

Type HROC 82
Over Current Relay + Stand By Memory
Three Phase and Earth Faults

Features

Internal flash memory for registering faults.

Registering the time of the faults (Including 24 event recorder concluding 6 event for each phase)

The last fault alarm led remain on front panel even after power off. Each fault conation maximum 5 second sample including 20cycle after trip and the remaining before trip.

Choice of 4 inverse time curves and 3 definite time ranges by switched selection.

Wide setting range of $0.05I_n$ to $2.4I_n$ in steps of $0.05I_n$

Time multiplier range 0.05 to 1 on all seven characteristics

Separate led indicator on each measuring board to show time delay trip alarm, highest trip alarm and peak up.

LED start indicators provided to facilitate testing

RS232 Port

In order to download recorded information of internal flash memory that conation the history of last 6 faults on each phase and earth, RS232 port provided an front panel.

Customer must interface relay with PC by dedicated RS232 cable in relay package. PC software needed for interface. This software given on the CD and must be installed on PC or notebook.

Application

The relay can be used in applications where time graded overcurrent and earth fault protection is required.

The relay can be used to provide selective protection for overhead and underground distribution feeders.

Other applications include back-up protection for transformers generators and HV feeder circuits and the protection of neutral earthing resistors.

With all the current/time characteristics available on one relay a standard relay can be ordered before detailed co-ordination studies are carried out distinct advantage for complex systems. Also changes in system configuration can be readily accommodated.

An instantaneous element with low transient overreach is incorporated within each phase or earth fault measuring board. This can be easily disabled in applications where it is not required.

For application where the instantaneous fault element is required to have a sensitive setting whilst remaining stable on heavy through faults the use of a stabilizing resistor is recommended. The current transformers for this application must satisfy the criteria detailed under current transformer requirements in technical data.

The total impedance of the relay and the series stabilizing resistor is usually low enough to prevent the current transformers developing voltages over 2 KV during maximum internal faults but in some applications a non-linear resistor is required to limit this voltage.

Non – standard resistance values and non – linear voltage limiting devices are available.

- Low AC burden
- Suitable for use with separate direction relay
- Accurately follows time curves to IEC255
- High resetting ratio
- Fast resetting time
- Positive calibrated settings by means of switches
- Internal DC auxiliary power supply operating over a wide input range
- Separate test mode with trip test feature
- Indication of power on front panel.
- Non-volatile memory for time delayed and instantaneous led indicators.

Switch position for Select the curve (0) (1)		Operating characteristic
	• • •	Trip test after pushing Switch of reset bottom for seven seconds.
• • •		Standard inverse $t = \frac{0.14 \times TMS}{I^{0.02} - 1} \text{sec } SI$
• •	•	Very inverse $t = \frac{13.5 \times TMS}{I - 1} \text{sec } VI$
•	• •	Extremely inverse $t = \frac{80 \times TMS}{I^2 - 1} \text{sec } EI$
•	• •	Long time earth fault $t = \frac{120 \times TMS}{I - 1} \text{sec } LT$
• •	•	Definite time 2 seconds D2
•	• •	Definite time 4 seconds D4
•	• •	Definite time 8 seconds D8

Table I

Description

This range of HROC relays is designed so that versions are available with separate measuring boards for each phase of earth fault input alternatively phase inputs may be combined on to one board for polyphase measurement (see table 1).

These boards together with the other circuits of the relay are contained in a single plug-in module which supplied in a size 4, 6 or 8 midos case. The case incorporates one or two terminal blocks for external connection.

Removal of the module automatically short circuits the current transformer connections by means of safety contacts within the case terminal block.

For added security when the module is removed the CT circuits are short circuited before the connection to output contacts and dc supply are broken.

The relay uses solid state techniques in each measuring board utilizing a micro computer as a basic circuit element.

The current measurement whether performed on a single phase or polyphase input is performed via an analog-to-digital converter.

Application diagrams are provided in figures 2 to 8 (inclusive) showing typical wiring configuration .

Each measuring board has a built-in power off memory feature for the time delayed and instantaneous led indicators .

Power to each measuring board may be tested whilst the relay is in service . without affecting the current measurement . A test mode is also available to carry out a trip test on the output relays . during this test , current measurement is inhibited .

When required directional control can be exercised over the relay by connecting an output contact from direction relay type METI to the terminals provided .

Separate output contacts capable of circuit breaker tripping are provided for time delayed phase faults time delayed earth fault and instantaneous earth fault operation .

Relay settings

Separate setting switches for each measuring board are provided on the relay front plate . these are used to select the required time / current characteristic current and time multiplier setting .

Selection of time characteristics

The current / time characteristics selection is carried out by means of three switches (identified by symbol on the nameplate .)

Table I gives the basic operating characteristic and the settings of the switches .

Time multiplier setting

The time given by each of the operating characteristics must be multiplied by the time multiplier to give the actual operating time of the relay. This control is marked $xt = \Sigma$ where Σ is the sum of all switch positions.

The range of multiplication is from $0.05 \times$ to $1.0 \times$ in steps of 0.025 .

This acts as a conventional time multiplier on the current dependent characteristics and gives the following time ranges for the definite time characteristics.

Operating characteristics	time range
S	s
2	0.1 to 2.0 in 0.05s steps
4	0.2 to 4.0 in 0.1s steps
8	0.4 to 8.0 in 0.2s steps

Current setting

Time delayed element

The current setting control is marked $I_s = \Sigma \times I_n$ where I_s is the current setting in AMPS, Σ is the sum of all switch positions and I_n is the relay rated current in amps.

Each measuring board provides a setting range of $0.05I_n$ to $2.4I_n$ in steps of $0.05I_n$

Instantaneous element

The setting control of the instantaneous element is marked $I_{inst} = \Sigma \times I_s$ where Σ is the sum of the switch positions and I_s is time delayed element setting .

When all switches are set to the left (at zero) or when the lowest switch is set to infinity regardless of the positions of the other five switches the instantaneous feature is rendered inoperable . the range of adjustment of finite setting is from $1 I_s$ to $17 I_s$ In unity steps .

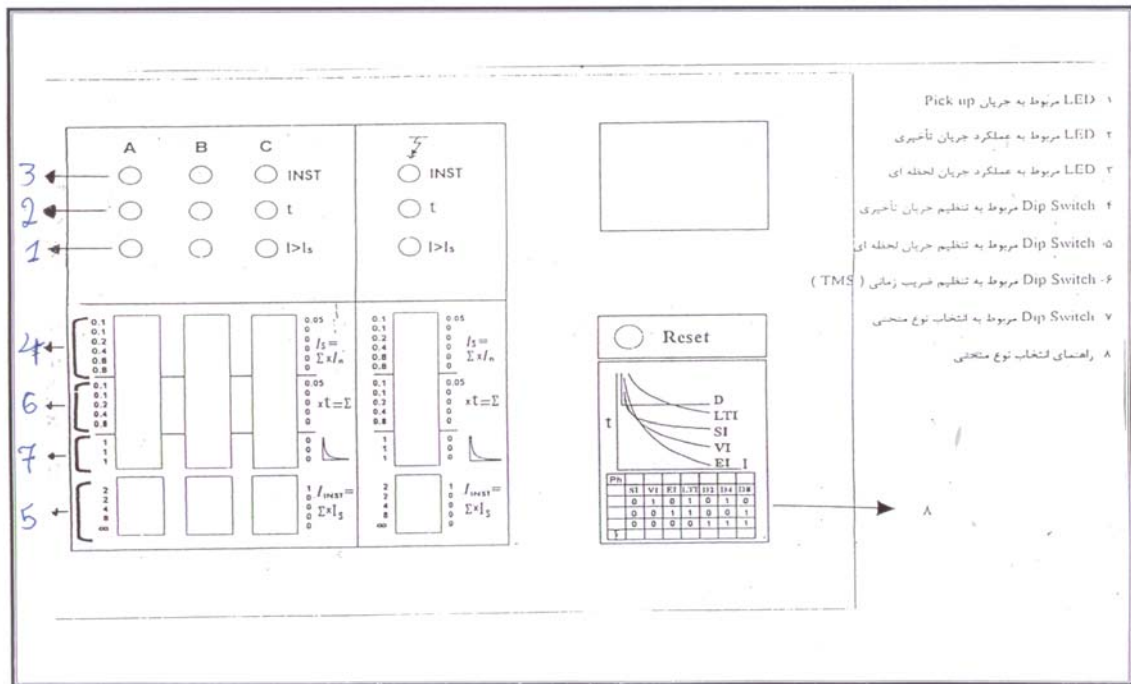
Trip tset

Current measurement is inhibited by setting the curve selection switched to 111 . this causes all three led to flash once per second . If the reset push button is then pressed for approximately six seconds both output relays associated with that measuring board will operate.

Power supply healthy test

If whilst relay is in service the reset button is pressed all the LEDs are illuminated indicating that is power to the measuring boards .

The LEDs are reset on releasing the push button . during this test normal current measurement is inhibited .



- NO: 1- Green LED for showing pick up relay
 2- Red LED for showing delay trip
 3- Red LED for showing instantaneous trip
 4- Dip Switch for setting current $I_s = \Sigma \times I_n$ Just like below

- 0.1 ← 0.05
 0.1 ⇌ 0
 0.2 ← 0
 0.4 ⇌ 0
 0.8 ⇌ 0
 0.8 ⇌ 0

For example we want to set the current in 1.5 AMP then by $I_s = \Sigma \times I_n$
 $1.5 = \Sigma \times 5$ then
 $\Sigma = 0.3$ which is colored by arrow

- 5- Dip Switch for setting instantaneous current $I_{inst} = \Sigma \times I_s$ Just like below

- 2 → 1
 2 ⇌ 0
 4 ← 0
 8 ⇌ 0
 ∞ ⇌ 0

For example we want to set the current in $5I_s$ then the setting is colored by arrow

- 6- Dip switch for setting multiply time – (TMS) sum of the numbers are multiplied to the curve formula.
 7- Dip switch for choosing the curve

IFC STANDARD COMPLINACE

Immunity test

1. Radiated electromagnetic field immunity test
Port : Enclosure
IEC255-22-3
Test level : class2 - 3V/M
24-500 MHZ
The relay place under above criteria and no fail in operation appear .
2. voltage interruption and alternating ripple
IEC255-11
Test level : 125 ms-41 Vac
The power supply of relay interrupted as above and no fail in operation appear.
3. electrostatic discharge immunity test
Enclosure
IEC255-22-2
Test level : class 4
Contact discharge : 8 KV
Air discharge : 15 KV
Electrostatic charge discharge on enclosure under above criteria and no fail in operation appear.
4. fast transient (Burst) immunity test
Port : power supply –signal line
IEC255-22-4
Test level : class 4-2KV-comuon male
In this test 5Khz signal under above criteria applied on power supply and inputs and no fail in operation appear .
5. 1 MHz burst disturbance test
Port : power supply-signal line
IEC255-22-1
Test level : class 3
2.5 KV common mode – 1 KV differential mode

Insulation test

1. insulation resistance

port : input / output – Enclosure

IEC 255-5 IEC255-6

Test level 500 Vdc

The impedance between relay contacts, inputs and enclosure measured above 1 GΩ

2. Dielectric test

port : input / output – Enclosure

IEC 255-5 IEC255-6

Test level : series G

1.5 KVrms

The relay contacts and enclosure put under above criteria for 1 minute and no fail in operation appear.

Atmospheric environment

Temperature IEC 255-6

Storage and transit -25°C to 70°C operating -25°C to +55°C

IEC 68-2-1 : 1 Cold

IEC 68-2-2 : 1 Dry heat

Humidity

IEC 68-2-3 : 1

56 days at 93% RH and + 40°C

Enclosure protection

IEC 529 IP50

Mechanical environment

Vibration

IEC 255-21-1

0.5g between 10Hz and 150 Hz

Mechanical durability

Loaded contact

10,000 operation minimum

Unloaded contact

100,000 operation minimum

Plot Current HTML Help

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Introduction

The Plot Current is a program for reading data form Over Current Relay and upload some setting in Relay.

The Over current Relay connects to PC through serial port.

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Software Installation

Insert the disc labeled Plot current program.

Autorun starts Setup.exe. If Autorun is disabled, run Setup.exe from disk1.

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Hardware Installation

Make sure the device is connected to a **serial port**.

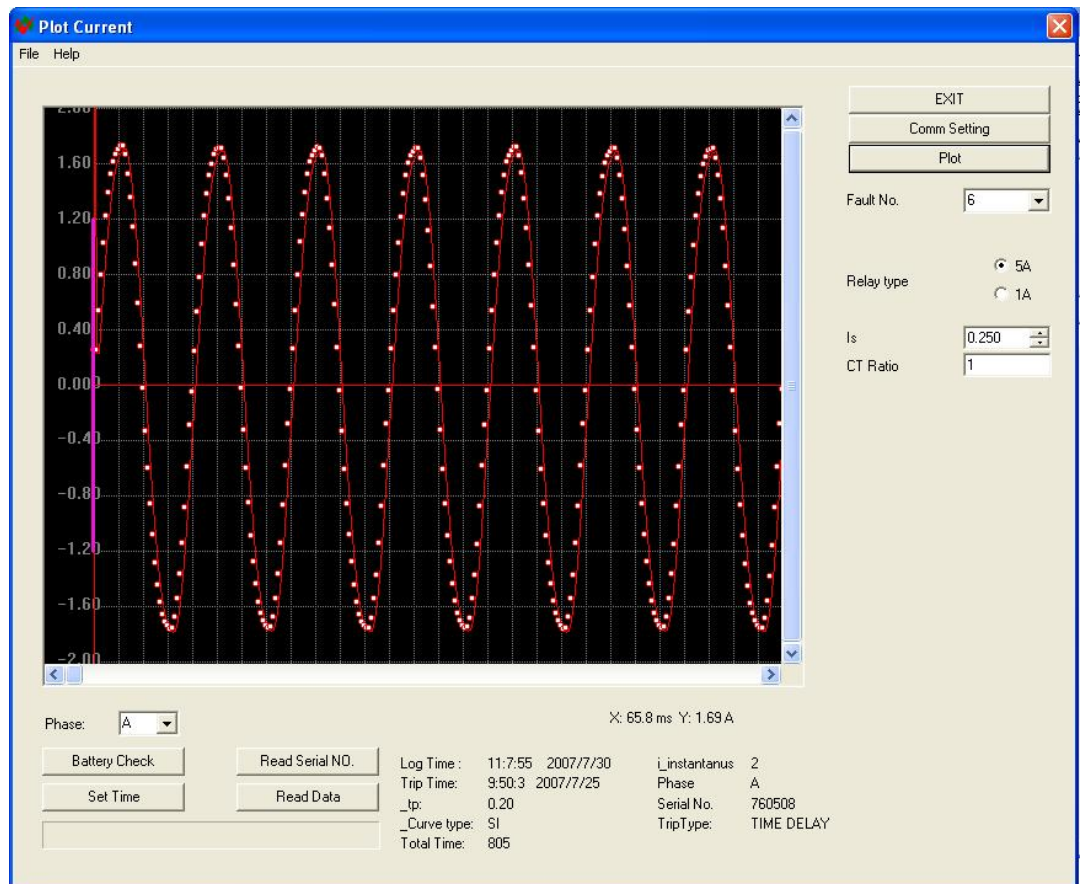
Make sure the device is powered with 110 V DC. when the device is turned on, the green LED is on.

Make sure the Plot current program is installed correct.

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General Operation

This program shows last 6 faults, that was saved in device. each fault includes last 5 seconds before Trip and .5 seconds after trip , Time and date of trip, all setting in front panel and type of trip, with vertical violet line was shown time of Trip.



Plot Current Controls

A The Phase box allows selection of the phase to be read. before reading data (Read Data) from relay you must select phase.

Battery Check The Battery Check button Checks the backup battery. This is a 3Volt Lithium battery and use to retain the contents of RTC (real-time clock) in the event of loss of supply .

Read Serial NO. The Read Serial NO. button use for reading serial number of relay.

Set Time The Set Time button adjusts time of relay with PC Date and Time.

Read Data The Read Data button use for reading data from relay. The phase should be selected, before the Read Data button pressed. if this procedure dose correctly, the "Data received successfully " box appears.

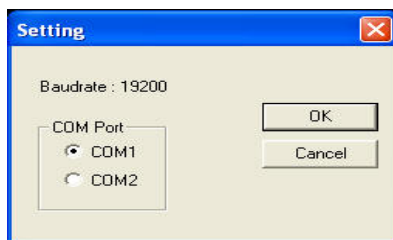
Plot The Plot button will plot the curve in the black screen. after curve plot, fault information will appear in the bottom of dialog,

- Log Time:

- Trip Time:
- $_tp$:
- $_Curve$ type:
- Total Time:
- $i_instantanus$:
- Phase:
- Serial No:
- Trip Type:

Comm Setting

The Comm Setting button use for setting communication port, In the setting box you can select COM1 or COM2. If Comport is not selected correct, PC will not connect to device, and "Communication Error" box will appear.



Fault No. 6

The Fault No. box allows selection of the fault. the last 6 fault save in device.

Relay type 5A 1A

Type of Relay.

Is 0.250

you can see Is form device front panel and set in this box, if this value wasn't select correct, the measurement of Current in screen is not correct,

CT Ratio 1

The value of primary CT (current transformer).

- **Plot Current Menu**

File Menu

File|Exit exits the program.

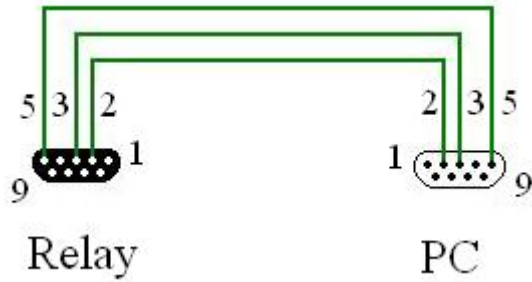
Help Menu

Help|Help opens the default browser and displays the HTML help file.

Help|About... displays the program version number and copyright.

- **Serial Cable**

The cable connecting the PC to the Relay should be less than 3 meters long. The drawing shows the pin outs and connections.



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Plot Current Troubleshooting

In general, the Plot Current Program is easy to use without difficulty. However, if there is a problem, the following may help.

Check the cable from the PC serial port to the Relay.

#1 Power Supply

Make sure that Relay is powered and green LED is on.

#2 PC Com Port

Make sure that PC Com port is working true.

#3 Com Setting

If you can not connect to target, with Com setting button change Com Port and try again.

If you suspect the Relay is defective:

- Double check the power supply.
- Test the Relay with a different cable.
- Install the software and test Relay on another computer.
- If you still have difficulty with the Plot Current, please [contact us](#).

