همیان فن
HAMIANFAN

Numerical Overcurrent Recloser Protection HF1034

TECHNICAL GUIDE AND USER MANUAL

Contents

INTRODUCTION

INTRODUCTION

The overcurrent relay type **HF1034** is a numerical relay have been designed to control, protect and monitor industrial installations, public distribution networks and substations, and to be used as back-up protection for EHV and HV transmission networks.

HOW TO USE THIS MANUAL

This manual provides a description of **HF1034** functions and settings. The goal of this manual is to allow the user to become familiar with the application, installation, setting and commissioning of these relays.

This manual has the following format:

Introduction

Contents of the manual and general introduction to the relay

Handling and case dimensions

Pre cautions to be taken when handling electronic equipment.

User Guide of the relay as

A detailed description of the features

Menu content table

Technical data and curve characteristics

Comprehensive details on nominal values, setting ranges, specifications and curves characteristics

Connection diagram for HF1034 relay

INTRODUTION TO THE HF1034 RELAY

The HF1034 relay provide comprehensive overcurrent phase and earth fault protection for utilities networks, industrial plants and networks as well as for other applications where overcurrent protection is required. The earth fault protection is sensitive enough to be applied in electrical networks where the earth fault current is low.

In addition to its protective functions, each relay offers control and recording features. They can be fully integrated to a control system so protection, control, data acquisition and recording of faults, events and disturbances can be made available.

The relay is equipped on the front panel with a liquid crystal display (LCD) with 2 x 16 back-lit alphanumerical characters, a tactile 7 button keypad (to access all settings, clear alarms and read measurements) and 10 LEDs that indicate the status of the relay.

In addition, the use of the RS485 communication port makes it possible to read, reinitialize and change the settings of the relay, if required, from a local or remote PC computer loaded with software.

Its flexibility of use, reduced maintenance requirements and ease of integration allow the Relay to provide an adaptable solution for the problems of the protection electric networks.

MAIN FUNCTIONS

The following table shows the functions available for HF1034 relay.

Functions	ANSI Code	HF1034
Three-phase overcurrent	50/51	yes
Earth fault overcurrent	50N/51N	yes
Cold load pickup		yes
Instantaneous/start contact		yes
Latching output contacts	86	yes
Setting groups		2
Blocking logic		yes
Measurements		yes
Disturbance recording		Yes/5
Fault Record		Yes/25
Event Record		Yes/250
RS 232 front communication		yes
RS 485 rear communication (Modbus RTU)		yes
Digital inputs		Yes/2
Output relays		Yes/6
Time synchronization	Via communication port	

HANDLING, INSTALLATION and CASE DIMENSION

GENERAL CONSIDERATIONS

RECEIPT OF RELAYS

Protective relay, although generally of robust construction, require careful treatment prior to installation on site. Upon receipt, relay should be examined immediately to ensure no damage has been sustained in transit. If damage has been sustained during transit a claim should be made to the transport contractor and HAMIANFAN should be promptly notified.

ELECTROSTATIC DISCHARGE (ESD)

The relay use components that is sensitive to electrostatic discharges.

The electronic circuits are well protected by the metal case and the internal module should not be withdrawn unnecessarily. When handling the module outside its case, care should be taken to avoid contact with components and electrical connections. If removed from the case for storage, the module should be placed in an electrically conducting antistatic bag.

There are no setting adjustments within the module and it is advised that it is not unnecessarily disassembled. Although the printed circuit boards are plugged together, the connectors are a manufacturing aid and not intended for frequent dismantling; in fact, considerable effort may be required to separate them. Touching the printed circuit board should be avoided, since complementary metal oxide semiconductors (CMOS) are used, which can be damaged by static electricity discharged from the body.

HANDLING OF ELECTRONIC EQUIPMENT

A person's normal movements can easily generate electrostatic potentials of several thousand volts. Discharge of these voltages into semiconductor devices when handling electronic circuits can cause serious damage, which often may not be immediately apparent but the reliability of the circuit will have been reduced.

The electronic circuits are completely safe from electrostatic discharge when housed in the case. Do not expose them to risk of damage by withdrawing modules unnecessarily. Each module incorporates the highest practicable protection for its semiconductor devices. However, if it becomes necessary to withdraw a module, the following precautions should be taken to preserve the high reliability and long life for which the equipment has been designed and manufactured.

1. Before removing a module, ensure that you are at the same electrostatic potential as the equipment by touching the case.

2. Handle the module by its front plate, frame or edges of the printed circuit board. Avoid touching the electronic components, printed circuit track or connectors.

3. Do not pass the module to another person without first ensuring you are both at the same electrostatic potential. Shaking hands achieves equal potential.

4. Place the module on an antistatic surface, or on a conducting surface which is at the same potential as yourself.

5. Store or transport the module in a conductive bag. If you are making measurements on the internal electronic circuitry of an equipment in service, it is preferable that you are earthed to the case with a conductive wrist strap.

Wrist straps should have a resistance to ground between 500kΩ – 10MΩ. If a wrist strap is not available, you should maintain regular contact with the case to prevent a build-up of static. Instrumentation which may be used for making measurements should be earthed to the case whenever possible.

More information on safe working procedures for all electronic equipment can be found in BS5783 and IEC147. It is strongly recommended that detailed investigations on electronic circuitry or modification work should be carried out in a special handling area such as described in the above-mentioned BS and

IEC documents.

RELAY MOUNTING

The relay is flush-mounted.

The Relay is dispatched either individually or as part of a panel assembly.

Modules should remain protected by their metal case during assembly into a panel.

There are a number of screws In the relay packing including 4 m3*10 screws, 4 m4*10 screws and 36 m4*8.

M4*8 and M4*10 screws must be used for case connection to panel.

m3*10 screws must be used for relay connection to panel.

Note: the relay must be fix to panel by M3*10 screws.

UNPACKING

Care must be taken when unpacking and installing the relay so that none of the parts is damaged or the settings altered. The relay must only be handled by skilled personnel. The installation should be clean, dry and reasonably free from dust and excessive vibration. The site should be well lit to facilitate inspection. The relay that have been removed from the case should not be left in a situation where that is exposed to dust or damp. This particularly applies to installation which is being carried out at the same time as construction work

STORAGE

If relay is not to be installed immediately upon receipt they should be stored in a place free from dust and moisture in their original cartons. Where de-humidifier bags have been included in the packing they should be retained. The action of the de-humidifier crystals will be impaired if the bag has been exposed

to ambient conditions and may be restored by gently heating the bag for about an hour, prior to replacing it in the carton. Dust which collects on a carton may, on subsequent unpacking, find its way into the relay; in damp conditions the carton and packing may become impregnated with moisture and the de-humidifier will lose its efficiency. Storage temperature: –25°C to +70°C.

DIMENSIONS

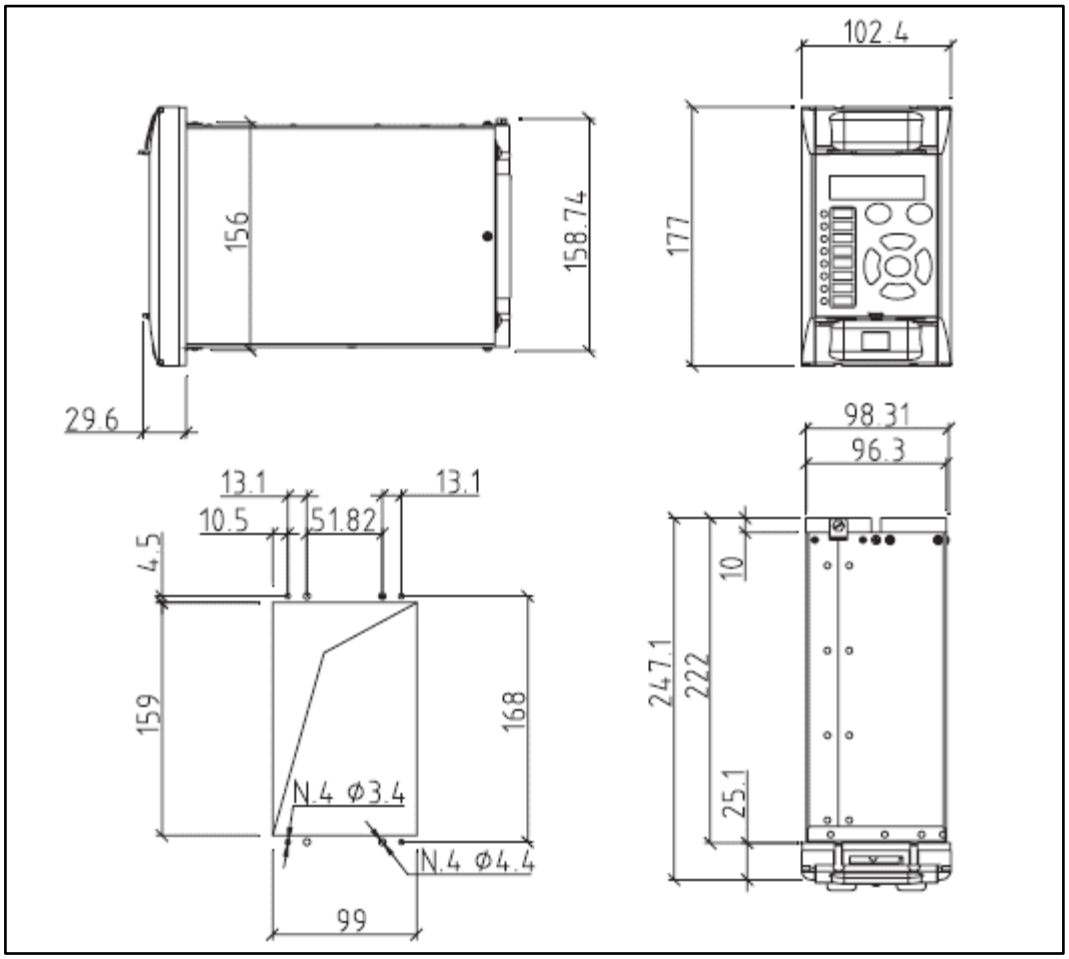
CASE DIMENSION

The relay is available in a 4U metal case for panel or flush mounting.

Weight: 1.7 to 2.1 Kg

External size:

	Height	Width	Depth
Case	152mm	97mm	226mm
Front panel	177mm	103mm	252mm



Note: The chassis is normally secured in the case by four screws (Self tap screws (6x1,4), to ensure good seating. The fixing screws should be fitted in normal service (do not add washers). Do not discard these screws.

COMMUNICATION

RS232 PORT

In the bottom of the front panel, there is a RS232 port, The communication with a computer through the RS232 allows access to the relay all information and setting. It makes the access and changes of any information, setting and configuration.

You can see all events and records by this port on monitor of computer we will explain it by details in the next sections.

RS485 PORT

Connections to RS485 is made using annular terminals. It is recommended that a two core screened cable, is used with a maximum total length of 1000 m or a200nF total cable capacitance.

Typical specification:

- Each core: 16/0.2 mm copper conductor, PVC insulated.
- Nominal conductor area: 0.5 mm² per core
- Screen: Overall braid, PVC sheathed
- Linear capacitance between conductor and earth: 100pF/m

EARTHING

Each equipment must be connected to a local earth terminal by the intermediary of a M4 earth terminals. We recommend a wire of minimal section of 2,5 mm², with annular terminals on the side of the equipment. Because of the limitations of the annular terminals, the possible maximum section is of 6mm² by wire. If a larger section is necessary, one can use cables connected in parallel, each one ending with an annular terminal separated on the side of the equipment. One can also use a metal bar.

NOTE: To prevent any electrolytic risk between copper conductor or brass conductor and the back plate of the equipment, it is necessary to take precautions to isolate them one from the other. This can be done in several ways, for example by inserting between the conductor and the case a plated nickel or insulated ring washer or by using a tin terminal.

User Guide

PRESENTATION OF HF1034 RELAY

This relay is fully numerical relays designed to perform electrical protection and control functions.

HF1034 relay is powered either from a DC or an AC auxiliary power supply.

Using the front panel, the user can easily navigate through the menu and access data, change settings, read measurements, etc.

Ten LEDs situated in the front panel help the user to quickly know the status of the relay and the presence of alarms. Alarms that have been detected are stored and can be displayed on the back-lit LCD.

Any short time voltage interruption (<50ms) is filtered and regulated through the auxiliary power supply.

HF1034 relay have 2 current inputs available for 2 rated CTs (1A and 5 A). HF1024 relay continuously measure three phase and earth current. Output relays are freely configurable and can be activated by any of the control or protection functions available in the relay. Logic inputs can also be assigned to various control functions.

On their rear terminals HF1034 have a standard RS485 port available for communication protocol MODBUS RTU.

Using RS485 communication channel, all stored information (measurements, alarms, and parameters) can be read and settings can be modified when the protocol allows it.

HF1034 relay can be connected directly to a digital control system. All the available data can then be gathered by a substation control system and be processed either locally or remotely.

USER INTERFACE

HF1034 relay from panel allows the user to easily enter relay settings, display measured values and alarm and to clearly display the status of the relay.

Figure 1: Front panel

The front panel of the relay has three separate sections:

1. The LCD display and the keypad
2. The LEDs
3. The two zones under the upper and lower flaps

LCD DISPLAY AND KEYPAD DESCRIPTION

In the front panel, a liquid crystal display (LCD) displays settings, measured values and alarms. Data is accessed through a menu structure.

The LCD has two lines, with sixteen characters each. A back-light is activated when a key is pressed and will remain lit for five minutes after the last key press. This allows the user to be able to read the display in most lighting conditions.

KEYPAD

The keypad has seven keys divided into two groups:

- Two keys located just under the screen (keys © and ®).

Keys © and ® are used to read and acknowledge alarms. To display successive alarms, press key ® . Alarms are displayed in reverse order of their detection (the most recent alarm first, the oldest alarm last). To acknowledge the alarms, the user can either acknowledge each alarm using ? or go to the end of the ALARM menu and acknowledge all the alarms at the same time.

- Four main arrow keys located in the middle of the front panel.

They are used to navigate through the different menus and submenus and to do the setting of the relay.

The enter key is used to validate a choice or a value (modification of settings).

LEDs

The top four LEDs indicate the status of the relay (Trip condition, alarm LED, equipment failure, Power).

The four lower LEDs are freely programmable by the user and can be assigned to display a threshold crossing for example (available for all models) or to show the status of the logic inputs .The description of each one of these eight LEDs located in the left side of the front view is given hereafter (numbered from the top to bottom from 1 to 8).

LED1 COLOR: RED LABEL: TRIP

LED 1 indicates that the relay has issued a trip order to the cut-off element (circuit breaker, contactor). This LED recopies the trip order issued to the Trip logic output. As soon as a triggering order is issued, the LED lights up. It is cleared when the associated alarm is

acknowledged either through the front panel, or by a remote command, a digital input, or by a new fault (configuration/Alarms menu).

LED 2 COLOR: YELLOW LABEL: ALARM

LED 2 indicates that the relay has detected an alarm. This alarm can either be a threshold crossing (instantaneous), or a trip order (time delayed). As soon as an alarm is detected, the LED starts blinking. After all the alarms have been read, the LED lights up continuously. After acknowledgement of all the alarms, the LED is extinguished.

The alarm LED can be reset by the front panel.

LED POWER: this LED indicates that power is alive on.

LED 4 to 8 COLOR: RED

These LEDs are user programmable and can be set to display information about instantaneous and time-delayed thresholds as well as the status of the logic inputs. Under the CONFIGURATION/LED menu of the relay, the user can select the information he wishes to associate with each LED. He can affect more than one function to one LED. The LED will then light up when at least one of the associated information is valid (OR gate). The LED is cleared when all the associated alarms are acknowledged.

.

LED G1: this LED indicates that group1 adjustment is active.
LED G2: this LED indicates that group2 adjustment is active.

DESCRIPTION OF THE TWO AREAS UNDER THE TOP AND BOTTOM FLAPS

Under the upper flap, a label identifies the relay according to its model number (order number) and its serial number. This information defines the product in a way that is unique. In all your requests, please refer to these two numbers.

Under the model and serial number, you will find information about the level of voltage of the auxiliary supply and the nominal earth current value.

There is RS232 port available under the lower flap in the relay. This RS232 port can be used to plug a laptop loaded with setting software.

To withdraw more easily the active part of the relay (i-e the chassis) from its case, open the two flaps, then with a 3mm screwdriver, turn the extractor located under the upper flap, and pulls it out of its case pulling the flaps towards you.

PASSWORD

An unlock key (up down) is required, when you want to press any key. After 5 minutes that you don't press any key, you must unlock the keys for navigation through menus.

A password is required for relay settings, especially when changing the various thresholds, time delays, and communication parameters, allocation of inputs and outputs relays.

The password consists of four capital characters. When leaving factory, the password is set to AAAA. The user can define his own combination of four characters. If the password be lost or forgotten, the modification of the stored parameters is blocked. It is then necessary to contact the manufacturer or his representative and a standby password specific to the relay may be obtained.

PASSWORD ENTRY

The input of the password is requested as soon as a modification of a parameter is made for any one of the six/eight menus and the submenus. The user enters each one of the 4 characters and then validates the entire password with enter keypad. After 5 seconds, the display returns to the point of the preceding menu. If no key is pressed inside of 5 minutes, the password is deactivated. A new password request is associated with any subsequent parameter modification.

CHANGING THE PASSWORD

To change an active password, go to the OP. PARAMETERS menu and then to the Password submenu. Enter the current password and validate it. Then press enter keypad and enter the new password character by character and validate the new password using enter keypad.

The message NEW PASSWORD OK is displayed to indicate that the new password has been accepted.

CHANGE OF SETTING INVALIDATION

The procedure to modify a setting is described in the following sections of this manual. If there is a need to get back to the old setting push key © before validating the setting change. The following message will then appear on the LCD for a few seconds and the old setting will remain unchanged.

DISPLAYS OF ALARM

Alarm messages are displayed directly on the front panel LCD. They have priority over the default display presenting measured current values. As soon as the relay detects an alarm

condition (crossing of a threshold for example), the associated message is displayed on the front panel LCD and the LED Alarm (LED 2) lights up.

Alarm messages generated by the electrical power network.

ELECTRICAL NETWORK ALARMS

Any crossing of a threshold (instantaneous or time delay) generates an "electrical network alarm". The involved threshold is indicated. Regarding the phase thresholds, the phase designation (A, B or C) is also displayed.

If several alarms are triggered, they are all stored in their order of appearance and presented on the LCD in reverse order of their detection (the most recent alarm first, the oldest alarm last). Each alarm message is numbered and the total number of alarm messages is displayed.

The user can read all the alarm messages pressing ®.

The user acknowledges and clears the alarm messages from the LCD pressing ©.

The user can acknowledge each alarm message one by one or all by going to the end of the list to acknowledge, and clear, all the alarm messages pressing ©.

The control of the ALARM LED (LED 2) is directly assigned to the status of the alarm If all the messages have been ACKNOWLEDGED, and cleared, if the cause that generated the alarm disappears, the ALARM LED (LED 2) is extinguished.

the different electrical system alarms are listed below:

I>	1st stage phase overcurrent threshold
I>>	2nd stage phase overcurrent threshold
I>>>	3rd stage phase overcurrent threshold
Ie>	1st stage earth fault threshold
Ie>>	2nd stage earth fault threshold
Ie>>>	3rd stage earth fault threshold
tI>	1st stage phase overcurrent time-out
tI>>	2nd stage phase overcurrent time-out
tI>>>	3rd stage phase overcurrent time-out
tI>	1st stage phase overcurrent time-out
tIe>	1st stage earth fault time-out
tIe>>	2nd stage earth fault time-out
tIe>>>	3rd stage earth fault time-out

WATCHDOG OPERATION

When watchdog operation is active that:

The protection functions are stopped.

The watchdog relay is de-energized (35-36 contact closed).

MENU

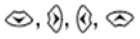
The menu of **HF1034** relay is divided into main menus and submenus. The available content depends on the model of the relay.

DEFAULT DISPLAY

By default, the LCD displays the current value measured. As soon as an alarm is detected by the relay, that information is considered as more important and the alarm message is then displayed instead of the default value.

The user can configure the information he wants to display by default going under the CONFIGURATION/Display menu.

ACCESS TO THE MENU

Navigation through the different menus is done pressing the arrow keys 

The organization of the menus is shown in figure as follows.

There is need of an unlock key when reading parameters and measured values.

Modification of a parameter requires entering a password.

Should an error be made in entering a parameter, press © to cancel.

NOTE: The letter P is displayed when the password needs to be entered. If no key is pushed during 5 minutes, the password needs to be entered again.

MENU CONTENTS DESCRIPTION

The menu of HF1034 relay is divided into 8 main sections

⇒ OP PARAMETERS
⇒ CONFIGURATION
⇒ MEASUREMENTS
⇒ COMMUNICATION
⇒ PROTECTION 1
⇒ PROTECTION 2
⇒ AUTOMATIC CTRL
⇒ RECORDS

To access these menus from the default display press .

To return to the default display from this menus or sub-menus press .

WIRING

AUXILIARY SUPPLY

The auxiliary supply for HAMIANFAN HF1034 relay can be either direct current with a voltage range of 48-150VDC or alternative current with a voltage range of 32-100VAC/50Hz. The voltage range is specified on the adhesive paper label under the top-hinged cover on the front of the relay.

The auxiliary power supply must be connected only to terminals 33 and 34.

CURRENT MEASUREMENT INPUTS

HAMIANFAN HF1034 relay have 3 phase and 1 earth current inputs available for 1 and 5 Amps rated CTs.
On each one of these relays, it is possible to combine 1 and 5 Amp current inputs together (i-e a mix between 1A for earth fault and 5A for phase connections) (refer to the wiring diagram).

NOTE: All phase inputs must have the same rating (1 or 5 Amps).

LOGIC INPUTS

There are 2 logic inputs in HF1034 relay.

On this relay the user can use different voltage levels (e.g. Vaux 48-150 VDC, Input 1,2=48-150VDC)

The automation functions that can be assigned to these logic inputs can be selected from the AUTOMAT. CTRL Menu.

OUTPUT RELAYS

The relay have 6 output relays.
The first logic output (RL0) is dedicated to indicate a relay fault (Watchdog, WD).
The normally closed (NC) contact of the Watchdog (RL0) cannot be configured. The second output relay is dedicated for tripping and this one cannot be configured too. The other contacts can be configured to be activated on activation of the different functions available in the relay.
A basic output matrix is included in the relay.
Some logic outputs have changeover contacts (RL2). The other relays (RL3, RL5) are normally open contacts.
The protection and control functions that can be assigned to these output relays (RL2, RL3, and RL5) can be selected from the AUTOMAT. CTRL Menu.

COMMUNICATION

RS485 REAR COMMUNICATION PORT

This relay have an RS485 rear communication port. The terminals 29-30-31-32 are dedicated to the RS485 communication port. See wiring diagrams in the end of this chapter.

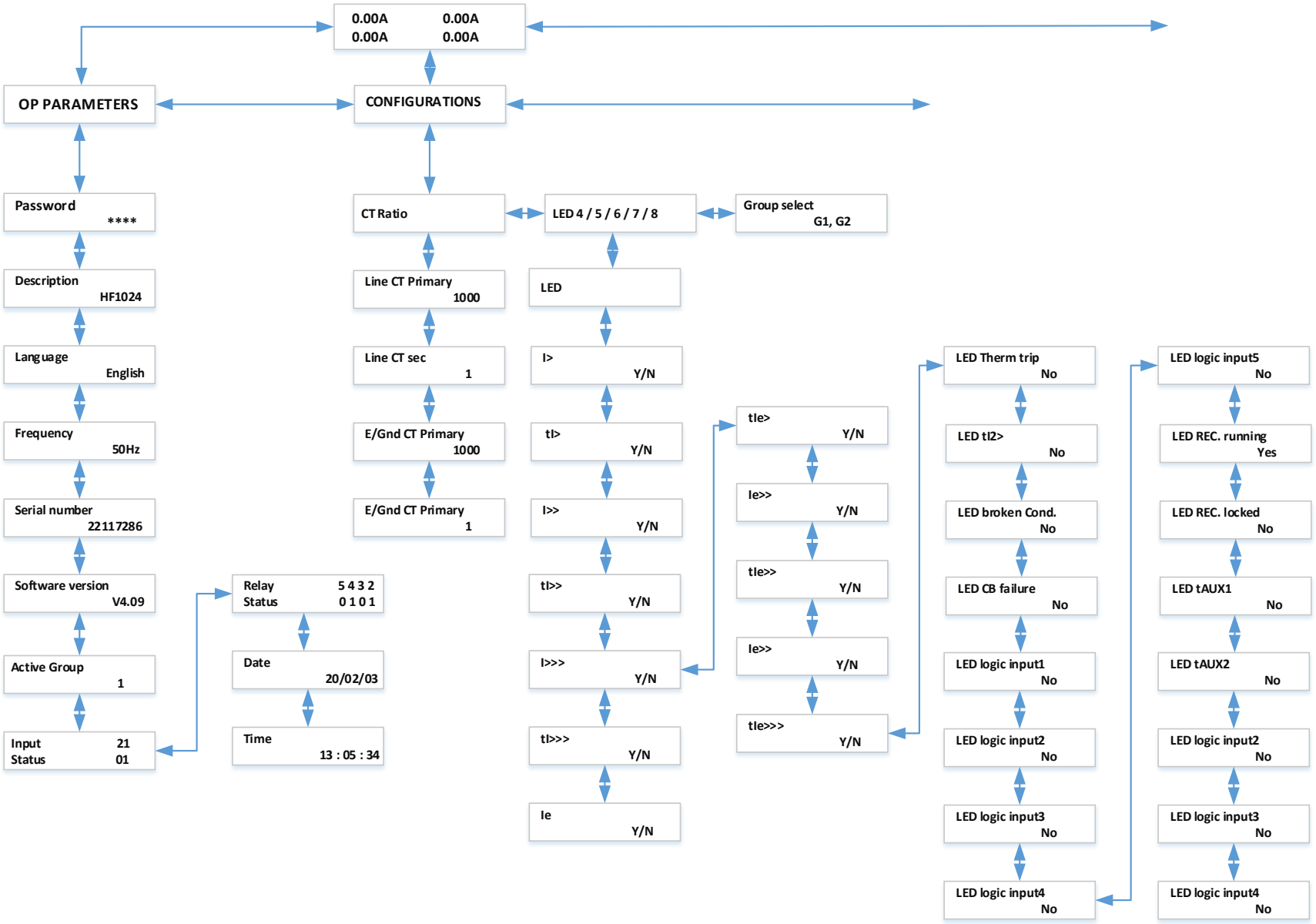
RS232 FRONT COMMUNICATION PORT

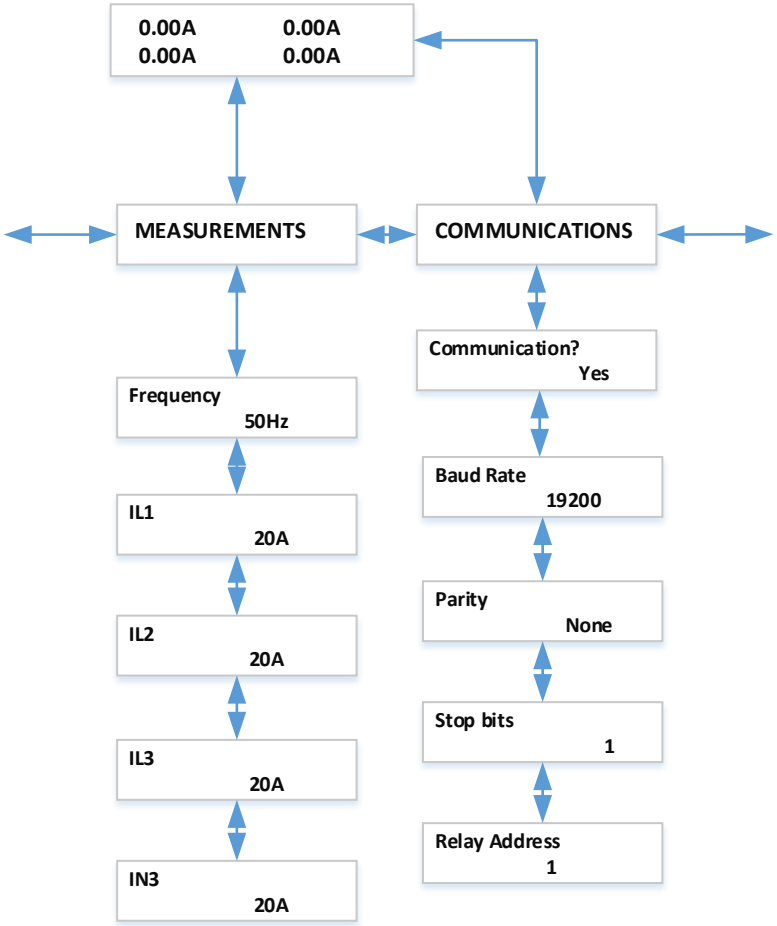
HF1034 relay provide a RS232 communication port. This port is dedicated to Setting software MiCOMS1.

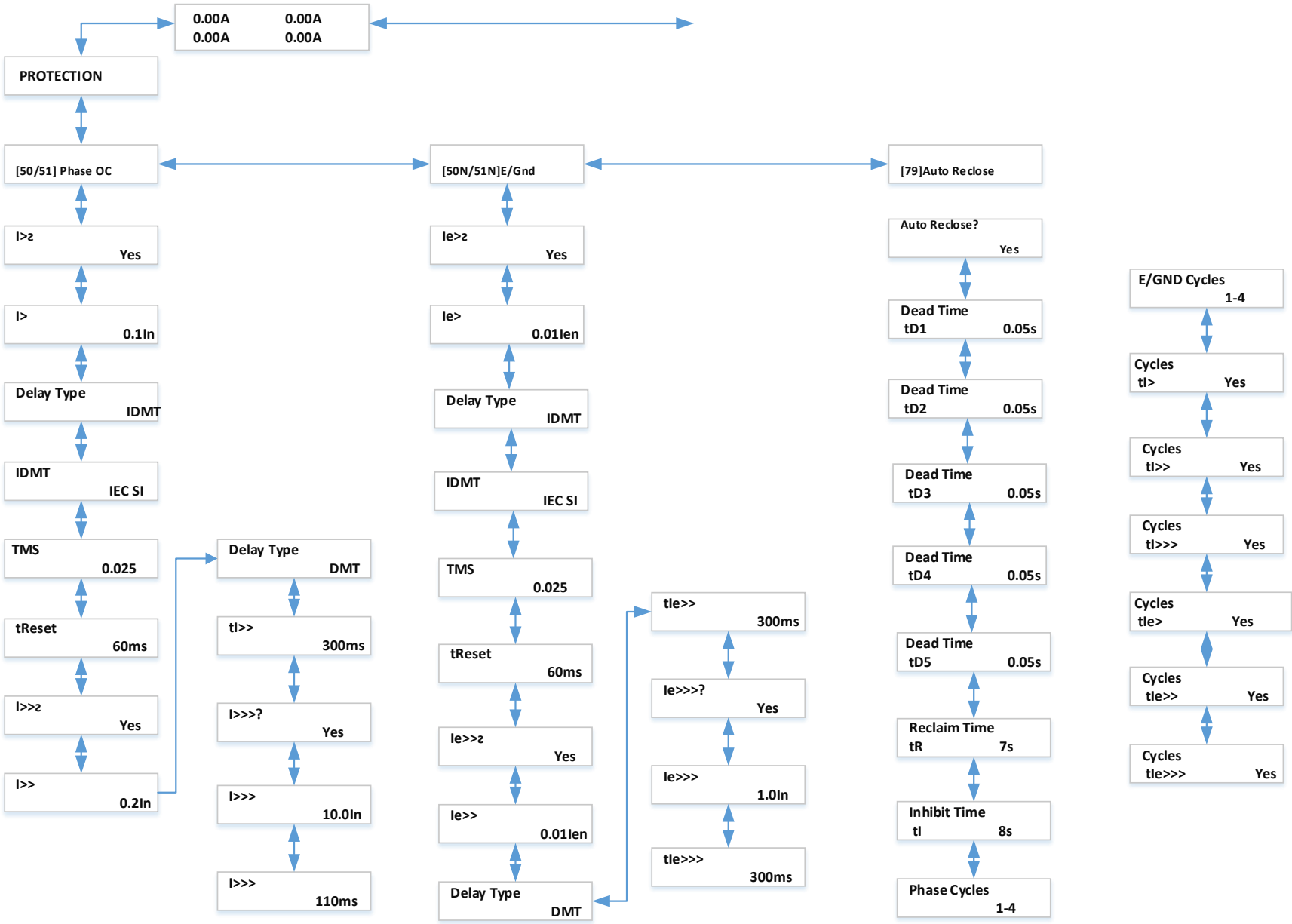
The cable between the relay and the PC is a standard RS 232 shielded-cable.

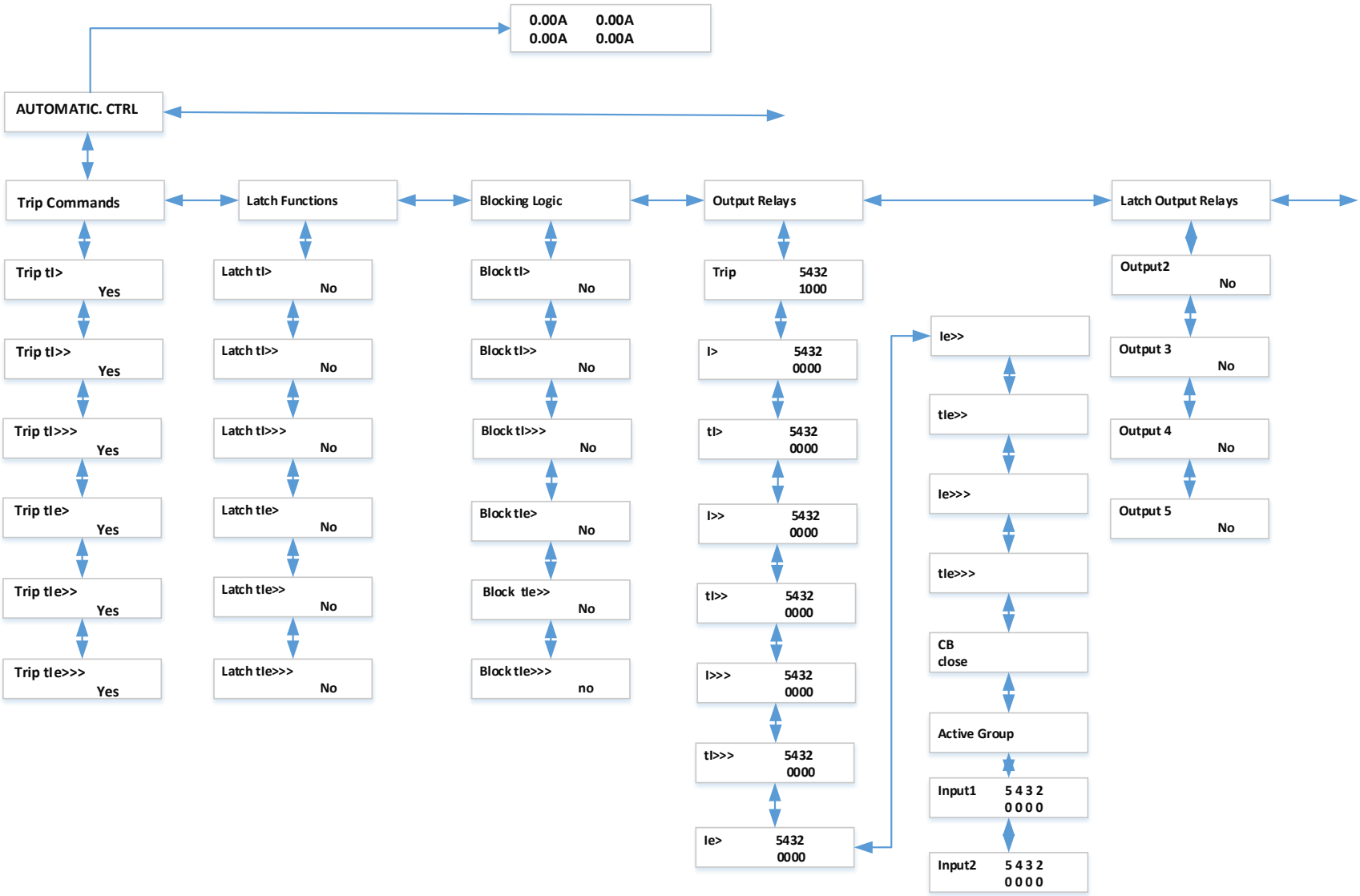
The relay requires a RS232 cable with a 9-pin male connector.

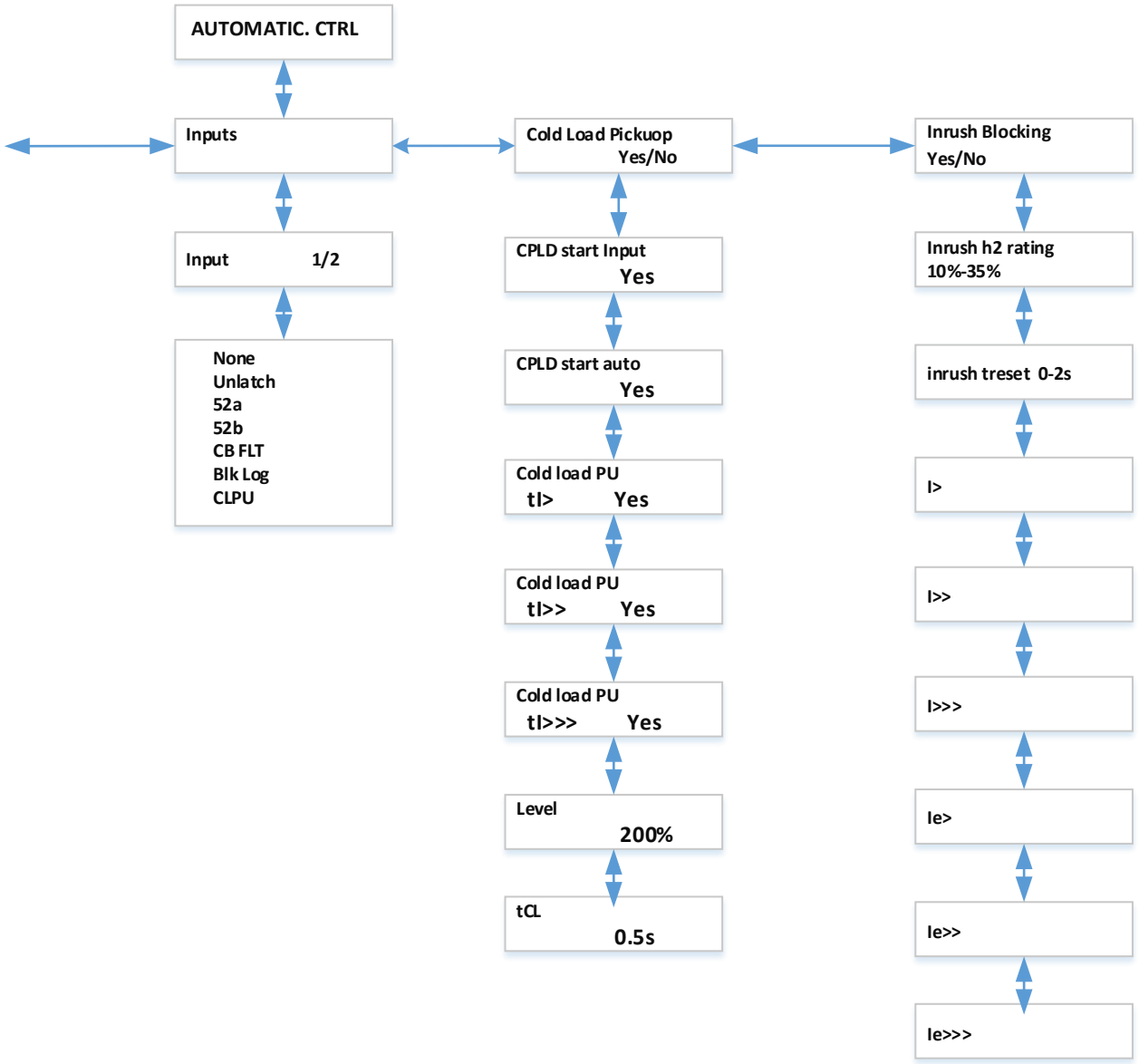
MENU CONTENT TABLES

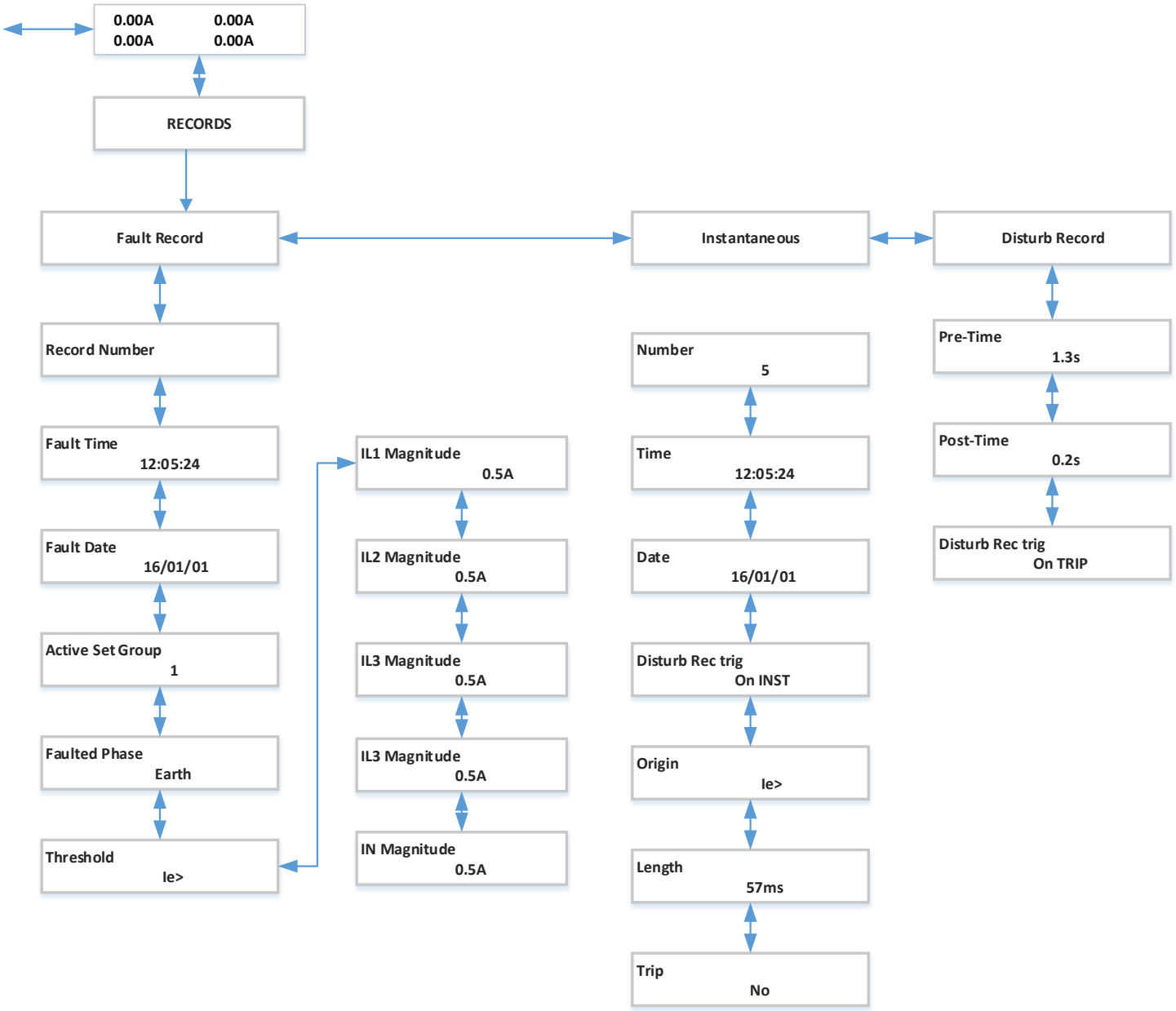

0.00A 0.00A
0.00A 0.00A
OP PARAMETERS
CONFIGURATIONS
Password ****
Description HF1024
Language English
Frequency 50Hz
Serial number 22117286
Software version V4.09
Active Group 1
Input 21
Status 01
Relay 5 4 3 2
Status 0 1 0 1
Date 20/02/03
Time 13 : 05 : 34
CT Ratio
Line CT Primary 1000
Line CT sec 1
E/Gnd CT Primary 1000
E/Gnd CT Primary 1
LED 4 / 5 / 6 / 7 / 8
Group select G1, G2
LED
I> Y/N
tI> Y/N
I>> Y/N
tI>> Y/N
I>>> Y/N
tI>>> Y/N
Ie Y/N
tIe> Y/N
Ie>> Y/N
tIe>> Y/N
Ie>> Y/N
tIe>>> Y/N
LED Therm trip No
LED tI2> No
LED broken Cond. No
LED CB failure No
LED logic input1 No
LED logic input2 No
LED logic input3 No
LED logic input4 No
LED logic input5 No
LED REC. running Yes
LED REC. locked No
LED tAUX1 No
LED tAUX2 No
LED logic input2 No
LED logic input3 No
LED logic input4 No


0.00A 0.00A
0.00A 0.00A
MEASUREMENTS
COMMUNICATIONS
Frequency
50Hz
IL1
20A
IL2
20A
IL3
20A
IN3
20A
Communication?
Yes
Baud Rate
19200
Parity
None
Stop bits
1
Relay Address
1


0.00A 0.00A
0.00A 0.00A
PROTECTION
[50/51] Phase OC
I>2 Yes
I> 0.1In
Delay Type IDMT
IDMT IEC SI
TMS 0.025
tReset 60ms
I>>2 Yes
I>> 0.2In
Delay Type DMT
tI>> 300ms
I>>>? Yes
I>>> 10.0In
I>>> 110ms
[50N/51N]E/Gnd
Ie>2 Yes
Ie> 0.01Ien
Delay Type IDMT
IDMT IEC SI
TMS 0.025
tReset 60ms
Ie>>2 Yes
Ie>> 0.01Ien
Delay Type DMT
tIe>> 300ms
Ie>>>? Yes
Ie>>> 1.0In
tIe>>> 300ms
[79]Auto Reclose
Auto Reclose? Yes
Dead Time tD1 0.05s
Dead Time tD2 0.05s
Dead Time tD3 0.05s
Dead Time tD4 0.05s
Dead Time tD5 0.05s
Reclaim Time tR 7s
Inhibit Time tI 8s
Phase Cycles 1-4
E/GND Cycles 1-4
Cycles tI> Yes
Cycles tI>> Yes
Cycles tI>>> Yes
Cycles tIe> Yes
Cycles tIe>> Yes
Cycles tIe>>> Yes


0.00A 0.00A
0.00A 0.00A
AUTOMATIC. CTRL
Trip Commands
Latch Functions
Blocking Logic
Output Relays
Latch Output Relays
Trip tI> Yes
Trip tI>> Yes
Trip tI>>> Yes
Trip tIe> Yes
Trip tIe>> Yes
Trip tIe>>> Yes
Latch tI> No
Latch tI>> No
Latch tI>>> No
Latch tIe> No
Latch tIe>> No
Latch tIe>>> No
Block tI> No
Block tI>> No
Block tI>>> No
Block tIe> No
Block tIe>> No
Block tIe>>> no
Trip 5432 1000
I> 5432 0000
tI> 5432 0000
I>> 5432 0000
tI>> 5432 0000
I>>> 5432 0000
tI>>> 5432 0000
Ie> 5432 0000
Ie>>
tIe>>
Ie>>>
tIe>>>
CB close
Active Group
Input1 5 4 3 2 0 0 0 0
Input2 5 4 3 2 0 0 0 0
Output2 No
Output 3 No
Output 4 No
Output 5 No


AUTOMATIC. CTRL
Inputs
Input 1/2
None
Unlatch
52a
52b
CB FLT
Blk Log
CLPU
Cold Load Pickuop
Yes/No
CPLD start Input
Yes
CPLD start auto
Yes
Cold load PU
tI> Yes
Cold load PU
tI>> Yes
Cold load PU
tI>>> Yes
Level
200%
tCL
0.5s
Inrush Blocking
Yes/No
Inrush h2 rating
10%-35%
inrush treset 0-2s
I>
I>>
I>>>
Ie>
Ie>>
Ie>>>


0.00A 0.00A
0.00A 0.00A
RECORDS
Fault Record
Instantaneous
Disturb Record
Record Number
Fault Time
12:05:24
Fault Date
16/01/01
Active Set Group
1
Faulted Phase
Earth
Threshold
Ie>
IL1 Magnitude
0.5A
IL2 Magnitude
0.5A
IL3 Magnitude
0.5A
IL3 Magnitude
0.5A
IN Magnitude
0.5A
Number
5
Time
12:05:24
Date
16/01/01
Disturb Rec trig
On INST
Origin
Ie>
Length
57ms
Trip
No
Pre-Time
1.3s
Post-Time
0.2s
Disturb Rec trig
On TRIP

Technical Data and Characteristic Curves

RATINGS

POWER SUPPLY

Nominal auxiliary voltage Vx	48-150VDC/32-100VAC
Residual ripple	Up to 12%
Burden	Normal mode: <3W DC or <5VA AC Max: 7.5W DC or 10VA AC

FREQUENCY

Nominal frequency	50/60Hz

CURRENT INPUTS

Phase current inputs	1 and 5A by connection
Earth current inputs	1 and 5A by connection
Burden Phase Current	< 0.08 VA (1A) < 0.42 VA (5A)
Burden Earth Current	< 0.08 VA (1A) < 0.42 VA (5A)
Thermal withstand	1s @ 100 x rated current 2s @ 40 x rated current continuous @ 4 x rated current

LOGIC INPUT

Number	2
Logic Input Type	optically insulated
Logic input burden	< 10mili Amps per input
Logic input recognition time	< 5ms
Supply	48-150VDC

OUTPUT RELAY CHARACTERISTIC

Number	6
Contact relay	Dry contact Ag Ni
Make current	Max. 30A and carrry for 3s
Carry capacity	5A continuous
Rated Voltage	250Vac
Breaking capacity AC	1500 VA resistive 1500 VA inductive (P.F. = 0.5) 220 Vac, 5A (cos φ = 0.6)
Breaking capacity DC	135 Vdc, 0.3A (L/R = 30 ms) 250 Vdc, 50W resistive or 25W inductive (L/R=40ms)
Operation time	<7ms
Durability in Loaded contact	10000 operation minimum
Unloaded contact	100000 operation minimum

INSULATION

Dielectric withstand	IEC 60255-1,6.4 IEC 60255-27,10.5.3.2	2kV
Impulse voltage	IEC 60255-1,6.4 IEC 60255-27,10.5.3.1	5kV: current input 1kV: ??
Insulation resistance	EC 60255-1,6.4 IEC 60255-27,10.5.3.3	≥ 100MΩ

EMC TESTS

High Frequency Disturbance (1MHz)	IEC60255-1, 6.15 IEC6100-4-18 IEC 60255-22-1	2.5kV common mode 1kV differential mode
Electrostatic Discharge (ESD)	IEC60255-1,6.15 EN6100-4-2 IEC60255-22-2	8kV contact discharge, Class 4 15kV air discharge, Class 4
Fast Transient	IEC60255-1, 6.15 IEC6100-4-4 IEC 60255-22-4	Open circuit test voltage: 2kV for functional earth port, Auxiliary power supply port, Input/ Output port, 1kV for Communication port
Surge	IEC60255-1, 6.15 IEC6100-4-5 IEC 60255-22-5	Open circuit test voltage: - Line to earth: 2kV for Auxiliary power supply port, Input/ Output port, and 1kV for communication port - Line to line: 1kV for Auxiliary power supply port, Input/ Output port

ENVIRONMENT

Temperature	IEC60255-27,10.5.1.1 IEC60255-27,10.5.1.2 IEC60255-27,10.5.1.3 IEC60255-27,10.5.1.3 IEC60255-1, 6.12.3.1 IEC60255-1, 6.12.3.2 IEC60255-1, 6.12.3.3 IEC60255-1, 6.12.3.4 IEC60068-2-1 IEC60068-2-2	Storage: -25°C to +75°C Operation: -5°C to +55°C
Humidity dam heat	IEC60255-27,10.5.1.5 IEC60255-1,6.12.3.6 IEC60068-2-78	10 days at 93%RH and 42°C
Enclosure protection	IEC60255-1,6.3 IEC60255-27, 10.5.2.3	IP42 (whole case)
Sinusoidal Vibrations	IEC60255-21-1 IEC60255-1,6.13.1	Response and endurance, class1 and class2
Shocks	IEC60255-21-1 IEC60255-1,6.13.1	Response and withstand Class 1 and class2
Shock withstand & Bump	IEC60255-21-2 IEC60255-1,6.13.2	Class2: 1000 pulses in each direction, 16ms, 20gn Class1: 1000 pulses in each direction, 16ms, 10gn
Seismic	IEC60255-21-2 IEC60255-1,6.13.3	1 sweep cycle in each axis(X, Y, Z) Class1, class2

DEVIATION OF PROTECTION ELEMENTS

Glossary

I: Phase current,

Is: I>, I>>, I>>>

Ies: Ie>, Ie>>, Ie>>>

DT: Definite time

IDMT: Inverse definite minimum time

Element	Range	Deviation	Trigger	Reset	Time Deviation
Phase over current elements I> & I>> & I>>>	0.1 to 40 In	± 2%	DT: Is ± 2% IDMT: 1.1 Is ± 2%	0.95 Is ±2% 1.05 Is ±2%	±2% +30…50ms ±5% +30…50ms
Earth fault overcurrent elements Ie> & Ie>> & Ie>>>	0.1 to 40 Ien	± 2%	DT: Is ± 2% IDMT: 1.1 Is ± 2%	0.95 Is ±2% 1.05 Is ±2%	±2% +30…50ms ±5% +30…50ms

DEVIATION OF MEASUREMENTS

Measurement	Range	Deviation
Phase current	0.1 to 40 In	Typical ±0.5% at In
Earth current	0.1 to 40 Ien	Typical ±0.5% at Ien

PROTECTION SETTING RANGES

[50/51] PHASE OVERCURRENT

Phase current: Fundamental only

Note: When I> or I>> is associated to an IDMT curve, the maximum setting recommended should be 2In.

Phase OC	**Setting Range**		
	Min	**Max**	**Step**
I>? Yes or No	0.1 In	25 In	0.01 In
Delay Type	DT or IDMT IEC: (SI, VI, EI, LTI, C08, C02) IEEE: (MI, VI, EI, RI, RECT)		
tI>	0.04 s	300 s	0.01 s
TMS	0.025	1.5	0.001
Reset Delay Type	DT or IDMT		
RTMS	0.025	1.5	0.01
tReset	0.04 s	100 s	0.01 s
K (RI)	0.1	10	0.1
I>>? Yes or No	0.05 In	40 In	0.1
Delay Type	DT or IDMT IEC: (SI, VI, EI, LTI, C08, C02) IEEE: (MI, VI, EI, RI, RECT)		
tI>>	0.04 s	300 s	0.01 s
TMS	0.025	1.5	0.001
Reset Delay Type	DT or IDMT		
RTMS	0.025	1.5	0.01
tReset	0.04 s	100 s	0.01 s
K (RI)	0.1	10	0.1
I>>>? Yes or No	0.5 In	40 In	0.1 In
tI>>>	0.04 s	150 s	0.01 s

[50N/51N] EARTH FAULT PROTECTION

Earth fault current: Fundamental only

Earth fault current ranges: See following table

Note: When Ie> or Ie>> are associated to an IDMT curve, the maximum setting recommended should be the maximum of the range divided by 20.

Earth OC	**Setting Range**		
	Min	**Max**	**Step**
I>? Yes or No	0.1 In	25 In	0.01 In
Delay Type	DT or IDMT (IEC_STI, IEC_SI, IEC_VI, IEC_EI, IEC_LTI, C02, C08, IEEE_MI, IIEEE_VI, IEEE_EI, RI).		
tIe>	0.04 s	300 s	0.01 s
TMS	0.025	1.5	0.025
Reset Delay Type	DT or IDMT		
RTMS	0.025	1.5	0.01
tReset	0.04 s	100 s	0.01 s
K (RI)	0.1	10	0.1
Ie>>? Yes or No	0. 5 In	40 In	0.1
Delay Type	DT or IDMT (IEC_STI, IEC_SI, IEC_VI, IEC_EI, IEC_LTI, C02, C08, IEEE_MI, IIEEE_VI, IEEE_EI, RI).		
tIe>>	0.04 s	150 s	0.01 s
TMS	0.025	1.5	0.001
Reset Delay Type	DT or IDMT		
RTMS	0.025	1.5	0.01
tReset	0.04 s	100 s	0.01 s
K (RI)	0.1	10	0.1
Ie>>>? Yes or No	0.5 In	40 In	0.1 In
tIe>>>	0.04 s	150 s	0.01 s

[79] AUTORECLOSE FUNCTION

Main shots: 4 independent shots.

External logic inputs: 2 inputs (external CB fail, phase start, earth start, blocking order).
Internal programmable trigger from phase and earth fault on all re-closing cycles.

External trigger from logic input.

Programmable dead times and reclaim time setting.

[79] Autoreclose	**Setting Range**		
	Min	**Max**	**Step**
Autoreclose? Yes or No			
Dead time			
tD1	0.5s	300s	0.01s
tD2	0.5s	300s	0.01s
tD3	0.5s	300s	0.01s
tD4	0.5s	600s	0.01s
Recalim time	1s	600S	0.01s
Inhibit time	1s	600s	0.01s
Phase cycle	0	4	1
Earth cycle	0	4	1
Cycle			
tI>	0 or 1 or 2 or 3 or 4		
tI>>	0 or 1 or 2 or 3 or 4		
tI>>>	0 or 1 or 2 or 3 or 4		
tIe>	0 or 1 or 2 or 3 or 4		
tIe>>	0 or 1 or 2 or 3 or 4		
tIe>>>	0 or 1 or 2 or 3 or 4		

AUTOMATION CONTROL FUNCTIONS

Trip commands	Assignation of the following thresholds to trip output relay: all models: tI>, tI>>, tI>>>, tIe>, tIe>>, tIe>>>
Latch function	Trip output relay programmable with one or many thresholds: all models: tI>, tI>>, tI>>>, tIe>, tIe>>, tIe>>>
Output relays	Alarm and trip threshold assignation to a logic output : 6 relays Note: RL1 only for output signal trip - output relays assignation (output 5, 4, 3, 2, 1): I>, tI>, I>>, tI>>, I>>>, tI>>>, Ie>, tIe>, Ie>>, tIe>>, Ie>>>, tIe>>>, CB Close, Active group, Input 1 and input 2.
Blocking logic	Possibility to block the following delayed thresholds: all models: tI>, tI>>, tI>>>, tIe>, tIe>>, tIe>>>,
Latch output relays	Possibility to latch output relays: output 2 to 5
Inputs	Single function or multiple automation functions assignable to 2 logic inputs: None, Unlatch, 52 a, 52 b, CB FLT,Blocking logic, CPLD
Cold load pickup	- Cold Load Pickuop Yes/No - CPLD start input: yes or no - CPLD start auto: yes or no - Cold Load PU: tI>, tI>>, tI>>>
- Level: min:20%, max: 800%, step: 1% - tCL: min: 0.1s, max: 3446.4s, step: 0. 1s
Inrush blocking	Possibility to set a second harmonic blocking threshold and to block each delayed overcurrent threshold. - Inrush harmonic2 rating: 10% to 35%; step: 1% - Inrush tReset: 0-2s; step: 0.01s - Inrush Blocking for I>, I>>, I>>>, Ie>, Ie>>, Ie>>>

RECORDING FUNCTION

EVENT RECORDS

Capacity	250 events
Time-Tag	1ms
Triggers	Any selected protection alarm and Threshold logic input change of state Setting changes

FAULT RECORDS

Capacity	25 events
Time-Tag	1ms
Triggers	Any selected protection alarm and Threshold
Data	Fault date Protection thresholds Setting Group AC inputs measurements Fault measurements

INSTANTANEOUS RECORDER

Capacity	5 starting information (instantaneous)
Time-Tag	1ms
Triggers	Any selected protection alarm and Threshold
Data	date, hour origin (any protection alarm) length (duration of the instantaneous trip yes or no

DISTURBANCE RECORDS

Triggers	Any selected protection alarm and threshold			
Data	date, hour origin (any protection alarm) length (duration of the instantaneous trip yes or no			
	Setting range			Default value
	Min	Max	Step	
Pre-Time	0.1	3	0.1	0.1
Post-Time	0.1	3	0.1	0.1
Disturb rec Trig	On tri[p			On trip or on INST
Trigger	Any selected protection alarm and threshold Logic input Remote command			

COMMUNICATION

Port type	**Relay Position**	**Physical Link**	**Connectors**	**Data Rate**	**Protocol**
RS485	Rear Port	Screened twister pair	Screws or Snap-On	19200	Modbus RTU
RS232	Front Port	Screened twister pair	Sub–D 9 pin female connector	19200	Modbus RTU

CURVES

Although the curves tend towards infinite when the current approaches Is (general threshold), the minimum guaranteed value of the operating current for all the curves with the inverse time characteristic is 1.1Is (with a tolerance of ± 0.05Is).

INVERSE TIME CURVES

The first stage thresholds for phase (earth) overcurrent can be selected with an Inverse Definite Minimum Time (IDMT) characteristic. The time delay is calculated with mathematical formula in all, there are eleven IDMT characteristics available. The mathematical formula applicable to the first ten curves is:

$$t = T \times \left(\frac{K}{\left(I / I_s \right)^{\alpha} - 1} + L \right)$$

t: Operation Time
K: Factor (see table)
I: Value of measured current
I_s: Value of the programmed threshold (pick-up value)
α: Factor (see table)
T: Time multiplier setting from 0.025 to 1.5
L: ANSI/IEEE constant (zero for IEC and RECT curves)

Type of curve	Standard	K factor	α factor	L factor
Short Time Inverse	AREVA	0.05	0.04	0
Standard inverse	IEC	0.14	0.02	0
Very Inverse	IEC	13.5	1	0
Extremely Inverse	IEC	80	2	0
Long Time Inverse	AREVA	120	1	0
Short Time Inverse	C02	0.02394	0.02	0.01694
Moderately Inverse	ANSI/IEEE	0.0515	0.02	0.114
Long Time Inverse	C08	5.95	2	0.18
Very Inverse	ANSI/IEEE	19.61	2	0.491
Extremely Inverse	ANSI/IEEE	28.2	2	0.1217
Rectifier protection	RECT	45900	5.6	0

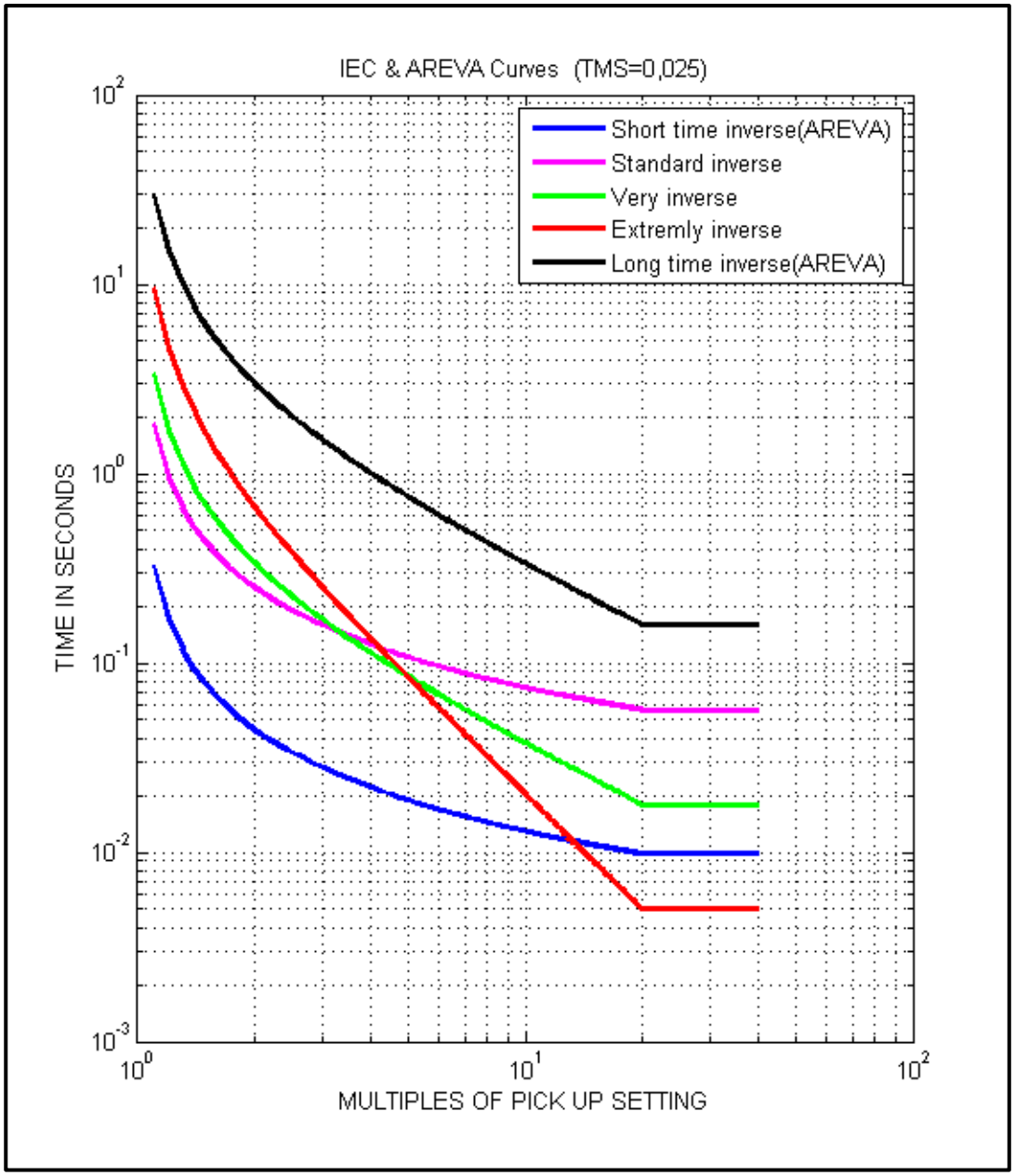
The RI curve has the following definition:

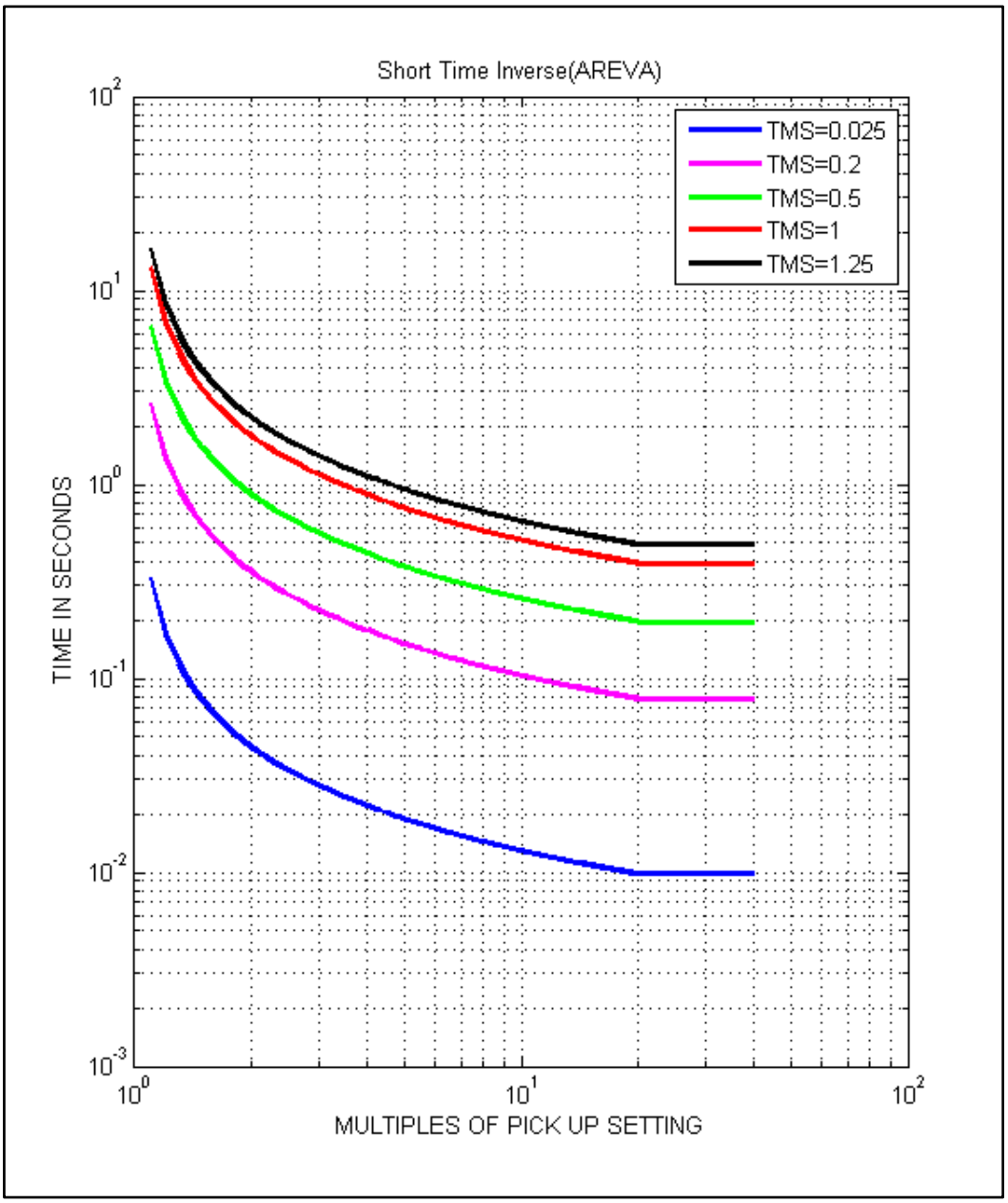
$$t = K \times \frac{1}{0.339 - \frac{0.236}{I/I_s}}$$

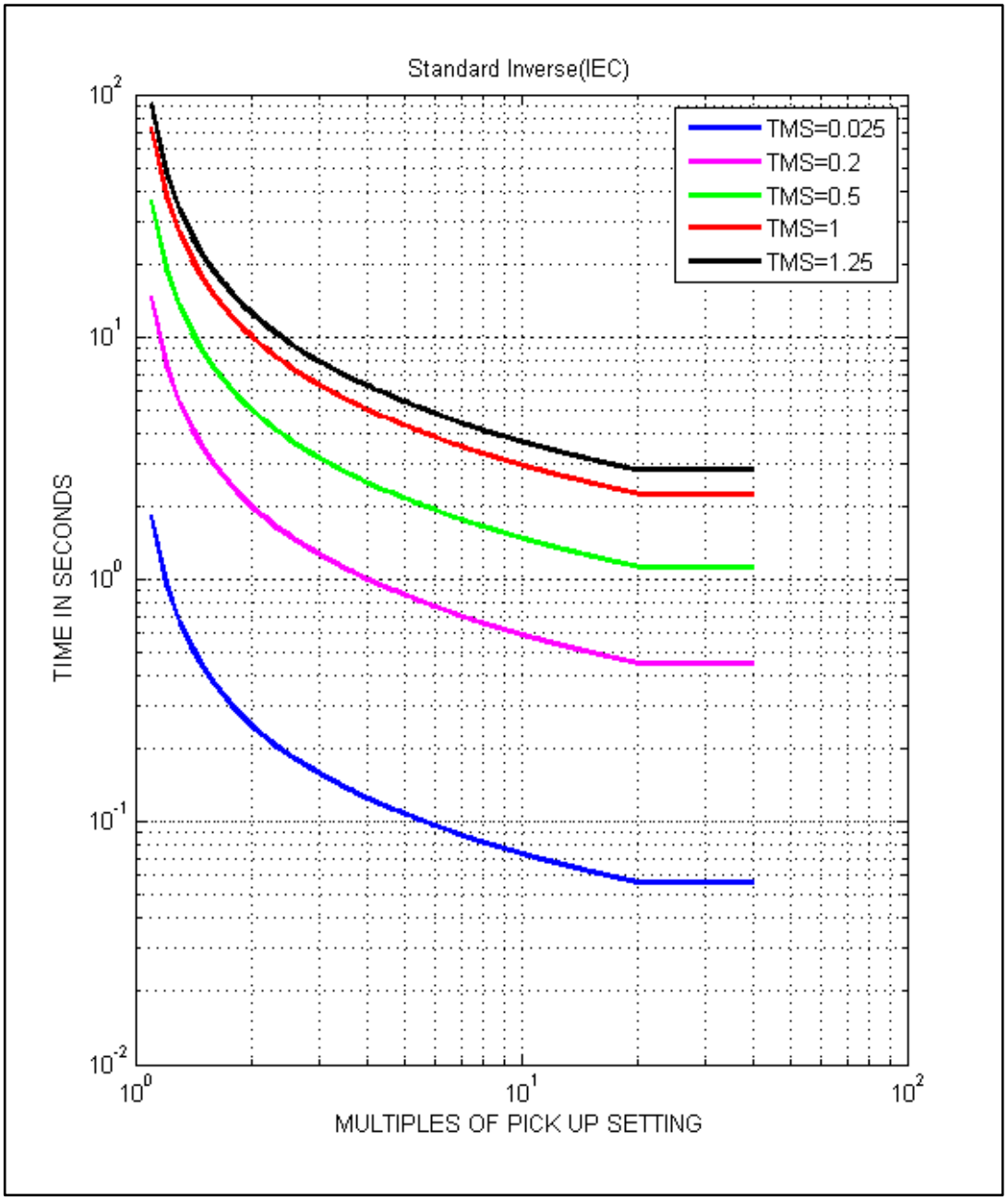
K setting is from 0.10 to 10 in steps of 0.05.
The equation is valid for 1.1 ≤ I/Is ≤ 20.

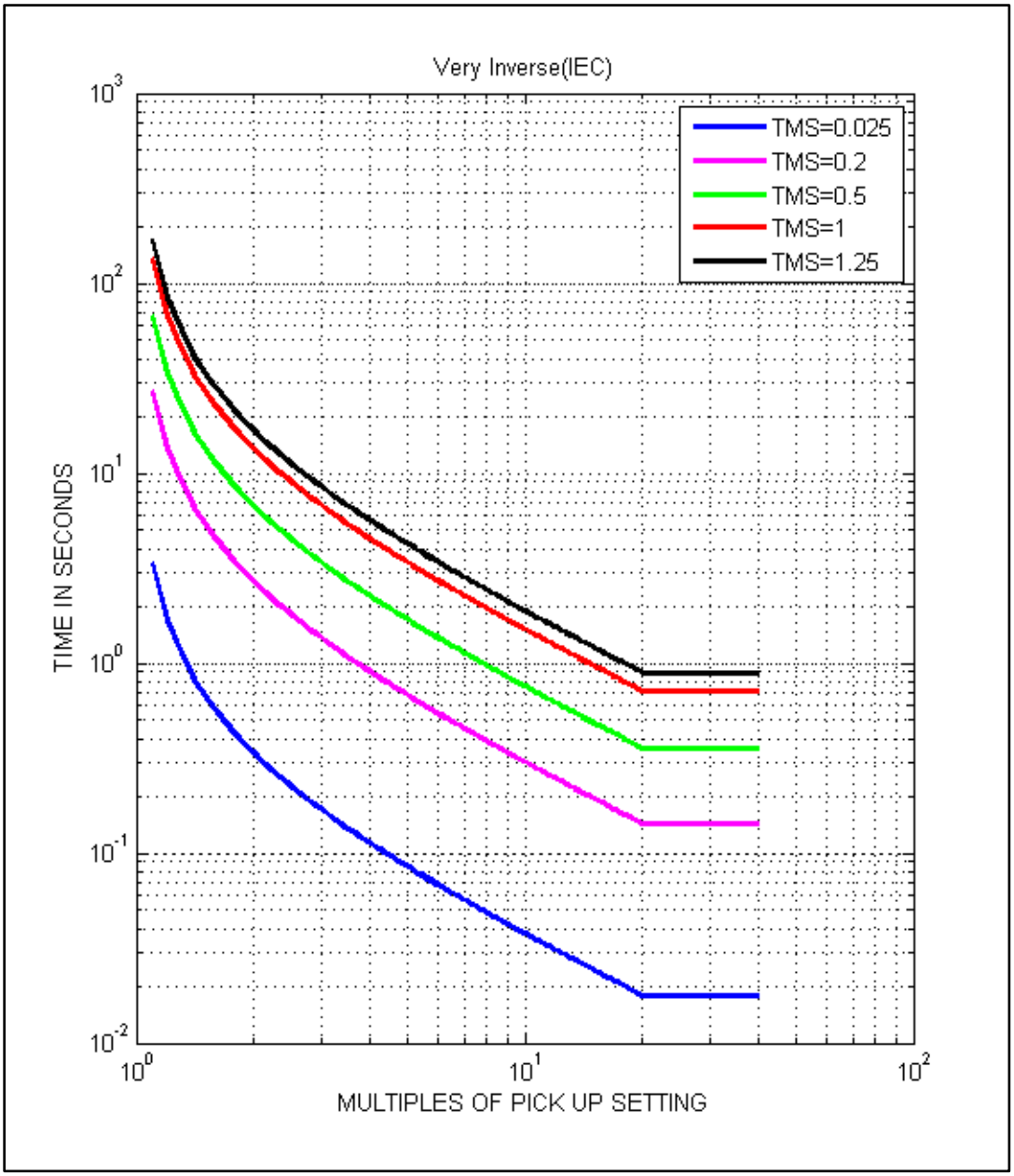
The following curves are given for indication only.

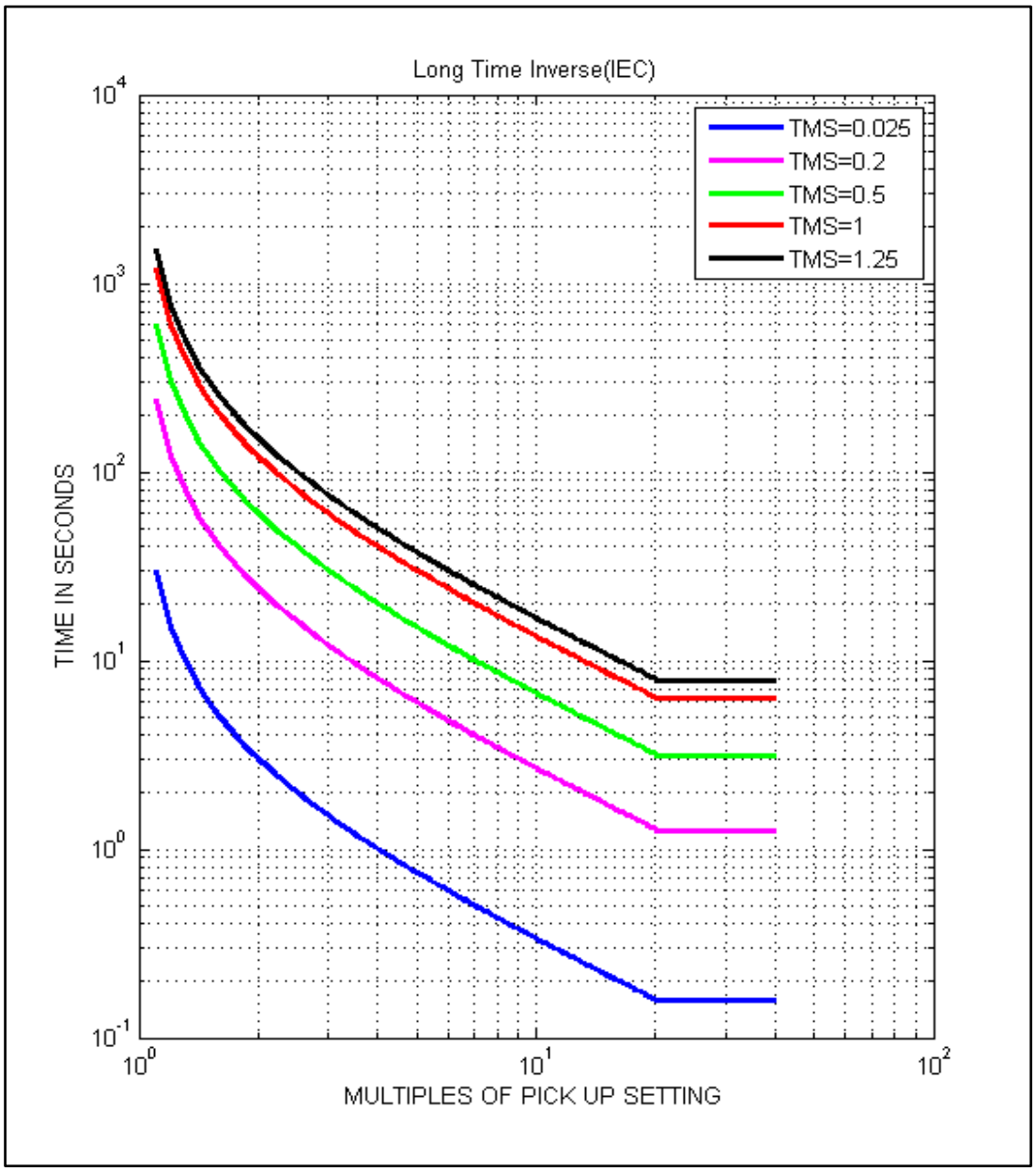
IEC CURVES

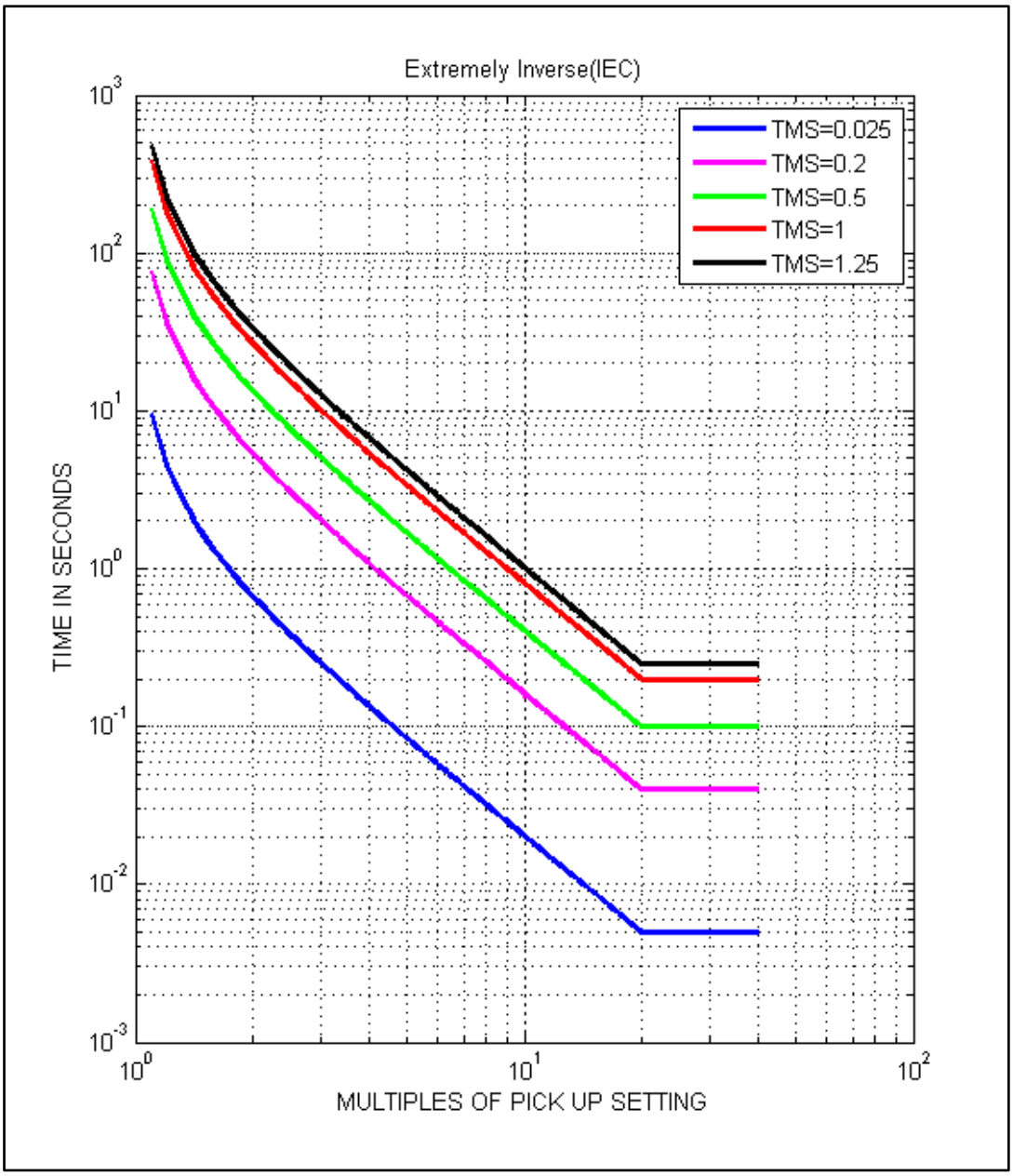

IEC & AREVA Curves (TMS=0,025)
Short time inverse(AREVA)
Standard inverse
Very inverse
Extremly inverse
Long time inverse(AREVA)
TIME IN SECONDS
MULTIPLES OF PICK UP SETTING
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^0
10^1
10^2

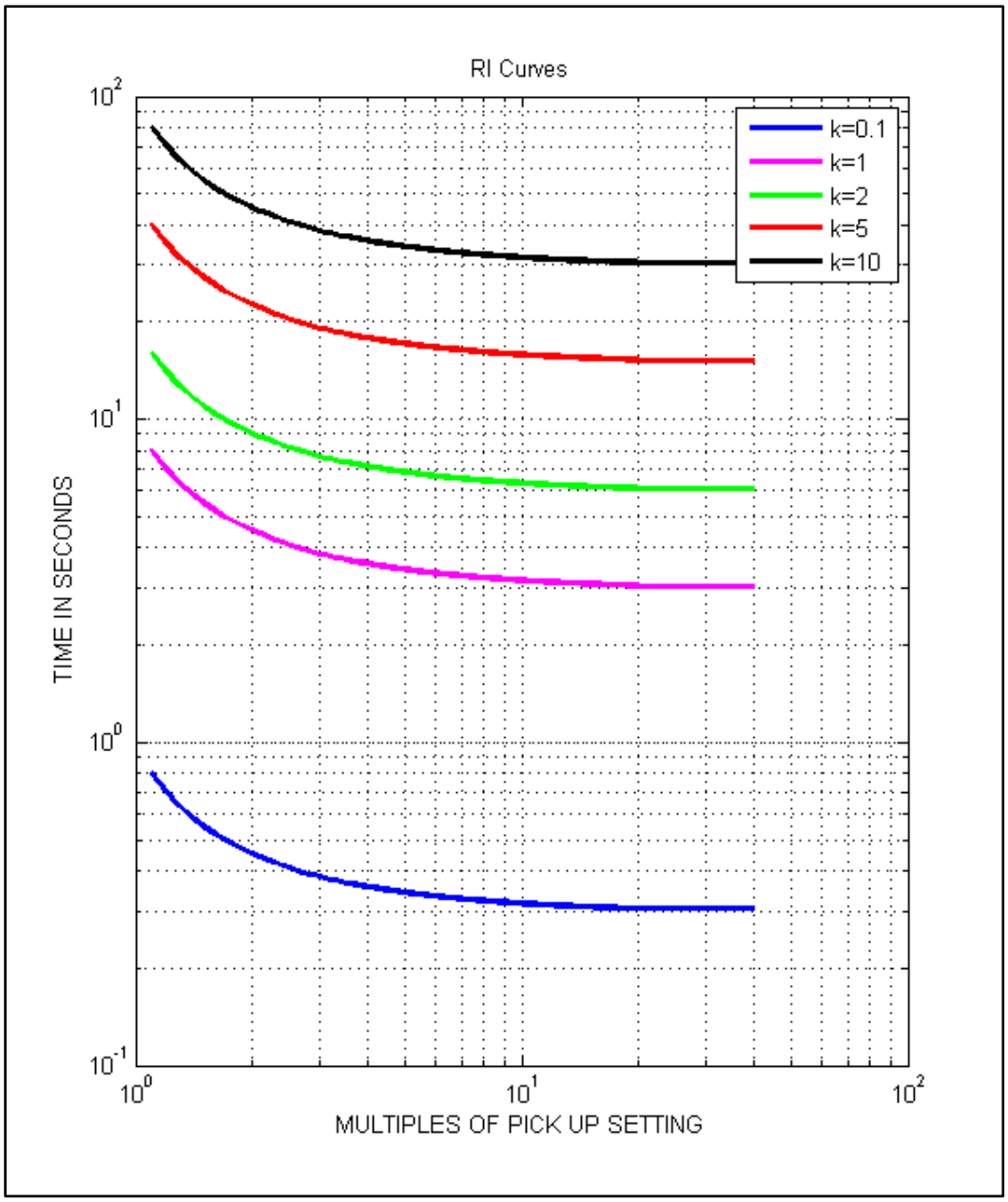

Short Time Inverse(AREVA)
TMS=0.025
TMS=0.2
TMS=0.5
TMS=1
TMS=1.25
TIME IN SECONDS
MULTIPLES OF PICK UP SETTING
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^0
10^1
10^2


Standard Inverse(IEC)
TMS=0.025
TMS=0.2
TMS=0.5
TMS=1
TMS=1.25
TIME IN SECONDS
MULTIPLES OF PICK UP SETTING
10^2
10^1
10^0
10^-1
10^-2
10^0
10^1
10^2


Very Inverse(IEC)
TMS=0.025
TMS=0.2
TMS=0.5
TMS=1
TMS=1.25
TIME IN SECONDS
MULTIPLES OF PICK UP SETTING
10^3
10^2
10^1
10^0
10^-1
10^-2
10^0
10^1
10^2


Long Time Inverse(IEC)
TMS=0.025
TMS=0.2
TMS=0.5
TMS=1
TMS=1.25
TIME IN SECONDS
MULTIPLES OF PICK UP SETTING
10^4
10^3
10^2
10^1
10^0
10^-1
10^0
10^1
10^2


Extremely Inverse(IEC)
TMS=0.025
TMS=0.2
TMS=0.5
TMS=1
TMS=1.25
TIME IN SECONDS
MULTIPLES OF PICK UP SETTING
10^3
10^2
10^1
10^0
10^-1
10^-2
10^-3
10^0
10^1
10^2


RI Curves
k=0.1
k=1
k=2
k=5
k=10
TIME IN SECONDS
MULTIPLES OF PICK UP SETTING
10^2
10^1
10^0
10^-1
10^0
10^1
10^2

TRANSFORMER INRUSH CURRENT

The inrush blocking function assumes stability protection during transformer energizing based on second harmonic presence.

In applications where the sensitivity of overcurrent thresholds need to be set below the prospective peak inrush current, the inrush block function can be used to block the overcurrent stages, During transformer inrush conditions, the second harmonic component of the inrush current may be as high as 70%, In practice, the second harmonic level may not be the same for all phases during inrush and therefore the relay will provide an Inrush Blocking signal for any phase above the set threshold. In general, a setting of 15% to 20% for the Inrush harmonic 2 ratio can be applied in most cases taking care that setting it too high, inrush blocking may not operate for low levels of second harmonic current which may result in the O/C element tripping during transformer energization. Similarly applying a too low a setting, inrush blocking may prevent tripping during some internal transformer faults with significant second harmonic current.

OVERVIEW

Inrush Blocking function operates by measuring ratio of second to fundamental harmonic current. It could be used as “blocking logic” of I >, I >>, I >>> in case the harmonic 2 ratio is higher than the settable threshold.

Indeed, inrush blocking functions will reset selected protection function starting. The minimum duration of overcurrent threshold inhibition (tReset) can be also set. This value depends on the transformer power transient inrush duration: between 0.1 second (for a 100kVA transformer) to 1.0 second (for a large unit). It is used to avoid any maloperation during a fixed duration in case of too sensitive setting.

OPERATION

For each of the three phases currents (IA, IB, IC), the harmonic restraint function compares the ratio of harmonic 2 to fundamental with the setting ratio (adjustable from Harmonic 2 / Fundamental = 10 % up to 35 % step 0.1%).

Minimum fundamental current value required for operation of Inrush Blocking function. There is 0.2In, and there is no upper limit to disable this feature. However, in transformer protection, the high set overcurrent stage shall not be controlled by this Inrush Blocking feature; this enables detection of all high current faults without inrush blocking.

Inrush Blocking feature will block selected protection stages, any time inrush conditions occurs on the line (Ratio of second Harmonics measured > Inrush H2 settings ratio), and will be at least active during tReset.

INRUSH BLOCKING LOGIC SUBMENU

Through the Inrush Blocking Logic submenu, the user can set a 2nd harmonic blocking threshold and block each delayed overcurrent threshold by setting. Relays have the submenu Inrush Blocking available for setting.
It is possible to enable or disable the “blocking” of OC protection functions. Blocking of a protection function can be prevented if “No” is selected in the relevant window (see below). Blocking of a protection function can be enabled if “Yes” is selected in the relevant window

Blocking Inrush	Setting range		
	Min	Max	Step
Blocking Inrush?	Yes or No		
Inrush h2 ratio	10%	35%	0.1%
Inrush tReset time	0s	2s	10ms
tI>	Yes or No		
tI>>	Yes or No		
tI>>>	Yes or No		
tIe>	Yes or No		
tIe>>	Yes or No		
tIe>>>	Yes or No		

COLD LOAD PICK-UP

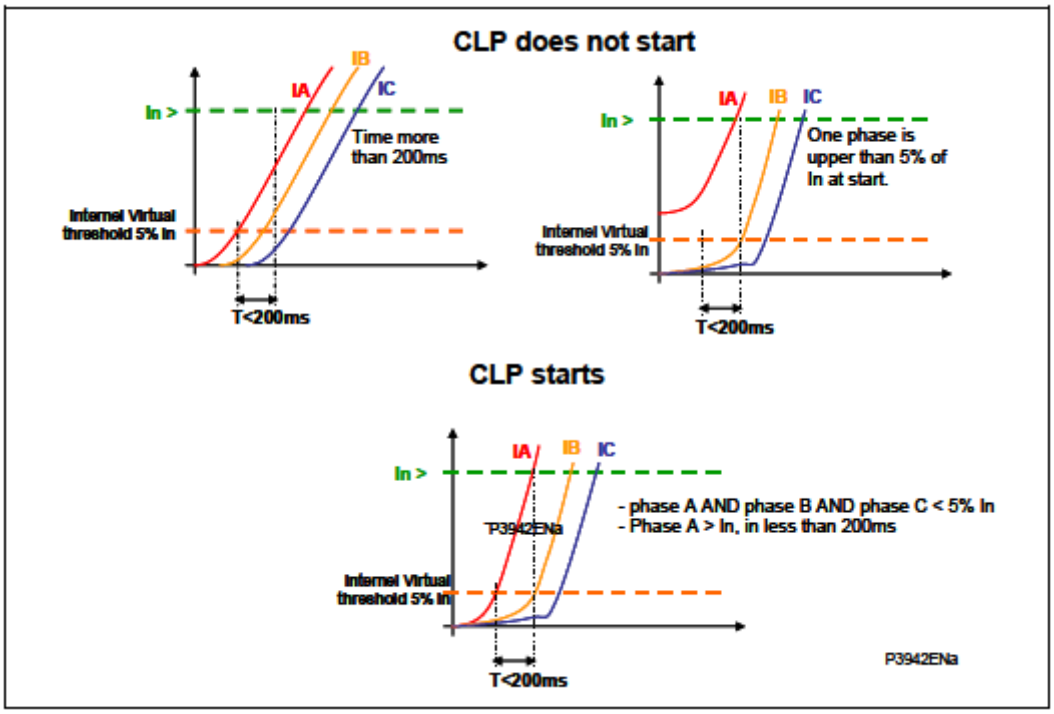
The Cold Load Pick-up feature allows selected settings of this relay to be changed to react to temporary overload conditions that may occur during cold starts. This condition may happen by switching on large eating loads after a sufficient cooling period, or loads that draw high initial starting currents.

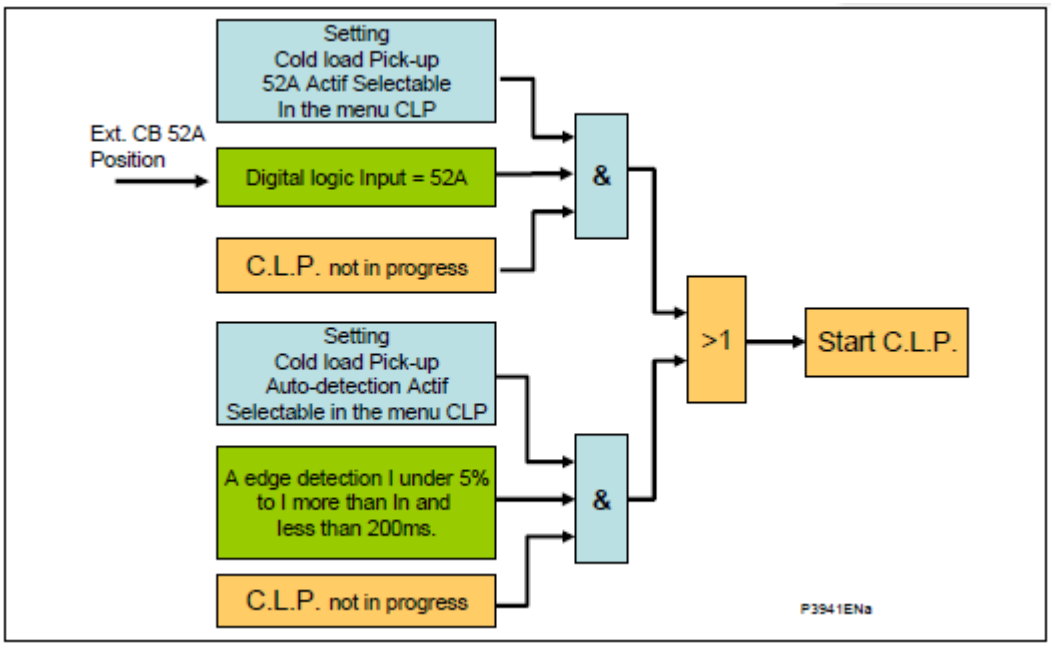
When a feeder is energized, the current levels that flow for a period of time following energizing may differ greatly from the normal load levels. Consequently, overcurrent settings that have been applied to give short circuit protection may not be suitable during this period.

The Cold Load Pick-up (CLP) logic raises the settings of selected stages for a set duration (tCL). This allows the protection settings to be set closer to the load profile. Cold load pick-up cannot restart until the end of tCL duration. The CLP logic provides stability, without compromising protection performance during starting.

The CLP can be started by digital logic Input 52A. if the CB positions are not available, to detect the Cold Load Pick-up start, a new internal threshold is created named autostart.

To detect the Cold Load Pick-up, the three phases current should be under 5% of In. When the current grows up to In or more, with a time of less than 200 ms, an internal edge detection is created.





COLD LOAD PICK-UP SUBMENU

Cold Load PU	Setting range		
	Min	Max	Step
Cold Load PU?	Yes or No		
CLPU Start input	Yes or No		
CLPU Start auto	Yes or No		
Cold load PU level	20%	800%	1%
Cold load PU tCL	100ms	3600s	10ms
tI>	Yes or No		
tI>>	Yes or No		
tI>>>	Yes or No		

DESCRIPTION AND SETTING GUIDE OF THE AUTORECLOSE

INTRODUCTION

An analysis of faults on overhead line network has shown that:

− 80-90% are transient in nature,

− the remaining 10-20% of faults are either non-permanent (arcing fault) or permanent.

A transient fault is a self -clearing 'non-damage' fault. This type of fault can be isolated and cleared by the immediate tripping of one or more circuit breakers, and does not reappear when the line is re-energised. The most common cause of transient faults are lightning, insulator flashover, clashing conductors and debris blown by the wind.

The immediate trip will not clear a non-permanent or permanent fault, and the use of the recloser may be necessary to clear it. A small tree branch falling on the line could cause a non-permanent fault. Permanent faults could caused by broken conductors, transformer faults, cable faults or machine faults which must be located and repaired before the supply can be restored.

Most of the time, if the faulty line is immediately tripped, and the fault arc has sufficient time

to de-ionise, reclose of the circuit breakers will result in the line being successfully re-energised.

Autoreclose schemes are used to automatically reclose a switching device once a time delay has elapsed and starting after the CB has opened.

On HV/MV distribution networks, the autoreclose function is used mainly for radial feeders

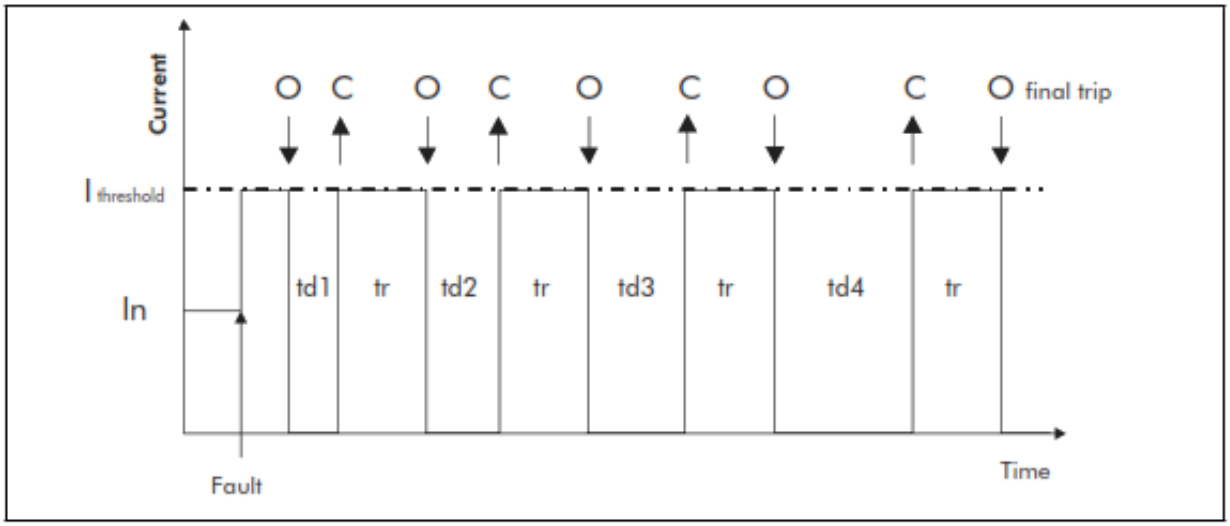
where system stability problems do not generally arise. Using the autoreclose minimizes time of interruption and reduces operating costs.

Automatic autorecloser allows a substation to operate unattended: the number of visits to manually reclose a circuit breaker is substantially reduced. This feature constitutes therefore an important advantage for substations supervised remotely.

On circuits using time-graded protection, the automatic autorecloser allows the use of instantaneous protection to give a high speed first trip. With fast tripping, the duration of the

power arc resulting from an overhead line fault is reduced to a minimum, thus lessening the

chance of damage and to develop the transient fault into a permanent fault.



Using short time delay protection prevents blowing of fuses and reduces circuit breaker maintenance by eliminating pre-arc heating when clearing transient faults.

The next figure shows an example of 4 autoreclose cycles (maximum numbers of allowed cycles) to the final trip (td1, td2, td3, td4 = dead time 1, 2, 3 and 4 timers, tr = Reclaim time, O = CB open and C = CB closed).

When short time delay protection is used with autoreclose, the scheme is normally arranged to block the instantaneous protection after the first trip. Therefore, if the fault persists after re- closing, time graded protection will give discriminative tripping with fuses or other protection devices, resulting in the isolation of the faulted section. However, for certain applications, where the majority of the faults are likely to be transient, it is not uncommon to allow more than one instantaneous trip before the instantaneous protection is blocked.

Some schemes allow a number of re-closings and time graded trips after the first instantaneo on-permanent faults. Such feeders where the fault current is low.

TYPICAL AUTORECLOSE CYCLE

Any decision to apply the autoreclose function would be influenced by all data known on the frequency of transient faults (for instance feeders which consist partly of overhead lines and partly of underground cables). When a significant proportion of the faults are permanent, the advantages of the autoreclose are small, particularly since re-closing on to a faulty cable is likely to aggravate the damage.

AUTORECLOSER ACTIVATION

The autoreclose function is activated using “AUTOMAT. CTRL/ PROTECTION G1” menu.

The same settings apply for the Menu PROTECTION G2.

The autoreclose function of HF1034 is available only if the following conditions are verified:

1- The auxiliary contact of the CB status 52a must be connected to one of input relays (input1 or input2).

   Refer to the “AUTOMAT. CTRL/Inputs” menu.

2- One of the output relays (from 2 to 5) must be assigned to CB close
   Refer to the “AUTOMAT. CTRL/output relays” menu.
3- The trip output relay RL1 must not be latched to the earth and/or phase protection function.

   Refer to the “AUTOMAT. CTRL/Latch functions” menu

NOTE: If the auxiliary supply is lost during an autoreclose cycle, the autoreclose function is totally disabled.

In addition to Autoreclose settings, the user will be able to fully link the autoreclose function to the protection function using the menus “PROTECTION G1/Phase OC” and “PROTECTION G1/E/GND”.

The autoreclose function has two inputs that can be assigned to the autoreclose logic. These inputs are opto-isolated inputs configured for that under the “AUTOMAT. CTRL” menu. External contacts can then be wired to be used as an input and influence the autorecloser scheme.

AUTORECLOSE LOGIC DESCRIPTION

The autoreclose function provides the ability to automatically control the autorecloser (two, three or four shot cycle, settable using “Phase Cycles” and “E/Gnd Cycles” menu). Dead times for all the shots (reclose attempts) can be independently adjusted.

The number of shots is directly related to the type of faults likely to occur on the system and the voltage level of the system (for instance medium voltage networks).

The **Dead Time** (tD1, tD2, tD3 and tD4) and the minimum drop-off time start when the CB has tripped (when the 52a input has disappeared). Dead Time is adjusted to start autoreclose when circuit breaker is closed.

The **reclaim time** (tR) starts when the CB has closed. If the circuit breaker does not trip again, the autoreclose function resets at the end of the reclaim time.
If the protection operates during the reclaim time, the relay either advances to the next shot that is programmed in the autoreclose cycle, or it locks out.

AUTORECLOSE INHIBIT FOLLOWING MANUAL CLOSE

The “Inhibit Time tI” timer can be used to block the autoreclose being initiated after the CB is manually closed onto a fault. The Autoreclose is blocked during the “Inhib Time tI“ following manual CB Closure.

RECLOSER LOCKOUT

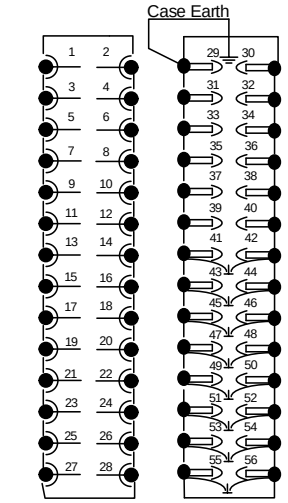
If the protection element operates during the reclaim time, following the final reclose attempt, the relay will lockout and the autoreclose function is disabled until the lockout condition resets.

The lockout condition can reset by a manual closing after the "Inhibit Time tI".

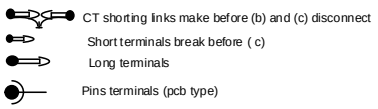
The Autoreclose can also be locked out using a “Block 79” input.

CONNECTION DIAGRAM

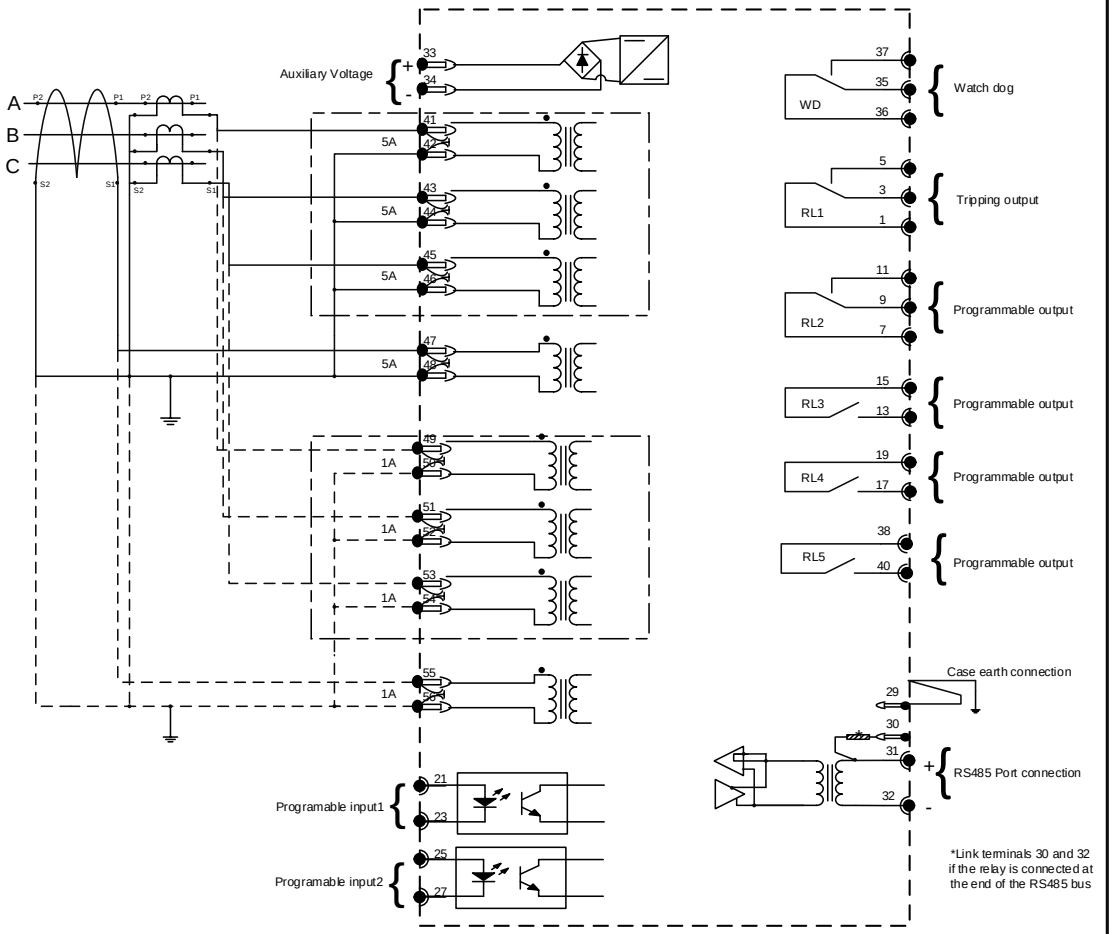
The current inputs are connected to 3 phase CTs + a core balanced CT



Module Terminal Blocks
Viwed from rear
(with integral earth link)



(2) Vx 48-150Vdc or 35-100Vac



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