



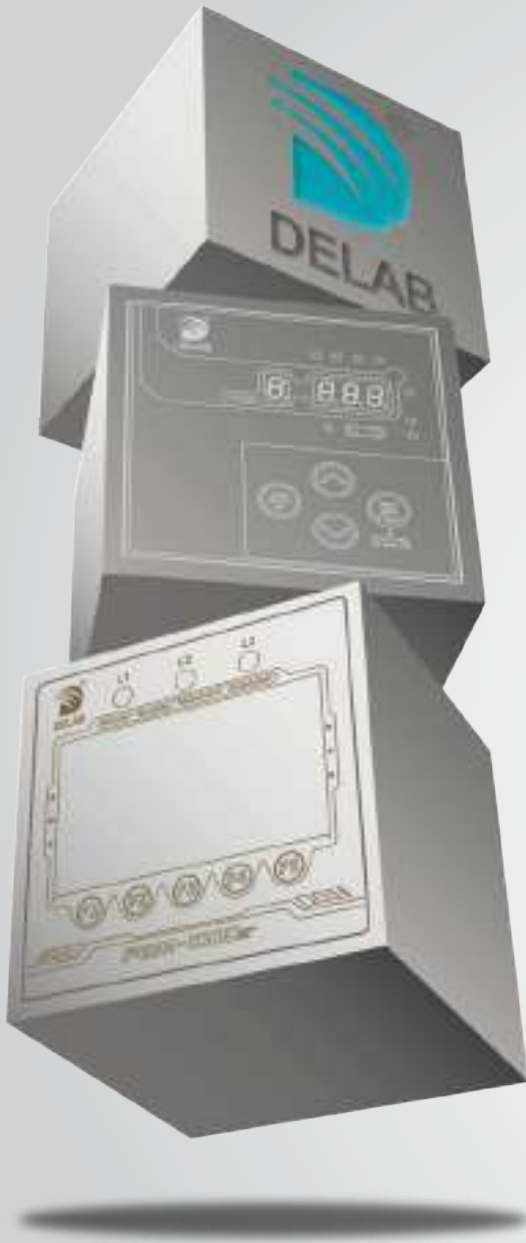
our innovation

YOUR SOLUTION



SEP 2021 - 2022

PRODUCT CATALOGUE



## ABOUT US *Our Innovation. Your Solution.*

Delab Scientific Sdn Bhd was established in 1998, specializing in research and development of digital and micro-processor based protection devices, mainly Earth Leakage, Earth Fault, and Over Current Relays, as well as Automatic Power Factor Compensation control devices mainly known as Power Factor Controllers. Voltage Monitoring Relays and Timers were introduced at a later stage. Over the years, our R&D has made tremendous improvements to existing products as well as development of new products which employed the latest innovated algorithms, technologies and design that are not only impressive but highly practical to the end users.

## DP Series *The Next Generation of Current Protection Relay*

### The New Generation of Protection Devices

They are designed purely for the purpose of protection against current faults such as over current, short circuits, earth faults and earth leakages. Equipped with digital displays, important information such as setting and operation parameters, real-time faults, tripping histories and indication of previous tripped elapsed time are easily available for a more precise fault analysis. Multiple firmware algorithms (notably SPARC<sup>1</sup>, DCOI<sup>2</sup> and Fundamental Signal Detection<sup>3</sup>) have been integrated into these devices which makes them extremely responsive yet precise while maintaining high immunity against EMI and nuisance tripping. DP series of protection relay truly belongs to the next generation that will lead the expectation of future protection devices.

## PQM *Impressive*

### The Future Generation of Power Meters

It is more than impressive. PQM will change the engineers' expectation of future power meters. Designed not only for the purpose of power quality monitoring, it is also a very informative tool for simple on-the-spot analysis with quite a long list of user-friendly features. Other than measurement of all standard and relevant electrical parameters, its graphical LCD will display real-time signal waveforms, spectrum harmonic bar graphs and phasor diagrams for both voltage and current signal. It not only triggers the analytical mind of the engineers, it does make the analyzing job so much easier to understand too. So user-friendly is the PQM, there's no need for the operation manual at hand to operate all of its functions. PQM – be Impressed!

#### SPARC<sup>1</sup>

Sampling Progressive Algorithm for RMS Computation: makes it possible to compute multiple true RMS values progressively in a single cycle. Delivers superior detection and response in short circuit situation and allows the relay to operate in extremely short time yet accurately. 100% true RMS protection at its best in any situation.

#### DCOI<sup>2</sup>

DC Offset Independent algorithm: cancel out DC signal component that is associated with EMI and aging circuitry. Provides high immunity against nuisance tripping yet responsive on actual AC faults in an AC network.

#### FSD<sup>3</sup>

Fundamental Signal Detection algorithm: discriminate between an actual fault and false or noisy signal. Prevents nuisance tripping.

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- True RMS Measurement
- Waveform Display for Voltage and Current
- Graphical Phasor Display
- Harmonics Spectrum Bar Graph Display
- 4 Quadrant Energy Measurement
- Demand for kW, kVA and Ampere (Max, Previous, Rolling)
- Info / Event Summary Page Display
- Phase Supply LED Indicator
- Phase Rotation Indication
- Complies with IEC-61326-1
- External Plug-in Module for RS-485 Modbus RTU Model: A-01s (isolated type)

## technical data

### Network Type

3P4W, 3P3W, 3P3W (Aron)

### Display Type

Graphical LCD with white LED backlit

### Current Measurement

AC Input Range : 0.005 ~ 6.500 A  
 Accuracy :  $\pm 0.5\%$   
 CT Range : 0 ~ 10,000 / 5A  
 Burden : < 0.1 VA at 5A

### Voltage Measurement

AC Input Range : 0~300 VLN , 0~500 VLL  
 Accuracy :  $\pm 0.5\%$   
 VT Range : 1.0 ~ 2500.0 : 1

### Power Measurement

Accuracy (W, Var, VA, PF, Cos  $\Phi$ ) :  $\pm 1.0\%$

### Frequency Measurement

Range : 45 ~ 65 Hz  
 Accuracy :  $\pm 0.1\%$

### Energy Measurement (4 Quadrant)

Range : 0.0 ~ 9,999,999,999.9  
 (kwh, kVAh, kVAh)

### Communication

A-01s : Modbus RTU RS-485 (isolated type)  
 Plug in module with selectable baud rate (kbps)  
 (sold separately) 0.6, 1.2, 2.4, 4.8, 9.6, 19.2, 38.4

### Aux Power Supply

AC range : 65 ~ 275 Vac, 45 ~ 65 Hz  
 DC range : 90 ~ 300 Vdc  
 Consumption : < 3VA

### Mechanical

Operating Temp. : -5°C ~ +55°C  
 IP Rating : IP54 (front panel)  
 Installation : Panel flush mount  
 Dimension (mm) : 99.2 (h) x 99.2 (w) x 45 (d)  
 Weight : approx. 310 gram

## measured parameters

**Voltage** : V1, V2, V3, V12, V23, V31, V asymmetry

**Current** : I1, I2, I3, In

**Power** : P1, P2, P3,  $\Sigma P$

**Reactive Power** : Q1, Q2, Q3,  $\Sigma Q$

**Apparent Power** : S1, S2, S3,  $\Sigma S$

**Active Energy** : Import and Export (kwh)

**Reactive Energy** : Inductive and Capacitive (kVarh)

**Apparent Energy** : (kVAh)

**Frequency** : Hz

**Power Factor** : PF1, PF2, PF3, PFavg

### Displacement Power Factor:

Cos  $\Phi$  1, Cos  $\Phi$  2, Cos  $\Phi$  3, Cos  $\Phi$  avg,  
 360° phasor angle measurement for  
 V1, V2, V3, I1, I2, I3, In

### Max / Roll / Prev. Demand :

I1, I2, I3, Iavg, P1, P2, P3,  $\Sigma P$ , S1, S2, S3,  $\Sigma S$

### Harmonics:

1st to 31st (odd harmonics) for Voltage and Current

**Total Harmonic Distortion** : Voltage and Current

**Min/Max events (V,I, thd-V, thd-I & P) with elapsed time for max**

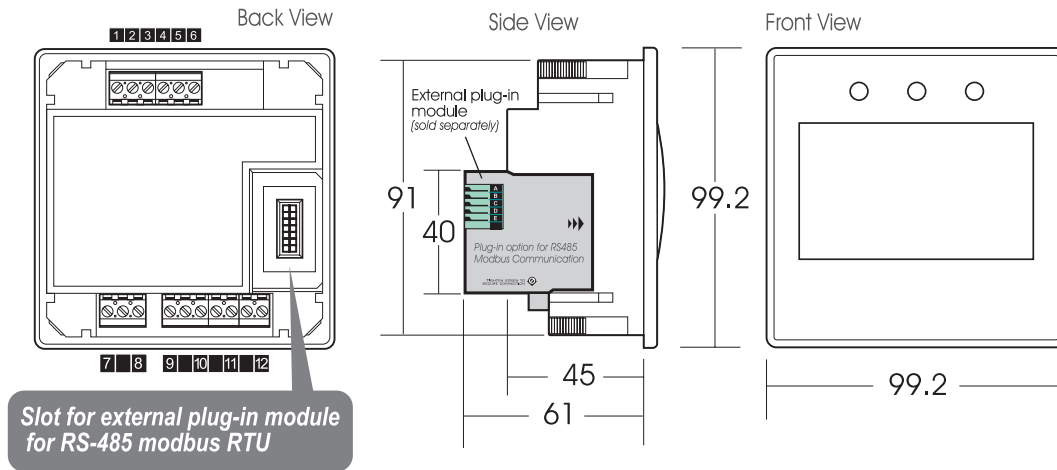
### k-Factor measurement for Ampere :

kF1, kF2, kF3 (indicative)

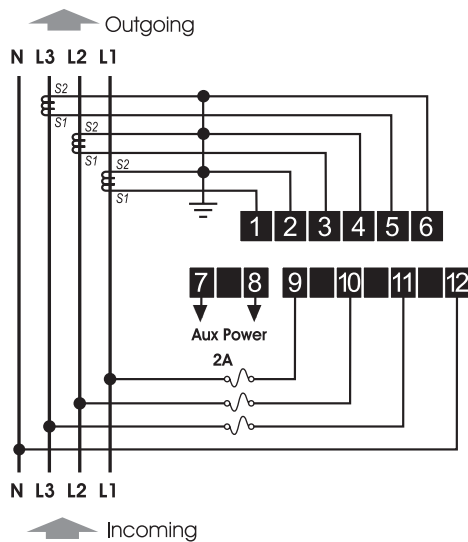
### Running Hours

Hour Run

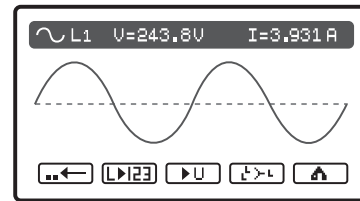
## casing dimension



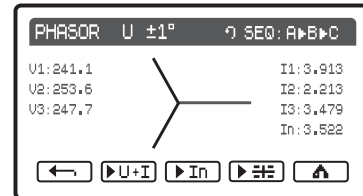
## wiring diagram



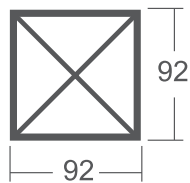
## display : voltage & ampere waveform



## display: phasor angle definition

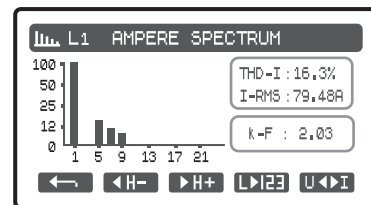


## panel cut-out



Panel Cut-out : 92 x 92

## display : total harmonic distortion



## ordering information

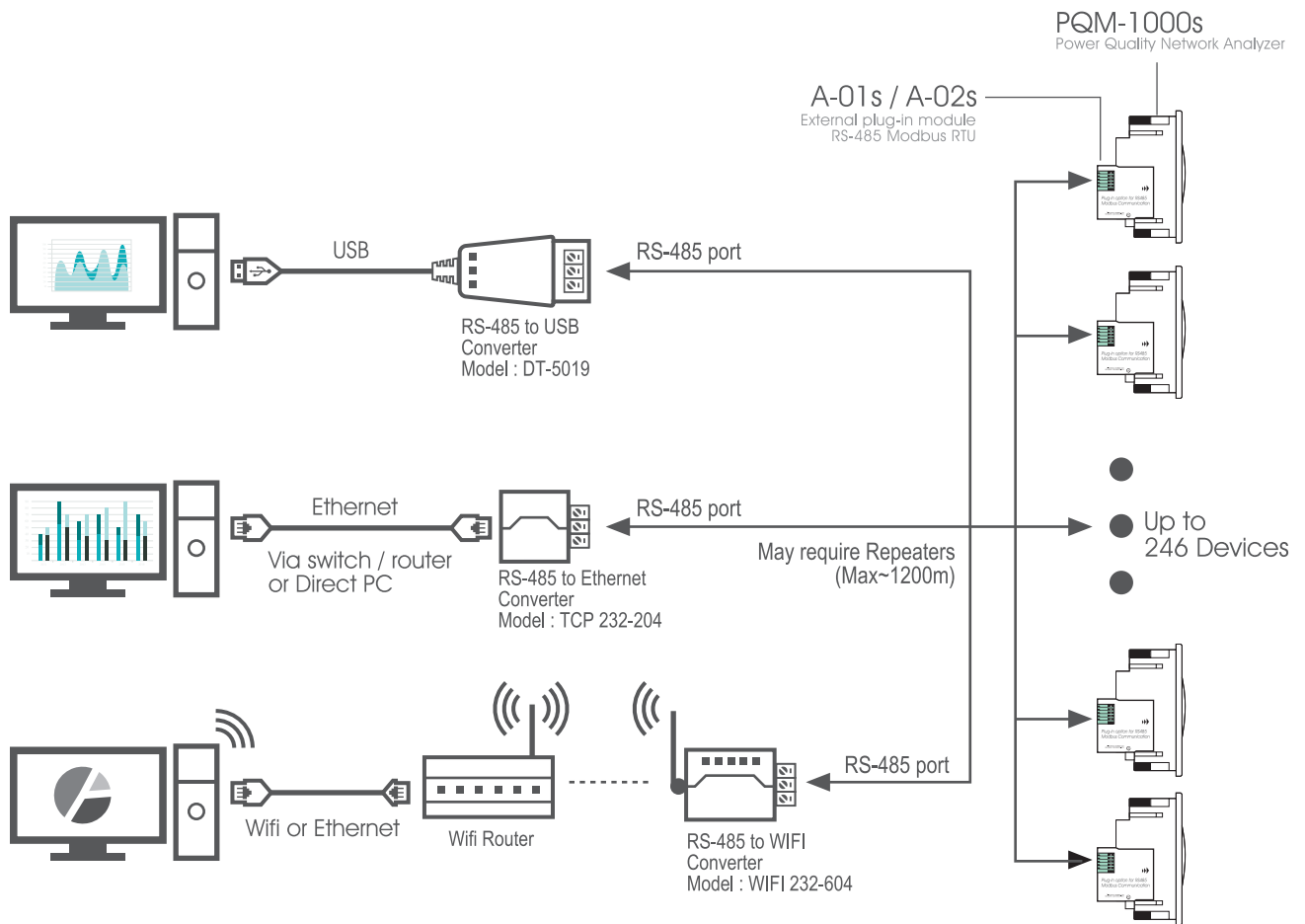
Model	Description
PQM-1000s	65 ~ 275 Vac (45~65 Hz) 90~300 Vdc

Note: All measurement in mm.

# PQM-1000s

## Live Monitoring & Energy Management System

- Identify **Wastages** by comparison of Energy Consumption Pattern
- Identify **Power Quality** Issues by monitoring Voltage Fluctuations and Total Harmonic Distortion
- Identify **Consumption Pattern** to reduce Maximum Demand charges

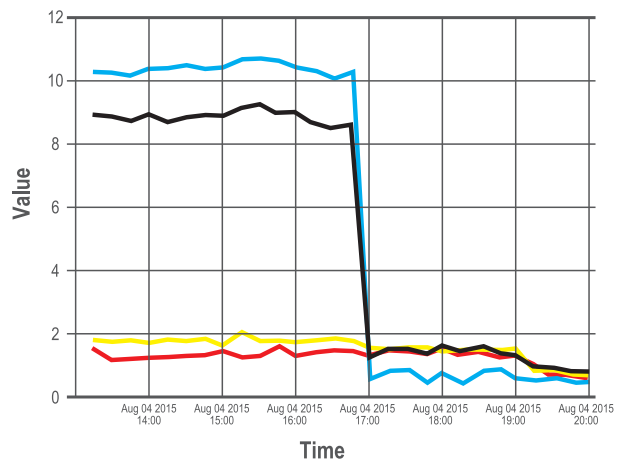


### Comprehensive i3EnMs Energy Management Software (Optional)

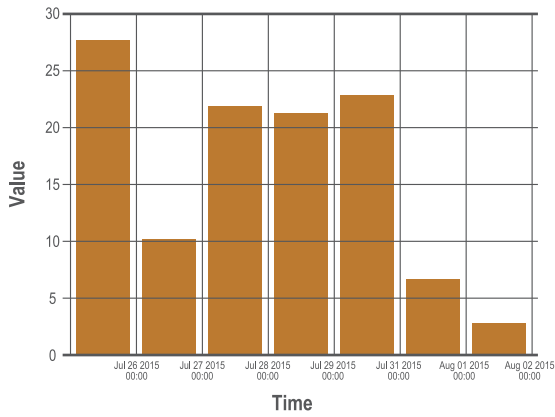
Real Time / Instantaneous Electrical Parameters

	3-Phase	Single Phase1	Single Phase2	Single Phase3	Neutral
<b>Voltage</b>					
Voltage Phase - Phase (V)	430.20	430.40	431.60		
Voltage THD (%)	1.70	0.50	0.80		
Voltage Phase - Neutral (V)	249.00	247.70	249.30		
<b>Current</b>					
Current (A)	158.96	144.44	145.72	86.36	
Current THD (%)	16.30	2.00	5.00		
<b>Energy</b>					
Active Energy Consumed (kWh)	389.4				
Reactive Energy Consumed (kVAh)	68.00				
<b>Power</b>					
Active Power (kW)	35.34	35.63	35.74		
Reactive Power Consumed (kVAR)	16.55	3.10	-8.29		
Power Factor	0.96	0.89	1.00	-0.98	
<b>Maximum Demand</b>					
Maximum Demand (kW)	106.71				
<b>Frequency</b>					
Frequency (Hz)	50.00				

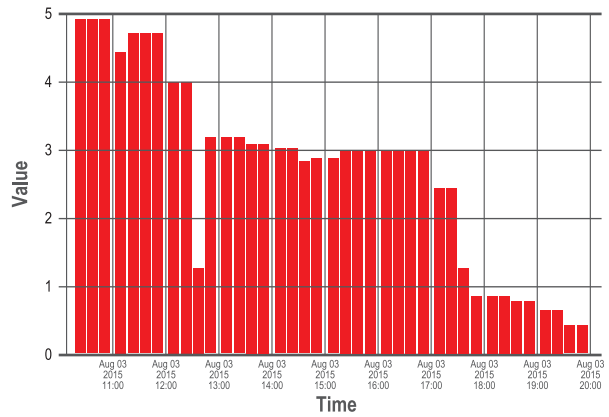
Load Current Trending Line Graph



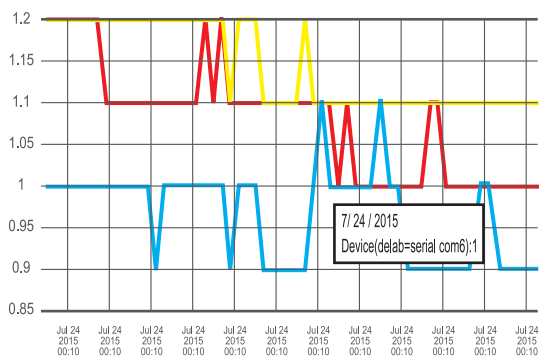
## Daily kWh Consumption Pattern



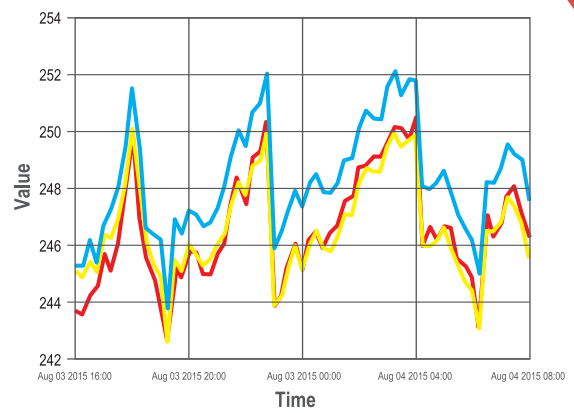
## MD Analysis



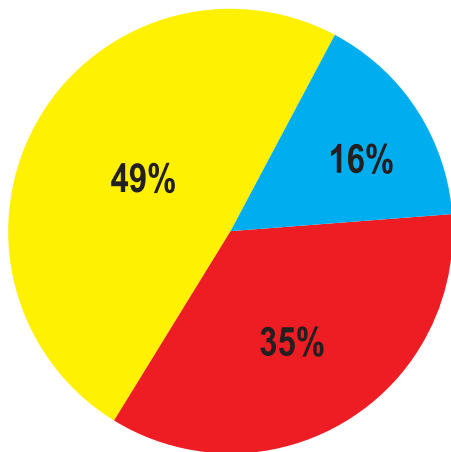
## Power Quality



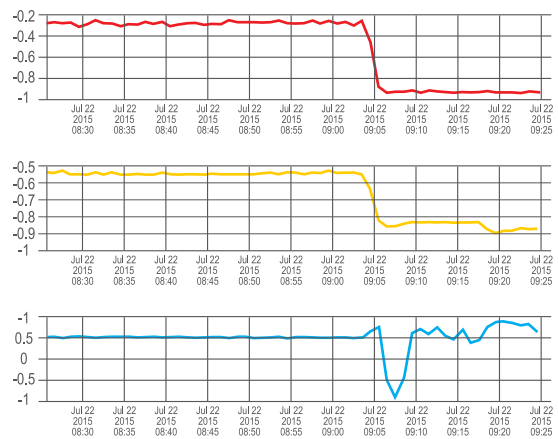
## Voltage Supply Trending



## Pie Chart Analysis & Report



## Comparative Analysis & Report



## ordering information

Model	Description
DT-5019	RS-485 to USB converter
TCP 232-204	RS-485 to Ethernet converter
WIFI 232-604	RS-485 to WIFI converter

# EM-122



## Application

Model **EM-122** is a modern designed DIN Rail type single phase 2 wire Electronic Active Energy kWh meter. It comes with a horizontal 5 + 1 digits LCD to show the power consumption clearly. It adopts advanced micro-electronics and digital processing technology to provide reliable and accurate active energy measurement for network frequency of 50Hz or 60Hz.

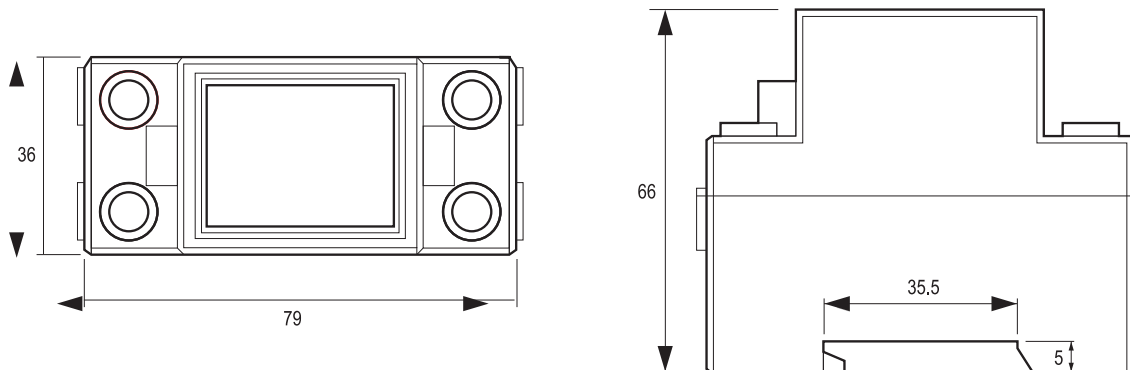
Through advanced micro-electronics design, EM-122 is highly immune to electromagnetic interference, thus ensuring stable and consistent performance for energy measurement . EM-122 complies to the requirement of class 1 active energy measurement and conforms to IEC 62053-1 standards.

## Features

- Bi-directional total active energy measurement
- Compact modular size with light weight for easy installation
- DIN rail installation complying with DIN EN 50022 / DIN 43880
- Easy & accurate monitoring of energy consumption



## Dimension



• All measurement in mm.

## Specification

Specification		EM-122
<b>Accuracy</b>	Active	Class 1.0
	Reactive	/
<b>Voltage</b>	Rated	240V
	Range	0.9Un ~ 1.1Un
	Limit	0.8Un ~ 1.2Un
<b>Frequency</b>		50Hz
<b>Current</b>	Range	10(60)A
<b>Starting Current</b>		0.4% Ib
<b>Constant</b>	Active	1600 imp/kWh
	Reactive	/
<b>Display</b>	Type	LCD
	Digit	Horizontal 5 + 1 digits
<b>Power Consumption</b>	Voltage Circuit	≤ 0.8, 10VA
	Current Circuit	≤ 4VA
<b>Communication</b>	Interface	/
	Protocol	/
<b>Temperature</b>	Working Temperature	-45°C ~ +55°C
	Storage Temperature	-40°C ~ +70°C
<b>Humidity</b>		≤ 90%
<b>Weight</b>		114.5 g



- True RMS Measurement
- 4-digits Segment Display
- Real Time Display (for each phase) :-
  - Current (I)
  - Voltage (V)
  - Frequency (Hz)
  - True Power Factor (PF)
  - Displacement Power Factor (Cos  $\Phi$ )
  - Active Power (P)
  - Reactive Power (Q)
  - Apparent Power (S)
- Default View Mode Selection
  - Auto / Manual Scroll for L1, L2 & L3
- Alarm LED Indication :- (Activated by A-02s)
  - Adjustable Over / Under Current Setting
  - Adjustable Over / Under Voltage Setting
  - Adjustable Over / Under Frequency Setting
  - Adjustable PF / Cos  $\Phi$  Setting
  - Adjustable Start / Reset Time Delay
- External Plug-in Module for :-
  - A-01s (RS-485 Modbus RTU) *isolated type*
  - A-02s (RS-485 Modbus RTU + Alarm Output) *isolated type*

### technical data

#### Network Type

3P4W, 3P3W & 1P2W

#### Display Type

4-digits 7 Segment Display

#### LEDs Indication

A, V, Hz, PF, Cos  $\Phi$ , kW, kVA, kVAR, kVA

#### Aux Power Supply

AC range : 65 ~ 275 Vac, 45 ~ 65 Hz  
 DC range : 90 ~ 300 Vdc  
 Consumption : < 3VA

#### Current Measurement

AC Input Range : 0,025 ~ 10,0 A  
 Accuracy :  $\pm 1,0\%$   
 CT Range : 5 ~ 10,000 / 5A  
 Burden : < 0,1 VA at 5A

#### Voltage Measurement

AC Input Range : 0~300 VLN, 0~500 VLL  
 Accuracy :  $\pm 1,0\%$

#### Power Measurement

Accuracy (W, VAR, VA, PF, Cos  $\Phi$ ) :  $\pm 1,0\%$

#### Frequency Measurement

Range : 45 ~ 65 Hz  
 Accuracy :  $\pm 0,1\%$

#### Mechanical

Operating Temp. : -5°C ~ +55°C  
 IP Rating : IP54 (front panel)  
 Installation : Panel flush mount  
 Dimension (mm) : 99,2 (h) x 99,2 (w) x 45 (d)  
 Weight : approx. 265 gram

### measured parameters

**Voltage** : V1, V2, V3, V12, V23, V31

**Current** : I1, I2, I3, In

**Active Power** : P1, P2, P3,  $\Sigma P$

**Reactive Power** : Q1, Q2, Q3,  $\Sigma Q$

**Apparent Power** : S1, S2, S3,  $\Sigma S$

**Frequency** : Hz

**True Power Factor** : PF1, PF2, PF3, PFavg

**Displacement Power Factor**:  
 Cos  $\Phi$  1, Cos  $\Phi$  2, Cos  $\Phi$  3, Cos  $\Phi$  avg

**Alarm** : Off / Under / Over Current  
 Off / Under / Over Voltage  
 Off / Under / Over Frequency  
 Off / Low PF / Low Cos  $\Phi$   
 Start / Reset Time Delay

**Operated Hours**  
 Hour Run

### communication

**A-01s & A-02s** Plug in module (sold separately)

Modbus RTU RS-485 (isolated type) with :-

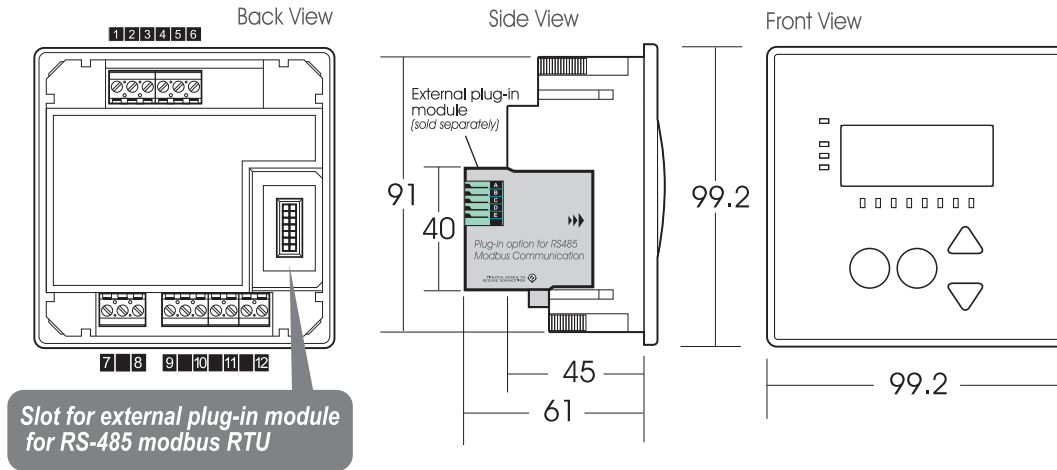
- i) Modbus Address : 1 ~ 247
- ii) Baud rate (kbps) : 3, 6, 12, 24, 48, 96, 192, 288
- iii) Parity : none, odd, even

### (programmable alarm) external output

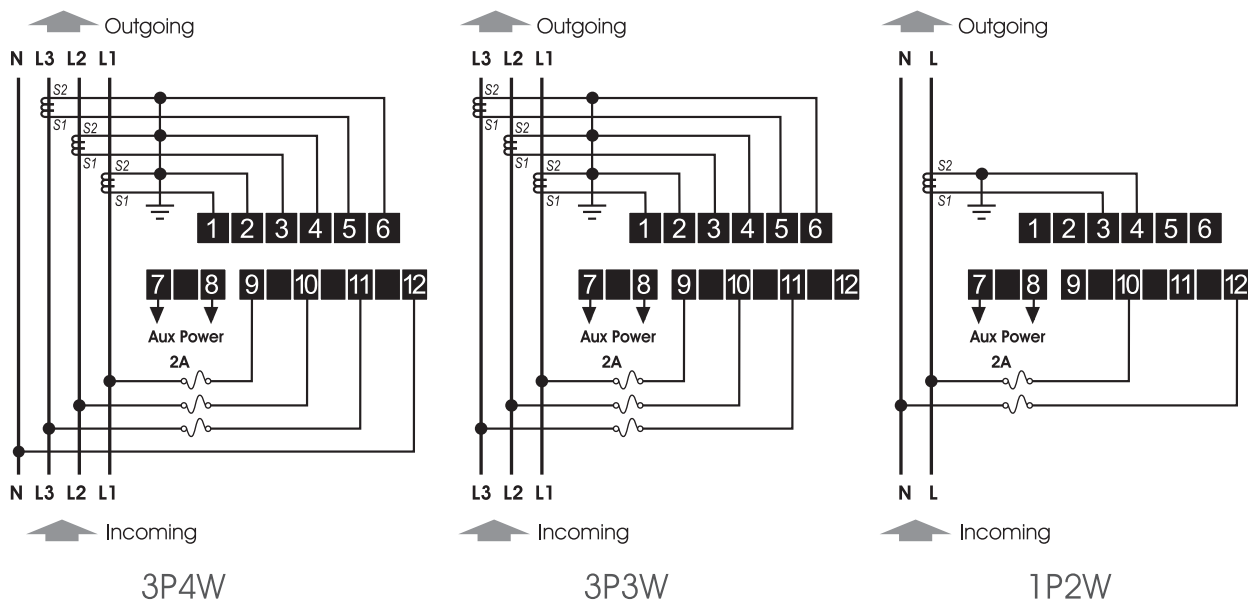
**A-02s** Plug in module (sold separately)

Modbus RTU RS-485 (isolated type) with external alarm output only

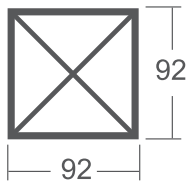
## casing dimension



## wiring diagram



## panel cut-out



Panel Cut-out : 92 x 92

## ordering information

Model	Description
DM-50	65 ~ 275 Vac (45~65 Hz) 90~300 Vdc

Note: All measurement in mm.



technical data

Current Input (In)	: $\pm 5A$ or $\pm 1A$
Frequency	: Software selectable 50 or 60 Hz
Burden	: $< 0.3 VA @ In$
Output Relay Rating	: SPDT 5A, 250V AC/DC
Display	: 7-Segment LED (3 + 1 digit)
Indication (LEDs)	: $\times 10$ , pre-alarm, fault, fault start event, lo / hi trip
Operating Temp.	: $0^{\circ}C \sim +55^{\circ}C$
Humidity	: 56 days at 93%RH, $40^{\circ}C$ non-condensing
IP Rating	: IP54 (front panel)
Weight	: 275 g

## parameter setting

## Phase OverCurrent

$I_{p>}$ : lo-set	2% to 200% (step of 1%)
TM $I_{p>}$ : lo-set time Multiplier	0.05 ~ 1.00 (step of 0.01, 5 IDMT + 1 DTL)
$t_{p>}$ : lo-set trip delay time	0.03s ~ 20.0s 0.03s ~ 0.10s (step of 0.01s) 0.10s ~ 1.00s (step of 0.02s) 1.0s ~ 20.0s (step of 0.1s)
$I_{p>>}$ : hi-set	OFF or 20% ~ 2000% 20% ~ 1000% (step of 10%) 1000% ~ 2000% (step of 100%)
$t_{p>>}$ : hi-set trip delay time	0.03s ~ 20.0s (same range as $t_{p>}$ )

## Earth Fault

$I_e >$ : lo-set	2% to 100% (step of 1%)
TM $I_e >$ : lo-set time Multiplier	0.05 ~ 1.00 (step of 0.01, 5 IDMT + 1 DTL)
$t_e >$ : lo-set trip delay time	0.03s ~ 20.0s 0.03s ~ 0.10s (step of 0.01s) 0.10s ~ 1.00s (step of 0.02s) 1.0s ~ 20.0s (step of 0.1s)
$I_e >>$ : hi-set	OFF or 20% ~ 1000% (step of 10%)
$t_e >>$ : hi-set trip delay time	0.03s ~ 0.5s

True RMS Measurement with SPARC<sup>1</sup> and DCOI<sup>2</sup> Algorithm

Auto / Manual Scroll for Real Time Display of Phase Current and Earth Fault in %

6 Selectable IDMT Graphs + 1 DTL

Fault / lo-set & hi-set Trip LED Indication

Fault Start Event Recording & LED Indication + Output<sup>3</sup>

Pre-Alarm LED Indication + Output<sup>3</sup>

Trip Event Memory  
(non-volatile 7 previous records for 3 phases + earth)

Fault Start Event Memory  
(non-volatile 4 previous records with phase info)

Programmable Relay Output Contacts for K2, K3\*

Last Trip Elapsed Time (up to 99days)

Software Lock to Prevent Unauthorized Setting

Complies with :

IEC-60255-26 / BS EN 50121-5 Standards

ANSI Code: 50P, 50G, 51P, 51G

External Plug-in Module for :-

A-01s (RS-485 MODBUS RTU) isolated type

A-02s (RS-485 MODBUS RTU+k3)\*isolated type

## aux power

DP-34-220a	: 65 ~ 275 Vac (45~65Hz), 90 ~ 300 Vdc
DP-34-024d	: 18 ~ 72 Vdc
Consumption	: $< 3VA$

## fundamental frequency

50 or 60Hz Selectable

## K1 output contact options

Latching (Lc) or non-latching (nLc) trip

## K2 output contact options

CbF (circuit breaker Failure - nLc only)

ALr (pre-fault 90%  $I_{p>}$ , 50%  $I_e >$ )

trP (tripping output - Lc or nLc)

Pht (Over Current Trip) Lc or nLc

EfT (Earth Fault Trip) Lc or nLc

AFS (all fault start signal - Lc or nLc)

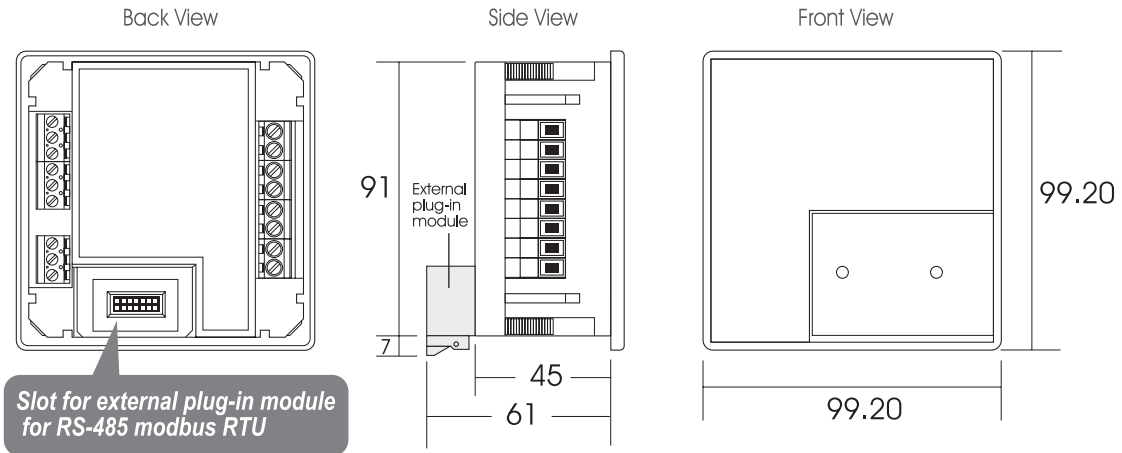
dUF (device failure - Lc only)

<sup>1</sup>SPARC - sampling progressive algorithm for RMS Computation:  
Computation of multiple rms values/cycle (Superior response in short circuit situation)

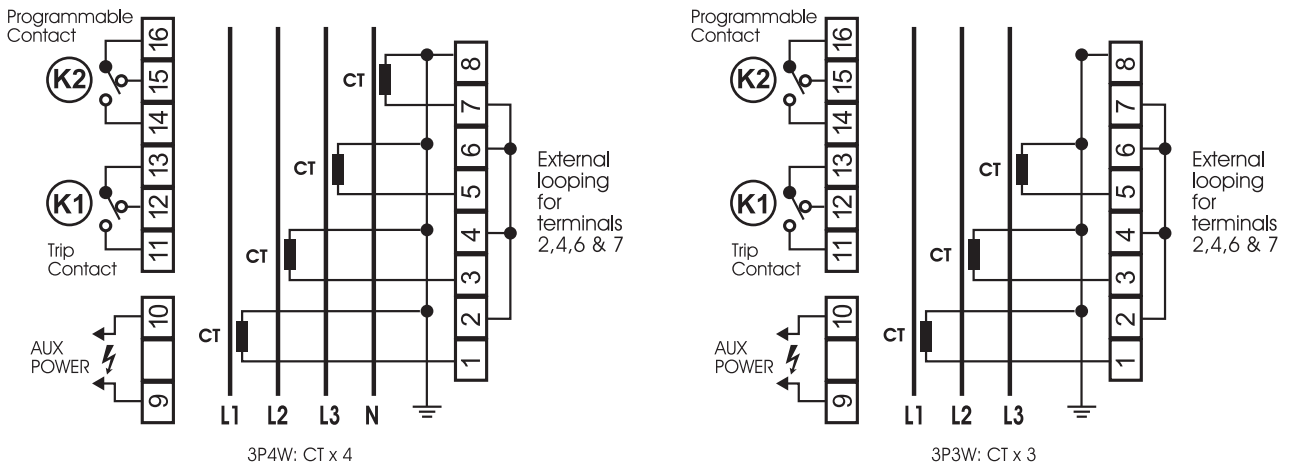
<sup>2</sup>DCOI - dc offset independent algorithm:  
Cancels out dc signal caused by EMI and aging circuitry (Better Immunity against EMI)

<sup>3</sup>Output on K2 dependent on the programmed options

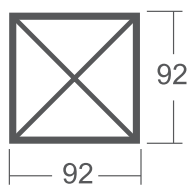
## casing dimension



## wiring diagram



## panel cut-out



Panel Cut-out : 92 x 92

## ordering information

► Refer to page 25 for IDMT graphs

Model	Description
DP-34-220a-5A	(CT.../5A) 65 ~ 275 Vac (45~65 Hz), 90~300 Vdc
DP-34-220a-1A	(CT.../1A) 65 ~ 275 Vac (45~65 Hz), 90~300 Vdc
DP-34-024d-5A	(CT.../5A) 18~72 Vdc
DP-34-024d-1A	(CT.../1A) 18~72 Vdc

Note: All measurement in mm.

# IDMT Over Current Relay

# DP-33



## features



True RMS Measurement with SPARC<sup>1</sup> and DCOI<sup>2</sup> Algorithm

Auto / Manual Scroll for Real Time Display of Phase Current

6 Selectable IDMT Graphs + 1 DTL

Fault / lo-set & hi-set Trip LED Indication

Fault Start Event Recording & LED Indication + Output<sup>3</sup>

Pre-Alarm LED Indication + Output<sup>3</sup>

Trip Event Memory

(non-volatile 7 previous records for all phases)

Fault Start Event Memory

(non-volatile 4 previous records with phase info)

Programmable Relay Output Contact for K2

Last Trip Elapsed Time (up to 99days)

Software Lock to Prevent Unauthorized Setting

Complies with :

IEC-60255-26 / BS EN 50121-5 Standards

ANSI Code: 50P, 51P

External Plug-in Module for :-

A-01s (RS-485 MODBUS RTU) isolated type

## technical data

Current Input (In)	: ..5A or ..1A
Frequency	: Software selectable 50 or 60 Hz
Burden	: <0.3 VA @ In
Output Relay Rating	: SPDT 5A, 250V AC/DC
Display	: 7-Segment LED (3 + 1 digit)
Indication (LEDs)	: x10, pre-alarm, fault, fault start event, lo / hi trip
Operating Temp.	: 0°C ~ +55°C
Humidity	: 56 days at 93%RH, 40°C non-condensing
IP Rating	: IP54 (front panel)
Weight	: 260 g

## parameter setting

I> : lo-set	2% ~ 200% (step of 1%)
TM > : lo-set time Multiplier	0.05 ~ 1.00 (step of 0.01, 5 IDMT + 1 DTL)
t> : lo-set trip delay time	0.03s~20.0s 0.03s~0.10s (step of 0.01s) 0.10s~1.00s (step of 0.02s) 1.0s~20.0s (step of 0.1s)
I>> : hi-set	OFF or 20%~2000% 20%~1000% (step of 10%) 1000%~2000% (step of 100%)
t>> : hi-set trip delay time	0.03s~0.5s

## aux power

DP-33-220a	: 65 ~ 275 Vac (45~65Hz), 90 ~ 300 Vdc
DP-33-024d	: 18 ~ 72 Vdc
Consumption	: < 3VA

## fundamental frequency

50 or 60Hz Selectable

## K1 output contact options

Latching (Lc) or non-latching (nLc) trip

## K2 output contact options

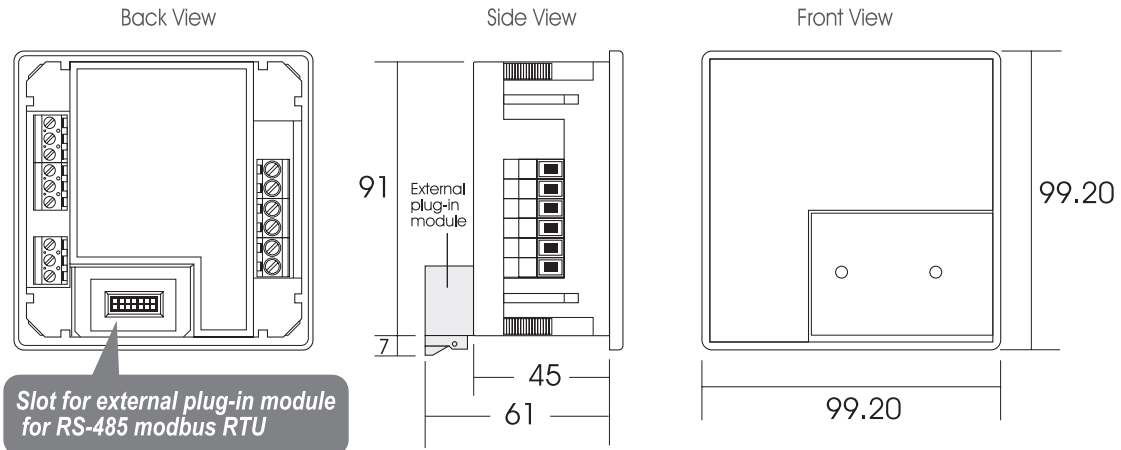
CbF (circuit breaker Failure - nLc only)  
A50 (pre-fault 50% of I> - Lc or nLc)  
A90 (pre-fault 90% of I> - Lc or nLc)  
trP (tripping output - Lc or nLc)  
LFS (lo fault start signal - Lc or nLc)  
HFS (hi fault start signal - Lc or nLc)  
AFS (all fault start signal - Lc or nLc)  
dUF (device failure - Lc only)

<sup>1</sup>SPARC - sampling progressive algorithm for RMS Computation: Computation of multiple rms values/cycle (Superior response in short circuit situation)

<sup>2</sup>DCOI - dc offset independent algorithm: Cancels out dc signal caused by EMI and aging circuitry (Better Immunity against EMI)

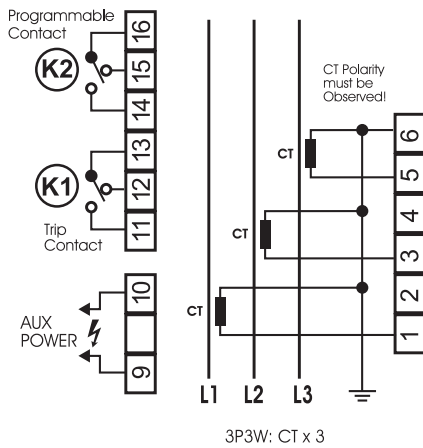
<sup>3</sup>Output on k2 dependent on the programmed options

## casing dimension

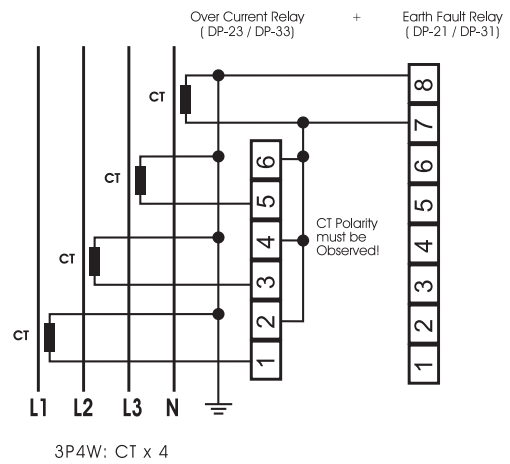


## wiring diagram

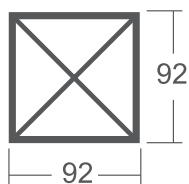
When used without Earth Fault Relay



CT connection when used with Earth Fault Relay



## panel cut-out



Panel Cut-out : 92 x 92

## ordering information

► Refer to page 25 for IDMT graphs

Model	Description
DP-33-220c-5A	(CT.../5A) 65 ~ 275 Vac (45~65 Hz), 90~300 Vdc
DP-33-220c-1A	(CT.../1A) 65 ~ 275 Vac (45~65 Hz), 90~300 Vdc
DP-33-024d-5A	(CT.../5A) 18~72 Vdc
DP-33-024d-1A	(CT.../1A) 18~72 Vdc

Note: All measurement in mm.



True RMS Measurement with SPARC<sup>1</sup> and DCOI<sup>2</sup> Algorithm

Auto / Manual Scroll for Real Time Display of Phase Current

1 LTI Inverse + 1 Definite Time Delay

Fault / lo-set & hi-set Trip LED Indication

Fault Start Event Recording & LED Indication + Output<sup>3</sup>

Pre-Alarm LED Indication + Output<sup>3</sup>

Trip Event Memory

(non-volatile 7 previous records for all phases)

Fault Start Event Memory

(non-volatile 4 previous records with phase info)

Programmable Relay Output Contact for K2

Last Trip Elapsed Time (up to 99days)

Software Lock to Prevent Unauthorized Setting

Complies with :

IEC-60255-26 / BS EN 50121-5 Standards

ANSI Code: 50P, 51P

External Plug-in Module for :-

A-01s (RS-485 MODBUS RTU) isolated type

### technical data

Current Input (In)	: ..5A or ..1A
Frequency	: Software selectable 50 or 60 Hz
Burden	: <0,3 VA @ In
Output Relay Rating	: SPDT 5A, 250V AC/DC
Display	: 7-Segment LED (3 + 1 digit)
Indication (LEDs)	: x10, pre-alarm, fault, fault start event, lo / hi trip
Operating Temp.	: 0°C ~ +55°C
Humidity	: 56 days at 93%RH, 40°C non-condensing
IP Rating	: IP54 (front panel)
Weight	: 260 g

### aux power

DP-23-220a	: 65 ~ 275 Vac (45~65Hz), 90 ~ 300 Vdc
DP-23-024d	: 18 ~ 72 Vdc
Consumption	: < 3VA

### fundamental frequency

50 or 60Hz Selectable

### K1 output contact options

Latching (Lc) or non-latching (nLc) trip

### K2 output contact options

CbF (circuit breaker Failure - nLc only)  
A50 (pre-fault 50% of I> - Lc or nLc)  
A90 (pre-fault 90% of I> - Lc or nLc)  
trP (tripping output - Lc or nLc)  
LFS (lo fault start signal - Lc or nLc)  
HFS (hi fault start signal - Lc or nLc)  
AFS (all fault start signal - Lc or nLc)  
dUF (device failure - Lc only)

### parameter setting

I>: lo-set	2% ~ 200% (step of 1%)
TM >: lo-set time Multiplier	0,05 ~ 1,00 (step of 0,01, 1 LTI + 1 DTL)
t>: lo-set trip delay time	0,03s~20,0s 0,03s~0,10s (step of 0,01s) 0,10s~1,00s (step of 0,02s) 1,0s~20,0s (step of 0,1s)
I>>: hi-set	OFF or 20%~2000%
t>>: hi-set trip delay time	20%~1000% (step of 10%) 1000%~2000% (step of 100%) 0,03s~0,5s

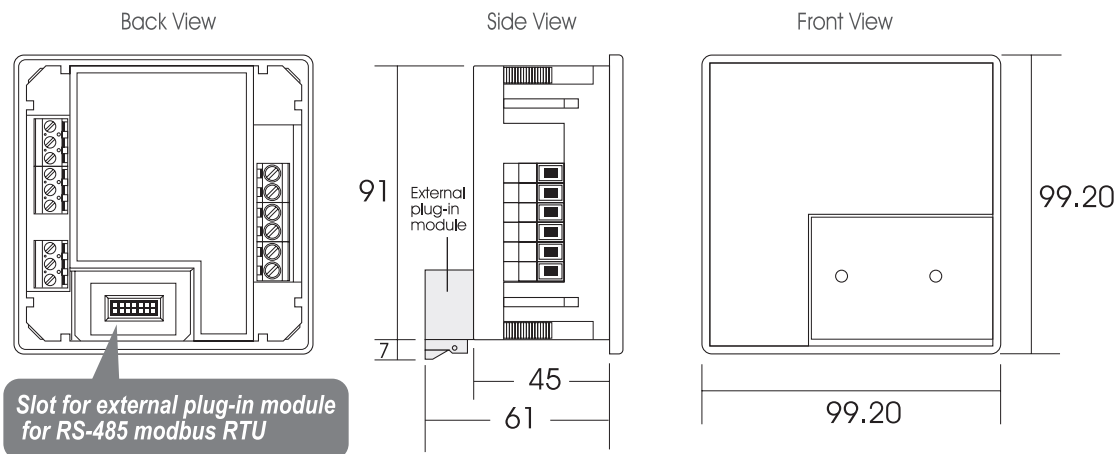
<sup>1</sup>SPARC - sampling progressive algorithm for RMS Computation: Computation of multiple rms values/cycle (Superior response in short circuit situation)

<sup>2</sup>DCOI - dc offset independent algorithm: Cancels out dc signal caused by EMI and aging circuitry (Better Immunity against EMI)

<sup>3</sup>Output on k2 dependent on the programmed options

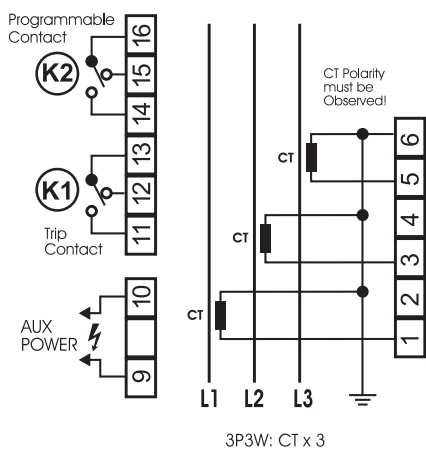


## casing dimension

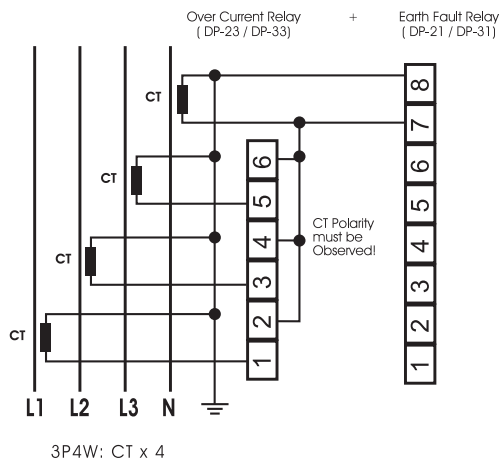


## wiring diagram

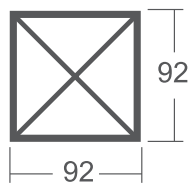
When used without Earth Fault Relay



CT connection when used with Earth Fault Relay



## panel cut-out



Panel Cut-out : 92 x 92

## ordering information

► Refer to page 25 for IDMT graphs

### Model

DP-23-220c-5A  
 DP-23-220c-1A  
 DP-23-024d-5A  
 DP-23-024d-1A

### Description

(CT.../5A) 65 ~ 275 Vac (45~65 Hz), 90~300 Vdc  
 (CT.../1A) 65 ~ 275 Vac (45~65 Hz), 90~300 Vdc  
 (CT.../5A) 18~72 Vdc  
 (CT.../1A) 18~72 Vdc

Note: All measurement in mm.



True RMS Measurement with SPARC<sup>1</sup> and DCOI<sup>2</sup> Algorithm

Fundamental Signal Detection<sup>3</sup>

Real Time Display of Earth Fault in %

6 Selectable IDMT Graphs + 1 DTL

Fault / lo-set & hi-set Trip LED Indication

Fault Start Event Recording & LED Indication + Output<sup>4</sup>

Pre-Alarm LED Indication + Output<sup>4</sup>

Trip Event Memory (non-volatile 7 previous records)

Fault Start Event Memory (non-volatile 4 previous records)

Programmable Relay Output Contacts

Last Trip Elapsed Time (up to 99days)

Software Lock to Prevent Unauthorized Setting

Complies with : IEC-60255-26 / BS EN 50121-5 Standards

ANSI Code: 50N, 51N

External Plug-in Module for :-

A-01s (RS-485 MODBUS RTU) isolated type

## technical data

Current Input (In)	: ..5A or ../1A
Frequency	: Software selectable 50 or 60 Hz
Burden	: <0.3 VA @ In
Output Relay Rating	: SPDT 5A, 250V AC/DC
Display	: 7-Segment LED (3 + 1 digit)
Indication (LEDs)	: mA, pre-alarm, fault, fault start event, lo / hi trip
Operating Temp.	: 0°C ~ +55°C
Humidity	: 56 days at 93%RH, 40°C non-condensing
IP Rating	: IP54 (front panel)
Weight	: 230 g

## parameter setting

I>: lo-set	2% ~ 100% (step of 1%)
TM >: lo-set time Multiplier	0.05 ~ 1.00 (step of 0.01, 5 IDMT + 1 DTL)
t>: lo-set trip delay time	0.03s~20.0s 0.03s~0.10s (step of 0.01s) 0.10s~1.00s (step of 0.02s) 1.0s~20.0s (step of 0.1s)
I>>: hi-set	OFF or 20%~1000% (step of 10%)
t>>: hi-set trip delay time	0.03s~0.5s

<sup>1</sup>SPARC - sampling progressive algorithm for RMS Computation: Computation of multiple rms values/cycle (Superior response in short circuit situation)

<sup>2</sup>DCOI - dc offset independent algorithm: Cancels out dc signal caused by EMI and aging circuitry (Better Immunity against EMI)

<sup>3</sup>Fundamental Signal Detection: To discriminate between signal and noise and eliminate nuisance tripping

<sup>4</sup>Output on k2 dependent on the programmed options

## aux power

DP-31-220a	: 65 ~ 275 Vac (45~65Hz), 90 ~ 300 Vdc
DP-31-024d	: 18 ~ 72 Vdc
Consumption	: < 3VA

## fundamental frequency

50 or 60Hz Selectable

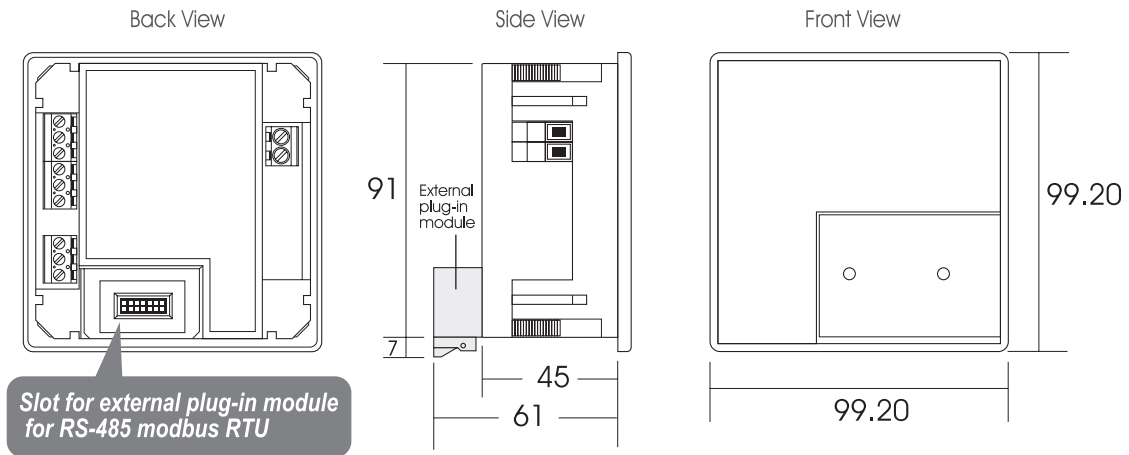
## K1 output contact options

Latching (Lc) or non-latching (nLc) trip

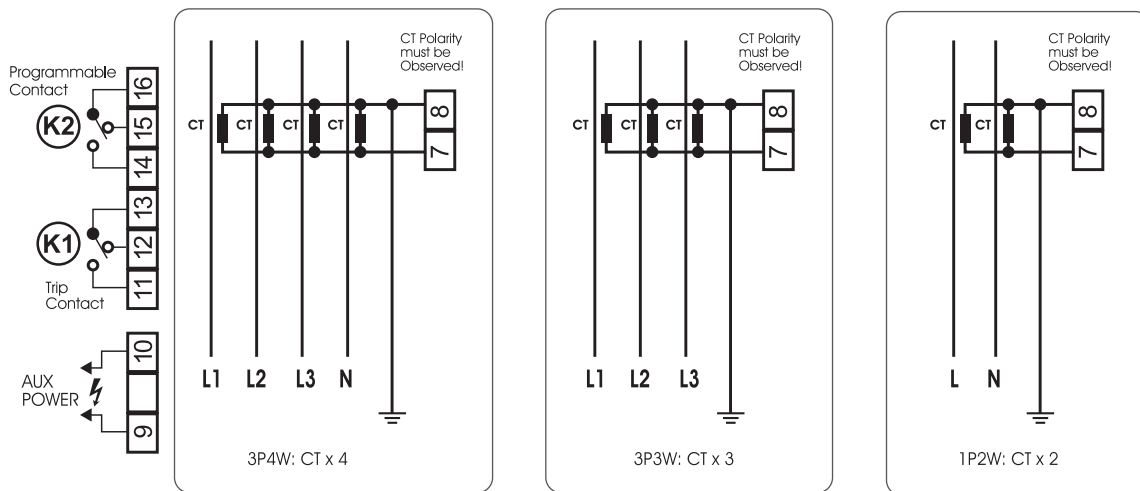
## K2 output contact options

CbF (circuit breaker Failure - nLc only)  
A50 (pre-fault 50% of I> - Lc or nLc)  
A90 (pre-fault 90% of I> - Lc or nLc)  
trP (tripping output - Lc or nLc)  
LFS (lo fault start signal - Lc or nLc)  
HFS (hi fault start signal - Lc or nLc)  
AFS (all fault start signal - Lc or nLc)  
dUF (device failure - Lc only)

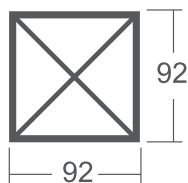
## casing dimension



## wiring diagram



## panel cut-out



Panel Cut-out : 92 x 92

## ordering information

► Refer to page 25 for IDMT graphs

Model	Description
DP-31-220a-5A	(CT.../5A) 65 ~ 275 Vac (45~65 Hz), 90~300 Vdc
DP-31-220a-1A	(CT.../1A) 65 ~ 275 Vac (45~65 Hz), 90~300 Vdc
DP-31-024d-5A	(CT.../5A) 18~72 Vdc
DP-31-024d-1A	(CT.../1A) 18~72 Vdc

Note: All measurement in mm.



True RMS Measurement with SPARC<sup>1</sup> and DCOI<sup>2</sup> Algorithm

Fundamental Signal Detection<sup>3</sup>

Real Time Display of Earth Fault in (%)

Fault / lo-set & hi-set Trip LED Indication

Fault Start Event Recording & LED Indication + Output<sup>4</sup>

Pre-Alarm LED Indication + Output<sup>4</sup>

Trip Event Memory (non-volatile 7 previous records)

Fault Start Event Memory (non-volatile 4 previous records)

Programmable Relay Output Contact for K2

Last Trip Elapsed Time (up to 99days)

Software Lock to Prevent Unauthorized Setting

Complies with : IEC-60255-26 / BS EN 50121-5 Standards

ANSII Code: 50N, 51N

External Plug-in Module for :-

A-01s (RS-485 MODBUS RTU) isolated type

## technical data

Current Input (In)	: ..5A or ..1A
Frequency	: Software selectable 50 or 60 Hz
Burden	: <0.3 VA @ In
Output Relay Rating	: SPDT 5A, 250V AC/DC
Display	: 7-Segment LED (3 + 1digit)
Indication (LEDs)	: x10, pre-alarm, fault, fault start event, lo / hi trip
Operating Temp.	: 0°C ~ +55°C
Humidity	: 56 days at 93%RH, 40°C non-condensing
IP Rating	: IP54 (front panel)
Weight	: 230 g

## parameter setting

I>: lo-set	2% ~ 100% (step of 1%)
t>: lo-set trip delay time	0.03s ~ 20.0s 0.03s ~ 0.10s (step of 0.01s) 0.10s ~ 1.00s (step of 0.02s) 1.0s ~ 20.0s (step of 0.1s)
I>>: hi-set	OFF or 20% ~ 1000% (step of 10%)
t>>: hi-set trip delay time	fixed @ 30ms

<sup>1</sup>SPARC - sampling progressive algorithm for RMS Computation: Computation of multiple rms values/cycle (Superior response in short circuit situation)

<sup>2</sup>DCOI - dc offset independent algorithm: Cancels out dc signal caused by EMI and aging circuitry (Better Immunity against EMI)

<sup>3</sup>Fundamental Signal Detection: To discriminate between signal and noise and eliminate nuisance tripping

<sup>4</sup>Output on k2 dependent on the programmed options

## aux power

DP-21-220a	: 65 ~ 275 Vac (45~65Hz), 90 ~ 300 Vdc
DP-21-024d	: 18 ~ 72 Vdc
Consumption	: < 3VA

## fundamental frequency

50 or 60Hz Selectable

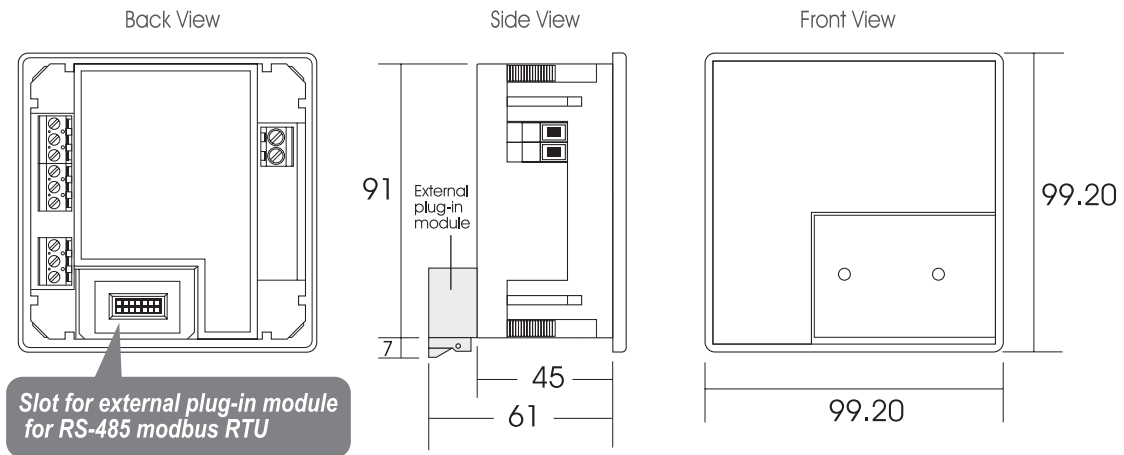
## K1 output contact options

Latching (Lc) or non-latching (nLc) trip

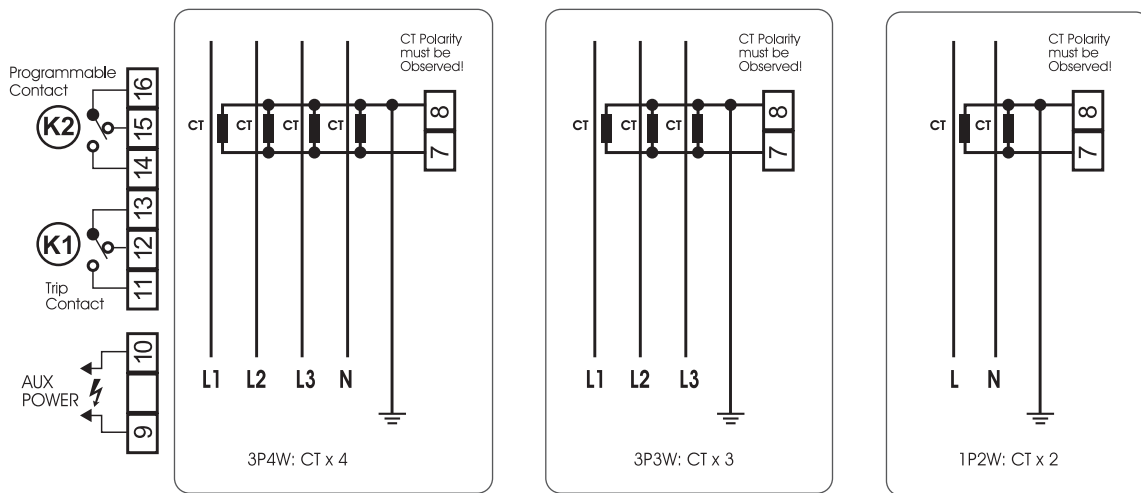
## K2 output contact options

CbF (circuit breaker Failure - nLc only)  
A50 (pre-fault 50% of I> - Lc or nLc)  
A90 (pre-fault 90% of I> - Lc or nLc)  
trP (tripping output - Lc or nLc)  
LFS (lo fault start signal - Lc or nLc)  
HFS (hi fault start signal - Lc or nLc)  
AFS (all fault start signal - Lc or nLc)  
dUF (device failure - Lc only)

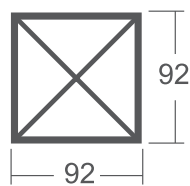
## casing dimension



## wiring diagram



## panel cut-out



Panel Cut-out : 92 x 92

## ordering information

Model	Description
DP-21-220a-5A	(CT.../5A) 65 ~ 275 Vac (45~65 Hz), 90~300 Vdc
DP-21-220a-1A	(CT.../1A) 65 ~ 275 Vac (45~65 Hz), 90~300 Vdc
DP-21-024d-5A	(CT.../5A) 18~72 Vdc
DP-21-024d-1A	(CT.../1A) 18~72 Vdc

Note: All measurement in mm.

# Digital Earth Leakage Relay

## DP-10/\*10<sub>R</sub>

Auto-reset type



## features



- True RMS Measurement with SPARC<sup>1</sup> and DCOI<sup>2</sup> Algorithm
- Fundamental Signal Detection<sup>3</sup>
- Real Time Display of  $I_{\Delta n}$  in mA/A
- Fault / lo-set & hi-set Trip LED Indication
- Fault Start Event Recording & LED Indication + (Output<sup>4</sup>: DP-10 only)
- Pre-Alarm LED Indication + Output<sup>4</sup> (DP-10 only)
- Trip Event Memory (non-volatile 7 previous records)
- Fault Start Event Memory (non-volatile 4 previous records)
- Programmable Relay Output contact for K2 (DP-10 only)
- \*Trip Lock-out contact for K2
- Last Trip Elapsed Time (up to 99days)
- \*Self Reclosing / Auto-reset
- \*Re-start Interval Setting
- Auto Z.C.T. Detection
- Software Lock to Prevent Unauthorized Setting
- Complies with : IEC-60255-26 / BS EN 50121-5 Standards
- External Plug-in Module for :- A-01s (RS-485 MODBUS RTU) isolated type

## technical data

Current Input ( $I_{\Delta n}$ )	: ZCT (multiple sizes from ID of 30~200mm)
Fundamental Frequency	: Software selectable 50 or 60 Hz
Measurement Range	: 0.01 ~ 30.0 A
Output Relay Rating	: SPDT 5A, 250V AC/DC
Accuracy	: Current protection threshold ( $\pm 5\%$ ) Time delayed (+5% or 50ms)
Display	: 7-Segment LED (3 + 1 digit)
Indication (LEDs)	: mA, fault, fault start event, lo / hi-set trip, ( pre-alarm for DP-10 only )
Operating Temp.	: 0°C ~ +55°C
Humidity	: 56 days at 93%RH, 40°C non-condensing
IP Rating	: IP54 (front panel)
Weight	: 230 g

## aux power

DP-10/10R-220a	: 65 ~ 275 Vac (45~65Hz), 90 ~ 300 Vdc
DP-10/10R-024d	: 18 ~ 72 Vdc
Consumption	: < 3VA

## K1 output contact options (DP-10 only)

Latching (Lc) or non-latching (nLc) trip

## K2 output contact options (DP-10 only)

<b>trP</b> (tripping output)	Lc or nLc
<b>LFS</b> (lo-set fault start signal)	Lc or nLc
<b>HFS</b> (hi-set fault start signal)	Lc or nLc
<b>AFS</b> (any fault start signal)	Lc or nLc
<b>dUF</b> (device failure)	nLc only
<b>CbF</b> (circuit breaker failure)	nLc only
<b>A50</b> (pre-alarm fault) >50% of $I_{\Delta n}$ >	Lc or nLc
<b>A90</b> (pre-alarm fault) >90% of $I_{\Delta n}$ >	Lc or nLc

## parameter setting

$I_{\Delta n} >$ (A) : lo-set	0.03~30.0 A
t > (sec) : lo-set trip time delay	0.03 ~ 20.0 sec
$I_{\Delta n} \gg$ (A) : hi-set	OFF or 0.1~30.0 A
t >> (sec): hi-set trip time delay	fixed @ 30ms
*Trip-lockout >	1~10 times
*Auto-reset timer	3~200 sec
*Re-start interval	OFF or 5 mins~24hrs

<sup>1</sup>SPARC - sampling progressive algorithm for RMS Computation: Computation of multiple rms values/cycle (Superior response in short circuit situation)

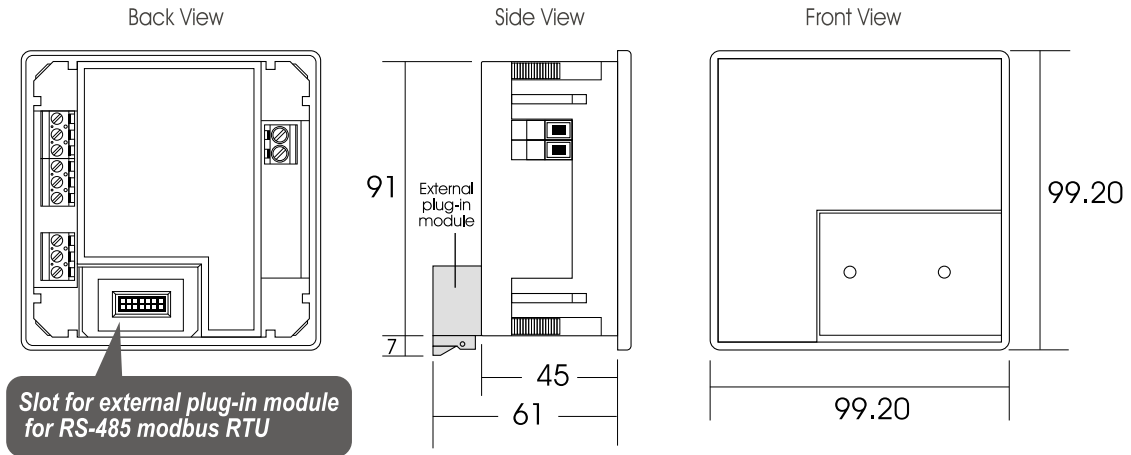
<sup>2</sup>DCOI - dc offset independent algorithm: Cancels out dc signal caused by EMI and aging circuitry (Better Immunity against EMI)

<sup>3</sup>Fundamental Signal Detection: To discriminate between signal and noise and eliminate nuisance tripping

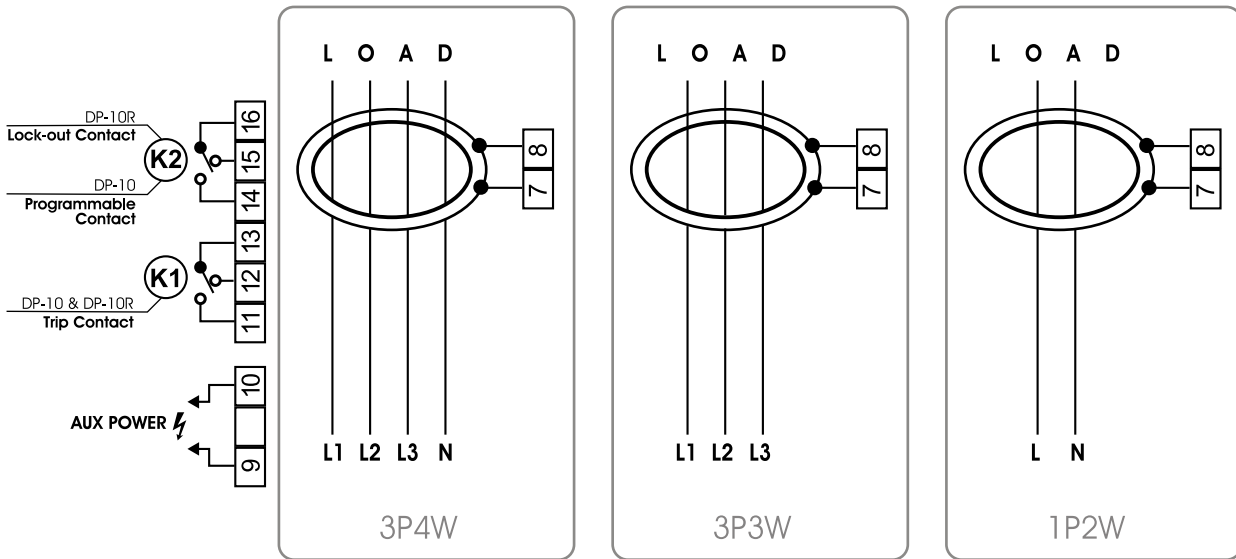
<sup>4</sup>Output on k2 dependent on the programmed options

Note: Specification subject to change without prior notification (please visit [www.delab.com.my](http://www.delab.com.my) for latest specification)

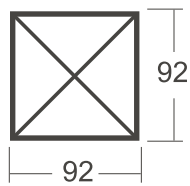
## casing dimension



## wiring diagram

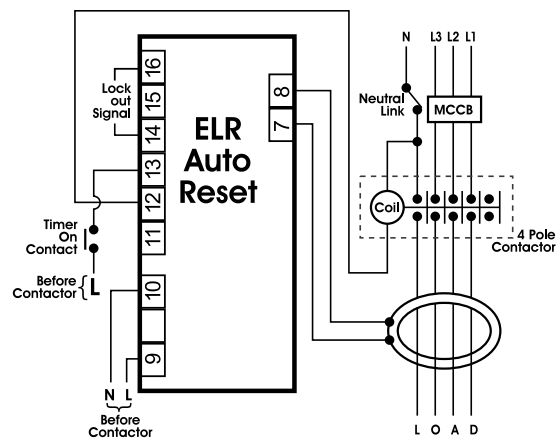


## panel cut-out



Panel Cut-out : 92 x 92

## auto-reset wiring diagram



## ordering information

Model	Description
DP-10-220a	65 ~ 275 Vac (45~65Hz), 90 ~ 300 Vdc
DP-10-024d	18 ~ 72 Vdc

Model	Description
DP-10R-220a	65 ~ 275 Vac (45~65Hz), 90 ~ 300 Vdc
DP-10R-024d	18 ~ 72 Vdc

Note: All measurement in mm.

## \*18r Auto-reset



True RMS Measurement with SPARC<sup>1</sup> and DCOI<sup>2</sup> Algorithm

Fundamental Signal Detection<sup>3</sup>

Real Time Display of I $\Delta$ n (A)

Fault / lo-set & hi-set Trip LED Indication

Fault Start Event Recording

Trip Event Memory  
(non-volatile 7 previous records)

Fault Start Event Memory  
(non-volatile 4 previous records)

Programmable Relay Output contact for K2

Last Trip Elapsed Time (up to 99days)

\*Self-reclosing / Auto-reset

\*Trip Lock-out Setting

Software Lock to Prevent Unauthorized Setting

Complies with :

IEC-61000-4-2/4-4/4-5/255-5:1 Standards

### technical data

Aux Power	: 65~275 Vac
Fundamental Frequency	: 50 or 60 Hz (software selectable)
Current Input (I $\Delta$ n)	: ZCT (multiple sizes from ID of 30~200mm)
Measurement Range	: 0.01 ~ 30.0 A
Output Relay Rating	: SPDT 5A, 250V AC/DC
Display	: 7-Segment LED (3 + 1 digit)
Indication (LEDs)	: Fault, lo / hi set trip
Operating Temp.	: 0°C ~ +55°C
Humidity	: 56 days at 93%RH, 40°C non-condensing
IP Rating / Weight	: IP52 (front panel) / 200g

### parameter setting

I $\Delta$ n > : lo-set	0.03~30.0 A 0.03 ~ 1.00 A (step of 0.01 A) 1.00 ~ 3.00 A (step of 0.05 A) 3.00 ~ 10.0 A (step of 0.1 A) 10.0 ~ 30.0 A (step of 0.5 A)
t> : lo-set trip delay time	0.03 ~ 20.0 sec 0.03 ~ 0.10 sec (step of 0.01sec) 0.10 ~ 1.00 sec (step of 0.02sec) 1.0 ~ 20.0 sec (step of 0.1sec)
I $\Delta$ n >> : hi-set	OFF or 0.1~30.0 A 0.1~10.0 A (step of 0.1 A) 10.0 ~ 30.0 A (step of 0.5 A)
t>> : hi-set trip delay time	fixed @ 30ms

### \*auto-reset setting

Trip lock-out setting	:	1 ~ 10
Auto reset timer	:	3.0 ~ 200 sec.

### fundamental frequency

50 or 60Hz Selectable

### K1 output contact

Latching (Lc) trip

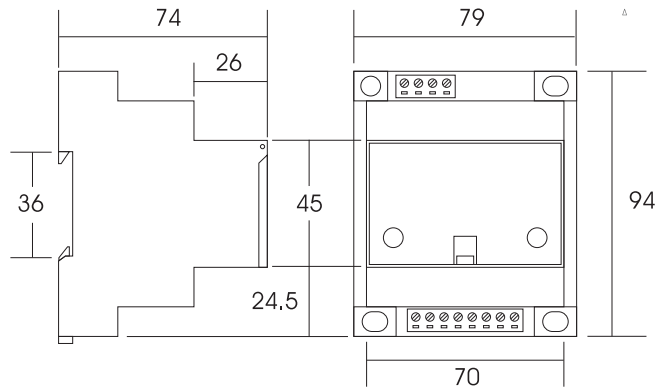
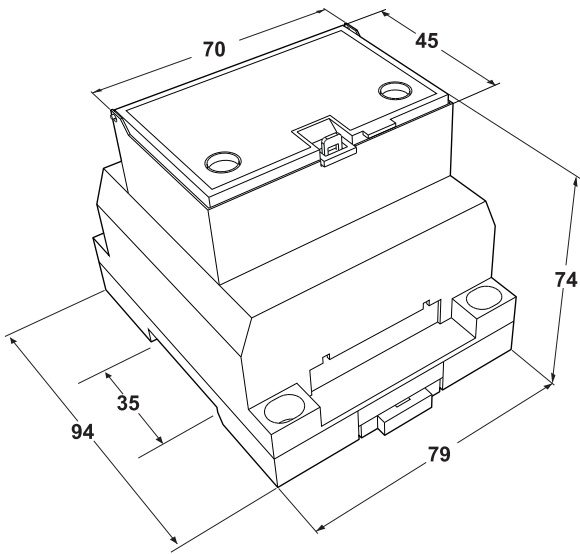
### programmable K2 output contact

Latching or non-latching (nLc)

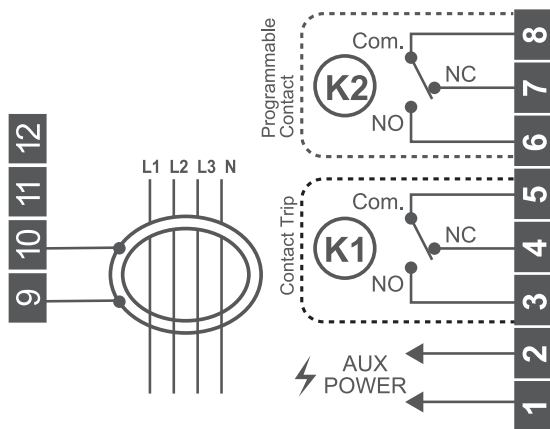
(\* Available for models TM-18r (Auto-reset) only



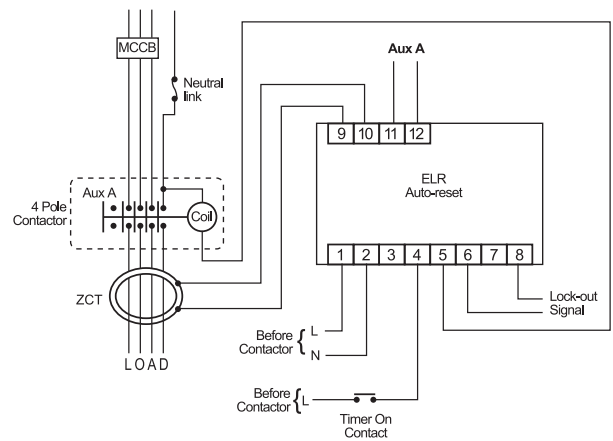
## casing dimension



## wiring diagram



## auto-reset wiring diagram



## ordering information

Model	Description
TM-18c	65 ~ 275 Vac (50~60Hz)
TM-18r	Auto-reset type : 65 ~ 275 Vac (50~60Hz)

Note: All measurement in mm.

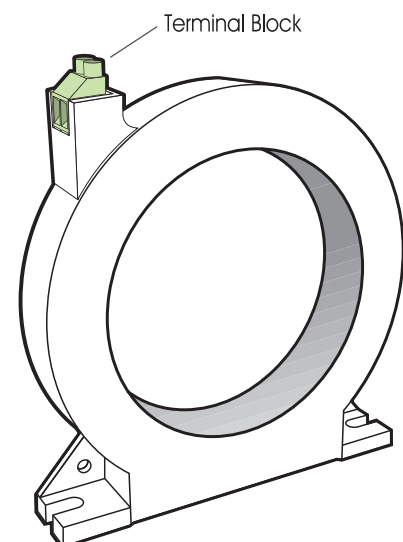
# ZPC-30

45  
65  
80  
100  
150  
200



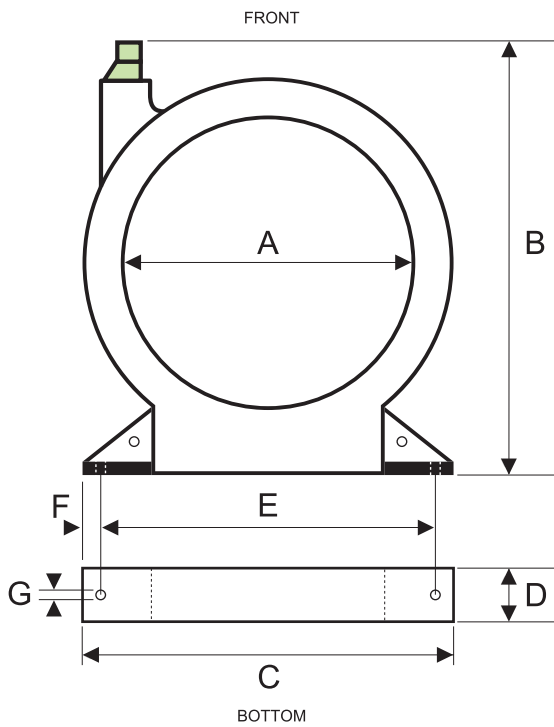
## technical data

Frequency	: 50 / 60 Hz
Current Ratio	: 200 / 1.5
Insulation	: 600V / 50 Hz 1 min.
Sec. Burden	: 10 VA
Connection	: Terminal Block



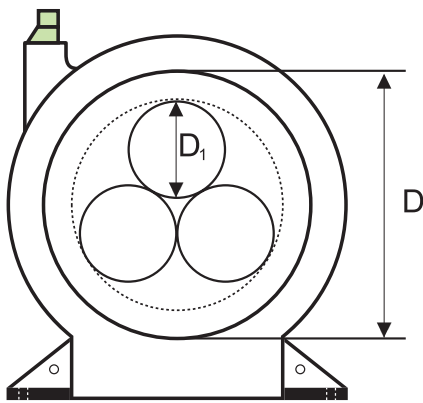
For optimum performance and accuracy, we recommend that you use only the original Z.C.T. intended for use with the device. Using others Z.C.T. could compromise on the performance or accuracy. The warranty does not cover product failures which have been caused by use of other Z.C.T.

## casing dimension

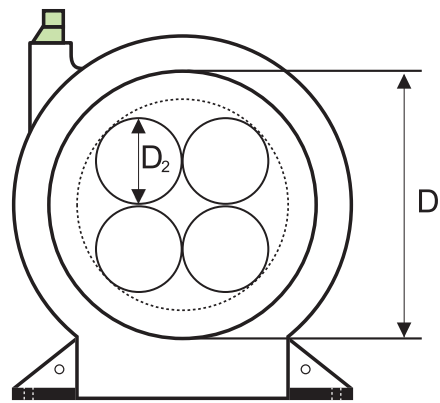


ZPC model	30	45	65	80	100	150	200
Applicable Current range	0~100A	0~160A	0~225A	0~400A	0~630A	0~1250A	0~1500A
A (mm)	30	45	65	80	100	150	200
B (mm)	85	100	120	135	152	206	274
C (mm)	75	98	124	140	167	224	295
D (mm)	25	28	28	32	32	32	40
E (mm)	70	87	112	123	153	207	280
F (mm)	3	5	6	9	7	10	9
G (mm)	5	5	6	6	6	6	6
Weight (kg)	~0.14	~0.21	~0.28	~0.46	~0.65	~1.1	~2.2

## calculation to determine inner diameter of ZCT required



3 wire



4 wire

model ZPC	30	45	65	80	100	150	200
D (ZCT inner diameter mm)	30	45	65	80	100	150	200
D <sub>1</sub> (3 wire max cable diameter mm)	9	16	24	32	40	60	82
D <sub>2</sub> (4 wire max cable diameter mm)	8	14	22	29	36	54	75

## ordering information

Model	Description
ZPC-30	Hole diameter 30mm
ZPC-45	Hole diameter 45mm
ZPC-65	Hole diameter 65mm
ZPC-80	Hole diameter 80mm

Model	Description
ZPC-100	Hole diameter 100mm
ZPC-150	Hole diameter 150mm
ZPC-200	Hole diameter 200mm

Note: All measurement in mm.

# A-01s

# 02s

A-02s

A-01s



PQM-1000s register map (ver 1.0.04)

- 1 reg = 2bytes (16bit)
- short int = 16 bit
- integer = 32 bit
- long int = 64 bit
- neg P = export
- neg Q = inductive

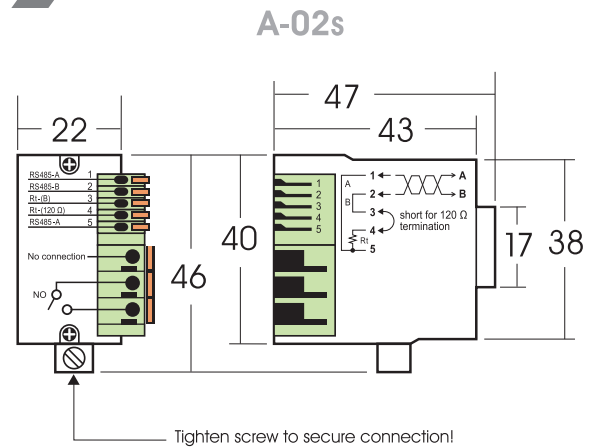
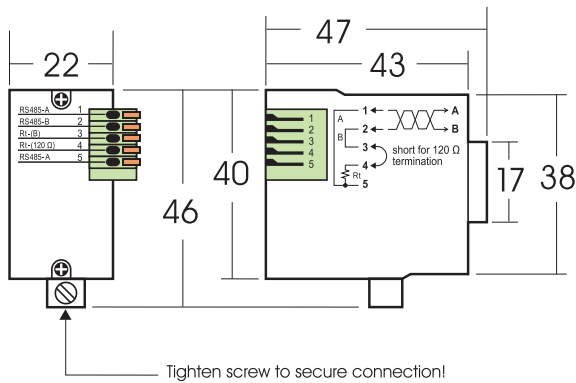
(isolated type) Models

A-01s : RS485 Modbus RTU  
For all DP series & PQM-1000s

\* A-02s : RS485 Modbus RTU + 1 output contact  
Only for DP-34

casing dimension: **A-01s**

casing dimension: **A-02s**

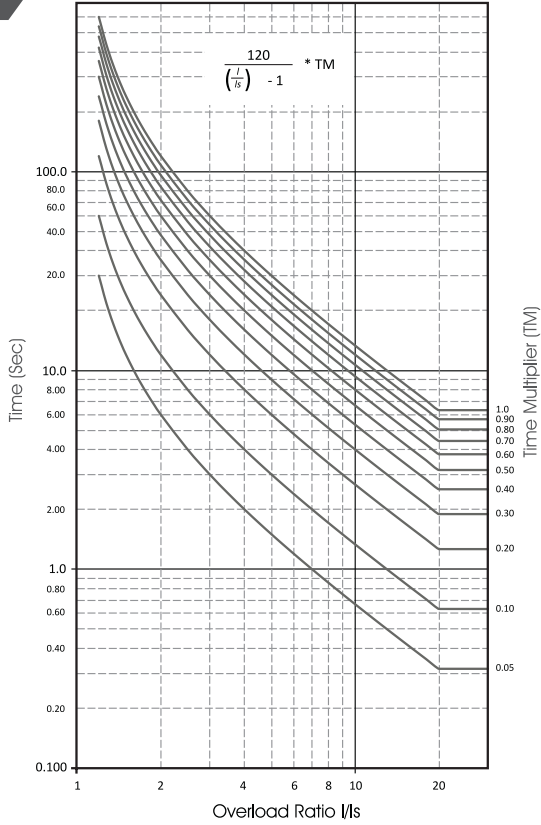


All measurement in mm.

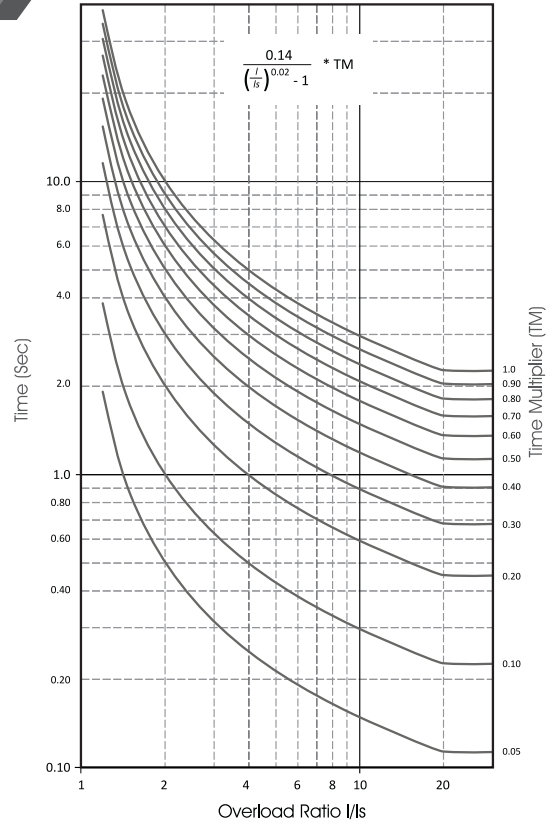


Complies with BS142/IEC 60255 standards

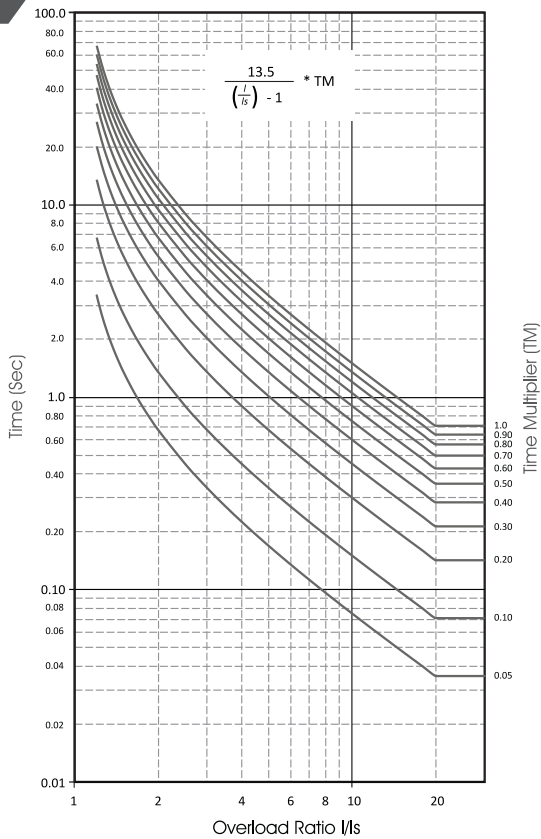
long time inverse



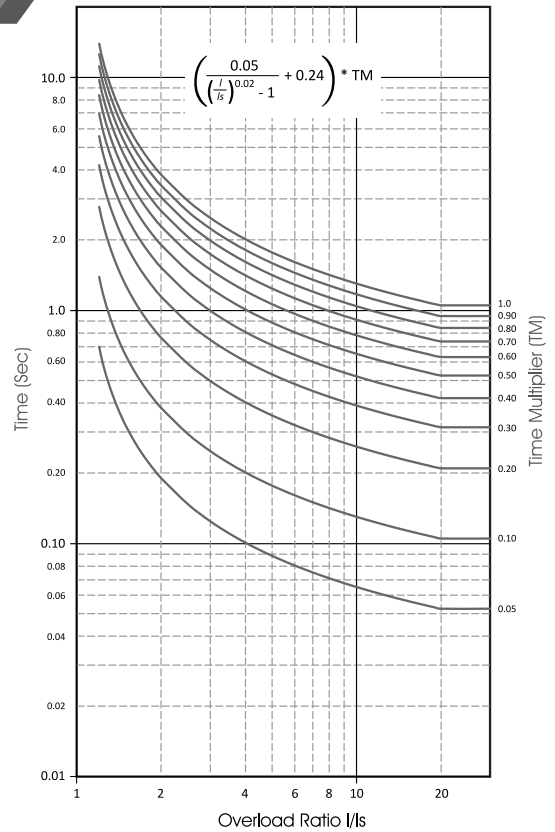
normal inverse 3.0



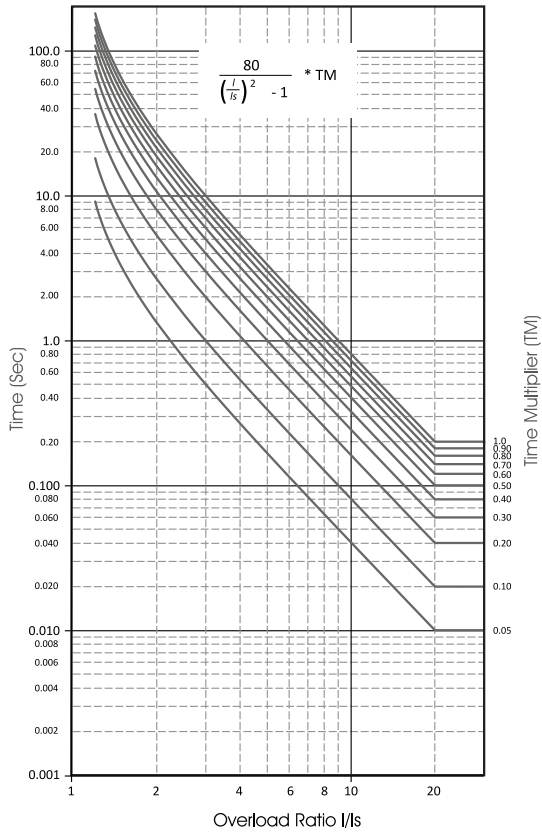
very inverse



normal inverse 1.3



extremely inverse



# Digital Power Factor Regulator

# NV-5/7



## features



- True RMS Measurement
- LED Step Indication
- Automatic / Manual Step Operation
- Automatic or Manual C.T. Polarity
- Automatic C/K Detection or User Preset
- Automatic or User Preset Switching Sequence (rotational for same size grouping)
- Operation from 1% Load
- Viewable Parameters:  
V, I, Cos  $\phi$ , PF, Hz, W, Var, THD-V, THD-I, Harmonics Spectrum up to 15<sup>th</sup> order for V & I (secondary values for I, W, Var)
- Individual Capacitor Step Info:
  - Hour run (accumulative)
  - Usage count (accumulative)
  - Secondary 1-phase Var value (present)
- Programmable Over Voltage & THD-V alarm
- Alarm Information:
  - Under / Over Compensate
  - Under / Over Voltage
  - Overload, THD-V Limit High
- User selectable capacitor protection for Over voltage & THD-V
- Selectable contact for Signal Alarm Output or Exhaust Fan Output
- Extrenal Plug-in Module for: A-01s / A-01sp (RS-485 Modbus RTU) isolated type
- Software Lock to prevent unauthorized modification of parameters
- Complies with:
  - IEC 61000-6-2 / 6-4 Standards
  - IEC 60255-27-Clause 10.6.4.2 / 4.3

## technical data

- Aux Power Supply**
  - AC range : 85 ~ 275 VAC, 45 ~ 65 Hz
  - Consumption : < 3 VA
- Power Measurement**
  - Accuracy (W, Var, Cos  $\phi$ , PF) :  $\pm 1.0\%$
- Current Measurement**
  - AC Input range : 0.01 ~ 6.50 A
  - Accuracy :  $\pm 1.0\%$
  - CT range :  $\dots/5A$
  - Burden : < 0.1 VA at 5A
- Voltage Measurement**
  - AC Input range : according to Aux Power Supply
  - Accuracy :  $\pm 1.0\%$
- Frequency Measurement**
  - Range: : 45 ~ 65 Hz
  - Accuracy :  $\pm 0.1\%$
- LEDs Indication**
  - Individual Steps, Aux Fan, x1000, A, PF, V, Hz, W, Var, thd, nth Harmonic, Auto/Manual, Cap., Ind.
- Mechanical**
  - Output Relay (Individual Steps / Alarm / Fan) Rating : SPST 7A, 250 VAC
  - Electrical Life : 100,000 operations at rated current
  - Mechanical Life :  $5 \times 10^6$  operations
  - No voltage release : < 40ms
  - Operating Temp. :  $-5^{\circ}C \sim +55^{\circ}C$
  - Humidity : 56 days at 93%RH, 40 $^{\circ}C$  non-condensing
  - IP Rating : IP54 (front panel)
  - Installation : Panel flush mount
  - Weight : 280 g

## parameter setting

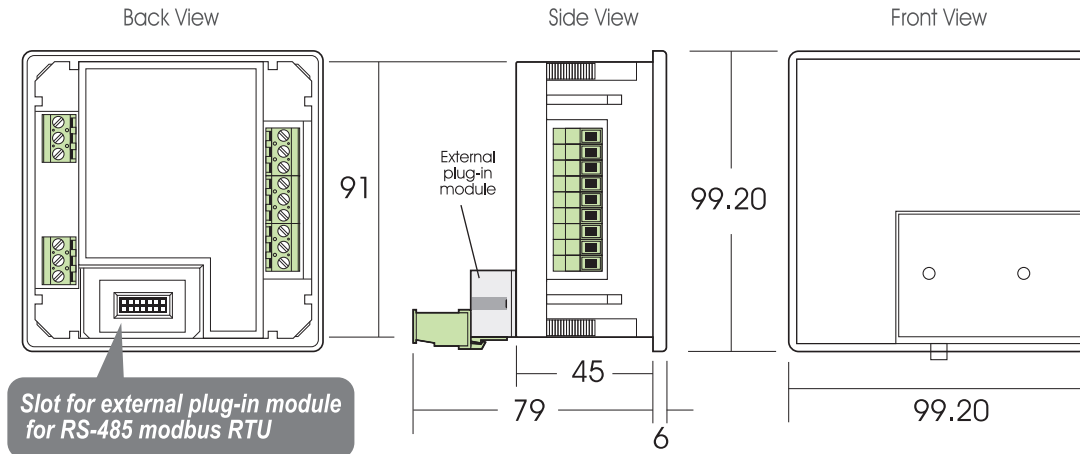
- C/K Value** : Auto or 0.01 ~ 0.80 (step of 0.01)
- Target Cos  $\phi$**  : 0.85 (Ind.) ~ 0.90 (Cap.) (step of 0.01)
- Switching Program** : Auto or P-0 ~ P-7
- Switching Interval** : (t-on) : 1s ~ 250s (step of 1s)  
(t-off) : 1s ~ 250s (step of 1s)
- Reconnection Inhibit** : OFF or 5s ~ 900s (step of 5s)
- V> (Over Voltage)** : OFF or 100 V ~ 260 V (step of 1 V)
- thd-V > (%)** : OFF or 3, 4, 5, 6, 7, 8, 10%

## selectable switching program sequence

Auto	Automatic
P-0	Linear
P-1	1 : 1 : 1 : 1 : 1
P-2	1 : 2 : 2 : 2 : 2
P-3	1 : 2 : 4 : 4 : 4
P-4	1 : 1 : 2 : 2 : 2
P-5	1 : 1 : 2 : 2 : 4
P-6	1 : 1 : 1 : 2 : 2
P-7	1 : 2 : 4 : 8 : 8

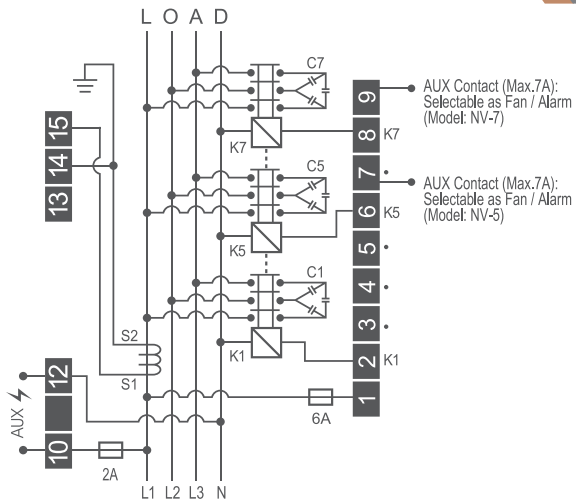


## casing dimension



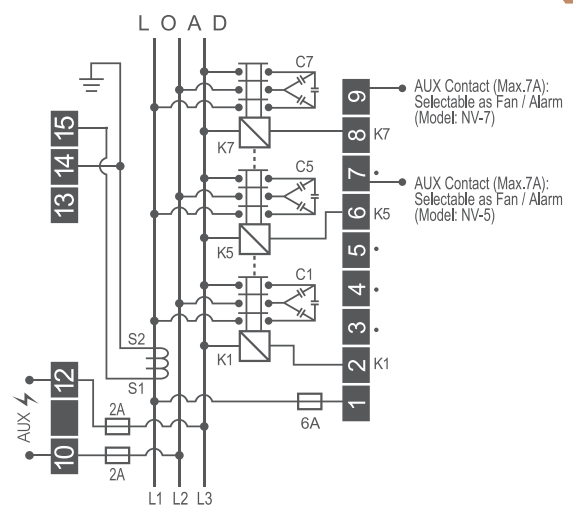
## wiring diagram: NV-5/7 (3P4W)

P-n (3P4W)

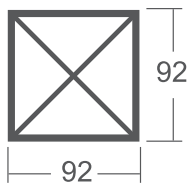


## wiring diagram: NV-5/7 (3P3W)

P-P (3P3W)



## panel cut-out



Panel Cut-out : 92 x 92

AUX Power Supply Range	AUX Power Connection	C.T. Phase Connection
85~275 VAC	L1- N (P-n)	L1
45~65 Hz	L2- L3 (P-P)	L1

**WARNING**  
Do not exceed Aux power supply specification.

## ordering information

Model	Description
NV-5	85 ~ 275 VAC (45~65 Hz)
NV-7	85 ~ 275 VAC (45~65 Hz)

Note: All measurement in mm.

# Digital Power Factor Regulator

## NV-6s/8s/14s



features



- True RMS Measurement
- Displacement Power Factor (Cos  $\Phi$ ) & True Power Factor (PF) Info
- LED Indication for Individual Step
- Auto / Manual Operation
- Automatic Detection of C.T. Polarity
- Automatic C/K Detection and Rated Individual Secondary Step Value
- Automatic or Preset Switching Programs
- Operation Frequency according to Network Frequency
- Minimum Operation @ < 1% Load
- No Voltage Release Function
- Secondary Current (I) / Voltage (V) / Frequency (Hz) Info
- Secondary Active Power (W) / Secondary Reactive Power (Var) Info
- THD Monitoring for Voltage and Current
- Individual Harmonic Spectrum Info up to 15th order for Voltage and Current
- Capacitors Utilization Monitoring for Utilization
- Hour Run and Switching Count
- Programmable Over Voltage & THD-V Alarm
- Dedicated Signal Alarm Output for:
  - Under/ Over Compensate
  - Under/ Over Voltage
  - Overload, thd-V Limit High, Frequency Out of Range & C.T. Polarity Error
- Dedicated Exhaust Fan Control
- Software Lock to Prevent Unauthorized Setting
- Complies with:
  - IEC-61000-4-2/4-4/4-5/255-5:1 Standards
  - Built-in RS-485 MODBUS RTU isolated communication

### technical data

- Aux Power Supply**
  - AC range : 100~275 VAC, 45~65 Hz or 330~450 VAC, 45~65 Hz
  - Consumption : < 3 VA
- Power Measurement**
  - Accuracy (W, Var, Cos  $\Phi$ , PF) :  $\pm 1.0\%$
- Current Measurement**
  - AC Input range : 0.01 ~ 6.50 A
  - Accuracy :  $\pm 1.0\%$
  - CT range :  $\cdot, /5A$
  - Burden : < 0.1 VA at 5A
- Voltage Measurement**
  - AC Input range : according to Aux Power Supply
  - Accuracy :  $\pm 1.0\%$
- Frequency Measurement**
  - Range : 45 ~ 65 Hz
  - Accuracy :  $\pm 0.1\%$
- Display / LEDs Indication**
  - 7-Segment LED Display (3 + 1 digit)
  - Individual Steps, x1000, A, PF, V, Hz, W, Var, thd, nth Harmonic, Auto, Alarm, Manual, Ind., Cap., Aux Fan
- Mechanical**
  - Output Relay (Individual Steps / Alarm / Fan) Rating : SPST 7A, 250 VAC
  - Expected Electrical Life : 100,000 operations at rated current
  - Expected Mechanical Life :  $5 \times 10^6$  operations
  - No voltage release : < 40ms
  - Operating Temp. :  $-5^{\circ}\text{C} \sim +55^{\circ}\text{C}$
  - Humidity : 56 days at 93%RH, 40°C non-condensing
  - IP Rating : IP54 (front panel)
  - Installation : Panel flush mount
  - Weight : 560 g

### parameter setting

- C/K Value** : Auto or 0.01 ~ 0.80 (step of 0.01)
- Target Cos  $\Phi$**  : 0.85 (Ind.) ~ 0.90 (Cap.) (step of 0.01)
- Switching Program** : Auto or P-0 ~ P-7
- Switching Interval** : (t-on) : 1s ~ 250s (step of 1s)  
(t-off) : 1s ~ 250s (step of 1s)
- Reconnection Inhibit** : OFF or 5s ~ 900s (step of 5s)
- V> (Over Voltage)** : OFF or 100 V ~ 260 V (step of 1 V)
- thd-V > (%)** : OFF or 3, 4, 5, 6, 7, 8, 10%

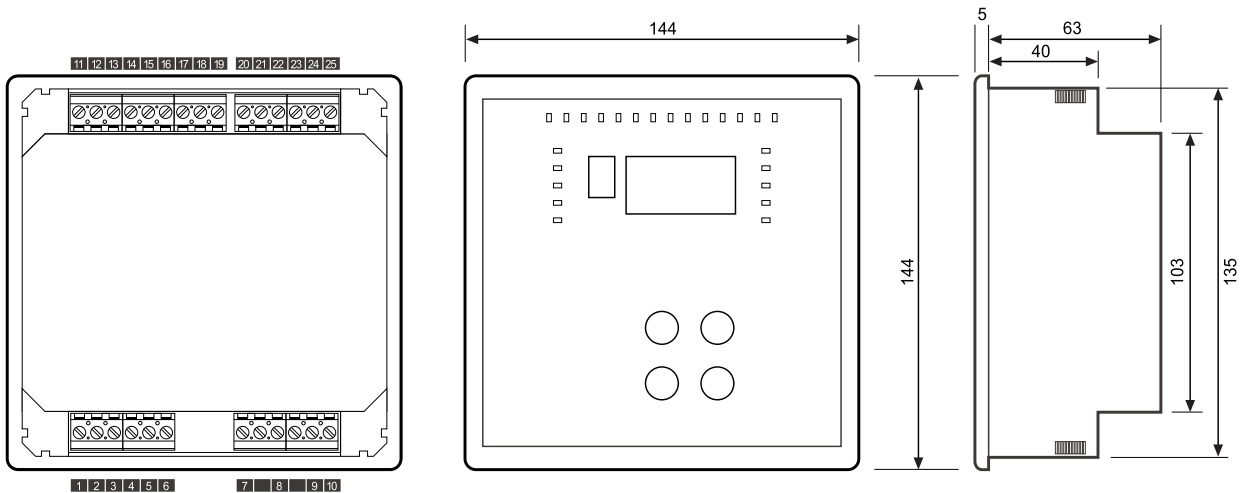
### programmable switching Program

Selection of preset or automatic switching program

#### program sequence

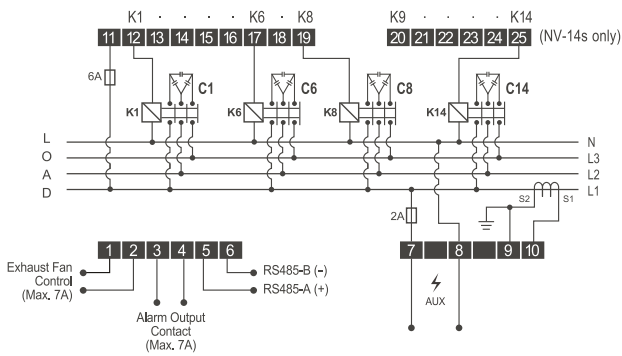
Program	Automatic decision by device
Auto	Automatic decision by device
P-0	Linear
P-1	1 : 1 : 1 : 1 : 1
P-2	1 : 2 : 2 : 2 : 2
P-3	1 : 2 : 4 : 4 : 4
P-4	1 : 1 : 2 : 2 : 2
P-5	1 : 1 : 2 : 2 : 4
P-6	1 : 1 : 1 : 2 : 2
P-7	1 : 2 : 4 : 8 : 8

## casing dimension



## wiring diagram : NV-6s /8s /14s

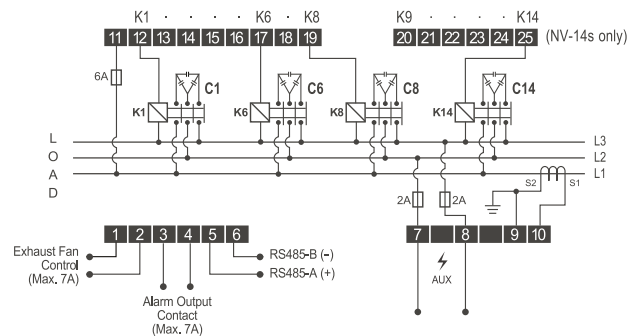
P-n (3P4W)



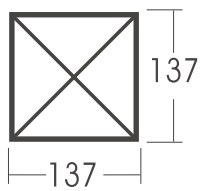
AUX Power Connection	C.T. Phase Connection
L1- N (P-n)	L1
L2- L3 (P-P)	L1

## wiring diagram : NV-6s /8s / NV-14s

P-P (3P3W)



## panel cut-out



Panel Cut-out : 137 x 137

## ordering information

Model	Description	Model	Description
NV-6s	100~275 VAC ( P-n / P-P ) 330~450 VAC ( P-P )	NV-14s	100~275 VAC ( P-n / P-P ) 330~450 VAC ( P-P )
NV-8s	100~275 VAC ( P-n / P-P ) 330~450 VAC ( P-P )		

Note: All measurement in mm.

# Digital Voltage Monitoring Relay

# DVS-1000E



## features



- True RMS Measurement
- Over Voltage Monitoring
- Under Voltage Monitoring
- Phase Failure Monitoring
- Trip LED Indicator
- Adjustable Over / Under Voltage Settings
- Adjustable Trip Delay
- Auto-reset
- Din-railed Mount

## technical data

Models	(3P3W)	(3P4W)
Measurement	True RMS Monitoring	
Rated voltage supply	AC 200~500V / 50Hz	AC 123~300V / 50Hz
U > setting value	(105% ~ 125%) x Un	
U < setting value	(70% ~ 95%) x Un	
U > trip delay	0.1~10 sec	
U < trip value	0.1~10 sec	
Voltage hysteresis	6V	5V
Trip time for incorrect phase sequence & phase failure	≤ 0.2 sec	
Voltage measurement error	≤ 1%	
Delay error	± 5%, +0.1 sec	
Knob setting error	1% x scale value	
Rated insulation voltage	480V	
Output contact	1C / O	
Current rating	8A / 250V AC1	
Trip delay for phase failure	≤ 0.2 sec	
Mechanical life	10 <sup>6</sup>	
Electrical life	10 <sup>5</sup>	
Protection degree	IP20	
Pollution degree	3	
Altitude	≤ 2000m	
Operating temperature	-20° ~ +55° C	
Relativity humidity	≤50% at 40° C (without condensation)	
Storage temp.	-30° C ~ +70° C	
Wire size	0.5 ~ 2.5 mm <sup>2</sup>	
Torque	0.5Nm	
Weight	~ 95g	
Mounting	DIN Rail mount / TH35 Rail (EN60715)	
Standard	EN/IEC 60947-5-1	

## parameter setting

### Over Voltage Setting :

250 Vac~310 Vac +1%, (3 phase 4 wire)  
430 Vac~530 Vac +1%, (3 phase 3 wire)

### Under Voltage Setting :

170 Vac~230 Vac +1%, (3 phase 4 wire)  
290 Vac~390 Vac +1%, (3 phase 3 wire)

### Delay Time Setting :

0.1sec~10.0 sec +1%, (Over/Under Voltage)  
2.0 s Fixed, (asymmetry trip)  
< 1.0 sec, (phase failure/phase seq. trip)

## monitoring characteristics

### Over Voltage Indication :

LED "U>" lit up, LED "Normal" unlit.

### Under Voltage indication :

LED "U<" lit up, LED "Normal" unlit.

### Phase Failure Indication :

Both LED "U>" & LED "U<" will lit up (Phs.Fail.),  
LED "Normal" unlit.

## auto-reset activation

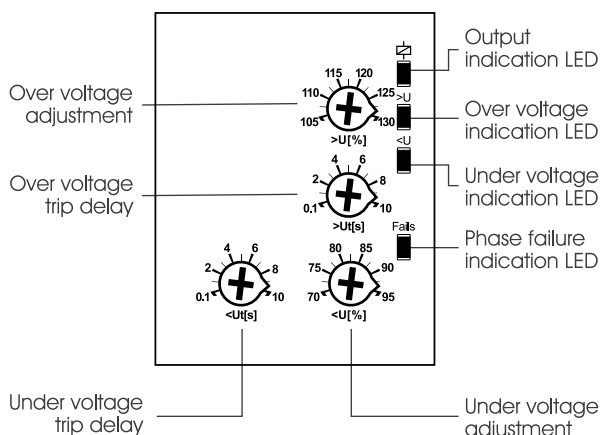
### Over Voltage :

< 6Vac of Ue> (3 phase 3 wire)  
< 3.5Vac of Ue> (3 phase 4 wire)

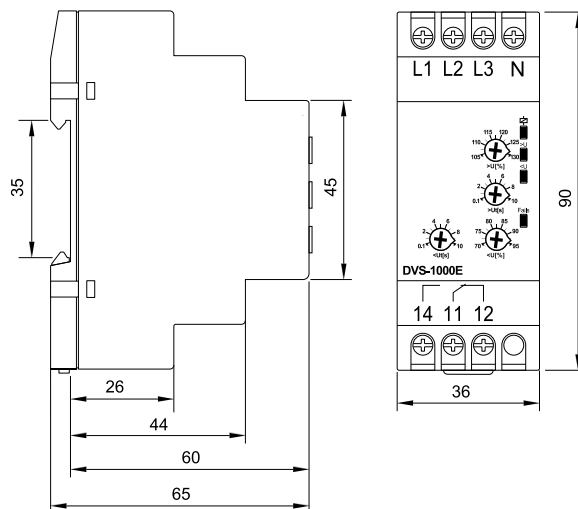
### Under Voltage :

> 6Vac of Ue< (3 phase 3 wire)  
> 3.5Vac of Ue< (3 phase 4 wire)

## panel description

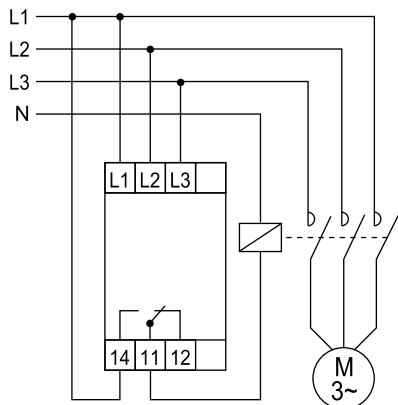


## casing dimension

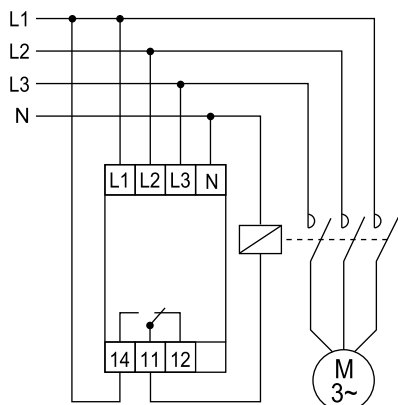


## wiring diagram

### 3 phase 3 wire

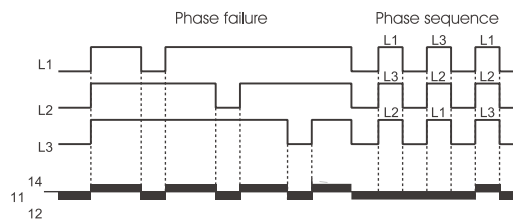


### 3 phase 4 wire

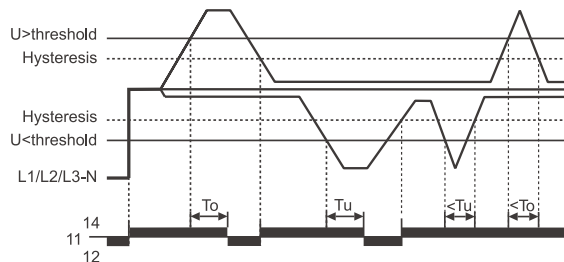


## function diagram

### Phase failure and phase sequence monitoring



### Overvoltage and undervoltage monitoring



To: Overvoltage trip delay  
Tu: Undervoltage trip delay

## ordering information

Model	Description
DVS -1000E - M220	AC 220V (3 phase 4 wire)
DVS -1000E - M240	AC 240V (3 phase 4 wire)
DVS -1000E - M380	AC 380V (3 phase 3 wire)
DVS -1000E - M415	AC 415V (3 phase 3 wire)

Note: All measurement in mm.

# Voltage Monitoring Relay

# DVS-1000

features



- True RMS Measurement
- Over Voltage Monitoring
- Under Voltage Monitoring
- Phase Asymmetry Monitoring
- Phase Failure Monitoring
- Phase Sequence Monitoring
- Trip LED Indicator
- Adjustable Over / Under Voltage Settings
- Adjustable Trip Delay
- Auto-reset
- Din-railed Mount

## technical data

Measurement	True RMS Ampere
Rated voltage supply	AC220V, AC230V, AC240V (3 phase 4 wire) AC380V, AC400V, AC415V (3 phase 3 wire)
Rated frequency	50 ~ 60 Hz
U > threshold range	(1.05 ~ 1.30)*Ue
U < threshold range	(0.70 ~ 0.95)*Ue
Asymmetry threshold	10%
Voltage hysteresis	3 phase 4 wire: 3.5V ; 3 phase 3 wire: 6V
Trip delay	0.1 ~ 10 sec
Asymmetry hysteresis	25% Asymmetry setting value
Phase failure sensitivity	0.5*Ue
Voltage measurement error	<1% (over the whole range)
Time delay error	±10%, + 0.1sec
Knob setting accuracy	1% of the full scale
Rated insulation voltage	420V
Rated fuse rating	RT36-00 5A
Output Contact	1 C/O contact
Pollution degree	3
Electrical life	10 <sup>5</sup>
Mechanical life	10 <sup>6</sup>
Conventional thermal current	5A
Usage category	AC-15
Contact capacity	Ue/Ie:240V/1.5A, 415V/0.95A
Wiring size	0.5mm <sup>2</sup> ~ 2.5mm <sup>2</sup>
Tightening torque	0.5Nm
Altitude	≤ 2000m
Operating temp.	-5° C ~ +40° C
Relativity humidity	≤50% at 40° C (without condensation)
Storage temp.	-20° C ~ +50° C
Enclosure Protection	IP20
Weight	~ 190g
Mounting	DIN Rail mount or Screw mount
Standard	EN/IEC 60947-5-1

## parameter setting

### Over Voltage Setting :

250 Vac~310 Vac +1%, (3 phase 4 wire)  
430 Vac~530 Vac +1%, (3 phase 3 wire)

### Under Voltage Setting :

170 Vac~230 Vac +1%, (3 phase 4 wire)  
290 Vac~390 Vac +1%, (3 phase 3 wire)

### Delay Time Setting :

0.1 sec~10.0 sec +1%, (Over/Under Voltage)  
2.0 s Fixed, (asymmetry trip)  
< 1.0 sec., (phase failure/phase seq. trip)

## monitoring characteristics

### Over Voltage Indication :

LED "U>" lit up, LED "Normal" unlit.

### Under Voltage indication :

LED "U<" lit up, LED "Normal" unlit.

### Asymmetry Indication :

Both LED "U>" & LED "U<" will flash,  
LED "Normal" unlit.

### Phase Failure Indication :

Both LED "U>" & LED "U<" will lit up (Phs.Fail.),  
LED "Normal" unlit.

### Wrong Phase Sequence Indication :

LED "Phs.Seq" will lit up, LED "Normal" unlit.

## auto-reset activation

### Over Voltage :

< 6Vac of Ue> (3 phase 3 wire)  
< 3.5Vac of Ue> (3 phase 4 wire)

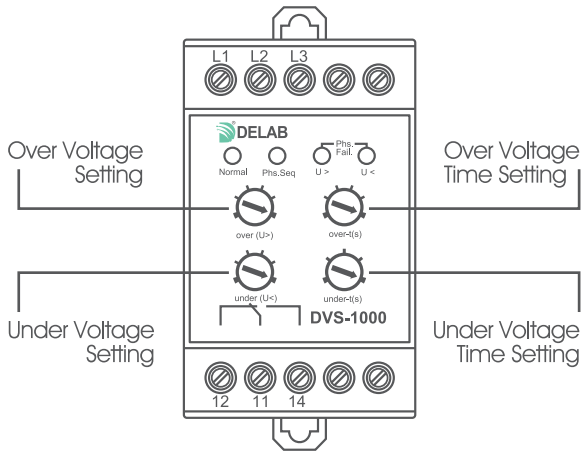
### Under Voltage :

> 6Vac of Ue< (3 phase 3 wire)  
> 3.5Vac of Ue< (3 phase 4 wire)

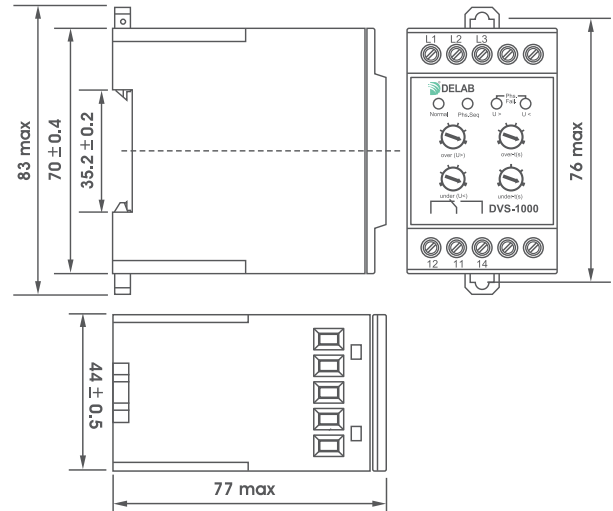
### Phase Asymmetry :

Phase voltage difference must not exceed 10%

## panel description

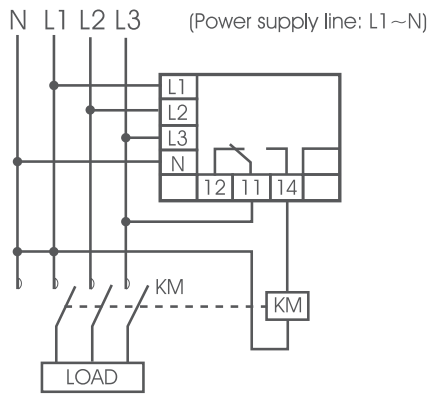


## casing dimension

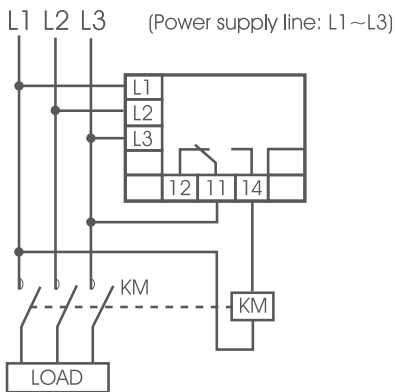


## wiring diagram

### 3 phase 4 wire

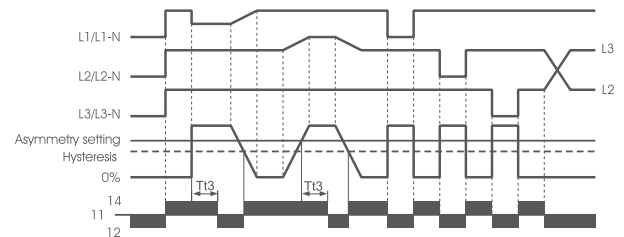


### 3 phase 3 wire

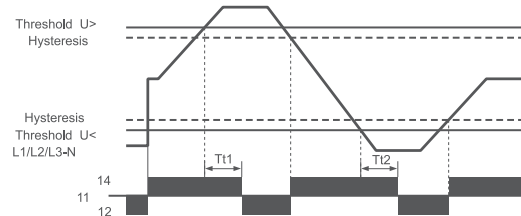


## function diagram

Phase asymmetry, phase failure, phase sequence monitoring



Overvoltage and undervoltage monitoring



Tt1: Overvoltage time delay  
Tt2: Undervoltage time delay  
Tt3: Asymmetry time delay

## ordering information

Model	Description
DVS-1000-M220	AC 220V (3 phase 4 wire)
DVS-1000-M240	AC 240V (3 phase 4 wire)
DVS-1000-M380	AC 380V (3 phase 3 wire)
DVS-1000-M415	AC 415V (3 phase 3 wire)

Note: All measurement in mm.

# Voltage Monitoring Relay

# DVS-2000

features



- True RMS Measurement
- Over / Under Voltage Monitoring
- Phase Asymmetry Monitoring
- Phase Sequence Monitoring
- Phase Failure Monitoring
- Adjustable Over / Under Voltage Setting
- Adjustable Trip Delay
- Real Time L-L Voltage & Fault Display
- LCD Backlit Display
- Test Trip Function
- Selectable Auto / Manual Reset Function
- Adjustable Start / Reset Time Delay
- Din-railed Mount

## technical data

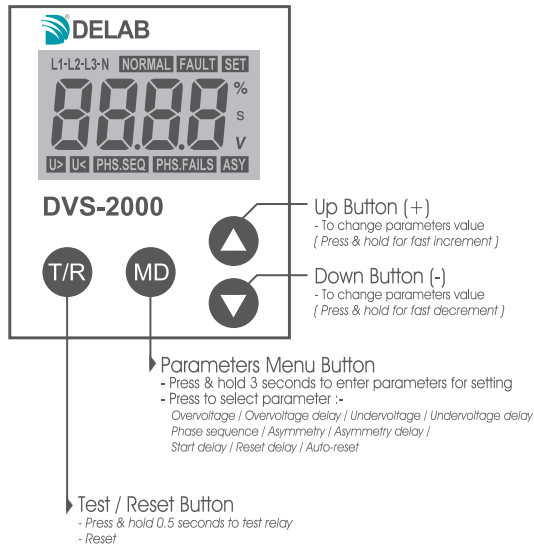
Measurement	True RMS Ampere
Rated voltage supply	M240 (3 phase 4 wire) : AC125V~AC300V M415 (3 phase 3 wire) : AC200V~AC500V
Rated frequency	50 ~ 60 Hz
Voltage hysteresis	M240 (3 phase 4 wire) : 5V M415 (3 phase 3 wire) : 6V
Time for phase failure & incorrect phase sequence	≤ 0.2 sec
Voltage measurement error	< 1% (over the whole range)
Time delay error	± 1%, + 0.1sec
Rated insulation voltage	415V
Rated fuse rating	RT36-00 5A
Pollution degree	3
Electrical life	10 <sup>5</sup>
Mechanical life	10 <sup>6</sup>
Contact capacity	Lth:5A ; AC-15: AC240V/1.5A, AC415V/0.95A
Altitude	≤ 2000m
Operating temp.	-5° C ~ +40° C
Relativity humidity	≤50% at 40° C (without condensation)
Storage temp.	-25° C ~ +50° C
Enclosure Protection	IP20
Weight	~ 95g
Mounting	DIN Rail mount
Standard	EN/IEC 60947-5-1

## parameter setting

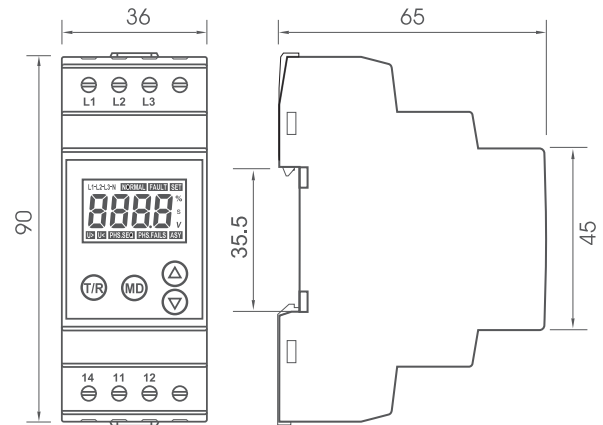
- Over Voltage:**  
Step adjustment : 1V  
OFF or 221V~300V (3 phase 4 wire)  
OFF or 381V~500V (3 phase 3 wire)
- Under Voltage:**  
Step adjustment : 1V  
OFF or 150V~219V (3 phase 4 wire)  
OFF or 260V~379V (3 phase 3 wire)
- Delay Time:**  
Step adjustment : 0.1 sec  
(Over / Under Voltage / Asymmetry)  
0.1 ~ 20 sec
- Asymmetry:**  
OFF or 5~20%
- Phase sequence:**  
ON or OFF
- Start/Reset delay:**  
0.3~30 sec
- Auto-reset:**  
ON or OFF



## panel description

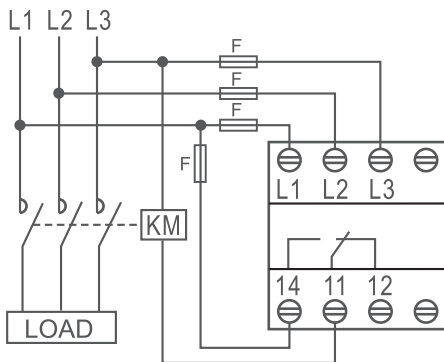


## casing dimension

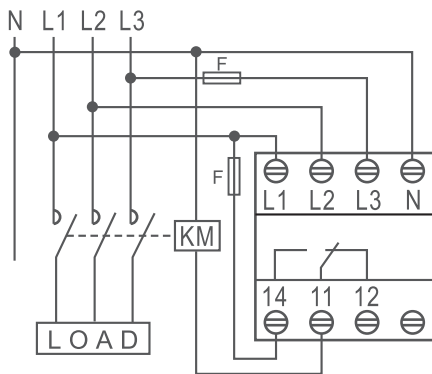


## wiring diagram

### 3 phase 3 wire

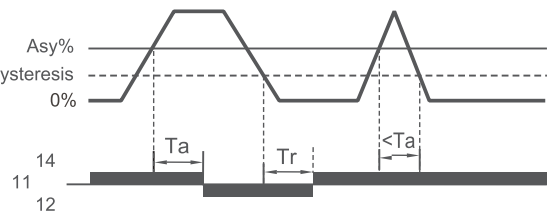


### 3 phase 4 wire

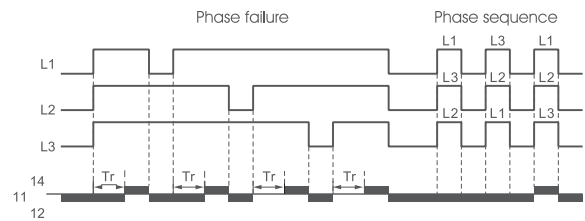


## function diagram

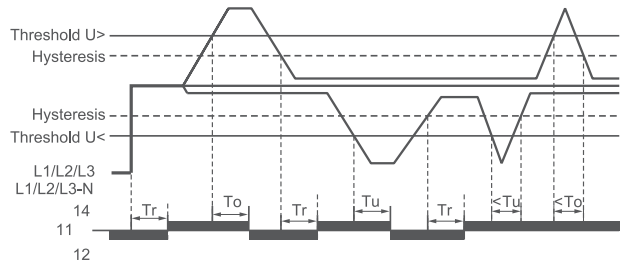
### Phase asymmetry monitoring



### Phase failure and phase sequence monitoring



### Overvoltage and undervoltage monitoring



Ta: Asymmetry time delay  
To: Overvoltage time delay  
Tr: Start / Reset time delay  
Tu: Undervoltage time delay

## ordering information

Model	Description
DVS-2000-M240	AC 125V~AC300V ±10% (3 phase 4 wire)
DVS-2000-M415	AC 200V~AC500V ±10% (3 phase 3 wire)

Note: All measurement in mm.

# DTS-100/101/102

features

## 200A



- Digital Time Switch with:  
Daily / Weekly / \*\*\*Astronomical Program
- \*LCD Display with Backlight
- Holiday Mode
- Single / \*\*Double Channel
- 5 or 10 Years Power Reserve (lithium battery)
- 40 Programs / \*\*100 Programs
- Sealable Front Cover
- Single / Double Channel
- Manual Control by Keys Combination
- Automatic Transfer of Weekdays
- Double Module
- Din-rail Mount (TH-35 rail)

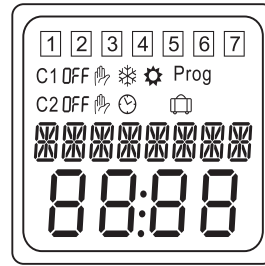
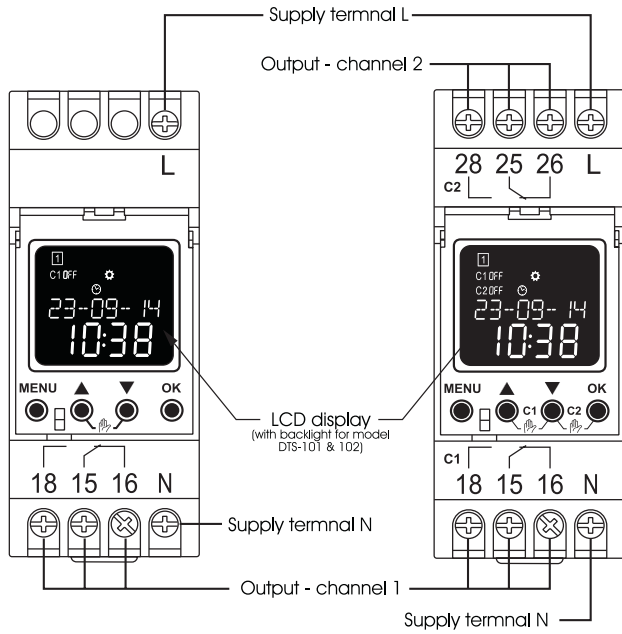
### technical data

Model	DTS-100	DTS-101	DTS-102	DTS-200A
Supply terminals	L-N			
Rated voltage	AC220~240 ±10%	AC/DC 24~264V ±10%		
Rated frequency	50/60 Hz			
Power consumption	1W		2W	1W
Number of programs	40		100	40
Program	daily / weekly			+ Astronomical
Mode of work	manual , automatic , holiday			
Summer/winter time	OFF , automatic changes			
Time tolerance	≤1s/day at 25° C			
Power reserve	5 yrs	10 yrs		
Data readout	LCD display	LCD display with backlit		
Number of contacts	1 C/O		2 C/O	1 C/O
Current of contacts	16A/250V AC1			
Switching capacity	4000VA/AC1, 384W/DC			
Mechanical life	10 <sup>6</sup>			
Electrical life	10 <sup>5</sup>			
Rated insulation voltage	250V			
Protection degree	IP20			
Pollution degree	3			
Altitude	≤ 2000m			
Ambient temperature	-20° C ~ +55° C			
Permissible relative humidity	≤ 50% (40° C, without condensation)			
Storage temperature	-30° C ~ +70° C			
Wire size	1mm <sup>2</sup> ~ 4mm <sup>2</sup>			
Tightening torque	0,5 Nm			
Mounting	TH-35 Rail (EN60715)			
Weight	approx. 210 g			
Enclosure Protection	IP20			
Standard	EN 60730-1/ EN 60730-2-7			

(\*) DTS-101/102    (\*\*) DTS-102    (\*\*\*) DTS-200A

\*Specification subject to change without prior notification (please visit [www.delab.com.my](http://www.delab.com.my) for latest specification)

## panel description



1 2 3 4 5 6 7

Days of the week  
Monday, Tuesday,...Sunday

C1 Channel 1

C2 Channel 2 (for model DTS-102)

OFF Activate

OFF Deactivate

⌚ Automatic mode

👉 Manual mode

🏠 Holiday mode

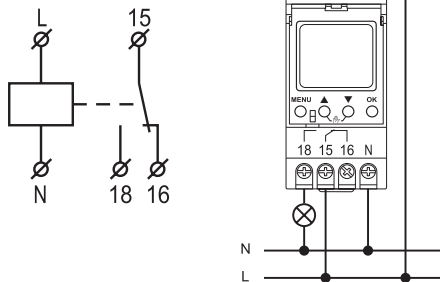
❄️ Winter mode

⚙️ Summer mode

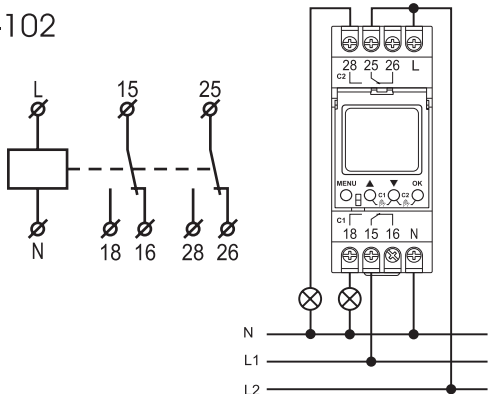
Prog Program setting

## wiring diagram

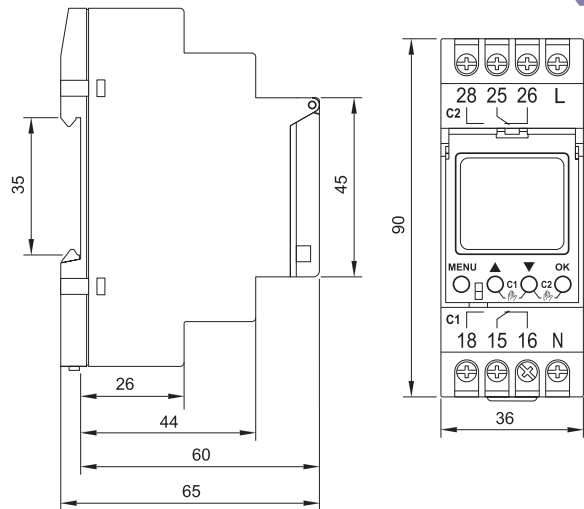
DTS-100 / 101



DTS-102



## casing dimension



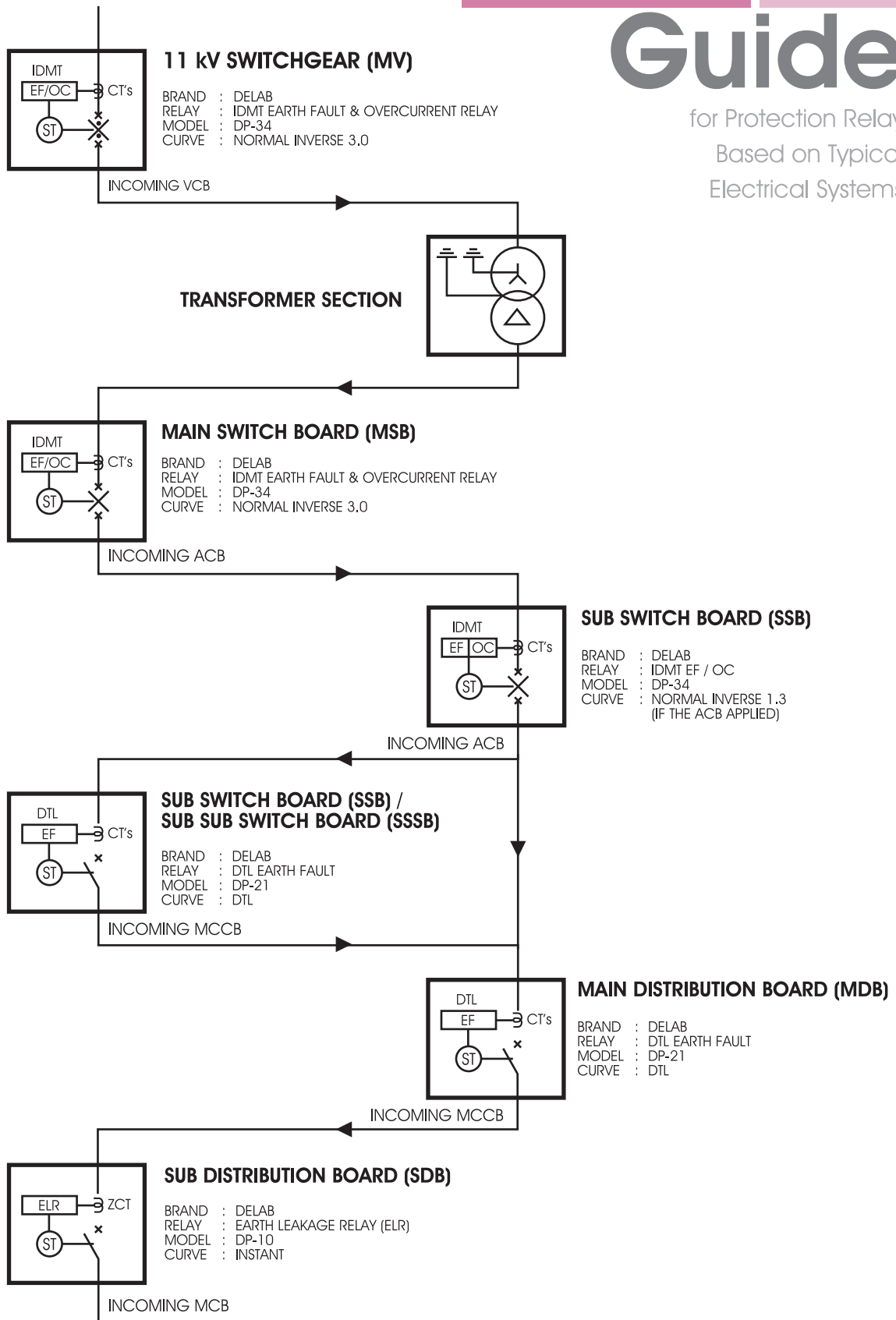
## ordering information

Model	Description
DTS-100	220~240 Vac
DTS-101	24~264 Vac / dc
DTS-102	24~264 Vac / dc
DTS-200A	24~264 Vac / dc

Note: All measurement in mm.

# Selection Guide

for Protection Relay  
Based on Typical  
Electrical Systems



REMARKS : Recommended DP-34 to use on SSB  
 RELAY : IDMT EARTH FAULT & OVER CURRENT  
 MODEL : DP-34  
 CURVE : NORMAL INVERSE 1,3

