

Belimo Savings Estimator Investment costs for 4-pipe system

Belimo	Savings Estin	nator		-
Investn	nent costs 4-pi	ipe syste	m	依
Project	Test building			
Version	Pre-project #3			
Creator	Christian Luchsinger			
Processing date	21.03.2016			
Calculation b	asis			
Number of heat e	xchangers (Heating & Cooling))	50	pieces
Type of installatio	n		New cons	truction / one-tir
Average distance	between control cabinet and ju	unction box	25	meters
Cost of a 2-way va	alve including actuator (modula	ating)	36	EUR/piec
Cost of a 2-way va	alve including actuator (open-c	lose)	32	EUR/piec
Cost of a 3-way va	alve including actuator		41	EUR/piec
Cost of a 6-way va	alve including actuator		165	EUR/piec
Cost of a physical	data point		50	EUR/piece
Cable costs	1		0.19	EUR/mete
Cost of a junction	DOX ation work		9	EUR/pieci
riouny rate mount			10	Loronou
Estimate of c	osts			
		4 pcs. 2-way	2 pcs. 2-way	1 pcs. 6-wa
		4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way	1 pcs. 6-wa
		4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way	1 pcs. 6-wa
		4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way	1 pcs. 6-wa
		4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way	1 pcs. 6-wa
		4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way	1 pcs. 6-wa
		4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way	1 pcs. 6-wa
Number of valves	per heat exchanger	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way	1 pcs. 6-wa
Number of valves Overall costs of	per heat exchanger material and installation	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way 3 Stk. EUR 25'506	1 pcs. 6-wa
Number of valves Overall costs of Total material c	per heat exchanger material and installation	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way 3 stk. EUR 25'506 EUR 15'213 FUR 5/500	1 pcs. 6-wa 1 pcs. 7-wa 1 pcs
Number of valves Overall costs of Total material c Costs of all van Total america	per heat exchanger material and installation osts ves and actuators	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way 3	1 pcs. 6-wr 1 pcs. 7-wr 1 pcs
Number of valves Overall costs of Total material c Costs of all valves Total number of 2	per heat exchanger material and installation osts ves and actuators f valves and actuators	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way 3	1 pcs. 6-wa 1 pcs. 7-wa 1 p
Number of valves Overall costs of Total material c Costs of all val Total number of Number of 3.	per heat exchanger material and installation osts ves and actuators f valves and actuators avay	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way 2 c	1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 6-wa 1 stk. EUR 18'01 EUR 11'43 EUR 8'250 50 pieces 0 pieces 0 pieces
Number of valves Overall costs of Total material c Costs of all vak Total number of 2- Number of 2- Number of 6-	per heat exchanger material and installation osts ves and actuators f valves and actuators way way	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way 3 Jk. EUR 25'506 EUR 15'213 EUR 5'650 150 pieces 100 pieces 50 pieces	1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 1 pcs.
Number of valves Overall costs of Total material c Costs of all val Total number Number of 2- Number of 3- Number of data	per heat exchanger material and installation osts ves and actuators f valves and actuators vay vay vay	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way 3	1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 1
Number of valves Overall costs of Total material c Costs of all valves Total number of Number of S-A Number of S-A Number of S-A Number of S-A	per heat exchanger material and installation osts ves and actuators f valves and actuators way vay vay vay oints, cable, junction boxes a pointe / iunction boxes	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way a b b c c c c c c c c c c	1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 1 pcs.
Number of valves Overall costs of Total material c Costs of all valv Total number of Number of 6-N Costs of data p Number of data Douber of data p Number of data p	per heat exchanger material and installation osts ves and actuators f valves and actuators way way vay obints, cable, junction boxes i polits / junction boxes ath	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way 3	1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 1 pcs.
Number of valves Overall costs of Total material c Costs of all valves Number of 2-3 Number of 6-A Costs of data p Number of data Number of data Sumber of data Dumber of data Sumber of data Total cable lem	per heat exchanger material and installation osts ves and actuators f valves and actuators way vay vay vay oints, cable, junction boxes points / junction boxes gth n costs	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way a cs. 3-way a cs. 3-way a cs. 3-way a cs. 3-way b	1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 1 pcs.
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Number of valves Overall costs of Total material c Costs of all val Total number of 2-4 Number of 2-4 Number of 3-4 Number of data Total cable leng Total installatio Costs of valve Effort valve ins Installation of	per heat exchanger material and installation osts ves and actuators f valves and actuators vay ooints, cable, junction boxes yay noints, cable, junction boxes gth n costs installation tallation for 2-way	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way 3	1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 1 pcs
Number of valves Overall costs of Total material c Costs of all valves Total number of Number of 3-A Number of 4-A Costs of data p Number of data Total cable leng Total cable leng Total installation Costs of valve Effort valve ins Installation eff Installation eff	per heat exchanger material and installation osts ves and actuators f valves and actuators vay vay vay vay oints, cable, junction boxes points / junction boxes gth n costs installation tallation fort 2-way oft 3-way	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way 3 cs. EUR 25'506 EUR 15'213 EUR 5'650 150 pieces 100 pieces 50 pieces 0 pieces 3.75 kilometres EUR 9'563 150 pieces 3.75 kilometres EUR 9'020 156 hours 95 hours 61 hours	1 pcs. 6-wa View of the second secon
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Number of valves Overall costs of Total material c Costs of all valves Total number of Number of 3-A Number of 4-A Costs of data p Number of data Total cable leng Total cable leng Total installation Costs of valve Effort valve ins Installation eff Installation eff Costs of actual Effort installatic	per heat exchanger material and installation osts ves and actuators f valves and actuators vay vay oints, cable, junction boxes opints / junction boxes gth n costs installation tallation fort 2-way fort 3-way fort 6-way or installation in actuator in actuator in of lunction box	4 pcs. 2-way	2 pcs. 2-way 1 pcs. 3-way 3 cst. EUR 25'506 EUR 15'213 EUR 5'650 150 pieces 100 pieces 50 pieces 0 pieces 3.75 kilometres EUR 9'663 150 pieces 3.75 kilometres EUR 10'294 EUR 7'020 156 hours 95 hours 61 hours 0 hours EUR 3'274 11 hours 44 hours	1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 6-wa 1 pcs. 1 pcs

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Installation Actuator: 4.2 minutes per actuator
Installation Junction box: 17.4 minutes per junction box
Effort cable installation : 0.3 minutes per linear meter

Subject to modifications and amendments.



1	Wh	/hat is calculated?		
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1 What is calculated?

It is well known that the demand for heating in today's buildings is often lower than it used to be, thanks to improved insulation and higher thermal loads (e.g. electronic devices). On the other hand, we also know that demand for cooling is on the rise. The equalisation of demand for heating and cooling allows a (combined) heat exchanger to be used for heating and cooling. The 4-pipe system is ideal for the hydraulic supply.



Fig.1 Combined heat exchanger for heating and cooling in 4-pipe system controlled using 4 straight way valves

As can be seen in Figure 1, several valves are needed for correct control. Alternatively, the 6-way zone valve launched by Belimo can be used. This innovative solution developed especially for 4-pipe systems takes the place of 4 straight way valves or 2 straight way valves and one 3-way change-over valve.



Fig.2 Combined heat exchanger for heating and cooling in 4-pipe system controlled using a 6-way zone valve



Using the 6-way zone valve not only provides technical benefits (e.g. mixing of cold and hot water due to incorrect valve activation totally impossible) but is also a great help with planning and installation.

- Procurement, handling and installation of fewer components
- Vastly reduced risk of installation errors
- ...

It may be the case that only the costs for <u>one</u> 2-way valve are compared with those of <u>one</u> 6-way zone valve. This <u>incomplete</u> comparison produces higher costs for the 6-way solution. However, a complete consideration is only meaningful if the different number of valves needed is taken into account. This is done automatically and correctly by the calculation tool. Differences in material and the amount of work which arise during installation are also taken into account. The following are taken into account

- costs of physical data points (control) → material costs
- junction boxes \rightarrow material and installation costs
- cable between data points and junction boxes \rightarrow material and laying costs
- actuators to motorise valves \rightarrow material and installation costs
- valves \rightarrow material and installation costs

2 Structure of the tool

The tool is an Excel file with five tabs:

_					
	MAIN PAGE	🛾 Cost analysis 🏒	Language-Currency 🟒	Calculation values	/Info/

2.1 MAIN PAGE

MAIN PAGE Cost analysis Language-Currency Calculation values Info

Operation/navigation

- Various buttons are provided for rapid operation and navigation within the tool.
- Macros must be activated in Excel to use the buttons.
- Other languages can be added in the *Calculation values* tab (see chapter 2.4).
- The values used when the 'Use sample values' button is clicked on can also be changed in the *Calculation values* tab (see chapter 2.4).
- Calculation base
 - Input of the information required for the calculation.
 - The installation condition can be selected in the 'Installation type' drop-down menu. Depending on whether a building is already occupied or you are working with an empty new build, the time needed to install the components will vary. The standard times for installing the various components (e.g. 2-way valve, actuator and junction box) can be adjusted to the country-specific values in the *Calculation values* tab (see chapter 2.4).



• Estimate of investment costs

• The material and labour costs for producing three different hydraulic design options are calculated on the basis of the input provided.







Fig.3a 4 x 2-way valve (2 x modulating / 2 x open-close)

Fig.3b 2 x 2-way valve + 1 x 3-way change-over valve



- The relevant solution is not displayed if no value was entered for the valve needed in the calculation base.
- If no value is entered for the other components (e.g. junction box), the calculation is undertaken anyway. A value of zero is used in the calculation for the component in question.
- The level of detail of the cost breakdown can be selected by pressing the corresponding button (low/medium/high)

Estimate of investment costs (graphic depiction)

• The costs for the different hydraulic versions are also displayed graphically.

2.2 Cost analysis



- Quick overview of the investment costs for the three different hydraulic solution options.
- The inputs required for this purpose are provided on the main page. The user also obtains supplementary results on the main page.

2.3 Language-Currency

MAIN PAGE Cost analysis Language-Currency Calculation values

- This tab offers the possibility of using additional currencies and languages.
- The corresponding instruction is stored in Excel.
- A selection can be made on the main page as to which currency and language are to be used.





2.4 Calculation values

MAIN PAGE Cost analysis Language-Currency Calculation values

- **Calculation values (standard times):** This tab allows the standard times for component installation to be changed.
 - The times entered define how long it takes to install the corresponding components (in hours).
 - Four installation types are pre-filled. The times stated for these can be changed.
 - New building, one-time
 - New building, repetitive
 - Existing building, one-time
 - Existing building, repetitive
 - Two user-defined scenarios can now also be defined.
 - Values for sample calculation: Sample values can be used on the main page by clicking on the corresponding button.
 - The values used when the corresponding button is clicked on can be changed in the *Calculation values* tab.

2.5 Info (Additional information)



- The costs taken into account by the calculation tool are shown in this tab.
- The 3 different hydraulic design variants are also shown schematically.

3 Supplementary information for the MAIN PAGE

- Light-grey fields are input fields.
 - Input/changes are not permitted in all other fields.
- Full-screen mode → It may be helpful to use Excel's full-screen mode especially if the monitor resolution is low (e.g. laptops).
 - This can be activated via the ribbon. As an alternative, a rapid selection button is available in the tool.





• The button **Print** leads to a fast printout on the configured printer. A two-page document is created.

Belimo Sa	vinas Estin	nator		Rail
Investmen	t costs 4-pi	ipe syste	m	14
Project	Test building	-		
Version	Pre-project #3			
Creator	Christian Luchsinger			
Processing date	21.03.2016			
Calculation basis				
Number of heat exchang	ers (Heating & Cooling))	50	pieces
Type of installation			New cons	truction / one-tin
Average distance betwee	en control cabinet and j	unction box	25	meters
Cost of a 2-way valve int	luding actuator (modula	ating)	36	EUR/piec
Cost of a 2-way valve inc	luding actuator (open-c	close)	32	EUR/piec
Cost of a 3-way valve inc	cluding actuator		41	EUR/piec
Cost of a 6-way valve in:	cluding actuator		165	EUR/piec
Cost of a physical data p	oint		50	EUR/piece
Cable costs			0.19	EUR/mete
Cost of a junction box	000		9	EUR/piec
Hourly rate installation w	ork		45	EUR/hour
Estimate of costs				
		4 pcs. 2-way	2 pcs. 2-way	1 pcs. 6-wa
			r pcs. oway	
		-I-I-I-I	a 8 a	3
Number of valves per he	at exchanger	• I •I•I•I 4 Stk.	∝ 1 3 Stk.	1 5%
Number of valves per he	at exchanger	•I•I•I•I 4 Stk. EUR 32'465	3 Stk.	1 Stk
Number of valves per he Overall costs of materia Total material costs	at exchanger	• I	3 Stk. EUR 25'506 EUR 15'213	1 Stk EUR 18'01 EUR 11'43
Number of valves per he Overall costs of materia Total material costs Costs of all valves an	at exchanger al and installation	4 Stk. EUR 32'465 EUR 19'550 EUR 6'800	3 Stk. EUR 25'506 EUR 15'213 EUR 5'650	1 Sik. EUR 1801 EUR 1143 EUR 825
Number of valves per he Overall costs of materia Total material costs Costs of all valves and Total number of valve	at exchanger al and installation d actuators s and actuators	4 Stk. EUR 32'465 EUR 19'550 EUR 6'800 200 pieces	3 Stk. EUR 25'506 EUR 15'213 EUR 5'650 150 pieces	1 Sik. EUR 18'01 EUR 11'43 EUR 8'25t 50 pieces
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- The button **Create PDF** creates a two-page PDF. The directory of the Excel file is selected as the location for saving the file.
 - o The file name is selected as follows: YYYY-MM-DD Project_Version.pdf

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