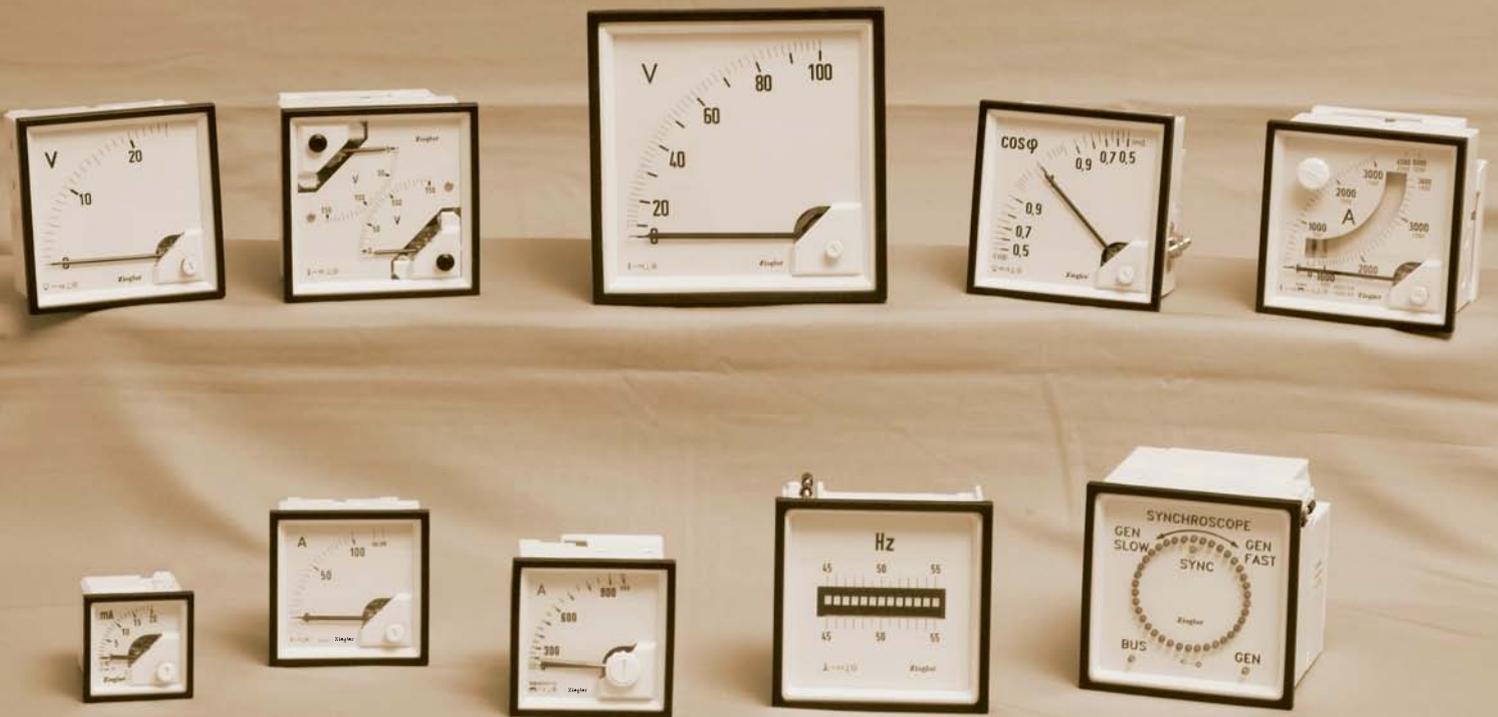
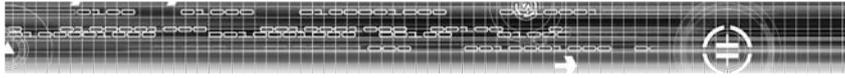


Analogue Panel Meters





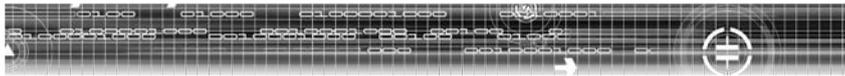
Ziegler

Redefine Innovative Metering

ANALOG PANEL METERS & ACCESSORIES

SECTION INDEX

1. Moving Iron Type 90 Degree Scale – DE for AC Current & Voltage.
2. Moving Coil Type 90 Degree Scale – DS for DC Current & Voltage.
3. Moving Coil with Rectifier Type 90 Degree Scale – DG for AC Current & Voltage.
4. Moving Coil with builtin transducer Type 90 Degree Scale – LF for Power Factor.
5. Moving Coil with builtin transducer Type 90 Degree Scale – LM for Active & Reactive Power.
6. Moving Coil with builtin transducer Type 90 Degree Scale – FM for Frequency.
7. Bimetallic Movement Type 90 Degree Scale – BM/EB for Maximum Demand Current.
8. 2 in 1 Pointer Type 90 Degree Scale meters.
9. Moving Iron Type 90 Degree Scale with builtin Selector Switch – for 3 phase AC Current & Voltage.
10. Moving Coil Type 240 Degree Scale – DSL for DC Current & Voltage.
11. Moving Coil with Rectifier Type 240 Degree Scale – DGL for AC Current & Voltage.
12. Moving Coil with builtin transducer Type 240 Degree Scale – LFL for Power Factor.
13. Moving Coil with builtin transducer Type 240 Degree Scale – LML for Active & Reactive Power.
14. Moving Coil with builtin transducer Type 240 Degree Scale – FML for Frequency.
15. LED Type Electronic Synchroscope.
16. Vibrating REED Type Frequency meter.
17. DC Shunts for High Current Measurement.
18. Accessories



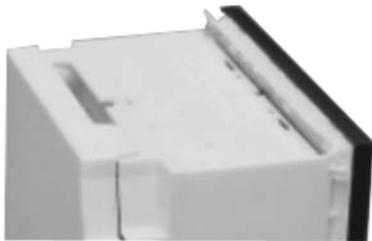
Ziegler

Redefine Innovative Metering

ZIEGLER ANALOGUE PANEL METERS

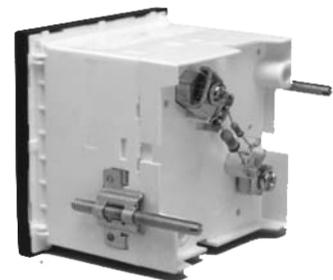
ROBUST CASE WITH CLASSIC FINISH

Ziegler Meters are housed in a Robust case made of glass filled Polycarbonate. This case is self extinguishing and non-drip which conforms to international regulations UL 94 V-0, resulting in no danger to the equipment below meters, since no burnt plastic material falls on some other equipment. This light weight material falls on some other equipment. This light weight material has very high mechanical strength and flame retardant properties



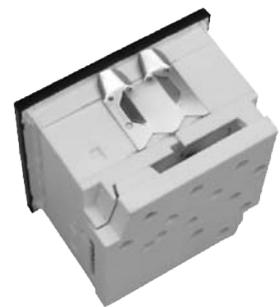
MOUNTING

Mounting is possible through S type screw clamps which can be mounted on any two opposite sides of the meter either left and right or top and bottom. All fasteners are resistant to excessive vibration and shock. The "S" type screw clamp supplied as standard equipment is suitable for control panel of thickness 25mm



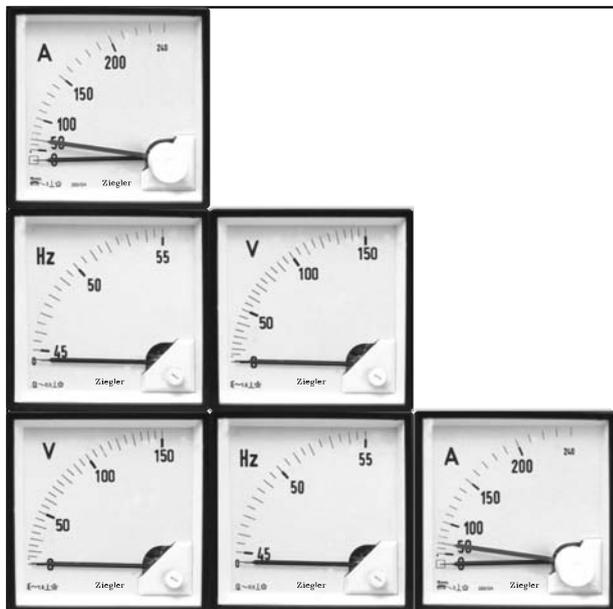
LEAF SPRING

As optional, Ziegler can supply an easy mounting leaf spring. This is saving time in installation as they snap into the panel very easily & speedily. It can be as front mounting into various grid systems. The instruments are suitable for mounting in control panels, switchboards and machine consoles even up to wall thickness of 25mm. Design facilitate for mounting meters in vertical and horizontal rows in a single cut-out.



CONVENIENT HOUSING FOR EASY MOUNTING

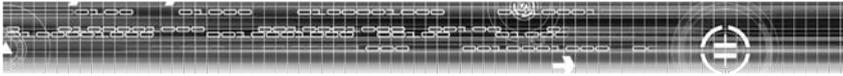
Housing design is so convenient that the installation is possible in various grid systems. The instrument is suitable for mounting in Control Panel, Switch Boards and machine consoles even up to a wall thickness of 25mm. Design facilitates for mounting meters in vertical and horizontal rows in a single cut-out. Optically an easy mounting leaf spring is also available for thickness of 1mm panel.



SELF LIFTING TERMINAL CLAMPS

The terminal screws are connected to the terminal clamps. Whenever we unscrew, the terminal clamp gets lifted along with the terminal screw. This simplifies clamping of connector/wires.



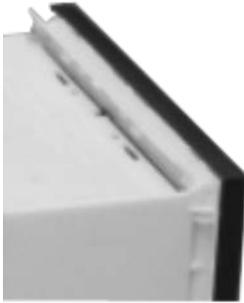


Ziegler

Redefine Innovative Metering

INTERCHANGEABLE SCALES

Scale replacement is quick and simple with no loss of accuracy and without tools. Interchangeable scale facility minimizes the carrying cost of inventory substantially. It also helps in reducing the lead times. A permanently fixed click fit window need only be opened for changing the scale.

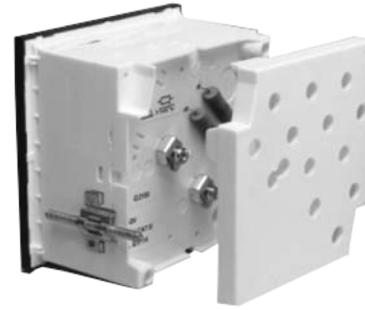


CONVENIENCE FEATURES

Bezels and front glass can be replaced easily. Material used for face plate is float glass. Optionally Anti-glare glass faceplate and transparent polycarbonate face plate are also available. Specially designed back cover eliminates risk of contact with live parts. Terminal protection cover conform to IP 20 as per IEC 529 (DIN 40050). The holes on the back cover facilitate to check the voltage without removing it.

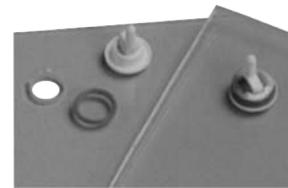
STANDARD IP20 (BACK COVER)

All Ziegler meters are supplied with click fit backcover. Specially designed back cover eliminates risk of contact with live parts. Terminal protection with back cover to IP 20 as per IEC 529. The holes on the backcover facilitate to check the voltage without removing it.



IP 52 PROTECTION

Ziegler meters conform to IP 52 protection as per IEC 529. The O-Ring incorporation in Zero Knob ensures protection from fine dust particles and water.



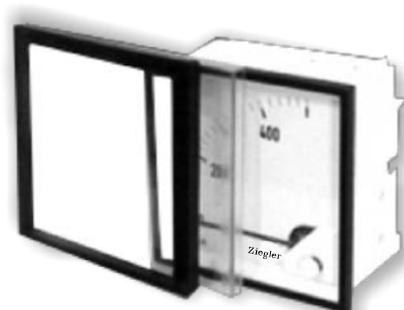
SURFACE MOUNTING TECHNOLOGY (SMT)

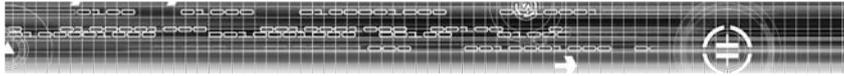
The built in Transducer forming a single unit meter. This is used for power, frequency and power factor measurements. Built in transducer PCB's with SMT manufacturing ensures quality and reliability of the products.



OPTIONAL IP54 & IP65

The Ip54 & Ip65 protection for the meter to meter will be provided on request. The Ip65 kit can be ordered separately and be added on site on the meters.





Moving Iron Panel Mount Analog Meters With Interchangeable Scales



| | |
|--------|---------------------------|
| DE 48 | |
| DE 72 | For Voltage-AC Voltmeter |
| DE 96 | For Current-AC Ammeter |
| DE 144 | with TRUE EFFECTIVE VALUE |



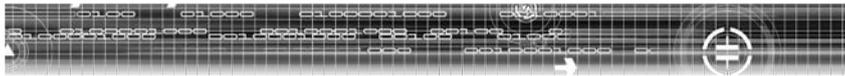
Available in both AC, Current & Voltage type, they come in standard size of 48x48, 72x72, 96x96 & 144x144mm

GENERAL FEATURES:

| APPLICABLE STANDARDS | |
|---|---|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| OVER RANGE | |
| Ammeters | 2 times nominal current |
| Voltmeters for use on voltage transformers | 1.2 times nominal voltage |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 600 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles | |
|---|--|-----------------------------------|
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 | |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) | |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) | |
| Position of use | Vertical | |
| Panel Fixing (mountable in a single cutout) | Metal side clamps leaf springs | |
| Panel thickness | 40mm | |
| Terminals | Voltmeter & Ammeter 30A | HEX STUD M4 screws and wire clamp |
| | Voltmeter & Ammeter >30A | Threaded studs M6 with nuts |
| | Voltmeter & Ammeter >60A | Threaded studs M8 with nuts |
| Pointer | Knife-edge pointer | |
| Pointer deflection | 0-90° | |
| Scale characteristics | Nearly linear above 10% of nominal full scale value | |
| Scale divisions | Coarse & fine | |
| POWER CONSUMPTION : | | |
| Voltmeter | < 4.5 VA | |
| Ammeter | <15A - < 0.5 VA | |
| | >15A - <0.8 VA | |
| Accuracy class | 1.5 according to IEC 60051 | |



Ziegler

Redefine Innovative Metering

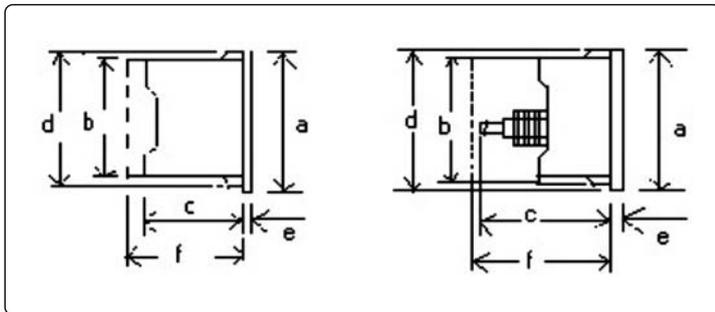
TECHNICAL SPECIFICATIONS:



| Model | Unit | DE 48 | DE 72 | DE 96 | DE 144 |
|----------------------------------|------|-----------|------------|-------|---------|
| Front Facia | mm | 48x48 | 72x72 | 96x96 | 144x144 |
| Approximate weight | kg | 0.10 | 0.16 | 0.20 | 0.40 |
| AC Ammeter CT operated | A | 1A, 5A | | | |
| AC Ammeter Direct measurement | A | 100mA-60A | 100mA-100A | | |
| AC Voltmeter | V | 6V-600V | 6V-750V | | |
| Rated insulation voltage | V | 660V | 1000V | | |
| Proof voltage | V | 2kV | 3kV | | |

OVERLOAD CAPACITY :

| | | | | | |
|--------------------------|------|---|----|-----------------------|-----|
| Continuous | | 1.2 x rated voltage/current | | | |
| Short duration Voltmeter | | 2 x rated voltage, 5sec. max. 10 x rated current, 5sec. max. | | | |
| Ammeter | 5sec | 10 times (200A max.) | | 10 times | |
| | 1sec | ----- | | 40 times (250 A max.) | |
| Scale length | mm | 41 | 63 | 97 | 146 |

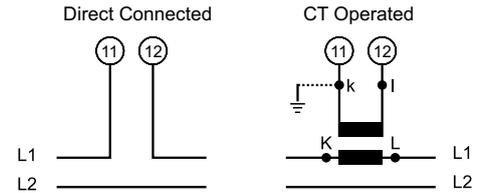


| Dimensions (in mm) | | DE 48 | DE 72 | DE 96 | DE 144 |
|-----------------------|-----------------|--------------------|--------------------|--------------------|-------------------|
| Bezel | a | 48 | 72 | 96 | 144 |
| Case | b | 43.5 | 66 | 90 | 136 |
| Depth | c (<30A) | 53 | 53 | 53 | 53 |
| | c (>30A) | 62 | 62 | 62 | 62 |
| | c (>60A) | 67 | 67 | 67 | 67 |
| | d | 44.5 | 67.5 | 91.5 | 137.5 |
| | e | 5.5 | 5.5 | 5.5 | 5.5 |
| Cutout Size | | 45 ^{+0.6} | 68 ^{+0.7} | 92 ^{+0.8} | 138 ⁺¹ |
| Depth with back cover | f ^{xx} | 64 | 64 | 64 | 64 |
| | | (30-60A) 70 | 70 | 70 | 70 |

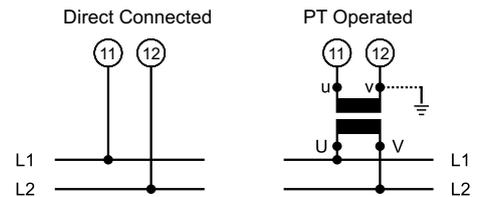
^{xx} f=75mm, for DE 48 I > 30 A

CONNECTION DIAGRAMS:

AC Ammeter



AC Voltmeter



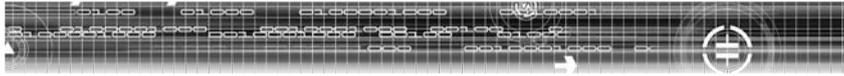
ORDERING INFORMATION

Please specify ordering information as given below,

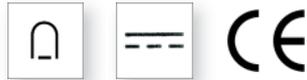
| Type | Size | Measured Qty | Measuring Range/Input | Over Range | Scale | Options |
|------|------|--------------|-----------------------|------------|-------|---------|
|------|------|--------------|-----------------------|------------|-------|---------|

ORDER EXAMPLE

| | | | | | | |
|----|----|---------|--------|-----|------|-----------------|
| DE | 72 | Ammeter | 100/5A | x 2 | 100A | with back cover |
|----|----|---------|--------|-----|------|-----------------|



Moving Coil Panel Mount Analog Meters With Interchangeable Scales



- DS 48
 - DS 72
 - DS 96
 - DS 144
- For Voltage-DC Voltmeter
For Current-DC Ammeter



Available in both DC, Current & Voltage type, they come in standard size of 48x48, 72x72, 96x96 & 144x144mm

GENERAL FEATURES:

APPLICABLE STANDARDS

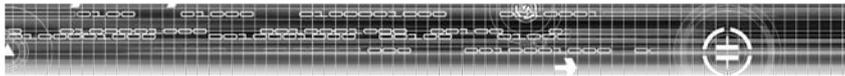
| | |
|---|---|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |

OVER RANGE:

| | |
|--|-------------------------------|
| Ammeters | 2 times nominal current |
| Voltmeters for use on voltage transformers | 1.2 times nominal voltage |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 600 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| | | |
|---|--|-----------------------------------|
| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles | |
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 | |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) | |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) | |
| Position of use | Vertical | |
| Panel Fixing (mountable in a single cutout) | Metal side clamps leaf springs | |
| Panel thickness | 40mm | |
| Terminals | Voltmeter & Ammeter 6A | HEX STUD M4 screws and wire clamp |
| | Ammeter 6A | Threaded studs M6 with nuts |
| | Ammeter >60A | Threaded studs M8 with nuts |
| Pointer | Knife-edge pointer | |
| Pointer deflection | 0-90° | |
| Scale characteristics | Nearly linear above 10% of nominal full scale value | |
| Scale divisions | Coarse & fine | |
| POWER CONSUMPTION : | | |
| Voltmeter | < 4.5 VA | |
| Ammeter | <15A - < 0.5 VA >15A - <0.8 VA | |
| Accuracy class | 1.5 according to IEC 60051 | |



Ziegler

Redefine Innovative Metering

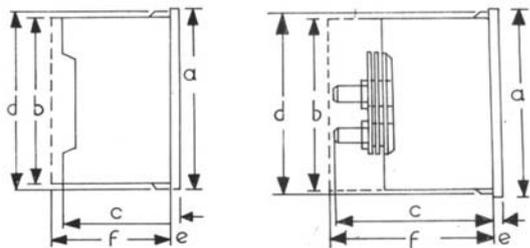
TECHNICAL SPECIFICATIONS:



| Model | Unit | DS 48 | DS 72 | DS 96 | DS 144 |
|-------------------------------|------|-----------|-----------|-------|-----------|
| Front Facia | mm | 48x48 | 72x72 | 96x96 | 144x144 |
| Approximate weight | kg | 0.13 | 0.18 | 0.22 | 0.43 |
| DC Ammeter Direct measurement | A | 15µA-60A | 15µA-100A | | 40µA-100A |
| DC Voltmeter | V | 15mV-600V | | | |
| Rated insulation voltage | V | 660V | 1000V | | |
| Proof voltage | V | 2kV | 3kV | | |

OVERLOAD CAPACITY :

| | | | | | |
|--------------------------|------|---|-----------------------|----|-----|
| Continuous | | 1.2 x rated voltage/current | | | |
| Short duration Voltmeter | | 2 x rated voltage, 5sec. max. 10 x rated current, 5sec. max. | | | |
| Ammeter | 5sec | 10 times (200A max.) | 10 times | | |
| | 1sec | ----- | 40 times (250 A max.) | | |
| Scale length | mm | 41 | 63 | 97 | 146 |



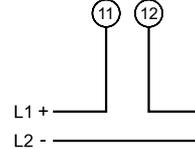
| Dimensions (in mm) | | DS 48 | DS 72 | DS 96 | DS 144 |
|--|---------|--------------------|--------------------|--------------------|-------------------|
| Bezel | a | 48 | 72 | 96 | 144 |
| Case | b | 43.5 | 66 | 90 | 136 |
| Depth | c (<6) | 53 | 53 | 53 | 53 |
| | (6-60A) | 68 | 68 | 68 | 68 |
| | (>60A) | 78 | 78 | 78 | 78 |
| | d | 44.5 | 67.5 | 91.5 | 137.5 |
| | e | 5.5 | 5.5 | 5.5 | 5.5 |
| Cutout Size | | 45 ^{+0.6} | 68 ^{+0.7} | 92 ^{+0.8} | 138 ⁺¹ |
| Depth without back cover f ^{xx} | | 64 | 64 | 64 | 64 |
| Depth with back cover (6-60A) | | 70 | 70 | 70 | 70 |

^{xx} f=75mm, for DS 48 I > 6 A

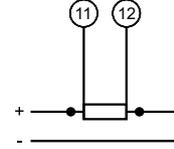
CONNECTION DIAGRAMS:

DC Ammeter

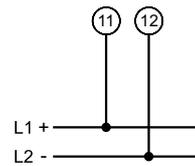
Direct Connected



Shunt Operated



DC Voltmeter



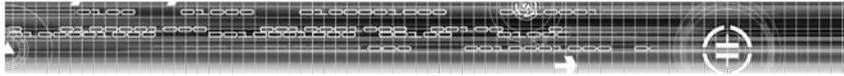
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | Measuring Range/Input | Scale | Options |
|------|------|--------------|-----------------------|-------|---------|
|------|------|--------------|-----------------------|-------|---------|

ORDER EXAMPLE

| | | | | | |
|----|----|---------|----------|--------------------|------------------------------------|
| DS | 96 | Ammeter | 100/75mV | 100A _{DC} | with red mark at 80A _{DC} |
|----|----|---------|----------|--------------------|------------------------------------|



Ziegler

Redefine Innovative Metering

The Moving Coil, Rectifier Analogue Meter DG 48,72,96,144mm, for the measurement of AC, Current & Voltage



| | |
|--------|---|
| DG 48 | For Voltage-AC Voltmeter For Current-AC Ammeter with built-in rectifier |
| DG 72 | |
| DG 96 | |
| DG 144 | |



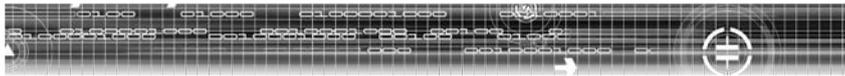
Available in both AC, Current & Voltage type, they come in standard size of 48x48, 72x72, 96x96 & 144x144mm

GENERAL FEATURES:

| APPLICABLE STANDARDS | |
|---|---|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| OVER RANGE: | |
| Ammeters | 2 times nominal current |
| Voltmeters for use on voltage transformers | 1.2 times nominal voltage |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 600 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles | |
|---|--|-----------------------------------|
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 | |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) | |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) | |
| Position of use | Vertical | |
| Panel Fixing (mountable in a single cutout) | Metal side clamps leaf springs | |
| Panel thickness | 40mm | |
| Terminals | Voltmeter & Ammeter <6A | HEX STUD M4 screws and wire clamp |
| | Ammeter 6A | Threaded studs M6 with nuts |
| Pointer | Knife-edge pointer | |
| Pointer deflection | 0-90° | |
| Scale characteristics | Nearly linear above 10% of nominal full scale value | |
| Scale divisions | Coarse & fine | |
| POWER CONSUMPTION : | | |
| Voltmeter | < 4.5 VA | |
| Ammeter | <15A - < 0.5 VA >15A - <0.8 VA | |
| Accuracy class | 1.5 according to IEC 60051 | |



Ziegler

Redefine Innovative Metering

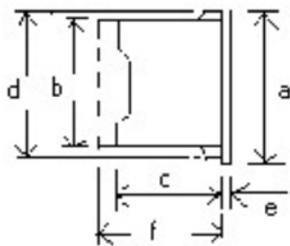
TECHNICAL SPECIFICATIONS:



| Model | Unit | DG 48 | DG 72 | DG 96 | DG 144 |
|----------------------------------|------|----------------|--------|--------|---------|
| Front Facia | mm | 48x48 | 72x72 | 96x96 | 144x144 |
| Approximate weight | kg | 0.13 | 0.18 | 0.22 | 0.43 |
| AC Ammeter CT operated | A | 1A, 5A | 1A, 5A | 1A, 5A | 1A, 5A |
| AC Ammeter Direct measurement | A | 10 μ A-10A | | | |
| AC Voltmeter | V | 6V-600V | | | |
| Rated insulation voltage | V | 660V | 1000V | | |
| Proof voltage | V | 2kV | 3kV | | |

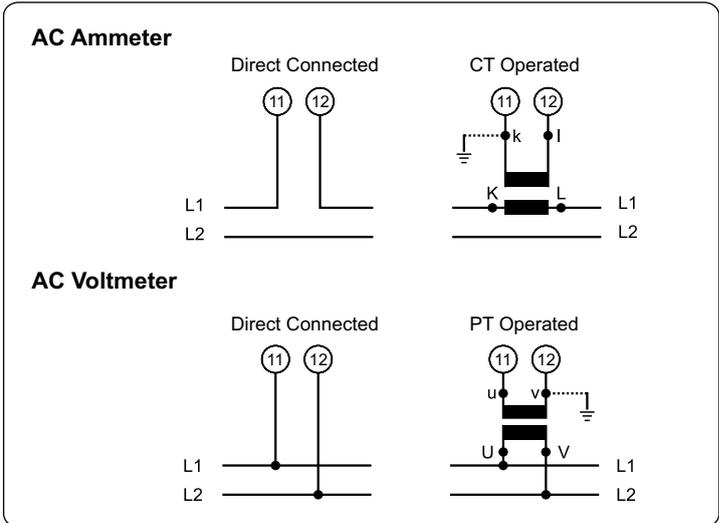
OVERLOAD CAPACITY :

| | | | | | |
|--------------------------|------|---|----|-----------------------|-----|
| Continuous | | 1.2 x rated voltage/current | | | |
| Short duration Voltmeter | | 2 x rated voltage, 5sec. max. 10 x rated current, 5sec. max. | | | |
| Ammeter | 5sec | 10 times (200A max.) | | 10 times | |
| | 1sec | ----- | | 40 times (250 A max.) | |
| Scale length | mm | 38 | 61 | 97 | 146 |



| Dimensions (in mm) | | DG 48 | DG 72 | DG 96 | DG 144 |
|-----------------------|--------|--------------------|--------------------|--------------------|-------------------|
| Bezel | a | 48 | 72 | 96 | 144 |
| Case | b | 43.5 | 66 | 90 | 136 |
| Depth | c (<6) | 53 | 53 | 53 | 53 |
| | d | 44.5 | 67.5 | 91.5 | 137.5 |
| | e | 5.5 | 5.5 | 5.5 | 5.5 |
| Cutout Size | | 45 ^{+0.6} | 68 ^{+0.7} | 92 ^{+0.8} | 138 ⁺¹ |
| Depth with back cover | f | 64 | 64 | 64 | 64 |

CONNECTION DIAGRAMS:



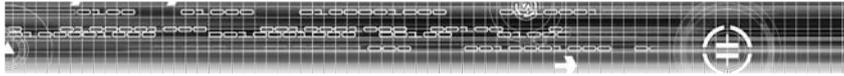
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | Measuring Range/Input | Scale | Options |
|------|------|--------------|-----------------------|-------|---------|
|------|------|--------------|-----------------------|-------|---------|

ORDER EXAMPLE

| | | | | | |
|----|----|-----------|------|------|-----------------|
| DG | 72 | Voltmeter | 500V | 500V | with back cover |
|----|----|-----------|------|------|-----------------|



Analogue Pointer type Frequency meter



FM 48
FM 72
FM 96
FM 144

For measuring frequency



Pointer type frequency meter measure frequencies in the range of 45Hz-450Hz. For maximizing the accuracy, the essential measuring range is obtained by suppressing the unwanted frequency span. They come in standard size of 48x48, 72x72, 96x96 & 144x144mm

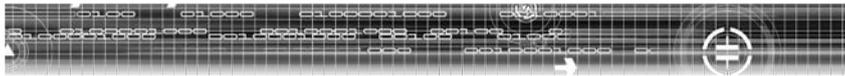
GENERAL FEATURES:

APPLICABLE STANDARDS

| | |
|---|---|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 600 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| | |
|---|--|
| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles |
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) |
| Position of use | Vertical |
| Panel Fixing (mountable in a single cutout) | Metal side clamps, Leaf springs |
| Panel thickness | 40mm |
| Terminals | HEX STUD M4 screws and wire clamp |
| Pointer | Knife-edge pointer |
| Pointer deflection | 0-90° |
| Scale characteristics | Linear |
| Scale divisions | Coarse & fine |
| POWER CONSUMPTION : | |
| Frequency meter | 7 VA |
| Accuracy class | 0.5 according to IEC 60051 |



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Redefine Innovative Metering

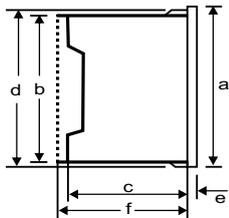
TECHNICAL SPECIFICATIONS:



| Model | Unit | FM 48 | FM 72 | FM 96 | FM 144 |
|--------------------------|------|---|-------|---|---------|
| Front Facia | mm | 48x48 | 72x72 | 96x96 | 144x144 |
| Approximate weight | kg | 0.15 | 0.21 | 0.28 | 0.49 |
| Measuring range | Hz | 45...50...55 Hz 48...50...52 Hz 45...55...65 Hz 55...60...65 Hz 58...60...62 Hz 180...200...220 Hz 360...400...440 Hz | | Rated input voltage 57.7V-440V (please specify the required voltage while ordering) | |
| Rated insulation voltage | V | 660V | | | |
| Proof voltage | V | 2kV | | | |

OVERLOAD CAPACITY :

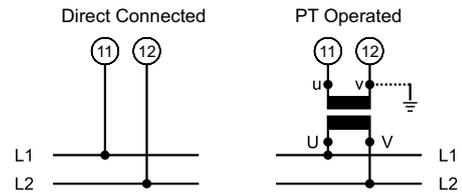
| | | | | | |
|--------------------------|----|------------------------------|----|----|-----|
| Continuous | | 1.2 x rated voltage | | | |
| Short duration Voltmeter | | 2 x rated voltage max. 5sec. | | | |
| Scale length | mm | 41 | 63 | 97 | 146 |



| Dimensions (in mm) | | FM 48 | FM 72 | FM 96 | FM 144 |
|-----------------------|---|--------------------|--------------------|--------------------|-------------------|
| Bezel | a | 48 | 72 | 96 | 144 |
| Case | b | 43.5 | 66 | 90 | 136 |
| Depth | c | 53 | 53 | 53 | 53 |
| | d | 44.5 | 67.5 | 91.5 | 137.5 |
| | e | 5.5 | 5.5 | 5.5 | 5.5 |
| Cutout Size | | 45 ^{+0.6} | 68 ^{+0.7} | 92 ^{+0.8} | 138 ⁺¹ |
| Depth with back cover | f | 64 | 64 | 64 | 64 |

CONNECTION DIAGRAMS:

FREQUENCY METER



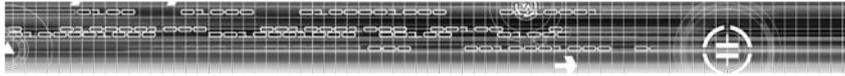
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | Input Voltage | Scale | Options |
|------|------|--------------|---------------|-------|---------|
|------|------|--------------|---------------|-------|---------|

ORDER EXAMPLE

| | | | | | |
|----|----|-----------------|------|--------------------|-----------------|
| FM | 96 | Frequency meter | 230V | 55Hz...60Hz...65Hz | with back cover |
|----|----|-----------------|------|--------------------|-----------------|



Moving Coil Panel Mount Analogue Power Factor Meters with Built-in Transducer



- LF 72 | Analogue power factor meter with
- LF 96 | Angle adjuster for monitoring
- LF 144 | changing power factor.



Power factor meter consist moving coil indicator with built-in SMD transducer to indicate power factor values in Single phase and Three phase systems. They come in standard size of 72x72, 96x96 & 144x144mm

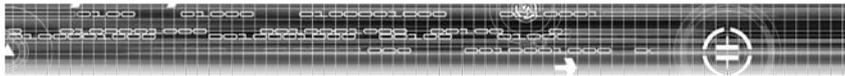
GENERAL FEATURES:

APPLICABLE STANDARDS

| | |
|---|--|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| Electro Magnetic Compatibility (EMC) | EN 50081-2, EN 50082-2, EN 55011/CISPR 11. EN 60555-2/IEC 555-2 EN 61000-4-4/IEC 1000-4-4 EN 61000-4-2/IEC 1000-4-2 EN 61000-4-5/IEC 1000-4-5, ENV 50140 |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 300 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| | |
|---|--|
| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles |
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) |
| Position of use | Vertical |
| Panel Fixing (mountable in a single cutout) | Metal side clamps leaf springs |
| Panel thickness | 40mm |
| Terminals | HEX STUD M4 screws and wire clamp |
| Pointer | Knife-edge pointer |
| Pointer deflection | 0-90° |
| Scale characteristics | Non linear |
| Scale divisions | Coarse & fine |
| POWER CONSUMPTION : | |
| Voltage path | 3.0 VA |
| Current path | 1.0 VA |
| Accuracy class | 1.5 according to IEC 60051 |



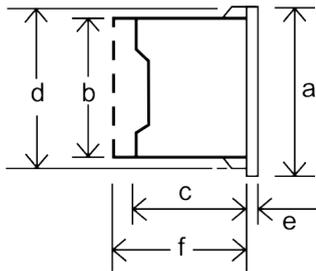
TECHNICAL SPECIFICATIONS:



| Model | Unit | LF 72 | LF 96 | LF 144 |
|--------------------------|------|--|-------|---------|
| Front Facia | mm | 72x72 | 96x96 | 144x144 |
| Approximate weight | kg | 0.55 | 0.60 | 0.80 |
| Rated current | A | 1A, 5A | | |
| AC Voltage range | V | 57.5V-500V <small>(Please specify the voltage range and system type while ordering)</small> | | |
| Measuring ranges | Cosφ | Cap 0.5 - 1 - 0.5 ind Cap 0.8 - 1 - 0.3 ind Cap 0.8 - 1 - 0.8 ind | | |
| Rated insulation voltage | V | 660V | | |
| Proof voltage | V | 2kV | | |

OVERLOAD CAPACITY :

| | | | | |
|----------------|----|---|----|-----|
| Continuous | | 1.2 x rated voltage/current | | |
| Short duration | | 2 x rated voltage, 5sec. max. 10 x rated current, 5sec. max. | | |
| Scale length | mm | 63 | 97 | 146 |



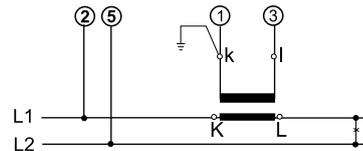
| Dimensions (in mm) | | LF 72 | LF 96 | LF 144 |
|-----------------------|---|--------------------|--------------------|-------------------|
| Bezel | a | 72 | 96 | 144 |
| Case | b | 66 | 90 | 136 |
| Depth | c | 53 | 53 | 53 |
| | d | 67.5 | 91.5 | 137.5 |
| | e | 5.5 | 5.5 | 5.5 |
| Cutout Size | | 68 ^{+0.7} | 92 ^{+0.8} | 138 ⁺¹ |
| Depth with back cover | f | 64 | 64 | 64 |

SYSTEM TYPES:

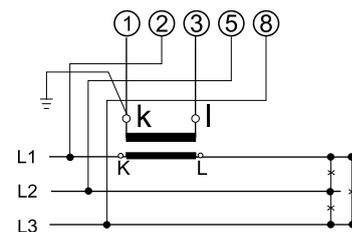
| Type | Active Power |
|---|--------------|
| Single phase system | D1C |
| 3 phase 3 wire system (balanced load) | E1C |
| 3 phase 4 wire system (balanced load) | V1C |
| 3 phase 3 wire system (unbalanced load) | D2C |
| 3 phase 4 wire system (unbalanced load) | V3C |

CONNECTION DIAGRAMS:

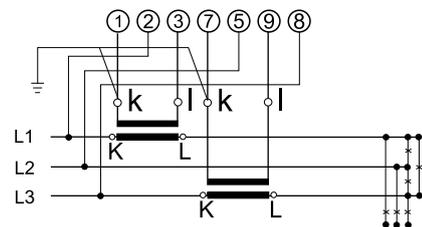
SINGLE PHASE SYSTEM



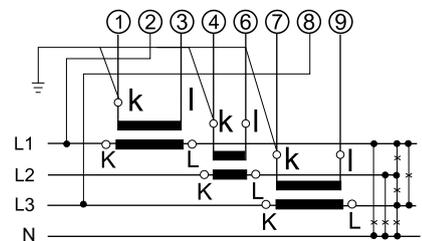
3 PHASE 3 WIRE SYSTEM (BALANCED LOAD)



3 PHASE 3 WIRE SYSTEM (UNBALANCED LOAD)

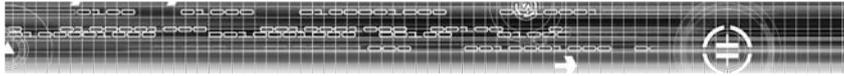


3 PHASE 4 WIRE SYSTEM (UNBALANCED LOAD)



| Type | Size | Measured Qty | System type | Measuring Range/Input | Scale | Options |
|------|------|--------------|-------------|-----------------------|-------|---------|
|------|------|--------------|-------------|-----------------------|-------|---------|

| | | | | | | |
|----|----|--------------|--------------|---------|------------------------------|-----------------|
| LF | 96 | Power Factor | Single Phase | 500V/5A | cap 0.5... 1...0.5 ind | with back cover |
|----|----|--------------|--------------|---------|------------------------------|-----------------|



Moving coil panel mount analogue Watt meters with built-in transducer



- LM 96 | Analogue watt meters for,
- LM 144 | Single phase
- Three phase balance load 3 or 4 wire
- Three phase unbalanced load 3 or 4 wire

Analogue watt meters, available in 96x96 & 144x144mm, are suitable to indicate export and import, active and reactive power on sinusoidal and non-sinusoidal current. These instruments use built-in transducers manufactured with SMD technology, offering reliable and accurate performance.

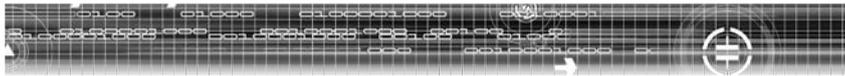


GENERAL FEATURES:

| APPLICABLE STANDARDS | |
|---|--|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| Electro Magnetic Compatibility (EMC) | EN 50081-2, EN 50082-2, EN 55011/CISPR 11. EN 60555-2/IEC 555-2 EN 61000-4-4/IEC 1000-4-4 EN 61000-4-2/IEC 1000-4-2 EN 61000-4-5/IEC 1000-4-5, ENV 50140 |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 300 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles |
|---|--|
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate / transparent (on request) |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) |
| Position of use | Nominal position ±1° |
| Panel Fixing (mountable in a single cutout) | Metal side clamps |
| Panel thickness | 40mm |
| Terminals | HEX STUD M4 screws and wire clamp E3 |
| Pointer | Knife-edge pointer |
| Pointer deflection | 0-90° |
| Scale characteristics | Linear |
| Scale divisions | Coarse & fine |
| POWER CONSUMPTION : | |
| Current | 0.2VA |
| Voltage path | E1W, D1W, D1B, V1W, V1B : 3.0VA E1B : 3.5VA D2W, D2B : 3.4VA V3W : 3.9VA V3B : 4.3VA |
| Accuracy class | 1.5 according to IEC 60051 |
| Input | Full power value Pw / Pb |
| Feasibility factor | Lambda = Pw / Ps or Pb / Ps |



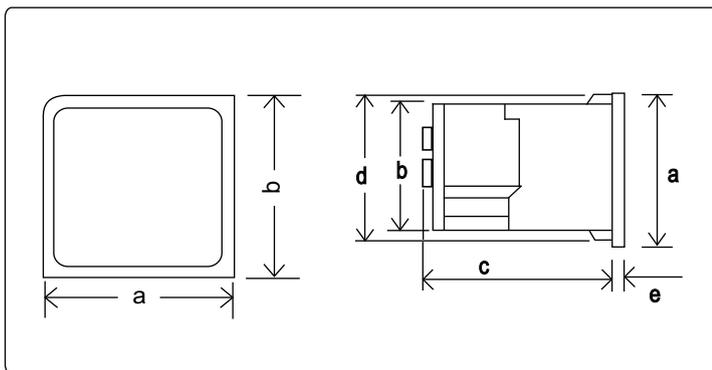
TECHNICAL SPECIFICATIONS:



| Model | Unit | LM 96 | LM 144 |
|-------------------------------|------|--|---------|
| Front Facia | mm | 96x96 | 144x144 |
| Approximate weight | kg | 0.65-0.9 | 0.9-1.1 |
| AC Wattmeter CT operated | A | 1A, 5A | 1A, 5A |
| AC wattmeter rated voltage | V | for single phase (E1W, E1B) : 57.7, 63.5, 100, 110, 127, 220, 289, 380 for three phase (D1W, D1B, D2W, D2B, V1W, V1B, V3W, V3B) : 100, 110, 220, 240, 380, 415, 500 | |
| Rated insulation voltage | V | 660V | |
| Proof voltage | V | 2kV | |

OVERLOAD CAPACITY :

| | | | |
|--------------------------------|-----|--|-----|
| Continuous | | 1.2 x rated voltage/current | |
| Short duration Voltage path | | 2 x rated voltage, 5sec. max. 10 x rated current, 5 sec. max. | |
| Response time | sec | 4sec. max. | |
| Scale length | mm | 97 | 146 |



| Dimensions (in mm) | | LM 96 | LM 144 |
|-----------------------|---|--------------------|-------------------|
| Bezel | a | 96 | 144 |
| Case | b | 90 | 136 |
| Depth | c | 106 | 106 |
| | d | 91.5 | 137.5 |
| | e | 5.5 | 5.5 |
| Cutout Size | | 92 ^{+0.8} | 138 ⁺¹ |
| Depth with back cover | f | 64 | 64 |

SYSTEM TYPES:

| Type | Active Power | Reactive Power |
|--|--------------|----------------|
| Single phase system | E1W | E1B |
| 3 phase 3 wire system (balanced load) | D1W | D1B |
| 3 phase 4 wire system (balanced load) | V1W | V1B |
| 3 phase 3 wire system (unbalanced load) | D2W | D2B |
| 3 phase 4 wire system (unbalanced load) | V3W | V3B |

SELECTION OF MEASURING RANGE :

Apparant power P_s is calculated from primary ratings of current transformer and voltage transformer.

In single phase network, $P_s = V \cdot I$

where V = voltage between phase and neutral & I = line current.

In three phase network, $P_s = \sqrt{3} V \cdot I$

where V = voltage between two phase & I = line current.

Full scale value i.e range of the instrument (P_w = active power, P_b = reactive power) must be selected in such a way that the same remain between 0.5 times and 1.2 times the value of apparant power P_s .

Thus feasibility factor "Lambda" should be between 0.5 and 1.2

where "Lambda" = P_w/P_s or P_b/P_s

Full scale values shall preferably be selected from standard series according to DIN 43701, 1-1.2-1.5-2-2.5-3-4-5-6-7.5-8 and their decadic / decimal multiples.

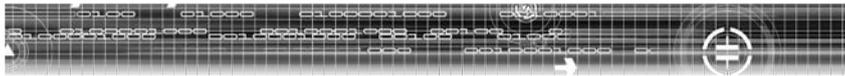
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | System type | Measuring Range/Input | Scale | Options |
|------|------|--------------|-------------|-----------------------|-------|---------|
|------|------|--------------|-------------|-----------------------|-------|---------|

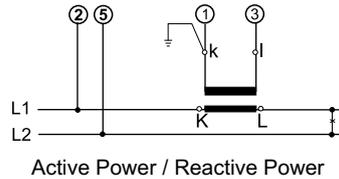
ORDER EXAMPLE

| | | | | | | |
|----|-----|--------------|------------------------------------|---------|-------|-----------------|
| LM | 144 | Active Power | 3 phase 3 wire balanced load | 380V/5A | 1900W | with back cover |
|----|-----|--------------|------------------------------------|---------|-------|-----------------|

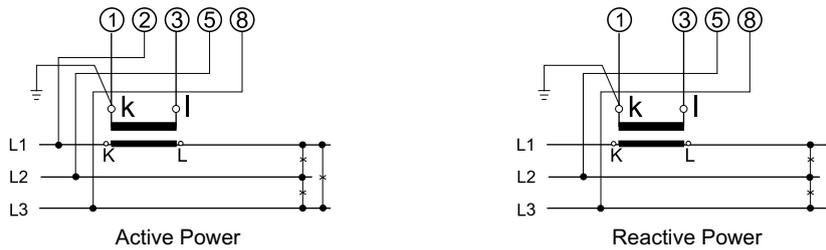


CONNECTION DIAGRAMS:

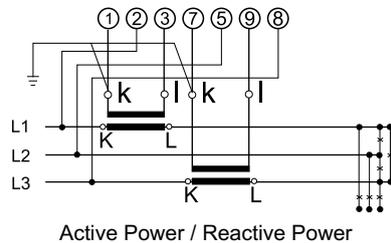
● SINGLE PHASE SYSTEM :



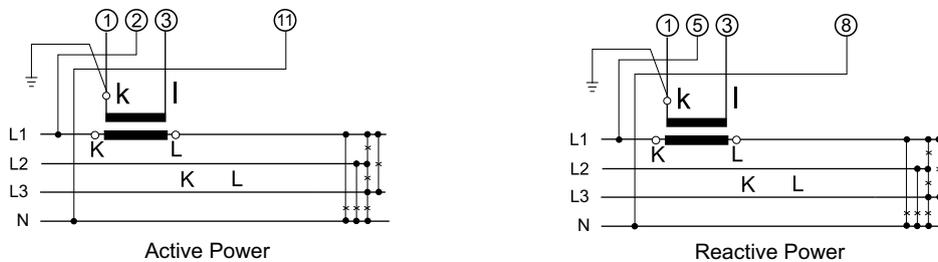
● 3 PHASE 3 WIRE SYSTEM (BALANCED LOAD) :



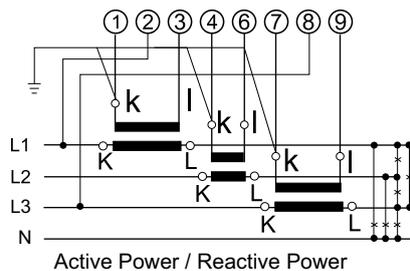
● 3 PHASE 3 WIRE SYSTEM (UNBALANCED LOAD) :

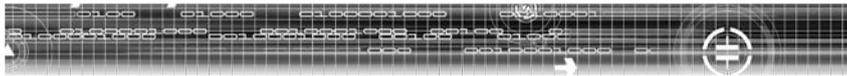


● 3 PHASE 4 WIRE SYSTEM (BALANCED LOAD) :



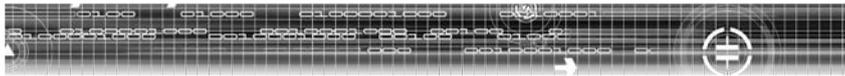
● 3 PHASE 4 WIRE SYSTEM (UNBALANCED LOAD) :





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Redefine Innovative Metering



Analogue Maximum Demand Ammeter with Bimetallic Movement



| | | |
|----------|--|-----------------------------------|
| BM/EB 48 | | BM-Bimetallic Movement MDI meter |
| BM/EB 72 | | EB-Bimetallic Movement MDI meter |
| BM/EB 96 | | combined with Moving Iron Ammeter |

The MDI meter indicates maximum demand of the system with thermal movement, deflecting proportional to the current time integral. The indicating system drives the red slave pointer which indicates the maximum value until it is reset manually by the resetting knob. If it is required to measure instantaneous current then EB type instrument serves the purpose. They come in standard size of 72x72, 96x96

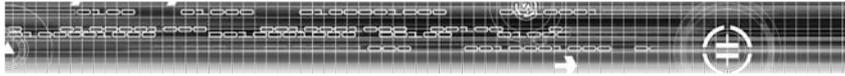


GENERAL FEATURES:

| APPLICABLE STANDARDS | |
|---|---|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 40 (standard) |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| OVER RANGE: | |
| Ammeters | 2 times rated current |
| Bimetallic Ammeters | 1.2 times rated current |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 300 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

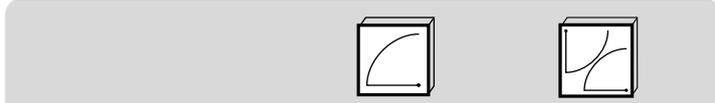
| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles | |
|---|---|----------|
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 | |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) | |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) | |
| Position of use | Vertical | |
| Panel Fixing (mountable in a single cutout) | Metal side clamps, Leaf springs | |
| Panel thickness | 40mm | |
| Terminals | HEX STUD M4 screws and wire clamp E3 | |
| Pointer | Knife-edge pointer | |
| Pointer deflection | 0-90° | |
| Scale characteristics | Bimetallic-Quadratic Moving iron-nearly linear | |
| Scale divisions | Coarse & fine | |
| POWER CONSUMPTION : | BM 72/96 | EB 72/96 |
| 1A rated current | < 1.6 VA | < 2.5 VA |
| 5A rated current | < 2.5 VA | < 3.4 VA |
| Accuracy class | 3(Bimetallic movement-referred to slave pointer) 1.5 (moving iron movement) according to IEC 60051 | |
| Response time | Approx. 1sec. (moving iron) | |
| Thermal time delay | 15 minutes 8 min/20min/30min. on request | |



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Redefine Innovative Metering

TECHNICAL SPECIFICATIONS:



| Model | Unit | BM 48 | BM 72 | BM 96 | EB 48 | EB 72 | EB 96 |
|--------------------------|------|--------|-------|-------|-------|-------|-------|
| Front Facia | mm | 48x48 | 72x72 | 96x96 | 48x48 | 72x72 | 96x96 |
| Approximate weight | kg | 0.20 | 0.22 | 0.26 | 0.20 | 0.26 | 0.30 |
| Measuring range | A | 1A, 5A | | | | | |
| Rated insulation voltage | V | 1000V | | | | | |
| Proof voltage | V | 3kV | | | | | |

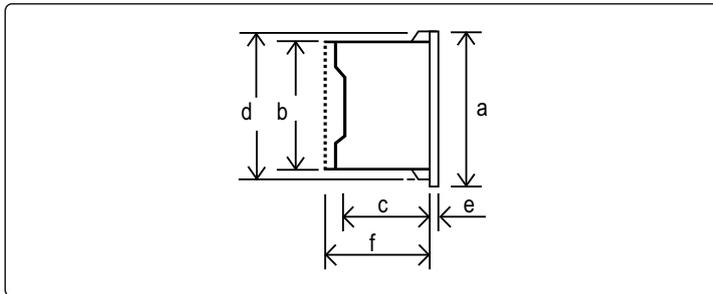
OVERLOAD CAPACITY :

Continuous 1.2 x rated current

Short duration 10 x rated current , 1sec. max.

Scale length

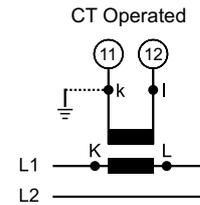
| | | | | | | | |
|-------------|----|----|----|----|----|----|----|
| Bimetallic | mm | 41 | 61 | 52 | 35 | 97 | 71 |
| Moving Iron | mm | — | — | 61 | 41 | — | 97 |



| Dimensions (in mm) | BM 48 | BM 72 | BM 96 | EB 48 | EB 72 | EB 96 |
|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Bezel a | 48 | 72 | 96 | 48 | 72 | 96 |
| Case b | 43.5 | 66 | 90 | 43.5 | 66 | 90 |
| Depth c | 53 | 53 | 53 | 53 | 53 | 53 |
| d | 67.5 | 67.5 | 91.5 | 67.5 | 67.5 | 91.5 |
| e | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| Cutout Size | 45 ^{+0.6} | 68 ^{+0.7} | 92 ^{+0.8} | 45 ^{+0.6} | 68 ^{+0.7} | 92 ^{+0.8} |
| Depth with back cover f | 64 | 64 | 64 | 64 | 64 | 64 |

CONNECTION DIAGRAMS:

MDI AMMETER



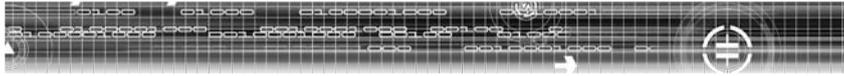
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | Measuring Range/Input | RS Time | Scale | Options |
|------|------|--------------|-----------------------|---------|-------|---------|
|------|------|--------------|-----------------------|---------|-------|---------|

ORDER EXAMPLE

| | | | | | | |
|----|----|-------------|--------|--------|--------------|-----------------|
| BM | 96 | MDI Ammeter | 300/5A | 15min. | 300A (x 1.2) | with back cover |
|----|----|-------------|--------|--------|--------------|-----------------|



2 IN 1 Pointer Type Analogue Panel Meters



| | |
|---------|------------------------------------|
| DE/2 96 | For measuring AC voltage & current |
| DS/2 96 | For measuring DC voltage & current |
| FM/2 96 | For measuring frequency |



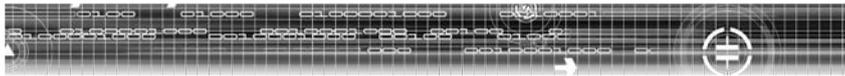
2 in 1 pointer type analogue panel meter come in 96mm x 96mm size. These measure frequency, AC and DC voltage and current depending upon the application. These combine 2 measuring systems independent of each other.

GENERAL FEATURES:

| APPLICABLE STANDARDS | |
|---|--|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| Electro Magnetic Compatibility (EMC) | EN 50081-2, EN 50082-2, EN 55011/CISPR 11. EN 60555-2/IEC 555-2 EN 61000-4-4/IEC 1000-4-4 EN 61000-4-2/IEC 1000-4-2 EN 61000-4-5/IEC 1000-4-5, ENV 50140 |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 600 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles | |
|---|--|-----------------------------------|
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 | |
| Front Facia | Glass Antique Glass (on request) Polycarbonate/transparent(on request) | |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) | |
| Position of use | Vertical | |
| Panel Fixing (mountable in a single cutout) | Metal side clamps leaf springs | |
| Panel thickness | 40mm | |
| Terminals | AC Voltmeter, Frequency meter & AC Ammeter 30A & DC Ammeter <6A | HEX STUD M4 screws and wire clamp |
| | AC Ammeter >30A DC Ammeter 6A | Threaded studs M6 with nuts |
| | Ammeter >60A | Threaded studs M8 with nuts |
| Pointer | Knife-edge pointer | |
| Pointer deflection | 0-90° | |
| Scale characteristics | AC moving iron-Nearly linear DC moving coil & frequency-linear | |
| Scale divisions | Coarse & fine | |
| POWER CONSUMPTION : | | |
| AC Voltmeter | < 4.5 VA | |
| AC Ammeter | <15A - < 0.5 VA | |
| | >15A - <0.8 VA | |
| Frequency meter | 7 VA | |
| DC Voltmeter | < 4.5 VA | |
| DC Ammeter | <15A - < 0.5 VA | |
| | >15A - <0.8 VA | |
| Accuracy class | 1.5 (for ammeter & voltmeter) 0.5 for frequency meter according to IEC 60051 | |



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Redefine Innovative Metering

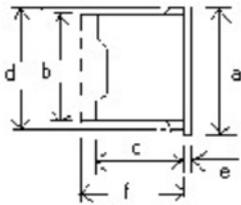
TECHNICAL SPECIFICATIONS:



| Model | Unit | DE/2 96 | DS/2 96 | FM/2 96 |
|--------------------------|------|-----------------------|------------------------|--|
| Front Facia | mm | 96x96 | 96x96 | 96x96 |
| Approximate weight | kg | 0.20 | 0.26 | 0.28 |
| Measuring range | | 100mA-100A 6V-750V | 15µA-100A 15mV-600V | 45...50...55 Hz 48...50...52 Hz 45...55...65 Hz 55...60...65 Hz 58...60...62 Hz 180...200...220 Hz 360...400...440 Hz Rated input voltage 57.7V-440V |
| Rated insulation voltage | V | 1000V | | 660V |
| Proof voltage | V | 3kV | | 2kV |

OVERLOAD CAPACITY :

| | | | | |
|--------------------------|------------------------------|----|----|----|
| Continuous | 1.2 x rated voltage | | | |
| Short duration Voltmeter | 2 x rated voltage max. 5sec. | | | |
| Scale length | mm | 54 | 54 | 54 |

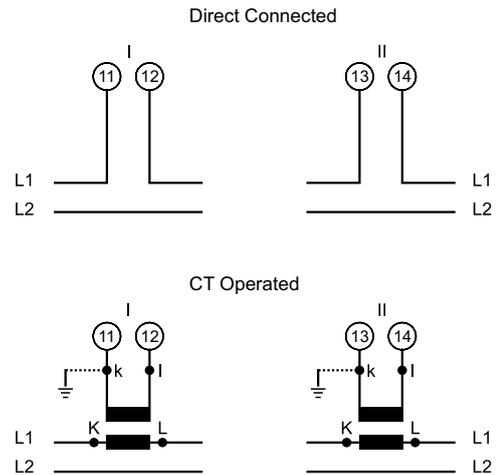


For AC Voltmeters, Ammeters & Frequency meters upto 30A
For DC Voltmeters & Ammeters <6A

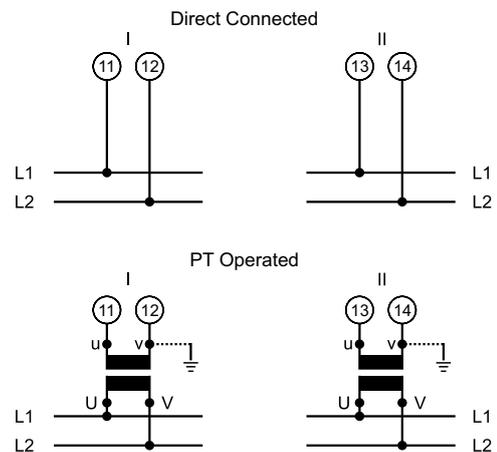
| Dimensions (in mm) | DE/2 96 | DS/2 96 | FM/2 96 |
|-------------------------|--------------------|--------------------|--------------------|
| Bezel a | 96 | 96 | 96 |
| Case b | 90 | 90 | 90 |
| Depth c | 53 | 53 | 53 |
| d | 91.5 | 91.5 | 91.5 |
| e | 5.5 | 5.5 | 5.5 |
| Cutout Size | 92 ^{+0.8} | 92 ^{+0.8} | 92 ^{+0.8} |
| Depth with back cover f | 64 | 64 | 64 |

CONNECTION DIAGRAMS:

AC / DC AMMETER



AC / DC VOLTMETER / FREQUENCY METER



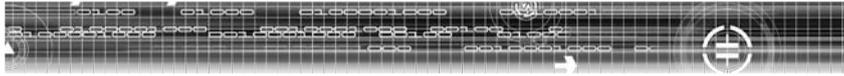
ORDERING INFORMATION

Please specify ordering information as given below,

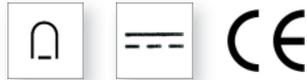
| Type | Size | Measured Qty | Measuring Range/Input | Over Range | Scale | Options |
|------|------|--------------|-----------------------|------------|-------|---------|
|------|------|--------------|-----------------------|------------|-------|---------|

ORDER EXAMPLE

| | | | | | | |
|------|----|------------------|------|------|------|-----------------|
| DE/2 | 96 | 2 in 1 Voltmeter | 415V | ---- | 415V | with back cover |
|------|----|------------------|------|------|------|-----------------|



Moving Coil Panel Mount Analog Meters With Interchangeable Scales



| | | |
|---------|--|--------------------------|
| DSL 48 | | For Voltage-DC Voltmeter |
| DSL 72 | | |
| DSL 96 | | |
| DSL 144 | | |

Available in both DC Current & Voltage type, they come in standard size of 48x48, 72x72, 96x96 & 144x144mm

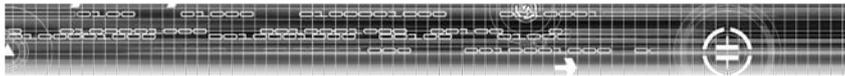


GENERAL FEATURES:

| APPLICABLE STANDARDS | |
|---|---|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| OVER RANGE: | |
| Ammeters | 2 times nominal current |
| Voltmeters for use on voltage transformers | 1.2 times nominal voltage |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 600 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles | |
|---|--|-----------------------------------|
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 | |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) | |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) | |
| Position of use | Vertical | |
| Panel Fixing (mountable in a single cutout) | Metal side clamps leaf springs | |
| Panel thickness | 40mm | |
| Terminals | Voltmeter & Ammeter 6A | HEX STUD M4 screws and wire clamp |
| | Ammeter 6A | Threaded studs M6 with nuts |
| | Ammeter >60A | Threaded studs M8 with nuts |
| Pointer | Knife-edge pointer | |
| Pointer deflection | 0-240° | |
| Scale characteristics | Nearly linear above 10% of nominal full scale value | |
| Scale divisions | Coarse & fine | |
| POWER CONSUMPTION : | | |
| Voltmeter | < 4.5 VA | |
| Ammeter | <15A - < 0.5 VA >15A - <0.8 VA | |
| Accuracy class | 1.5 according to IEC 60051 | |



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Redefine Innovative Metering

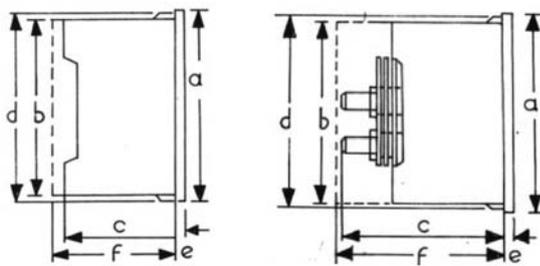
TECHNICAL SPECIFICATIONS:



| Model | Unit | DSL 48 | DSL 72 | DSL 96 | DSL 144 |
|-------------------------------|------|------------|----------|-----------|---------|
| Front Facia | mm | 48x48 | 72x72 | 96x96 | 144x144 |
| Approximate weight | kg | 0.13 | 0.25 | 0.30 | 0.43 |
| DC Ammeter Direct measurement | A | 100µA-100A | 50µA-30A | 50µA-100A | |
| DC Voltmeter | V | 60mV-600V | | | |
| Rated insulation voltage | V | 660V | | | |
| Proof voltage | V | 3kV | | | |

OVERLOAD CAPACITY :

| | | | | | |
|--------------------------|------|---|-----------------------|-----|-----|
| Continuous | | 1.2 x rated voltage/current | | | |
| Short duration Voltmeter | | 2 x rated voltage, 5sec. max. 10 x rated current, 5sec. max. | | | |
| Ammeter | 5sec | 10 times (200A max.) | 10 times | | |
| | 1sec | ----- | 40 times (250 A max.) | | |
| Scale length | mm | 70 | 106 | 142 | 230 |

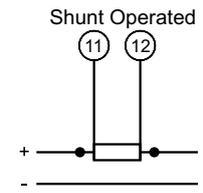
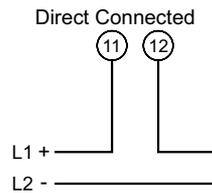


| Dimensions (in mm) | DSL 48 | DSL 72 | DSL 96 | DSL 144 |
|--|--------------------|--------------------|--------------------|-------------------|
| Bezel a | 48 | 72 | 96 | 144 |
| Case b | 43.5 | 66 | 90 | 136 |
| Depth c (<6) | 53 | 53 | 53 | 53 |
| | (6-60A) | 68 | 68 | 68 |
| | (>60A) | 78 | 78 | 78 |
| d | 44.5 | 67.5 | 91.5 | 137.5 |
| e | 5.5 | 5.5 | 5.5 | 5.5 |
| Cutout Size | 45 ^{+0.6} | 68 ^{+0.7} | 92 ^{+0.8} | 138 ⁺¹ |
| Depth without back cover f ^{xx} | 64 | 64 | 64 | 64 |
| Depth with back cover (6-60A) | 70 | 70 | 70 | 70 |

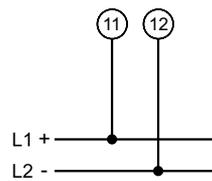
^{xx} f=75mm, for DSL 48 I > 6 A

CONNECTION DIAGRAMS:

DC AMMETER



DC VOLTMETER



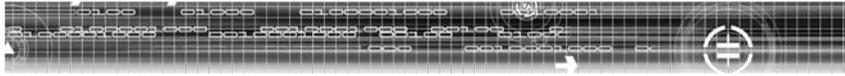
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | Measuring Range/Input | Scale | Options |
|------|------|--------------|-----------------------|-------|---------|
|------|------|--------------|-----------------------|-------|---------|

ORDER EXAMPLE

| | | | | | |
|-----|----|-----------|------|--------------------|-----------------|
| DSL | 72 | Voltmeter | 300V | 300V _{bc} | with back cover |
|-----|----|-----------|------|--------------------|-----------------|



The moving coil, rectifier analogue meter DGL 48, 72, 96, 144mm, for the measurement of AC, Current & Voltage



| | |
|---------|---|
| DGL 48 | For Voltage-AC Voltmeter For Current-AC Ammeter with built-in rectifier |
| DGL 72 | |
| DGL 96 | |
| DGL 144 | |



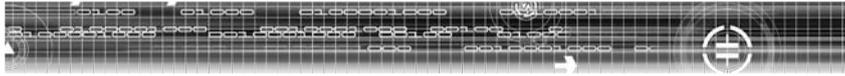
Available in both AC, Current & Voltage type, they come in standard size of 48x48, 72x72, 96x96 & 144x144mm

GENERAL FEATURES:

| APPLICABLE STANDARDS | |
|---|---|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| OVER RANGE: | |
| Ammeters | 2 times nominal current |
| Voltmeters for use on voltage transformers | 1.2 times nominal voltage |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 600 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles | |
|---|--|-----------------------------------|
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 | |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) | |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) | |
| Position of use | Vertical | |
| Panel Fixing (mountable in a single cutout) | Metal side clamps leaf springs | |
| Panel thickness | 40mm | |
| Terminals | Voltmeter & Ammeter <6A | HEX STUD M4 screws and wire clamp |
| | Ammeter 6A | Threaded studs M6 with nuts |
| Pointer | Knife-edge pointer | |
| Pointer deflection | 0-240° | |
| Scale characteristics | Nearly linear above 10% of nominal full scale value | |
| Scale divisions | Coarse & fine | |
| POWER CONSUMPTION : | | |
| Voltmeter | < 4.5 VA | |
| Ammeter | <15A - < 0.5 VA >15A - <0.8 VA | |
| Accuracy class | 1.5 according to IEC 60051 | |

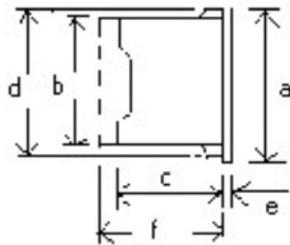


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Redefine Innovative Metering

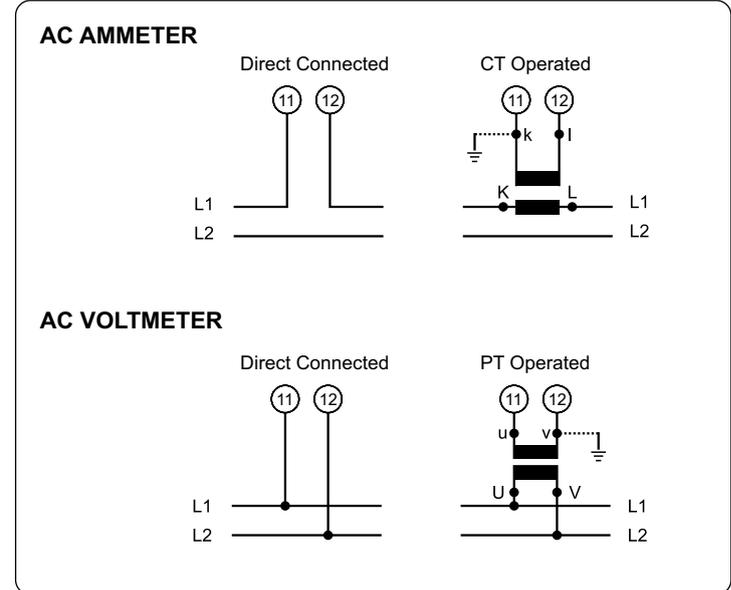
TECHNICAL SPECIFICATIONS:

| Model | Unit | DGL 48 | DGL 72 | DGL 96 | DGL 144 |
|-------------------------------|------|---|-----------------------|--------|---------|
| Front Facia | mm | 48x48 | 72x72 | 96x96 | 144x144 |
| Approximate weight | kg | 0.13 | 0.25 | 0.30 | 0.43 |
| AC Ammeter CT operated | A | 1A, 5A | | | |
| AC Ammeter Direct measurement | A | 100mA-10A | | | |
| AC Voltmeter | V | 6V-600V | | | |
| Rated insulation voltage | V | 660V | | | |
| Proof voltage | V | 3kV | | | |
| OVERLOAD CAPACITY : | | | | | |
| Continuous | | 1.2 x rated voltage/current | | | |
| Short duration Voltmeter | | 2 x rated voltage, 5sec. max. 10 x rated current, 5sec. max. | | | |
| Ammeter | 5sec | 10 times (200A max.) | 10 times | | |
| | 1sec | ----- | 40 times (250 A max.) | | |
| Scale length | mm | 70 | 106 | 142 | 230 |



| Dimensions (in mm) | DGL 48 | DGL 72 | DGL 96 | DGL 144 |
|---------------------------------------|--------------------|--------------------|--------------------|-------------------|
| Bezel a | 48 | 72 | 96 | 144 |
| Case b | 43.5 | 66 | 90 | 136 |
| Depth c (<6) | 53 | 53 | 53 | 53 |
| d | 44.5 | 67.5 | 91.5 | 137.5 |
| e | 5.5 | 5.5 | 5.5 | 5.5 |
| Cutout Size | 45 ^{+0.6} | 68 ^{+0.7} | 92 ^{+0.8} | 138 ⁺¹ |
| Depth with back cover f ^{xx} | 64 | 64 | 64 | 64 |

CONNECTION DIAGRAMS:



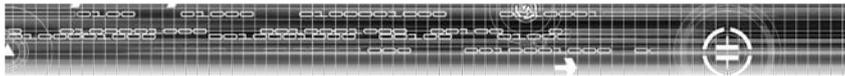
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | Measuring Range/Input | Scale | Options |
|------|------|--------------|-----------------------|-------|---------|
|------|------|--------------|-----------------------|-------|---------|

ORDER EXAMPLE

| | | | | | |
|-----|----|-----------|------|------|-----------------|
| DGL | 48 | Voltmeter | 500V | 500V | with back cover |
|-----|----|-----------|------|------|-----------------|



Analogue Pointer type Frequency meter



FML 96

FML 144

For measuring frequency



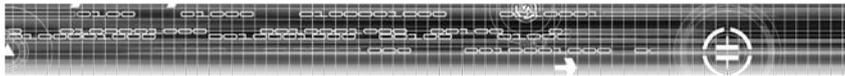
Pointer type frequency meter measure frequencies in the range of 45Hz-450Hz. For maximizing the accuracy, the essential measuring range is obtained by suppressing the unwanted frequency span. They come in standard size of 96x96 & 144x144mm

GENERAL FEATURES:

| APPLICABLE STANDARDS | |
|---|---|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 600 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles |
|---|--|
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) |
| Position of use | Vertical |
| Panel Fixing (mountable in a single cutout) | Metal side clamps, Leaf springs |
| Panel thickness | 40mm |
| Terminals | HEX STUD M4 screws and wire clamp |
| Pointer | Knife-edge pointer |
| Pointer deflection | 0-240° |
| Scale characteristics | Linear |
| Scale divisions | Coarse & fine |
| POWER CONSUMPTION : | |
| Frequency meter | 7 VA |
| Accuracy class | 0.5 according to IEC 60051 |



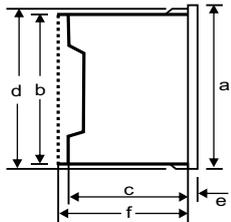
TECHNICAL SPECIFICATIONS:



| Model | Unit | FML 96 | FML 144 |
|--------------------------|------|---|---|
| Front Facia | mm | 96x96 | 144x144 |
| Approximate weight | kg | 0.45 | 0.60 |
| Measuring range | Hz | 45...50...55 Hz 48...50...52 Hz 45...55...65 Hz 55...60...65 Hz 58...60...62 Hz 180...200...220 Hz 360...400...440 Hz | Rated input voltage 57.7V-500V (please specify the required voltage while ordering) |
| Rated insulation voltage | V | 660V | |
| Proof voltage | V | 2kV | |

OVERLOAD CAPACITY :

| | | | |
|--------------------------|----|---|-----|
| Continuous | | 1.2 x rated voltage | |
| Short duration Voltmeter | | 2 x rated voltage, 5sec. max. 10 x rated current, 5sec. max. | |
| Scale length | mm | 142 | 230 |



| Dimensions (in mm) | | FML 96 | FML 144 |
|-----------------------|---|--------------------|-------------------|
| Bezel | a | 96 | 144 |
| Case | b | 90 | 136 |
| Depth | c | 53 | 53 |
| | d | 91.5 | 137.5 |
| | e | 5.5 | 5.5 |
| Cutout Size | | 92 ^{+0.8} | 138 ⁺¹ |
| Depth with back cover | f | 64 | 64 |

CONNECTION DIAGRAMS:

FREQUENCY METER



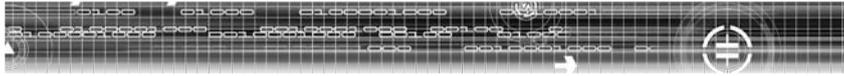
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | Input Voltage | Scale | Options |
|------|------|--------------|---------------|-------|---------|
|------|------|--------------|---------------|-------|---------|

ORDER EXAMPLE

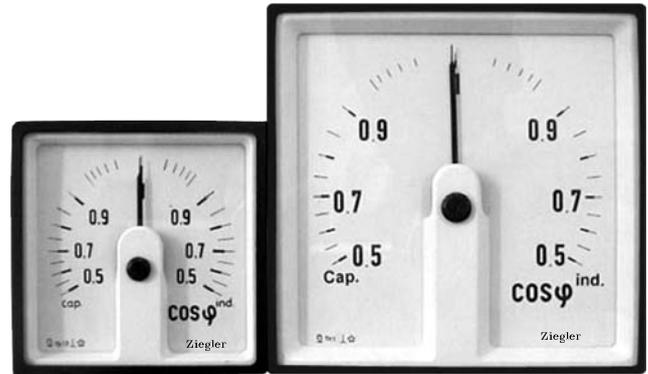
| | | | | | |
|-----|----|-----------------|------|--------------------|-----------------|
| FML | 96 | Frequency meter | 230V | 55Hz...60Hz...65Hz | with back cover |
|-----|----|-----------------|------|--------------------|-----------------|



Moving coil panel mount analogue power factor meters with built -in transducer phase.



- LFL 96 | Analogue power factor meter with
- LFL 144 | Angle adjuster for monitoring changing power factor.



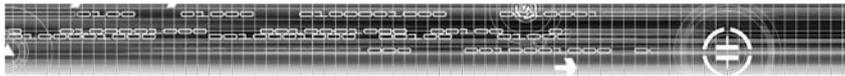
Power factor meter consist moving coil indicator with built-in SMD transducer to indicate power factor values in Single phase and Three phase systems. They come in standard size of 96x96 & 144x144mm

GENERAL FEATURES:

| Applicable Standards | |
|---|--|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| Electro Magnetic Compatibility (EMC) | EN 50081-2, EN 50082-2, EN 55011/CISPR 11. EN 60555-2/IEC 555-2 EN 61000-4-4/IEC 1000-4-4 EN 61000-4-2/IEC 1000-4-2 EN 61000-4-5/IEC 1000-4-5, ENV 50140 |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 300 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

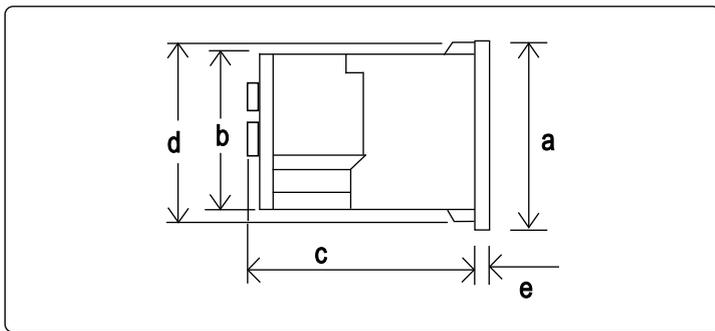
| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles |
|---|--|
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) |
| Position of use | Vertical |
| Panel Fixing (mountable in a single cutout) | Metal side clamps leaf springs |
| Panel thickness | 40mm |
| Terminals | HEX STUD M4 screws and wire clamp |
| Pointer | Knife-edge pointer |
| Pointer deflection | 0-240° |
| Scale characteristics | Non linear |
| Scale divisions | Coarse & fine |
| Power Consumption : | |
| Voltage path | 3.5 VA |
| Current path | 1.0 VA |
| Accuracy class | 1.5 according to IEC 60051 |



TECHNICAL SPECIFICATIONS:



| Model | Unit | | LFL 96 | LFL 144 |
|----------------------------|------|--|--------|---------|
| Front Facia | mm | | 96x96 | 144x144 |
| Approximate weight | kg | | 0.68 | 0.80 |
| Rated current | A | | 1A, 5A | |
| AC Voltage range | V | 57.5V-500V <small>(Please specify the voltage range and system type while ordering)</small> | | |
| Measuring ranges | Cosφ | Cap 0.5 - 1 - 0.5 ind Cap 0.8 - 1 - 0.3 ind Cap 0.8 - 1 - 0.8 ind | | |
| Rated insulation voltage | V | | 660V | |
| Proof voltage | V | | 2kV | |
| OVERLOAD CAPACITY : | | | | |
| Continuous | | 1.2 x rated voltage/current | | |
| Short duration | | 2 x rated voltage, 5sec. max. 10 x rated current, 5sec. max. | | |
| Scale length | mm | | 142 | 230 |



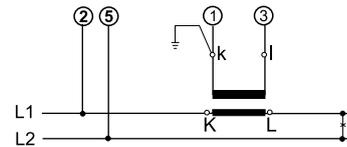
| Dimensions (in mm) | | LFL 96 | LFL 144 |
|-----------------------|---|----------------------|---------------------|
| Bezel | a | 96 | 144 |
| Case | b | 90 | 136 |
| Depth | c | 106 | 106 |
| | d | 91.5 ^{+0.8} | 137.5 |
| | e | 5.5 | 5.5 |
| Cutout Size | | 92 | 138 ^{+0.1} |
| Depth with back cover | f | 64 | 64 |

System types:

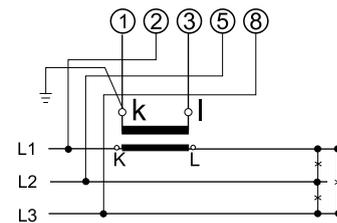
| Type | Active Power |
|---------------------------------------|--------------|
| Single phase system | E |
| 3 phase 3 wire system (balanced load) | D |

CONNECTION DIAGRAMS:

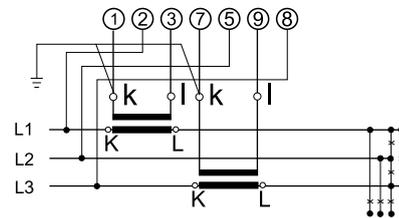
SINGLE PHASE SYSTEM



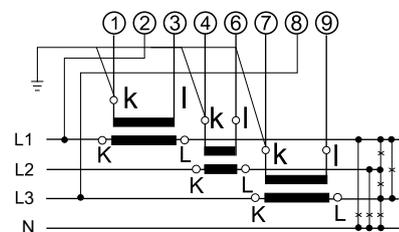
3 PHASE 3 WIRE SYSTEM (BALANCED LOAD)



3 PHASE 3 WIRE SYSTEM (UNBALANCED LOAD)



3 PHASE 4 WIRE SYSTEM (UNBALANCED LOAD)



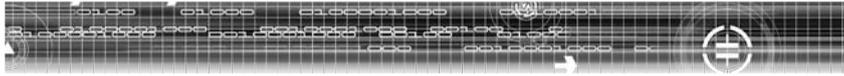
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | System type | Measuring Range/Input | Scale | Options |
|------|------|--------------|-------------|-----------------------|-------|---------|
|------|------|--------------|-------------|-----------------------|-------|---------|

ORDER EXAMPLE

| | | | | | | |
|-----|----|--------------|--------------|---------|------------------------------|-----------------|
| LFL | 96 | Power Factor | Single Phase | 500V/5A | cap 0.5... 1...0.5 ind | with back cover |
|-----|----|--------------|--------------|---------|------------------------------|-----------------|

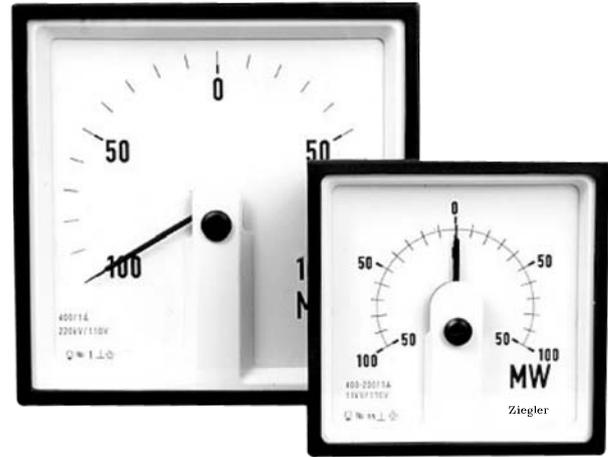


Moving coil panel mount analogue Watt meters with built-in transducer



| | |
|---------|---|
| LML 96 | Analogue watt meters for, Single phase |
| LML 144 | Three phase balance load 3 or 4 wire Three phase unbalanced load 3 or 4 wire |

Analogue watt meters, available in 96x96 & 144x144mm, are suitable to indicate export and import, active and reactive power on sinusoidal and non-sinusoidal current. These instruments use built-in transducers manufactured with SMD technology, offering reliable and accurate performance.

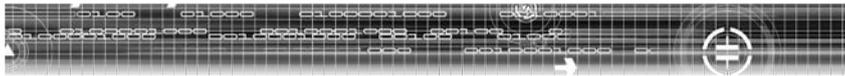


GENERAL FEATURES:

| APPLICABLE STANDARDS | |
|---|--|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| Electro Magnetic Compatibility (EMC) | EN 50081-2, EN 50082-2, EN 55011/CISPR 11. EN 60555-2/IEC 555-2 EN 61000-4-4/IEC 1000-4-4 EN 61000-4-2/IEC 1000-4-2 EN 61000-4-5/IEC 1000-4-5, ENV 50140 |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 300 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

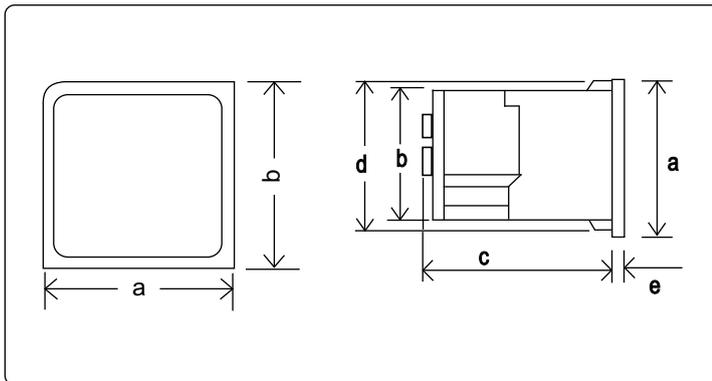
FACT SHEET:

| | |
|---|--|
| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles |
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate / transparent (on request) |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) |
| Position of use | Nominal position $\pm 1^\circ$ |
| Panel Fixing (mountable in a single cutout) | Metal side clamps |
| Panel thickness | 40mm |
| Terminals | HEX STUD M4 screws and wire clamp E3 |
| Pointer | Knife-edge pointer |
| Pointer deflection | 0-240° |
| Scale characteristics | Linear |
| Scale divisions | Coarse & fine |
| POWER CONSUMPTION : | |
| Current | 0.2VA |
| Voltage path | E1W, D1W, D1B, V1W, V1B : 3.0VA E1B : 3.5VA D2W, D2B : 3.4VA V3W : 3.9VA V3B : 4.3VA |
| Accuracy class | 1.5 according to IEC 60051 |
| Input | Full power value Pw / Pb |
| Feasibility factor | Lambda = Pw / Ps or Pb / Ps |



TECHNICAL SPECIFICATIONS:

|  | | | |
|---|------|--|---------|
| Model | Unit | LML 96 | LML 144 |
| Front Facia | mm | 96x96 | 144x144 |
| Approximate weight | kg | 0.73-0.98 | 0.9-1.2 |
| AC Wattmeter CT operated | A | 1A, 5A | 1A, 5A |
| AC wattmeter rated voltage | V | for single phase (E1W, E1B) : 57.7, 63.5, 100, 110, 127, 220, 289, 380 for three phase (D1W, D1B, D2W, D2B, V1W, V1B, V3W, V3B) : 100, 110, 220, 240, 380, 415, 500 | |
| Rated insulation voltage | V | 660V | |
| Proof voltage | V | 2kV | |
| OVERLOAD CAPACITY : | | | |
| Continuous | | 1.2 x rated voltage/current | |
| Short duration Voltage path | | 2 x rated voltage, 5sec. max. 10 x rated current, 5 sec. max. | |
| Response time | sec | 4sec. max. | |
| Scale length | mm | 142 | 230 |



| Dimensions (in mm) | | LML 96 | LML 144 |
|-----------------------|---|--------------------|-------------------|
| Bezel | a | 96 | 144 |
| Case | b | 90 | 136 |
| Depth | c | 106 | 106 |
| | d | 91.5 | 137.5 |
| | e | 5.5 | 5.5 |
| Cutout Size | | 92 ^{+0.8} | 138 ⁺¹ |
| Depth with back cover | f | 64 | 64 |

SYSTEM TYPES:

| Type | Active Power | Reactive Power |
|--|--------------|----------------|
| Single phase system | E1W | E1B |
| 3 phase 3 wire system (balanced load) | D1W | D1B |
| 3 phase 4 wire system (balanced load) | V1W | V1B |
| 3 phase 3 wire system (unbalanced load) | D2W | D2B |
| 3 phase 4 wire system (unbalanced load) | V3W | V3B |

SELECTION OF MEASURING RANGE :

Apparant power P_s is calculated from primary ratings of current transformer and voltage transformer.

In single phase network, $P_s = V \cdot I$
 where V = voltage between phase and neutral & I = line current.

In three phase network, $P_s = \sqrt{3} V \cdot I$
 where V = voltage between two phase & I = line current.

Full scale value i.e range of the instrument (P_w = active power, P_b = reactive power) must be selected in such a way that the same remain between 0.5 times and 1.2 times the value of apparant power P_s .

Thus feasibility factor "Lambda" should be between 0.5 and 1.2
 where "Lambda" = P_w/P_s or P_b/P_s

Full scale values shall preferably be selected from standard series according to DIN 43701, 1-1.2-1.5-2-2.5-3-4-5-6-7.5-8 and their decadic / decimal multiples.

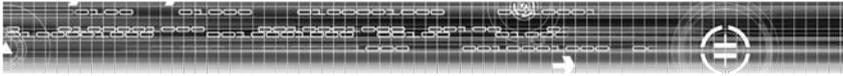
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | System type | Measuring Range/Input | Scale | Options |
|------|------|--------------|-------------|-----------------------|-------|---------|
|------|------|--------------|-------------|-----------------------|-------|---------|

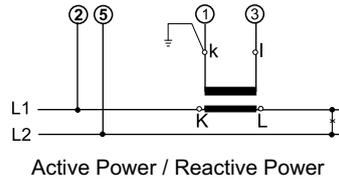
ORDER EXAMPLE

| | | | | | | |
|-----|----|--------------|------------------------------|---------|-------|-----------------|
| LML | 96 | Active Power | 3 phase 3 wire balanced load | 380V/5A | 1900W | with back cover |
|-----|----|--------------|------------------------------|---------|-------|-----------------|

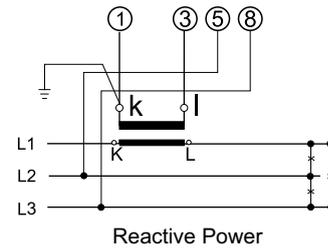
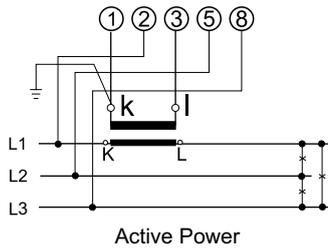


CONNECTION DIAGRAMS:

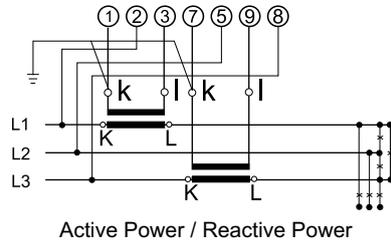
● SINGLE PHASE SYSTEM :



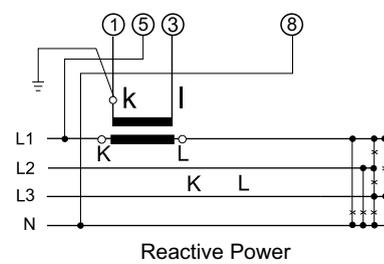
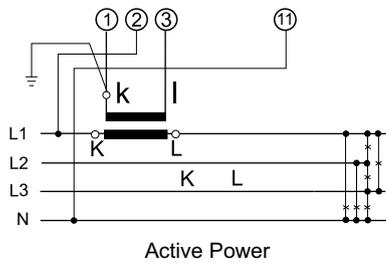
● 3 PHASE 3 WIRE SYSTEM (BALANCED LOAD) :



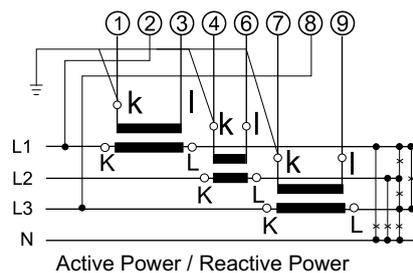
● 3 PHASE 3 WIRE SYSTEM (UNBALANCED LOAD) :

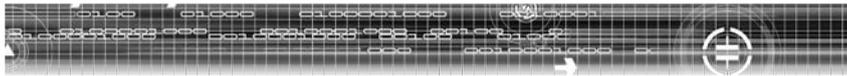


● 3 PHASE 4 WIRE SYSTEM (BALANCED LOAD) :



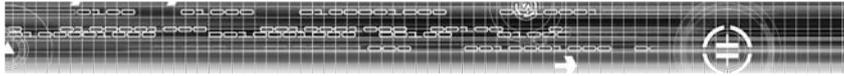
● 3 PHASE 4 WIRE SYSTEM (UNBALANCED LOAD) :





Ziegler

Redefine Innovative Metering



LED Type Electronic Synchroscope

SQ 96

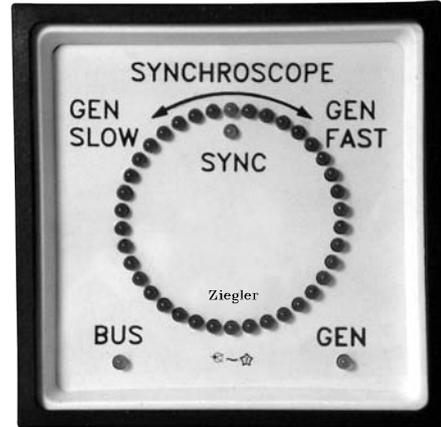
Electronic LED type
Synchroscope for synchronizing
application

The Electronic Synchroscope is designed to provide an illuminated indication of actual phase difference between the BUS voltage (reference voltage) & the GENERATOR Voltage (incoming voltage)

It denotes the actual frequency difference corresponding to the inverse of time taken for 1 rotation of the illuminated vector spot. When 2 alternators are paralleled, it is necessary that,

- 1) Frequency must be equal.
- 2) Phase must be same.

Synchroscope is, hence used to indicate the phase and frequency difference between 2 AC alternators.



Applicable Standards

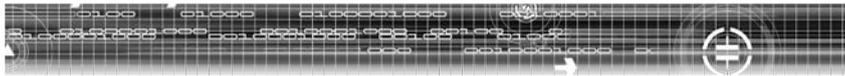
GENERAL FEATURES:

APPLICABLE STANDARDS

| | |
|---|---|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| OVER RANGE: | |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 600 V (IEC 61010) |
| Insulation resistance | >50MΩ at 500 V DC |

FACT SHEET:

| | | |
|---|--|-----------------------------------|
| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles | |
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 | |
| Front Facia | Glass glare Antiglare Glass (on request) Polycarbonate/transparent(on request) | |
| Color of Bezel | Black/Red/Yellow/Blue/White (on request) | |
| Color of LED's | Red/Orange/Yellow | |
| Position of use | Vertical | |
| Panel Fixing (mountable in a single cutout) | Swivel screws | |
| Panel thickness | 40mm | |
| Terminals | Voltmeter & Ammeter <6A | HEX STUD M4 screws and wire clamp |
| | Ammeter 6A | Threaded studs M6 with nuts |
| POWER CONSUMPTION : | | |
| Synchroscope | < 6 VA max. | |

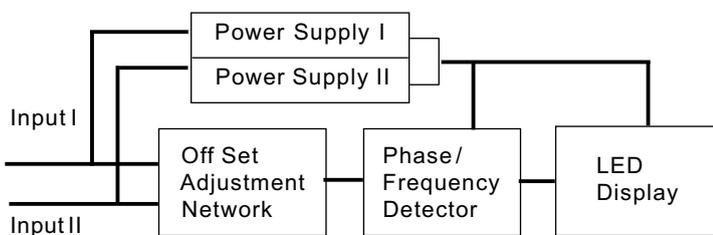


TECHNICAL SPECIFICATIONS:



| Model | Unit | SQ |
|----------------------------|------|------------------------------|
| Front Facia | mm | 96X96 |
| Approximate weight | kg | 0.60 |
| Measuring quantity | | Frequency & Phase difference |
| Measuring range | Hz | 35-70Hz |
| Pull in/drop out frequency | Hz | ±9Hz |
| Rated insulation voltage | V | 660V |
| Proof voltage | V | 2kV |
| Dimensions (in mm) | | SQ 96 |
| Bezel a | | 96 |
| Case b | | 90 |
| Depth c (<6) | | 104 |
| d | | 91.5 |
| e | | 5.5 |
| Cutout Size | | 92 ^{+0.8} |
| Depth with back cover f | | 64 |

FUNCTIONAL PRINCIPLE:



The Bus & Gen inputs are fed to the Frequency & Phase detection network. The output duty cycle of the network corresponds to the frequency difference between Bus & Generator Voltage. The detector network also determines the actual phase difference.

DESCRIPTION

The rotation of the vector spot is with reference to the bus voltage. If the vector spot LED turns clockwise, it indicates the GENERATOR frequency is greater than the BUS frequency. It means the speed of the generator must be reduced by the operator.

If the spot LED turns anticlockwise, the GENERATOR frequency is less than BUS frequency. In this case, speed of the generator must be increased.

If 'T' is the time taken for one rotation, the frequency difference can be calculated as $1/T = \Delta f$

Example: Let the bus frequency be 50 Hz. The vector spot takes 10 Sec. for one rotation, clockwise.

$1/10 = 0.1$ Hz.

The frequency difference = 0.1 Hz. Hence we can infer that GENERATOR frequency is 50.1 Hz.

If the Frequency & Phase of BUS signal matches with those of GENERATOR signal, the two green led's at 12 o'clock position glow.

If the Frequency matches & Phase does not, then one red led corresponding to the phase difference will glow.

FAVORABLE CONDITION FOR "SWITCHING IN" THE GENERATOR:

1. Ensure that the frequency difference between two inputs is within the requirements of user as follows:

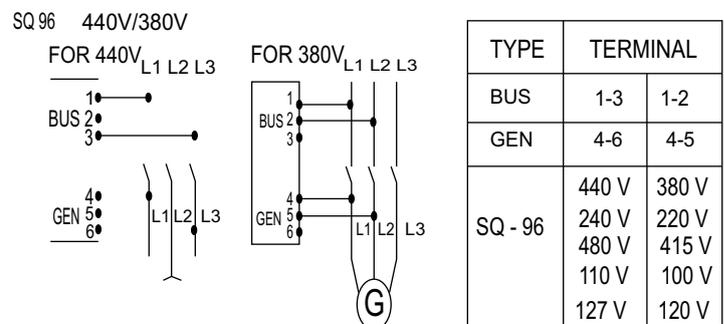
Measure time taken for 1 complete rotation of the vector spot in SECOND (T).

The frequency difference will be $\Delta f = 1/T$ (Hz)

2. Provided the frequency difference is within acceptable limits, wait till the SYNC mark LED s (two green LED s at 12 o'clock position) glow.

At this instant, it is safe to CONNECT the GENERATOR to BUS.

CONNECTIONS DIAGRAM :



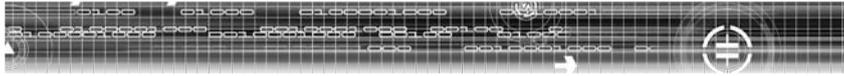
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | Measuring Range/Input | Options |
|------|------|--------------|-----------------------|---------|
| | | | | |

ORDER EXAMPLE

| | | | | |
|----|----|------------------------------|-----------|-----------------|
| SQ | 96 | Frequency & Phase difference | 415V/50Hz | with back cover |
|----|----|------------------------------|-----------|-----------------|



Moving Iron Panel Mount Analog Meters With Interchangeable Scales & built-in selector switch



- EQ 72 SWT For Voltage-AC Voltmeter with selector switch
- EQ 96 SWT For Current-AC Ammeter with selector switch with TRUE EFFECTIVE VALUE in 3 phase systems

Available in both AC Current & Voltage type, they come in standard size of 72x72, 96x96mm



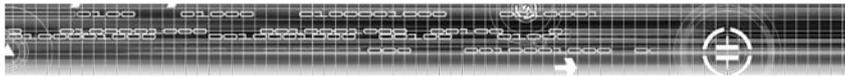
| Selector Switch Position | System & Instrument Type |
|---------------------------------------|--------------------------|
| L1, L2, L3, OFF | 3 Phase Ammeter |
| L1L2, L2L3, L3L1, OFF | 3 Phase 3 Wire Voltmeter |
| L1L2, L2L3, L3L1 L1N, L2N, L3N | 3 Phase 4 Wire Voltmeter |
| L1L2, L2L3, L3L1 L1N, L2N, L3N OFF | |

GENERAL FEATURES:

| APPLICABLE STANDARDS | |
|---|---|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| OVER RANGE: | |
| Ammeters | 2 times nominal current |
| Voltmeters for use on voltage transformers | 1.2 times nominal voltage |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 600 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles |
|---|--|
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) |
| Position of use | Vertical |
| Panel Fixing (mountable in a single cutout) | Swivel screws |
| Panel thickness | 40mm |
| Terminals | HEX STUD M4 screws and wire clamp E3 |
| Pointer | Knife-edge pointer |
| Pointer deflection | 0-90° |
| Scale characteristics | Nearly linear above 10% of nominal full scale value |
| Scale divisions | Coarse & fine |
| POWER CONSUMPTION : | |
| Voltmeter | < 3.5 VA |
| Ammeter | 1 VA |
| Accuracy class | 1.5 according to IEC 60051 |



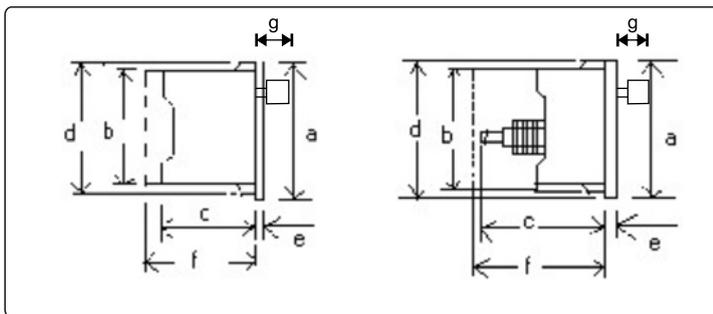
Ziegler

Redefine Innovative Metering

TECHNICAL SPECIFICATIONS:



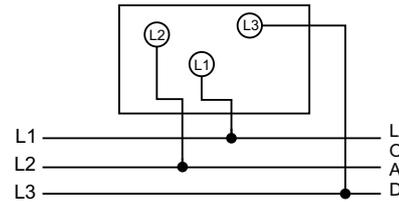
| Model | Unit | EQ 72 | EQ 96 |
|----------------------------|------|--|-------|
| Front Facia | mm | 72x72 | 96x96 |
| Approximate weight | kg | 0.19 | 0.23 |
| AC Ammeter | A | 1A, 5A | |
| AC Voltmeter | V | 110V, 120V, 132V, 150V, 200V, 250V, 300V, 400V, 500V, 600V | |
| Rated insulation voltage | V | 1000V | |
| Proof voltage | V | 3kV | |
| OVERLOAD CAPACITY : | | | |
| Continuous | | 1.2 x rated voltage/current | |
| Short duration Voltmeter | | 2 x rated voltage max. 1000V upto max. 5sec. | |
| Ammeter | 5sec | 10 times | |
| | 1sec | 40 times (250 A max.) | |
| Scale length | mm | 61 | 97 |



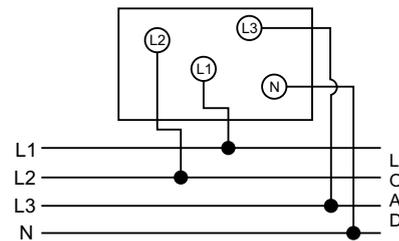
| Dimensions (in mm) | | EQ 72 SWT | EQ 96 SWT |
|-----------------------|---|--------------------|--------------------|
| Bezel | a | 72 | 96 |
| Case | b | 66 | 90 |
| Depth | c | 53 | 53 |
| | d | 67.5 | 91.5 |
| | e | 5.5 | 5.5 |
| Cutout Size | | 68 ^{+0.7} | 92 ^{+0.8} |
| Depth with back cover | f | 64 | 64 |
| | g | 13 | 13 |

CONNECTION DIAGRAMS:

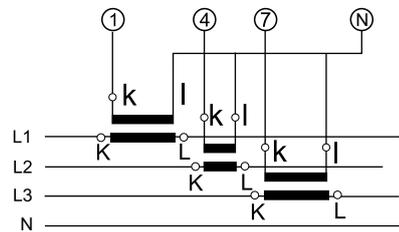
AC VOLTMETERS 3 PHASE 3 WIRE



AC VOLTMETERS 3 PHASE 4 WIRE



AC AMMETERS 3 PHASE 4 WIRE



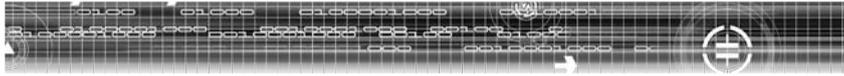
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | System Type | Measuring Range/Input | Scale | Options |
|------|------|--------------|-------------|-----------------------|-------|---------|
|------|------|--------------|-------------|-----------------------|-------|---------|

ORDER EXAMPLE

| | | | | | | |
|----|----|-----------|----------------|------|------|-----------------|
| EQ | 72 | Voltmeter | 3 Phase 3 Wire | 250V | 250V | with back cover |
|----|----|-----------|----------------|------|------|-----------------|



Vibrating REED Type Frequency Meter



FQ 72 | For measuring frequency
 FQ 96 | of Generators and Power Suppliers

The vibrating REED Type Frequency Meters are used measuring frequency of gensets, generator sets in the span of rated frequencies 50Hz or 60Hz. They come in 72x72mm & 96x96mm DIN Quadratic sizes.



Movement :

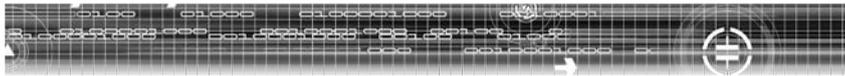
Vibrating REED Movement with 13nos. If REEDs mounted in HORIZONTAL ARRANGEMENT. Each REED is tuned to a different value in the frequency span.

GENERAL FEATURES:

| APPLICABLE STANDARDS | |
|---|---|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Nominal case and cutout dimensions for indicating Electrical instruments | DIN 43700 DIN 16257 |
| Connections and Terminal markings for panel meters | DIN 43807 |
| Terminal bolts / leads. | DIN 46200/46282 |
| Principle Dimensions & Front frames for indicating measuring instruments | DIN 43718 |
| Safety requirements and protective measures for Electrical indicating instruments and their accessories. | DIN 40050/8-70, VDE 0110/ 11-72 VDE 0410/ 10-76 IEC 529 , IEC 1010 |
| Enclosure code | IP 52 (standard) IP 65(on req.) IP 54 (on request) casings |
| UL combustibility class | UL 94 V-0 |
| Compliance with European Directives | 89/336/EEC (EMC directive) 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE Marking |
| Insulation class | Group A according to VDE 0110 |
| Installation category | CAT III 600 V (IEC 61010) |
| Insulation Resistance | >50MΩ at 500 V DC |

FACT SHEET:

| | |
|---|--|
| Casing Details | Moulded square case suitable for mounting in control / switchgear panels, Machinery consoles |
| Case Material | Glass filled polycarbonate, Flame retardant & drip proof as per UL 94 V0 |
| Front Facia | Glass Antiglare Glass (on request) Polycarbonate/transparent(on request) |
| Color of Bezel | Black Red/Yellow/Blue/White (on request) |
| Position of use | Vertical |
| Panel Fixing (mountable in a single cutout) | Metal side clamps, Leaf springs |
| Panel thickness | 40mm |
| Terminals | HEX STUD M4 screws and wire clamp E3 |
| No. of REEDs | 13 |
| REED Arrangement | Horizontal |
| Scale divisions | Coarse & fine |
| Accuracy class | 0.5 according to IEC 60051 |



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Redefine Innovative Metering

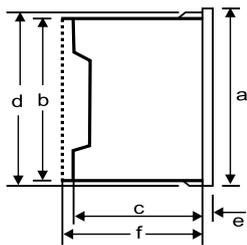
TECHNICAL SPECIFICATIONS:



| Model | Unit | FQ 72 | FQ 96 |
|--------------------------|------|-----------------|---------------------------------|
| Front Facia | mm | 72x72 | 96x96 |
| Approximate weight | kg | 0.30 | 0.40 |
| Measuring range | Hz | 45...50...55 Hz | Resolution: ½ Hz |
| | | 47...50...53 Hz | ½ Hz |
| | | 44...50...56 Hz | 1 Hz |
| | | 57...60...63 Hz | ½ Hz |
| | | 54...60...66 Hz | 1 Hz |
| Rated voltage | V | 100V | Approx. power consumption 0.4VA |
| | | 110V | 0.5VA |
| | | 230V | 1VA |
| | | 400V | 1.5VA |
| | | 500V | <3VA |
| | | 600V | <3VA |
| Rated insulation voltage | V | 660V | |
| Proof voltage | V | 2kV | |

OVERLOAD CAPACITY :

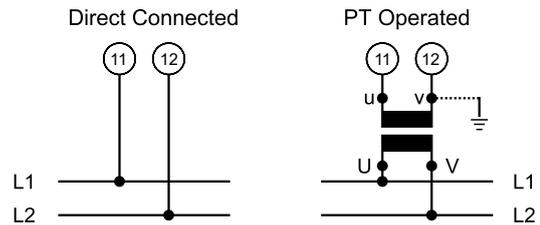
| | |
|----------------|------------------------------|
| Continuous | 1.2 x rated voltage |
| Short duration | 2 x rated voltage max. 5sec. |



| Dimensions (in mm) | | FQ 72 | FQ 96 |
|-----------------------|---|--------------------|--------------------|
| Bezel | a | 72 | 96 |
| Case | b | 66 | 90 |
| Depth | c | 53 | 53 |
| | d | 67.5 | 91.5 |
| | e | 5.5 | 5.5 |
| Cutout Size | | 68 ^{+0.7} | 92 ^{+0.8} |
| Depth with back cover | f | 64 | 64 |

CONNECTION DIAGRAMS:

Frequency meter



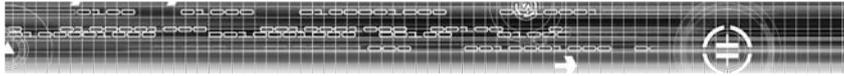
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Measured Qty | Input Voltage | Scale | Options |
|------|------|--------------|---------------|-----------------|-----------------|
| FQ | 72 | Frequency | 230V | 45...50...55 Hz | with back cover |

ORDER EXAMPLE

| | | | | | |
|----|----|-----------|------|-----------------|-----------------|
| FQ | 72 | Frequency | 230V | 45...50...55 Hz | with back cover |
|----|----|-----------|------|-----------------|-----------------|

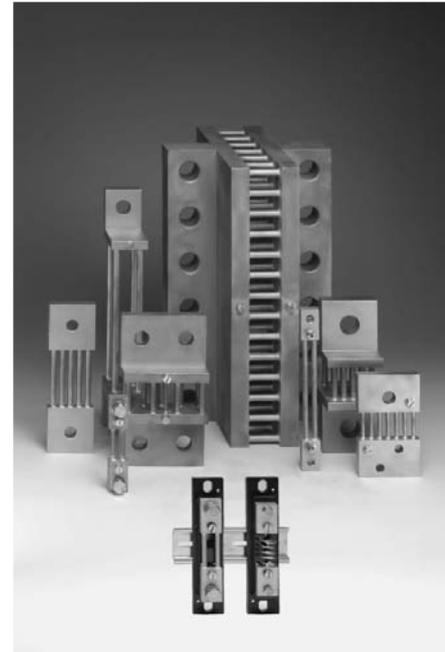


DC Shunts for High current on DC circuits

50mV
60mV
75mV
150mV

For measuring High Value current connection on DC circuits on 0.5 and 1 class.

DC shunts convert high value current in DC circuits into proportional voltage drop (50mV/60mV/75mV/150mV) which can be connected of DC voltmeters to measure the high value current. They come in three forms as described below,



GENERAL FEATURES:

APPLICABLE STANDARDS

| | |
|---|-------------------------------|
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories | IEC51/DINEN60051 DIN 43701 |
|---|-------------------------------|

| | |
|--------|-----------|
| Shunts | DIN 73703 |
|--------|-----------|

| | |
|----------------|-----------------|
| Mounting rails | DIN EN 50022-35 |
|----------------|-----------------|

| | |
|----------------|-------|
| Enclosure code | IP 00 |
|----------------|-------|

OVER RANGE:

| | |
|-------|---------------------------|
| Shunt | 1.2 times nominal current |
|-------|---------------------------|

| | |
|------------------|-------------------------------|
| Insulation class | Group A according to VDE 0110 |
|------------------|-------------------------------|

| | |
|-----------------------|---------------------------|
| Installation category | CAT III 600 V (IEC 61010) |
|-----------------------|---------------------------|

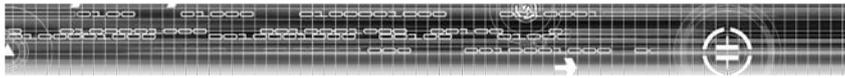
| | |
|-----------------------|---------------------------|
| Insulation Resistance | >50M Ω at 500 V DC |
|-----------------------|---------------------------|

FACT SHEET:

| | |
|----------------------|--|
| Form A | Insulating base mounted shunts clamping to DIN mounting rail or wall mounting (upto 30A) without insulating base (31...150A) |
| Form B | L-profile end blocks |
| Resistance bars | Manganin |
| End blocks Form A | High conductivity brass |
| Form B/C | High conductivity brass / copper |
| Base material | Polycarbonate, black |

POWER CONSUMPTION :

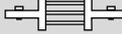
| | |
|----------------|-----------------------------------|
| Voltmeter | < 4.5 VA |
| Ammeter | <15A - < 0.5 VA >15A - <0.8 VA |
| Accuracy class | Class 1, 0.5, 0.2 |



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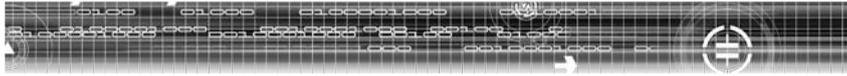
Redefine Innovative Metering

TECHNICAL SPECIFICATIONS:

| DIN 43703 standard | |  |  |  |
|--------------------|----|---|--|---|
| Model | | Form A | Form B | Form C |
| Voltage drop | mV | 50mV, 60mV, 75mV, 150mV | 50mV, 60mV, 75mV, 150mV | 50mV, 60mV, 75mV, 150mV |
| MEASURING RANGE | In | 1,2,4,5,6 10,15,20,25,30,40 50,60,80,100 or 150 | 200; 250; 300; 400; 500; 600; 750; 800; 1000; 1200; 1500; 2000 or 2500 | 1200; 1500; 2000 or 2500 3000 or 4000 |

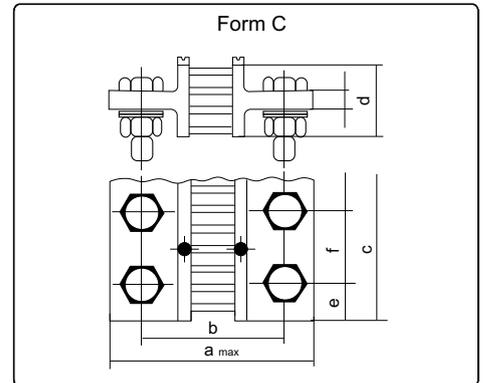
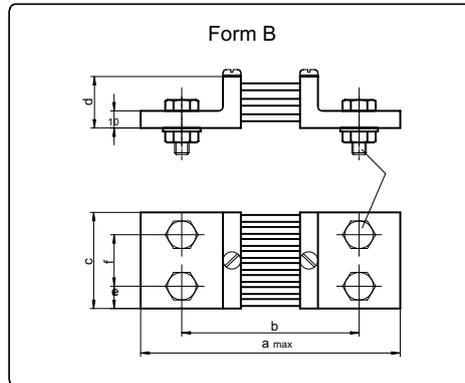
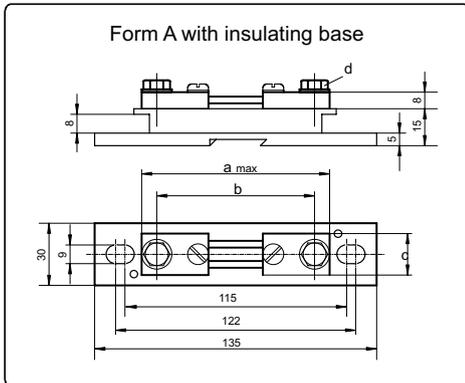
| Approximate weight (Kg) | | | | | | | |
|-------------------------|---------|-----------|------------|------------|-------|-------|-------|
| In | 1...30A | 31...150A | 200...250A | 400...600A | 1000A | 1500A | 2500A |
| 50/60mV | 0.12 | 0.13 | 0.61 | 0.85 | 1.45 | 1.96 | 2.90 |
| 75mV | 0.12 | 0.16 | 0.61 | 1 | 1.90 | 3 | 3.10 |
| 150mV | 0.15 | 0.23 | 0.68 | 1.16 | 2.15 | 3.15 | 5.20 |

| Voltage drop mV | Rated current A | Exec. according to figure | a | b | c | d | e | f | No. of screws | Hexagonal screw DIN 933-5-8 |
|-----------------|-----------------|---------------------------|-----|-----|-----|----|----|-------|---------------|-----------------------------|
| 50/60 mV | 1...30A | A | 90 | 70 | 20 | - | - | - | 2 x 1 | M5x12 |
| | 31...150A | A | 110 | 80 | 20 | - | - | - | 2 x 1 | M8x16 |
| | 200...250A | B | 155 | 105 | 30 | 30 | 15 | - | 2 x 1 | M12x40 |
| | 400...600A | B | 155 | 105 | 30 | 30 | 20 | - | 2 x 1 | M16x45 |
| | 1000A | B | 175 | 115 | 60 | 30 | 30 | - | 2 x 1 | M20x50 |
| | 1500A | B | 175 | 115 | 90 | 30 | 21 | 48 | 2 x 2 | M16x45 |
| 75mV | 2500A | C | 175 | 115 | 120 | 30 | 30 | 60 | 2 x 2 | M20x50 |
| | 200...250A | B | 165 | 125 | 30 | 30 | 15 | - | 2 x 1 | M12x40 |
| | 400...600A | B | 165 | 125 | 40 | 30 | 20 | - | 2 x 1 | M16x45 |
| | 1000A | B | 185 | 135 | 60 | 30 | 30 | - | 2 x 1 | M20x50 |
| | 1500A | B | 185 | 135 | 90 | 30 | 21 | - | 2 x 2 | M16x45 |
| 150mV | 2500A | C | 185 | 135 | 120 | 30 | 30 | - | 2 x 2 | M20x50 |
| | 200...250A | B | 270 | 230 | 30 | 50 | 15 | - | 2 x 1 | M12x40 |
| | 400...600A | B | 270 | 230 | 40 | 50 | 20 | - | 2 x 1 | M16x45 |
| | 1000A | B | 290 | 240 | 70 | 60 | 35 | - | 2 x 1 | M20x50 |
| | 1500A | C | 290 | 240 | 90 | 60 | 21 | - | 2 x 2 | M16x45 |
| 2500A | C | 290 | 240 | 120 | 60 | 30 | - | 2 x 2 | M20x50 | |



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Redefine Innovative Metering



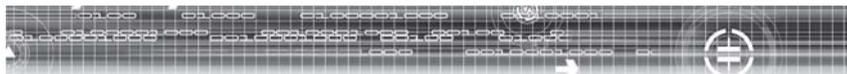
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Voltage Drop | Rated Current | Accuracy | Insulating Base |
|------|--------------|---------------|----------|-----------------|
|------|--------------|---------------|----------|-----------------|

ORDER EXAMPLE

| | | | | |
|-------|------|------|---------|----|
| Shunt | 75mV | 500A | Class 1 | NA |
|-------|------|------|---------|----|



Analog Meters with Moving-Iron Movement with contacts

EQC 96

Available in both AC, Current & Voltage type, they come in standard size of 96x96mm

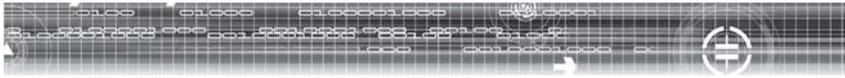


GENERAL FEATURES:

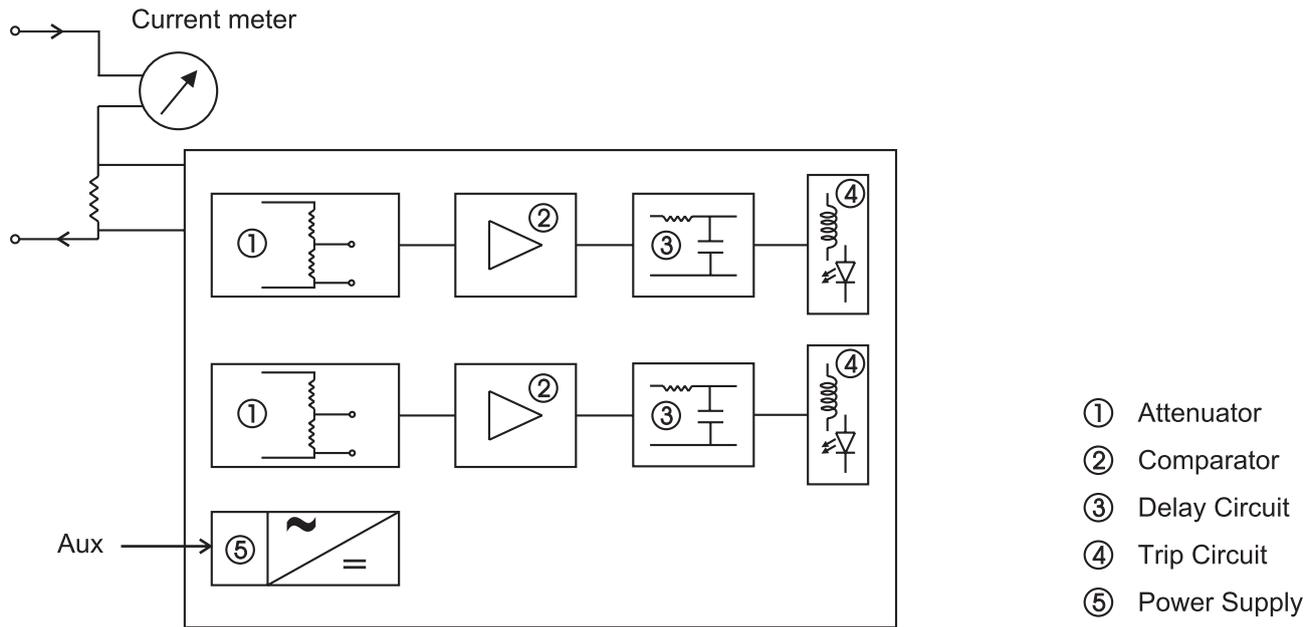
| APPLICABLE STANDARDS | |
|--|--|
| Nominal case and cutout dimensions for indicating Electrical instruments | IEC 61554 |
| Scale and pointer for electrical measuring instruments | DIN 43802 |
| Safety requirements and protective measures for electrical indicating instruments and their accessories. | DIN 40050 / 8-70, VDE 0110 / 11-72 VDE 0410 / 10-76 IEC 529, IEC 1010 |
| Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories. | IEC 51 / DIN EN 60051 DIN 43701 |
| Environmental conditions | VDE / VDI 3540 |
| Front frames for indicating measuring instruments principle dimensions | DIN 43718 |
| Enclosure code | IP 52 case |
| UL Combustibility Class | UL 94 V-0 |
| Insulation class | Group A according to VDE 0110 |
| Rated insulation voltage | 1000 V |
| Proof voltage | EQC 96 : 2KV |
| Installation category | 300 V CAT III (IEC 1010) |
| Insulation resistance | > 50 Mohm at 500 V d.c |
| Voltmeters | 2 times rated voltage |
| Ammeter | |
| 5 s max. | 10 times (200 A max.) : 10 overloads |
| 1 s max. | -- 40 times (250 A max.) |
| Relay contact rating | 10A @ 250VAC |
| Time delay | 0 - 30 Sec. ± 3 Sec. |
| Set accuracy | ± 5 % |
| Trip Setting | 0 - 100% |
| Set accuracy | ± 5 % |
| Hysteresis | 2% of the scale |

FACT SHEET:

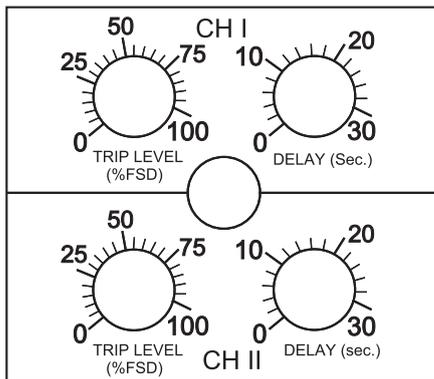
| | |
|---------------------------------|---|
| Case details | Moulded square case suitable for mounting in Control / Switchgear panels, Machinery consoles. |
| Case material | Glass filled polycarbonate, flame retardant and drip proof as per UL 94 V-0. |
| Front facia | Glass |
| Colour of bezel | Black |
| Position of use | Vertical |
| Panel fixing | Mounting Clamps |
| Mounting | Stackable in a single cutout |
| Panel thickness | ≤ 25 mm |
| Terminals | Plug and play terminal blocks |
| Pointer | Knife - edge pointer |
| Pointer deflection | 0...90° |
| Scale characteristics | Near Linear above 10% of nominal full Scale value |
| Scale division | Coarse - fine |
| Scale length | EQC 96 97mm |
| Over range | |
| Ammeters | 2 times nominal current |
| Voltmeters for use on | 1.2 times nominal voltage |
| Voltage transformer | |
| Scale Interchangeability | Interchangeable |
| Power consumption | |
| Ammeter < 15 A | < 1 VA |
| Ammeter > 15 A | < 1.5 VA |
| Voltmeter | < 4.5 VA |
| Accuracy class | 1.5 according to IS : 1248 (IEC 51/ DIN EN 60051) |



Schematic Diagram



Trip level and delay settings



| | CH-I | CH-II |
|---------------------------|------------|------------|
| Trip level setting | 0 - 100% | 0 - 100% |
| Delay setting | 0 - 30 sec | 0 - 30 sec |

Relay and LED status

Cascade I mode :

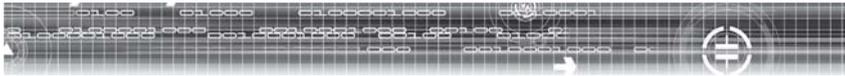
| | Relay I | LED I | Relay II | LED II |
|--------------------------|---------|-------|----------|--------|
| Healthy condition | ON | OFF | ON | OFF |
| Trip condition | OFF | ON | OFF | ON |

Note : Trip condition will occur after the set delay.

Cascade II mode :

| | Relay I | LED I | Relay II | LED II |
|--------------------------|---------|-------|----------|--------|
| Healthy condition | OFF | OFF | OFF | OFF |
| Trip condition | ON | ON | ON | ON |

Note : Trip condition will occur after the set delay.



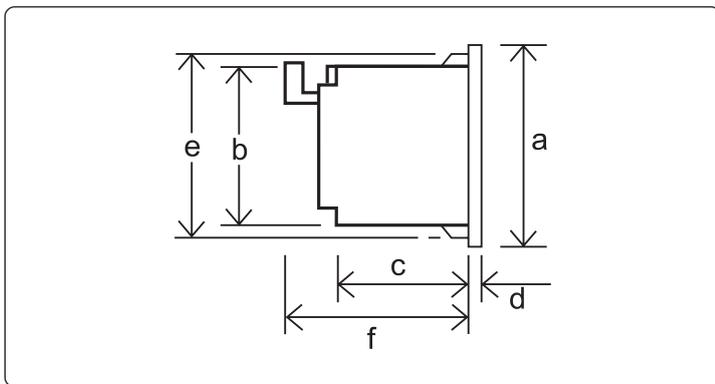
TECHNICAL SPECIFICATIONS:



| Model | Unit | EQC 96 |
|-------------------------------|------|------------------------|
| Front Facia | mm | 96x96 |
| Approximate weight | kg | 0.450 |
| AC Ammeter CT operated | A | 1A, 5A |
| AC Ammeter direct measurement | A | 100mA-10A |
| AC voltmeter | V | 6-600V |
| Aux Supply | V | 230VAC±15% 45-65 Hz |
| Rated insulation voltage | V | 1000V |
| Proof voltage | V | 2kV |

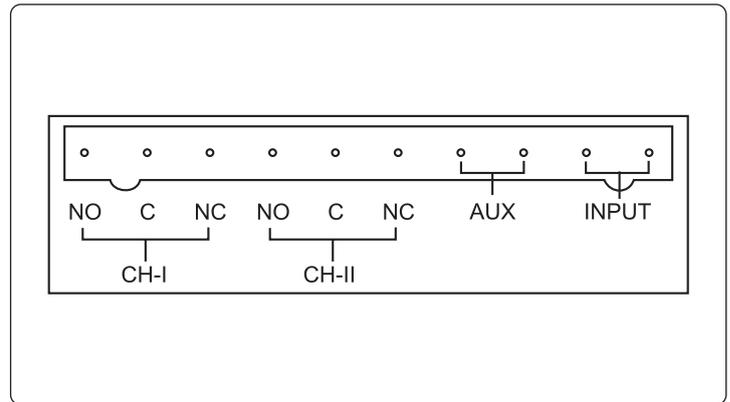
OVERLOAD CAPACITY :

| | | |
|-----------------------------|--------------|--|
| Continuous | | 1.2 x rated voltage/current |
| Short duration Voltage path | | 2 x rated voltage, 5sec. max. |
| Ammeter | 5sec 1sec | 10 times (200A max.) 40 times (250A max.) |
| Scale length | mm | 97mm |



| Dimensions (in mm) | | EQC 96 |
|--------------------|---|--------------------|
| Bezel | a | 96 |
| Case | b | 87.5 |
| Depth | c | 60 |
| | d | 5 |
| | f | 72 |
| Cutout Size | e | 92 ^{+0.8} |

CONNECTION DIAGRAMS:



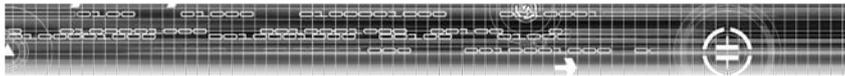
ORDERING INFORMATION

Please specify ordering information as given below,

| Type | Size | Over Range | Measuring Range | Index Pointer | Front Facia | Color of Bezel | Aux | Modes |
|------|------|------------|-----------------|---------------|-------------|----------------|-----|-------|
|------|------|------------|-----------------|---------------|-------------|----------------|-----|-------|

ORDER EXAMPLE

| | | | | | | | | |
|--------|----|-----|------|-----|--------------|-------|---------|-----------|
| EQC 96 | 96 | 0-5 | Amps | Red | Normal glass | Black | 230V AC | Cascade 1 |
|--------|----|-----|------|-----|--------------|-------|---------|-----------|



Accessories - Analogue Panel Meters

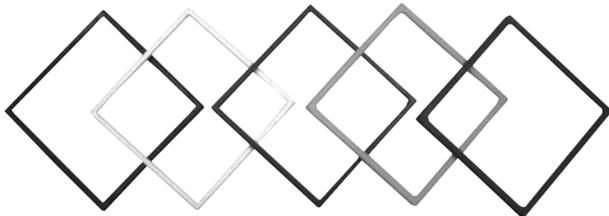
SCALES

Ziegler can supply blank and printed scales as accessories. The special color marking, scale mark with different color bands also supplied on request. All scales are printed as per the DIN standard. Also plastic scale can be supplied on request.



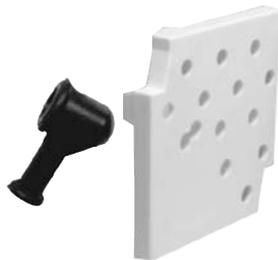
DIFFERENT SIZES AND COLOR BEZELS

In Ziegler meters we can change scale very easily and can use different color bezel for indication. Eg: Red, White, Yellow, Blue & Black. Available in 48x48, 72x72, 96x96, 144x144mm sizes.



TERMINAL COVER / BACK COVER

The click fit back cover can be supplied as an accessory with different DIN sizes 48, 72, 96 & 144. For protection we have other option as terminal cover.



ADAPTER PLATE

Available for following size:
96x144
72x96



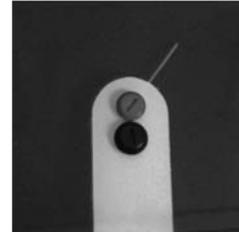
MOUNTING CLAMPS

The swivel screw and leaf spring can be supplied as accessories.



RED POINTER KIT

Available for following size:
48X48
72X72
96X96
144X144
Available in 90° & 240°



PLOTTER AND ACCESSORIES

Plotter & Printing Software can be supplied on request for printing the scales locally in bulk quantities.

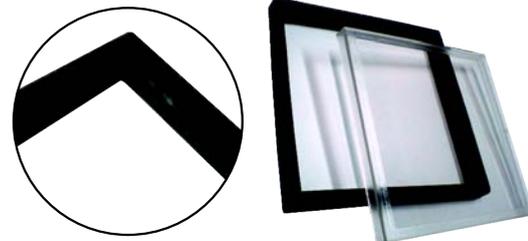


GLASS

The Glass can also be replaced and can be ordered as an accessory. The Antiglare, Polycarbonate glasses can be supplied on request

IP 65 KIT

48X48
72X72
96X96



PANEL WINDOWS

72X72
96X96

