VARIANTS FOR

MICROPROCESSOR OVERCURRENT AND EARTH FAULT PROTECTION RELAY

IM30-AE0

OPERATION MANUAL

0	EMISSION	03-1197	P.Brasca	D. Abad	
REV.	**DESCRIPTION**	**DATE**	**PREP.**	**CONTR.**	**APPR.**

2.2 ALGORITHM OF THE TIME CURRENT CURVES

The Time Current Curves are generally calculated with the following equation :

$$t(I) = \left[\frac{(1-B) \bullet (10^{a} - 1)}{(I/I_s)^{a} - 1} + B \right] \bullet T_s + t_r$$ where :

t(I) = Actual trip time delay when the input current equals I

I_s = Set minimum pick-up level

T_s = Set time delay : $t(I) = T_s$ when $\frac{I}{I_s} = 10$

tr = Operation time of the output relay on pick-up.

The constants **B** and **a** have different values for the different Time Current Curves.

Curve Name	Curve Identifier	B	a
IEC A Inverse	A	0	0.02
IEC B Very Inverse	B	0	1
IEC C Extr. Inverse	C	0	2
IEEE Moderate Inverse	MI	0.0226	0.02
IEEE Short Inverse	SI	0.00262	0.02
IEEE Very Inverse	VI	0.0963	2
IEEE Inverse	I	0.18	2
IEEE Extremely Inverse	EI	0.0352	2

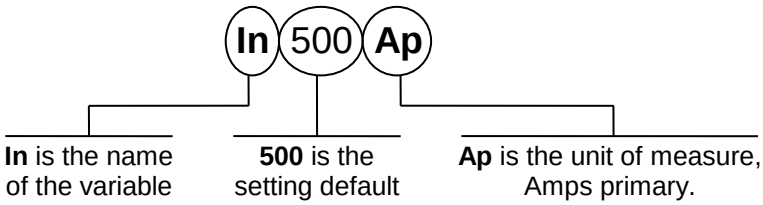
11. READING OF PROGRAMMED SETTINGS AND SETTING CONFIGURATION

Enter the mode "SET DISP", select the menu "SETTINGS" or "F→RELAY", scroll information available in the menu by keys "+" or "-".
SETTINGS= values of relay's operation parameters as programmed
F→RELAY= output relays associated to the different functions as programmed.

12. PROGRAMMING

The relay is supplied with the standard default programming used for factory test. [Values here below reported **(-----)**].
All parameters can be modified as needed in the mode PROG and displayed in the mode SET DISP
Local Programming by the front face key board is enabled only if no input current is detected (main circuit breakers open). Programming via the serial port is always enabled but a password is required to access the programming mode. The default password is the null string; in the standard application program for communication "MS-COM" it is also provided an emergency password which can be disclosed on request only.
As soon as programming is enabled, the Led PRG/IRF flashes and the reclosing lock-out relay R5 is deenergized..
Enter MODE "PROG" and SELECT either "SETTINGS" for programming of parameters or "F→RELAY" for programming of output relays configuration; enable programming by the indirect operation key PROG.
The key SELECT now scrolls the available parameters. By the key (+) , (-) the displayed values can be modified; to speed up parameter's variation press the key SELECT while "+" or "-" are pressed.
Press key "ENTER/RESET" to validate the set values.

12.1 - PROGRAMMING OF FUNCTIONS SETTINGS



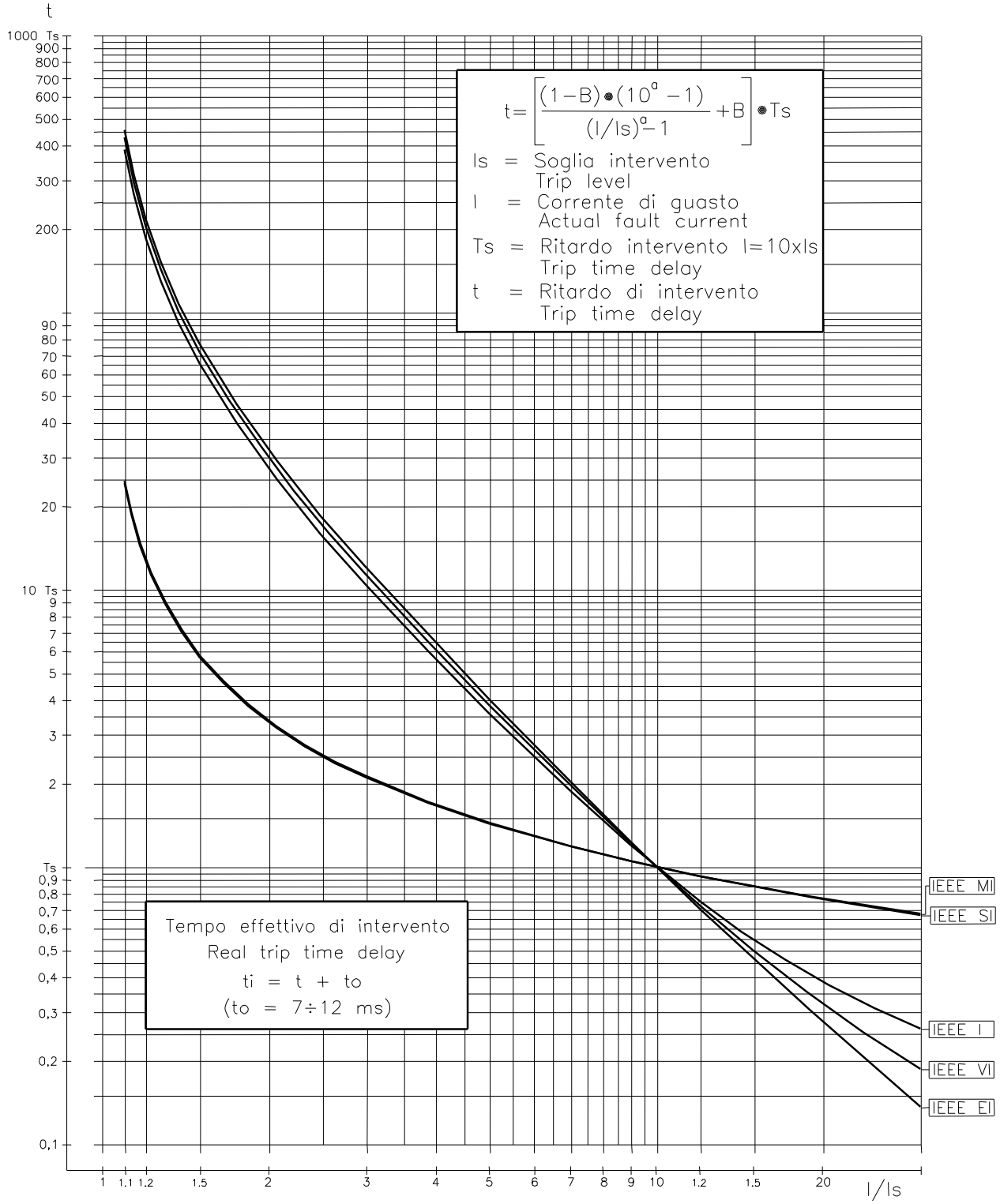
Mode PROG menu SETTINGS. (Production standard settings here under shown).

Display	Description	Setting Range	Step	Unit
Fn 50 **Hz**	Mains frequency	50 - 60	10	Hz
In 500**Ap**	Rated primary current of the phase C.Ts.	1 - 9999	1	A
On 500**Ap**	Rated primary current of the C.Ts. or of the tore C.T. supplying the zero sequence current	1 - 9999	1	A
F(I>) D	Operation characteristic of the low-set overcurrent element: (D) = Independent definite time (A) = IEC Inverse Curve type A (B) = IEC Very Inverse Curve type B (C) = IEC Extremely Inverse Curve type C (MI) = IEEE Moderate Inverse Curve (SI) = IEEE Short Inverse Curve (VI) = IEEE Very Inverse Curve (I) = IEEE Inverse Curve (EI) = IEEE Extremely Inverse Curve	 D A B C MI SI VI I EI	 D A B C MI SI VI I EI	-

Display	Description	Setting Range	Step	Unit
I> .5**In**	Trip level of low-set overcurrent element (p.u. of the rated current of the phase C.Ts.)	0.5 - 4 - Dis	0.01	In
tI> .05**s**	Trip time delay of the low-set overcurrent element In the inverse time operation [tI>] is the trip time delay at I = 10x[I>].	0.05 - 30	0.01	s
I>> .5**In**	Trip level of high-set overcurrent element (p.u. of the rated current of the phase C.Ts.):	0.5 - 40 - Dis	0.1	In
tI>> .05**s**	Trip time delay of the high-set overcurrent element	0.05 - 3	0.01	s
F(O>) D	Operation characteristic of the low-set earth fault element: (D) = Independent definite time (A) = IEC Inverse Curve type A (B) = IEC Very Inverse Curve type B (C) = IEC Extremely Inverse Curve type C (MI) = IEEE Moderate Inverse Curve (SI) = IEEE Short Inverse Curve (VI) = IEEE Very Inverse Curve (I) = IEEE Inverse Curve (EI) = IEEE Extremely Inverse Curve	 D A B C MI SI VI I EI	 D A B C MI SI VI I EI	-
O> .02**On**	Trip level of low-set earth fault element (p.u. of the rated current of the C.Ts. for zero sequence detection)	0.02 - 0.4 - Dis	0.01	On
tO> .05**s**	Trip time delay of low-set earth fault element. In the inverse time operation [tO>] is the trip time delay at I = 10x[O>].	0.05 - 30	0.01	s
O>> .02**On**	Trip level of high-set earth fault element (p.u. of the rated current of the C.Ts. for zero sequence detection)	0.02 - 4 - Dis	0.01	On
tO>> .05**s**	Trip time delay of the high-set earth fault element	0.05 - 3	0.01	s
tBO .05**s**	Max. reset time delay of the instantaneous elements after tripping of the time delayed elements and time delay for activation of the output relay associated to the Breaker Failure function	0.05 - 0.25	0.01	s
2I>> OFF	Automatic doubling of high set overcurrent level When set to ON the level I>> is automatically doubled (from I>> to 2I>>) Within the first 60ms from switch-on, the inrush current gets higher than 1,5 In. As soon as the current drops below 1,25 In the level I>> comes back to its normal set value (from 2I>> to I>>).	ON - OFF	ON - OFF	-
NodAd 1	Identification number for connection on serial communication bus	1 - 250	1	-

The setting Dis indicates that the function is disactivated.

20. TIME CURRENT CURVES IEEE (TU0354 Rev.0 2/2)



Curve Type	B	a
MI= IEEE Moderate Inv.	0.0226	0.02
SI= IEEE Short Inv.	0.00262	0.02
VI= IEEE Very Inv.	0.0963	2
I= IEEE Inverse	0.18	2
EI= IEEE Extremely Inv.	0.0352	2

F51 { Is = I> = (0.5−4)In
Ts = tI> = (0.05−30)s

F51N { Is = O> = (0.02−0.4)On
Ts = tO> = (0.05−30)s