

Series V47 Temperature Actuated Modulating Valves

Introduction

The V47 modulating water valves regulate the flow of water to maintain a desired temperature. The valves have a quick opening characteristic and OPEN on a temperature increase at the bulb.

The V47 temperature valves are used for heating applications. It has a heating element, this means that the bulb temperature always must be higher than that of the valve body (the power element).



Series V47 Temperature Actuated Water Regulating Valve

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	Feature and Benefits									
	Pressure balanced valve design	Setpoint is independent from water inlet pressure								
	3/8, 1/2, 3/4" are angled body type valves with high Kv value	Small dimensions with high flow capacity								
	No close fitting or sliding parts in water passages	No hysteresis increase or stuck valve caused by contamination								
	Easy to disassemble. All parts can be replaced	Valve can easily be repaired "in line". Valve piece parts are available "world-wide"								
	Special bronze bodies and monel parts	Used for sea water applications								

Note

All Series V47 water regulating valves are designed for use only as operating devices. Where system closure, improper flow or loss of pressure due to valve failure can result in personal injury and/or loss of property, a separate pressure relief or safety shutoff valve, as applicable, must be added by the user.

Description

A pressure-balanced design employing rubber sealing diaphragms correctly proportioned to the valve port area, balances valve against both gradual and sudden water pressure changes, and seals water away from range spring, guides and sliding parts so these are not submerged in water where they would be subject to sedimentation and corrosion. Only five metal parts, made of corrosion resistant material, come in contact with the water. These are the valve disc holder, the disc stud, the valve seat, the valve stem, and the body.

Adjustments

The temperature at which the valve starts to open (= opening point) can be adjusted by the adjusting screw located at the top of the range spring housing. Valves may be adjusted with standard service valve wrenches or screwdrivers. (Valves are not factory set at a certain value.)

Manual flushing

Valves may be manually flushed by lifting the lower spring guide with screwdrivers at two sides of the pressure plate to open valve. This does not affect valve adjustment.

Valve size selection

The valve size can be selected by the use of: - the diagram (see page 3).

- Ky factors and calculation formulae

Refer to the Diagram for selection of valves sizes. Carefully follow the steps as outlined below.

- 1. Determine the maximum water flow required and draw a horizontal line across upper half of Flow Chart through this flow (e.g. 65 l/min, see line A)
- 2. Determine the temperature rise above the valve opening point.
 - a. Valve closing point is the lowest temperature at which it is desired to have no flow through the valve.

- b. Valve opening point will be about 3 K above the valve closing point.
- c. Determine the temperature the valve is to maintain
- d. Subtract the temperature opening point from the operating temperature. This gives the temperature rise.
- Draw a horizontal line across lower half of Flow Chart through this value (e.g. 8 K, see line B)
- 4. Determine the allowable pressure drop through the valve. This is the pressure actually available to force liquid through the valve.
- 5. On lower half of curve, mark point on drawnin horizontal temperature line at pressure determined in Step 4 (e.g. Δp of 2 bar, see line B). Interpolate between curves, or pick curve for nearest lower pressure drop for which curve is drawn (this gives a reserve maximum load capacity).
- 6. From this point draw line vertically upward until it intersects drawn-in horizontal water flow line in upper half of Flow Chart (see line C).
- 7. If intersection falls on a valve size curve this is the valve size.
- 8. If intersection falls between two curves the required valve size is the larger of the two (for given example it becomes a 1" valve).

Valve size selection by the use of the Ky factors and calculation formulae

For water:

The following K values

K _v =	Q V p
Δ P =	(<u>Q</u> Kv

can be used:								
Valve	K _v value							
size	-							
3/8"	1.8							
1/2"	2.7							
3/4"	4.5							
1"	6.5							
11/4"	9							
11/2"	10.5							
2"	18							
21/2"	22							

 $\mathbf{Q} = \mathbf{K}_{\mathbf{V}} \cdot \mathbf{V}$ p

- = quantity of liquid (in m³/h) Q
- ΔP = pressure drop across valve (in bar)
- K_v = valve flow coefficient

The K_v factor is the quantity of 20°C water that will pass through the valve at one bar pressure drop and a valve opening which belongs by 14 K temperature rise above the valve opening point.



Diagram for selecting the valve size corresponding with information on page 2



Fig. 1

Repair and replacement

Diaphragm kits can be ordered for all valves. Also the complete power element can be replaced. For a total revision of the valve a renewal kit can be ordered.

For type numbers of replacement power elements, renewal kits and diaphragm kits see valve selection table.

If a replacement is ordered a "repair parts and service instruction" sheet will be included in which a step by step description is given to disassemble/assemble the valve.

Bulb



Note:

Never subject temperature bulb to temperatures in excess of 11°C above maximum range temperature. E.g. for range 24 to 57°C the maximum bulb temperature not to exceed 68°C.

Note:

To provide satisfactory operation, always install valve with bellows down and spring cage up. Capillary end of temperature bulb should always be higher than plugged-end of bulb, or if horizontal, the word TOP (marked on the surface of the sensor) should be at the top or uppermost surface of bulb.

Bulb Wells



	Dime	ensions	Material		
Part Number	Α	В	`c ´	Connect	Tube
WEL17A-600	285	265	21	Steel	Copper
WEL17A-601	240	220	21	Steel	Copper
WEL18A-602	110	90	21	Steel	Brass

Renewal KITs

Each KIT contains parts as indicated in the table below. The complete KIT must be ordered that contains part required.			e disc	iger disc	t guide	: stud	e stem	e disc holder	ention sleeve	'e seat	ohragms	ket	e seat wrench	W	l ring
Valve	KIT	Disc	Valv	Plur	Sea	Disc	Valv	Valv	Exte	Valv	Diap	Gas	Valv	Scre	Sea
type:	number:		-		•/		-	-		<u> </u>		-	-		•,
V47AA	STT002N600R	1	1	-	1	1	1	-	-	1	4	1	1	-	1
V47AB	STT003N600R	1	1	-	1	1	1	-	-	1	4	1	1	-	1
V47AC	STT004N600R	1	1	-	1	1	1	-	-	1	4	1	1	-	1
V47AD	STT17A609R	1	1	-	1	1	1	-	-	1	5	1	1	-	1
V47AE	STT17A610R	1	1	-	1	1	1	-	-	1	5	1	1	-	1
V47AR	STT17A610R	1	1	-	1	1	1	-	-	1	5	1	1	-	1
V47AS	STT18A600R	-	1	1	-	-	-	1	1	1	5	1	-	1	1
V47AT	STT18A601R	-	1	1	-	-	-	1	1	1	5	1	-	1	1
V47BB	STT15A603R	1	1	-	1	1	1	-	-	1	4	-	1	-	-
V47BC	STT17A613R	1	1	-	1	1	1	-	-	1	4	-	1	-	-
V47BD	STT17A611R	1	1	-	1	1	1	-	-	1	5	-	1	-	-
V47BE	STT17A612R	1	1	-	1	1	1	-	-	1	5	-	1	-	-
V47BR	STT17A612R	1	1	-	1	1	1	-	-	1	5	-	1	-	-
V47BS	STT18A602R	-	1	1	-	-	-	1	1	1	5	-	-	1	-

Dimensions (mm)

Angled type



Commercial Types											
Valve type	Valve size	Dimensions in mm									
		Α	В	С	D	Е	F				
V47AA	³ /8"	69	153	66	43	18	89				
V47AB	¹ /2"	80	170	86	51	27	100				
V47AC	3/4"	91	183	95	55	36	110				

Dimensions (mm)

Straight type



Commercial Types											
Valve	Valve Valve Dimensions in mm.										
type size A B C D E F											
V47AD	1"	124	233	139	72	50	13				
V47AE	1 ¹ / ₄ "	125	243	145	72	58	13				
Sea-water	[.] Types										
V47BB	1/2"	79	165	86	52	29	10				
V47BC	³ /4"	86	175	96	55	35	10				
V47BD	1"	124	246	139	71	52	13				
V47BE	1 ¹ / ₄ "	124	254	144	71	62	13				

Dimensions (mm)

Flange type



Commercial Types											
Valve type	Valve	Dim	Dimensions in mm.								
	size	Α	В	С	D	Е	F	G	Н	I	J
V47AR	1 ¹ / ₂ "	137	244	144	18	150	47	67	13	110	18
V47AS	2"	168	304	164	20	165	57	90	18	125	18
V47AT	2 ¹ / ₂ "	172	304	164	20	185	70	90	18	145	18
Sea-wate	er Types										
V47BR	1 ¹ / ₂ "	135	244	144	14	150	47	67	13	110	18
V47BS	2"	162	304	164	16	165	57	90	18	125	18
V47BT	2 ¹ / ₂ "	172	304	164	16	185	70	90	18	145	18

Valve selection table

Commercial types

ltem	Size	Range	Bulb	Max.	Connection	Replacements			Weight	Bulb Well
	inch	°C	Size	Bulb Temp. °C	body	power element	renewal kit	diaphragm kit	single pack kg.	Oder separately
V47AA-9160	3/8	24/57	ø18 x 83	68	ISO 228 - G3/8	SET98A632R	STT002N600R	KIT016N600 (100)	1.40	WEL18A-602
V47AA-9161	3/8	46/82	ø18 x 83	93	ISO 228 - G3/8	SET98A636R	STT002N600R	KIT016N600 (100)	1,40	WEL18A-602
V47AB-9160	1/2	24/57	ø18 x 83	68	ISO 228 - G1/2	SET98A617R	STT003N600R	KIT016N601 (100)	2,00	WEL18A-602
V47AB-9161	1/2	46/82	ø18 x 83	93	ISO 228 - G1/2	SET98A640R	STT003N600R	KIT016N601 (100)	2,00	WEL18A-602
V47AC-9160	3/4	24/57	ø18 x 83	68	ISO 228 - G3/4	SET98A624R	STT004N600R	KIT016N602 (100)	2,60	WEL18A-602
V47AC-9161	3/4	46/82	ø18 x 83	93	ISO 228 - G3/4	SET98A641R	STT004N600R	KIT016N602 (100)	2,60	WEL18A-602
V47AD-9160	1	24/57	ø18 x 152	68	ISO 7 - Rc 1	SET29A648R	STT17A609R	KIT016N603 (50)	4,50	WEL17A-601
V47AD-9161	1	46/82	ø18 x 152	93	ISO 7 - Rc 1	SET29A629R	STT17A609R	KIT016N603 (50)	4,50	WEL17A-601
V47AE-9160	11/4	24/57	ø18 x 152	68	ISO 7 - Rc 11/4	SET29A648R	STT17A610R	KIT016N603 (50)	5,50	WEL17A-601
V47AE-9161	11/4	46/82	ø18 x 152	93	ISO 7 - Rc 11/4	SET29A629R	STT17A610R	KIT016N603 (50)	5,50	WEL17A-601
V47AR-9160	11/2	24/57	ø18 x 152	68	Flange 11/2 DIN2533	SET29A648R	STT17A610R	KIT016N603 (50)	8,00	WEL17A-601
V47AR-9161	11/2	46/82	ø18 x 152	93	Flange 11/2 DIN2533	SET29A629R	STT17A610R	KIT016N603 (50)	8,00	WEL17A-601
V47AS-9160	2	24/46	ø18 x 254	57	Flange 2 DIN2533	SET29A662R	STT18A600R	KIT016N604 (25)	12,30	WEL17A-600
V47AS-9161	2	46/71	ø18 x 254	82	Flange 2 DIN2533	SET29A-632R	STT18A600R	KIT016N604 (25)	12,30	WEL17A-600
V47AT-9160	21/2	24/46	ø18 x 254	57	Flange 21/2 DIN2533	SET29A662R	STT18A601R	KIT016N604 (25)	15,00	WEL17A-600
V47AT-9161	21/2	46/71	ø18 x 254	82	Flange 21/2 DIN2533	SET29A-632R	STT18A601R	KIT016N604 (25)	15,00	WEL17A-600

Sea-water types

ltem	Size	Range	Bulb	Max.	Connection		Replacements			Bulb Well
	inch	°C	Size mm	Bulb Temp. °C	body	power element	renewal kit	diaphragm kit	single pack kg.	Oder separately
V47BB-9161	1/2	46/82	ø18 x 83	93	ISO 228 - G1/2	SET98A640R	STT15A603R	KIT016N601 (100)	2,00	WEL18A-602
V47BC-9160	3/4	24/57	ø18 x 83	68	ISO 228 - G3/4	SET98A624R	STT17A613R	KIT016N602 (100)	2,60	WEL18A-602
V47BC-9161	3/4	46/82	ø18 x 83	93	ISO 228 - G3/4	SET98A641R	STT17A613R	KIT016N602 (100)	2,60	WEL18A-602
V47BD-9160	1	24/57	ø18 x 152	68	ISO 228 - G1	SET29A648R	STT17A611R	KIT016N603 (50)	4,50	WEL17A-601
V47BD-9161	1	46/82	ø18 x 152	93	ISO 228 - G1	SET29A629R	STT17A611R	KIT016N603 (50)	4,50	WEL17A-601
V47BE-9160	11/4	24/57	ø18 x 152	68	ISO 228 - G11/4	SET29A648R	STT17A612R	KIT016N603 (50)	5,50	WEL17A-601
V47BR-9160	11/2	24/57	ø18 x 152	68	Flange 11/2 DIN86021	SET29A648R	STT17A612R	KIT016N603 (50)	9,00	WEL17A-601
V47BS-9161	2	46/71	ø18 x 254	82	Flange 2 DIN86021	SET29A-632R	STT18A602R	KIT016N604 (25)	14,00	WEL17A-600

Specifications

Commercial

Size	3/8" - 3/4"	1" - 1 ¹ /4"	11/2" - 21/2"
Max. water supply press. (bar)	10	10	10
Max. water supply temp.	90 °C	90 °C	90 °C
Min. water supply temp.*	-20 °C	-20 °C	-20 °C
Valve body style angled	X		
straight		Х	x
Pipe connection** thread ISO 228	X		
thread ISO 7 - Rc		x	
flange DIN 2533			x
Capillary length (m)	1.8 plain	1.8 armored	1.8 armored
Material body	hot forged brass	cast iron***	cast iron***
disc stud/disc cup	brass	brass	brass
seat	alum. bronze	alum. bronze	alum. bronze
diaphragms	BUNA-N	BUNA-N	BUNA-N
bulb	copper	copper	copper
Closed tank connector	brass	brass	brass
stem/extension sleeve	brass	brass	brass
disc	BUNA-N	BUNA-N	BUNA-N
Sea-water			
Size	3/8" - 3/4"	1" - 1 ¹ /4"	1 ¹ /2" - 2 ¹ /2"
Max. water supply press. (bar)	10	10	10
Max. water supply temp.	90 °C	90 °C	90 °C
Min. water supply temp.*	-20 °C	-20 °C	-20 °C
Valve body style straight	Х	Х	х
Pipe connection** thread ISO 228	X	X	
flange DIN86021			x
Capillary length (m)	1.8 plain	1.8 armored	1.8 armored
Material body	bronze	bronze	bronze
disc stud/disc cup	monel	monel	monel
seat	monel	monel	monel
diaphragms	BUNA-N	BUNA-N	BUNA-N
bulb	copper	copper	copper
Closed tank connector	brass	brass	brass
stem/extension sleeve	monel	monel	monel
disc	BUNA-N	BUNA-N	BUNA-N

Care should be taken the valve does not freeze up. Thread ISO 7 - Rc = DIN2999-RC thread/ISO 228 = DIN259-Rp thread Cast iron bodies are executed with rust resisting finish ** ***

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



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