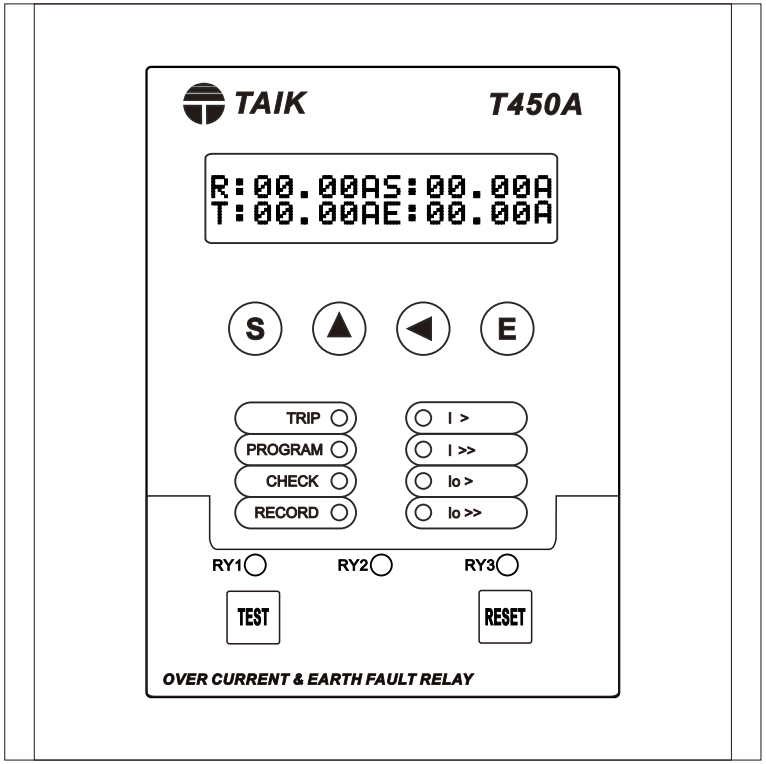
T450A

Instruction Manual

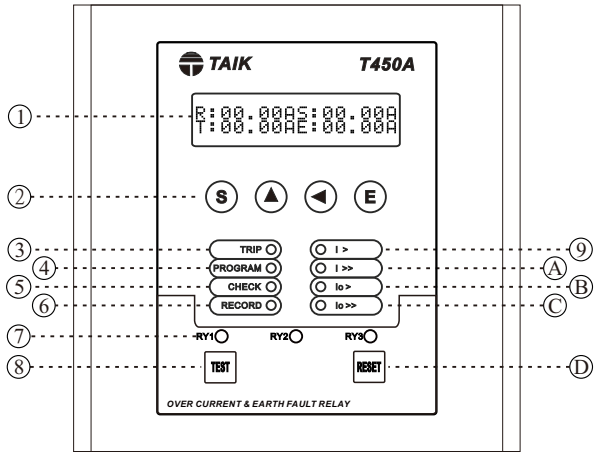


TAIK ELECTRIC CO.,LTD

10/2023

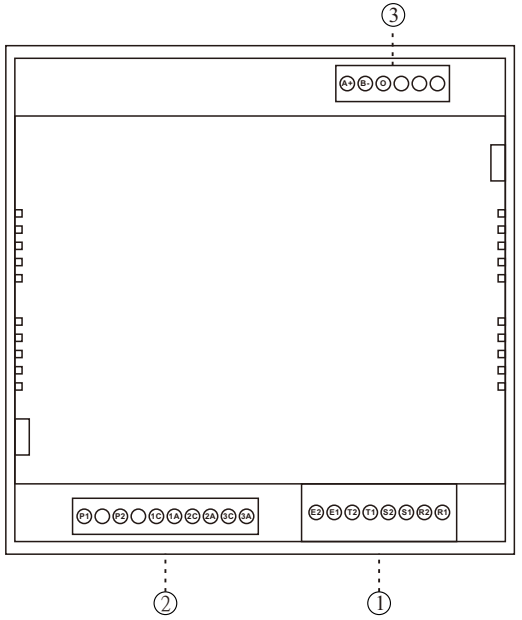
1. Exterior :

1.1 Front panel



① LCD
② 4 Keys
③ Lights up while tripping
④ Lights up while setting
⑤ Lights up while viewing parameter settings
⑥ Lights up while viewing tripping cords
⑦ Lights up while relay outputs 1-3 activating
⑧ Trip test function key
⑨ Overcurrent time-delay trip
Ⓐ Overcurrent instantaneous trip
Ⓑ Earth fault time-delay trip
Ⓒ Earth fault instantaneous trip
Ⓓ Trip reset function key

1.2 Terminal block：

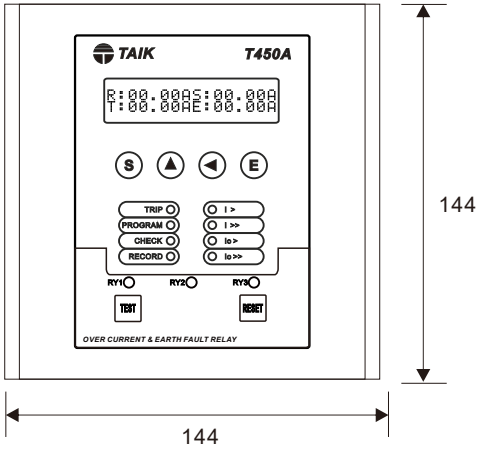


① Current input
② Aux.power supply and relay output terminal
③ RS485 interface

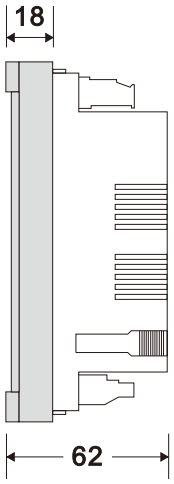
2. Installation and Wiring :

2.1 Dimension: Unit(mm)

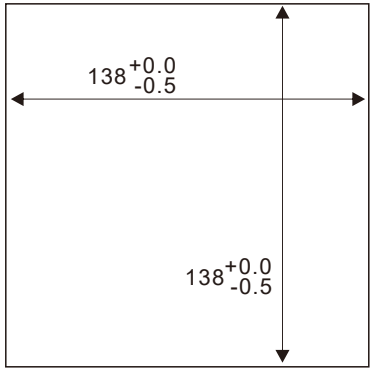
- Rear view



- Side view

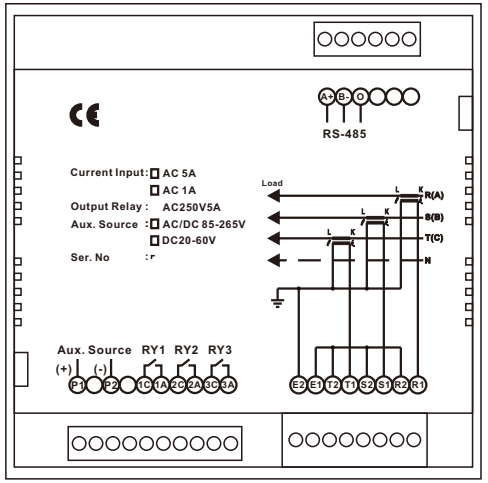


- Cut-out

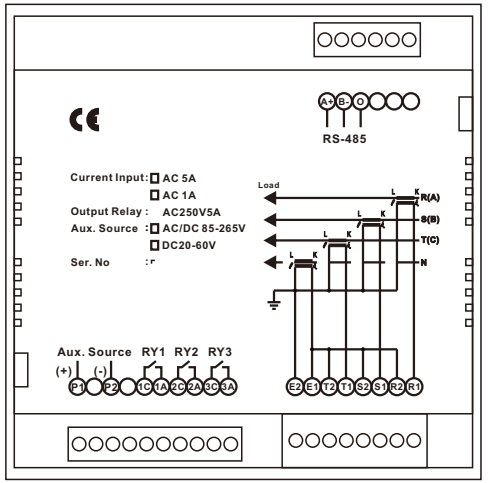


2.2 Wiring

- 3 Phase 3 Wire

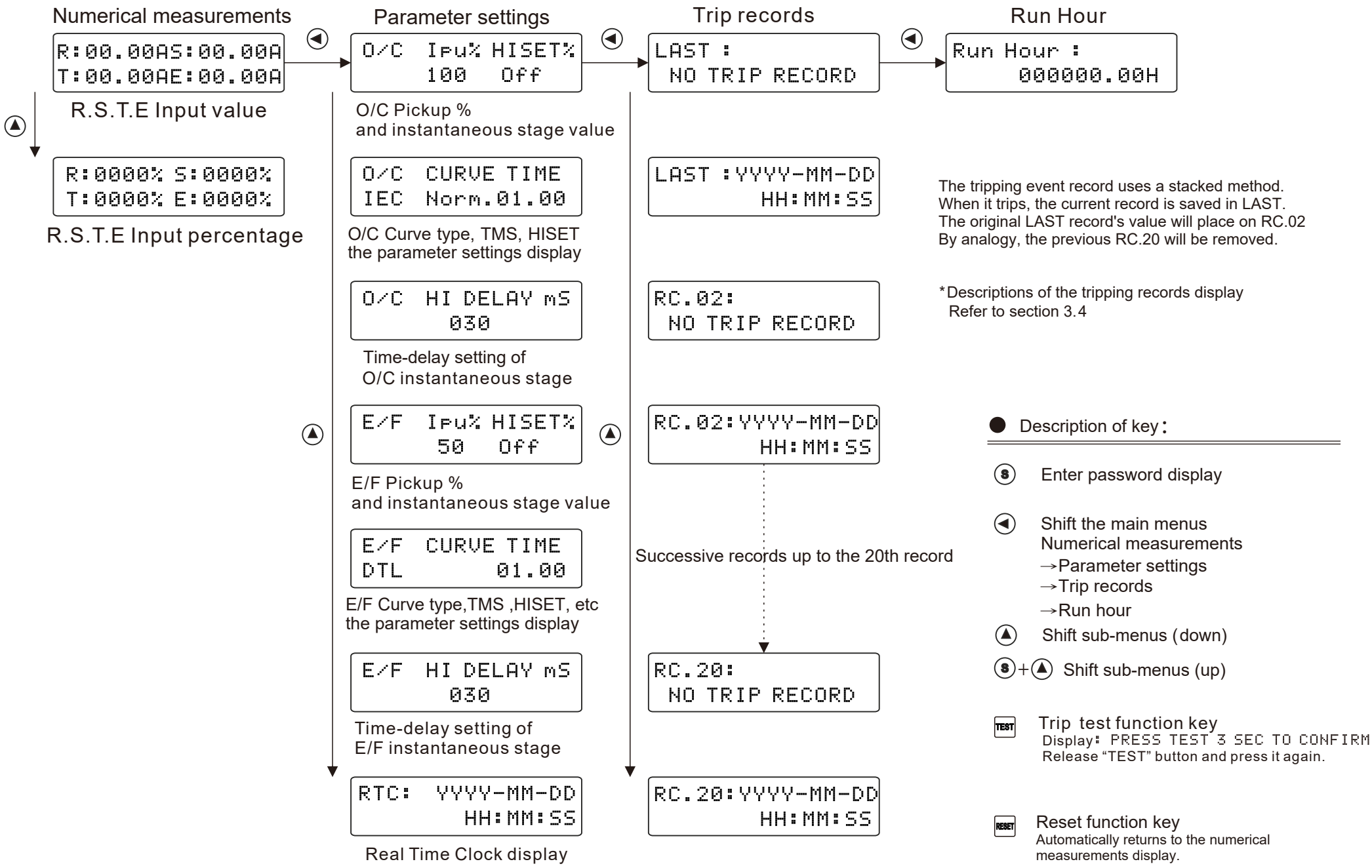


- 3 Phase 4 Wire



3. Display and Key Functions:

3.1 Display and Key



The tripping event record uses a stacked method.
When it trips, the current record is saved in LAST.
The original LAST record's value will place on RC.02
By analogy, the previous RC.20 will be removed.

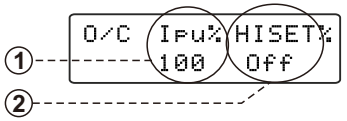
*Descriptions of the tripping records display
Refer to section 3.4

● Description of key:

- (S) Enter password display
- (◀) Shift the main menus
  Numerical measurements
  →Parameter settings
  →Trip records
  →Run hour
- (▲) Shift sub-menus (down)
- (S)+(▲) Shift sub-menus (up)
- TEST Trip test function key
  Display: PRESS TEST 3 SEC TO CONFIRM
  Release "TEST" button and press it again.
- RESET Reset function key
  Automatically returns to the numerical measurements display.

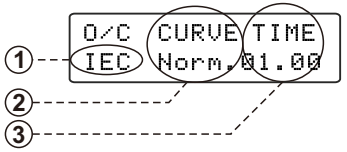
3.2 Descriptions of Parameter Settings Display

" CHECK lights up "



① Overcurrent IPu: 100%

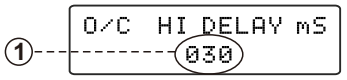
② Overcurrent HISET: Disabled off



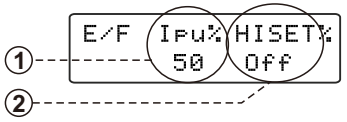
① Overcurrent curve standard: IEC

② Overcurrent curve type: Normally Inverse

③ Overcurrent curvet time parameter: 1.00

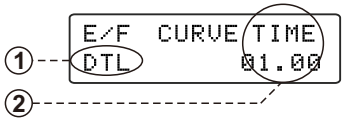


① Overcurrent HISET: Time-delay for 30 sec



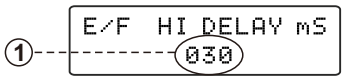
① Earth Fault IPu: 50%

② Earth Fault HISET: Disabled off

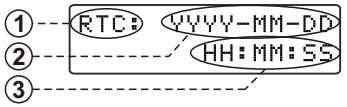


① Earth Fault curve standard: DTL

② Time-delayed with selected definite time: 1.00 sec



① Earth Fault HISET: Time-delay for 30 sec



① Real Time Clock

② YYYY-MM-DD : Year－Month－Day

③ HH:MM:SS : Hour－Min－Sec

Ex : RTC: 2012-06-01
08:00:01

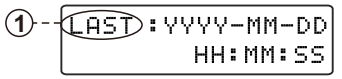
3.3 Descriptions of Trip Records Display

" RECORD lights"

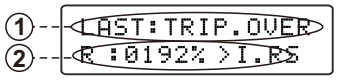


① LAST : Latest trip record

② NO TRIP RECORD

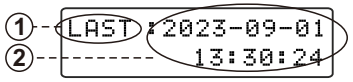


① LAST : Latest trip record time



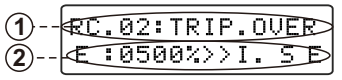
① LAST :TRIP. OVER
Latest trip record and fault current condition

② R:0192% >I.RS
Direction: R:192% >I (Time-delay phase overcurrent)
Tripping for fault current in phase R and S



① LAST : Latest trip record time

② 2023 Year / 09 Month / 01 Day
13 Hour : 30 Min : 24 Sec



① RC.02:TRIP.OVER
Previous trip record and fault current condition

② E:0500%>>I. S E
Direction: E:500%,>>I (Instantaneous phase overcurrent)
Tripping for fault current in phase S and Earth

3.4 Instructions of Fault Current/TRIP/RESET/TEST/RECORD

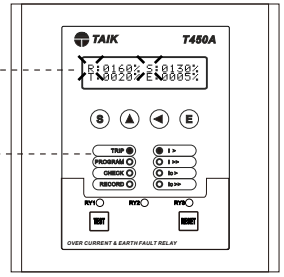
3.4.1 Descriptions of Fault Current

While the fault current occurs, it automatically returns to the numerical measurements display.

While the fault current occurs,
the corresponding input phase on display flashes.

OVER FLASH=Yes

While the fault current occurs,
the corresponding indicators designated for which
fault current type and TRIP flash.



The fault current occurs in phase R and S

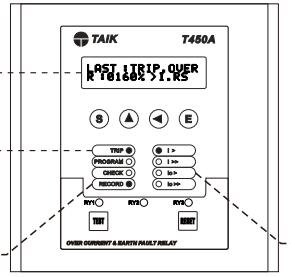
3.4.2 Descriptions of TRIP

It automatically returns to the trip record display after tripping.

Trip record,
it can refer to chapter 3.3

TRIP lights up：Current status of tripping
I>:Time-delayed phase overcurrent

RECORD lights up: Viewing tripping records



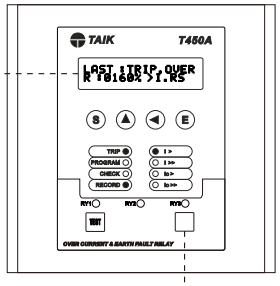
I> : Time-delayed phase overcurrent
I>> : Instantaneous phase overcurrent
Io> : Time-delayed phase earth fault
Io>> : Instantaneous phase earth fault

The indicator corresponding to the type of tripping fault

3.4.3 Descriptions of RESET

After tripping, it automatically returns to the numerical measurements display if the faulty status is not happened while the RESET is pressed.

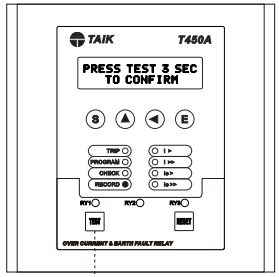
Numerical display



☞ RESET Key

3.4.4 Descriptions of TEST

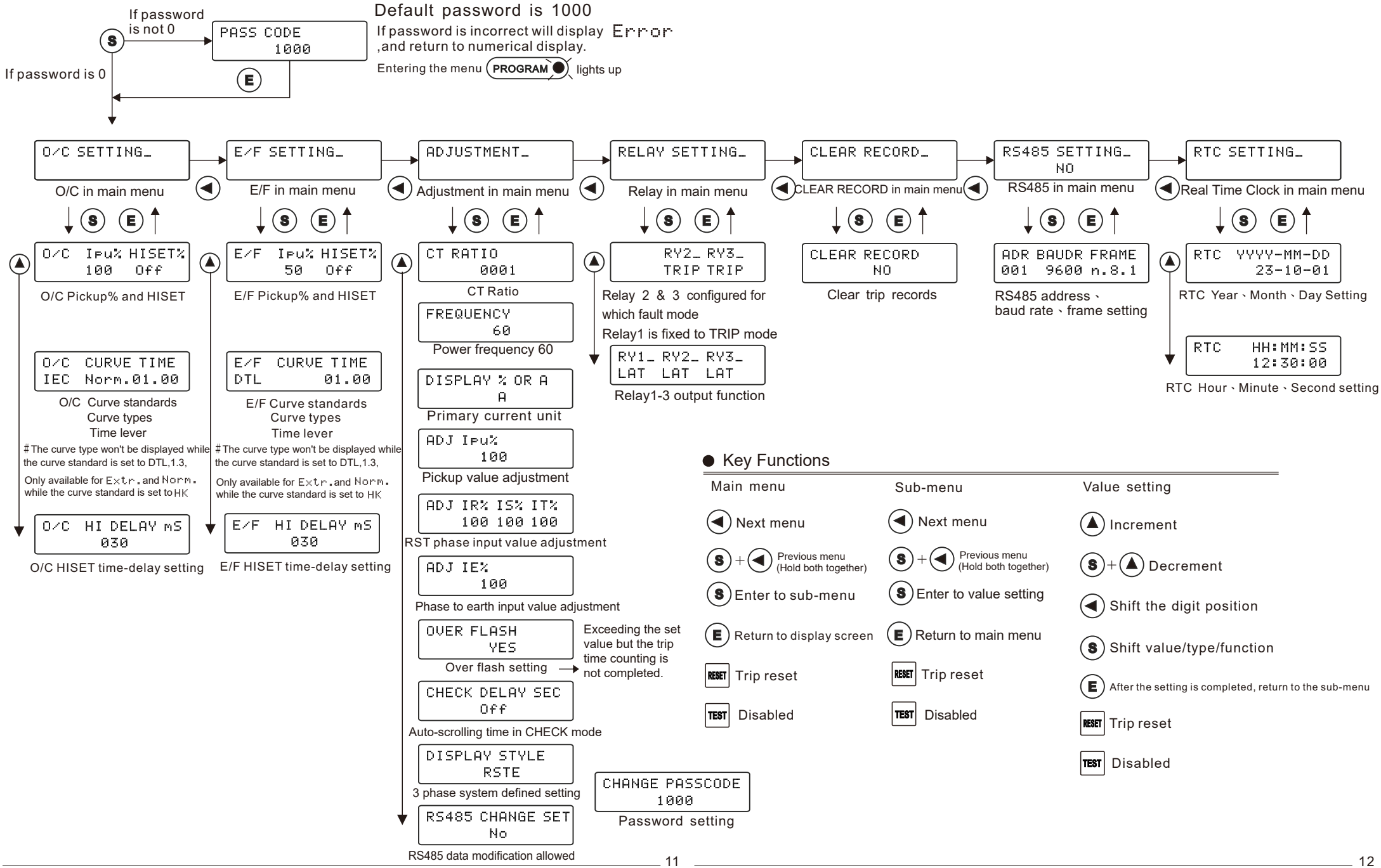
Press TEST to display: PRESS TEST 3 SEC TO CONFIRM
, sequentially release “test” button then hold it again for 3 sec for showing: PRESS TEST 3 SEC TO CONFIRM
, and subsequently the TRIP relay will be energized.
Otherwise it will fail to indicate: “TEST CANCELED”, then automatically returns to the numerical measurements display as it is not followed by the above guides during operation.



☞ TEST Key

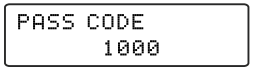
4. Setting and key functions：It can refer to the setting configuration, chapter 4.2

4.1 Setting menu:

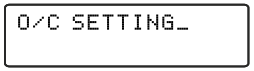


4.2 Descriptions of Parameter Settings

● Password：The default is 1000, it can be accessed if a password is forgotten, setting password is not required while the password is set to 0



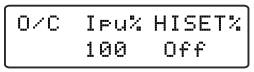
Range: 0000 ~ 9999



O/C Setting in main menu

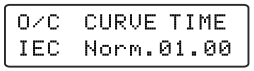
● O/C Pickup% and HISET setting

Range: Ipu%：10 ~ 250 %, HISET: Off~20~2500%



HISET: Off (Disabled)
It is appeared with 19 that represents Off as the setting screen is accessed.

● O/C Curve standards, type, time lever setting



Curve standards:
IEC、ANSI、IAC、HK、
1.3、DTL

Curve type:

Norm. Normally Inverse
Very Very Inverse
Extr. Extremely Inverse
Lone Long Time Inverse (Only IEC available)
Short Short Time Inverse (IEC、ANSI unavailable)
Mode. Moderately Inverse (Only ANSI available)

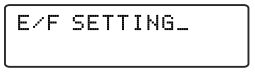
1.3 : IEC Normally Inverse α : 0. 02, β : 0.0613
$T=K*[\beta/((I/Ipu)^{\alpha}-1)]$
HK : IEC Normally Inverse α : 0. 02, β : 0.05
$T=K*[\beta/((I/Ipu)^{\alpha}-1)+0.24]$
HK : IEC Extremely Inverse α : 2. 24, β : 58.5
$T=K*[\beta/((I/Ipu)^{\alpha}-1)+0.30]$

Time lever:
Range：IEC:0.03~2.00 ANSI, IAC:0.3~20.00
DTL:0.03~64.00 HK, 1.3:0.03~2.00

● O/C HISET Time-delay setting

Range: Ipu%:20 ~ 200mS

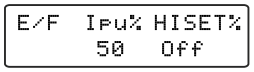




E/F Setting in main menu

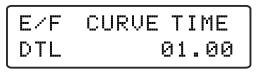
● E/F Pickup% and HISET setting

Range：Ipu%: 1 ~ 200 %,HISET: Off~5~1250%



HISET: Off (Disabled)
It is appeared with 4 that represents Off as the setting screen is accessed

● E/F Curve standards, type, time lever setting



Curve standards:
IEC、ANSI、IAC、HK、
1.3、DTL

Curve time:

Norm. Normally Inverse
Very Very Inverse
Extr. Extremely Inverse
Lone Long Time Inverse (Only IEC available)
Short Short Time Inverse (IEC、ANSI unavailable)
Mode. Moderately Inverse (Only ANSI available)

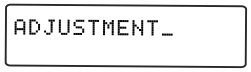
1.3 : IEC Normally Inverse α : 0. 02, β : 0.0613
$T=K*[\beta/((I/Ipu)^{\alpha}-1)]$
HK : IEC Normally Inverse α : 0. 02, β : 0.05
$T=K*[\beta/((I/Ipu)^{\alpha}-1)+0.24]$
HK : IEC Extremely Inverse α : 2. 24, β : 58.5
$T=K*[\beta/((I/Ipu)^{\alpha}-1)+0.30]$

Time lever:
Range：IEC:0.03~2.00 ANSI, IAC:0.3~20.00
DTL:0.03~64.00 HK, 1.3:0.03~2.00

● E/F HISET Time-delay setting

Range:Ipu%:20 ~ 200mS

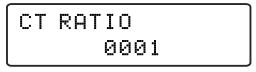




ADJUSTMENT Parameters adjustment in main menu

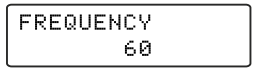
● CT ratio setting

Range：1~9999



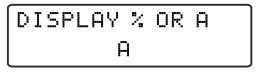
● Frequency setting

Range: 50 or 60 HZ



● Primary current unit display setting

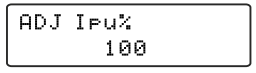
Range: A or %



● Pickup current offset adjustment

Range：100~115%

※Offset value=
The pre-set pickup current x offset percentage



● Input current offset adjustment in phase R/S/T

Range: 90~110%

```
ADJ IR% IS% IT%
    100 100 100
```

```
DISPLAY STYLE = ABCE
 ADJ  A%  B%  C%
```

※ Offset value=
The pre-set input current x offset percentage

● Input current offset adjustment in earth phase

Range: 90~110%

```
ADJ IE%
     100
```

※ Offset value=The pre-set earth current x offset percentage

● Over flash setting

Range: No ~Yes

```
OVER FLASH
      YES
```

※ Exceeding the set value but the trip time counting is not completed

● Auto-scrolling time in CHECK mode

Range: Off ~30~ 999 seconds

```
CHECK DELAY SEC
      Off
```

Off is Disabled
It is appeared with 29 that represents Off as the setting screen is accessed

● 3 phase system defined setting

Range: RSTE ~ABCE

```
DISPLAY STYLE
      RSTE
```

If choose ABCE display, then display R becomes A, S becomes B, T becomes C.

● RS 485 data access for writing

Range: No ~Yes

```
RS485 CHANGE SET
      No
```

● Password setting ※ Setting password is not required while the password is set to 0

Range:0 ~ 9999

```
CHANGE PASSCODE
     1000
```

```
RELAY SETTING_
```

Relay in main menu _____

● Relay 2 & 3 configured for which fault mode ※ Relay1 is fixed to TRIP mode

Range：NON、OC、>OC、>>OC、EF、>EF、>>EF、TRIP、FAULT

```
    RY2_ RY3_
    TRIP TRIP
```

NON：Disabled
OC：O/C either IDMTL or HISET activates the trip
>OC：O/C IDMTL activates the trip
>>OC：O/C HISET activates the trip
E/F: E/F either IDMTL or HISET activates the trip
>EF：E/F IDMTL activates the trip
>>EF：E/F HISET activates the trip
TRIP：O/C E/F either IDMTL or HISET activates the trip
FAULT：It activates the trip while the EEPROM fails

● Relay 1-3 output functions

Range: LAT or PUL

```
RY1_ RY2_ RY3_
LAT  LAT  LAT
```

LAT：LATCH mode
PUL：PULSE mode (min. 500msec)

※ Once Trip is issued will remain even if fault doesn't persists.

```
CLEAR RECORD_
```

Clear Record in main menu _____

● Clear trip records

Range：No ~ Yes

```
CLEAR RECORD
      NO
```

```
RS485 SETTING_
      NO
```

RS485 in main menu

It indicates NO while RS 485 communication fails
It indicates OK while RS 485 communicates successfully
If there's a RS485 error, it displays "FAULT."

● Address, baud rate, frame setting

```
ADR BAUDR FRAME
001  9600 n.8.1
```

Address：1 ~ 255
Baud rate:1200、2400、4800、9600、19200、38400
Frame：n, 8, 2、e, 8, 1、o, 8, 1、n, 8, 1

```
RTC SETTING_
```

Real time clock setting _____

● RTC Year、Month、Day setting Range: 2000-01-01 ~ 2099-12-31

```
RTC  YYYY-MM-DD
       23-10-01
```

● RTC Hour、Minute、Second setting

```
RTC    HH:MM:SS
       12:30:00
```

Range: 00:00:00~23:59:59

5. Specifications：

1. ANSI Protection functions
   - Instantaneous phase overcurrent 50
   - Time-delay phase overcurrent 51
   - Instantaneous earth fault 50N/50G
   - Time-delay earth fault 51N/51G
   - Lockout 86
2. Curve compliance standards(ANSI, IAC, IEC, 1.3, DTL)
   Operating curve types (IEC 60255-3)
   IEC - Normally inverse, Very inverse, Extremely inverse, Long time inverse
   ANSI - Normally inverse, Very inverse, Extremely inverse, Moderately inverse
   IAC - Normally inverse, Very inverse, Extremely inverse, Short time inverse
3. Sampling rate ..... True RMS, 64 samples per cycle
4. Auxiliary power supply ..... AC/DC 85~265V, DC 20~60V(option)
5. Power consumption ..... AC ≤ 8VA, DC ≤ 5W
6. 50, 51(CO)Setting range of pick-up current
   - 51 ..... 10 ~ 250 % (1% step)
   - 50 (High-Set) ..... 20 ~ 2500 % (1% step)
   - 50 (High-Set) with selected definite time ..... 20 ~ 200mS
7. 50G/N, 51G/N(LCO)Setting range of pick-up current
   - 51G/N ..... 1 ~ 200 % (1% step)
   - 50G/N (High-Set) ..... 5 ~ 1250 % (1% step)
   - 50G/N (High-Set) with selected definite time ..... 20 ~ 200mS
8. Time multiplier setting ..... 0.03~2.00 in step of 0.01(IEC, 1.3)
   0.3~20.0 in step of 0.1(IAC, ANSI)
9. Definite Time Lag (DTL) setting ..... 0.03~64.00 in step of 0.01 sec
10. Pickup current level ..... 100 ~ 115 % of setting current
11. Reset time ..... <100mS
12. Operation accuracy ..... ±3% of the set current
13. Operation time accuracy ..... the set time delay, ±20ms
14. Relay contacts ..... 3 N.O. Contacts, AC 250V , 5A, DC 24V 5A
    Configurable for latching or pulse mode
15. Backlit LCD display ..... High brightness LCD 16*2 characters
16. LED indicator ..... Indication designated individually for
    trip, program, check, record, I>, I>>,Io>, Io>>, RY1, RY2, RY3
17. Communication interface ..... MODBUS RTU, RS485
18. Operating temperature range ..... 0 ~ 60℃
19. Storage temperature range ..... -10 ~ 70℃
20. Max. relative humidity 95%
21. IP enclosure ..... IP 52 (front plate), IP 30(rear)
22. Flammability of enclosure ..... UL 94 V-0
23. Tripping record memory ..... 20 records with date/time stamping
24. Real Time Clock

Standards Compliance

- Electromagnetic compatibility (EMC) ..... Directive 2014/30/EU
- Product safety requirement ..... IEC 60255-27
- Electrostatic discharge ..... IEC 61000-4-2 (IEC 60255-26)
- Electromagnetic field immunity ..... IEC 61000-4-3 (IEC 60255-26)
- Electrical fast transient/burst immunity ..... IEC 61000-4-4 (IEC 60255-26)
- Surge immunity ..... IEC 61000-4-5 (IEC 60255-26)
- Immunity to conducted disturbances ..... IEC 61000-4-6 (IEC 60255-26)
- Power frequency magnetic field immunity ..... IEC 61000-4-8 (IEC 60255-26)
- Short interruptions and voltage ..... IEC 61000-4-11(IEC 60255-26)
- Radiated emission ..... CISPR 11/22 (IEC 60255-26)
- Conducted emission ..... CISPR 22 (IEC 60255-26)
- Vibration ..... IEC 60255-21-1
- Shock and bump ..... IEC 60255-21-2
- Cyclic temperature with humidity ..... IEC 60068-2-30 (IEC 60255-1)
- Certificate ..... CE

6.Communications

6.1 Communication protocol :

Utilizing MODBUS communication shall use a repeater as the meters are in parallel connection more than 30pcs.

6.2 Transmission mode:

RTU MODE

6.3 Transmission method:

RS485(Half-Duplex)

6.4 Modbus Frame:

6.4.1 Basic frame: Hexadecimal

Start of frame	Address Field	Function Code	Data Field	Error Check	End of Frame

Start of frame：The data is not transmitted by a silent period of at least 4 characters.
Address field：The address field is valid in the range of 1-255.

The address 0 for broadcast command is only valid for Function Code xx H, but it would not reply to any message

Function code：03H xx Read Holding Registers
06H xx Write Single Holding Register
Data field：The start address of a register, and it contains the requested WORD to be read or the values to be written.
Error check：16bit CRC。
End of frame：The data is not transmitted by a silent period of at least 4 characters

6.4.2 Bit per byte: Access to the flowchart of 485 FrA under Sub Configuration for setting.

Start Bit	Data Bit	Parity	Stop	Frame
1	8	None	2	N，8，2
1	8	Odd	1	O，8，1
1	8	Even	1	E，8，1
1	8	None	1	N，8，1

6.5 Read Input Registers :

Query：

Start of Frame	Address Field	Function Code	Start Address Hi	Start Address Lo	Number of Word Hi	Number of Word Lo	Error Check		End of Frame
	01H~FFH	03H	0~nnH	0 ~ nnH	0H	1~nnH	CRC Lo	CRC Hi	
	1 Byte	1 Byte	2Byte		2 Byte		2 Byte		

Response：(The command shall be correct)

Start of Frame	Address Field	Function Code	Number of Data Byte Count	D0、D1.. Dn (Hi,Lo,Hi,Lo....)	Error Check		End of Frame
	01H~FFH	03H			CRC Lo	CRC Hi	
	1 Byte	1 Byte	1Byte		2 Byte		

6.6 Write Input Registers : A single WORD for Writing Command

Query：

Start of Frame	Address Field	Function Code	Start Address Hi	Start Address Lo	Value Hi..	Value ..Lo	Error Check		End of Frame
	01H~FFH	06H	0~nnH	0 ~ nnH	Setting Value		CRC Lo	CRC Hi	
	1 Byte	1 Byte	2Byte		2 or 4 Byte		2 Byte		

Response：(Response to the written data if the command is correct)

Start of Frame	Address Field	Function Code	Start Address Hi	Start Address Lo	Value Hi..	Value .. Lo	Error Check		End of Frame
	01H~FFH	06H	0~nnH	0 ~ nnH	Setting Value		CRC Lo	CRC Hi	
	1 Byte	1 Byte	2Byte		2 or 4 Byte		2 Byte		

6.7 Errors: Command Errors

Start of Frame	Address Field	Function Code	Error Code	Error Check		End of Frame
	01H~FFH	83H or 86H		CRC Lo	CRC Hi	
	1 Byte	1 Byte	1 Byte	2 Byte		

- Function Code：Response to the received Function Code but MSB being set to 1, eg 03H xxx83H
- Error Code：
  - 01：Error Function。
  - 02：Error Data Address。
  - 03：Error Data Value。

6.8 CRC Calculation:

The CRC is calculated on all the bytes of a message from the address field to the last data bytes inclusively. It means a message frame in error if a packet in the final CRC check could not be valid for combination. A typical message frame is being started from the address field to the end of data field.

CRC Performing

1. Load a CRC register with xxxx.
2. Exclusive OR the first 8bit byte of the message with the low order byte of the 16 bit CRC register, subsequently putting the result in the CRC register.
3. Shift the CRC register one bit to the right (toward the LSB), zero filling the MSB. Extract and examine the SLSB.
4. Repeat step 3 if the SLSB=0. Exclusive OR the CRC register with the polynomial if the SLSB=0, subsequently putting the result in the CRC register.
5. Repeat Steps 3 and 4 until 8 shifts have been performed.
6. Repeat Steps 2 through 5 for the next 8 bit byte of the message. Continue doing this until the 2 bytes have been processed.
7. When the CRC is placed into the message, its upper and lower bytes must be swapped.

CRC Checking

The returned CRC register is as unsigned short int. The start address and the data field have transmitted, and the returned CRC register with the low and high bytes has been swapped.

```
/*CRC Generation Function with 'C' language*/
/* Msg:*message to calculate CRC upon*/
/* usDatalen: number of bytes in message*/
unsigned int CRC16(char *Msg,unsigned char usDatalen)
{
   unsigned char uchCRCHi=0xFF；/*CRC high byte*/
   unsigned char uchCRCLo=0xFF；  /*CRC low byte*/
   unsigned char uIndex；
   while(usDatalen--)/*pass through message buffer*/
   {
      uIndex=uchCRCHi^*Msg++；/*calculate the CRC*/
      uchCRCHi=uchCRCLO^auchCRCHi[uIndex]；
      uchCRCLo=auchCRClo[uIndex]；
   }
}
return (uchCRCHi<<8|uchCRCLo)；
```


sraric unsigned char auchCRCHI[]={
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,
0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,
0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x00,0xc1,0x81,0x40,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,0x01,0xc0,0x80,0x41,0x01,0xc0,0x80,0x41,
0x00,0xc1,0x81,0x40,};

sraric unsigned char auchCRCLO[]={
0x00,0xc0,0xc1,0x01,0xc3,0x03,0x02,0xc2,0xc6,0x06,0x07,0xc7,
0x05,0xc5,0xc4,0x04,0xcc,0x0c,0x0d,0xcd,0x0f,0xcf,0xce,0x0e,
0x0a,0xca,0xcb,0x0b,0xc9,0x09,0x08,0xc8,0xd8,0x18,0x19,0xd9,
0x1b,0xdb,0xda,0x1a,0x1e,0xde,0xdf,0x1f,0xdd,0x1d,0x1c,0xdc,
0x14,0xd4,0xd5,0x15,0xd7,0x17,0x16,0xd6,0xd2,0x12,0x13,0xd3,
0x11,0xd1,0xd0,0x10,0xf0,0x30,0x31,0xf1,0x33,0xf3,0xf2,0x32,
0x36,0xf6,0xf7,0x37,0xf5,0x35,0x34,0xf4,0x3c,0xfc,0xfd,0x3d,
0xff,0x3f,0x3e,0xfe,0xfa,0x3a,0x3b,0xfb,0x39,0xf9,0xf8,0x38,
0x28,0xe8,0xe9,0x29,0xeb,0x2b,0x2a,0xea,0xee,0x2e,0x2f,0xef,
0x2d,0xed,0xec,0x2c,0xe4,0x24,0x25,0xe5,0x27,0xe7,0xe6,0x26,
0x22,0xe2,0xe3,0x23,0xe1,0x21,0x20,0xe0,0xa0,0x60,0x61,0xa1,
0x63,0xa3,0xa2,0x62,0x66,0xa6,0xa7,0x67,0xa5,0x65,0x64,0xa4,
0x6c,0xac,0xad,0x6d,0xaf,0x6f,0x6e,0xae,0xaa,0x6a,0x6b,0xab,
0x69,0xa9,0xa8,0x68,0x78,0xb8,0xb9,0x79,0xbb,0x7b,0x7a,0xba,
0xbe,0x7e,0x7f,0xbf,0x7d,0xbd,0xbc,0x7c,0xb4,0x74,0x75,0xb5,
0x77,0xb7,0xb6,0x76,0x72,0xb2,0xb3,0x73,0xb1,0x71,0x70,0xb0,
0x50,0x90,0x91,0x51,0x93,0x53,0x52,0x92,0x96,0x56,0x57,0x97,
0x55,0x95,0x94,0x54,0x9c,0x5c,0x5d,0x9d,0x5f,0x9f,0x9e,0x5e,
0x5a,0x9a,0x9b,0x5b,0x99,0x59,0x58,0x98,0x88,0x48,0x49,0x89,
0x4b,0x8b,0x8a,0x4a,0x4e,0x8e,0x8f,0x4f,0x8d,0x4d,0x4c,0x8c,
0x44,0x84,0x85,0x45,0x87,0x47,0x46,0x86,0x82,0x42,0x43,0x83,
0x41,0x81,0x80,0x40};

6.9 Data address：

6.9.1 Set-up：

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
0000	0000H	OC Pickup current setting	Integer	1	R/W	10 - 250(%)
0001	0001H	OC curve standard option	Integer	1	R/W	0 - 5(Note)
0002	0002H	OC curve type option	Integer	1	R/W	0 - 3(Note)
0003	0003H	OC time parameter configuration	Integer	1	R/W	3 - 6400 (Note)
0004	0004H	OC instantaneous trip setting	Integer	1	R/W	19 - 2500 (Note)
0005	0005H	OC instantaneous trip delay	Integer	1	R/W	20 - 200(mS)
0006	0006H	EF Pickup current setting	Integer	1	R/W	1 - 200(%)
0007	0007H	EF curve standard option	Integer	1	R/W	0 - 5(Note)
0008	0008H	EF curve type option	Integer	1	R/W	0 - 3(Note)
0009	0009H	EF time parameter configuration	Integer	1	R/W	3 - 6400 (Note)
0010	000AH	EF instantaneous trip setting	Integer	1	R/W	4 - 1250(Note)
0011	000BH	EF instantaneous trip delay	Integer	1	R/W	20 - 200(mS)
0012	000CH	Default current display	Integer	1	R/W	0 - 1 (Note)
0013	000DH	Rs485 modification allowed	Integer	1	R/W	0 - 1 (Note)
0014	000EH	RTC year setting	Integer	1	R/W	0 - 99
0015	000FH	RTC month setting	Integer	1	R/W	1 - 12
0016	0010H	RTC date setting	Integer	1	R/W	1 - 31
0017	0011H	RTC hour setting	Integer	1	R/W	0 - 23
0018	0012H	RTC minute setting	Integer	1	R/W	0 - 59
0019	0013H	RTC second setting	Integer	1	R/W	0 - 59
0020	0014H	Reserve	Integer	1	R	
0021	0015H	Relay 2 trip option	Integer	1	R/W	0 - 8 (Note)
0022	0016H	Relay 3 trip option	Integer	1	R/W	0 - 8 (Note)
0023	0017H	Relay 1 action	Integer	1	R/W	0 - 1 (Note)
0024	0018H	Relay 2 action	Integer	1	R/W	0 - 1 (Note)
0025	0019H	Relay 3 action	Integer	1	R/W	0 - 1 (Note)
0026	001AH	Clear trip record	Integer	1	R/W	0 - 1 (1：Clear)
0027	001BH	Reserve	Integer	1	R	
0028	001CH	Reserve	Integer	1	R	
0029	001DH	CT Ratio	Integer	1	R/W	1 - 9999
0030	001EH	Input frequency option	Integer	1	R/W	0 - 1 (0：50，1：60)
0031	001FH	OC Pickup value adjustment	Integer	1	R/W	100 - 115 (%)
0032	0020H	R phase input value adjustment	Integer	1	R/W	90 - 110 (%)
0033	0021H	S phase input value adjustment	Integer	1	R/W	90 - 110 (%)
0034	0022H	T phase input value adjustment	Integer	1	R/W	90 - 110 (%)
0035	0023H	E phase input value adjustment	Integer	1	R/W	90 - 110 (%)

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
0036	0024H	Rs485 address setting	Integer	1	R/W	1 - 255
0037	0025H	Rs485 baud rate setting	Integer	1	R/W	0 - 5 (Note)
0038	0026H	Rs485 frame setting	Integer	1	R/W	0 - 3 (Note)
0039	0027H	Password setting	Integer	1	R/W	0 - 9999
0040	0028H	Over flash setting	Integer	1	R/W	0 - 1 (Note)
0041	0029H	CHECK display carousel	Integer	1	R/W	29 - 999 (Note)
0042	002AH	Display format setting	Integer	1	R/W	0 - 1 (Note)

Note：

Contents	Description
Curve standards	0：IEC，1：ANSI，2：IAC，3：HK，4：1，3，5：DTL。
Curve types	0:Normally inverse，1：Very，2:Extremely，3:Long(Short，Moderately)。 If curve standards is Hk，0、1、3: Normally，2: Extremely
Timer lever	0，03~2，00(IEC，1，3，HK)。0，03~20，00(ANSI，IAC)。0，03~64，00 sec(DTL)。 If change the curve standard may cause the time scale go out of range.
OC Instantaneous tripping multiplier	19 means OFF，20~2500 means 20~2500%。
EF Instantaneous tripping multiplier	4 meansOFF，5~125 means 5~1250%。
Default current display setting	0：Current unit，1：Percent。
Rs485 programming allowed	0：Close，1：Open。
Relay trip option	0:Close，1:OC，2:>OC，3:>>OC，4:EF， 5:>EF，6:>>EF，7：TRIP，8：Fault。
Relay action type	0：Latch，1：Pulse。
Rs485 baud rate	0:1200，1:2400，2:4800，3:9600，4:19200，5:38400。
Rs485 frame setting	0:n,8,2，1:o,8,1，2:e,8,1，3:n,8,1。
Over flash setting	0：Close，1：Open。
CHECK display carousel setting	29 means OFF，30~999(Seconds)。
Display format setting	0：RSTE，1：ABCE。

**In addition to Rs485 programming permission and RTC time setting, other addresses require open the function of RS485 programming permission before programming.

6.9.2 Data address：Integers

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
0512	0200H	R phase current input percent	Integer	1	R	%
0513	0201H	S phase current input percent	Integer	1	R	%
0514	0202H	T phase current input percent	Integer	1	R	%
0515	0203H	EF phase current input percent	Integer	1	R	%
0516	0204H	R phase current input value	Integer	1	R	A
0517	0205H	S phase current input value	Integer	1	R	A
0518	0206H	T phase current input value	Integer	1	R	A
0519	0207H	EF phase current input value	Integer	1	R	A
0520	0208H	R phase current decimal point	Integer	1	R	0 - 3(Note)
0521	0209H	S phase current decimal point	Integer	1	R	0 - 3(Note)
0522	020AH	T phase current decimal point	Integer	1	R	0 - 3(Note)
0523	020BH	EF phase current decimal point	Integer	1	R	0 - 3(Note)
0524	020CH	R phase current unit	Integer	1	R	0 - 6(Note)
0525	020DH	S phase current unit	Integer	1	R	0 - 6(Note)
0526	020EH	T phase current unit	Integer	1	R	0 - 6(Note)
0527	020FH	EF phase current unit	Integer	1	R	0 - 6(Note)
0528	0210H	Pickup over current inquiry	Integer	1	R	Note
0529	0211H	Trip record inquiry	Integer	1	R	Note
0530	0212H	Relay status	Integer	1	R	Note
0531	0213H	Operating hour Lo Word	Integer	1	R	Note
0532	0214H	Operating hour Hi Word	Integer	1	R	Note

Note :

Context	Description
Current decimal point	0: no decimal point, 1: one decimal place, 2: two decimal places, 3: decimal places.
Current unit	0:no unit，3:K，6:M.
Pickup over current inquiry	0：none, 1: R phase, 2: S phase, 4: T phase, 8: EF phase, complexity. If shows 3, it means that R and S phase exceed the Pickup current setting
Trip record inquiry	0：none, 1：R phase, 2：S phase, 4：T phase, 8：EF phase 16(0x10)：Test button tripped.
Relay status	0x01：The previous action of Relay1 wasn't cleared by pressing Reset. 0x02：The previous action of Relay2 wasn't cleared by pressing Reset. 0x04：The previous action of Relay3 wasn't cleared by pressing Reset. 0x10：Relay3 action. 0x20：Relay3 action. 0x40：Relay3 action. With complexity.
Operating hour	The operation time is a ling integer value(Hi * 65536 + Lo)。 The unit is 0．01H

6.9.3 Relay Status

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
1024	0400H	Latest trip record value	Integer	1	R	0.1%
1025	0401H	Latest trip type	Integer	1	R	Note
1026	0402H	Latest trip record: Year	Integer	1	R	0~99(Note)
1027	0403H	Latest trip record: Month	Integer	1	R	1~12
1028	0404H	Latest trip record: Date	Integer	1	R	1~31
1029	0405H	Latest trip record: Hour	Integer	1	R	0~23
1030	0406H	Latest trip record: Minute	Integer	1	R	0~59
1031	0407H	Latest trip record: Second	Integer	1	R	0~59
1032	0408H	Latest overload record while tripping	Integer	1	R	Note
1033	0409H	REC. 2 trip record value	Integer	1	R	0.1%
1034	040AH	REC. 2 trip type	Integer	1	R	Note
1035	040BH	REC. 2 trip record: Year	Integer	1	R	0~99(Note)
1036	040CH	REC. 2 trip record: Month	Integer	1	R	1~12
1037	040DH	REC. 2 trip record: Date	Integer	1	R	1~31
1038	040EH	REC. 2 trip record: Hour	Integer	1	R	0~23
1039	040FH	REC. 2 trip record: Minute	Integer	1	R	0~59
1040	0410H	REC. 2 trip record: Second	Integer	1	R	0~59
1041	0411H	REC. 2 overload record while tripping	Integer	1	R	Note
1042	0412H	REC. 3 trip record value	Integer	1	R	0.1%
1043	0413H	REC. 3 trip type	Integer	1	R	Note
1044	0414H	REC. 3 trip record: Year	Integer	1	R	0~99(Note)
1045	0415H	REC. 3 trip record: Month	Integer	1	R	1~12
1046	0416H	REC. 3 trip record: Date	Integer	1	R	1~31
1047	0417H	REC. 3 trip record: Hour	Integer	1	R	0~23
1048	0418H	REC. 3 trip record: Minute	Integer	1	R	0~59
1049	0419H	REC. 3 trip record: Second	Integer	1	R	0~59
1050	041AH	REC. 3 overload record while tripping	Integer	1	R	Note
1051	041BH	REC. 4 trip record value	Integer	1	R	0.1%
1052	041CH	REC. 4 trip type	Integer	1	R	Note
1053	041DH	REC. 4 trip record: Year	Integer	1	R	0~99(Note)
1054	041EH	REC. 4 trip record: Month	Integer	1	R	1~12
1055	041FH	REC. 4 trip record: Date	Integer	1	R	1~31
1056	0420H	REC. 4 trip record: Hour	Integer	1	R	0~23
1057	0421H	REC. 4 trip record: Minute	Integer	1	R	0~59
1058	0422H	REC. 4 trip record: Second	Integer	1	R	0~59
1059	0423H	REC. 4 overload record while tripping	Integer	1	R	Note

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
1060	0424H	REC. 5 trip record value	Integer	1	R	0.1%
1061	0425H	REC. 5 trip type	Integer	1	R	Note
1062	0426H	REC. 5 trip record: Year	Integer	1	R	0~99(Note)
1063	0427H	REC. 5 trip record: Month	Integer	1	R	1~12
1064	0428H	REC. 5 trip record: Date	Integer	1	R	1~31
1065	0429H	REC. 5 trip record: Hour	Integer	1	R	0~23
1066	042AH	REC. 5 trip record: Minute	Integer	1	R	0~59
1067	042BH	REC. 5 trip record:Second	Integer	1	R	0~59
1068	042CH	REC. 5 overload record while tripping	Integer	1	R	Note
1069	042DH	REC. 6 trip record value	Integer	1	R	0.1%
1070	042EH	REC. 6 trip type	Integer	1	R	Note
1071	042FH	REC. 6 trip record: Year	Integer	1	R	0~99(Note)
1072	0430H	REC. 6 trip record: Month	Integer	1	R	1~12
1073	0431H	REC. 6 trip record: Date	Integer	1	R	1~31
1074	0432H	REC. 6 trip record: Hour	Integer	1	R	0~23
1075	0433H	REC. 6 trip record: Minute	Integer	1	R	0~59
1076	0434H	REC. 6 trip record:Second	Integer	1	R	0~59
1077	0435H	REC. 6 overload record while tripping	Integer	1	R	Note
1078	0436H	REC. 7 trip record value	Integer	1	R	0.1%
1079	0437H	REC. 7 trip type	Integer	1	R	Note
1080	0438H	REC. 7 trip record: Year	Integer	1	R	0~99(Note)
1081	0439H	REC. 7 trip record: Month	Integer	1	R	1~12
1082	043AH	REC. 7 trip record: Date	Integer	1	R	1~31
1083	043BH	REC. 7 trip record: Hour	Integer	1	R	0~23
1084	043CH	REC. 7 trip record: Minute	Integer	1	R	0~59
1085	043DH	REC. 7 trip record: Second	Integer	1	R	0~59
1086	043EH	REC. 7 overload record while tripping	Integer	1	R	Note
1087	043FH	REC. 8 trip record value	Integer	1	R	0.1%
1088	0440H	REC. 8 trip type	Integer	1	R	Note
1089	0441H	REC. 8 trip record: Year	Integer	1	R	0~99(Note)
1090	0442H	REC. 8 trip record: Month	Integer	1	R	1~12
1091	0443H	REC. 8 trip record: Date	Integer	1	R	1~31
1092	0444H	REC. 8 trip record: Hour	Integer	1	R	0~23
1093	0445H	REC. 8 trip record: Minute	Integer	1	R	0~59
1094	0446H	REC. 8 trip record: Second	Integer	1	R	0~59
1095	0447H	REC. 8 overload record while tripping	Integer	1	R	Note

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
1096	0448H	REC. 9 trip record value	Integer	1	R	0.1%
1097	0449H	REC. 9 trip type	Integer	1	R	Note
1098	044AH	REC. 9 trip record: Year	Integer	1	R	0~99(Note)
1099	044BH	REC. 9 trip record: Month	Integer	1	R	1~12
1100	044CH	REC. 9 trip record: Date	Integer	1	R	1~31
1101	044DH	REC. 9 trip record: Hour	Integer	1	R	0~23
1102	044EH	REC. 9 trip record: Minute	Integer	1	R	0~59
1103	044FH	REC. 9 trip record:Second	Integer	1	R	0~59
1104	0450H	REC. 9 overload record while tripping	Integer	1	R	Note
1105	0451H	REC. 10 trip record value	Integer	1	R	0.1%
1106	0452H	REC. 10 trip type	Integer	1	R	Note
1107	0453H	REC. 10 trip record: Year	Integer	1	R	0~99(Note)
1108	0454H	REC. 10 trip record: Month	Integer	1	R	1~12
1109	0455H	REC. 10 trip record: Date	Integer	1	R	1~31
1110	0456H	REC. 10 trip record: Hour	Integer	1	R	0~23
1111	0457H	REC. 10 trip record: Minute	Integer	1	R	0~59
1112	0458H	REC. 10 trip record: Second	Integer	1	R	0~59
1113	0459H	REC. 10 overload record while tripping	Integer	1	R	Note
1114	045AH	REC. 11 trip record value	Integer	1	R	0.1%
1115	045BH	REC. 11 trip type	Integer	1	R	Note
1116	045CH	REC. 11 trip record: Year	Integer	1	R	0~99(Note)
1117	045DH	REC. 11 trip record: Month	Integer	1	R	1~12
1118	045EH	REC. 11 trip record: Date	Integer	1	R	1~31
1119	045FH	REC. 11 trip record: Hour	Integer	1	R	0~23
1120	0460H	REC. 11 trip record: Minute	Integer	1	R	0~59
1121	0461H	REC. 11 trip record: Second	Integer	1	R	0~59
1122	0462H	REC. 11 overload record while tripping	Integer	1	R	Note
1123	0463H	REC. 12 trip record value	Integer	1	R	0.1%
1124	0464H	REC. 12 trip type	Integer	1	R	Note
1125	0465H	REC. 12 trip record: Year	Integer	1	R	0~99(Note)
1126	0466H	REC. 12 trip record: Month	Integer	1	R	1~12
1127	0467H	REC. 12 trip record: Date	Integer	1	R	1~31
1128	0468H	REC. 12 trip record: Hour	Integer	1	R	0~23
1129	0469H	REC. 12 trip record: Minute	Integer	1	R	0~59
1130	046AH	REC. 12 trip record: Second	Integer	1	R	0~59
1131	046BH	REC. 12 overload record while tripping	Integer	1	R	Note

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
1132	046CH	REC. 13 trip record value	Integer	1	R	0.1%
1133	046DH	REC. 13 trip type	Integer	1	R	Note
1134	046EH	REC. 13 trip record: Year	Integer	1	R	0~99(Note)
1135	046FH	REC. 13 trip record: Month	Integer	1	R	1~12
1136	0470H	REC. 13 trip record: Date	Integer	1	R	1~31
1137	0471H	REC. 13 trip record: Hour	Integer	1	R	0~23
1138	0472H	REC. 13 trip record: Minute	Integer	1	R	0~59
1139	0473H	REC. 13 trip record:Second	Integer	1	R	0~59
1140	0474H	REC. 13 overload record while tripping	Integer	1	R	Note
1141	0475H	REC. 14 trip record value	Integer	1	R	0.1%
1142	0476H	REC. 14 trip type	Integer	1	R	Note
1143	0477H	REC. 14 trip record: Year	Integer	1	R	0~99(Note)
1144	0478H	REC. 14 trip record: Month	Integer	1	R	1~12
1145	0479H	REC. 14 trip record: Date	Integer	1	R	1~31
1146	047AH	REC. 14 trip record: Hour	Integer	1	R	0~23
1147	047BH	REC. 14 trip record: Minute	Integer	1	R	0~59
1148	047CH	REC. 14 trip record:Second	Integer	1	R	0~59
1149	047DH	REC. 14 overload record while tripping	Integer	1	R	Note
1150	047EH	REC. 15 trip record value	Integer	1	R	0.1%
1151	047FH	REC. 15 trip type	Integer	1	R	Note
1152	0480H	REC. 15 trip record: Year	Integer	1	R	0~99(Note)
1153	0481H	REC. 15 trip record: Month	Integer	1	R	1~12
1154	0482H	REC. 15 trip record: Date	Integer	1	R	1~31
1155	0483H	REC. 15 trip record: Hour	Integer	1	R	0~23
1156	0484H	REC. 15 trip record: Minute	Integer	1	R	0~59
1157	0485H	REC. 15 trip record:Second	Integer	1	R	0~59
1158	0486H	REC. 15 overload record while tripping	Integer	1	R	Note
1159	0487H	REC. 16 trip record value	Integer	1	R	0.1%
1160	0488H	REC. 16 trip type	Integer	1	R	Note
1161	0489H	REC. 16 trip record: Year	Integer	1	R	0~99(Note)
1162	048AH	REC. 16 trip record: Month	Integer	1	R	1~12
1163	048BH	REC. 16 trip record: Date	Integer	1	R	1~31
1164	048CH	REC. 16 trip record: Hour	Integer	1	R	0~23
1165	048DH	REC. 16 trip record: Minute	Integer	1	R	0~59
1166	048EH	REC. 16 trip record:Second	Integer	1	R	0~59
1167	048FH	REC. 16 overload record while tripping	Integer	1	R	Note

Address	(Hex)	Contents	Format	Word	Access	Range & Unit
1168	0490H	REC. 17 trip record value	Integer	1	R	0.1%
1169	0491H	REC. 17 trip type	Integer	1	R	Note
1170	0492H	REC. 17 trip record: Year	Integer	1	R	0~99(Note)
1171	0493H	REC. 17 trip record: Month	Integer	1	R	1~12
1172	0494H	REC. 17 trip record: Date	Integer	1	R	1~31
1172	0495H	REC. 17 trip record: Hour	Integer	1	R	0~23
1174	0496H	REC. 17 trip record: Minute	Integer	1	R	0~59
1175	0497H	REC. 17 trip record:Second	Integer	1	R	0~59
1176	0498H	REC. 17 overload record while tripping	Integer	1	R	Note
1177	0499H	REC. 18 trip record value	Integer	1	R	0.1%
1178	049AH	REC. 18 trip type	Integer	1	R	Note
1179	049BH	REC. 18 trip record: Year	Integer	1	R	0~99(Note)
1180	049CH	REC. 18 trip record: Month	Integer	1	R	1~12
1181	049DH	REC. 18 trip record: Date	Integer	1	R	1~31
1182	049EH	REC. 18 trip record: Hour	Integer	1	R	0~23
1183	049FH	REC. 18 trip record: Minute	Integer	1	R	0~59
1184	04A0H	REC. 18 trip record:Second	Integer	1	R	0~59
1185	04A1H	REC. 18 overload record while tripping	Integer	1	R	Note
1186	04A2H	REC. 19 trip record value	Integer	1	R	0.1%
1187	04A3H	REC. 19 trip type	Integer	1	R	Note
1188	04A4H	REC. 19 trip record: Year	Integer	1	R	0~99(Note)
1189	04A5H	REC. 19 trip record: Month	Integer	1	R	1~12
1190	04A6H	REC. 19 trip record: Date	Integer	1	R	1~31
1191	04A7H	REC. 19 trip record: Hour	Integer	1	R	0~23
1192	04A8H	REC. 19 trip record: Minute	Integer	1	R	0~59
1193	04A9H	REC. 19 trip record: Second	Integer	1	R	0~59
1194	04AAH	REC. 19 overload record while tripping	Integer	1	R	Note
1195	04ABH	REC. 20 trip record value	Integer	1	R	0.1%
1196	04ACH	REC. 20 trip type	Integer	1	R	Note
1197	04ADH	REC. 20 trip record: Year	Integer	1	R	0~99(Note)
1198	04AEH	REC. 20 trip record: Month	Integer	1	R	1~12
1199	04AFH	REC. 20 trip record: Date	Integer	1	R	1~31
1200	04B0H	REC. 20 trip record: Hour	Integer	1	R	0~23
1201	04B1H	REC. 20 trip record: Minute	Integer	1	R	0~59
1202	04B2H	REC. 20 trip record: Second	Integer	1	R	0~59
1203	04B3H	REC. 20 overload record while tripping	Integer	1	R	Note

Note :

Context	Description
Trip type	0：None, 1：R phase, 2：S phase, 4:T phase, 8:EF. 32(0x20): The current trip did not clear upon pressing the Reset key. (Detection reserved for this instance only) Trip queries involve complexity. If the read value is 4, it is a T phase delayed trip. 52(4 and 16 and 32) is a T phase instantaneous trip and has not been reset yet.。
Year of record	0 ~ 99 means 2000 ~ 2099 year
Overload record while tripping	0：None, 1:R phase, 2:S phase, 4:T phase, 8:EF. If the read value is 1, then when tripping, it is an R phase overload. If the read value is 12 (4 and 8), then when tripping, it is a T, E phase overload.

7. Curve：

IEC CURVES

IEC Curve Constants	α	β
Normally Inverse	0.02	0.14
Very Inverse	1	13.5
Extremely Inverse	2	80
Long time	1	120
1.3 (Normally Inverse)	0.02	0.064

$$T = K * \left(\frac{\beta}{\left(\frac{I}{Ipu} \right)^{\alpha} - 1} \right)$$

T： Trip Time (Sec.)
K： Time Multiplier Setpoint
I： Input Current
Ipu： Pickup Current Setpoint

IEC Normally Inverse ：Trip Time (Sec)

K \ I/Ipu	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
0.10	7.337	1.719	1.003	0.630	0.498	0.428	0.384	0.353	0.330	0.312	0.297	0.252	0.227
0.20	14.675	3.439	2.006	1.260	0.996	0.856	0.767	0.706	0.659	0.623	0.594	0.503	0.453
0.40	29.350	6.878	4.012	2.521	1.992	1.712	1.535	1.411	1.319	1.247	1.188	1.006	0.907
0.60	44.025	10.317	6.017	3.781	2.988	2.568	2.302	2.117	1.978	1.870	1.782	1.509	1.360
0.80	58.700	13.755	8.023	5.042	3.984	3.424	3.070	2.822	2.637	2.493	2.376	2.012	1.814
1.00	73.374	17.194	10.029	6.302	4.980	4.280	3.837	3.528	3.297	3.116	2.971	2.516	2.267

IEC Very Inverse ：Trip Time (Sec)

K \ I/Ipu	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
0.10	13.500	2.700	1.350	0.675	0.450	0.338	0.270	0.225	0.193	0.169	0.150	0.096	0.071
0.20	27.000	5.400	2.700	1.350	0.900	0.675	0.540	0.450	0.386	0.338	0.300	0.193	0.142
0.40	54.000	10.800	5.400	2.700	1.800	1.350	1.080	0.900	0.771	0.675	0.600	0.386	0.284
0.60	81.000	16.200	8.100	4.050	2.700	2.025	1.620	1.350	1.157	1.013	0.900	0.579	0.426
0.80	108.00	21.600	10.800	5.400	3.600	2.700	2.160	1.800	1.543	1.350	1.200	0.771	0.568
1.00	135.00	27.000	13.500	6.750	4.500	3.375	2.700	2.250	1.929	1.688	1.500	0.964	0.711

IEC Extremely Inverse ：Trip Time (Sec)

K \ I/Ipu	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
0.10	38.095	6.400	2.667	1.000	0.533	0.333	0.229	0.167	0.127	0.100	0.081	0.036	0.020
0.20	76.190	12.800	5.333	2.000	1.067	0.667	0.457	0.333	0.254	0.200	0.162	0.071	0.040
0.40	152.38	25.600	10.667	4.000	2.133	1.333	0.914	0.667	0.508	0.400	0.323	0.143	0.080
0.60	228.57	38.400	16.000	6.000	3.200	2.000	1.371	1.000	0.762	0.600	0.485	0.214	0.120
0.80	304.76	51.200	21.333	8.000	4.267	2.667	1.829	1.333	1.016	0.800	0.646	0.286	0.160
1.00	380.95	64.000	26.667	10.000	5.333	3.333	2.286	1.667	1.270	1.000	0.808	0.357	0.201

IEC Long Time Inverse：Trip Time (Sec)

K \ I/Ipu	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
0.10	120.000	24.000	12.000	6.000	4.000	3.000	2.400	2.000	1.714	1.500	1.333	0.857	0.632
0.20	240.000	48.000	24.000	12.000	8.000	6.000	4.800	4.000	3.429	3.000	2.667	1.714	1.263
0.40	480.000	96.000	48.000	24.000	16.000	12.000	9.600	8.000	6.857	6.000	5.333	3.429	2.526
0.60	720.000	144.000	72.000	36.000	24.000	18.000	14.400	12.000	10.286	9.000	8.000	5.143	3.789
0.80	960.000	192.000	96.000	48.000	32.000	24.000	19.200	16.000	13.714	12.000	10.667	6.857	5.053
1.00	1200.000	240.000	120.000	60.000	40.000	30.000	24.000	20.000	17.143	15.000	13.333	8.571	6.316

ANSI CURVES

$$T = M * \left(A + \frac{B}{\left(\frac{I}{Ipu} - C\right)} + \frac{D}{\left(\frac{I}{Ipu} - C\right)^2} + \frac{E}{\left(\frac{I}{Ipu} - C\right)^3} \right)$$

ANSI Curve Constants	A	B	C	D	E
Normally Inverse	0.0274	2.2614	0.3	-4.19	9.1272
Very Inverse	0.0615	0.7989	0.34	-0.284	4.0505
Extremely Inverse	0.0399	0.2294	0.5	3.0094	0.7222
Moderately Inverse	0.1735	0.6791	0.8	-0.08	0.1271

T： Trip Time (Sec.)
M： Time Multiplier Setpoint
I： Input Current
Ipu： Pickup Current Setpoint

ANSI Normally Inverse ：Trip Time (Sec)

M \ *I/Ipu*	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
1.0	14.134	4.282	1.766	0.754	0.513	0.407	0.344	0.302	0.270	0.246	0.226	0.165	0.133
2.0	28.268	8.568	3.531	1.508	1.025	0.814	0.689	0.604	0.541	0.492	0.452	0.329	0.265
4.0	56.535	17.137	7.062	3.016	2.051	1.627	1.378	1.208	1.082	0.983	0.904	0.659	0.530
6.0	84.803	25.705	10.594	4.524	3.076	2.441	2.067	1.812	1.622	1.475	1.356	0.988	0.796
8.0	113.071	34.274	14.125	6.031	4.102	3.254	2.756	2.415	2.163	1.967	1.808	1.318	1.061
10.0	141.338	42.842	17.656	7.539	5.127	4.068	3.445	3.019	2.704	2.458	2.260	1.647	1.326

ANSI Very Inverse Trip Time (Sec)

M \ *I/Ipu*	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
1.0	9.848	3.134	1.325	0.537	0.341	0.260	0.216	0.189	0.170	0.156	0.146	0.116	0.102
2.0	19.696	6.268	2.650	1.074	0.682	0.520	0.432	0.378	0.340	0.312	0.291	0.232	0.204
4.0	39.393	12.537	5.301	2.148	1.365	1.040	0.864	0.755	0.680	0.625	0.583	0.464	0.408
6.0	59.089	18.205	7.951	3.221	2.047	1.559	1.297	1.133	1.020	0.937	0.874	0.696	0.612
8.0	78.785	25.073	10.602	4.295	2.730	2.079	1.729	1.510	1.360	1.250	1.165	0.928	0.185
10.0	98.481	31.341	13.252	5.369	3.412	2.599	2.161	1.888	1.700	1.562	1.457	1.160	1.019

ANSI Extremely Inverse ：Trip Time (Sec)

M \ *I/Ipu*	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
1.0	12.125	4.001	1.744	0.659	0.368	0.247	0.185	0.149	0.126	0.110	0.098	0.070	0.060
2.0	24.250	8.002	3.489	1.319	0.736	0.495	0.371	0.298	0.251	0.219	0.196	0.141	0.119
4.0	48.501	16.004	6.977	2.638	1.472	0.990	0.742	0.596	0.503	0.439	0.393	0.281	0.239
6.0	72.751	24.005	10.466	3.956	2.208	1.484	1.113	0.894	0.754	0.658	0.589	0.422	0.358
8.0	97.002	32.007	13.955	5.275	2.944	1.979	1.483	1.192	1.006	0.878	0.786	0.562	0.477
10.0	121.252	40.009	17.443	6.594	3.680	2.474	1.854	1.491	1.257	1.097	0.982	0.703	0.597

ANSI Moderately Inverse ：Trip Time (Sec)

M \ *I/Ipu*	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
1.0	6.256	1.351	0.757	0.478	0.382	0.332	0.302	0.281	0.267	0.255	0.247	0.221	0.209
2.0	12.511	2.702	1.515	0.955	0.764	0.665	0.604	0.563	0.533	0.511	0.493	0.442	0.417
4.0	25.023	5.404	3.030	1.910	1.527	1.329	1.208	1.126	1.066	1.021	0.986	0.884	0.835
6.0	37.534	8.106	4.0544	2.866	2.291	1.994	1.812	1.689	1.600	1.532	1.479	1.326	1.252
8.0	50.045	10.807	6.059	3.821	3.054	2.659	2.416	2.252	2.133	2.043	1.972	1.768	1.669
10.0	62.557	13.509	7.574	4.776	3.818	3.324	3.020	2.815	2.666	2.554	2.465	2.210	2.087

IAC CURVES

$$T = M * \left(A + \frac{B}{\left(\frac{I}{Ipu} - C\right)} + \frac{D}{\left(\frac{I}{Ipu} - C\right)^2} + \frac{E}{\left(\frac{I}{Ipu} - C\right)^3} \right)$$

IAC Curve Constants	A	B	C	D	E
Normally Inverse	0.2078	0.863	0.8	-0.418	0.1947
Very Inverse	0.09	0.7955	0.1	-1.289	7.9586
Extremely Inverse	0.004	0.638	0.62	1.787	0.246
Short Time Inverse	0.0428	0.0609	0.62	-0.001	0.0221

T： Trip Time (Sec.)
M： Time Multiplier Setpoint
I： Input Current
Ipu： Pickup Current Setpoint

IAC Normally Inverse ：Trip Time (Sec)

M \ *I/Ipu*	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
1.0	5.651	1.155	0.749	0.532	0.443	0.392	0.360	0.337	0.320	0.307	0.297	0.267	0.252
2.0	11.302	2.310	1.499	1.064	0.885	0.784	0.719	0.674	0.640	0.614	0.594	0.533	0.503
4.0	22.605	4.621	2.997	2.128	1.770	1.569	1.439	1.348	1.280	1.229	1.188	1.066	1.007
6.0	33.907	6.931	4.496	3.192	2.656	2.353	2.158	2.022	1.921	1.843	1.781	1.599	1.510
8.0	45.209	9.242	5.995	4.256	3.541	3.138	2.878	2.695	2.561	2.457	2.375	2.133	2.013
10.0	56.511	11.552	7.494	5.320	4.426	3.922	3.597	3.369	3.201	3.072	2.969	2.666	2.516

IAC Very Inverse ：Trip Time (Sec)

M \ *I/Ipu*	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
1.0	7.555	2.901	1.312	0.537	0.343	0.266	0.227	0.202	0.186	0.174	0.165	0.140	0.128
2.0	15.110	5.802	2.624	1.075	0.687	0.533	0.453	0.405	0.372	0.349	0.331	0.280	0.255
4.0	30.220	11.605	5.248	2.150	1.374	1.065	0.906	0.810	0.745	0.698	0.662	0.560	0.511
6.0	45.331	17.407	7.872	3.225	2.061	1.598	1.359	1.215	1.117	1.046	0.992	0.840	0.766
8.0	60.441	23.209	10.497	4.299	2.747	2.131	1.813	1.620	1.490	1.395	1.323	1.120	1.022
10.0	75.551	29.012	13.121	5.374	3.434	2.663	2.266	2.025	1.862	1.744	1.654	1.400	1.277

IAC Extremely Inverse ：Trip Time (Sec)

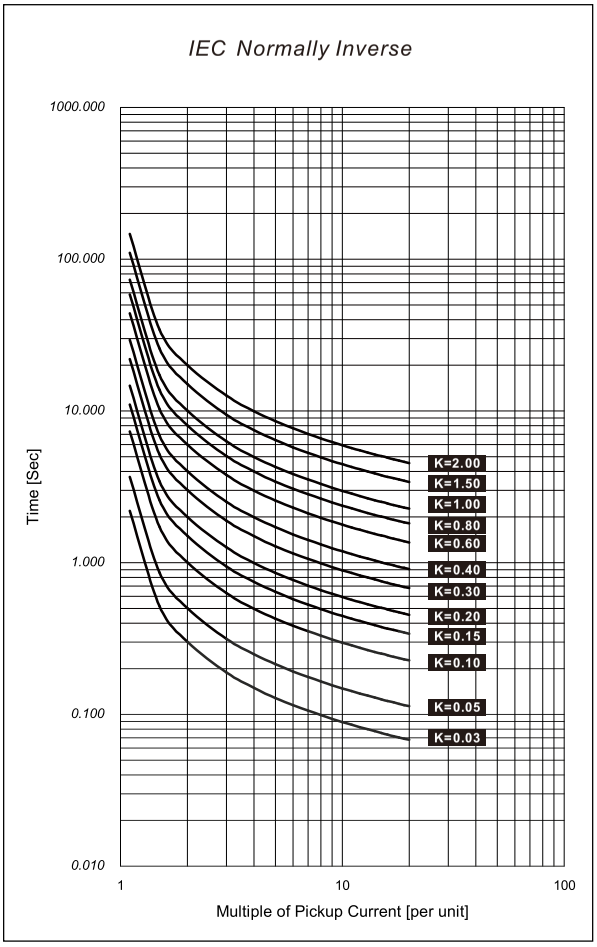
M \ *I/Ipu*	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
1.0	11.314	3.398	1.498	0.606	0.356	0.246	0.186	0.149	0.124	0.106	0.093	0.057	0.042
2.0	22.627	6.795	2.997	1.212	0.711	0.491	0.372	0.298	0.248	0.212	0.185	0.114	0.083
4.0	45.255	13.590	5.993	2.423	1.422	0.983	0.744	0.595	0.495	0.424	0.371	0.228	0.167
6.0	67.882	20.385	8.990	3.635	2.133	1.474	1.115	0.893	0.743	0.636	0.556	0.343	0.250
8.0	90.509	27.181	11.986	4.846	2.844	1.966	1.487	1.191	0.991	0.848	0.741	0.457	0.334
10.0	113.136	33.976	14.983	6.058	3.555	2.457	1.859	1.488	1.239	1.060	0.926	0.571	0.471

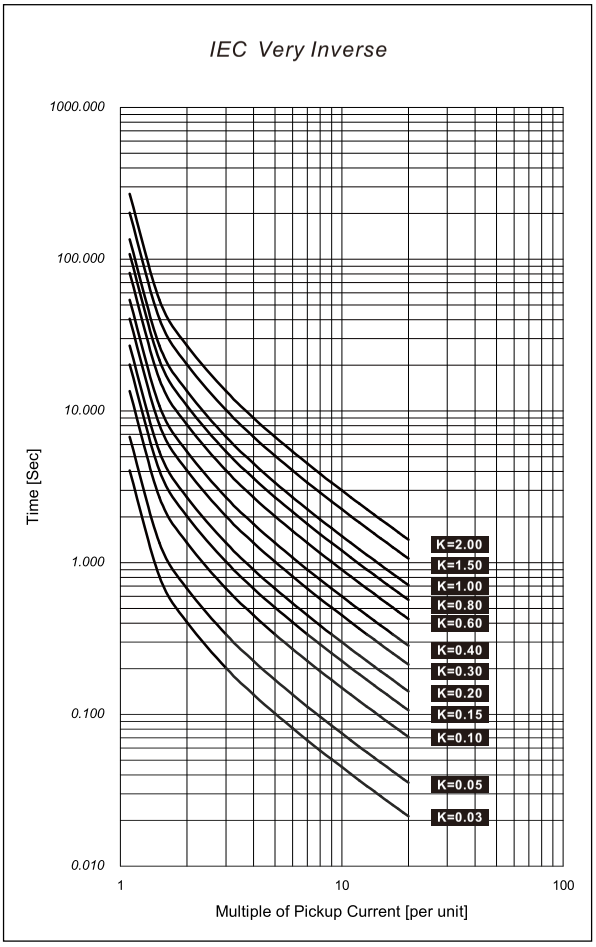
IAC Short Time Inverse ：Trip Time (Sec)

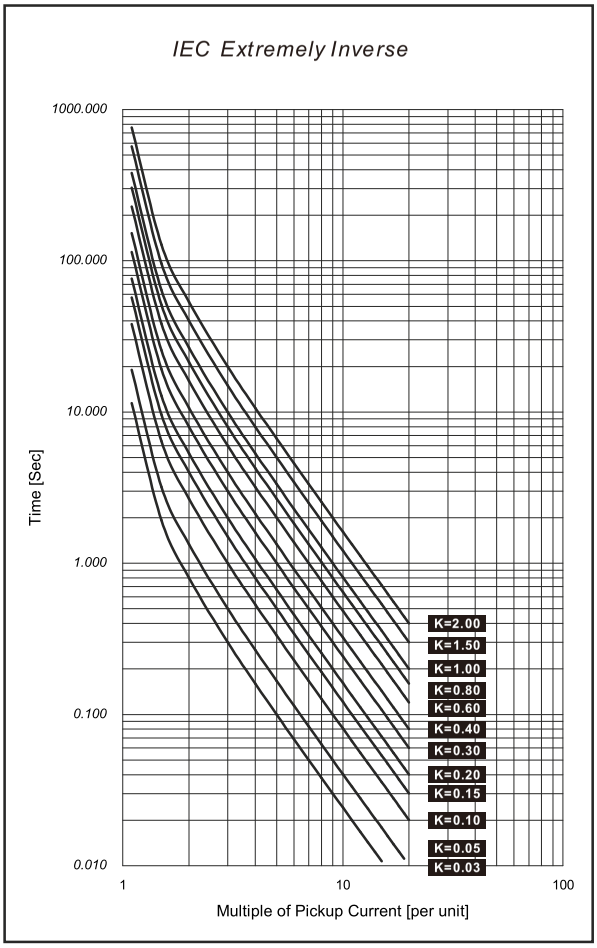
M \ *I/Ipu*	1.1	1.5	2	3	4	5	6	7	8	9	10	15	20
1.0	0.365	0.143	0.095	0.070	0.061	0.057	0.054	0.052	0.051	0.050	0.049	0.047	0.046
2.0	0.730	0.286	0.190	0.140	0.123	0.114	0.108	0.105	0.102	0.100	0.099	0.094	0.092
4.0	1.461	0.573	0.379	0.279	0.245	0.228	0.217	0.210	0.204	0.200	0.197	0.188	0.184
6.0	2.191	0.859	0.569	0.419	0.368	0.341	0.325	0.314	0.307	0.301	0.296	0.282	0.276
8.0	2.921	1.145	0.759	0.559	0.490	0.455	0.434	0.419	0.409	0.401	0.394	0.376	0.368
10.0	3.652	1.431	0.948	0.699	0.613	0.569	0.542	0.524	0.511	0.501	0.493	0.470	0.459

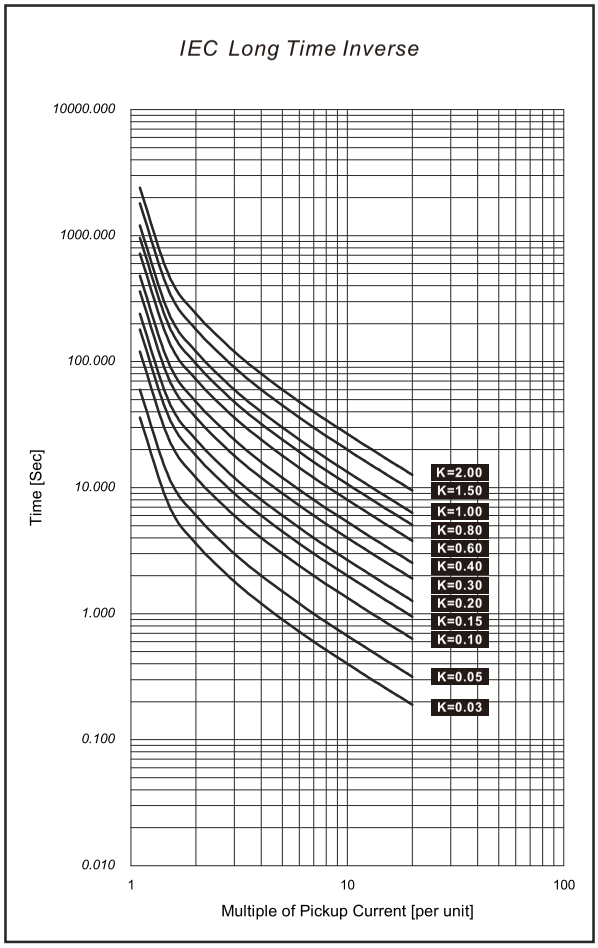
IEC TIME CURRENT CHARACTERISTIC

[K=Time Multiplier/10]



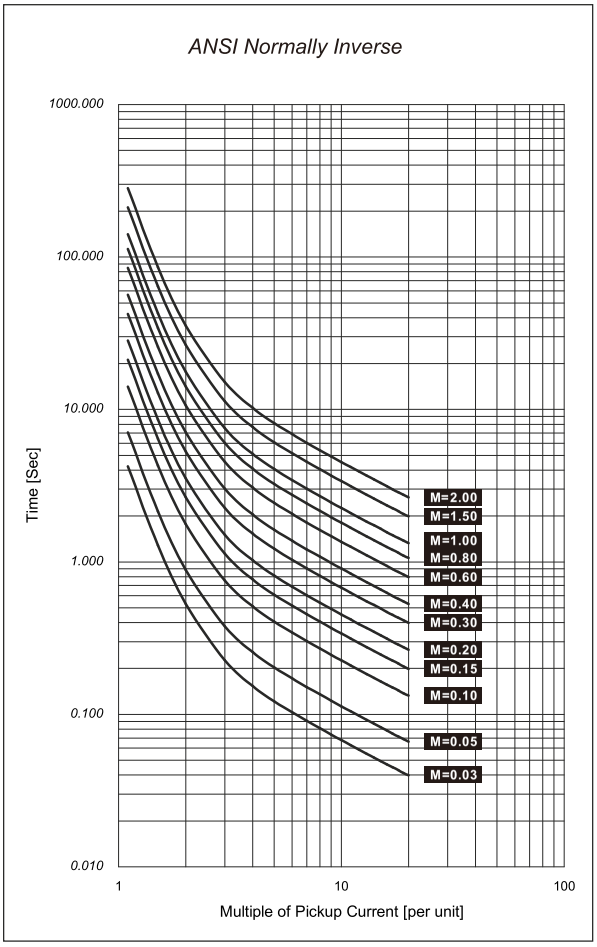


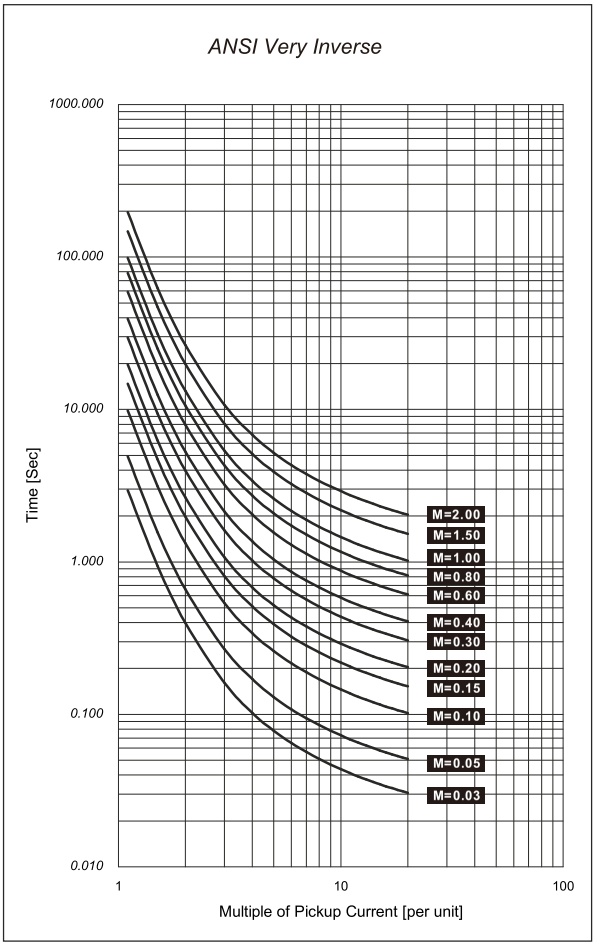


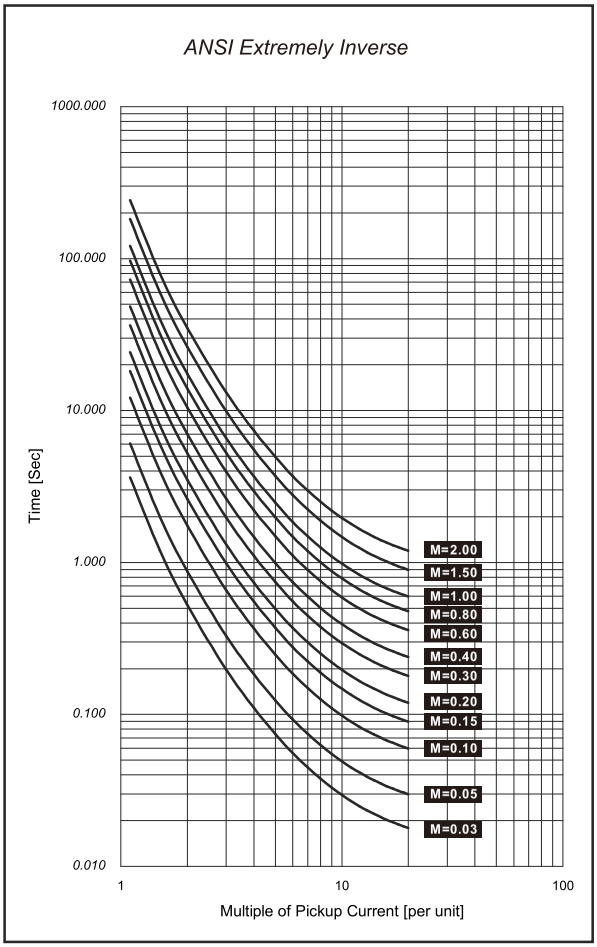


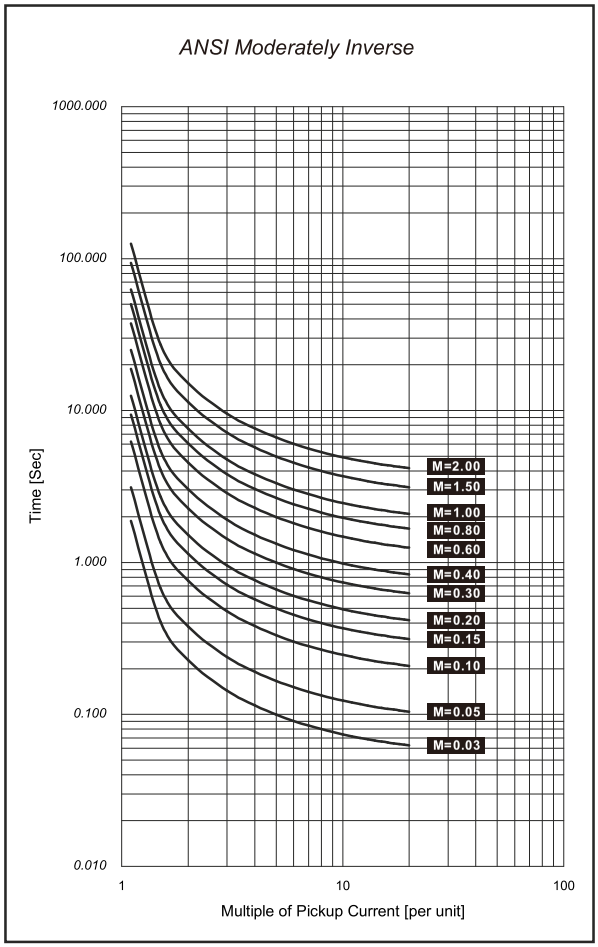
ANSI TIME CURRENT CHARACTERISTIC

[M=Time Multiplier/10]









IAC TIME CURRENT CHARACTERISTIC

[M=Time Multiplier/10]

