

Manual Hvac_Simply version 6.00

This is an indication of the main types of blocks that lets you build together to a model.

New:

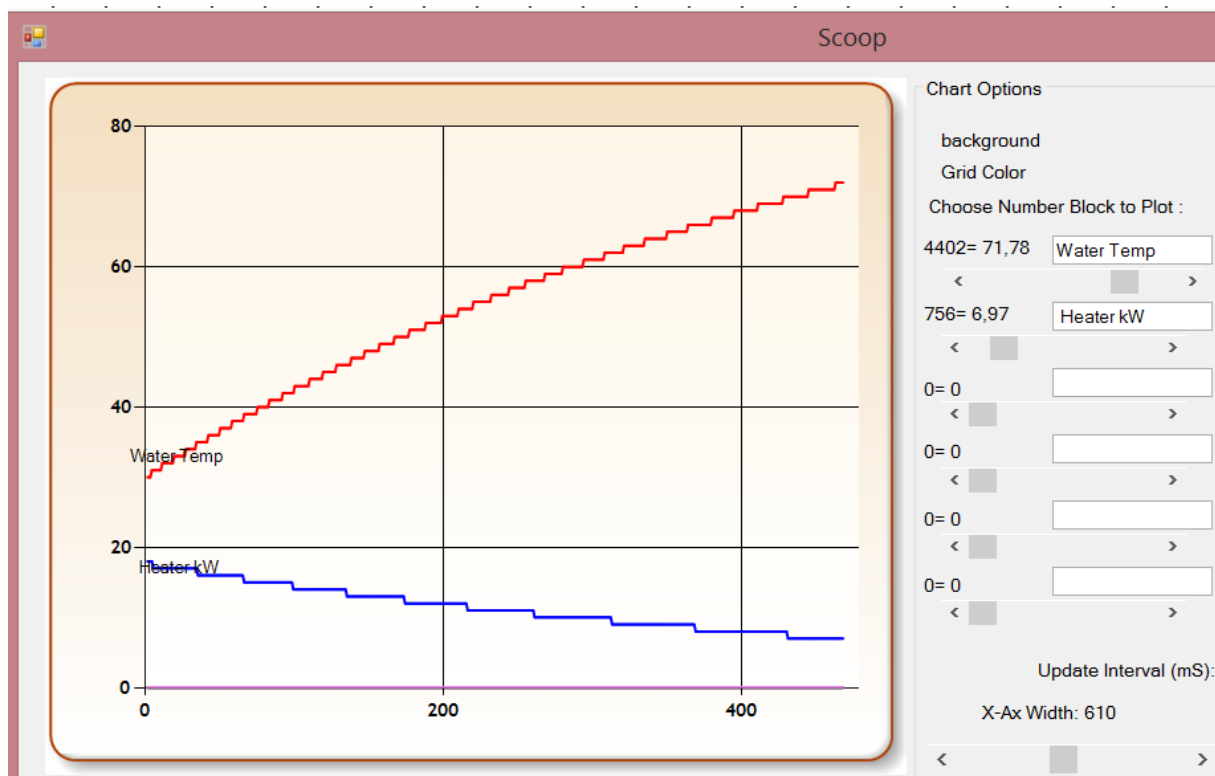
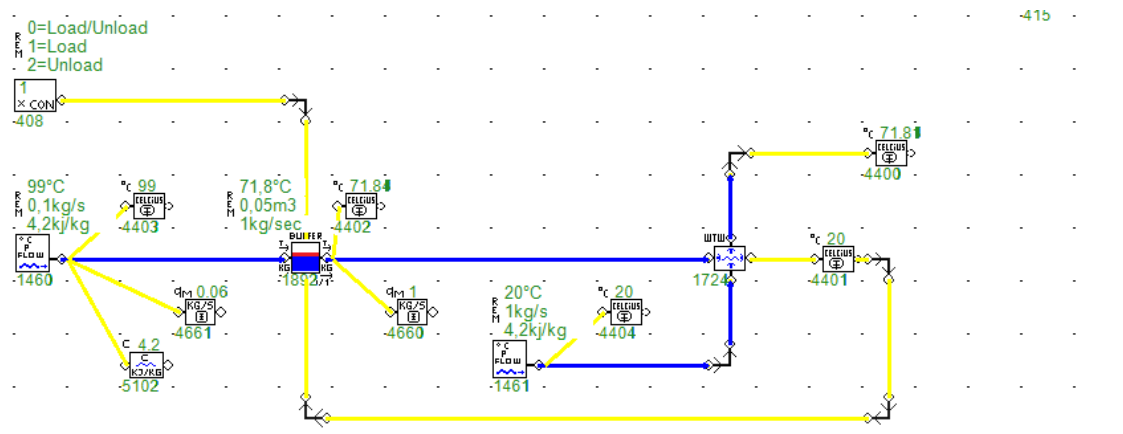
Make you own buffer for Load/Unload Energy.

3 states :

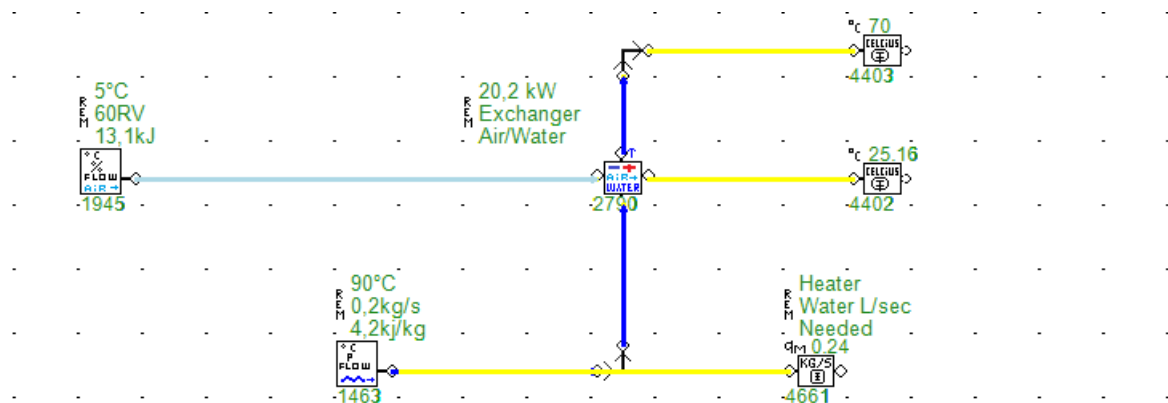
0=Load/Unload

1=Load

2=Unload



New Air/Water exchanger with input curve.
Easy to make you own Air Handling plant.



air/water heat/cool input block nr= 2790

Num	Type Paramete	Parameter	Calculate	Comment
1	Water Supply =		90	Temperature
2	Air Sec: T		25,16	Temperature
3	Air Sec: % RV		16,4	Relative Humidity
4	Air Sec: g/kg		3,2	Absolute Humidity
5	Air Sec: mBar		1013	Air Pressure
6	Air Sec: kjoule		33,4	Enthalpy
7	Air Sec: kg/sec		1	Flow
8				Exam. Heat Cool
9	Air prim: X1	-10		X1: -10 10
10	Air prim: X2	5		X2: 5 20
11	Air prim: X3	20		X3: 20 30
12	Water dT: Y1	40		Y1: 20 0
13	Water dT: Y2	20		Y2: 10 5
14	Water dT: Y3	0		Y3: 0 10

*

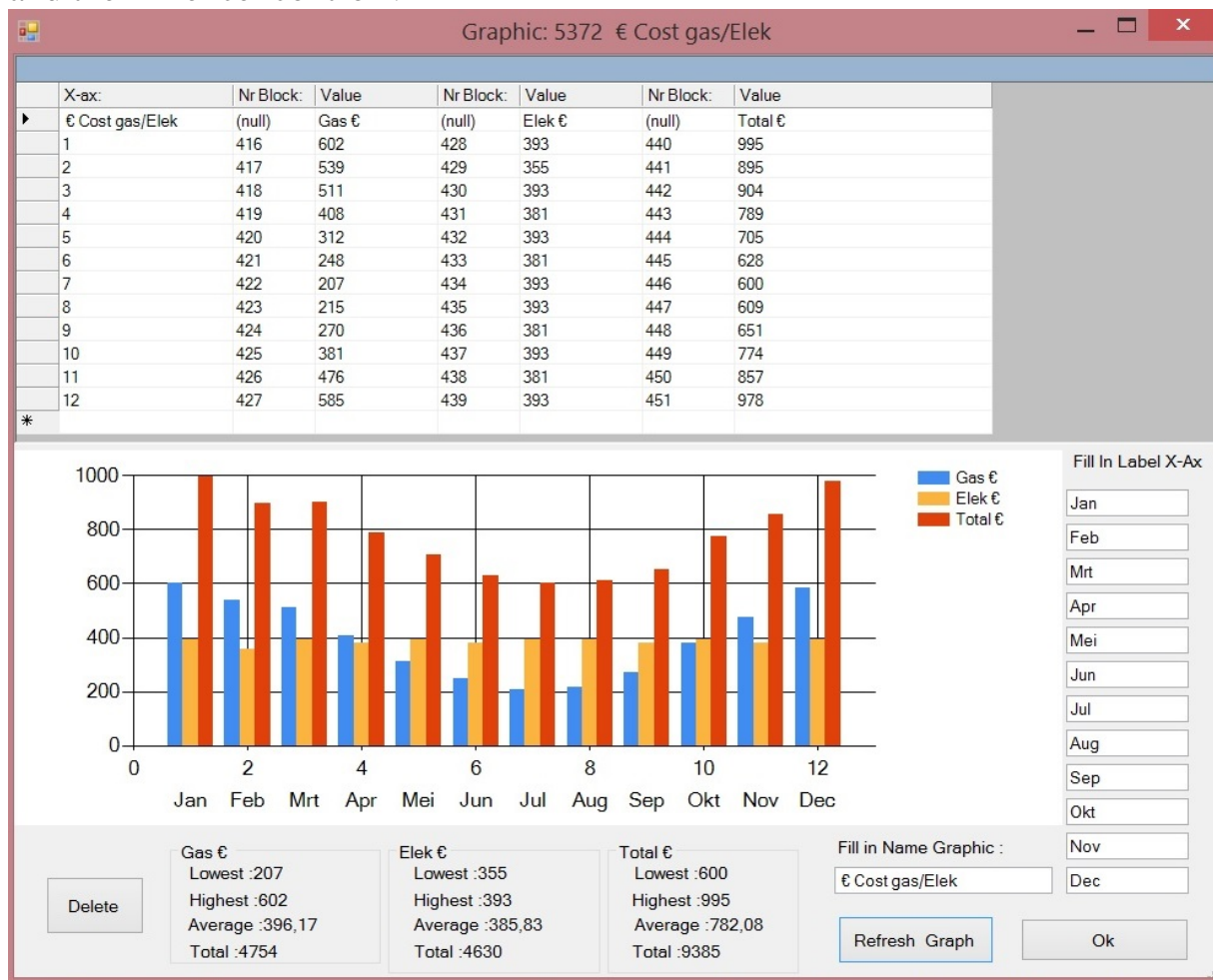
Delete Block

☐ Search Block

OK

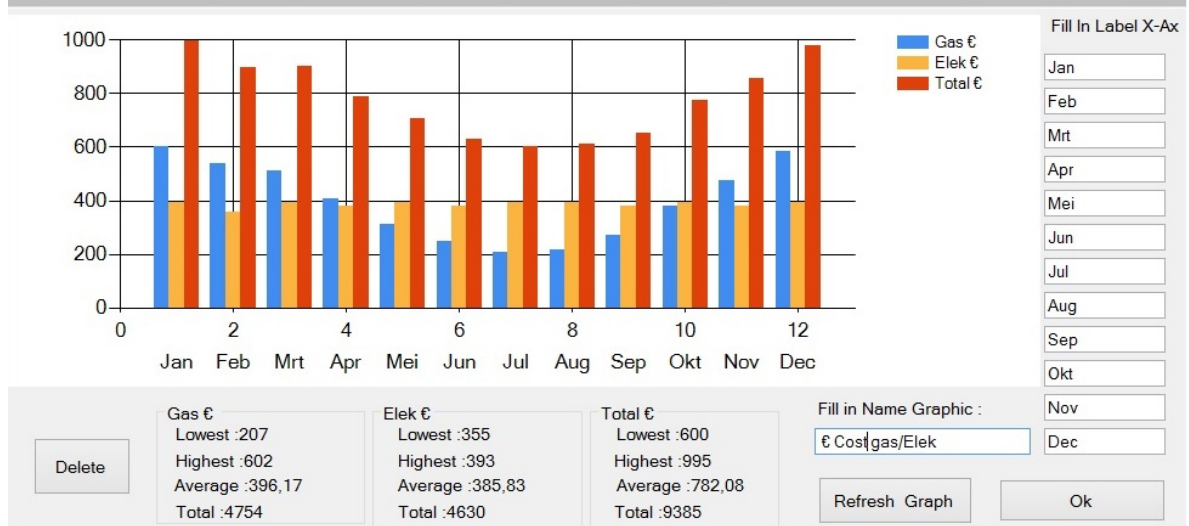
New nice Excel compatible Graphic see next.

Easily transport data to Excel
Just control a then control c
and then in excel control v



	X-ax:	Nr Block:	Value	Nr Block:	Value	Nr Block:	Value
►	€ Kosten gas/Elek	(null)	Gas €	(null)	Elek €	(null)	Total €
1		416	602	428	393	440	995
2		417	539	429	355	441	895
3		418	511	430	393	442	904
4		419	408	431	381	443	789
5		420	312	432	393	444	705
6		421	248	433	381	445	628
7		422	207	434	393	446	600
8		423	215	435	393	447	609
9		424	270	436	381	448	651
10		425	381	437	393	449	774
11		426	476	438	381	450	857
12		427	585	439	393	451	978

*



€ Cost gas/Elek							
	A	B	C	D	E	F	G
1	€ Cost gas (null)		Gas €	(null)	Elek €	(null)	Total €
2	1	416	602	428	393	440	995
3	2	417	539	429	355	441	895
4	3	418	511	430	393	442	904
5	4	419	408	431	381	443	789
6	5	420	312	432	393	444	705
7	6	421	248	433	381	445	628
8	7	422	207	434	393	446	600
9	8	423	215	435	393	447	609
10	9	424	270	436	381	448	651
11	10	425	381	437	393	449	774
12	11	426	476	438	381	450	857
13	12	427	585	439	393	451	978
14							
15							

Source t/rv/p block: nr= 1945					
	Numb	Type Parameter	Parameter	Calculate	Comment
▶	1	T	20		-40<=T<=100 Temperature
	2	% RV	50		1<=RV<=100 Relative Humidit
	3	Abs Humidity		7,3	Absolute Humidity
	4	mBar	1013		750<=P<=1050 Air Pressure
	5	kJoule		38,4	Enthalpy
	6	kg/sec	1		Flow
*					



Block Source you can set different parameters.

The flow can be set. Everything under Title Type Parameter allows you to set temperature,% RH, Pressure and Flow. everything under Calculate calculated automatically.

The block has no input output only.

Cooling block: nr= 1992

	Numb	Type Parameter	Parameter	Calculate	Comment
▶	1	Cooling =	-5		Cooling
	2	T		15	Temperature
	3	% RV		68,6	Relative Humidity
	4	Abs Vocht		7,3	Absolute Humidity
	5	mBar		1013	Air Pressure
	6	kJoule		33,3	Enthalpy
	7	kg/sec		1	Flow



*  

The diagram shows a cooling block with an input air flow of 1944 °C and an output air flow of 1992 °C.

Block Parameter Cooling Cool that you can set how many degrees the air cooled to be.
 Calculate everything is calculated automatically.
 The block has 1 input and 1 output

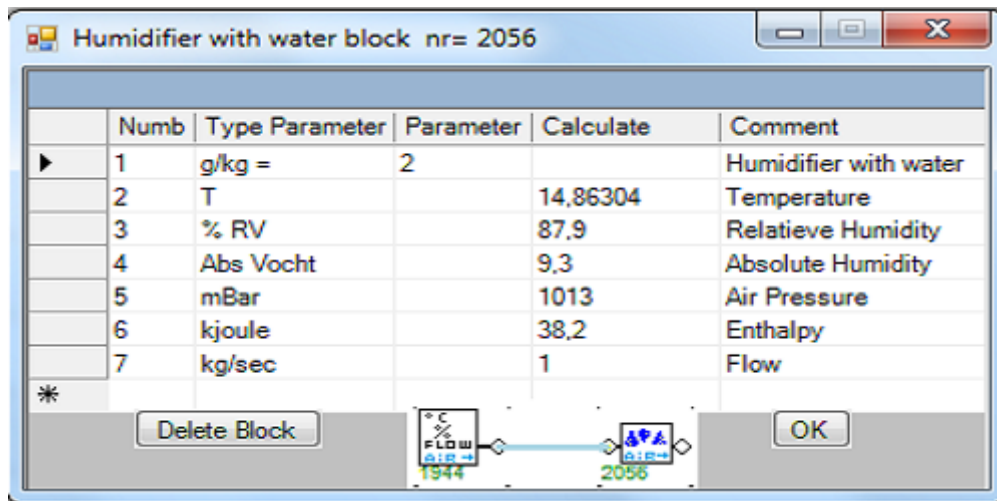
Heater block: nr= 2024

	Numb	Type Parameter	Parameter	Calculate	Comment
▶	1	Heating =	10		Heating
	2	T		30	Temperature
	3	% RV		27,5	Relative Humidity
	4	Abs Vocht		7,3	Absolute Humidity
	5	mBar		1013	Air Pressure
	6	kJoule		48,5	Enthalpy
	7	Kg/sec		1	Flow

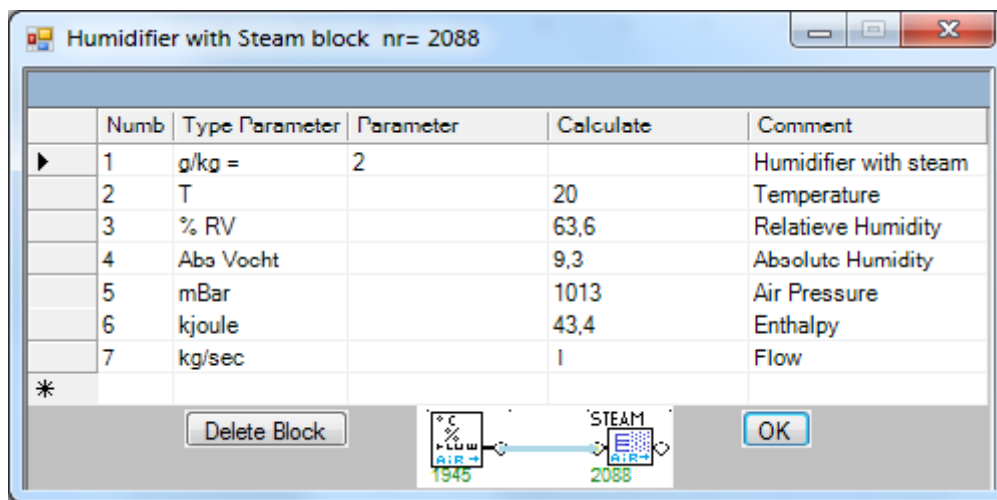
*  

The diagram shows a heating block with an input air flow of 1945 °C and an output air flow of 2024 °C.

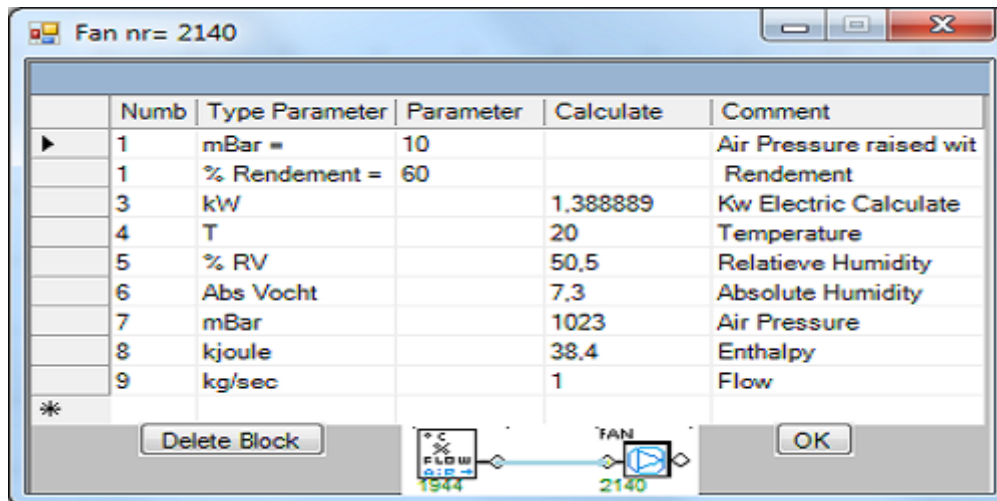
Block Parameter Heating Heat which you can set how many degrees the air must be heated the air must be heated be.
 Calculate everything is calculated automatically.
 The block has one input and one output.



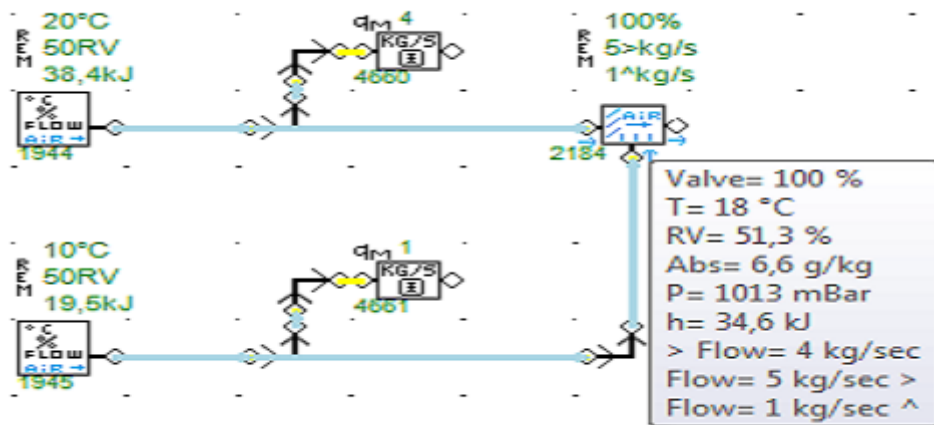
Block Humidifier allows you to Parameter $g / kg =$ can set how many grams of water per kg air humidified air should be come. In this example you can see that the temperature drops from 25 degrees to 19.8 °C by extracting vapour heat absolute humidity increases from 7.3 to 9.3 and from 36.9% RH to 64.3. Enthalpy of the air remains the same. Calculate everything is calculated automatically. The block has one input and one output.



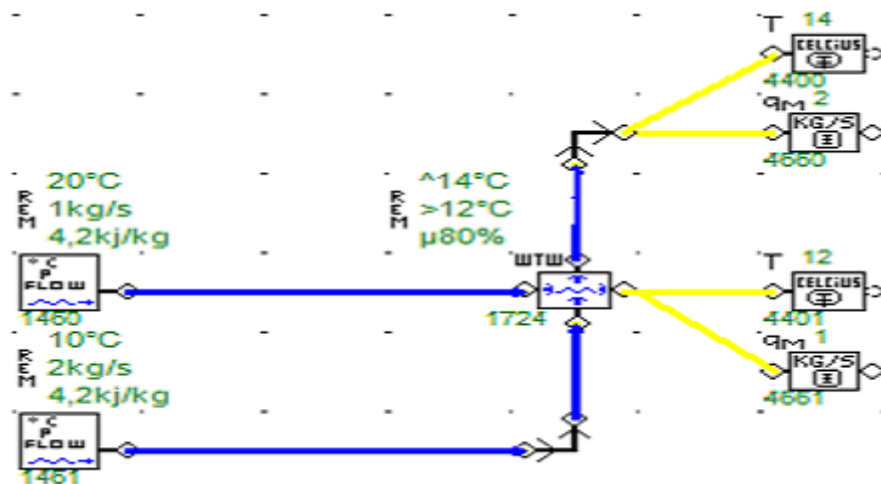
Block Humidifier allows you to Parameter $g / kg =$ can set how many grams of water per kg air humidified air should worden. In this example you can see that the temperature drops from 25 degrees to 19.8 °C by extracting vapour heat. The absolute humidity increases from 7.3 to 9.3 and from 36.9% RH to 64.3. Enthalpy of the air remains the same. Calculate everything is calculated automatically. The block has one input and one output.



Fan unit with which you can set with Parameter = mBar how the pressure is increased
 In this example you can see that the air pressure is increased from 1013 to 1023 mBar.
 Everything under Calculate automatically calculated. Through change air pressure also changes %R.V a little. Look under calculate kw automatic calculate Power needed for the Fan: 1.38 kW.
 The block has one input and one output.



Examples source 1944 for flow (4 kg / sec) 20°C is mixed with 1945 source flow (1 kg / sec) 10°C
 Setting Parameter Mixer% = 100%.
 This means 100% of source 1944 is = 4kg/sec source is mixed with 1945 (1 kg / sec)
 Outcome 4kg/sec + 1kg/sec is 5 kg / sec. The temperature is now 18°C



Heat Regeneration Water

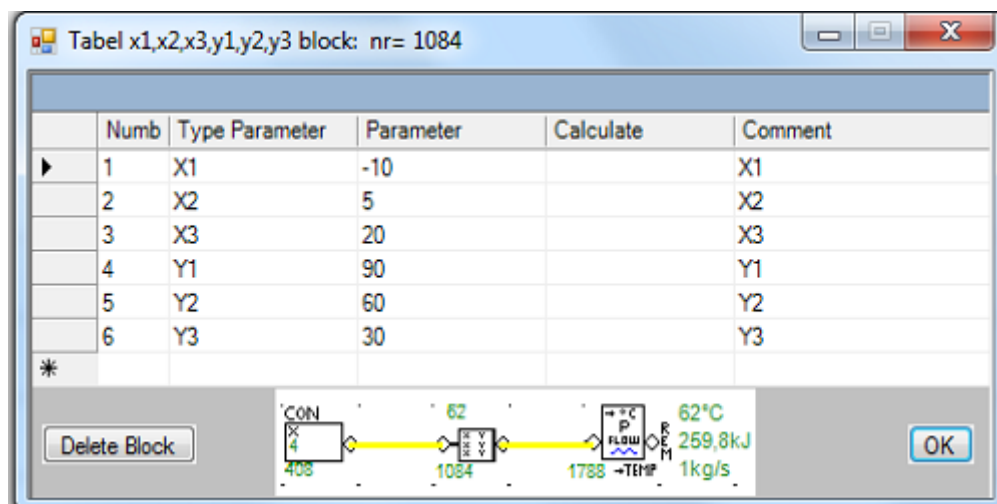
Examples source 1460 1kg 20°C

Source 1461 2 kg 10°C

Setting Parameter Profit% = 80%

This can be ,Crossflow etc

The block has two input and two output.



Tabel 3 input x 3 output y

Examples

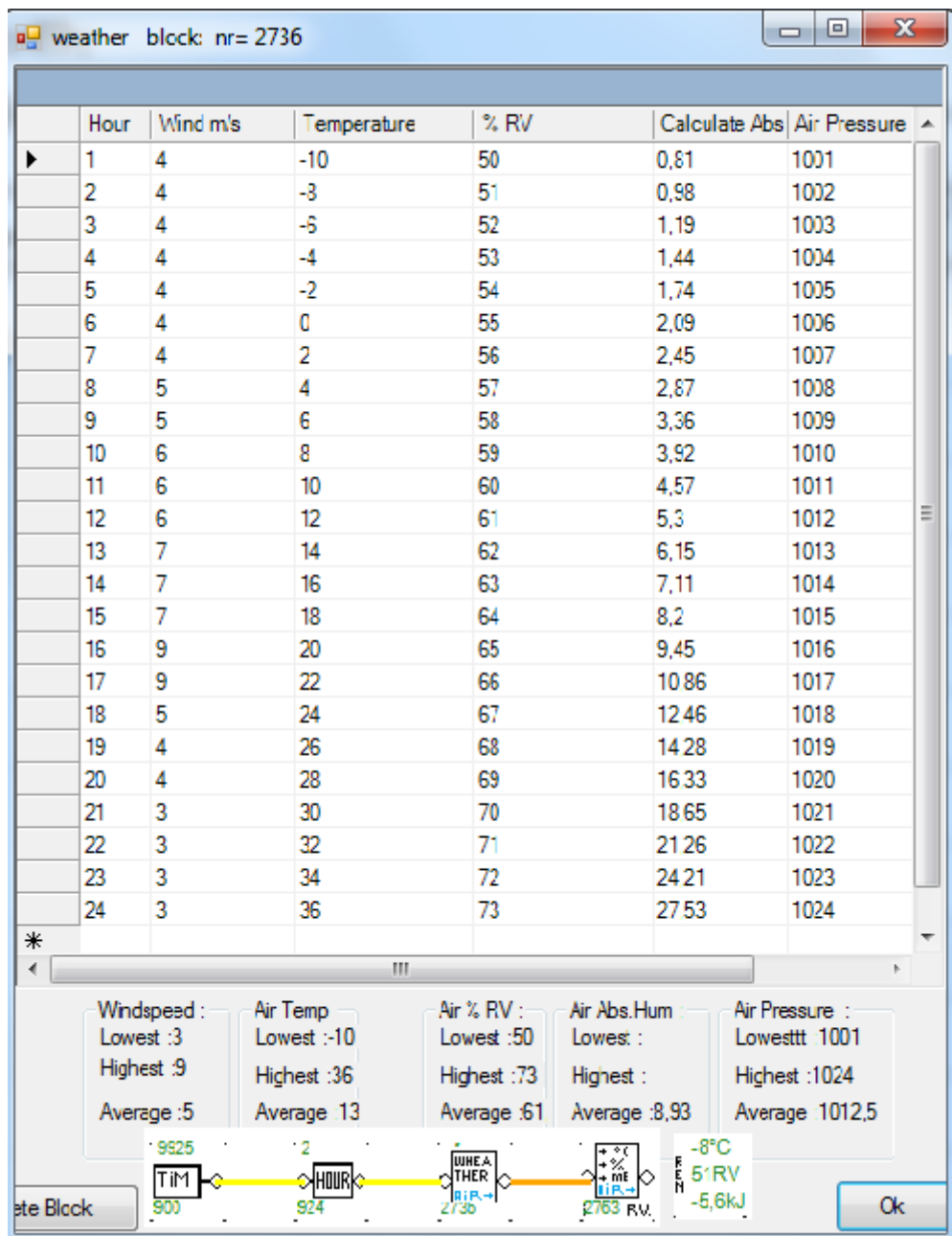
To make a weather-dependent control Outside temp=4°C

Input tabel 4 then output 62

From this arithmetic block a line to Source with input Temp

You have now a complete heating system

Also is a table block with 21 inputs and 21 outputs

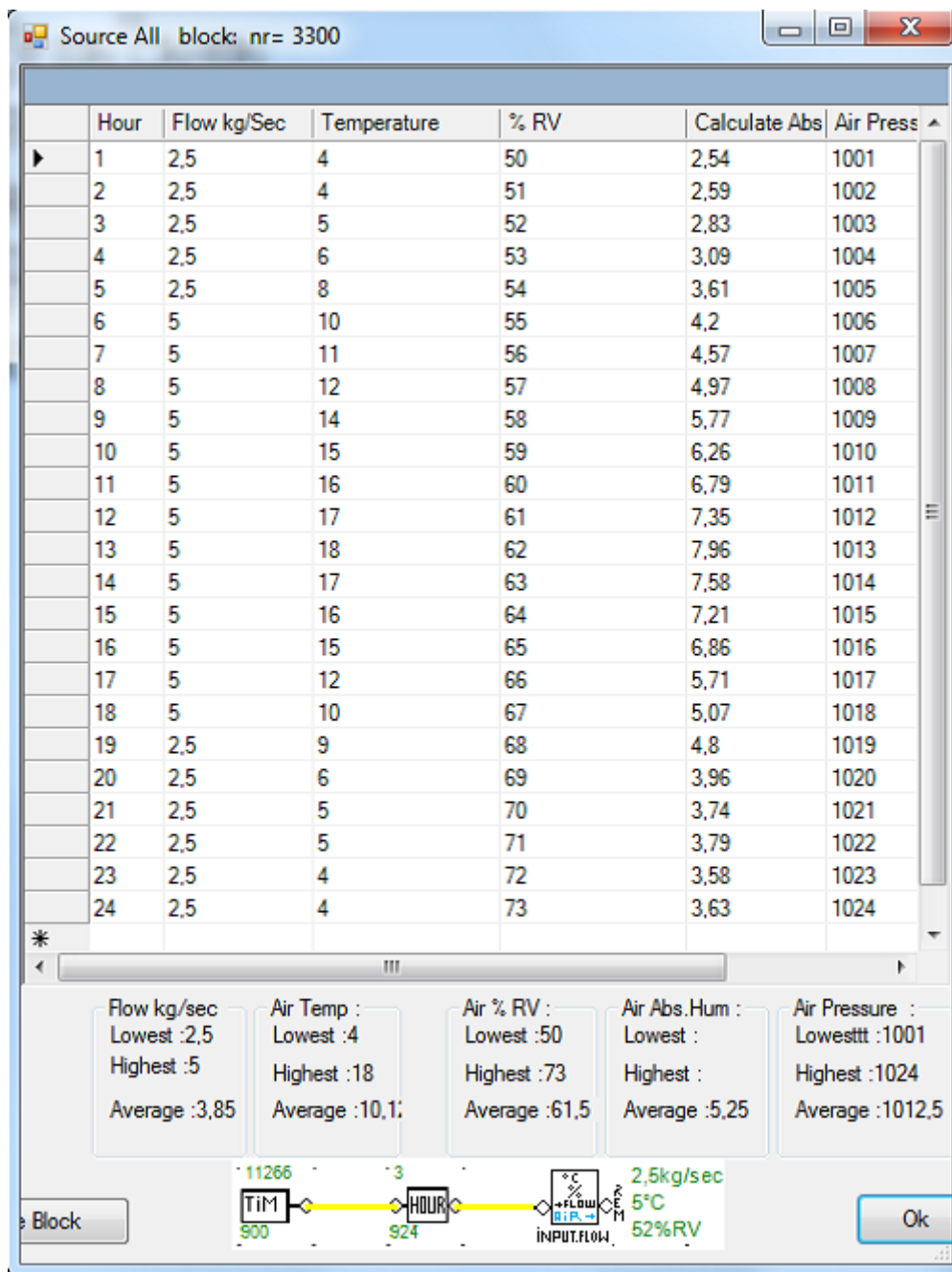


Weather 24 Hour Simulation

Examples

To make a weather-depending system for different condition
 From time > Hour then input wheather Block
 From this arithmetic block a line to Source with input Weather
 You have now a complete simulation system
 That you use as input for Air Connditioning Installation
 Made with 4 blocks in a just a minute !





Input Condition Air 24 Hour Simulation

Example

To make a Time-depending systeem for different condition

From time > Hour then input Source All Block

From this arithmetic block a line to Source with input Source All


You have now a complet simulation system


You can change the flow each hour


You use it as input for Air Conditionioing Installation

Made with 4 blocks in a minute

Calculating with auxiliary blocks..

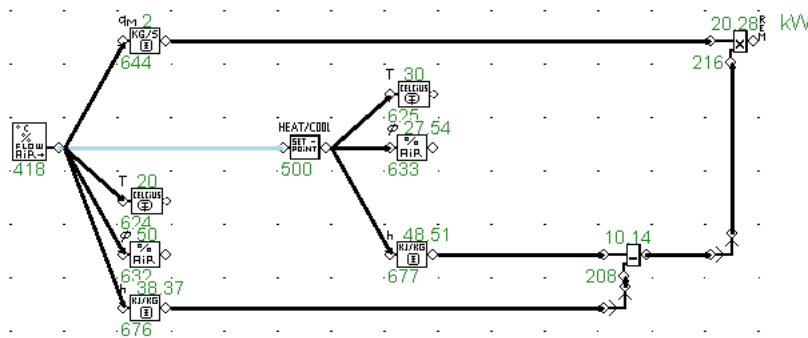
With block  value you get from air temperature value

With block  you can get from air enthalpy value





























With block  you can air mass flow in kg / s

Sample mass flow rate * delta enthalpy represents power in kW. $2 * 10.14 = 20.28 \text{ kW}$

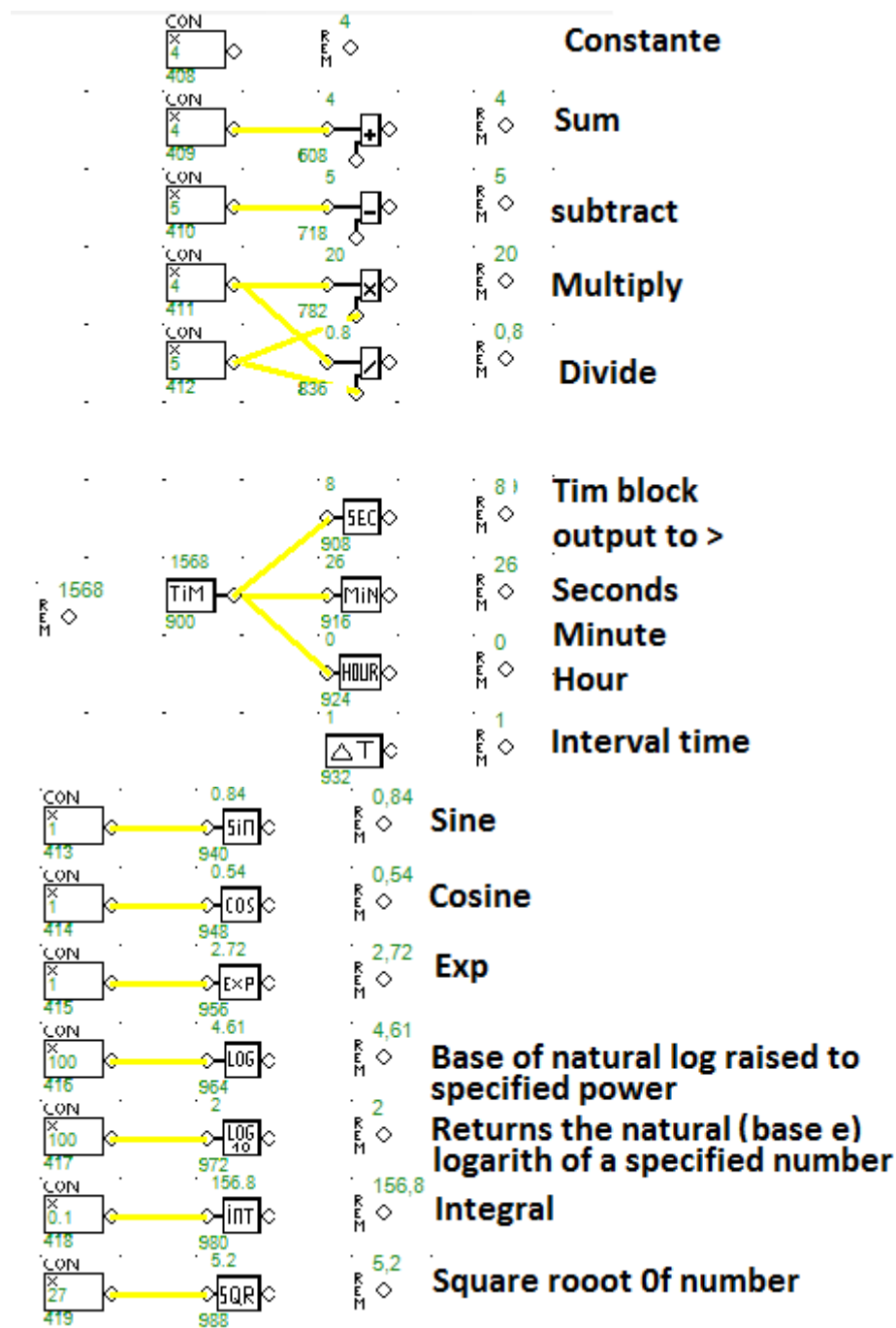
With REM you can add comments

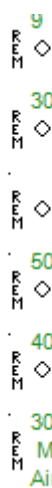
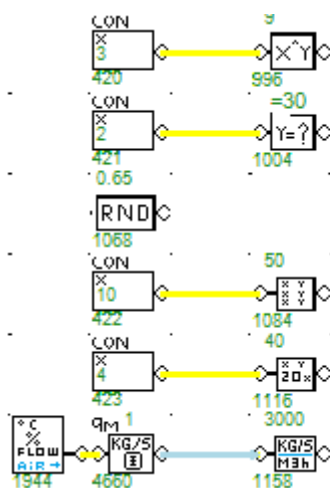
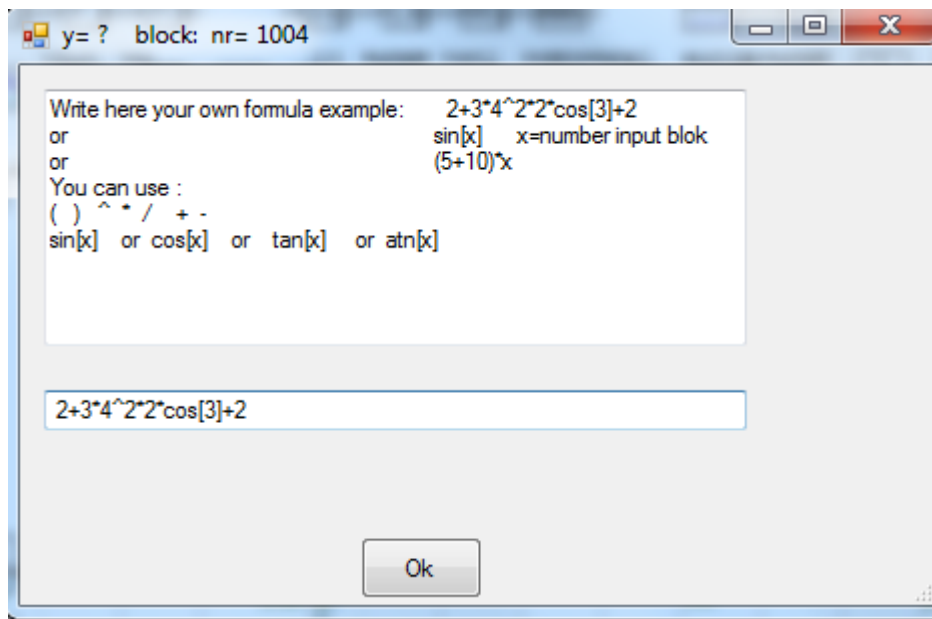


First Row : Digital Blocks

		constant value bit
		Or 2 inputs
		Or 3 inputs
		And 2 inputs
		And 3 inputs
		Nor 3 inputs
		Nand 3 inputs
		Exor 2 inputs
		Timer Delay On
		Timer Delay Off
		Marker 4 inputs
		Marker Out
		Pulse
		Not

Second Row Arithmetic





^ Power

Write here your own formula example:
 $(5+10)*x$ $x=\text{input from other blok}$

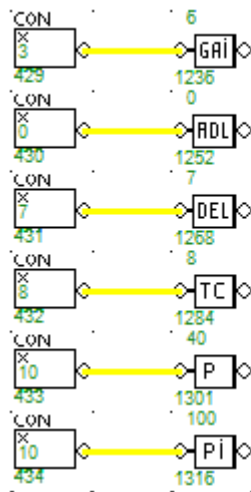
Random number

Table $3*x$ $3*y$ 1 input 1 output

Table $21*x$ $21*y$ 1 input 1 output

Works only with block KG/S
 $1 \text{ kg/s} > 3000 \text{ m}^3/\text{h}$

Third Row Controlling system and water blocks Sources e.g



Y:6
Gain:2
0
7
Y:8
Time:10
Y:40
Sp:20
Y:100
Sp:20

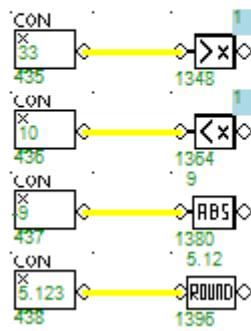
One interval back

Several intervals back

Timeconstant

P controller

PI Controller



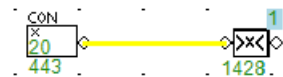
Y:1
Sp:20
Y:1
Sp:20
9
5,12

High Switch

Low Switch

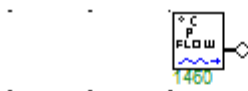
-9 become 9

**Rounded
Decimal places**



Y:1
Sp:20

**Band if input is between 19 and 21
then output =1**



20°C
1kg/s
4,2kj/kg

Source Water



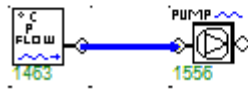
15°C
1kg/s
4,2kj/kg

Cooling Water



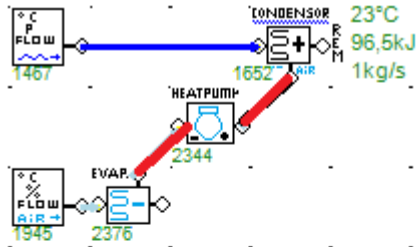
30°C
1kg/s
4,2kj/kg

Heating Water



+ 0,5 Bar
1kg/s
P=2,5 Bar

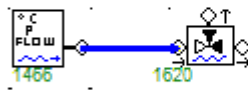
Pump Water



23°C
96,5kJ
1kg/s

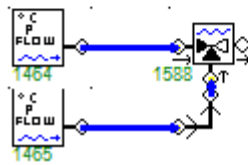
Heat Pump Water

Important connection lines must be directly from Evap to Heatpump and Heatpump to Condensor !!!!!!!!!!!!!!!!!!!!!!!



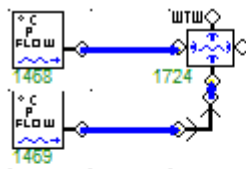
20°C
^0,5kg/s
0,5kg/s >

Spit Valve



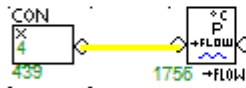
>0,5kg/s
1,5kg/s >
^1kg/s

Mixing Valve



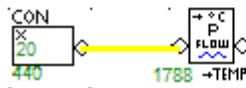
REM
16°C
>14°C
μ40%

Heat Regeneration Water



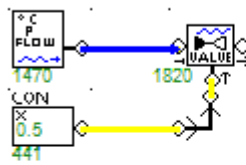
REM
20°C
83,8kJ
4kg/s

Con Block give value to Source for Flow



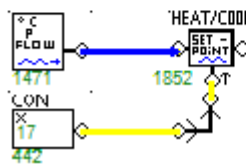
REM
20°C
83,8kJ
1kg/s

Con block gives value to Source for Temperature



REM
> 2,5 kg/s
x:0,5

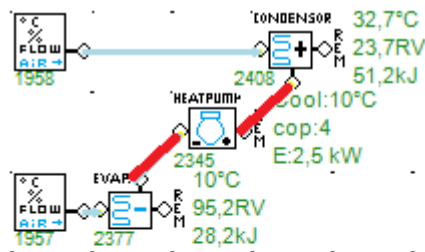
Con block gives signal to Control Valve to Open 0,5=50%
Could also be a P Controller etc.



REM
17°C
71,2kJ
1kg/s

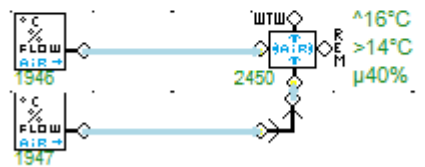
Con block gives value Setpoint Heat/Cool block

Row 4 : air treatment

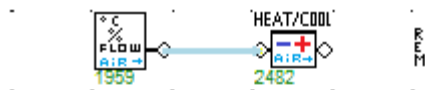


Heat Pump air

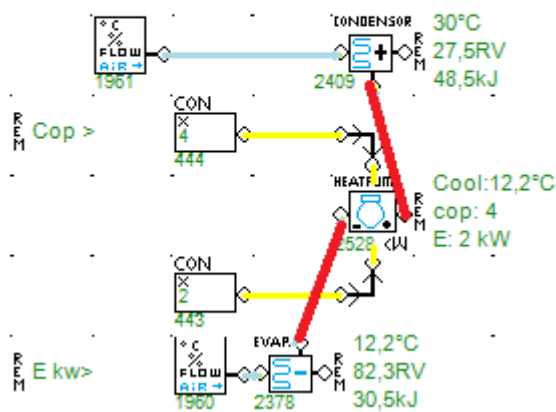
Important Connection Lines must be directly from Evap to Heatpump and Heatpump to Condensor



Heat Regeneration Air



Heat/Cool Block



Heat Pump air

Important Connection Lines must be directly from Evap to Heatpump and Heatpump to Condensor

Outside you can give Cop value and Power to Heatpump



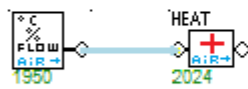
20°C
50RV
38,4kJ

Source air



15°C
68,6RV
33,3kJ

cooling Air



30°C
27,5RV
48,5kJ

Heating air



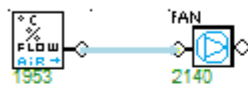
14,9°C
87,9RV
38,2kJ

**Humidify Air with Water
or Dehumidify Air**



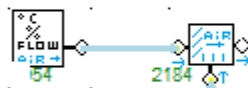
20°C
63,6RV
43,4kJ

**Humidify Air with steam
or Dehumidify Air**



+ 10 mBar
1 kg/s
1023 mBa

**Fan Air
Pressure raised**



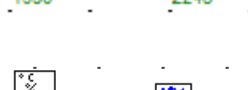
50%
1,5>kg/s
1^kg/s

Mixing Air Valve



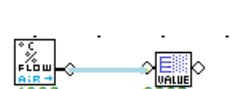
50%
0,5^kg/s
0,5>kg/s

Split Air Valve



18,3°C
60,3RV
38,2kJ

**setpoint %RH for
water humidifier**



20°C
60RV
42,1kJ

**setpoint &hr for
Steam humidifier**



20°C
50RV
4 kg/sec

Con block give value Flow to source



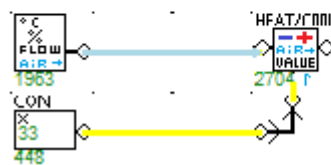
20°C
50RV
38,4kJ

con block give value Temperature to source



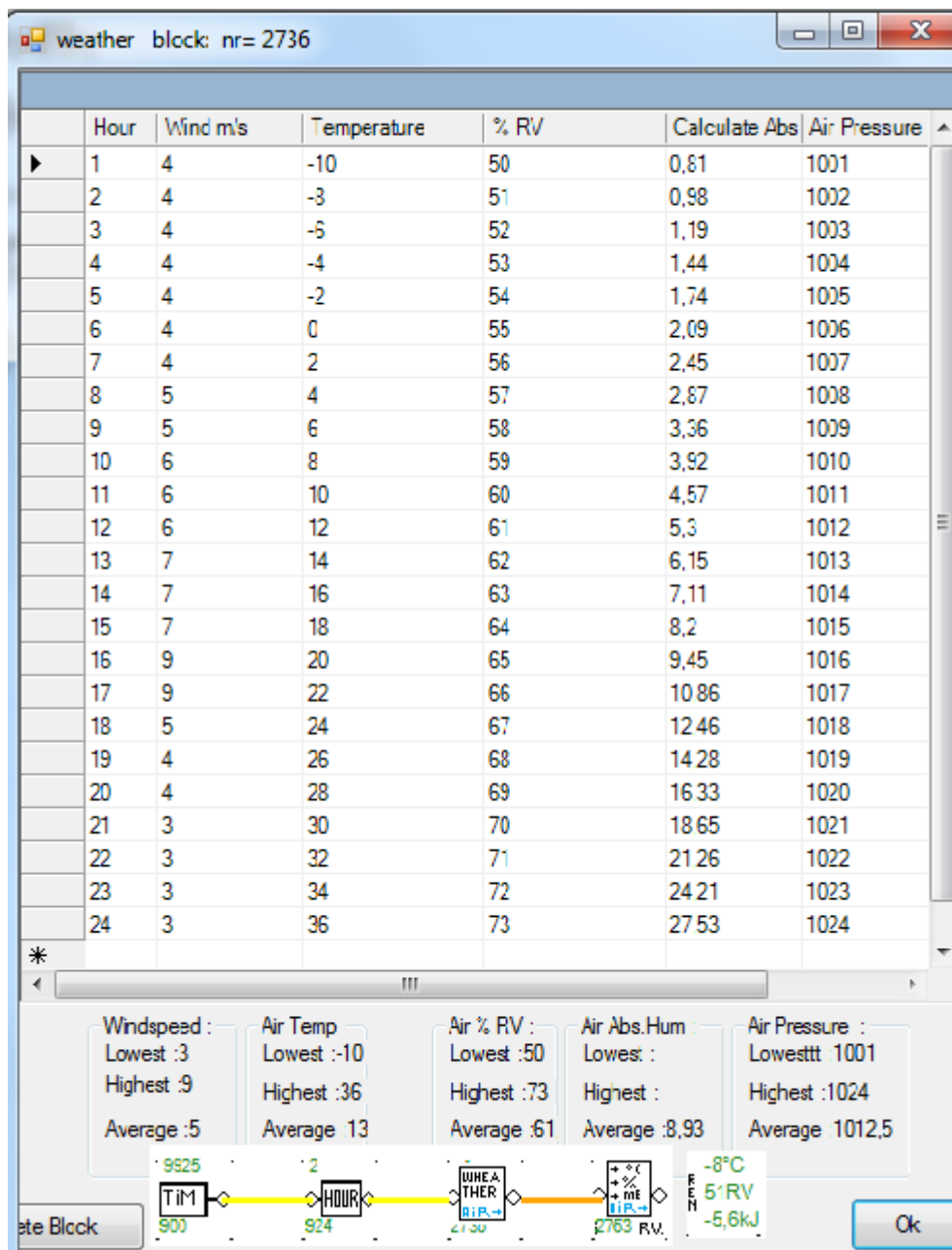
> 6 kg/s
x:0,6

**Con block gives signal to control Valve to open 0,6=60%
Could also be a P controller**



33°C
23,2RV
51,6kJ

Con block gives value Setpoint Heat/Cool block



Weather 24 Hour Simulation

Examples

To make a weather-depending systeem
for different condition

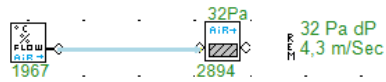
From time > Hour then input wheather
Block

From this arithmetic block a line to
Source with input Weather

You have now a complete simulation
system.

That you use as input for Air

Connditioning Installation Made with 4
blocks in a just a minute !!!!!!!!



Air duct Resistance input diameter and lenght



**Resistance different "heater etc"
input diameter and zeta Friction faktor**



**Resistance Filter input
m2 filter and Filter faktor**

Source All block: nr= 3300

Hour	Flow kg/Sec	Temperature	% RV	Calculate Abs	Air Press
1	2,5	4	50	2,54	1001
2	2,5	4	51	2,59	1002
3	2,5	5	52	2,83	1003
4	2,5	6	53	3,09	1004
5	2,5	8	54	3,61	1005
6	5	10	55	4,2	1006
7	5	11	56	4,57	1007
8	5	12	57	4,97	1008
9	5	14	58	5,77	1009
10	5	15	59	6,26	1010
11	5	16	60	6,79	1011
12	5	17	61	7,35	1012
13	5	18	62	7,96	1013
14	5	17	63	7,58	1014
15	5	16	64	7,21	1015
16	5	15	65	6,86	1016
17	5	12	66	5,71	1017
18	5	10	67	5,07	1018
19	2,5	9	68	4,8	1019
20	2,5	6	69	3,96	1020
21	2,5	5	70	3,74	1021
22	2,5	5	71	3,79	1022
23	2,5	4	72	3,58	1023
24	2,5	4	73	3,63	1024

Summary statistics:

- Flow kg/sec: Lowest :2,5, Highest :5, Average :3,85
- Air Temp : Lowest :4, Highest :18, Average :10,1
- Air % RV : Lowest :50, Highest :73, Average :61,5
- Air Abs.Hum : Lowest : , Highest : , Average :5,25
- Air Pressure : Lowest:1001, Highest :1024, Average :1012,5

Block diagram showing flow from 900 to 924 to 3300, with parameters: 2.5 kg/sec, 5°C, 52%RV.

Input Condition Air 24 Hour Simulation

Example

To make a Time-depending systeem for
different condition

From time > Hour then input Source All Block

From this arithmetic block a line to Source
with input Source All

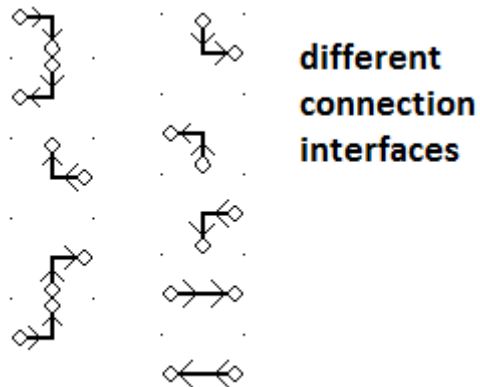
You have now a compleet simulation system.

You can change the flow each hour.

You use it as input for Air Conditionig

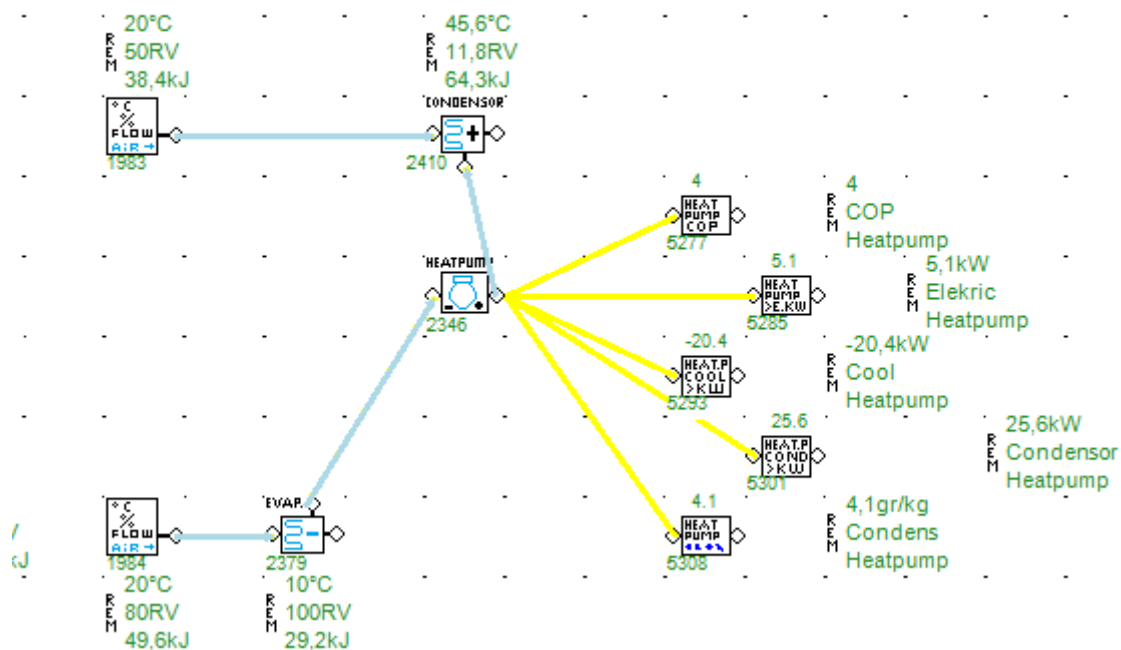
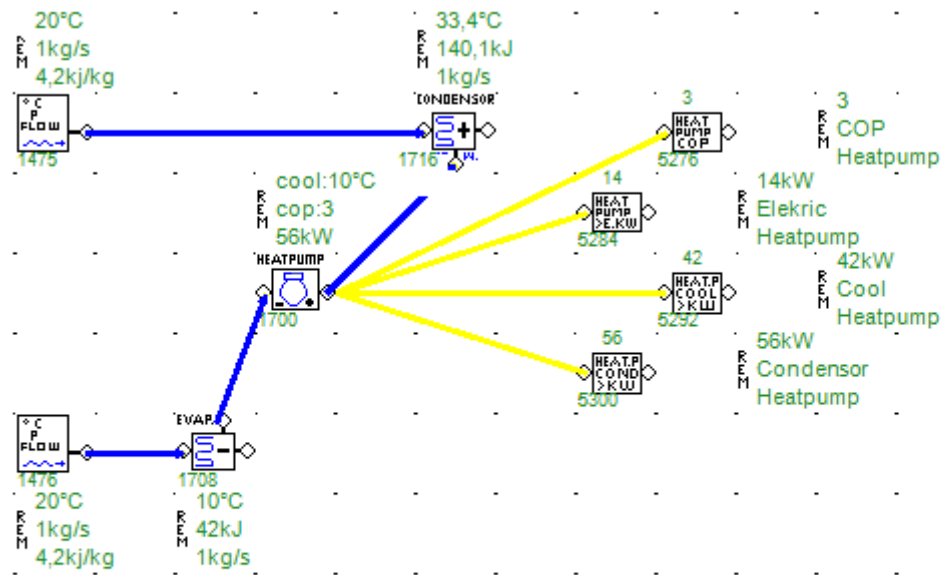
Installation Made with 4 blocks in a minute

Row 5 : General Helping blocks



1969	° C FLOW AIR	20 T CELEWS	20°C	
1970	° C FLOW AIR	4400 50 %	50%RV	
1971	° C FLOW AIR	4500 7.26 G/KG	7,3gr/kg	
1972	° C FLOW AIR	4600 1 KG/S	1kg/s	
1973	° C FLOW AIR	4681 1013 MBAR	1013Mbar	
1974	° C FLOW AIR	4700 1169 PA	1169Pa	
1975	° C FLOW AIR	4750 1.2 KG/M3	1,2kg/m3	
1976	° C FLOW AIR	4766 38.37 KJ/KG	38,4Kj	
1977	° C FLOW AIR	4802 20 SENS KJ/KG	20Kj Sensible Air	
1978	° C FLOW AIR	4846 0.28 SENS KJ/KG	0,3Kj Sensible Water	
1979	° C FLOW AIR	4910 0 HEIGHT	0 Metre	
1980	° C FLOW AIR	4958 0 MBAR	0 mBar	
1981	° C FLOW AIR	4974 700 PA	700 Pa	
1982	° C FLOW AIR	4992 2.66 METAL PVC	2,7 m/sec	
1472	° C FLOW P	2831 2 BAR	2 Bar	
1473	° C FLOW P	5078 4.19 C KJ/KG	4,2kj/kg	
1474	° C FLOW P	5102 PUMP 0.07 MOTOR E.KW	0,07kW Elektric Motor	

Row 6 : General Helping blocks Remark block



Control Program:

Models Apply:

Choose File and then File open one of the examples.

E.g. Model from folder c:\hvac_data\hvac
file Humidify.

if you click with right mouse on the middle of a block

then become a new form .
 Choose block humidifier (block with water drops).
 Click under field parameter (default value 2) and gives it another value 1
 and confirmed it with enter. Click afterwards on ok.
 Now 1 g/kg is moistened.
 When you click with the left mouse on the middle of a block then you see rapidly the value of the block you can not change something.
 The block left of block-system cool (row 4) is a source block.(C '% P).
 Here can establish you temperature, flow, %rv of air.
 Click with the right mouse on the middle of a block source then becomes there a form.
 Click with the left mouse now under parameters on temperature.
 The default value 20 stands there changes these in 30 then Enter key and click on okay.
 Now everything going calculated the outcome after block moistening change.

Self making Models:

Making self models:
 With the left mouse choose you a block from the library above to the window.
 Click with the left mouse in the middle of the block hold mouse press and drag the block to the middle off the window and then drop.
 Choose block con. This is block with a constant value.
 If you click on this in the middle of the block with the right mouse then open a form click under field parameter and give it 8 and a return.
 Afterwards click on button okay.
 Choose another block and give the value 2.
 And place it it under the other block.
 Choose now the Sum block and place it Right of the other blocks.
 Now we make a connection between the blocks:
 With the left mouse double click in the middle of block con (now appears a radiobutton right outside of the block) .
 Now click on the radio button.Then another circle in the radiobutton appears.
 Now afterwards double click with the left mouse on the middle of the block SUM. Also a radiobutton appears.
 (when you make a mistake click in the empty field the radio buttons disappears).
 Click with the left mouse on the radiobutton left from the sum block.
 Now a line appears between block CON and connected to block SUM.
 Then make also a connection between block CON and to SUM.
 Now appears number 10 above the block SUM.
 If you click with the left mouse on the block you get also a tool tip to see $2+8 = 10$

You can not connect all the blocks:
Because it is a hybrid simulation.

Row A: Digital Blocks
Row Two: Arithmetic blocks
Row Three: Control order also 1 block etc.
Row Four: Air
Row Five: General help for blocks and connections
Row Six: General help for blocks and connections

Rem Block: Can you give comments.
Well you can using some blocks eg an analog value is a digital value.
Eg make between a block and a con highest value block
> X when a connection block con is a number > 20 then a digital 1 appears at the output of the highest value block.
Of row 5 so you can get the temperature of an air stream.
Select a source eg first block in row 4 and connect it with the "thermometer" block row 5 .
Then you get 20 degrees filtered.
Do the same with rv block will get 50% rh.
With these results you can count again with computational blocks.

Removing Blocks:

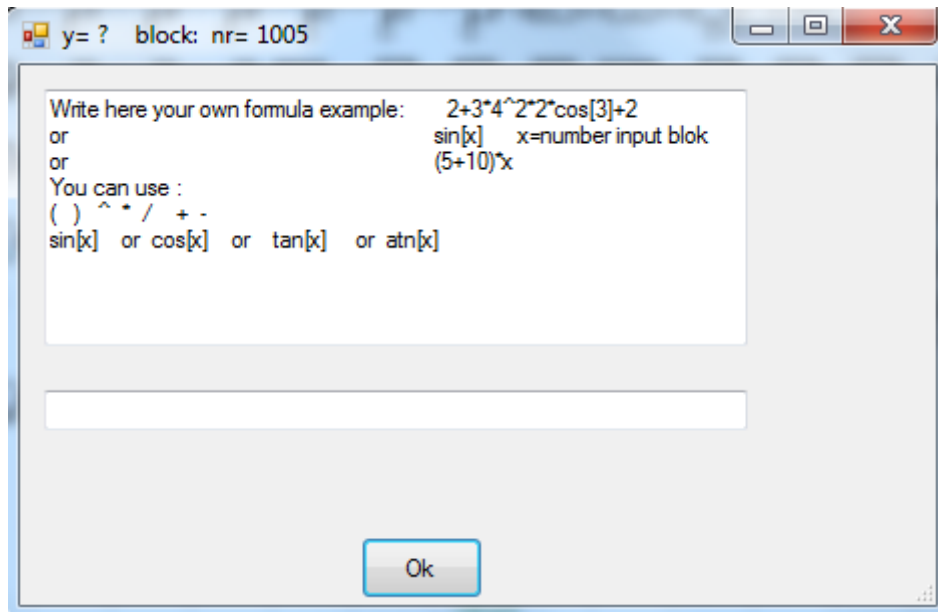
Click with the right mouse button on a block and choose delete block.
Now the connector automatically removed.

Delete horizontal lines :

Click on Menu Edit then you can click delete Line (checked on).
That means that you can delete line.
Example :
Put a block con and a sum block on the field.
Make a line between con and sum.
Click with the left mouse on block con after that click on a the empty place on the field with the left mouse.
The line between block con and block sum disappear now.
Don't forget do click once more on Menu delete line to (checked off).
When you are ready do delete line's.
General:
All inputs are on the left and right output center.

Only marker has 4 inputs and a separate block merker_out the output of the marker.

Math Functions Block Own Formula $y = ?$



Function Description

Cos Returns the cosine of a specified number (angle)

Sin Returns the sine of a specified number (angle)

Tan Returns the tangent of a specified number (angle)

ATan Returns the atangent of a specified number (angle)

Exp Returns e raised to a power

Heatpump:

To connect connections Heatpump see example:

Choose from folder c:\hvac_data\hvac

heatpump.

You must directly connect line between evaporator an heatpump also Heatpump and condenser !

Various Settings:

Can be found under Settings menu.

Interval time

Include interval time in seconds for calculations simulation.

Tooltip

The time that a ToolTip appears when the left mouse click on a block can be set here.

You can also check if it does not want to see useful if you create a new model.

New Changes :

version 2.41

Bargraph can you make with line to another block
but now also with click right mouse on bargraph block en
give a nr block in.
Advantage you see no lines exactilly in graphic picture.

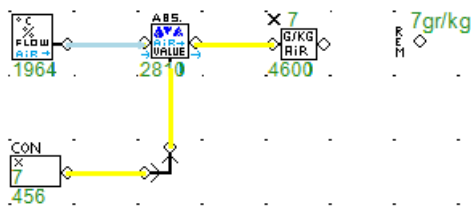
version 4.76

Rem block :
Beside text you can also received value from a other block.
Right mouse click on the rem block and give the number nr.block in .
And click on ok button.
Also you can make a line now from the rem block to e,g sum block.
Left clicked with mouse radio button appears and then click on the radiobutton
And then click on the sum block .Also a radiobutton appear ,click on it and you have
Connected you blocks Now you can calc with the value from a Rem block.

version 5.51

Pickup >
Blocks>

Put a pickup block into the field.
Put some other blocks into the rectangle
Then with the right mouse
click on take blocks
Now with the left mouse you can
Move all the blocks .
After you find a other place
You can click on ok to
Put the blocks fixed.
This is specially useful if you made a large model
and large distances to the blocks dragging.



**Give setpoint abs humidity
eg 7 then the air get 7 g/kg**

Move Blocks

Put a Macro block into the field.

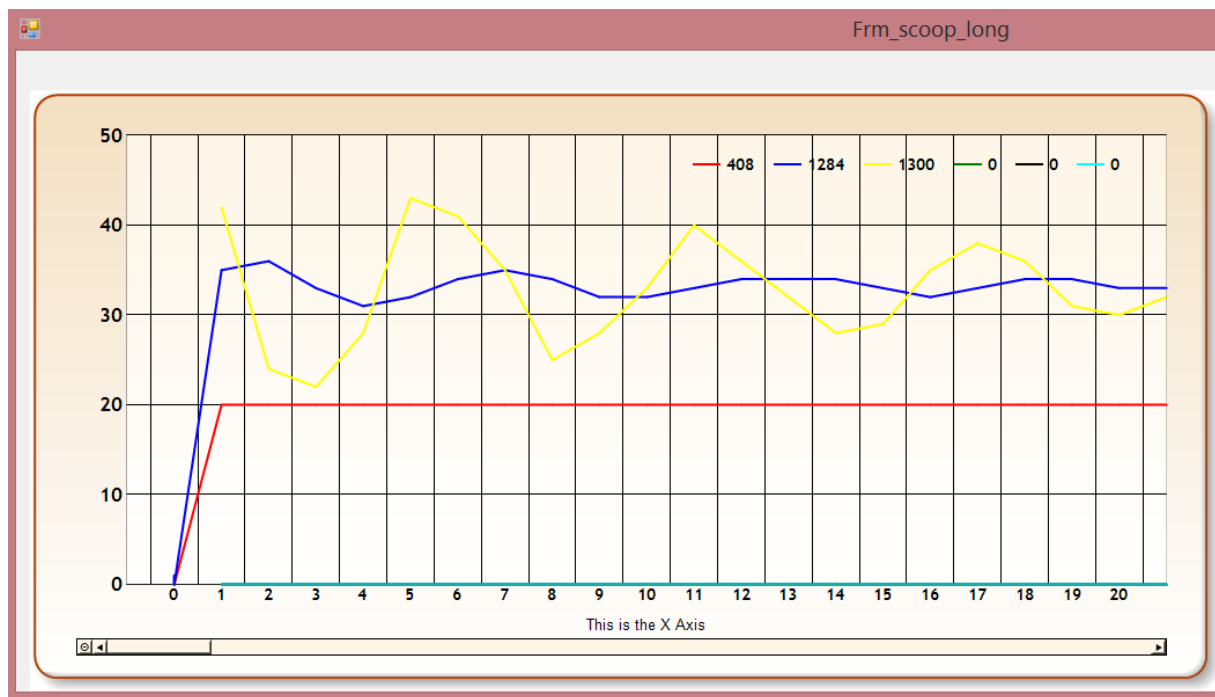
Then click on move block then you have put the macro model
On the field.

You can now also got a picture from map macro

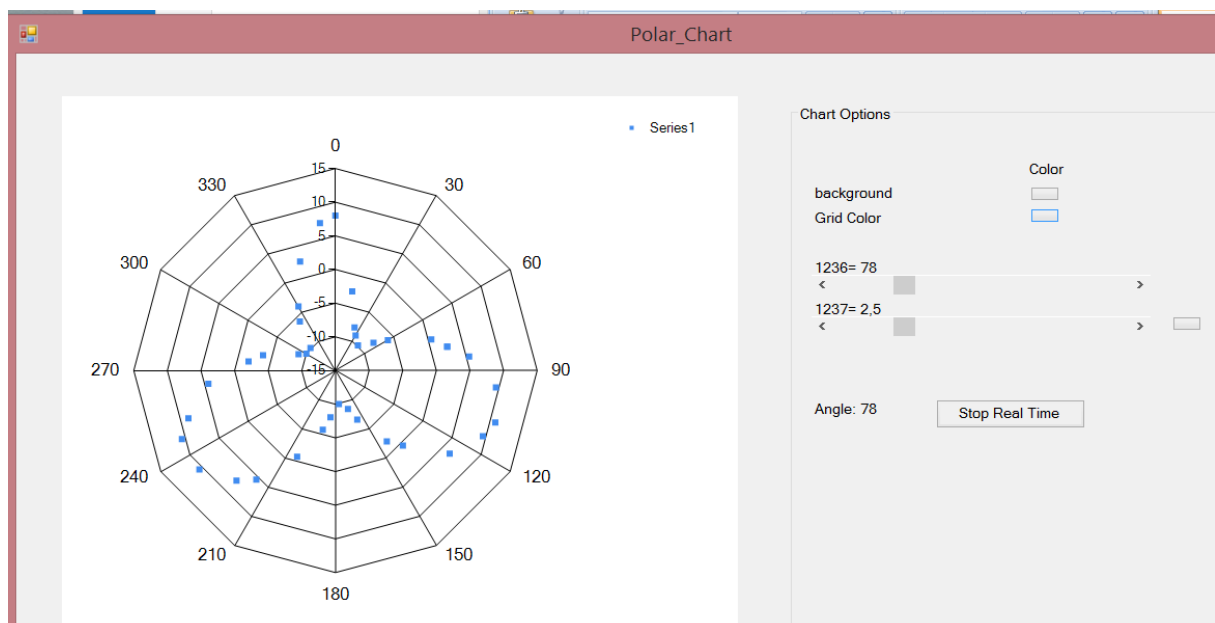
Menu File open background image

Choose a picture from map Macro.

New Scoop Long: For long proces situations



New polar chart for control Proces etc.



If you have problems or questions
You can always contact me

Piettadema@gmail.com

Success with this program.