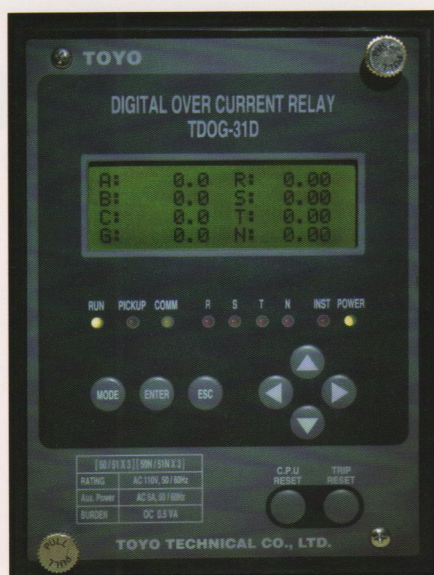


TOYO

Digital Type Protection Relay



DIGITAL Over Current & Earth Fault Relay [50/51 X 3] [50N/51N]



SPECIFICATION

Model

CO X 3 + LCO	
TDOG - 31	(Fixed Type with RS485 output)
TDOG - 31D	(Draw Out Type with RS485 output)

Rating

Input	AC 5A
Frequency	50 / 60 Hz $\pm$ 5%
Auxiliary Voltage	AC / DC 80 ~ 260V
Ambient Temperature	-10°C / +60°C (without icing)

Current Setting

[CO]	
Overcurrent Range	0.2 ~ 25A (0.1A step)
Instantaneous Range	5 ~ 120A (1A step)
[LCO]	
Overcurrent Range	0.2 ~ 20A (0.1A step)
Instantaneous Range	1 ~ 80A (1A step)
Operating Value	100% ($\pm$ 10%)
Thermal Withstand	15A / continuous, 400A / 1S

Time Setting & Curve

<IEC 60255-3>

Overcurrent Time Lever	0.1 ~ 40 (0.1 step)
Instantaneous	$\leq$ 40ms

$$\text{Normal Inverse Time} \quad N = \frac{0.14}{I^{0.02} - 1} \times \frac{tp}{10}$$

$$\text{Very Inverse Time} \quad V = \frac{13.5}{I - 1} \times \frac{tp}{10}$$

$$\text{Extremely Inverse Time} \quad I = \frac{80}{I^2 - 1} \times \frac{tp}{10}$$

($I = I_t / I_s$, $tp = t >$)

$$\text{Definite Time} \quad D = 2 \times \frac{tp}{10}$$

Resetting Value	$>$ 95%
Reset Time	$<$ 100ms

Burden

AC CO	$\leq$ 0.5VA
AC LCO	$\leq$ 0.5VA
AC Aux. Voltage	12VA
DC Aux. Voltage	6W

CHARACTERISTICS

Easy coordination between wiring and receiving point of OCR with only 1 set of relay.

With LCD display showing all information about the state of setting and input current value of each phase, also, LED lights indicating the running state.

Selective operating time consists of definite time, normal inverse time, very inverse time, and extremely inverse time.

Protective coordination can be harmonized with 1 set of relay, regardless of distributing and receiving line.

In case of induction relay, 4 sets of relays were required.

But, our relay was structured as **integrated type** with 3 OCR and 1 OCGR; easy to install, with high accuracy and reliability based on digital system.

Detecting faults correctly at the time of short circuit as well.

The relay was electronically structured, therefore it works semi-permanently.

The design meets the standard requirements, thus the relay is highly applicable to panel manufacture for the purpose of export.

Contact

Output Relay	Trip: 1a	CO: 1a LCO: 1a
Trip Contact Capacity	12A / 250VAC / 28VDC	
Making Capacity	30A	
Contact Material	Silver Alloy	

Indicator (LED)

CPU State	(Self-diagnostic & monitoring)
Communication Indication	RUN (Green)
Flicker when inputted OC	COMM (Yellow)
Fault phase / instantaneous	PICKUP (Red)
	R.S.T.N / INST (Red)

Memory

Up to 10 records of fault data

RS 485 Communication

Protocol	Modbus
Comm. Speed	9600 / 19200 bps
Parity	None

Vibration Resistance

<IEC 60255-21-1>

Malfunction	10Hz 5mm double amplitude 30s each in X and Y directions 16.7Hz 2.5mm double amplitude 600s each in X, Y, and Z directions
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Shock Resistance

<IEC 60255-21-2>

Destruction	300m/s ² (approx. 30G) 3 time each in 3 directions
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Insulation <IEC 60255-5>

Dielectric Withstand	2kv for 1 minute between all terminals and case earth
Insulation Resistance at 500V	$>$ 1,000M Ω
Impulse Voltage Withstand	5KV-1.2/50 μ s
Surge Transient Simulator	2.5KV 1MHz/200 Ω <IEC255-6>
Weight	2.2kg

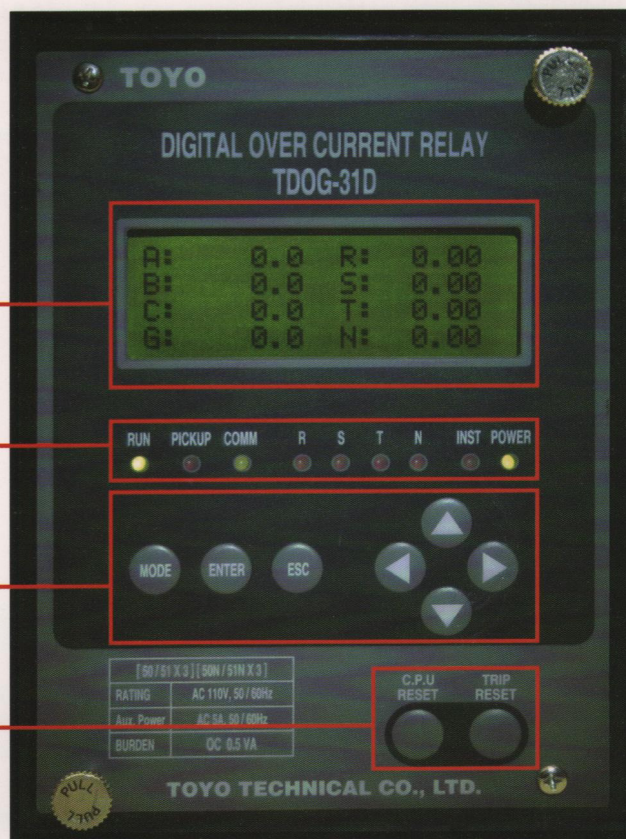
Environmental & EMC Conditions

<IEC 61000>

Dust & Drop Resistance	Front cover with IP42 protection level Optional IP54 protection level (with extra charge)
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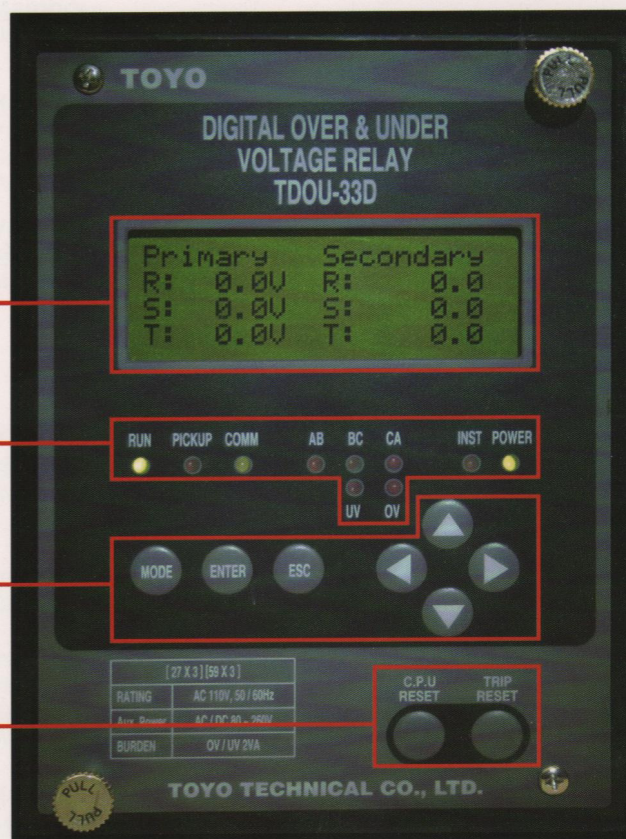
TDOG - 31 / TDOG - 31D

1. **4 X 20 LCD Display**
State and information display
2. **LED Indicator**
Trip phase and state indication
3. **Control Key**
To set and check the state
4. **CPU Reset / Trip Reset**
To reset CPU / Trip state

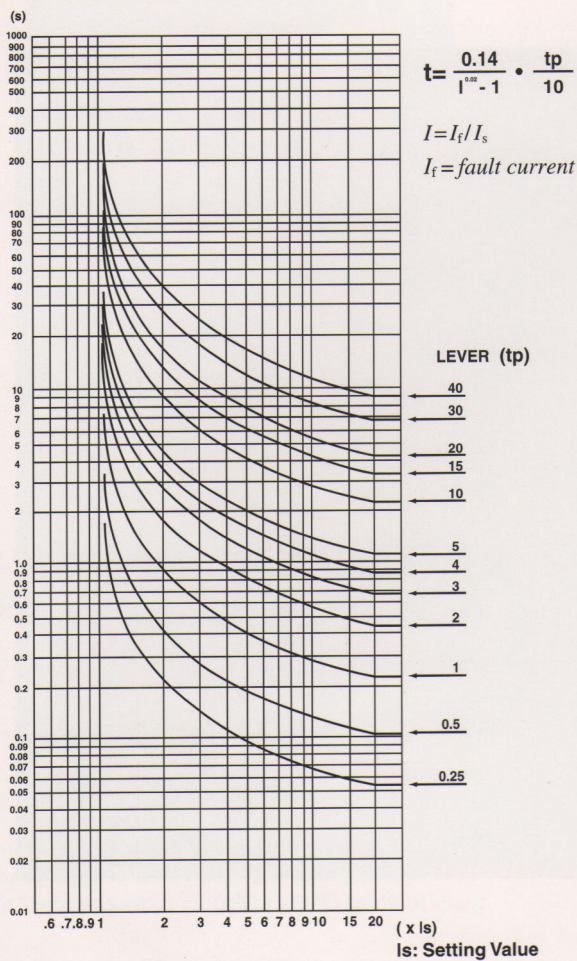


TDOU - 33 / TDOU - 33D

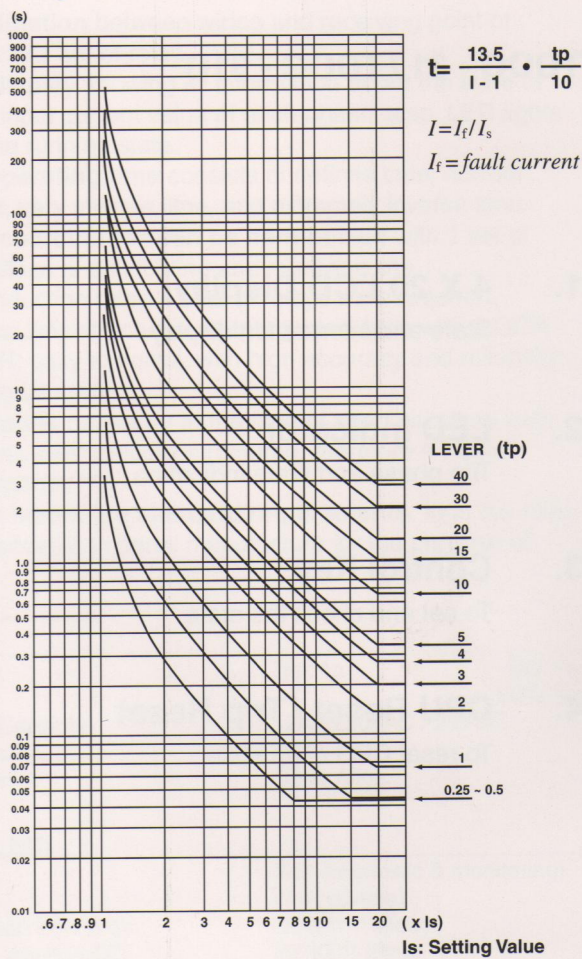
1. **4 X 20 LCD Display**
State and information display
2. **LED Indicator**
Trip phase and state indication
3. **Control Key**
To set and check the state
4. **CPU Reset / Trip Reset**
To reset CPU / Trip state



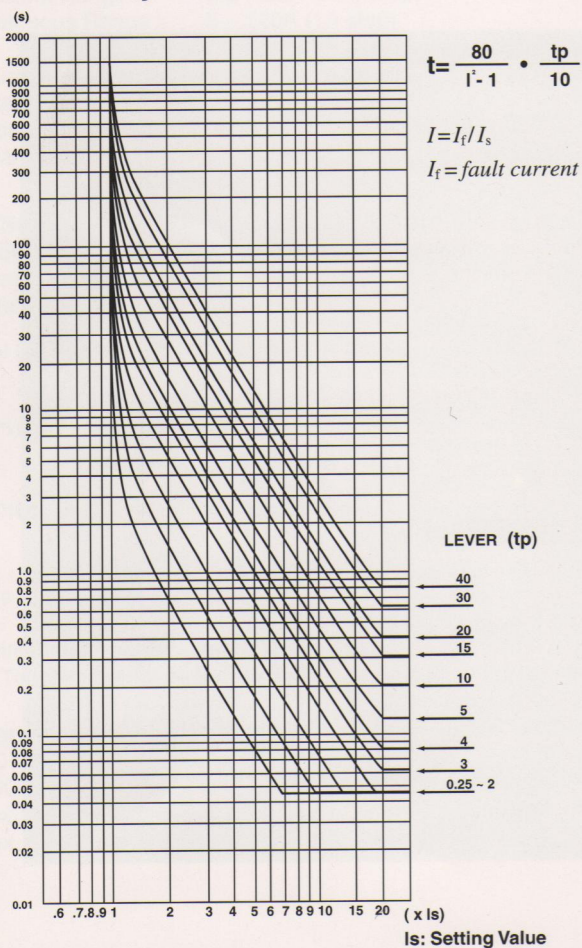
Normal Inverse



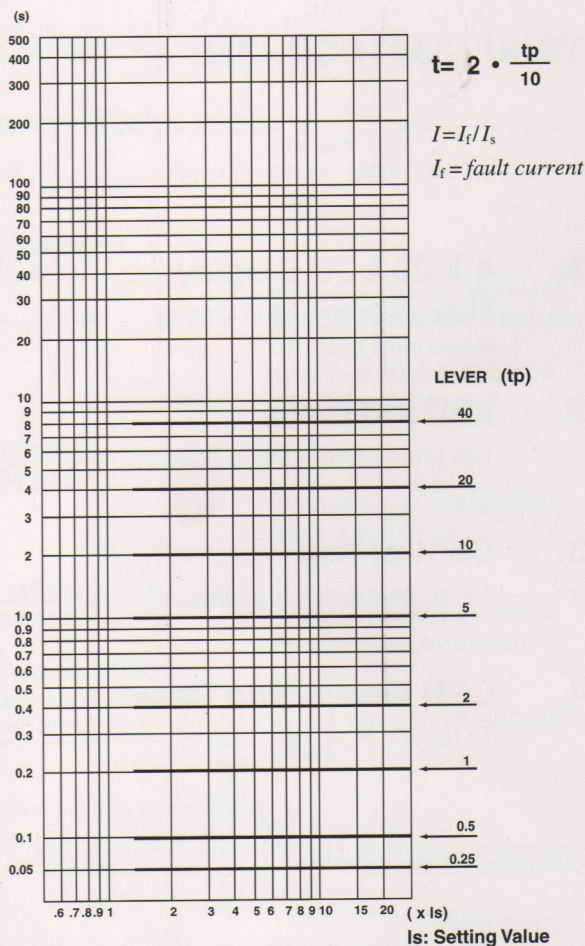
Very Inverse



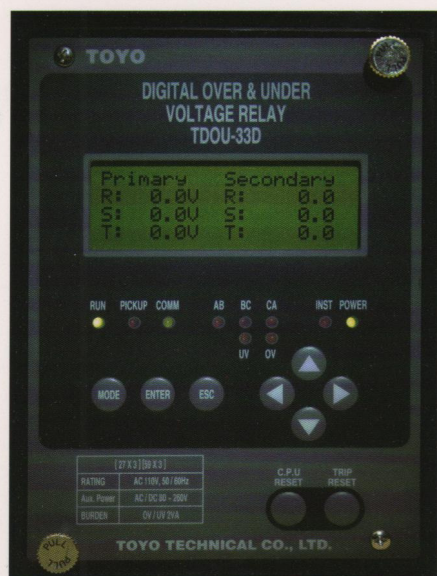
Extremely Inverse



Definite Time



DIGITAL Over Voltage & Under Voltage Relay [59/27]



■ CHARACTERISTICS

Up to now OVR and UVR relays were separately set and operated, but now they are compacted in one relay unit. Therefore, it is very convenient for handling, too.

As assembled with state of the art and multifunction, it is most suitable and applicable for protective coordination. Volt meter being installed, it can be used for measuring.

Electronic indicator can accurately detect troubles, and surely indicate electrical troubles.

■ SPECIFICATION

Model

OV X 3 + UV X 3	
TDOU - 33	(Fixed Type with RS485 output)
TDOU - 33D	(Draw Out Type with RS485 output)

Rating

Input	AC 110V
Frequency	50 / 60 Hz $\pm$ 5%
Auxiliary Voltage	AC / DC 80 ~ 260V
Ambient Temperature	-10°C / +60°C (without icing)

Voltage Setting

[OV]	100 ~ 160V (1V step)
[UV]	50 ~ 120V (1V step)
Instantaneous	20 ~ 90V
Operating Value	100% ($\pm$ 10%)

Time Setting & Curve <IEC 60255>

UV/OV Time Lever	0.1 ~ 10 (0.1 step)
Instantaneous Time	$\leq$ 60ms
Reset Time	$\leq$ 100ms
Resetting Value	
[OV]	$V < 95\%$
[UV]	$V > 105\%$

UV Inverse Time	$t = \frac{-0.85}{(V/100)^{2.4} - 1} \times t_p$
OV Inverse Time	$t = \left(\frac{12.15}{V^2 - 1} + 0.35 \right) \times t_p$
UV/OV Definite Time	$t = t_p$

Operating Time

[OV]	Inverse or Definite Time
[UV]	Inverse or Definite Time

Burden

AC Voltage	$\leq$ 2.0VA
AC Aux. Voltage	12VA
DC Aux. Voltage	6W

Contact

Output Relay	Trip: 1a OV: 1a UV: 1a
Trip Contact Capacity	12A / 250VAC / 28VDC
Making Capacity	30A
Contact Material	Silver Alloy

Indicator (LED)

CPU State	(Self-diagnostic & monitoring) RUN (Green) COMM (Yellow) PICKUP (Red)
Communication Indication	AB, BC, CA / OV, UV (Red)
Flicker when inputted OV/UV	
Display fault phase/instantaneous	

Memory

Up to 10 records of fault data

RS 485 Communication

Protocol	Modbus
Comm. Speed	9600 / 19200 bps
Parity	None

Vibration Resistance <IEC 60255-21-1>

Malfunction	10Hz 5mm double amplitude 30s each in X and Y directions 16.7Hz 2.5mm double amplitude 600s each in X, Y, and Z directions
-------------	--

Shock Resistance <IEC 60255-21-2>

Destruction	300m/s ² (approx. 30G) 3 time each in 3 directions
-------------	--

Insulation <IEC 60255-5>

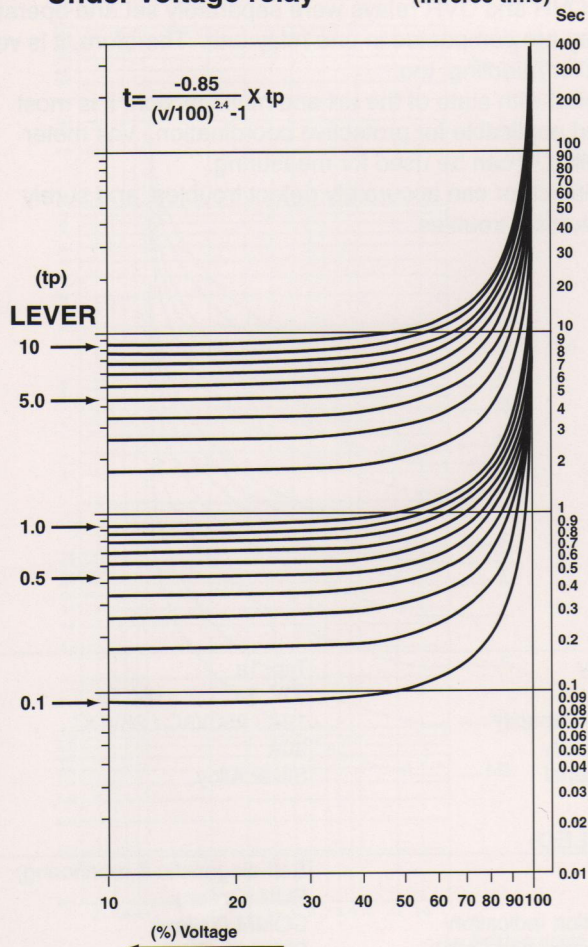
Dielectric Withstand	2kv for 1 minute between all terminals and case earth
Insulation Resistance at 500V	$> 1,000M\Omega$
Impulse Voltage Withstand	5KV-1.2/50 μ s
Surge Transient Simulator	2.5KV 1MHz/200 Ω <IEC255-6>
Weight	2.2kg

Environmental & EMC Conditions <IEC 61000>

Dust & Drop Resistance	Front cover with IP42 protection level Optional IP54 protection level (with extra charge)
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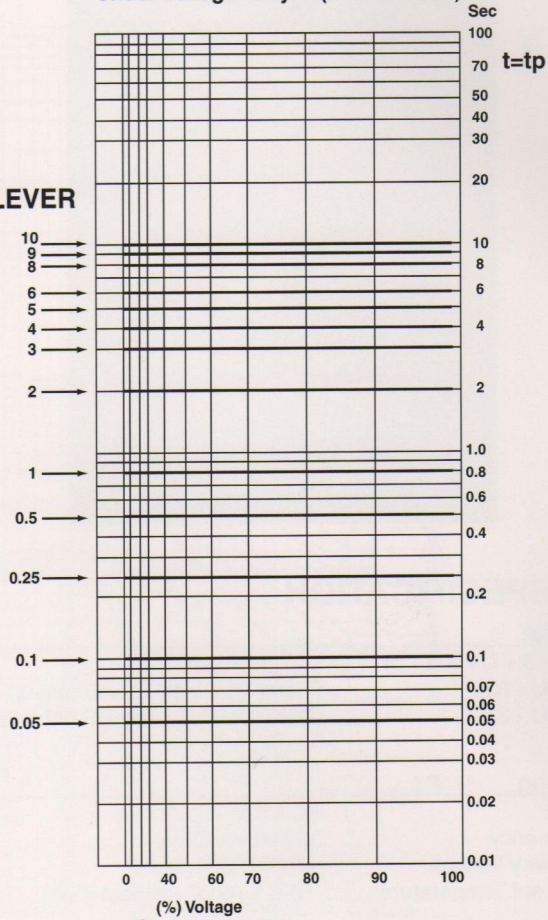
Under voltage relay

(Inverse time)



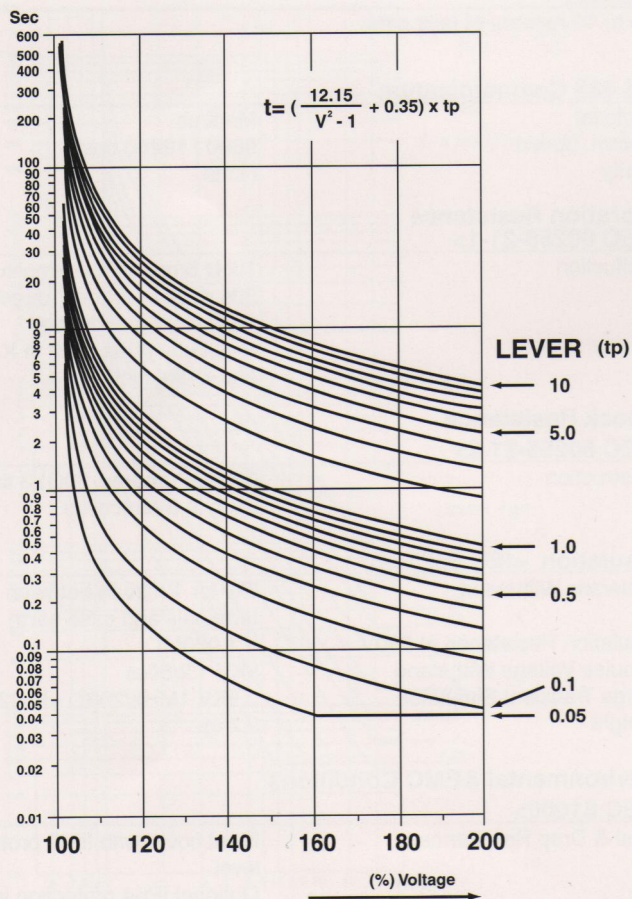
Under voltage relay (Definite time)

(tp) LEVER

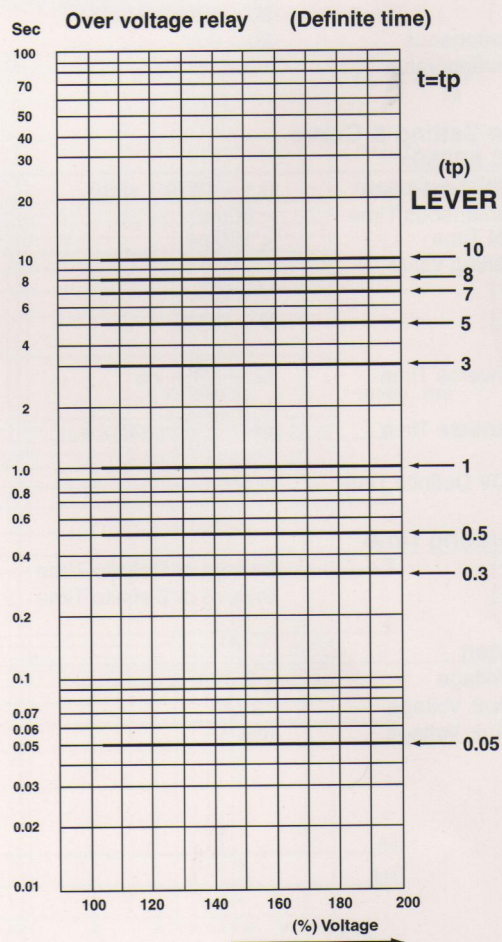


Over voltage relay

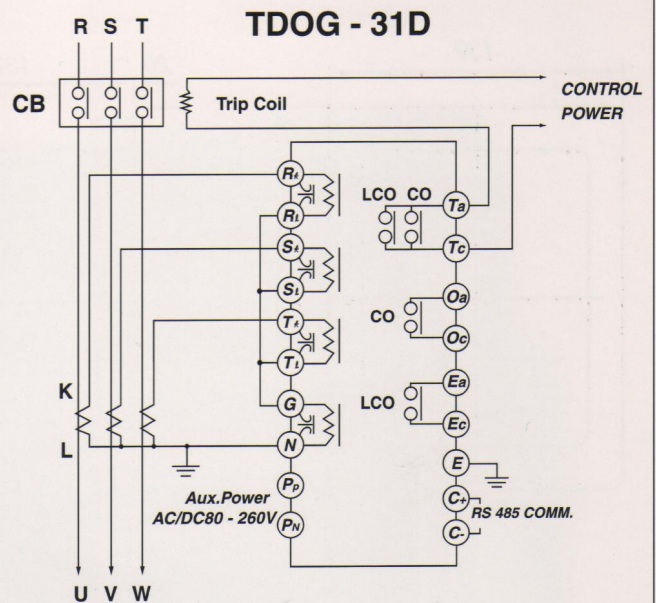
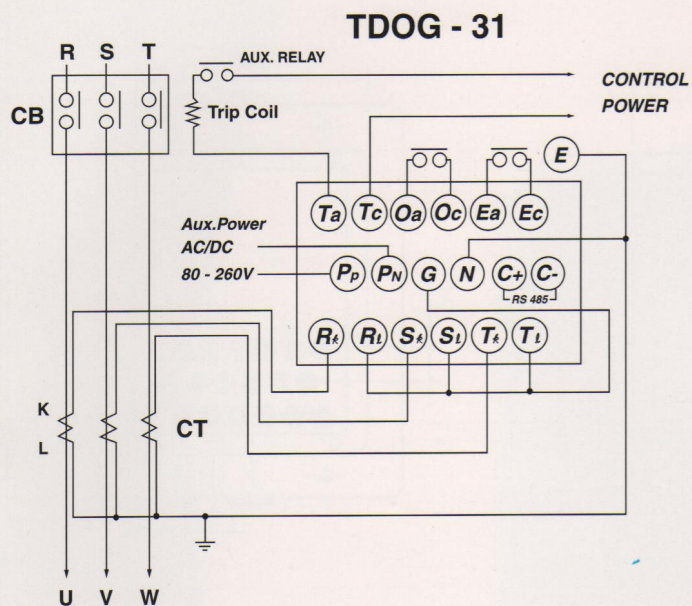
(Inverse time)



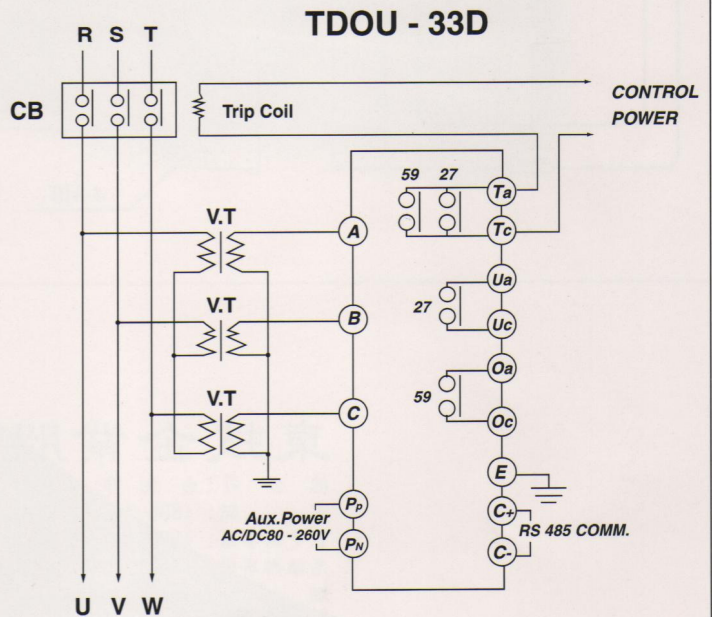
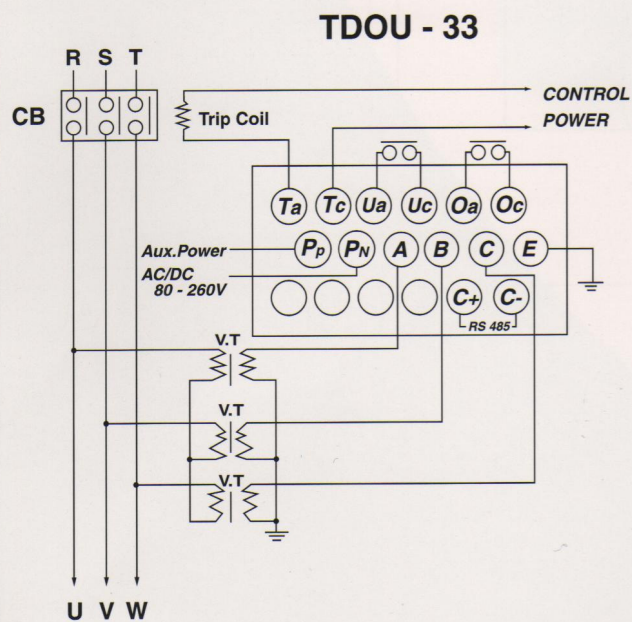
Over voltage relay (Definite time)



TDOG - 31 / TDOG - 31D



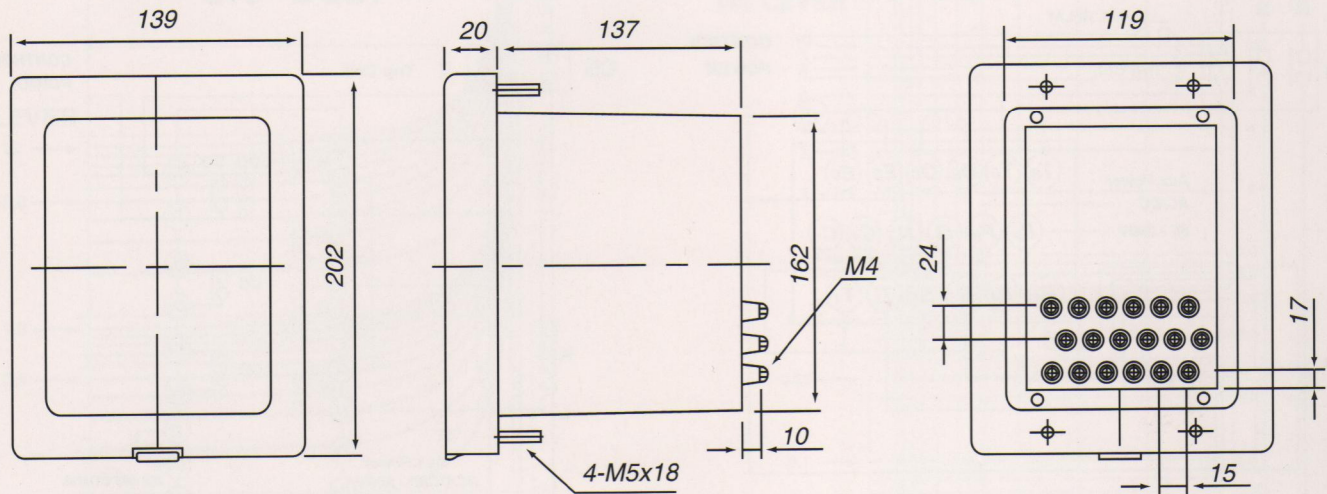
TDOU - 31 / TDOU - 33D



■ DIMENSIONS

Fixed Type

TDOG - 31 / TDOU - 33



Draw Out Type

TDOG - 31D / TDOU - 33D

