INSTRUCTION MANUAL

MT935

MOTOR & PHASE ROTATION INDICATOR

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1. INTRODUCTION

The MT935 is a handheld, battery-operated meter designed to detect the rotary field of three-phase systems and determine motor-rotation direction.

2. SYMBOLS

The following symbols appear on the Meter or in this manual.

ϟ	Risk of electric shock
⚠	Risk of Danger, Important information see manual.
⚠ϟ	Hazardous Voltage.
⧈	Equipment protected by double or reinforced insulation
▭+	Battery
⏚	Earth
≂	AC or DC
CE	Conforms to EU directives
CAT III	Overvoltage (Installation) Category III. Pollution Degree 2 per ICE 1010-1 refers to the level of Impulse withstand voltage protection provided. Equipment of Overvoltage Category III is equipment in fixed installations (e.g. electricity meter and primary over-current protection equipment).

3. SAFETY INFORMATION

⚠ **CAUTION** identifies conditions & actions that may damage the meter.

⚠⚠**WARNING** identifies conditions & actions that pose hazard to the user. To avoid possible electric shock or fire, do the following:

- Read the safety information carefully before using or servicing this meter.
- Adhere to local and national safety codes.
- Individual protective equipment must be used to prevent shock and injury.
- Using this meter in a manner not specified by Major Tech may impair safety features/protection provided by the equipment.
- Avoid working alone.
- Inspect the test leads for damaged insulation or exposed metal. Check test lead continuity, damaged leads must be replaced, do not use the meter if it appears to be damaged.
- Be careful when working above 30V AC RMS, 42V AC peak and 60V DC, such voltages pose a shock hazard.
- When using the probes, keep fingers away from probe contacts, keep fingers behind the finger guards on the probes.
- Measurements can be adversely affected by impedances of additional operating circuits connected in parallel or by transient currents.

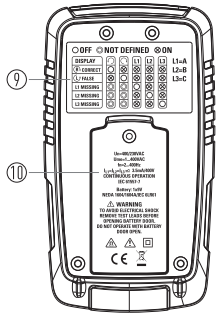
- Verify operation prior to measuring hazardous voltages (voltages above 30V AC RMS, 42V AC peak and 60V DC).
- Do not use the meter with any of the parts removed.
- Do not use the meter around explosive gas, vapor, or dust.
- Do not use the meter in a wet environment.

4. Accessories Included

3 Piece Self-Retaining Test Leads, 3 Alligator Clips, 9V Battery & Manual.

5. METER DESCRIPTION

1 - Test Lead Input Jack
2 - L1 Indicator
3 - L2 Indicator
4 - L3 Indicator
5 - Clockwise Rotation Indicator
6 - Counter Clockwise Rotation Indicator
7 - ON/OFF Indicator
8 - ON/OFF Button
9 - Brief Instructions on Instrument Rear
10 - Battery Cover



6. OPERATION

6.1. Determine Rotary Field Direction

1. Connect one end of the test leads to the Meter, make sure the L1, L2 and L3 test leads are connected to the corresponding input jacks.
2. Connect the test probes to the three main phases, press the ON/OFF Button, the green ON indicator shows that the meter is ready for testing.
3. Either the Clockwise or Counter Clockwise Rotary indicator illuminates showing the Type of rotary field direction present.
4. The rotary indicator lights up even if the neutral conductor, N, is connected instead of the Test lead input jacks.
5. Refer to Figure 1 (Shown on the back of the Meter) for more information.

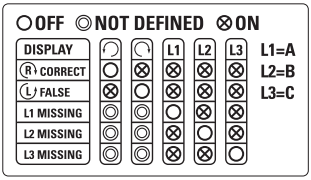


Figure 1

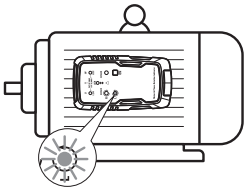


Figure 2

6.2. Non-Contact Rotary Field Indication

1. Disconnect all test leads from the Meter.
2. As shown in Figure 2, position the MT935 on the motor so that it is parallel to the length of the motor shaft, the meter should be at least 1 inch away from the motor.
3. Press the ON/OFF Button, the green ON indicator shows that the instrument is ready for testing.
4. Either the Clockwise or Counter Clockwise Rotary indicator illuminates showing the type of rotary field direction present.

Note: The indicator will not operate with engines controlled by frequency converters. The bottom of the Meter should be oriented towards the drive shaft. See the Orientation Symbol on the Meter.

See Table for the minimum motor diameter and number of pole pair to obtain a reliable test result.

Number of Pole Pair	Rotary Number of Rotary Field (1/min)at Frequency (Hz)			Angle Between Poles	Min. Ø of Motorcase
	16 2/3	50	60	°	cm
1	1000	3000	3600	60	5.3
2	500	1500	1800	30	10.7
3	333	1000	1200	20	16.0
4	250	750	900	15	21.4
5	200	600	720	12	26.7
6	167	500	600	10	32.1
8	125	375	450	7.5	42.8
10	100	300	360	6	53.5
12	83	250	300	5	64.2
16	62	188	225	3.75	85.6

6.3. Determine the Motor Connection

1. Connect one end of the test leads to the Meter, make sure the L1, L2 and L3 test leads are connected to the corresponding jack.
2. Connect the alligator clamps to the other end of the test leads.
3. Connect the alligator clamps to the motor connections, L1 to U, L2 to V, L3 to W.
4. Press the ON/OFF Button, the green ON indicator shows that the instrument is ready for testing.
5. Turn the motor shaft half a revolution towards the right.

Note: The bottom of the Meter should be oriented towards the drive shaft. See the Orientation Symbol on the Meter.

Note: Either the Clockwise or Counter Clockwise Rotary indicator illuminates showing the type of rotary field direction present.

6.4. Magnetic Field Detection

- To detect a magnetic field, place the Motor and Phase Rotation indicator to a solenoid valve.
- A magnetic field is present if either the Clockwise or the Counter Clockwise Rotary indicator illuminate.

7. BATTERY REPLACEMENT

This Meter uses a 9V battery. To replace the battery, follow these steps.

1. Place the LCD side of the Meter down on a non-abrasive surface.
2. With a screwdriver, loosen the screw of the battery compartment and remove the lid. Remove the old batteries.
3. Insert the new batteries while observing the battery polarity shown in the battery compartment.
4. Secure the battery compartment lid back in position with the screw.

Note: The Meter contains alkaline batteries. Do not dispose of these batteries with other solid waste. Used batteries should be disposed of by a qualified recycle or hazardous materials handler.

8. SPECIFICATIONS

8.1. Determine Rotary Field Direction

Function	Range
Nominal Voltage Rotary Direction	1 to 400V AC
Nominal Voltage Phase Indirection	120 to 400V AC
Frequency Range (fn)	2 to 400Hz
Test Current (In per phase)	Less than 3.5mA

8.2. Non-Contact Rotary Field Indication

Function	Range
Frequency Range (fn)	2 to 400Hz

8.3. Determine the Motor Connection

Function	Range
Nominal Test Voltage (U me)	1 to 400V AC
Nominal Test Current (In per phase)	Less than 3.5mA
Frequency Range (fn)	2 to 400Hz

8.4. Electrical Specifications

Function	Range
Battery	9V alkaline, IEC 6LR61
Current Consumption	Max 20mA
Battery life Minimum	1 year for average use

8.5. Safety Specifications

Function	Range
Electrical Safety	Meets DIN VDE 0411,IEC 61010 DIN, VDE 0413-7, IEC 61557-7/EN 61557-7
Maximum Operating Voltage (Ume)	400V AC for all ranges
Protection Levels	CAT III 1000V and CAT IV 600V

8.6. Environmental

Function	Range
Operating Temperature	0°C to 40°C
Operating Humidity	15% to 80%RH
Operating Altitude	2000m
Pollution Degree	2
Type of Protection	IP40

8.7. Mechanical Specifications

Function	Range
Size (HxWxD)	135x75x31mm
Weight (With the battery)	174g

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