`psicret` User Manual

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Resumen

`psicret` is a package that include a library and some few interfaces for making psychrometric calculations. The interaces include a command line interface, a graphical interface, and a web (PHP) interface.

This manual focuses on the command line interface (CLI) and the library.

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1. Introduction

1.1. Psychrometrics

Psychrometrics or psychrometry or hygrometry are terms used to describe the field of engineering concerned with the determination of physical and thermodynamic properties of gas-vapor mixtures. The term derives from the

Greek psuchron (ψυχρόν) meaning "cold" and metron (μέτρον) meaning "means of measurement".[1]

1.2. Psychrometric chart

A psychrometric chart is a graph of the thermodynamic parameters of moist air at a constant pressure, often equated to an elevation relative to sea level. The ASHRAE-style psychrometric chart was pioneered by Willis Carrier in 1904. It depicts these parameters and is thus a graphical equation of state.

The "Mollier i-x" (Enthalpy - Humidity Mixing Ratio) diagram, developed by Richard Mollier in 1923, is an alternative psychrometric chart, preferred by many users in Scandinavia, Eastern Europe, and Russia.

2. The library

3. The command line

The command line will accept a series of parameters. Parameters can be in the form `-p`, `-param`, `-k val`, `-key=value`, or `value`. Several parametes of the form `-p` can be grouped as `-pq` (meaning `-p -q`).

The first non-marked parameter `value`, if numeric, will be interpreted as dry bulb temperature, or as some other point parameter if followed by a unit suffix.

The second non-marked parameter `value`, if also numeric, will be interpreted as relative humidity (in percentage), or as some other point parameter if followed by a unix suffix.

Non numeric non-marked parameters will concatenate as a chart title.

If a point is parametrized, the output

3.1. Text output

`-m` `--si` Uses international metric system (SI or metric) for input and output units. This is the default.

`-i` `--english` Uses imperial/English units for input and output.

`-P` `--pressure=`*`pres`* Sets the pressure in kilopascal or psi. a letter suffix might change the default unit: `kpa` kilopascal, `pa` pascal, `bar`, `atm` atmosphere, `tor` torr, `hg` or `mmhg` millimeter of mercury, `psi` pounds per square inch.

`-E` `--elevation=`*`height`* Sets the elevation in meters or feet above sea level. It can accept a unit suffix including `m` meter, `ft` feet.

If both elevation and pressure parameters are given, it makes calculations using pressure. (For graphical output both parameters will show in the chart, but calculations are made using pressure.)

[1] *http://en.wikipedia.org/wiki/Psychrometrics*

If neither is provided, it assumes sea level (1 atm pressure).

`-t` `--dbt=`*`temp`* Sets the dry bulb temperature. Units are celcius or farenheight degrees. Unit suffixes include `K` for Kelvin, `C` for celcius and `F` for farenheight. suffixes are not case-sensitive.

`-w` `--wbt=`*`temp`* Sets the wet bulb temperature.

`-p` `--relative=`*`percentage`* Sets the relative humidity.

`-d` `--dpt=`*`temp`* Sets the dew point temperature.

`-h` `--humidity=`*`prop`* Sets the specific humidity.

`-a` `--absolute=`*`value`* Sets the absolute humidity (water vapor density).

`-e` `--entalpy=`*`value`* Sets the specific entalpy.

`-v` `--volume=`*`value`* Sets the specific volume.

`-r` `--ratio=`*`value`* Sets the psychrometric ratio.

`--heat=`*`value`* Sets the humid heat.

`--lang=`*`language`* Sets the output language. Default is English. *`language`* is usually a two-letter code, which refers to the file `bab-`*`language`*`.dic` in the program path with translations of the different terms and units.

`-?` `--help` displays a basic help.

`--version` displays the version of the program.

When a text output is required, two parameters should be provided aside pressure/elevation.

3.2. Graphical output

The command line interface can create an ASHRAE-style or a Mollier i-x psychrometric chart for a given air preasure (or height), either empty or with a marked point.

If one variable (aside pressure/elevetion) is provided, the chart will highlight that respective line.

If two variables (aside pressure/elevetion) are provided, the chart will mark the specific point, highlight all relevant lines, and display all calculated variables in a table.

The following parameters can be used (this settings are for ASHRAE-style charts in landscape mode, Mollier i-x charts are in portrait mode and width and height are traspossed accordingly):

`-o` `--svg=`*`file.ext`* Outputs to *`file.ext`* and deduce format from *`ext`*.

`-V` `--svg=`*file* Outputs to *file* (or *file*`.svg` if no extension provided) using scalable vector graphics (SVG) format. If no further commands are issued, this will be a 11 inch × 21 cm output with 2 cm margins.

`--ps=`*file* Outputs to *file* (or *file*`.ps` if no extension provided) using postscript format. If no further commands are issued, this will be a 11 inch× 21 cm output with 2 cm margins.

`-R` `--png=`*file* Outputs to *file* (or *file*`.png` if no extension provided) using portable network graphics (PNG) format. If no further commands are issued, this will be a 800 × 600 pixels output with 2 cm margins.

`-W` `--width=`*x* Set the width of the output file to *x* pixels or, if a twoletter unit code is set, to that specific length. Default is 800 pixels for raster output (PNG) or 11 inch (-2 cm margin at each side) for scalable output.

`-H` `--height=`*y* Set the height of the output file to *y* pixels or, if a twoletter unit code is set, to that specific length. Default is 600 pixels for raster output (PNG) or 21 cm (-2 cm margin at each side) for scalable output.

`-D` `--dpi=`*res* Sets the resolution in dots per inch. Default is 90 dpi.

`--dpm=`*res* Sets the resolution in dots per meter. Default is 3543.307087 d/m.

`-M` `--margin=`*top,left,bottom,right* Sets the margins for the output. The default is zero for raster and 2 cm at each side for scalable formats. If no *right* value is provided, it takes it equal to *left*. If *bottom* is missing, it takes it equal to *top*. If *left* is missing, it takes it equal to *top*.

The default units are pixels. If only one of the parameters have a twocode unit name, that unit is used for all other margins.

Example: `-m 1,1.5cm,2` will set left and right margins to 1.5 cm, the top margin to 1 cm and the bottom margin to 2 cm.

`-S` `--size=`*format* Sets the size for the output using a keyword. Common keywords include: `letter` for letter papersize (11 inch × 8,5 inch), 1 inch margins. `a4` for A4 papersize (297 mm × 210 mm), 25 mm margins. `b4` for B4 papersize (353 mm × 250 mm), 30 mm margins. `hd` for 1080p widescreen format (1920 × 1080 pixels), no margins. `vga` for VGA screen format (640 × 480 pixels), no margins. `default` for default format, according if it is a scalable or a raster format. Other formats can be defined by creating a file `fmt-`*format*`.par`. This file cointains parameters for both raster and scalable output formats. If the local directory or program path contains a `fmt-custom.par` file, that will override the default behavior.

`-A` shorthand for `-size=a4`

`-B` shorthand for `-size=b4`

`-L` shorthand for `-size=letter`

`-c` `--color` Lines are drawed using different colors. Default.

`--color=`*`scheme`* Lines and background are drawed using different colors using a scheme defined by file `col-`*`scheme`*`.sch`.

`-b` `--bw` Lines are drawed in black over a white background, suitable for black and white printing. This is equivalent to `-color=bw`.

`-T` `--title="`*`the title`*`"` Sets a title for the chart

`-n` `--no-lines` Will not highlight the relevant lines if a point is given.

`-N` `--no-table` Will not print the table of values if a point is given.

`-q` `--quiet` Will not print a table if a point is parametrized.

3.3. Alphabetical list of options

`-a` `--absolute=`*`value`* Sets the absolute humidity (water vapor density).

`-A` shorthand for `-size=a4`

`-b` `--bw` Lines are drawed in black over a white background.

`-B` shorthand for `-size=b4`

`-c` `--color` Lines are drawed using different colors. Default.

`-d` `--dpt=`*`temp`* Sets the dew point temperature.

`-D` `--dpi=`*`res`* Sets the resolution in dots per inch.

`--dpm=`*`res`* Sets the resolution in dots per meter. Default is 3543.307087 d/m.

`-e` `--entalpy=`*`value`* Sets the specific entalpy.

`-E` `--elevation=`*`height`* Sets the elevation.

`-h` `--humidity=`*`prop`* Sets the specific humidity.

`-H` `--height=`*`y`* Set the height of the output file to *y*.

`--heat=`*`value`* Sets the humid heat.

`-i` `--english` Uses imperial/English units.

`-L` shorthand for `-size=letter`

`--lang=`*`language`* Sets the output language.

`-m` `--si` Uses international metric system (SI or metric).

`-M` `--margin=`*`top,left,bottom,right`* Sets the margins.

`-n` `--no-lines` Will not highlight the relevant lines if a point is given.

`-N` `--no-table` Will not print the table of values if a point is given.

`-o` `--svg=`*`file.ext`* Outputs to *`file.ext`* .

`-p` `--relative=`*`percentage`* Sets the relative humidity.

`-P` `--pressure=`*`pres`* Sets the pressure.

`--ps=`*`file`* Outputs to *`file`*`.ps`.

`-q` `--quiet` Will not print a table if a point is parametrized.

`-r` `--ratio=`*`value`* Sets the psychrometric ratio.

`-R` `--png=`*`file`* Outputs to *`file`*`.png`.

`-S` `--size=`*`format`* Sets the size for the output using a keyword.

`-t` `--dbt=`*`temp`* Sets the dry bulb temperature.

`-T` `--title="`*`the title`*`"` Sets a title for the chart

`-v` `--volume=`*`value`* Sets the specific volume.

`-V` `--svg=`*`file`* Outputs to *`file`*`.svg`.

`--version` displays the version of the program.

`-w` `--wbt=`*`temp`* Sets the wet bulb temperature.

`-W` `--width=`*`x`* Set the width of the output file to *`x`* .

`-?` `--help` displays a basic help.

4. Graphical interface

5. Web interface

6. Installation

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