



Energy Division

Crompton Instruments Integra 1630 Low Profile Digital Metering System

DIN Integra 1630 Series

Multifunction Integra 1630 digital metering system provides high accuracy 0.2% measurement, display and communication of all major electrical and power quality parameters including total harmonic distortion (THD) measurement 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 mounted enclosure offers simple programming and display of up to 35 electrical measurement parameters via a simple menu-driven user interface on the front panel. Integra 1630 digital metering system benefits from optional pulsed and digital communication outputs. This allows enhanced status information of up to 60 measured parameters to be communicated to SCADA, building management or other systems. Additionally, a simple Windows-based software package is available to remotely configure the Integra and display all 60 major electrical and power quality parameters.

Operation

The multifunction Integra 1630 digital metering system offers uncomplicated operation and high accuracy measurement of three-phase voltage, current, frequency, Watts, VAR, VA, energy, power factor, and total harmonic distortion measurement of both phase and system, current and voltage.

Three-phase four-wire system line-to-line voltage measurements are often a vector calculation of the line-to-neutral voltage measurements. However, Integra 1630 digital metering system includes true measurement of both line-to-neutral, and line-to-line measurements, ensuring accurate readings even with unusual wiring configurations (e.g. four-wire open delta). To suit the requirements of individual power monitoring applications, the Integra 1630 digital metering system offers simple programming and display via the menu driven interface. Alternatively, an optional Windows-based software package can be used for remote configuration and monitoring. Once configured by either method, simultaneous monitoring of up to 60 electrical and power quality variables can be communicated to building management systems via pulsed or digital communication options.

If customer requirements extend beyond the original specified capabilities, the functionality of this innovative product is easily enhanced to meet new client expectations. Integra plug-in option modules allow cost effective upgrades with any combination of pulsed and digital communication outputs. The option module is interchangeable without recalibration.

Accuracy

Integra 1630 digital metering system utilises true rms measurement techniques up to the 31st harmonic. An exceptional tolerance to high harmonic frequencies is achieved from a robust frequency detection method, which is able to detect the fundamental frequency on any phase. For safe maintenance, the system indicates CT current in the absence of voltage signals.

System Input

Designed for all low, medium and high voltage switchgear and distribution systems, the Integra 1630 digital metering system offers programmable VT and CT ratio capability. Direct connection up to 480V AC with 5A CT inputs is standard, and 1A CT inputs are optional.

Programmable Display

A two-button interface on the front panel of Integra 1630 units provides simple programming of system configuration (three-phase four-wire etc), VT and CT ratio settings, configuration of selected communication options, and adjustment of operating parameters. To prevent unauthorised access to the product configuration settings, all set-up screens offer password protection. Once configured, status information can be viewed by scrolling through 16 screens featuring a high contrast three-line, four-digit LED display, with separate annunciators for each of the 35 measured parameters.



Features

- Low profile
- High contrast LED display
- LED annunciators for each measured parameter
- Modbus TCP
- Profibus™ protocol
- BACnet/IP protocol
- ANSI/ASHRAE 135 - 1995 Annex J
- User programmable system configuration (four-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
- User programmable system configuration (4-wire system)

Benefits

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

Applications

- Switchgear distribution systems
- Control panels
- Embedded generation
- Energy management
- Building management
- Utility power monitoring
- Process control
- Motor monitoring

Compliant

- IEC1010-1 (BSEN 61010-1 - 2001)



System Outputs

Pulsed Output

Integra 1630 digital metering system offers optional single or dual pulsed outputs. Each output can be user programmed to represent import or export kWh, import or export kVAh or kVAh. The output pulses can be customised by both user programmable pulse rate divisor and pulse width. The solid state output relays have fully isolated volt-free connections via screw-clamp terminals.

Digital Communications

RS485 Modbus RTU

Integra 1630 digital metering systems offer an RS485 communication port for direct connection to SCADA systems using the Modbus RTU protocol or the Johnson Controls Metasys N2 protocol. Remote monitoring enables the user to record systems parameters in real time, using high resolution numbers. The DMS Integra 1630 establishes the format for the master's query automatically, and responds with the correct protocol using IEEE floating point values. The Modbus protocol option also offers user programmable word order and support for function 8 subfunction 0, return query data diagnostic.

Enhanced status information of up to 60 measured parameters can be communicated to building management systems via the optional digital communications output. Any of 5 energy parameters can be output as pulses via optional pulse relay outputs.

Measurement and Display

Up to 35 electrical and power quality parameters can be configured and displayed.

Screen No.	Description
1	System (average) volts System (average) current System (total) kW
2	System volts (average) THD% System current (average) THD%
3	Volts L1 - N Volts L2 - N Volts L3 - N (4 wire only) Volts L1 - L2 Volts L2 - L3 Volts L3 - L1 (3 wire only)
4	Volts L1 - N THD% Volts L2 - N THD% Volts L3 - N THD% (4 wire only) Volts L1 - L2 THD% Volts L2 - L3 THD% Volts L3 - L1 THD% (3 wire only)
5	Volts L1 - L2 Volts L2 - L3 Volts L3 - L1 (4 wire only)
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 (overall)
9	kVAh 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	Maximum kW demand Maximum current demand
16	Hours run

Modbus TCP Ethernet Connection

The Integra 1630 digital metering system with Ethernet communication module supports connection to SCADA systems using the Modbus[®] TCP protocol. The Integra 1630 digital metering system with Ethernet module acts as a MODBUS slave device and may be queried by a Modbus[®] master device which conforms to the Modbus[®] TCP protocol. The Integra 1630 digital metering system Ethernet module supports 10Base-T Ethernet communication. Connection is normally via an Ethernet switch or hub that supports the IEEE 802.3 standard at 10/100Mbps.

BACnet/IP Protocol Ethernet Connection

The Integra 1630 with Ethernet communication module supports connection to SCADA systems using the BACnet/IP protocol. The Integra 1630 with Ethernet module acts as a BACnet/IP server device and may be queried by a BACnet/IP client device which conforms to the BACnet/IP protocol. The Integra 1630 Ethernet module supports 10Base-T Ethernet communication. Connection is normally via an Ethernet switch or hub that supports the IEEE 802.3 standard at 10/100Mbps.

IP Address Assignment

The Integra 1630 digital metering system IP address is factory set to '192.168.1.100' and supports static IP address assignment, but may be changed by the user before installation. The IP address of the Integra 1630 digital metering system at installation must be appropriate for the network to which it is attached and should be determined by the network administrator.

Profibus™

The Integra 1630 digital metering systems offer an RS485 serial interface for the communication of the PROFIBUS DP protocol as a slave device. The Integra 1630 can automatically detect the masters' baud rate and communicate at data rates up to 12Mbit over the optically isolated RS-485 port. Connection is made via a 9-way D type connector. The interface supports standard DP protocol functionality, class 1 and class 2 services. Networks can be configured using the GSD file. The earth tag (fuseblade) is intended for local earth bonding if electrical interference may be an issue.

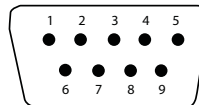
Profibus Connections

Pin	Signal	Description Cable	Device	Specification
1	(Shield)	Shield or potential equalization		Not recommended
2	M24		Ground of 24V power supply	Optional ^p
3	RxD/TxD-P	Receive/Transmit data, line B (red)		Mandatory
4	CNTR-P		Control of repeater direction	Optional ^p
5	DGND		Data ground (reference voltage to VP)	Mandatory
6	VP ^a		Power supply +5v (e.g. for bus terminal)	Mandatory
7	P24		+24V power supply	Optional ^p
8	RxD/TxD-P	Receive/Transmit data, line A (green)		Mandatory
9	CNTR-N		Control of repeater direction	Optional ^p

^aMinimum current capability is 10mA

^pThese signals should be provided by the device if converters from RS485 to fibre optic transmission are to be supported.

Pin assignment of 9-pin Sub-D-connector front side



Programmable Parameters

Parameter	Range
Password	4-digit 0000 - 9999
CT primary current	Maximum 9999A ** CT Secondary Current: 5A (1A option)
VT primary voltage	Maximum 400kV **
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 360MW 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

Specifications

Nominal input voltage	57.7 to 277V L-N, 100 to 480V L-L
Max. continuous input voltage	120% 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 400kV **
Nominal input voltage burden	< 0.2 VA
Nominal input current	5A (1A option)
System CT primary values	Any integer value up to 9999A **
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 360MW at 120% of relevant input

Outputs (optional)

RS485 communications	2-wire half duplex
Baud rates (Modbus RTU)	4800, 9600, 19200, 38400
Pulsed	Solid state relays
Pulse duration	60, 100 or 200 milliseconds
Contact rating	50mA max at 250V ac max.
Pulsed outputs	1 or 2
Profibus	9-way D type
Modbus TCP	RJ 45
BACnet/IP	RJ 45

Auxiliary

Standard nominal supply voltage	100V - 250V ac or dc (85V - 287V ac absolute limits) (85V - 312V dc absolute limits)
AC supply frequency range	45-66Hz
AC supply burden	6VA
Optional auxiliary dc supply	12V-48V dc (10.2V-60V dc absolute limits)
DC supply burden	6VA

Accuracy Defined

*Error in energy readings is expressed as a percentage of the energy count that would result from applying range maximum voltage and nominal current for the same measurement period.

Error change due to variation of an influence quantity (except temperature) by varying one influence quantity within range of use, whilst keeping all other influence quantities at their nominal value is less than twice the error allowed for the reference condition applied in the test.

(This definition is applied to limit the number of combinations to be applied during type tests)

Error due to temperature variation is as above.

Error in measurement when a measurand is within its measuring range, but outside its reference range is less than twice the error allowed at the end of the reference range adjacent to the section of the measuring range where the measurand is currently operating / being tested.



Import and Export Connections

The connections diagrams opposite assume an import power configuration; therefore any power flow towards the load will register as imported energy. If power flows away from the load in an export power situation, then the power will register as exported energy.

Auxiliary Supply

The Integra 1630 digital metering system should ideally be powered from a dedicated supply: either 100-250 AC, DC (85-280V AC absolute or 85-315V DC absolute), or 12-48V DC (10.2V-60V DC absolute). However, the device may be powered from the signal source, provided the source remains within the working range of the chosen auxiliary supply.

Fusing

It is recommended that all voltage lines be fitted with 1 amp fuses.

Safety/Ground Connections

For safety reasons, all CT secondary connections should be grounded in accordance with local regulations.

Measuring Ranges

Voltage	80-120% of nominal (functional 5-120%)
Current	5-120% of nominal
Frequency	45-66Hz
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 60Hz ±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)
kVAh	0.6% of range maximum
Temperature coefficient	Voltage and current typical: 0.013%/°C Watts typical: 0.018%/°C

Enclosure

Enclosure style	DIN 96 panel mount
Compliant with	IEC 1010-1 BSEN 61010-1 : 2001 CAT III, CE EMC and LVD directives
Material	Polycarbonate
Terminals	Shrouded screw-clamp 0.05mm to 4mm wire
Dielectric voltage	Withstand test 3.25kV rms 50Hz 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	30g in 3 planes
Vibration	10-18Hz, 1.5mm peak-to-peak 18-150Hz @1g
IP protection	IP54
Dimensions	96mm wide x 96mm high x 79mm deep (max). Typically <60mm depth behind panel 3.78" wide x 3.78" high x 3.11" deep (max)
Panel cut-out	92mm x 92mm, 3.62" x 3.62"

Product Codes

Product family	System type	Input v	Input i	Auxiliary v	Options
16	30 -LED DIN96	L -57.7-139 L-N (100-240 L-L)	5 -5A 1 -1A	L -12-48V dc M -100-250V ac/dc	000 - No option 010 - Modbus® 100 - One pulse 110 - One pulse & Modbus™ 200 - Two pulse 210 - Two pulse & Modbus™ 050 - Profibus DP™ 250 - Two pulse & Profibus DP™ 070 - Modbus™ TCP 080 - BACnet/IP
Low profile	User selectable system type	M -140-277 L-N (241-480 L-L)			
Features as specified	Factory default - 4-wire				

Pre-configured Spares/Options

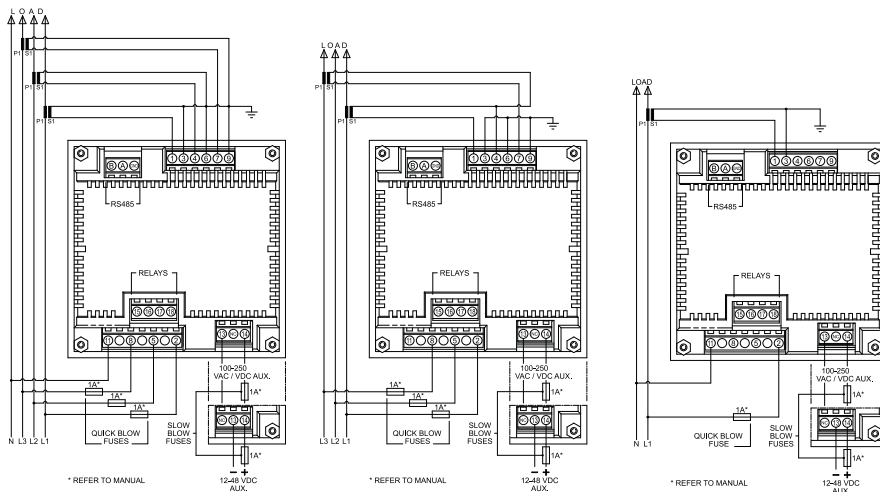
The functionality of existing Integra 1630 digital metering system products can be easily upgraded with the use of Crompton pre-configured plug-in cards.

Order Code Example

INT-1630-M-5-M-110 Integra 1630 digital metering system, three-phase four-wire, nominal input voltage, 140-277V L-N (241-480V) L-L, 5A CT input, auxiliary supply 100 to 250V ac or dc, one relay pulsed output and one RS485 Modbus communication port.

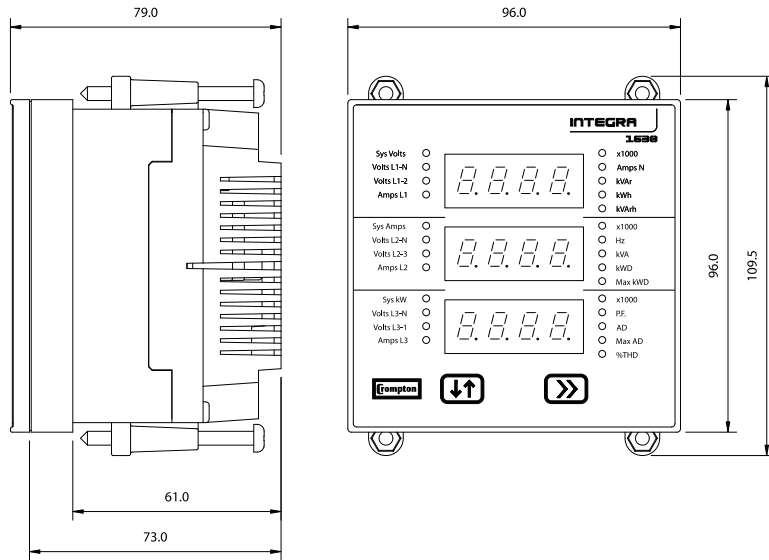
Option Code	Description
OPT-1630-M-010	Modbus communications card with 100-250V auxiliary
OPT-1630-M-100	Single pulsed output card with 100-250V auxiliary
OPT-1630-M-110	Single pulsed modbus card with 100-250V auxiliary
OPT-1630-M-200	Dual pulsed card with 100-250V auxiliary
OPT-1630-M-210	Dual pulsed modbus card with 100-250V auxiliary
OPT-1630-M-050	Profibus communication modules with screws and clamps
OPT-1630-M-250	Dual pulsed and Profibus DP™
OPT-1630-M-070	Modbus™ TCP communications module with screws and clamps
OPT-1630-M-080	BACnet/IP communications module with screws and clamps
OPT-1630-L-010	Modbus communications card with 12-48V dc auxiliary
OPT-1630-L-100	Single pulsed output card with 12-48V dc auxiliary
OPT-1630-L-110	Single pulsed modbus card with 12-48V dc auxiliary
OPT-1630-L-200	Dual pulsed card with 12-48V dc auxiliary
OPT-1630-L-210	Dual pulsed modbus card with 12-48V dc auxiliary
OPT-1630-L-050	Profibus communication modules with screws and clamps
OPT-1630-L-250	Dual pulsed and Profibus DP™
OPT-1630-L-070	Modbus™ TCP communications module with screws and clamps
OPT-1630-L-080	BACnet/IP communications module with screws and clamps

Wiring

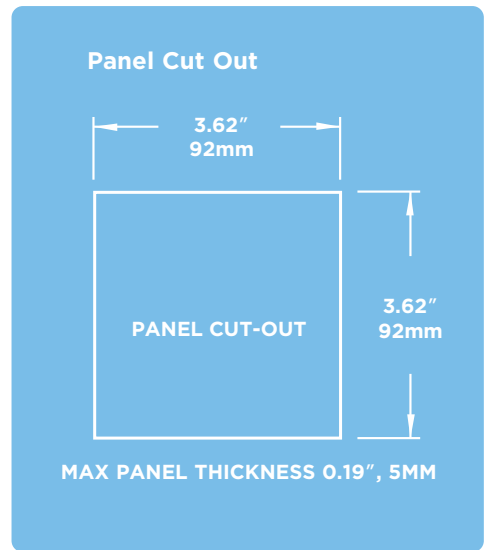
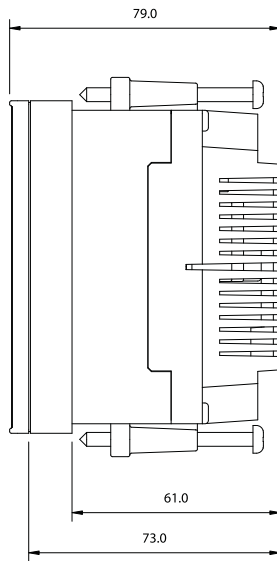




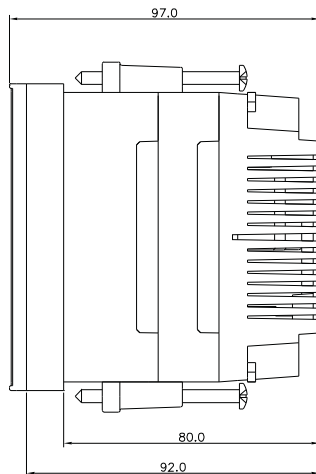
Integra 1630 DMS Dimensions



Modbus TCP Option Dimensions



Profibus Option Dimensions



CT Accessories

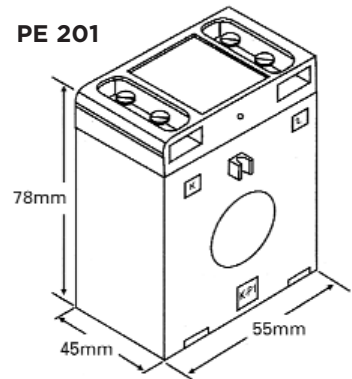
Crompton Instruments also offer a complete range of high quality current transformers offering comprehensive measuring and protection class accuracies. The range offers a wide selection of system current ratings, busbar sizes, case widths, apertures and mounting options to every application.

Features

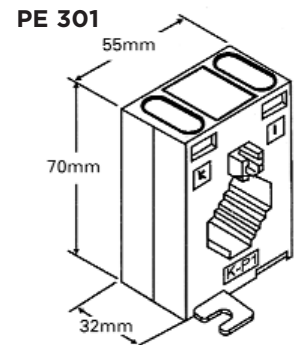
- Cost effective moulded case measuring current transformers
- Limited range include the six most popular sizes of current transformers
- Ratio ratings from 50/5 to 4000/5
- Comprehensive measurement of class accuracy
- Wide range of system current ratings, busbar sizes, case widths and apertures
- Wire sealable terminal covers
- Feet mounting and busbar options

Product Codes

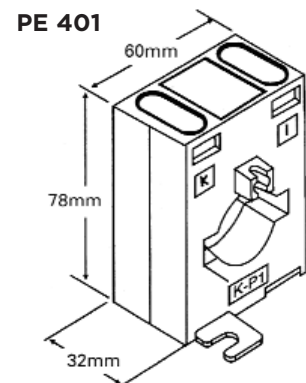
Product code	Ratio range	VA at CL 3	VA at CL 1	VA at CL 0.5
PE201	50/5	1.5	-	-
PE201	60/5	-	1	-
PE201	80/5	-	2	-
PE201	100/5	-	2.5	-
PE201	200/5	-	7.5	-
PE201	250/5	-	7.5	-
PE301	75/5	1	-	-
PE301	80/5	1	-	-
PE301	100/5	-	1	-
PE301	125/5	-	1	-
PE301	150/5	-	1	-
PE301	200/5	-	2.5	-
PE301	250/5	-	2.5	-
PE301	300/5	-	2.5	-
PE301	400/5	-	5	-
PE301	500/5	-	5	-
PE301	600/5	-	5	-
PE401	150/5	2.5	-	-
PE401	200/5	-	2.5	-
PE401	300/5	-	2.5	-
PE401	400/5	-	5	-
PE401	500/5	-	5	-
PE401	600/5	-	7.5	-
PE401	750/5	-	7.5	-
PE401	800/5	-	7.5	-



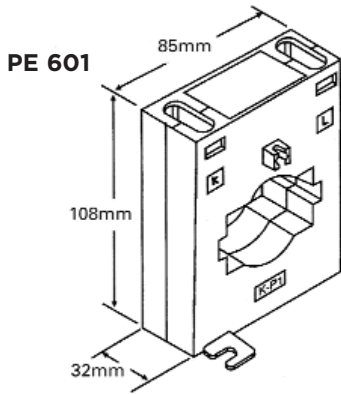
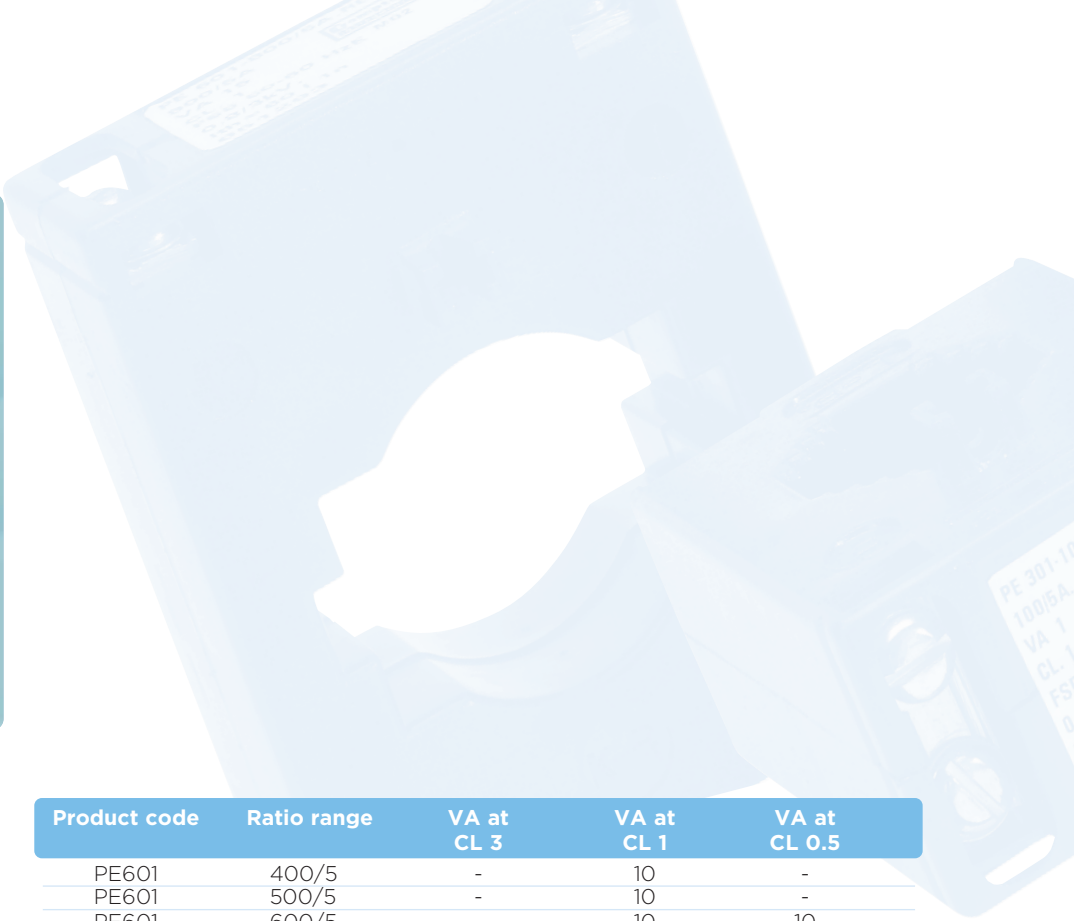
Aperture: 20mm diameter



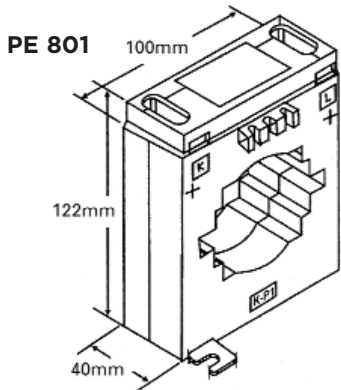
Aperture: 30x10, 25x15, 20x20mm



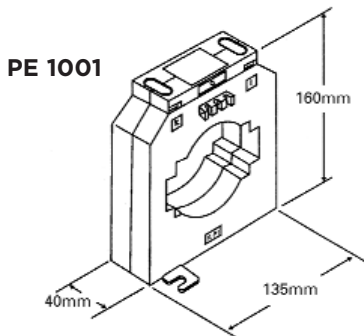
Aperture: 40x12mm & 28mm diameter



Aperture: 60x10, 50x30mm & 45mm diameter



Aperture: 80x10, 60x30, 50x50mm & 60mm diameter



Aperture: 100x30, 80x50mm & 85mm diameter

Product code	Ratio range	VA at CL 3	VA at CL 1	VA at CL 0.5
PE601	400/5	-	10	-
PE601	500/5	-	10	-
PE601	600/5	-	10	10
PE601	800/5	-	15	10
PE601	1000/5	-	15	10
PE601	1200/5	-	15	10
PE601	1500/5	-	15	10
PE601	1600/5	-	15	10

PE801	400/5	-	5	-
PE801	500/5	-	5	-
PE801	600/5	-	5	-
PE801	800/5	-	10	5
PE801	1000/5	-	10	5
PE801	1200/5	-	10	5
PE801	1500/5	-	10	5
PE801	1600/5	-	15	5
PE801	2000/5	-	15	10

PE1001	400/5	-	-	5
PE1001	500/5	-	10	5
PE1001	600/5	-	10	5
PE1001	800/5	-	15	10
PE1001	1000/5	-	15	10
PE1001	1200/5	-	15	10
PE1001	1500/5	-	30	15
PE1001	1600/5	-	30	15
PE1001	2000/5	-	30	15
PE1001	3000/5	-	-	30
PE1001	4000/5	-	-	30

Energy Division

With 4000 employees and more than 10,000 customers world-wide, the Energy Division represents a very significant part of Tyco Electronics. Based in headquarters in Ottobrunn, near Munich, Germany, the Energy Division is a global supplier to power utilities and power industry customers, to equipment manufacturers and transport systems. These customers are served by dedicated R&D teams, sales representatives in more than 80 countries, a professional marketing organization and 25 manufacturing sites in five continents.

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Energy Division – economical solutions for the electrical power industry: cable accessories, connectors & fittings, electrical equipment, instruments, lighting controls, insulators & insulation enhancement and surge arresters.

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