

10. Warranty

OAKTON warrants this instrument to be free from significant deviations in material and workmanship for a period of one year from date of purchase. If repair or adjustment is necessary and has not been the result of abuse or misuse within the warranted time period, please return—freight prepaid—and correction will be made without charge. OAKTON alone will determine if the product problem is due to deviations or customer misuse.

Out-of-warranty products will be repaired on a charge basis.

11. Return of items

Authorization must be obtained from our Customer Service Department before returning items for any reason. When applying for authorization, please include data regarding the reason the items are to be returned. For your protection, items must be carefully packed to prevent damage in shipment and insured against possible damage or loss. We will not be responsible for damage resulting from careless or insufficient packing. A restocking charge will be made on all unauthorized returns.

NOTE: We reserve the right to make improvements in design, construction, and appearance of products without notice.

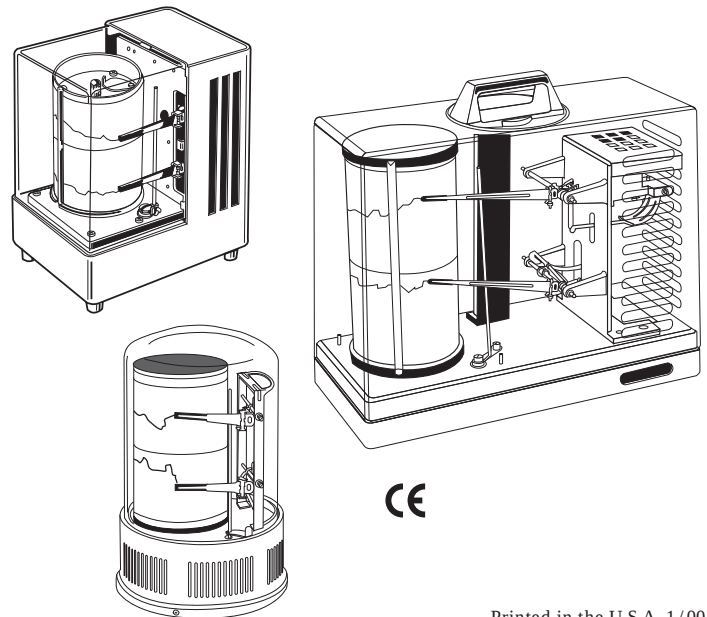
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OAKTON®

OPERATING INSTRUCTIONS

**OAKTON® Models 08369-50, -70
37250-00, -10, -20**

Hygrothermographs



Printed in the U.S.A. 1/00

OAKTON®

NOTES

Write down the name and information of your OAKTON distributor here.

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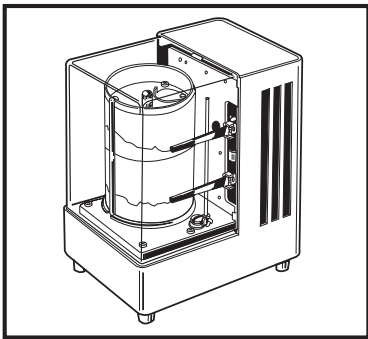
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1. Introduction

Thank you for selecting an OAKTON thermohygrometer. These precision instruments are useful for monitoring temperature and relative humidity conditions over time. They create a permanent chart recording of these measurements for your records. Their quartz-controlled drive maintains an even drum speed even when batteries are weak (or when the spring winding runs down).

Typical applications include general weather measurements, agriculture, horticulture, monitoring the condition of test laboratories, humidity chambers, computer rooms, precision machinery rooms, food storage facilities, warehouses, museums, bank vaults, film and book storage facilities.

You have one of five available models:

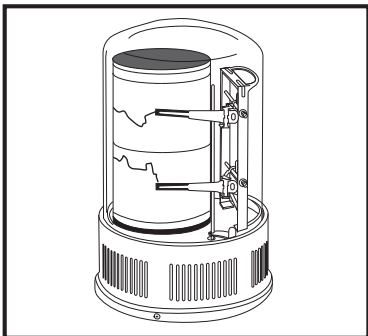


Minidrum hygromograph

Model number: 08369-70

Special features:

- Compact size
- Records on 7-day rotation
- Protective acrylic cover locks into place

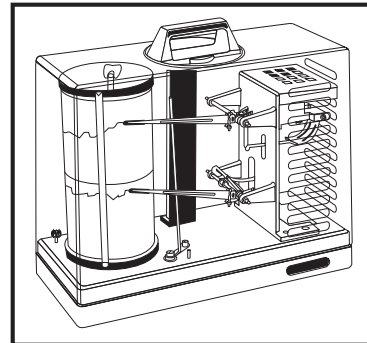


Domed minidrum hygromograph

Model number: 08369-50

Special features:

- Our most compact model
- Records on 7-day rotation
- Protective glass dome

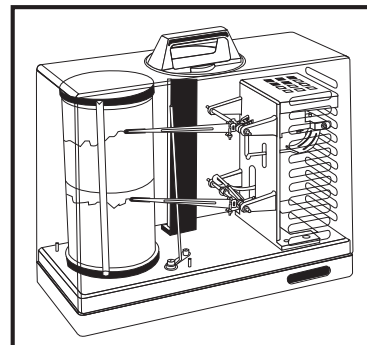


Spring-wound, two-speed hygromograph

Model number: 37250-10

Special features:

- Spring wound—no batteries needed!
- Records on 1- or 7-day rotation
- Protective acrylic cover locks into place

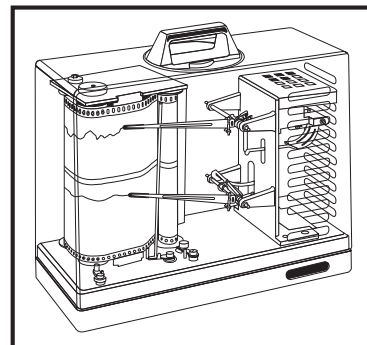


Three-speed hygromograph

Model number: 37250-00

Special features:

- Records on 1- or 7-, or 32-day rotation
- Protective acrylic cover locks into place



Long-cycle hygromograph

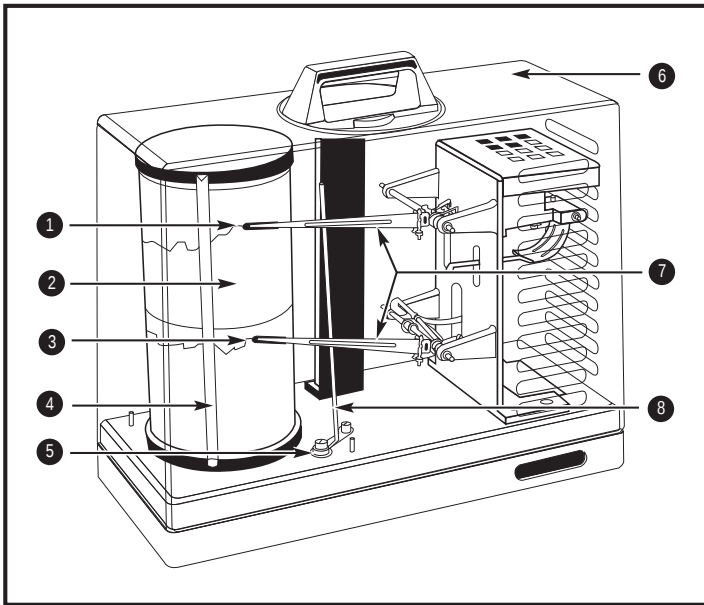
Model number: 37250-20

Special features:

- Records on 1 or 3 month rotation
- Protective acrylic cover locks into place

2. Components

All OAKTON hygrothermographs have these same features:



- | | |
|------------------------------------|---------------------|
| 1. Pen tip for temperature | 6. Protective cover |
| 2. Cylinder drum with quartz clock | 7. Pen arms |
| 3. Pen tip for humidity | 8. Pen guide |
| 4. Paper holder | |
| 5. Pen lift lever | |

3. Getting started

3.1 Unpacking

1. Remove all components from the packing material.
2. Carefully remove the acrylic or glass protective cover from the hygrothermograph. If your model has a handle, turn the carrying handle to the left until it stops, then lift up the protective cover.
3. Carefully remove the styrofoam piece located beneath the pen arm mechanism.
4. Remove the white paper that secures the humidity pen.
5. Lift the metal pen holding fitting up from the temperature pen until it is removed from the pen guide.
6. Move the pen lift lever towards you to pull the temperature and humidity pens to their resting position.

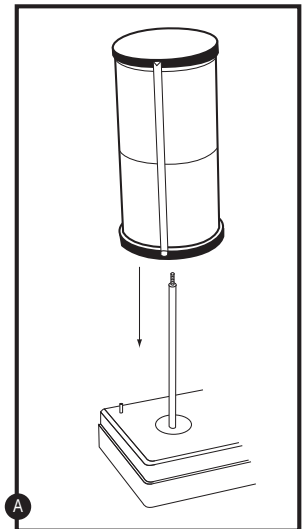
NOTE: Keep all original packing in case you need to transport the instrument.

3.2 Attaching the cylinder drum

NOTE: Long-cycle model 37250-20 already has an attached cylinder drum.

1. Unscrew the hold-down nut from the center shaft.
2. Carefully insert the cylinder drum onto the center shaft. Make sure the cylinder drum is completely lowered over the center shaft.
3. Replace the hold-down nut on the top of the center shaft.

See figure A

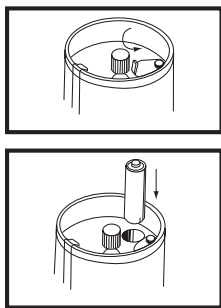


4. Hygrothermograph operation

4.1 Powering your hygrothermograph

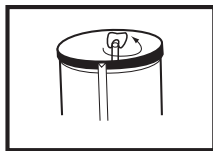
Minidrum models (08369-50 and -70):

These models require one AA battery. The battery compartment is located on top of the cylinder drum. To open the battery compartment, slide the cover of the battery compartment to the side. Make sure that the + end of the battery is facing up.



Spring wound, 2 speed model (37250-10):

This model is spring wound (requires no batteries). The spring winding shaft is located on top of the cylinder drum. To wind up the unit, turn the shaft counterclockwise until it is too stiff to move any further. This hygrothermograph will make a “clicking” sound while running. The drum will maintain an even rotation speed even when the spring is winding down.

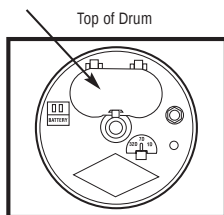


3 speed model (37250-00):

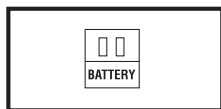
This model requires two C batteries. The battery compartment is located on top of the cylinder drum. To open the battery compartment, pull the silver knob on top of the battery compartment away from the center of the cylinder drum. Note polarity on the lid of the battery compartment.

This model features a battery indicator. To check the battery, press the red check button next to the battery compartment. Note the color of the LED indicator:

- A green LED means the batteries are in good condition.
- A red LED means the batteries need to be replaced.



Close-up of battery indicator

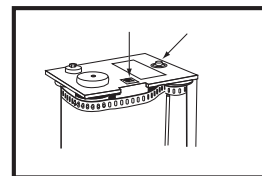
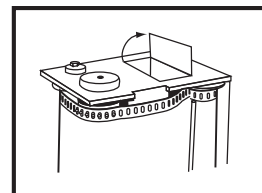


Long cycle model (37250-20):

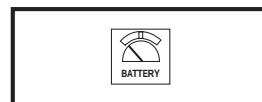
This model requires one C battery. The battery compartment is located on top of the cylinder drum. To open the battery compartment, flip open the lid on top of the cylinder drum. Note polarity inside the battery compartment.

This model features a battery indicator. To check the battery, press the red check button next to the battery compartment. The power indicator has green, white and red zones.

- the green zone means the battery is in good condition.
- The white zone means the battery is low and will have to be replaced soon.
- The red zone means the battery is very low and should be replaced immediately.



Close-up of battery indicator



4.2 Cartridge pens

To operate the pens:

1. Pull the pen lift lever towards you to move the temperature and humidity pens to their resting position.

See figure A

2. Remove the pen caps by rotating them counter clockwise.
3. Push the pen lift lever away from you until the temperature and humidity pens are touching the paper on the cylinder drum.

NOTE: Do not touch the pen tips, because skin oils will prevent the ink from flowing smoothly.

To replace the pens:

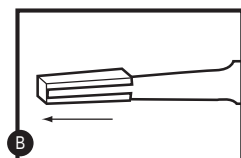
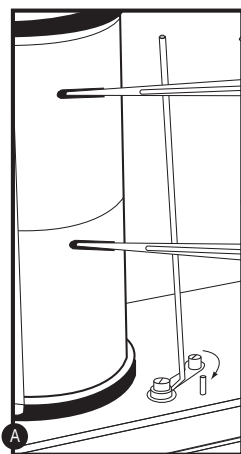
The pen tips can be used for up to a year, but we recommend that you replace them at least every six months. Conditions such as high temperature or low humidity may shorten pen life to three months.

See the “Accessories” section on page 26 to order extra pens.

1. Hold the pen arm in your right hand and pull the pen cartridge off with your left hand. If it is difficult to pull off, use a small pliers.

See figure B

2. To attach the replacement cartridge pen, insert it over the arm until it is fully attached.



4.3 Setting the time

Models 08369-50, 08369-50, 37250-10, 37250-00:

1. Pull the pen lift lever towards you to move the temperature and humidity pens to their resting position.

See figure A

2. Turn the cylinder drum one full rotation clockwise.

See figure B

3. Turn the cylinder drum counterclockwise until the pen tips align with the correct time of day or night. Numbers indicating time are located at the top and bottom of the chart paper.

NOTE: Make sure that the numbers on the graph are right side up. Change the chart paper when the cylinder has completed one rotation.

Long cycle model (37250-20) only:

1. Pull the pen lift lever slightly towards you to move the temperature and humidity pens away from the chart.

See figure C

2. Turn the chart assembly knob (located on top of the chart assembly) clockwise.

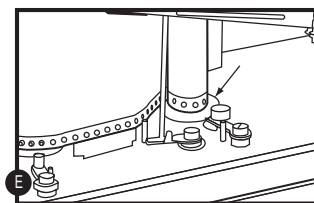
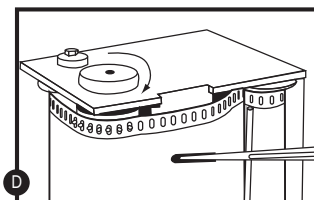
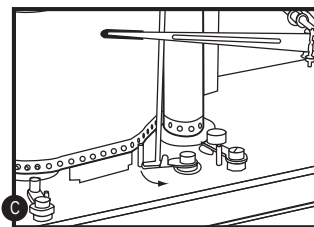
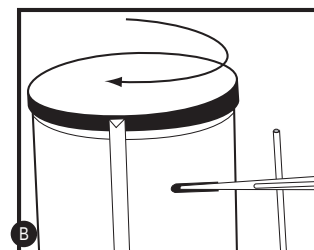
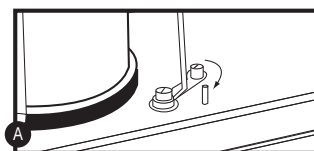
See figure D

3. Stop when the time printed on the chart paper and pen tips line up about two hours past the present time.

4. Turn the cylinder counterclockwise to the correct present time.

5. To take up slack in the chart paper, turn the chart paper roll counterclockwise until the paper is taut. Be sure not to offset the alignment of present time and pen tips.

See figure E



4.4 Chart paper

NOTE: See pages 13-17 for directions on changing the chart paper on long-cycle model 37250-20.

Your cylinder drum comes with one sheet of chart paper already attached. See the “Accessories” section on page 26 to order extra chart paper.

To replace chart paper for models 08369-50, 08369-50, 37250-10, 37250-00:

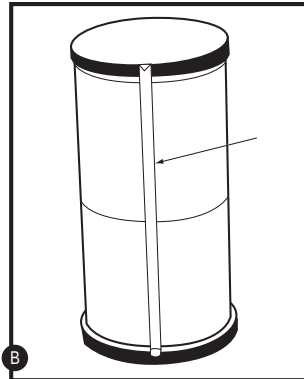
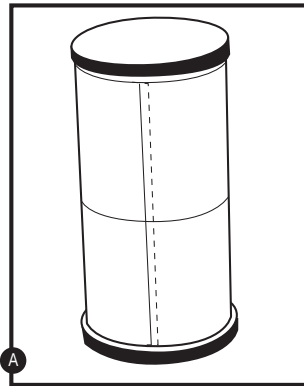
1. Wind the new chart onto the cylinder so that the two ends of the paper overlap.

See figure A

2. Secure this overlapping section with the paper holder.

See figure B

3. Make sure the markings on the paper coincide where the overlap occurs.
4. Follow directions on bottom of page 11 to set the correct time.



To replace chart paper for long-cycle model 37250-20:

The long-cycle hygrothermograph comes with one roll of paper installed. As the unit records, paper moves from the *Chart Roll* to the *Take-Up Roll*. When the paper is completely used, you need to replace the chart paper.

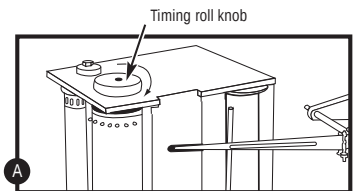
NOTE: do not discard cardboard tube from the original chart paper roll. You will need this cardboard tube for use on the *Take-Up Roll*.

For best results, we recommend you use our chart paper. See the “Accessories” section on page 26 to order extra chart paper rolls.

When the chart paper is nearing the end of its cycle, a red stripe will appear on the lower edge of the chart paper. The stripe means there are only three days left, and that the paper should be changed by that time.

To change the chart paper:

1. Remove the protective cover. Pull the pen lift lever towards you so the pen tips do not touch the paper. Write the time and date on the chart paper.

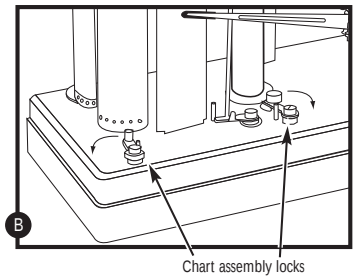


2. Wind the old chart paper onto the *Take-Up Roll* by turning the *Timing Roll* knob clockwise (in the direction of the arrow).

See figure A

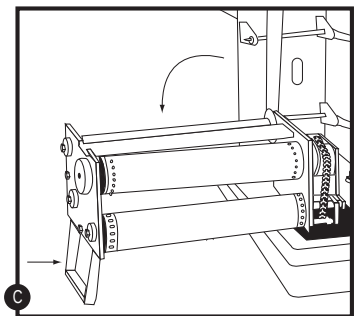
3. Release the right and left chart assembly locks located on the base of the instrument near the chart drive mechanism.

See figure B



4. Pull the chart assembly back using the handle located behind the chart assembly. To prevent the unit from tipping over, hold the base of the instrument with your other hand. Use the handle to keep the chart assembly in a horizontal position.

See figure C



5. Remove the empty cardboard tube from the Chart Roll (see sticker on top of chart assembly for position).

See figure **D**

- Push the *Chart Roll* towards the top of the chart assembly, which removes it from the groove at the base of the assembly.
- Pull the *Chart Roll* out from the bottom.
- Remove the upper plastic disk of the *Chart Roll* by turning it counter-clockwise.
- Remove the cardboard tube from the metal spindle (spindle is inside the cardboard tube). Save this cardboard tube for step 7.

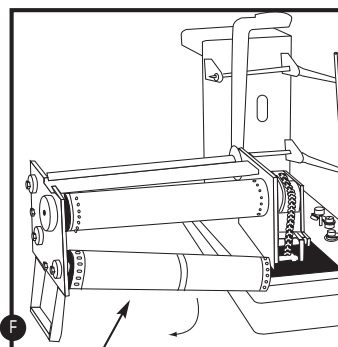
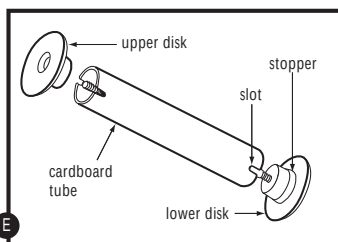
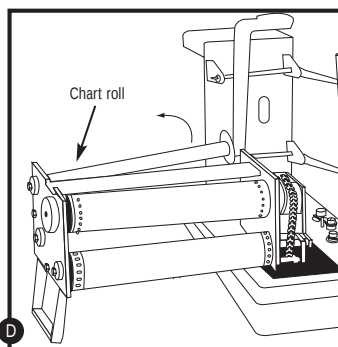
See figure **E**

6. Remove the Take-Up Roll with the old chart paper from the chart assembly (see sticker on top of chart assembly for position).

See figure **F**

- Push the *Take-Up Roll* toward the top of the chart assembly, which removes it from the groove at the base of the assembly.
- Pull the *Take-Up Roll* out from the bottom.
- Remove the upper plastic disk of the *Take-Up Roll* by turning it counter-clockwise.
- Remove the used chart paper, complete with inner cardboard tube, from the metal spindle (spindle is inside the cardboard tube).

See figure **E**



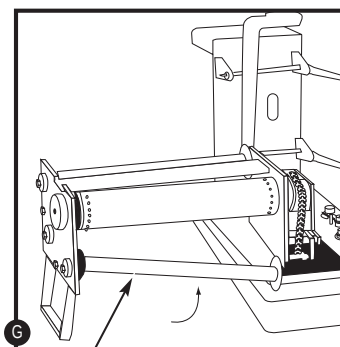
7. Replace the Take-Up Roll with the empty cardboard tube into the chart assembly.

- Place the empty cardboard tube (from step 5) back over the metal spindle of the *Take-Up Roll*. Make sure that the slot on the *Take-Up Roll* fits into the ridge on the lower disk.
- Replace the upper plastic disk of the *Take-Up Roll* by turning it clockwise.

See figure **E**

- Place the pointed spindle tip (protruding through the upper disk) into the receptacle at the left (on the upper part of the assembly). Push to the left, and reinsert the right end of the take-up cylinder into the bottom groove. You may have to turn the cylinder slightly until it slides into the groove.

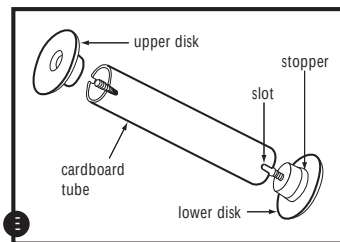
See figure **G**



8. Install the new chart paper on the Chart Roll.

- Load the new chart paper onto the *Chart Roll*, making sure that the slot on the chart paper roll fits into the ridge on the lower disk.
- Make sure that the chart paper is loaded correctly. The side of the paper with the oval-shaped sprocket holes should be at the upper disk (top), while the side with the round sprocket holes should be at the lower disk (bottom).
- Replace the upper plastic disk of the *Chart Roll* by turning it clockwise.

See figure **E**



9. Install the Chart Roll with the new chart paper back into the chart assembly.

- Place the pointed spindle tip (protruding through the upper disk) into the receptacle at the left (on the upper part of the assembly). Push to the left, and reinsert the right end of the starting roll into the groove (on the lower part of the assembly). Make sure that the roll is securely installed and can pivot easily.

See figure **H**

- Make sure paper is positioned so it will run in a counterclockwise direction around the *Chart Roll*.

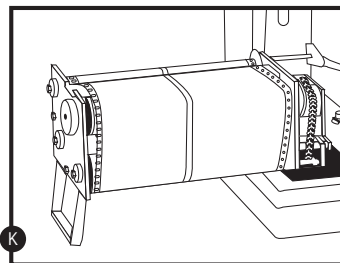
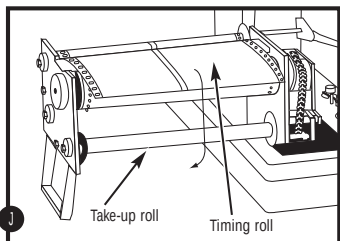
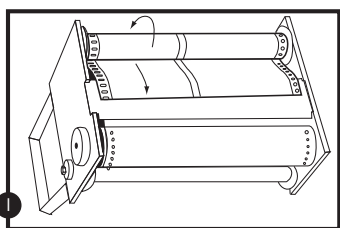
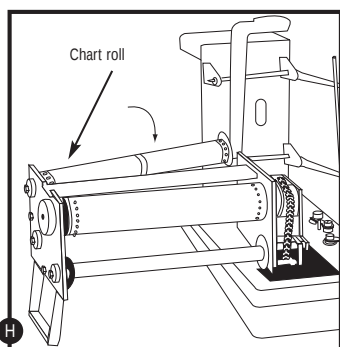
See figure **I**

10. Pull out the chart paper about 6 inches. Draw the paper around the *Timing Roll*. Make sure the sprocket holes in the paper are placed correctly over the sprockets on the *Timing Roll*.

See figure **J**

11. Tape the end of the chart paper to the *Take-Up Roll*. Remove any other paper that might still be attached to the *Take-Up Roll*. Be sure the paper is straight and even so that it tracks properly.

See figure **K**



12. Advance the chart with the timing knob.

13. Return the chart assembly upright to its original position.

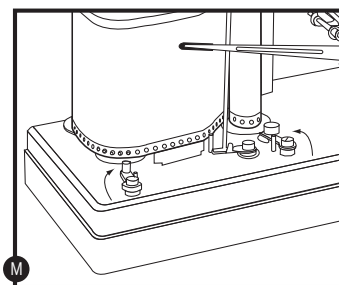
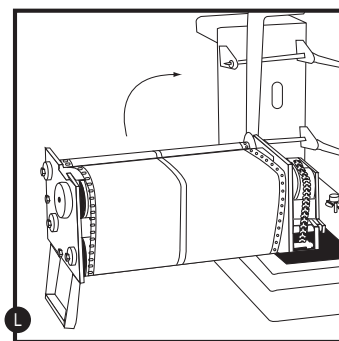
See figure **L**

14. Tighten the right and left assembly locks to hold chart assembly in place.

See figure **M**

15. To set time, see bottom of page 11.

16. Make sure to check that pen cartridges and batteries are still fresh.



Notes

Be sure to check at least once a month to guarantee accuracy, since the instrument operates over a long period of time (30 or 90 days).

Also make sure to periodically check that the pens are operating correctly.

Vibrations could loosen the chart paper in about 60 days. The paper should be tightened for accurate time readings.

4.5 Calibration adjustment

Your hygrothermograph is factory calibrated. However, vibration during shipment may make a slight readjustment necessary.

To adjust calibration:

1. Compare the hygrothermograph reading to another temperature/ humidity instrument known to be accurate.
2. Raise and lower the reading by turning the adjustment screws. See drawings on these two pages for location of the adjustment screws.

Calibration adjustment screw locations

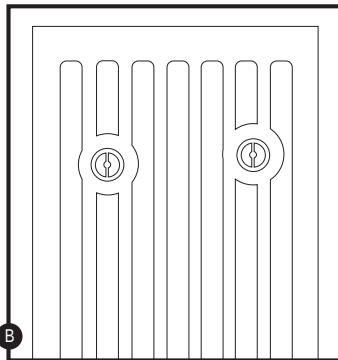
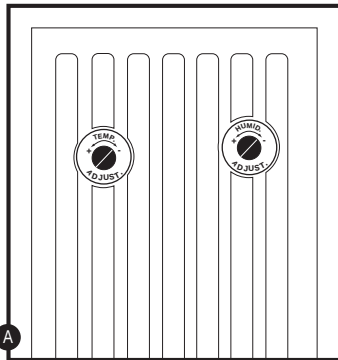
Minidrum hygrothermograph (model 08369-70)

On the minidrum hygrothermograph model, the calibration screws are located behind the two stickers on the back of the beige case protecting the pen mechanism.

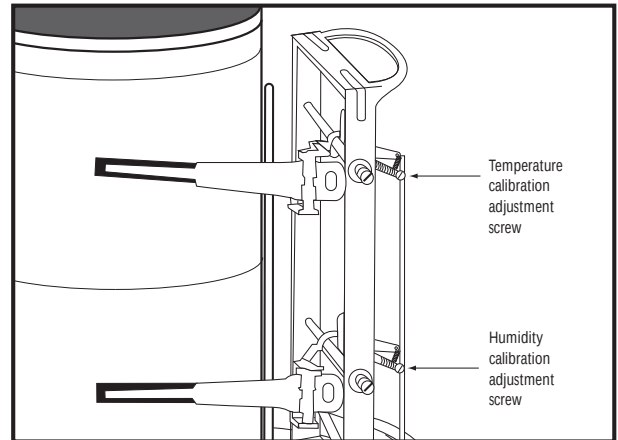
See figure **A**

Remove the stickers to reach the calibration adjustment screws.

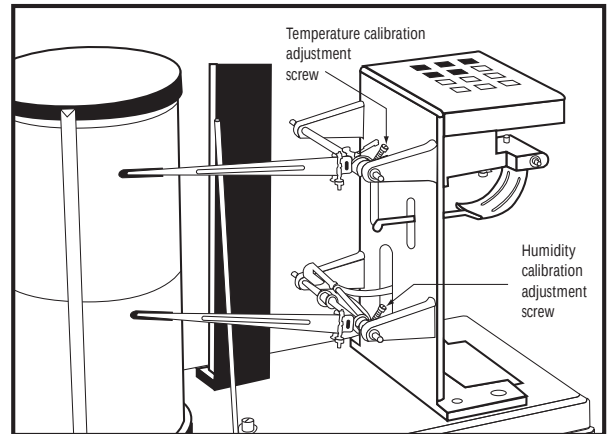
See figure **B**



Domed minidrum hygrothermograph (model 08369-50)



All other models (models 37250-00, -10, -20)



4.6 Changing drum rotation length

NOTE: Minidrum models 08369-50 and 08369-70 operate on a 7 day rotation only.

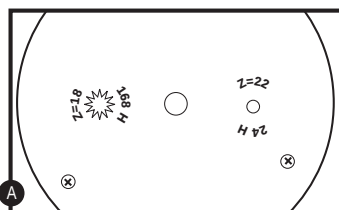
Long cycle model 37250-20 accepts either 1 month or 3 month chart rolls—it is not necessary to adjust drum speed.

Spring wound, two speed hygrothermograph 37250-10

This model lets you select between a 1 and 7 day drum rotation. When you receive your hygrothermograph from the factory, it is set for a 7 day rotation.

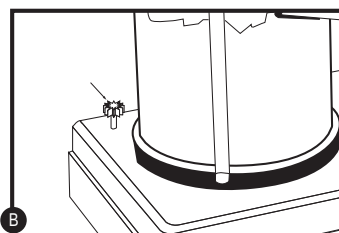
IMPORTANT: make sure you have the appropriate chart paper for the rotation speed you select. See page 26 to order more chart paper.

1. Look at the bottom of the cylinder drum. You will see notches for two gears. Only one gear will be in place.



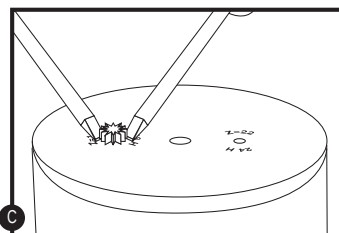
See figure A

2. The alternate gear is located on a post at the corner of the thermohygrometer's base. Remove it from the post.



See figure B

3. Using two screwdrivers, lift the gear currently installed on the bottom of the cylinder drum.



See figure C

4. Insert the other gear onto the opposite shaft on the bottom of the drum.
 - The one-day gear slides on the shaft marked "24 H / Z = 22". This gear has 22 teeth and a larger diameter than the 7-day gear.
 - The seven day gear slides onto the shaft marked 168H / Z = 18. This gear has 18 teeth.
5. Place the gear not in use over the post at the corner of the thermohygrometer's base for storage.
6. Install the cylinder drum onto the cylinder shaft. See page 7 for directions.



Three speed hygrothermograph 37250-00

This model lets you select between a 1, 7, and 32 day drum rotation. When you receive your hygrothermograph from the factory, it is set for a 7 day rotation.

See figure D

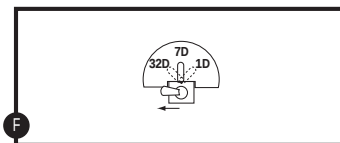
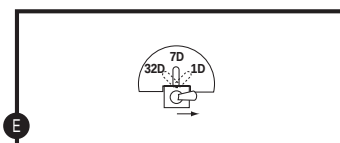
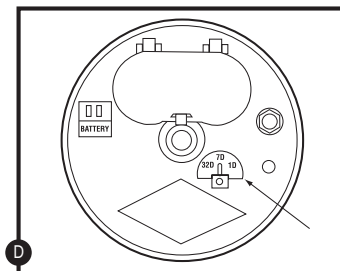
IMPORTANT: make sure you have the appropriate chart paper for the rotation speed you select. See page 26 to order more chart paper.

1. To switch from 7 day operation to 1 day operation, flip the switch on top of the cylinder drum to 1D.

See figure E

2. To switch from 7 day operation to 32 day operation, flip the switch on top of the cylinder drum to 32D.

See figure F



5. Installing optional axial fan

NOTE: The axial fan is not for use with minidrum models 08369-50 and 08369-70.

The external draft fan (optional) attaches to the protective cover. It improves instrument response and accuracy by directly pulling surrounding air into the instrument. Use the fan in areas where ventilation is poor.

If you want to order an axial fan, see the “Accessories” section on page 26.

To attach the fan:

1. Install the fan on the single column of five vents located on the protective cover.

See figure A

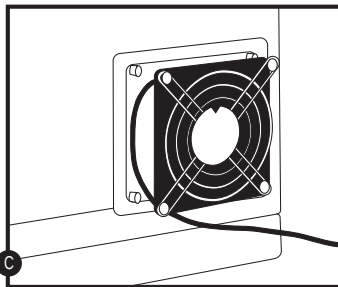
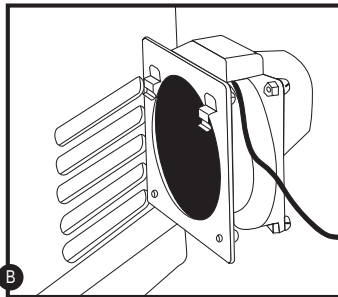
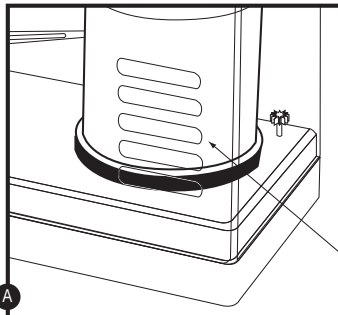
2. Position fan so that the spring clips on the fan go into the upper vent slots on the hygrothermograph cover.

See figure B

3. Let the fan slide down until it stops. Make sure both spring clips are fully engaged in the cover.

See figure C

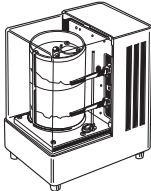
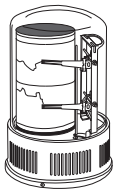
4. Position the instrument so the flow of air from the fan will not be blocked.
5. Plug the power cord into an 110 to 120 volt, 50/60 Hz outlet. For 220 V operation, order optional 220 V transformer (sold separately in “Accessories” section on page 26).

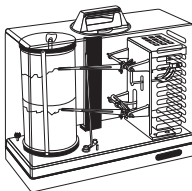
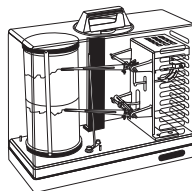
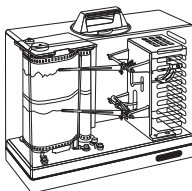


6. Precautions

1. Do not use your hygrothermograph:
 - in direct sunlight
 - in temperatures below -20°C or above 50°C
 - near ovens, stoves, or other heating equipment
 - near harsh chemicals such as paint thinner or ammonia
 - in dusty or wet environments
 - within magnetic fields
 - in areas with strong vibrations, such as loudspeakers or motors
2. For best results, use only the pens and chart paper listed under the “Accessories” section of this manual (page 26). We cannot guarantee results with other pens and other paper.
3. Do not repair the instrument yourself. Should repairs be necessary, please return the instrument to place of purchase. See the back cover of this manual for information on instrument Warranty and Return of Items.
4. If your instrument will not be used for long periods of time, make sure to replace the pen caps and remove the battery.

7. Specifications

		
Model	Minidrum hygromograph	Domed minidrum hygromograph
Model number	08369-70	W08369-50
Humidity range	5 to 90% RH	5 to 90% RH
Humidity accuracy	±5% from 10 to 90% RH; ±7% from 5 to 10% RH	±5% from 10 to 90% RH; ±7% from 5 to 10% RH
Humidity chart range	5 to 100% RH	5 to 100% RH
Humidity sensor	human hair bundle	human hair bundle
Humidity chart graduations	5% RH	5% RH
Temperature range	–6 to 40°C / 22 to 104°F	–6 to 40°C / 22 to 104°F
Temperature accuracy	±2°C / ±3.6°F	±2°C / ±3.6°F
Temperature sensor	bimetallic strip	bimetallic strip
Temp. chart graduations	2°C / 2°F	2°C / 2°F
Chart size	3.6"H x 8.1"L	3.6"H x 8.1"L
Chart rotation	7 day (172 hr)	7 day (172 hr)
Power	One AA battery (included)	One AA battery (included)
Dimensions	6"W x 7.4"H x 3.9"D	7.5"H x 5" dia
Shipping weight	4 lbs	4 lbs

		
Spring wound, two speed hygromograph	Three speed hygromograph	Long cycle hygromograph
37250-10	37250-00	37250-20
5 to 90% RH	5 to 90% RH	5 to 90% RH
±3% from 10 to 90% RH; ±5% from 5 to 10% RH	±3% from 10 to 90% RH; ±5% from 5 to 10% RH	±3% from 10 to 90% RH; ±5% from 5 to 10% RH
0 to 100% RH	0 to 100% RH	0 to 100% RH
human hair bundle	human hair bundle	human hair bundle
1% RH	1% RH	1% RH
–10 to 50°C / 14 to 122°F	–10 to 50°C (14 to 122°F)	–20 to 50°C
±1°C / ±1.8°F	±1°C / ±1.8°F	±1°C
bimetallic strip	bimetallic strip	bimetallic strip
1°C / 2°F	1°C / 2°F	1°C
6.6"H x 11.5"L	6.6"H x 11.5"L	6.6"H x 11.4" L (1-month) 6.6"H x 300" L (3-month)
1 day (26 hr) or 7 day (172 hr)	1 day (26 hr), 7 day (172 hr) or 32 day (810 hr)	1-month (38 day max) or 3-month (100 day max)
Spring wound	Two C batteries (included)	One C battery (included)
13.3"W x 11.5"H x 5.1"D	13.3"W x 11.5"H x 5.1"D	13.3"W x 11.5"H x 5.1"D
9 lbs	9 lbs	9 lbs

8. Ordering information

Additional Hygrothermographs

WD-08369-70 Minidrum hygrothermograph

WD-08369-70 Domed minidrum hygrothermograph

WD-37250-10 Spring wound, two speed hygrothermograph

WD-37250-00 Three speed hygrothermograph

WD-37250-20 Long cycle hygrothermograph

Extra Chart Paper

Model number	Use with model type	Temperature range	Rotation	Increments	Quantity/pack
WD-08369-60	Mini-drum	22 to 104°F	7-day	2-hour	100
WD-08369-55	Mini-drum	−6 to 40°C	7-day	2-hour	100
WD-08368-10	2- or 3-speed	14 to 122°F	1-day	15-minute	100
WD-08368-20	2- or 3-speed	14 to 122°F	7-day	2-hour	100
WD-08368-30	2- or 3-speed	−10 to 50°C	1-day	15-minute	100
WD-08368-40	2- or 3-speed	−10 to 50°C	7-day	2-hour	100
WD-08368-22	3-speed	14 to 122°F	32-day	6-hour	25
WD-08368-42	3-speed	−10 to 50°C	32-day	6-hour	25
WD-37250-60	Long cycle	−20 to 50°C	1-month	2-hour	1 roll
WD-37250-62	Long cycle	−20 to 50°C	3-month	2-hour	1 roll

Extra Pens

For use with all OAKTON hygrothermographs.

WD-08368-75 Blue pens, 6/pack

WD-08368-70 Red pens, 6/pack

Axial Fan

WD-37250-50 Optional axial fan. Use with 2-speed, 3-speed and long cycle models for more uniform sample measurements in fluctuating environments. 110 VAC

WD-01578-02 Transformer. Use to operate axial fan at 220 VAC, 100 W

9. Appendix 1: Readings in areas with high humidity

The specially processed human hair bundle, such as the one used in this instrument, is the best sensor for ambient humidity measurements in terms of linearity, repeatability, and temperature compensation. Human hair will elongate linearly as humidity increases or decreases in the range of 5 to 90% RH.

However, one of the characteristics of human hair is that exposure to humidity levels above 90%RH causes it to undergo a change of state. This condition is called the “saturated state”, and occurs with even short exposure to high humidity levels. When the hair bundle reaches the saturated state, it contracts and causes a 7 to 9% downward shift in the humidity indications. If the humidity then stays below 80%, the hair bundle will elongate linearly for approximately two weeks. After this time period, the hair bundle is in its dry state.

The hair bundle has two curves, depending on the state of the hair bundle. These characteristics can be taken into account when using the instrument. The instrument is calibrated at the factory with the hair bundle in the dry state. Generally, the instrument is used indoors with humidity levels below 90%.

When used in air conditioned areas or other areas of moderate humidity, you do not need to adjust the instrument.

How to use the instrument in high humidity areas:

For use above 85% RH, turn the humidity fine adjustment screw counterclockwise to raise the humidity reading by 7 to 9%. Readings will be within specifications over the entire range when the instrument is exposed to high humidity conditions (85 to 100%) at least once every two weeks.

Note any calibration change either on the chart paper or on the instrument itself. This way you can change the instrument back to its original calibration if required.