



Blakeborough Control Valve Sizing & Selection Program

Operation Manual

Version 1.0

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The Blakeborough Control Valve Sizing Software & Product Configurator

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The Blakeborough Control Valve Sizing Software & Product Configurator

The new Blakeborough control valve sizing software is an innovative step forward in control valve sizing technology, which, with its user-friendly Microsoft® Windows based interface, will prove to be an invaluable tool for process engineers, irrespective of their level of skill in control valve sizing.

In its basic form, with just a few easy steps, the Blakeborough control valve configurator, will size and select a complete valve assembly suitable for the process conditions given. Once sized, the program will then go on to display a wealth of information, such as performance calculations, actuator specification, materials and dimensional information. In addition to this mode of operation, by using the preference and configuration option screens available at the input stage of the program, more experienced control valve engineers can use the sizing software to specify particular solutions from the Blakeborough product range by picking from a series of easy to understand options. Regardless of the mode in which the program is used, the user can be ensured of reliable and cost effective solution to their control valve problems.

The following is a series of easy to understand user instructions for the new Blakeborough control valve covering both of the modes of operation and the new features of this advanced software. There is also a series of troubleshooting questions and answers given at the rear of the manual.

Data Input Screens

Input Screen One – Product Overview & User Interface

This screen is designed as an introduction to the product range and the new sizing and selection software. When the software is opened for the first time the program will automatically start a new file, the input screens for which can either be accessed by clicking on the **'Next'** icon in the bottom right handed corner of each screen, or by clicking on the required screen displayed under the **'Data Entry Screens'** section of the blue **'Operating Requirements'** panel on the left-hand side of the screen.

'Operating Requirements' (blue panel down the left-hand side of the screen)

This is the main menu from the program and will be present at all times while the program is active,



however, the contents of this menu may change depending on where the user is in the program. During the input screens the menu will contain the following information.

- New** This will create a new valve sizing file. (Please note that this action will wipe clean any remaining information from a previous file and reset all defaults.)
- Open** This allow the user to open an existing file previously generated by the new sizing program.
- Save (Input Data Only)** This will allow you to save the input data in whatever state the file is in. If the file has already been given a name, this action will overwrite the existing file, if not the user will be asked to specify a name.
- Save As (In. Dat. Only)** This will allow you to save the data but will ask for a file name before the save action is carried out.

Electronic Catalogue

This option will bring up a menu of all the electronically available control valve product catalogues which can be accessed within the program.

Data Entry Screens

By clicking on any one of the screens listed below the user can directly access any one of the program's data input screens. Please note these can also be accessed by using the '**Next**' and '**Prev**' icons in the bottom right-hand corner of each screen.

The available screens at the input stage are as follows:

- Product Overview** - see page 3 of this user manual for details
- Customer Details** - see page 6 of this user manual for details
- Valve Details** - see page 7 of this user manual for details
- Design Conditions** - see page 9 of this user manual for details
- Process Conditions** - see page 11 of this user manual for details

Preferences

By clicking on the '**Preferences**' icon, the user can go straight to the '**Preferences screen**'. This is an optional screen which can be used to pre-select a specific valve combination, or specify certain components of the valve, such as the body material, rather than leaving the program to automatically select the valve combination in its entirety. A more detailed description of this screen can be found on page 13 of this user manual.

Opening a DOS File

This allows a '.vlv' file from the old DOS based control valve sizing program to be opened to the new sizing program. For instructions of how to do this please refer to the section entitled 'Opening a DOS File' starting on page 17 of this user manual.

'Configure' Button

Once all the required input data has been entered, this button is used to initiate the sizing and selection process.

'Exit Configurator' Button

This button will allow the user to exit the sizing program at any point. Please note this action can also be done by using the red cross button in the top right-hand corner of each screen.

Input Screen Two - Customer Details

This screen contains all relevant customer, project and valve identification information. Details of the information required is as follows:

Quote Ref.	Weir Valves & Controls UK internal quotation reference number.
Revision	This refers to the revision number of the sizing file for the valve in question. This should be updated sequentially (i.e. 0, 1, 2, 3 etc.) each time a modification is made to the valve sizing file, once the original specification has been submitted.
Customer Name	The name of the customer to which the valve is being sold
Purchase Order No.	This is the purchase order number applicable to the valve and should therefore only be specified once a purchase order has been received.
End User	The name of the end user of the valve if known. This may differ from the customer if the if an external contractor is being used to design or maintain the plant in which the valve will be situated.
Project: Name	The name of the project for which the valve is being specified if known.
Customer Item No.	This item number of the valve as referred to by the customer.
Customer's Ref.	This refers to any reference number that the customer has given to either the contract or the valve, excluding tag and serial numbers
Tag No.	The individual tag number given to the valve being sized. More than one tag number can be given when the number of valves required (i.e. the quantity) is greater than one.
Serial No.	The individual serial number given to the valve being sized.
Sales Engineer	Initials of the sales person responsible for sizing the valve.
Quantity	This is the number of valves required to the same specification.

Input Screen Three – Valve Details

This screen is designed to contain all of the details relevant to the valve such as its application environment and performance specification.

Product Requirements [New]

Blakeborough Product Configurator
Control/Choke Valves and Desuperheating Equipment

Excellent Engineering Solutions **WEIR** VALVES & CONTROLS

Operating Requirements

New
Open
Save (Input Data Only)
Save As (Input Data Only)
Electronic Catalogue
Engineer's Toolkit

Data Entry Screens
Product Overview
Customer Details
Valve Details
Design Conditions
Process Conditions

Preferences
Open DOS Sizing File
Configuration Options
Table Information

Configure
Exit Configurator

Valve Details

Industry: Power
Valve Application: Standard
☐ On/Off ☒ Modulating
Line Fluid: Water
Fluid Type: Liquid
Valve Type: Globe
Body Material: Auto Select
Leakage Class: ANSI Class III
Flow Characteristic: Linear
Industrial Specification: Standard
Noise Level Limit (dBA): 85 Silencer/Baffles ☒
Guiding: Cage Guided
Seat Type: Single Seated

Flow Direction

☒ Standard ☐ Under
☐ Over ☐ Under & Over

Additional Hard Materials

☐ Tungsten Carbide
☐ Ceramic T3000
☒ Not Allowed

Prev | Next

The information required for input into this screen is as follows:

Industry

This allows the choice from four options; '**Power**', '**Oil and Gas**', '**Refinery**' and '**General Industry**'. These options are used to make initial material selections within the program, however, if unsure of the industry sector applicable to the application then set the **Industry** option to '**General Industry**'.

Valve Application

The option contains a list of known valve applications which are relevant to the industry sector selected above. Once again this information is used to identify potential hazards and make initial material selections, however, if the application is unknown leave the **Valve Application** option to the default of '**Standard**'.

On/Off, Modulating

The '**On/Off**' and '**Modulating**' option buttons are used to describe the operation of the valve, which is used in the sizing and selection of the required actuator and instrumentation. Once again if the operation is unknown then leave the option buttons set to the default for a control valve of '**Modulating**'.

Line Fluid

Based on the previous selections made in terms of Industry and Valve Application, a number of known line fluids will be displayed in the line fluid drop down box. Either pick from one of these selections, or, if the line fluid is not known, then select the '**other**' option from the drop down box or alternatively if the line fluid is known but not displayed in the drop down box then a line fluid may be written in by clicking the mouse inside the box and typing in the new line fluid.

Fluid Type

If applicable, this will allow a selection from three options; '**Liquid**', '**Gas/Vapour**' and '**Multi-phase**'. However, if a known line fluid has already been selected the fluid type will be set automatically where applicable.

Valve Type	This refers to the type of valve required and one of the following options must be selected. The options available are; ' Angle ', ' Globe ', ' Three-way ', ' Desuperheater ', ' Pipe Desuperheater ' and ' Choke Valve '.
Body Material	Depending on the Industry sector and valve application chosen, the sizing program is designed to suggest material options automatically, as a default this option is therefore automatically set to ' Auto Select '. However, a body material has already been specified by the customer then a different body material can be selected from the available list. (Please note: if the body material required is not displayed in the list then this may be due to an incorrect selection earlier, if this is the case please refer to the problem troubleshooting section at the rear of this manual).
Leakage Class	This refers to the ANSI leakage class which the valve is required to achieve and should be selected as required from the drop down box.
Flow Characteristic	This refers to the dynamic flow performance characteristic which the valve is required to provide. Using the drop down box, this can be selected from one of the following; ' EQ% ', ' Linear ', ' Mod EQ% ' and ' Quick Opening '.
Industrial Spec.	Depending on the application, the customer may specify the use of a special industrial specification such as ' NACE ', which may effect the valve and material options selected. Where applicable an industrial specification can be selected from the list given in the drop down box.
Noise Level Limit	This refers to the maximum allowable noise level which the valve can generate in service. As a default this will be set to the industry standard of 85 dBA , however, if a different noise level limit is required then this can be set by clicking with the mouse inside the box and inputting the revised noise level limit. (Please note noise level must be input in the units of dBA.)
Silencers	The program is designed to use both baffles and silencers where applicable as a cost effective solution to the problem. However, if the use of silencers are not permitted by the customer then the Silencer/Baffles check box should be set to unchecked.
Guiding	This describes the guiding action of the valve, which can be chosen from the following list; ' Cage Guided ', ' Top and Bottom Guided ', ' Top Guided ' and ' Seat Guided '. This will effect the type of trim chosen for the valve and should therefore be selected with care. Please note that spline trims will still be selected where applicable when the guiding type is set to ' Cage Guided ' – see the problem troubleshooting notes given at the end of this manual for further details.
Seat Type	This can be set from a selection of ' Single Seated ' and ' Double Seated ' which should be selected based on the type of valve required and the application into which it will be operating.
Valve Function	This will only appear when the valve type option is set to ' Three-way '. This refers to the direction of the flow through the three inlet/outlets of the valve and is defined as a valve for either ' Mixing ', ' Diverting ' or ' Diverting (with a balanced trim) ' service.
Flow Direction	This refers to the direction in which the flow passes through the valve in relation to the valve trim. For example, if the flow direction is set to ' Under ', the flow direction through the valve will be such that the flow passes from under the plug and out through the valve cage. This would be specified in relation to the specified fail action of the valve, if specified by the customer, however, the default for the program is set to ' Standard ' which will work to the preferred flow direction for the trim option chosen.
Add. Hard Materials	This is used to specify whether or not the customer's specification will allow the use of one of the additional hard materials specified. If either ' Tungsten Carbide ' or ' Ceramic T3000 ' option is selected the program will only use these materials if the process conditions require it.

Input Screen Four - Design Conditions / Pipe Interface

This screen contains all of the information relating to either the design conditions of the valve or the pipe interface into which the valve will be situated.

The screenshot shows the 'Product Requirements [New]' window of the 'Blakeborough Product Configurator'. The title bar indicates 'Excellent Engineering Solutions' and 'VALVES & CONTROLS'. The left sidebar lists various options: 'Operating Requirements' (New, Open, Save, Save As, Electronic Catalogue, Engineer's Tool kit), 'Data Entry Screens' (Product Overview, Customer Details, Valve Details, Design Conditions, Process Conditions), 'Preferences' (Open DOS Sizing File, Configuration Options, Table Information), and 'Configure' and 'Exit Configurator' buttons. The main area is divided into two sections: 'Design Conditions' and 'Pipe Interface'. The 'Design Conditions' section includes input fields for 'Design Pressure' (with a unit dropdown set to 'bar'), 'Max. Shut-off Press.' (unit 'bar'), 'Max Design Temp.' (unit '°C'), and 'Min Design Temp.' (unit '°C'). The 'Pipe Interface' section includes input fields for 'Inlet' (Size, Schedule, Connection) and 'Outlet' (Size, Schedule, Connection), all with dropdown menus. Below these is a table for 'For Information Only' with columns for 'Inlet Pipe mm', 'O/D', 'I/D', 'Thickness', 'Outlet Pipe mm', 'O/D', 'I/D', and 'Thickness'. At the bottom right are 'Prev' and 'Next' buttons.

The information required for input into this screen is as follows:

Design Conditions

Design Pressure

This refers to the design pressure to which the valve should be rated. If not specified by the customer this should be set to the maximum absolute pressure given in the process conditions. The design pressure can be entered by clicking inside the relevant box and entering the required pressure. The pressure units can be altered by selecting an alternative units of measurement from the drop down box.

Max Shut-off Press.

This refers to the total pressure which the actuator must overcome in order to close the valve to the required shut-off. If not specified by the customer, this should be set to approximately 1 bar less than the design pressure. Once again, the shut-off pressure can be entered by clicking inside relevant the box and entering the required pressure.

Max Design Temp.

This is the maximum design temperature at which the valve must operate. If not specified by the customer this should be set to the maximum temperature given in the process conditions. The temperature can be entered by clicking inside the relevant box and entering the required value. The temperature units can be altered by selecting an alternative units of measurement from the drop down box.

Min Design Temp.

This is the minimum design temperature at which the valve must operate. If not specified by the customer, this should either be set to the lowest temperature value given in the process conditions or 0°C, whichever is the lowest.

Pipe Interface

Inlet Size	This refers to the nominal diameter of the pipe, in mm, onto to which the inlet of the valve will connect. This information should be set in the customer's specification for the valve and the nominal diameter chosen from one of the options given in the drop down box. Please refer to the section on 'Problem Troubleshooting' if the customer has not specified an inlet pipe diameter.
Inlet Schedule	This is schedule of the pipework at the inlet of the valve which is used in the calculation of the valve size and noise predictions. If the customer has not specified a pipe schedule then this should be set to '40' and if '40' is not available due to the size of the valve, the pipe schedule should be set to the lowest possible value.
Inlet Connection	This is used to define the type of pipe connection required at the inlet of the valve. This should be chosen from one of the options available in the drop down box, taking into account the customer's specification where applicable.
Outlet Size	This refers to the nominal diameter of the pipe, in mm, onto to which the outlet of the valve will connect. This information should be set in the customer's specification for the valve and the nominal diameter chosen from one of the options given in the drop down box. If the customer has not specified a outlet pipe diameter then this should be set to the same as the inlet diameter if available or else refer to the section on 'Problem Troubleshooting'.
Outlet Schedule	This is schedule of the pipework at the outlet of the valve which is used in the calculation of the valve size and noise predictions. If the customer has not specified a pipe schedule then this should be set to the same as the inlet pipe schedule.
Outlet Connection	This is used to define the type of pipe connection required at the outlet of the valve. This should be chosen from one of the options available in the drop down box, taking into account the customer's specification where applicable.

Pipe Diameter Information

Once the above data has been selected, this table will display information on the inner and outer diameters of the pipework chosen. This information will be used in the program to select a suitable sized valve to match this pipework selection and is displayed here for information purposes only.

Input Screen Five – Process Conditions

This screen contains all of the process conditions required to size a suitable valve for the application. The program will allow for between one and ten process conditions to be entered and will adjust the process data which is required depending on the fluid type chosen (i.e. gas/vapour, liquid etc.). This is the final mandatory input data entry screen and once this screen has been completed the '**Configure**' button, situated in the bottom left hand corner of the screen, can be pressed to initiate the program to size and select a valve.

Process	Uom	Maximum	Normal	Minimum
Liquid Flow Rate	kg/hour			
Inlet Pressure	bar			
Outlet Pressure	bar			
Pressure Drop	bar			
Inlet Temperature	°C			
Specific Gravity				
Vapour Pressure	bar			
Critical Pressure	bar			
Viscosity	Centi-Poise			
Duration	%			

The user functions within the screen are as follows:

Changing the units of a given flow property

Against each fluid property given in the table, is a unit of measure in the column marked '**Uom**'. If the user wishes to use alternative units, these can be altered by clicking on the respective unit box and selecting an alternative unit of measure from the list given in the drop down box. Please note that when changing a unit of measure that is used elsewhere in the table, such as the units of pressure, all the units for that property will change at the same time.

Changing the number of process conditions

Changing the number of process conditions displayed in the table can be done by either using toggle buttons against the '**No. of Process Conditions**' box located bottom left of the process condition table or by using the column '**Copy**' function. Please note that if the column '**Copy**' function is used the data in that column will be copied across.

Changing the name of a process condition

As the program's default the process screen will open with three process conditions which are given in title of '**Maximum**', '**Normal**' and '**Minimum**'. These titles are only used to identify the individual processes on the valve data sheets and therefore have not effect on the valve sizing or selection process. The user is therefore free to change the title of these columns to suit the customer's specification. This can be done by clicking on title of the column, which the user wishes to change, and entering the new title.

‘Copy’ Function

This allows another process condition to be added to the table by copying the data from an existing process condition. This function is available in the sub-menu which can be accessed by double-clicking the mouse on the column title.

‘Delete’ Function

This allows another process condition to be added to the table by copying the data from an existing process condition. This function is available in the sub-menu which can be accessed by double-clicking the mouse on the column title.

‘Move Left’ Function

This allows a complete column to be moved one space to the left in the ‘Process Conditions’ table. This function is available in the sub-menu which can be accessed by double-clicking the mouse on the column title.

‘Move Right’ Function

This allows a complete column to be moved one space to the right in the ‘Process Conditions’ table. This function is available in the sub-menu which can be accessed by double-clicking the mouse on the column title.

‘Export Flow Conditions’ Button

This allows just the process conditions data to be output to a separate file so that it can be stored for later use. This is a useful function, for example, if the same or similar process conditions are being used to size a series of valves, as this function can be used to prevent the process data from being input in its entirety every time. The file extension for the process data files is ‘.FlowData’.

‘Import Flow Conditions’ Button

This is used to import a data file with the extension ‘.FlowData’, which contain information on the process conditions. See ‘Export Flow Conditions’ button for the generation of this file.

‘Clear Table’ Button

This allows the contents of the table to be cleared.

Optional Data Input Screens

Optional Data Input Screens – Preferences

This screen can be used to direct the product configurator to select a certain valve configuration by pre-specifying a particular feature of the valve. With the exception of the maximum valve opening, all of the features of the valve which can be pre-specified are set to '**Auto Select**' as default.

The features of the valve which can be pre-specified using the '**Preferences**' screen are given below:

Valve Size	If the valve size is known, this can be entered by selecting a valve size from the drop down, valve sizes are given in mm.
Material Form	This allows the body material form to be specified as either a ' casting ' or a ' forged ' block.
Trim Design	This displays all of the valve trim forms considered by the program and allows a particular design to be pre-specified. However, please note that if the trim type selected is not suitable for the process conditions, the program will fail to size a suitable valve. The ' Exclude X-Stream ' will prevent an X-Stream from being sized where applicable, this option should only really be used when cost prohibits the X-Stream from being an acceptable trim option.
ANSI Class	This allows the ANSI body rating to be over-specified in accordance with customer requirements. Once again, please note that the program will not allow the valve to be under-specified.
Body Rating	This refers to the use of a special pressure class rating which is only applicable for valves with butt-weld end connections. The body rating can therefore be set to either ' Standard ' or ' Special ' using this option.
Bonnet Form	The product configurator will select a bonnet form based on the chosen valve and the process conditions. However, this options will allow a

alternative bonnet form to be pre-specified from a list of '**Standard**', '**Normalising**', '**Extended**', '**Cryogenic**' and '**Bellows Seal**'.

Max. Opening

This refers to the percentage opening of the valve at which the maximum flow conditions should be designed to occur. To allow some extra flow capacity within the valve this is set as a default to 80%, however, by modifying this value slightly it may be possible to select a smaller valve, this can be determined by reviewing the 'Configuration Log' – see the description of the 'Configuration Log' which starts on page * of this user manual. Please note that when the input data is brought in from a '.vlv' file, the maximum opening is automatically set to 100%, in this case it is very important to **check the valve opening given in the calculation screen to ensure the suitability of the valve**. To input an alternative value for the maximum valve opening, click on the box and enter the new value.

Min. Design Cv

This is an alternative method of specifying valve opening by inputting a minimum design Cv value. To input an alternative value for the minimum design Cv, click on the box and enter the new value.

Pressure Class Table

Once the design conditions for the valve have been entered, this table displays the calculated interpolated pressure class and from this gives the minimum required pressure class, which is then used to select a valve in the program. This information is displayed here for information purposes only and requires no additional action.

Additional Important Note

If the any of the options given on this screen have been specified by the user, such that the valve would be unsuitable for service, **the product configurator will fail to size a valve!** This is because the program is designed not to allow unsafe or unsuitable valve configurations to be selected.

Opening an Existing File from the Old DOS Sizing Program

An important feature of the new control valve sizing program is the ability open control valve sizing files from the old Blakeborough DOS based sizing program (i.e. files with the extension .vlv).

Existing '.vlv' files can be opened by clicking on the '**Open DOS Sizing File**' icon located in the blue '**Operating Requirements**' menu on the left-hand side of the screen. This action will open up the DOS file conversion screen shown below.

Open Dos Configuration File

BLAKEBOROUGH

Dos Sizing Program File Conversion

Quotation Details

Quote Ref:

Customer Name:

Customer's Order No.:

Customer's Ref:

Project:

Note: A maximum Opening of 100% will be assumed. Use the Preferences option to apply an alternative value.
Instrumentation requirements must be re-specified.

Double Click to Select

No.	Tag Number	Valve Series	Valve Size	Body Rating	Body Material	Trim Design	Design Cv
1	T24-FCV-011	BV500	150 mm	ANSI 150	CARBON STEEL ASTM	MULTI-FLOW MF4	240
2	T62-LCV-001	BV500	150 mm	ANSI 150	CARBON STEEL ASTM	MULTI-FLOW SPEC.	220
3	T62-LCV-003	BV500	250 mm	ANSI 150	CARBON STEEL ASTM	MULTI-FLOW MF2	900
65	T72-FCV-011	BV990	100 mm	ANSI 1500	316 ST. ST. A351 CF8M	CASCADE 2 SPEC.	52
66	T71-TCV-122	BV500	80 mm	ANSI 150	CARBON STEEL ASTM	MULTI-FLOW MF2	104
6	T62-TCV-013	BV500	200 mm	ANSI 150	CARBON STEEL ASTM	MULTI-FLOW SPEC.	480
7	T62-TCV-043	BV500	200 mm	ANSI 150	CARBON STEEL ASTM	MULTI-FLOW MF3	610

Using the information from the '.vlv' file, the DOS file conversion screen will list all the valves contained within this file along with a brief description of the configuration of each valve and, where known, the quotation details.

As with the old DOS based sizing program, the new sizing program is only able to handle one valve configuration at a time, although the file itself may contain many files. In order to open a particular valve configuration into the new sizing program, the required valve must first be located in the list given. This can be done by using the scroll bar located to the right-hand side of the list. Once the required valve has been found it can be loaded into the new program by simply double clicking the mouse anywhere within the relevant line on the table. This action will open the new sizing program and load in the available information, from the DOS file, into the data input screens. Once the data has been loaded in, the program will behave in the same manor as before, allowing the user to change data where required, however, it is important that all data is checked before attempting to configure a valve.

If the data has been entered from an existing '.vlv', the program will attempt to configure the valve selected in the '.vlv' file, which may mean that the option displayed by the program when it first enters the output screens may not be the first option that it has selected. Alternatively, the program may find that it can't configure the valve selected in the '.vlv' file, which will lead to a warning message such as the one shown here. This could occur for several reasons, ranging from the valve not being considered suitable for the application due to factors set within the program to a change in the design Cv of the selected valve. If this occurs, click on the 'OK' button and allow the program to continue.

Warning!!

Your saved configuration :

Valve Series=BV990
Inlet Size=100
Body Size=100
Outlet Size=100
Body Rating=ANSI 1500
Trim Design=Cascade 2
Size Ref=SPEC. AREA
Flow Direction=Under
Design CV=52

cannot be reconstituted and will be ignored.

OK

Warning!

One of the most common reasons for a particular valve configuration not being selected is that the valve maximum valve travel has been set to low, if this occurs try increasing the maximum travel in the '**Preferences**' screen and re-configure.

Valve Selection Output Screens

Once the '**Configure**' button has been pressed the program will attempt to size and configure a suitable valve arrangement. Each valve should only take a few seconds to configure and the progress of the program can be monitored through the green progress bars located at the base of the screen.

Once the program has successfully configured a valve it will transfer directly to the data output screens described in the following few pages.

Output Screen One - Valve Details

Once configured, the program will transfer directly to the first of data output screens, namely '**Valve Details**'. This screen contains an overview of the valve configuration, excluding the actuator.

Valve Sizing Results

Control/Choke Valves and Desuperheating Equipment
Blakeborough Product Configurator

Excellent Engineering Solutions **WEIR** VALVES & CONTROLS

Configuration Results

- Save Valve Selection
- Save Valve Selection As
- Review/Print Documents
- Configuration Results
- Valve Details
- Valve Calculation
- Silencer
- Silencer Calculations
- Actuator Specification
- Actuator Calculations
- Instrumentation
- Materials
- Painting
- Inspection & Test
- Flow Characteristics
- Envelope Drawing
- Alternative Valves
- Configuration Log
- Hole Development
- Product Configuration

Valve Details

Option 1 of 1

Valve

Valve Size	200mm
Valve Type	Globe
Class	ANSI 150
Valve Series	BV500
Design CV	700
Body Material	ASTM A351 CF8M

Trim

Trim Design	Multi-Flow
Trim Reference	MF1
Flow Direction	Over
Seat Form	Separate
Flow Char.	Mod Eq%

Actuator

Actuator Type	Pneumatic, Diaphragm Spring Return
Manufacturer	Fouress
Actuator Code	A40ALJ95B

☐ Disable Actuator Selection

Silencer

Configured	Yes
No. Baffles	2

☐ Disable Silencer

Configuration Notes

Next

Because this screen is displaying information from the configuration process it can not be altered at this stage, the functionality of this screen is therefore limited to the following:

Disable Actuator Selection

In all cases, the program will attempt to size and select an actuator from a standard range of products provided by Weir Valves & Controls. However, in the case that the actuator is not required, either because the an actuator is not required by the customer or because the customer has specified the use of a non-standard actuator, the actuator sizing can be disabled by checking this box and by the reverse process, un-checking the box will regenerate the actuator. Please note, this action will remove the actuator related screens from the output, including instrumentation and actuator painting.

Disable Silencer

In a similar manor to the actuator, this check box will enable a selected silencer to be toggled on and off as required. Disabling the silencer will automatically adjust the valve calculations to reflect this action and may cause the valve selection to become unsuitable for the application, this option must therefore be used with care! If the customer has specified that silencer units should not be used this

information should be transferred to the program by toggling off the silencer/baffles toggle on the 'Valve Details' screen at the input stage of the program – see details on page 7.

Additional Output Screens - Alternative Valves Screen

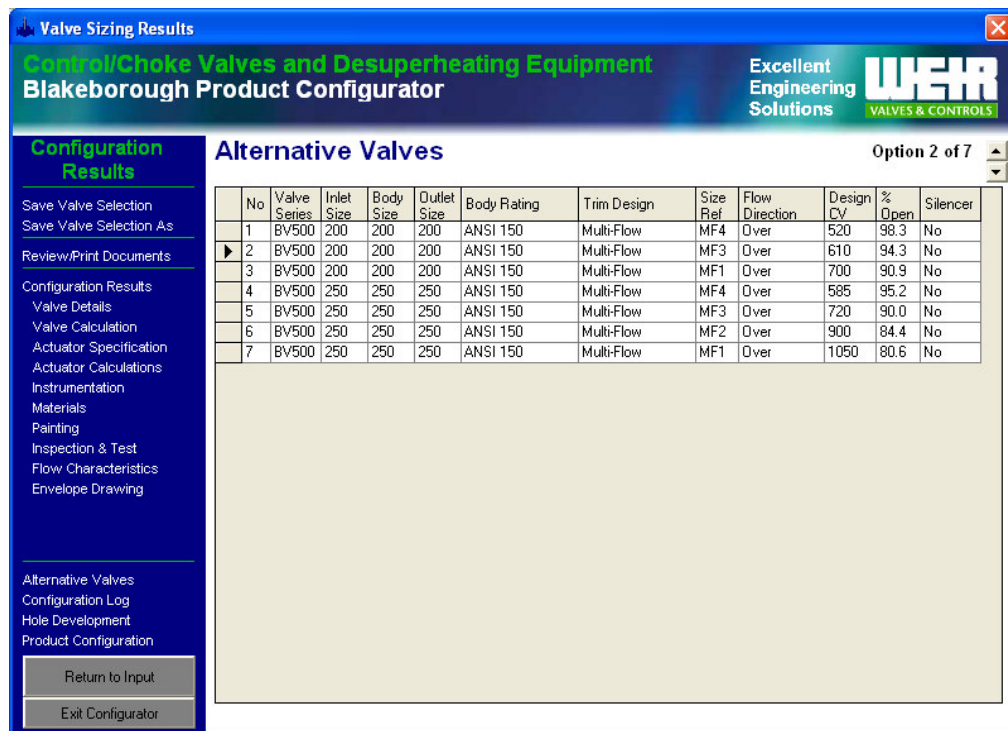
Depending on the calculated limits and the options set in the '**Configuration Options**' and '**Preferences**' screens at the data input stage of the program, the program may deliver a series of valve configuration, thus allowing the user to choose their preferred option. An example of where this may occur is when the size of the valve selected is less than the pipe size. In this case the program will display a number of valves ranging in size from half the pipe size diameter, if suitable for the application, to the full pipe size diameter. The program will then number the options starting with the smallest valve first.

If this is the case, the user can see that the program has returned a number of options by looking in the top right-hand corner of the screen as shown below.



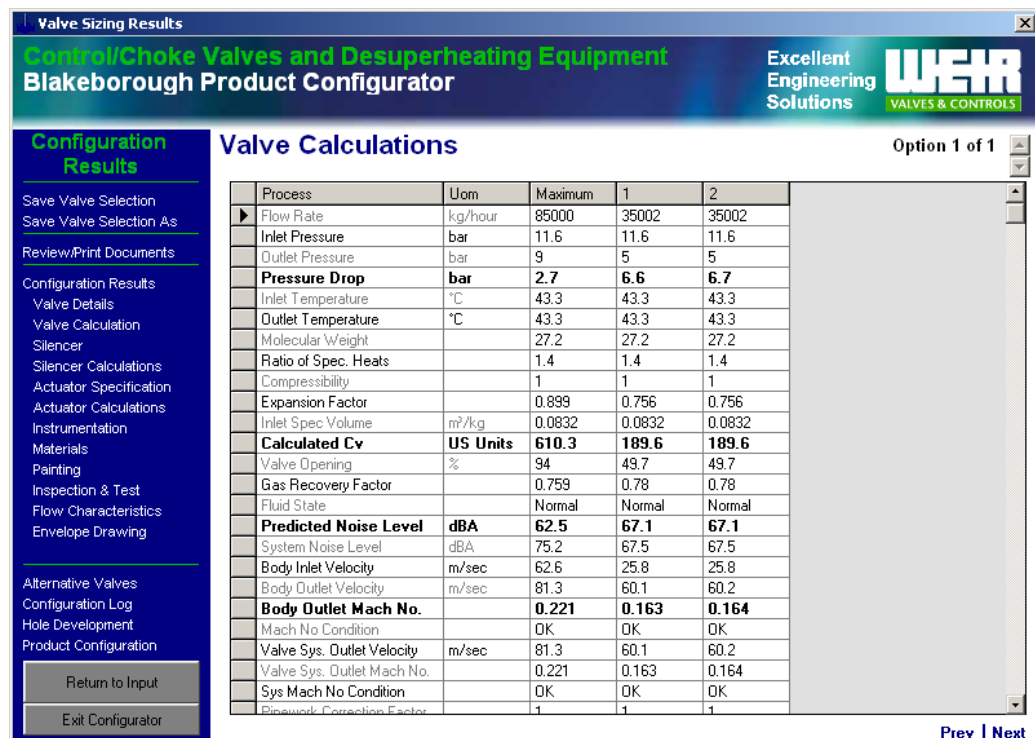
When this occurs the options can be toggled through by clicking on the toggle buttons shown next to the option display. Where there are a number of valve configurations proposed it is sometimes easier to view details of these valves through the '**Alternative Valves**' screen which can be accessed through the appropriate icon on the blue '**Configuration Results**' menu.

The '**Alternative Valves**' screen displays the different options chosen by the program in a list form with a brief overview of each valve, which is intended to help the user select their preferred option. An example of a screen containing a number of valve options is shown on the following page. The option currently selected is identified by a black arrow in the first column on left-hand side of the list, however, if the user wishes to select a different valve this can be done by double clicking the mouse anywhere in the relevant line.



Output Screen Two – Valve Calculations

This screen displays details of the process conditions and the valve calculations, such as calculated Cv, predicted noise level, cavitation index, valve opening etc. If alternations have been made to the valve which means the it may longer be suitable for the application for which it was specified for then the calculations which are causing a problem will show up in red.



Output Screen Three – Silencer

If a silencer has been selected as part of the valve which has been configured by the program, the silencer details and calculations will be displayed as part of the data output screens. The silencer details screen appears as follows.

Valve Sizing Results
Control/Choke Valves and Desuperheating Equipment
Blakeborough Product Configurator

Excellent Engineering Solutions **WEIR** VALVES & CONTROLS

Configuration Results

- Save Valve Selection
- Save Valve Selection As
- Review/Print Documents
- Configuration Results
 - Valve Details
 - Valve Calculation
 - Silencer
 - Silencer Calculations
 - Actuator Specification
 - Actuator Calculations
- Instrumentation
- Materials
- Painting
- Inspection & Test
- Flow Characteristics
- Envelope Drawing

Alternative Valves
 Configuration Log
 Hole Development
 Product Configuration

Return to Input
 Exit Configurator

Silencer

Silencer Details

Silencer Material: CF8M(316 SS) ☐ Fix Design ☒ Reset

Size: Inlet 200 mm, Outlet 300.00 mm

Rating: ANSI 150, ANSI 150

Connection: Flanged R/F, Flanged R/F

Design Press: 9 bar, 6 bar

Design Temp: 43.3 °C, 43.3 °C **Calculate**

Sparger Details

☐ Incorporate Sparger in Sizing Calcs

☐ Set Sparger Size ☒ Set Sparger Pressure Drop

Size	mm
Pressure Drop	bar

Baffle Plate Settings

Baffle No	Set Press Ratio	Baffle Cv	Pipe Size	Enabled
1	1.7	1000	300	☒
2	1.7	700	250	☒
3	1.7			☐
4	1.7			☐
5	1.7			☐

Option 1 of 1

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Details on the functionality of this screen are given below.

Silencer Details

Silencer Material

This is selected by the program based on the materials selected for the valve but can be changed using the drop down box available.

Size

This refers to the pipe diameter, at the inlet and outlet, of the silencer selected. Using the drop down box available this can be altered to an alternative pipe size if required, which will in turn adjust the silencer calculations.

Rating

This will allow the ASME pressure rating of the silencer to be modified using the drop down box available.

Connections

This will allow the end connections of the silencer to be modified using the drop down box available.

Design Pressure

The design pressure for the silencer is set based on the estimated pressure in the flow at the outlet of the valve and the silencer. However, this value can be increased if desired.

Design Temp.

The design temperature for the silencer is set based on the estimated temperature in the flow at the outlet of the valve and the silencer. However, like the design pressure, this value can be increased if desired.

'Calculate' button

When changes to the silencer specification are made the calculations must be updated. This should be done when all the changes have been made by pressing the **'Calculate'** button.

'Reset' Button

By pressing the '**Reset**' button the specification of the silencer will be return to the original specification produced by the program when the valve was configured.

Output Screen Four – Silencer Calculations

This screen gives details of all the necessary process information required to calculate the design of the silencer and the calculations required to predict its performance. Once again, if there are any potential problems with the calculations which may effect the suitability of the solution, these will be shown in red.

Valve Sizing Results
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WEIR
 VALVES & CONTROLS

Configuration Results

- Save Valve Selection
- Save Valve Selection As
- Review/Print Documents
- Configuration Results
 - Valve Details
 - Valve Calculation
 - Silencer
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 - Actuator Specification
 - Actuator Calculations
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- Alternative Valves
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- Product Configuration

Return to Input
 Exit Configurator

Silencer Calculations Option 1 of 1

Baffle Plate	Condition	Uom	Maximum	1	2
1	Baff Inlet Pressure	bar	6.05	4.22	4.22
	Baff Pressure Ratio		1.59	1.11	1.11
	Outlet Spec Volume	m³/kg	0.25	0.25	0.25
	Outlet Velocity	m/sec	91.84	37.82	37.82
	Mach Number		0.25	0.10	0.10
	Baffle Noise	dBA	73.6	57.1	57.1
	Est. System Noise	dBA	76.3	71.3	71.3
2	Baff Inlet Pressure	bar	8.96	4.99	4.98
	Baff Pressure Ratio		1.48	1.18	1.18
	Outlet Spec Volume	m³/kg	0.16	0.23	0.23
	Outlet Velocity	m/sec	81.66	48.16	48.18
	Mach Number		0.22	0.13	0.13
	Baffle Noise	dBA	69.3	55.7	55.7
	Est. System Noise	dBA	75.2	67.5	67.5

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Output Screen Five – Actuator Specification

Based on the valve selected the program will attempt to select a suitable pneumatic actuator based on the chosen manufacturer selected in the 'Configuration Options' screen.

Valve Sizing Results
Control/Choke Valves and Desuperheating Equipment
Blakeborough Product Configurator
 Excellent Engineering Solutions **WEH** VALVES & CONTROLS

Configuration Results
 Save Valve Selection
 Save Valve Selection As
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 Exit Configurator

Actuator Specification Option 1 of 1

Manufacturer: Fouress
 Actuator Type: Pneumatic
 Duty: Modulating Normally Open

Pneumatic Actuator Details

Air Fail Mode: Stay Put (Tend to Open)
 Manual Override: None
 Limit Stops: None

Pneumatic Actuator Settings
☒ Diaphragm Spring Return
☐ Piston Spring Return
☐ Piston Double Acting

Actuator Air Pressure
 Min: 58.5 psi
 Max: 60

Plug Design
☒ Balanced
☐ Solid
☐ Pilot Balanced

Option	Act Type	Model	Area	Min Spring Setting	Spring Range	Seat Eff.	Mod. Eff.
1	Diaphragm	A40ALJ9SB	300	0.4 bar	1.7 bar	2.37	4.2
2	Diaphragm	A40ALJ9SR	300	1.4 bar	1.4 bar	1.53	14

Prev | Next

Like with the valves, were possible the program will select a number of suitable actuators, leaving the user to select their preferred option. Once again, the actuator selected is identified by the black arrow in the first column of the alternative actuators table, and another actuator in the list can be selected by simply double clicking on the appropriate line, which will in turn adjust the actuator calculations accordingly. Moreover, this screen can also be used to select a different type of actuator using relevant drop down boxes displayed. For example by setting the '**Actuator Type**' to **Electro-Hydraulic**, the screen will change to the screen shown below to enable to relevant data to be input.

Valve Sizing Results
Control/Choke Valves and Desuperheating Equipment
Blakeborough Product Configurator
 Excellent Engineering Solutions **WEH** VALVES & CONTROLS

Configuration Results
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 Save Valve Selection As
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 Return to Input
 Exit Configurator

Actuator Specification Option 1 of 1

Manufacturer: Fouress
 Actuator Type: Electro-Hydraulic
 Duty: On / Off Normally Open

Electro-Hydraulic Actuator Details

Model:
 Description:

Electrical Information
 Voltage:
 Instr. Signal:
 Haz. Area:

Additions
☐ Transmitter
☐ Limit Switches
☐ Torque Switches
☐ Manual Override
☐ Mech. Limit Stop

Hydraulic Information
☐ Separate Pump
☒ Separate Supply
☐ Integral Pump
 Hydraulic Pressure:
 Hydraulic Fluid:

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Output Screen Six – Actuator Calculations

Once a suitable actuator has been selected on the '**Actuator Specification**' screen the calculations relevant to the performance of that actuator will be displayed on the '**Actuator Calculations**' screen shown below.

The screenshot shows the 'Valve Sizing Results' window for 'Control/Choke Valves and Desuperheating Equipment' by 'Blakeborough Product Configurator'. The 'Actuator Calculations' section is active, showing 'Option 1 of 1'.

Configuration Results

- Save Valve Selection
- Save Valve Selection As
- Review/Print Documents
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- Alternative Valves
- Configuration Log
- Hole Development
- Product Configuration

Actuator Calculations

Plug Load Details

Act Sizing DP	16 bar	Stem Friction	1687 N	Reqd. Opening Force	2126 N
Seat Load	15932 N	Plug Seal Friction	440 N	Reqd. Closing Force	19668 N

Cage Guided

Seat Diameter	212 mm
Cage Diameter	215 mm
Stem Diameter	24 mm

Estimated Stoking Times (secs)

	Standard	With Small Booster	With Large Booster
Apply	65	22	6
Vent	110	35	8
Trip			

☒ Preferred ☐ Preferred ☐ Preferred

Condition	Uom	Vlv Closed	Cracked	Maximum	1	2
Inlet Pressure	bar	16	16	11.64	11.64	11.64
Outlet Pressure	bar	0	0	8.96	4.99	4.98
Unbalanced Force	N	1609.25	0	405.3	225.75	225.41
Min Air Required	bar	3.09	2.26	2.2	2.19	2.19
Min Spring Setting	bar	0.03	0.11	0.09	0.1	0.1
Stem Stress	N/mm ²	8.26	4.7	5.6	5.2	5.2
Stability	1/16 inch			0.04	0.04	0.04
Mod. Stability				19.75	35.47	35.52

Unbalanced force tends to Open Valve

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Once again, because this screen is displaying calculations which have come from the program none of this information can be altered without changing the specification of the valve or the actuator. However, there is the option to display a preference in terms of the estimated stoking time of the valve, by selecting a preference for the standard stroking time or a reduced stroking time using an additional booster. This decision will effect the instrumentation which will need to be fitted to the valve. Finally, any problems which the user should be aware of will be displayed at the bottom of the screen in red, as shown in the example above.

Output Screen Seven – Instrumentation

This screen is where the instrumentation for the valve configuration can be selected. This is done by selecting items from the left-hand instrument selection list and transferring them to the right-hand instrumentation selection list.

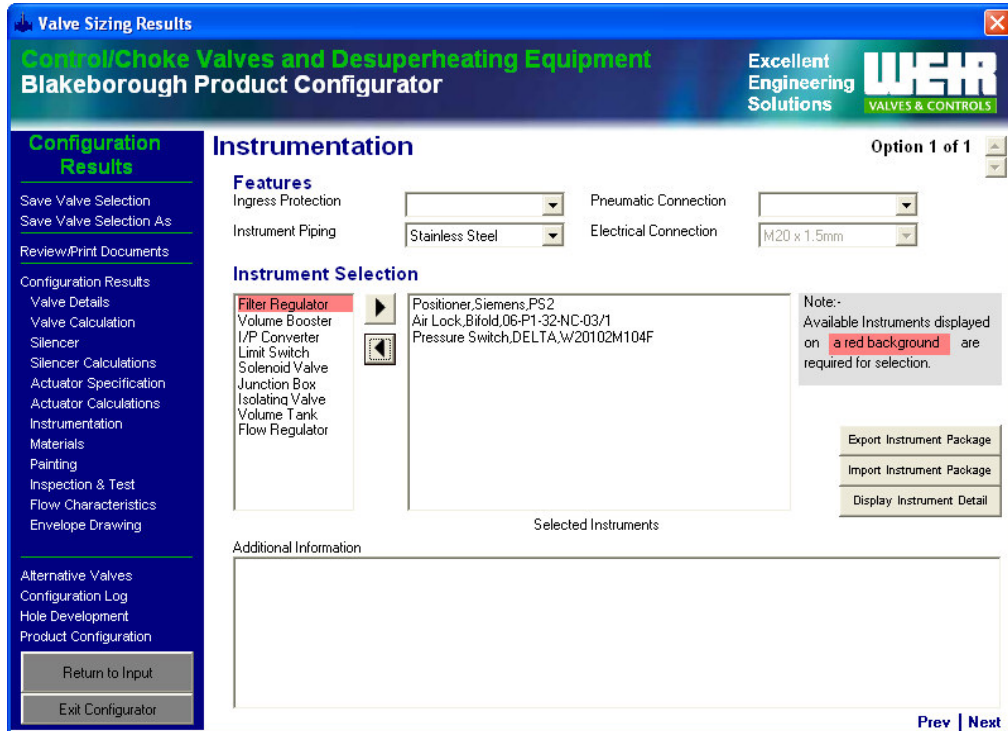
The first stage of the instrument selection procedure is to define the necessary instrumentation features which can be done selecting items from the drop-down boxes shown. **It is important to note that selections made here may effect the instrumentation options that are made available later.**

Once the features of the instrumentation package have been selected, an instrumentation item can then be selected by clicking on the relevant item in the left-hand instrumentation selection list and then clicking on the arrow head button (located between the two lists) which is pointing to the right, this will open up a second screen such as the example shown below for a positioner.

Manufacturer	Model No	Haz Area Cert	IP Rating	Transmitter Module	Limit Switch
ABB	TZID-C200	EEx D IIC T4	65	Integral	No
ABB	TZID-C200	EEx D IIC T4	65	Integral	Integral
ABB	TZID-C200	EEx D IIC T4	65	Integral	No

The option boxes located at the top of the screen can be used to filter the list of positioners down to just the ones that are suitable for the required specification, and then a positioner is selected for use by selecting a positioner from the list and clicking on the **'Save Selected Instrument'** button. This will return the user to the main 'Instrumentation' screen and details of the selected instrument will appear in the right-hand instrumentation selection list. This same procedure can be followed for all the instrumentation items available.

Where possible the program will help guide the user to select a suitable instrumentation package by identifying instrumentation items which are required. For example, if a filter regulator is required due to the positioner selected the filter regulator will appear in red in the instrumentation selection list as shown below.



Once a suitable instrumentation package has been selected it is often the case that this package will be suitable for a number of other valves, particularly if there are similar valves on the same contract. To save the user having to re-enter the information to build up the instrumentation package every time a new valve is selected, the new sizing program has the facility to export this information into a separate file which can then be imported back into the configuration at a later date.

'Export Instrumentation Package' Button

By pressing this button the instrument package selected can be exported to a separate file (with the file extension '.instruments') so that it can be used on other similar valves.

'Import Instrumentation Package' Button

This button will allow an existing instrument package file to be imported into the current valve configuration.

'Display Instrument Details' Button

This displays the full details of the instruments selected in the current instrumentation package so far.

Output Screen Eight – Materials

This screen displays the details of the materials chosen by the program for each of the valve's components. These can be changed by simply clicking on the relevant box and picking an alternative material from the drop-down box which appears. If any of the materials of change, the originally selected material will be displayed in light grey next to the relevant material box.

Valve Sizing Results

Control/Choke Valves and Desuperheating Equipment

Blakeborough Product Configurator

Excellent Engineering Solutions **WEHR** VALVES & CONTROLS

Option 1 of 1

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 - Inspection & Test
 - Flow Characteristics
 - Envelope Drawing
- Alternative Valves
- Configuration Log
- Hole Development
- Product Configuration

Return to Input

Exit Configurator

Materials

Valve Components

Body	ASTM A351 CF8M
Bonnet	ASTM A351 CF8M
Body Gasket	316 L ST. ST. / GRAPHITE
Body Stud	88M CLASS 2
Body Nut	8M
Seat	316 ST. ST.
Plug	316 ST. ST.
Stem	316 ST. ST.
Cage	17/4 PH ST. ST.
Cage Gasket	316 L ST. ST. / GRAPHITE
Packing Spacer	316 ST. ST.
Packing Support Ring	316 ST. ST.
Packing Follower	316 ST. ST.
Packing Type	PTFE Chevrons
Plug Seal Ring	PTFE U Seal

Overlay Materials

Body Overlay	NONE
Seat Overlay	NONE
Plug Overlay	NONE
Cage Overlay	NONE

Click any text box to change its associated material

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Output Screen Nine – Painting Requirements

This screen shows the available painting specifications and colours for the valve and the actuator. By default these will appear in accordance to the standard WVC painting specification, but can be altered by using the drop-down boxes available.

Valve Sizing Results

Control/Choke Valves and Desuperheating Equipment

Blakeborough Product Configurator

Excellent Engineering Solutions **WEHR** VALVES & CONTROLS

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- Product Configuration

Return to Input

Exit Configurator

Painting Requirements

Valve

Specification: System B

Operating Temp: 120° C

Description: 2 Coat Epoxy for protection in moderately corrosive offshore and onshore environments. Resistant to chemical, oil, saltwater, certain solvents, impact and abrasion.
Coat 1: J984, Zinc rich primer - DFT 75 Microns
Coat 2: C137V2, acrylic urethane - DFT 50 Microns
Total Dry Film Thickness: 125 Microns

Colour: RAL 5002 WVC STANDARD BLUE

Actuator

Specification: System A

Description: Fusion bonded epoxy coating. For moderately corrosive environments.
Total Dry Film Thickness: 150-450 Microns

Colour: RAL 5002 WVC STANDARD BLUE

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Output Screen Ten – Inspection and Test

This screen is used to detail any additional inspection and test requirements detailed by the customer, including customer witness requirements, inspecting authority and NDE requirements. In the same manor as the instrumentation package, this information can be export into a separate file (with the file extension '.Detail') so that the same information can be used on other valves without having to re-input the data.

Valve Sizing Results

Control/Choke Valves and Desuperheating Equipment

Blakeborough Product Configurator

Excellent Engineering Solutions **WEIR** VALVES & CONTROLS

Configuration Results

Save Valve Selection
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Return to Input
Exit Configurator

Inspection and Test

Option 1 of 1

Customer Witness: Hydraulic Test ☐ Inspection Basis: Company Standard ☐
Functional Test ☐ Special ☐
Special Test ☐

NDE Requirements

Type of Examination	Radiography	Magnetic Particle	Liquid Penetrant	Ultrasonic
Weld Ends	☐	☐	☐	☐
ASME B16.34	☒	☐	☐	☒
Change of Section	☐	☐	☐	☐
100%	☐	☐	☐	☐
Witness	☒	☐	☐	☒
ASME B16.34	☒	☐	☐	☐
Change of Section	☐	☐	☐	☐
100%	☐	☐	☐	☐
Witness	☒	☐	☐	☐

Inspecting Authority:

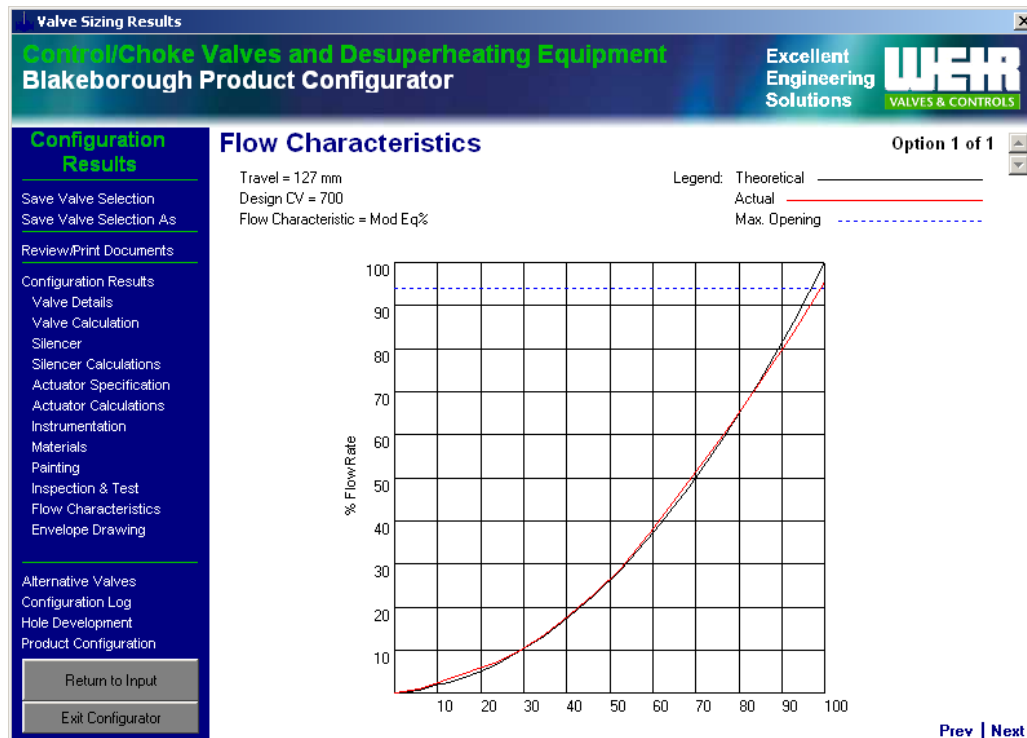
Other Details

Export Details
Import Details

Prev | Next

Output Screen Eleven – Flow Characteristic

As well as performing the standard valve calculations displayed earlier, the new sizing program will also calculate the dynamic performance characteristic of the valve using a computer generated hole pattern. Assuming that the hole pattern generation has been successful the flow characteristic graph shown below will appear with both a red and a black line, as shown below. Where the black line denotes the theoretical characteristic and the red line is the actual characteristic achieved by the hole pattern which has been produced.

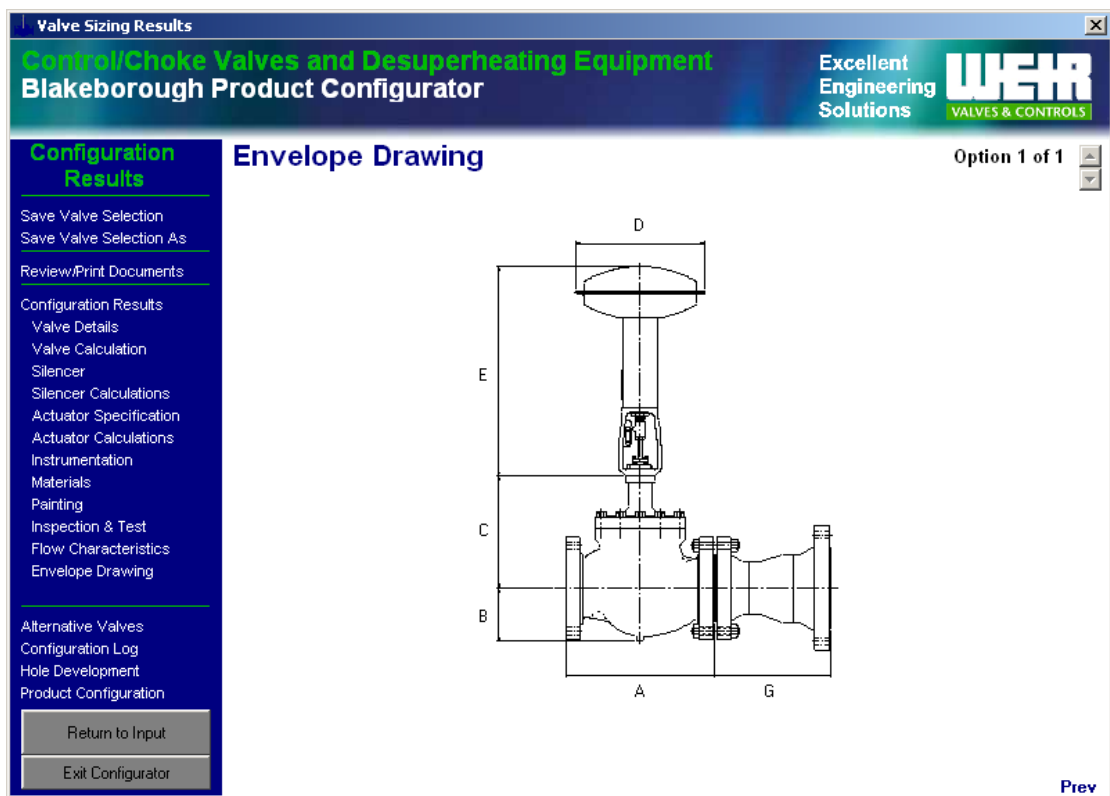


Important Note

Occasionally, the hole pattern configurator will be unable to generate a hole pattern due to missing dimensional information. In the event of this a warning message will appear in the '**Configuration Notes**' box on the output '**Valve Details**' screen and only the black line will appear on the flow characteristic graph. To generate the hole pattern the user must manually input the missing information by opening up the '**Hole Development**' screen and filling in the missing data under the '**Trim Geometry**' heading. If unsure of the required dimensions please consult engineering before proceeding.

Output Screen Twelve – Envelope Drawing

This is the final data output screen which displays an approximate envelope drawing of the selected valve configuration.



Review/ Print Reports

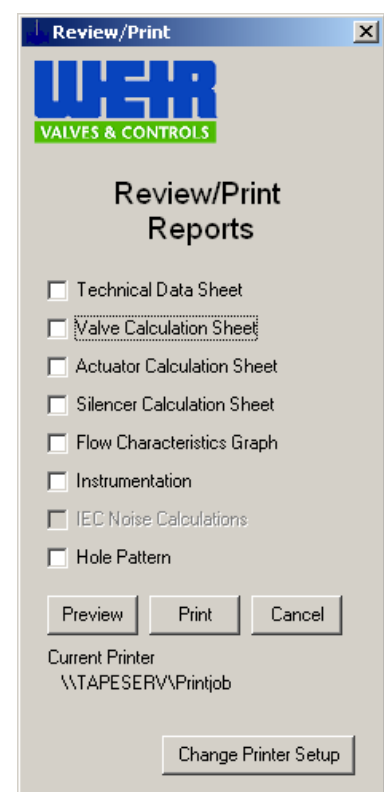
Once the valve has been configured the required data / calculation sheet can be generated by opening the '**Review / Print Reports**' box, which can be accessed from the '**Review/Print Documents**' icon in the blue '**Configuration Results**' menu.

From the '**Review / Print Reports**' box the required can either be viewed or printed off by checking the required boxes and pressing either the '**Print**' or the '**Preview**' button towards the bottom of the box.

The current printer and printer set-up can be changed by clicking on the '**Change Printer Setup**' button and following the instructions.

'Return to Input' Button

This will allow the user to return to the input details for the current valve at any time. However, please note that once pressed **all configuration details will be lost!**



Problem Troubleshooting

Input Data

What happens if line fluid I require is not display in the drop-down box?

The line fluids displayed in the drop-down box are determined by the industry which has been selected. If the line fluid you require does not appear in the relevant drop-down box then try changing the '**Industry Type**' to '**General Industry**' and try again. If the line fluid you require does still not appear then it can be typed in by clicking inside the box and typing in a description of the fluid you require.

What happens if the body material I require is not available in the drop-down box?

The contents of the body material drop-down box are selected based on the '**Industry Type**' and the '**Line Fluid**' chosen. If the body material you require is not available please try changing the '**Industry Type**' to '**General Industry**' and the '**Line Fluid**' to '**Other**' and try again. If the body material is still not listed then the material you are trying to use is probably non-standard and should be agreed with the Engineering Department before proceeding.

What happens if I require a different dynamic control characteristic to those described in the drop-down box?

The drop-down box in the program contains all of the standard dynamic control characteristics with the exception of a modified linear characteristic. If something different is required then the details of the required characteristic should be passed and approved by Engineering before proceeding.

How do I find out what is the standard flow direction for a particular control valve configuration?

The preferred flow direction through the valve is either based on the selection and fail action of the actuator or on the operation of the valve trim. In the case that the flow direction is set to 'standard' the program will use the preferred flow direction based on the valve trim. Details relating to this can be found in the Blakeborough product information.

What happens if the piping scheduled is not shown in the relevant drop down box?

Some schedules are only applicable to certain pipe diameters, therefore the contents of the drop down box are restricted based on the pipe diameter chosen. If the schedule is not shown in the drop down box it is not considered to be a standard schedule for that size of pipework.

What happens if the pipework diameter is not known?

In the rare occasion that the customer has not given any pipework information in the valve specification, the valve size should be estimated using the velocity limits stated in the product documentation. The pipework diameter can then be based on the estimated valve size.

Valve Configurations

What happens if the solution chosen by the program has a silencer and silencers are not acceptable?

The program will use a silencer where applicable unless the '**Silencer / Baffles**' check box has been unchecked on the '**Valve Details**' screen at the input stage of the program. If the program has selected a silencer and the customer has specifically stated that silencers can not be used, the user

should return to the '**Valve Details**' screen and change the setting of this check box to unchecked in order to configure a suitable solution.

