Mikro MSC MU350 3 Phase Voltage Relay User Guide

Contents

Mikro MSC MU350 3 Phase Voltage Relay

Product Usage Instructions

- Make sure to connect the neutral wire based on the selected Phase option:
- The product has dimensions of 96mm x 96mm x 90mm. Refer to Figure 6 for more details.
- The product allows settings for Undervoltage, Overvoltage, Time delay for overvoltage, Unbalance, Time delay for unbalance, and Phase loss.
- These settings can be adjusted to meet specific requirements.
- Refer to Figure 5 for a typical application diagram showing the connection layout for L1, L2, L3, N, R1, R2, AUX, NC, and NO COM components.

MU350 3-Phase Voltage Relay User's Guide V3.2

Brief Overview

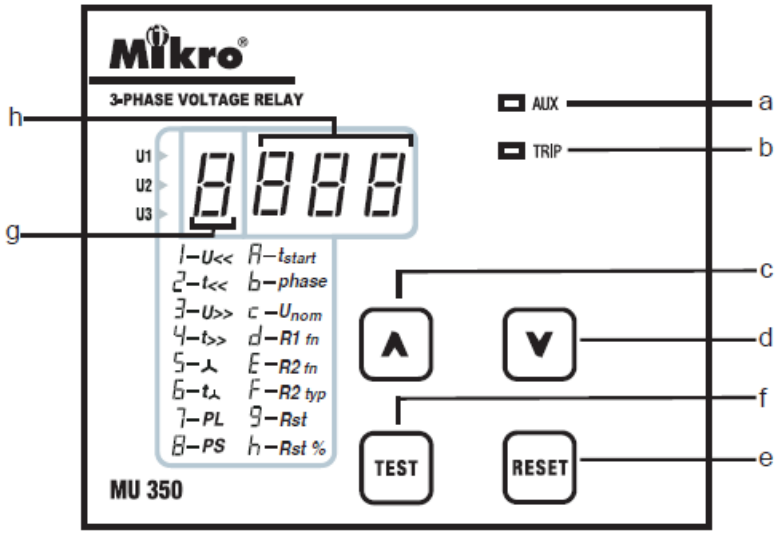


Figure 1: Front panel overview

Symbols

a – Auxiliary power supply LED

b – Trip/Pickup LED

c – Up key

d – Down key

e – Reset/Mode key

f – Test key

g – Function LED

h – Data LED

U<< - Undervoltage
t<< - Undervoltage time delay
U>> - Overvoltage
t>> - Overvoltage time delay
 - Unbalance/phase
 - Unbalance time delay
PL - Phase loss
PS - Phase sequence
t_{start} - Starting delay
U_{nom} - Nominal Voltage
fn - Function
R2 typ - R2 energized type
Rst - Reset

General Description

- MU350 is a voltage relay that combines overvoltage, undervoltage, unbalance, phase loss, phase sequence, and delay start functions. It can be connected with or without a neutral wire.
- MU350 incorporates a 4-digit LED display which allows direct numerical readout of set values, actual measured value, and system indication.
- MU350 has 2 relay outputs (R1 and R2). R1 is energized under normal operating conditions. R2 can be configured as normally energized or de-energized.
- Both R1 and R2 can be assigned to operate separately by various tripping elements.

Voltage and Frequency Display

- During power up, when the relay is not under tripping condition, the display will show voltage and frequency readings.
- The Function LED indicates which line/phase of voltage is being displayed or shows ‘F’ when frequency is being displayed.
- The Data LED shows a value. Press “UP” or “DOWN” to scroll through the parameters as shown in Figures 2 and 3 (depends on L-L or L-N setting).

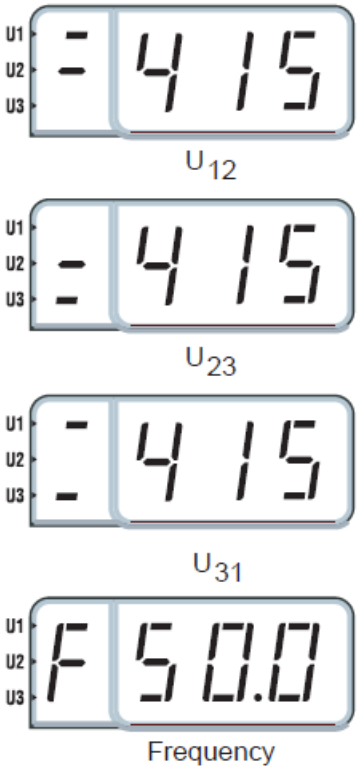


Figure 2: Display for L-L setting. 415V and 50.0Hz shown as example

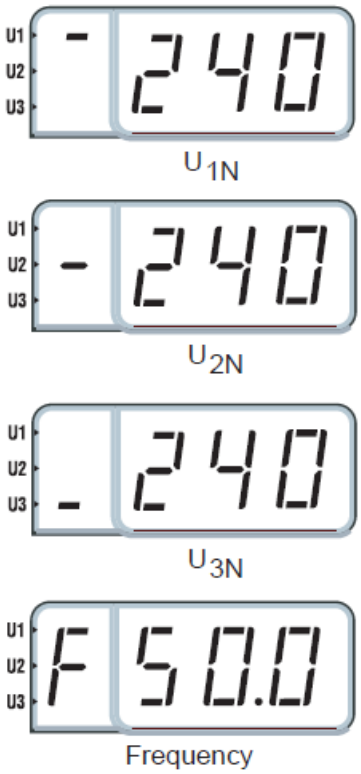


Figure 3: Display for L-N setting. 240V and 50.0Hz shown as example

Auto Scroll

- Auto scroll lets the display to scroll to the next available parameter every 10 seconds.
- To toggle auto scroll mode, press “UP” and “DOWN” simultaneously.

Settings

Setting Display

- When the relay is not under tripping condition, pressing “RESET/MODE” can scroll through various settings.
- Function LED shows a number or alphabet to indicate which setting is being viewed, as shown in Figure 4. Table 1 gives description of each setting.

Tip: To quickly jump back to the voltage display during the setting display, press and hold “RESET/MODE” for more than 1.5 seconds.

Programming Setting

- Step 1: Press “RESET/MODE” until the Function LED shows the required setting.
- Step 2: Press “UP” and “DOWN” simultaneously to enter programming mode.
- The Function LED blinks to indicate that the relay is in programming mode.
- Step 3: Press “UP” or “DOWN” to select the desired value.
- Step 4: To save the selected value, press “UP” and “DOWN” simultaneously again. It will exit the programming mode with the Data LED displaying the newly set value.

To exit programming mode without saving the selected setting, press “RESET/MODE” once.

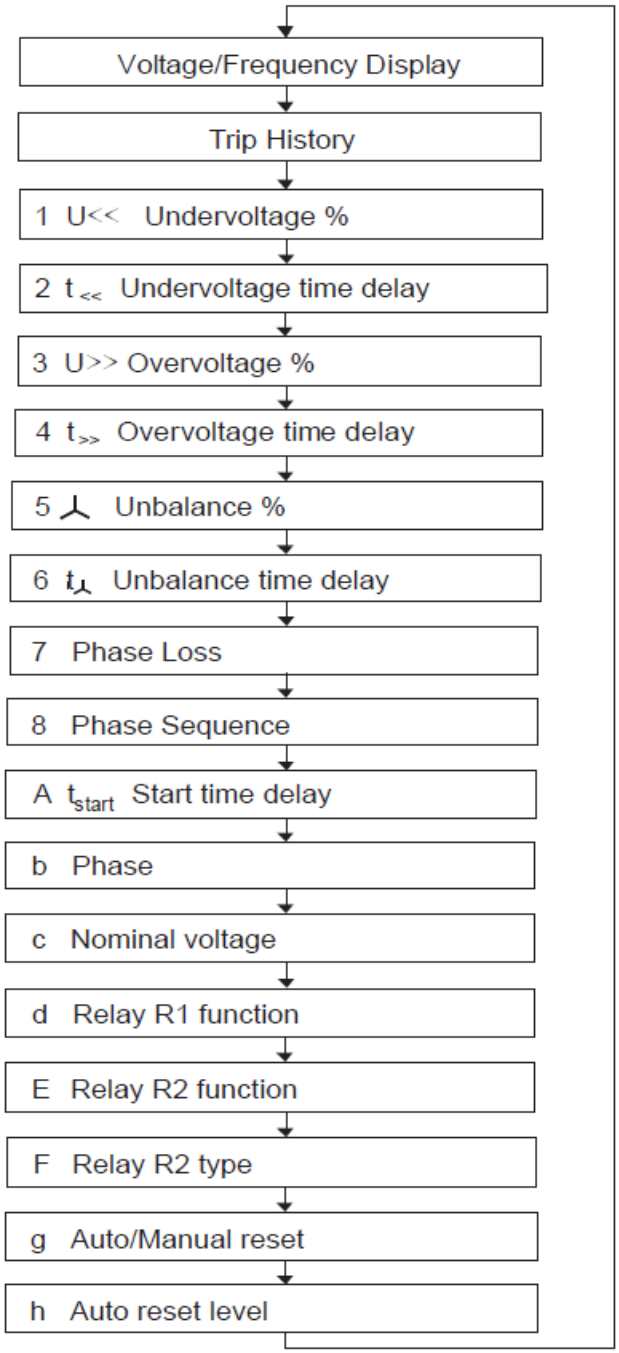


Figure 4: Display mode when pressing Reset/Mode

Table 1: Description of functions

Setting	Function	Setting Range	Description
1	U<< Undervoltage	off, 1-25 %	Undervoltage % from nominal voltage
2	t<< Undervoltage delay	0.1-30 s	Time delay for undervoltage
3	U>> Overvoltage	off, 1-20 %	Overvoltage% % from nominal voltage
4	t>> Overvoltage delay	0.1-30 s	Time delay for overvoltage
5	Unbalance	off, 3-20%	Unbalance %
6	t Unbalance delay	0.5-30 s	Unbalanced time delay
7	Phase loss	off, on	Phase loss disable/enable
8	Phase sequence	off, on	Phase sequence disable/enable
A	t start Starting delay	0-999 s	On-time delay of R1 during power up
b	Phase	L-L, L-N	L-L: Display and uses Line-to-Line voltage L-N: Display and use Line to Neutral voltage
c	Nominal Voltage	100 – 415 V or 58 – 240 V	Nominal voltage. Value depends on L-L or L-N setting
d	Relay R1 function	0 – 7	*Refer to Table 2
E	Relay R2 function	0 – 7	*Refer to Table 2
F	Relay R2 type	0 – 1	0: Normally de-energized 1: Normally energized
g	Auto/Manual reset	0=auto, 1=manual	auto: auto reset when trip condition is clear, ma nual: press “RESET/MODE” to reset
h	Auto reset level	1-10 %	Auto reset level for U<< and U>>

Undervoltage

- Undervoltage pickup occurs when any line-to-line or line-to-neutral voltage is less than [nominal voltage – U<< %], relay trips when the delay time elapses.

Overvoltage

- Overvoltage pickup occurs when any line-to-line or line-to-neutral voltage is more than [nominal voltage + U> >%], relay trips when the delay time elapses.

Unbalance

- Unbalance is calculated as:
- (Vmax-Vmin)/Vmin X 100%
- Where Vmax is the maximum voltage among the 3 voltages. Vmin is the minimum voltage among the 3 voltages.
- Unbalanced pickup occurs when unbalance is more than the setting %, the relay trips when the delay time elapses.
- Phase Sequence trip occurs when the phase sequence in any 2 or all of the lines is reversed.
- Phase Loss trip occurs when any voltage is less than 70% of the nominal.

Starting Delay

- Starting delay is the delay time for R1 to be energized during power up under normal conditions.

Relay Function Selection

- During tripping, the output contact relay R1 or R2 will be de-energized/energized if the related tripping element is activated.
- The setting is shown below:

Code	Phase	OV	UV
0	0	0	0
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

- Code: Displays on Data LED
- Phase: Unbalance, Phase Loss, and Phase Sequence
- OV: Overvoltage
- UV: Undervoltage
- 0= De-activated
- 1= Activated

Table 2: Relay function selection

Trip

Trip Display

- During pickup, the Trip/Pickup LED blinks. During the tripping condition, the Trip/Pickup LED turns on. Function LED and Data LED blink with trip source as shown:

Function LED	Data LED	Description
1	trip voltage	Undervoltage trip
3	trip voltage	Overvoltage trip
5	Ub	Unbalance trip
5	PL	Phase loss trip
5	PS	Phase sequence trip
t	EST	Test

Table 3: Trip display

Trip Reset

- During tripping condition, press “RESET/MODE” to reset the relay; the relay will reset if lower than the threshold. Manual reset threshold for U>> / U<< and Unbalance is: Setting % – 1%.
- Auto/Manual reset setting applies to U<<, U>>, Unbalance tripping. Phase Sequence and Phase loss is always auto reset.

Auto reset level

- This sets the U<< and U>> auto reset level. Unbalanced auto reset is fixed to 2%.
- E.g.. if U>> is set to 10% and Auto reset level is set to 2%, U>> trips when voltage >110%, U>> reset when voltage <108%
- Eg2. if U<< is set to 20% and Auto reset level is set to 5%, U<< trips when voltage <80%, U<< reset when voltage >85%
- If Auto reset% % is equal or larger than U<< / U>> %, it will be automatically set to U<< / U>> % – 1%.

Trip Test

- The trip test is used to simulate a tripping condition.
- Press the “TEST” button and hold for 1.5s; the trip LED blinks. After 3.5 seconds, “tESt” will blink, R1 deenergized, and R2 will operate depending onthe relay R2 type. Press “RESET/MODE” to reset.

Trip History Display

- During the Voltage and frequency display, Press the “RESET/MODE” button to jump to the Trip History Display.
- The display shows the previous trip status with a ‘dot’ blinking at the Function LED. To clear trip history, press “UP” and “DOWN” simultaneously.

Trip Bypass Mode

- To disable tripping due to incorrect settings, press “RESET/MODE” and “TEST” simultaneously during power up. The Trip LED slow blink indicates Trip Bypass Mode.
- Go into programming mode to correct the setting. Power off and on to reset the relay. The relay will return to normal if no button is pressed for longer than 2 minutes.

Typical Application Diagram

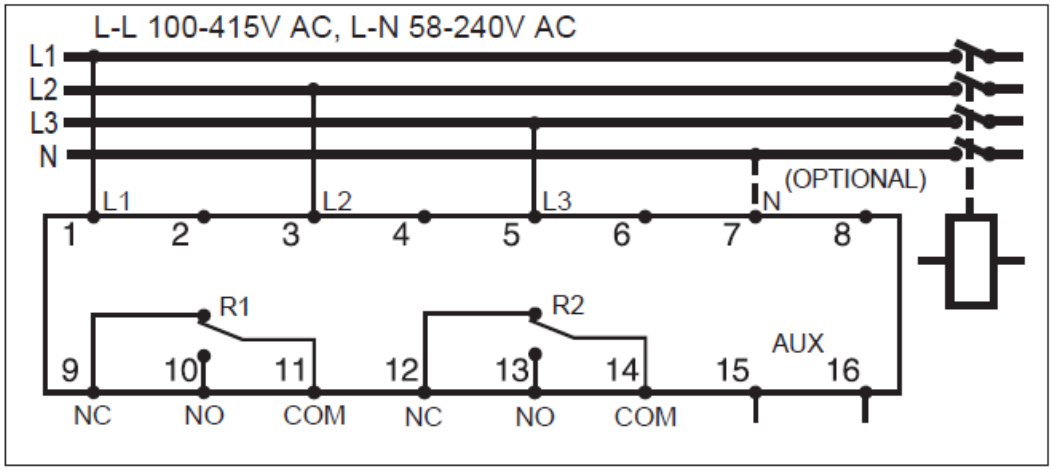


Figure 5

- Neutral connection is optional when the Phase option is set to L-L. A neutral connection is required when the Phase option is set to L-N. (refer to Setting b – Phase)

Case Dimensions

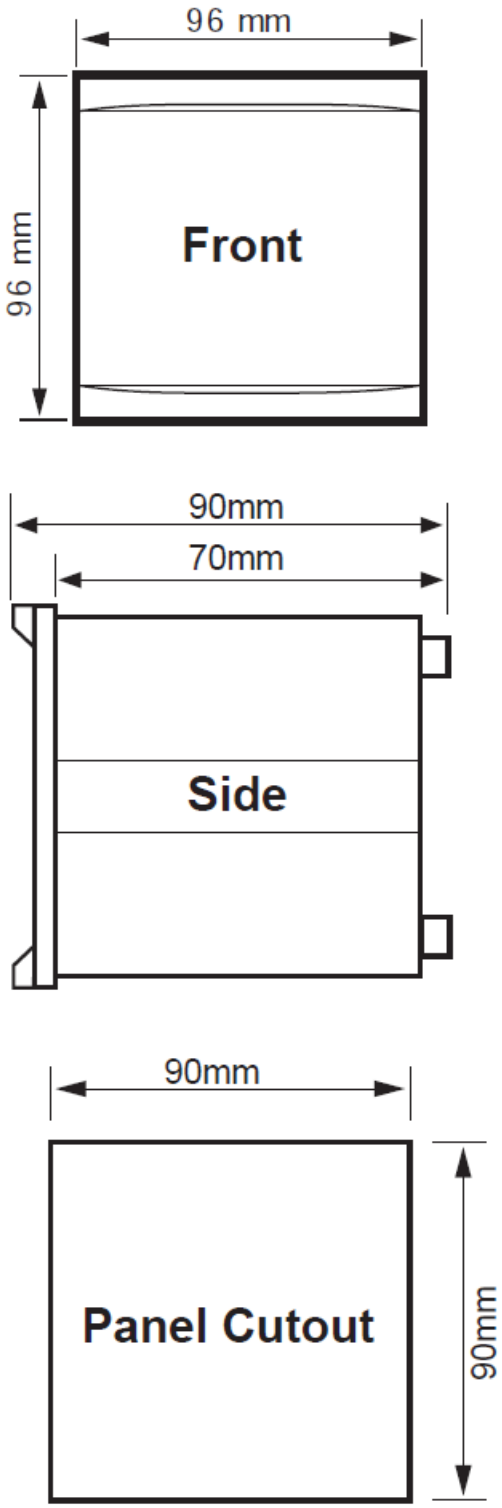


Figure 6: Case Dimensions

Technical Data

Setting Ranges

- Undervoltage: Off, 1% – 25%
- Time delay for undervoltage: 0.1s – 30s
- Overvoltage : Off, 1% – 20%
- Time delay for overvoltage: 0.1s – 30s
- Unbalance: Off, 3% – 20%
- Time delay for unbalance: 0.5s – 30s

- Phase loss: off, on, Fixed time <0.5s
- Phase sequence: off, on, Fixed time <0.5s
- Start time delay: 0s – 999s
- Auto reset level (undervoltage and overvoltage): 1% – 10%

Auxiliary Supply (AUX)

- MU350-415V: 380V(-25%) – 415V(+20%) AC
- MU350-220V: 220V(-25%) – 240V(+20%) AC
- MU350-110V: 100V(-25%) – 120V(+20%) AC
- MU350-240AD: 85V(-25%) 265V(+20%) AC or 110V(-25%) – 340V(+20%) DC
- Supply frequency: 45Hz to 65Hz
- Maximum power consumption: 3VA

Measuring Input

- Line to line: 100 – 415(+20%) VAC
- Line to Neutral: 58 – 240(+20%) VAC
- Frequency: 40Hz to 70Hz

Contacts

- Contact arrangement: Change-over
- Contact rating: 5A, 250V AC(cos☒ =1)
- Contact material: Silver alloy
- Operating time: 15 ms max
- Expected electrical life: 100,000 operations at rated current
- Expected mechanical life: 5 x 106 operations

Indicators

- Auxiliary supply: Green LED indicator
- Pickup indicator: Red LED indicator
- Trip: 7-segment display and red LED indicators

Mechanical

- Mounting: Din rail mounted
- Approximate weight: 0.31kg

Accuracy

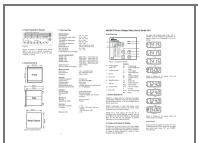
- Protection thresholds: ± 3 %
- Time delay: 0–0.5s, ± 15% with a minimum of 40ms 0.6s and above, ±3%

- Measurements: ± 3%

FAQ

- **Q: When should I connect the neutral wire?**
  - **A:** Connect the neutral wire based on the selected Phase option. It is optional for L-L Phase option and required for L-N Phase option.
- **Q: How do I adjust the technical settings?**
  - **A:** To adjust technical settings such as Undervoltage, Overvoltage, Time delays, Unbalance, and Phase loss, refer to the user manual for detailed instructions on setting adjustments.

Documents / Resources

	Mikro MSC MU350 3 Phase Voltage Relay [pdf] User Guide MU350-V3.2-NX, MU350 3 Phase Voltage Relay, 3 Phase Voltage Relay, Voltage Relay, Relay

References

- User Manual