

- >> MOVING IRON
- >> RECTIFIED MOVING COIL
- >> FREQUENCY METERS
- >> PHASE SEQUENCE INDICATORS
- >> NULL VOLTMETERS

- >> WATTMETERS
- >> VARMETEERS

DIN Square Measuring Instruments

# ELTIME CONTROLS

Global Suppliers of Measurement and Protection Equipment for Industry

- >> ELECTROMECHANICAL HOURMETERS
- >> LCD HOURMETERS
- >> KWK METERS
- >> MAXIMUM DEMAND METERS
- >> COUNTERS
- >> DIRECT READING KWK METERS
- >> LDA-C MULTIFUNCTION MONITORS
- >> DIGITAL TRIP UNITS
- >> LDA-C MULTIFUNCTION MONITORS
- >> CURRENT TRANSFORMERS
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- >> E-SERIES TRANSDUCERS
- >> ANALOGUE SIGNAL CONDITIONERS
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- >> EARTH LEAKAGE RELAYS
- >> CORE BALANCE TRANSFORMERS
- >> MULTIFUNCTION TIME RELAYS
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- >> ELECTRONIC TIMERS
- >> ROTARY SELECTOR SWITCHES
- >> TIMESWITCHES
- >> MINI-DISBARS

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## General Specification

### Reference Standards

Performance / Accuracy:	BS EN 60051-1, BS 89 and DIN 43780
Enclosure:	DIN 43700
Vibration Resistance:	DIN 43780
Measuring Ranges:	DIN 43701
Safety:	IEC 414
Dial Symbols:	IEC 51

### Environmental

Calibration Temperature:	23°C
Operating Temperature:	-25°C to 50°C
Temperature Coefficient:	±0.03%/ °C
Relative Humidity:	0 - 90% non-condensing

### Input

Input Burden:	See individual specifications
Overload:	See individual specifications
Response Time:	< 2seconds

### Scales

Dials:	White with black legends
Reference Standard:	DIN 43802
Scale Length:	DIN48 - 37mm DIN72 - 65mm DIN96 - 90mm

### Enclosure

Enclosure:	Flame retardant white ABS plastic case with black bezel Plain glass window is standard* but a polycarbonate window is available. (*Polycarbonate window is standard on EL meters)
Enclosure Code:	Case IP52 (IP65 with gasket optional) to IEC529 and BS5490
Insulation Test:	2kV rms 50Hz 1min (to IEC 414)
Markings:	CE marked

Specification subject to change without notice.



#### Models Available

**FE48MIA** DIN48 Moving Iron Ammeter

**FE72MIA** DIN72 Moving Iron Ammeter

**FE96MIA** DIN96 Moving Iron Ammeter

**FE48MIV** DIN48 Moving Iron Voltmeter

**FE72MIV** DIN72 Moving Iron Voltmeter

**FE96MIV** DIN96 Moving Iron Voltmeter

#### Product Features

- AC current or AC voltage
- Standard DIN square sizes
- Interchangeable scaleplates
- Many options available (see page 16)

For dimensions see pages 17-18

## Moving Iron Meters

Moving iron meters are suitable for the measurement of true rms AC current or voltage. All moving iron meters have interchangeable scaleplates. Scales are non-linear and are calibrated down to 20% of full scale. Ammeters are available with a 2x overload as standard or a 6x overload for monitoring motor start up currents.

Voltmeters are also available with scales for high voltage measurement via voltage transformers. All moving iron meters are calibrated for operation at 50/60Hz but calibration at 400Hz is available upon request. Moving iron meters may be used to measure DC at reduced accuracy.

## Moving Iron – for measurement of true rms DC current or voltage

#### Specification

##### Accuracy:

- Class 1.5 ( $\pm 1.5\%$  max. error)

##### Input Current, $I_n$ :

- 0-0.5A to 0-100A direct connected
- FE48 40A maximum direct
- 0-1A or 0-5A CT operated

##### Input Voltage, $U_n$ :

- 0-100V to 0-800V direct connected
- FE48 500V maximum

##### Scales:

- 0-0.5, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 15, 20, 25, 30, 40, 50, 60, 75, 80, 100, 120, 150, 200, 250, 300, 400, 500, 600, 800, 1000, 1200, 1500, 1600, 2000, 2500, 3000A
- 100, 150, 250, 300, 400, 500, 600, 800V

##### Overload:

- $1.2 \times I_n$  or  $U_n$  for 2 hours
- $10 \times I_n$  or  $U_n$  for 5 seconds

##### Frequency:

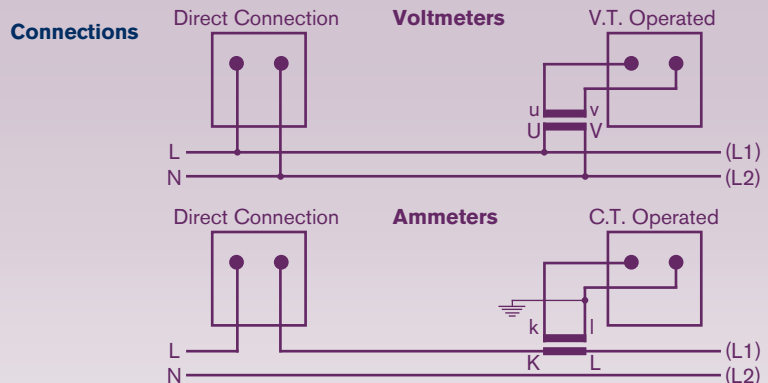
- 50/60Hz (400Hz upon request)

##### Burden:

- Ammeter  $< 1VA$ , Voltmeter  $< 3VA$

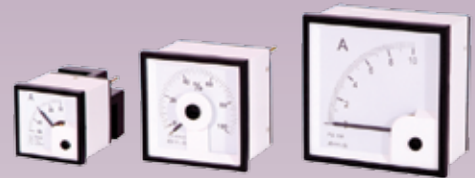
##### Weight:

- FE48 140g, FE72 190g, FE96 290g



#### Ordering information

Code	DIN Square Size & Movement Type	Meter Type	Input & Scaling
FE48MI	48 x 48mm Shortscale (90°)	-	-
FE72MI	72 x 72mm Shortscale (90°)	-	-
FE96MI	96 x 96mm Shortscale (90°)	-	-
A	-	Moving Iron Ammeter	-
V	-	Moving Iron Voltmeter	-
Specify	-	-	0.5 to 100A direct (FE48 – 40A max.)
Specify	-	-	1A or 5A from a CT
Specify	-	-	scaled 5A to 3000A
Specify	-	-	100, 150, 250, 300,
Specify	-	-	400, 500, 600, 800V (FE48 – 500V max.)
<b>Example</b>	<b>FE48MI</b>	<b>A</b>	<b>100/5A</b>



## Moving Coil Meters

Moving coil meters are suitable for measurement of DC current or voltage. All meters have a jewel and pivot movement which ensures reliability and accuracy. The moving coil meters are available in shortscale (90°) versions or longscale (240°) versions.

All meters have interchangeable scaleplates. Scales are linear and are calibrated from zero to full scale. Scaleplates are available in any process unit including A, V, °C, bar, rpm, kW and %, so meters can be driven from a transducer output.

### Models Available

- FE48MCA** DIN48 Moving Coil Ammeter
- FE72MCA** DIN72 Moving Coil Ammeter
- FE96MCA** DIN96 Moving Coil Ammeter
- FE72LSA** DIN72 240° Mov. Coil Ammeter
- FE96LSA** DIN96 240° Mov. Coil Ammeter

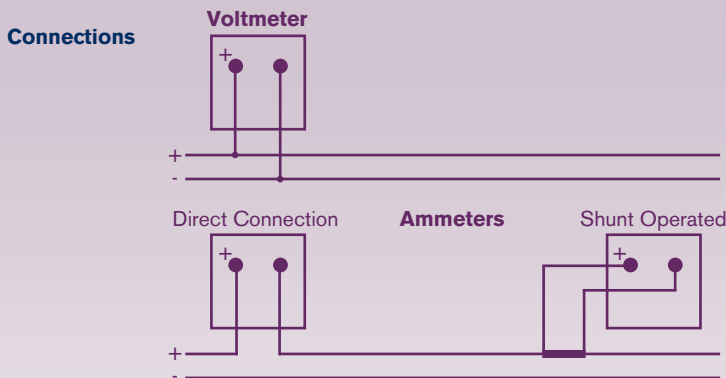
- FE48MCV** DIN48 Moving Coil Voltmeter
- FE72MCV** DIN72 Moving Coil Voltmeter
- FE96MCV** DIN96 Moving Coil Voltmeter
- FE72LSV** DIN72 240° Mov. Coil Voltmeter
- FE96LSV** DIN96 240° Mov. Coil Voltmeter

### Product Features

- DC current or DC voltage
- Standard DIN square sizes
- Interchangeable scaleplates

For dimensions see pages 17-18

## Moving Coil - for measurement of DC current or voltage



### Ordering information

Code	DIN Square Size & Movement Type	Meter Type	Input & Scaling
FE48MC	48 x 48mm Shortscale (90°)	-	-
FE72MC	72 x 72mm Shortscale (90°)	-	-
FE96MC	96 x 96mm Shortscale (90°)	-	-
FE72LS	72 x 72mm Longscale (240°)	-	-
FE96LS	96 x 96mm Longscale (240°)	-	-
A	-	Moving Coil Ammeter	-
V	-	Moving Coil Voltmeter	-
Specify	-	50µA to 40A direct (FE48 - 25A max.)	-
Specify	-	> 40A use shunt & 50, 60, 75mV Voltmeter (c/w scale)	-
Specify	-	4-20mA (c/w scale)	-
Specify	-	50mV to 800V (FE48 - 500V max.)	-
<b>Example</b>	<b>FE72MC</b>	<b>V</b>	<b>100Vdc</b>

### Specification

- Accuracy:**
  - Class 1.5 ( $\pm 1.5\%$  max. error)
- Input Current,  $I_n$ :**
  - 0-50µA to 0-40A direct connected
  - FE48 25A maximum direct
  - > 0-40A use shunt and mV voltmeter
  - 4-20mA
- Input Voltage,  $U_n$ :**
  - 0-50mV to 0-800V direct connected
  - FE48 500V maximum
- Scales:**
  - 0-1, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 15, 20, 25, 30, 40, 50, 60, 75, 80, 100, 120, 150, 200, 250, 300, 400, 500, 600, 800, 1000, 1200, 1500, 1600, 2000, 2500, 3000 µA, mA, A, mV, V
- Overload:**
  - $1.2 \times I_n$  or  $U_n$  for 2 hours
  - $10 \times I_n$  or  $U_n$  for 5 seconds
- Voltage Drop:**
  - Ammeter < 100mV
- Current Consumption:**
  - Voltmeter < 200V 1mA, > 200V 200µA
- Weight:**
  - FE48 140g, FE72 190g, FE96 280g
  - FE72LS 310g, FE96LS 360g



#### Models Available

- FE72MCRA** DIN72 Rect. M.C. Ammeter
- FE96MCRA** DIN96 Rect. M.C. Ammeter
- FE72LSRA** DIN72 240° Rect. M.C. Ammeter
- FE96LSRA** DIN96 240° Rect. M.C. Ammeter

- FE48MCRV** DIN48 Rect. M.C. Voltmeter
- FE72MCRV** DIN72 Rect. M.C. Voltmeter
- FE96MCRV** DIN96 Rect. M.C. Voltmeter
- FE72LSRV** DIN72 240° Rect. M.C. Voltmeter
- FE96LSRV** DIN96 240° Rect. M.C. Voltmeter

#### Product Features

- Linear AC current or AC voltage
- Standard DIN square sizes
- Interchangeable scaleplates
- Many options available (see page 16)

For dimensions see pages 17-18

## Rectified Moving Coil Meters

Rectified moving coil meters are suitable for measurement of average rms AC current or voltage. All meters have a jewel and pivot movement which ensures reliability and accuracy. The moving coil meters are available in shortscale (90°) versions or longscale (240°) versions.

All meters have interchangeable scaleplates. Scales are linear and are calibrated from zero to full scale. All meters are calibrated at 50Hz but can be calibrated at an alternative frequency upon request.

## Rectified Moving Coil – for measurement of average rms AC current or voltage

#### Specification

##### Accuracy:

- Class 1.5 ( $\pm 1.5\%$  max. error)

##### Input Current, $I_n$ :

- 0-0.1 to 0-5A direct connected
- 0-1A or 0-5A CT operated
- FE48 not available

##### Input Voltage, $U_n$ :

- 0-10V to 0-800V direct connected
- FE48 500V maximum

##### Scales:

- 0-0.1, 0.2, 0.5, 1, 1.5, 2, 2.5, 3, 4, 5A
- 5A to 3000A CT operated (1A or 5A)
- 0-10, 15, 20, 25, 30, 40, 50, 60, 75, 80, 100, 120, 150, 200, 250, 300, 400, 500, 600, 800V

##### Overload:

- 1.2 x  $I_n$  or  $U_n$  for 2 hours
- 10 x  $I_n$  or  $U_n$  for 5 seconds

##### Frequency:

- 50Hz (up to 400Hz upon request)

##### Voltage Drop:

- Ammeter < 100mV

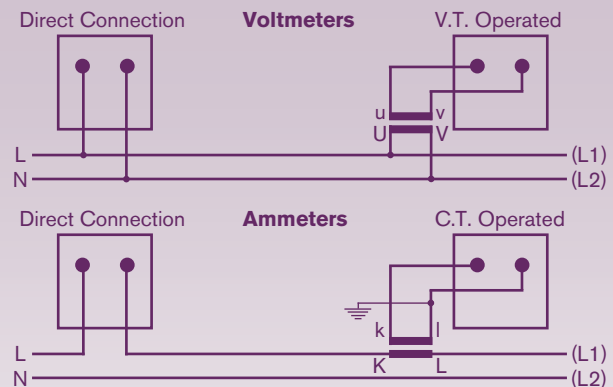
##### Current Consumption:

- Voltmeter < 200V 1mA, > 200V 200 $\mu$ A

##### Weight:

- FE48 170g, FE72 210g, FE96 310g
- FE72LS 350g, FE96LS 400g

#### Connections



#### Ordering information

Code	DIN Square Size & Movement Type	Meter Type	Input & Scaling
FE48MC	48 x 48mm Shortscale (90°) (R/A n/a)	-	-
FE72MC	72 x 72mm Shortscale (90°)	-	-
FE96MC	96 x 96mm Shortscale (90°)	-	-
FE72LS	72 x 72mm Longscale (240°)	-	-
FE96LS	96 x 96mm Longscale (240°)	-	-
RA	-	Rectified Moving Coil Ammeter	-
RV	-	Rectified Moving Coil Voltmeter	-
Specify	-	-	0.1 to 5A direct
Specify	-	1A or 5A from a CT scaled 5A to 3000A	-
Specify	-	-	10 to 800V
	-	-	(FE48 – 500V max.)
<b>Example</b>	<b>FE48MC</b>	<b>RV</b>	<b>100V</b>

## Frequency Meters

Frequency meters are suitable for the measurement of the frequency of an AC supply. All meters have a jewel and pivot movement which ensures reliability and accuracy. The frequency meters are available in shortscales (90°) versions or longscales (240°) versions.

All frequency meters have interchangeable scaleplates. Scales are linear and are calibrated from 45 to 65Hz with a suppressed zero. Frequency meters with dual scales (Hz & rpm) are available to display generator speed. High frequency (360-440Hz) meters and dual voltage input (110V & 230V) frequency meters are also available.



### Models Available

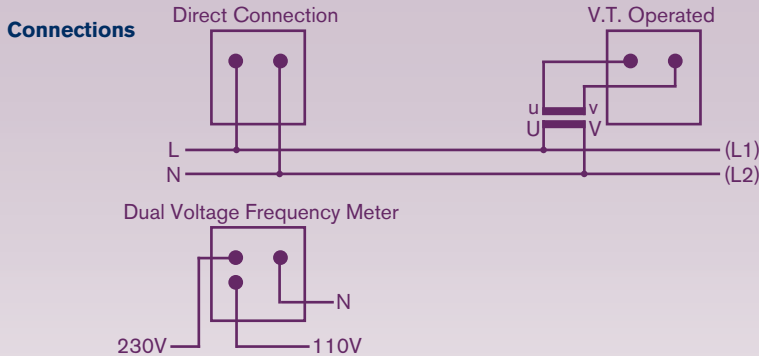
- FE48F** DIN48 Frequency Meter
- FE72F** DIN72 Frequency Meter
- FE96F** DIN96 Frequency Meter
- FE72LSF** DIN72 Longscale Frequency Meter
- FE96LSF** DIN96 Longscale Frequency Meter

### Product Features

- Frequency measurement
- Standard DIN square sizes
- Interchangeable scaleplates
- Many options available (see page 16)

For dimensions see pages 17-18

## Frequency Meters – for measurement of AC frequency

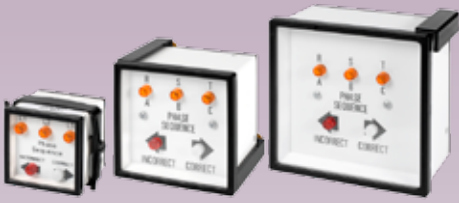


### Specification

- Accuracy:**
  - Class 0.5 ( $\pm 0.5\%$  max. error)
- Input Voltage,  $U_n$ :**
  - 110, 230 or 415V
- Scales:**
  - 45-65Hz
  - 45-65Hz & 1350-1950rpm
  - 360-440Hz
- Overload:**
  - $1.2 \times U_n$  for 2 hours
  - $10 \times U_n$  for 5 seconds
- Burden:**
  - 2VA at 230V
- Weight:**
  - FE48 150g
  - FE72 190g
  - FE96 290g

### Ordering information

Code	DIN Square Size & Movement Type	Scaling	Input
FE48	48 x 48mm Shortscale (90°)	-	-
FE72	72 x 72mm Shortscale (90°)	-	-
FE96	96 x 96mm Shortscale (90°)	-	-
FE72LS	72 x 72mm Longscale (240°)	-	-
FE96LS	96 x 96mm Longscale (240°)	-	-
F	-	45-65Hz	-
FR	-	45-65Hz & 1350-1950rpm	-
FD	-	45-65Hz @ 110 & 230V	-
FH	-	360-440Hz	-
Specify	-	-	110, 230, 415V
<b>Example</b>	<b>FE48</b>	<b>F</b>	<b>230V</b>



#### Models Available

**FE48PSI** DIN48 Phase Sequence Indicator

**EL72PSI** DIN72 Phase Sequence Indicator

**EL96PSI** DIN96 Phase Sequence Indicator

#### Product Features

- Phase sequence indication
- Standard DIN square sizes
- Highly visible neon display
- Many options available (see page 16)

For dimensions see pages 17-18

## Phase Sequence Indicators

Phase sequence indicators are suitable for monitoring the correct connection of a three phase AC supply. Incorrect phase connection or the loss of one phase will often cause serious damage to motors in compressors, generators, pumps and heating & ventilation equipment.

The presence or absence of the three phases is indicated by three amber neons. Only when all three phases are present and in the correct sequence will the white neon illuminate. Any loss of phase or incorrect sequence is indicated by a red neon.

## Phase Sequence Indicators – for correct connection of a three phase supply

#### Specification

##### Input Voltage, $U_n$ :

- 150 to 500Vac

##### Overload:

- 1.2 x  $U_n$  for 2 hours
- 10 x  $U_n$  for 5 seconds

##### Frequency:

- 50/60Hz

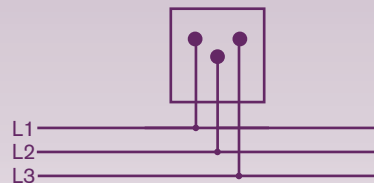
##### Burden:

- 3VA

##### Weight:

- FE48 100g
- EL72 150g
- EL96 200g

#### Connections



#### Ordering information

Code	DIN Square Size & Meter Type
FE48PSI	48 x 48mm Phase Sequence Indicator
EL72PSI	72 x 72mm Phase Sequence Indicator
EL96PSI	96 x 96mm Phase Sequence Indicator
<b>Example</b>	<b>EL96PSI</b>

## Wattmeters & Varmeters

Wattmeters and Varmeters are suitable for the measurement of active power (Watts) or reactive power (Vars). DIN96 meters are self contained whilst all smaller units are connected to a separate converter unit and calibrated as a complete unit to individual requirements.

The converter unit has finger-proof terminal covers and can be remotely DIN rail mounted. All meters have a jewel and pivot movement which ensures reliability and accuracy. The Wattmeters and Varmeters are available in shortscale (90°) only. Scales are linear and are calibrated from zero to full scale.

**Notes:**

1. Ensure that current transformers are mounted such that K faces the supply and L faces the load.
2. Secondary windings of the current transformers should be earthed.
3. No isolation is provided between input AC voltage and DC output on converter unit.



**Models Available**

- FE48W** DIN48 Wattmeter with Converter
- FE72W** DIN72 Wattmeter with Converter
- EL96W** DIN96 Wattmeter - Self Contained

- FE48V** DIN48 Varmeter with Converter
- FE72V** DIN72 Varmeter with Converter
- EL96V** DIN96 Varmeter - Self Contained

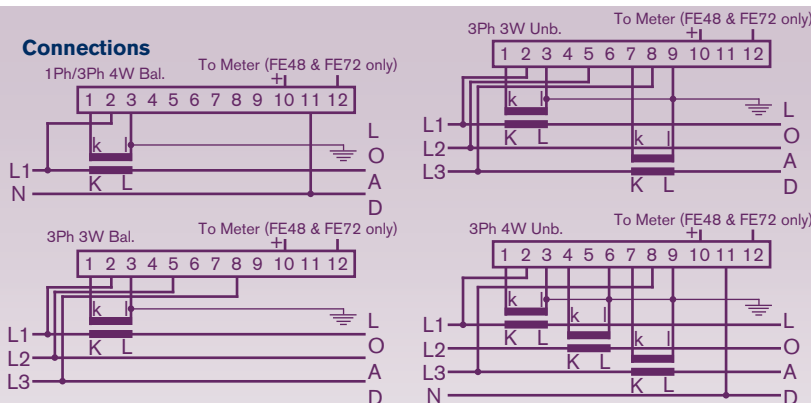
**Product Features**

- Active power (Watts) or Reactive power (Vars)
- Standard DIN square sizes
- Many options available (see page 16)

For dimensions see pages 17-18

## Wattmeters & Varmeters – for measurement of active or reactive power

**Connections**



**Ordering information**

Code	DIN Square Size & Movement Type	Meter Type	Input & Scaling
FE48W	48 x 48mm Shortscale (90°) Wattmeter	-	-
FE72W	72 x 72mm Shortscale (90°) Wattmeter	-	-
EL96W	96 x 96mm Shortscale (90°) Wattmeter	-	-
/1	-	Single Phase	-
/2	-	3 Phase 3 Wire Balanced	-
/3	-	3 Phase 3 Wire Unbalanced	-
/4	-	3 Phase 4 Wire Balanced	-
/5	-	3 Phase 4 Wire Unbalanced	-
Specify	-	Voltage (L-N or L-L), Current (CT Ratio)	-
Specify	-	and/or full scale Watts/Vars	-
<b>Example</b>	<b>EL72W</b>	<b>/5</b>	<b>230VL-N, 100/5A</b>

**Specification**

- Accuracy:**
- Class 1.5 ( $\pm 1.5\%$  max. error)
- Input Current,  $I_n$ :**
- 0-0.2A to 0-10A direct connected
  - 1A or 5A CT operated
- Input Voltage,  $U_n$ :**
- 110, 230 or 415V (-15% to +10%)
  - (50 to 600V upon request)
- Frequency:**
- 50/60Hz
- Scales:**
- 0-1 to 0-1000 W/Var, kW/kVar or MW/MVar
- Overload:**
- 1.2 x  $I_n$  or  $U_n$  for 2 hours
  - 6 x  $I_n$  for 5 seconds
- Burden:**
- Voltage circuit < 2VA per phase
  - Current circuit < 1VA per phase
- Response Time:**
- < 1 second
- Weight:**
- FE48 140g, FE72 180g, EL96 320g
  - Converter unit 200g
- Converter Unit Enclosure:**
- 55mm wide grey ABS
  - Case IP40, terminals IP20
  - Fixes to 35mm DIN rail (DIN-EN 50022)



## Power Factor (cos $\phi$ ) Meters

Power factor meters are suitable for the measurement of power factor (cos $\phi$ ). DIN96 meters are self contained whilst all smaller units are connected to a separate converter unit and calibrated as a complete unit to individual requirements. The converter unit has finger-proof terminal covers and can be remotely DIN rail mounted.

All meters have a jewel and pivot movement which ensures reliability and accuracy. The power factor meters are available in shortscale (90°) only. Scales are non-linear, bi-directional and are calibrated from 0.5 lead to 0.5 lag.

### Notes:

1. Ensure that current transformers are mounted such that K faces the supply and L faces the load.
2. Secondary windings of the current transformers should be earthed.
3. No isolation is provided between input AC voltage and DC output on converter unit.

### Models Available

- FE48PF1** DIN48 1ph/3ph4w cos $\phi$  Meter
  - FE72PF1** DIN72 1ph/3ph4w cos $\phi$  Meter
  - FE48PF3** DIN48 3ph3w cos $\phi$  Meter
  - FE72PF3** DIN72 3ph3w cos $\phi$  Meter
- (all above are complete with a converter unit)

- FE96PF1** DIN96 1ph/3ph4w cos $\phi$  Meter
  - FE96PF3** DIN96 3ph3w cos $\phi$  Meter
- (both above are self contained)

### Product Features

- Power factor (cos $\phi$ ) measurement
- Standard DIN square sizes
- Many options available (see page 16)

For dimensions see pages 17-18

## Power Factor Meters – for measurement of power factor (cos $\phi$ )

### Specification

#### Accuracy:

- Class 1.5 ( $\pm 1.5\%$  max. error)

#### Input Current, $I_n$ :

- 0-0.2A to 0-10A direct connected
- 1A or 5A CT operated

#### Input Voltage, $U_n$ :

- 110, 230 or 415V (-30% to +10%)
- (50 to 600V upon request)

#### Frequency:

- 50/60Hz

#### Scale:

- 0.5 lead to 0.5 lag

#### Overload:

- 1.2 x  $I_n$  or  $U_n$  for 2 hours
- 6 x  $I_n$  for 5 seconds

#### Burden:

- Voltage circuit < 2VA per phase
- Current circuit < 1VA per phase

#### Response Time:

- < 1 second

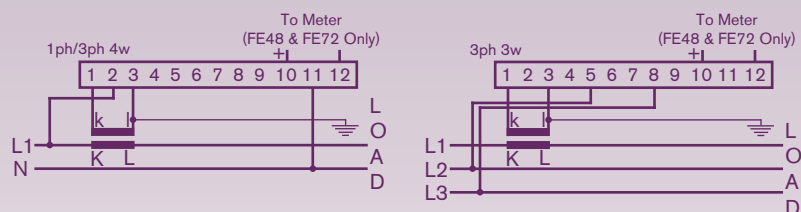
#### Weight:

- FE48 140g, FE72 180g, FE96 350g
- Converter unit 150g

#### Converter Unit Enclosure:

- 55mm wide grey ABS
- Case IP40, terminals IP20
- Fixes to 35mm DIN rail (DIN-EN 50022)

### Connections



### Ordering information

Code	DIN Square Size & Movement Type	Meter Type	Input
FE48PF	48 x 48mm Shortscale (90°) Cos $\phi$ meter	-	-
FE72PF	72 x 72mm Shortscale (90°) Cos $\phi$ meter	-	-
FE96PF	96 x 96mm Shortscale (90°) Cos $\phi$ meter	-	-
1	-	Single Phase / 3 Phase 4 Wire Balanced	-
3	-	3 Phase 3 Wire Balanced	-
Specify	-	-	Voltage (L-N or L-L) and Current
<b>Example</b>	<b>FE96PF</b>	<b>1</b>	<b>230VL-N, 5A</b>

## Maximum Demand Meters

Maximum demand meters are suitable for measuring the maximum average load current over a 15 minute time period. Due to their inherent time lag the bimetallic movement remains unaffected by any momentary or short duration overloads. The mean maximum demand is therefore indicated by a red 'drag' pointer which can be set or reset to zero using the front control knob.

The FE96MDIA version also includes an instantaneous reading ammeter for constant monitoring of current demand. The meters are available to operate from 5A secondary rated current transformers. Scales are non-linear and are calibrated from 20% to 120% of full scale current.



### Models Available

**FE96MDI** DIN96 Maximum Demand Meter

**FE96MDIA** DIN96 Maximum Demand Meter with Ammeter

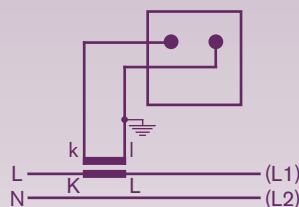
### Product Features

- Maximum current demand measurement
- Standard DIN square size
- Interchangeable scaleplates
- Many options available (see page 16)

For dimensions see pages 17-18

## Maximum Demand - for measuring the maximum average load current

### Connections



### Ordering information

Code	DIN Square Size & Meter Type	Input & Scaling
FE96MDI	96 x 96mm Maximum Demand Meter	-
FE96MDIA	96 x 96mm Maximum Demand with Ammeter	-
Specify	-	50/5A to 2500/5A (specify)
<b>Example</b>	<b>FE96MDIA</b>	<b>100/5A</b>

### Specification

#### Accuracy:

- Class 1.5 ( $\pm 1.5\%$  max. error)

#### Input Current, $I_n$ :

- 5A CT operated

#### Scales:

- 0-50, 100, 150, 200, 250, 300, 400, 500, 600, 800, 1000, 1200, 1500, 1600, 2000, 2500A

#### Response Time:

- 15 minutes

#### Overload:

- $1.2 \times I_n$  for 2 hours
- $10 \times I_n$  for 5 seconds

#### Frequency:

- 50/60Hz (400Hz upon request)

#### Burden:

- $< 2.5VA$

#### Weight:

- FE96MDI 260g
- FE96MDIA 300g



### Models Available

- BZW48/2-E** DIN48 Black AC Panel Mounted
- BZW48/2-A** DIN48 Black AC - DIN Rail Mount
- BZG48/2-E** DIN48 Black DC Panel Mounted
- BZG48/2-A** DIN48 Black DC - DIN Rail Mount

- HE72ETM/A** DIN72 White AC Panel Mounted
- HE72ETM/D** DIN72 White DC Panel Mounted
- HE96ETM/A** DIN96 White AC Panel Mounted
- HE96ETM/D** DIN96 White DC Panel Mounted

### Product Features

- Hours run monitoring
- Standard DIN square sizes
- Non-resettable
- Many options available (see page 16)

For dimensions see pages 17-18

## Hours Run Meters (Electromechanical)

Hours run meters are suitable for monitoring equipment and scheduling of events. The meters are ideal for recording running time, maintenance intervals or machine utilisation. The electromechanical movement ensures the count is retained in the event of power loss. They are available in several sizes of DIN enclosure and are available to operate on a comprehensive variety of supply voltages and frequencies, including DC.

The DIN48 black hourmeters are available to panel mount or surface/DIN rail mount. Optional 55mm and 72mm bezels enable circular hole mounting and optional gaskets are also available for all models. The DIN48 hourmeters have finger-proof terminals whilst the DIN72 and DIN96 hourmeters are supplied with a terminal cover.

## Hours Run Meters – for monitoring hours of operation on machines

### Specification

#### Counting Range:

- 99,999.99 hours with power indication

#### Numerals:

- DIN48: 3.5mm high (with magnifier)
- DIN72/DIN96: 4mm high

#### Enclosure:

- Flame retardant ABS to DIN 43700

#### Enclosure Code:

- DIN48: IP65 front
- DIN72/DIN96: IP54 front (IP65 optional)

#### Mounting:

- DIN rail: BZW48/2-A & BZG48/2-A
- Panel mounting: all others

#### Operating Voltages:

- 24, 48, 110, 230, 415Vac ( $\pm 10\%$ )
- 10-80, 80-220Vdc ( $\pm 10\%$ )

#### Test Voltage:

- 2.5kV rms for 1 minute

#### Frequency:

- 50 or 60Hz

#### Power Consumption:

- Approximately 10mA at rated voltage

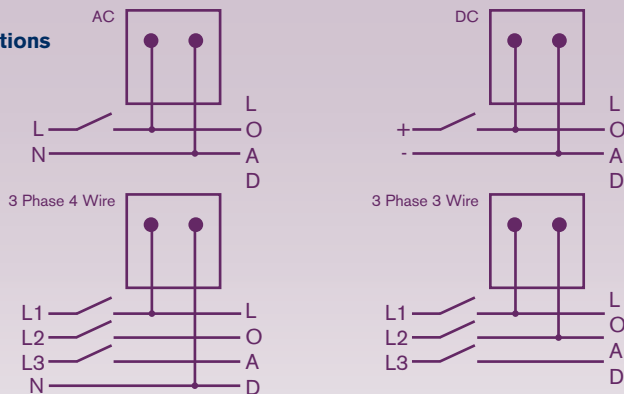
#### Terminals:

- Polarity marked screw clamp

#### Weight:

- DIN48 60g, DIN72 150g, DIN96 190g

### Connections



### Ordering information

Code	DIN Square Size & Mounting Type	Voltage	Frequency
BZW48/2-E	48 x 48mm AC Panel Mounting	-	-
BZW48/2-A	48 x 48mm AC DIN Rail/Surface Mounting	-	-
BZG48/2-E	48 x 48mm DC Panel Mounting	-	-
BZG48/2-A	48 x 48mm DC DIN Rail/Surface Mounting	-	-
HE72ETM/A	72 x 72mm AC Panel Mounting	-	-
HE72ETM/D	72 x 72mm DC Panel Mounting	-	-
HE96ETM/A	96 x 96mm AC Panel Mounting	-	-
HE96ETM/D	96 x 96mm DC Panel Mounting	-	-
Specify	-	24, 48, 110, 230, 415Vac	-
Specify	-	10-80, 80-220Vdc	-
Specify	-	-	DC, 50 or 60Hz
<b>Example</b>	<b>BZW48/2-E</b>	<b>230V</b>	<b>50Hz</b>

## Hours Run Meters (LCD)

LCD hours run meters are suitable for monitoring equipment and scheduling of events. These solid state electronic meters are black and feature an LCD display with large 7mm digits and optional electrical reset. The LCD hours run meters are available in two different DIN sizes and have exceptional reliability even in severe environments.

Memory is retained in excess of 25 years in the power off condition, by the use of non-volatile memory, so no internal battery is required. These instruments can record upto 99,999.9 hours before resetting with a 0.1 hour resolution, and have separate power and input terminals. Power consumption is minimal over the wide AC/DC supply voltage bands.



### Models Available

**DH24** DIN24x48 LCD Hours Run Meter

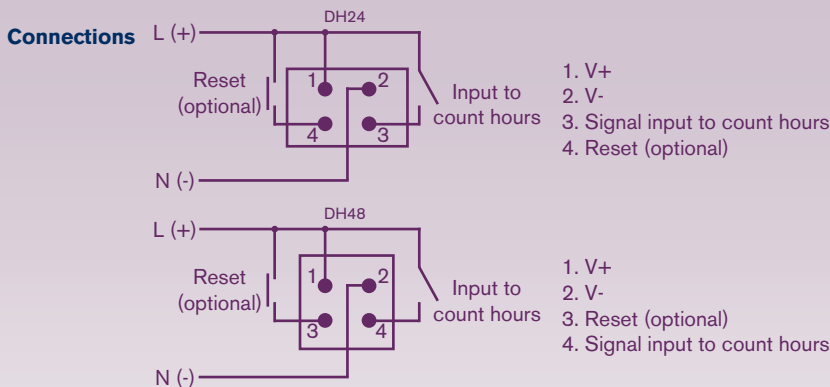
**DH48** DIN48 LCD Hours Run Meter

### Product Features

- Hours run monitoring
- Standard DIN sizes
- Non-resettable or resettable
- Many options available (see page 16)

For dimensions see pages 17-18

## Hours Run Meters - for monitoring hours of operation on machines



### Specification

**Display:**

- 6 digit LCD

**Counting Range:**

- 99,999.9 hours with operation indication

**Numerals:**

- DH24: 5mm high

- DH48: 7mm high

**Accuracy:**

- ±0.04% maximum error

**Enclosure:**

- Flame retardant ABS to DIN 43700

**Enclosure Code:**

- IP52 front

**Mounting:**

- Panel mounting

**Operating Voltages:**

- L: 9-60Vdc and 15-75Vac

- H: 36-185Vdc and 75-270Vac

**AC Frequency Range:**

- 48 to 440Hz

**Power Consumption:**

- < 2mA

**Terminals:**

- DH24: 4.8mm spade terminals

- DH48: 6.4mm spade terminals

**Weight:**

- DH24 40g, DH48 70g

### Ordering information

Code	DIN Size	Reset Type	Voltage
DH24	24 x 48mm LCD Hours Run Meter	-	-
DH48	48 x 48mm LCD Hours Run Meter	-	-
N	-	Non-Resettable	-
R	-	Electrical Reset	-
L	-	-	9-60Vdc & 15-75Vac
H	-	-	36-185Vdc and 75-270Vac
<b>Example</b>	<b>DH24</b>	<b>R</b>	<b>L</b>



## Energy Meters (kWh Meters)

Kilowatt hour meters are suitable for the monitoring of active energy (kWh) in all types of sub-metering applications. Models are available for single phase and three phase, balanced and unbalanced loads, as well as DC systems. The panel mounting kWh meters are accurate to class 1 to IEC1036 and AC models have a user selectable CT ratio through a rotary switch accessible from a removable cover on the meter.

The meters are housed in a compact DIN96 enclosure measuring only 61mm in depth and are available combined with an analogue instantaneous reading wattmeter (EL96GTW) if required. All meters have an electromechanical counter eliminating the need for any auxiliary power supply on the AC models. All meters are available with an optional voltage free pulsed output for input to data loggers, PLC's, building management systems or computers.

### Models Available

**EL96GT** DIN96 kWh Meter

**EL96GTW** DIN96 kWh Meter with Wattmeter

### Product Features

- Active energy (kWh) measurement
- Standard DIN square size
- Accuracy class 1 (1%)
- Non-resettable
- Pulsed output option
- Many options available (see page 16)

For dimensions see pages 17-18

## kWh Meters – for measuring energy (kWh) consumption

### General Specification

#### Design complies with:

- IEC1036, IEC521

#### Accuracy:

- kWh counter class 1 to IEC1036
- Wattmeter class 1.5 to IEC51

#### Counter:

- 6 digit (4mm high) electromechanical

#### Scales (EL96GTW):

- 0-1 to 0-1000W, kW or MW

#### Front Panel LED's:

- Energy LED indicates correct connection of voltage and current
- Pulse LED indicates rate of energy measurement and pulse output

#### Enclosure Code:

- Case IP52 (IP65 option)

#### Weight:

- EL96GT 370g, EL96GTW 420g

#### Pulsed Output:

- Voltage free isolated relay
- 5A contacts at 250Vac, 200msec

#### Pulsed Output Ratio:

- Once every counter increment

### Specification (AC Measurement)

#### Input Current, $I_n$ :

- 0-0.2A to 0-5A direct connected
- 1A or 5A CT operated

#### Input Voltage, $U_n$ :

- 110, 230, 415V or VT ratio
- (50 to 440V upon request)

#### Voltage Variation:

- $\pm 20\%$  of  $U_n$

#### Frequency:

- 50/60Hz

#### Overload:

- $1.2 \times I_n$  or  $U_n$  for 2 hours
- $6 \times I_n$  for 5 seconds

#### Test Voltage:

- 2kV rms for 1 minute

#### Burden:

- Voltage circuit  $< 3VA$  per phase
- Current circuit  $< 0.1VA$  per phase

#### Counter & Pulse Resolution:

- 1 kWh (L CT ratio model)
- 10 kWh (H CT ratio model)
- Other resolutions available on request

### Specification (DC Measurement)

#### Input Current, $I_n$ :

- 0-0.1A to 0-10A direct connected
- 0-10A to 0-5000A from 50, 60 or 75mV shunt

#### Input Voltage, $U_n$ :

- 12, 24 or 48Vdc
- (upto 600V upon request)

#### Voltage Variation:

- 0-120% of  $U_n$

#### Overload:

- $1.2 \times U_n$  continuous,  $2 \times U_n$  for 3 sec
- $1.2 \times I_n$  continuous,  $10 \times I_n$  for 3 sec

#### Test Voltage:

- 1kV rms for 1 minute

#### Counter & Pulse Resolution:

- 1 Wh, 10Wh, 0.1kWh or 1kWh
- Other resolutions available on request

#### Auxiliary Power Supply:

- 12, 24, 48Vdc, 110, 230 or 415Vac

#### Auxiliary Power Supply Variation:

- -10% to +20% of nominal

**Ordering information**

Model	Code	Description
	EL96GT	96 x 96mm kWh Meter
	EL96GTW	96 x 96mm kWh Meter with Wattmeter

Current or CT Ratio	Code	Description
	1L	25/1 to 800/1A (selectable) - see table below *
	1H	200/1 to 6000/1A (selectable) - see table below **
	5L	25/5 to 800/5A (selectable) - see table below *
	5H	200/5 to 6000/5A (selectable) - see table below **
	Specify	Other CT ratio (specify)
	Specify	0.5 to 5 Amps direct (specify)
DC	Specify	0.1 to 10 Amps DC direct (specify) or 10 to 5000 Amps DC from 50, 60, 75mV shunt (specify)***

Wiring System	Code	Description
	/1	Single Phase
	/2	3 Phase 3 Wire Balanced
	/3	3 Phase 3 Wire Unbalanced
	/4	3 Phase 4 Wire Balanced
	/5	3 Phase 4 Wire Unbalanced
DC	/DC	DC System

Input Voltage	Code	Description
	Specify	110, 230 or 415Vac (specify L-N or L-L)
	Specify	50 to 440Vac upon request (specify)
DC	Specify	12, 24, 48Vdc or up to 600Vdc upon request

Auxiliary Power (DC)	Code	Description
DC	Specify	110, 230 or 415Vac (specify)
DC	Specify	12, 24 or 48Vdc (specify)

Options	Code	Description
	/P	Voltage Free Pulsed Output
	GTTC	Terminal Cover

**Example EL96GT - 5L - /5 - 415VL-L - /P**

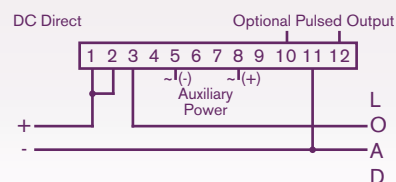
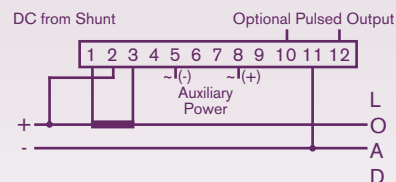
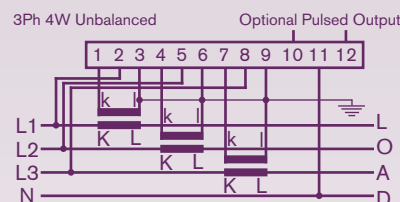
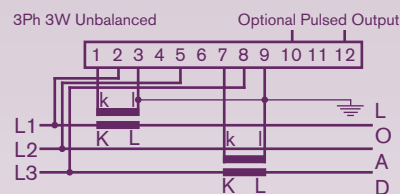
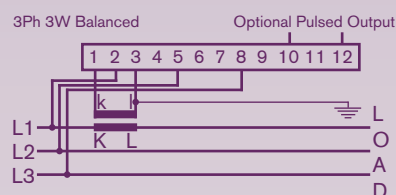
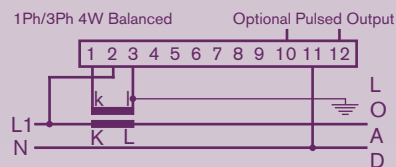
**Current Transformer Primary Currents (Selectable)**

\* L 25, 40, 50, 60, 75, 80, 100, 120, 150, 200, 250, 300, 400, 500, 600, 800A  
 \*\* H 200, 250, 300, 400, 500, 600, 800, 1000, 1200, 1500, 1600, 2000, 2500, 3000, 4000, 6000A  
 \*\*\* Standard Shunt Values  
 10, 15, 20, 25, 30, 40, 50, 60, 75, 80, 100, 120, 150, 200, 250, 300, 400, 500, 600, 800, 1000, 1200, 1500, 2000, 2500, 3000, 4000, 5000A

**Notes:**

1. Models with (L)ow CT ratios will have a pulse rate of 1pulse/kWh and models with (H)igh CT ratios will have a pulse rate of 1pulse/10kWh (unless a VT ratio is applicable). Other pulse rates are available to suit direct connected units or VT ratios etc.
2. The Wattmeter on all EL96GTW meters will be scaled as calculated by Etime unless specified otherwise.
3. Ensure that current transformers are mounted such that K faces the supply and L faces the load.
4. Secondary windings of the current transformers should be earthed.

**Connections**



## Meter Options

### Meter Terminal Covers

Available for FE72 and FE96\* meters is a plastic terminal cover to finger-proof the terminals.

(Order Code: **FE72TC, FE96TC**) \*All FE48 meters are supplied with terminal covers

### Meter Terminal Covers

Available for all sizes of FE72, FE96 and EL meter are a pair of plastic terminal covers to finger-proof the terminals.

(Order Code: **MTC**)

### DIN Square Blanking Plates

Available on all sizes of meter is a black plastic blanking plate to cover a DIN square hole.

(Order code: **FE48BP, FE72BP, FE96BP**)

### Adjustable Red Pointer

Available on all sizes of shortscales meter is an adjustable red pointer which can be adjusted by a screwdriver from the front fascia. Not available on longscales meters.

(Order code: **ARP**)

### Calibration Certificate

Calibration certificates traceable to national standards can be supplied on all meters.

(Order code: **CALCERT**)

### 6x Overload

Available on all ac ammeters is an overload reading of 6x the full scale current (2x is standard).

(Order Code: **6X O/L**)

### Red Line On Scale

Available on any scale is a red line marked at any point on the scale, as specified by the customer.

(Order Code: **RL@ - specify**)

### Coloured Sector On Scale

One or more specified coloured (red, green, yellow) sectors on the scale are available on all meters.

(Order Code: **Coloured Sector - specify**)

### Heavily Damped Movements

1A or 5A DIN96 moving iron ammeters are available with a damped viscous movement and all moving coil meters are available with an electronically damped movement.

(Order Code: **HD movement**)

### IP65 Sealing

All meters are available with a front sealed to IP65 and a neoprene gasket to retain sealing against the panel.

(Order Code: **IP65**)

### Gaskets

Gaskets are available for all meters.

(Order Code: **G48F, G72F, G96F**)

### Centre Zero Movement

Moving coil meters are available with a bi-directional reading, centre zero movement and scale. Moving coil meters are also available with an offset centre zero movement and scale.

(Order Code: **C/Z movement or O/Z movement**)

### Suppressed Zero Movement

Moving Coil meters are available with a suppressed zero movement and scale (e.g. 15Vdc with suppressed scale from 0 to 10Vdc).

(Order Code: **S/Z movement**)

### External Adjustable Trim Potentiometer

All moving coil meters are available with an external trim multi-turn potentiometer which is accessible from the back of the meter and adjusts the full scale reading by a minimum of  $\pm 20\%$ .

(Order Code: **EXT. TRIM. POT.**)

### Polycarbonate Window

All sizes of FE meters have a glass window but a polycarbonate window is available. All sizes of EL meters have polycarbonate windows as standard.

(Order Code: **POLY window**)

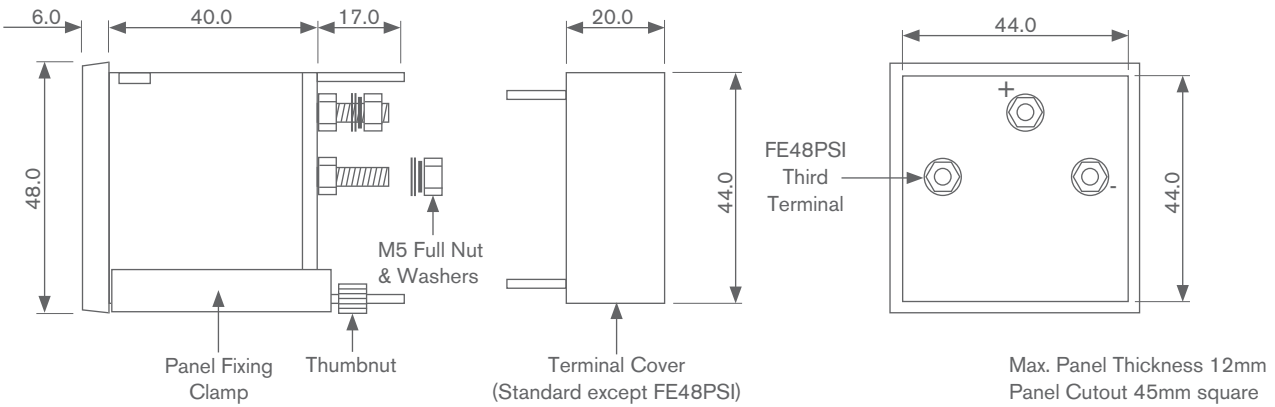
### Anti-Glare Window

Anti-glare windows are available for all meters.

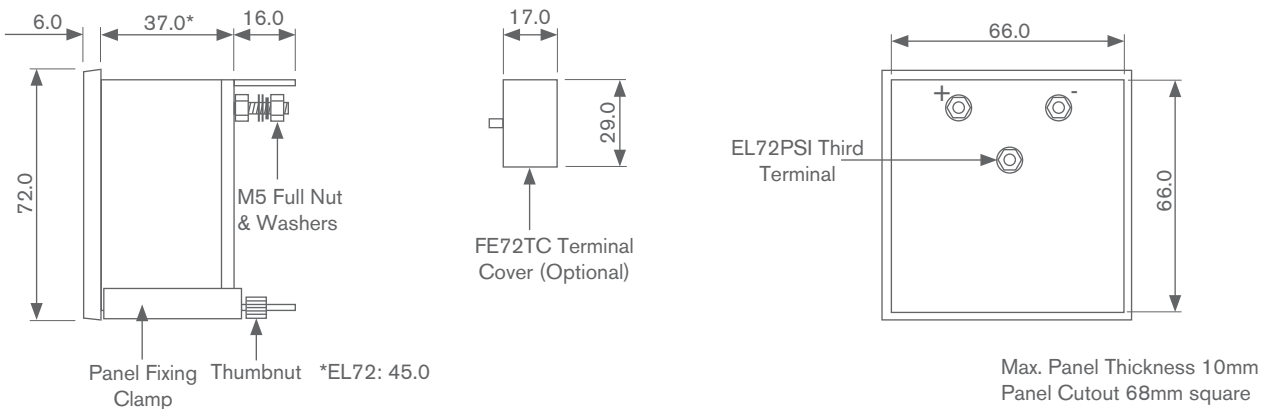
(Order Code: **AG window**)

# Dimensions

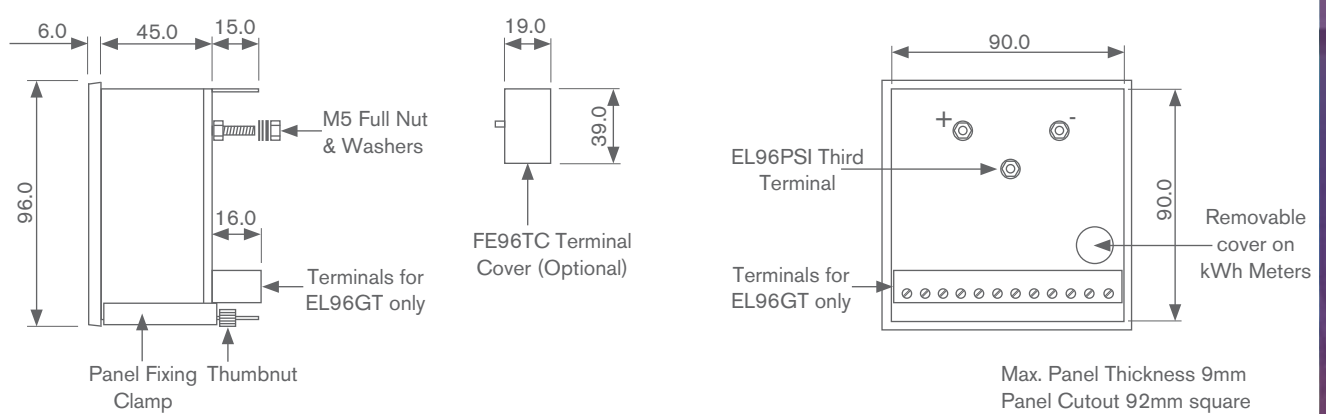
## FE48 Enclosure



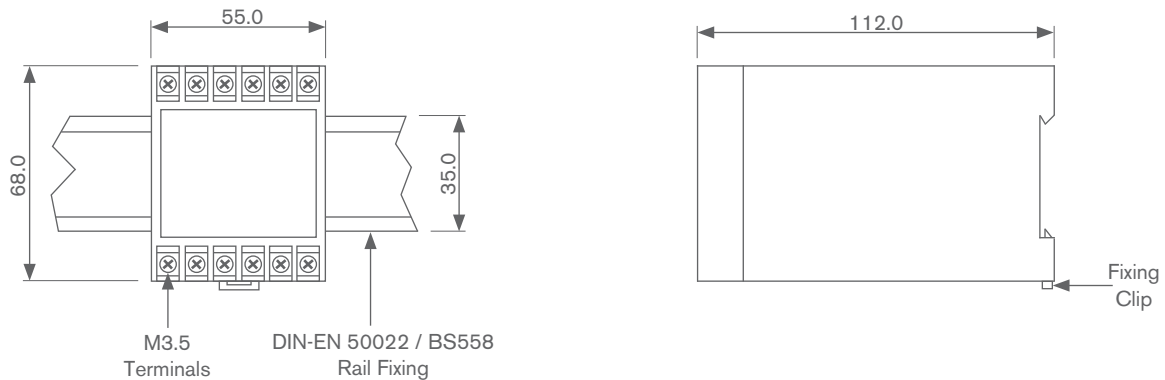
## FE72/EL72 Enclosure



## FE96/EL96 Enclosure

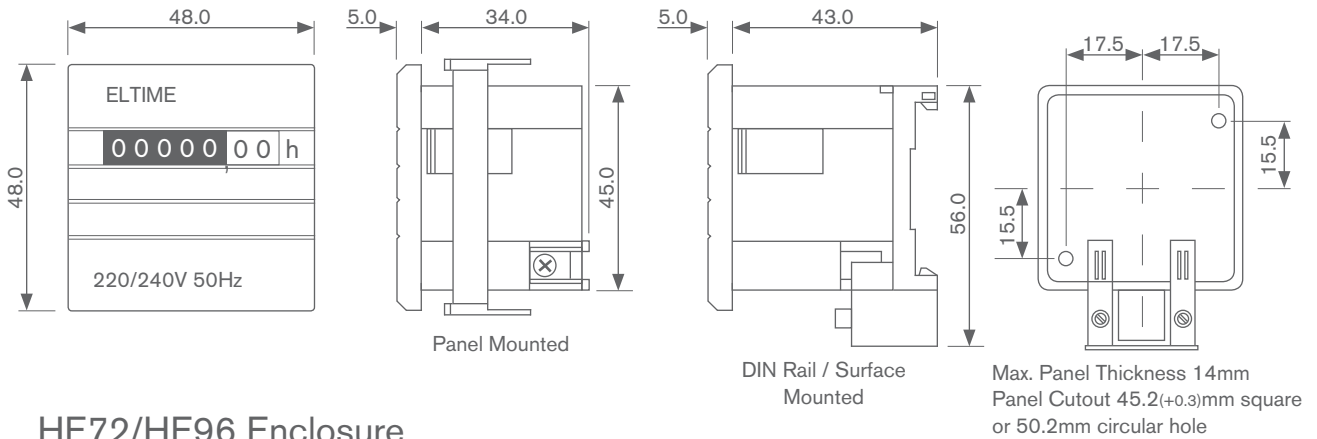


## Watt/Var/cosØ Converter Unit Enclosure

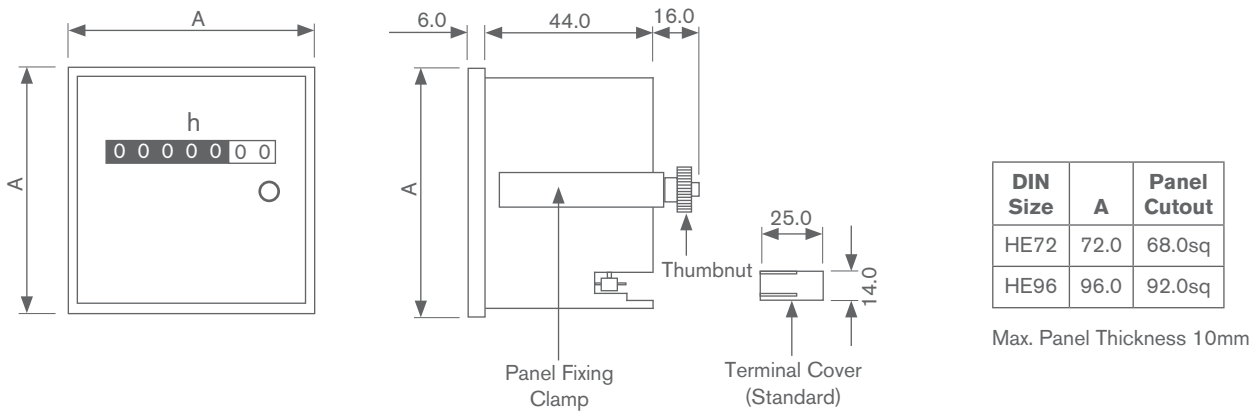


# Dimensions

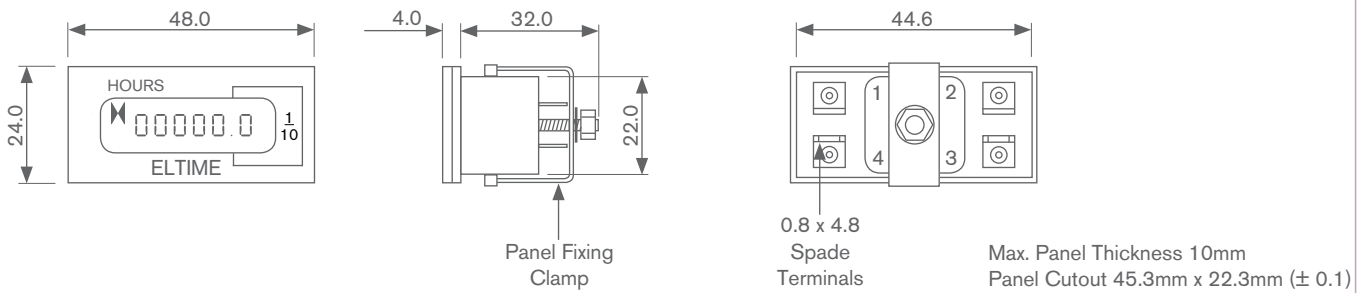
## BZW48/BZG48 Enclosure



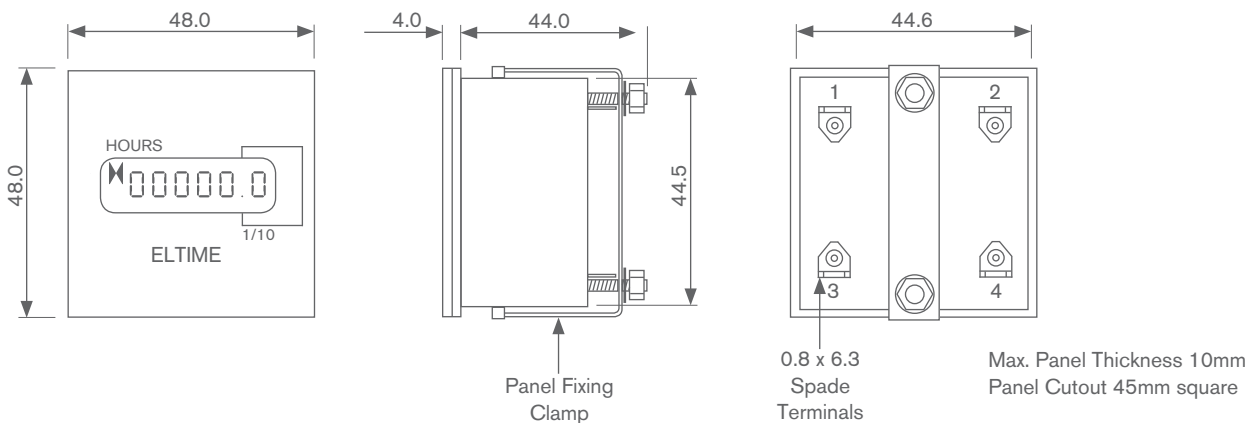
## HE72/HE96 Enclosure



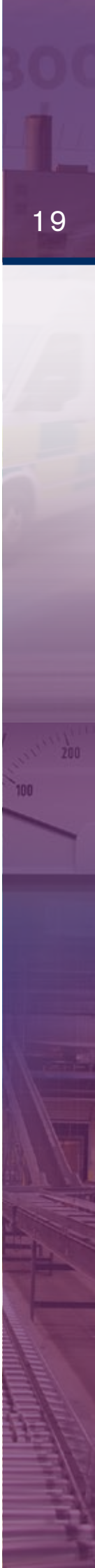
## DH24 Enclosure



## DH48 Enclosure



All dimensions in mm





GENERATOR  
NO. 3

100 200 300



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