

Air & Exhaust Gas Properties

Air & Exhaust Gas Properties is a shareware developed by Taftan Data. It calculates the properties of air and exhaust gas by using a set of equations accepted by ASHRAE and CIBSE (Chartered Institute of Building Services Engineers). The calculated results can be transferred between this program and any other spreadsheet or calculation program. For transferring data:

- 1) Select the data.
- 2) **Ctrl+Insert** or **Shift+Delete** to **Cut** from Air & Exhaust Gas Properties.
- 3) **Shift+Insert** to **paste** into the other program.

Important topics are:

Brief Description
Push button Commands
Registering & Shareware
Thermodynamics Online Help?

Brief Description

Air and Exhaust Gas Properties calculates some properties of air (or exhaust gas) over a wide range of temperature and pressure. It may be used for analyzing a number of energy conversion components and unit operations used in air conditioning. Many of these components such as gas turbine and compressor are briefly described in the Thermodynamics Online Help.

Air and Exhaust Gas Properties finds a solution to a problem by knowing two parameters. Input fields are as following:

Property	Value	Action
P	1.01325 bar	Clear
T	20 C	Clear
h	36.01 kJ/kg	Clear
s	0.071 kJ/kg,K	Clear
Cp	1.01 kJ/kg,K	Clear
ρ	1.20 kg/m ³	Clear
Mm	28.86 Kg/kmol	Clear
R	0.288 kJ/kg,K	Clear

Control Panel: O₂ N₂ CO₂ OK Cancel Help

Buttons: About Setup Reset Clear All

The problem solving behind **Air & Exhaust Gas Properties** is based on the following facts. If the composition of the medium is known then **Molecular Mass, Mm** and **Gas Constant, R** are known. If the **Temperature** is known then **specific heat capacity, Cp** and **specific enthalpy, h** are known, and vice versa. The **specific entropy, s** and **density** are dependent on both temperature and pressure.

Related Topic:

- [Push Buttons](#)

Thermodynamics
Online Help?

Definition of Shareware

Shareware distribution gives users a chance to try software before buying it. If you try a Shareware program and continue using it, you are expected to register. Individual programs differ on details -- some request registration while others require it, some specify a maximum trial period. With registration, you get anything from the simple right to continue using the software to an updated program with printed manual.

Copyright laws apply to both Shareware and commercial software, and the copyright holder retains all rights, with a few specific exceptions as stated below. Shareware authors are accomplished programmers, just like commercial authors, and the programs are of comparable quality. (In both cases, there are good programs and bad ones!) The main difference is in the method of distribution. The author specifically grants the right to copy and distribute the software, either to all and sundry or to a specific group. For example, some authors require written permission before a commercial disk vendor may copy their Shareware.

Shareware is a distribution method, not a type of software. You should find software that suits your needs and pocketbook, whether it's commercial or Shareware. The Shareware system makes fitting your needs easier, because you can try before you buy. And because the overhead is low, prices are low also. Shareware has the ultimate money-back guarantee -- if you don't use the product, you don't pay for it.

Benefits of Registering

By registration of your copy of **Air & Exhaust Gas Properties** you will be sent:

- a complete registered copy of the **Air & Exhaust Gas Properties**
- the latest version of the Thermodynamics Online Help

In addition your name will be added to our mailing list and you will be informed about other software. These software products are mainly related to properties of chemicals and applied thermodynamics. Other benefits of registering are:

- Unlimited support by mail, Fax or email.
- One free major update
- Update and upgrade notices
- Discount on upgrades

Please remember that your registration helps to support the shareware concept and promote the development of PC programs at reasonable prices.

Related Topic:

- [Registration](#)

How to Register

You may register **Air & Exhaust Gas Properties** by one of the following methods:

- check or money order
- credit card orders
- SWREG on CompuServe

Registration fee is \$90.00 US (Shipping/Handling included). For detailed information about each of the registration methods see below. If there are any problems, do not hesitate to contact Taftan Data.

How to register by check or money order:

For registration, print out the registration form registration form. Fill it out and mail it to Taftan Data. Please do not forget to include a check or money order payable to Taftan Data for \$90.00 US. If there is a problem in printing out the registration form, you can still register by writing to the above address. Include a return address and specify the type of diskettes required.

How to register by credit cards:

Attention! CREDIT CARD ORDERS ONLY. Attention!

You can order with MC, Visa, Amex, or Discover from Public (software) Library by calling **800-2424-PsL** or **713-524-6394** or by FAX to **713-524-6398** or by CIS Email to 71355,470. You can also mail credit card orders to PsL at P.O.Box 35705, Houston, TX 77235-5705. PsL has assigned item/product #15006 to Air and Exhaust Gas Properties in their system.

"THE ABOVE NUMBERS ARE FOR CREDIT CARD ORDERS ONLY.

"THE AUTHOR OF THIS PROGRAM CANNOT BE REACHED AT THESE NUMBERS.

"Any questions about the status of the shipment of the order, refunds, registration options, product details, technical support, volume discounts, dealer pricing, site licenses, non-credit card orders, etc, must be directed to Taftan Data

"To insure that you get the latest version, PsL will notify us the day of your order and we will ship the product directly to you."

How to register by SWREG on CompuServe

CompuServe users can order through SWREG (Shareware Registration). Simply "GO SWREG" and you will find instructions to register shareware. Registration ID is 14290.

Discount on site licenses

2 users	10%	
3 users	15%	
4 users	20%	
5 users	25%	
6 users	30%	
7 users	35%	
8 users	40%	
9 users	45%	
10 and more users		50%

Air & Exhaust Gas Properties Version 1.0 Registration Form

Please complete all the following questions in this section:

Your name : _____

Company name: _____

Street Address : _____

City : _____ State : _____ Zip : _____

What type of diskettes do you require? (Check one):

3 1/2" DS/HD (1.4 mb) disks ___ 3 1/2" DS/DD disks (720 kb) ___

The registration fee for Air & Exhaust Gas Properties is \$90.00 US (Shipping and Handling included). Be sure to include a check or money order payable to Taftan Data for \$90.00 US.

The completion of the following information is optional but will help us a lot:

Email Address : _____

Where did you obtain this copy of Air & Exhaust Gas Properties?

Bulletin Board Service (Name : _____ Phone #: _____)

Friends: ___

Other: _____

Any questions, comments, or improvements you would like to see made?

Please send this form and your check or money order payable to Taftan Data to:

Air & Exhaust Gas Properties Registration
Taftan Data
Box 23538
200 45 Malmo
Sweden

Please allow 1 weeks for deliveries outside Europe.

DISCLAIMER - AGREEMENT

Users of **Air & Exhaust Gas Properties** must accept this disclaimer of warranty: **Air & Exhaust Gas Properties** is supplied as is. The author disclaims all warranties, expressed or implied, including, without limitation, the warranties of merchantability and of fitness for any purpose. The author assumes no liability for damages, direct or consequential, which may result from the use of **Air & Exhaust Gas Properties**.


Air & Exhaust Gas Properties is a **shareware program** and is provided at no charge to the user for evaluation. Feel free to share it with your friends, but please do not give it away altered or as part of another system. The essence of "user-supported" software is to provide personal computer users with quality software without high prices, and yet to provide incentive for programmers to continue to develop new products. If you find this program useful and find that you are using **Air & Exhaust Gas Properties** and continue to use **Air & Exhaust Gas Properties** after a reasonable trial period, you must make a registration payment of \$90.00 US to **Taftan Data**. The \$90.00 US registration fee will license one copy for use on any one computer at any one time. You must treat this software just like a book. An example is that this software may be used by any number of people and may be freely moved from one computer location to another, so long as there is no possibility of it being used at one location while it's being used at another. Just as a book cannot be read by two different persons at the same time.

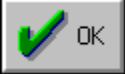
Commercial users of **Air & Exhaust Gas Properties** must register and pay for their copies of **Air & Exhaust Gas Properties** within 30 days of first use or their license is withdrawn. Site-License arrangements may be made by contacting **Taftan Data**.

You are encouraged to pass a copy of **Air & Exhaust Gas Properties** along to your friends for evaluation. Please encourage them to register their copy if they find that they can use it. All registered users will receive a copy of the latest version of the **Air & Exhaust Gas Properties** system.


Taftan Data


Push Button Commands


 Clears a data field. This button command changes the state of data to unknown. Please remember when you try to edit a data field and later change your mind, push this button, otherwise the program tries to check this data field when you press OK!

 Using this push button in the main window activates the Air & Exhaust Gas Properties. First the input parameters are controlled for correct format. If the format is OK, then the unit used to specify the input is controlled. You are not restricted to input the values by default units. The default units are there just to simplify your job. They are also used for specifying the output values.
The next step is to check if the input values are in the acceptable range. If every thing is ok and there are enough inputs, Air & Exhaust Gas Properties will find unknown parameters.


 Exiting the program. This works exactly the same way Alt+F4 does.

 Starts this help file.

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 This push button opens the setup window for specifying:

- Default values for the unit conversion
- composition of air or exhaust/flue gas

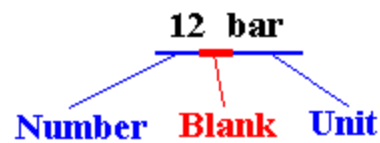
 Clears all the fields which are filled by the program.

 Clears all data fields.

Some Words About Shareware and Registration

- Definition of Shareware
- Benefits of Registering
- DISCLAIMER - AGREEMENT
- How to Register
- Order Form

Input Format



The input consists of a number and a suitable unit. At least one space is necessary to separate the number from the unit. If the format is not correct, a message will be sent. E.g. The value in the pressure [P] field is not acceptable!. You should also use a correct unit for the input which is supported by the program. Some input fields such as the dryness fraction of the steam is dimensionless and does not require any unit.

The program supports both ordinary real number notation and scientific notation. All these examples are correct as an input in the pressure field:

100.0 bar
100 bar
1.0e2 bar
1E+2 bar

Input Range

The equations used for calculating of properties of air, exhaust or flue gas are valid within a restricted range. The acceptable range for pressure is:

$$\mathbf{0.1 \text{ bar} < P < 20 \text{ bar}}$$

and for temperature is :

$$\mathbf{-40 \text{ C} < T < 1500 \text{ C}}$$

The other input parameters are also restricted. The restriction is not as straight forward as the limitations for pressure and temperature. The program will send error messages if any parameter falls outside the acceptable range.

Taftan Data



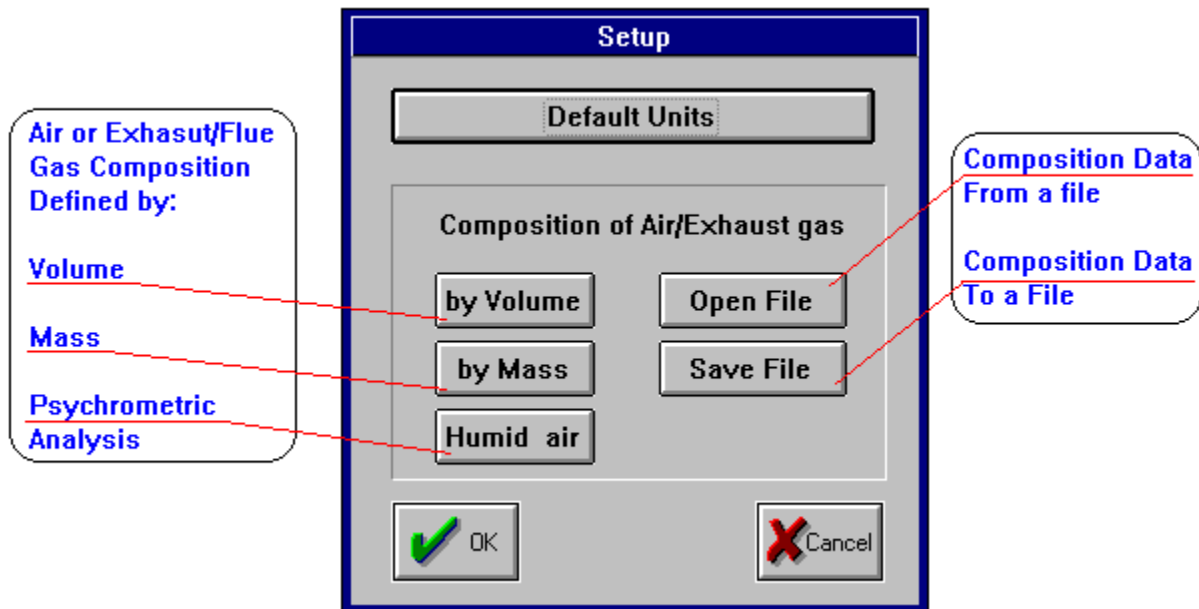
Taftan Data is a software developer and consulting company. We develop software mainly for industrial, scientific and engineering applications.

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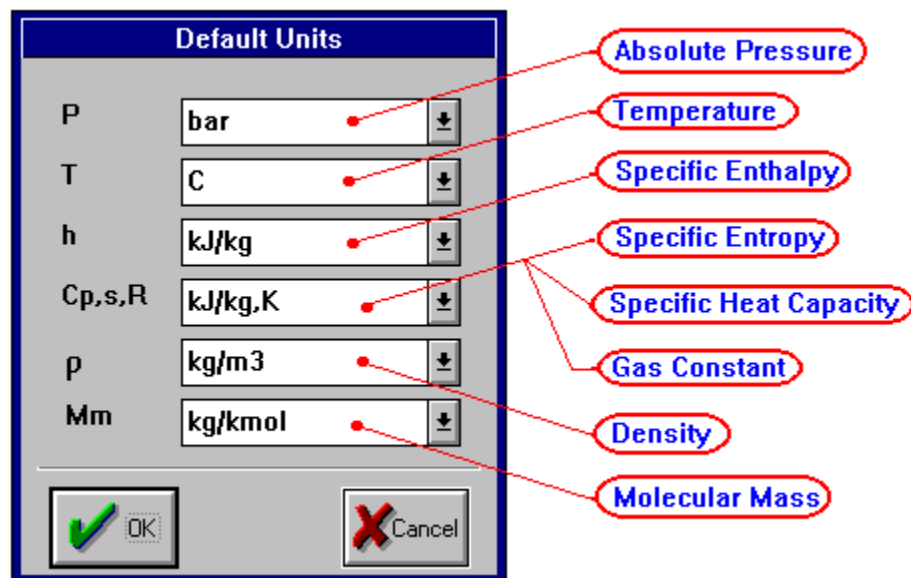
If you want to know more about "Taftan Data" or other software developed by this company please visit our homepage:

<http://ourworld.compuserve.com/homepages/taftan/>

Setup Window



The push buttons in this window enable the user to define **default units** and **the composition of air, exhaust/ flue gas**. The default unit push button starts the following window:



There are three methods for defining the composition of air, exhaust or flue gas.

- **Volumetric Composition**
- **Mass Composition**

- Knowing data of an psychrometric analysis.

Composition by Volume

N ₂	<input type="text" value="0.764"/>	<input type="button" value="Clear"/>
O ₂	<input type="text" value="0.205"/>	<input type="button" value="Clear"/>
CO ₂	<input type="text" value="2.9E-0004"/>	<input type="button" value="Clear"/>
Ar	<input type="text" value="9.3E-0003"/>	<input type="button" value="Clear"/>
H ₂ O	<input type="text" value="0.021"/>	<input type="button" value="Clear"/>
SO ₂	<input type="text" value="0.0E+0000"/>	<input type="button" value="Clear"/>

The input fields in windows for **Volumetric Composition** and **Mass Composition** need numbers between 0 and 1.

The Humid Air push button opens the following window:

Psychrometric Analysis

Hygrometer type: <input checked="" type="radio"/> Sling <input type="radio"/> Screen	
Air Pressure: <input type="text" value="1.01 bar"/>	Specific humidity ω <input type="text" value="0.013"/>
Measured Temperature: Wet Bulb <input type="text" value="22 C"/> Dry Bulb <input type="text" value="30 C"/>	Percentage saturation Ψ <input type="text" value="0.792"/>
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	<input type="button" value="Calculate"/>

The user should specify all the data on the left side of the window. More information about psychrometric analysis can be found in thermodynamics online help.

Related Topic:

[Thermodynamics
Online Help?](#)

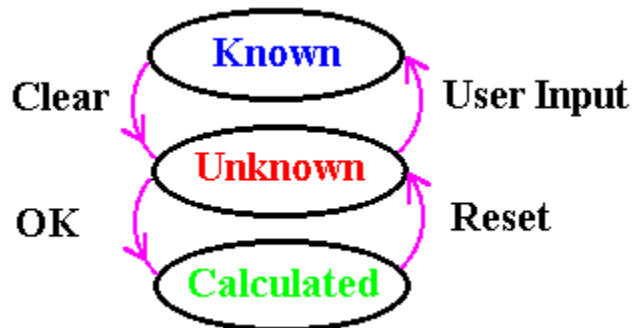
3-State Data Fields

The value shown in each data field has one the states i.e.

Known Unknown Calculated

The user input will be recognized as a known data field to the program. By pressing the **Clear** push button, the state of the field will be changed to unknown. The program will try to find the values of unknown data fields. If there is a solution, the state of the field will be changed to calculated and the value will be presented to the user. By pressing the **Reset** push button, the state of calculated values will be changed to unknown. This is necessary when user tries to solve the same problem with slightly different input. By introducing 3-state data fields, each data field can be used for input or output. This approach simplifies the input/output user interface.

User fills the known parameters in appropriate fields then presses the **OK** button. If there are solutions to the problem, the program fills the output fields. In case of incorrect input format or incompatibility between inputs, an error message will be issued.



Important Topics:

- Brief Description
- Push Buttons