

ELECTRONIC COMETER

**Digital airflow measuring unit for
Fan series ATZAF, ATZAF-FF, ATLI, ATHI, ATHI-FF
Plenum Series APAF, APBC, NAPAF, NAPBC, ATE, ANPL, ANPA**



OPERATION, SERVICE AND CALIBRATION INSTRUCTIONS

1. GENERAL POINTS ON THE ELECTRONIC COMETER

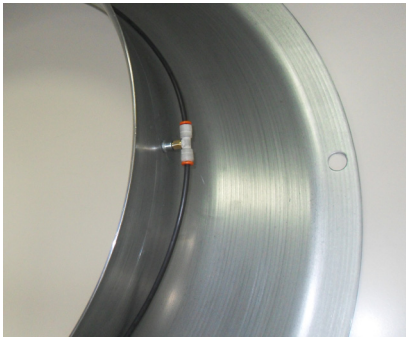
The Electronic Cometer is a transducer that calculates and displays the airflow delivered by a fan. The determination is made by measuring the piezometer ring differential pressure.
When correctly installed (i.e. respecting the installation procedure outlined in this document), the measuring system has an accuracy of $\pm 5\%$ (the accuracy decreases when the cfm drops below 40% WOVF).
Accessories like inlet guards will produce inaccurate readings.
The Electronic Cometer should operate at a temperature between 32°F and 104°F (0°C and +40°C).

2. COMPONENTS

The Electronic Cometer kit consists of 2 components:
(1) Piezometer Ring installed in the Fan or Plenum Fan inlet cone.
(2) The digital measuring unit or Electronic Cometer

Note: The tubing with OD 1/4" (OD Φ 6mm) ID 0.17" (ID Φ 4mm) for connecting the piezometer ring and the reference pressure to the Electronic Cometer is not provided with the kit.

3. PIEZOMETER RING AT THE INLET CONE



The piezometer ring consists of one or more static pressure taps mounted in the inlet cone throat.

If the pressure taps in the inlet cone are more than one, they are equally spaced and connected together in a ring.

Figure 1

4. MEASURING THE AIRFLOW WITH THE ELECTRONIC COMETER

Connect the flexible tubing from the Piezometer Ring to the connection (5) of the Electronic Cometer indicated in Figure 3.

The connection (6) of the Electronic Cometer (Figure 3) should be connected to a tap pressure point in the air handling unit located in proximity of the fan inlet. This area must be suitable for measuring static pressure without obstacles (i.e. filters) located between the tap point and the fan inlet. See Appendix A for examples of installation.

The Electronic Cometer measures the differential pressure between the connections (6) and (5) and calculates the air volume flow (cfm) of the Comefri fan in use. The determination of the air volume flow is made using coefficients of calibration (C-coefficient) specific for each fan model and size. See Appendix B for a list of the C coefficients. The C coefficient can be stored in the Electronic Cometer as explained in section 6.5.

5. ELECTRONIC COMETER

The Electronic Cometer (fig. 2) is a programmable pressure transducer with a 4-digit display intended for the measurement of differential pressures and the calculation of air volume flow. The pressure meter range is 0 to 10 in.wg (0 to 2.5 kPa).

The set-up of the Electronic Cometer is explained in section 6.5.2, 6.5.3.

The Electronic Cometer requires a 24 VAC or 24 VDC power supply. The electrical connections are made with spring clip connectors.

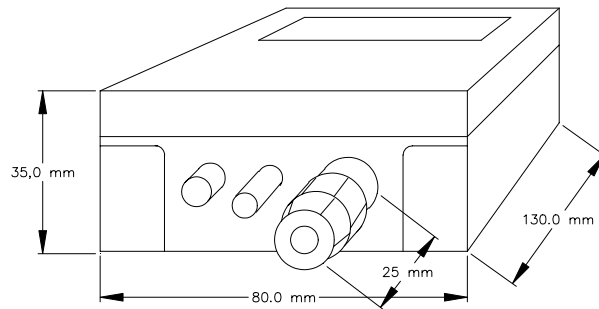


Figure 2

5.1. TECHNICAL SPECIFICATIONS OF DIGITAL MEASURING UNIT

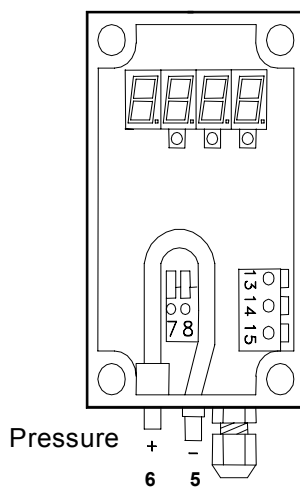
Input: Air Pressure 0...10 in.wg (0...2500 Pa)

Other specifications:

Display	4-digit, 7-segment, LED-display, height of numbers 1/2" (14 mm)
Measurement rate	> 5 measurements/second
Analogue output	0 – 10 V DC output, min. load 10 KOhm
Precision of pressure transducer (not of the whole system)	0,2 % of range ± 1 digit
Enclosure	3.1" x 5.1" x 1.4" (80x130x35 mm)
Weight	7.1 oz. (200 g)
Operating temp.	32...104°F (0...+40 °C), temperature dependence < 50 ppm/°C
Storage temp.	-40...185°F (-40...+85 °C)
Power supply	24 VAC $\pm$ 10% 50 Hz or 60 Hz or 24 VDC $\pm$ 10%, max 100 mA, 2,5 W

5.2. CONNECTIONS

Connections to the meter are shown in figure 3, electrical input and output connections are made in the connection blocks located inside the meter. Pressure connections are made to the connectors 5 and 6 outside the meter.



24 VAC or VDC supply (100 mA, 2,5 W)
with three wire connections:

13: L (line)
14: N (Neutral)
15: PE (Protective Earth Ground)

Analog output voltage:

7: 0 .. 10 V
8: GND

Pressure connections:

5: to inlet cone / piezometer ring
pressure
6: to inlet chamber pressure

NOTE:

8 can be connected with 14

Figure 3

5.3. CHECKS BEFORE OPERATION

Visual

Check for any external damage that could affect the safety or the functionality of the Electronic Cometer.

Connections

All electrical connections should be verified with the connection diagram. To avoid interferences and ensure satisfactory operation use good quality ground protected cable for all electrical connections.

Power supply

Check the supply voltage. If the supply voltage is subject to fluctuations, the use of a main filter should be considered.

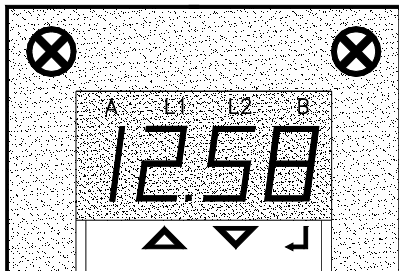
Programming

Make sure that the program settings are correct. Refer to paragraph 6.5.5 for the adjustment of the zero.

5.4. FUNCTIONAL DESCRIPTION

5.4.1. PUSH BUTTONS AND INDICATOR LIGHTS

On the front panel of the Electronic Cometer there are three push buttons used to change function and to program the meter.



A.) The push buttons and their usage are as follows:



The up arrow push button has four functions

1. In the run mode switches between air volume flow display, and pressure display.
2. In the programming mode switches between the main menu and the subprograms.
3. In the set mode increases the numerical value.
4. Pressed simultaneously with the down arrow switches between run mode and programming mode.



The down arrow push button has four functions

1. In the run mode switches between air volume flow display, and pressure display.
2. In the programming mode switches between the main menu and the subprograms.
3. In the set mode decreases the numerical value.
4. Pressed simultaneously with the up arrow switches between run mode and programming mode.



The 'ENTER' (return) push button has the function

Accept and save the selections made in the set mode, and move to the next line of the program.

B.) The front panel lights indicate:

-  - The value displayed in the Electronic Cometer is a pressure.
-  - The value displayed in the Electronic Cometer is the air volume flow.
-  +  - The Electronic Cometer is in the programming mode.
If the lights are flashing, the Electronic Cometer is waiting for an input value.

5.4.2. RUN MODE

In the run mode the Electronic Cometer will update continuously the selected displayed values (air volume flow or piezometer differential pressure).

The Electronic Cometer is equipped with a display filter function (FL), which can be used to eliminate fast fluctuations in the displayed values. Once a filter time FL is set, the mean value of the air volume flow or piezometer pressure is calculated and displayed every FL seconds.

If the input differential pressure exceeds 10 in.wg (2.5 KPa), the Electronic Cometer display will show the overload message 'OL'.

The Electronic Cometer provides an analogue output (0 to 10V DC). The DC output can be programmed for a specific air volume flow range.

5.5. PROGRAMMING THE METER

5.5.1. ENTERING THE PROGRAMMING MODE

To enter the programming mode, while in the run mode press the up and down arrow push buttons simultaneously. The display will show "Un-1".

Pushing the ENTER key, the display will show the current measuring unit Un-1, Un-2 or Un-3.
The default unit is Un-1, which correspond to m³/s.

The units are:

Un-1	m ³ /s	
Un-2	m ³ /h / 1000	(Un-1 x 3,60)
Un-3	cfm / 1000	(Un-1 x 2.12)

Using the ARROW keys, select the desired unit and save the selection using the ENTER key (use Un-3 for cfm / 1000).

After the selection of the unit, the Electronic Cometer will ask for the password and will display 'PASS'.

The password set by factory is 0.

Press ENTER and the 0 value will be displayed.

With the up and down arrow push buttons enter the correct password code number and then press the ENTER push button.

If the incorrect password is used the Electronic Cometer will return to the run mode. If you have trouble using the password, contact Comefri USA (see section 5.6.3).

The display will then show the symbol for the first program setting "Cur".

Once selected N00 in the menu "Cur", press ENTER.

This allows the calculation of the air volume flow using the C-coefficient and the piezometer differential pressure with the formula:

$$V = C \cdot p^{0.5} \quad \text{where}$$

p is the measured differential pressure at the piezometer ring expressed in Pascal [Pa]
 V is the air volume flow expressed in m^3/s
 C is the coefficient for the specific Fan model and size.

The Electronic Cometer will display "dFac"; press ENTER.

With up and down arrow keys set the C-coefficient (dFac) value for the specific fan model and size according to Appendix B. Contact Comefri USA if you cannot find the fan model.

Save the selected C-coefficient pressing ENTER.

5.5.2. DISPLAY FILTER (FL)

The FILTER function will calculate and display the average value of the air volume flow every (FL) seconds.

To activate the FILTER function, in the program mode press either the up or the down arrow push buttons until the display shows 'FL' (display filter).

Press the ENTER push button and the display will show the current selection. A new value for the filter may now be set using the up and down push buttons. The range of values goes from 0 to 9; 0 represents no filtering, 1= the mean value is calculated over a period of 1 second and then shown in the display, 2= the mean value is calculated over a period of 2 seconds and then shown in the display, etc. When the required value has been selected, the value is saved by pressing ENTER.

The display will move to the next line in the programming menu. To exit the programming mode and return to run mode press simultaneously the up and the down arrow push buttons.

5.5.3. ADJUSTING THE ZERO (OFFS)

Before using the Electronic Cometer, the zero of the device should be checked.

Let the device run for about 10 min with the Electronic Cometer disconnected from the pressure sensors. Read the pressure value displayed (measurement A). Set the OFFS value equal and opposite to the residual value read in the display (measurement A pressure).

The zero of the Electronic Cometer is adjusted using the function 'OFFS'.

In the programming mode press either the up or the down arrow push buttons until the display shows 'OFFS'.

Press the ENTER push button.

The display will show the current value of the offset.

Change the value pressing either the up or down arrow push buttons, and save the new value by pressing the ENTER push button.

The display will move to the next line in the programming menu. Other programmable functions may be selected by pressing the up or down push buttons until the required symbol is shown in the display. To exit the calibration mode and return to run mode press simultaneously the up and the down arrow push buttons.

5.5.4. PROGRAMMING THE ANALOGUE OUTPUT 0 – 10 V (OP)

The Electronic Cometer is equipped with an analogue electric output voltage 0-10 V DC.

In the basic programming mode press the up or down push button until 'OP' is shown in the display and press ENTER.

If CH-A is selected the output corresponds to the differential pressure, if CH-F is selected the output corresponds to the air volume flow. Select CH-A or CH-F using the up or down arrow push buttons.

Press ENTER button and the display will show 'LO'.

Press ENTER button again and the LOW value is displayed. If this has to be changed, press the up or down arrow push button. This is the pressure value or the air volume flow value (it depends on CH-A or CH-F choice) that will correspond to the output of 0 V. Store the selected value by pressing ENTER.

The display shows 'HI', which is the value corresponding to the output of 10 V.

Press ENTER button again and the HI value is displayed. If this has to be changed, press the up or down arrow push button.

If CH-F has been selected, the airflow values for "LOW" and "HI" have to be inserted in the same measuring unit set in the 'Display Un' menu (Un-1...m³/s, Un-2...m³/h/1000, Un-3...cfm/1000).

For instance for setting 10V as the analogical output corresponding at 14500 cfm, the unit must be set in Un-3, and the value of HI will be set to 14.50.

Step through the other program settings using the up or down arrow push button to return to run mode pressing simultaneously the up and the down arrow push buttons.

5.5.5. CHANGE OF PASSWORD (PASS)

The basic programming mode is protected by a password; this may be any number between -999 to 9999. The factory setting for the password is 0.

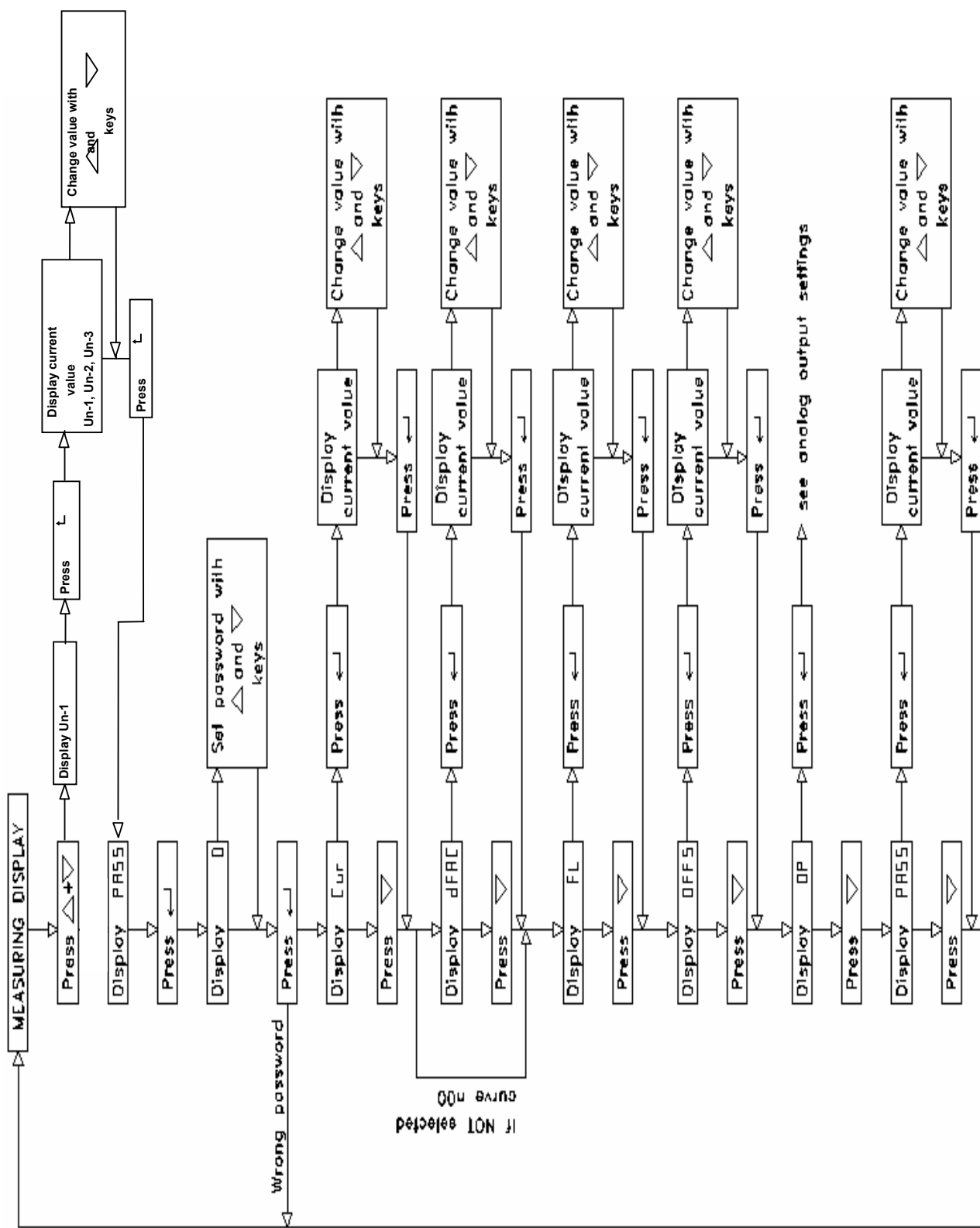
The current password must be used initially to enter the programming mode.

In order to change the current password, while in the programming mode (using the current password) scroll using the down arrow push button until the code 'PASS' is displayed again.

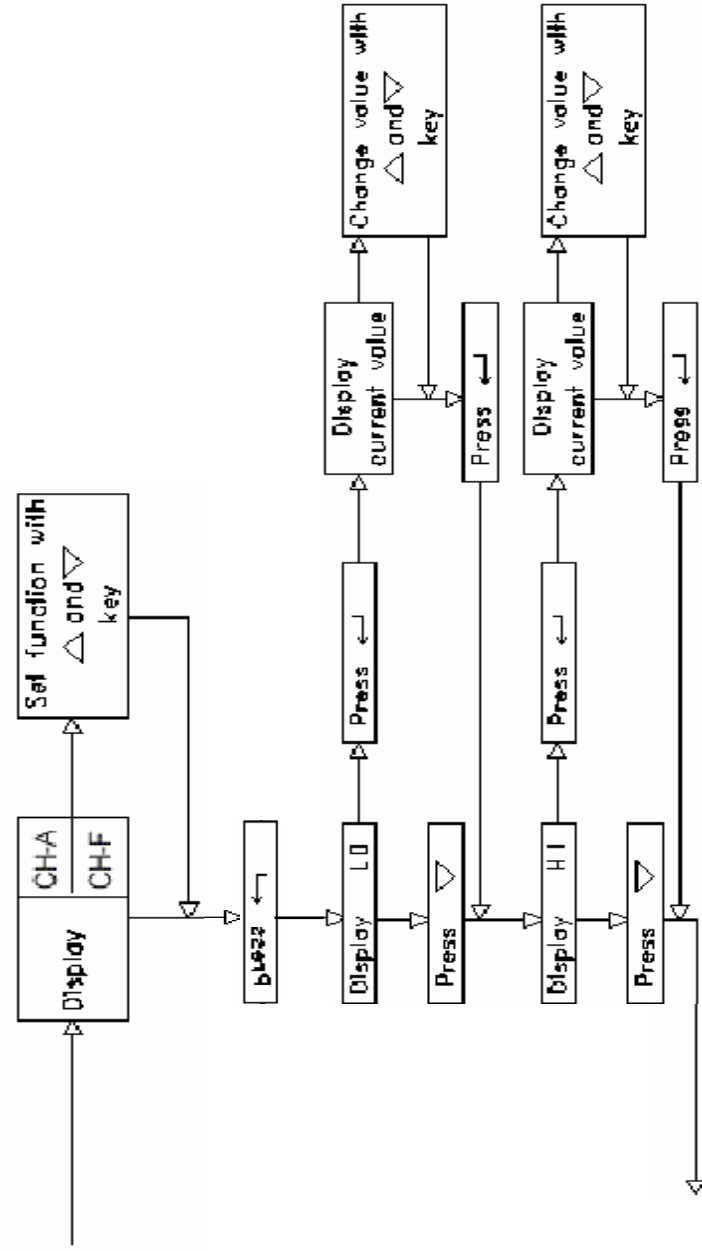
Press ENTER push button to visualize the current password, and use the up or down arrow push buttons to set a new value. Store the new password in the memory by pressing the ENTER push button.

The display will now change back to the run mode.

Contact Comefri USA if you forget the password code.



ANALOG OUTPUT SETTINGS



5.6. TROUBLESHOOTING

5.6.1. TROUBLE ANALYSIS

The display is completely dark

Check the supply voltage and the fuse

The display has stopped and programming does not work

Disconnecting the supply voltage and then reconnecting it.

The display does not show correct values or shows only OL (overload)

- Check that the pressure is not greater than 10 in.wg (2500 Pa).
- Check the condition of the sensor and the sensor connectors.
- Check the programmed values.
- Check the Electronic Cometer with a calibrated input.

Other functional faults

- Check the steps in the programming mode.
- Disconnect the supply voltage from the Electronic Cometer, remove the front panel by loosening the four screws and make a visual inspection of components and their securing on the circuit board.

5.6.2. TROUBLE CORRECTING ON SITE

On site fault corrections are limited to changing the fuse and the fault analysis points mentioned above, as well as possible removal and replacement of faulty components by a skilled electronic technician. If it is not possible to find and correct the fault, contact the service department of the manufacturer.

5.6.3. COMEFRI SERVICE DEPARTMENT CONTACT INFORMATION

Comefri USA

Address : 330 Bill Bryan Blvd Hopkinsville – KY 42240
USA

Tel. : 270 881 1444

Fax. : 270 889 0309

5.7. METER CALIBRATION ON SITE

From time to time (suggested every 2 years) the meter should be checked using a calibrated input and comparing the pressure value with the reading shown in the display (measurement A). If the difference between the display value and the calibrated input is large, the Electronic Cometer can be recalibrated using the calibration program. For the calibration of the Electronic Cometer a pressure generator capable of producing 2000 Pa will be needed.

Calibration is carried out as follows:

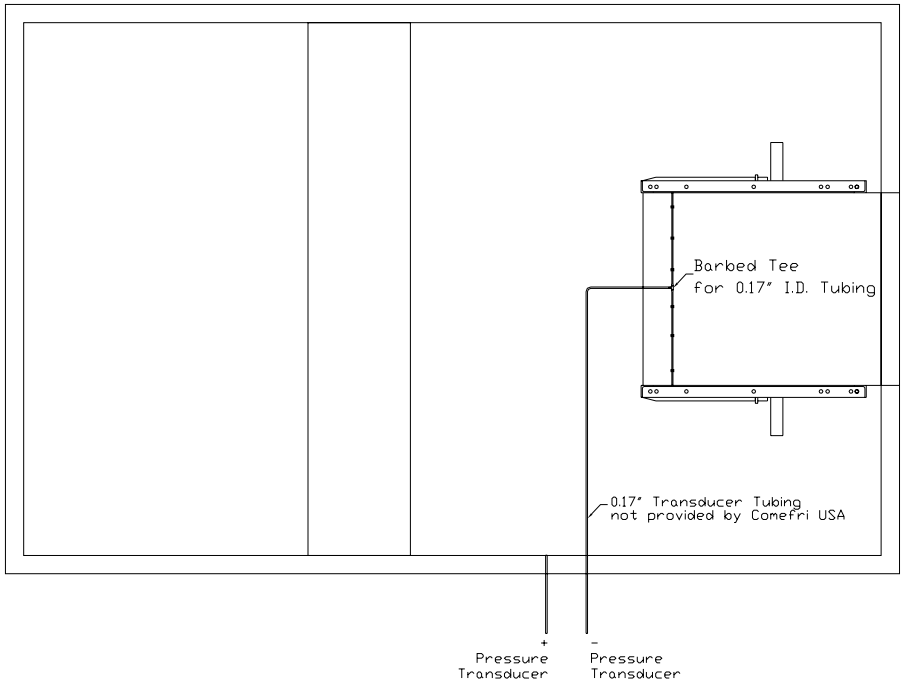
- Press simultaneously the up and the down arrow push buttons, and press ENTER until the meter displays 'PASS'.
- Give the calibration password '-51' and then press the ENTER push button on the right hand side of the meter. The meter display will then show the first calibration point 'P-0' (this corresponds to a calibration of 0 Pa). Press the ENTER push button to zero the display.
- Next the display will show the second calibration point 'P-2', connect the pressure generator (2000 Pa) to the input pressure connector of the Electronic Cometer and press ENTER. After this the meter moves to the next calibration step (OP), voltage calibration. If no voltage output calibration is required, to exit calibration press simultaneously the up and the down arrow push buttons.
- The 'OP' item allows calibration of the voltage output as follows (a voltmeter required):
- Connect the analogue output with a Voltmeter to show the output value.
- Press ENTER so that the display shows O-LO. The voltage output measured by the meter must be 0 V. If not, adjust the voltage output to 0 using the up and down arrow push buttons and accept this by pressing ENTER. The display will then show O-HI. The voltage output measured by the meter must be 10 V. If not, adjust the voltage output to 10 using the up and down arrow push buttons and accept this by pressing ENTER.
- Exit from calibration by simultaneously pressing the up and the down arrow push buttons.

6. CONTENTS

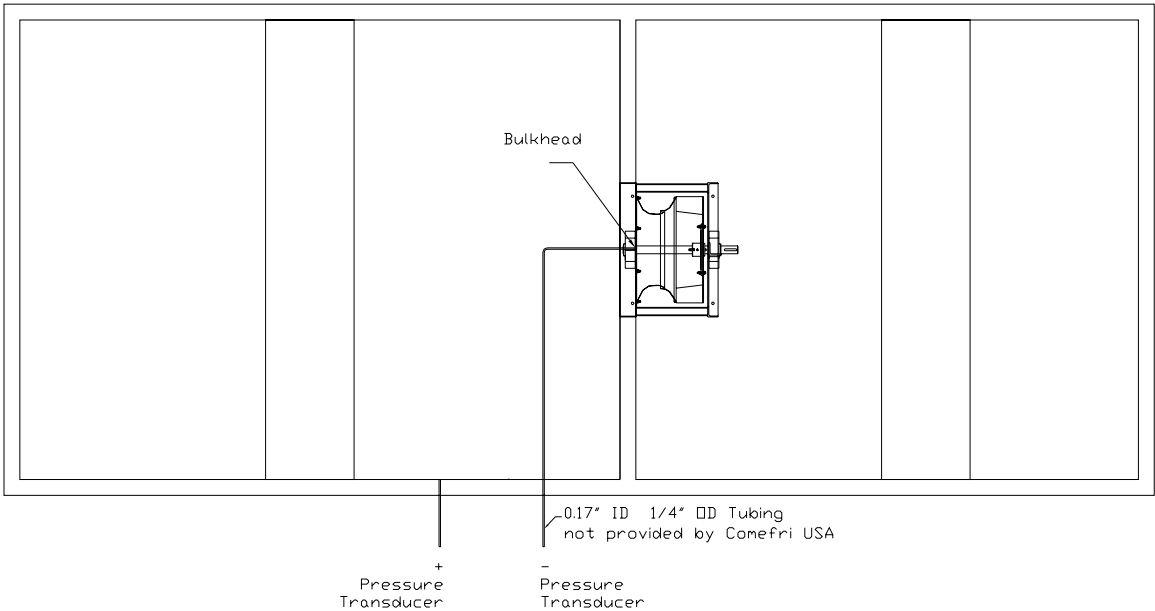
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7. APPENDIX A

Installation Fans with Piezoring



Installation Plenum Fans with Piezoring



8. APPENDIX B 01_11

Fan model	C-Coefficient for Electronic Cometer
ATZAF 12-12 T1	0.070
ATZAF 12-12 T2	0.067
ATZAF 15-15 T1	0.116
ATZAF 15-15 T2	0.116
ATZAF 18-18 T1	0.140
ATZAF 18-18 T2	0.140
ATZAF 20-20 T1	0.175
ATZAF 20-20 T2	0.159
ATZAF 22-22 T1	0.225
ATZAF 22-22 T2	0.198
ATZAF 25-25 T1	0.290
ATZAF 25-25 T2	0.275
ATZAF 28-28 T1	0.384
ATZAF 28-28 T2	0.353
ATZAF 32-32 T1	0.487
ATZAF 32-32 T2	0.487
ATZAF 36-36 T1	0.589
ATZAF 36-36 T2	0.579
ATZAF 40-40 T1	0.699
ATZAF 40-40 T2	0.749

Fan model	C-Coefficient for Electronic Cometer
ATZAF 12-12 FF T1	0.070
ATZAF 12-12 FF T2	0.067
ATZAF 15-15 FF T1	0.116
ATZAF 15-15 FF T2	0.116
ATZAF 18-18 FF T1	0.140
ATZAF 18-18 FF T2	0.140
ATZAF 20-20 FF T1	0.175
ATZAF 20-20 FF T2	0.153
ATZAF 22-22 FF T1	0.225
ATZAF 22-22 FF T2	0.198
ATZAF 25-25 FF T1	0.290
ATZAF 25-25 FF T2	0.266
ATZAF 28-28 FF T1	0.384
ATZAF 28-28 FF T2	0.353
ATZAF 32-32 FF T1	0.487
ATZAF 32-32 FF T2	0.487
ATZAF 36-36 FF T1	0.589
ATZAF 36-36 FF T2	0.579
ATZAF 40-40 FF T1	0.699
ATZAF 40-40 FF T2	0.749

Fan model	C-Coefficient for Electronic Cometer
ATHI 9-9 FF T1	0.028
ATHI 9-9 FF T2	0.026
ATHI 10-10 FF T1	0.032
ATHI 10-10 FF T2	0.032

Fan model	C-Coefficient for Electronic Cometer
APBC 10	0.014
APBC 11	0.018
APAF 12	0.035
APAF 14	0.046
APAF 16	0.056
APAF 18	0.068
APAF 20	0.087
APAF 22	0.110
APAF 25	0.148
APAF 28	0.188
APAF 32	0.235
APAF 36	0.300
APAF 40	0.389
APAF 44	0.439
APAF 49	0.547
APAF 55	0.639
APAF 63	0.840

Fan model	C-Coefficient for Electronic Cometer
NAPBC 10	0.015
NAPBC 11	0.018
NAPAF 12	0.035
NAPAF 14	0.046
NAPAF 16	0.056
NAPAF 18	0.068
NAPAF 20	0.087
NAPAF 22	0.110
NAPAF 25	0.138
NAPAF 28	0.188
NAPAF 32	0.235
NAPAF 36	0.300
NAPAF 40	0.389
NAPAF 44	0.439
NAPAF 49	0.524
NAPAF 55	0.639
NAPAF 63	0.840

Fan model	C-Coefficient for Electronic Cometer
ANPA 12	0.036
ANPA 14	0.048
ANPA 16	0.062
ANPA 18	0.069
ANPA 20	0.093
ANPA 22	0.118
ANPA 25	0.148
ANPA 28	0.200
ANPA 32	0.245
ANPA 36	0.315
ANPA 40	0.408
ANPA 44	0.460
ANPA 49	0.600
ANPA 55	0.753

Fan model	C-Coefficient for Electronic Cometer
ANPL 10	0.018
ANPL 11	0.021
ANPL 12	0.027
ANPL 14	0.036
ANPL 16	0.050
ANPL 18	0.064
ANPL 20	0.078
ANPL 22	0.096
ANPL 25	0.125
ANPL 28	0.163
ANPL 32	0.203
ANPL 36	0.251
ANPL 40	0.308
ANPL 44	0.385
ANPL 49	0.444
ANPL 55	0.557

Fan model	C-Coefficient for Electronic Cometer
TE 180 (ATE 7)	0.008
TE 200 (ATE 8)	0.011
TE 225 (ATE 9)	0.014
TE 250 (ATE 10)	0.017
TE 280 (ATE 11)	0.021
TE 315 (ATE 12)	0.027
TE 355 (ATE 14)	0.034
TE 400 (ATE 16)	0.044
TE 450 (ATE 18)	0.057

Fan model	C-Coefficient for Electronic Cometer
ATLI 20-15 T1	0.210
ATLI 20-15 T2	0.204
ATLI 20-20 T1	0.218
ATLI 20-20 T2	0.215
ATLI 22-22 T1	0.272
ATLI 22-22 T2	0.263
ATLI 25-25 T1	0.360
ATLI 25-25 T2	0.350
ATLI 28-28 T1	0.432
ATLI 28-28 T2	0.420
ATLI 32-32 T1	0.610
ATLI 32-32 T2	0.603
ATLI 36-36 T1	0.839
ATLI 36-36 T2	0.824
ATLI 40-40 T1	1.173
ATLI 40-40 T2	1.138

