



INSTALLATION, OPERATION & MAINTENANCE GENERAL MANUAL

Thermaflo Engineering Company

STEAM-TO-STEAM GENERATORS

Note:

Each Thermaflo Clean Steam Generator has its own unique detailed submittal data that is detailed by item. In most cases this IOM is attached to the submittal data. Each individual item has an IOM for the particular part for reference.

Please contact Thermaflo with the specific project number so that your correct project submittal can be located.



THERMAFLO ENGINEERING COMPANY, INC.
LIMITED WARRANTY AND REMEDY

Thermaflo Engineering Company Inc. warrants to the original user of the Thermaflo Engineering equipment supplied by it and used in the service and in the manner for which they are intended, that such product shall be free from defects in material and workmanship for a period of 1 year from the date of installation, but no longer than 15 months from the date of shipment from the factory (unless a special warranty period applies as listed below). This warranty does not extend to any product that has been subject to misuse, neglect, or alteration after shipment from the Thermaflo Engineering Company factory, except as may be expressly provided in a written agreement between Thermaflo Engineering Company and the user, which is signed by both parties.

THERMAFLO DOES NOT MAKE ANY OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR ANY IMPLIED WARRANTY OF FITNESS FOR AN PARTICULAR PURPOSE.

The sole and exclusive remedy with respect to the above limited warranty or with respect to any other claim relating to the products or to the defects or any condition or use of the products supplied by Thermaflo, however cause, and whether such claim is based upon warranty, contract, negligence, strict liability, or any other basis or theory, is limited to Thermaflo's repair or replacement of the part or product, excluding labor or any other cost to remove or install said part of product, or at Thermaflo's option, to repayment of the purchase price. As a condition of enforcing any rights or remedies relating to Thermaflo products, notice of any warranty or other claim relating to the products must be given in writing to Thermaflo: (i) within 30 days of the last day of the applicable warranty period, or (ii) within 30 days of the date of the manifestation of the conditions or occurrence giving rise to the claim, whichever is greater. In no event shall Thermaflo Engineering Company be liable for special, direct, indirect, incidental, or consequential damages including, but not limited to, loss of use or profits or interruption of business. Thermaflo Engineering Company will not be held responsible for piping leaks after factory hydrotesting. Remedy of piping leaks



and their prompt repair are the sole responsibility of the installer or user. The Limited Warranty and Remedy terms herein apply notwithstanding and contrary terms in any purchase order or form shall be deemed rejected by Thermaflo Engineering Company Inc. Failure to follow the Water Quality and Operation Guidelines will void the Warranty and cause premature failures of the generators.

STANDARD TERMS & CONDITIONS

1. All purchase orders are subject to written acceptance at the office of Thermaflo Engineering Company, 2880 Fair Avenue Newberry, S.C. 29108.
2. Cancellation charges of 100% will apply if cancellation occurs after receipt of signed submittal drawings and release for fabrication.
3. Payment Terms: Net 30 Days from date of invoice unless other terms are stated as part of our quotation.
4. All invoices over thirty days will be subject to finance charges of 1 ½% per month.
5. Warranties are the responsibility of the manufacturers represented by Thermaflo Engineering Company. A copy of the manufacturer's standard warranty may be included with this proposal.
6. All sales are FOB: Factory unless otherwise specified by Thermaflo Engineering Company. Transportation will be at the buyer's sole risk and claims for loss or damages in transit are the responsibility of and must be filed by the buyer within 5 days of shipment delivery.
7. No terms, warranties, or guarantees express or implied, except as stated herein, shall apply to any quotation, sale, or contract for sale unless approved in writing by Thermaflo Engineering Company.
8. If shipment is deferred at buyer's request, payment shall nevertheless be due after notice to the buyer that the equipment is ready for shipment. Reasonable storage charges shall be paid by the buyer after seven days.



INTRODUCTION

Thermaflo Engineering Company (TEC) manufactures steam-to-steam generators using high pressure steam (150 psig max) to produce lower pressure clean steam. Thermaflo generators can also use high temperature hot water or hot oil to produce low-pressure steam. This manual will review all aspects of operation in a complete but general nature.

Each generator is custom engineered to furnish clean or pure steam to its users. All Thermaflo Steam-to-Steam Generators are furnished with manuals on each of the controlling or indicating components. These individual manuals should be reviewed for proper operation and troubleshooting if necessary.

All Thermaflo Engineering Steam-to-Steam Generators are constructed to the strict guidelines of the ASME Code and stamped in accordance with this code. Local codes should be reviewed before installation and made available to Thermaflo Engineering Company.

Thermaflo Engineering Company is not responsible for product damages or injuries due to the improper operation or maintenance of its equipment.

Thermaflo Engineering Company selects and uses products of other manufacturers to properly control their equipment and cannot be held responsible for the proper maintenance and operation of the components or the manuals furnished by these manufacturers. These manufacturers are selected on their high quality and past experienced reliability. Their manuals should be reviewed and Thermaflo Engineering strongly encourages that these companies be consulted as the need requires for information, maintenance, or operating manuals.

Always refer to your specific submittal data and product data sheets for details.



GENERAL OPERATIONAL DESCRIPTION

Thermaflo Engineering Steam-to-Steam Generators are constructed with two major component systems.

► Inner U Tube Bundle Heat Transfer System

This is the inner tube U bundle. The steam, high temperature water, or hot oil enters the generator at the tube bundle head and delivers the heat to the feedwater until it changes from a liquid state into the vapor state STEAM. Steam is a useful but hot and dangerous medium. Frequent startup and shutdowns are NOT recommended.

► Feedwater or Makeup System

As the liquid feedwater is changed by heat energy into a vapor state STEAM, and is delivered out to its point of use, it must be replaced by additional feed water or makeup so that the vapor supply can continue to be delivered. The feedwater system automatically replenishes this makeup to the generator shell where the change in state can take place. The heating supply in most cases is high-pressure steam or a steam at a higher pressure in the tubes than is being produced from the shell. This source steam is controlled to the tube bundle by a steam control valve and a feedback controller. The feedback controller senses the clean steam pressure being produced in the shell, compares the pressure to its set point, and sends the steam control valve a signal as to open or close proportionally to hold the set point. The standard steam control and makeup water control valve is the Thermaflo JVV Segmented V steam control valve. Please refer to the JVV Control Valve IOM for reference on this valve.

As the feedwater in the shell (outside the inner tube bundle) is heated by the incoming steam (inside the tube bundle) to its saturation point, the feedwater changes state and becomes a vapor (steam).

As the steam flows from the generator outlet to its point of use, the feed water level drops. A level controller senses this level drop and sends a control signal to the makeup control valve to open or close in order to hold a precise level of feed water in the shell. All Thermaflo Generators are fitted with a modulating feed water level system to ensure steam quality of the discharge. These two systems operate in conjunction with each other to create a supply of clean steam to its users. Some generators are fitted with feed water stainless steel preheaters which accept the main coil condensate into its shell and preheat the incoming feed water to the shell. Please refer to your submittal and specific drawing for details.

Control Panel Operation Note:

Repeated cycling of power will cause damage to the inner PLC module. This includes brown outs. Be sure you are connected to a reliable power source. The EC1000 logs power cycling.



INSTALLATION

- *Location*

Thermaflo Steam-to-Steam Generators should be located in a space where maintenance, when required, can be performed without removal of other equipment. A major consideration for installation would be the unobstructed distance in front of the head for tube bundle removal. This distance is indicated on the submittal drawing furnished with each unit. A proper housekeeping concrete pad should be constructed of approx. 4" in height so that the loner saddle or frame supports are not subjected to water, chemicals, or excessive moisture causing rust or deterioration. Steam supply, clean steam outlet, and feedwater piping connections should be close to the unit for ease of accessibility. A proper blowdown drainage point should be located in the area and it is highly recommended to use a Thermaflo type JASR or JSA Blowdown Aftercooler /Separator unit to accommodate blowdown in the area.

- *Mounting/Install*

The Thermaflo Steam-to-Steam Generator should be properly secured to the housekeeping pad or floor. Anchor points are provided with each unit for this purpose. Be sure to check the specifications for proper fasteners and seismic codes for the site or project.

- *Steam or HTHW Supply Piping **VERY IMPORTANT READ***

The supply steam piping should be saturated and dry. A main drip trap point is supplied with each unit located at the inlet to the control valve. The steam supply line should never be smaller than the source steam inlet connection. The inlet source steam connection can be located in the submittal drawing connection schedule and has been properly sized for the load by Thermaflo. The main supply line should have a full size drip point within 24" of the main steam control valve or a HSS steam separator to eliminate condensate from the process steam supply. This also stops control valve seat failures and tube bundle failures. **The steam piping MUST be 100% supported so NO weight loading is on the head or gasket leaks will occur over time.** Water hammer will destroy the tube bundle and control valve internals. Always start up the system slowly to avoid this situation. It is always advisable to contact your local Thermaflo representative about proper steam piping design. Loading recommendations are the same for HTHW. Always include a strainer on the inlet. Dry steam means long life and optimum performance.



Feed Water Supply (**IMPORTANT READ**) **Maintaining Feed Water Quality is Imperative** The feed water supply to the generator should be clean 1-5 micron filtered, carbon filtered, RO or DI to avoid hard water scale out and chlorine. The PH level should be maintained between 6.6 and 7.5 and should be tested daily with records or the warranty will be void. It is never advisable to use brine, chlorinated or salt treated soft water due to the high sodium, chlorine or salt content in the feed water. The feed water supply should be at least one pipe size larger than the feed water control valve size to allow for minimum pressure drop on long runs. The feed water pressure should always be at minimum 15 psig above the clean steam pressure being generated but never higher than 50 psig above operating. For example, if the clean steam pressure being generated is 15 psig, the feed water pressure should be 30 psig minimum. **Water should be no more than 1 grain per gallon hardness. Hardness buildup will greatly reduce the heat transfer rate and reduce capacity. Hardness buildup will expand the inner tubes as it grows and pull tubes from the tubesheet and create uneven pressures at the head gasket causing gasket leaks. It is 100 % the responsibility of the user to maintain the hardness at or below 1 grain per gallon.** Adjustable Timed blowdown is standard on all THCS clean steam generators. The blowdown rate is set based on operating pressure and type of water used. The conductivity should always be maintained at 2000-3000 microsiemens per centimeters or lower and should be checked and logged daily. All feedwater level control valves must be calibrated with the system or high and low levels can persist. All Thermaflo Steam-to-Steam Generators require a check valve on the outlet of the clean steam outlet and a the makeup level control valve. If the generator is being supplied feed water via a feed pump, a feedwater control valve may or may not be furnished. Check the 'Submittal Sheet' or contact your Thermaflo representative. Installers should be careful when using Tefl on tape or excessive joint compound as not to let this material flow into the check valve or feed water control valve. Attached to this IOM you will find a water quality listing and the user is 100% responsible for maintaining these level and daily records must be maintained at all times. Failure to maintain water causes failures.

- *Safety Relief Valves*

Each Thermaflo Steam-to-Steam Generator is fitted with pressure safety relief valves to protect the shell against overpressure and not the clean steam system. Clean Steam system should employ a separate valve for this function if deemed required. The outlet should be piped unrestricted to atmosphere. Never install a valve of any type on the outlet of the safety valve. This could cause serious injury and major damage to the generator. Local piping codes and engineers' specifications should be followed. The discharge point should be to an area where it cannot be in contact with any person, equipment, or other obstruction. The discharge will consist of steam and hot water and is dangerous. It is the sole responsibility of the installer to locate, size, and pipe the discharge correctly. Safety relief valves should be tested often minimum yearly and for proper operation per local codes for proper function.

- *Electrical Connections*

Thermaflo Steam-to-Steam Generators require a single point power connection in most cases. The source power requirements are 110 volt / 1 phase / 60 Hz except when noted on the project submittal sheet'. Electrical power should be furnished to the unit via proper wiring codes by a certified electrician. A 20 Amp service is recommended.

- *Surface and Lower Blowdown Piping (IMPORTANT READ)*

As indicated earlier, Thermaflo Steam-to-Steam Generators require blowdown for operation when using standard soft water. A series of valves are located on the bottom of each shell for this purpose. The blowdown discharge line should be the same size as the valve provided and should be piped to a properly. Shell blowdown should be done weekly for 3-5 seconds. If the user does not blowdown the shell and buildup occurs the level controls will fail and warranty will be void. Blow down records should be maintained or logged to ensure this procedure is followed.



Blowdown is very hot and can cause injury to personnel if proper precaution is not taken with the discharge piping. Other blowdown points from the generator should also be piped to drain.

These points include the level controller and surface blowdown valve.

Local codes and engineers' project specifications for blow down piping should be followed. Hot blowdown should never be discharged to drain without a properly installed tempering system for cooling. The highest temperature is 140F under most codes.

Blowdown is important part of operation even with RO or Deionized Water for Clean Steam makeup. The surface or shell is fitted with a timer blowdown and is generally set for 1 minute duration 2 times in 24hrs, This can vary so the user is responsible for this setting to be 3000 microsiemens per centimeter or lower at all times. The bottom blowdown valve should be operated on a biweekly basis for 3 seconds. This means open and close the valve for a short count of 3 seconds. Blowdown records must be keep consistently. These parameters are set at the factory depending upon the type of water used.

- *Clean Steam Outlet*

The outlet clean steam discharge connection will be sized for the application. Check the project 'submittal sheet' for this size. Never downsize this line or proper flow could be compromised for capacity. **Always install a check valve on the generator outlet to avoid backflow to the shell which will cause high level alarm problems. Or if space is a concern the installer can locate an elbow directly off the outlet and slope all discharge piping away from generator to trap station. This is the installers responsibility. Never pipe vertical more than 18" or high level drain back will occur. Always pitch the outlet away from the generator.**

- *Condensate Return Piping*

Each Thermaflo Steam-to-Steam Generator is fitted with a properly sized F&T (Float & Thermostatic) steam trap to drain the inner energy source steam coil and a main drip trap at the control valve inlet. **The size of the condensate line will be indicated on the individual 'submittal sheet' for the unit and should never be downsized or piped to a pressurized return or lifted overhead. Install a condensate pump to allow proper drainage to return.**

Proper condensate piping will enable the generator to operate properly without water hammer and thermal shock. Condensate should never be piped into a vertical riser or pressurized return line or waterhammer can and will occur.

- *Piping Confirmation*

All Thermaflo Steam-to-Steam Generators are fitted with high quality pipe fittings and valves and have been factory hydrotested for leaks. During transportation from the factory to jobsite locations, road travel vibration, and jobsite fitups these can work a joint loose. Upon startup, all joints should be inspected for leaks and some retightening may be required. **Any leak should be retightened before erosion takes place at the joint immediately.**

- **Never allow steam supply piping or condensate return piping to be supported in any way on the clean steam head connections or this will eventually cause head gasket leaks. The thermal expansion will pull at the head bolts and remove proper torque. All head bolts should be retorqued and checked after the first two hours of operation and biannual thereafter. Not following this procedure can result in head gasket leaks prematurely.**



Thermaflo Engineering Company cannot be held responsible for leaks or piping drips after hydrotest and shipment from the factory. It is the sole responsibility of the installer to provide full piping confirmation after shipment and eliminate any leak points found. The installer shall also follow proper retorquing procedures as listed in this manual before and after startup to avoid head and gasket leaks.

NOTE: Always refer to your specific generator submittal package and drawing for individual details on each component.

STARTUP PROCEDURE

Foreword

Generators can only be started and setup by a certified factory representative or trained manufacturer's representative on site and present for startup assistance. All 'submittal sheet' details and component manufacturer's data should be reviewed before startup is attempted.

READ CAREFULLY Unless otherwise specified all Clean Steam generators are preprogrammed and are equipped with a slow startup feature in the EC 1000 controller.

STARTUP:

1. The main steam valve should be closed and the outlet steam valve from the shell should be closed. **Do not open any steam valves until the level has been set, and the system controller is completely functional.**
2. The lower blowdown valves should be closed. Open the condensate valves on trap outlets.
3. Most units are equipped with Vega 63/81 level transmitter or a Vega 61 level switch. Always refer to your specific submittal before starting the equipment. Level switches do not require calibration and filling of level lines but the DP transmitters do. See DP fill instructions located at the end of this manual. DP Transmitters were discontinued on 2020.
4. Electrical power should be turned on to the unit. This will power up the control panel. With the shell empty of feedwater at this point, the low level alarm will sound. Push the silence button and open the manual valve on the feedwater supply line. This will allow feedwater to enter the shell through the feed water JVV control valve. If a feed water pump is being used for fill, this action will start the pump, sending feedwater into the shell.
5. The feed water will begin filling the generator shell and the low level alarm will shut off as this level comes up. A sight glass has been provided with the level controller assembly so that the operator has a visual sight of this process. Be sure power is on both control valves.
6. The inlet filling feed water will reach a point just below the inner tube bundle or about the halfway point on the level gauge before the level controller closes the makeup feedwater control valve and or stops the feed pump. *Note: In some cases, the feed pump runs continuously and the feedwater control valve will stop the feedwater fill flow see data sheet.*

All feedwater valves are modulating type after 2009 manufacturing date. It is critical that this fill cycle function properly in order to operate the generator.

Levels are preset at the factory before shipment approx 24" above the shell flange. Do not change this without consulting with the factory as carry over or lower capacity output will occur.



7. With the shell filled with feed water and the level controls operating properly, the steam source to the tube bundle can be started. Do this manually very slowly with the isolation valve. The Vega Probe requires no adjustment. The Vega Probe instructions are attached. The Vega Probe can be easily recognized by a bright yellow head. Levels are preset at the factory. Check and make sure power is on to both the JVV level and pressure control valves . Low alarm will be on until water fills generator.

8. ***The ECJ000 control panel has been factory set for the clean steam outlet pressure per the submittal data as well as the level. Do not change these values without a Thermajlo Tech.*** Now slowly open the inlet supply steam valve and feed steam to the JVV pressure control valve. This procedure should be done very slowly so that thermal expansion of the inner tube bundle can take place. The clean steam pressure in the shell will slowly begin to rise to the set point on the controller and the source control valve will begin to modulate closed to hold this set point. **If the unit is started unsupervised water hammer and thermal shock will occur and cause bundle failures and gasket and fitting leaks.**

9. At this point on the initial system startup, the generator should be held at setpoint pressure for a period of 30 minutes to assure proper cleaning of the generator shell. *If this is not the initial startup, proceed to Step 10.* After 30 minutes at set point, close the main energy source valve and slowly drain the shell via the bottom manual blow down valve. Be sure the blow down cooling system is operational. When the low level alarm sounds, close the bottom blow down valve and allow the fill feed water cycle to repeat. Again, slowly open the source valve and allow the generator to come back up to setpoint pressure. The main clean steam outlet valve can now be opened to the system. This should be done very slowly as to avoid thermal shock and water hammer. The valve should be opened in 5% increments to maintain control of the outlet clean steam flow. It is the responsibility of the startup installer to slowly warm up the clean steam system properly.

10. On initial startup, it is advisable to set a small steam purge to atmosphere for a minimum of 15 minutes to observe operation. Be sure to discharge steam to a safe place and at a low noise level.

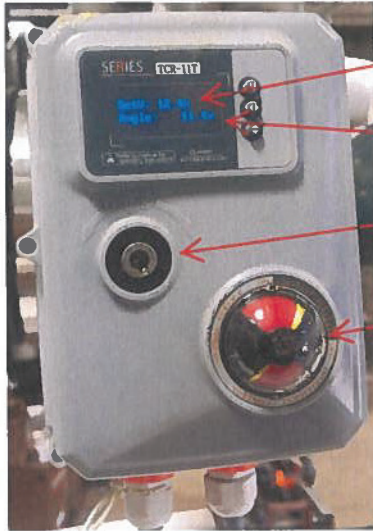
11. At this point, the unit is ready for normal operation.

12. **Important: Head Bolts must be re-torqued after initial startup to prevent leakage between the gaskets located on either side of the tube bundle. Periodic torque checks should be done during scheduled maintenance. See pages 11 through 13 specifically for torque rating for correct torque procedure. Important. If any drip leak occurs torque immediately at the leak spot and follow sequential pattern at 10 additional ft/lbs. Head gasket leaks due to neglect and improper torque requirement procedure will not be considered warranty by Thermaflo Engineering as this is very clear.**

13. All Thermaflo Engineering, Inc. Clean Steam Generators are furnished with blowdown controls. Applications require different types. Review the type and setup so that proper calibration and operation occurs. Consult factory with questions.



JVV Actuator Digital Display



"Set V" Actual Opening Position from the Controller
 "Angle" Actual Valve Opening Position

Manual Allen Head Over Ride Opening Slot

Visual Positioner Red is closed and Yellow is Open
 This valve is slightly 11.1% Open as example
 If no indication is showing 24V DC Power is not reaching the valve. If no Set V is showing no signal is reaching the valve.

Supply Voltage: 24V DC
 Signal: 0-10 Volts

Important JW Actuator Notes Please Read"

1. Never use the manual over ride while the valve is powered on with a signal or you will strip in internal gearing.
2. Before any manual steam or water makeup valves are opened on startup make sure the main controller is powered up and the JW control valves are receiving power and charging up. On startup both valves should say 98 to 100% SetV and Angle because the generator is empty of makeup water and no shell steam pressure exist.
3. Both the process steam or HTHW side generator and makeup water valves are set to FAIL CLOSED. Test these before any manual valves are opened.
4. Never introduce steam or HTHW to the bundle side before setting the makeup level in the shell, opening the outlet clean steam discharge valve. Remember you must have a load to properly setup a clean steam generator.

SHUTDOWN PROCEDURES

1. Close the main steam valve, feeding the heat exchanger bundle.
2. Close the outlet clean steam supply valve.
3. Shutdown the pneumatic and or electrical power and lock out these sources.
4. Slowly open the lower blowdown valve and drain the shell completely. This valve should remain open on shutdown.
5. Open the lower drain valve on the level controller assembly and sight glass.

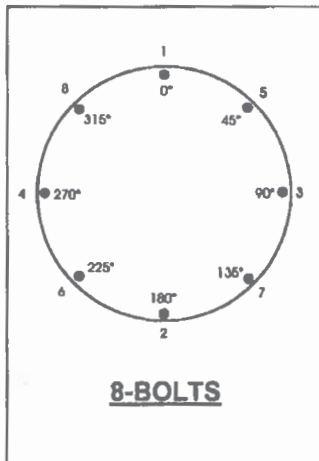
• Inner Bundle Removal

All Thermaflo Engineering Inc. internal bundles can be fully removed without disturbing the shell or source heating piping. This can be accomplished by shutting down all incoming and outgoing piping, and draining the generator. After the unit has cooled the lower head can be removed by breaking the source flanges and removing the head to shell bolts. The inner bundle drops from the bottom on a vertical and from the front on a horizontal unit. After cleaning or inspecting the bundle. Replace the inner and outlet gaskets and slide the bundle back into the shell with head matching cross section plate for 2 pass steam. Install head bolts and retorque to the specifications attached below. Reinstall the source heating inlet and outlets and startup up, After an hour of run time retorque the bolts to avoid leaks due to thermal expansion.

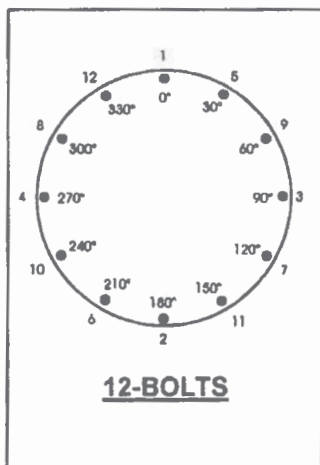
Note: After December 2020 the clean steam generators have been equipped with a 2" visible bundle view port. Remove this flange and inspect before removal.

See Maintenance Section of this Manual.

Appendix A

Bolt Torque Procedure


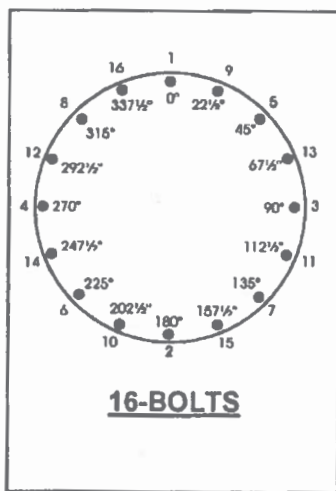
<u>SEQUENTIAL ORDER</u>	<u>ROTATIONAL ORDER</u>
1 - 2	1
3 - 4	5
5 - 6	3
7 - 8	7
	2
	6
	4
	8



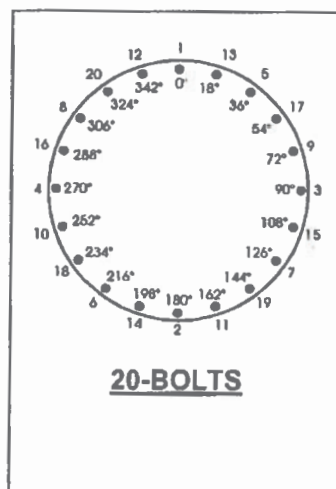
<u>SEQUENTIAL ORDER</u>	<u>ROTATIONAL ORDER</u>
1 - 2	1
3 - 4	5
5 - 6	9
7 - 8	3
9 - 10	7
11 - 12	11
	2
	6
	10
	4
	8
	12

Appendix A (cont'd)

Bolt Torque Procedure



<u>SEQUENTIAL ORDER</u>	<u>ROTATIONAL ORDER</u>
1 - 2	1
3 - 4	9
5 - 6	5
7 - 8	13
9 - 10	3
11 - 12	11
13 - 14	7
15 - 16	15
	2
	10
	6
	14
	4
	12
	8
	16



<u>SEQUENTIAL ORDER</u>	<u>ROTATIONAL ORDER</u>
1 - 2	1
3 - 4	13
5 - 6	5
7 - 8	17
9 - 10	9
11 - 12	3
13 - 14	15
15 - 16	7
17 - 18	19
19 - 20	11
	2
	14
	6
	18
	10
	4
	16
	8
	20
	12

Bolt Size and Torque Requirements

Heat Exchanger Bolt Size # of Bolts Torque FT/lb 150lb

Size	Bolt Size	Qty	Torque Required Min
6"	.75	8	117
8"	.75	8	200
10"	.87	12	200
12"	.87	12	250
14"	1.00	12	317
16"	1.00	16	490
18"	1.13	16	710
20"	1.13	20	710
24"	1.25	20	1000

Garlock 5500 Gaskets

Maintenance

Monthly:

1. Check the sight glass to make sure the level is clearly visible. If the sight glass is becoming cloudy schedule cleaning at a shutdown.
2. Check to make sure the system is holding the desired outlet clean steam pressure and the makeup and steam control valves are modulating properly.
3. Check the timer blowdown for operation. This is generally set for 1 minute duration twice daily however the timer does have a test button.
4. Check operation of the inlet steam and shell pressure gauges for function.
5. Check the inlet makeup water for hardness and log results.
6. Manually blowdown the shell for 2-3 seconds with the lower hand valve at the bottom of the shell.

Yearly:

1. After December 2020 each Thermaflo Clean Steam Generator has been equipped with a 2" flanged port at the lower shell so that the condition of the inner bundle can be viewed. Shutdown the generator after blowing down for 5 seconds while operating at normal pressure. Allow the unit to cool and isolate all inputs of water and steam manually. Remove the 2" 150lb blind flange and observe the inner tube bundle. The bundle stainless steel tubes should be clearly visible with no buildup. If buildup is visible remove bundle and clean with high pressure water only, and reinstall. Gasket and Torque instructions are listed above.

Vega 81 Makeup Water Transmitter Probe

Function Note: The Vega 81 Transmitter is fitted in the 316 stainless steel external stilling well and produces a 4-20 ma signal for 3 functions.

1. Level Control of the Makeup Water in the shell via the JVV Modulating Makeup Valve. The 4-20 ma signal is wired into the EC1000 Control Panel. The EC1000 panel has a PID level control loop that modulates the makeup valve to precisely hold level.
2. Generates a high level alarm before the high high level alarm shutdown the system.
3. Generates a low level alarm

VEGAFLEX 81

4 ... 20 mA/HART - two-wire, rod and cable probe

TDR sensor for continuous level and interface measurement of liquids



Application area

With VEGAFLEX 81 you can measure all kinds of liquids essentially maintenance free. The sensor delivers precise and reliable measured values even in applications with steam, buildup, foam generation or condensation. VEGAFLEX 81 is a truly cost-effective level and interface sensor for your measuring task.

Your benefit

- The guided adjustment enables a simple, time-saving and reliable setup
- Comprehensive diagnosis options ensure maintenance-friendly operation and thus high plant availability
- Shortenable probes allow simple standardization and maximum flexibility in planning

Function

High frequency microwave pulses are coupled onto a cable or rod and guided along the probe. The pulse is reflected by the product surface. The time from emission to reception of the signals is proportional to the level in the vessel.

Technical data

Measuring range	
– Cable probe	up to 75 m (246.1 ft)
– Rod probe	up to 6 m (19.69 ft)
Measuring accuracy	± 2 mm
Process fitting	Thread from G $\frac{3}{4}$, $\frac{3}{4}$ NPT, flanges from DN 25, 1"
Process pressure	-1 ... +40 bar/-100 ... +4000 kPa (-14.5 ... +580 psig)
Process temperature	-40 ... +200 °C (-40 ... +392 °F)
Ambient, storage and transport temperature	-40 ... +80 °C (-40 ... +176 °F)
Operating voltage	9.6 ... 35 V DC

Materials

The wetted parts of the instrument are made of stainless steel. The instrument seal is made either of FKM, FFKM or EPDM. You will find a complete overview of the available materials and seals in the "configurator" on our homepage at www.vega.com/configurator.

Housing versions

The housings are available as single chamber or double chamber version in plastic, stainless steel or aluminium. They are available with protection ratings up to IP 68 (1 bar).

Electronics versions

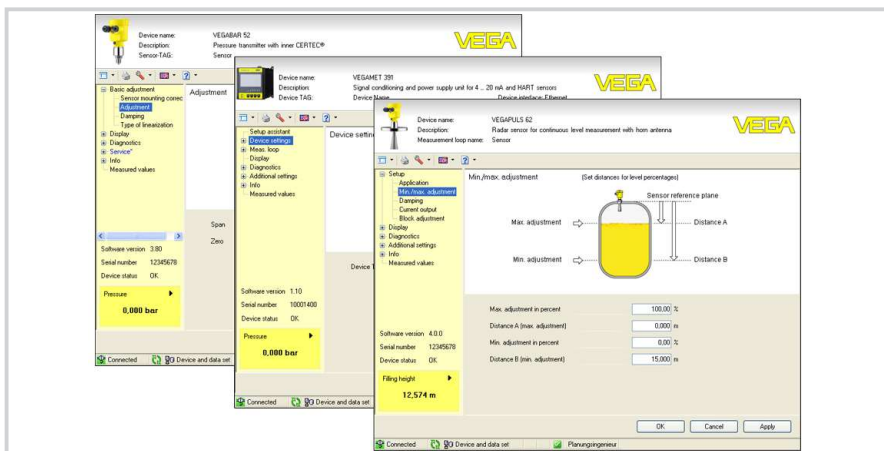
The instruments are available in different electronics versions. Apart from the two-wire electronics with 4 ... 20 mA/HART, a four-wire version and two purely digital versions with Profibus PA and Foundation Fieldbus are available.

Approvals

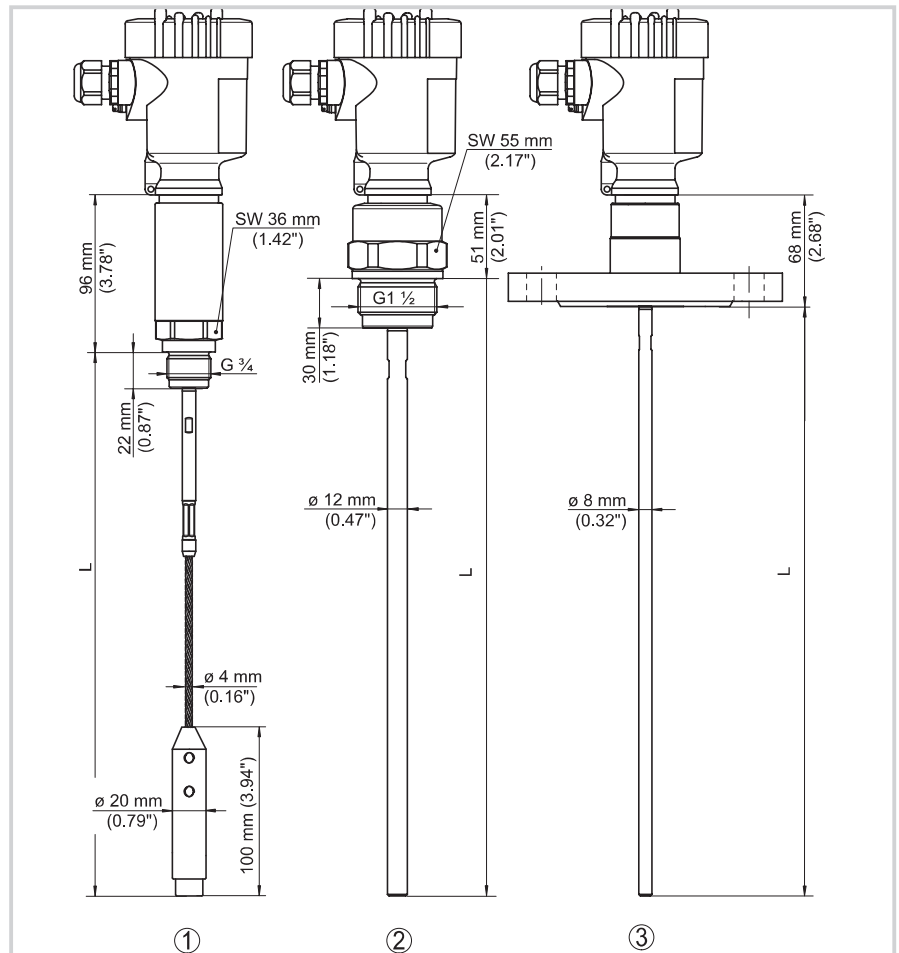
The instruments are suitable for use in hazardous areas and are approved e.g. according to ATEX and IEC. The instruments also have various ship approvals such as e.g. GL, LRS or ABS. You can find detailed information at www.vega.com/downloads and "Approvals".

Operation

The adjustment of the instrument is carried out via the optional display and adjustment module PLICSCOM or via a PC with the adjustment software PACTware and corresponding DTM. Further adjustment options are available via HART communicator as well as manufacturer-specific programs such as AMS™ or PDM.



Dimensions



VEGAFLEX 81

- 1 Cable version
- 2 Rod version
- 3 Flange version

Information

You can find further information about the VEGA product line on www.vega.com. In the download section at www.vega.com/downloads you'll find operating instructions, product information, brochures, approval documents, instrument drawings and much, much more. There, you will also find GSD and EDD files for Profibus PA systems as well as DD and CFF files for Foundation Fieldbus systems.

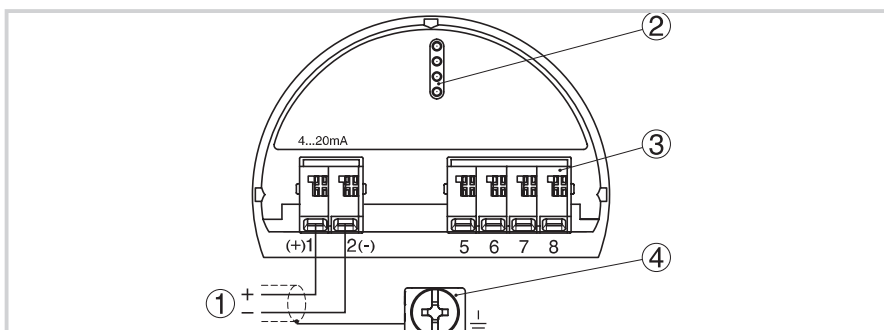
Instrument selection

With the "Finder" at www.vega.com/finder and "VEGA Tools" you can select the most suitable measuring principle for your application. You can find detailed information on the instrument versions in the "Configurator" at www.vega.com/configurator and "VEGA Tools".

Contact

You can find the VEGA agency serving your area on our homepage www.vega.com.

Electrical connection



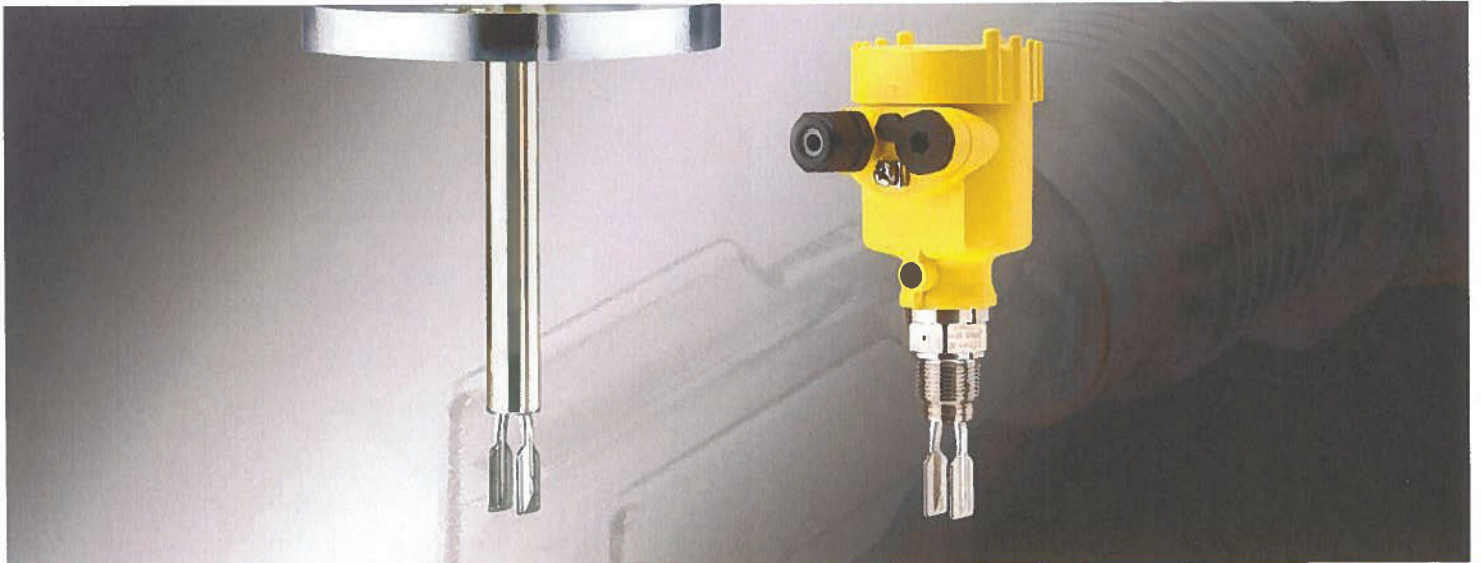
Electronics and terminal compartment, single chamber housing

- 1 Voltage supply/Signal output
- 2 For display and adjustment module or interface adapter
- 3 For external display and adjustment unit
- 4 Ground terminal for connection of the cable screen



Vega 61 High High Level Switch Assembly

Note: This switch is mounted in the top of the level column and will only operate or make contact on extreme high level. When contact is made the makeup water and steam valve close and high level alarm alerts the operator.



Thermaflo Engineering Inc 704-940-1228

Product information

Vibrating

Level detection in liquids

- VEGASWING 51
- VEGASWING 53
- VEGASWING 61 ←
- VEGASWING 63
- VEGASWING 66

Thermaflo Engineering after December 31, 2020 employed the Vega Swing 61 Level Switch for High High Level for all Clean Steam Generators

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High High Level Switch



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Take note of safety instructions for Ex applications



Please note the Ex specific safety information that you can find at www.vega.com and that comes with each instrument. In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units. The sensors must only be operated on intrinsically safe circuits. The permissible electrical values are stated in the certificate.

1 Measuring principle

Measuring principle

VEGASWING is a point level sensor with tuning fork for point level detection.

It is designed for industrial use in all areas of process technology, but preferably in liquids.

The vibrating element (tuning fork) is piezoelectrically energized and vibrates at its mechanical resonance frequency. The piezo elements are mechanically fixed and are hence not subject to temperature shock limitations. If the vibrating element is submerged in the product, the vibrating frequency changes. This change is detected by the integrated electronics module and converted into a switching command.

Configuration

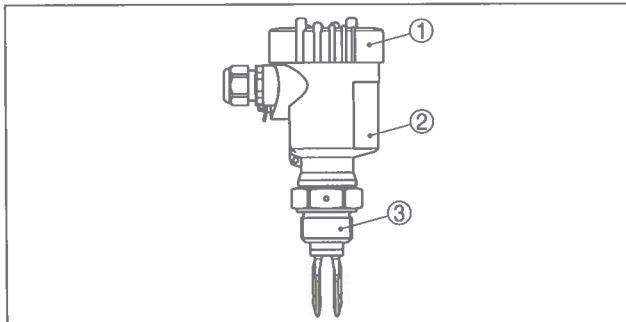


Fig. 1: Vibrating level switch VEGASWING, for example VEGASWING 61 with plastic housing

- 1 Housing lid
- 2 Housing with electronics
- 3 Process fitting

Typical applications are overflow and dry run protection. Thanks to its simple and robust measuring system, VEGASWING is virtually unaffected by the chemical and physical properties of the liquid.

It also works when subjected to strong external vibrations or changing products.

Function monitoring

The electronics module of VEGASWING continuously monitors the following criteria:

- Strong corrosion or damage on the tuning fork
- Loss of vibration
- Line break to the piezo drive

If one of the stated malfunctions is detected or in case of voltage supply, the electronics takes on a defined switching status, for example the switching output is open (safe state).

Function test

The recurring function test is used to check the safety function, in order to reveal possible dangerous unrecognized faults. The function of the measuring system must be checked in regular, adequate intervals.

There are two different ways to carry out a function test:

VEGASWING 61, 63, 66 with two-wire electronics in conjunction with a VEGATOR controller.

- Test key on the VEGATOR controller

VEGASWING 61, 63, 66 with two-wire electronics in conjunction with a VEGALOG processing system or a PLC.

- Brief interruption of the connection cable to the PLC

1.2 Application examples

Chemical industry - Solvents

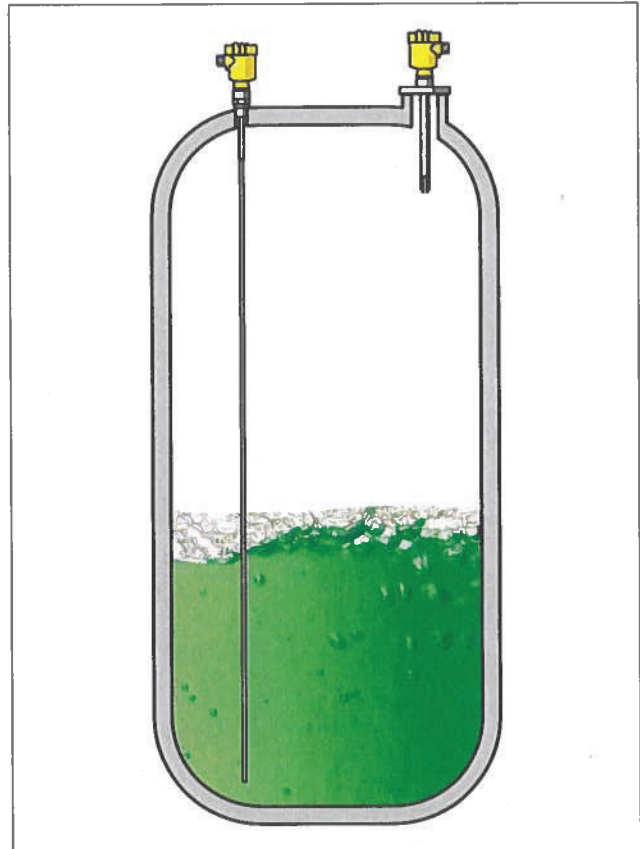


Fig. 2: Level detection in vessels with solvents

Apart from the continuous level measurement, level detection is an essential safety feature for storage tanks. Many modern sensors for continuous level measurement are actually approved as overflow protection system, however, a second, physically different measuring system provides the best safety and redundancy.

Thanks to their manifold application possibilities, VEGASWING vibrating level switches are ideal for all applications in the area of liquids warehousing. A large number of electrical and mechanical versions ensures simple integration into existing control systems.

Advantages:

- Various electrical versions
- Product-independent
- Universal level detection for all liquids

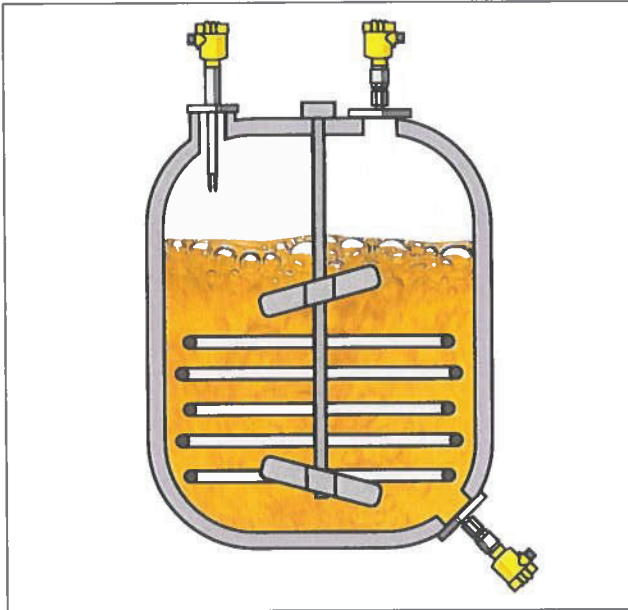
Chemical industry - reactors

Fig. 3: Level detection in chemical reactors

Because they prevent overfilling or dry running of pumps, sensors for level detection are an important safety element in reactors. Due to their universal applicability, VEGASWING level switches are well suited for use in reaction vessels. Even high viscosities, temperatures up to 250 °C and pressure up to 64 bar do not impair their function.

To provide the required chemical resistance, high resistance materials and enamelled versions are available.

In toxic products, the VEGASWING version with metallic process separation ensures a high level of safety. To prevent product leakage even in case of corrosion on the tuning fork, a glass seal is also welded in. This ensures optimum protection.

To provide optimal resistance to the measured medium, whatever its composition and corrosive properties may be, sensors made of 316L or Alloy, or sensors in plastic-coated and enamelled versions, are available.

Thanks to their manifold application possibilities, VEGASWING vibrating level switches are ideal for all applications in the area of liquids storage. A large number of electrical and mechanical versions enables simple integration into existing control systems.

Advantages:

- Various electrical versions
- Product-independent
- Completely gas-tight
- High reliability
- Universal level detection for all liquids

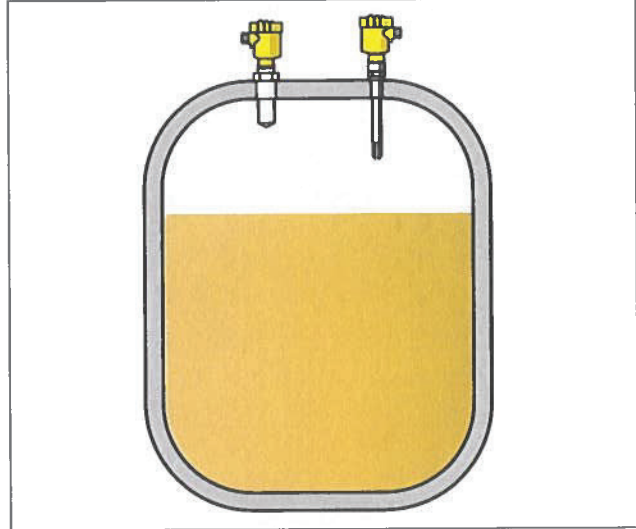
Water/Sewage water plants

Fig. 4: Precipitants in sewage water processing

Chemicals are required for sewage water treatment. They are applied to promote chemical precipitation. Phosphates and nitrates are thus sedimented and separated. In addition to lime water and ferric chloride, various acids and alkalis are stored for use in digested sludge treatment and neutralisation.

These substances are subject to the regulations covering water-endangering substances. Overfill protection systems thus have to be installed on the storage tanks.

Since they prevent the overfilling of vessels containing toxic products, sensors for level detection are an important safety element.

Due to their versatile nature, VEGASWING vibrating level switches are also well qualified for use with water-endangering substances. To provide optimal resistance to the measured medium, whatever its composition and corrosive properties may be, sensors made of 316L or Alloy, as well as sensors in plastic-coated or enamelled versions, are available.

Advantages:

- Small non-repeatability
- High-resistance sensor materials such as PFA, ECTFE, Alloy C22 (2.4602), enamel

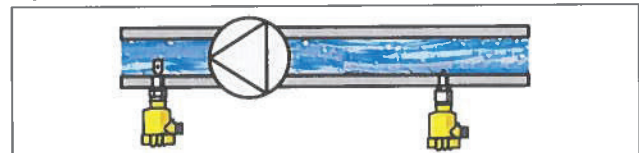
Pipelines

Fig. 5: Dry run protection in pipelines

Monitoring of levels is also important in pipelines, as dry running often causes damage or complete breakdown of the pumps.

The VEGASWING level switch is recommended as dry run protection system, e.g. for drinking water pumps. With a fork only 40 mm (1.575 in) long (VEGASWING series 60), this level switch functions quite reliably, even in pipes with small diameters from DN 32.

Advantages:

- Universal level detection for all liquids
- Adjustment and maintenance-free

Food processing industry

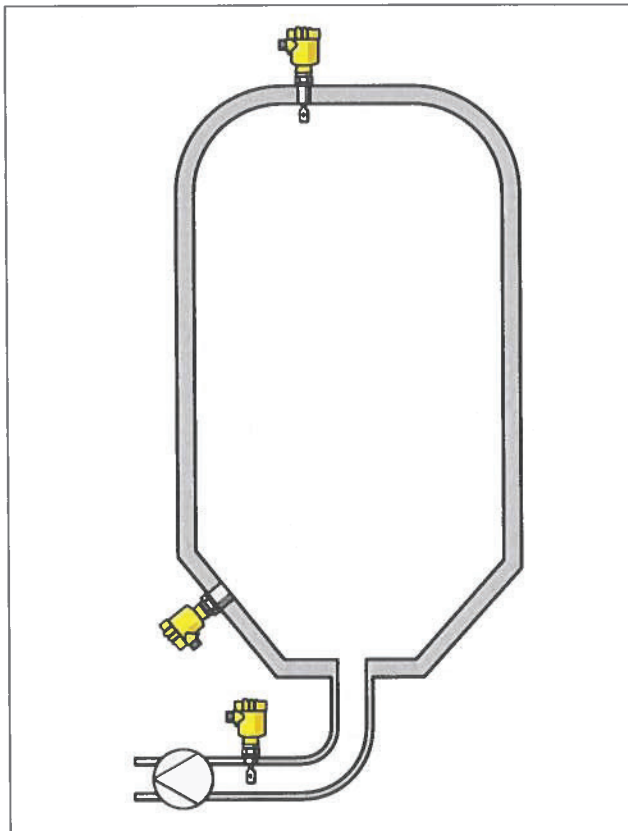


Fig. 6: Level detection and dry run protection in a tank storing milk

The processes in food processing tanks, e.g. for milk, place heavy demands on the installed measurement technology. High pressures and temperatures are generated during sterilization and cleaning of the tanks. That means that the implemented level measuring instruments and level detectors must meet the requirements of hygienic design. The innocuousness of all wetted materials must be proven and optimum cleanability must be ensured through hygienic technical design.

VEGASWING is installed for level detection and as dry run protection system. The tuning fork is highly polished for use in sensitive foodstuffs such as milk.

Advantages:

- Universal level detection for all liquids
- High-resistance sensor materials such as PFA, ECTFE, Alloy C22 (2.4602), enamel
- Adjustment and maintenance-free

Cryogenic processes

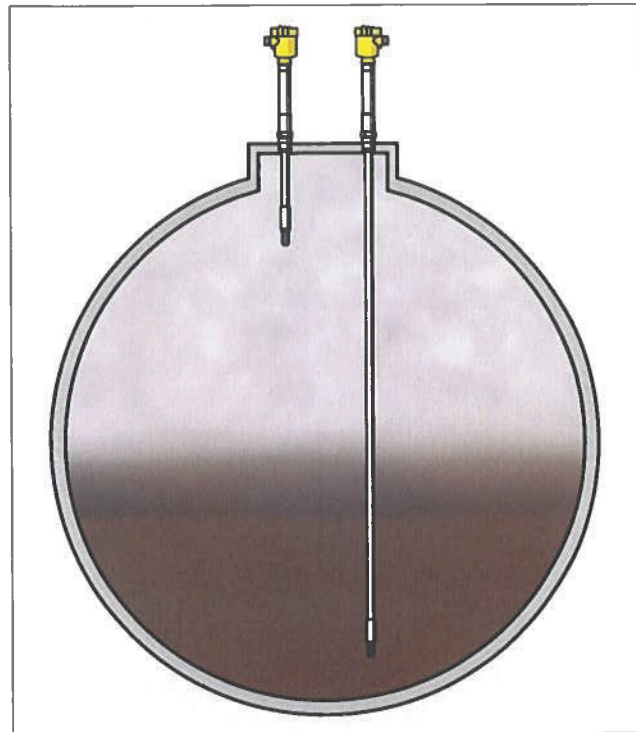


Fig. 7: Level detection in a liquid gas vessel

The extremely low temperatures in liquid tanks are a challenge to the installed measurement instrumentation. Petroleum gas is stored for example at $-162\text{ }^{\circ}\text{C}$ ($-260\text{ }^{\circ}\text{F}$) and nitrogen even at $-196\text{ }^{\circ}\text{C}$ ($-321\text{ }^{\circ}\text{F}$). The VEGASWING 66 with $-196\text{ }^{\circ}\text{C}$... $+450\text{ }^{\circ}\text{C}$ ($-321\text{ }^{\circ}\text{C}$... $+482\text{ }^{\circ}\text{F}$) can cover a large temperature range.

Advantages:

- Universal use, because only low min. density of the medium required.
- Double safety through Second Line of Defense
- Cost-optimized setup without medium

Steam vessel

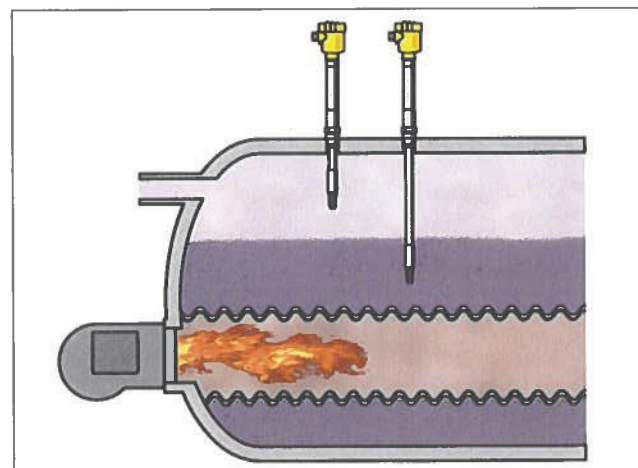


Fig. 8: Level detection in a steam boiler

Point level measurement in steam boilers monitors the high and low water level of the vessel. The point level measurement is independent of vessel pressure and temperature as well as the density of the water or the saturated steam. With its pressure range up to 160 bar (2320 psig) and a max. temperature up to $+450\text{ }^{\circ}\text{C}$ ($+482\text{ }^{\circ}\text{F}$), the VEGASWING 66

covers the majority of saturated steam applications.

Advantages:

- Reliable and quick function test
- Double safety through Second Line of Defense
- Flexible and high availability in applications up to SIL3

2 Type overview



Applications	Point level measurement in liquids	Point level measurement in liquids	Point level measurement in liquids	Point level measurement in liquids	Point level measurement in liquids High and low process temperatures High process pressures
Length	-	100 ... 1000 mm (3.94 ... 39.37 in)	-	80 ... 6000 mm (3.15 ... 236.22 in)	260 ... 3000 mm (10.24 ... 118.11 in)
Process fitting	Thread G½, G¾, G1 Hygienic fittings	Thread G¾, G1 Hygienic fittings	Thread G¾, G1 Flanges Hygienic fittings	Thread G¾, G1 Flanges Hygienic fittings	Thread G1 Flanges
Process temperature	-40 ... +100 °C (-40 ... +212 °F) -40 ... +150 °C (-40 ... +302 °F) with temperature adapter	-40 ... +100 °C (-40 ... +212 °F) -40 ... +150 °C (-40 ... +302 °F) with temperature adapter	-50 ... +150 °C (-58 ... +302 °F) -50 ... +250 °C (-58 ... +482 °F) with temperature adapter	-50 ... +150 °C (-58 ... +302 °F) -50 ... +250 °C (-58 ... +482 °F) with temperature adapter	-196 ... +450 °C (-321 ... +482 °F)
Process pressure	-1 ... 64 bar (-14.5 ... 928 psig)	-1 ... 64 bar (-14.5 ... 928 psig)	-1 ... 64 bar (-14.5 ... 928 psig)	-1 ... 64 bar (-14.5 ... 928 psig)	-1 ... 160 bar (-14.5 ... 2321 psig)
Signal output	Transistor Contactless electronic switch IO-Link	Transistor Contactless electronic switch IO-Link	Relay Transistor Two-wire NAMUR Contactless electronic switch	Relay Transistor Two-wire NAMUR Contactless electronic switch	Relay Transistor Two-wire
Ruggedness	+	+	+	+	+
Sensitivity	+	+	++	++	++
Bulldup	++	++	+	+	+
Cleanability	++	++	++	++	++
Installation length	++	++	++	++	++

3 Instrument selection

VEGASWING 51, 53

VEGASWING 51 is a universal level switch with small dimensions. Independent of the mounting position, it detects the level reliably and with millimetre accuracy. The instrument can be used for full or empty alarm, as approved overflow protection or dry run or pump protection in vessels and pipelines. VEGASWING 51 is an economical solution with a small, compact stainless steel housing and is available with the electronics versions transistor output, contactless electronic switch and IO-Link.

On VEGASWING 53, the switching point can be adapted to the process with a freely selectable extension tube.

VEGASWING 61, 63

VEGASWING series 60 level switches are instruments from the VEGA plics® series, which are available in standard and tube version. Thanks to the many different process fittings, housings and electronics versions, plics® instruments can be configured in versions suitable for any application. They have all standard approvals and the tuning fork can also be polished, e.g. for applications in the food processing industry.

On VEGASWING 63, the switching point can be adapted to the process with a freely selectable extension tube.

VEGASWING are virtually unaffected by product properties and thus do not have to be adjusted.

The level switches are used in applications with process temperatures up to +250 °C (+482 °F) and pressures of up to 64 bar (928 psig).

They detect liquids from 0.5 ... 2.5 g/cm³ (0.018 ... 0.09 lbs/in³).

All electronics are qualified for the function "overflow and dry run protection" according to IEC 61508 and 61511 for SIL2, in redundant version also up to SIL3.

VEGASWING 66

The point level sensors VEGASWING 66 are instruments from the VEGA plics® series and available in standard and tube version. The instruments are suitable for liquids with extremely low and high process temperatures. With their many different process fittings, housings and electronics versions, plics® instruments can be ideally configured for any application. They have all standard approvals.

VEGASWING are virtually unaffected by product properties and thus do not have to be adjusted.

The level switches are used in applications with process temperatures up to -196 ... +450 °C (-321 ... +482 °F) and pressures of up to 160 bar (2321 psig).

They detect liquids from 0.42 to 2.5 g/cm³ (0.015 to 0.09 lbs/in³).

All electronics are qualified for the function "overflow and dry run protection" according to IEC 61508 and 61511 for SIL2, in homogeneous redundant version also up to SIL3.

4 Instrument features

Second Line of Defense

To increase safety in applications with dangerous or toxic products, the series 60 sensors can be ordered with a welded, gas-tight feedthrough (Second Line of Defense).

Temperature adapter

For VEGASWING 61 and 63, a temperature adapter is optionally available. With it you can increase the max. permissible process temperature from +150 °C (+302 °F) to +250 °C (+482 °F).

SIL qualification

As an option, the sensors of VEGASWING series 60 can be ordered with SIL qualification. The sensors can thus be used in applications according to SIL2. In a homogeneously redundant configuration, they can also be used up to SIL3.

Coating

To make the use of VEGASWING series 60 sensors possible in aggressive or corrosive products, different coatings are optionally available. The following coating materials can be used depending on the required resistance. Our application engineers will be pleased to give you advice on resistances and the possibilities the sensors offer.

- ECTFE
- PFA
- Enamel

5 Accessories

Protective cover

To protect the sensor against pollution and strong heat due to the sun, you can snap a weather protective cover onto the sensor housing.

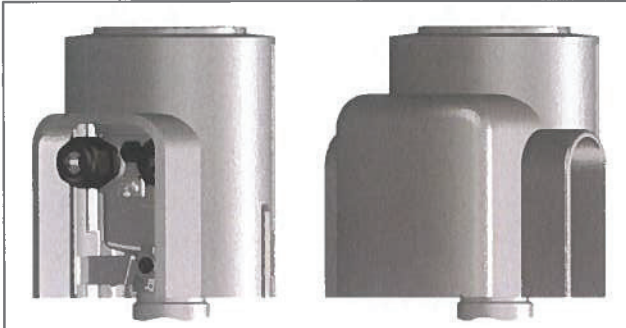


Fig. 9: Weather protection cover in different versions

Display module PLICSLED

The display module allows you to clearly display the switching status of the sensor. For this purpose, housing lids with inspection windows in different materials are available. The plastic housing is optionally available with a transparent lid through which you can see the indicator lamp from the side.

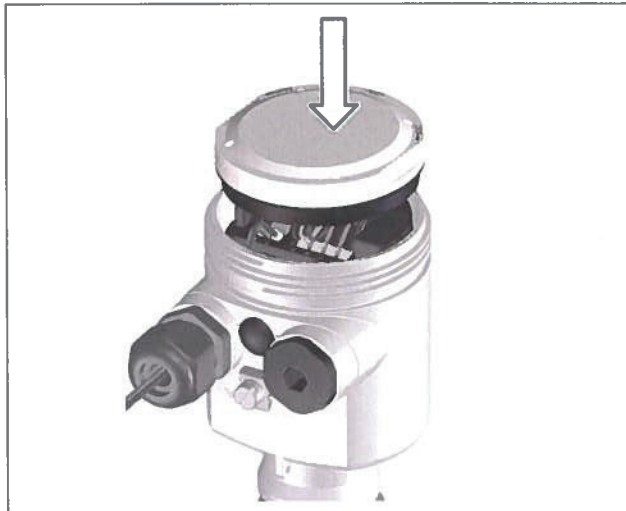


Fig. 10: Display module PLICSLED

Lock fitting

VEGASWING in tube version can be mounted with a lock fitting for infinitely variable height adjustment. Take note of the pressure specifications of the lock fitting.

Keep in mind that the lock fitting must not be used with coated instrument versions.



Fig. 11: Lock fitting - e.g. ARV-SG63.3 for VEGASWING 63 up to 64 bar

Plug connector

Instead of a cable gland, you can also use various plug connectors for making connections. The following plug connectors are available for VEGASWING series 60:

- ISO 4400
- ISO 4400 with Quick-On fitting
- Amphenol-Tuchel
- Harting HAN 7D
- Harting HAN 8D
- M12 x 1

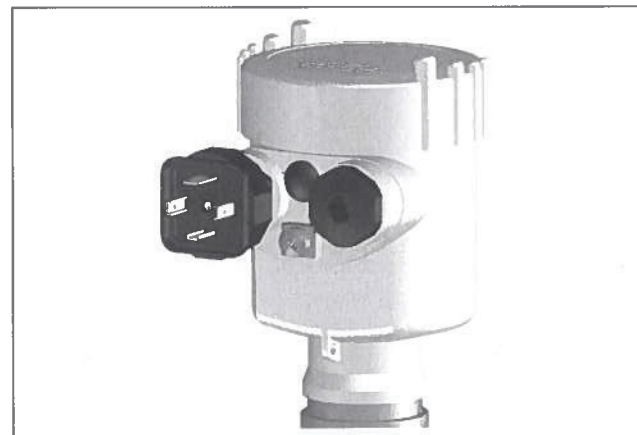


Fig. 12: Plug connector - e.g. VEGASWING series 60 with ISO 4400 plug

There are no cable glands possible for the VEGASWING of series 50. The instruments are available with the following plug connectors:








- ISO 4400
- ISO 4400 with Quick-On fitting
- M12 x 1

6 Selection criteria

Version		VEGASWING		VEGASWING		VEGASWING 66	
		51 Compact	53 Tube	61 Compact	63 Tube	66 Compact	66 Tube
Vessel	Probe length max. 3 m	-	●	-	●	-	●
	Probe length max. 6 m	-	●	-	●	-	-
	Cryogenic applications	-	-	-	-	●	●
	Pipelines	●	-	●	●	●	●
Process	Aggressive liquids	○	○	○	○	○	○
	Bubble or foam generation	●	●	●	●	●	●
	Wave movements at the surface	●	●	●	●	●	●
	Steam or condensation	●	●	●	●	●	●
	Buildup	○	○	○	○	○	○
	Changing density	●	●	●	●	●	●
	Temperatures up to +150 °C	●	●	●	●	●	●
	Temperatures up to +250 °C	-	-	●	●	●	●
	Temperatures > +250 °C	-	-	-	-	●	●
	Pressures up to 64 bar	●	●	●	●	●	●
	Pressures up to 160 bar	-	-	-	-	●	●
	Hygienic applications	○	○	●	●	-	-
	Narrow space above the vessel	●	●	●	●	-	-
	Steam boiler application	-	-	-	-	●	●
Process fitting	Threaded fittings	●	●	●	●	●	●
	Flange connections	-	-	●	●	●	●
	Hygienic fittings	●	●	●	●	-	-
Sensor	Stainless steel	●	●	●	●	●	●
	Coating	-	-	●	●	-	-
	Polished version	●	●	●	●	-	-
	SIL qualification	-	-	●	●	●	●
Industry	Chemical	●	●	●	●	●	●
	Power generation	○	○	○	○	●	●
	Foodstuffs	○	○	●	●	-	-
	Offshore	●	●	○	○	●	●
	Petrochemical	○	○	○	○	●	●
	Pharmaceutical	○	○	●	●	-	-
	Shipbuilding	●	●	●	○	●	○
	Environment and recycling industry	●	●	●	●	●	●
	Water	●	●	●	●	○	○
	Waste water	○	○	○	○	○	○

- = optimum suitability
- = possible with limitations
- = not recommended

7 Housing overview - VEGASWING 61, 63, 66

Plastic PBT			
Protection rating	IP66/IP67	IP66/IP67	
Version	Single chamber	Double chamber	
Application area	Industrial environment	Industrial environment	
Aluminium			
Protection rating	IP66/IP67, IP66/IP68 (1 bar)	IP66/IP67, IP66/IP68 (1 bar)	
Version	Single chamber	Double chamber	
Application area	Industrial environment with increased mechanical stress	Industrial environment with increased mechanical stress	
Stainless steel 316L			
Protection rating	IP66/IP67	IP66/IP67, IP66/IP68 (1 bar)	IP66/IP67, IP66/IP68 (1 bar)
Version	Single chamber, electropolished	Single chamber, precision casting	Double chamber, precision casting
Application area	Aggressive environment, food processing, pharmaceutical	Aggressive environment, extreme mechanical stress	Aggressive environment, extreme mechanical stress

8 Mounting

Switching point

In general, VEGASWING can be installed in any position. The instrument only has to be mounted in such a way that the vibrating element is at the height of the desired switching point.

The tuning fork has lateral markings (notches) marking the switching point with vertical installation. The switching point refers to the medium water with basic setting of the density switch $\geq 0.7 \text{ g/cm}^3$ (0.025 lbs/in³).

Keep in mind that foams with a density $> 0.45 \text{ g/cm}^3$ (0.016 lbs/in³) are detected by the sensor.

Mounting socket

The vibrating element should protrude into the vessel to avoid buildup. For that reason, avoid using mounting bosses for flanges and screwed fittings. This applies particularly to horizontal installation and use with adhesive products.

Agitators

Due to agitators, vibration or similar, the level switch can be subjected to strong lateral forces. For this reason, do not use an overly long extension tube for VEGASWING 63 or 66, but check if a VEGASWING 51 or 61 level switch without tube extension couldn't be used instead, mounted on the side of the vessel in horizontal position.

Extreme vibration caused by the process or the equipment, e.g. agitators or turbulence in the vessel, can cause the extension tube of VEGASWING to vibrate in resonance. This leads to increased stress on the upper weld joint. Should a longer tube version be required, you can provide a suitable support or guy directly above the vibrating element to secure the extension tube.



This measure applies mainly to applications in Ex areas. Make sure that the tube is not subject to bending stress due to this measure.

Inflowing medium

If VEGASWING is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount VEGASWING at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

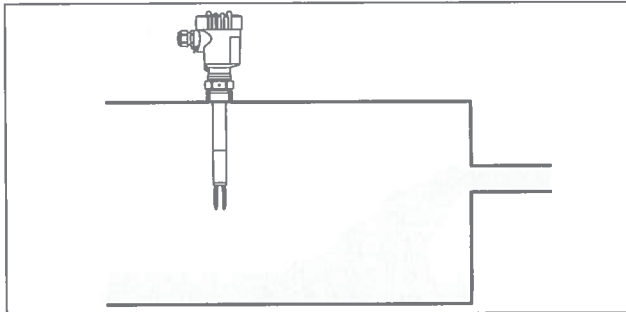


Fig. 13: Inflowing medium

Product flow

To make sure the tuning fork of VEGASWING generates as little resistance as possible to product flow, mount the sensor so that the surfaces are parallel to the product movement.

Lock fitting

VEGASWING in tube version can be mounted with a lock fitting for infinitely variable height adjustment. Take note of the pressure specifications of the lock fitting.

Keep in mind that the lock fitting must not be used with coated instrument versions.

Pressure/Vacuum

The process fitting must be sealed if there is gauge or low pressure in the vessel. Check if the sealing material is resistant against the measured product and the process temperature.

Protective cover

To protect the sensor against pollution and strong heat due to the sun, you can snap a weather protective cover onto the sensor housing.

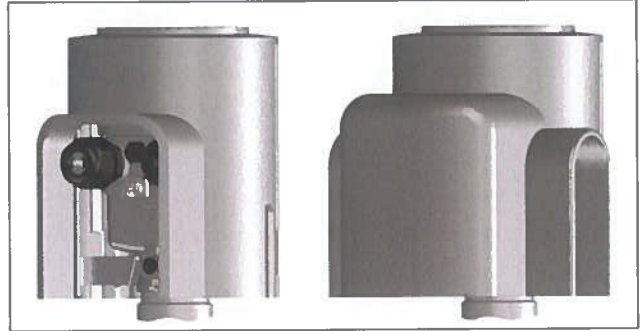


Fig. 14: Weather protection cover in different versions

9 Relay output

Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage

Take note of safety instructions for Ex applications

In hazardous areas you must take note of the respective regulations, conformity and type approval certificates of the sensors and power supply units.

Select voltage supply

Connect the operating voltage according to the following diagrams. The oscillator with relay output is designed in protection class 1. To maintain this protection class, it is absolutely necessary that the ground conductor be connected to the internal ground terminal. Take note of the general installation regulations. As a rule, connect VEGASWING to vessel ground (PA), or in case of plastic vessels, to the next ground potential. On the side of the housing there is a ground terminal between the cable entries. This connection serves to drain off electrostatic charges. In Ex applications, the installation regulations for hazardous areas must be given priority.

Select connection cable

The VEGASWING is connected with standard three-wire cable without screen with round cross-section. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use a suitable cable gland and select a suitable seal depending on the cable diameter.



In hazardous areas, use only approved cable connections for VEGASWING.

Select connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications.

VEGASWING 61, 63

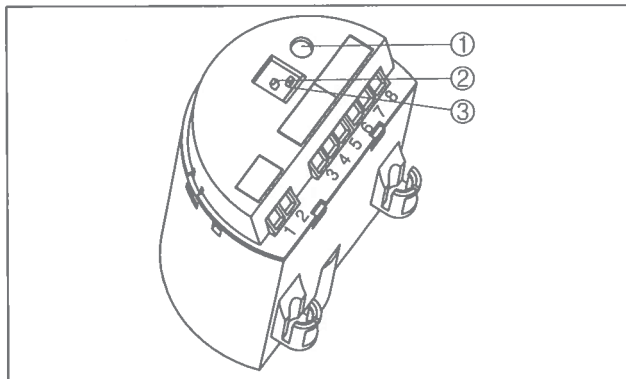


Fig. 15: VEGASWING 61, 63 - electronics module with relay output

- 1 Control lamp
- 2 DIL switch for mode adjustment
- 3 DIL switch for sensitivity adjustment

We recommend connecting VEGASWING in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state).

The relays are always shown in non-operative condition.

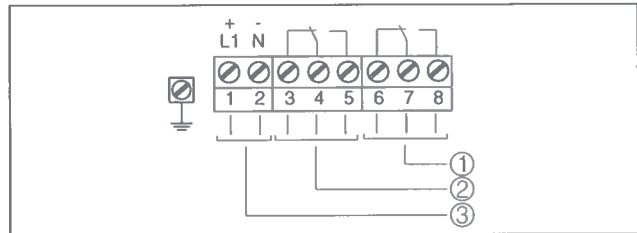


Fig. 16: VEGASWING 61, 63 - wiring plan - relay output

- 1 Relay output
- 2 Relay output
- 3 Voltage supply

VEGASWING 66

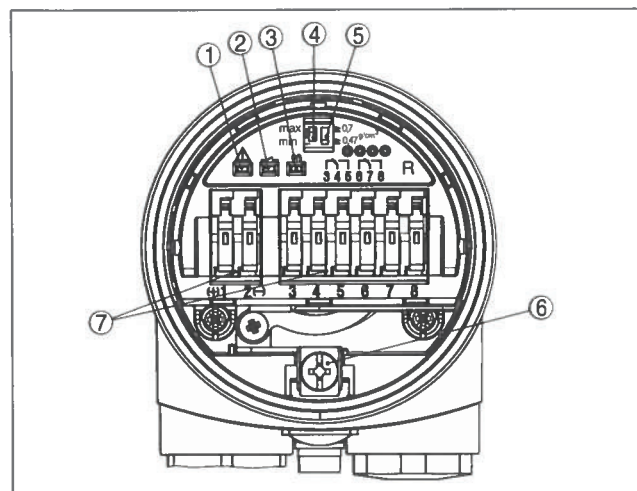


Fig. 17: Electronics and connection compartment, single chamber housing

- 1 Control lamp - fault indication (red)
- 2 Control lamp - Switching status (yellow)
- 3 Control lamp - Operating status (green)
- 4 Mode switch for selecting the switching behaviour (min./max.)
- 5 DIL switch for sensitivity adjustment
- 6 Ground terminal
- 7 Connection terminals

We recommend connecting VEGASWING in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state).

The relays are always shown in non-operative condition.

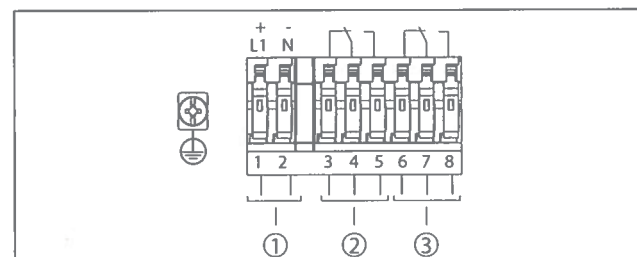


Fig. 18: Wiring plan, single chamber housing

- 1 Voltage supply
- 2 Relay output SPDT
- 3 Relay output SPDT

10 Transistor output

Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage

Take note of safety instructions for Ex applications

In hazardous areas you must take note of the respective regulations, conformity and type approval certificates of the sensors and power supply units.

Select voltage supply

Connect the voltage supply according to the following diagrams. Take note of the general installation regulations. As a rule, connect VEGASWING to vessel ground (PA), or in case of plastic vessels, to the next ground potential. On the side of the instrument housing there is a ground terminal between the cable entries. This connection serves to drain off electrostatic charges. In Ex applications, the installation regulations for hazardous areas must be given priority.

Select connection cable

The VEGASWING is connected with standard two-wire cable without screen with round cross-section. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use a suitable cable gland and select a suitable seal depending on the cable diameter.



In hazardous areas, use only approved cable connections for VEGASWING.

Select connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications.

Transistor output

We recommend connecting VEGASWING in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state).

The instrument is used to control relays, contactors, magnet valves, warning lights, horns as well as PLC inputs.

VEGASWING 61, 63

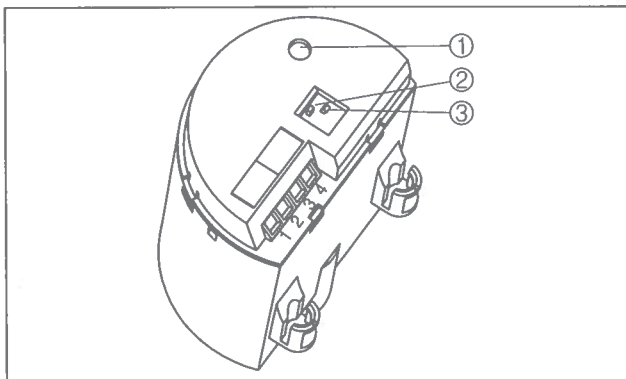


Fig. 19: VEGASWING 61, 63 - electronics module with transistor output

- 1 Control lamp
- 2 DIL switch for mode adjustment
- 3 DIL switch for sensitivity adjustment

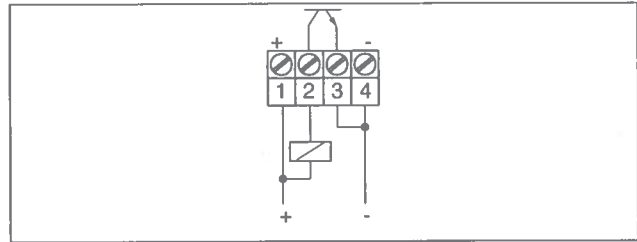


Fig. 20: VEGASWING 61, 63 - transistor output - NPN action

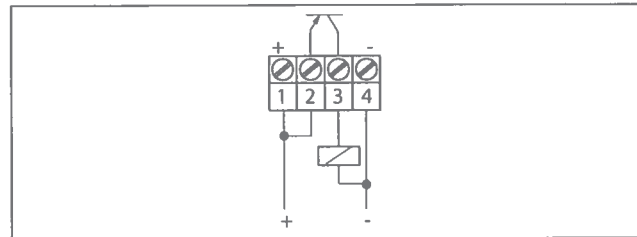


Fig. 21: VEGASWING 61, 63 - transistor output - PNP action

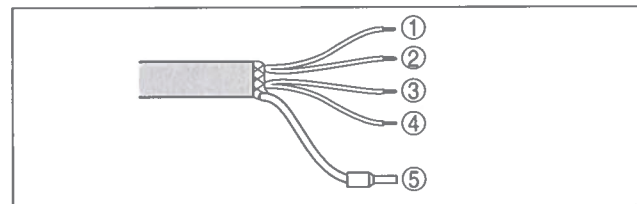


Fig. 22: Wire assignment connection cable. The numbers of the wires correspond to the terminals of the instrument.

- 1 brown (+) voltage supply
- 2 White
- 3 Yellow
- 4 blue (-) voltage supply
- 5 Shielding

VEGASWING 66

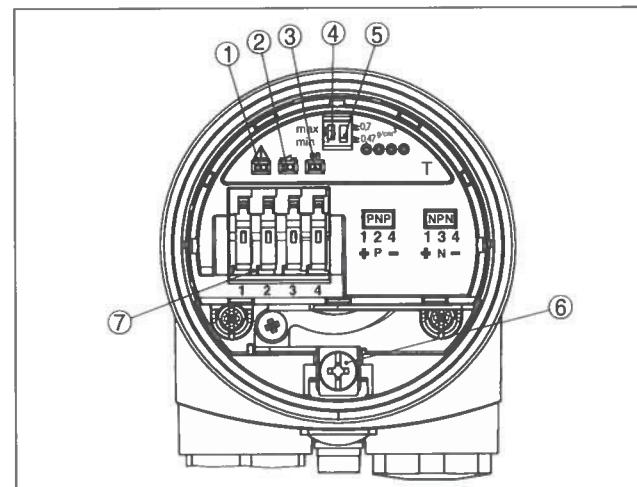


Fig. 23: VEGASWING 66 - electronics module with transistor output

- 1 Control lamp - fault indication (red)
- 2 Control lamp - Switching status (yellow)
- 3 Control lamp - Operating status (green)
- 4 Mode switch for selecting the switching behaviour (min./max.)
- 5 DIL switch for sensitivity adjustment
- 6 Ground terminal
- 7 Connection terminals

We recommend connecting VEGASWING according to the closed-circuit principle, i.e. the switching circuit is open when there is a level signal, line break or fault (safe state).

The instrument is used to control relays, contactors, magnet valves, warning lights, horns as well as PLC inputs.

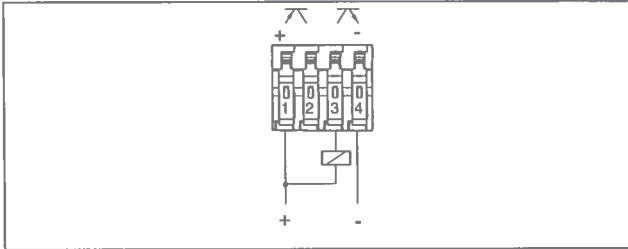


Fig. 24: VEGASWING 66 - transistor output - NPN action

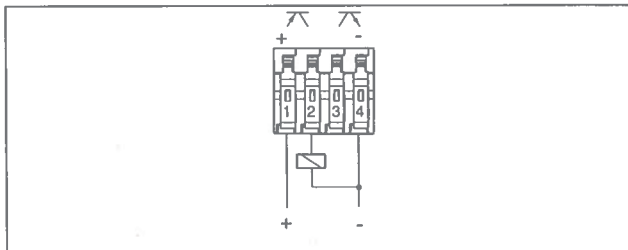


Fig. 25: VEGASWING 66 - transistor output - PNP action

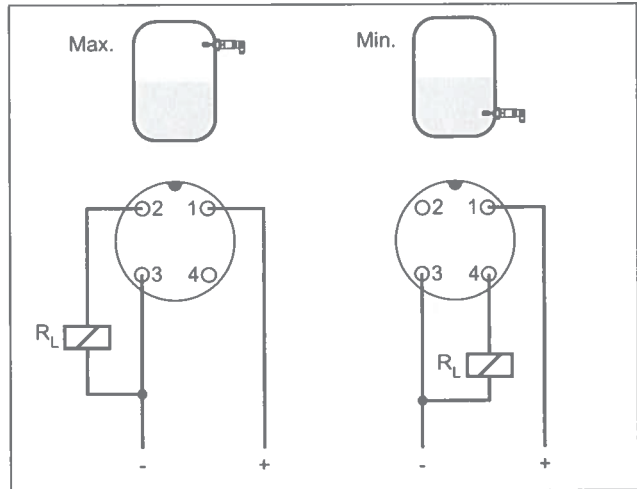


Fig. 27: VEGASWING 51, 53 - transistor output with M12 x 1 plug connection (housing)

- 1 Brown
- 2 White
- 3 Blue
- 4 Black
- RL Load resistance (contactor, relay, etc.)

VEGASWING 51, 53

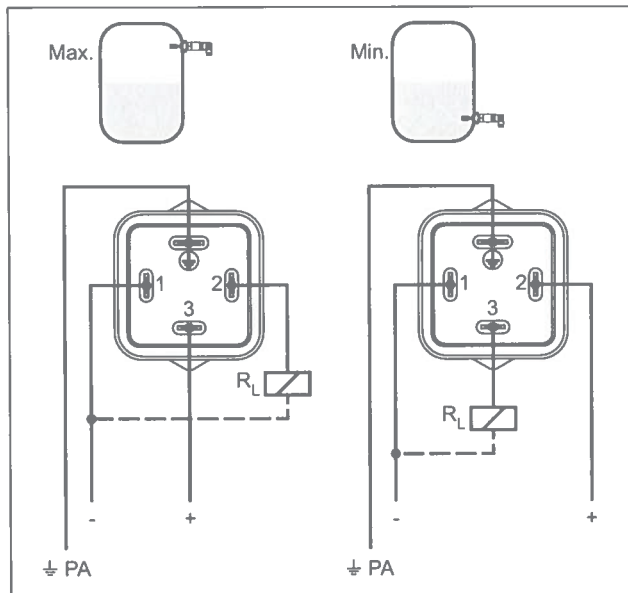


Fig. 26: VEGASWING 51, 53 - transistor output with valve plug ISO 4400

- PA Potential equalisation
- RL Load resistance (contactor, relay, etc.)

11 Contactless electronic switch

Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage

Take note of safety instructions for Ex applications

In hazardous areas you must take note of the respective regulations, conformity and type approval certificates of the sensors and power supply units.

Select voltage supply

Connect the operating voltage according to the following diagrams. The electronics module is designed in protection class 1. To maintain this protection class, it is absolutely necessary that the ground conductor be connected to the internal ground terminal. Take note of the general installation regulations. As a rule, connect VEGASWING to vessel ground (PA), or in case of plastic vessels, to the next ground potential. On the side of the housing there is a ground terminal between the cable entries. This connection serves to drain off electrostatic charges. In Ex applications, the installation regulations for hazardous areas must be given priority.

Select connection cable

The VEGASWING is connected with standard three-wire cable without screen with round cross-section. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use a suitable cable gland and select a suitable seal depending on the cable diameter.



In hazardous areas, use only approved cable connections for VEGASWING.

Select connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications.

Contactless electronic switch

We recommend connecting VEGASWING in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state).

The contactless electronic switch is always shown in non-operative condition.

The instrument is used for direct control of relays, contactors, magnet valves, warning lights, horns etc. It must not be operated without an intermediately connected load, because the electronics would be destroyed if connected directly to the mains. It is not suitable for connection to low voltage PLC inputs.

Domestic current is temporarily lowered below 1 mA after switching off the load so that contactors, whose holding current is lower than the constant domestic current of the electronics, are reliably switched off.

When VEGASWING is used as part of an overfill protection system according to WHG, also note the regulations of the general type approval.

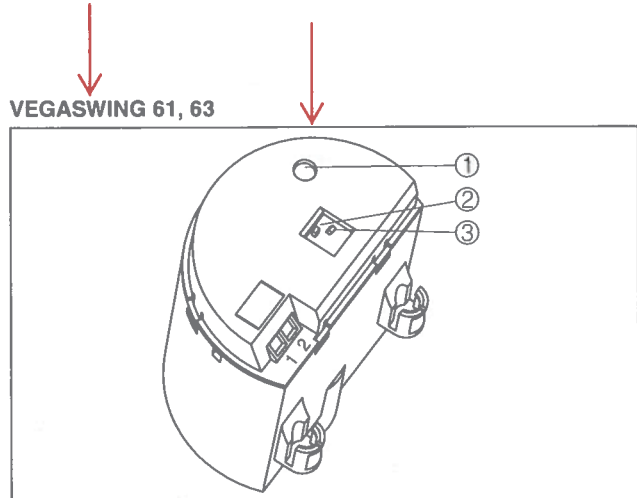


Fig. 28: VEGASWING 61, 63 - electronics module with contactless electronic switch

- 1 Control lamp
- 2 DIL switch for mode adjustment
- 3 DIL switch for sensitivity adjustment

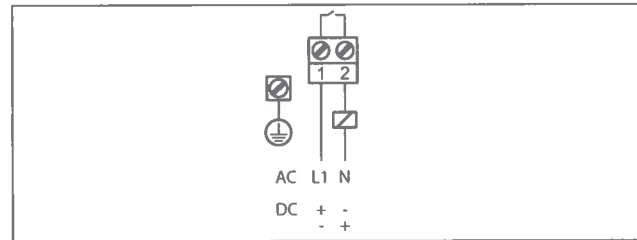


Fig. 29: VEGASWING 61, 63 - wiring plan - output, contactless electronic switch

VEGASWING 51, 53

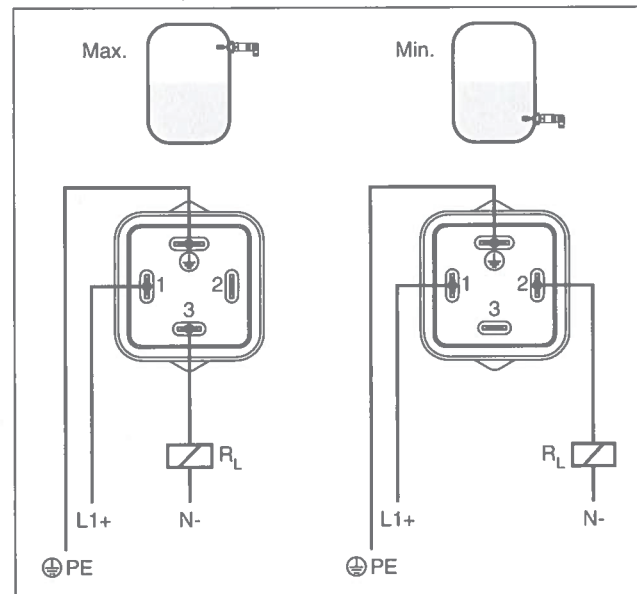


Fig. 30: VEGASWING 51, 53 - contactless electronic switch with valve plug ISO 4400

- PE Protection earth
- RL Load resistance (contactor, relay, etc.)

12 Two-wire output

Preparing the connection

Note safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage

Take note of safety instructions for Ex applications

In hazardous areas you must take note of the respective regulations, conformity and type approval certificates of the sensors and power supply units.

Select voltage supply

Connect the voltage supply according to the following diagrams. Take note of the general installation regulations. As a rule, connect VEGASWING to vessel ground (PA), or in case of plastic vessels, to the next ground potential. On the side of the instrument housing there is a ground terminal between the cable entries. This connection serves to drain off electrostatic charges. In Ex applications, the installation regulations for hazardous areas must be given priority.

Select connection cable

The VEGASWING is connected with standard two-wire cable without screen with round cross-section. If electromagnetic interference is expected which is above the test values of EN 61326 for industrial areas, screened cable should be used.

Use a suitable cable gland and select a suitable seal depending on the cable diameter.



In hazardous areas, use only approved cable connections for VEGASWING.

Select connection cable for Ex applications

Take note of the corresponding installation regulations for Ex applications.

Two-wire output

VEGASWING 61, 63

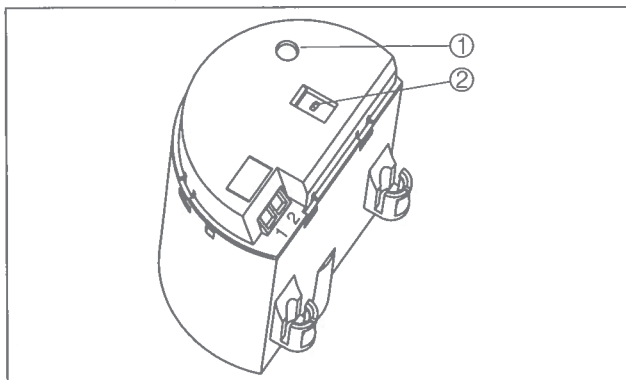


Fig. 31: VEGASWING 61, 63 - electronics module with two-wire electronics

- 1 Control lamp
- 2 DIL switch for sensitivity adjustment

We recommend connecting VEGASWING in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state).

For connection to a controller, ditto Ex operating voltage via the connected controller.

The wiring example is applicable for all suitable controllers.

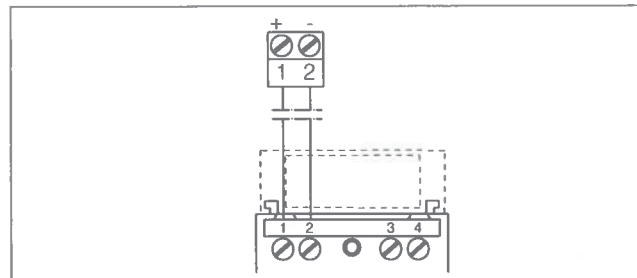


Fig. 32: VEGASWING 61, 63 - wiring plan - two-wire output

VEGASWING 66

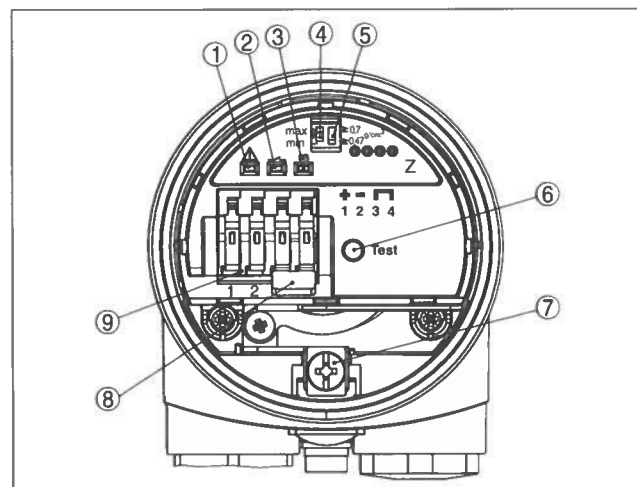


Fig. 33: VEGASWING 66 - electronics module with two-wire electronics

- 1 Control lamp - fault indication (red)
- 2 Control lamp - Switching status (yellow)
- 3 Control lamp - Operating status (green)
- 4 Mode switch for selecting the switching behaviour (min./max.)
- 5 DIL switch for sensitivity adjustment
- 6 Test key
- 7 Ground terminal
- 8 Connector block
- 9 Connection terminals

We recommend connecting VEGASWING in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state).

For connection to a controller, ditto Ex operating voltage via the connected controller.

The wiring example is applicable for all suitable controllers.

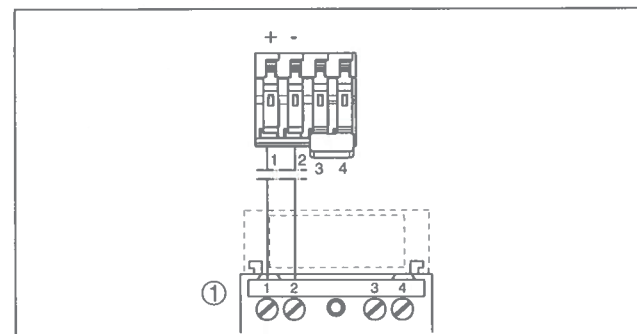


Fig. 34: VEGASWING 66 - wiring plan - two-wire output

- 1 Controller



EC1000 Bacnet System Control Panel Data Sheet and Wiring

CONSULT THERMAFLO FOR PANEL OPERATION



EC1000 SERIES TOUCHSCREEN CONTROL PANEL



DESCRIPTION

The Thermaflo EC1000 Electronic Controller combines full PID BacNet based control of temperature pressure level or flow and a combination one simple dynamic panel. Over 40 years of field experience has been designed into the EC1000. Standard application for the EC1000 are as follows:

Temperature control of Heat Exchangers, Process Vessels, Hot Water Hydronic Heating Systems, as well as Domestic Water Systems
Pressure Control of Steam Pressure Reducing Stations, VFD drive pump controls, Boiler and Deaerator systems, and Clean Steam Generators
Level control of Feed Water and Deaerator Tanks, Process Tanks and Vats, Clean Steam Generators and Boiler Systems
Flow control of heating logics, steam flow into processors, and buildings with BTU /Steam Flow/or Water Flow Measurements

Simple standard functions, all EC1000 controllers are designed to operate with Thermaflo water heating clean steam and feedwater systems. Standard features include high temperature alarms, value shutdowns, slow ramp startup, remote BacNet or 4-20 Ma control, remote on-off and real time trending of set points versus actual with 24 hour 10 year backup for BAC systems

Single point wiring: These controllers only require one 120VAC connection for operation and internal system wiring required on packages with built in surge protection 5 AMP service required

The EC1000 features a NEMA standard enhanced white panel completely programmed, wired, and tested ready for operation

FEATURES

Touchscreen Control: The standard 4.5" touchscreen keeps the user informed of set point versus actual, alarms, go off operating of control valve while allowing simple adjustments to be made available in 7" and 10" optional sizes.

Alarm Function: Closes control valves and safety shutdown valve in the event of high temperature or pressures, plus has a latching or non-latching feature. These alarm points are fully programmable.

Ramp Control System: This feature slowly starts a system by incrementally opening at a programmed rate a steam or hotwater control valve thus eliminating thermal shock, water hammer or system overload. Startup is made simple and controlled and can be automatically, or remotely activated

Contacts for BMS (Building Management Systems): Building management systems are fully informed 24/7 with BacNet, Dry Contact or 4-20 MA of alarms, set points, Control valve positions, and control. Remote control of set points and On-Off are standard.

Single Point UL Wiring: Each EC1000 has single point 120 vac power connection and is UL Certified

Custom Setup and Programming: Thermaflo application Technicians can setup program, and test the EC1000 for your specific needs in our live system and hydronic testing at facility.

SPECIFICATIONS

Supply Voltage	120 Volts AC @ 5AMPS
Power Consumption	24 Volts DC 60 Watts
Power Supply Output	24V DC 60 Watt
Inputs	MA, RTD, 1000
Up to	OHM Thermister
BacNet Remote	Dry Contacts or EMS Signal
Outputs	0-20 MA, 4-20
PDI and BacNet	Ma 0-10 Volts, Dry Contact Relay
Control Actions	Direct or Reverse on all outputs heating, cooling or level
Display Standards	Touchscreen 4.9" LLC (7" and 10" Optional)
Real Time Clock	10,000 Hours continuous
Internal Power Supply	24 VDC 60 Watts for control valve actuator power
Ambient Temperature	-4° to 140° F Cooling optional
Accuracy Enclosure Approval	UL Listed NEMA Standard NEMA 4x Optional
Weight	22 lbs
Overall Dimensions	16" width x 20" height x 8" depth

Model Number Code EC1000-01-04.5-1-120V

Programmed PID Loops _____
 01 Standard
 02 2 Loops
 03 3 Loops
 04 4 Loops

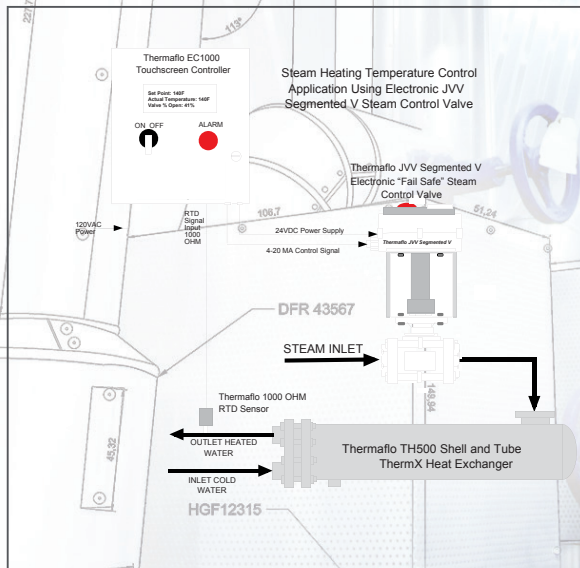
Touchscreen Size _____
 04.5 4.5" Optional
 07 7" Standard
 010 10" Optional
 Note: 10" Option increases panel size to 20"x 24" x 6"

NEMA Panel Rating _____
 1 NEMA 1 Optional
 4 NEMA 4 Standard
 4X NEMA 4X

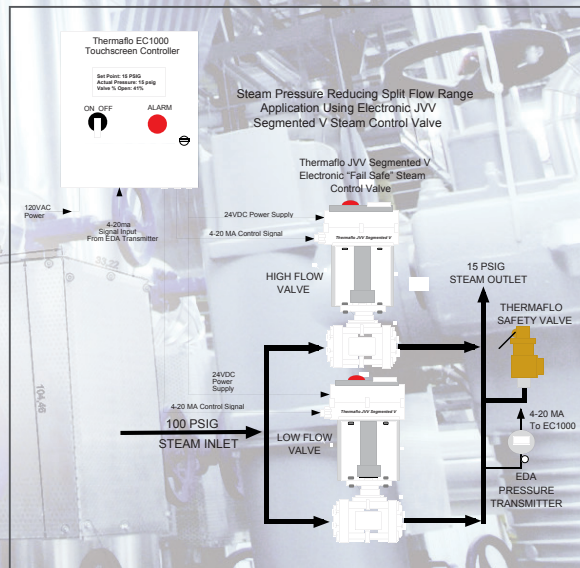
120V Power 60Hz Standard
 50 Hz Available

When ordering specify control mode of each loop for example:
 01- Temperature
 02- Pressures
 03- (2) Temperatures
 (1) Pressure

Thermaflo EC1000 JVV Single Valve Hookup



Thermaflo EC1000 JVV Dual PRV Valve Hookup



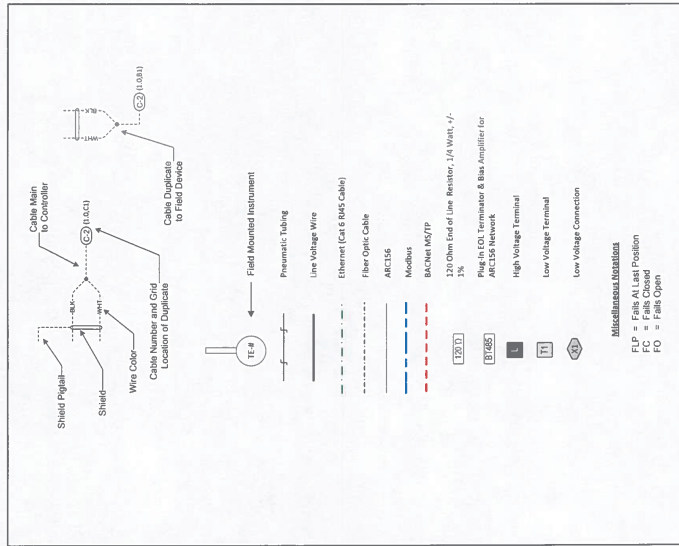
ThermaFlo EC1000-CSG-07-P - Rev8.1

2880 Fair Ave,
Newberry, SC 29108 November 1,2023 Version



DRAWING NO.	DRAWING NAME
TOC.1	Table of Contents
SYM.1	Symbol Legend
WIRE.1	Wire Specification
1.1	Bill of Material
2.1	Sequence of Operation
2.2	EC1000-CSG-07-P (Clean Steam) Rev8.1
2.3	Integration Points List
3.1	Panel Scale/Layout

LEGEND



TAG DESCRIPTIONS

AA	Remote Annunciator Module & Auto Dialer	P	Pressure Probe
ALC	Automated Logic Controller	PC	Photo Cell
ASA	Smoke Detector	PDS	Pressure Differential Switch
CR	Control Relay	PDT	Pressure Differential Transmitter
CS	Conductivity Sensor	PS	Pressure Switch
CTI	Conventional Thermostat Interface	PT	Pressure Transmitter
ENC	Enclosure	QT	Gas Transmitter
ES	Direct Current Power Supply	RD	Remote Display
ESL	E-Stop Panel Light	REC	Receptacle
ETA	Bapi ETA Line	ST	Speed Transmitter
FCV	Flow Control Valve / Damper Actuator	SUB	Subpanel
FE	Flow Element	TAG	Bake-o-lite Tag
FS	Flow Switch	TE	Temperature Element
FT	Flow Transmitter	TPI	Third Party Integrator
G	Generic Device	TS	Temperature Switch
HIS	Harris Integrated Solutions Part	TSH	Temperature Switch High
IP	Electro-Pneumatic Transducer	TSL	Temperature Switch Low
IS	Current Switch	TT	Temperature Transmitter
ISE	Circuit Breaker	TY	Dew Pt/Enthalpy/Wet Bulb Transducer
IT	Current Transducer	V	Valve
JT	BTU Meter	VAV	VAV
JY	Power Meter	VFD	VFD
KS	Electronic Timeclock	VT	Vibration Transmitter / Switch
LED	LED Light	X	Unclassified
LS	Level Switch	XF	Transformer
LT	Level Transmitter	YK	Position Transmitter
MS	Humidistat	YL	Position Transmitter
MT	Humidity Transmitter	YS	Leak Detector
MTE	Humidity Transmitter w/ Temperature Element	YSE	Emergency Stop
MTT	Humidity Transmitter w/ Temperature Transmitter	YY	Transducer
N	Accessories	ZS	Position Indicating Switch
NY	Network Device	ZT	Position Transmitter

TIA-485 (Arcnet, MS/TP, Modbus RTU) Wire Specification

Description	Single twisted pair, low capacitance (12pF), CL2P, 22 AWG (7x30), TC foam FEP, plenum rated cable
Conductor	22 AWG (7x30) stranded copper (tin plated) 0.030 in. (0.762 mm) O.D. NOTE 24 AWG can be used for segments <200 ft. (6.7 m).
Insulation	Foamed FEP 0.015 in. (0.381 mm) wall 0.060 in. (1.524 mm) O.D.
Color code	Black/white
Twist lay	2 in. (50.8 mm) lay on pair 6 twists/foot (20 twists/meter) nominal
Shielding	Aluminum/Mylar shield with 24 AWG (7x32) TC drain wire
Jacket	SmokeGard (SmokeGard PVC) 0.021 in. (0.5334 mm) wall 0.175 in. (4.445 mm) O.D. Halar (E-CTFE) 0.010 in. (0.254 mm) wall 0.144 in. (3.6576 mm) O.D.
DC resistance	15.2 Ohms/1000 feet (50 Ohms/km) nominal
Capacitance	12.5 pF/ft (41 pF/meter) nominal conductor to conductor
Characteristic impedance	100 Ohms nominal
Weight	12 lb/1000 feet (17.9 kg/km)
UL temperature rating	SmokeGard 167°F (75°C) Halar -40 to 302°F (-40 to 150°C)
Voltage	300 Vac, power limited
Listing	UL: NEC CL2P, or better

Rnet Wire Specification

Description	4 conductor, shielded or unshielded, CMP, plenum rated cable
Conductor	22 AWG (7x0096) bare copper if Rnet has only sensors 18 AWG (7x0132) bare copper if Rnet has a BACview® device
Maximum length	500 feet (152 meters)
Insulation	Low-smoke PVC (or equivalent)
Color Code	Black, white, green, red
Shielding	If shielded, Aluminum/Mylar shield (100% coverage) with TC drain wire, terminated at controller
UL temperature rating	32-167°F (0-75°C)
Voltage	300 Vac, power limited
Listing	UL: NEC CL2P, or better

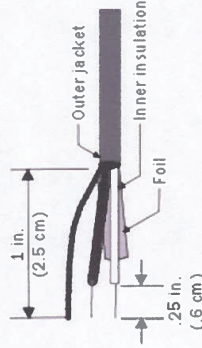
RS-485 Cable Wiring Instructions (Typical for ARC156, MS/TP, Modbus RTU)

- Partially cut, then bend and pull off 1" of the outer jacket of the cable(s). Do not nick the inner insulation.
- Strip about 0.25 inch (0.6 cm) of the inner insulation from each wire.
- If wiring two cables to the controller, twist together the shield wires from both cables.
- Insert the wires into the terminal block.

CAUTION! Do not allow more than .125 inch (.3 cm) bare communication wire to protrude.

NOTE: Do not ground the shield to earth ground or to the controller's power ground. The PROT485 and the individual controllers allow the shield to float a limited amount so that there are no ground loops. If the voltage on the shield becomes too great relative to the earth ground, then the excess voltage is bled off with protective devices on the PROT485 or on the controllers.

If bare communication wire contacts the cable's foil shield, shield wire, or a metal surface other than the terminal block, communications may fail.



Communication Bus Wiring Installation Detail

Ethernet Wire Specification

All Ethernet cabling shall be to CAT6 standards with jacket either CMR or CMP as required by installation location and local building codes.

Code Requirements

Install all wiring to local electrical code requirements. The wiring requirements detailed here are a minimum – any additional requirements to meet the code in use at the time of installation will supersede these wiring specifications. If there is a conflict between the wire specifications here and local code requirements, contact Automated Logic for further guidance.

Tag	Part Number	Product Description	Manufacturer	Qty
ALC-1	EQT3-7-ALC	Touch Screen Interface, Wall/Panel Mount w/Temp. & Humidity, Rnet	Automated Logic	1
ALC-2	SE6104sp	Control Module, 6DO, 10UI, 4AO, Single Program	Automated Logic	1
CR-1	781-1C-24D+781-1C-SKT	Control Relay, SPDT, 24VDC, LED, w/Socket	AutomationDirect	1
CR-2	781-1C-24D+781-1C-SKT	Control Relay, SPDT, 24VDC, LED, w/Socket	AutomationDirect	1
CR-3	781-1C-24D+781-1C-SKT	Control Relay, SPDT, 24VDC, LED, w/Socket	AutomationDirect	1
ENC-1	SCE-20EL1606LPWH	Saginaw Hinge Cover Enclosure, NEMA 4, 20x16x6	Saginaw	1
ES-1	EDR-120-24-DC	AC-DC Industrial DIN rail power supply; Output 24V at 5A; metal case	MEAN WELL	1
G-1	CR123a	3V Lithium Battery	Duracell	1
G-2	MTP-A00N1805COY1	8" x 1/2" Braided Ground Straps	modoparty	1
G-3	SCE-ELMFK4	Foot Kit, EL Mounting (4pc.)	Saginaw	1
ISE-1	TMC-71C-05A	5 Amp Single Pole Circuit Breaker	Phoenix Contact	1
ISE-2	2006-1611	Fuse Block - Din Rail Mounted	WAGO	1
ISE-3	S506-5-R	5 Amp Control Fuse	Eaton/Bussmann	1
LED-1	ECX2051-24L	LED indicating light, permanent light function, IP65, 22mm, red, 30mm, 24 VAC/VDC	AutomationDirect	1
PT-1	P51-100-5-E	Pressure Transmitter 0-100psig 1-5vdc output	Kele	1
SUB-1	SCE-20P16	Saginaw Sub-panel, Solid, NEMA 4, 20x16	Saginaw	1
SW-1	GXI3000	Selector Switch, 22mm, 2-position, maintained, (1) N.O. contact	AutomationDirect	1
TAG-1	1285/1023	Carolina Laser Custom Engraved and Sized	Carolina Laser	1
TAG-2	1285/1023	Carolina Laser Custom Engraved and Sized	Carolina Laser	1
XF-1	TR50VA001	Xlfr. 50VA, 120:24, Class 2 Functional Devices	Functional Devices	1

Bill of Material

Bill of Material

Rev.	Date	Pages Changed	Name



REV	DESCRIPTION	DATE	BY
0			
0			
0			
0			

AutomatedLogic
 304 Pannel Street
 West Columbia, South Carolina 29169

PROJECT: ThermaFlo EC1000-CSG-07-P - Rev8.1
 2880 Fair Ave,
 Newberry, SC 29108

CONTRACT NO:	DATE:	PR. TB:

FILENAME: H1 Bill of Material
 BILL OF MATERIAL

DRAWING NO.: 1.1 Project Page: 1 OF 1

A	B	C	D	E	F	G	H
1							
2							
3							
4							
5							

Sequence of Operation

ThermaFlo EC1000-CSG Sequence of Operation:

Pressure Control Valve:

- When the system is enabled the steam control valve shall enable "slow ramp start-up" to maintain the pressure setpoint of 30psi (adj.).
- Slow Ramp Start-up: When the system is enabled the slow ramp start-up sequence will be started. Once enabled the valve will stroke 0-100% of the configured valve limit range in a user selectable time of 30 – 120 minutes in 15-minute selectable increments. When the valve feedback is greater than or equal to the high limit, or the system pressure is greater than or equal to the setpoint, the valve stroke timer will be disabled and release control to the P.I.D. to modulate the valve in order to maintain setpoint. The slow ramp timer shall be re-enabled when the pressure has decreased below 1psig for 10 seconds, or when the system is restarted.
- P.I.D. Loop Control: The control valve shall modulate to maintain the pressure setpoint set by the equipment manufacturer. As the pressure drops below the control setpoint, the control valve shall modulate open. As the pressure rises above the control setpoint, the control valve shall modulate closed.

Level Control Valve:

- When the system is enabled the level control valve shall enable "slow ramp start-up" to maintain the level setpoint of 85% (adj.).
- Slow Ramp Start-up: When the system is enabled the slow ramp start-up sequence will be started. Once enabled the valve will stroke 0-100% of the configured valve limit range in a user selectable time of 30 – 120 minutes in 15-minute selectable increments. When the valve feedback is greater than or equal to the high limit, or the system level is greater than or equal to the setpoint, the valve stroke timer will be disabled and release control to the P.I.D. to modulate the valve in order to maintain setpoint. The slow ramp timer shall be re-enabled when the low-level alarm is active for 10 seconds, or when the system is restarted.
- P.I.D. Loop Control: The control valve shall modulate to maintain the level setpoint set by the equipment manufacturer. As the level drops below the control setpoint, the control valve shall modulate open. As the temperature rises above the control setpoint, the control valve shall modulate closed.

Blowdown Shell 120V Valve Control:

- The valve shall be energized based on a user definable timer through the touch screen interface. The interval shall determine how often the control valve is opened and be adjustable between 1 hour and 48 hours. The duration shall determine how long the control valve stays open and shall be adjustable between 15 seconds and 10 minutes. The duration is determined by the user for TDS control or the chemical treatment vendor.

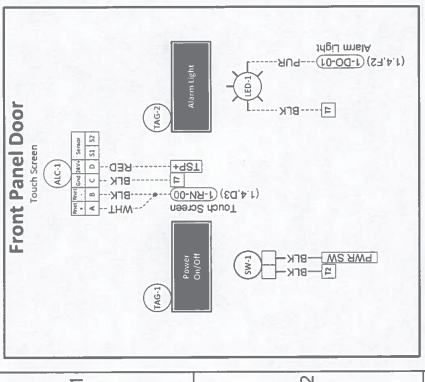
Display/Monitoring Points

- Pressure
- Steam valve position
- Level
- Level valve position
- High high level switch
- Blowdown valve status

Alarms:

- **High High Level Alarm:** When the level rises above the high high level setpoint as sensed by the high high level sensor the following shall occur...
 - o Steam Valve will close
 - o Level Control Valve will close
 - o Alarm light is energized
 - o Alarm notification generated for third party integration
 High High Level alarm shall require a manual reset at the user interface after the level has returned to normal conditions.
- **High Level Alarm:** When the level rises above the high level setpoint 80% (adj.) as sensed by the level sensor the following shall occur...
 - o Steam Valve will close
 - o Level Control Valve will close
 - o Alarm light is energized
 - o Alarm notification generated for third party integration
 High level alarm shall be reset automatically after the level has returned to normal conditions.
- **Low Level Alarm:** When level drops below the low level setpoint 20% (adj.) as sensed by the level sensor the following shall occur...
 - o Steam Valve will close
 - o Level Valve shall open
 - o Alarm light is energized
 - o Alarm notification generated for third party integration
 Low level alarm will automatically reset after the level has returned to normal operating levels.
- **High Pressure Alarm:** When the pressure rises above the high pressure setpoint of 15psi (adj.) the following shall occur...
 - o Steam Valve will close
 - o Alarm light is energized
 - o Alarm notification generated for third party integration
 High pressure alarm shall require a manual reset at the user interface after the pressure has returned to normal conditions.
- **Low Pressure Alarm:** When the pressure drops below the low pressure setpoint of 5psi (adj.) the following shall occur...
 - o Alarm light is energized
 - o Alarm notification generated for third party integration
 Low pressure alarm will automatically reset after the pressure has returned to normal operating levels.

H G F E D C B A

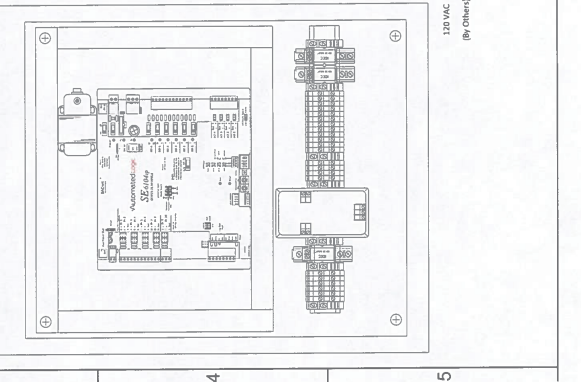


Note:

- R (WHT) side of the 120V Valve lands on 13
- G (GRN) side of the 120V Valve lands on 14
- 24 VDC power for pressure & level controllers land on 16 & 17

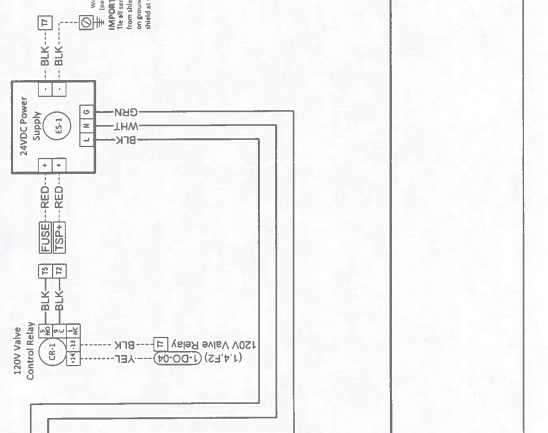
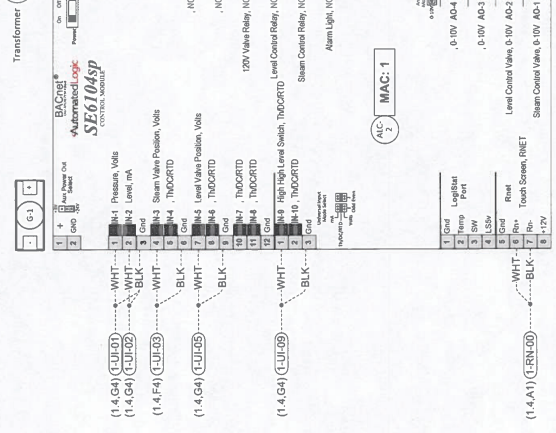
Legend:

- Field Wiring: Solid line
- Factory Low Voltage Wiring: Dashed line
- Factory Power Wiring: Solid line with a dot



EC1000-CSG-07-P (Clean Steam) RevB.1

Inside Panel Enclosure

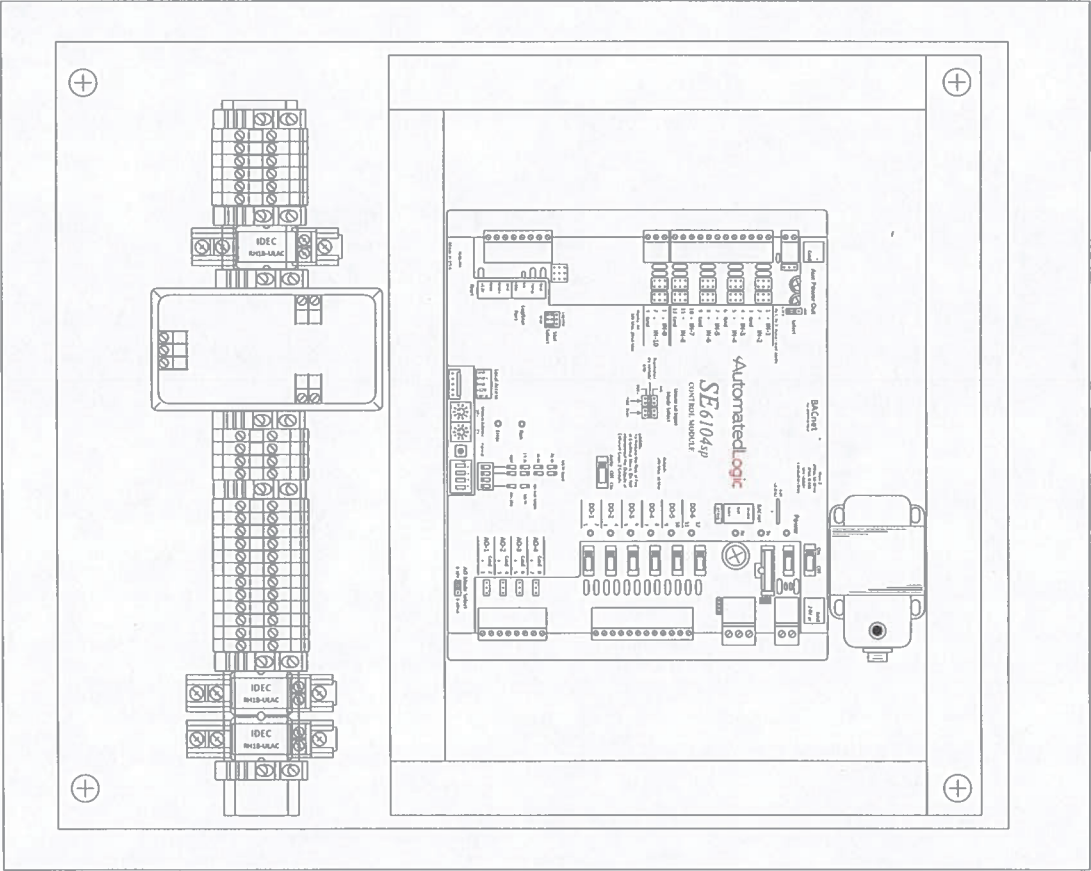


1 2 3 4 5

Integration Points List

ThermaFlo EC1000-CSG BACnet Points List

Object Name	Type	Object ID	Read/Write	Description
Active Level Setpoint	BAV	AV/1	R	Current Active Level Setpoint.
Active Pressure Setpoint	BAV	AV/2	R	Current Active Pressure Setpoint.
BMS Level Setpoint	BAV	AV/3	W	Level Setpoint written by BMS.
BMS Pressure Setpoint	BAV	AV/4	W	Pressure Setpoint written by BMS.
Current Level	BAV	AV/5	R	Current level sensed by the level sensor.
Current Pressure	BAV	AV/6	R	Current pressure sensed by the pressure sensor.
Level Control VLV Signal	BAV	AV/9	R	Output signal to level control valve.
Level Valve Position Feedback	BAV	AV/8	R	Current level control valve position.
Local Level Setpoint	BAV	AV/19	R	Level Setpoint set locally through the touchscreen interface.
Local Pressure Setpoint	BAV	AV/21	R	Pressure Setpoint set locally through the touchscreen interface.
Steam Control VLV Signal	BAV	AV/31	R	Output signal to steam control valve.
Steam Valve Position Feedback	BAV	AV/33	R	Current steam control valve position.
High Level Alarm Setpoint	BAV	AV/51	R	Level Setpoint for High Level Alarm
High Pressure Alarm Setpoint	BAV	AV/52	R	Pressure Setpoint for High Pressure Alarm
Low Level Alarm Setpoint	BAV	AV/53	R	Level Setpoint for Low Level Alarm
Low Pressure Alarm Setpoint	BAV	AV/54	R	Pressure Setpoint for Low Pressure Alarm
Level Control VLV Signal Limit	BAV	AV/55	R	High limit for the level control valve signal output.
Steam Control VLV Signal Limit	BAV	AV/56	R	High limit for the steam control valve signal output.
HI Level Alarm	BBV	BV/1	R	Active whenever the panel has a high level alarm.
HI Level Alarm	BBV	BV/2	R	Active whenever the panel has a high level alarm.
General Alarm	BBV	BV/3	R	Active whenever the panel has an alarm.
HI Pressure Alarm	BBV	BV/4	R	Active when there is a high pressure condition, requires manual reset through touchscreen.
Low Level Alarm	BBV	BV/6	R	Active whenever the panel has a low level alarm.
Level Setpoint Mode	BMSV	MSV/2	R	1 = Local - Local Setpoint becomes Active 2 = BMS - BMS Setpoint becomes Active
Program On/Off Control	BMSV	MSV/4	W	1 = Off - Panels program is deactivated and is shutdown. 2 = On - Panels program is enabled and allowed to control.
Pressure Setpoint Mode	BMSV	MSV/5	R	1 = Local - Local Setpoint becomes Active 2 = BMS - BMS Setpoint becomes Active





Type JVV Steam Control Valve and Makeup Water Valve General Data Sheets



JV V SERIES ELECTRONIC “V BALL” STEAM AND HIGH-TEMPERATURE HOT WATER CONTROL VALVES

The Thermaflo JVV V Ball Series Control Valve is designed for high speed 100% duty for temperature, pressure and level control applications. Specifically designed for steam, high-temperature hot water, and other rigorous control applications.

The equal percentage segmented V inner ball design provides the user with accurate control over a 300:1 flow turndown rangeability. Half the size and weight of any conventional globe control valve, the JVV is simple to install. The high-speed electronic actuator fails closed on power loss and totally eliminates air supply. The fully programmable actuator accepts 0-10V or 4-20 ma input control signal and can be split range controlled when required. The JVV Series high flow CVs reduces valve size, space and overall weight of any application in your piping system.

JVV V-BALL STANDARD FEATURES

PRECISION MACHINED 316 STAINLESS
STEEL CONTROL SHAFT

ENGINEERED HIGH TEMPERATURE EXTENDED
MOUNTING BRACKET

HIGH SPEED FAIL SAFE MODULATING ACTUATOR 0-10V
OR 4-20MA CONTROL SIGNAL INPUT

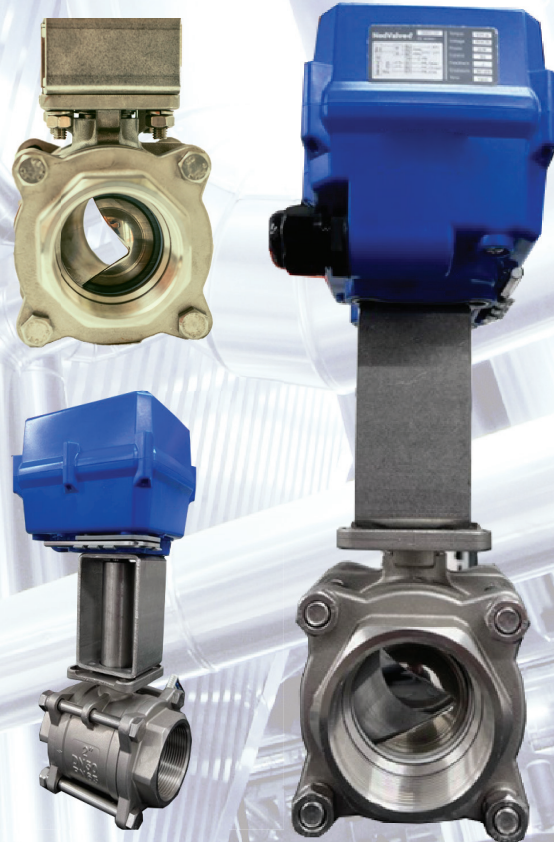
HIGH TEMP CHEVRON SEAT AND STEM SEALS IN A
ISO MACHINED BASE MOUNT

COMPLETE 316 STAINLESS STEEL
BODY, BALL, AND STEM CONSTRUCTION

BUBBLE TIGHT CLASS VI STEAM AND HOT
WATER SHUTOFF

HIGH V PORT CV FLOW CAPACITIES
AND EXCELLENT EQUAL PERCENTAGE
CHARACTERIZED FLOW

VALVE POSITION FEEDBACK AND ALARMS



• MAX OPERATING PRESSURE/TEMPERATURE 400F
@ 150 PSIG (HIGHER RATINGS AVAILABLE)

• MAXIMUM AMBIENT TEMPERATURE: 120F

• CUSTOM SLOTTED BALL AND CVS AVAILABLE

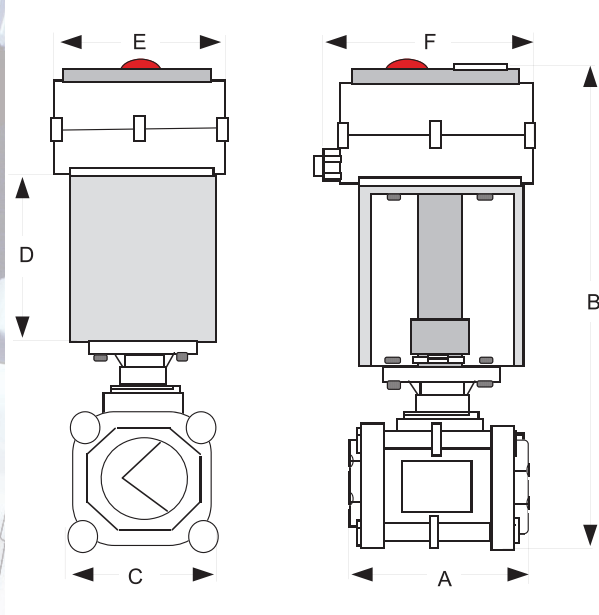
• SIZES: 1/2" THRU 3" CONNECTIONS: NPT OR
SOCKET WELD UP TO 8" 150/300 LB AVAILABLE

• MATERIALS OF CONSTRUCTION: 316 STAINLESS
STEEL BODY, BALL, AND STEAM

• REINFORCED HIGH TEMPERATURE TEFLON SEATS

SIZING NOTES:

1. OPTIMUM CONTROL RANGE 30% TO 90%.
2. CV REDUCED 30% WHEN INSTALLING IN A PIPE WHERE VALVE SIZE IS MORE THAN HALF THE PIPE SIZE. EXAMPLE 2" PIPE AND CONTROL VALVE SIZE 3/4"



DIMENSIONS (Shown in Inches)

VALVE SIZE	A	B	C	D	E	F
1/2"	2.5	14	2	6	3	4
3/4"	2.9	14	2	6	3	4
1"	3.4	14.5	2.2	6	3	4
1.25"	3.7	14.6	2.9	6	4	6
1.5"	4.3	15	3.2	6	4	6
2"	5.8	15.3	3.5	6	4	6
3"	8	21	9	6	4	6

NOTE: Dimensions may change with inlet pressures over 150 psig due to actuator selection. Consult Factory.
3" Valve is 150lb Flanged Connection

POWER REQUIREMENTS

S80 60w at 24 VDC

2 AMPS Min

Install Notes:

1. Never Insulate the JVV Valve, Bracket or Actuator
2. Always Install the valve so that the actuator is at a 3:00 or 9:00 O'clock position to avoid heat migration to the actuator.
3. Install a strainer and main drip trap at the inlet.

FLOW PERFORMANCE DATA VALVE
CV % of Opening 90% Segmented V

SIZE	30%	50%	80%	100%
1/2"	.85	2	8	14
3/4"	1	2.6	10	20
1"	2.7	7.7	24	43
1.25"	3	10.2	34	65
1.5"	3	14	48	90
2"	7.2	25	87	167
3"	8.65	42	161	359

JVV V BALL SERIES MODEL NUMBER DESIGNATION

SIVALVE SIZE: 1/2", 3/4", 1", 1.25", 1.5", 2", 3"
VALVE CONSTRUCTION: S 316 STAINLESS STEEL

ALL TRIMS ARE 316 STAINLESS STEEL BALL AND STEM
VALVE SEATS RT REINFORCED TEFLON 400F

END CONNECTIONS SE SCREWED ENDS 150LB FLG 3" ONLY

SW SOCKET WELD FAIL POSITION FC FAIL CLOSED

FO FAIL OPEN CONTROL PORT V90 90 DEGREPORT

INPUT SIGNAL

1 0-10 VOLTS 2 4-20 MA

JVV-1" SRT-SE-FCV90-1 NEMA 2 4 (OPTIONAL)



Type JVV Steam Control Valve and Makeup Water Valve IOM and Wiring

JVV V-BALL SERIES CONTROL VALVE

IOM BULLETIN



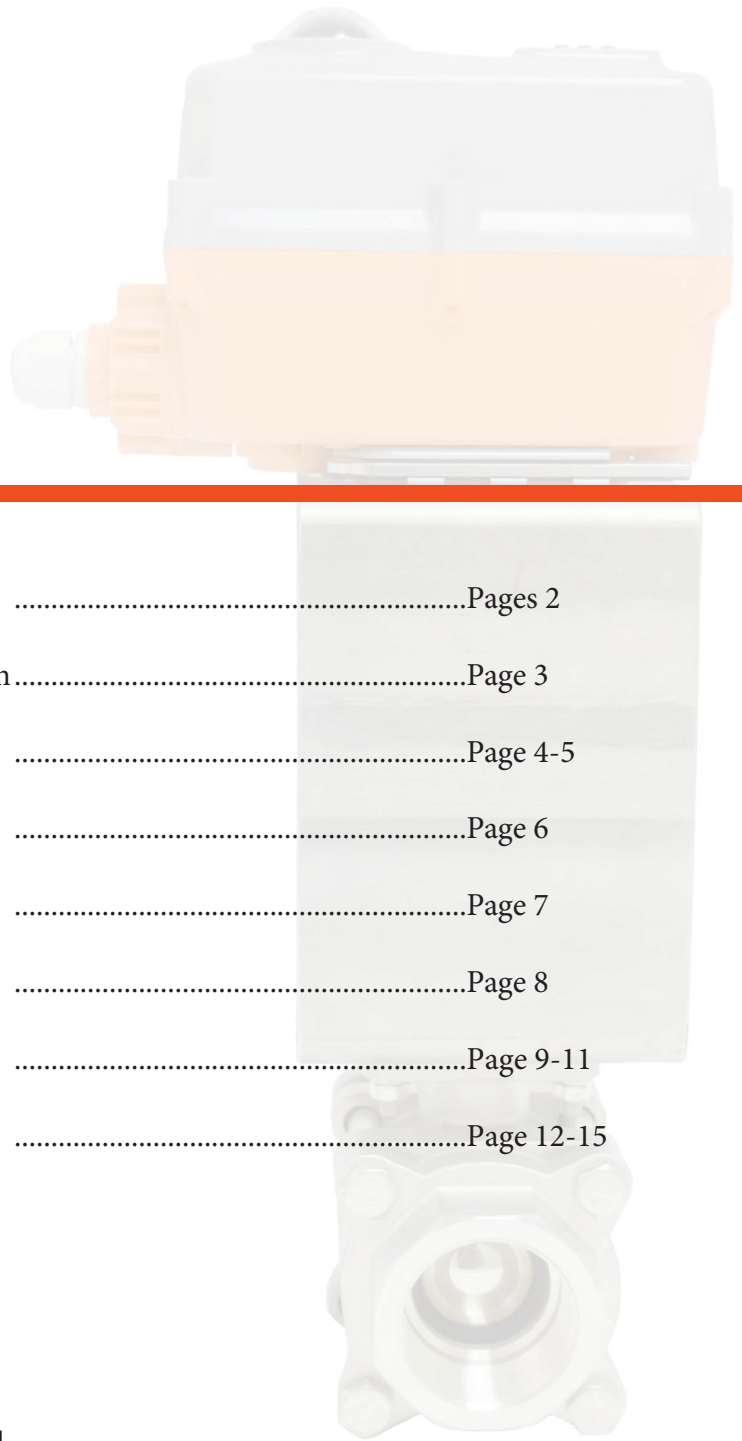
THERMAFLO
INCORPORATED SINCE 1986

MANUFACTURERS OF STEAM FIRED SPECIALTY EQUIPMENT

2022

THERMAFLOENGINEERING.COM | 2880 FAIR AVE. NEWBERRY, SC. | 704-940-1228

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JFE S 80 Actuator	Page 12-15

- Dimensions & Maintenance Parts
- Wiring Diagram
- Mounting Instructions and Technical Requirements



JVV V-BALL CONTROL VALVE INSTALLATION | OPERATION | MAINTENANCE BULLETIN

The ThermaFlo JVV V-Ball Series Control Valve is designed for high speed 100% duty for temperature pressure and level control applications. Specifically designed for steam, high temperature hot water, and other rigorous control applications. Dead tight 100% Class VI Shutoff Flow.

The equal percentage segmented and V inner ball design provides the user with accurate control over a 100:1 flow turndown rangeability and 1000:1 actuator rangeability. Half the size and weight of any conventional globe control valve, the JVV is simple to install. The high-speed electronic actuator accepts 0-10v or 4-20 ma input control signal and can be split range control when required. The JVV Series high flow CV reduces valve size, space and overall weight of any application in your piping system.

JVV V-BALL STANDARD FEATURES

**MACHINED 316
STAINLESS STEEL CONTROL
SHAFT NON SLIP KNURL PAD**

**ENGINEERED HIGH TEMPERATURE
EXTENDED STAINLESS STEEL
MOUNTING BRACKET**

**HIGH SPEED FAIL SAFE
MODULATING ACTUATOR 0-10V OR
4-20MA CONTROL SIGNAL INPUT**

**HIGH TEMP CHEVRON SEAT AND SHAFT
SEALS IN A MACHINED BASE MOUNT**

**COMPLETE 316 STAINLESS STEEL
BODY, BALL, AND STEM CONSTRUCTION**

**BUBBLE TIGHT CLASS VI STEAM
AND HOT WATER SHUTOFF**

**HIGH V PORT CV FLOW CAPACITIES
AND EXCELLENT EQUAL PERCENTAGE
CHARACTERIZED FLOW**



**Standard Input Control
Signal is 0-10V**

**Actuator Standard
Speed is 8 Seconds**



**MAX OPERATING PRESSURE/TEMPERATURE 450°F
@250 PSIG (HIGHER RATINGS AVAILABLE)**

MAXIMUM AMBIENT TEMPERATURE: 130°F

CUSTOM SLOTTED BALL AND CVS AVAILABLE

**SIZES: 1/2 "THRU 2" CONNECTIONS: NPT OR SOCKET WELD
3" - 8" 150LB OR 300LB AVAILABLE**

**MATERIALS OF CONSTRUCTION: 316 STAINLESS
STEEL BODY, BALL, AND STEM**

REINFORCED TEFLON SEATS

READ THIS INFORMATION CAREFULLY

HELPFUL PIPING HINTS

Never Insulate the Valve Body, Actuator or Mounting Bracket

Always install on a horizontal mounting position so that heat does not migrate up the actuator shaft. If the valve can not be installed on a horizontal (3:00 or 9:00 o'clock) position, at minimum, install at a 2:00/11:00 position. The extended mounting bracket allows the actuator to operate below 200°F in steam and hot fluid applications up to 450°F. With any steam control valve installation a proper steam trap drip should be located as close to the intel as possible. If the JVV V-Ball is being used for flow turndowns in excess of 20:1 a ThermFlo HSS steam separator should be installed to remove all entrained condensate and avoid seat wear. The first choice for a drain steam trap will be the ThermaFlo FT42 series and second choice the ThermaFlo 421 Thermodynamic series.

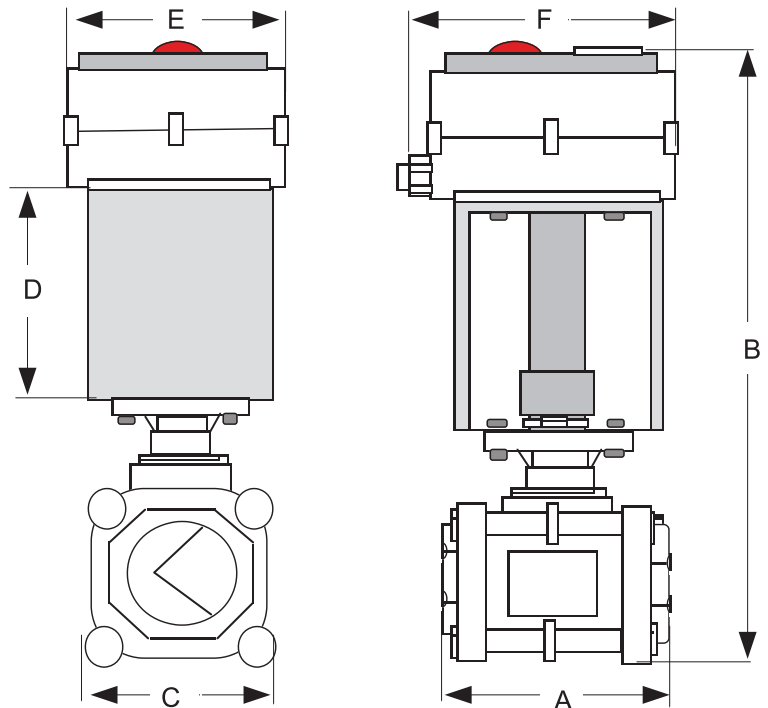
Sizing Notes:

1. Optimum Control Range 20% to 80%.
2. CV Reduced 40% when installed in a pipe where valve size is more than half the pipe size.
Example: 2" Pipe and Control Valve Size 3/4"
3. When sizing for steam pressure control refer to the JVV pressure reducing sizing chart for lbs/hr capacity.

DIMENSIONS (Shown in Inches)

VALVE SIZE	A	B	C	D	E	F
1/2"	2.5	14	2	6	3	4
3/4"	2.9	14	2	6	3	4
1"	3.4	14.5	2.2	6	3	4
1.25"	3.7	14.6	2.9	6	4	6
1.5"	4.3	15	3.2	6	4	6
2"	5.8	15.3	3.5	6	4	6

NOTE: Dimensions may change with inlet pressures over 150 psig due to actuator selection. Consult Factory.

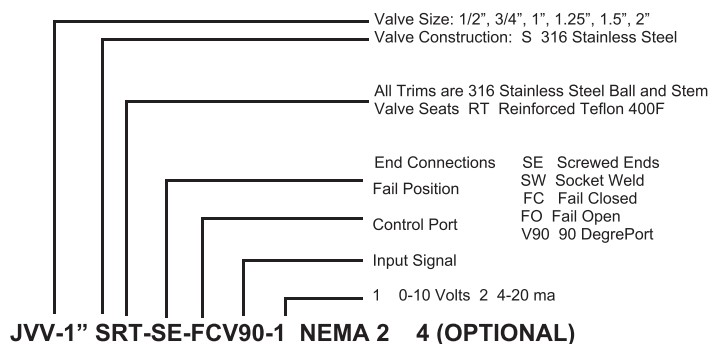


FLOW PERFORMANCE DATA VALVE CV % of Opening 90% Segmented V

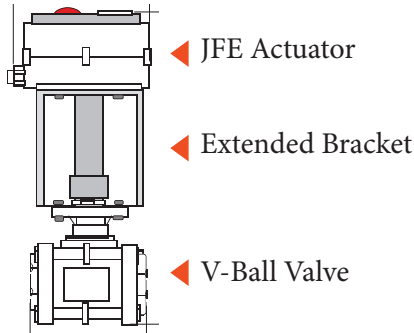
SIZE	30%	50%	80%	100%
1/2"	.85	2	8	14
3/4"	1	2.6	10	20
1"	2.7	7.7	24	43
1.25"	3	10.2	34	65
1.5"	3	14	48	90
2"	7.2	25	87	167
3"	38	89	188	340

3"- 8" 150lb or 300lb **Available**

JVV V Ball Series Model Number Designation



INSTALLATION, OPERATION & MAINTENANCE FOR JVV SEGMENTED V VALVES



GENERAL

ThermaFlo JVV V-Ball valves have been designed and engineered to provide long lasting and trouble free service when used in accordance with the instructions and specifications herein. The following instructions refer only to JVV V-Ball Control Valves. Keep protective cover in place until moment of installation. Valve performance depends upon preventing of damage to ball surface. Upon removal of cover, make sure that the valve is completely open and free of obstruction. If requested, valves can be shipped from the factory containing a silicon based lubricant which aids in the assembly of the valve. This may be removed with a solvent if found intolerable. Certain ferrous valves are phosphate and oil dipped during the course of manufacture, but they are completely non-toxic and the valves are quite safe to use for edible or potable products.

STORAGE

All manual valves are shipped in the fully open position with protective end caps (covers). Keep all protective packaging, flange covers, or end caps attached to the valves during storage. To avoid damage to the seat due to contact with the ball's edge, leave the valve in the fully open or closed position during storage. It is recommended to keep the valves in a clean and dry environment until ready for use.

NEVER REMOVE ACTUATOR TOP

CAUTION

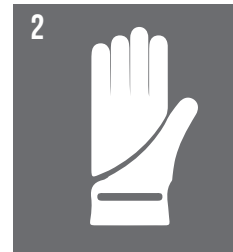
!!!SAFETY PRECAUTION!!!

BEFORE REMOVING VALVE FROM PIPELINE NOTE THAT:

Media flowing through a valve may be corrosive, toxic, flammable, a contaminant or harmful nature. Where there is evidence of harmful fluids having flowed through the valve, the utmost care must be taken. It is suggested that the following minimal safety precautions be taken when handling valves.



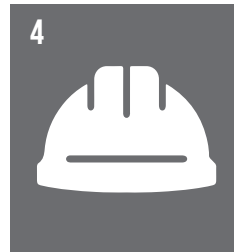
1
ALWAYS WEAR EYE SHIELDS



2
ALWAYS WEAR GLOVES AND OVERALLS



3
WEAR PROTECTIVE FOOTWEAR



4
WEAR PROTECTIVE HEADGEAR



5
ENSURE THAT RUNNING WATER IS READILY ACCESSIBLE



6
HAVE A SUITABLE FIRE EXTINGUISHER READY IF MEDIA IS FLAMMABLE

7 Be sure that you are aware of the fluid that has been passing through the valve before opening or dismantling any valve. Require MSDS information.

READ INSTALLATION CAREFULLY

By checking line gauges, ensure that no pressure is present at the valve. Ensure that any media is released by operating valve slowly to half open position. Ideally, the valve should be decontaminated when the ball is in the half open position.

These valves, when installed, have body connectors which form an integral part of the pipeline and the valve cannot be removed from the pipeline without being dismantled.

Valves and accessories must not be used as a sole support of piping or human weight. Safety accessories such as safety relief (overpressure) valves are the responsibility of the system designer.

It is the user/system designer's responsibility to use insulation in high temperature applications. Refer to OSHA documents for more details.

INSTALLATION

Always install a 100 to 80 Mesh Strainer as close to the inlet as possible to be sure no debris, weld slag, pipe shavings or dirt get to the seats. Also install a steam trap directly at the valve inlet when used on steam. This will eliminate seat wash out due to flashing condensate. Never insulate the valve, shaft, bracket or actuator. Insulating causes heat to migrate up the shaft and overheats the actuator over time shorting the life. Install at a 3:00 or 9:00 position if possible

OPERATION

JVV valves provide tight shut off when used under normal conditions and in accordance with JVV's published pressure/temperature chart. If these valves are used in a partially open (throttled) position seat life may be reduced. JVV valves have ¼ turn operation closing in a clock-wise direction. It is possible to see when the valve is open or closed by the position of the wrench handle. When the wrench is inline with the pipeline, the valve is open. Any media which might solidify, crystallize or polymerize should not be allowed to stand in the ball valve cavities unless regular maintenance is provided. If minimal maintenance is re-quired, JVV offers steam jacketed ball valves.

TORQUE REQUIREMENTS

Torque ratings are subject to variations depending on the length of time between cycles and the media in the system. Breakaway torque is that force which must be exerted to cause the ball to begin to open. Operating torque requirements will vary depending on the length of time between cycles, media in the system, line pressure and type of valve seat.

MAINTENANCE

With self-wiping ball/seats, JVV valves have a long, trouble free life, and maintenance is seldom required. When necessary, valves may be refur-bished, using a small number of components, none of which require machining. JVV valves are designed for easy service and assembly in the field. The following checks will help to extend valve life, or reduce plant problems. JVV ball valves utilize live-loaded stem seals featuring Belleville Wash-ers (disk springs) that maintain constant pressure on the Stem Seal area even under a wide range of pressure and temperature fluctuations. If stem leakage is evident proceed as follows:

STEM LEAKAGE

Examine the disk springs (Belleville washers) for damage. If in good condition tighten the gland nut until disk springs are firmly compressed, then back nut off 1/16th of a turn. If damaged, dismantle the stem down to the gland, fit new disk springs with their outer edges touching, replace and retighten using gland nut. Further maintenance necessitates dismantling of the valve.

LEAKAGE AT BODY JOINT

Check for tightness at the body connector bolts. If loose, tighten body bolts. Excessive force will damage the bolts (see Table A). If there is still leakage, it will be necessary to dismantle the valve and replace the body seals.

IN-LINE LEAKAGE

Check that the valve is fully closed. If leakage occurs while the valve is in the closed position, a seat or ball sealant surface may be damaged and it will be necessary to disassemble the valve.

NOTE: If stem leakage and leakage at the body joint are not cured by simple means described above, it will be necessary to dismantle the valve. If there is no stem leakage the stem assembly should not be touched.



INSTALLATION, OPERATION & MAINTENANCE FOR JVV SEGMENTED V VALVES

REBUILDING

Before rebuilding, check that all the correct components are available and that they are fit for reassembly. When rebuilding, cleanliness is essential to allow long valve life and provide cost effective maintenance.

CAUTION:
NO BODY OR STEM SEALS ARE REUSABLE.

Care must be taken to avoid scratching the seats and seals during installation. NOTE: Caution must be taken with valves that have been in hazardous media. They must be decontaminated before disassembly by relieving the line pressure and flushing the line with the valve in the partially open position. Protective clothing, face shields, gloves, etc., **MUST BE USED** for this operation. Generally if a valve has been in steam service for over 10 years, it should be totally replaced.

A DISASSEMBLY OF VALVE REMOVED FROM LINE

1. Remove the End Connectors (#1) by removing the Body Bolts (#6A) and Body Bolt Nuts (#6B).
2. Once the End Connectors (#1) have been separated from the Body (#2), remove the Body Seals (#5), Seats (#4), and Seat Retainer, if applicable (#17).
3. Make sure the Ball is in the closed position, thus the Ball (#3) can be taken out easily from the Body (#2).

B REMOVING STEM ASSEMBLY 1/4" - 2"

1. Remove Handle (#12) by removing Handle Nut (#14) along with the Lock Washer (#13).
2. Remove the complete chevron packing seals. Push the Stem (#10) down into the body cavity to remove. Once removed take off the Thrust Washer (#7).

C INSPECTION

1. The ball and the surfaces of the seats should be free of pit marks and scratches. Light marring from the action of the ball against the seats is normal and will not affect the operation of the valve.
2. The stem and body surfaces, which the thrust and washer make contact with, should be free of pit marks and scratches.

D REASSEMBLY

1. Apply an adequate amount of lubricant compatible with the media being handled around the Ball (#10), Seats (#4), Body Seals (#6), Stem (#4), and Thrust Washer (#18).
2. For stem reassembly, disassembly procedure should be followed in reverse order.
3. When stem assembly is complete, tighten Stem Nut according to the values in Table A.
4. With the Stem (#10) in the closed position, insert the Ball (#3) into Body (#1) so that stem slot engages with the tang at the base of the stem.
5. Make sure the Body Seals (#6) rests squarely on the center seal surface of the Body (#1).
6. Insert Seats (#5) into the Body (#1). Make sure seats rest firmly on back surface of each recess.
7. Merge the End Connectors (#2) with the Body (#1).
8. Insert and tighten the Body Bolts (#16) diagonally, in accordance to the cross pattern procedure shown on page 5 for sizes 1/4" to 2-1/2" or page 6 for size 3".
9. In the final assembly step, ensure that the Body Bolts (#6A) are tightened according to torque values in Table A.

INSTALLATION, OPERATION & MAINTENANCE FOR JVV SEGMENTED V VALVES

TORQUE SPECS

Certain precautions need to be followed when tightening bolts down to their corresponding torques to help prevent bolt galling. There are two passes each bolt has to undergo during the process, first pass and the final pass. Once every bolt has met the first pass requirement, the final pass can be initiated. When tightening down bolts it is necessary to follow the corresponding bolt pattern shown below.

TABLE A TORQUE REQUIREMENTS
IN - LBS

Valve Size	Bolt Pattern	BODY BOLTS				Stem Nuts
		Stainless Steel		Carbon Steel		
		First Pass	Final Pass	First Pass	Final Pass	
1/4"	4	48	80	53	88	35
3/8"	4	48	80	53	88	35
1/2"	4	48	80	53	88	35
3/4"	4	48	80	53	88	35
1"	4	101	168	117	195	80
1-1/4"	4	101	168	117	195	80
1-1/2"	4	207	345	240	400	115
2"	4	207	345	240	400	115

TABLE B GENERAL REPAIR KIT
1/4" ~ 3"

Part	Quantity
Thrust Washer	1
Stem Seals	2
Chevron Packing	2
Seats	2
Body Seals	2

REPAIR KIT

Repair Kits are available from ThermaFlo. Table B below shows what the kits consist of. When ordering a Repair Kit, please be sure to specify the type, size and seating material of the valve. When repairing a valve use only ThermaFlo Inc., authorized spare parts including; bolts and nuts, etc. In addition to maintenance kits, spare parts are available from ThermaFlo. They are: balls, stems and glands. If additional parts are required (body and ends), it is normally recommended that the complete valve be replaced. Components from a different valve series should not be used with the repair of any other valve. If the valve is altered in any way, no liability can be accepted by ThermaFlo Inc.

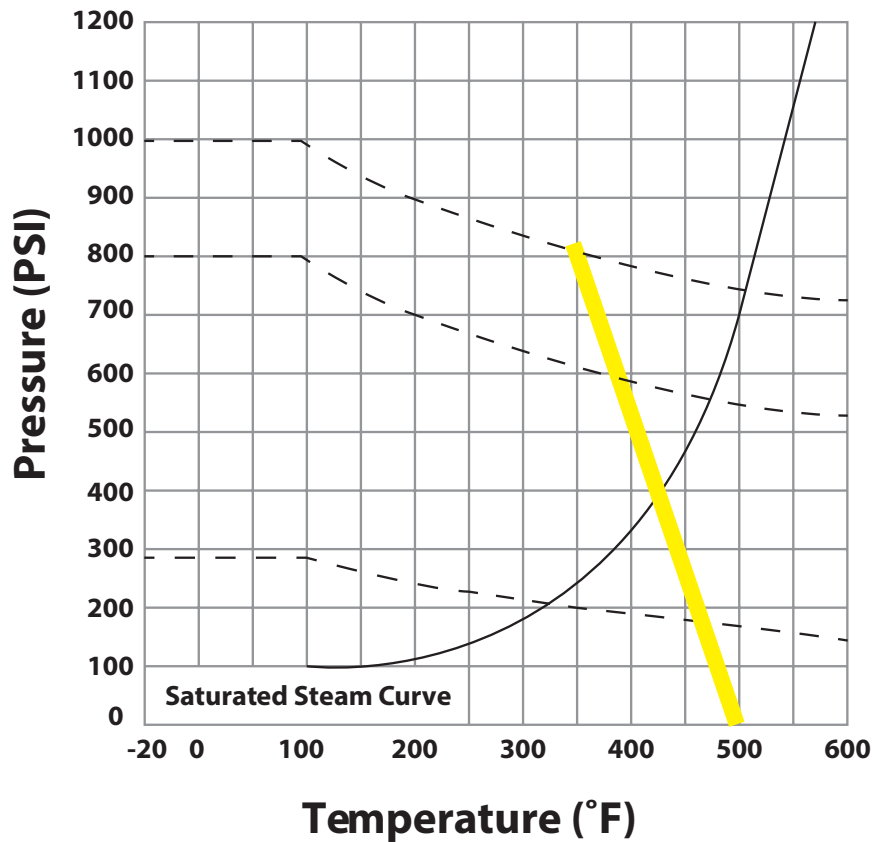
TABLE C

R8	B8
1/4"	-
3/8"	-
1/2"	-
3/4"	1/2"
1"	3/4"
1-1/4"	1"
1-1/2"	1-1/4"
2"	1-1/2"

NOTE: When ordering parts, keep in mind that standard port valves and full port valves use interchangeable parts. Refer to Table C to see the valve size comparison.

THERMAFLO GENERAL REPAIR KIT PART NO JVV-S316IN SPECIFY SIZE VALVE AND SERIAL NUMBER

JVV PRESSURE AND TEMPERATURE CHART



PTFE-S

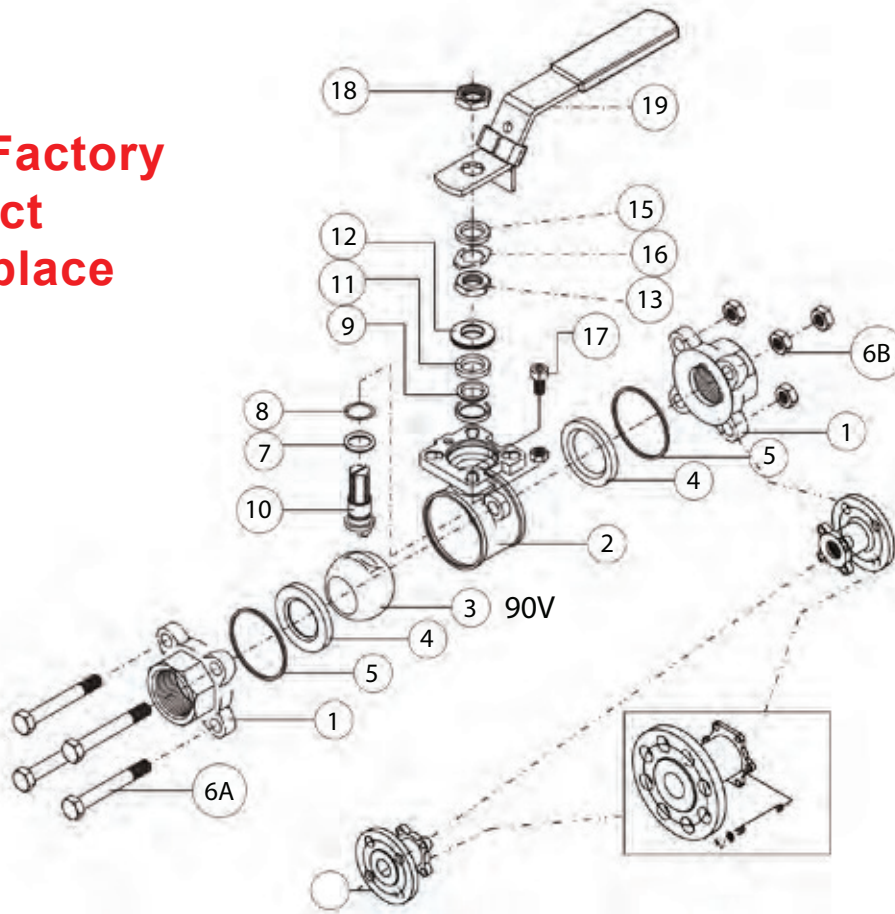
USED FOR STEAM APPLICATIONS TO 150 PSIG

TORQUE VALUES

SIZE	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
GREASE	31	31	44	49	62	97	150	204
NON-GREASE	44	44	53	62	84	142	239	266

NOTE: Increase Torque value is increased by 40% when sizing JFE actuator for V-Ball. Contact Thermaflo for 3" and Above

**Consult Factory
for Correct
Parts Replace**



No	Part Name	Materials
1	End Cap	CF8M/WCB
2	Body	CF8M/WCB
3	V Ball	SS316
4	Seat	TFM
5	Gasket	TFM
6A	Bolt	SS304
6B	Nuts	SS304
7	Thrust Washer	TFM
8	O-Ring	Viton
9	Stem Packing	TFM
10	Stem	SS316
11	Gland	SS304
12	Disk Washer	SS301

No	Part Name	Materials
13	Stem Nut	SS304
14	Nut Stop	SS304
15	Space Washer	SS304
16	Plater	SS304
17	Stop Pin	SS304
18	Handle Nut	SS304
19	Handle	SS304
20	Handle Cover	Plastic
21	Set Bolt	SS304
22	Lever Head	CF8
23	Lever	Steel Pipe

TFE-S80 Actuator



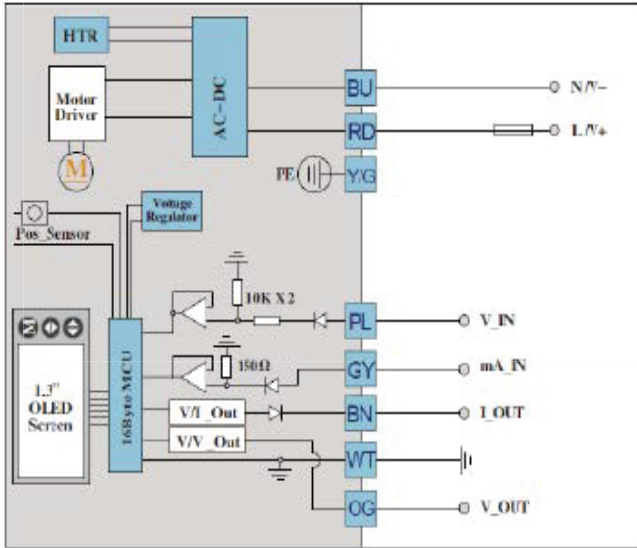
Operation Indicator Light
Added 2023

1/2" - 2" Valve Sizes

INTELLIGENT MODULATING ACTUATOR USAGE INSTRUCTIONS

NEVER REMOVE THE TOP HOUSING OF THE ACTUATOR OR YOU WILL VOID THE WARRANTY CONTACT 704-940-1228 FOR HELP

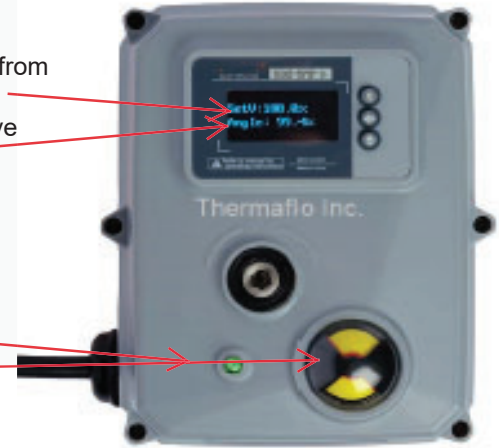
WIRING DIAGRAM



- 1 BLUE
- 2 RED
- 3 YELLOW/GREEN
- 4 PURPLE
- 5 ORANGE
- 6 WHITE

SET V % open set from the control signal.
ANGLE Actual Valve Position

LED Power Light Valve Indicator
RED is Closed
Yellow is Open



24VDC Power is Recommended
FORMELY 06T

POWER REQUIREMENTS

S80 Series 60W @ 24vdc

S80 (Formely 06T)	Valve Sizes . 5" to 2"
RED	24V DC DC ONLY
BLUE	NEUTRAL - Volt
PURPLE	0-10V Control INPUT SIGNAL
WHITE	COMMON
GREEN /YELLOW	GROUND
ORANGE	SIGNAL FEEDBACK

NOTE: Factory Control Signal is 0-10V Calibrated Input and Output

24VAC can be used. However 24VDC will enable the actuator to be 100% duty cycle

Note:
Whenever the actuator is first powered up at anytime it will take approx 45-60 seconds to fully charge the internal capacitor. This will be noticed on the top actuator screen and the green indicator light will come on.

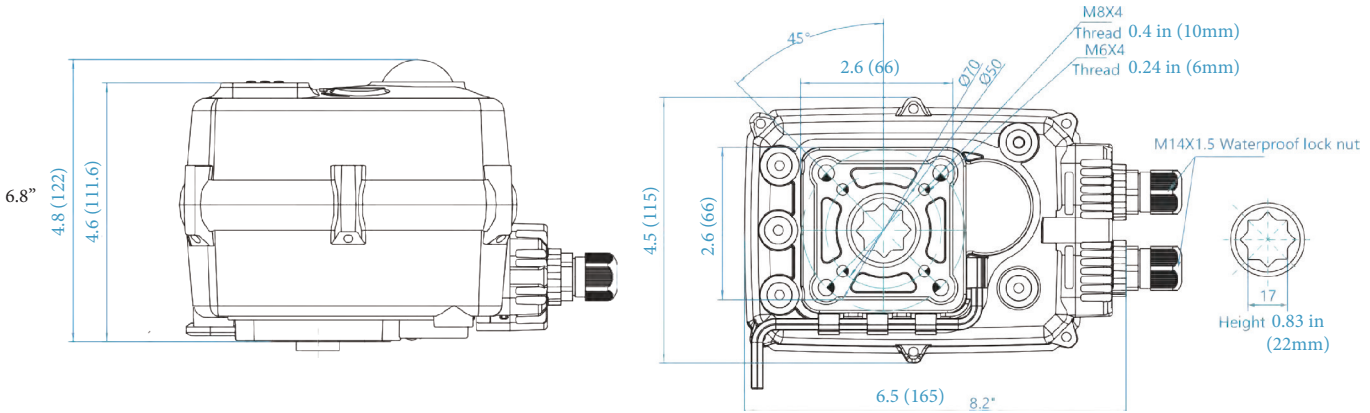
TFE-S80 ALL SERIES

INTELLIGENT MODULATING ACTUATOR USAGE INSTRUCTIONS

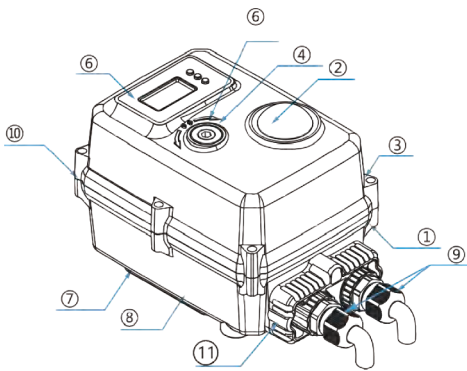
DIMENSIONS

FEMALE OCTAGON

UNIT: INCHES (MM)



MAIN PARTS



Operation Indicator Light (After 2022)

Visual Indicator:
Full Red Valve is Closed
Full Yellow Valve is Open
50% Yellow 50% Red Valve is 50%
Open and Modulating

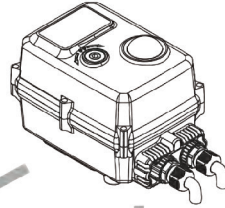
Six PIN Connector Cord after 2022

	Parts	Material		Parts	Material
1	Actuator	ABS or Casting Aluminum	8	Hexagon wrench	Tool Steel
2	Indicator	TransparentAS	9	Waterproof Cable Connector	Nil on
3	Screwx4	304	10	Seal Part between Up and Down Cover	NBR
4	Manual Shaft	304	11	Terminal Cover	ABS
5	Oil Seal	NBR			
6	Label	PVC			
7	Wrench Fixed	ABS			

NOTE: No. 5, "Oil Seal" is an inner gasket.

MOUNTING INSTRUCTIONS

Always use extended bracket for steam or fluid medium above 180°F and mount the actuator on a horizontal plane to avoid all heat radiation.



1. When assembly with valve, to use spring washer add flat washer in order to fasten the screw and nut.
2. It's recommend to use 704 silica gel or instant cement instead of anaerobic adhesive and UV glue.
3. Please keep the actuator housing away from organic solvents, such as: kerosene, butanone, tetrachlormethane etc., or the housing will crack.



Diagram | With Bracket
UPVC plastic ball valve+bracket assembly

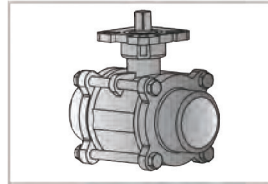


Diagram | Direct Mount
3 piece stainless steel ball valve assembly

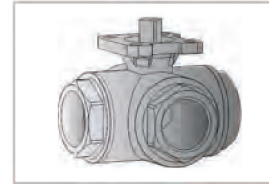


Diagram | Direct Mount
3 piece stainless steel 3-way ball valve assembly

INSTALLED VALVE TECHNICAL REQUIREMENTS

1. If the JVV V-Ball Valve is out of operation for a long time, and the torque value of first on or off is the max torque. Or you can choose ball valve with elastic sealing.
2. When installing JVV valve, the max torque. Because the torque value will increased by 20-4% after installing.
3. When installing direct mount model valve, the hole deep ≤ 20 mm. It requires cutting if the output shaft is longer than 20mm. **Never install a S80 actuator on any fluid above 120F without extended mounting bracket.**
4. Please pay attention to the following items if you install the bracket and coupling by yourself:
 - The intensity of bracket should meet the using requirements: the bracket twisting extent ≤ 0.2 mm in the process of on or off.
 - The parallelism of bracket ≤ 0.5 mm.
 - When processing the shaft hole at both end of the coupling, it is necessary to ensure the accuracy and concentricity. The purpose is to make sure the mechanical hysteresis $\leq 10^\circ$, otherwise it will cause the actuator unable to work.
5. It is available to use Lock Tight on all small screws used for mounting this actuator.

JVV V-BALL SERIES CONTROL VALVE

The ThermaFlo JVV V-Ball Series Control Valve is designed for high speed 100% duty for temperature, pressure and level control applications. Specifically designed for steam, high temperature hot water, and other rigorous control applications.

The equal percentage segmented V inner ball design provides the user with accurate control over a 300:1 flow turn-down range-ability. Half the size and weight of any conventional globe control valve, the JVV is simple to install. The high-speed electronic actuator fails closed on power loss and totally eliminates air supply. The fully programmable actuator accepts 0-10V input control signal and can be split range controlled when required.

The JVV Series high flow CVs reduces **the need for large pipe size type control valves.**



**CONSULT THERMAFLO SERVICES GROUP
FOR TECHNICAL ASSISTANCE WITH THIS PRODUCT
704-940-1228 or Your Representative**



2880 FAIR AVE. NEWBERRY, SC.
PHONE: 704-940-1228



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INVOICING: ACCOUNTING@THERMAFLOENGINEERING.COM