

OWNER'S MANUAL

APM 360 Multi-Purpose Meter



ALNOR®
A TSI® Company

TABLE OF CONTENTS

General Description	2
Using the APM 360 Safely	2
Getting Started	2
Installing Batteries	2
Preparing the Instrument	3
Attaching the Optional Probes (175, 275 and 220B)	3
Attaching a MicroPrinter	3
Start-Up Sequence	3
Clearing the Memory	3
About the APM 360 Display	4
APM 360 Keypad and Menus	4
The APM 360 Keypad	4
Primary Key Functions	4
Secondary Key Functions	5
Menu Selections	5
Menu Items	5
Using the APM 360	6
Basic Functions	6
To Change Units	6
To Hold a Reading (For Storage or Printing)	6
Measurement Modes	6
Volume Selection	6
Data Storage	7
Troubleshooting & Maintenance	8
Service Information	9

GENERAL DESCRIPTION

The APM 360 multi-purpose meter measures air velocity, air volume flow, temperature, and relative humidity when used with various Alnor probes. The meter recognizes the type of probe attached and digitally displays the measurement.

Functions are selected through a keypad or an RS232 serial port. Each key has dual functions. In addition, the user can choose from many menu-driven items for added measuring flexibility. Options such as units of measurement and time-constant settings can also be selected.

The APM 360 displays results on a liquid-crystal display (LCD), with additional display segments for memory locations and units of measure.

The instrument's memory can hold 100 readings of air velocity, volume flow, temperature, or relative humidity. For convenience, memory can be organized into sections called "pages." All data is saved by the instrument's own battery-powered system.

Readings can also be printed out during operation with an optional printer, or can be saved for subsequent downloading. The RS232 serial connection attaches the APM 360 to a printer or personal computer.

The APM 360 uses three (3) AA size alkaline batteries for low replacement cost. The instrument's automatic shut-off option can be used to conserve battery power.

USING THE APM 360 SAFELY

When using the instrument to check air flow in an elevated workplace, make certain that you can safely raise and hold the instrument while making measurements. This is especially important when you are working on a ladder.

Avoid catching probes, cables, or attachments in moving machinery. Use the instrument only for measurements using air. Avoid any corrosive or other dangerous or explosive gas mixtures.

***Note:** Please dispose of used batteries in a responsible manner.*

GETTING STARTED



Figure 1—Back view of instrument

Installing Batteries

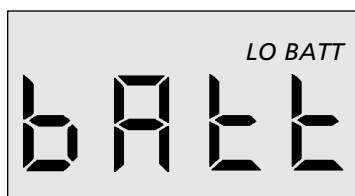
The APM 360 uses three (3) AA size non-rechargeable batteries. The unit was shipped with batteries not installed. You will find the batteries in the instrument package.

To install the batteries:

- Loosen the battery cover screw on the rear of the instrument.
- Slide the cover up and lift it out. (Fig. 1)

- Install the batteries over the pull strap, taking care to observe each battery's polarity.
- Replace the cover and tighten the screws.

Note: *When the batteries become low, the LCD will show [LO BATT] above the reading. From that point, you will have about one hour of normal use left. If [b A t t] comes on continuously and replaces the reading, the battery voltage is too low for accurate measurements and the meter will turn itself off.*



Low battery displays

Always keep a replacement set of new batteries available.

Preparing the Instrument

The unit is shipped with its auto shut-off feature enabled. This setting will automatically turn the unit off after a twenty minute period of keypad inactivity. To disable this feature, follow the instructions in the menu selections section of this manual.

If desired, attach the wrist strap to the bottom of the instrument.

Attaching the Optional Probes (175, 275 and 220B)

- Make sure the meter is off before attaching or detaching a probe.
- Remove the protective cap from the probe and save to replace on the probe later for proper storage.
- Attach the 12-pin connector on the probe to the probe port on top of the meter.
- Turn connector clockwise to tighten.

Attaching a MicroPrinter

Connect the 8521 to the APM 360 before turning on the instrument. The connector on the APM 360 is a telephone-style jack.

To attach the printer:

- Grasp the 8521 integral cable at the connector.
- Align the keyway.
- Gently push the connector into the APM 360 until it is locked.

Start-Up Sequence

Each time you turn the instrument on, some basic functions are tested. The following will occur:

- All the LCD segments will turn on.
- The model of attached probe will be displayed.
- The current software revision level will be displayed.
- The message [b U S Y] will appear.
- The meter will begin to measure.

The meter starts in **RUN** mode. It will display measurement values associated with the unit last used. If the value is *OVER RANGE*, the display will show [O r]; if the instrument is measuring an *UNDER RANGE* value, the display will show [U].

Clearing the Memory

If this is the first time you are using the APM 360, clear the memory before using the instrument.

Clearing the memory is done with the following steps:

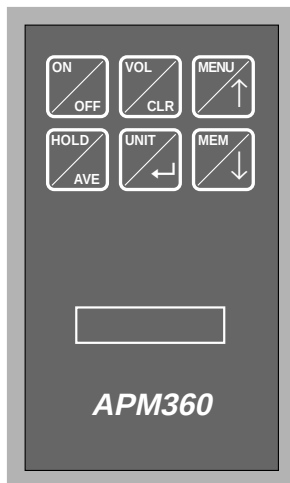
- Push **CLR** for three seconds until [C l r] appears.
- Push ↑ until [Y E S] appears.
- Push ↵ to clear memory.

ABOUT THE APM 360 DISPLAY

The APM 360 uses a 4-digit, 7-segment LCD. As a result, measurements exceeding 9,999 of a given unit of measure will be displayed in a scientific notation format of XXEY. The actual reading will be rounded to the nearest thousand, XX. The Y indicates the number of zeros after XX. For example, 12,751 is displayed as [12E3].

The APM 360 is measuring and averaging the *actual* value of the reading, not the rounded scientific notation value. No accuracy loss will be encountered. When printing the data on the 8521 MicroPrinter or downloading the data to a host PC, the scientific notation will be seen.

APM 360 KEYPAD AND MENUS



The APM 360 Keypad

Each key has two different functions. The *primary* function is shown above the diagonal line on the key's surface. The *secondary* function is shown below the diagonal line. A more detailed description of each function follows.

In the **RUN** mode, if a key is held for *less than three seconds*, the primary function is activated. When a key is held for *more than three seconds*, the secondary function is activated. The exceptions to this are the $\uparrow$ and $\downarrow$ keys. Because they are used to move between menu options, these keys do not function in **RUN** mode.

Primary Key Functions:

ON/OFF This key is used to turn the instrument on or off when in the **RUN** mode. If the unit is in any other mode, pressing this key will exit this state and go back to the **RUN** mode without making any changes.



VOL



MENU



The **VOL** key prepares the APM 360 to calculate volume rate. After pressing this key, select from the four options: area, horn, round or rectangular duct by using the $\uparrow$ or $\downarrow$ key to scroll and the $\rightarrow$ key to select.

MENU allows you to select one of several options. Use the $\uparrow$ or $\downarrow$ keys to move through the choices. To choose a selection, push $\rightarrow$, or return to **RUN** mode by pushing **ON/OFF**.

The **MENU** selections are as follows:

- [PAGE] Changes memory page
- [PRINT] Prints all stored data
- [CF] Correction Factor
- [AUTO] Enables or disables auto shut-off
- [HEE] Scans meter voltages
- [RL] This is only used by the factory
- [PORT] Enables or disables the serial port
- [TC] Time constant selection

(See also Menu Selections)

HOLD



Pressing this key freezes data in **RUN** mode for input to memory or output to a printer. The display flashes. Pushing **HOLD** again stores and prints your data. Pressing **ON/OFF** returns you to **RUN** mode without storing or printing.

UNIT



The **UNIT** key allows you to select a unit of measurement. The $\uparrow$ and $\downarrow$ keys move through the choices. Use the $\swarrow$ key to accept a choice, or press **ON/OFF** to return to **RUN** mode without making changes.

MEM



The **MEMORY** key is used to review stored data. When it is pressed, the display will show the current page number. The $\uparrow$ and $\downarrow$ keys will move you to any page you wish to review. To examine data, press the $\swarrow$ key.

If memory is empty, the unit automatically jumps back to **RUN** mode. Otherwise, you can return there by pressing the **ON/OFF** key.

(See also **PAGES** in Data Storage)

Secondary Key Functions:

$\uparrow$ and $\downarrow$



These keys allow you to scroll through menu selections in forward ($\uparrow$) or reverse ($\downarrow$) order.



AVE



If held for 3 seconds, the **AVE** key lets you view the average of the current page of measurements which has been stored. Pushing **ON/OFF** returns you to **RUN** mode.

$\swarrow$



This key accepts all selected choices such as values and menu items. After each entry, [b u s y] appears on the display as the APM 360 stores new information.

Menu Selections

Pressing the  key activates the main menu. Use the $\uparrow$ and $\downarrow$ keys to scroll through the available selections. Once you find your desired selection, choose it by pressing $\swarrow$. Pressing **ON/OFF** exits the menu, returning you to **RUN** mode.

Menu items (to select any of the following press $\swarrow$):

PAGE

Measurements stored in the instrument's memory are organized into Pages. This key changes the Page onto which you are saving your measurements. A total of 100 readings can be stored.

Print

This copies all stored data to a connected printer or computer. You can abort the printout at any time by pressing and holding the **ON/OFF** key.

cF

The Correction Factor is an all-purpose multiplying factor which is applied to all measurements. cF is set to 1.000 unless it is changed in the menu. An annunciator $\blacktriangledown$ tells the user when "cF=1". cF is usually used when air density conditions deviate from standard. See Appendix D.

Select values with the $\uparrow$ or $\downarrow$ key, then press $\swarrow$ to accept them or **ON/OFF** to reject them.

Auto

This automatic shut-off option can be enabled or disabled by pushing $\uparrow$ or $\downarrow$ to select [y e s] or [n o], then pushing the $\swarrow$ key to enter your selection. When enabled, the automatic shut-off will power-down the APM 360 after twenty minutes of keypad inactivity.

CHC

This diagnostic tool allows a user to view important analog voltages within the instrument. Pushing $\uparrow$ or $\downarrow$ views the eight different channels, which include the following:

[0] — 0 V dc.

[5] — 4.965 to 5.025 V dc.

[7] — battery voltage (max display value)

CAL

Factory use only.

P o r t Selecting this item allows the user to “enable” or “disable” the serial port. By pressing the $\uparrow$ or $\downarrow$ key, scroll to either **ON** or **OFF** and press the $\downarrow$ key. In the normal **RUN** mode, the port should be disabled. If communicating with a computer, it must be enabled.

t c tc allows you to select from five different speeds of display response. See Appendix B.

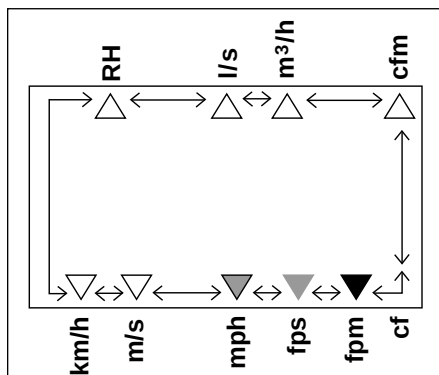
- 1 = fast response.
- 5 = slow response.

USING THE APM 360

Basic Functions

To Change Units:

- Push the **UNIT** key until [U N I T] appears.
- Use the $\uparrow$ and $\downarrow$ keys to view new measurement units.
- The display annunciator $\blacktriangle$ will move to the selected unit.
- Push $\downarrow$ to select a new measurement unit.



Display with annunciator and units of measure.

For example: to change the units of measurement from feet per minute to meters per second:

- Push the **UNIT** key until [U N I T] appears.
- Push $\uparrow$ until the display annunciator $\blacktriangle$ moves to m/s, indicating meters per seconds.
- Push $\downarrow$ to select the measurement unit.

To Hold a Reading (For storage or printing):

- Push the **HOLD** key briefly until the measured value flashes.

- Push **HOLD** again to **STORE** this reading to memory, or push **ON/OFF** to reject it and return to **RUN** mode.

Measurement Modes

You can set the APM 360 for temperature, relative humidity, velocity, or volume measurement by pressing the **UNIT** key. To read relative humidity, you must use the Alnor 220B Relative Humidity Probe. Air velocity or temperature measurements can be accomplished using the telescoping, articulated 275 probe or the straight 175 probe.

Volume Selection:

Volume [VOLU]

Air volume measurement is achieved by multiplying a velocity reading by an area.

- When you press the **VOL** key, the **VOL** menu appears on the display and provides a way to choose whether you are measuring by area, by horn, or by a round or rectangular cross-section.
- Make your selection by using the $\uparrow$ and $\downarrow$ keys, then pressing the $\downarrow$ key to accept your choice.

Area [AREA] (also to review the Area or selected horn)

When selected, the following will appear:

- The current units, either ft² [F t ²] or m² [m ²]

- The current horn (if previously used)
- The numeric value of the calculated area for round or rectangular duct.
- Pressing the $\downarrow$ key will display a numeric reading. Use the $\uparrow$ or $\downarrow$ key to change the value, and the $\downarrow$ key to accept the new value.

Note: *if you only wanted to review, press the ON/OFF key.*

Rectangular [r E c t]

- After [r E c t] is selected, the units of linear distance will be flashed briefly in inches or meters.
- The display will then show starting X dimension values of [12.0] inches or [0.50] meters.
- Change these values using $\uparrow$ or $\downarrow$. Press the $\downarrow$ key to accept.
- The next display shows starting Y dimension values of [12.0] inches or [0.50] meters.
- Change these values using $\uparrow$ or $\downarrow$. Press the $\downarrow$ key to accept and return to the **RUN** mode.

Round [r n d]

- After [r n d] is selected, the units of linear diameter are flashed briefly in inches or meters.
- The display will show starting point diameter values of [12.0] inches or [0.50] meters.
- Change the value to the necessary diameter using $\uparrow$ or $\downarrow$. Press the $\downarrow$ key to accept and return to the **RUN** mode.

Horn [H o r n]

- When selected, use the $\uparrow$ or $\downarrow$ keys to scroll through the following options:
 - AM100 [H n 1]
 - AM300 [H n 3]
 - AM600 [H n 6]
 - AM1200 [H n 12]
- Press $\downarrow$ to select one of these choices.

Data Storage

All measurements stored in the instrument's memory are recorded on Pages. A Page is created whenever:

- the unit of measurement changes,
- or Page is selected from the **MENU**.

For example, if you are measuring feet per second and decide to take measurements in miles per hour, a new page will be created.

The APM 360 memory has a total capacity of 100 sets of data, in any combination of Pages and Lines.

Each time the **HOLD** key is pressed for the "second" time, the instrument will store measurements, their units, and the correction factor. Readings are stored in battery-backed memory so that powering off or changing batteries does not erase readings. These stored readings will remain in memory unless they are cleared or the instrument is damaged or malfunctions.

A copy of this data can be obtained if a printer or computer is attached to the instrument.

If a printer is connected:

- Press the **MENU** key, then the $\uparrow$ or $\downarrow$ key until [P r n t] appears.
- Press $\downarrow$ to print the data.
- To escape from the print routine, press and hold the **ON/OFF** key until [P r n t] appears, then press the **ON/OFF** key to return to the **RUN** mode.

To erase stored data:

- Press the **CLR** key until [C l r] appears.
- Push the $\uparrow$ or $\downarrow$ key until [E E 5] appears.
- Press $\downarrow$ to clear the memory.

Note: *Keep in mind that you cannot erase individual pages. Clearing data erases every page in the instrument's memory.*

TROUBLESHOOTING & MAINTENANCE

Troubleshooting

Symptom	Check
Display shows [0 r]	1. Measured value is beyond range of probe. See probe manual for limits. 2. Change input to sensor to see if display changes.
Display shows [OPEN]	Connection between meter and probe is faulty. Turn meter off, check probe connection, and turn meter back on.
Display does not change	1. Your meter could be in a mode other than RUN. Press the ON/OFF key until the unit turns off. Then turn it on and try again. 2. Your input might simply be very stable.
Meter turns off after completing start-up cycle	The batteries are too low for your meter to start. Watch for the [b A E E] indication just before the meter turns off, then replace the batteries.
Meter turns off by itself	1. Your batteries are probably too low; replace them. 2. Check the auto shut-off feature. If after 20 minutes your meter turns off again, disable the auto shut-off feature.
Meter does not turn off	Be sure your meter is in RUN mode, since it must be in RUN mode to turn off.
Measurement is erratic	1. The input is not steady. Change your time constant setting to a higher value. 2. Probe is not steady. Secure probe.
Erroneous readings	1. Make sure velocity probe is perpendicular to the air flow you are measuring. 2. Change the value of your time constant. It may be inappropriate for your current application. 3. Clean your probe—it may be dirty. 4. Take measurements at a different location. 5. Verify your correction factor setting. 6. Defective probe or meter. Call Alnor
Meter will not communicate with computer	1. Make sure the meter's serial port is enabled. 2. Be sure the computer's port is correctly set.

If any of these problems persist, call Alnor for assistance.

Maintenance

Periodic maintenance should be performed on the meter.

- Batteries should be replaced when the low battery indication is on or when the unit turns itself off after power-up.
- Batteries should be removed from the meter if it will not be used for two (2) months or longer.
- Calibration checks are recommended every 12 months.
- Keep the meter clean by using a mild detergent on its case. DO NOT use abrasives or solvents. Also, DO NOT allow liquids to enter the meter's case. Dry thoroughly after cleaning.
- Use an eyeglass cleaner and lens paper to clean the LCD window.

SERVICE INFORMATION

Service and Repair

Please return your Product Registration Card immediately. This allows us send you service reminders, special offers, and important information about your product.

Before sending your instrument for calibration or repair, you should call Alnor Customer Service. The Service Department will provide you with the cost of service or calibration, Return Material Authorization (RMA) number, and shipping instructions.

Please have the following information available when you call:

Owner's Name, address, and phone number
Billing address, if different and applicable
Instrument Name or Model
Serial Number
Date of Purchase
Where Purchased

Alnor recommends that you keep a 'calibration log' and keep all records of service on your instrument.

Instructions for Return

Send the instrument prepaid. Securely package your instrument in a strong container surrounded by at least two inches (5 cm) of suitable shock-absorbing material. Include the Purchase Order

showing instrument model number, cost of service and/or calibration, and the RMA number. Mark the outside of the shipping container with the RMA number. This will expedite processing of your instrument when we receive it.

Please note that instruments received improperly marked or without an accompanying Purchase Order may be returned at your expense. See back cover for factory address.

Damaged in Transit

All orders are carefully packed for shipment. On receipt, if the shipping container appears to have been damaged during shipment, the instrument should be thoroughly inspected. The delivering carrier's papers should be signed noting the apparent damage. DO NOT DISCARD THE BOX.

If the instrument itself has been damaged, a claim should be promptly filed against the carrier by the customer. The selling agent will assist the customer by supplying all pertinent shipping information; however, the claim must be filed by the insured. If the instrument is damaged beyond use, a new order should be placed with Alnor while awaiting reimbursement from the carrier for the damaged instrument.

Call Alnor directly for assistance if necessary.

WARRANTY

Alnor Instrument Company (Alnor) warrants this product to be free of defects in material and workmanship for a period of two years from the date of original purchase. If the product should become defective during the warranty period, Alnor will repair it or elect to replace it free of charge under the following conditions:

1. Product is returned postpaid per the instructions for return, located in the owner's manual.
2. Owner submits proof of original date of purchase.
3. Alnor will inspect product for defects in material and workmanship. Alnor's decision as to existence of defect, and in the case of defect, to repair or replace will be final.

THIS WARRANTY IS EXCLUSIVE. THERE ARE NO OTHER WARRANTIES EITHER EXPRESSED

OR IMPLIED. SPECIFICALLY AND WITHOUT LIMITATION, THERE IS NO WARRANTY, EXPRESSED OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE.

This warranty is void if product is misused, used contrary to procedures set forth in the owner's manual, or if product is serviced by anyone other than Alnor's authorized service. This warranty does not cover consumables such as light bulbs, paper, batteries, etc.

Alnor's liability for this product is limited to the above stated warranty and shall not in any event exceed the cost of the product. In no event will Alnor be liable for any direct or consequential damages, including but not limited to lost profits, loss of use, inaccuracies, loss of data, dismantling or reinstallation.

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