PREXISO MT-105

PREXISO MT-105 Non-Prism Total Station Instruction Manual

Model: MT-105 | Brand: PREXISO

1. Introduction

This instruction manual provides essential information for the safe and efficient operation of your PREXISO MT-105 Non-Prism Total Station. Please read this manual thoroughly before using the device to ensure proper handling, setup, measurement procedures, and maintenance. Keep this manual in a safe place for future reference.
The PREXISO MT-105 is a high-performance total station designed for precise surveying and measurement tasks. It features a non-prism measurement capability, 2-axis compensation, a laser plummet with shifting function, and a user-friendly Japanese LCD display.

2. Safety Information

Always observe the following safety precautions to prevent injury and damage to the instrument:

- Do not look directly into the laser beam. Laser radiation can cause eye damage.
- Ensure the instrument is securely mounted on a stable tripod to prevent tipping.
- Operate the device within the specified temperature range (-20°C to +50°C).
- Protect the instrument from severe impacts and vibrations.
- Use only approved batteries and chargers.
- Keep the instrument dry. Although it has IP66 dust and water protection, avoid submerging it.

3. Product Overview and Components

The PREXISO MT-105 Total Station is designed for robust field use. Key components include the main unit, display, keypad, and various optical and electronic parts.

Figure 3.1: Main unit of the PREXISO MT-105 Total Station. This image shows the overall design of the total station, highlighting its compact and durable construction.

Figure 3.2: PREXISO MT-105 Total Station. This image displays the total station with the PREXISO brand logo, emphasizing its professional appearance and certification by the Geospatial Information Authority of Japan.

3.1 Key Features

- **Non-Prism Measurement:** Capable of measuring distances from 0.5m (non-prism) to 5000m (with 1 prism).
- **2-Axis Compensation:** Automatically corrects for tilt in both horizontal and vertical axes, ensuring accurate angle measurements.
- **Laser Plummet with Shifting Function:** Facilitates easy and precise centering over a survey point.
- **Japanese LCD Display:** Clear, backlit, double-sided display for easy readability in various conditions.
- **Data Storage:** Internal memory for 50,000 points and support for USB memory for convenient data transfer.
- **IP66 Protection:** Dust-tight and protected against powerful water jets.

Figure 3.3: Diverse Functions. This image illustrates various features of the MT-105, including laser plummet, 2-axis compensation, non-prism measurement, laser pointer, shifting, IP66 rating, USB slot, data management (TSLink), and a multi-functional case.

4. Setup

4.1 Unpacking and Inspection

Carefully unpack the total station and all accessories. Verify that all items listed in the packing list are present and undamaged. Report any discrepancies or damage to your supplier immediately.

Figure 4.1: Robust Storage Case. The durable storage case protects the total station and can also accommodate mini prisms and pin poles.

4.2 Battery Installation and Charging

The MT-105 uses rechargeable Ni-MH batteries. Ensure batteries are fully charged before use. Insert the charged battery into the battery compartment as shown in the diagram (refer to product diagram for battery compartment location). A full charge provides approximately 10 hours of continuous operation.

4.3 Mounting the Instrument

Mount the total station securely onto a stable tripod. Ensure the tripod legs are spread wide and firmly planted on the ground. Use the central screw to attach the instrument to the tripod head.

4.4 Leveling and Centering

Accurate leveling and centering are crucial for precise measurements.

1. **Rough Leveling:** Adjust the tripod legs to bring the circular bubble into the center.
2. **Fine Leveling:** Use the leveling screws on the tribrach to center the plate bubble.
3. **Centering with Laser Plummet:** Activate the laser plummet. Adjust the tribrach's shifting mechanism to align the laser dot precisely over the survey point. The shifting function allows for easy adjustment without disturbing the leveling.

Figure 4.2: Laser Plummet and Shifting Function. This image demonstrates how the laser plummet and shifting mechanism simplify centering the instrument over a point.

4.5 2-Axis Compensation

The MT-105 features a 2-axis compensation system that automatically detects and corrects for any tilt of the vertical axis in both front-back and left-right directions, ensuring highly accurate angle measurements.

Figure 4.3: 2-Axis Compensation Function. This diagram illustrates how the 2-axis compensation detects and corrects for tilt, ensuring precise angle measurements.

5. Operating Instructions

5.1 Power On/Off and Display

Press the power button to turn on the instrument. The Japanese LCD display will illuminate. The display is double-sided and backlit for clear visibility. To power off, press and hold the power button.

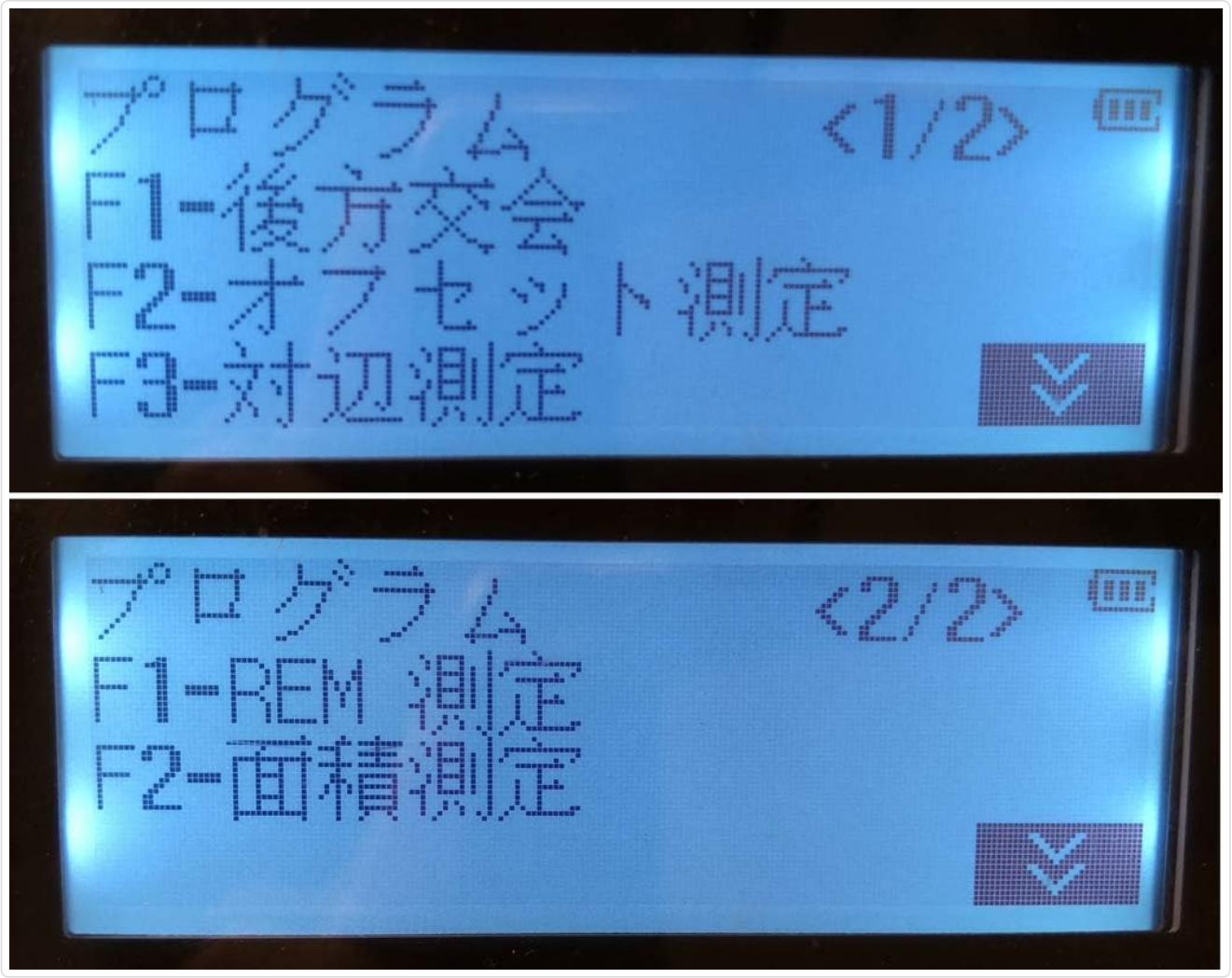

Figure 5.1: LCD Display Program Menu. The display shows various program options such as Resection, Offset Measurement, Traverse Measurement, REM Measurement, and Area Measurement.

5.2 Basic Measurement Modes

The MT-105 offers various measurement modes accessible via the keypad and display menu.

- **Angle Measurement:** Set the horizontal angle to zero or a known value. Rotate the instrument to measure horizontal and vertical angles. Angle accuracy is 5 arc seconds, with display options of 1", 5", or 10".
- **Distance Measurement (EDM):**
    - **Non-Prism Mode:** For measuring distances to surfaces without a prism. Minimum measurable distance is 0.5m. Range up to 800m.
    - **Prism Mode:** For measuring distances to a prism. Range up to 5000m with a single prism.

  Distance accuracy is ±(2+2ppm×D)mm (maximum). The shortest focus distance is 1.6m.

Figure 5.2: Non-Prism Measurement. The MT-105 can measure distances from a minimum of 1.6m (0.5m in non-prism mode), making it suitable for narrow spaces. It includes a laser pointer for targeting.

5.3 Advanced Measurement Functions

The MT-105 supports various advanced surveying programs:

- **Resection:** Determine the instrument's position by measuring known points.
- **Offset Measurement:** Measure points that cannot be directly observed.
- **Traverse Measurement:** Establish control points by measuring angles and distances.

- **REM Measurement:** Remote Elevation Measurement.
- **Area Measurement:** Calculate the area of a polygon defined by measured points.
- **Stakeout:** Layout points from design data.

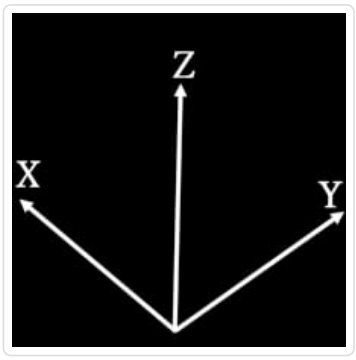

Figure 5.3: Coordinate Measurement. Diagram illustrating the principle of coordinate measurement.

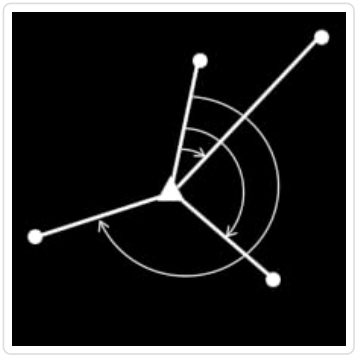

Figure 5.4: Resection. Diagram illustrating the resection method for determining instrument position.

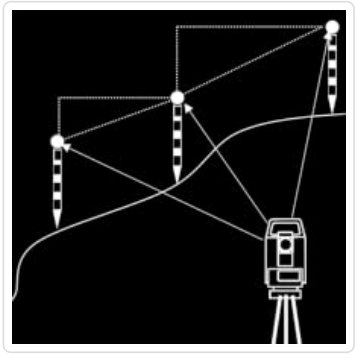

Figure 5.5: Traverse Measurement. Diagram illustrating the process of traverse measurement.

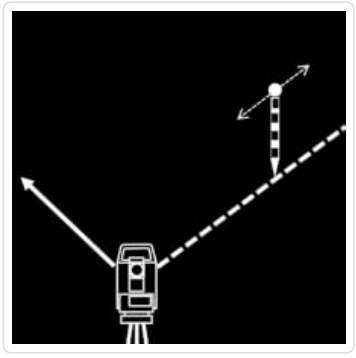

Figure 5.6: Stakeout. Diagram illustrating the stakeout procedure.

5.4 Data Management

The MT-105 allows for efficient data storage and transfer.

- **Internal Memory:** Stores up to 50,000 points.
- **USB Memory:** Connect a commercial USB memory stick to the USB port for easy data backup and transfer to a computer.
- **RS232C Cable:** Use the RS232C interface for direct data communication with a computer.

Figure 5.7: USB Memory Port. The USB port allows for convenient data management and transfer using commercially available USB

6. Maintenance

6.1 Cleaning

- Gently wipe optical parts (lens, display) with a soft, lint-free cloth. Do not use abrasive cleaners.
- Clean the instrument body with a damp cloth. Avoid using strong solvents.

6.2 Storage

When not in use, store the total station in its original carrying case in a dry, temperature-controlled environment. Remove batteries if storing for extended periods.

6.3 Calibration

Regular calibration by authorized service personnel is recommended to maintain measurement accuracy. Refer to the specifications for recommended calibration intervals.

7. Troubleshooting

This section provides solutions to common issues you might encounter. For problems not listed here, please contact customer support.

Problem	Possible Cause	Solution
Instrument does not power on.	Low or uncharged battery.	Charge the battery or replace with a charged one.
Inaccurate measurements.	Instrument not level or compensated.	Re-level the instrument and ensure 2-axis compensation is active.
Laser plummet not visible.	Bright ambient light or dirty lens.	Use in shaded areas or clean the laser plummet lens.
Data transfer issues.	Incorrect cable connection or USB memory format.	Check connections, ensure USB memory is properly formatted (e.g., FAT32).

8. Specifications

The following table details the technical specifications of the PREXISO MT-105 Total Station.

MT-105仕様表		
望遠鏡	対物有効径	45mm
	倍率	26倍
	像	正立
	視野	1° 30′
	分解能	3.5″
	最短合焦距離	1.6m
測角部	読取方式	アブソリュートエンコーダー方式
	精度	5″ *1
	最小表示	1″ / 5″ / 10″　選択可能

	傾斜角補正範囲			±3′
	傾斜補正モード			2軸補正/1軸補正/補正なし　選択可能
測距部	方式			位相差測定方式
	光源			赤色レーザーダイオード：波長685nm
	レーザークラス			クラス3R
	精度	プリズム	精密測定(1.6～4m)	±（3+2ppm×D）mm *2
			精密測定(4m以上)	±（2+2ppm×D）mm *2
			高速測定	±（5+2ppm×D）mm *2
		反射シート		±（3+2ppm×D）mm
		ノンプリズム		±（5+3ppm×D）mm
	測定可能範囲	一素子プリズム		1.6m～5,000m *3
		反射シート		1.6m～800m *3
		ノンプリズム *4		0.5m～400m *3
	距離最小表示	精密/高速/とラッキング		1mm
	測定時間	精密測定		約1.8秒（初回2.5秒）
		高速測定		約0.9秒（初回2.5秒）
		トラッキング測定		約0.4秒（初回1.5秒）
	プリズム定数			1mm単位で入力可。デフォルト0mm
	気象補正			気温/気圧入力か気象補正係数(ppm)
レーザー求心	光源			赤色レーザーダイオード：650nm
	レーザークラス			クラス2
	精度			2mm/1.5m以下
	スポット径			φ2mm/1.5m
気泡管部	円形気泡管			8′/ 2mm
	横気泡管			30″ / 2mm
表示部				正反両側表示(バックライト照明付き)
データ記録	最大記録点数			50,000点
	インターフェース			RS232Cケーブル及びUSBメモリ
電源部	内部バッテリー			充電式ニッケル水素電池
	連続使用時間			10時間 *5
	電圧			DC 7.2V
諸般	動作温度範囲			-20℃～+ 50℃
	寸法			190(D)X210(W)X350(H)mm
	質量			5.7Kg

*1：JIS B 7912-3：2006 準拠。JSIMA 101:2014 適用区分 B
*2：JIS B 7912-4：2006 準拠。JSIMA 102:2006 適用区分 A
*3：もやがなく視程が約 40 ㎞確保でき、曇っていてかげろうがない環境下。
*4：ノンプリ時の測定可能範囲はコダックグレーカードの白色面 (反射率 90%) を使用しております。
　　測定対象物の反射率・気象条件・計測条件により測定可能範囲と精度が変わります。
*5：精密単回で 30 秒毎に測距、気温 20℃の条件下

Figure 8.1: PREXISO MT-105 Detailed Specifications. This image provides a comprehensive table of technical specifications for the total station.

Category	Item	Specification
Telescope	Effective Aperture	45 mm
	Magnification	26x

Category	Item	Specification
	Image	Erect
	Field of View	1° 30'
	Resolving Power	3.5"
	Shortest Focus Distance	1.6 m
Angle Measurement	Reading Method	Absolute Encoder
	Accuracy	5"
	Minimum Display	1" / 5" / 10" (selectable)
	Tilt Angle Correction Range	±3'
	Tilt Correction Mode	2-axis / 1-axis / Off (selectable)
Distance Measurement (EDM)	Method	Phase difference method
	Light Source	Red laser diode: Wavelength 685nm
	Laser Class	Class 3R
	Accuracy (Prism)	±(2+2ppm×D) mm
	Accuracy (Non-Prism 4m+)	±(2+2ppm×D) mm
	Accuracy (Non-Prism)	±(5+2ppm×D) mm
	Measurement Range (1 Prism)	1.6 m - 5000 m
	Measurement Range (Non-Prism)	0.5 m - 800 m
	Measurement Time (Fine)	Approx. 1.8 sec (initial 2.5 sec)
	Measurement Time (Tracking)	Approx. 0.4 sec (initial 1.5 sec)
Laser Plummet	Light Source	Red laser diode: Wavelength 635nm
	Laser Class	Class 2
	Accuracy	±2mm / 1.5m
	Spot Diameter	φ2mm / 1.5m
Bubble Level	Circular Bubble	8' / 2mm
	Plate Bubble	30" / 2mm
Display Unit	Display	Japanese LCD (double-sided, backlit)
Data Recording	Max Recordable Points	50,000 points
	Interface	RS232C cable & USB memory
Power Supply	Battery	Rechargeable Ni-MH battery
	Continuous Operating Time	10 hours

Category	Item	Specification
	Voltage	DC 7.2V
	Operating Temperature Range	-20°C to +50°C
General	Dimensions (D×W×H)	190(D)×210(W)×350(H) mm
	Weight	5.7 kg

Note: Specifications are subject to change without notice.

Figure 8.2: Geospatial Information Authority of Japan Certification. The PREXISO MT-105 is certified as a Class 2A Total Station by the Geospatial Information Authority of Japan (Registration No. 521, registered March 31, 2021).

9. Warranty and Support

9.1 Warranty Information

Your PREXISO MT-105 Total Station comes with a standard manufacturer's warranty. Please refer to the warranty card included with your product for specific terms and conditions, including warranty period and coverage details. Keep your purchase receipt as proof of purchase.

9.2 Customer Support

For technical assistance, troubleshooting, or service requests, please contact your local PREXISO dealer or authorized service center. You can also visit the official PREXISO website for support resources and contact information.