CTXL
High Performance
Universal Portable Circular Chart
Superecorder™

Operator’s Manual
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<td>2-18</td>
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<tr>
<td>4-1</td>
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CAUTION & SAFETY INFORMATION

If the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

The Installation category is one (1).

There is no user replaceable fuse in this product.

The output terminals of this product are for use with equipment (digital meters, chart recorders, etc.) which have no accessible live parts. Such equipment should comply with all the applicable safety requirements.

Do not operate the equipment in flammable or explosive environments.

Power must be disconnected before making any electrical connections.

A recommended DC adaptor is included with this product, 9 Vdc @ 1.7 A.

SAFETY WARNINGS AND IEC SYMBOLS

This device is marked with international safety and hazardous symbols in accordance with IEC1010. It is important to read and follow all the precautions and instructions in this manual before operating or commissioning this device as it contains important information relating to safety and EMC. Failure to follow all the safety precautions may result in injury and/or damage to your equipment.

<table>
<thead>
<tr>
<th>IEC Symbol</th>
<th>Description</th>
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<tr>
<td><img src="image" alt="Caution" /></td>
<td>Caution - Refer to the accompanying document(s).</td>
</tr>
<tr>
<td><img src="image" alt="Direct Current" /></td>
<td>Direct Current</td>
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This advanced Universal Circular Chart SUPERECORDER™ monitors and records data on a 1, 7, or 32 Days chart. The microprocessor based portable recorder provides many powerful and practical features as follows:

- Three models are offered:
  - Temperature/Relative Humidity – TRH [-17 to 49°C (2 to 120°F) & 2 to 98% RH]
  - Dual Thermocouple Input – DTC [ J, K, or T type TC ]
  - Dual Process Input – DPR [ (0-1, 0-5, 0-10) VDC, (0-20, 4-20) mA ]
- 203 mm (8”) Chart paper for 1, 7, or 32 Day recording
- Custom backlit LCD display shows two channels simultaneously
- Membrane keypad provides full access to all functions of the recorder
- Minimum, Maximum, and Average values are monitored and can be displayed
- Chart data is stored in non-volatile memory
- Chart paper can be re-scaled from the PC via RS232 interface
- Temp/RH sensor probe can be up to 12.2 m (40 feet) away from the recorder without any sacrifice in performance
- Battery as well as ac power operation.
- Battery icon displays the status of the battery voltage
- High & Low alarm points set via keypad
- Audible & visual alarms with built-in Relay contacts
- Additional two drive lines to power external Relays
- Wall Mount or Bench top Mount
- Built-in Real time Clock to monitor two channels vs. time
- Electronic Lock/Unlock key for unauthorized access
- RS232 Computer interface allows downloading of recorded chart data to PC
- Recorder comes with two built-in chart lights, and time reference arrow
- Decorative Foot cover for wall mounting
- Double sided Linear Radial Chart Paper
# 1.1 Parts of the Recorder

![Front and Side Views of the Recorder](image)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Function</th>
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<tr>
<td>1</td>
<td>Chart Paper Knob (magnetic)</td>
<td>Holds chart paper in place.</td>
</tr>
<tr>
<td>2</td>
<td>Chart Lights</td>
<td>Lights up the chart paper. The light comes on for 3 seconds in battery mode and permanently in ac adapter mode.</td>
</tr>
<tr>
<td>3</td>
<td>Pen Cap Posts</td>
<td>Holds the loose pen caps.</td>
</tr>
<tr>
<td>4</td>
<td>Time Reference Arrow</td>
<td>Helps align the time on the new chart paper with the actual time.</td>
</tr>
<tr>
<td>5</td>
<td>Chart Paper</td>
<td>Linear Radial Double sided charts are available for 1, 7, and 32 day recording. See the inside back cover for a detailed list of paper available.</td>
</tr>
</tbody>
</table>

Figure 1-1. Front and Side Views of the Recorder - Temperature/Humidity Model
6 ac Power Jack

Allows the unit to be powered from ac power using the universal 100/240 Vac adapter supplied.

7 Membrane Keypad

Provides full access to all functions of the recorder.

8 Backlit LCD Display

Displays temperature and relative humidity values simultaneously.

9 Temperature/Humidity Sensor

Houses the electronic sensor which measures ambient temperature and relative humidity.

10 Sensor Holder (clip)

Holds the temperature/humidity probe to the side of the recorder.

11 Pen Arm and Holder (2 each)

Upper pen, red, CHAN 1 (temperature)
Lower pen, blue, CHAN 2 (humidity)

12 Latch Button

Releases and secures the recorder’s door.

13 Decorative Foot Cover

Stays in place for wall-mounting the recorder. The cover must be removed for upright bench-top use (otherwise the recorder topples over)!

14 Door Key

It locks/unlocks the chart door.

15 “Keyhole” Slot Mounting Holes

Allows the recorder to be mounted on the wall.

16 Carrying Slot

Allows the user to carry the recorder conveniently.

17 Product Label

Product information label.

18 Alarm/Relay Terminal Block

Allows the user to connect to built-in relay contacts or power external mechanical relays.

19 Battery Compartment

Holds 4 “D” size batteries which provide power if the ac adapter is not used, or provide power backup in case of ac power failure.

20 RS232 Connection

Serial PC interface

21 Recorder Door

It contains pen drive mechanisms. Open the door to change chart paper.

22 Ferrite Core

Attach the snap-on Ferrite Core (included) on the Sensor Probe cable to minimize RF radiation emission.

---

**Figure 1-2. Wiring Diagram, Dual Process Input Model, CTXL-DPR**
Figure 1-3. Rear and Side Views

Figure 1-4. Front and Side Views of the Recorder - Dual Thermocouple Model

Figure 1-5. Front View of the Recorder - Dual Process Input Model
1.2 Membrane Keypad and Display Functions

**MEMBRANE KEYPAD**
- **POWER**  
  Turns ON/OFF the recorder
- **C ↔ F**  
  Changes temperature display from °F to °C or vice versa
- **CLOCK**  
  Displays Real Time Clock for 3 seconds
- **SCALE**  
  Sets the Chart Scale to °F & RH or °C & RH
- **SPEED**  
  Sets the Chart Speed to 1, 7, or 32 Day chart
- **CONFIG**  
  Configuration Menu - Sets Low, High Alarms & Time Clock (Sec. 2-6)
- **SET**  
  Enables/disables low & high alarms (Sec. 2-6)
- **YES**  
  Increments set values
- **NO**  
  Decrements set values
- **MODE**  
  Mode Menu - Displays Max, Min, Average values (Sec. 2-7)
- **LIGHT**  
  Turns on/off Chart Lights & Display backlight (Sec. 2-13)
- **Locks/unlocks the Keypad Functions** (Sec. 2-14)

**DISPLAY - TEMPERATURE/ HUMIDITY MODEL**
- **MAX**  
  Displays Maximum values of two channels
- **MIN**  
  Displays Minimum values of two channels
- **AVG**  
  Displays Average values of two channels
- **32D**  
  Turns on when Chart Speed is set to 32 Days
- **7D**  
  Turns on when Chart Speed is set to 7 Days
- **1D**  
  Turns on when Chart Speed is set to 1 Day
- **RH**  
  Displays % Relative Humidity
- **°F**  
  Displays Temperature in °F
- **°C**  
  Displays Temperature in °C
- **%**  
  Displays percentage (0-100%)
- **Dual Process Input Model**
- **Flashes when pens are jammed**
- **Turns on when Keypad functions are locked**
- **Displays Battery life status (Sec. 2-3)**
- **1 Refers to Channel (1)**
- **2 Refers to Channel (2)**
- **H AL**  
  Turns on or flashes when in High alarm condition
- **L AL**  
  Turns on or flashes when in Low alarm condition
- **C OM**  
  Turns on or flashes when communicating thru RS232
- **T1-T2**  
  Displays Differential temperature

**Figure 1-6. Membrane Keypad and Display Functions**
2.1 Placing the Recorder on the Bench Top

Figure 2-1 shows the removal of the decorative foot cover.

1. Place the recorder on its back (so it is face up).
2. Remove the clip-on foot cover by lifting up on the cover and releasing it from the stabilizing arm at the bottom of the recorder. This exposes the rubber feet and stabilizing arm. The rubber feet protect the bench top surface.

---

**CAUTION**

DO NOT ATTEMPT TO SET THE RECORDER UPRIGHT ON THE BENCH WHEN THE CLIP-ON FOOT COVER IS IN PLACE. THE RECORDER WILL TOPPLE OVER.

---

Figure 2-1. Foot Cover Removal
3. Swing out the stabilizing arm and extend it towards you. Figure 2-2 shows how to swing out the stabilizing arm. Make sure the slot in the stabilizing arm extends out the rear of the recorder.

![Figure 2-2. Swivel Stabilizing Arm](image)

When the recorder is in normal operating position (chart door is closed), the stabilizing arm should be pushed to middle position (the bumps on the arm will click in place under the recorder). Refer to Figure 2-3a.

Before opening the chart door, pull the stabilizing arm out to its full extension position to provide full stability. Refer to Figure 2-3b. After closing the door, return the arm to its middle position. Refer to Figure 2-3a.

Note that the arm extends towards the front or rear of the case. If the unit is placed on a bench top snug against the wall, extend the stabilizing arm fully to the front of the unit. Refer to Figure 2-3b.

![Figure 2-3a. Stabilizing Arm Use for Bench Top Use (Normal Position)](image)  ![Figure 2-3b. Stabilizing Arm in Extended Position (Position When You Open Door)](image)
2.2 Mounting the Recorder on the Wall

To mount the recorder on the wall, first locate the wall mounting holes using the template provided in the wall mounting kit. Leave the decorative foot cover (Figure 1-1, item #18) in place*. After drilling the holes, insert the wall anchors and put in the screws, leaving 1/8 inch (3 mm) between the screw heads and the wall. Hang the recorder by positioning the two (2) “keyholes” in the rear cover over the screw heads.

* If the decorative foot cover is not in place, go through the following steps to reinstall the cover (if desired):

1. Place the recorder on the table (so it is front face up).
2. Roughly position the foot cover so the clips are in line with the stabilizing arm. Gently “stretch” the clips out and position over the arm as shown in Figure 2-4a.
3. Once the clips are in place, gently slide down until the foot cover is even with the front of the recorder as shown in Figure 2-4b.

Figure 2-4a. Installing the Foot Cover (Top View)  
Figure 2-4b. Installing the Foot Cover (Side View)
2.3 Using Batteries

The recorder operates on either four “D” size non-rechargeable alkaline batteries or a universal (100-240 Vac, 50-60 Hz) ac adapter.

In the event of ac power failure, the unit will switch over to battery power automatically. Keep a fresh set of batteries in the unit in case of power outage.

2.3.1 Installing Batteries

You may power the recorder with four “D” size alkaline batteries. Under normal conditions, the recorder operates full time on battery power for up to three months when using fresh alkaline batteries. When replacing batteries, we recommend that you use Alkaline “D” size batteries for long life and for best performance at low temperatures.

To install the batteries (refer to Figure 2-5):

Figure 2-5. Battery Compartment and Battery Orientation
The battery icon on the LCD shows the status of the batteries as shown below.

![Battery Icons](image)

- **Full Battery Life (100%)**
- **75% Battery Life**
- **50% Battery Life**
- **25% Battery Life**
- **Low Battery - Replace Battery**
- **No Battery Icon – AC adapter**

**Figure 2-6. Battery Warnings**

### 2.3.2 Connecting ac Power

The recorder can be ac powered using the universal 100-240 Vac adapter supplied. The dc power jack is located on the right side of the unit (refer to Figure 1-1, item #6.). The ac adapter provides 9 Vdc @ 1.7A power output and comes with a 1.8 meters (6 ft.) long cable.

The following parameters are stored in the non-volatile memory and will not be lost when batteries or main power are removed:

- Chart speed & scale
- High & low alarm set points for the two channel
- Chart Data points

When the recorder runs only on AC adaptor, and the main power restores after a power failure, the recorder turns on automatically without pressing the Power Key. All LCD segments turn on momentarily, then there is a 20 second delay before the revision screen. This only happens when the power is removed without pressing the Power Key. The pens go to the home position and back to the correct chart scale every time the recorder powers up.
2.4 Installing and Changing Chart Paper

Make sure the Sensor probe is plugged into the Recorder when power is on. The Factory set up is for 7 Day Chart Speed & °F Chart Scale for CTXL-TRH.

To install or change the same Chart paper:

- Open the Recorder door & remove the magnetic hub that holds the paper.
- Place the new Chart paper.
- Rotate the paper, until the present time lines up with the Time reference arrow as shown in Fig 2.8.
- Place the magnetic hub over the paper & close the recorder door. This can be done with or without power turned on.

2.4.1 Changing Chart Speed & Scale

You can change the Chart speed & scale as follows:

- Make sure the unit is turned on by pressing the Power Key.
- Open the Recorder door. The pens will go to the Home position (Bottom of scale) and the display will show "door oPEn" as well as the existing Chart Speed (7 Days) and Chart scale (°F).
- Press the Chart Speed key to change to 1 or 32 day chart.
- Press the Chart Scale key to change to °C if needed (CTXL-TRH only).
- Install the new Chart paper as explained in the previous paragraph
- Close the Recorder door. The display will show "dAtA rSt?"
- Press key to reset (erase) previous stored data in memory. The unit beeps for verification.
- Press key to continue recording without resetting (erasing) previous stored data in memory.
- If no keys are pressed, the unit will resume recording after 5 seconds without erasing previous stored data in memory.

Figure 2-7. Changing Chart Speed and Scale Flow Diagram
2.5 Installing and Removing Pens

The recorder already comes with the two pens installed. While the unit is turned off, open the recorder door and remove the pen caps from the two pens. Place the pen caps on the two posts as shown in Fig. 2-11.

2.5.1 Installing the Pens

The recorder uses two different colored pens to record information. The red (upper) pen records temperature. The blue (lower) pen records relative humidity. Pen life varies with use and climate. Under normal operating conditions, pens last at least one month. We recommend that you install a fresh set of pens after every month of use.

To install pens:

1. Make sure the recorder is turned off. The recorder door should be closed.
2. Examine the location of the pen arms through the window in the recorder door.
   a. If the pen arms are offset as shown in Figure 2-9, continue to Step 3:

   Figure 2-9. Offset Alignment of Pens (For Ease of Pen Installation)
b. If the pen arms are vertically aligned as shown in Figure 2-10, do the following and then proceed to Step 3.

Figure 2-10. Vertical Alignment of Pens (Pens Can’t Be Inserted)

(The pen arms must be offset sufficiently to allow for clearance before insertion or removal of pens are attempted. The pens must be moved electrically.)

- Make sure the recorder door is closed and a piece of chart paper is installed on the spindle on the chart base.
- Turn on the unit by pressing the power key and wait for the pens to be far enough apart to remove a used pen one at a time or to insert a new pen one at a time.

CAUTION

DO NOT ATTEMPT TO OFFSET THE PENS MANUALLY (BY HAND). THE DRIVE MECHANISM COULD BE DAMAGED. DO NOT ATTEMPT TO CHANGE THE PENS WHILE THEY ARE IN MOTION.

- Turn off the unit by pressing the power key again to stop the pen movement.

3. Open the recorder door by applying downward pressure on the latch button.

4. Remove the pens from the package and the cap from each pen.

We recommend that you put the pen caps on special posts located on the chart base of the recorder near the light bulbs. Figure 2-11 shows the location of the posts.

Figure 2-11. Post Location for Pen Caps

5. Insert the blue pen fully into the lower (humidity) holder and the red pen fully into the upper (temperature) holder.
If you installed the pens correctly, you will hear a click as they position themselves in the holders. Figure 2-12 shows how to insert the pens.

6. Close the recorder door.

![Figure 2-12. Pen Installation](image)

### 2.5.2 Removing the Pens

1. Check to see that the pens are offset as shown in Figure 2-9. Otherwise, you can damage the arm and drive mechanism if you try to remove them.

   ![CAUTION](image)

   **CAUTION**

   **DO NOT ATTEMPT TO OFFSET THE PENS MANUALLY (BY HAND). THE DRIVE MECHANISM COULD BE DAMAGED. DO NOT ATTEMPT TO CHANGE THE PENS WHILE THEY ARE IN MOTION.**

2. Perform Step 2b in Section 2.5.1 to offset the pens.

3. With a screwdriver in one hand, push on the rectangular area of the pen shown in Figure 2-13. Using the other hand, release the pen from the spring clip attached to the pen holder.

![Figure 2-13. Pen Removal](image)

4. At the same time, slide the pen out from the pen holder.

5. Install new pens following section 2.5.1, steps 3 thru 6.
2.6 Setting Alarms and Time Clock

The following flow chart shows how to set the alarms and the time clock in a Temperature/Humidity model recorder.

- **Real Time Mode**

- **High Alarm - Channel 1 (Temperature)**
  - Press ▲ or ▼ keys to set high alarm
  - Press SET key to enable/disable alarm
  - [HAL] icon is on when high alarm enabled

- **Low Alarm - Channel 1 (Temperature)**
  - Press ▲ or ▼ keys to set low alarm
  - Press SET key to enable/disable alarm
  - [LAL] icon is on when low alarm enabled

- **High Alarm - Channel 2 (Humidity)**
  - Press ▲ or ▼ keys to set high alarm
  - Press SET key to enable/disable alarm
  - [HAL] icon is on when high alarm enabled

- **Low Alarm - Channel 2 (Humidity)**
  - Press ▲ or ▼ keys to set low alarm
  - Press SET key to enable/disable alarm
  - [LAL] icon is on when low alarm enabled

- **Clock - Display Hour**
  - Press ▲ or ▼ keys to set the hour
  - (Military time 0-23)

- **Clock - Display Minute**
  - Press ▲ or ▼ keys to set the minute
  - (00-59)

- **Clock - Display Month**
  - Press ▲ or ▼ keys to set the month
  - (1-12)

- **Clock - Display Day**
  - Press ▲ or ▼ keys to set the day
  - (01-31)

Figure 2-14. Setting Alarms and Time Clock
Press the **CONFIG** key to get into the Configuration mode. In this mode, you can set High & Low alarm points as well as the Time Clock as shown in the flow chart on the previous page.

You can exit the configuration menu at any time by pressing the **MODE** key. The high & low alarm set points are stored in the non-volatile memory. Removing power (ac adapter or batteries) will not affect the alarm settings. The real time clock has its own rechargeable battery back up. The clock continues to operate when the main power is removed for about 14 days. There is no need to change the real time clock battery since it gets charged every time the main power is present.

The recorder has two built-in Relays and provides an additional two voltage outputs to drive external mechanical relays. There is a 10 position terminal block in the back of the recorder. It provides the two relay contact closures & two signal outputs to drive external mechanical relays as shown in Fig 2.14. In order to do your wiring, remove the terminal block from the back of the recorder. Connect your wiring, then plug the terminal block back in its place.

When the recorder is in alarm condition, the high or low alarm icon and the channel no. flashes on the display. The unit beeps and the corresponding relay output turns on (Built-in Relay energizes-contact closure- and/or relay voltage output goes high). You can disable the high or low alarms by going thru the configuration menu and pressing the SET key to disable.

If you are switching inductive loads across Relay contacts, it is recommended to connect a Varistor across the relay contacts to protect the contacts from the rush current during the switching period.

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**Figure 2-15. Relay Terminal Block Wiring Diagram**
2.7 Reviewing Parameter Values

You can review the Maximum, Minimum, and Average values of the two channels by pressing the \( \text{MODE} \) key. You can review the differential temperature between the two channels (T1-T2) on the Dual Thermocouple models. You can reset the values and start fresh at any time by pressing the \( \text{SET} \) key.

Temperature/Humidity Model or Dual Process Model

![Diagram showing parameter values]

Dual Thermocouple Model

![Diagram showing parameter values]

Figure 2-16. Reviewing Parameter Values

NOTE

The Minimum, Maximum, and Average values will reset when power is removed.
2.8 Using the Remote Sensor Cable - Temperature/Humidity Model

1. Connect the end of the cable with the arrow to the short cable on the sensor. Line up the two arrows as shown in Figure 2-16 before mating the two cables.

2. Connect the other end of the remote sensor cable to the recorder.

For accurate temperature and humidity readings, the sensor probe can be up to 12.2 m (40 ft.) away from the recorder.
2.9 Using the Sensor Clip

An extra sensor clip is provided in the shipping box, so you can hang the sensor in a remote location. Two self-tapping screws are provided for mounting to wood, sheet rock or plastic surfaces. When mounting to wood or sheet rock surfaces, drill two \( \frac{1}{16} \)" (1.5 mm) diameter holes. When mounting to plastic, drill two \( \frac{3}{32} \)" (1.9 mm) diameter holes. Appropriate hardware must be selected when mounting to metal surfaces. Refer to Figure 2-17.

Figure 2-18. Using the Sensor Clip for Mounting Sensor in a Remote Location
2.10 Open/Out of Range Input

If the input to the recorder is open or out of range, the chart motor continues to run but the recorder handles the situation as follows:

1. Temperature/Humidity Model: When the sensor probe is disconnected, the pens go to the home position and the display shows “Prb Err”. When the probe is out of range, the display flashes.

2. Dual Thermocouple Model: When any of the two thermocouple inputs open up, the pens go to the home position, and the display shows “Prb Err”. When the input is out of range, the display flashes.

3. Dual Process input Model: When the two inputs are out of range, the display flashes.

2.11 Pen Jamming

Each pen drive mechanism has two optical sensors. One is to detect the home position, the other is to detect pen movement. If the pen drive mechanism skips steps due to wear & tear or dirt & dust over a period of time, the recorder can compensate for it so that the pens are at the right location on the chart. If the pens have too much friction or get jammed for any reason, the recorder detects the situation. It turns off both the pen and the chart motors. It continues to display the parameters on the LCD and stores data in the memory. The Chart icon starts to flash to indicate Pen Jamming.

Once the pen drive mechanisms are serviced, and the recorder is powered back on, the unit continues to operate normally and the chart icon flashing will disappear.

2.12 Pen Re-scaling

Each or both pens can be re-scaled within the range of the input sensor. Here are the standard chart ranges for the three models:

Temperature/ Humidity Model  -17.7 to 49°C (0 to 120°F)
                                  0 to 100% RH

Dual Thermocouple Input

Type K  -40 to 560°C (-40 to 1040°F)
Type J  -40 to 260°C (-40 to 500°F)
Type T  -40 to 160°C (-40 to 320°F)

Dual Process Input  0 to 100%

The pens can be re-scaled thru RS232 from the PC using certain commands. See Chapter 3 for more details. Once the pens are re-scaled, the Chart icon turns on. The unit remembers the new pen scales even if the main power is removed. The chart icon will disappear if the pens are scaled back to factory settings.
2.13 Chart Lights & Display Backlight

You can turn ON/OFF the chart lights and the display backlight by pressing the \( \text{LIGHT} \) key on the front panel keypad.

In Battery mode (Battery Powered), the lights stay on for 3 seconds. In DC adaptor mode, the lights stay on until pressing the \( \text{LIGHT} \) key again to turn them off.

2.14 Lock/Unlock Keypad Functions (White Box)

You can Lock/Unlock the front panel keypad functions by pressing & holding the \( \text{LOCK} \) key for 3 seconds. When in lock mode, the lock icon comes on and the configuration menu will be inactive (Config, Set, Yes, No). When in unlock mode, the Unlock icon comes on and all the keys are active.
3 PC Communication

You can communicate with the CTXL recorder thru RS232 port from a PC. There are a number of PC commands that allows the user to do the following functions:

- Get the data (Like Temperature & Relative Humidity) in real time. This is the same data displayed on the LCD.
- Download the stored chart data from the recorder to the PC. It will save the data into a data file. It can then be imported into the Excel spread sheet program for further review and analysis.
- Re-scale the Chart paper for one or both Pens to any range within the input operating range.
- Reset the Chart scale back to the Factory standard scales.

You can initiate the PC commands from the Hyper terminal or can develop your own program and incorporate these commands. Here are the steps to work from the Hyper terminal:

- From Start ➞ Programs ➞ Accessories ➞ Hyper Terminal
- Create a name for your communication
- Set the communication settings as follows (In the Properties Menu):
  - COM port (1, 2, 3)
  - Baud Rate (9600)
  - Data Bits (8)
  - Parity (None)
  - Stop Bit (1)
  - Flow Control (None)

3.1 Get Display Data in Real Time

You can get the data for channels 1 & 2 in real time. It will be the same data displayed on the LCD. The following two commands perform such functions.

In the Temperature/Humidity Model, the temperature data is multiplied by 10 using the AT command.

Please note that all the PC commands terminate with a Carriage Return. In the Example section of the following tables, the PC commands are in Bold, and the response is in regular text.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>Get display data from Chan 1 (Temperature)</td>
<td>AT;00748</td>
</tr>
<tr>
<td>AH</td>
<td>Get display data from Chan 2 (Humidity)</td>
<td>AH;0048</td>
</tr>
</tbody>
</table>
3.2 Re-scaling One or Both Pens on Chart Paper

You can re-scale one or both pens to any range within the operating input range. Here are the commands:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUT</td>
<td>Change Chan 1 Pen (Temp) top chart value</td>
<td>PUT90; Pen Scale set</td>
</tr>
<tr>
<td>PUB</td>
<td>Change Chan 1 Pen (Temp) bottom chart value</td>
<td>PUB50; Pen Scale set</td>
</tr>
<tr>
<td>PLT</td>
<td>Change Chan 2 Pen (Humidity) top chart value</td>
<td>PLT80; Pen Scale set</td>
</tr>
<tr>
<td>PLB</td>
<td>Change Chan 2 Pen (Humidity) bottom chart value</td>
<td>PLB40; Pen Scale set</td>
</tr>
<tr>
<td>PRO0</td>
<td>Issue the new Pen scales values to the recorder</td>
<td>PRO; Rescaled</td>
</tr>
<tr>
<td>PS</td>
<td>Get the Pen scales for Chan 1 &amp; 2</td>
<td>PS,0090,0050,0080,0040</td>
</tr>
<tr>
<td>PR1</td>
<td>Re-scale the Pens to the standard Factory scales</td>
<td>PR1; Rescaled</td>
</tr>
</tbody>
</table>

In the above example, we are re-scaling both Pens as follows:

Temperature Pen: 50 to 90°F (Standard: 0 to 120°F)

Humidity Pen: 40 to 80% RH (Standard: 0 to 100%RH)

After issuing the PR0 command, the new Pen scale values will take affect, otherwise the previous scale values will remain. The Chart icon comes on to indicate new chart scale. The new scale is stored in the non-volatile memory. To restore the Pen scales back to the Factory settings, you need to issue the PR1 command.

The rescaling value can be a negative number on models CTXL-DTC and CTXL-DPR. For example, you can issue a PC command: PUB-100 meaning the bottom of chart for channel 1 starts at -100.

NOTE

The rescaling of the Temperature Pen is based on Degree F scale on both CTXL-TRH and CTXL-DTC Models.
3.3 Download Stored Chart Data from Recorder to PC

You need to create a Text file for saving the data from the recorder before issuing the MD command. While in Hyperterminal, go to: Transfer ➞ Capture Text (Create a Text file) ➞ Start

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD</td>
<td>Download stored Chart data &amp; save it in a data file</td>
<td>MD;</td>
</tr>
<tr>
<td>MI</td>
<td>Erase stored Chart data from recorder’s memory</td>
<td>MI,Done</td>
</tr>
</tbody>
</table>

When you issue the MD command, it will download the Chart data (Chan 1 & 2) stored in the non-volatile memory of the recorder. It will save the data into a text file which can be imported into the Excel spread sheet program. Depending on the amount of data stored in the non-volatile memory of the recorder, the data transfer could take up to 3 minutes.

Here is a sample of data downloaded from the recorder.

CTXL Circular Chart Recorder
Ver: 10.12
OnLine
Chart Speed: 1d
Hum% Temp Deg F
0012 0075
0011 0076
0012 0077
0013 0078
0014 0079
0014 0079
0015 0080
0017 0079
0020 0078
,,Month, Day, Hour, Minute,
,,0012, 0019, 009, 0012 ← Ending Time

Please note that the data file begins with the Chart Speed (1, 7, 32 Days). Then it follows the headings of the data (Humidity % RH, Temp Deg F). Then it follows the chart data. Then the Ending Time of the Chart data in Month, Day, Hour, Minute.

You can stop data transfer at any time by pressing the Q key. You can restart data transfer by issuing the MD command again.

The download data is always in Degree F scale on models CTXL-TRH and CTXL-DTC.
3.4 - Humidity Probe Calibration Procedure (CTXL-TRH)

This is a two point humidity calibration, 33% RH and 75% RH. The temperature does not require calibration although it can be certified at room or any other temperature within its operating range. Before the humidity calibration, you must record the humidity reading of the probe at 33% RH & 75% RH environments. If the reading accuracy at these two points are within +/-3% RH, no calibration is required. Otherwise the probe needs calibration as described below:

Example: The probe humidity reading at 33% RH is 37% RH and at 75% RH is 72% RH.

(PC commands are in Bold)

1. Connect the CTXL recorder to a PC with the RS232 cable provided.

2. Run HyperTerminal program from the PC. The COM port setting are:
   - Baud rate: 9600
   - Data Bits: 8
   - Parity: None
   - Stop Bit: 1

3. Turn on the power to the CTXL. The probe does not have to be at any specific humidity environment (Regular room environment).

4. Type HH then press Enter key from the Hyper Terminal. The following message shows the previous two calibration data (Factory Default setting are 33% RH and 75% RH) saved in the CTXL memory.

   HH;
   Humidity calibration saved data are:
   00033
   00075

5. Type HC then press Enter key to start the humidity calibration, and the following message will appear.

   HC;
   Humidity calibration begins,
   Please type HUL followed by the measurement value at 33% RH.

6. Type HUL37 then press Enter key. (37 is the value that the probe was reading at 33% RH humidity), and the following message will appear:

   HUL37; 00037
   Please type HUH followed by the measurement value at 75% RH.

7. Type HUH72 then press Enter key. (72 is the value that the probe was reading at 75% RH humidity), and the following message will appear:

   HUH72; 00072
   Humidity calibration is done.
   00037
   00072

8. Now the humidity calibration is complete and the probe reading should be in specs.
3.5 Changing Thermocouple Input Type (Model CTXL-DTC)

The dual thermocouple input model CTXL-DTC can accommodate J, K, or T thermocouple types. The factory default setting is Dual K type thermocouple input. You can configure the recorder for other thermocouple types (J or T) from the PC without re-calibration as follows:

Once the PC is connected to the recorder thru RS232 cable, use the following PC commands (in Bold):

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT0</td>
<td>Change to K type TC</td>
<td>IT0; Toggle Power to use new input type</td>
</tr>
<tr>
<td>IT1</td>
<td>Change to J type TC</td>
<td>IT1; Toggle Power to use new input type</td>
</tr>
<tr>
<td>IT2</td>
<td>Change to T type TC</td>
<td>IT2; Toggle Power to use new input type</td>
</tr>
</tbody>
</table>

After issuing the command, the response is “Toggle Power to use new input type” which means to remove and then apply power to the recorder for the command to take affect. At the power up, the LCD screen always shows the thermocouple type for two seconds. This is the way to confirm thermocouple input type.
4 Specifications

4.1 General

Display: Custom made 4 Digit Dual LCD, Backlit

Display Data sampling rate: Once per 2 seconds

Chart Speed: 1 Day, 7 Days, 32 Days

Chart Response time: 0.5 min, 3.5 min, 16 min for 1, 7, 32 days respectively

Keypad response: 250 msec

Chart Paper: 203 mm (8") circular, Linear radial divisions,

Double sided:

Chart Drive
Type: Stepper Motor
Accuracy: 1% Rotation

Chart Hold Down: Magnetic Hub

Pen Drive
Type: Stepper Motor, Linear screw drive
Deadband: 1ºF (0.5ºC) or 1% RH

Pen Lift: Automatic on Door opening- Pens are door mounted and swing clear of the chart when door opens

Lights: LCD Backlight & Chart lights
Turns on/off using Light key
In Battery mode, it turns on for 3 seconds
In DC adapter mode, it toggles on/off

Display Modes – Press Mode key
MAX: Displays Maximum value
MIN: Displays Minimum value
AVG: Displays Average value
T1-T2: Displays differential temperature between Channel 1 & 2 (Dual Thermocouple Model only)

ºC ↔ ºF key: Displays temperature in Degree C or F

Clock key: Displays the clock time & date for 3 seconds

Configuration Modes – Press Config key
High Alarm – Channel 1
Low Alarm – Channel 1
High Alarm – Channel 2
Low Alarm – Channel 2
Clock – Hour (Military time 0-23)
Clock- Minute (0-59)
Date - Month (1-12)
Date – Day (1-31)
Specifications

Clock Battery Backup: 0.33 F Super Capacitor, Holds Clock information for about 14 days when main power is removed.

White Box key: Press & hold for 3 seconds to Lock/Unlock. When in Lock mode, all keys are inactive except for the Power, Light, Mode, Clock, and the White Box keys.

Pens Going to Home Position: At the Power Up
Chart Door is opened
Input Probe is open
Chart is re-scaled

Audible alarm: Piezo-electric beeper

Alarm outputs
Two separate relay contacts & two voltage outputs
Relay Contacts: 2A @ 30 Vdc
Voltage output: 100 mA to drive an external relay

Operating ambient temperature: 0 to 49°C (32 to 120°F)
Operating Relative Humidity: 0 to 98% RH

Power: Four “D” size alkaline Batteries or DC adaptor

Battery Life: 3 Months under normal conditions

Battery status indication: Icon on the LCD

AC adapter
Output: 100 to 240 VAC, 50-60 Hz input
Output Plug (Female): 9Vdc @ 1.7A, UL, CE, FCC Marked
Output Cable: Center Positive, Coax 2.0/5.5/10 mm
1.8 m (6 Ft.) Long

Serial PC communication: RS232, 2 way, 9600 Buad, 8 Bits Data, 1 Step Bit, No Parity

RS232 Adaptor - RJ12 to 9 pin D - Sub connector, Female
RJ12 Pin # 9 pin D connector Pin #
3 Tx 2 Rx
4 Rx 3 Tx
5 GND 5 GND

Memory: 256K EEPROM, Circular Buffer - Holds 2.8 Chart revolutions worth of data

PC Communication – See Chapter 3 for more details

Chart Rescale: Rescale one or both pens
Restore Default Factory settings

Data Transfer: Download stored data and save into a data file
Erase stored data from recorder’s memory

Get Data in Real Time: Read current data from channel 1 and 2

Mounting: Key hole slots for wall mounting
Foot cover for Bench top use
Specifications

Dimensions: 33.5 H x 27.1 W x 6.7 cm D
(13 ⅜ x 10 11⁄16 x 2 5⁄8") You can double
Weight: Approx. 3.2 Kg (7 lbs) including batteries

4.2 Temperature/Humidity Model

Temperature:
Range: -17.7 to 49°C (0 to 120°F)
Accuracy: 1°C (2°F)
Display Resolution: 0.1 Degree F or C

Relative Humidity:
Range: 0 to 98% RH
Accuracy: 3% RH, From 15-90% RH @ room temperature
5% RH, Below 15 & above 90% RH @ room temperature
Display Resolution: 1% RH

Distance for Remote Probe: 40 Feet

Temperature/Humidity sensor: Digital chip

Probe Disconnect: Pens will go to the Home position, Display will show “Prb Err”. Chart motor will continue to run

Alarm set point Resolution
Temperature: 0.5 ºC or ºF
Humidity: 1%RH

Alarm Deadband: 0.5ºC or ºF – Temperature
3% RH – Humidity

Factory Default settings:

Chart Scale:
Temperature: 0-120ºF
Humidity: 0-100% RH

High Alarm set point:
Temperature: 120ºF
Humidity: 100% RH

Low Alarm set point:
Temperature: 0ºF
Humidity: 0% RH

Chart Speed: 7 Days
4.3 Dual Thermocouple Input Model

Display Range
Type K: -100 to 1000°C (-148 to 1832°F)
Type J: -100 to 700°C (-148 to 1292°F)
Type T: -100 to 300°C (-148 to 572°F)

Display Accuracy
Type K: 2°C (4°F)
Type J & T: 1.5°C (3°F)

Standard Chart Scales
Type K: -40 to 560°C (-40 to 1040°F)
Type J: -40 to 260°C (-40 to 500°F)
Type T: -40 to 160°C (-40 to 320°F)

Input connection: Universal connector
Probe input: Dual K, J, or T programmable from PC
Open Thermocouple input: Pens will go to the Home position, Display will show “Prb Err”. Chart motor will continue to run
Out of Range Input: Display flashes
Alarm set point Resolution: 1°C or °F
Alarm Deadband: 3°C or °F

Factory Default settings
Thermocouple Input: Dual Type K
Chart Scale, both inputs: -40 to 560°C (-40 to 1040°F)
High Alarm set point
Chan 1: 1040°F
Chan 2: 1040°F
Low Alarm set point
Chan 1: -40°F
Chan 2: -40°F
Chart Speed: 7 Days
### 4.4 Dual Process Input Model

**Inputs:**
- 0-1 V, 0-5 V, 0-10 V, 4-20 mA, 0-20 mA

**Display Accuracy:**
- 0.2% Full scale

**Input Connection:**
- Wire connection

**Out of range input:**
- Display will flash. Chart motor will continue to run.

**Standard Chart Scale:**
- 0-100%

**Alarm set point Resolution:**
- 1%

**Alarm Deadband:**
- 3%

**Excitation Voltage:**
- 15Vdc @ 50 mA

**Factory Default settings**

- **Process Input:**
  - Dual 4-20 mA (CTXL-DPR-I)
  - Dual 0/5 Vdc (CTXL-DRP-V)

- **Chart Scale, both inputs:**
  - 0 to 100%

- **High Alarm set point**
  - Chan 1: 100%
  - Chan 2: 100%

- **Low Alarm set point**
  - Chan 1: 0%
  - Chan 2: 0%

- **Chart Speed:**
  - 7 Days

---

**Figure 4-1. Using Internal 15 Vdc Excitation to Power External Transmitters**

---
5.1 General Considerations

Keep the recorder in a dry place. If it gets wet, wipe the case as soon as possible to get rid of any moisture.

Do not expose the recorder to temperatures other than those stated in the specifications. The recorder can operate in temperatures as high as 120°F (49°C) or as low as 32°F (0°C).

Handle the recorder carefully (DO NOT DROP IT).

Do not use strong cleaning solvents or alcohol when cleaning the outer case. Refer to Section 8.3 for more details.

Do not use old or weak batteries in the recorder. It is important to change the batteries monthly or when you see the LO BAT indicator (see Fig. 2-6).

Keep the recorder away from excessive dirt and dust. Do not use the recorder or the sensor in a corrosive air environment.
All humidity sensors are susceptible to contamination from outside sources that can affect accuracy and response time. Take care to prevent excessive contamination by dirt, oil, grease, solvents, or a corrosive air environment.

Notes
### List of Accessories and Chart Papers

#### Accessories

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTXL-CABLE-6</td>
<td>1.8 m (6') extension cable</td>
</tr>
<tr>
<td>CTXL-CABLE-10</td>
<td>3.05 m (10') extension cable</td>
</tr>
<tr>
<td>CTXL-CABLE-25</td>
<td>7.6 m (25') extension cable</td>
</tr>
<tr>
<td>CTXL-CABLE-6-S</td>
<td>1.8 m (6') analog cable, stripped leads</td>
</tr>
<tr>
<td>CAL-3-CTXL</td>
<td>NIST Traceable Calibration</td>
</tr>
<tr>
<td>CT485B-CAL-KIT</td>
<td>Calibration kit (33 and 75% RH salt solutions)</td>
</tr>
<tr>
<td>CT485-PS</td>
<td>Pen set, red &amp; blue, package of 1 each</td>
</tr>
<tr>
<td>CT485-PS-6</td>
<td>Pen set, red &amp; blue, package of 6 each</td>
</tr>
<tr>
<td>CT485B-CLIP-KIT</td>
<td>Sensor clip kit</td>
</tr>
</tbody>
</table>

#### Charts

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTXL-DTC-R1-CD</td>
<td>100 Charts, 1 Day -40/1040°F (-40/560°C)</td>
</tr>
<tr>
<td>CTXL-DTC-R1-CW</td>
<td>100 Charts, 7 Day -40/1040°F (-40/560°C)</td>
</tr>
<tr>
<td>CTXL-DTC-R1-CM</td>
<td>100 Charts, 32 Day -40/1040°F (-40/560°C)</td>
</tr>
<tr>
<td>CTXL-DTC-R2-CD</td>
<td>100 Charts, 1 Day -40/500°F (-40/260°C)</td>
</tr>
<tr>
<td>CTXL-DTC-R2-CW</td>
<td>100 Charts, 7 Day -40/500°F (-40/260°C)</td>
</tr>
<tr>
<td>CTXL-DTC-R2-CM</td>
<td>100 Charts, 32 Day -40/500°F (-40/260°C)</td>
</tr>
<tr>
<td>CTXL-DTC-R3-CD</td>
<td>100 Charts, 1 Day -40/320°F (-40/160°C)</td>
</tr>
<tr>
<td>CTXL-DTC-R3-CW</td>
<td>100 Charts, 7 Day -40/320°F (-40/160°C)</td>
</tr>
<tr>
<td>CTXL-DTC-R3-CM</td>
<td>100 Charts, 32 Day -40/320°F (-40/160°C)</td>
</tr>
<tr>
<td>CTXL-DPR-CD</td>
<td>100 Charts, 1 Day, 0 to 100%</td>
</tr>
<tr>
<td>CTXL-DPR-CW</td>
<td>100 Charts, 7 Day, 0 to 100%</td>
</tr>
<tr>
<td>CTXL-DPR-CM</td>
<td>100 Charts, 32 Day, 0 to 100%</td>
</tr>
<tr>
<td>CTXL-BLANK-CD</td>
<td>100 Charts, 1 Day, Blank Scale</td>
</tr>
<tr>
<td>CTXL-BLANK-CW</td>
<td>100 Charts, 7 Day, Blank Scale</td>
</tr>
<tr>
<td>CTXL-BLANK-CM</td>
<td>100 Charts, 32 Day, Blank Scale</td>
</tr>
<tr>
<td>CTXL-CSP-T</td>
<td>150 Charts, Sample Pack Temperature</td>
</tr>
<tr>
<td>CTXL-CSP-P</td>
<td>120 Charts, Sample Pack Process</td>
</tr>
<tr>
<td>CT485-CDF</td>
<td>100 Charts, 1 day am/pm, °F</td>
</tr>
<tr>
<td>CT485-CDR</td>
<td>100 Charts, 1 day am/pm, °C</td>
</tr>
<tr>
<td>CT485-C24F</td>
<td>20 Charts, 24 hour clock, °F</td>
</tr>
<tr>
<td>CT485-C24C</td>
<td>20 Charts, 24 hour clock, °C</td>
</tr>
<tr>
<td>CT485-CWF</td>
<td>100 Charts, 7 day, °F</td>
</tr>
<tr>
<td>CT485-CWC</td>
<td>100 Charts, 7 day, °C</td>
</tr>
<tr>
<td>CT485-CMF</td>
<td>100 Charts, 32 day, °F</td>
</tr>
<tr>
<td>CT485-CMC</td>
<td>100 Charts, 32 day, °C</td>
</tr>
<tr>
<td>CT485-CSP</td>
<td>120 Charts, 20 of each style</td>
</tr>
<tr>
<td>CT485-CDF-6</td>
<td>600 Charts, 1 day, °F</td>
</tr>
<tr>
<td>CT485-CDC-6</td>
<td>600 Charts, 1 day, °C</td>
</tr>
<tr>
<td>CT485-CWF-6</td>
<td>600 Charts, 7 day, °F</td>
</tr>
<tr>
<td>CT485-CWC-6</td>
<td>600 Charts, 7 day, °C</td>
</tr>
<tr>
<td>CT485-CMF-6</td>
<td>600 Charts, 32 day, °F</td>
</tr>
<tr>
<td>CT485-CMC-6</td>
<td>600 Charts, 32 day, °C</td>
</tr>
</tbody>
</table>

* Please note that on the °F graduation, on the chart paper, the 45°F is misprinted. It should be 77°F instead.
Table 7-1 contains a brief troubleshooting guide.

Table 7-1. Troubleshooting Guide

<table>
<thead>
<tr>
<th>If this occurs</th>
<th>Perform these steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>? Recorder appears not to function at all.</td>
<td>Make sure POWER switch is pressed.</td>
</tr>
<tr>
<td></td>
<td>Make sure the ac adapter is securely plugged into the wall and into the power jack on the recorder.</td>
</tr>
<tr>
<td></td>
<td>If using fresh batteries, make sure they are inserted correctly.</td>
</tr>
<tr>
<td></td>
<td>If using old batteries, replace with a fresh set of alkaline batteries.</td>
</tr>
<tr>
<td>? Chart paper appears not to turn, or to turn at the wrong speed.</td>
<td>Make sure the magnetic chart knob is in place.</td>
</tr>
<tr>
<td></td>
<td>Make sure the chart speed 1/7/32 days is set properly.</td>
</tr>
<tr>
<td>? The humidity pen (blue) appears to be in the wrong position.</td>
<td>Make sure the “CHART SCALE” °C/°F is set properly.</td>
</tr>
</tbody>
</table>
### Troubleshooting the Recorder

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulbs don’t light.</td>
<td>Bulbs are blown. Replace them with new bulbs.</td>
</tr>
<tr>
<td>The pens do not appear to be leaving traces on the paper.</td>
<td>Check that the pens are locked firmly in position in their holders.</td>
</tr>
<tr>
<td>Make sure pen caps are removed (and secured on the cap posts as recommended).</td>
<td></td>
</tr>
<tr>
<td>Make sure the pens are fresh. Remove a pen and test it on a piece of chart paper. Insert new pens if necessary.</td>
<td></td>
</tr>
<tr>
<td>Make sure the door is completely closed and the latch button is in the uppermost position. It may be necessary to squeeze the case slightly to close the latch completely.</td>
<td></td>
</tr>
<tr>
<td>The pens do not appear to be leaving traces on the paper.</td>
<td></td>
</tr>
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FOR WARRANTY RETURNS, please have the following information available BEFORE contacting NEWPORT:
1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult NEWPORT for current repair charges. Have the following information available BEFORE contacting NEWPORT:
1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.
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<td>Totalizers</td>
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<td>Clock/Timers</td>
<td>Strain Gauge Meters</td>
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<td>Printers</td>
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<td>Process Meters</td>
<td>Multimeters</td>
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<tr>
<td>On/Off Controllers</td>
<td>Soldering Iron Testers</td>
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<td>Recorders</td>
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For Immediate Assistance
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