# CURRENT CONTROLLER



**INDUSTRIAL CONTROLS & DRIVES (INDIA) PVT. LIMITED**
*New No: 33 Old No:10, Mettukuppam Road, (via) Alapakkam Road,*
*Maduravoyal, Chennai - 600 095.*
*Ph : 2378 1753 / 2378 0837  Fax : 91-44-2378 1431*
Website: www.icdipl.com   e-mail : gcicdipl@vsnl.com

# **CONTENTS**

# <u>CURRENT  CONTROLLER</u>

## 1. General description

ICD's Digital Current Monitor is a microcontroller based instrument which accepts current input and shows the  corresponding amps value linearly in display window.  It has the operational security of extensive measuring  system and self-monitoring.   All data of the measuring system is safely stored (without batteries) in the EEPROM.

The instrument houses 6 digit 0.39" seven segment LED type display to indicate the 3 phase current and 1x4 matrix keypad in the front facia to configure the relevant parameters. It has one number of potential free relay contact for controlling purpose.
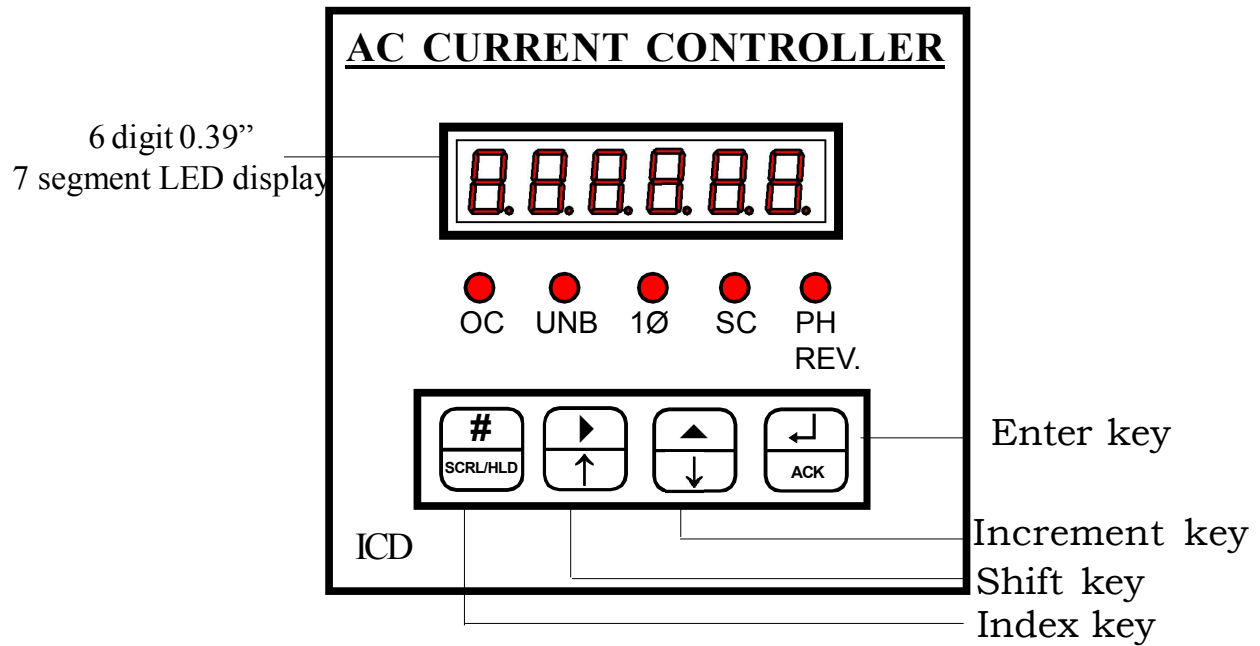
The instrument is powered by 230 V AC and is housed  in  an ABS plastic case enclosure of size  96(H) x 96(W) x 120(D) mm  dimension and is suitable for flush panel mounting.

## 2. Front & Back  Panel Details

### 2.1 Front Panel Details

The front panel of Instrument has display window,1x4 matrix keypad for programming & LED indications.

1.  Display window houses 6 digit  0.39" 7 segment red LED type.

2. The 1x4 matrix keypad is designed for programming setting parameters.

3. 5 No's of 3mm red colour LED indicator is provided to indicate Relay status.



### 2.2 Terminal Details

## 2.3 Key Description

| <u>Keys</u> | <u>Program mode</u> | <u>Normal operating mode</u> |
|---|---|---|
| **#** SCRL/HLD | Index key *(To select Menus)* | SCRL/HLD *(To switch between Scroll/Hold mode)* |
| ▶ ↑ | Shift Key *(To move between characters & to select parameters)* | Page UP Key *(To view next display page)* |
| ▲ ↓ | Increment Key *(To increment the selected digit & to select parameters)* | Page DOWN Key *(To view previous display page)* |
| ↵ ACK | Enter Key *(To store the modifications & datas)* | Acknowledge Key *(To acknowledge the Relay alone)* |

## 2.4  Changing the configuration Items

In program mode, after selecting the configuration item through Index key, It can be altered by using shift, Increment & Enter key.

The shift  ( ▶ )  key is used to select the digit one by one. The selected digit is shown by flashing that digit.

The Increment ( ▲ )  key is used to increment the selected digit. The increment key Increments the digit from 0 to 9 and then wraps down to zero once again. Shift and Increment keys are also used for selecting the required parameter.

Once the required  values are set in the configuration items press the Enter ↵ key to store it in memory. If the change is accepted the display Indicates 'E' otherwise an error message is displayed as 'Error'.
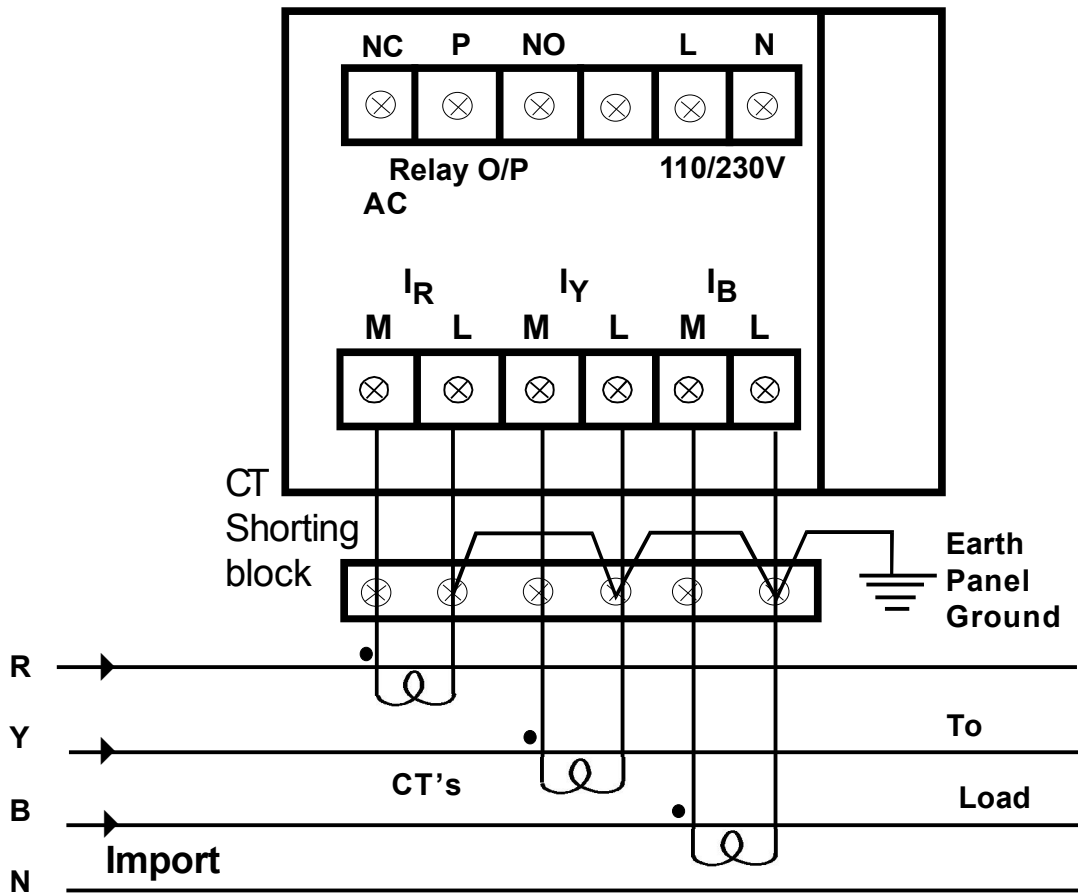
Once the configuration Items are programmed hold in the ▶ &  ▲ keys together for 3 seconds to return back to normal operating mode.

# 3. Wiring Diagram

## 3.1) Three phase four wire LT systems (3 watt measurement)

**Voltage Input** : Direct 240V AC P-N (-20% to +10%)

**Current Input** : 5A provide through 3 CT's

# 4. Functional Description

When the instrument is powered by giving suitable supply, it works in run mode and displays manufacturers name & year for an instant and shows value proportional to input. Relay output is provided at the  rear side of the unit. The control action is explained below

## (i)Over Current :

When the current  in any one of the phase exceeds the set point fault is detected as over current and relay de-energizes after the delay time. When the current falls below the set point at this time enter the acknowledge key (Enter key). Then the relay is  energises.

**Over current adjustable is 50% to 200% for CT ratio settable.**

Time delay ( td1 ) set range  : (1 - 120 Secs)

## (ii)Unbalance ;

When the current  in any one of the phase differs from the other phase by set percentage the fault detected as unbalanced and relay is de-energizes after the delay time.

**0- 30% for CT ratio settable**

Time delay ( td2 ) set range  : (1 - 120 Secs)

## (iii)Short Circuit:

When the current  in any one of the phase exceeds the set point fault is detected  relay de- energizes after the delay time. When the current falls below the set point   the relay is energise (when after pressing the enter key)

**Short circuit  adjustable is 200 % to 300%**

Time delay ( td3 ) set range  : (1 - 10 Secs)

## (iv) Single phase :

When the current in any one of the phase are not flow at this time relay is de- energises When the current is flow the set point the relay is de - energizes (when after pressing the enter key).

Time delay ( td4 ) set range  : (1 - 30 Secs)

## (v) Phase Reverse :

When the phase current in the three phase is in forward/ reverse flow condition LED will be in ON.When any one of the phase current is reversed and load current should be greater than 10% at this time the fault LED will be OFF after the setted time delay.

Time delay ( td2 ) set range  : (1 - 120 Secs)

## SCR/HOLD MODE :

If the First digit  (Example)

( r. ) - HOLD MODE

( r  ) -  SCRL MODE

## 5.Control Action:

In Normal Condition (without fault), Relay is in energise State. whereas, relay get de- energised during fault condition.

The relay can be acknowledged manually, by pressing Enter key in Run Mode.The Relay get energised after delay time, when any of the current reaches the over current setpoint, with glowing of "OC" LED in front facia. When acknowledged, relay alone will return to normal state (Energised state), but not the LED. LED goes OFF, when fault is originally recovered. (i.e., when display goes below the "OC" setpoint)

## Time Delay :

Time delay is applicable at the time of fault occurance. (i.e., Relay de- energises and "OC" LED glows after the programmed delay time, when current is any phase exceeds the setvalue).

Time delay 01 - Over Current (OC)

Time delay 02 - Unbalance (UNB & PH REV )

Time delay 03 - Short circuit (SC)

Time delay 04 - Single phase(1$\varphi$)

## Fault Messages :

The message "no FLT" is displayed, when there is no fault or else displays the message "Or r" / "Or y" / "Or b" depending on the phase in which current exceeds the setvalue. If current in 3 phases exceeds the setvalue it indicates the "Or r". Priority of Phases are R, Y & B.

## Fault Registry :

This page shows, the value at which the fault occurs. It captures the first error value, after the delay time (as progrrammed).

# 6. Programming Instruction

## 6.1  Program Mode

The Current Monitor is to be programmed properly to work in a particular installation.  The various items that are to be programmed are given below.

1. New Password  (0000 - 9999)
2. Current  Set Point (0000 - 9999)
3. Over current Set Point
4. Short Circuit Set Point
5. Unbalanced
6. Time Delay (00-120 sec)

The Current Monitor is provided with password facility to prevent alteration of configuratioon items by unauthorised persons.  The configuration items can be changed by following the procedure given below,

With power applied to the meter hold the ▶ and ▲ keys  together for 3 seconds, the display indicates enter password, where user has to enter the valid password.

| E P - - - - |  ——— Enter password

The valid password is set in the configuration item.  New password has to be entered by using Shift (▶), Incr (▲) and Enter ( ↵ ) Keys or else display will show 'Err' (Error).  After the valid password is entered the unit enters into program mode by showing it in display

| P r O G |  ——— Program Mode

*Special Note:*

*If the user enters the 'enter password' for the first time or if the user fails to remember the password entered in 'New password', the default password of '0386' can be entered.*

The configuration Items can be selected by pressing the Index (#) key. Heading displays are used to differentiate the various configuration items. The heading displays for various configuration item are given below,

| n - - - - |

Password to prevent unauthorised persons entry
(Range: 0000 - 9999)

*Press # Key*

| C 0 3 0 0 |

CT Primary setting (Range: 0000 - 9999)

*Press # Key*

| O C 0 20 0 |

Over Current Setpoint in A AC

*Press # Key*

| SC 0 0 1 0 |

Short Circuit Setpoint in A AC

*Press # Key*

| U n b   3 0 |

Unbalanced Setpoint in A AC

*Press # Key*

| t d 1   0 0 5 |

Time Delay for Relay to get energise and OC LED to get ON (Range: 1 - 120sec)

up to 4 time delay

| 4 t d   0 0 5 |

Again pressing Index (#) key repeats the same process in cyclic manner. Press Shift & Increment keys together for few seconds to quit program mode & return to RUN mode.

## 6.2  Run  Mode

      When the instrument is powered by giving suitable supply, it works in run mode (mode in which the input value is displayed) and displays manufacturers name & year for an instant and shows display value, proportional to input fed at input terminals and in Hold mode by default . The 3 phase currents are shown in different pages as shown below.  In hold mode, Display pages is viewed one by one (upside down) by using Page up key and viewed viceversa by using page down keys.   When the unit is in Run Mode, the display pages also made to scroll automatically one by one with definite interval by pressing 'Scrl/ Hold" key provided in the front facia of the meter.  (**Note:** The Hold mode is identified by a dot present in MSD, whereas the dot is absent in Scroll Mode).

| I C d 1 3 |
|---|

M a n u f a c t u r e r ' s  N a m e  &  Y e a r

*AutoScroll*

| r.      1 5 0 |
|---|

R P h a s e  C u r r e n t  i n  A A C . (dot in MSD indicates Hold Mode)

*Press ↟ Key*

| y.      1 5 0 |
|---|

Y Phase Current in A AC.

*Press ↟ Key*

| b.      1 5 0 |
|---|

B Phase Current in A AC.

*Press ↟ Key*

| OC.        r |
|---|

*Press ↟ Key*

Indicates the Phase in which current reaches the Over Current setpoint or "no FLt" is displayed, when there is no fault.

| F.      1 0 1 |
|---|

During Fault, the very first value at which fault occurs is captured & displayed. This page will not appear, during "nO FLT" (no fault) condition.

## 7. Technical Specification

Instrument           : MICROCONTROLLER BASED **CURRENT CONTROLLER**

### Input
Input                  : 0 - 5A AC
No of Current Inputs  : 3 CT
Display             : 6 digit 0.5" 7 segment Red LED
Range              : 0000-9999 (Selectable thru' keypad)
Resolution        : 1 AMPS
Accuracy        : ± (1% of Reading + 1 LSD)

### Control Action

No. of Set points    : 4
No. of Relays       : 1 for (common)
Setpoint Resolution  : 1 A  AC
Output            : 1 c/o potential free contact  for  set point
Contact Rating     : 6 Amps at 230 V AC

### Others
No of Keys        : 4 (Index, Shift, Increment & Enter Keys)
Aux. Supply      : 110/230 VAC±10% 50Hz
Box Dimension    : 96 (W) X 96(H) X 120 (D) mm
Mounting        : Panel.

## 8. Commissioning of Digital Current controller

Before fixing the unit into the panel

★ Thoroughly read the operating manual, if queries arised contact ICD's sales representative.

★ Visualize the unit for any physical damage, which may be caused during transit.

★ If severely damaged, unpack the instrument and contact ICD's factory or its representative.

★ After physical inspection, complete the external wiring and switch ON the unit for preliminary check (if necessary).

★ The display page shows the process .

★ Program the required Setting parameters.

★ After complete satisfaction, fix the instrument into the panel and complete the external wiring.

Excess voltage can damage the instrument ,
lesser voltage can cause improper functioning.