The Energy Conservatory

TRUEFLOW® AIR HANDLER FLOW METER

USING THE DG-1000 WITH THE TRUEFLOW AIR HANDLER FLOW METER

ENERGY CONSERVATORY WARRANTY

EXPRESS LIMITED WARRANTY:

Seller warrants that this product, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for a period of 24 months, or such shorter length of time as may be specified in the operator's manual, from the date of shipment to the Customer.

LIMITATION OF WARRANTY AND LIABILITY:

This limited warranty set forth above is subject to the following exclusions:

1. With respect to any repair services rendered, Seller warrants that the parts repaired or replaced will be free from defects in workmanship and material, under normal use, for a period of 90 days from the date of shipment to the Purchaser.
2. Seller does not provide any warranty on finished goods manufactured by others. Only the original manufacturer's warranty applies.
3. Unless specifically authorized in a separate writing, Seller makes no warranty with respect to, and shall have no liability in connection with, any goods which are incorporated into other products or equipment by the Purchaser.
4. All products returned under warranty shall be at the Purchaser's risk of loss. The Purchaser is responsible for all shipping charges to return the product to The Energy Conservatory. The Energy Conservatory will be responsible for return standard ground shipping charges. The Customer may request and pay for the added cost of expedited return shipping.

The foregoing warranty is in lieu of all other warranties and is subject to the conditions and limitations stated herein. No other express or implied warranty IS PROVIDED, AND THE SELLER DISCLAIMS ANY IMPLIED WARRANTY OF FITNESS for particular purpose or merchantability.

The exclusive remedy of the purchaser FOR ANY BREACH OF WARRANTY shall be the return of the product to the factory or designated location for repair or replacement, or, at the option of The Energy Conservatory, refund of the purchase price.

The Energy Conservatory's maximum liability for any and all losses, injuries or damages (regardless of whether such claims are based on contract, negligence, strict liability or other tort) shall be the purchase price paid for the products. In no event shall the Seller be liable for any special, incidental or consequential damages. The Energy Conservatory shall not be responsible for installation, dismantling, reassembly or reinstallation costs or charges. No action, regardless of form, may be brought against the Seller more than one year after the cause of action has accrued.

The Customer is deemed to have accepted the terms of this Limitation of Warranty and Liability, which contains the complete and exclusive limited warranty of the Seller. This Limitation of Warranty and Liability may not be amended or modified, nor may any of its terms be waived except by a writing signed by an authorized representative of the Seller.

TO ARRANGE A REPAIR: Visit energyconservatory.com/calibration-repair/ and download the Equipment Service Form. Complete the form and return with the product. You may also call The Energy Conservatory at 612-827-1117 before sending any product back for repair or to inquire about warranty coverage. All products returned for repair should include a return shipping address, name and phone number of a contact person concerning this repair, and the purchase date of the equipment.

Manual Edition: June 2019

INTRODUCTION TO THE TRUEFLOW® AIR HANDLER FLOW METER

The air flow rate through residential air handlers is an important variable in estimating and optimizing the performance of heat pumps, air conditioners and furnaces. Numerous field studies of installed heating and cooling systems around the United States have found that insufficient air flow across the indoor coil is an extremely common problem. Low air flow can lead to decreased heating and cooling system capacity, increased energy use and comfort problems.

The most widely used methods for estimating the air handler flow rate, (the temperature rise method, static pressure and fan curve method, and the Duct Blaster® isolated return method) have been found to be either problematic or time-consuming to perform. The Energy Conservatory's TrueFlow® Air Handler Flow Meter is designed to provide a simple and accurate measurement of air flow through residential air handlers rated from 1 to 5 tons. The TrueFlow Meter temporarily replaces the filter in a typical air handler system during the airflow measurement procedure. If the filter location is directly adjacent to the air handler, the TrueFlow Meter will measure the total air handler flow. If the filter is located remotely at a single central return, the TrueFlow Meter will measure the airflow through the central return.

Note: If the return duct system is very airtight, the air flow through the single central return will be very close to the total air handler flow.

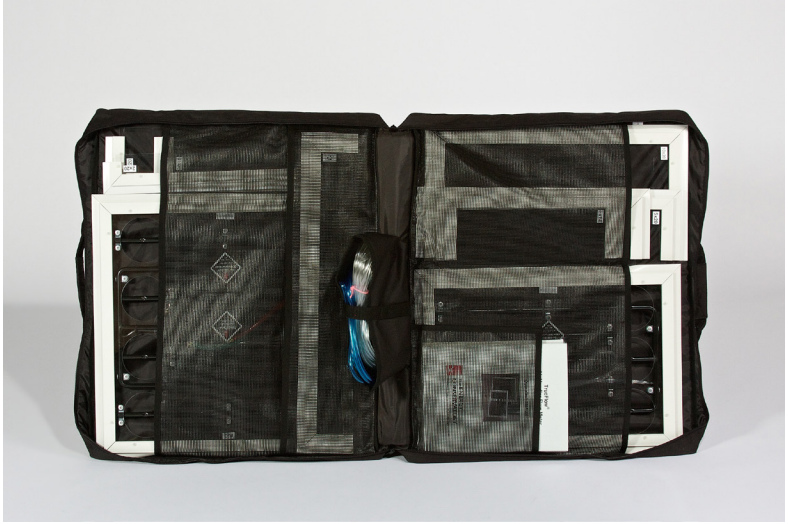
Extensive field testing of the TrueFlow Meter has shown that it:

- Is easy and fast to use in the field. The TrueFlow Meter provides direct CFM readings in approximately 2 to 4 minutes without extensive calculations or setup. The TrueFlow Meter requires about the same time as the single-point temperature rise method, when including the time required in the temperature method to measure the output capacity.
- Can be used in a wide range of return plenums and air handler fan configurations. Adjustable sizing of the TrueFlow Meter allows it to fit most standard filter slots. Custom adjustments for unusual filter sizes can be easily made by the operator.
- Has a flow accuracy of +/ 7% for most applications when used with a pressure gauge having an accuracy of 1% of reading. The TrueFlow Meter is approximately 4 times more accurate than the single-point temperature rise method, and of comparable accuracy to the Duct Blaster isolated return method.
- Is applicable to many systems for which the temperature rise method cannot be used due to inadequate or absent supply plenum temperature measurement points.
- Can be used with any manometer which has a resolution of 1 Pascal or 0.005 In H2O.

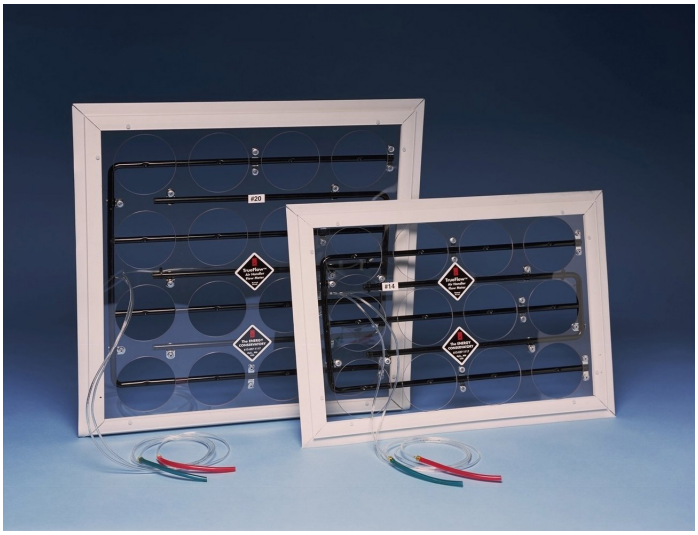
SYSTEM COMPONENTS OF THE TRUEFLOW® AIR HANDLER FLOW METER

The TrueFlow Air Handler Flow Meter consists of the following components:

- 2 calibrated Metering Plates.
- 8 spacers which attach to the Metering Plates to provide for sizing adjustments.
- 1 static pressure probe.
- Flow conversion tables used to convert Metering Plate pressure measurements to flow in Cubic Feet per Minute.
- 10 feet of blue tubing and 30 feet of clear tubing.
- Operation manual.
- Carrying case.



METERING PLATES

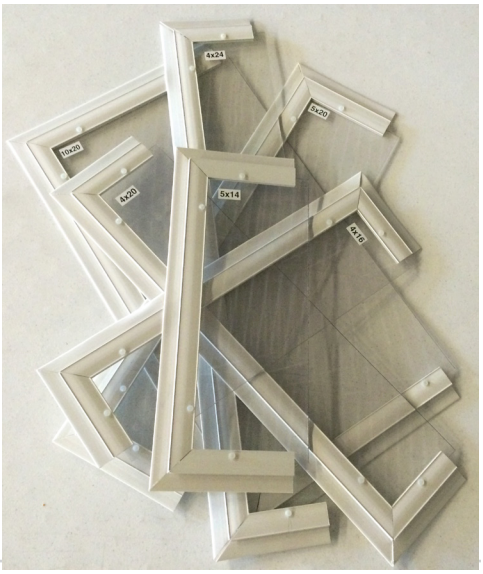


The TrueFlow Meter includes 2 Metering Plates (#14 and #20), each comprised of a clear plastic plate with a series of round metering holes and black pressure sensing grids. Each plate has H-channel gasket attached to all 4 sides. The H-channel gasket provides a seal around the Metering Plate when it is installed in a filter slot, and also provides an attachment channel to attach spacers to the plate. Two Metering Plates are provided due to the large range of filter sizes possible in residential air handling systems.

The Metering Plates are installed in place of the system air filter, which is always located in the return side of the duct system. The front side of the Metering Plate has the TEC label and logo on it, as shown to the right, and needs to be facing "upstream" into the airflow (i.e. away from the air handler fan). The 2 tubing connections to the plate's pressure sensing grids are located on the front side of the plate.

Air flow through the Metering Plate is determined by measuring the pressure difference between the two sensing grids on the plate. The measured pressure difference is converted to air flow in Cubic Feet per Minute using a flow conversion. Each metering plate contains two tubing connections to the pressure sensing grids. The Red tubing connection provides a pressure signal from the plate's "total pressure" grid. The Green tubing connection provides a pressure signal from the plate's "static pressure" grid.

SPACERS



The TrueFlow Meter comes with 8 spacers which are used to adjust the size of the Metering Plates. The 2 Metering Plates and 8 spacers are compatible with the following 12 standard filter sizes :

Table 1: Standard Filter Sizes Compatible with the TrueFlow Meter

Plate #14:	14 x 20	14 x 25	16 x 20	16 x 24	16 x 25	18 x20
Plate #20:	20 x 20	20 x 22	20 x 24	20 x 25	20 x 30	24 x 24

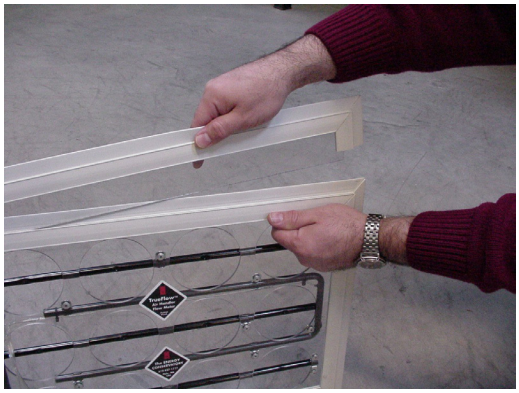
Each spacer consists of a clear plastic plate with H-channel gasket attached to three sides. Spacers are attached to the Metering Plate by pushing the open side of the spacer into the attachment channel found on the Metering Plate H-channel. Install the spacer so that the outside edge of the gasket on the spacer and the Metering Plate line up with each other.

It is sometimes necessary to attach two spacers to a Metering Plate at the same time. Attaching the second spacer is done in the same manner as the first spacer - push the open side of the second spacer into the attachment channels found on the Metering Plate and first spacer. Install the second spacer so that the outside edge of the gasket on the spacer and the Metering Plate line up with each other.

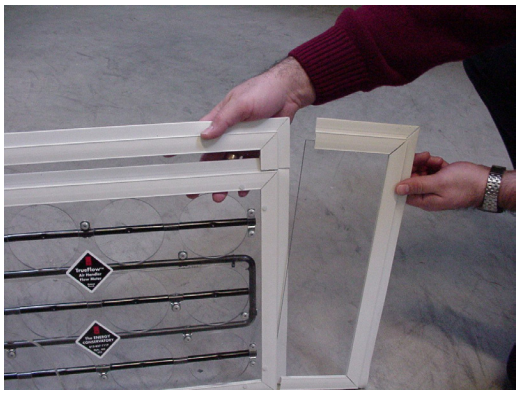
Table 2 below lists the combination of Metering Plates and spacers needed to adjust the TrueFlow Meter to the 12 most commonly found filter sizes.

Table 2: Metering Plate and Spacer Selection Guide

Filter Size (in. x in.)	Flow Metering Plate	Spacer Dimension (in. x In.)	
		Spacer 1	Spacer 2
14 x 20	#14	------	------
14 x 25	#14	5 x 14	------
16 x 20	#14	2 x 20	------
16 x 24	#14	2 x 20	4 x 16
16 x 25	#14	2 x 20	5 x16
18 x 20	#14	4 x 20	------
20 x 20	#20	------	------
20 x 22	#20	2 x 20	------
20 x 24	#20	4 x 20	------
20 x 25	#20	5 x 20	------
20 x 30	#20	10 x 20	------
24 x 24	#20	4 x 20	4 x 24



Adding a single spacer



Adding a second spacer

To use the Selection Guide, locate the filter slot size in the “Filter Slot” column. Determine the TrueFlow Metering Plate and spacers needed by referring to the “Flow Metering Plate” and “Spacer Dimension” columns. For example, a 16” x 25” filter slot requires the #14 Metering Plate, along with the 2” x 20” and 5” x 16” spacers.

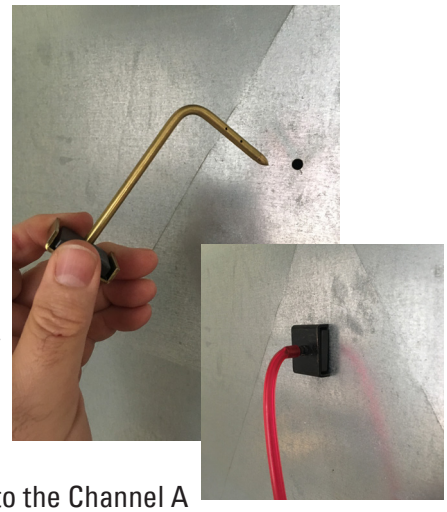
Note: If you need to match a filter slot size that is not listed in the Selection Guide, custom sized spacers can be cut from any 3/32” or 1/8” thick material (e.g. plastic sheet or cardboard). These custom spacers can be attached to the Metering Plates in the same manner as the standard spacers, or they can be taped to the edge of the Metering Plate. In addition, the H-channel gasket can be temporarily removed (by removing the gasket fastener plugs) to reduce the size of the Metering Plates or spacers.

STATIC PRESSURE PROBE

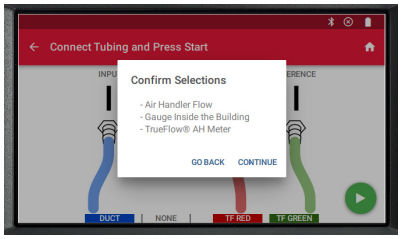
The TrueFlow Meter comes with one static pressure probe. During the air flow measurement procedure, the operator will need to measure the operating pressure in the duct system, both with the existing filter in place and with the TrueFlow Meter in place. These two operating pressure measurements are used to adjust the measured air flow through the Metering Plate for differences in resistance between the existing filter and the TrueFlow Meter.

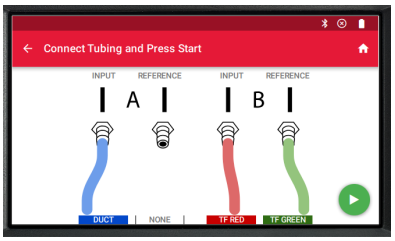
BASIC OPERATION

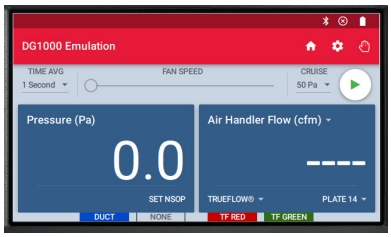
MEASURING THE NORMAL SYSTEM OPERATING PRESSURE



1. Measure the Normal System Operating Pressure (NSOP) with the existing filter in place (replace if it is dirty) by installing a static pressure probe into the ductwork at one of the 3 locations listed below:
   - Insert the static pressure probe into the side surface of the supply plenum. The static pressure probe should point into the airstream.
   - Or, insert the tip of the static pressure probe into a "dead-end" corner of the supply plenum.
   - Or, insert the static pressure probe in the side surface of the return plenum.
2. Attach one end of the clear tube to the static pressure probe, and attach the other end to the Channel A input tap.
3. Turn on the air handler fan to the desired speed.
4. Turn on the DG-1000 gauge by pressing and holding the power button until the green light comes on and wait for the home screen to appear.
5. Press Tubing Assistant. This will set-up the DG-1000 for proper configuration and readings.
6. Press Air Handler.
7. Press Gauge Inside. (Most of the time measurements are taken with the gauge inside, regardless of where the air hanlder is. But if the guage is outside the building envelope, press Gauge Outside.)
8. Press TrueFlow.
9. Continue with your selection or go back to make changes.
10. The tubing diagram appears. Connect the DG-1000 with the proper tubing connections to the TrueFlow Meter and the air handler. Press the play button.
11. Your DG-1000 is now ready to take measurements.



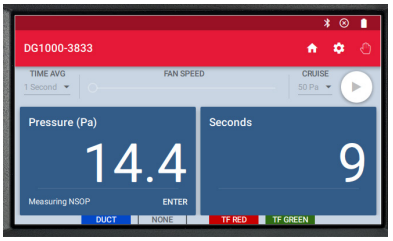


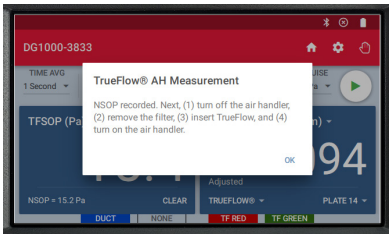


12. Press where it says “SET NSOP”. Since the air handler is already on and the tubing is connected to the duct, the DG-1000 will display the static pressure in the duct work. This number is used to adjust the air flow readings of the system when the TrueFlow Meter is installed instead of the regular filter.

13. On Channel A the pressure of the system is being measured. On Channel B is the number of seconds that have elapsed. Once the number on Channel A stabilizes, press ENTER. The display will show the next steps to complete the measurement. When ready press OK.

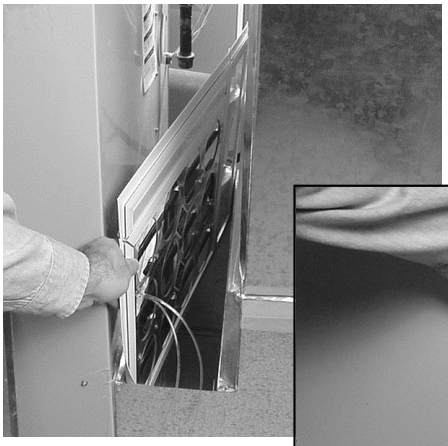
14. The display on Channel A will change from SET NSOP to SET TFSOP. You will also see the amount of the adjust ment that will be made to the system pressure value during the test and a CEAR button to start over with the NSOP.



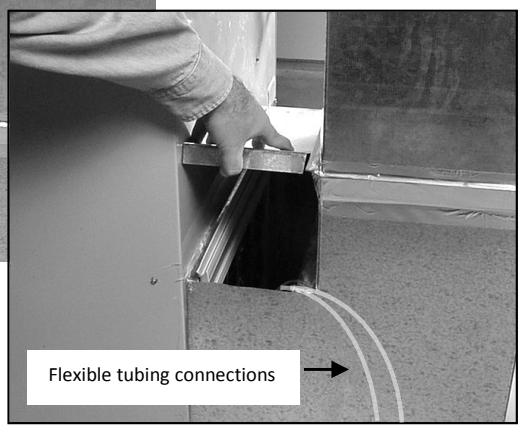


MEASURING THE TRUEFLOW SYSTEM OPERATING PRESSURE

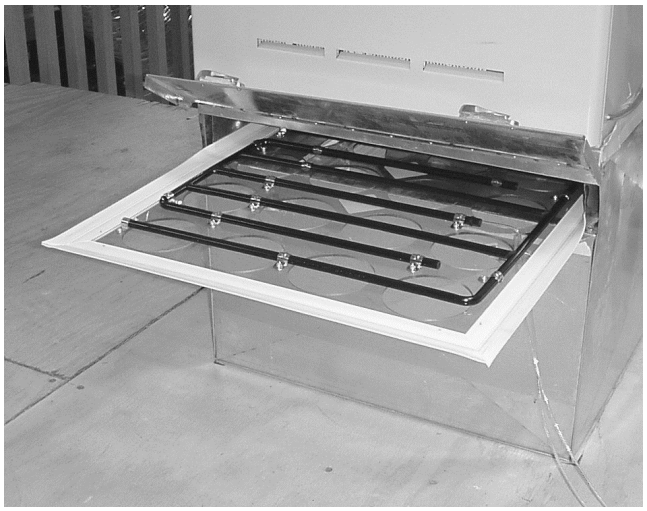
1. Turn off the air handler but keep the DG-1000 Gauge on.
2. Remove the filter from the filter slot
3. If the filter slot is larger than 14 x 20 or 20 x 20, add the necessary spacers, as described earlier, to the plate of choice to match the filter being removed.
4. Place the TrueFlow Meter into the filter slot, with the front side with the lables facing into the airstream and the tubes from the TrueFlow meter leading outside of the filter slot area. Cover the filter slot area. Do not pinch the tubes extending from the duct work.



Airflow is moving right to left so the front of the plate faces into the airflow to the right.



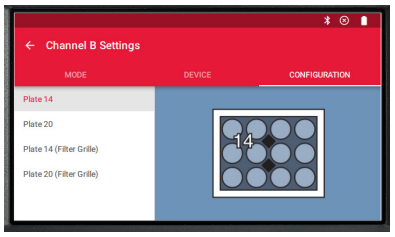
Airflow is moving from the bottom to the top so the front of the plate faces down into the airflow.



Airflow is moving from the room into the duct so the front of the plate faces into the room into the airflow. Keep grill door open during test.

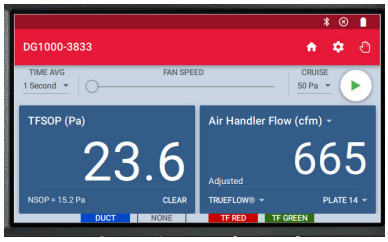
5. Turn on the air handler.

6. Press on the PLATE area to select the correct size of plate that was installed in the filter slot. (You will see that there is additional selections for a filter grill. There is a different calibration value built into the DG-1000 to be used when the TrueFlow Meter is in a filter grill. This provides a more accurate number to account for the different air flow pattern that exists in a filter grill.)



7. Channel A will display the TFSOP and Channel B will display the flow in cfm.

8. Once the Channel A number stabilizes, activate hold to freeze the number on the screen. Hold can be activated by touching the hand in the red status bar, or by double tapping in either Channel A or Channel B.



9. Your test is now complete.

10. Turn off the air handler before removing the TrueFlow Meter. Remove the TrueFlow Meter, return the orginal filter, cover the filter slot.

11. The results of the test are now compared to the air handler manufacturers specified value for flow to determine next actions to take.

Specifications

Flow Accuracy:	+/- 7% for most applications when used with a 1% pressure gauge (DG-1000). *
Flow Range:	#14 Metering Plate: 365 cfm to 1,565 cfm. #20 Metering Plate: 485 cfm to 2,100 cfm.
Nominal Size of Metering Plates:	#14 Metering Plate: 14.5 in. by 20.5 in. (with gasket material). #20 Metering Plate: 20.5 in. by 20.5 in (with gasket material).
System Weight:	13 lbs. (2 Metering Plates, 8 spacers, carrying case, tubing, static pressure probe, manual.)

* The accuracy of the TrueFlow Air Handler Flow Meter is installation dependent. The stated flow accuracy covers 95% of the typical installations documented during both the field and laboratory testing of the device. Obstructions within 6 inches upstream or 2 inches downstream of the Metering Plate that are blocking air flow through any of the metering holes may reduce the flow accuracy beyond the specifications listed here. Always follow the installation and operation instructions listed elsewhere in this manual.

Air Density Factors to Convert from *Indicated* Flow to *Volumetric* Flow

Temp. of air through the Metering Plate (F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
0	0.933	0.95	0.968	0.986	1.005	1.023	1.043	1.062	1.083	1.104	1.125
10	0.943	0.961	0.978	0.996	1.016	1.034	1.054	1.074	1.095	1.116	1.138
20	0.953	0.971	0.989	1.007	1.026	1.045	1.065	1.085	1.106	1.128	1.15
30	0.963	0.981	0.999	1.017	1.037	1.056	1.076	1.097	1.118	1.139	1.162
40	0.973	0.991	1.009	1.028	1.048	1.067	1.087	1.108	1.129	1.151	1.173
50	0.983	1.001	1.019	1.038	1.058	1.077	1.098	1.119	1.14	1.162	1.185
60	0.992	1.01	1.029	1.048	1.068	1.088	1.108	1.13	1.152	1.174	1.197
70	1.002	1.02	1.039	1.058	1.078	1.098	1.119	1.14	1.163	1.185	1.208
80	1.011	1.03	1.049	1.068	1.089	1.109	1.13	1.151	1.174	1.196	1.219
90	1.021	1.039	1.058	1.078	1.099	1.119	1.14	1.162	1.184	1.207	1.231
100	1.03	1.049	1.068	1.088	1.109	1.129	1.15	1.172	1.195	1.218	1.242
110	1.039	1.058	1.078	1.097	1.118	1.139	1.161	1.183	1.206	1.229	1.253
120	1.048	1.067	1.087	1.107	1.128	1.149	1.171	1.193	1.216	1.24	1.264
130	1.057	1.076	1.096	1.117	1.138	1.159	1.181	1.203	1.227	1.25	1.275
140	1.066	1.085	1.106	1.126	1.148	1.169	1.191	1.213	1.237	1.261	1.285
150	1.075	1.094	1.115	1.135	1.157	1.178	1.201	1.224	1.247	1.271	1.296

Volumetric Flow = Indicated Flow x Sqrt (0.075/air density) where air density is the density of air, in lbs/ft3, going through the Metering Plate.

Air Density Factors to Convert from *Indicated* Flow to *SCFM* Flow

Temp. of air through the Metering Plate (F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
0	1.071	1.052	1.033	1.014	0.995	0.977	0.959	0.941	0.923	0.906	0.889
10	1.06	1.041	1.022	1.004	0.985	0.967	0.949	0.931	0.913	0.896	0.879
20	1.049	1.03	1.011	0.993	0.974	0.957	0.939	0.921	0.904	0.887	0.87
30	1.038	1.02	1.001	0.983	0.964	0.947	0.929	0.912	0.895	0.878	0.861
40	1.028	1.009	0.991	0.973	0.955	0.937	0.92	0.903	0.886	0.869	0.852
50	1.018	0.999	0.981	0.963	0.945	0.928	0.911	0.894	0.877	0.86	0.844
60	1.008	0.99	0.972	0.954	0.936	0.919	0.902	0.885	0.868	0.852	0.836
70	0.998	0.98	0.962	0.945	0.927	0.911	0.894	0.877	0.86	0.844	0.828
80	0.989	0.971	0.954	0.936	0.919	0.902	0.885	0.869	0.852	0.836	0.82
90	0.98	0.962	0.945	0.928	0.91	0.894	0.877	0.861	0.844	0.828	0.813
100	0.971	0.954	0.936	0.919	0.902	0.886	0.869	0.853	0.837	0.821	0.805
110	0.962	0.945	0.928	0.911	0.894	0.878	0.862	0.845	0.829	0.814	0.798
120	0.954	0.937	0.92	0.903	0.886	0.87	0.854	0.838	0.822	0.807	0.791
130	0.946	0.929	0.912	0.896	0.879	0.863	0.847	0.831	0.815	0.8	0.785
140	0.938	0.921	0.905	0.888	0.871	0.856	0.84	0.824	0.808	0.793	0.778
150	0.93	0.914	0.897	0.881	0.864	0.849	0.833	0.817	0.802	0.787	0.772

SCFM = Indicated Flow x Sqrt (air density/0.075) where air density is the density of air, in lbs/ft3, going through the Metering Plate.

FLOW RESISTANCE CORRECTION FACTORS IN PASCALS

Normal System Operating Pressure in Pascals (NSOP)

TrueFlow System Operating Pressure in Pascals. (TF SOP)

	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
10	1.00	1.10	1.18	1.26	1.34	1.41	1.48	1.55	1.61	1.67	1.73	1.79	1.84	1.90	1.95	2.00	2.05	2.10	2.14	2.19	2.24
12	0.91	1.00	1.08	1.15	1.22	1.29	1.35	1.41	1.47	1.53	1.58	1.63	1.68	1.73	1.78	1.83	1.87	1.91	1.96	2.00	2.04
14	0.85	0.93	1.00	1.07	1.13	1.20	1.25	1.31	1.36	1.41	1.46	1.51	1.56	1.60	1.65	1.69	1.73	1.77	1.81	1.85	1.89
16	0.79	0.87	0.94	1.00	1.06	1.12	1.17	1.22	1.27	1.32	1.37	1.41	1.46	1.50	1.54	1.58	1.62	1.66	1.70	1.73	1.77
18	0.75	0.82	0.88	0.94	1.00	1.05	1.11	1.15	1.20	1.25	1.29	1.33	1.37	1.41	1.45	1.49	1.53	1.56	1.60	1.63	1.67
20	0.71	0.77	0.84	0.89	0.95	1.00	1.05	1.10	1.14	1.18	1.22	1.26	1.30	1.34	1.38	1.41	1.45	1.48	1.52	1.55	1.58
22	0.67	0.74	0.80	0.85	0.90	0.95	1.00	1.04	1.09	1.13	1.17	1.21	1.24	1.28	1.31	1.35	1.38	1.41	1.45	1.48	1.51
24	0.65	0.71	0.76	0.82	0.87	0.91	0.96	1.00	1.04	1.08	1.12	1.15	1.19	1.22	1.26	1.29	1.32	1.35	1.38	1.41	1.44
26	0.62	0.68	0.73	0.78	0.83	0.88	0.92	0.96	1.00	1.04	1.07	1.11	1.14	1.18	1.21	1.24	1.27	1.30	1.33	1.36	1.39
28	0.60	0.65	0.71	0.76	0.80	0.85	0.89	0.93	0.96	1.00	1.04	1.07	1.10	1.13	1.16	1.20	1.22	1.25	1.28	1.31	1.34
30	0.58	0.63	0.68	0.73	0.77	0.82	0.86	0.89	0.93	0.97	1.00	1.03	1.06	1.10	1.13	1.15	1.18	1.21	1.24	1.26	1.29
32	0.56	0.61	0.66	0.71	0.75	0.79	0.83	0.87	0.90	0.94	0.97	1.00	1.03	1.06	1.09	1.12	1.15	1.17	1.20	1.22	1.25
34	0.54	0.59	0.64	0.69	0.73	0.77	0.80	0.84	0.87	0.91	0.94	0.97	1.00	1.03	1.06	1.08	1.11	1.14	1.16	1.19	1.21
36	0.53	0.58	0.62	0.67	0.71	0.75	0.78	0.82	0.85	0.88	0.91	0.94	0.97	1.00	1.03	1.05	1.08	1.11	1.13	1.15	1.18
38	0.51	0.56	0.61	0.65	0.69	0.73	0.76	0.79	0.83	0.86	0.89	0.92	0.95	0.97	1.00	1.03	1.05	1.08	1.10	1.12	1.15
40	0.50	0.55	0.59	0.63	0.67	0.71	0.74	0.77	0.81	0.84	0.87	0.89	0.92	0.95	0.97	1.00	1.02	1.05	1.07	1.10	1.12
42	0.49	0.53	0.58	0.62	0.65	0.69	0.72	0.76	0.79	0.82	0.85	0.87	0.90	0.93	0.95	0.98	1.00	1.02	1.05	1.07	1.09
44	0.48	0.52	0.56	0.60	0.64	0.67	0.71	0.74	0.77	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00	1.02	1.04	1.07
46	0.47	0.51	0.55	0.59	0.63	0.66	0.69	0.72	0.75	0.78	0.81	0.83	0.86	0.88	0.91	0.93	0.96	0.98	1.00	1.02	1.04
48	0.46	0.50	0.54	0.58	0.61	0.65	0.68	0.71	0.74	0.76	0.79	0.82	0.84	0.87	0.89	0.91	0.94	0.96	0.98	1.00	1.02
50	0.45	0.49	0.53	0.57	0.60	0.63	0.66	0.69	0.72	0.75	0.77	0.80	0.82	0.85	0.87	0.89	0.92	0.94	0.96	0.98	1.00

Normal System Operating Pressure in Pascals (NSOP)

TrueFlow System Operating Pressure in Pascals. (TF SOP)

	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150
50	1.00	1.05	1.10	1.14	1.18	1.22	1.26	1.30	1.34	1.38	1.41	1.45	1.48	1.52	1.55	1.58	1.61	1.64	1.67	1.70	1.73
55	0.95	1.00	1.04	1.09	1.13	1.17	1.21	1.24	1.28	1.31	1.35	1.38	1.41	1.45	1.48	1.51	1.54	1.57	1.60	1.62	1.65
60	0.91	0.96	1.00	1.04	1.08	1.12	1.15	1.19	1.22	1.26	1.29	1.32	1.35	1.38	1.41	1.44	1.47	1.50	1.53	1.55	1.58
65	0.88	0.92	0.96	1.00	1.04	1.07	1.11	1.14	1.18	1.21	1.24	1.27	1.30	1.33	1.36	1.39	1.41	1.44	1.47	1.49	1.52
70	0.85	0.89	0.93	0.96	1.00	1.04	1.07	1.10	1.13	1.16	1.20	1.22	1.25	1.28	1.31	1.34	1.36	1.39	1.41	1.44	1.46
75	0.82	0.86	0.89	0.93	0.97	1.00	1.03	1.06	1.10	1.13	1.15	1.18	1.21	1.24	1.26	1.29	1.32	1.34	1.37	1.39	1.41
80	0.79	0.83	0.87	0.90	0.94	0.97	1.00	1.03	1.06	1.09	1.12	1.15	1.17	1.20	1.22	1.25	1.27	1.30	1.32	1.35	1.37
85	0.77	0.80	0.84	0.87	0.91	0.94	0.97	1.00	1.03	1.06	1.08	1.11	1.14	1.16	1.19	1.21	1.24	1.26	1.28	1.31	1.33
90	0.75	0.78	0.82	0.85	0.88	0.91	0.94	0.97	1.00	1.03	1.05	1.08	1.11	1.13	1.15	1.18	1.20	1.22	1.25	1.27	1.29
95	0.73	0.76	0.79	0.83	0.86	0.89	0.92	0.95	0.97	1.00	1.03	1.05	1.08	1.10	1.12	1.15	1.17	1.19	1.21	1.24	1.26
100	0.71	0.74	0.77	0.81	0.84	0.87	0.89	0.92	0.95	0.97	1.00	1.02	1.05	1.07	1.10	1.12	1.14	1.16	1.18	1.20	1.22
105	0.69	0.72	0.76	0.79	0.82	0.85	0.87	0.90	0.93	0.95	0.98	1.00	1.02	1.05	1.07	1.09	1.11	1.13	1.15	1.18	1.20
110	0.67	0.71	0.74	0.77	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00	1.02	1.04	1.07	1.09	1.11	1.13	1.15	1.17
115	0.66	0.69	0.72	0.75	0.78	0.81	0.83	0.86	0.88	0.91	0.93	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14
120	0.65	0.68	0.71	0.74	0.76	0.79	0.82	0.84	0.87	0.89	0.91	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12
125	0.63	0.66	0.69	0.72	0.75	0.77	0.80	0.82	0.85	0.87	0.89	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10
130	0.62	0.65	0.68	0.71	0.73	0.76	0.78	0.81	0.83	0.85	0.88	0.90	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.07
135	0.61	0.64	0.67	0.69	0.72	0.75	0.77	0.79	0.82	0.84	0.86	0.88	0.90	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.05
140	0.60	0.63	0.65	0.68	0.71	0.73	0.76	0.78	0.80	0.82	0.85	0.87	0.89	0.91	0.93	0.94	0.96	0.98	1.00	1.02	1.04
145	0.59	0.62	0.64	0.67	0.69	0.72	0.74	0.77	0.79	0.81	0.83	0.85	0.87	0.89	0.91	0.93	0.95	0.96	0.98	1.00	1.02
150	0.58	0.61	0.63	0.66	0.68	0.71	0.73	0.75	0.77	0.80	0.82	0.84	0.86	0.88	0.89	0.91	0.93	0.95	0.97	0.98	1.00

Flow Resistance Correction Factor = $\sqrt{\text{NSOP / TFSOP}}$

FLOW RESISTANCE CORRECTION FACTORS IN INCHES OF WATER COLUMN

Normal System Operating Pressure in In. H2O (NSOP)

TrueFlow System Operating Pressure in In. H20 (TF SOP)

	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.24
0.04	1.00	1.12	1.22	1.32	1.41	1.50	1.58	1.66	1.73	1.80	1.87	1.94	2.00	2.06	2.12	2.18	2.24	2.29	2.35	2.40	2.45
0.05	0.89	1.00	1.10	1.18	1.26	1.34	1.41	1.48	1.55	1.61	1.67	1.73	1.79	1.84	1.90	1.95	2.00	2.05	2.10	2.14	2.19
0.06	0.82	0.91	1.00	1.08	1.15	1.22	1.29	1.35	1.41	1.47	1.53	1.58	1.63	1.68	1.73	1.78	1.83	1.87	1.91	1.96	2.00
0.07	0.76	0.85	0.93	1.00	1.07	1.13	1.20	1.25	1.31	1.36	1.41	1.46	1.51	1.56	1.60	1.65	1.69	1.73	1.77	1.81	1.85
0.08	0.71	0.79	0.87	0.94	1.00	1.06	1.12	1.17	1.22	1.27	1.32	1.37	1.41	1.46	1.50	1.54	1.58	1.62	1.66	1.70	1.73
0.09	0.67	0.75	0.82	0.88	0.94	1.00	1.05	1.11	1.15	1.20	1.25	1.29	1.33	1.37	1.41	1.45	1.49	1.53	1.56	1.60	1.63
0.10	0.63	0.71	0.77	0.84	0.89	0.95	1.00	1.05	1.10	1.14	1.18	1.22	1.26	1.30	1.34	1.38	1.41	1.45	1.48	1.52	1.55
0.11	0.60	0.67	0.74	0.80	0.85	0.90	0.95	1.00	1.04	1.09	1.13	1.17	1.21	1.24	1.28	1.31	1.35	1.38	1.41	1.45	1.48
0.12	0.58	0.65	0.71	0.76	0.82	0.87	0.91	0.96	1.00	1.04	1.08	1.12	1.15	1.19	1.22	1.26	1.29	1.32	1.35	1.38	1.41
0.13	0.55	0.62	0.68	0.73	0.78	0.83	0.88	0.92	0.96	1.00	1.04	1.07	1.11	1.14	1.18	1.21	1.24	1.27	1.30	1.33	1.36
0.14	0.53	0.60	0.65	0.71	0.76	0.80	0.85	0.89	0.93	0.96	1.00	1.04	1.07	1.10	1.13	1.16	1.20	1.22	1.25	1.28	1.31
0.15	0.52	0.58	0.63	0.68	0.73	0.77	0.82	0.86	0.89	0.93	0.97	1.00	1.03	1.06	1.10	1.13	1.15	1.18	1.21	1.24	1.26
0.16	0.50	0.56	0.61	0.66	0.71	0.75	0.79	0.83	0.87	0.90	0.94	0.97	1.00	1.03	1.06	1.09	1.12	1.15	1.17	1.20	1.22
0.17	0.49	0.54	0.59	0.64	0.69	0.73	0.77	0.80	0.84	0.87	0.91	0.94	0.97	1.00	1.03	1.06	1.08	1.11	1.14	1.16	1.19
0.18	0.47	0.53	0.58	0.62	0.67	0.71	0.75	0.78	0.82	0.85	0.88	0.91	0.94	0.97	1.00	1.03	1.05	1.08	1.11	1.13	1.15
0.19	0.46	0.51	0.56	0.61	0.65	0.69	0.73	0.76	0.79	0.83	0.86	0.89	0.92	0.95	0.97	1.00	1.03	1.05	1.08	1.10	1.12
0.20	0.45	0.50	0.55	0.59	0.63	0.67	0.71	0.74	0.77	0.81	0.84	0.87	0.89	0.92	0.95	0.97	1.00	1.02	1.05	1.07	1.10
0.21	0.44	0.49	0.53	0.58	0.62	0.65	0.69	0.72	0.76	0.79	0.82	0.85	0.87	0.90	0.93	0.95	0.98	1.00	1.02	1.05	1.07
0.22	0.43	0.48	0.52	0.56	0.60	0.64	0.67	0.71	0.74	0.77	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00	1.02	1.04
0.23	0.42	0.47	0.51	0.55	0.59	0.63	0.66	0.69	0.72	0.75	0.78	0.81	0.83	0.86	0.88	0.91	0.93	0.96	0.98	1.00	1.02
0.24	0.41	0.46	0.50	0.54	0.58	0.61	0.65	0.68	0.71	0.74	0.76	0.79	0.82	0.84	0.87	0.89	0.91	0.94	0.96	0.98	1.00

Normal System Operating Pressure in In. H2O (NSOP)

TrueFlow System Operating Pressure in In. H20 (TF SOP)

	0.20	0.22	0.24	0.26	0.28	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0.46	0.48	0.50	0.52	0.54	0.56	0.58	0.60
0.20	1.00	1.05	1.10	1.14	1.18	1.22	1.26	1.30	1.34	1.38	1.41	1.45	1.48	1.52	1.55	1.58	1.61	1.64	1.67	1.70	1.73
0.22	0.95	1.00	1.04	1.09	1.13	1.17	1.21	1.24	1.28	1.31	1.35	1.38	1.41	1.45	1.48	1.51	1.54	1.57	1.60	1.62	1.65
0.24	0.91	0.96	1.00	1.04	1.08	1.12	1.15	1.19	1.22	1.26	1.29	1.32	1.35	1.38	1.41	1.44	1.47	1.50	1.53	1.55	1.58
0.26	0.88	0.92	0.96	1.00	1.04	1.07	1.11	1.14	1.18	1.21	1.24	1.27	1.30	1.33	1.36	1.39	1.41	1.44	1.47	1.49	1.52
0.28	0.85	0.89	0.93	0.96	1.00	1.04	1.07	1.10	1.13	1.16	1.20	1.22	1.25	1.28	1.31	1.34	1.36	1.39	1.41	1.44	1.46
0.30	0.82	0.86	0.89	0.93	0.97	1.00	1.03	1.06	1.10	1.13	1.15	1.18	1.21	1.24	1.26	1.29	1.32	1.34	1.37	1.39	1.41
0.32	0.79	0.83	0.87	0.90	0.94	0.97	1.00	1.03	1.06	1.09	1.12	1.15	1.17	1.20	1.22	1.25	1.27	1.30	1.32	1.35	1.37
0.34	0.77	0.80	0.84	0.87	0.91	0.94	0.97	1.00	1.03	1.06	1.08	1.11	1.14	1.16	1.19	1.21	1.24	1.26	1.28	1.31	1.33
0.36	0.75	0.78	0.82	0.85	0.88	0.91	0.94	0.97	1.00	1.03	1.05	1.08	1.11	1.13	1.15	1.18	1.20	1.22	1.25	1.27	1.29
0.38	0.73	0.76	0.79	0.83	0.86	0.89	0.92	0.95	0.97	1.00	1.03	1.05	1.08	1.10	1.12	1.15	1.17	1.19	1.21	1.24	1.26
0.40	0.71	0.74	0.77	0.81	0.84	0.87	0.89	0.92	0.95	0.97	1.00	1.02	1.05	1.07	1.10	1.12	1.14	1.16	1.18	1.20	1.22
0.42	0.69	0.72	0.76	0.79	0.82	0.85	0.87	0.90	0.93	0.95	0.98	1.00	1.02	1.05	1.07	1.09	1.11	1.13	1.15	1.18	1.20
0.44	0.67	0.71	0.74	0.77	0.80	0.83	0.85	0.88	0.90	0.93	0.95	0.98	1.00	1.02	1.04	1.07	1.09	1.11	1.13	1.15	1.17
0.46	0.66	0.69	0.72	0.75	0.78	0.81	0.83	0.86	0.88	0.91	0.93	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14
0.48	0.65	0.68	0.71	0.74	0.76	0.79	0.82	0.84	0.87	0.89	0.91	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12
0.50	0.63	0.66	0.69	0.72	0.75	0.77	0.80	0.82	0.85	0.87	0.89	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10
0.52	0.62	0.65	0.68	0.71	0.73	0.76	0.78	0.81	0.83	0.85	0.88	0.90	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.07
0.54	0.61	0.64	0.67	0.69	0.72	0.75	0.77	0.79	0.82	0.84	0.86	0.88	0.90	0.92	0.94	0.96	0.98	1.00	1.02	1.04	1.05
0.56	0.60	0.63	0.65	0.68	0.71	0.73	0.76	0.78	0.80	0.82	0.85	0.87	0.89	0.91	0.93	0.94	0.96	0.98	1.00	1.02	1.04
0.58	0.59	0.62	0.64	0.67	0.69	0.72	0.74	0.77	0.79	0.81	0.83	0.85	0.87	0.89	0.91	0.93	0.95	0.96	0.98	1.00	1.02
0.60	0.58	0.61	0.63	0.66	0.68	0.71	0.73	0.75	0.77	0.80	0.82	0.84	0.86	0.88	0.89	0.91	0.93	0.95	0.97	0.98	1.00

Flow Resistance Correction Factor = $\sqrt{\text{NSOP} / \text{TFSOP}}$

USING THE DG-1000 WITH THE TRUEFLOW AIR HANDLER FLOW METER

Software Information

The Energy Conservatory (TEC) offers a variety of Windows-based programs. These programs can be found and downloaded for free at software.energyconservatory.com.

TEC also offers mobile apps for Apple and Android devices that can be found in the Apple App Store or the Google Play Store.

Instructional Videos

The Energy Conservatory (TEC) offers a variety of online instructional videos, including

- Minneapolis Blower Door Quick Guide
- Minneapolis Duct Blaster Quick Guide
- Field Calibration Checks for Gauges
- Pressure and Airflow Basics
- Exhaust Fan Flow Meter
- TECLOG
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