail mounted meter LCD Input 400 V L-L, 100 mA AC Modbus RTU RS 485 Self powered	SL1-01

DISPLAYED PARAMETERS

Power (Load 1)
Active Energy IMPORT kWh
Volts / Current / Active Power
Active power per phase (L1, L2, L3)
Active Power Demand (kW)
Apparent Power Demand (kVA)
Active Power MAX Demand (kW)
Apparent Power MAX Demand (kVA)
Current per phase (L1, L2, L3)
Current demand per phase (L1, L2, L3)
Current MAX demand per phase (L1, L2, L3)
Frequency / Power Factor
Active Power Demand (kW)
Apparent Power Demand (kVA)
Active Power MAX Demand (kW)
Apparent Power MAX Demand (kVA)



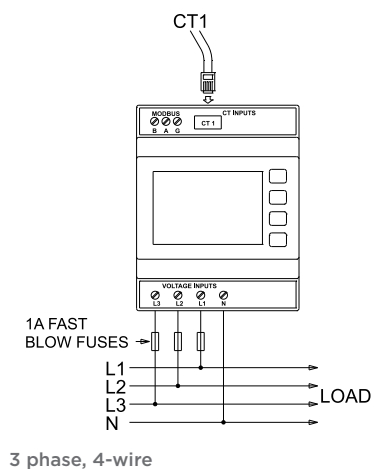
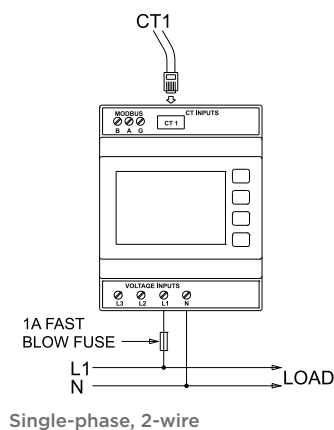
DIMENSIONS



Integra SL1 single load metering system



WIRING DIAGRAMS



SPECIFICATION

Input	
Nominal input voltage	100 V to 230 V AC rms., L - N. 173 V to 400 V AC rms., L - L
Max. continuous input overload voltage	120% of nominal
Max. short duration input voltage (1 sec)	2 x nominal voltage
Nominal input voltage burden	0.2 VA per phase (Except L1)**Self powered using the meter electrical input from L1 (6VA)
Nominal input current	100 mA AC rms. per CT
System CT primary values	1-9999 A (selectable from display)
CT burden	0.1 VA
Accuracy	
Voltage (V)	< 0.5% of reading
Current (A)	< 0.5% of reading
Frequency (Hz)	< 0.2% of mid range
Power factor (PF)	1% of unity
Active power (W)	+/- 0.5% of reading
Active energy (kWh)	+/- 0.5% of reading to IEC 62053-22
Range	
Voltage (V)	5% to 120% for nominal
Current (A)	5% to 120% of nominal
Frequency	45 - 65 Hz
Power	1 - 144% of nominal 0.8 capacitive - 1 - 0.8
Power factor	Inductive (functional 4 quadrant, 0-1 lag lead)
Energy	6-digit resolution and to be displayed in kWh (Maximum display 999999, before rollover to 0)
Outputs	
Communication protocol	RS485 Modbus RTU
Type	2-wire half duplex
Baud rate	9600, 19200, 38400
Enclosure	
Enclosure style	DIN-rail mounting EN43880
Dimensions	72 x 90 x 62 mm
Material	Polycarbonate to UL94-V0
Weight	0.25 kg
Terminals voltage	Shrouded screw-clamp 0.05 - 4 mm wire
Terminals CT	RJ12 connector
Sealing	IP52 front of panel
Environment	
Operating temperature	-10°C to +55°C
Storage temperature	-20°C to +70°C
Relative humidity	0-90% non-condensing
Shock	30 g in 3 planes and vibration of 0 Hz to 50 Hz IEC 60068-2-6, 2 g
Vibration	0 Hz to 50 Hz, IEC 60068-2-6, 2 g. Withstand test 2.2 kV, 50 Hz for 1 minute between auxiliary / input / output

For Wiring Solution see page 24

Integra DL 1 dual load metering system

FEATURES

- One meter for split load panels
- * Meter with RJ12 CT connection for easy installation
- Two display mode operation
- Modbus RTU RS485 as standard
- User-programmable CT ratio and system configuration
- True rms measurement
- Continuous busbar or individual busbar metering
- Can be programmed for one individual power load



APPROVALS

- IEC 61326
- IEC 61010-1
- IEC 62053-22
- RoHS Compliant

BENEFITS

- Cost-effective, single meter solution
- UK manufactured
- CL0.5 accuracy
- Modbus communications
- Fully configurable
- Additional facility to accumulate the total system power/kWhs - displaying the combined system total parameters

Designed, developed and manufactured in the UK, the Integra DL1 is a digital metering system which provides measurement, isolation and conversion of all main electrical parameters from 2x three-phase loads, in a single meter. It can be used in single and three-phase unbalanced four-wire electrical systems and as an accuracy of CL0.5.

The Integra DL1 has an integrated microprocessor for exceptional waveform handling of distorted waveforms, and is ideal for low voltage applications. It provides a cost effective way of metering split load distribution and panel boards, in a single metering solution.

PRODUCT CODES

Description	Part number
Integra DL1 multifunction DIN-rail LCD Input 400 V L-L, 100 mA AC x 2 Modbus RTU RS 485 Self powered	DL1-01

TWO LOADS

Power or Lighting import kWh



Amps per phase



Individual import kWh readings



System import kWh



Display test



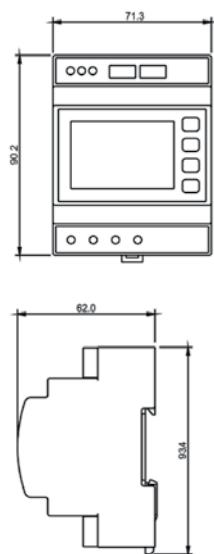
FEATURES

- Power and Lighting indicators can be changed to Load 1 and Load 2
- Each Load can be programmed for CT primary of 60A, 125 A or 250 A
- Additional facility to accumulate the total system power/kWhs - displaying the combined Power and Lighting system total parameters

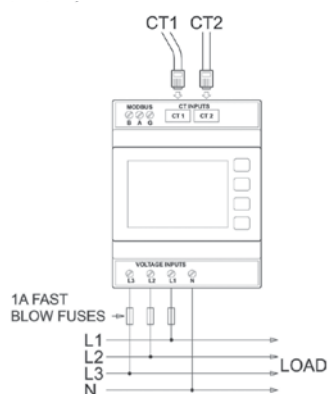


Integra DL 1 dual load metering system

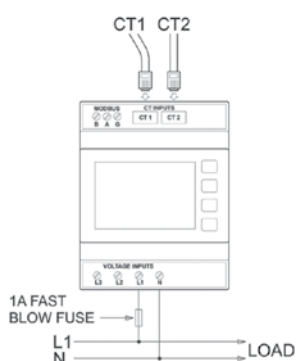
DIMENSIONS



WIRING DIAGRAMS



3-phase, 4-wire



Single-phase, 2-wire

DISPLAYED PARAMETERS

Power (Load 1)	Lighting (Load 2)	System
Active Energy IMPORT kWh	Active Energy IMPORT kWh	Active Energy IMPORT - Power (Load 1) kWh Active Energy IMPORT - Lighting (Load 2) kWh
Volts / Current / Active Power	Volts / Current / Active Power	Active Energy System Total kWh
Active power per phase (L1, L2, L3)	Active power per phase (L1, L2, L3)	Volts / Current / Active Power
Active Power Demand (kW)	Active Power Demand (kW)	Voltage per phase (L-N)
Apparent Power Demand (kVA)	Apparent Power Demand (kVA)	Voltage per phase (L-L)
Active Power MAX Demand (kW)	Active Power MAX Demand (kW)	Current per phase
Apparent Power MAX Demand (kVA)	Apparent Power MAX Demand (kVA)	Current Demand per phase
Current per phase (L1, L2, L3)	Current per phase (L1, L2, L3)	Current MAX Demand per phase
Current demand per phase (L1, L2, L3)	Current demand per phase (L1, L2, L3)	
Current MAX demand per phase (L1, L2, L3)	Current MAX demand per phase (L1, L2, L3)	Frequency / Power Factor
		Active Power Demand (kW)
		Apparent Power Demand (kVA)
		Active Power MAX Demand (kW)
		Apparent Power MAX Demand (kVA)

SPECIFICATION

Input	
Nominal input voltage	100 V to 230 V AC rms., L - N. 173 V to 400 V AC rms., L - L
Max. continuous input overload voltage	120% of nominal
Max. short duration input voltage (1 sec)	2 x nominal voltage
Nominal input voltage burden	0.2 VA per phase (Except L1)**Self powered using the meter electrical input from L1 (6 VA)
Nominal input current	100 mA AC rms. per CT
System CT primary values	1-9999 A (selectable from display)
CT burden	0.1 VA
Accuracy	
Voltage (V)	< 0.5% of reading
Current (A)	< 0.5% of reading
Frequency (Hz)	< 0.2% of mid range
Power factor (PF)	1% of unity
Active power (W)	+/- 0.5% of reading
Active energy (kWh)	+/- 0.5% of reading to IEC 62053-22
Range	
Voltage (V)	5% to 120% for nominal
Current (A)	5% to 120% of nominal
Frequency	45 - 65 Hz
Power	1 - 144% of nominal 0.8 capacitive - 1 - 0.8
Power factor	Inductive (functional 4 quadrant, 0-1 lag lead)
Energy	6-digit resolution and to be displayed in kWh (Maximum display 999999, before rollover to 0)
Outputs	
Communication protocol	RS485 Modbus RTU
Type	2-wire half duplex
Baud rate	9600, 19200, 38400
Enclosure	
Enclosure style	DIN-rail mounting EN43880
Dimensions	72 x 90 x 62 mm
Material	Polycarbonate to UL94-V0
Weight	0.25 kg
Terminals voltage	Shrouded screw-clamp 0.05-4 mm wire
Terminals CT	RJ12 connector
Sealing	IP52 front of panel
Environment	
Operating temperature	-10°C to +55°C
Storage temperature	-20°C to +70°C
Relative humidity	0-90% non-condensing
Shock	30 g in 3 planes and vibration of 0 Hz to 50 Hz IEC 60068-2-6, 2 g
Vibration	0 Hz to 50 Hz, IEC 60068-2-6, 2 g. Withstand test 2.2 kV, 50 Hz for 1 minute between auxiliary / input / output

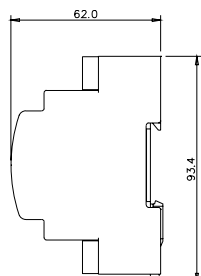
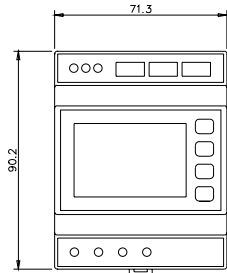
Integra TL1 tri load metering system

FEATURES

- Single meter for 3x three-phase loads
- Multiple display modes
- Modbus RTU RS485 as standard
- User-programmable CT ratio and system configuration
- True rms measurement
- Continuous busbar or individual busbar metering
- Can be programmed for individual power loads when required
- RJ12 socket for fast connection
- Optional DIN 96 mm panel mounting bezel can be supplied



DIMENSIONS



APPROVALS

- IEC 61326
- IEC 61010-1
- IEC 62053-21
- RoHS Compliant

BENEFITS

- Cost-effective, single meter solution
- UK manufactured
- CL1.0 accuracy for Energy
- Modbus communications
- Fully configurable
- Additional facility to accumulate the total system power/kWhs -displaying the combined system total parameters

Designed, developed and manufactured in the UK, the Integra TL1 is a digital metering system which provides measurement, isolation and conversion of all main electrical parameters from 3x three-phase loads, in a single meter. It can be used in three-phase unbalanced four-wire electrical systems and has an accuracy of CL1 Energy.

PRODUCT CODES

Description	Part number
Integra Triload multifunction DIN-rail mounted meter LCD Input 400 V L-L, 100 mA AC Modbus RTU RS 485 Self powered	TL1-01

DISPLAYED PARAMETERS

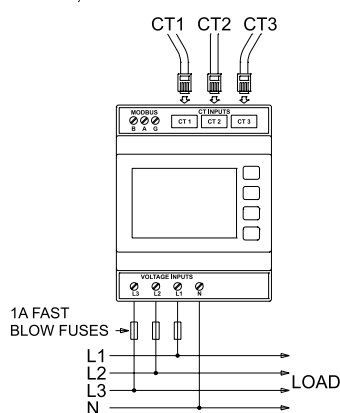
Load 1	Load 2	Load 3	System
Active Energy IMPORT kWh	Active Energy IMPORT kWh	Active Energy IMPORT kWh	Active Energy IMPORT - Power (Load 1) kWh Active Energy IMPORT - Lighting (Load 2) kWh
Volts / Current / Active Power	Volts / Current / Active Power	Volts / Current / Active Power	Active Energy System Total kWh
Active power per phase (L1, L2, L3)	Active power per phase (L1, L2, L3)	Active power per phase (L1, L2, L3)	Volts / Current / Active Power
Active Power Demand (kW) Apparent Power Demand (kVA)	Active Power Demand (kW) Apparent Power Demand (kVA)	Active Power Demand (kW) Apparent Power Demand (kVA)	Voltage per phase (L-N)
Active Power MAX Demand (kW) Apparent Power MAX Demand (kVA)	Active Power MAX Demand (kW) Apparent Power MAX Demand (kVA)	Active Power MAX Demand (kW) Apparent Power MAX Demand (kVA)	Voltage per phase (L-L)
Current per phase (L1, L2, L3)	Current per phase (L1, L2, L3)	Current per phase (L1, L2, L3)	Current per phase
Current demand per phase (L1, L2, L3)	Current demand per phase (L1, L2, L3)	Current demand per phase (L1, L2, L3)	Current Demand per phase
Current MAX demand per phase (L1, L2, L3)	Current MAX demand per phase (L1, L2, L3)	Current MAX demand per phase (L1, L2, L3)	Current MAX Demand per phase
Frequency / Power Factor			
Active Power Demand (kW) Apparent Power Demand (kVA)			
Active Power MAX Demand (kW) Apparent Power MAX Demand (kVA)			



Integra TL1 tri load metering system

WIRING DIAGRAM

3 Phase, 4 wire



SPECIFICATIONS

Input	
Nominal input voltage	100 V to 230 V AC rms., L - N. 173 V to 400 V AC rms., L - L
Max. continuous input overload voltage	120% of nominal
Max. short duration input voltage (1 sec)	2 x nominal voltage
Nominal input voltage burden	0.2 VA per phase (Except L1)**Self powered using the meter electrical input from L1 (6 VA)
Nominal input current	100 mA AC rms. per CT
System CT primary values	1-9999 A (selectable from display)
CT burden	0.1 VA
Accuracy	
Voltage (V)	< 0.5% of reading
Current (A)	< 0.5% of reading
Frequency (Hz)	< 0.2% of mid range
Power factor (PF)	1% of unity
Active power (W)	+/- 0.5% of reading
Active energy (kWh)	+/- 0.5% Class 1 IEC 62053-21
Range	
Voltage (V)	5% to 120% for nominal
Current (A)	5% to 120% of nominal
Frequency	45 - 65 Hz
Power	1 - 144% of nominal 0.8 capacitive - 1 - 0.8
Energy	6-digit resolution and to be displayed in kWh (Maximum display 999999, before rollover to 0)
Outputs	
Communication protocol	RS485 Modbus RTU
Type	2-wire half duplex
Baud rate	9600, 19200, 38400
Enclosure	
Enclosure style	DIN-rail mounting EN43880
Dimensions	72 x 90 x 62 mm
Material	Polycarbonate to UL94-V0
Weight	0.25 kg
Terminals voltage	Shrouded screw-clamp 0.05 - 4 mm wire
Terminals CT	RJ12 connector
Sealing	IP52 front of panel
Environment	
Operating temperature	-10°C to +55°C
Storage temperature	-20°C to +70°C
Relative humidity	0 - 90% non-condensing
Shock	30 g in 3 planes and vibration of 0 Hz to 50 Hz IEC 60068-2-6, 2 g
Vibration	0 Hz to 50 Hz, IEC 60068-2-6, 2 g. Withstand test 2.2 kV, 50 Hz for 1 minute between auxiliary / input / output

	Operating Mode	
	Tri1	Tri2
Load 1 (CT1)	CT1 - CT2	CT2 - CT3
Load 2 (CT2)	CT2 - CT3	CT1 - CT2
Load 3 (CT3)	CT3	CT3

	Operating Mode
	Tri3
Load 1 (CT1)	CT1
Load 2 (CT2)	CT2
Load 3 (CT3)	CT3

Integra DMS - RJ12 3-in-1 Current Transformers for use with Integra 1221, Integra SL1, DL1, TL1

FEATURES

- Busbar DIN-rail and metal feet (mounting hardware supplied)
- RJ12 socket for fast connection eliminate wiring errors
- Cable included (length 1.5 m)
- Low 60A ratio for more energy efficient loads
- Aperture hole centres 25, 35, 45, 70 mm

APPROVALS

- IEC 61869-2

BENEFITS

- RJ12 connection for simple and easy error free installation

The 3-in-1 current transformer range are for use with the Integra digital metering system SL1-01/ DL1-01/TL1-01 and INT 1221 combines three traditional current transformers in one moulding case with a RJ12 connection for simple and easy error free installation.



SPECIFICATIONS

System voltage:	720V maximum
Test voltage:	3kV for 1 minute
System frequency:	50Hz or 60Hz
Primary ratings:	100mA AC rms. per CT
Overload withstand:	1.2 x rated current continuously
Enclosure:	Flame retardant grade classified UL94V-O
Aperture hole centres:	25mm, 35mm, 45mm, 70mm
Operating temperature:	-20°C to +85°C
Compliant with accuracy:	IEC61869-2 Class 0.5, Class 1

Part number	Primary Current	VA at Class 1	VA at Class 0.5	A (Width) mm	B (Height) mm	C (Depth) mm	D (Hole centres) mm	Aperture mm
DL3N1-25-60/0.1	60A	0.25	-	76	78	30	25	3 @ 25 x 15
DL3N1-25-100/0.1	100A	0.35	0.25	76	78	30	25	3 @ 25 x 15
DL3N1-25-125/0.1	125A	0.35	0.25	76	78	30	25	3 @ 25 x 15
DL3N1-25-160/0.1	160A	0.35	0.25	76	78	30	25	3 @ 25 x 15

DL3N1-35-60/0.1	60A	0.25	-	107	70	35	35	3 @ 22 x 22
DL3N1-35-125/0.1	125A	0.5	0.25	107	70	35	35	3 @ 22 x 22
DL3N1-35-160/0.1	160A	0.35	0.25	107	70	35	35	3 @ 22 x 22
DL3N1-35-250/0.1	250A	0.5	0.25	107	70	35	35	3 @ 22 x 22

DL3N1-45-250/0.1	250A	0.25	-	142	86	40	45	3 @ 27 x 32
DL3N1-45-400/0.1	400A	-	0.25	142	86	40	45	3 @ 27 x 32
DL3N1-45-600/0.1	600A	-	0.25	142	86	40	45	3 @ 27 x 32

DL3N1-70-400/0.1	400A	-	0.25	212	100	40	70	3 @ 40 x 52
DL3N1-70-600/0.1	600A	-	0.25	212	100	40	70	3 @ 40 x 52
DL3N1-70-800/0.1	800A	-	0.25	212	100	40	70	3 @ 40 x 52
DL3N1-70-1000/0.1	1000A	-	0.25	212	100	40	70	3 @ 40 x 52
DL3N1-70-1250/0.1	1250A	-	0.25	212	100	40	70	3 @ 40 x 52
DL3N1-70-1600/0.1	1600A	-	0.25	212	100	40	70	3 @ 40 x 52



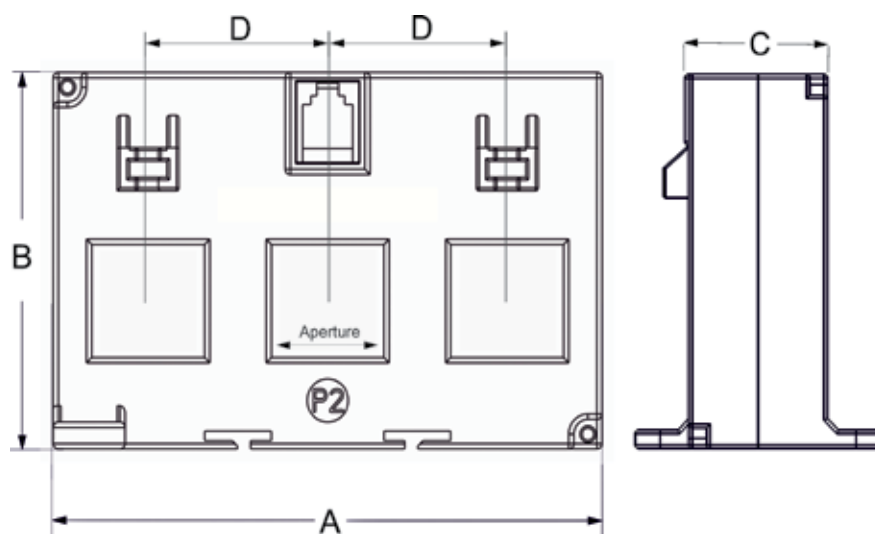
Integra DMS - RJ12 3-in-1 Current Transformers for use with Integra 1221, Integra SL1, DL1, TL1



For use with the Integra digital metering system INT 1221.

All current transformers are supplied with a 1.5m connecting cable, with RJ12 connector termination at each end.

DIMENSIONS



KEY FEATURE

- New CT label design shows correct metering setting for left hand and right hand mounting, current phasing and current flow.

CT LABEL







Chapter 3

DRR mid approved energy meters - DIN-rail mounted

DRR MID Approved engery meters.....	28
All models.....	29
DRR-45-1P.....	30
DRR-100-1P.....	31
DRR-100-3P.....	32
DRR-CT-3P.....	33

DRR MID APPROVED ENERGY METERS



FEATURES

- MID approved
- Single & Three phase
- Import & Export energy parameters
- Modbus / M-Bus Communication
- Pulsed Output (PLS model)
- 1, 2 or 4 Mod DIN-rail enclosure
- Backlit LCD display

3 variations

- Direct connected energy meters
- 1/5A CT Fed

MID APPROVED ENERGY METERS

TE Connectivity's (TE) Crompton Instruments AC energy meters are designed for use in residential, commercial and light industrial electrical energy metering.

This range of energy meters are self-powered thus offering simplified connections. It displays parameters on a bright LCD screen and also has Pulse Output and Impulse LED for energy monitoring. With inbuilt industry standard MODBUS RTU or MBUS for remote monitoring.

These meters are primarily for bidirectional Active, Reactive and Apparent Energy measurement but it also accurately measures important electrical parameters like Voltage, Current, Frequency, Active, Reactive and Apparent Power, and Power Factor in Single Phase Networks. The measured parameters can be viewed on display and MODBUS or MBUS for remote viewing.

Standard Din rail mounting for easy installation.

Conventional CT Connected Meters

Designed to measure current through external CTs with 1A or 5A secondary output

M-Bus protocol

The meter offers optional communication via the M-Bus protocol, enabling remote acquisition of measurement data as well as remote configuration capabilities.

	Part number	Number id buttons	Module width	CT fed (1/5A)	Direct connected	Modbus	M-Bus	Pulsed outputs (SO)	Tariff Input
	DRR-45-1P-PLS-01	1	1	X	✓	X	X	1	1
	DRR-45-1P-MOD-01	1	1	X	✓	✓	X	1	X
	DRR-45-1P-MBUS-01	1	1	X	✓	X	✓	1	X
	DRR-CT-1P-PLS-01	1	1	✓	X	X	X	1	1
	DRR-CT-1P-MOD-01	1	1	✓	X	✓	X	1	X
	DRR-CT-1P-MBUS-01	1	1	✓	X	X	✓	1	X
	DRR-100-1P-PLS-01	2	2	X	✓	X	X	2	1
	DRR-100-1P-MOD-01	2	2	X	✓	✓	X	2	1
	DRR-100-1P-MBUS-01	2	2	X	✓	X	✓	2	1
	DRR-CT2-1P-PLS-01	2	2	✓	X	X	X	2	1
	DRR-CT2-1P-MOD-01	2	2	✓	X	✓	X	2	1
	DRR-CT2-1P-MBUS-01	2	2	✓	X	X	✓	2	1
	DRR-100-3P-PLS-01	3	4	X	✓	X	X	2	2
	DRR-100-3P-MOD-01	3	4	X	✓	✓	X	2	2
	DRR-100-3P-MBUS-01	3	4	X	✓	X	✓	2	2
	DRR-CT-3P-PLS-01	4	4	✓	X	X	X	2	1
	DRR-CT-3P-MOD-01	4	4	✓	X	✓	X	2	1
	DRR-CT-3P-MBUS-01	4	4	✓	X	X	✓	2	1

ALL MODELS - MEET THE FAMILY DIN RAIL DRR AC ENERGY METERS

Single Phase AC Energy Meters - 1 Mod



45A
Direct Current Input

DRR-45-1P-PLS-01
DRR-45-1P-MOD-01
DRR-45-1P-MBUS-01

1/5A
CT Input

DRR-CT-1P-PLS-01
DRR-CT-1P-MOD-01
DRR-CT-1P-MBUS-01

Connect
with our
Ebony XL
Current
Transformers
Range



Single Phase AC Energy Meters - 2 Mod



100A
Direct Current Input

DRR-100-1P-PLS-01
DRR-100-1P-MOD-01
DRR-100-1P-MBUS-01

1/5A
CT Input

DRR-CT-2P-PLS-01
DRR-CT-2P-MOD-01
DRR-CT-2P-MBUS-01

Connect
with our
Ebony XL
Current
Transformers
Range



Three Phase AC Energy Meters - 4 Mod



100A
Direct Current Input

DRR-100-3P-PLS-01
DRR-100-3P-MOD-01
DRR-100-3P-MBUS-01

1/5A
CT Input

DRR-CT-3P-PLS-01
DRR-CT-3P-MOD-01
DRR-CT-3P-MBUS-01

Connect
with our
Ebony XL
Current
Transformers
Range



DRR MID APPROVED ENERGY METERS



FEATURES

- MID approved
- Single phase
- Import & export energy parameters
- 1 Mod DIN-rail enclosure
- Backlit LCD Display

3 variations

- Modbus / M-Bus Communication
- Pulsed Output (PLS model)
- Direct connected energy meters
- 1/5A CT Fed

APPLICATIONS

- Internal energy billing/monitoring/auditing
- Sub-metering

Description	Part number
45A, Single Phase, Direct Connect, 1xDigital Input,, 1xSO	DRR-45-1P-PLS-01
45A, Single Phase, Direct Connect, 1xSO, 1xModbus	DRR-45-1P-MOD-01
45A, Single Phase, Direct Connect, 1xSO, 1xMbus	DRR-45-1P-MBUS-01
Single Phase, 1/5A CT Connected, 1xDI, 1xSO	DRR-CT-1P-PLS-01
Single Phase, 1/5A CT Connected, 1xSO, 1xModbus	DRR-CT-1P-MOD-01
Single Phase, 1/5A CT Connected, 1xSO, 1xMbus	DRR-CT-1P-MBUS-01

RELEVANT STANDARDS & TEST REPORTS

Accuracy Standard :

- EN50470-3: 2022
- IEC62053-21

IP for water & dust:

- IEC 60529

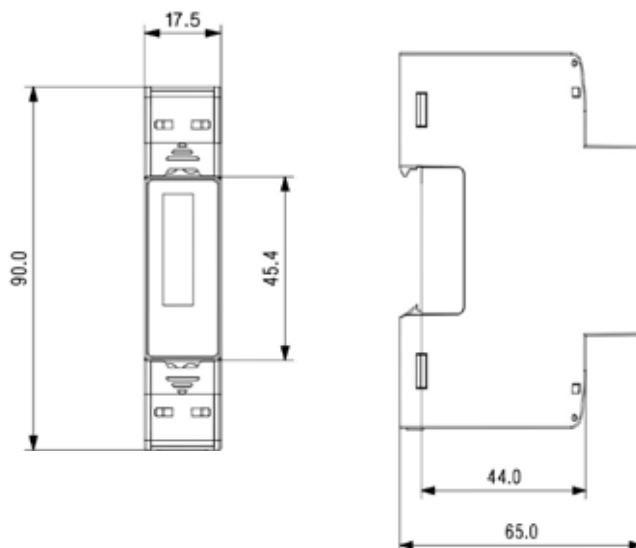
Plastic Flammability Standard:

- UL 94

Safety Standard:

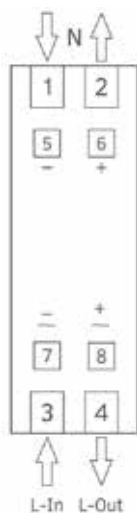
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DIMENSIONS



WIRING DIAGRAMS

DRR-45-1P
DRR-CT-1P



- 1 :Neutral IN
- 2 :Neutral Out
- 3 :L-In
- 4 :L-Out
- 5,6 :Pulse Output Terminal
- 7,8 :Tariff input Terminal (in Tariff input Model)
- :RS485 Terminal (in Modbus Model)
- :Mbus Terminal (in MBUS Model)

DRR MID APPROVED ENERGY METERS



FEATURES

- MID approved
- Single phase
- Import & export energy parameters
- 2 Mod DIN-rail enclosure
- Backlit LCD Display

3 variations

- Modbus / M-Bus Communication
- Pulsed Output (PLS model)
- Direct connected energy meters
- 1/5A CT Fed

APPLICATIONS

- Internal energy billing/monitoring/auditing
- Sub-metering
- Genset, Test Benches & Laboratories

Description	Part number
100A, Single Phase, Direct Connect, 1xDI, 2xSO	DRR-100-1P-PLS-01
100A, Single Phase, Direct Connect, 1xDI, 2xSO, 1xModbus	DRR-100-1P-MOD-01
100A, Single Phase, Direct Connect, 1xDI, 2xSO, 1xMbus	DRR-100-1P-MBUS-01
Single Phase, 1/5A CT Connected, 1xDI, 2xSO	DRR-CT2-1P-PLS-01
Single Phase, 1/5A CT Connected, 1xDI, 2xSO, 1xModbus	DRR-CT2-1P-MOD-01
Single Phase, 1/5A CT Connected, 1xDI, 2xSO, 1xMbus	DRR-CT2-1P-MBUS-01

RELEVANT STANDARDS & TEST REPORTS

Accuracy Standard :

- EN50470-3: 2022
- IEC62053-21

IP for water & dust:

- IEC 60529

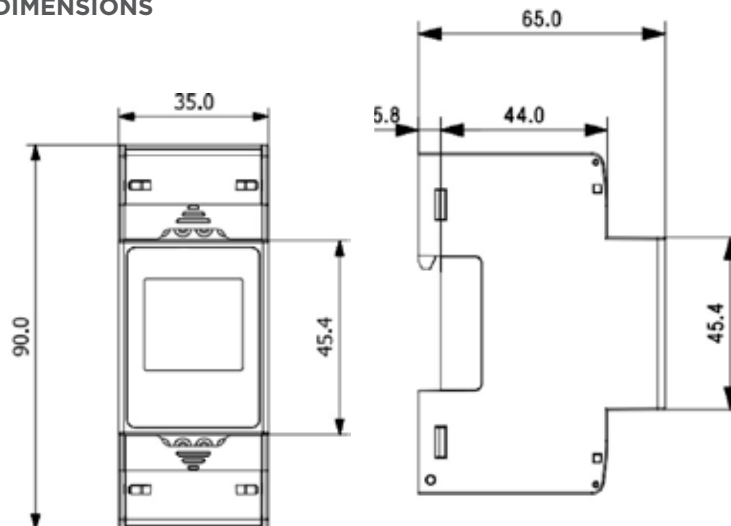
Plastic Flammability Standard:

- UL 94

Safety Standard:

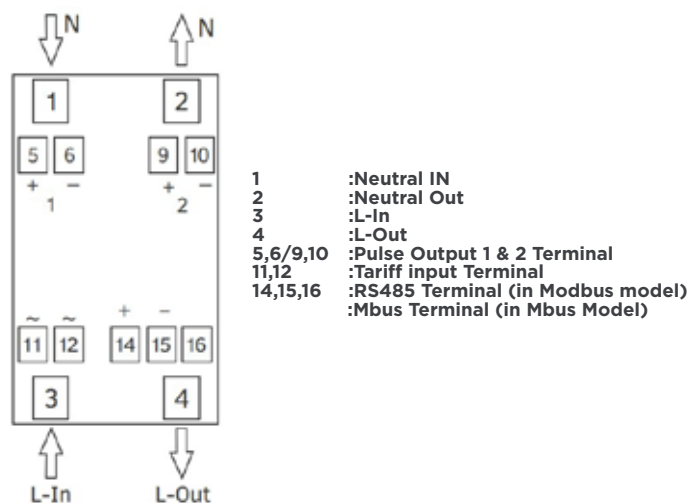
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DIMENSIONS



WIRING DIAGRAM

DRR-100-1P



DRR MID APPROVED ENERGY METERS



FEATURES

- Direct Connection Meter
- Three Buttons (for easy navigation)
- Multi Tariff & Partial Energy Counters
- MID Approved
- LCD & Backlit Display
- Impulse LED
- Din rail mounted

Optional Features

- Remote Communication
- Tariff Input
- Pulse Outputs

APPLICATIONS

- Internal Energy billing/monitoring/auditing
- Sub-metering
- Genset, Test Benches & Laboratories

Description	Part number
100A, 3 Phase, Direct Connect, 2xDI, 2xSO	DRR-100-3P-PLS-01
100A, 3 Phase, Direct Connect, 2xDI, 2xSO, 1xModbus	DRR-100-3P-MOD-01
100A, 3 Phase, Direct Connect, 2xDI, 2xSO, 1xMbus	DRR-100-3P-MBUS-01

RELEVANT STANDARDS & TEST REPORTS

Accuracy Standard :

- EN50470-3: 2022
- IEC62053-21

IP for water & dust:

- IEC 60529

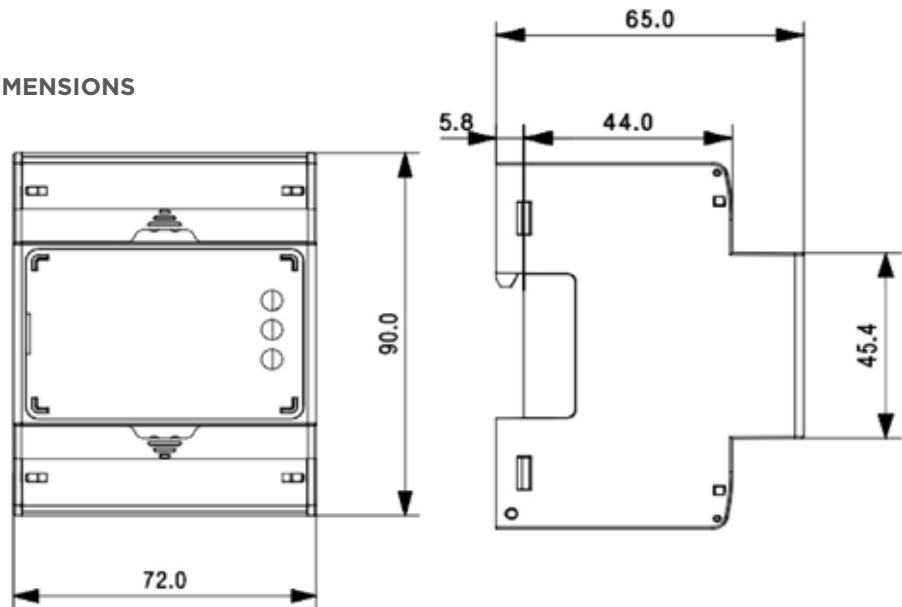
Plastic Flammability Standard:

- UL 94

Safety Standard:

- 62052-31: 2015

DIMENSIONS



WIRING DIAGRAM

DRR-100-3P



- 1,2,3 :I-In
- 5,6,7 :I-Out
- 4 :Neutral-In
- 8 :Neutral-Out
- 15,16,18,19 :Pulse Output 1 & Pulse Output 2 Terminal
- 9,10,12,13 :Tariff input a & Tariff input b Terminal
- 30,31,32 :RS485 Terminal (in Modbus model)
- :Mbus Terminal (in Mbus model)

DRR MID APPROVED ENERGY METERS



FEATURES

- True RMS measurement
- In-built 1/5A OR RJ12 100mA CT
- Four Buttons (for easy navigation)
- 1 Digital Input
- 2 Pulse Outputs
- Dual Tariff
- Programable CT ratios
- 3P4W, 3P3W, 1 Phase 2 wire system types
- Din rail mounted

Optional Features

- Remote Communication
- Tariff Input
- Pulse Outputs

APPLICATIONS

- Internal energy billing/monitoring/auditing
- Sub-metering
- Genset, Test Benches & Laboratories

Description	Part number
1A or 5A CT input, Aux Powered 100-550V AC/DC (230V Nominal), 1 x Digital Input, 2 x Pulsed Outputs	DRR-CT-3P-PLS-01
1A or 5A CT input, Aux Powered 100-550V AC/DC (230V Nominal), 1 x Digital Input, 2 x Pulsed Outputs, 1 x Modbus	DRR-CT-3P-MOD-01
1A or 5A CT input, Aux Powered 100-550V AC/DC (230V Nominal), 1 x Digital Input, 2 x Pulsed Outputs, 1 x Mbus	DRR-CT-3P-MBUS-01

RELEVANT STANDARDS & TEST REPORTS

Accuracy Standard :

- EN50470-3: 2022
- IEC62053-21

IP for water & dust:

- IEC 60529

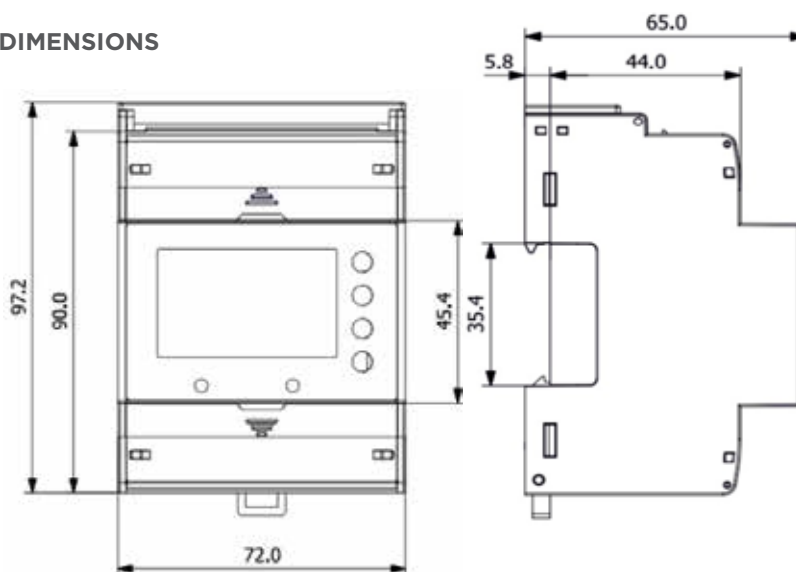
Plastic Flammability Standard:

- UL 94

Safety Standard:

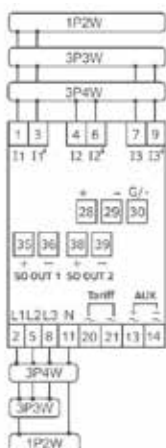
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DIMENSIONS



WIRING DIAGRAM

DRR-CT-3P



- 2,5,8 :L1,L2,L3
- 11 :Neutral
- 1 & 3 :L1 Current In & L1 Current Out
- 4 & 6 :L2 Current In & L2 Current Out
- 7 & 9 :L3 Current In & L3 Current Out
- 13 & 14 :Aux Terminal
- 35,36 & 38,39 :Pulse Output Terminal
- 20,21 :Tariff input Terminal
- 28,29,30 :RS485 Terminal (in Modbus Model)
- :Mbus Terminal (in Mbus Model)





Chapter 4

Integra 1630 and 1530 digital metering systems – panel mounted

Integra 1630 digital metering system.....	36-38
Integra 1530 digital metering system.....	39-41

Integra 1630 digital metering system

FEATURES

- Low profile
- High contrast LED display
- LED annunciators for each measured parameter
- User programmable system configuration (4-wire default)
- Fully programmable VT and CT ratios
- Current demand per phase
- Elapsed time counter for connected loads
- Removable bezel for very low profile applications



PROGRAMMABLE PARAMETERS

Parameter	Range
Password	4-digit 0000-9999
CT primary current	Maximum 9999A ** CT Secondary Current: 5 A (1 A option)
VT primary voltage	Maximum 400 kV **
VT secondary voltage	Nominal input voltage ** maximum VT or CT ratios are limited so that the combination of primary voltage and current do not exceed 360 MW at 120% of relevant input
Demand integration time	8, 15, 20, 30, 60 minutes
3 independent resets	Demands and maximum demands Energy registers Hours run
Pulse output duration	60, 100, 200 milliseconds
Pulse rate divisors	1, 10, 100, 1000
RS485 baud rate	4.8, 9.6, 19.2, 38.4 kBd
RS485 parity and stop bits	Odd or even with 1 stop bit or no parity with 1 or 2 stop bits

APPROVALS

- IEC1010-1 (BSEN 61010-1 – 2001)

The Integra 1630 digital metering system (dms) provides high accuracy 0.2% measurement, display and communication of all major electrical and power quality parameters including total harmonic distortion (THD) up to the 31st harmonic. To suit user requirements, the range includes single-phase, three-phase three-wire and three-phase four-wire capability, all selectable at the point of installation.

This DIN 96 panel mounting enclosure offers simple programming and display of up to 35 electrical parameters via a simple menu-driven user interface on the front panel. Optional pulsed and digital communication outputs are available, to allow up to 60 parameters to be communicated to building management systems. A Windows-based software package is available to remotely configure the Integra dms and display all 60 major parameters.

OPERATION

Integra 1630 dms offers uncomplicated operation and high accuracy measurement of three-phase voltage, current, frequency, Watts, VAR, VA, energy, power factor, and total harmonic distortion of both phase and system, current and voltage. Integra 1630 dms includes true measurement of both line-to-neutral, and line-to-line voltages, ensuring accurate readings. The pre-calibrated plug-in option cards allow cost effective upgrades with any combination of pulsed, analogue and digital communication outputs. Cards slot simply into the back of the unit and products do not need to be removed from the installation or recalibrated.

COMMUNICATION

Integra 1630 dms offers a wide range of communication protocols including:

- Pulsed outputs
- Modbus RTU RS 485 Protocol
- Modbus TCP (Ethernet)
- BACnet IP Interface
- BACnet MSTP Interface
- Profibus DP Protocol

PRODUCT CODES

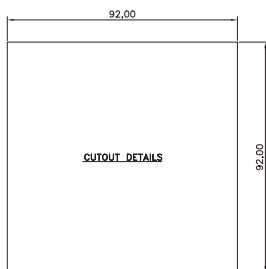
Description	Cat. no.
1-phase, 3-phase 3/4-wire, 100 - 240 V L-L, 5 A CT input, Aux. 100 - 250 V AC/DC	INT-1630-L-5-M-option
1-phase, 3-phase 3/4-wire, 241 - 480 V L-L, 5 A CT input, Aux. 100 - 250 V AC/DC	INT-1630-M-5-M-option
Options	
Modbus RTU RS485 protocol	010
Modbus RTU RS485 protocol + 1 kWhr pulsed output	110
Modbus RTU RS485 protocol + 2 kWhr pulsed output	210
Extended collar	OPT-1630-collar

BENEFITS

- True rms measurement
- High accuracy <0.2% on some measurements
- Configurable via software package or menu-driven interface
- Import and export monitoring

Integra 1630 digital metering system

PANEL CUT-OUT



SPECIFICATIONS

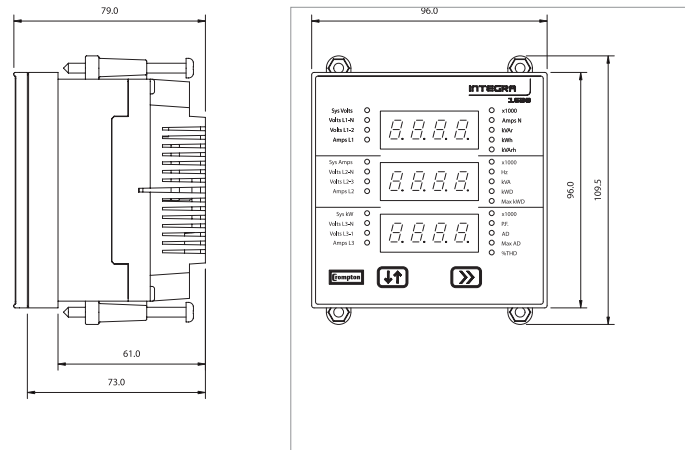
Input	
Nominal input voltage	57.7 to 277 V L-N, 100 to 480 V L-L
Max. continuous input voltage	120% of nominal
Max. short duration input voltage	2 x nominal for 1 second, repeated 10 times at 10 second intervals
System VT ratios (primary)	Any significant 4-digit integer value up to 400 kV **
Nominal input voltage burden	<0.2 VA
Nominal input current	5 A (1 option)
System CT primary values	Any integer value up to 9999 A **
Max. continuous input current	120% nominal
Max. short duration input current	20 x nominal for 1 second, repeated 5 times at 5 minute intervals
Nominal input current burden	< 0.6 VA ** maximum CT and VT ratios are limited so that the combination of primary voltage and current do not exceed 360 MW at 120% of relevant input
Output modules (optional)	
RS485 communications	2-wire half duplex
Baud rates	4800, 9600, 19200, 38400
Pulsed	Solid state relays
Pulse duration	60, 100 or 200 milliseconds
Contact rating	50 mA max at 250 V AC max
Pulsed outputs	1 or 2
Auxiliary	
Standard nominal supply	100-250 V AC or DC voltage: (85-287 V AC absolute limits) (85-312 V DC absolute limits)
AC supply frequency range	45 – 66 Hz
AC supply burden	6 VA
Optional auxiliary DC supply	12 – 48 V DC (10.2-60 V DC absolute limits)
DC supply burden	6 VA
Measuring Ranges	
Voltage	80 – 120% of nominal (functional 5-120%)
Current	5 – 120% of nominal
Frequency	45 – 66 Hz
Measuring Ranges	
Power factor	0.8 capacitive–1–0.8 inductive (functional 4 quadrant, 0-1 lag/lead)
THD	Up to 31st harmonic 0 – 40% Measured voltage >5% of range Measured current >5% of nominal Full accuracy of voltage >25% of range Full accuracy of current >25% of nominal
Energy	7-digit resolution
Reference conditions	
Ambient temperature	23 ±1°C
Input frequency	50 or 60 Hz ±2%
Input waveform	Sinusoidal (distortion factor < 0.005)
Auxiliary supply voltage	Nominal ±1%
Auxiliary supply frequency	Nominal ±1%
AC auxiliary supply waveform	Sinusoidal (distortion factor < 0.05)
Magnetic field of external origin	Terrestrial flux
Accuracy	
Voltage	±0.17% of range maximum
Current	±0.17% of nominal
Frequency	±0.15% of mid frequency
Active power	±0.2% of range maximum
Power factor	1% of unity
Reactive power (VAr)	±0.5% of range maximum
Apparent power (VA)	±0.2% of range maximum
THD	±1%
Neutral current calculated	±0.95% of nominal
Energy	0.3% of range maximum (Better than class 1) IEC1036 Sect 4.6)
kVArh	0.6% of range maximum
Temperature coefficient	Voltage and current typical: 0.013%/°C Watts typical: 0.018%/°C

Integra 1630 digital metering system

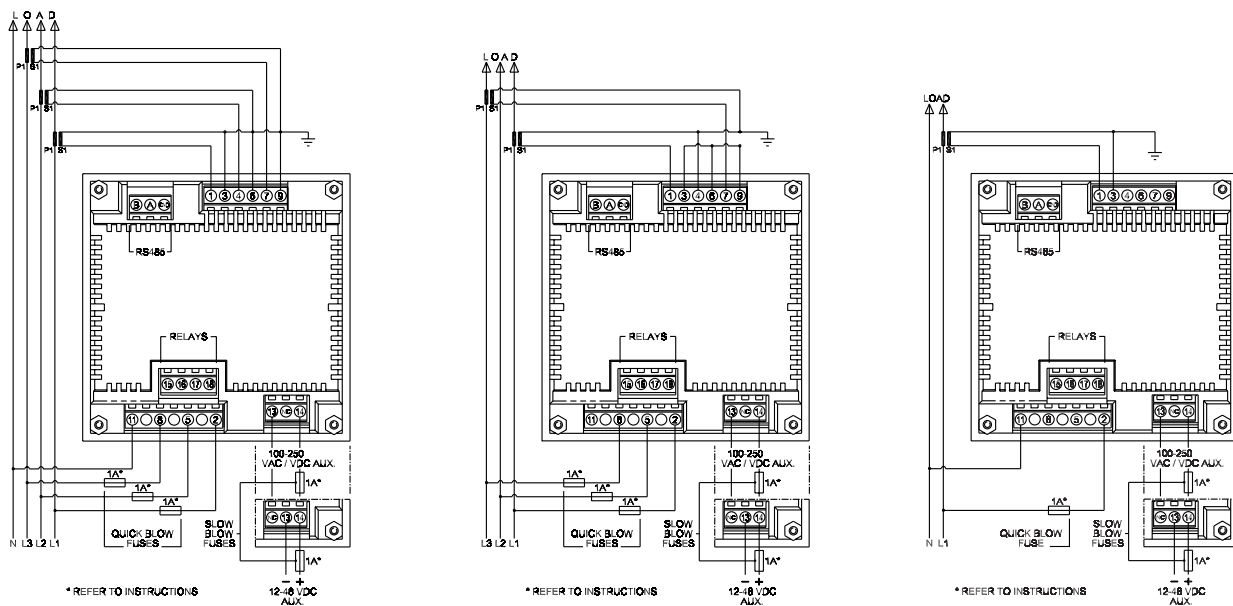
SPECIFICATIONS

Enclosure	
Enclosure style	Enclosure style
Compliant with	IEC 1010-1/ BSEN 61010-1 : 2001 CAT III, CE EMC and LVD directives
Material	Polycarbonate
Terminals	Shrouded screw-clamp 0.05 mm to 4 mm wire
Dielectric voltage	Withstand test 3.25 kV rms 50 Hz for 1 minute between all electrical circuits
Operating temperature	-20 to +60°C
Storage temperature	-30 to +80°C
Relative humidity	0 – 90% (non condensing)
Warm-up time	1 minute
Shock	30 g in 3 planes
Vibration	10-18 Hz, 1.5mm peak-to-peak 18-150 Hz @1 g
IP protection	IP54
Dimensions	96 mm wide x 96 mm high x 79 mm deep (max). Typically <60 mm depth behind panel 3.78" wide x 3.78" high x 3.11" deep (max)
Panel cut-out	92 mm x 92 mm, 3.62" x 3.62"

DIMENSIONS



WIRING



Integra 1530 digital metering system

FEATURES

- Measure and display up to 34 electrical and power parameters
- High-contrast red LED display
- THD measurement and power quality data to 31st harmonic
- True rms measurement
- Pulsed, analogue and digital outputs
- Modbus, Johnson Controls and Lonworks protocol interface options
- Fully programmable VT and CT ratios



APPROVALS

- UL file no: E20300
- UL 61010B-1
- IEC 1010-1/BSEN 61010-1 CAT III

BENEFITS

- Replaces multiple single function instruments
- Pre-calibrated plug-in options
- High accuracy <0.2% of range
- Configurable via software package or menu driven interface
- Import and export monitoring
- Neutral CT input option
- True 3-and 4-wire measurement

The Integra 1530 series instruments provide high accuracy <0.2% measurement, display and communication of all major electrical and power quality parameters, including true rms system values, and total harmonic distortion (THD) up to the 31st harmonic.

This DIN 96 panel mounting offers programming and display of up to 34 power measurement parameters. Optional pulsed, analogue and digital communication outputs, allow the communication of information of up to 50 measured parameters into building management systems. A Windows-based software package is available to remotely configure the Integra dms and display all 60 major parameters.

OPERATION

Integra 1530 digital metering system (dms) offers uncomplicated operation and high accuracy measurement of three-phase voltage, current, frequency, Watts, VAR, VA, energy, power factor, and total harmonic distortion of both phase and system, current and voltage. Integra 1530 dms includes true measurement of both line-to-neutral, and line-to-line voltages, ensuring accurate readings.

PROGRAMMABLE DISPLAY

A two-button interface on the front panel provides configuration programming of system (three-phase four-wire etc), VT and CT ratio settings, selected communication options and adjustment of operating parameters. All set-up screens offer password protection.

SYSTEM INPUTS

Designed for all low, medium and high voltage switchgear and distribution systems, the Integra 1530 meter offers programmable VT and CT ratio capability. Direct connection for up to 480 V AC with 5 A CT inputs is standard, and 1 A CT inputs available as an option.

NEUTRAL CT INPUT OPTION

Integra 1530 dms offers a three-phase four-wire version with a neutral 4th CT, allowing true neutral current measurement and protection in high harmonic environments.

COMMUNICATION

Integra 1630 dms offers a wide range of communication protocols including:

- Pulsed outputs
- Modbus RTU RS 485 Protocol
- Lonworks Protocol

PRODUCT CODES

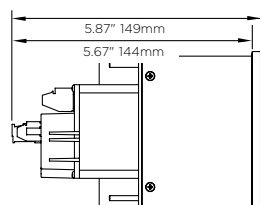
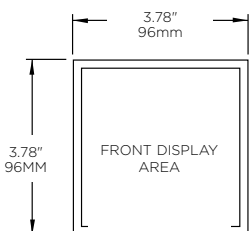
Description	Cat. no.
1-phase 2-wire 100 – 240 V L-L, 5 A CT input. Aux. 100-250 V AC/DC	INT-1630-L-5-M-option
1-phase 2-wire 241 – 480 V L-L, 5 A CT input. Aux. 100-250 V AC/DC	INT-1531-M-5-M-option
1-phase 3-wire 100 – 240 V L-L, 5 A CT input. Aux. 100-250 V AC/DC	INT-1532-L-5-M-option
1-phase 3-wire 241 – 480 V L-L, 5 A CT input. Aux. 100-250 V AC/DC	INT-1532-M-5-M-option
3-phase 3-wire 100 – 240 V L-L, 5 A CT input. Aux. 100-250 V AC/DC	INT-1533-L-5-M-option
3-phase 3-wire 241 – 480 V L-L, 5 A CT input. Aux. 100-250 V AC/DC	INT-1533-M-5-M-option
3-phase 4-wire 100 – 240 V L-L, 5 A CT input. Aux. 100-250 V AC/DC	INT-1534-L-5-M-option
3-phase 4-wire 241 – 480 V L-L, 5 A CT input. Aux. 100-250 V AC/DC	INT-1534-M-5-M-option
3-phase 4-wire with true neutral measurement 100-240 V L-L, 5 A CT input, Aux 100 – 250 V AC/DC	INT-1535-L-5-M-option
3-phase 4-wire with true neutral measurement 241 – 480 V L-L, 5 A CT input, Aux 100 – 250 V AC/DC	INT-1535-M-5-M-option
Options	
1 analogue output (0/0/1 mA)	101=3
2 analogue outputs (0/20 mA)	102=1
2 analogue outputs (1/0/1 mA)	102=3
1 modbus	110
1 modbus, 1 analog (0/20mA)	111=1
1 modbus, 1 analog (1/0/1mA)	111=3
1 modbus, 2 analog (0/20mA)	112=1
1 modbus, 2 analog (1/0/1mA)	112=3
2 relay	200
2 rely, 1 modbus	210

PROGRAMMABLE PARAMETERS

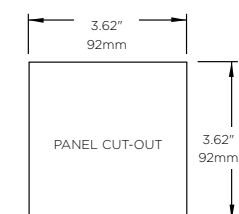
Parameter	Range
Password	4-digit 0000-9999
Primary current	Max 9999:5 A (360 MW max**)
VT primary	400 kV (360 MW max**)
Secondary voltage	Nominal system voltage ** maximum VT and CT ratios are limited so that the combination of primary voltage and current does not exceed 360 MW at 120% of relevant input
Demand integration time	8, 15, 20, 30 and 60 minutes
Reset	Max demand and active energy registers
Pulse output duration	60, 100, 200 ms
Pulse rate divisors	1, 10, 100, 1000
RS485 interface baud rate	2.4, 4.8, 9.6, 19.2kB
RS485 parity	Odd/even/no, 1 or 2 stop bits
Modbus RTU RS485 protocol address	1-247
Analogue outputs	User definable

Integra 1530 digital metering system

DIMENSIONS



PANEL CUT-OUT



MAX PANEL THICKNESS 0.19", 5mm

SPECIFICATIONS

Input	
Nominal input voltage	57.7 to 277 V L-N, 100 to 480 V L-L
Max. continuous input voltage	120% of nominal
Max. short duration input voltage	2 x for 1 second, repeated 10 times at 10 second intervals
System VT ratios (primary)	Any value up to 400 kV **
Nominal input voltage burden	<0.2 VA
Nominal input current	5 A (1 option)
System CT primary values	9999:5 A or 9999:1 A max 360 MW **
Max. continuous input current	120% nominal
Max. short duration input current	20 x for 1 second, repeated 5 times at 5 second intervals
Optional auxiliary DC supply	12 – 48 V DC (10.2 – 60 V DC absolute limits)
Nominal input current burden	< 0.6 VA ** maximum VT and CT ratios are limited so the combination of primary voltage and current does not exceed 360 MW at 120% of relevant input
Output (optional)	
RS485 communications	2-wire half duplex
Baud rates	2400, 4800, 9600, 19200
Pulsed	Clean contact SPNO
Pulse duration	60, 100 or 200 milliseconds
Pulsed outputs	1 or 2
Analogue outputs	1 or 2
Auxiliary	
Standard nominal supply voltage	100 – 250 V, AC or DC 85 – 287 V, AC absolute) (85 – 312 V, DC absolute)
AC supply frequency range	45 – 66 Hz
AC supply burden	6 VA
Optional auxiliary DC supply	12 – 48 V DC (10.2 – 60 V DC absolute)
DC supply burden	6 VA
Measuring Ranges	
Voltage	80 – 120% of nominal (functional 5 – 120%)
Current	5 – 120% of nominal
Frequency	45 – 66 Hz
Power factor	0.8 capacitive–1–0.8 inductive (functional 4 quadrant, 0-1 lag/lead)
THD	Up to 31st harmonic (0% – 40%)
Energy	7-digit resolution
Reference conditions	
Ambient temperature	23 ±1°C
Input frequency	50 or 60 Hz ±2%
Input waveform	Sinusoidal (distortion factor < 0.005)
Auxiliary supply voltage	Nominal ±1%
Auxiliary supply frequency	Nominal ±1%
AC auxiliary supply waveform	Sinusoidal (distortion factor < 0.05)
Magnetic field of external origin	Terrestrial flux
Accuracy	
Voltage	±0.17% of range maximum
Current	±0.17% of nominal
Frequency	±0.15% of mid frequency
Active power	±0.2% of range maximum
Power factor	1% of unity
Reactive power (VAr)	±0.5% of range maximum
Apparent power (VA)	±0.2% of range maximum
THD	±1%
Neutral current calculated	±0.95% of nominal
Energy	0.3% of range maximum (Better than class 1) IEC1036 Sect 4.6)
kVArh	0.6% of range maximum
Temperature coefficient	Voltage and current typical: 0.013%/°C Watts typical: 0.018%/°C

Integra 1530 digital metering system

MEASUREMENT AND DISPLAY

Up to 34 electrical and power quality parameters can be configured and displayed on the Integra 1530 dms unit.

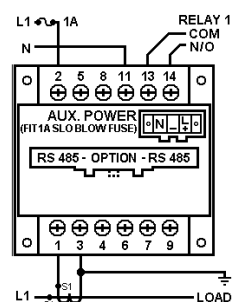
- 1 System volts
System current
System kW
- 2 System volts THD %
System current THD %
- 3 Volts L1 – N (4-wire only)
Volts L2 – N (4-wire only)
Volts L3 – N (4-wire only)
- 4 Volts L1 – L2
Volts L2 – L3
Volts L3 – L1
- 5 Volts line 1 THD %
Volts line 2 THD %
Volts line 3 THD %
- 6 Current L1
Current L2
Current L3
- 7 Current line 1 THD %
Current line 2 THD %
Current line 3 THD %
- 8 Neutral current (4-wire only)
Frequency
Power factor
- 9 kVAr
kVA
kW
- 10 kWh import (7-digit resolution)
- 11 kVAh import (7-digit resolution)
- 12 kWh export (7-digit resolution)
- 13 kVAh export (7-digit resolution)
- 14 kW demand
Current demand
- 15 kW maximum demand
Current maximum demand

Enhanced status information of up to 50 parameters can be communicated into building management systems via optional pulsed, analogue and digital outputs.

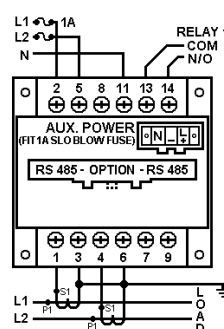
SPECIFICATIONS

Enclosure	
Enclosure style	DIN 96 panel mount
Compliant with	UL E20300, UL61010B-1, IEC 1010-1/BSEN 61010-1 CATIII, EMC and LVD
Material	Polycarbonate
Terminals	Shrouded screw-clamp
Dielectric voltage	Withstand test 3.25 kV rms 50 Hz for 1 minute between all electrical circuits
Operating temperature	-20 to +60°C
Storage temperature	-30 to +80°C
Relative humidity	0 – 90% (non condensing)
Warm-up time	1 minute
Shock	30 g in 3 planes
Vibration	10-15 Hz, 1.5 mm peak-to-peak/15-150 Hz @ 1 g IP protection: IP54
Dimensions	96 mm wide x 96 mm high x 149 mm deep (max) 3.78" wide x 3.78" high x 5.87" deep (max)
Panel cut-out	92 mm x 92 mm, 3.62" x 3.62"

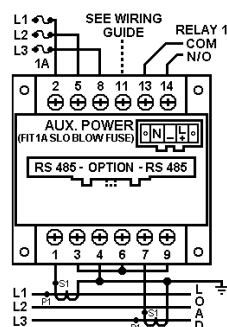
CONNECTIONS



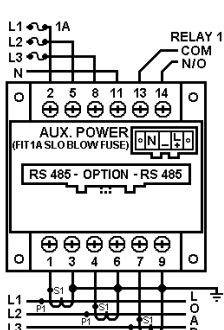
Single-phase



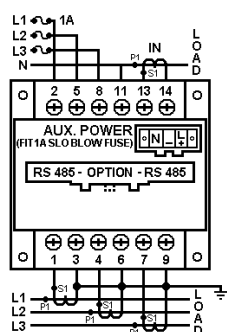
Single-phase 3-wire



3-phase 3-wire



3-phase 4-wire



3-phase 4-wire with neutral CT





Chapter 5

Integra 2170 and 2270 power quality metering system

Integra 2170 power quality meter.....	45-46
Integra 2270 power quality meter.....	46-47

Integra 2170/2270 power quality meter

Power to analyse quality, with a touch

FEATURES (INT 2170 AND 2270)

- Full colour, energy efficient, touch screen user interface
- Alarm/pulsed output
- Pulsed inputs
- Min/Max value stored in non-volatile memory
- Individual harmonics measurement to 63rd harmonic
- Percentage of load bar for full scale indication
- Accuracy to 0.5S% (reading)
- Sub cycle transient monitoring



FEATURES (INT-2270 ONLY)

- Waveform capture 8 cycles per phase
- Sags/swells monitoring to BS EN 50160
- Accuracy to 0.2S% (reading)

BENEFITS

- Fits both ANSI and DIN cut-outs
- User programmable configuration
- Heart beat indication for self checking
- Soft alarms
- User programmable display screen
- Single meter for all utilities including water and gas
- Wiring solution

The Integra 2x70 power quality meter provides information about energy consumption and its quality by monitoring three basic measurements:

- Total Harmonic Distortion: the total distortion in the supply, caused by multiples of the base frequency up to the 63rd harmonic
- Waveform Capture: allowing instantaneous events to be captured and analysed offline using a computer
- Voltage Interference: also known as 'sags and swells'. This measures variations in the voltage supply caused by non-linear loads, classified to BS EN 50160:2010.

The Integra 2270 digital meter provides measurement, isolation and conversion of all main electrical parameters and can be used in single-phase and three-phase three-wire unbalanced, four-wire balanced and unbalanced systems. RS485 Modbus RTU communications protocol, pulse/alarm outputs and inputs are fitted as standard.

KEY FEATURES



SIGNAL CONDITIONING

New technology enables measurement of power quality within any voltage of electrical supply, in a single product, covering the global range 120/230 V of electrical supplies.



FULL COLOUR TOUCH SCREEN DISPLAY

Energy-efficient and intuitive touch screen display with clear graphics and simple navigation. Easy for Field Engineers to set up and configure, reducing site time and saving money during installation.



INPUTS AND OUTPUT

- Total measurement for all utilities in a single meter, including measurement of pulses from water and gas meters
- Can be configured to communicate outputs relating to active and reactive energy to building management systems
- Alarms can be configured for any relevant, measured parameters and can also serve as a trip function
- Datalogging module
- Modbus TCP/IP module



EASY INSTALLATION

Plug and socket connectivity for easy installation of prewired looms, saving valuable installation time and reducing wiring errors. Current flows directly through the meter primary CTs, meaning there is no need to terminate the CT wire at the meter.

APPROVALS

EMC	IEC 61000-4-2 IEC 61000-4-3 IEC 61000-4-4 IEC 61000-4-5 IEC 61000-4-6 IEC 61000-4-8 IEC 61000-4-11 IEC 61326-1, Class A IEC 61000-3-2 IEC 61000-3-3
Safety	IEC 61010-1
Accuracy and Measurement	IEC 62053-21 class IEC 62053-22 class 0.2S IEC 62053-23 class 0.5S ANSI C12.20
Features	IEC 50160 (sag/swells classes) EN60688 ANSI C37.90.1 (surge withstand) ANSI C62.41 (Burst) RoHS compliant

MEASURED PARAMETERS

- Active power (kW) by phase
- Reactive power (kVAr) per phase
- Apparent power (kVA) per phase
- Current demand (AD) per phase
- Unbalanced voltage (%)
- Unbalanced current (%)
- Internal temperature measurement
- Hours run
- Supported real time clock

PRODUCT CODES

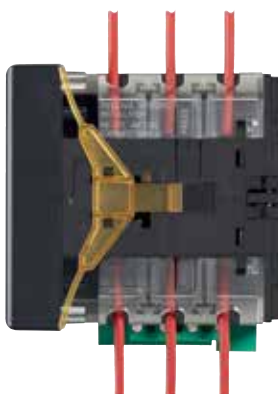
Description	Part number
Integra 2170 Power quality meter Accuracy: 0.5S%	INT-2170-M-01

Description	Part number
Integra 2270 Power quality meter Accuracy: 0.2S% Waveform capture	INT-2270-M-01

Description	Part number
Datalogging module for Integra 2170 and 2270 Power Quality Meter	OPT-2270-020
Modbus TCP/IP module for Integra 2170 and 2270 power quality meter	OPT-2270-070

Integra 2170/2270 power quality meter

Ensure error free installation and reduces wiring time by 80%



SPECIFICATIONS

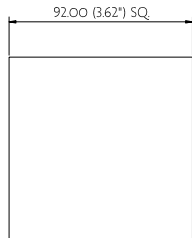
Input	
Nominal input voltage	57.7 V – 346 V AC L-N (100 – 600 V L-L) 720 V MAX
Max. continuous input overload voltage	120% of nominal
Max. continuous input overload voltage	2 x nominal voltage for 1 second
Nominal input voltage burden	<0.5 VA per phase
Nominal input current	1 A AC or 5 A AC RMS
Nom. Input current burden	<0.1 VA
Max. continuous input overload current	120% of nominal
Max. continuous input overload current	20 x nominal current for 1 second
Auxiliary	
Operating range	110 – 250 V AC/DC (+/- 20%) 45 – 66 Hz (88-300 V AC absolute limit)
Supply burden	10 VA
Accuracy	
Voltage (V)	0.18% of reading + 0.02% nominal
Current (A)	0.18% of reading + 0.02% nominal
Neutral current calculated (A)	< 1.0%
Frequency (Hz)	< 0.1 Hz
Power factor (PF)	± 1% of unity
Active power (W)	± 0.25% of reading (at unity power factor)
Reactive power (VAR)	± 0.25% of reading (at unity power factor)
Apparent power (VA)	± 0.25% of reading (at unity power factor)
Active energy (kWh)	Class 0.2S (IEC 62053-22)
Reactive energy (kVARh)	Class 0.5S (IEC 62053-23)
THD	1%
Range	
Voltage (V)	20% to 120% of nominal
Current (A)	1% to 120% of nominal
Frequency	45 – 66 Hz
Power factor	1 .. 0 lead or lag, 4 quadrant
Active power	5 to 144% of nominal
Demand interval	8, 10, 15, 20, 30, 60
THD	up to 63rd harmonic
Energy	8 digit displayed in Wh, kWh, MWh (Maximum 9,999,999.9 MWh before rollover to 0.0)
Environment	
Operating temperature	-20°C to +60°C
Storage temperature	-30°C to +80°C
Relative humidity	0-95% non-condensing
Shock	30 g in 3 planes to IEC60068-2-6, 2 g
Vibration	10 Hz to 50 Hz, IEC 60068-2-6, 2 g
Dielectric voltage	Withstand test 2.5 kV, 50 Hz for 1 minute between auxiliary/ input/output
IP protection (IEC 60529)	IP 52 front display IP 30 product
Altitude	Up to 2000 m
Installation category	CAT III
Protection class	II
Input waveform	Sinusoidal (distortion factor < 0.005)
Magnetic field of external origin	Terrestrial flux
Max wire gauge (input voltage, supply, I/O)	AWG 12/2.5 mm²
Max wire gauge (current pass through)	0.177"/4.5 mm

Integra 2170/2270 power quality meter

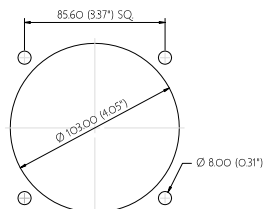
Power to analyse quality, with a touch

DIMENSIONS

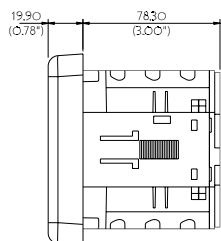
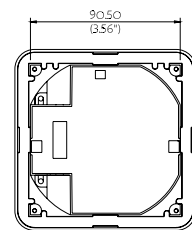
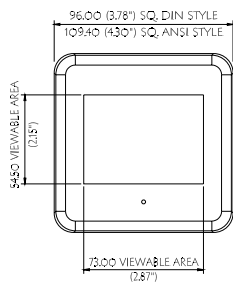
- 100 x 70 x 118mm
- 3.94" x 3.11" x 4.65"
- Weight 0.42kg
- 92mm square DIN cut-out
- ANSI C39.1, 4" round



DIN CUTOUT



ANSI CUTOUT



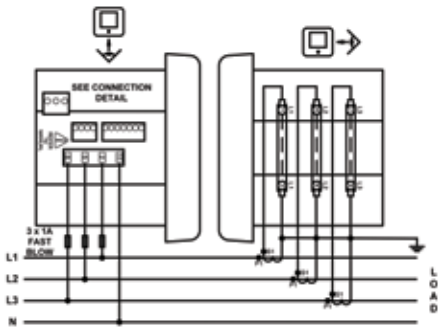
DISPLAY

Size	3.5" diagonal, 70 mm x 52.5 mm
Resolution	320 x 240 RGB
Colours	16 M
Type	Touch screen (TFT)
Outputs Pulsed	
Pulse/alarm output relay (KYZ)	User defined solid state relay
Contact rating	50 mA max at 250 V AC
Isolation	2.5 kV rms
Pulse duration	60, 100, 200 msecs
Pulse rate divisor range	1 pulse per Wh up to 1 pulse per GWh
Pulsed output parameter	Import/export kWh/kVArh
Energy units	Kilo, mega, giga
Max pulse rate	2 pulses per second
Outputs (Alarm)	
Alarm trip and release	Any value in range
Alarm type	User defined solid state relay, latched and unlatched
Alarm delay	0 – 600 second
Delay resolution	10 ms
Modbus™ Protocol	
Communication protocol	RS485 Modbus RTU
Type	2-wire half duplex
Baud rate	2900, 4800, 9600, 19200, 38400
Inputs	
Number of digital (pulsed) inputs	2
Voltage rating	Logic high threshold > 2 volts Logic low threshold < 1.2 volts
Current rating	Logic high threshold > 0.5 mAmps Logic low threshold < 0.1 mAmps
Max voltage limit	30 volts
Max frequency	25 Hz
Isolation	2.5 kV RMS
Detection	Rising, falling or both edges
Soft Alarms	
Number of soft alarms	6
Alarm parameter	Any practical Modbus parameter
Alarm trip level	Any value in range
Alarm release level	Any value in range
Delay	0 to 600 seconds (10 minutes)
Output	Latched/unlatched
Other Features	
Internal temperature measurement	-20 °C to +60 °C
Internal temperature accuracy	± 2 °C
Under/over/critical temp	User defined
Real time clock	± 2 seconds per day (1 sec intervals)
Simultaneous waveform recording	8 cycles of each phase (volts and amps)
Sub-cycle transients	Voltage and current
Resolution	0.15 ms

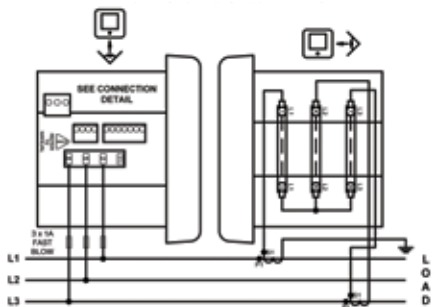
Integra 2170/2270 power quality meter

Ensure error free installation and reduces wiring time by 80%

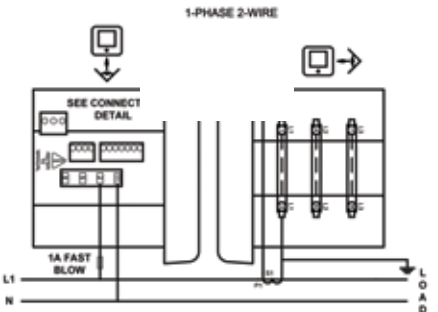
CONNECTION DIAGRAMS



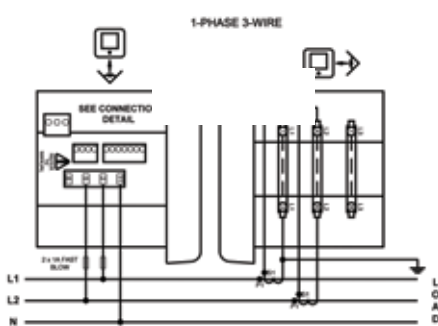
3-phase 4-wire unbalanced



3-phase 3-wire unbalanced

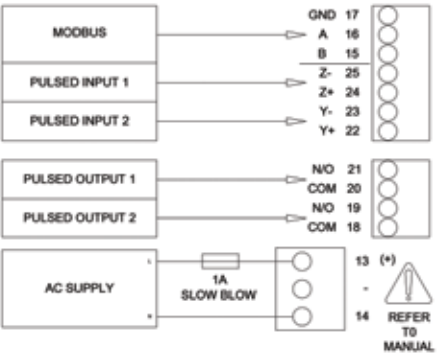


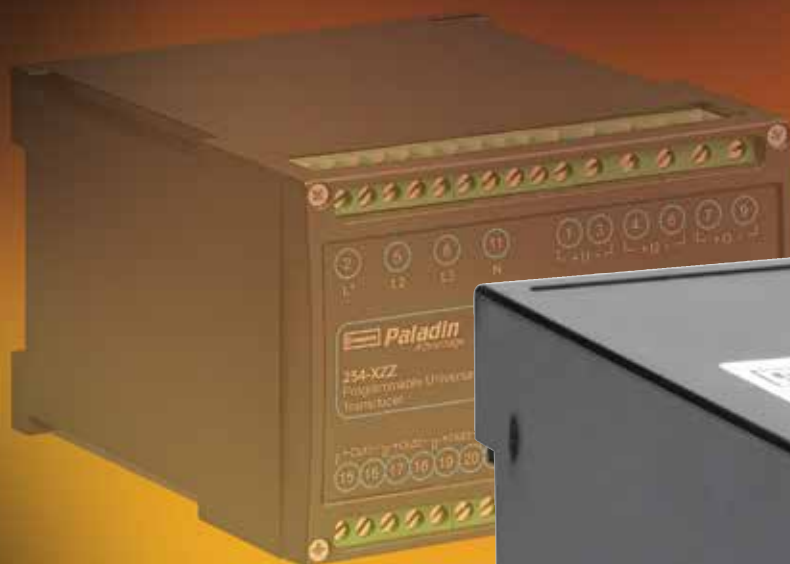
1-phase 2-wire



1-phase 3-wire

CONNECTION DETAIL







Chapter 6

Paladin advantage universal programmable transducer

Transducer – 254 TXX.....50-51

Programmable Transducers - Paladin Advantage Universal



FEATURES

- DIN-rail enclosure
- Ethernet or USB options
- Measurement, isolation & conversion of up to 31 electrical parameters
- RS485 Modbus RTU protocol as standard
- Programmable VT/CT ratio
- Linear or Dual Slope Outputs
- User programmable configuration using free PC software

TE Connectivity's (TE) Crompton Instruments Paladin Advantage, 254-TXX is a programmable transducer which provides measurement, isolation and conversion of all main electrical parameters into an industry standard DC output signal. The 254-TXX can be used in single and three-phase balanced or unbalanced three or four-wire electrical systems.

The 254-TXX has an accuracy of CL0.2 and includes RS485 Modbus RTU communications protocol and pulse/alarm output as standard. The 254-TXX is an accurate device for the conversion of all main electrical parameters into 2 or 4 fully isolated Voltage or mA outputs.

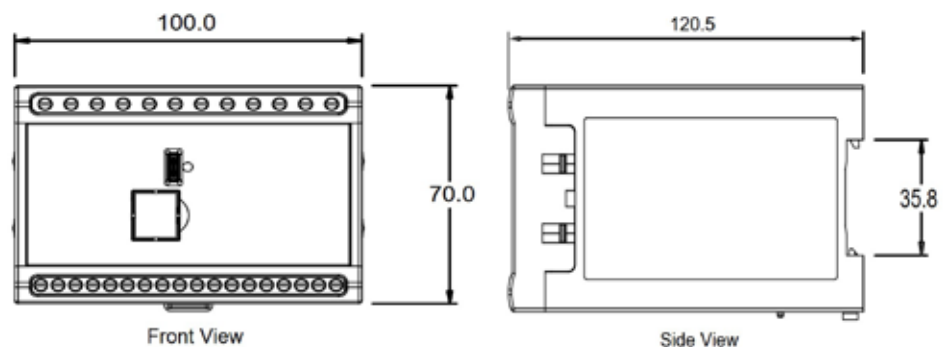
Designed, developed and manufactured in the UK, with an integrated microprocessor for exceptional handling of distorted waveforms. The 254-TXX is ideal for low, medium and high voltage applications and provides a high protection against continuous and short circuit protection as well as galvanically isolated inputs and outputs

STANDARDS

- IEC 61326
- IEC 61010-1
- IEC 62053-21
- EN60688
- RoHS Compliant
- UL Certified

Part number	Outputs	Auxiliary
254-TXX-M-2-030	2x Analogue, USB	100-250V AC/DC
254-TXX-M-2-070	2x Analogue, Ethernet	
254-TXX-M-4-030	4x Analogue, USB	
254-TXX-M-4-070	4x Analogue, Ethernet	
254-TXX-L-2-030	2x Analogue, USB	12-48V DC
254-TXX-L-2-070	2x Analogue, Ethernet	
254-TXX-L-4-030	4x Analogue, USB	
254-TXX-L-4-070	4x Analogue, Ethernet	

DIMENSIONS



Programmable Transducers - Paladin Advantage Universal



INPUT PARAMETERS

Parameter	Description	Analogue Output
V1	Phase 1 Voltage	✓
V2	Phase 2 Voltage	✓
V3	Phase 3 Voltage	✓
I1	Phase 1 Current	✓
I2	Phase 2 Current	✓
I3	Phase 3 Current	✓
W1	Phase 1 Watts	✓
W2	Phase 2 Watts	✓
W3	Phase 3 Watts	✓
Var1	Phase 1 Vars	✓
Var2	Phase 2 Vars	✓
Var3	Phase 3 Vars	✓
VA1	Phase 1 VA	✓
VA2	Phase 2 VA	✓
VA2	Phase 3 VA	✓
VLL12	Phase 1-2 Voltage	✓
VLL23	Phase 2-3 Voltage	✓
VLL31	Phase 3-1 Voltage	✓
PF1	Power Factor Phase 1	✓
PF2	Power Factor Phase 2	✓
PF3	Power Factor Phase 3	✓
PA1	Phase Angle Phase 1	✓
PA2	Phase Angle Phase 2	✓
PA3	Phase Angle Phase 3	✓
VLN Avg	Average L/N Voltage	✓
VLL Avg	Average L/L Voltage	✓
I Sum	System Current Total	✓
I Avg	Average System Current	✓
W Sum	System Power Total	✓
VAr Sum	System Reactive Power Total	✓
VA Sum	System VA Total	✓
Sys Hz	System Frequency	✓
PF Avg	System Power Factor	✓
THD V1	Phase 1 V THD %	✓
THD V2	Phase 2 V THD %	✓
THD V3	Phase 3 V THD %	✓
THD I1	Phase 1 I THD %	✓
THD I2	Phase 2 I THD %	✓
THD I3	Phase 3 I THD %	✓

The Paladin 254-TXX is a programmable Transducer.

For initial programming or reprogramming of an existing product please use the Crompton Instruments Transducer Configurator software.

Make sure that you have the latest version of Transducer Configurator software installed on your computer. You can download the latest version at:

<https://www.te.com/usa-en/private/energy/crompton-software-downloads.html>



TE Connectivity Ltd. is a \$13 billion global technology and manufacturing leader creating a safer, sustainable, productive, and connected future. For more than 75 years, our connectivity and sensor solutions, proven in the harshest environments, have enabled advancements in transportation, industrial applications, medical technology, energy, data communications, and the home. With 78,000 employees, including more than 7,000 engineers, working alongside customers in nearly 150 countries, TE ensures that EVERY CONNECTION COUNTS. – www.TE.com.

Generation

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- Nuclear Power
- Wind/Solar
- Hydro-electric

Transmission & Distribution

- Substation
- Underground
- Overhead
- Street Lighting

Industry

- Mining
- Petrochemical
- Railway
- Shipbuilding

WHEREVER ELECTRICITY FLOWS, YOU'LL FIND TE ENERGY



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