
Energy Division

# Crompton Instruments
# Kilowatt Hour Energy Meters

Tyco Electronics

Our commitment. Your advantage.

# Kilowatt Hour Energy Meters

An extensive range of DIN-rail, panel mounting and ANSI style Kilowatt products which measure the real consumption of active energy. These instruments are ideal for secondary metering in switchgear, plant instrumentation and process control applications offering considerable advantages over traditional mechanical Ferraris disc type.

These models incorporate an electro-mechanical kWh counter or LCD display with associated electronics within the instrument case. Requiring no maintenance, the  kWh energy meters support energy efficiency and awareness whilst ensuring systems remain balanced and safe.

**Features**
High accuracy
Extensive range
Pulsed output optional
DIN-rail, panel mounted or ANSI style
Active energy consumption indication
Direct connect

**Benefits**
Energy efficiency and awareness
Balanced and safe systems
No maintenance

**Applications**
Switchgear
Distribution systems
Generator sets
Control panels
Energy management
Building management
Utility power monitoring
Process control
Secondary metering

**Approvals**
IEC and UL

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# Single-phase DIN-rail kWh Energy Meters

## DRK-1PPO-240

### Single-phase 230V – 15A Direct Connected, Pulse Output

This innovative two DIN module kWh energy meter measures the real consumption of active energy to Class 2 accuracy with a resolution of 0.1kWh displayed via a non-zeroing mechanical counter on the front panel. The module is operated via an internal shunt with pulsed output optically isolated from the power-supply and load. Ideally suited for environments with Category III over-voltage and level 2 pollution in accordance with IEC EN 61010-1.

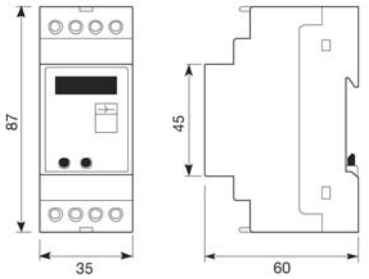
### Specifications

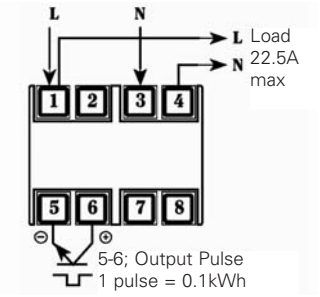
| | |
|---|---|
| Active energy accuracy | Class 2 |
| Input frequency | 45 - 65Hz |
| Nominal input voltage | 230V |
| Input voltage tolerance | –15% to +10% of nominal |
| Nominal input voltage burden | 4VA |
| Input current | Base 15A |
| Startup current | 50mA |
| Max continuous input current | 22.5A |
| Nominal input current burden | 2VA |
| Current measurement | Internal shunt |
| System CT ratios | Direct connection up to 22.5A |
| Pulsed output | Opto-isolated |
| Pulse duration | 75 milliseconds |
| Pulsed frequency | 1 per 0.1kWh |
| Counter | 5-digit + 1 decimal point mechanical counter |
| Reading resolution | 0.1kWh |
| LED indicator display | Green – power supply<br>Red – active power consumption<br>@ 1 beat per 1Wh |
| Enclosure material | Class V-0 in accordance with UL94 |
| Compliant with | IEC EN 61010-1CAT III, IEC EN 61036,<br>EMC and LVD |
| Operating temperature | –10°C to +45°C |
| Storage temperature | –25°C to +70°C |
| Relative humidity | 0 - 95%, non-condensing |
| Dimensions | 2 x DIN modules wide x 87mm high |
| IP protection | IP51 at front, IP20 at rear |

### Ordering Codes

| Description | Cat. no. |
|---|---|
| 1-phase 230V – 15A direct connected, pulse output | DRK-1PPO-240 |

### Dimensions and Connections




### Features

- Class 2 accuracy
- Pulsed output
- Direct connection up to 15A
- Non-zeroing 5-digit + 10th mechanical counter
- Static meter with direct start-up 22.5A max
- Active energy consumption indication
- 2 DIN module format

### Benefits

- Replaces outdated rotating disk meters
- Increased energy efficiency and awareness
- High accuracy
- Balanced and safe systems
- Maintenance free

### Applications

- Switchgear
- Distribution systems
- Generator sets
- Control panels
- Energy management
- Building management
- Utility power monitoring
- Process control
- Motor control
- Secondary metering

### Approvals

- IEC EN 61010-1 CAT III
- IEC EN 61036
- EMC and LVD

# DRK-1PCT-240

## Single-phase 230V – CT Connected 5A, Pulse Output

This innovative four DIN module kWh energy meter measures the real consumption of active energy to Class 2 accuracy with a resolution of 1 kWh displayed via a mechanical counter on the front panel. The module is operated via an internal current transformer with pulsed output optically isolated from the power supply and load.

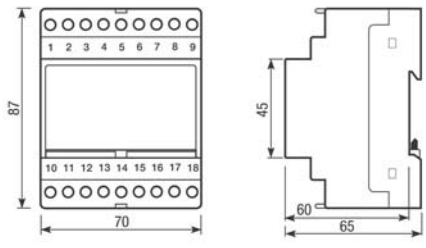

### Specifications

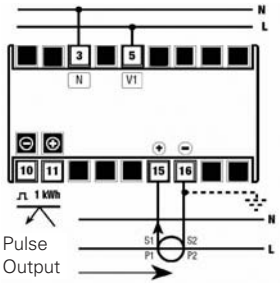
| | |
|---|---|
| Active energy accuracy | Class 2 |
| Input frequency | 50 - 60Hz |
| Nominal input voltage | 230V ac |
| Input voltage tolerance | –15% to +10% of nominal |
| Nominal input voltage burden | <2.5VA |
| Nominal input current | 5A |
| Startup current | 15mA |
| Max continuous input current | 6A |
| Nominal input Current burden | <2.5VA |
| Current measurement | Internal current transformer |
| System CT ratios | 5, 10, 25, 50, 75, 100, 125, 150, 200, 250, 300, 400, 500, 600, 800, 1000A |
| Pulsed output | Opto-isolated |
| Pulse duration | <100 milliseconds |
| Pulsed frequency | 1 per kWh |
| Pulse capacity | 3 - 30V dc, <20mA |
| Counter | 7-digit mechanical counter |
| Reading resolution | 1 kWh |
| LED indicator display | Green – power supply<br>Red – active power consumption<br>@ 1 beat per 1/16 kWh |
| Enclosure material | Class V-0 in accordance with UL94 |
| Compliant with | IEC EN 61010-1, IEC EN 61036, EMC and LVD |
| Operating temperature | –10°C to +45°C |
| Storage temperature | –25°C to +70°C |
| Relative humidity | 0 - 95%, non-condensing |
| Dimensions | 4 x DIN modules wide x 87mm high |
| IP protection | IP20 |

### Ordering Codes

| Description | Cat. no. |
|---|---|
| 1-phase 230V - CT connected 5A, pulsed output | DRK-1PCT-240 |

### Dimensions and Connections




### Features

Direct connection up to 15A
Class 2 accuracy
Pulsed output
Selectable CT ratios
Dip switch settings
7-digit mechanical counter
Insulated CT connections
Active energy consumption indicator
4 DIN module format

### Benefits

Increased energy efficiency and awareness
High accuracy
Balanced and safe systems
Maintenance free

### Applications

Switchgear
Distribution systems
Generator sets
Control panels
Energy management
Building management
Utility power monitoring
Process control
Motor control
Secondary metering

### Approvals

IEC EN 61010-1
IEC EN 61036
EMC and LVD


# Three-phase DIN-rail kWh Energy Meters

## DRK-3PCT-415

**Three-phase 400V CT Connected 5A, Pulse Output, Three- or Four-wire System**

This innovative four DIN module kWh energy meter measures the real consumption of active energy to Class 2 accuracy with a resolution of 1kWh displayed via a mechanical counter on the front panel.

The module is operated via an internal current transformer with pulsed output optically isolated from the power supply and load.

### Specifications

| | |
|---|---|
| Active energy accuracy | Class 2 |
| Input frequency | 50 - 60Hz |
| Nominal input voltage | 400V L-L (230V L-N)) |
| Input voltage tolerance | –15% to +10% of nominal |
| Nominal input voltage burden | <2.5VA |
| Nominal input current | 5A |
| Startup current | 15mA |
| Max continuous input current | 6A |
| Nominal input current burden | <2.5VA |
| Current measurement | Internal current transformer |
| System CT ratios | 5, 10, 25, 50, 75,100, 125, 150, 200, 250, 300, 400, 500, 600, 800, 1000A |
| Pulsed output | Opto-isolated |
| Pulse duration | <100 milliseconds |
| Pulsed frequency | 1 per kWh |
| Pulse capacity | 3 - 30V dc, <20mA |
| Counter | 7-digit mechanical counter |
| Reading resolution | 1 kWh |
| LED indicator display | Green – power supply<br>Red – active power consumption<br>@ 1 beat per 1/4 kWh<br>Yellow: warning of 1/4 kWh negative |
| Enclosure material | Class V-0 in accordance with UL94 |
| Compliant with | IEC EN 61010-1, IEC EN 61036, EMC and LVD |
| Operating temperature | –10°C to +45°C |
| Storage temperature | –25°C to +70°C |
| Relative humidity | 0 - 95%, non-condensing |
| Dimensions | 4 x DIN modules wide x 87mm high |
| IP protection | IP20 |

### Features

Class 2 accuracy
Pulsed output
Selectable CT ratios
Dip switch settings
7-digit mechanical counter
Insulated CT connections
Active energy consumption indicator
4 DIN module format
3 or 4-wire systems

### Benefits

Increased energy efficiency and awareness
High accuracy
Balanced and safe systems
Maintenance free

### Applications

Switchgear
Distribution systems
Generator sets
Control panels
Energy management
Building management
Utility power monitoring
Process control
Motor control
Secondary metering

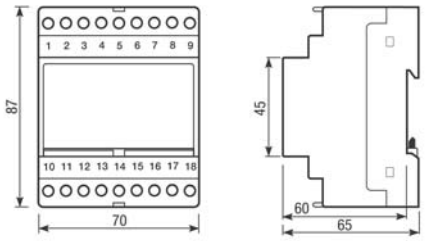
### Approvals

IEC EN 61010-1
IEC EN 61036
EMC and LVD

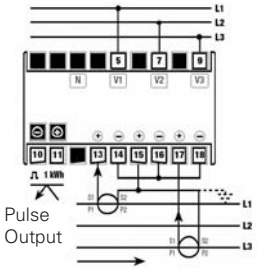
### Ordering Codes

| Description | Cat. no. |
|---|---|
| 3-phase 230V -CT connected 5A, pulsed output, 3 or 4-wire | DRK-3PCT-415 |

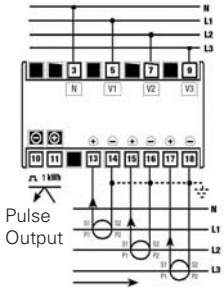
### Dimensions and Connections




**DRK-3PCT Three-phase CT connected 5A(*) three-wire system**




**DRK-3PCT Three-phase CT connected 5A(*) four-wire system**



# Concentrator Module for kWh Energy Meters


## DRK-485-230

### 8 Input Remote kWh Energy Consumption Monitoring Device

The DRK-485 concentrator module remotely monitors energy consumption from up to 8 Crompton kWh meters within a 25 metre radius. The device communicates through a Modbus® connection to a computer COM port via a RS485 serial line. Up to 32 concentrator modules can be connected to the RS485 line without the need for signal amplifiers. Up to 247 modules in groups of 32 can be connected when separated by signal amplifiers.

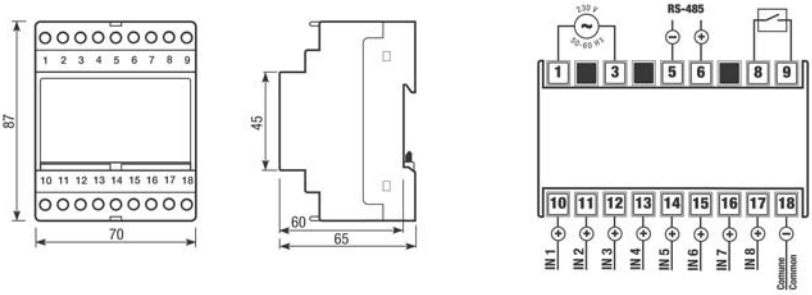
### Specifications

| | |
|---|---|
| Input frequency | 50 - 60Hz |
| Nominal input voltage | 230V ac |
| Input voltage tolerance | -15% to +10% of nominal |
| Nominal input voltage burden | 2VA |
| Digital communications | RS485 interface Modbus® protocol |
| Band handling | Dual charge |
| Baud rate | 9600 bits per second |
| Transmission mode | ASCII |
| Error detection method | Longitudinal redundancy check |
| Max number of contactors | Up to 8 input signals (1 and 3-phase) |
| Pulse input duration | <100 milliseconds |
| LED indicator display | Green – power supply<br>Red – data transit via RS485 |
| Enclosure material | Class V-0 in accordance with UL94 |
| Compliant with | IEC EN 61010-1, IEC EN 50081-1, IEC EN 50082-1, EMC and LVD |
| Operating temperature | -10°C to +45°C |
| Storage temperature | -25°C to +70°C |
| Relative humidity | 0 – 95%, non-condensing |
| Dimensions | 4 x DIN modules wide x 87mm high |
| IP protection | IP41 to front, IP20 to rear |

### Ordering Codes

| Description | Cat. no. |
|---|---|
| Remote kWh energy consumption monitoring device | DRK-485-230 |

### Dimensions and Connections




### Features

Collects up to 8 pulsed inputs
Remote monitoring device
Modbus® protocol
8 dip switch settings
Dual charge rate handling
Data transit and power indicators
4 DIN module format

### Benefits

Pulse collection
Increased energy efficiency and awareness
Balanced and safe systems
Maintenance free

### Applications

Switchgear
Distribution systems
Generator sets
Control panels
Energy management
Building management
Utility power monitoring
Process control
Motor control
Secondary metering

### Approvals

IEC EN 61010-1
IEC EN 50081-1
IEC EN 50082-1
EMC
LVD


# Single-phase DIN-rail kWh Energy Meters (Direct Connection)

## DRK-1P-230-D63

This three DIN module kWh energy meter measures the real consumption of active energy. The module meter has the highest accuracy class (1) with easy wiring, back illuminated LCD display, non-zeroing total counter and partial zeroing counter. This module passes the load cable through the case allowing up 63A direct connection.

### Specifications

| | |
|---|---|
| Active energy accuracy | Class 1 in accordance with CEI-EN 62053-21 |
| Input frequency | 50-60Hz |
| Nominal input voltage | 230V ac |
| Input voltage tolerance | -15% to +10% of nominal voltage |
| Nominal input voltage burden | <2.5VA |
| Max input current | 63A |
| Current input Ib | 10A |
| Start-up current | 40mA |
| Nominal input power burden | <2.5VA |
| Pulsed output | Opto-isolated, open collector |
| Pulsed voltage | 9-24 V dc $^{+}$/-10% (switchable O/P current 20mA max) |
| Pulsed duration | 100 milliseconds $^{+}$/-15% |
| Pulsed frequency | 1 per 0.1kWh |
| Display | LCD 7 + 5-digit |
| Reading resolution | 0.1kWh and/or 0.1MWh (automatic) |
| LED indicator display | Green – Power supply<br>Red – Flashing @ 10Wh |
| Enclosure material | Grey RAL 7035 class V-0 in accordance with UL94 |
| Compliant with | IEC EN 62052-11, IEC EN 62053-21, EMC and LVD |
| Operating temperature | -10°C to +45°C |
| Storage temperature | -25°C to +70°C |
| Relative humidity | 10% - 90%, non-condensing |
| Dimensions | 3 x DIN modules wide 53.7mm x 87mm high |
| Max. diameter of through-hole | 12.5mm |
| IP protection | IP51 at front, IP20 at rear |

### Features

Class 1 accuracy
Direct connected 63A
Pulsed output (Opto)
LCD display
Non-zeroing total counter
Active energy consumption indication
3 DIN module format

### Benefits

Energy efficiency and awareness
High accuracy
Balanced and safe systems
No maintenance

### Applications

Switchgear
Distribution systems
Generator sets
Control panels
Energy management
Building management
Utility power monitoring
Process control
Secondary metering

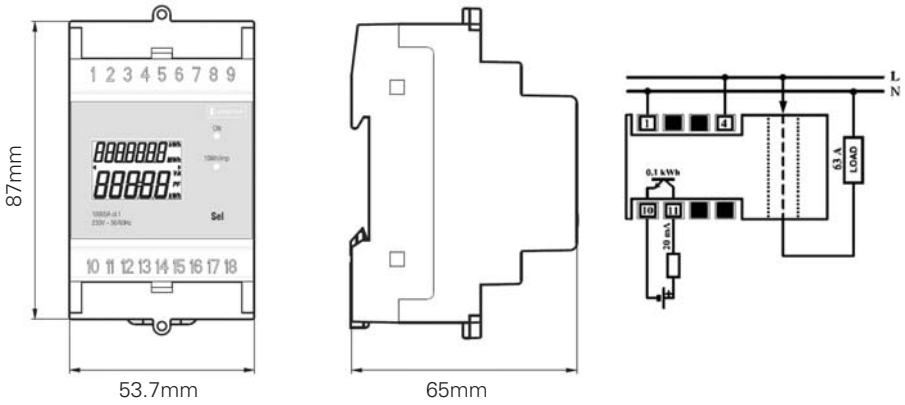
### Approvals

IEC EN62052-11
IEC EN62053-21
EMC and LVD

### Product Codes

| Description | Cat. no. |
|---|---|
| 1-phase 230V – 63A direct connected, pulsed output (Opto) | DRK-1P-230-D63 |

### Dimensions and Connections



# Three-phase DIN-rail kWh Energy Meters (Direct Connection)

## DRK-3P-400-D90

This seven DIN module kWh energy meter measures the real consumption of active energy. The module meter has the highest accuracy class (1) with easy wiring, back illuminated LCD display, non-zeroing total counter and partial zeroing counter. This module passes the load cable through the case allowing up 90A direct connection on a three-phase system.

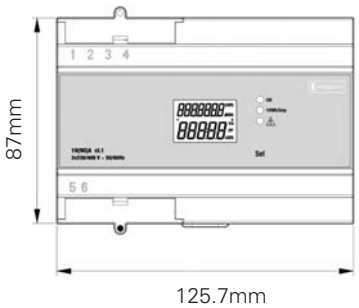
### Specifications

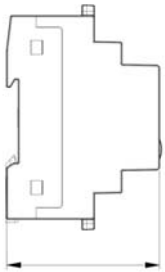
| | |
|---|---|
| Active energy accuracy | Class 1 in accordance with CEI-EN 62053-21 standard |
| Input frequency | 50 - 60Hz |
| Nominal input voltage | 3 x 230V ac L-N (400V L-L) |
| Input voltage tolerance | -15% to +10% of nominal voltage |
| Burden | < 2.5VA |
| Max input current | 90A |
| Input current Ib | 10A |
| Start-up current | 40mA |
| Pulsed output | Opto-isolated, open collector type |
| Pulsed voltage | 9-24V dc +/-10% (switchable O/P current 20mA max) |
| Pulsed duration | 100 milliseconds +/-15% |
| Pulsed frequency | 1 per 0.1 kWh |
| Display | LCD 7 + 5-digit |
| Reading resolution | 0.1 KWh from 0000000.0KWh – 999999.9KWh<br>1 KWh from 1000000KWh to 9999999KWh (Automatic) |
| LED indicator display | Green - power supply<br>Red - flashing @ 10Wh<br>Yellow – indicates wrong connection |
| Enclosure material | Grey RAL 7035 class V-0 in accordance with UL94 |
| Compliant with | IEC EN62052-11, IEC EN62053-21 (2003-03) EMC and LVD |
| Operating temperature | -10°C to +45°C |
| Storage temperature | -25°C to +70°C |
| Relative humidity | 10% - 90%, non-condensing |
| Dimensions | 7 x DIN modules wide 125.7mm x 87mm high |
| Max. diameter of through-hole | 12.5mm |
| IP protection | IP51 at front, IP20 at rear |

### Product Codes

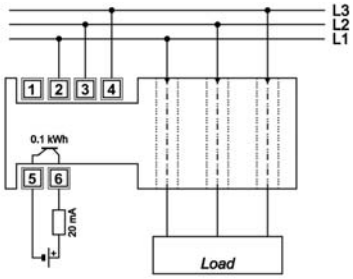
| Description | Cat. no. |
|---|---|
| 3-phase 230V L-N (400V L-L) – 90A direct connected, pulsed output (Opto) | DRK-3P-400-D90 |

### Dimensions and Connections

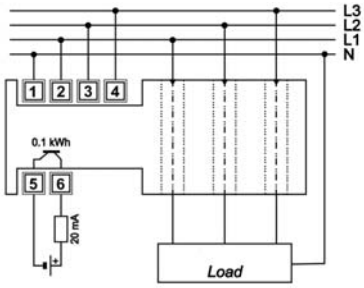



### Three-wire System




### Four-wire System




### Features

Class 1 accuracy
Direct connected 90A
Pulsed output (Opto)
LCD display
Non-zeroing total counter
Active energy consumption indication
7 DIN module format

### Benefits

Energy efficiency and awareness
High accuracy
Balanced and safe systems
No maintenance

### Applications

Switchgear
Distribution systems
Generator sets
Control panels
Energy management
Building management
Utility power monitoring
Process control
Secondary metering

### Approvals

IEC EN62052-11
IEC EN62053-21
EMC and LVD


# Panel Mounted kWh Energy Meters

## 240 ‘H’ Series DIN Panel

This Class 1 instrument uses microprocessor controlled circuitry for optimum performance and accuracy. Incoming voltage and current signals are converted into numbers representing instantaneous values. These are then multiplied together to give the instantaneous power.

This sampling is repeated many times during each waveform cycle allowing the accurate measurements of distorted waveforms. Incoming power is indicated by the pulsing red LED indicator. Accumulated values are registered on the energy counter.

### Introduction

The 240 ‘H’ series of kWh meters is a major upgrade in a product range offered by Tyco Electronics Crompton Instruments Business Unit. The self-contained meters are designed as either a stand-alone kWh counter or as a single integrated instrument combining a kWh counter with an analogue display of instantaneous power in Kilowatts. This provides both cost and space savings over conventional devices. ‘H’ series meters provide Class 1 accuracy and can also be used for secondary metering in switchgear, plant instrumentation and process control applications.

These meters offer increased functionality over traditional disc-type kWh meters, offering instantaneous Watt readings and providing pulsed output of kWh for data loggers and computers. They can be scaled in Watts, Kilowatts and Megawatts. A range of kVArh meters is also available. All models are switchboard panel mountable.

### Operational Principles

The electro-mechanical counters are auto-resetting.* Resetting is an option on LCD counter versions. Counter pulses may be outputted via volt-free relay contacts or from an opto-isolator as an option for high pulse rates

Instrument models displaying instantaneous power have a moving coil meter to provide the analogue readout. As an option, the instantaneous power reading can be made available as a current or voltage signal, similar to a power transducer.

* Automatically resets to 0000000 from 9999999

### Features

1% of reading to IEC 1036/ BS EN 61036

Compact 96mm DIN case

Switchboard panel door mountable

Combination of kWh or kVArh with instantaneous analogue Watts or VArs

Pulsed and analogue output options

7-digit electro-mechanical counter

### Application

Secondary metering

Energy management

Load control

Import/export energy management

Process control

Distorted waveform power measurement

Load profile data logging

## Options

The following 5 models all measure Watts or VArs but come with varying display options. All models can have optional analogue kW signal terminals and kWh pulse terminals at the rear. Analogue output is not available on the LCD counter version.

### Single Electro-mechanical Counter Model

This model incorporates a 7-digit auto-resetting* electro-mechanical kWh or kVArh counter. Relay or opto-isolator pulsed output and analogue output options are also available. The optional analogue output shows the instantaneous Watts or VArs on a separate analogue indicator.

* Automatically resets to 0000000 at 9999999


### Electro-mechanical Counter & Shortscale Indicator

This model incorporates a 7-digit auto-resetting* electro-mechanical kWh or kVArh counter and a short-scale instantaneous Watts or VArs indicator. Options include a relay or opto-isolator pulsed output and analogue output.

* Automatically resets to 0000000 at 9999999


### Two Electro-mechanical Counters

This model incorporates two 7-digit auto-resetting* electro-mechanical kWh or kVArh counters. Relay or opto-isolator pulsed output and analogue output options are available. Two counters permit registering of both import and export of kWh or kVArh.

* Automatically resets to 0000000 at 9999999


### Single LCD Counter

This model incorporates an 8-digit LCD kWh or kVArh counter and an optional external reset. Relay or opto-isolator pulsed output options are also available. An internal battery ensures constant display even without ac power and a 10 year memory back-up.

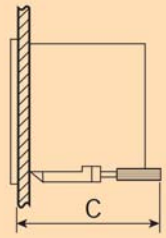
* Automatically resets to 00000000 at 99999999 but will display an * in the top left hand corner of the display

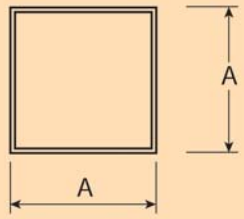

### Electro-mechanical Counter & Longscale Indicator

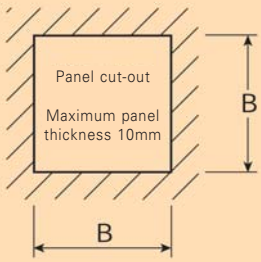
This model incorporates a 7-digit auto-resetting* electro-mechanical kWh or kVArh counter and a long-scale instantaneous Watt and VArs indicator. Relay or opto-isolator pulsed output and analogue output options are also available. This model gives precise indication of Watts or VArs.

* Automatically resets to 0000000 at 9999999

## Dimensions




| | A | B | C |
|---|---|---|---|
| 244 | 96 | 92 | 142 |

Dimensions in mm

## Ordering Codes for kWh Meters

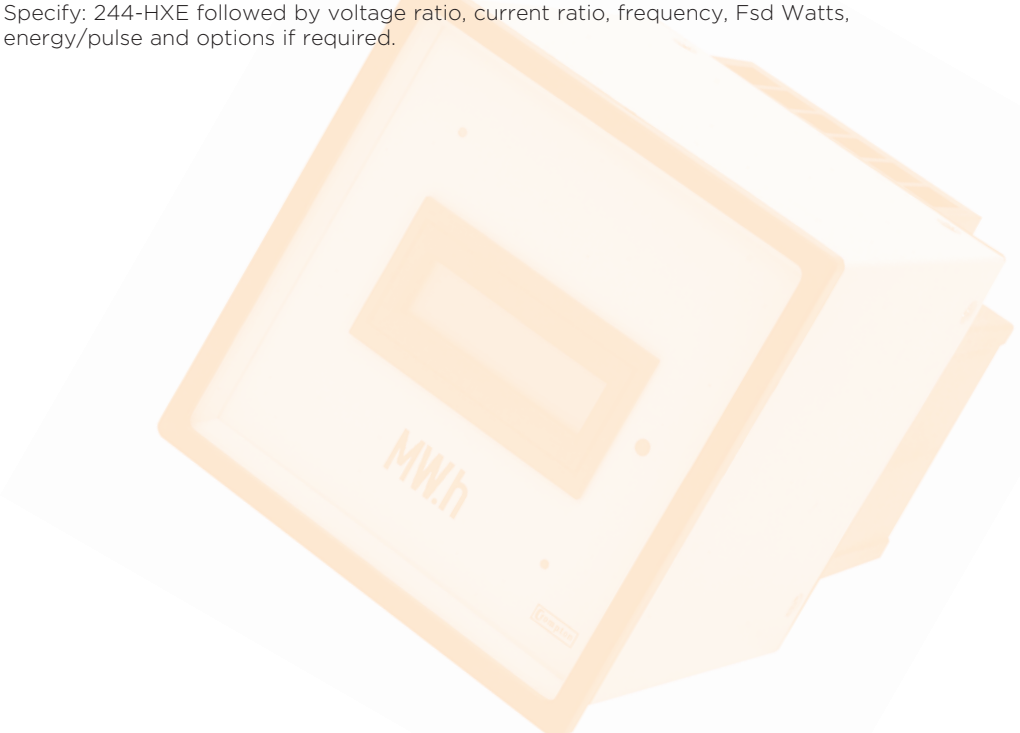
| Voltage system | Mechanical counter only | Mechanical counter + meter 90° scale | Import export counter only | LCD counter only | Mechanical counter + meter 240° scale |
|---|---|---|---|---|---|
| 1-phase | 244-HWM | 244-HWG | 244-HEM | 244-HWS | 244-HWB |
| 3-phase 3-wire balanced load | 244-HWN | 244-HWH | 244-HEN | 244-HWT | 244-HWC |
| 3-phase 3-wire balanced load with reversed CTs | 244-HW2 | 244-HW3 | – | 244-HW4 | – |
| 3-phase 4-wire balanced load | 244-HWY | 244-HWV | 244-HE7 | 244-HWZ | 244-HWU |
| 3-phase 3-wire unbalanced load | 244-HWP | 244-HWJ | 244-HEP | 244-HWW | 244-HWD |
| 3-phase 4-wire unbalanced load | 244-HWQ | 244-HWK | 244-HEQ | 244-HWX | 244-HWE |
| Transducer inputs | 244-KWL | 244-KWF | – | 244-KWR | 244-KWA |

Example: 3ph 4W unbalanced mechanical counter with 240° meter.
Specify: 244-HWE followed by voltage ratio, current ratio, frequency, Fsd Watts, energy/pulse and options if required.

## Ordering Codes for kiloVAr Hour Meters

| Voltage system | Mechanical counter only | Mechanical counter + meter 90° scale | Import export counter only | LCD counter only | Mechanical counter + meter 240° scale |
|---|---|---|---|---|---|
| 1-phase | 244-HXM | 244-HXG | – | – | – |
| 3-phase 3-wire balanced load | 244-HXN | 244-HXH | 244-HIN | 244-HXT | 244-HXC |
| 3-phase 3-wire unbalanced load | 244-HXP | 244-HXJ | 244-HIP | 244-HXW | 244-HXD |
| 3-phase 4-wire unbalanced load | 244-HXQ | 244-HXK | 244-HIQ | 244-HXX | 244-HXE |
| Transducer inputs | 244-KXL | 244-KXF | – | 244-KXR | 244-KXA |

Example: 3ph 4W unbalanced mechanical counter with 240° meter.
Specify: 244-HXE followed by voltage ratio, current ratio, frequency, Fsd Watts, energy/pulse and options if required.



## Specifications

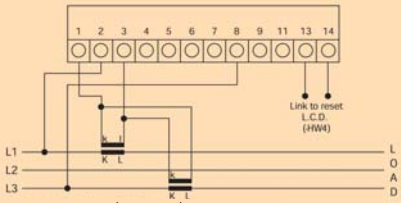
| | |
|---|---|
| Complies with | IEC 1036/BS EN 61036 |
| Case | Grade UL94V2 |
| Enclosure code | IP54 to IEC529, IP55 optional |
| Safety requirements | IEC 1010-1 (300V ac rms Category III installation, Degree 2 pollution |
| Vibration | Lloyd's shipping specifications |
| Dielectric strength | 2kV rms for 1 minute |
| Temperature range | Operational 0°C to +60°C; Storage –25°C to +70°C<br>Calibrated at 23°C |
| Temperature coefficient | 0.05%/per °C |
| Humidity range | Up to 95%, non-condensing |
| Accuracy | kWh or kVArh +/- 1% of reading<br>Watts or VArs +/- 1.5% of FS for long scale indicator<br>Watts or VArs +/- 2% of FS for short scale indicator<br>Class1 to IEC1036 and BS EN61036 (kWh functionality only) |
| Input | |
| Voltage | Nominal voltages 63.5, 110, 120, 220, 230, 240, 400, 415, 440, 480V ac or via VT |
| Voltage range | 57.7V to 480V ac or via VT |
| Voltage variation | +/- 20% of nominal system voltage |
| Current | 1 or 5 amps ac. CT operated |
| Frequency | 45 to 65Hz inclusive |
| Burden | |
| Voltage | Maximum 4VA per circuit |
| Current | Maximum 0.2VA per circuit |
| Overload | |
| Voltage | 1.2 times continuously 2 x rating for 5 seconds<br>Current: 2 times continuously 10 x rating for 5 seconds |
| Counter | |
| Electro-mechanical | 7-digit counts 9999999 and automatically resets at 9999999. Digit height 4mm. |
| Liquid crystal display (LCD) | 8-digit counts 99999999.<br>After the maximum reading is reached, an * will display in the top left hand corner. Digits will return to zero and the * will remain. Counter resettable via terminals in the rear of the unit. 10 year back-up power with included lithium battery.<br>Digit height 8 millimetre. |
| EMC | Please consult Technical Sheet T89/336 for full information. |

## Output kWh Measurement Options

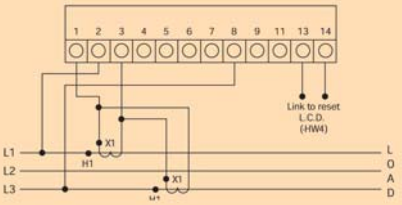
| | |
|---|---|
| **Note:** The pulse rate must be the same as the counter rate | |
| **1-pole relay** | |
| Ratings ac | 120V 5A non-inductive |
| Ratings dc | 30V resistive 5A resistive |
| Energy/pulse | Standard 1kWh/pulse |
| Maximum pulse rate | 10000/hr |
| Pulse duration | 50ms |
| **Opto-isolator** | |
| Output | Open collector |
| Switching | Up to 40mA 25V dc |
| | Observe the polarity |
| Energy/pulse | Standard 1kWh/pulse |
| Maximum pulse rate | 10000/hr |
| Pulse duration | 50ms |
| **Analogue output** | |
| Any standard transducer output (For instantaneous kW and kVAr measurement) | |
| To BSEN 60688 Class 0.5 (IEC688:1992) | |
| Accuracy range | 0/120% |
| Response time | <250ms |
| Compliance voltage | 10V |
| Open circuit | <20V |
| **Available outputs** | 0/1mA, 0/5mA, 0/1mA, 0/20mA and bipolar |
| | 0-1V, 0-5V, 0-10V and bipolar 4/20mA,1-5V |
| **Compliance voltage** | 10V |
| **Open circuit O/P voltage** | <20V |
| **Dielectric withstand test voltage** | 2.2kV rms for 1 minute |

## Connections

### Three-phase three-wire Balanced Load with Reversed Connected CTs



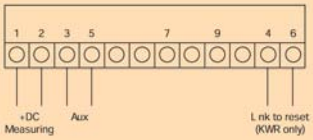

244-HW2/HW3/HW4




### Transducer Input Models

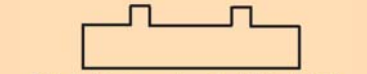
Pulsed output connections (optional) via relay 7 (NO), 9 (COM) and 11 (NC) via transistor 7 (+VE) and 9 (-VE)

244-KWA/KWF/KWL/KWR
KXL/KXF/KXR/KXA



### 244 - HW and HX

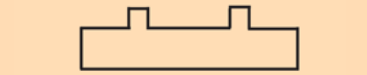
Opto-isolator output connection
N/O +VE COM -VE



| 15 | 16 | | 25 | 28 | 26 |
|---|---|---|---|---|---|
| + | – | | COM | N/O | N/C |

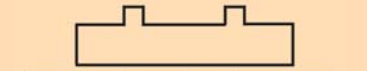
15 (+) Analogue O/P
16 (–) Analogue O/P

### 244 - HE and HI



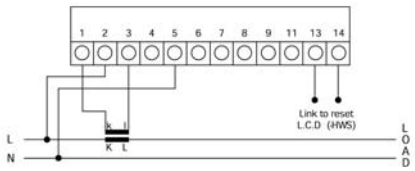
| 21 | 24 | 15 | 25 | 28 | 16 |
|---|---|---|---|---|---|
| COM | N/O | N/C | COM | N/O | N/C |
| EXPORT | | | IMPORT% | | |

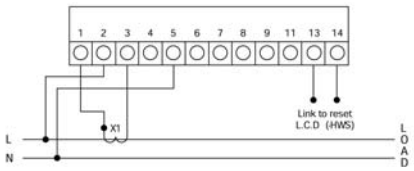
With analogue output



| 15 | 16 | 21 | 24 | 25 | 28 |
|---|---|---|---|---|---|
| + | – | COM | N/O | COM | N/O |
| | | EXPORT | | IMPORT | |

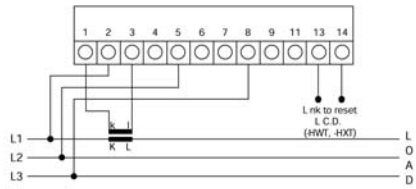
### Single-phase

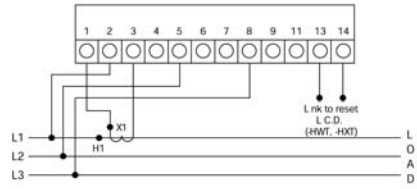



244-HWM/HWG/HWS/HWB
244-HEM
244-HXM/HXG

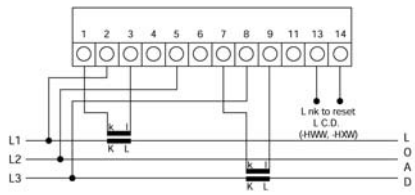
### Three-phase three-wire Balanced Load

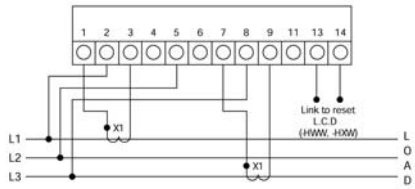



244-HWN/HWH/HWT/HWC
244-HEN
244-HXN/HXH/HXT/HXC
244-HIN

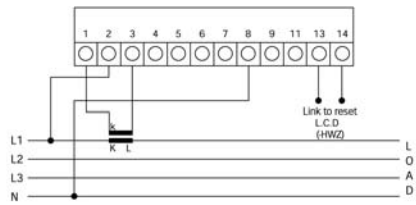
### Three-phase three-wire Unbalanced Load

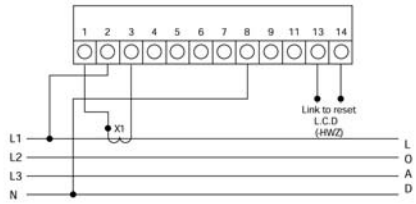



244-HWP/HWJ/HWW/HWD
244-HEP
244-HXP/HXJ/HXW/HXD
244-HIP

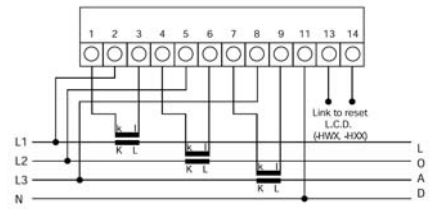
### Three-phase four-wire Balanced Load

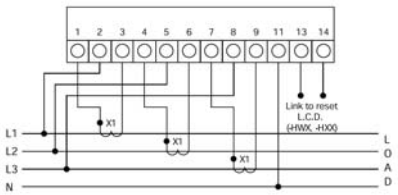



244-HWY/HWV/HWZ/HWU/HE7

### Three-phase four-wire Unbalanced Load




244-HWQ/HWK/HWX/HWE
244-HEQ
244-HXQ/HXK/HXX/HXE
244-HIQ

## KWH-400 Series DIN Panel

This self contained 96mm DIN panel mounted kilowatt hour meter measures the real consumption of active energy to Class 1.0 accuracy, displayed via a 6-digit auto-resetting electro-mechanical counter. The unit also provides status and diagnostic information via LED indicators on the front panel, and incorporates an integral pulsed output for communication of energy usage. The KWH-400 unit is designed for connection to either 3-phase 3-wire, or 3-phase 4-wire unbalanced loads and is ideal for secondary metering in switchgear, plant instrumentation and process control applications, offering considerable advantages over traditional rotating disc type kilowatt hour meters.


### 3-phase Voltage Status

The unit incorporates one green 'ON' LED for each voltage phase. Three illuminated LEDs indicate active monitoring of each of the three phases. In the event of a missing phase voltage, the appropriate LED will switch off, however, the meter will continue to accurately measure energy for the available voltage phases. A flashing green LED indicates incorrect phase sequence connection, and wiring should be checked. The meter will not give accurate readings if the phase sequence is incorrect.

### Reverse Connected Current Transformers

For each of the three phases, a red 'REV' LED will illuminate to indicate a reverse connected CT. The wiring should be checked, but the meter will continue to accurately register the energy consumption even if the CTs are reverse connected.

### Pulse Indicator

The unit features a dedicated red LED pulse indicator which flashes at a rate proportional to the measured power.

### Pulse Outputs

The KWH-400 unit features an integral pulsed output, pulsed at a rate proportional to the measured energy, and connected via screw clamp terminals. The pulse rate scales appropriately to the CT settings. The re-transmission of kWh time based energy status to TTL circuits, CMOS circuits or management systems is achieved via the fully volt free opto-isolator open collector transistor output. A pull-up resistor will be required, and it is advisable to use a Schmitt Trigger input for TTL.

### Current Transformers

To enable the safe and simple measurement of ac current, the KWH-400 unit requires a current transformer to be fitted to each of the three phases. An extensive range of suitable current transformers offering accurate measurement of ac current and ratio matching to a consistent 5 amp secondary current, proportional to the primary current is available.



### Features

Class 1.0 accuracy
Wide operating voltage 85V to 500V L-L 3-phase 3 and 4-wire
True RMS measurement
6-digit auto-resettable electro-mechanical counter
LED status and diagnostic indicators
Pulsed output
Fully programmable CT ratios
DIP switch settings
Fully isolated current input

### Benefits

Replaces the need for rotating disc meters
Energy efficiency and awareness
Industry standard DIN96 case style
Tamper proof
Low VA burden

### Applications

Switchgear
Distribution systems
Generator sets
Control panels
Embedded generation
Energy management
Building management
Utility power monitoring
Process control
Motor monitoring

### Compliant With

IEC 1036


## Programming and Scaling

The CT ratio is field programmable without any special tools via DIP switches mounted on the underside of the unit behind a tamper proof label.

Once the CT ratio has been programmed, the scale factor should be adjusted on the front display. A selfadhesive decimal point can be affixed in the appropriate position on the mechanical counter.

| CT Ratio | DIP Switch Setting | | | | Multiplier |
|---|---|---|---|---|---|
| | 4 | 3 | 2 | 1 | |
| 5/5A | 1 | 1 | 1 | 1 | 0.01 |
| 10/5A | 1 | 1 | 1 | 0 | 0.1 |
| 20/5A | 1 | 1 | 0 | 1 | 0.1 |
| 30/5A | 1 | 1 | 0 | 0 | 0.1 |
| 40/5A | 1 | 0 | 1 | 1 | 0.1 |
| 50/5A | 1 | 1 | 1 | 1 | 0.1 |
| 60/5A | 1 | 0 | 1 | 0 | 0.1 |
| 75/5A | 1 | 0 | 0 | 1 | 0.1 |
| 80/5A | 0 | 1 | 1 | 0 | 0.1 |
| 100/5A | 1 | 1 | 1 | 0 | 1 |
| 125/5A | 0 | 1 | 0 | 0 | 1 |
| 150/5A | 1 | 0 | 0 | 0 | 1 |
| 200/5A | 1 | 1 | 0 | 1 | 1 |
| 250/5A | 0 | 1 | 1 | 1 | 1 |
| 300/5A | 1 | 1 | 0 | 0 | 1 |
| 400/5A | 1 | 0 | 1 | 1 | 1 |
| 500/5A | 1 | 1 | 1 | 1 | 1 |
| 600/5A | 1 | 0 | 1 | 0 | 1 |
| 750/5A | 1 | 0 | 0 | 1 | 1 |
| 800/5A | 0 | 1 | 1 | 0 | 1 |
| 1000/5A | 1 | 1 | 1 | 0 | 10 |
| 1200/5A | 0 | 1 | 0 | 1 | 10 |
| 1250/5A | 0 | 1 | 0 | 0 | 10 |
| 1500/5A | 1 | 0 | 0 | 0 | 10 |
| 1600/5A | 0 | 0 | 1 | 1 | 10 |
| 2000/5A | 1 | 1 | 0 | 1 | 10 |
| 2500/5A | 0 | 1 | 1 | 1 | 10 |
| 3000/5A | 1 | 1 | 0 | 0 | 10 |
| 3200/5A | 1 | 1 | 0 | 1 | 10 |
| 4000/5A | 1 | 0 | 1 | 1 | 10 |
| 5000/5A | 1 | 1 | 1 | 1 | 10 |

## Specifications

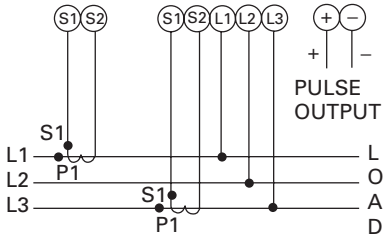
| | |
|---|---|
| Active energy accuracy | Class 1.0 +/- 1.0% of range maximum |
| Auxiliary supply | Self powered |
| Input frequency | 45-55HZ |
| Nominal input voltage | 110-400V L-L (63.5-230V L-N) |
| Input voltage tolerance | 85-500V L-L (49-288V L-N) |
| Nominal input voltage burden | <8VA |
| Nominal input current | 5A |
| Start up current | 0.2% of rated current |
| Max continuous input current | 6A |
| Nominal input current burden | <2 VA |
| Power factor | 0.5 lag – unity – 0.8 lead |
| Current measurement | 3 x current transformers (not included) |
| System CT primary ratios | 5, 10, 20, 30, 40, 50, 60, 75, 100, 150, 200, 250, 300, 400, 500, 600, 800, 1000, 1200, 1250, 1500, 1600, 2000, 3200, 5000A |
| Pulsed output | Volt free optical Isolator with open collector transistor output |
| Pulse capacity | 50V dc, <40mA |
| Pulse duration | >200 milli seconds |
| Counter | 6-digit auto-resetting electro-mechanical |
| Reading resolution | 1 per digit |
| LED Indicator display | 3 x Green: Voltage phase monitoring |
| 3 x Red | Reverse connected CT warning |
| Pulse indicator | Red LED flashing at 1 kWh |
| Enclosure style | Panel mount to DIN 42700 |
| Enclosure material | Glass filled polycarbonate |
| Terminals | M4 captive screw clamp |
| Fixing | 2 side clamps |
| Compliant with | IEC 1036. EMC and LVD |
| Operating temperature | 0 to +55°C |
| Storage temperature | -10 to +70°C |
| Relative humidity | 0 .. 95% non condensing |
| Dimensions | 96mm high x 96mm wide x 82mm deep |
| Panel cut out | 92mm x 92mm |
| IP protection | IP54 |
| Weight | 500g approx |

## Product Codes

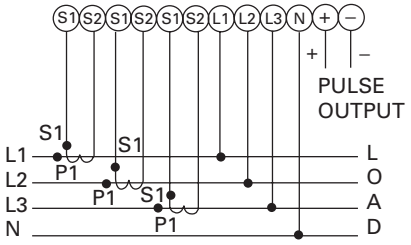
| Description | Cat. no. |
|---|---|
| 3-phase 3 and 4-wire, CT Connected 5A 110V L/L | KWH-110 |
| 3-phase 3 and 4-wire, CT Connected 5A 400V L/L | KWH-400 |

## Connections

**Three-phase Three-wire Unbalanced Load**




**Three-phase Four-Wire Unbalanced Load**




It is recommended that all voltage lines are fitted with 1 Amp HRC fuses.
For safety reasons, CT secondary connections should be grounded according to local codes of practice.

# ANSI AC Watt/Watt Hour Meters

A high quality range of switchboard instruments which complies with the American specification ANSI-C39.1(1981) accuracy Class 1. Moving coil indication gives instantaneous Watt reading. Self-contained circuitry drives an impulse counter to indicate KWh.

## Specifications

| | |
|---|---|
| Dielectric withstand | 2.3KV for 1 minute |
| Pulsed duration | 250 milliseconds +/- 15% |
| Pulse/hour | 1 per kWh Min 100/hour Max 10,000/hour |
| Counter | Counts 999999 then resets to 0. Height 4mm |
| Analogue response time | 2.5 seconds to full scale. Overshoot 33% max. |
| Operating temperature | 0°C to +40°C (077) -40°C to +70°C (078) |
| Storage temperature | -10°C to +50°C |
| IP protection | 077 to IP54 (NEMA 3S) 078 to IP67 (NEMA 6) |
| Input frequency | 50-60Hz |

## Self-contained (KHB/E/G) as above specification with below

| | |
|---|---|
| Input voltage | 63V to 480V |
| Input voltage tolerance | -20% to +10% of nominal voltage |
| Input voltage max burden | 1VA |
| Input current | 1A or 5A. CT operated |
| Input current max burden | 2VA |
| Dielectric withstand | 2.3KV for 1 minute |

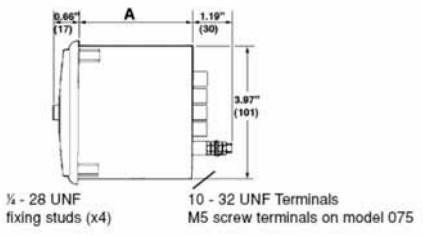
## Transducer driven (KHA) as above specification with below

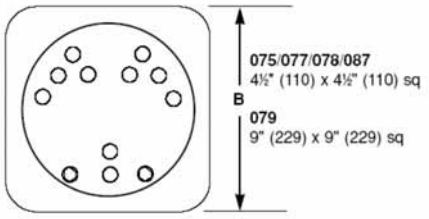
| | |
|---|---|
| Input voltage (aux) | 120V, 240V |
| dc input (from transducer) | 1mA, 4-20mA, 0-5V & 0-10V |

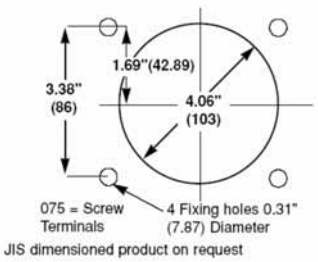
## Product Codes

| Description | Cat. no. |
|---|---|
| Transducer indicator - standard | 077-KHAU |
| Transducer indicator - sealed | 078-KHAU |
| 1-phase - standard | 077-KHBU |
| 1-phase - sealed | 078-KHBU |
| 3-phase 3-wire - standard | 077-KHEU |
| 3-phase 3-wire - sealed | 078-KHEU |
| 3-phase 4-wire - standard | 077-KHGU |
| 3-phase 4-wire - sealed | 078-KHGU |

## Dimensions




JIS dimensioned product on request

## Features

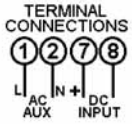
Class 1 accuracy
Rugged hi-Q taut band suspension
Bump shock and vibration proof
078 versions hermetically sealed

## Applications

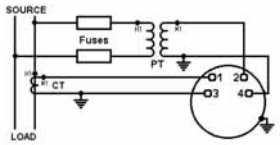
Load control
Distribution systems
Import/export energy management
Distorted waveform power Measurement
Process control
Secondary metering

## Connections

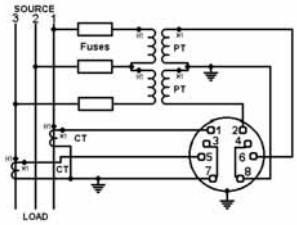
### Transducer Indicator (KHA)



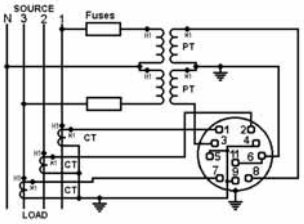

### Single-phase (KHB)




### Three-phase three-wire (KHE)




### Three-phase four-wire (KHG)



# Notes

**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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