

BASIC OPERATION MANUAL OF DISTANCE PROTECTION RELAY

A. Starting the Distance Protection Trainer

1. Start the Distance Protection Trainer (MV1434-1) by means of the MAINS switch enabling the power to the IED and internal auxiliary.



Fig. 1 MAINS Switch

2. Start the Power Source (MV1300 or MV1429+MV1103) and increase the voltage to a level of approximately 230 or 400V (measured directly after the power source and before the reactor ballast). Make sure that you can monitor both the voltage and current feed into the system.

Current Limitation by means of a Reactor Ballast to ensure safe fault simulations

3. To limit the current when simulating faults, increase the Reactor Ballast (MV1101) to Level 6 which is equivalent to a reactance of approximately 100Ω (resistance approximately 2Ω). This will limit the current when simulating faults (Phase-Phase or Phase-Earth) to be maximum 2A at 400V Phase-Phase.

B. Controlling the Power Bus Circuit Breaker

1. Operate the Power Bus Circuit Breaker = CB FEEDER by means of the Control Buttons (Fig. 2 below):



Fig. 2 Control Buttons

2. The Control Buttons are used to operate the CB FEEDER when the HMI is showing the CONTROL screen = SINGLE LINE DIAGRAM (Fig. 3 below). The CONTROL screen = SINGLE LINE DIAGRAM can be reached from: MAIN MENU > CONTROL > SINGLE LINE DIAGRAM but is also defined as the default start screen.

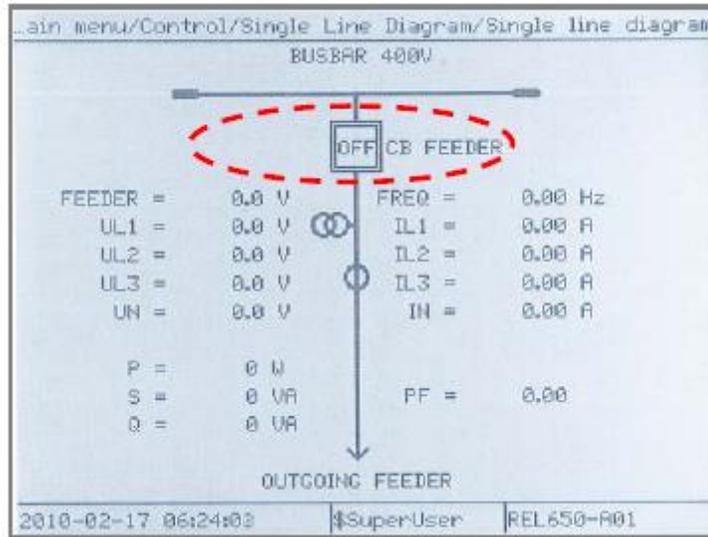


Fig. 3 Single Line Diagram

3. Controlling the CB FEEDER (red crosshatched section of Fig. 3 above):

- Mark CB FEEDER in the SINGLE LINE DIAGRAM (SLD) by pressing the  or  buttons. (The state OFF/ON is shown within the square)
- Change the state of the CB FEEDER to ON by pressing the  button followed by the  button.
- Change the state of the CB FEEDER to OFF by pressing the  button followed by the  button.

C. Function Key Control HMI

The HMI is equipped with five function keys (Fig. 4 below) which in this case are preset according to Table 1.

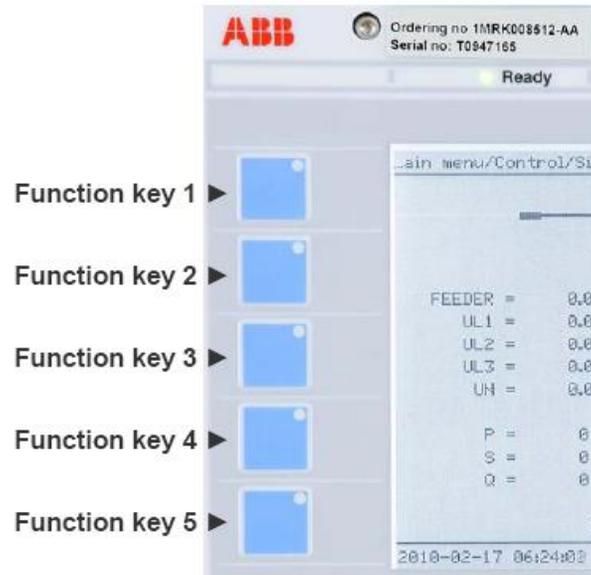


Fig. 4 Function keys

Pushing any of the function keys (1-5) will display descriptions of the functionalities of each function key. Pushing once again will enable the functionality of the pushed function key.

To clear the view from descriptions of the function keys, simply push the  button.

Table 1 Function Keys

Function key number	Preset function	Description
1	RESET	Resets all of the indication LEDs.
2	MAIN MENU REL650	Shortcut to the Main menu.
3	SINGLE LINE DIAGRAM	Shortcut to the SINGLE LINE DIAGRAM (SLD).
4	DISTURBANCE RECORDER	Shortcut to the DISTURBANCE RECORDER.
5	CLEAR	Shortcut to the CLEAR menu.

Note: To reset all of the indication LEDs, please press and hold the RESET button until the LED of the Function key 1 lights on.

D. Fault Simulation

The fault simulation between phases or between phases and neutral (earth) can be simulate at the end of each line model (equivalent to each zone in the laboratory environment) by connecting the load switch (MV1500), a resistance (MV1959) and an Ammeter (MV1922) in series to create a short circuit with more or less resistance. The suggested connection is

illustrated in Fig. 5. The fault can be simulated either between two phases, L1-L2 like in the illustration, or between phase and earth (neutral in the laboratory environment).

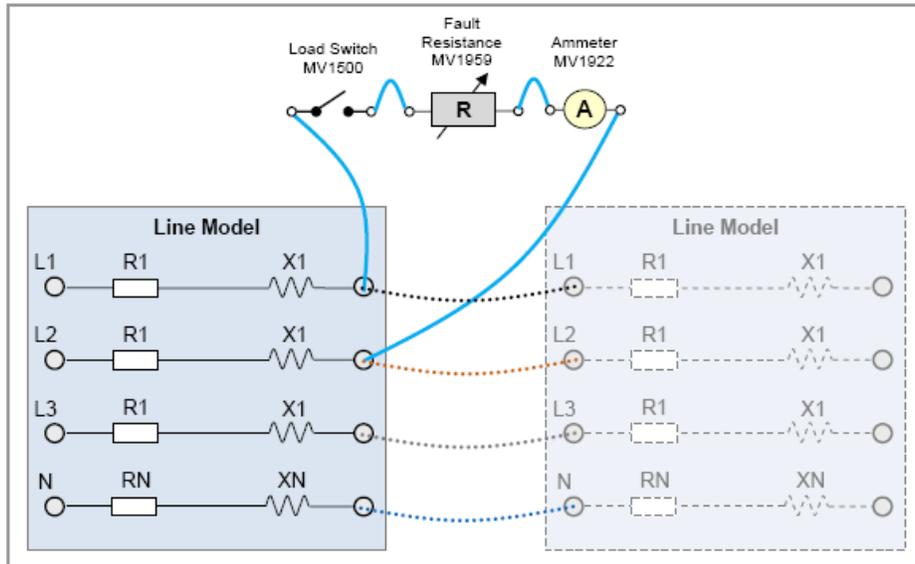


Fig. 5 Simulating a Fault

E. Interpreting the Tripping Indication LEDs



Fig. 6 Trip indication LEDs

Table 2. Trip indication LEDs

LED indication name	Description	Indication colour
TRIP IMP PROT Z1	Trip indication of impedance protection zone 1	●
TRIP IMP PROT Z2	Trip indication of impedance protection zone 2	●
TRIP IMP PROT Z3	Trip indication of impedance protection zone 3	●
TRIP IMP PROT Z4	Trip indication of impedance protection zone 4	●
TRIP IMP PROT Z5	Trip indication of impedance protection zone 5	●
START L1 TRIP	Start fault indication phase 1 (L1)	●
START L2 TRIP	Start fault indication phase 2 (L2)	●
START L3 TRIP	Start fault indication phase 3 (L3)	●
START PE TRIP	Start fault indication of neutral (protective earth, PE in the laboratory environment constituted by neutral N)	●
OC TRIP PP	Over current trip phase-phase	●
OC TRIP PE	Over current trip phase-earth (neutral in the laboratory environment)	●
START OC PROT	Start fault indication over current	●
OVER VOLT PROT	Trip indication over voltage	●
UNDER VOLT PROT	Trip indication under voltage	●
START VOLT PROT	Start fault indication voltage protection	●