DTM-351-S

3 – Axis Digital Teslameter

Serial Communications

Operations Manual

Made in New Zealand

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010326-D351

INTRODUCTION

Thank you for purchasing and using a Group3 Digital Teslameter with Serial Communications. We hope you will join the many users worldwide who are enthusiastic about our products for accurate, stable, and reliable magnetic field measurements.

The DTM-351-S is a 3-Axis Digital Teslameter designed for high-resolution measurement of magnetic flux density with direct digital readout in tesla or gauss, and USB communication for data acquisition. The DTM-351-S is built on the same proven platform as the highly reliable Group3 legacy DTM-151 Teslameter, ensuring dependable performance in demanding measurement environments.

The probe characterization data is stored within the probe assembly itself, allowing any compatible Group3 probe to be used with any Group3 DTM instrument. For optimum performance and full accuracy, the DTM-351-S is recommended for use with temperature-compensated 3-axis probes, such as the 3DT-141 and 3DT-231.

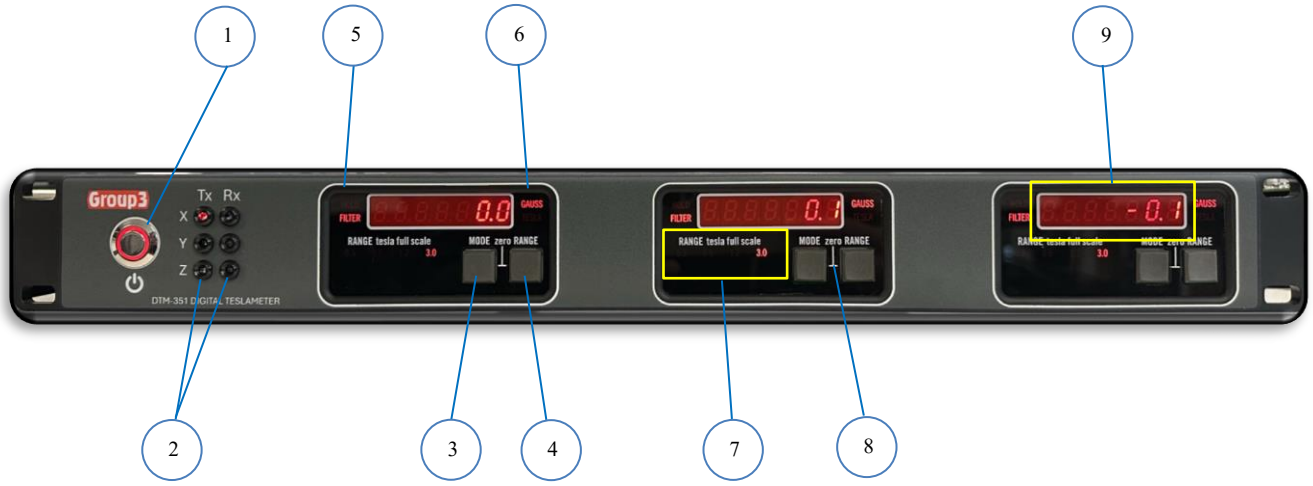
User control of the DTM-351-S can be accomplished in several ways: via the custom LabVIEW Virtual Instrument (VI) provided, through a terminal emulator for individual axis control, or directly using the front-panel push buttons for each axis. The display can be configured to show magnetic field magnitude, peak-hold values, AC components of the field, or probe temperature. Digital filtering (time averaging) can be enabled to reduce short-term fluctuations and improve measurement stability.

Communication with the instrument is achieved through a USB interface, controlled using the LabVIEW VI software running on Windows 10 or Windows 11. Real-time data logging, vector summation, and customizable command scripts are supported, enabling precise 3-axis magnetic field mapping and automated measurement routines.

Group3 has been designing and manufacturing magnetic field measurement equipment since 1983. We constantly upgrading our products and documentation and welcome feedback from our customers. If there are aspects of the instrument which you particularly like or would like to see improved, please contact your Group3 supplier or email us directly with your suggestions to sales@group3technology.com.

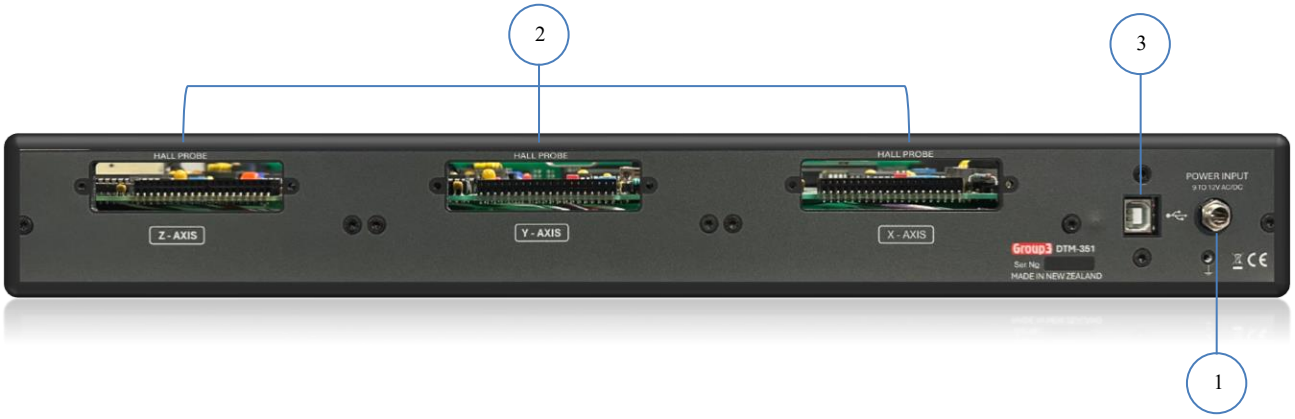
For the latest information on our products and updates, please visit our website at www.group3technology.com. The site is regularly updated with new developments and product releases.

A. DTM-351 Digital Teslameter Features



FRONT PANEL

1	Power Button	Press to power the unit ON or OFF.
2	Transmit Tx & Receive Rx Indicator LEDs	These LEDs illuminate during active communication, indicating an ongoing session.
3	MODE Button	Press to select and operate an individual axis.
4	RANGE Button	Press to cycle through and select the desired DTM range.
5	FILTER & HOLD Indicator	Lights up when ON
6	GAUSS & TESLA Indicator	Magnetic field units lights up when ON
7	Range Indicator	Indicates the Axis, current range
8	ZERO Indicator	Press both Mode and Range button at the same time to zero the field readings
9	Field Indicator	Shows the measured magnetic field and temperature reading



REAR PANEL

1	Power Input 9V to 12V AC/DC	Attach the supplied DC Power supply and lock to secure the power plug.
2	Hall Probe Socket	Attach the probe plug into this sockets and secure using 2 jackscrews.
3	USB Type B port	Attach USB Type B to communicate with LabView interface.

CONNECTIVITY

USB Type A to Type B Connector — Unit has a built-in USB Type B port for communication to Windows PC and LabView interference.

The DTM-351 Digital Teslameter offers accurate measurement of magnetic flux density, with direct digital readout in tesla or gauss. The instrument is robust, solid and the probes are easy to use. The DTM-351 has been engineered to withstand the severe electrical interference produced by high voltage discharge.

B. PRODUCT DESCRIPTION AND FEATURES

The DTM-351 Digital Teslameter is a high-precision, 3-axis magnetic field measurement instrument designed to provide accurate, high-resolution measurement of magnetic flux density with direct digital readout in tesla or gauss. The DTM-351 is built on the same proven platform as the highly reliable Group3 legacy DTM-151 Teslameter, ensuring stable and dependable performance in laboratory and industrial environments.

The instrument supports four measurement ranges with a maximum field capability of up to 3 tesla and provides polarity indication for each axis. High measurement accuracy and resolution are achieved when used with temperature-compensated 3-axis probes, such as the 3DT-141 and 3DT-231.

The DTM-351 is lightweight and compact, with probes that are easy to handle and mount. It has been engineered to withstand severe electrical interference, including environments affected by high-voltage discharge, making it suitable for demanding measurement applications.

Probe characterization and calibration information are stored directly within the probe assembly, allowing any compatible Group3 probe to be used with any Group3 DTM instrument. This design ensures interchangeability while maintaining system accuracy based on probe-specific calibration data.

User control of the teslameter can be performed through multiple interfaces:
via the supplied custom LabVIEW VI, through a terminal emulator for individual axis control, or directly using the front-panel push buttons for each axis.

The display supports multiple operating modes, including magnetic field measurement, peak hold of magnetic field, AC component of the magnetic field, and probe temperature. Digital filtering (time averaging) can be enabled to suppress short-term fluctuations and improve measurement stability in electrically noisy environments.

Communication with the DTM-351 is provided through a USB interface, controlled using the LabVIEW VI software running on Windows 10 or Windows 11. The system supports real-time data logging, allowing users to perform data gathering directly on the DTM and save the data in the created Logs folder in Text file format. The DTM-351 also features a graphical display of all 3 axis simultaneously, enabling users to observe the behavior of a measurement session rather than relying solely on numerical field readings. The graphical display allows users to visually monitor sudden or abrupt changes in any of the three magnetic magnetic field components over time. The time and field range are configurable depending on the user's preferences. The vector summation of the 3 fields is calculated shown on the tab, along with support for customizable command scripts, enabling accurate 3-axis field mapping and automated measurement routines.

The probes incorporate three miniature Hall-effect sensors, each coupled with an individual temperature sensor, and are mounted in a 10 mm diameter probe head configured in three orthogonal axes. The probe handle includes mounting screws for transverse or axial installation, allowing easy integration with linear guide rails and stepping motor systems for precision magnetic field mapping.

The LabVIEW VI includes customizable scripts to initialize and automate command sequences, simplifying repetitive measurement tasks and system setup.

The DTM-351 is available as a bench-top instrument (feet provided) or can be mounted in a standard 19-inch rack panel, offering flexibility for standalone use or system integration.

C. DTM-351 Performance with listed probe

DTM-351 performance with listed probe	Active area (mm)	Resolution of display	Max Field	Finest Resolution	Accuracy at 25°C	Tempco ppm/°C	Zero drift µT/°C
3DT-141	1 x 0.5	1 in 600,000	3T	1 µT	± 0.01%	± 10	± 1
3DT-231	1 x 0.5	1 in 600,000	0.3T	0.1 µT	± 0.03%	± 25	± 1

Resolution using 3DT-141 Probe
DC Mode with Digital Filtering ON

Range	Display Resolution		VI Output Resolution	
	Gauss	Tesla	Gauss	Tesla
0.3	0.01	0.000001	0.001	0.0000001
0.6	0.02	0.000002	0.01	0.000001
1.2	0.04	0.000004	0.01	0.000001
3.0	0.1	0.00001	0.01	0.000001

Standard Sensitivity
3DT-141

*Probe holder for illustration purposes only

Resolution using 3DT-231 Probe
DC Mode with Digital Filtering ON

Range	Display Resolution		Serial/GPIB Output Resolution	
	Gauss	Tesla	Gauss	Tesla
0.3	0.001	0.0000001	0.0001	0.00000001
0.6	0.002	0.0000002	0.001	0.0000001
1.2	0.004	0.0000004	0.001	0.0000001
3.0	0.01	0.000001	0.001	0.0000001

High Sensitivity
3DT-231

*Probe holder for illustration purposes only

D. SPECIFICATIONS OF DTM-351 SYSTEM

Specifications of each axis of the DTM-351 using 3DT-141 or 3DT-231 3-Axis Hall Probe.

Measurements magnetic field density in tesla or gauss

Field ranges 0.3 0.6 1.2 3.0 tesla full-scale,
3, 6, 12, 30, kilogauss full-scale,
with polarity indication and selectable auto ranging
maximum calibrated field ±3 tesla

Resolution 1 in 12,000 of bipolar span with digital filtering on

Range	Display resolution	
	Gauss	Tesla
0.3	0.5	0.00005
0.6	1	0.0001
1.2	2	0.0002
3.0	5	0.0005

Accuracy DTM-351 with 3DT-141 probe:
± (0.01% of reading + 0.006% of full-scale)

Temperature stability Zero drift: ± (1 µT + 0.0003% of full-scale) / °C max.
Effect of probe cable: add −3 ppm / °C for each meter of probe cable

Time stability Stable for long-term measurements; designed for continuous operation in laboratory and industrial environments.

Measurement rate	Real-time data acquisition via USB interface (dependent on host PC and software configuration)
Filtering	Digital filtering (time averaging) selectable to suppress short-term field fluctuations.
Display rate	10 display updates per second
Display	Soft key navigation, simulated 7-character, 7-segment alphanumeric display
Response time	full-scale change of field reading settles to within resolution in less than 0.2 second (filtering off - see below)
Peak hold mode	Displays maximum measured field since mode entry or reset Digitally implemented with zero sag or decay
Interface	USB interface to PC running Windows 10 or Windows 11
Probe Head Diameter	10 mm
Probe Cable Length	Standard 5 meters Custom lengths available up to 30 meters
Mounting	Bench-top operation or mountable to standard 19-inch rack panel
Weight	Approximately 3.5 kg

E. FEATURES:

MODE	Operate in Axis (default) or Channel Mode.
Memory backup	user-entered data stored indefinitely in non-volatile memory
Power source (per channel)	ac: min 8V, 0.75A rms max 15V, 0.35A rms dc: min 10V, 0.5A dc max 19V, 0.2A dc (because a switch-mode regulator is used, input current falls as the voltage rises) ac line input plugpack supplied. Power fuse on processor board: 1 amp anti-surge 5 x 20mm
Data Log	Via USB, data log of 3 axis, 3 channel saved in Text file format
Enclosure	All metal, with tilt stand on bench models, mounting cheeks on rack
Dimensions	350 (L) x 320 (W) x 150 (H, including feet) mm ,
Ambient field	Maximum operating field for electronics package: 10 millitesla with single-range probe, 0.5 millitesla with multi-range probe.
Temperature range	0 to 50°C operating, absolute maximum temperature of probe 60°C

Probes standard sensitivity: 3DT-141
High sensitivity types: 3DT-231

Digital data format ASCII input commands and output responses
Commands requests for field values; setting and inspection of display and control modes; field measurement triggering; entry of numerical values; setting units, output data format, and filter characteristics; test commands.

F. ORDER CODES

DTM-351-NS

Recommended Probes:
Four ranges, standard 5 meters cable and custom lengths available up to 30 meters.

3- Axis Probe:
3DT-141 | Standard sensitivity
3DT-231 | High sensitivity

Individual Probes (User-designed probe holder):
MPT-141 standard sensitivity, 0.3, 0.6, 1.2, 3.0T ranges
MPT-231 high sensitivity probes, 0.03, 0.06, 0.12, 0.3T ranges

Special probe cable lengths: add length suffix **-Xm** or **-Xs**,
for **X** substitute cable length in meters, 30 max.
m denotes unshielded cable, **s** denotes shielded cable.

Example: MPT-141-5S – standard sensitivity, 5 meters, shielded cable

G. CONNECTING THE HALL PROBE

Before handling the probe, please read the following:

Group3 Hall probes are built to be as robust as possible for a small, precision device. However, it is most important that certain precautions be taken when handling and installing probes so that they are not damaged or destroyed, and to preserve their accurate calibration.

Mount the probe head so there is no pressure which will tend to bend or depress its ceramic rear surface. If the probe head is clamped, make sure the surface in contact with the ceramic is flat and covers the whole of the ceramic surface. Do not apply more force than is required to hold the probe in place. Any strain on the ceramic will alter the probe's calibration, and excessive force will destroy the Hall element inside. When the probe head is mounted, the cable should be clamped firmly nearby so it cannot be torn away from the probe head if accidentally pulled. The flexible section adjacent to the probe head can be carefully folded to allow the cable to come away in any direction but avoid repeated flexing of this section.

Keep the cable out of the way of foot traffic. Do not pinch the cable or drop sharp or heavy objects on it. A severed cable cannot be re-joined without altering the probe's performance and requires factory repair and re-calibration.

The DTM-351 must be used with a Group3 Hall probe. Probe models 3DT-141 (3-axis), 3DT-231 (3-Axis), single axis LPT-141, LPT-231, MPT-141, or MPT-231 are the most suitable for use with the DTM-351. The probe may be one supplied with your teslameter, or it may have been obtained separately. In any case, calibration is preserved when probes are exchanged between instruments.

The standard probe cable length is 5 meters. Probes with non-standard cable lengths up to 30 meters may be ordered from your Group3 supplier. The cable used for Group3 probes is shielded to reduce pickup of induced noise from external sources. Such noise may reduce the accuracy of the instrument, cause malfunctioning, or in extreme circumstances even result in damage to the internal circuitry.

GROUNDING

All parts of the teslameter's metal case are connected together to form an integral electric shield around the circuitry inside. When the probe connector is plugged into the teslameter and the retaining screws are tightened, the probe connector case and the teslameter case are connected together and form an integral shield around the circuitry inside. The cable shield is added to the case shield and extends protection from electrical interference almost up to the probe head.

Because there is an internal connection between teslameter circuit common and the probe connector case, when the probe connector is engaged, and the retaining screws tightened the teslameter circuit common will be connected to the case. Do **not** make an additional connection between circuit common and the case at any point. Such additional connection will form a ground loop and may introduce errors in the measured field value.

The shielding provided with the above arrangement should be sufficient protection against EMI in most cases, especially when the probe cable is shielded. Sometimes it may be found helpful to ground the teslameter case to a good electrical ground point. Connection can be made to the case by inserting an appropriate lug or terminal under the head of one of the rear panel fixing screws.

H. INSTALLATION TECHNIQUES FOR ELECTRICALLY NOISY ENVIRONMENTS

The DTM-351 is a precision electronic measuring device. Because of the nature of the measurements, it is asked to do, it is frequently exposed to conditions that are considerably worse than are normally encountered by precision instruments. Therefore, the teslameter has been carefully engineered to be as immune as possible to sparks and other forms of interference through the use of several kinds of power input filtering and a special high-isolation switch mode power module built into its circuitry. The design has been verified by extensive testing, using high energy sparking in close proximity to both the teslameter instrument case and the probe. Nevertheless, due care should
always be taken when installing the teslameter system.

The teslameter and its probe must be protected from any chance of receiving a direct hit by a high voltage discharge. The probe should have shielded cable if the meter is to be used in an electrically noisy environment. The cable shield is an RFI screen, not a high current path, so if there is any possibility of an arcing discharge hitting the probe area, then the probe head and part or all of the cable must be enclosed in a metal tube (nonmagnetic near the probe head) or shielded in some other way.

The probe cable should be routed away from any power, high current or high voltage wiring. It should be shielded from any capacitively coupled noise effects. If the cable runs close to any section of the apparatus that could be subjected to a very rapid change of potential when a spark discharge occurs, then the probe cable may need additional shielding to prevent capacitive coupling of the noise.

The retaining jack screws designed to hold the probe connector onto the teslameter must be screwed up finger tight, as they form part of the electrical connection of the shield system. The woven braid of the probe cable is terminated to the probe connector case. The retaining screws then connect the probe connector case to the teslameter case.

The teslameter itself should be sited in a sheltered location, where it will not be exposed to spark discharges or radiated or capacitively coupled noise. The teslameter case is made of metal for shielding reasons. However, of necessity it is less than perfect, as apertures have to be left in the case for the display and various connectors etc. The unit is a precision measuring device, and should be treated with care, not subjected to adverse environmental conditions.

The plugpack supplied with each teslameter should be plugged in to a clean mains power supply. Noise on the mains will work its way through the transformers and disturb the teslameter. Simple mains filters are readily available if there is only one mains supply for the whole machine. Route the low voltage lead away from high current or high voltage wiring. Ideally cut the low voltage lead to the minimum length required for the installation and re-connect the plug to it.

I. LabVIEW Interface –TABS

HOME:

- **Field reading** display of all 3 Axis in each simulated 7-segment display
- Field Unit in either **GAUSS** or **TESLA** indicated by GREEN backlight
- When on **Channel Mode**, each channel can be set individually. On **Axis Mode** (default), all three channels are operated simultaneously.
- **FILTER** is set to ON by default as indicated by a GREEN backlight, press to turn OFF.
- Press **RESET** button to do a power cycle and reset the unit.
- Press **ZERO** button to zero any stray field.
- **Maximum Field**, **Filter**, **Mode** and **Range** status are displayed inside the readings display.
- **SESSION** indicator lights up GREEN when there is a session running. Graph can be zoomed in or out if a session is in progress.
- Displays the number of **Out of Range** readings in that session
- **Vector Sum** shows the value in real time when there is a session running
- Range indicator is lit in RED. Press the **TOGGLE** button to select the range.
- **Networking** – LAN port available. Communicates with any Windows PC using DHCP.

GRAPH:

- Graphical representation of field on 3 channels/axis
- Field readings of all 3 channels/axis including maximum field
- Configuration button to set time frame, offsets and zeroing
- **SESSION** indicator lights up GREEN when there is a session running. Graph can be zoomed in or out if a session is in progress.
- Displays the number of **Out of Range** readings in that session
- **Vector Sum** shows the value in real time when there is a session running

DATA LOG:

- Set the sample number and sample rate
- Displays the memory capacity information when a USB memory stick / drive is inserted
- Display the Time/Date and is configurable by pressing the time/date text
- Multiple session is available

MENU:

- Master functions as well as other control features such as resetting, zeroing, filtering, etc. are available in this tab.

J. Operation Guide

GETTING STARTED

IMPORTANT!

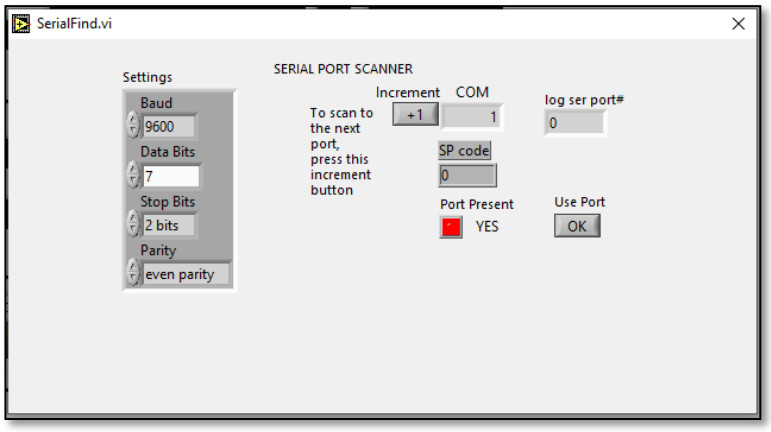
DO NOT PLUG OR UNPLUG THE PROBE WHILE THE UNIT IS ON, OTHERWISE THE UNIT MAY NOT FUNCTION CORRECTLY, AND MAY DAMAGE/CORRUPT THE TESLAMETER'S CALIBRATION.

1. Unpack the DTM-351 unit from the hard case that comes with the unit. **Caution!** Unit weighs 3.5 KG. Package includes the following
    a. DTM-351-S unit
    b. Power supply
    c. USB connector to a Windows 10 or 11 PC
    d. Copy of Operations Manual
    e. 19" Standard Rack Panel (optional)
2. If unit is to be installed as a bench unit, lay the DTM-351 in a safe and secure way. Make sure that the DTM is at least 2 meters away from the magnet.

3. Insert the three probe plugs into probe sockets at the back of DTM unit. If user is going to use a 3DT probe model, insert the probes to its corresponding DTM channel. If individual probes are to be used, mark the probes appropriately, example:
   X-axis, Y-axis, Z-axis.
4. Attach the USB Type B connector to the port at the back of DTM, if the unit is to be monitored or operated remotely using a Windows PC.
5. Connect power supply plug and lock.
6. Press Power button to turn ON the display. Group3 will be shown on displays, followed by the software version.

LABVIEW INTRERFACE SETTINGS

After clicking the DTM-351 LabView icon, a notification will be displayed showing LabView settings and requesting the user to select communication and log serial port number. In the LabVIEW interface, you will need to configure the serial communication settings to ensure the proper connection between your device and the system. The hardware settings are pre-configured and should match the settings through the LabView interface.



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1. **Baud Rate: 9600**
   The Baud rate determines the speed of data transfer over the serial communication link.
   Select 9600 from the dropdown menu or input field.
   Why it's important: This setting must match the Baud rate configured on your device to ensure proper communication between the system and the device.

2. **Data Bits: 7**
   Data bits represent the number of bits used to encode each character of data.
   Select 7 from the available options.
   Why it's important: The data bits setting must be set to 7 to match the communication requirements of your device.

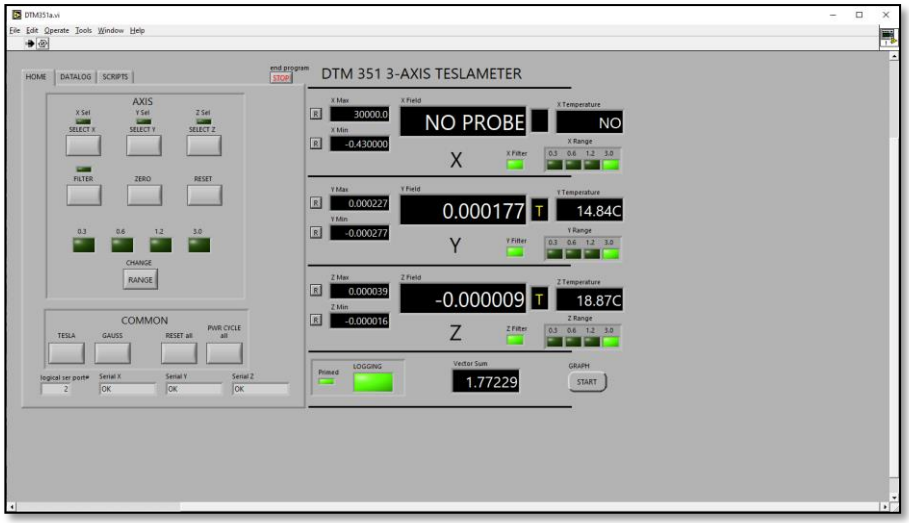
3. **Stop Bits: 2 bits**
   Stop bits signal the end of a data packet in serial communication.
   Choose 2 bits from the stop bits option.
   Why it's important: The stop bits ensure proper communication timing and prevent data overlapping. Setting it to 2 bits matches the communication protocol of your device.

4. **Parity: Even Parity**
   Parity is used to detect errors in the transmitted data.
   Choose Even Parity from the options.
   Why it's important: Even parity ensures that the number of bits with a value of 1 in the data is even, helping to detect errors in communication.
5. **Selecting Communication and Log Serial Port Number**
   Press the Increment button to select the communication port and log serial port number that appears in the interface. After configuring all the settings, press the **OK** button to apply the settings and establish communication.

The LabView HOME page should look like this.

Your DTM-351 is now ready to use.

If no probe is plugged to the DTM, "NO PROBE" will appear in the affected axis. This indicates that the system has detected no probe attached to the specified axis. Turn off power and UNPLUG power supply and attach the required probe.



K. DTM-351 LABVIEW VI FEATURES

K.1. HOME Tab

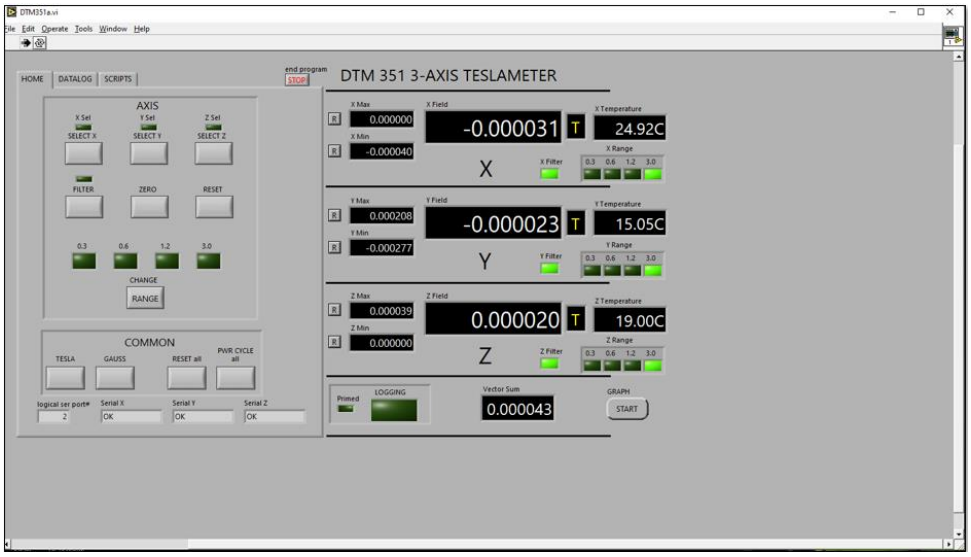
Default Setting:

Filter ON
Serial X OK
Serial Y OK
Serial Z OK
Gauss unit
Logical Serial Port #
X, Y, Z axis status: OK

- Display shows the Field, Temperature, and MIN and MAX field reading
- In Axis: X Sel, Y Sel, and Z Sel buttons, each axis can be operated individually.
- To Zero the field, click "ZERO"
- To change the range, click "RANGE"
- To reset the specific axis, select the required axis and click "RESET". To reset all 3 axis simultaneously, click "RESET all".
- To select the required field unit, click "TESLA" to display values in Tesla or "GAUSS" to display values in Gauss.
- To power cycle all the 3 axis, click "PWR CYCLE all"
- To display the graph waveform, click "START" button under the graph.

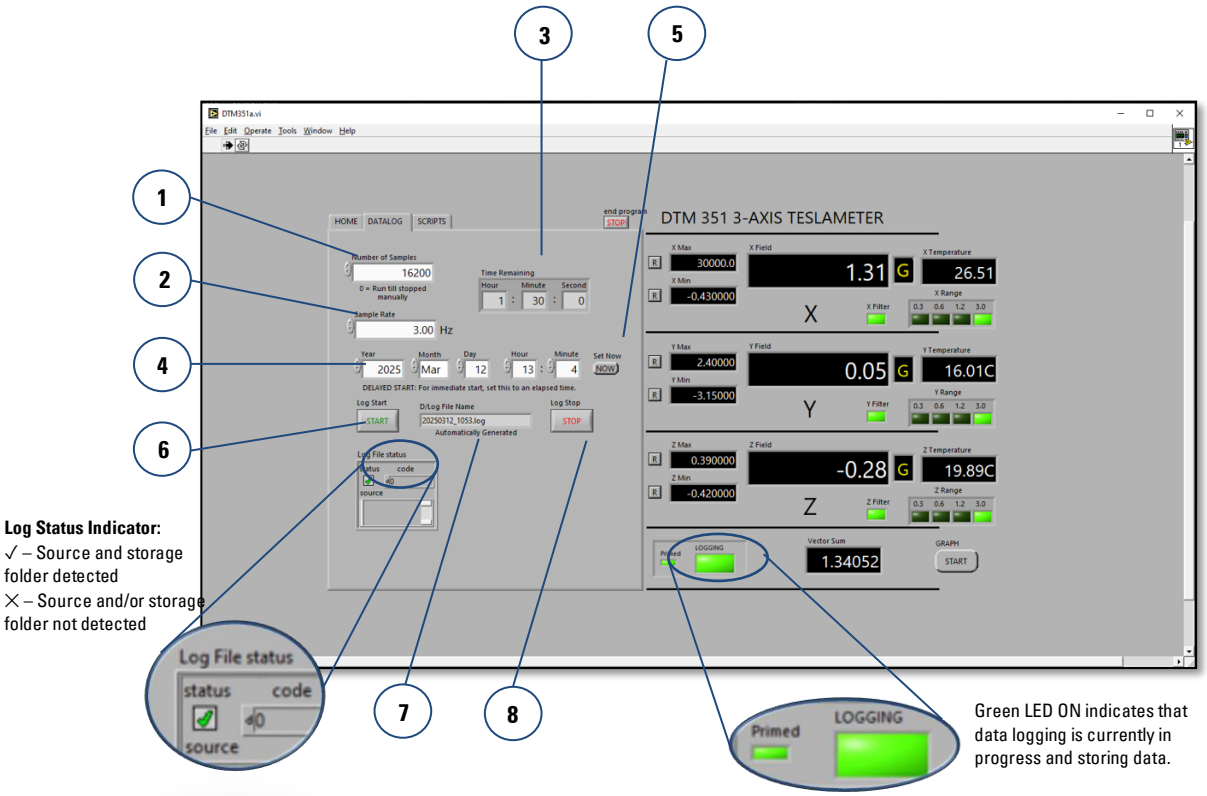
Range Operation

Range	Standard Probe	High Sensitivity Probe
Range 0	0.3T	0.03T
Range 1	0.6T	0.06T
Range 2	1.2T	0.12T
Range 3	3.0T	0.3T



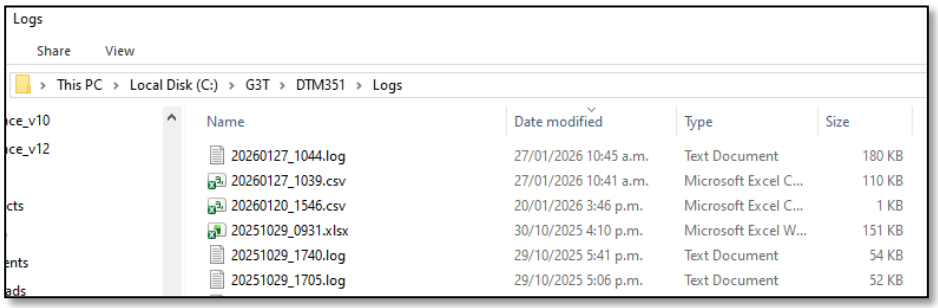
K.2. DATALOG Tab

The DTM-351 has the capability to data log a field measurement session. This feature makes field measurement quite easy, and all the data is stored as a Text Document file which the user can manipulate/convert to MS Excel.



1. **Number of Samples:** Total number of data points will record during a logging session.
2. **Sampling Rate:** Frequency at which data points are recorded, expressed in Hz (samples per second).
   Note: Can be adjusted either by using the UP or DOWN arrows or manually entering the desired number. The software will automatically calculate how much data that can be stored on your PC/laptop and the time it can run the data.
3. **Time Remaining:** Displays the duration left for the current data logging session based on the configured number of samples and sampling rate.
4. **Date and Time setting** can be changed either by using the UP or DOWN arrows or by clicking directly on the field to enter manually the desired date and time.
5. Clicking the **NOW** button to automatically set the current system date and time.
   Updated dates and time appear on the data log menu and are applied to all subsequent logs.
6. **Starts**: Initiates data logging based on the configured settings.
7. **Stop**: Terminates the current data logging session. It will ask if you want to "SAVE" the halted session or "CANCEL" the session completely.
8. **D/Log File Name**: Displays the name of the current log file.

In your network-connected PC, open your Local Disk (C:) go to G3T folder > DTM351 > Logs.
All generated log files are automatically saved in the Logs folder at G3T folder.



K.3. GRAPH Tab

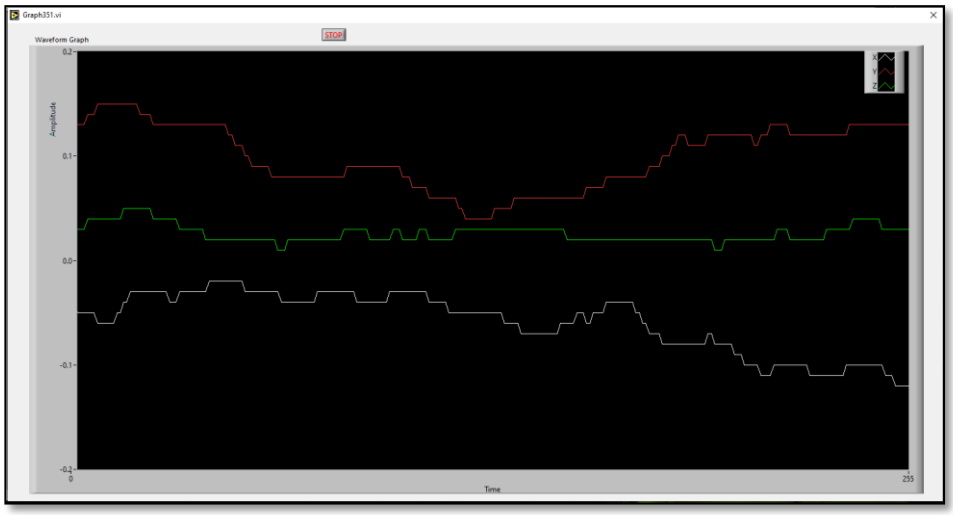
The GRAPH tab provides continuous real-time visualization of the X, Y, and Z magnetic field measurements. The vertical axis represents magnetic field amplitude (Tesla or Gauss), and the horizontal axis represents time. Each axis is displayed as an independent waveform, allowing simultaneous observation of three-dimensional magnetic field behavior. Transient events, oscillations, drift, and noise can be visually identified. Each axis trace can be independently customized using LabVIEW graph tools. These features enable users to configure the graphical display according to their specific measurement and analysis requirements.

- X-axis field
- Y-axis field
- Z-axis field

Graph Orientation and Scaling

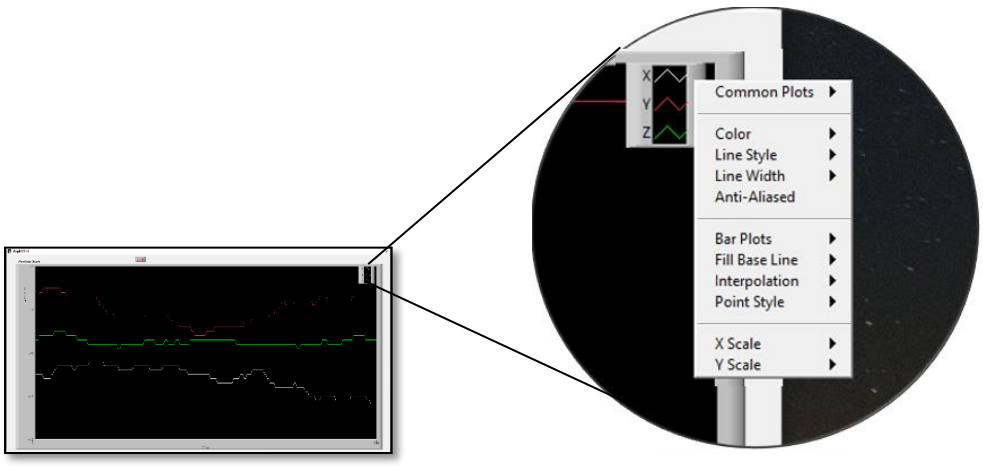
- Vertical Scale (Y-Axis of the graph): Magnetic field amplitude (Tesla or Gauss)
- Horizontal Scale (X-Axis of the graph): Time

The graph presents magnetic field amplitude versus time, enabling users to observe dynamic changes in the measured field.



Graph Customization Tools and Analysis Features

The LabVIEW graph environment provides flexible visualization tools to support user-defined analysis requirements. Each axis trace can be customized individually through the graph properties. To access options, click the upper-right corner of the graph, where the X, Y, and Z axis legends are displayed.



Plot Appearance Options:

- Plot type selection (standard line plot, bar plot, etc.)
- Trace color selection
- Line style (solid, dashed, etc.)
- Line width adjustment
- Anti-aliased rendering (for smoother visual presentation)

- Fill to baseline option
- Interpolation settings between points
- Point style selection

Data Interpretation Capability
The graphical interface allows users to:

- Compare the behavior of all three axes simultaneously
- Analyze time-based field variations
- Identify peak events and transient disturbances
- Evaluate waveform stability
- Customize graphical representation for reporting or research purposes

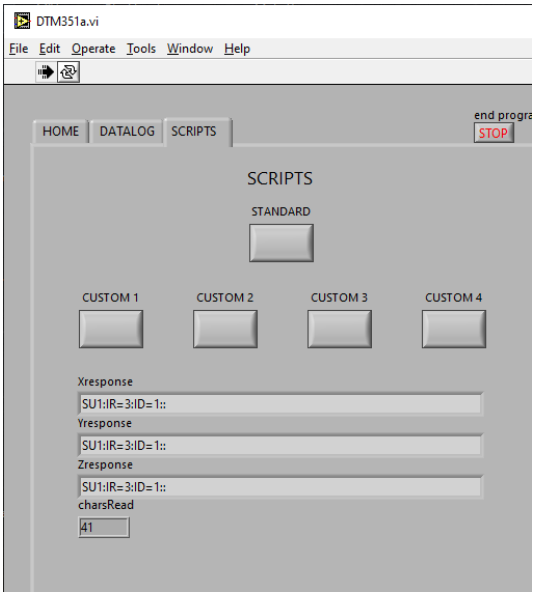
Different graph styles may be selected depending on whether the user is performing stability monitoring, transient analysis, comparative axis evaluation, or general observation.

K.4. SCRIPTS Tab

The Scripts feature allows users to customize, edit, and send command sequences to the DTM-351 in order to retrieve real-time information and modify instrument settings efficiently.
It provides a structured method for executing predefined or user-defined commands without manually entering each command during operation.

This function is particularly useful for:

- Repetitive command execution
- Rapid configuration changes
- Real-time monitoring of X, Y, and Z axis responses
- Custom measurement setup



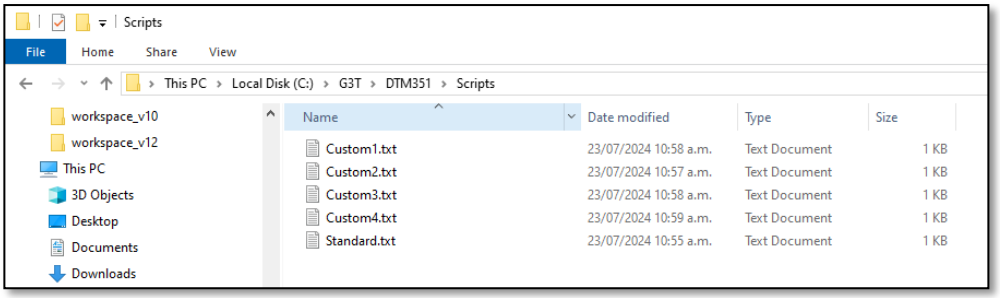
To access Scripts folder:

1. On the network-connected PC, open Local Disk (C:).
2. Navigate to: C:\G3T\DTM351\Scripts

Inside the Scripts folder, there are five (5) text document files:

- Custom 1
- Custom 2
- Custom 3
- Custom 4
- Standard

The **Custom 1 to Custom 4** files are editable and may be modified by the user to create personalized command sequences.
The **Standard** file contains the default command configuration.



Customizing Script Commands
Users may customize commands by:

1. Opening any of the Custom 1 to Custom 4 text document files.
2. Editing the commands as required.
3. Saving the text file after modifications.

Once saved, the updated commands become available within the LabVIEW VI.

Executing Scripts from the LabVIEW VI
To run a customized script:

1. On LabVIEW VI, navigate to the Scripts Tab.
2. Click the corresponding Custom (1–4) button that matches the edited text file.
3. The saved commands will be sent to DTM-351, and the instrument responses will be displayed for the X, Y, and Z axes in real time.

List of Commands:

Commands	Functions	Descriptions
IZ	Get user DC Zero	Displays the current user-defined DC zero offset for the selected axis and range.
IC	Get user DC Cal	Displays the current user-defined DC calibration factor applied to the selected axis.
ID or D	Get Digital Filtering status	Displays the current digital filtering state (ON or OFF).
IY	Get Filter Window	Displays the current window duration used for digital filtering.
IJ	Get Filter Factor	Displays the current filter factor applied to magnetic field readings.
IO	Get Global Offset	Displays the current global offset applied to field measurements.
IL	Get Global Scale	Displays the current global scaling factor applied to measurement data.
IK	Get Sampling Rate	Displays the current sampling rate of the measurement system.
IG	Get AC/DC and Trigger Modes	Displays the current measurement mode (AC or DC) and the active trigger mode.
IN	Get Display Mode	Displays the current display mode: Normal (N), Hold (H), or Temperature (T).

IR or R	Get Range Selection	Displays the currently selected measurement range: 0.3 T (0), 0.6 T (1), 1.2 T (2), or 3.0 T (3).
G: A/D	Set AC/DC Mode	Sets the instrument measurement mode to AC (A) or DC (D).
GC: C/V	Set Trigger Mode	Sets the instrument trigger mode to Continuous (C) or External/Voltage trigger (V).
NN	Set Display to Normal	Sets the display in Normal measurement mode.
NH	Set to Display Mode to Hold	Sets the display to Hold mode, freezing the current field reading.
NT or NcT	Set Temperature Display	Sets the display to probe temperature measurement mode.
F	Get Field Reading	Displays the current magnetic field reading for the selected axis.
T	Get Temperature Reading	Displays the current probe temperature reading.
SU	Set include Unit Symbol	Sets whether the measurement unit symbol (Tesla or Gauss) is displayed.
UFC	Set Display Units	Sets the measurement unit to Tesla (T) or Gauss (G).
WA	Get Raw Field (Post ADC)	Displays the raw magnetic field value immediately after analog-to-digital conversion.
WE	Get Raw Field (Post Cal)	Displays the magnetic field value after calibration scaling, before zero offset correction.
WZ	Get Raw Field (Post Zero)	Displays the magnetic field value after zero offset correction is applied.
Z	Set current value as zero	Assigns the present magnetic field reading as zero reference for the selected range.

K.5 VECTOR SUM MEASUREMENT

The DTM-351 Digital Teslameter measures magnetic flux density simultaneously along three orthogonal axes (X, Y, and Z) using a 3-axis Hall-effect probe.

In addition to displaying individual axis values, the instrument calculates and displays the Vector Sum, which represents the total magnitude of the magnetic field independent of direction.

The Vector Sum (also referred to as Total Field Magnitude) is calculated using the three measured field components:

$$B_{Total} = \sqrt{X^2 + Y^2 + Z^2}$$

Where:

- X = Magnetic field component along X-axis
- Y = Magnetic field component along Y-axis
- Z = Magnetic field component along Z-axis
- B_{total} = Resultant magnetic field magnitude

The result is displayed in the selected unit (Tesla or Gauss).

The Vector Sum is always a positive value. Accuracy depends on the calibration and accuracy of each axis. Digital filtering may be enabled to improve stability in electrically noisy environments. The displayed Vector Sum updates in real time along with individual axis readings.

L. DISPLAY MESSAGES

No Probe
The message **noProbE** is displayed if the Hall probe is disconnected from the instrument. While the message is visible, all key functions are disabled and will also appear **NO PROBE** on LabView Interface.

Over-range
The message **o'rAnGE** appears if the field to be measured exceeds the instrument's input capacity and **OVER RAN** will also appear on LabView Interface.
To clear the over-range message, select a higher range or reduce the magnetic field at the probe, or both if necessary.
During over-range, all key operations are locked out, except for range selection.

If a single-range probe is in use, no range changing can occur.

Overflow
The message **o'FLo** is displayed if the computed value of the field reading exceeds the capacity of the display.
In overflow, the instrument is not over-ranged, but rather the computed reading is too large to be displayed. However, if over-ranging occurs at the same time as overflow, then the over-range message is displayed preferentially.

If the overflow message appears on a DTM-351, it can usually be cleared by reloading defaults. Otherwise, please contact the supplier of the teslameter.

Error 1
This indicates that the main circuit board has no calibration EEPROM chip and cannot be used with this software version.

M. TURNING OFF THE UNIT

- Before turning the unit off, make sure that data logging session has stopped or has been saved.
- Press the Power button to turn off the DTM.
- UNPLUG the power supply connector at the back of the unit to completely turn OFF the unit.

N. TROUBLESHOOTING

- **Display shows no probe** – Press the power button to turn off the unit. Unplug the power supply connector from the DTM power input port. Disconnect the probe plug and inspect it for bent pins. Also, check that the probe socket is not damaged. If no abnormalities are found, re-insert the probe plug, tighten the jackscrew securely, and turn the unit on again.
- **Display shows "Bad Cal"** – call or email Group3 for support
- **Display freezes or hangs up** – Turn off the unit by pressing the power button. Unplug the power supply connector from the DTM power input port. Close the LabView software and reopen it. Check whether the previous settings are retained, and re-enter them if necessary.
- **Display shows erroneous data** – If field readings shows abnormality or that readings on each range is different or inconsistent, go to the HOME tab, press the RESET button on each affected DTM. If all 3 -axis are affected, user can press RESET all. All previous settings entered would return to default and user settings must be re-entered. User may also use POWER CYCLE ALL to restart all the 3 axis.
- **ALL OTHER ERRORS** – if unit is still misbehaving or not operating correctly after unplugging/plugging the power plug, kindly contact Group3 through our website www.group3technology.com/service or email service@group3technology.com for advice.

LIMITED WARRANTY

Group3 Technology Ltd. (hereinafter called the Company) warrants instruments and other products of its manufacture to be free from defects in materials and workmanship that adversely affect the product's normal functioning under normal use and service for a period of one year from the date of shipment to the purchaser.

The obligation of this warranty shall be limited to repairing or replacing, at the discretion of the Company and without charge, any equipment which the Company agrees is defective as set out above within its warranty period. The Company will reimburse lowest freight rate two-way charges on any item returned to the Company's factory or any authorised distributor or service centre, provided that prior written authorisation for such return has been given by the Company.

This warranty shall not apply to any equipment which the Company determines to have become defective owing to mishandling, improper installation, alteration, negligence, inadequate maintenance, incorrect use, exposure to environmental conditions exceeding specifications, or any other circumstance not generally acceptable for equipment of a similar type.

The Company reserves the right to make changes in design without incurring any obligation to modify previously manufactured units. No other warranties are expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The Company is not liable for consequential damages.

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