MACON® CONTROLS

A respected national supplier of radiator valves and regulating sensors for the heating and cooling industry since 1975, ***Macon Controls*** *- a division of the Tunstall Corporation - maintains a solid reputation for energy-efficient products, trouble-free service, and virtually non-existent failure rates. Distinguished by superior quality and performance, all Macon valves and controls conform to ASHRAE Standard 102P-1983 and European Standard EN 215/1215 and carry a 12-month warranty.*

Macon Controls are ideal for hydronic and low-pressure steam heating applications – and they deliver up to 30 percent energy savings. A complete line of valve sizes and non-electric control models is available, allowing for temperature regulation of radiators, convectors, fin-tube baseboard, fan coils or wherever individual control is required.

As a pioneer and developer of "smart solutions", Macon also offers high quality, innovative accessories, including Umbrella adaptors ™ to upgrade existing thermostatic controls to Macon operators and E-Z Fit ™ Conversion kits which transform manual radiator valves to temperature sensitive self-acting valves.

NT SERIES VALVES

NON-ELECTRIC OPERATORS

ELECTRIC OPERATORS

ONE-PIPE STEAM

NT SERIES VALVE ACCESSORIES

E-Z FIT™ CONVERSION INSERTS

UMBRELLA ADAPTORS

Tunstall Corporation
118 Exchange St • Chicopee, MA 01013
Phone: 413-594-8695 • Fax: 413-598-8109
www.maconcontrols.com

NT Series Valve Vertical Angle	NT Series Valve Straight	NT Series Valve Horizontal	NT Series Valve Sweat
			
Thermostatic Diverter or Mixing Valve	**Non-Electric Operator EVO**	**Non-Electric Operator EVO-Z**	**Non-Electric Operator EVOL**
			
Non-Electric Operator EVOLZ	**Electric Operator VA & WM Series**	**Electric Operator ZMC - ES & DDC Series**	**Electric Operator MVA & MPVC Series**
			
One-Pipe Steam OPSK	**NT Series Valve Inserts**	**E-Z Fit ™ Conversion Kits**	**Umbrella Adaptors**
			

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Table of Contents

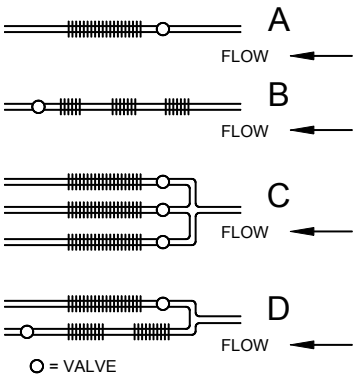
Table of Contents (cont.)

Operation

The *Macon* valve is designed to save energy by controlling hot water or low pressure steam heat in freestanding radiators, convectors, baseboards, fan coil units and the like in a loop, a zone or a unit. The valve, coupled with a *Macon* operator, provides a reliable automatic modulating unit. As room temperature drops, the *Macon* valve opens to allow more hot water or steam to flow through the radiator, thus allowing more heat into the room. When the room approaches the selected temperature, the operator causes the valve to begin closing off the flow of hot water or steam. This continued monitoring of the temperature is fully automatic, using no electricity whatsoever. The *Macon* valve can be equipped with any wide variety of *Macon* operators.

Features

- Compact dimensions
- Replaceable insert
- Stainless steel spindle
- Individual room control
- Easy one-trade installation
- Fuel savings up to 30%
- Prevents over- and under-heating
- Helps balance the heating system
- Same valve used for hot water or low pressure steam
- All NPT are forged brass nickel-plated
- Minimizes or eliminates expansion noises
- Suitable for nearly any hydronic heating application
- Operators can be changed without draining the system
- Shipped with a protective cap that can be used to control heating during the installing period



VALVE LOCATION IN SINGLE AND MULTIZONE HEATING SYSTEMS.

Vertical angle valve with straight nipple. NPT - female inlet, male union outlet.

N10637 - 1/2”
N10657 - 3/4”
N10677 - 1”
N10697 - 1-1/4”

Straight valve with straight nipple. NPT - female inlet, male union outlet.

N10737 - 1/2”
N10757 - 3/4”
N10777 - 1”
N10797 - 1-1/4”

Horizontal angle valve with straight nipple. NPT - female inlet, male union outlet.

N10837 - 1/2”
N10857 - 3/4”
N10877 - 1”
N10897 - 1-1/4”

Sweat valve with female inlet and outlet.

N10930 - 1/2”
N10950 - 3/4”
N10970 - 1”

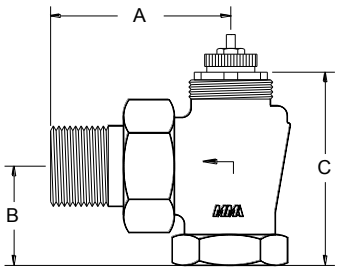
Fail closed valves also available, consult factory.
All Macon valves and thermostats conform to ASHRAE Standard 102P-1983 and European Standard EN 215/1215. We are also ISO 9001 certified (1994) and ISO 14001 certified (1998).

DATA - Macon Valves for NT Series

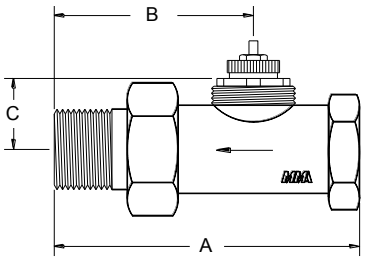
Disc Material: EPDM
Body Styles: Straightway or angle
Maximum steam pressure: 15 psig
Maximum static pressure: 145 PSI
Maximum water temperature: 250°F
Body tappings: Female inlet, male union outlet, Female sweat
Body Material: Forged brass, NPT valves are nickel-plated
Max. Differential pressure: 20 psi H_2O, refer to thermostat specs
Suggested Differential Pressure = 0.5 to 2.9 psi
Overall Height: Add thermostat dimensions less 1/4"

Macon NT Series Valves are in an open position when no operator is attached.

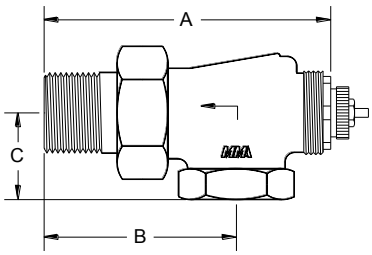
CV: 1/2" = 1.8
3/4" = 2.5
1" = 2.74
1-1/4" = 3.5



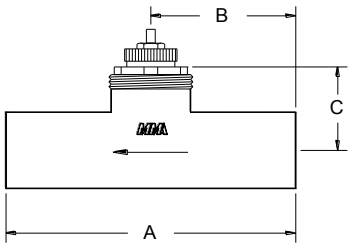
Vertical Angle



Straight



Horizontal Angle



Sweat

DIMENSIONS & INSERTS

VERTICAL ANGLE

BODY #	SIZE	A	B	C	Insert
N10637	1/2"	2-¼"	1"	1-¾"	T23000
N10657	3/4"	2-½"	1-1/8"	2-1/8"	T23000
N10677	1"	3"	1-3/8"	2-¼"	T25000 (LBLD)
N10697	1-¼"	3-¼"	1-¾"	2-¾"	T25000 (LBLD)

HORIZONTAL ANGLE

BODY #	SIZE	A	B	C	Insert
N10837	1/2"	3-3/8"	2-3/16"	1-½"	T23000
N10857	3/4"	3-¾"	2-½"	1-¼"	T23000
N10877	1"	4-3/16"	3"	1-3/8"	T23000
N10897	1-¼"	4-¾"	3-¼"	1-7/8"	T25000 (LBLD)

STRAIGHT

BODY #	SIZE	A	B	C	Insert
N10737	1/2"	3-½"	2-1/16"	1"	T23000
N10757	3/4"	4"	2-½"	1"	T23000
N10777	1"	4-5/8"	2-15/16"	1"	T25000 (LBSD)
N10797	1-¼"	5-¼"	3-3/8"	1-1/8"	T25000 (LBLD)

SWEAT VALVES

BODY #	SIZE	A	B	C	Insert
N10930	1/2"	2-3/16"	1-3/32"	1"	T23000
N10950	3/4"	2-11/16"	1-11/32"	7/8"	T23000
N10970	1"	3-5/32"	1-9/16"	1"	T25000 (LBSD)

STEAM

BTU/hour

P.D.* with 10 PSI Inlet	3.5 C_v 1-1/4" Valves	2.74 C_v 1" Valves	2.5 C_v 3/4" Valves	1.8 C_v 1/2" Valves
1 psi	48,000	39,000	36,000	28,000
3 psi	87,000	70,000	65,000	46,000
5 psi	113,000	91,000	84,000	63,000
7 psi	130,000	104,000	96,000	72,000
10 psi	162,000	130,000	120,000	90,000

*P.D. = Pressure Drop
Capacity measured with 10 psi inlet pressure.
EDR = Equivalent Direct Radiation (in ft.^{2})

$$EDR = \frac{BTU/hr}{240} \qquad BTU/hr = 240 \times EDR$$

BTU/hour = lbs. steam/hour x 1000

HOT WATER

BTU/hour**

** Pressure Drop Ft.	P.D. PSI	3.5 C_v 1-1/4" Valves	2.74 C_v 1" Valves	2.5 C_v 3/4" Valves	1.8 C_v 1/2" Valves
1	.43	21,000	17,000	16,500	12,000
2	.87	28,000	23,000	22,000	15,500
4	1.7	44,000	35,000	32,500	23,500
6	2.6	53,000	43,000	40,000	29,000
8	3.5	64,000	51,000	47,000	33,500
10	4.3	70,000	56,000	52,000	37,500
12	5.2	77,000	62,000	57,000	41,000
14	6.1	83,000	67,000	62,000	44,500
16	7.0	88,000	71,000	66,000	47,500

** Assumes 20°F drop in water temperature through radiation.

GPM = $C_v \sqrt{P.D.}$ 1psi = 2.31 Ft. H_2O
BTU/hour = GPM x 10,000 1Ft. H_2O = .433 psi

EDR (Equivalent Direct Radiation in ft.^{2}) for Hot Water

Water Temperature	Cast Iron Radiator	Convector
200°F	209	205
190°F	187	183

BTU/hour = EDR in ft.^{2} x (Appropriate number from above EDR Table)
For example: 205 for 200°F water in convector

COMPARISON CHART

Description	MACON	Ammark		Bell & Gossett (ITT)	Honeywell Braukmann	Honeywell Sparco/ Braukamnn	Danfoss RA 2000	Taco	
		Old (SYR)	New					Series 53 (Old)	Series 54 (New)
½" Vertical Angle	N10637	70	60	TM12-50	V110E1004	V100E1055/5030	013G8014	5323	5423
½" Horizontal Angle	N10837	77	67	TM42-50	V110F1002	V100f1054	013G8013	5322	5422
½" Straight	N10737	71	61	TM21-50	V110D1000	V100D1056/5057	013G8015	5321	5421
½" Sweat	N10930	-	-	-	-	V100G5054	013G8042	-	5424
¾" Vertical Angle	N10657	70	60	TM12-75	V110E1012	V100E1063	013G8019	5333	5433
¾" Horizontal Angle	N10857	77	67	TM42-75	V110F1010	V100F1062	013G8018	5332	5432
¾" Straight	N10757	71	61	TM21-75	V110D1008	V100D1008	013G8020	5331	5431
¾" Sweat	N10950	-	-	-	-	V100G5062	013G8044	-	5434
1" Vertical Angle	N10677	70	60	TM12-100	V110E1020	V100E1071	013G8024	-	5443
1" Horizontal Angle	N10877	77	67	TM42-100	V110F1018	V100F1070	013G8023	-	5442
1" Straight	N10777	71	61	TM21-100	V110D1016	V100D1072	013G8025	-	5441
1" Sweat	N10970	-	-	-	-	-	-	-	5444
1¼" Vertical Angle	N10697	70	60	-	V110E1028	-	013G8031	-	5453
1¼" Horizontal Angle	N10897	77	67	-	V110F1026	-	013G8030	-	5452
1¼" Straight	N10797	71	61	-	V110D1024	-	013G8032	-	5451
Direct Mount T-Stat	EVO	72	62	TM5	T104A1018/1040	T100A1028/1018	013G8250	5201	5401
Remote Sensor T-Stat	EVO-Z	73	63	TM6	T104F1021/1512	T100F1395/1021	013G8252	5203	5403
Remote Dial T-Stat	ENTL B46000	76	66	TM9	T104B1019/1038	T100B1035/1387	013G8562	5206	5406
Remote Sensor & Dial	ENTLZ B56000	74	-	-	T104C1015/1036	T100C1026/1015	013G8564	5211	5411
One Pipe Steam Valve	OPSK	-	-	TM1PS	Y108P	Y100P	013G0140	5213	5413

	 EVO*	 MTW-HS*	 EVO-Z	 ENTL B46000	 ENTLZ B56000	 VA & VM
 Vertical Angle	Not recommend-ed (may shut off prematurely due to poor air circu-lation)	Yes	Yes	Yes	Yes	Yes
 Straight	Yes, if thermostat is mounted inverted or horizontal	Yes	Yes	Yes	Yes	Yes
 Horizontal Angle	Yes	Yes	Yes	Yes	Yes	Yes
 Sweat	Yes, if thermostat is mounted inverted or horizontal	Yes	Yes	Yes	Yes	Yes

*Not recommended within enclosure.

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Operation

The EDV is a twin seat valve with an intermediate cone of EPDM rubber that closes flow to both gates at the end position and directs flow as required. This valve can be used with any of the Macon electric or nonelectric thermostats.

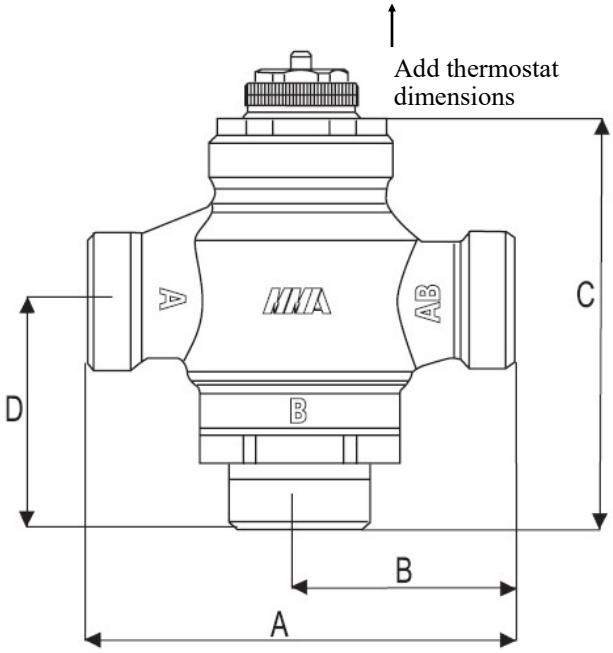
Areas of Use

Three way valves are designed for mixing or diverting flows in various water based heat or cooling transmission systems, such as radiator loops, floor heating, heat exchangers, solar heat collectors, water heaters, etc.

Features

- Forged brass construction
- Compact dimensions
- Replaceable insert
- Stainless steel spindle
- Easy one-trade installation
- Electric or non-electric - fully automatic
- Provides constant temperature
- Actuators can be changed without draining of the system
- Shipped with a protective cap that can be used to control the unit during installation period
- Four temperature ranges available. See chart.

EDV-050 1/2”
EDV-075 3/4”



RECCOMENDED OPERATOR*		
Temp Range	Operators	
	Remote Dial, Remote Sensor	Direct Mount w/ Remote Sensor
56° - 83°F	ENTL/Z-T1	EVO-Z-T1
68° - 108°F	ENTL/Z-T2	EVO-Z-T2
95° - 131°F	ENTL/Z-T3	EVO-Z-T3
122° - 158°F	ENTL/Z-T4	EVO-Z-T4

*Thermostatic Operators sold separately.

DIMENSIONS		
	EDV-050	EDV-075
A	2-1/5”	2-1/5”
B	1”	1”
C	2-3/5”	2-3/5”
D	1-1/2”	1-1/2”

Sweat Couplings	
1/2”	1-1/4” O.A. Length
3/4”	1-1/2” O.A. Length

Tunstall®

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

MACON® CONTROLS

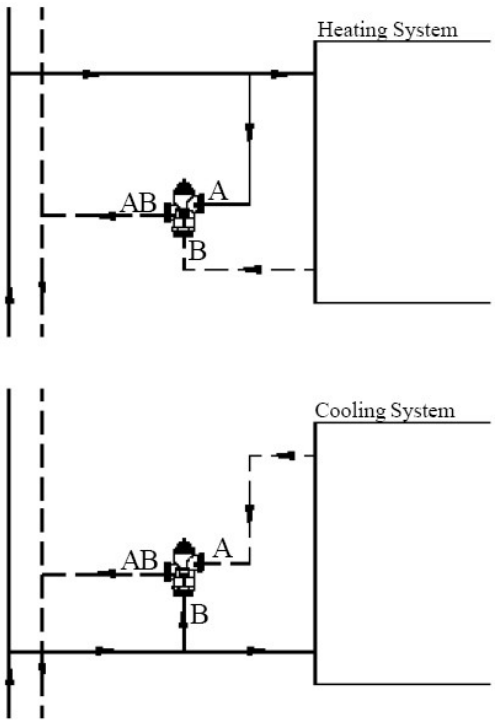
THERMOSTATIC DIVERTER or MIXING VALVE EDV

Data - Macon Thermostatic Diverter/Mixing Valve
Maximum static pressure: 145 psig
Maximum water temperature: 250°F
Cv-value
- 1/2 = 2.0
- 3/4 = 3.2

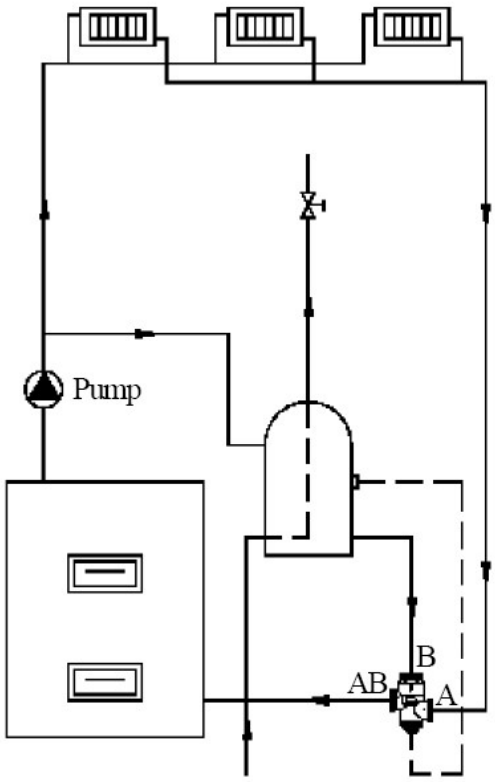
P-band at
- temperature range T-1: 56°-83°F
- temperature range T-2: 68°-108°F
- temperature range T-3: 95°-131°F
- temperature range T-4: 122°-158°F

Body sizes: 1/2” and 3/4”
Body material: Forged brass
Disc material: EPDM
Body tappings: Female sweat inlets and outlet
NOTE: See chosen thermostat for control data

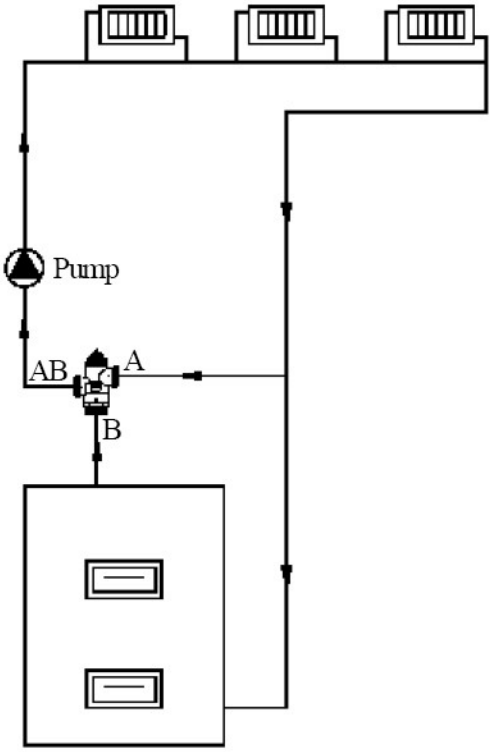
INSTALLATION EXAMPLES



Example of DHW-cyl. control

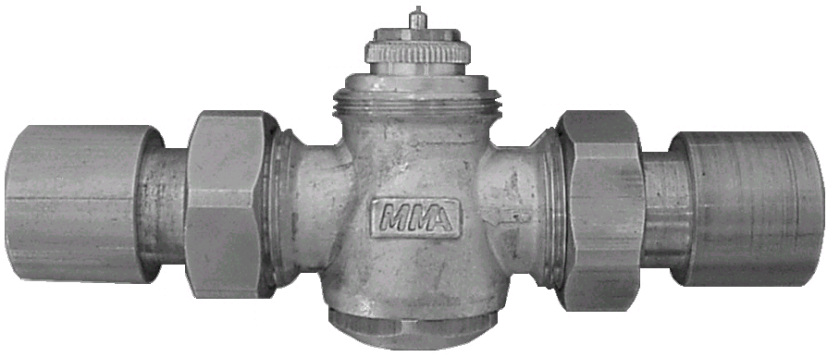


Example of radiator circuit control



Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

COOLING VALVE
EKV 20



Areas of use

The EKV valves are designed for use in refrigeration plants, induction or fan coil units where the flow of cold water through the heat exchangers can be regulated to obtain constant differentiated temperatures in different parts of the building.

Function

The sensor medium of a thermostat component expands with rising temperature. The expansion is transmitted to the valve spindle and conus, opening the valve to permit flow of coolant. A return spring in the valve body closes the valve when the pressure on the spindle is relieved. The valve will be balanced so that the plug comes to rest in a given position, passing a given flow of coolant. Any change in the temperature at the sensor bulb causes a change in the position of the plug and thus increases or reduces the flow. The desired temperature is set by adjusting the regulation knob on the thermostat.

Features

- Compact dimensions
- Forged brass valve
- Actuators can be changed without draining the system
- Stainless steel spindle
- Shipped with protective cap that may be used for controlling cooling during construction period
- Easy, one-trade installation
- Replaceable insert
- Prevents over- and under-cooling
- Accessories available for proper mounting of
- sensor in circulating air for good sensing function
- 24 Volt electric or non-electric t'stats available
- Provides constant temperature

Technical Data		
	EKV15 - 1/2"	**EKV20 - 3/4"**
Max. Static Pressure	145 PSI	145 PSI
Cv - Value	1.8	2.75
Fittings	1/2 Union Sweat	3/4 Union Sweat
O.A. Length w/Fittings	4-1/2"	5"
Weight	6 oz	8 oz
Height Less Operator	2-1/8"	2-1/8"

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

This page left blank intentionally.

DIFFERENTIAL PRESSURE VALVE DR 15

The DR 15 pressure differential pressure valve has a proportional control characteristic, opening with rising differential pressure. It is suitable for installation in circulated pumped radiator circuits equipped with radiator thermostatic valves. Used with hot water systems.

OPERATION

Design: flow regulation with cap for concealed setting. At a given setting (number of turns "n") of the valve spindle and a given differential pressure, a given amount of water flows through the valve. If the differential pressure rises, e.g. when one or more radiators are shut off, the through-flow rate increases, relieving the pump pressure on the remaining valves.

Two pressure ranges available: 0-2.9 PSI and 0-8.7 PSI.

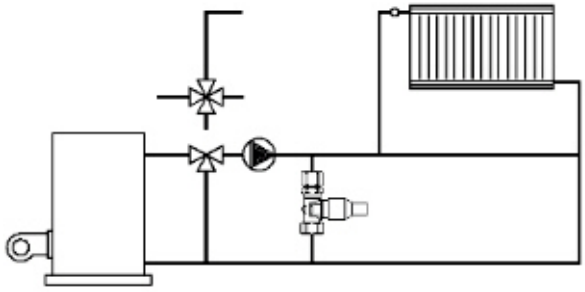
ADVANTAGES

- Regulates pressure changes in single and double pipe systems due to thermostatic radiator valve settings.
- Eliminates rushing noise and chattering in radiator thermostatic valves.
- Easy to fit.

DATA

Material: Hot forged brass
Design: Straight connection, 1/2 NPT
Max. Temperature: 250°F
Max. Static Pressure: 145 psi

Application example

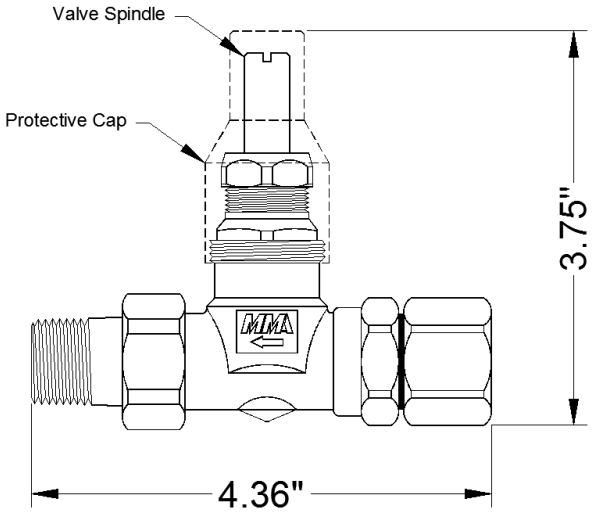


DR 15 valve installed in central heating system with 3- or 4-way shunt valve.

Tunstall®
Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

MACON® CONTROLS

DIFFERENTIAL PRESSURE VALVE DR 15

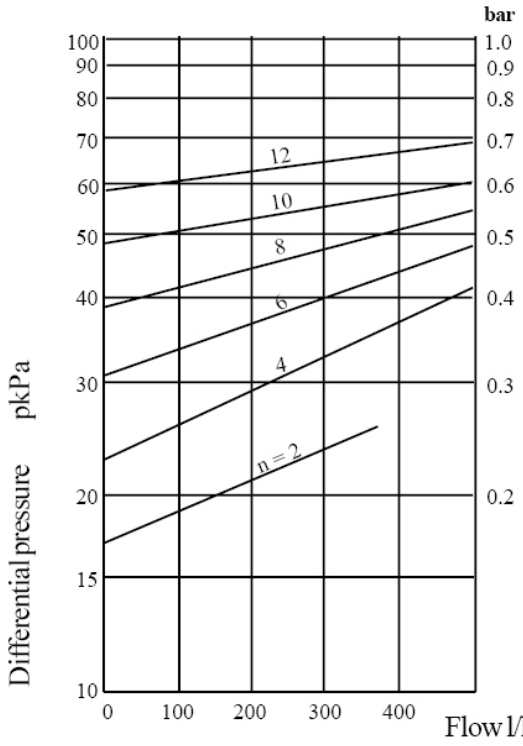


Setting the differential pressure

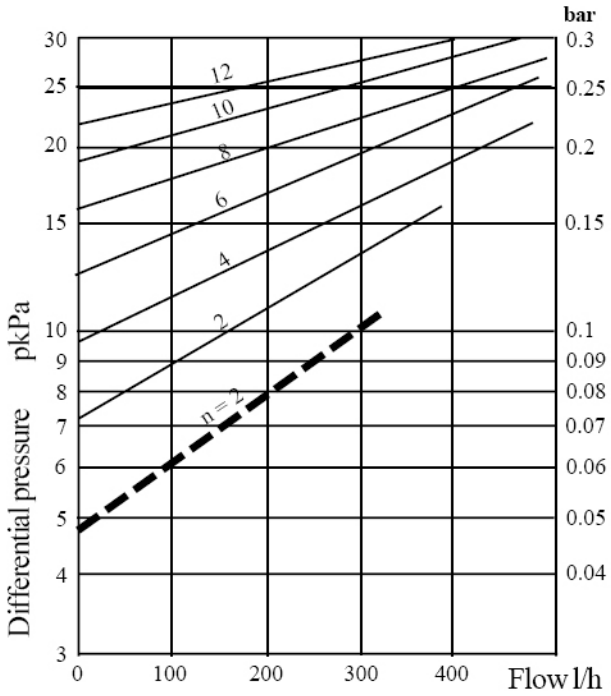
Turn the valve spindle (see fig.) until it is wide open. Locate the maximum differential pressure of the pump on the vertical axis of the graph and draw a horizontal line to intersect the “n” line corresponding to the required flow rate according to the horizontal axis.

Then turn the valve spindle clockwise the number of turns indicated by the selected “n” line.

The DR 15 pressure relief valve is delivered with a spring for a differential pressure range of 0-2.9 PSI in place. To alter the range to 0-8.7 PSI, exchange the spring in the valve for the separate one delivered with it.



Spring for 0.1-0.6 bar (10-60KPA) pressure range.



Spring for 0-0.2 bar (0-20KPA) pressure range.

KiloPASCALS - kPa x 0.1450 = pounds force per sq. inch.
BARS - bar x 14.504 = pounds force per sq. inch.

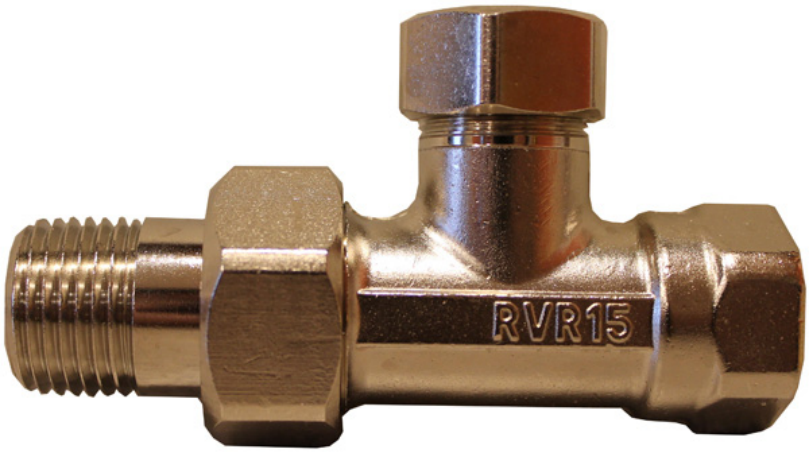
Reference numbers for ordering

Art. No.	Code	Conn. No.	Thread
4141501	DR 15	15	1/2” NPT

Compression fittings must be ordered separately.

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

UNION SHUT-OFF VALVE
RVR - Straight

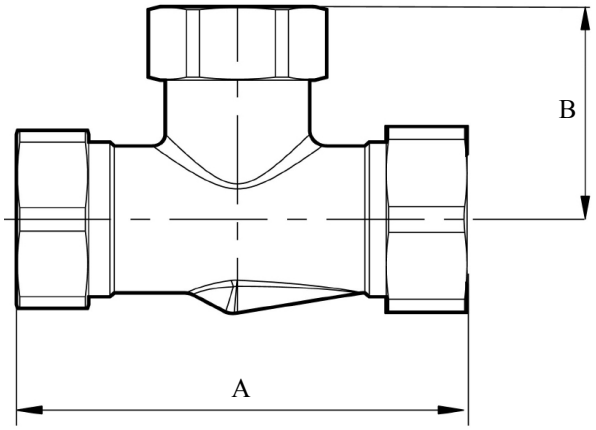


Areas of use

The RVR valves are used as a shut-off or isolation valve on radiators.

Specification Data

Disc Material:	EPDM
Body Style:	Straight
Maximum Steam Pressure:	15 psig
Maximum Static Pressure:	145 PSI
Maximum Water Temperature:	250º F
Body Tappings:	Female NPT inlet, male NPT union outlet
Body Material:	Forged brass, nickel plated



TECHNICAL DATA				
Model	**Cv - Value**	**A**	**B**	**Weight**
RVR- 1/2 "	1.5	2.28”	1.30”	0.42 lb
RVR- 3/4 "	2.3	2.56”	1.69”	0.79 lb

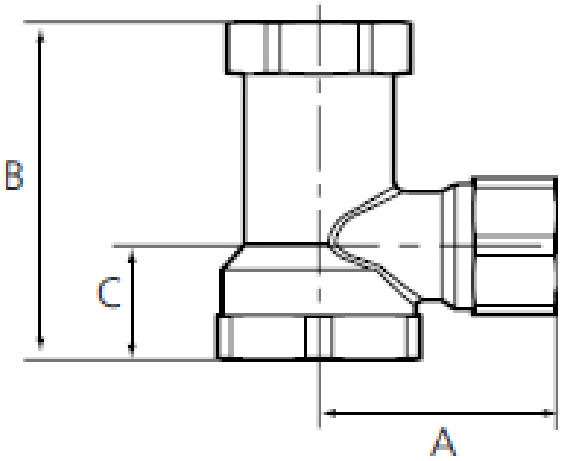
Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

MACON® CONTROLS

UNION SHUT-OFF VALVE
RVV - Angle

Areas of use

The RVV valves are used as a shut-off or isolation valve on radiators.



Specification Data

Disc Material:	EPDM
Body Style:	Angle
Maximum Steam Pressure:	15 psig
Maximum Static Pressure:	145 PSI
Maximum Water Temperature:	250º F
Body Tappings:	Female NPT inlet, male NPT union outlet
Body Material:	Forged brass, nickel plated

TECHNICAL DATA

Model	Cv - Value	A	B	C	Weight
RVV- 1/2 "	1.5	2.17”	2.13”	0.94”	0.36 lb
RVV- 3/4 "	2.3	2.52”	2.52”	1.10”	0.66 lb

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

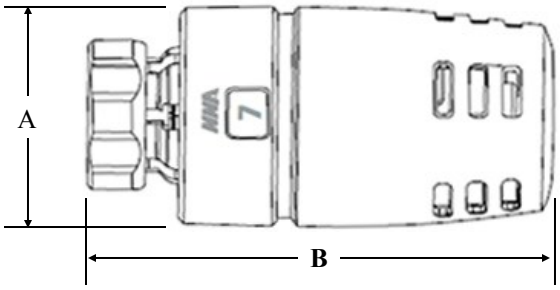
MACON® CONTROLS

THERMOSTATIC OPERATOR
DIRECT MOUNT
EVO-28

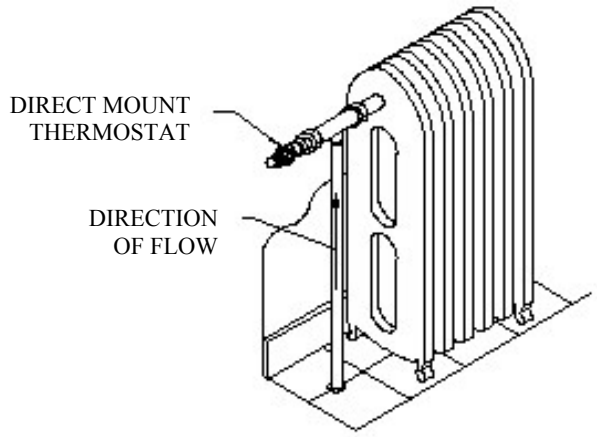
NON-ELECTRIC OPERATORS

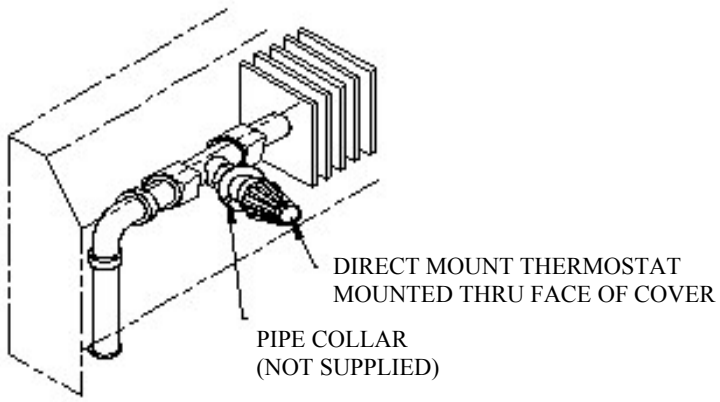
Description

EVO is a self-acting, adjustable, non-electric thermostatic operator. It has adjustable max./min. temperature, selected temperature locking feature and can be shutoff completely if required.
The symbol * protects against frost damage. Each EVO thermostatic operator is individually calibrated and conforms to ASHRAE standardization rules for temperature regulation. The EVO's smooth shape and narrow air gaps gives a nice operation and makes it easy to keep clean. They can be mounted on all Macon NT series valves.



TECHNICAL DATA				
Temperature Setting Range	50ºF to 82ºF		Material	Engineered heat resistant thermoplastic (PBT,POM)
Maximum Storage & Ambient Temp.	122ºF			
Maximum Water Temp.	250ºF		Nut	Low Lead Brass
Maximum Steam Pressure	15 psig		Weight	4.16 oz.
Maximum Differential Pressure	20 psi		Color	White
Suggested Differential Pressure	0.5 to 2.9 psi		Width (A)	1.73"
Max. Movement	0.125"		Height (B)	3.66"
Nominal Opening	0.018 (3.6ºF)			
Long Term Test	5000 Cycles (1.3ºF)			





Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Bulletin-MC-EVO-28-1015
Section: *Non-Electric Operators*

NON-ELECTRIC OPERATORS

Maximum & Minimum Setting

Maximum setting

1. Turn the wheel to maximum.
2. Push the mark in with limit tool (located opposite the dial setting window) and press in the wheel handle 1-2 mm until it stops. (Figure 1)
3. Remove the limit tool and press in the wheel handle until it stops. (Figure 2)
4. Set the required temperature according to the chart below.
5. Pull the wheel handle out and the maximum temperature is set. (Figure 3)

Minimum setting

1. Turn the wheel to minimum
2. Push the mark in with limit tool (located opposite the dial setting window) and press in the wheel handle 1-2 mm until it stops.
3. Remove the limit tool and press in the wheel handle until it stops.
4. Set the required temperature according to the chart below.
5. Pull the wheel handle out and the minimum temperature is set.

Figure 1

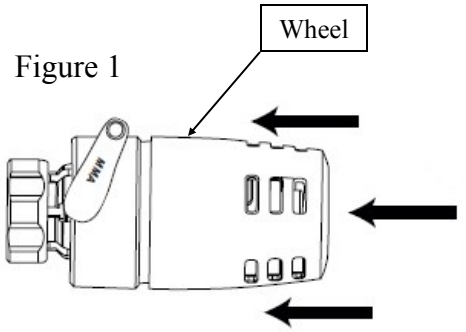


Figure 2

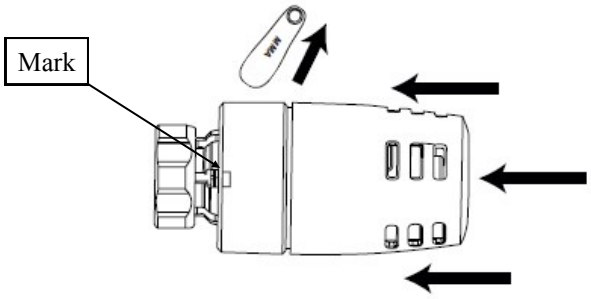
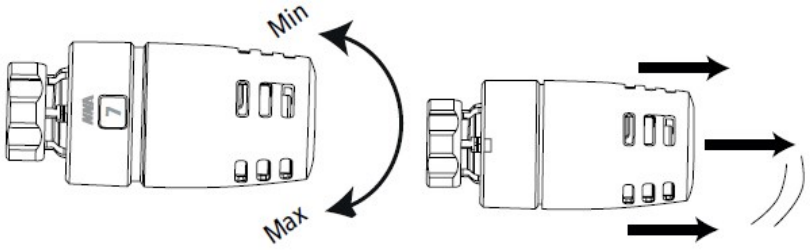


Figure 3



DIAL SETTINGS								
0	*	1	3	5	6	7	8	9
Off	50	54	61	68	72	75	79	82
	Frost Protection							

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

NON-ELECTRIC OPERATORS

EVO-TPC - Areas of Use

The EVO-TPC is a direct mount thermostatic head with a tamper protection cover. It is used in order to protect and prevent unauthorized manipulation of thermostatic head settings.

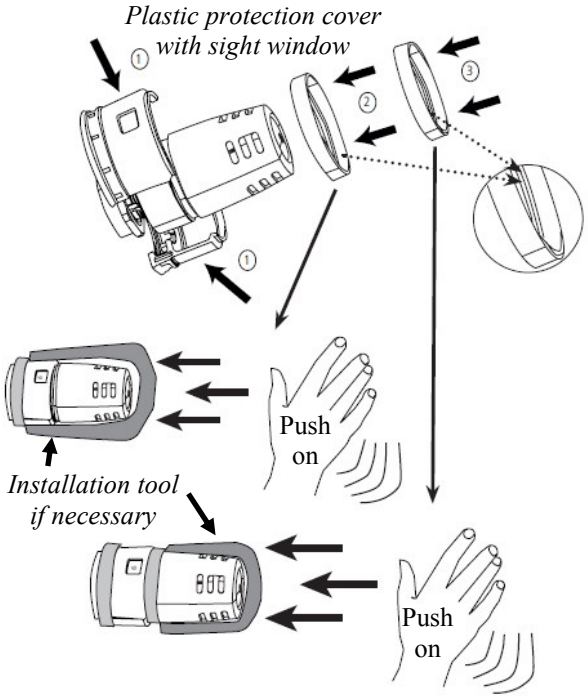
Above EVO-TPC shown installed on a special EVO-28 designed to accept the locking components.

Description

The EVO-TPC is two parts plastic which are mounted around a special EVO-28 Macon thermostatic head designed to accept them and held in place by two metal rings.

Assembly Instructions

- Set the required minimum and maximum temperatures according to the instructions on page 2 before installing the TPC.
- Assemble the plastic protection covers (#1) around the thermostatic head with the sight window aligned with the dial setting window.
- Thread ring (#2) over the thermostat with the inside groove towards the leading edge, aligning it's edge with the bottom edge.
- Thread ring (#3) over the thermostat with the inside groove towards the leading edge.
- Press rings firmly into place.



TECHNICAL DATA - Operator				
Temperature Setting Range	50ºF to 82ºF		Material	Engineered heat resistant thermoplastic (PBT,POM)
Maximum Storage & Ambient Temp.	122ºF			
Maximum Water Temp.	250ºF		Nut	Low Lead Brass
Maximum Steam Pressure	15 psig		Weight	4.16 oz.
Maximum Differential Pressure	20 psi		Color	White
Suggested Differential Pressure	0.5 to 2.9 psi		Width (A)	1.73"
Max. Movement	0.125"		Height (B)	3.66"
Nominal Opening	0.018 (3.6ºF)			
Long Term Test	5000 Cycles (1.3ºF)			
TECHNICAL DATA - Tamper Protection Cover				
Castings Material	Polyamide		Weight	2.50 oz.
Rings	Chrome plated metal			

Tunstall®

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Maximum & Minimum Setting

Maximum setting

1. Turn the wheel to maximum.
2. Push the mark in with limit tool (located opposite the dial setting window) and press in the wheel handle 1-2 mm until it stops. (Figure 1)
3. Remove the limit tool and press in the wheel handle until it stops. (Figure 2)
4. Set the required temperature according to the chart below.
5. Pull the wheel handle out and the maximum temperature is set. (Figure 3)

Minimum setting

1. Turn the wheel to minimum
2. Push the mark in with limit tool (located opposite the dial setting window) and press in the wheel handle 1-2 mm until it stops.
3. Remove the limit tool and press in the wheel handle until it stops.
4. Set the required temperature according to the chart below.
5. Pull the wheel handle out and the minimum temperature is set.

Figure 1

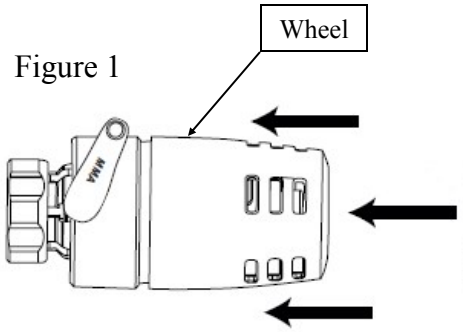


Figure 2

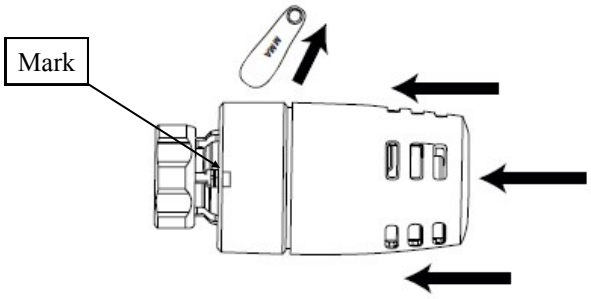
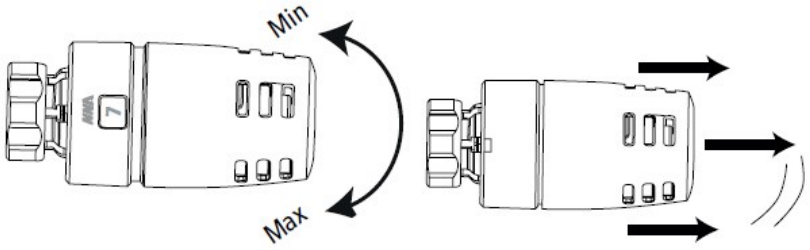


Figure 3



DIAL SETTINGS								
0	*	1	3	5	6	7	8	9
Off	50	54	61	68	72	75	79	82
	Frost Protection							

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

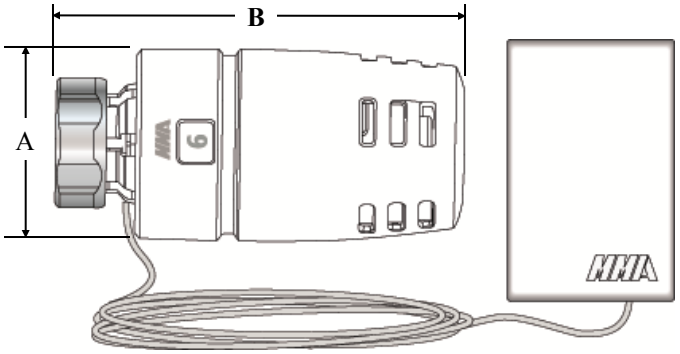
MACON® CONTROLS

THERMOSTATIC OPERATOR
DIRECT MOUNT w/Remote Sensor
EVO-Z

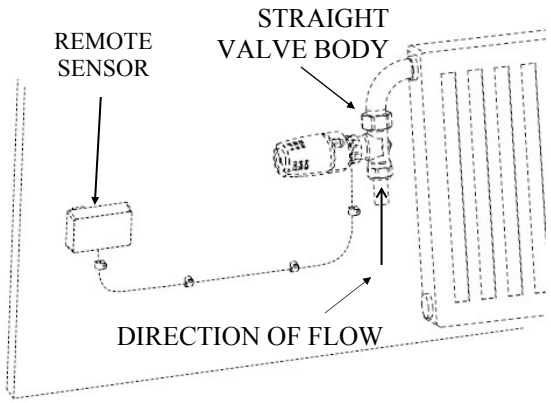
NON-ELECTRIC OPERATORS

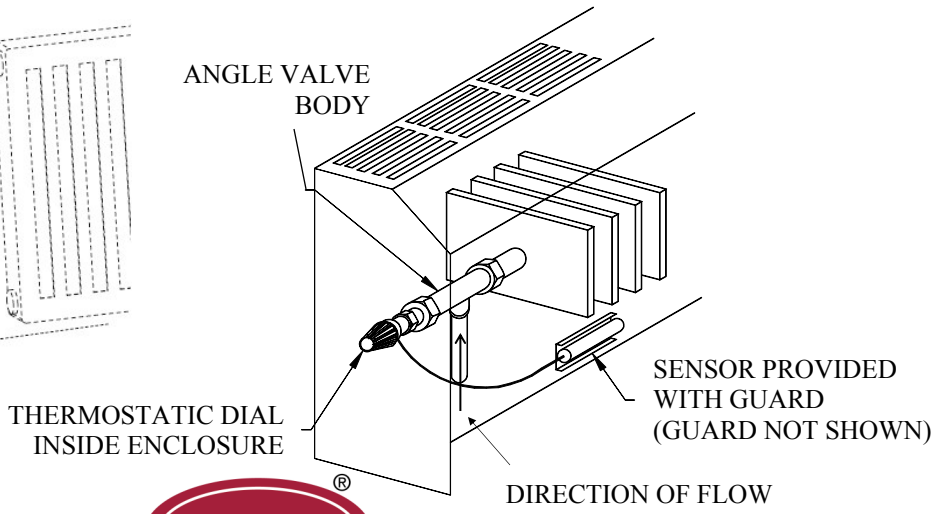
Description

EVO-Z is a self-acting, adjustable, non-electric thermostatic operator and remote temperature sensor. It has adjustable max./min. temperature, selected temperature locking feature and can be shutoff completely if required.
The symbol * protects against frost damage. Each EVO-Z thermostatic operator is individually calibrated and conforms to ASHRAE standardization rules for temperature regulation.
The EVO-Z's smooth shape and narrow air gaps gives a nice operation and makes it easy to keep clean. They can be mounted on all Macon NT series valves.



TECHNICAL DATA				
Temperature Setting Range	50ºF to 82ºF		Material	Engineered heat resistant thermoplastic (PBT,POM)
Maximum Storage & Ambient Temp.	122ºF			
Maximum Water Temp.	250ºF		Nut	Low Lead Brass
Maximum Steam Pressure	15 psig		Weight	4.16 oz.
Maximum Differential Pressure	20 psi		Color	White
Suggested Differential Pressure	0.5 to 2.9 psi		Width (A)	1.73"
Max. Movement	0.125"		Height (B)	3.66"
Nominal Opening	0.018 (3.6ºF)		Capillary Length	6' 6"
Long Term Test	5000 Cycles (1.3ºF)			





Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Maximum & Minimum Setting

Maximum setting

1. Turn the wheel to maximum.
2. Push the mark in with limit tool (located opposite the dial setting window) and press in the wheel handle 1-2 mm until it stops. (Figure 1)
3. Remove the limit tool and press in the wheel handle until it stops. (Figure 2)
4. Set the required temperature according to the chart below.
5. Pull the wheel handle out and the maximum temperature is set. (Figure 3)

Minimum setting

1. Turn the wheel to minimum
2. Push the mark in with limit tool (located opposite the dial setting window) and press in the wheel handle 1-2 mm until it stops.
3. Remove the limit tool and press in the wheel handle until it stops.
4. Set the required temperature according to the chart below.
5. Pull the wheel handle out and the minimum temperature is set.

Figure 1

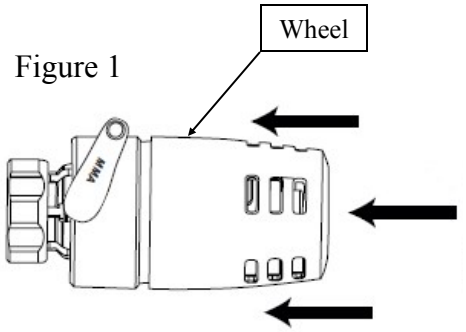


Figure 2

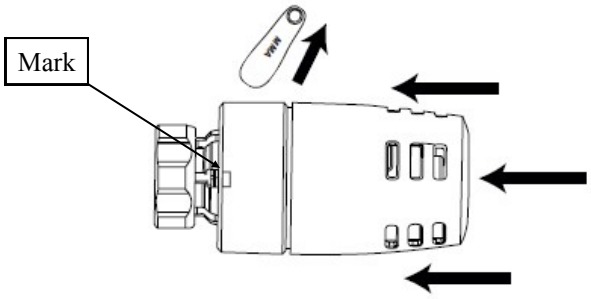
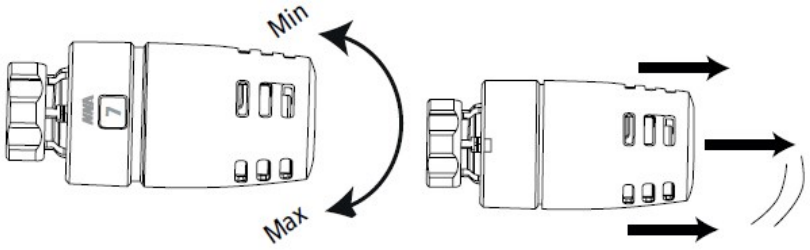


Figure 3



DIAL SETTINGS								
0	*	1	3	5	6	7	8	9
Off	50	54	61	68	72	75	79	82
	Frost Protection							

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

MACON® CONTROLS

THERMOSTATIC OPERATOR
DIRECT MOUNT w/REMOTE SENSOR
MTWZ (Models T1-T4)

NON-ELECTRIC OPERATORS

See reverse for
min/max field adjustment

(MTWZ shown with
Macon NT series valve)

Operation

The sensor is wax-filled and the wax volume varies according to ambient temperature. The volume changes are transmitted to the valve stem via a liquid capillary system. The valve body has a return spring which closes the valve when the stem is under low pressure. When the force from the sensor and the return spring are balanced to the room temperature selected, the valve disc stops in that position to allow a certain amount of water or steam to flow through the valve. Temperature changes cause the valve disc to change position and thereby continuously modulate the flow so that the room temperature is maintained at the desired temperature. The unit is secured against damage from over pressure by a pressure absorbing spring.

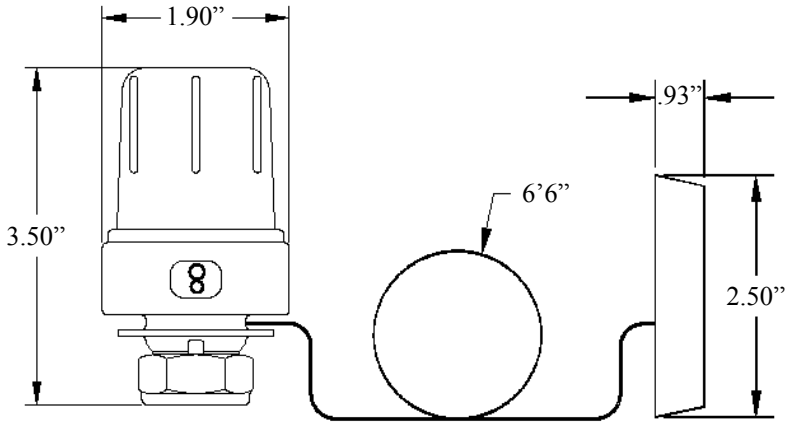
Features

- Valve-mounted setting knob and remote temperature sensor
- Brass sensor, High sensitivity
- Fiberglass valve plug shaft
- Stainless steel capillary tube, 6’6” standard length
- Longer capillary available, consult factory
- Fits all Macon NT series valves
- Replaces the valve-mounted sensors on built-in convectors, etc., and where the valve-mounted sensor is exposed to draft from doors and windows
- Fully automatic - nonelectric, no wiring
- Manufactured to exacting standards using exceptionally high quality materials
- Each sensor is tested and re-checked to achieve exact settings before leaving the factory
- Note that changing of the actuator can be accomplished without draining of the system
- All Macon thermostats can be locked at or limited to a specific temperature or temperature range
- Simple one-trade installation
- Sensor guard furnished at no extra cost
- All Macon valves and thermostats conform to ASHRAE Standard 102P-1983 and European Standard EN 215/1215. We are also ISO 9001 certified (1994) and ISO 14001 certified (1998).

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Bulletin-MC-MTWZ-T1-T4-0714
Non-Electric Operators

THERMOSTATIC OPERATOR
DIRECT MOUNT w/REMOTE SENSOR
MTWZ (Models T1-T4)

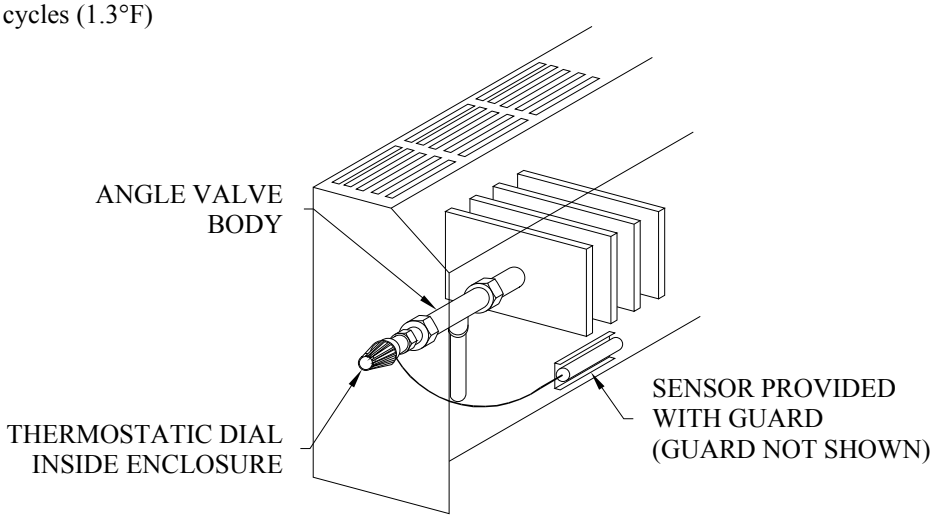


DATA

Temp. Range:

T-1: 56° - 83°F
T-2: 68° - 108°F
T-3: 95° - 131°F
T-4: 122° - 158°F

Hystersis:	0.9°F
Heat Transfer:	1.1°F (Valve Housing Sensor)
Dead Time:	0.8 Minutes
Max. Differential Pressure:	20 psi
Suggested Differential Pressure:	0.5 to 2.9 psi
Max. Water Temp.:	250°F
Max. Storage & Ambient Temp.:	122°F
Max. Steam Pressure:	15 psig
Max. Movement:	0.125
Long Term Test:	5000 cycles (1.3°F)



Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

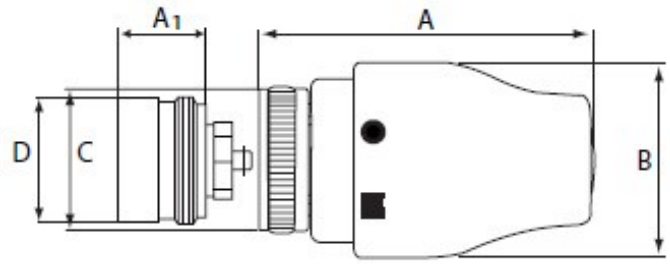
MACON® CONTROLS

THERMOSTATIC OPERATOR
DIRECT MOUNT
DTWC

NON-ELECTRIC OPERATORS

Description

DTW is a self-acting, adjustable, non-electric thermostatic operator. It has adjustable max./min. temperature, selected temperature locking feature and can be shutoff completely if required.
The symbol * protects against frost damage. Each DTW thermostatic operator is individually calibrated and conforms to ASHRAE standardization rules for temperature regulation.
The DTW's smooth shape and narrow air gaps gives a nice operation and makes it easy to keep clean. DTW has a connection that is M30x1.5 and will be delivered with an adapter so they can be mounted on all Macon NT series valves.



TECHNICAL DATA				
Temperature Setting Range	46ºF to 82ºF		Material	Engineered heat resistant thermoplastic (PBT,POM)
Maximum Storage & Ambient Temp.	122ºF			
Maximum Water Temp.	250ºF		Nut	Brass
Maximum Steam Pressure	15 psig		Weight	3.1 oz.
Maximum Differential Pressure	20 psi		Color	Chrome
Suggested Differential Pressure	0.5 to 2.9 psi		Width (A)	1.71"
Max. Movement	0.125"		Height (B)	3.66"
Nominal Opening	0.018 (3.6ºF)		Adapter (C)	M30x1.5
Long Term Test	5000 Cycles (1.3ºF)		Adapter (D)	M28x1.5

DIAL SETTINGS						
0	*	I	II	III	IIII	•
Off	46	57	64	71	77	82
	Frost Protection					

Note: Consult factory for pricing and delivery.

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Bulletin-MC-DTW-1116
Section: *Non-Electric Operators*

This page left blank intentionally.

MACON® CONTROLS

THERMOSTATIC OPERATOR
w/REMOTE DIAL
EVOL

NON-ELECTRIC OPERATORS

EVOL shown with
Macon NT series valve
(sold separately)

Operation

The sensor is wax-filled and the wax volume varies according to ambient temperature. The volume changes are transmitted to the valve stem via a liquid capillary system. The valve body has a return spring which closes the valve when the stem is under low pressure. When the force from the sensor and the return spring are balanced to the room temperature selected, the valve disc stops in that position to allow a certain amount of water or steam to flow through the valve. Temperature changes cause the valve disc to change position and thereby continuously modulate the flow so that the room temperature is maintained at the desired temperature. The unit is secured against damage from over pressure by a pressure absorbing spring.

Features

- Combined remote dial/sensor
- Brass sensor, High sensitivity
- Fiberglass valve plug shaft
- Stainless steel capillary tube, 6’6” std. length
- Longer capillary available, consult factory
- Fits all Macon NT series valves
- Replaces the valve-mounted sensors on built-in convectors, etc., and where the valve-mounted sensor is exposed to draft from windows or doors
- Fully automatic - nonelectric, no wiring
- Small dimensions
- Manufactured to exacting standards using exceptionally high quality materials
- Each sensor is tested and re-checked to achieve exact settings before leaving the factory
- Note that all changing of the actuator can be accomplished without draining the system
- All Macon thermostats can be locked at or limited to a specific temperature or temperature range
- Simple one-trade installation
- Sensor guard furnished at no extra charge
- All Macon valves and thermostats conform to ASHRAE Standard 102P-1983 and European Standard EN 215/1215. We are also ISO 9001 certified (1994) and ISO 14001 certified (1998).

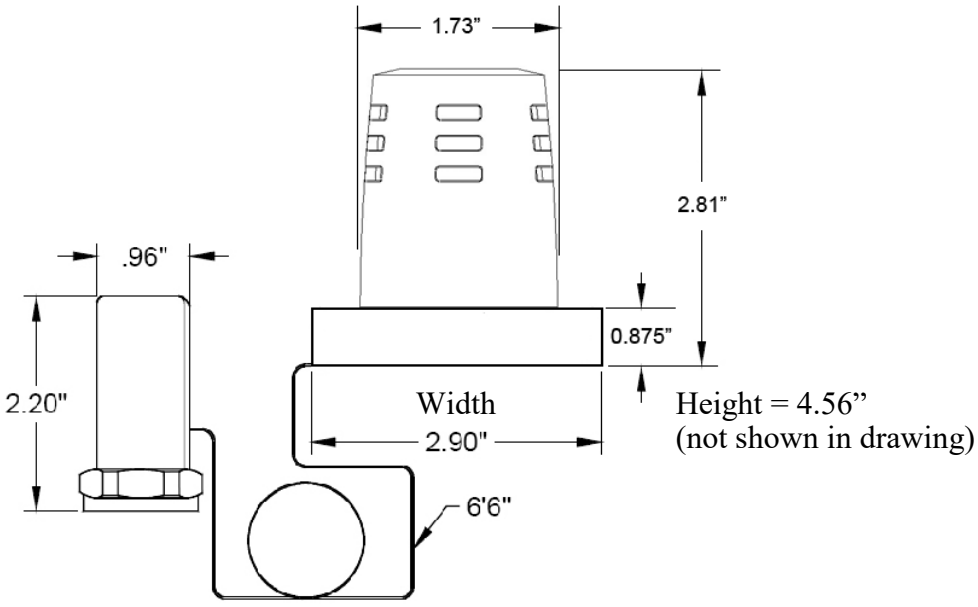
Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013

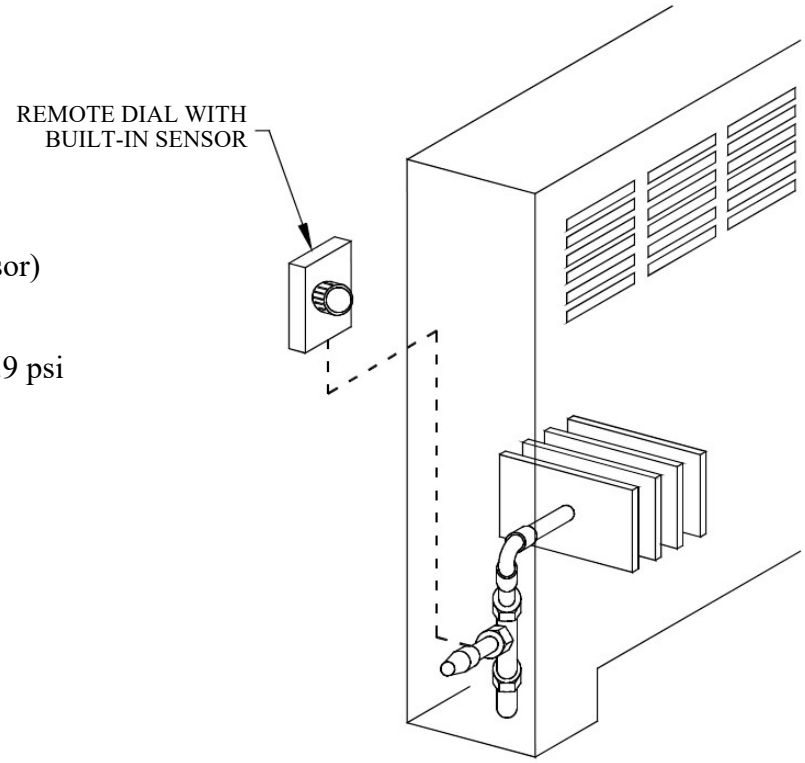
Tunstall®

Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

THERMOSTATIC OPERATOR
w/REMOTE DIAL
EVOL

NON-ELECTRIC OPERATORS





DATA

Temp. Range: 50° - 80°F
Hysteresis: 0.9°F
Heat Transfer: 1.1°F (Valve Housing Sensor)
Dead Time: 0.8 Minutes
Max. Differential Pressure: 20 psi
Suggested Differential Pressure = 0.5 to 2.9 psi
Max. Water Temp.: 250°F
Max. Storage & Ambient Temp.: 122°F
Max. Steam Pressure: 15 psig
Max. Movement: 0.125
Nominal Opening: 0.018 (3.6ºF)
Long Term Test: 5000 cycles (1.3°F)
Weight: 0.62 lbs

DIAL SETTINGS								
0	*	1	3	5	6	7	8	9
Off	50	54	61	68	72	75	79	82
	Frost Protection							

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

THERMOSTATIC OPERATOR
w/REMOTE DIAL and REMOTE SENSOR
EVOLZ

NON-ELECTRIC OPERATORS

EVOLZ shown with
Macon NT series valve
(sold separately)

Operation

The sensor is wax-filled and the wax volume varies according to ambient temperature. The volume changes are transmitted to the valve stem via a liquid capillary system. The valve body has a return spring which closes the valve when the stem is under low pressure. When the force from the sensor and the return spring are balanced to the room temperature selected, the valve disc stops in that position to allow a certain amount of water or steam to flow through the valve. Temperature changes cause the valve disc to change position and thereby continuously modulate the flow so that the room temperature is maintained at the desired temperature. The unit is secured against damage from over pressure by a pressure absorbing spring.

Features

- Combined remote dial/sensor
- Brass sensor, High sensitivity
- Fiberglass valve plug shaft
- Stainless steel capillary tube, 6'6" x 6'6" std. length
- Longer capillary available, consult factory
- Fits all Macon NT series valves
- Replaces the valve-mounted sensors on built-in convectors, etc., and where the valve-mounted sensor is exposed to draft from windows or doors
- Fully automatic - nonelectric, no wiring
- Small dimensions
- Manufactured to exacting standards using exceptionally high quality materials
- Each sensor is tested and re-checked to achieve exact settings before leaving the factory
- Note that all changing of the actuator can be accomplished without draining the system
- All Macon thermostats can be locked at or limited to a specific temperature or temperature range
- Simple one-trade installation
- Sensor guard furnished at no extra charge
- All Macon valves and thermostats conform to ASHRAE Standard 102P-1983 and European Standard EN 215/1215. We are also ISO 9001 certified (1994) and ISO 14001 certified (1998).

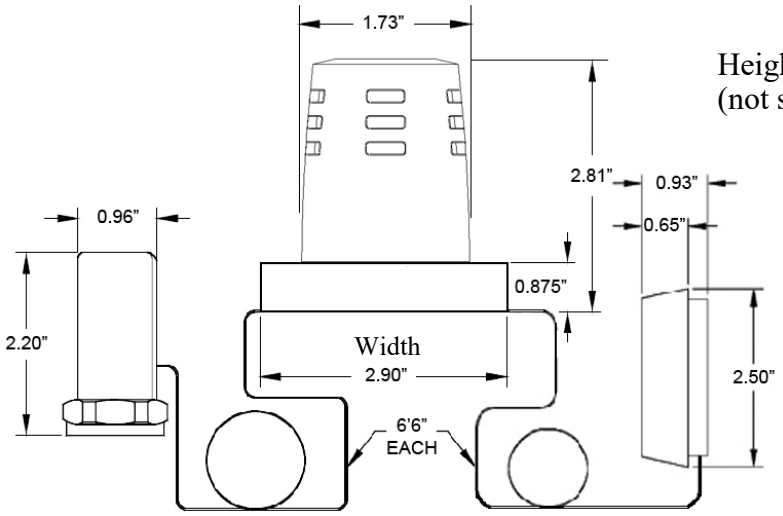
Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013

Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

MACON® CONTROLS

THERMOSTATIC OPERATOR
w/REMOTE DIAL and REMOTE SENSOR
EVOLZ

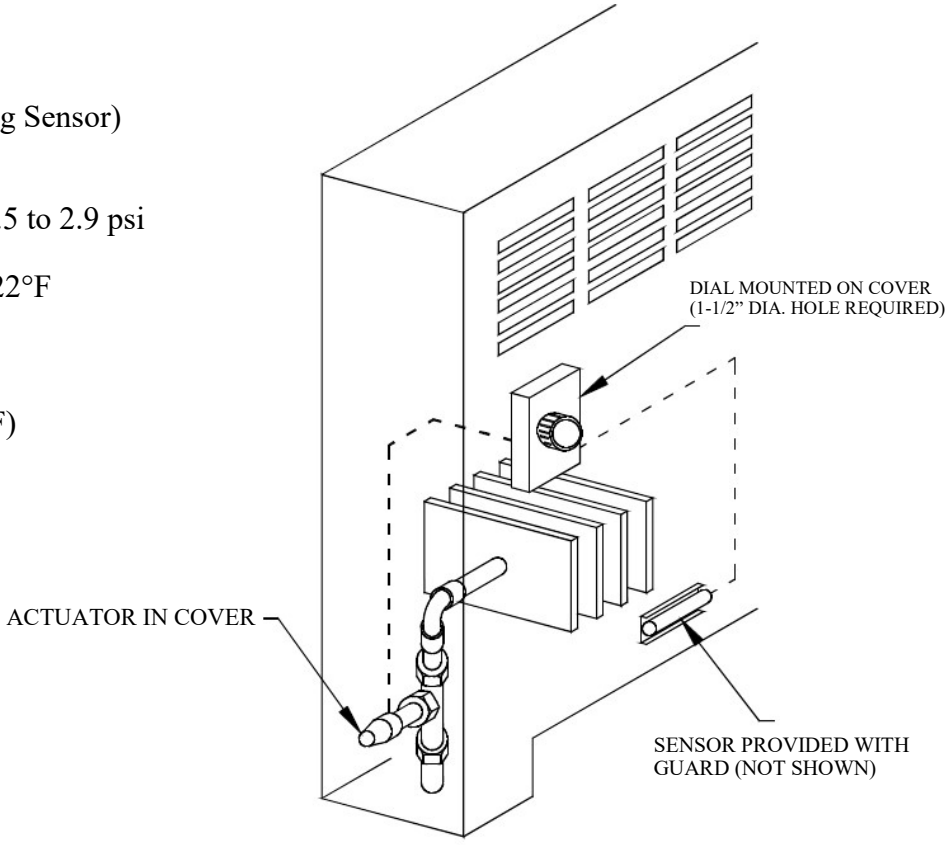
NON-ELECTRIC OPERATORS



Height = 3.88"
(not shown in drawing)

DATA

Temp. Range: 50° - 80°F
Hysteresis: 0.9°F
Heat Transfer: 1.1°F (Valve Housing Sensor)
Dead Time: 0.8 Minutes
Max. Differential Pressure: 20 psi
Suggested Differential Pressure = 0.5 to 2.9 psi
Max. Water Temp.: 250°F
Max. Storage & Ambient Temp.: 122°F
Max. Steam Pressure: 15 psig
Max. Movement: 0.125
Nominal Opening: 0.018 (3.6ºF)
Long Term Test: 5000 cycles (1.3°F)
Weight: 0.62 lbs

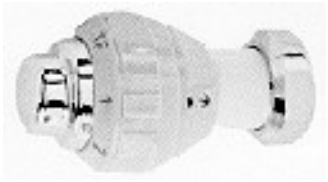


DIAL SETTINGS								
0	*	1	3	5	6	7	8	9
Off	50	54	61	68	72	75	79	82
	Frost Protection							

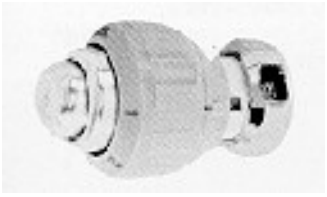
Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013

Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Direct Mount Operators



(1st gen) TF B21000
Upgrade with T23000 Insert and EVO-28 T'Stat



(2nd gen) TM B22000
Upgrade with T23000 Insert and EVO-28 T'Stat

(3rd gen) NT B25000
Upgrade with EVO-28 T'Stat

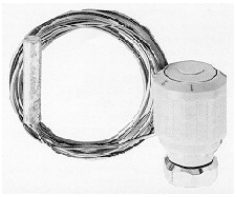
(4th gen) NTB B24000
Upgrade with EVO-28 T'Stat

(5th gen) ENT B26000
Upgrade with EVO-28 T'Stat

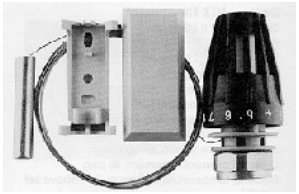
(6th gen) MTW-28
Upgrade with EVO-28 T'Stat

Direct Mount Operators with Remote Sensor

(1st gen) TL B41200
Upgrade with T23000 Insert and EVO-Z T'Stat



(2nd gen) TMZ B32000
Upgrade with T23000 Insert and EVO-Z T'Stat



(3rd gen) NTZ B36000
Upgrade with EVO-Z T'Stat

(4th gen) ENTZ B36000
Upgrade with EVO-Z T'Stat

(5th gen) MTWZ
Upgrade with EVO-Z T'Stat

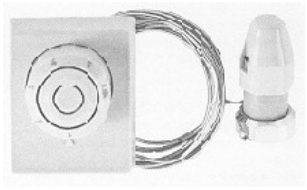
(6th gen) EVO-Z
Current Operator

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013

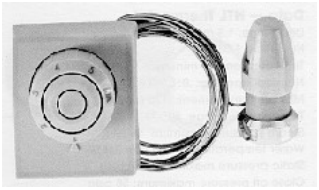
Tunstall®

Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com
Bulletin-MC-Previous Gen-1705.02
Section: *Non-Electric Operators*

Wall Mount Operators with Remote Dial



(1st gen) TML B42000
Upgrade with T23000 Insert and EVOL T'Stat

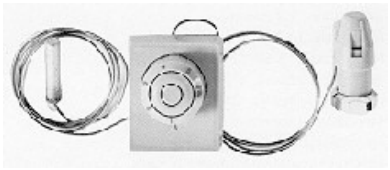


(2nd gen) NTL B45000
Upgrade with EVOL T'Stat

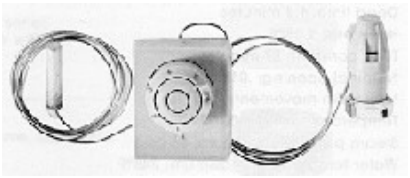
(3rd gen) ENTL B46000
Upgrade with EVOL T'Stat

(4th gen) EVOL
Current Operator

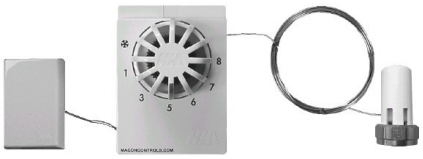
Wall Mount Operators with Remote Dial and Remote Sensor



(1st gen) TMLZ B52000
Upgrade with T23000 Insert and EVOLZ T'Stat



(2nd gen) NTLZ
Upgrade with EVOLZ T'Stat



(3rd gen) ENTLZ B56000
Upgrade with EVOLZ T'Stat

(4th gen) EVOLZ
Current Operator

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

ELECTRIC ZONE VALVE ACTUATOR
VA Series

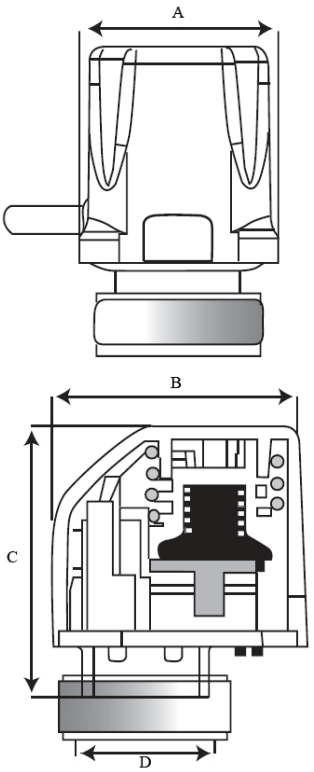
Description

Designed for use with the Macon NT Series Valves, the VA series electric zone valve actuator is a new concept in zone controls. Utilizing a gearless electric thermic operator, this valve actuator operates off low power 24V AC. Proportional control can be realized by using time proportioning techniques. The VA series is ideal for control of Radiators, Fin-Tube, Zones, Solar Panels, Heat Pumps etc…

Features

- Normally open or normally closed
- Suitable for low pressure steam
- Low power consumption
- Noiseless operation
- Easy installation
- Compact size
- Low cost
- Transparent zone above nut for checking the status of the actuator.
  - Red = Closed
  - Black = Open

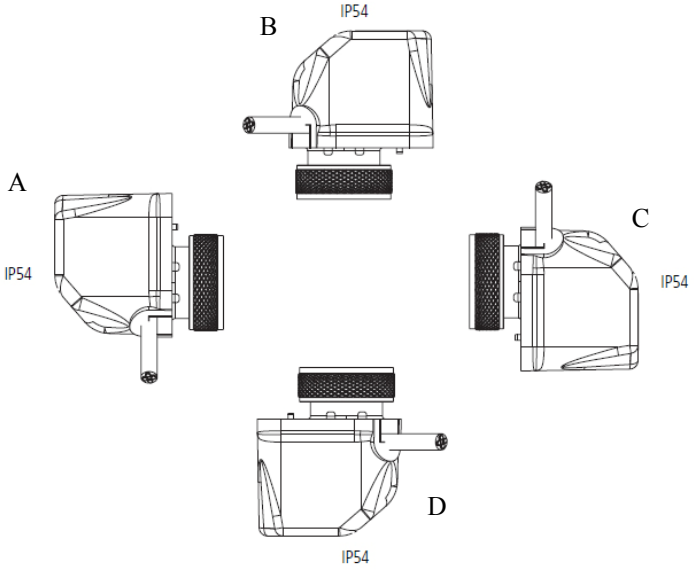
TECHNICAL DATA		
	VAO-24	**VAC-24**
Voltage	24V AC	24V AC
Current, Initial	200 mA	200 mA
Current, Consumption	1.8 W	1.8 W
Closing and Opening Time	5 Minutes	5 Minutes
Valve Stroke	2.5 mm	2.5 mm
Actuating Force	80 N ± 10%	110 N ± 10%
Ambient Temperature	32ºF to 122ºF	32ºF to 122ºF
State when OFF/No Current	Normally Open	Normally Closed
Housing Material / Color	Polyamide / White	
Nut (D)	Brass (D - 28 mm)	
Weight	4.94 oz.	
Connection Cable / Color	1 meter long, 2 x 0.5 mm^2, white	
Width (A)	40.5 mm	
Length (B)	49.5 mm	
Height (C)	52.0 mm	



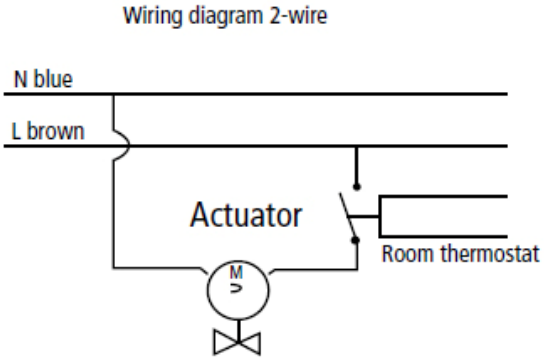
Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Installation Orientation

The Macon VAC and VAO must be installed preferably in vertical or horizontal position (A, B, & C).
For "overhead" installation (D) special circumstances (e.g. drain water) can reduce the lifetime of the actuator.

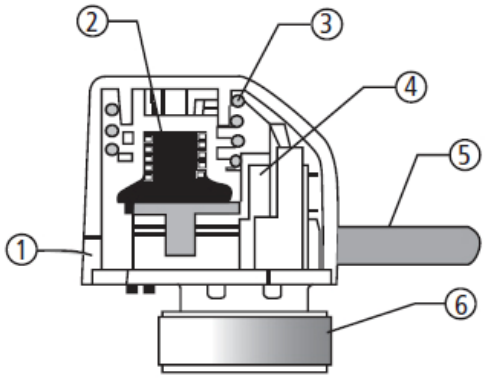


Wiring Diagram



Cut-A-Way View

1. Transparent Zone
2. Sensor
3. Spring
4. Electrical Micro switch (4 wire)
5. Cable Connector
6. Ring Nut



ELECTRIC ZONE VALVE ACTUATOR
VM Series

VL

Accessory Valve Extender for Heat Dissipation
#MAC-NT-Valve-Ext (4032601)

Description

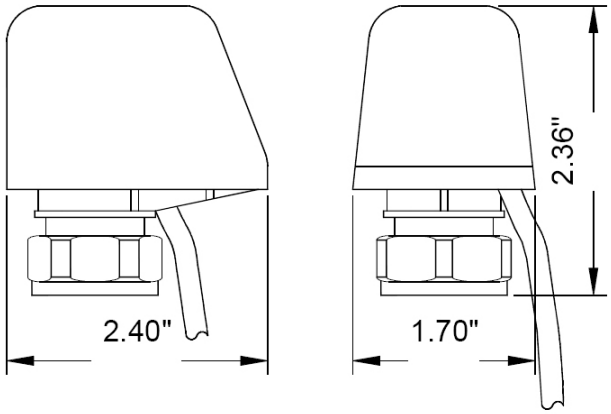
Designed for use with the Macon NT Series Valves, the VM series electric zone valve actuator is a new concept in zone controls. Utilizing a gearless electric thermic operator, this valve actuator operates off low power 24V AC. Proportional control can be realized by using time proportioning techniques. The VM series is ideal for control of Radiators, Fin-Tube, Zones, Solar Panels, Heat Pumps etc...

Features

- Normally open or normally closed
- Suitable for low pressure steam
- Low power consumption
- Noiseless operation
- Easy installation
- Compact size
- Low cost

Specifications

Data	VMO 24	VMC 24
Voltage	24V AC	24V AC
Current, initial	200mA	200mA
Current consump.	70mA/2W	70mA/2W
Closing and opening time	ca 3 minutes	ca 3 minutes
Stroke	ca 4 mm	ca 4 mm
Max amb. temp.	122 F	122 F
Design		
Body	plastic	plastic
Nut	brass	brass
Weight	2.8 oz.	2.8 oz
Conn. cable	2x0,22 white 3 feet	2x0,22 white 3 feet
No current	open	closed



VMO 24 - Normally Open
VMC 24 - Normally Closed

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

This page left blank intentionally.

ELECTRIC ZONE VALVE ACTUATOR VM 2-10V

ELECTRIC OPERATORS

Description

The precise regulation of VM 2-10 V gives a constant valve flow corresponding to the signal from the temperature regulator resulting in a very high comfort. A built in processor is programmed with very useful functions such as self-calibration, valve flow linearity etc. It also has an every 24-hour stroke function preventing the valve spindle from getting stuck. It has a red visible position indicator located just above the connection nut. 2-10 voltage regulation gives a long life time cycle. Electrical connection is easily done by the means of push in modular cable. VM 2-10 V matches all MMA valves. To fit other makes it can be used in combination with one of our adaptors. VM is also available with M30x1.5 connection.

Areas of Use

Actuator VM 2-10V is used to regulate valves in heating and cooling systems.

Specifications

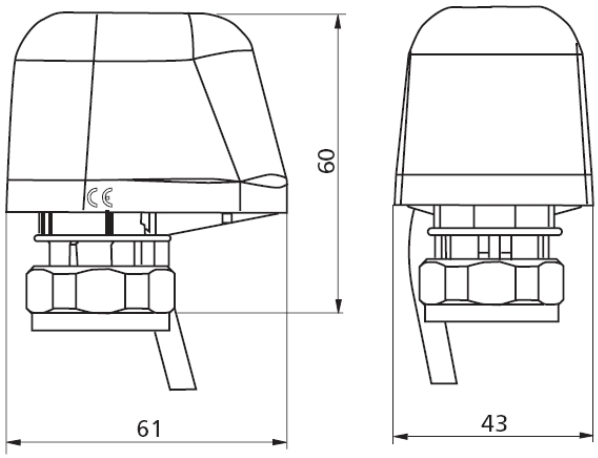
Data

Power consumption start	5VA
Power consumptions operating	3VA
Flow position	NC
Supply voltage	24V AC + 10%
Control current	0.4mA
Closing and opening time	ca 3 min
Stroke	ca 0.157 inch
Operating force	22.5 lbs
Ambient temp. max	122 F

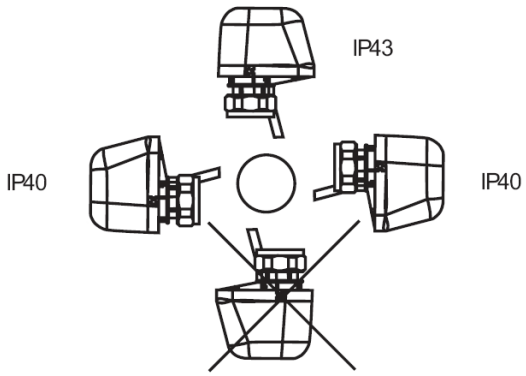
Design

Body material	Polyamide
Nut material	Brass
Connection cable	Modular cable (K121-1m) 3 ft.
Color	RAL 9016
Weight	4.94 oz.

Dimensions



Installation Position



Valve Function - Without Power (No Current)			
Actuator Type	Application		
	Radiator Valve	Cooling Valve	3-Way Valve
VM 2-10V	Closed	Open	Port B Closed

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

This page left blank intentionally.

Macon ZM-12V

The Macon actuator ZM-12V is a thermoelectric actuator for opening and closing valves and small valves used in the scope of HVAC technology. The predominant area of application is the energy-efficient room-by-room temperature control in the area of building services and automation. The Macon ZM-12V is controlled by a 12v room thermostat with two-point output or pulse-width modulation.

1) Features

- 360º installation position
- Patented 100% protection against leaky valves
- Available in normally closed (NC) and normally open (NO)
- Power consumption 1 watt
- Simple snap-on installation
- High functional safety and long expected service life
- First-Open function
- Adaptation check on valve
- Alignment aid on the valve
- Compact size, small dimensions
- All round function display
- Noiseless and maintenance-free

2) Function

The actuator mechanism of the Macon ZM-12V with end switch uses a PTC resistor heated wax element and a compression spring. The wax element is heated by applying the operating voltage and moves the integrated ram. The force generated by this movement is transferred on the valve lifter and opens and closes the valve.

2.1 Version ZMC-12V: **Normally Closed** (valve closed)

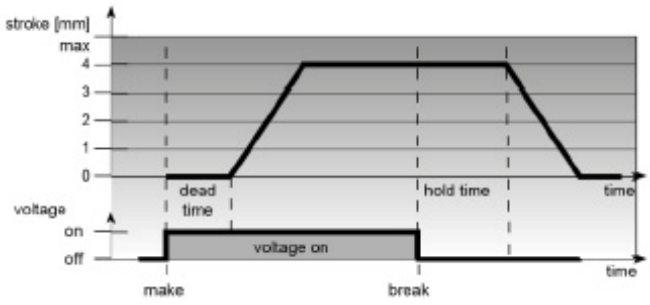


Figure: Example with respect to the travel path of 4 mm. The characteristic curves of the travel path of 5 mm result

In case of the normally closed version, the valve is opened steadily by the ram motion upon switching on the operating voltage and after expiry of the dead time.

After the operating voltage is cut and after expiry of the hold time the valve is closed evenly by the closing force of the compression spring.

The closing force of the compression spring is matched to the closing force of commercially available valves and keeps the valve closed when de-energized.

2.2 Version ZMO-12V: Normally Open (valve open)

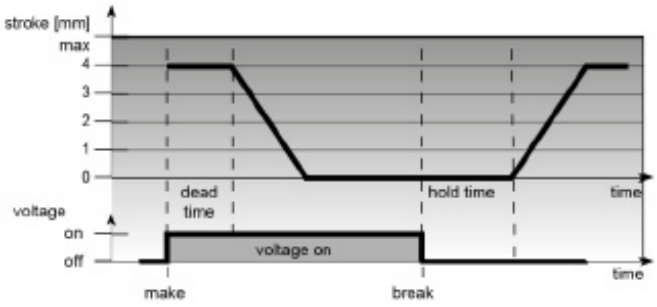


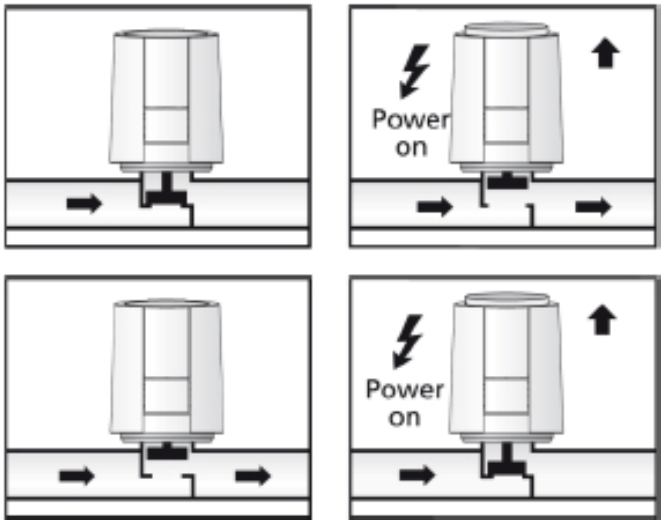
Figure: Example with respect to the travel path of 4 mm. The characteristic curves of the travel path of 5 mm result from this.

In case of the normally open version, the valve is closed steadily by the ram motion upon switching on the operating voltage and after expiry of the dead time.

After the operating voltage is cut and after expiry of the hold time the valve is opened evenly by the closing force of the compression spring.

2.3 Function Display

The function indicator of the Macon ZM-12V (all around view) allows identifying the operating condition (valve open or closed) at a glance. It is also possible to feel the current operating state when it's dark.



ZMC-12V

- In case of the NC version, an extended function display shows opening of the valve.

ZMO-12V

- In case of the NO version, an extended function display shows closing of the valve.

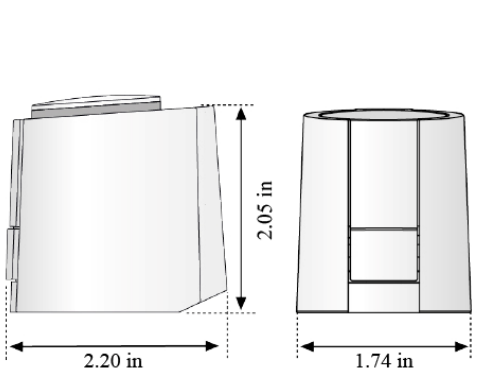
2.3 "First Open" function (for NC only)

In its delivery condition, the Macon ZMC-12V is kept open when de-energized due to the First-Open function. This enables heating operation during the construction phase even when the electric wiring of the individual room control is not yet complete. During the later electrical start-up, the First Open function is automatically unlocked by applying the operating voltage for more than 6 minutes. The valve drive is now fully operable.

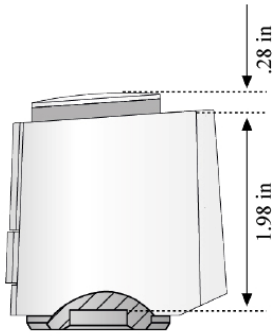
3) Technical Data

Operating voltage	12 V AC/DC +20%...-10%	
Max. inrush current	< 600 mA during max. 2 min.	
Operating power	1 W [1)]	
Stroke (actuator travel)	4.0 / 5.0 mm	
Actuating force	100 N ±5%	
Fluid temperature	32° F to 212° F [2)]	
Storage temperature	-13° F to 140° F	
Ambient temperature	32° F to 140° F	
Degree / class of protection	IP 54 [3)]	
CE conformity according to	EN 60730	
Housing material / color	Polyamide / light grey (RAL 7035)	1) measured with precision reference meter LMG95
Connection line / color	2 x 0.75 mm² PVC / light gray (RAL 7035)	
Cable length	3' 3"	2) or higher, depending on the adapter
Weight with connecting cable (1 m)	approx. 3.5 oz	
Surge protection according to EN 60730-1	min. 2.5 kV	3) in all installation positions

3.1 Dimensions



Dimensions

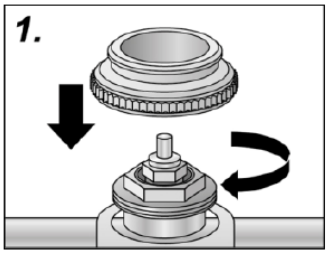


Installation height

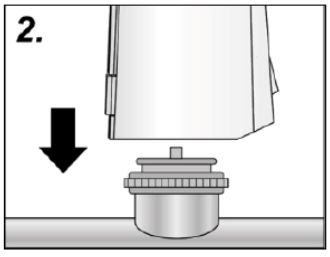
4) Installation notes

4.1 Installation with valve adapter

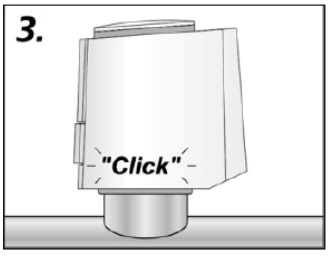
The valve adapter assortment guarantees a perfect match of the valve drive to almost any valve bottom and heating circuit distributor available on the market. Simply snap-on the Macon ZM-12V to the manually pre-installed valve adapter.



Screw the adaptor manually onto the valve.

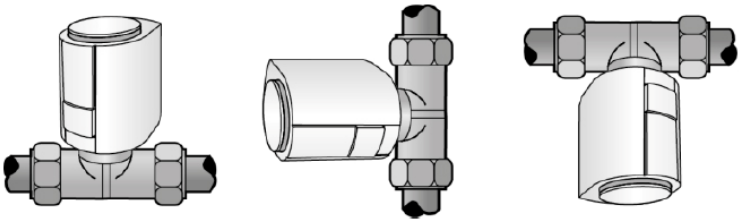


Place the Macon ZM-12V vertically on the valve adaptor.



The Macon ZM-12V snaps onto the valve adaptor with a "click" when pressed down vertically by hand.

4.2 Installation position



vertical horizontal overhead

Preferred installation position of the Macon ZM-12V is vertical or horizontal. An upside down position may reduce product life through special circumstances (e.g. contaminated water).

5) Accessories

- Protection Cap AA SK 1004

Protection against theft and vandalism, available for valve drives with a stroke of 4mm or 5mm

Macon ZMC/ZMO Series

The Macon ZMC/ZMO 24 V Standard is a thermoelectric actuator for opening and closing valves on heating and cooling systems. The main field of application is the energy-efficient individual room temperature control in the range of building management systems and home automation. The Macon ZMC/ZMO 24 V Standard is controlled by a 24 V room thermostat with two point output or pulse-width modulation.

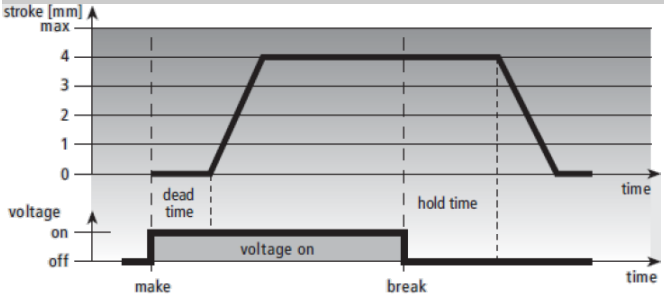
1) Features

- Available in normally closed (NC) or normally open (NO)
- Power consumption 1 watt
- Simple snap-on installation
- 360° installation position
- First-Open Function
- Alignment aid on the valve
- Compact size, small dimensions
- All around function indicator
- Noiseless and maintenance-free

2) Function

The actuator mechanism of the Macon ZMC/ZMO Series uses a PTC resistor-heated wax element and a compression spring. The wax element is heated by applying the operating voltage and moves the integrated ram. The force generated by the movement is transferred on the valve lifter and thus opens and closes the valve.

2.1 **Normally Closed** (valve closed)

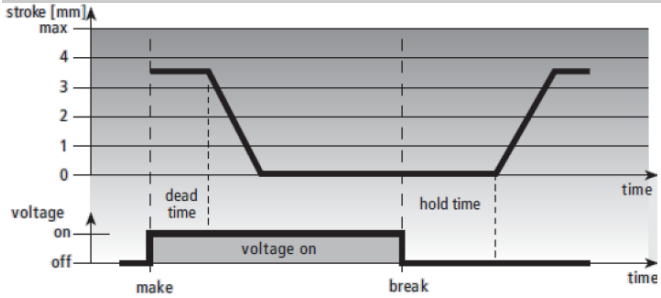


In case of the normally closed version, the valve is opened steadily by the ram motion upon switching on the operating voltage and after expiry of the dead time.

After the operating voltage is cut and after expiry of the hold time, the valve is closed evenly by the closing force of the compression spring. The closing force of the compression spring is matched to the closing force of commercially available valves and keeps the valve normally closed.

Figure: Example for 4 mm stroke. Characteristic line for stroke 5 mm results analogous.

2.2 **Normally Open** (valve open)



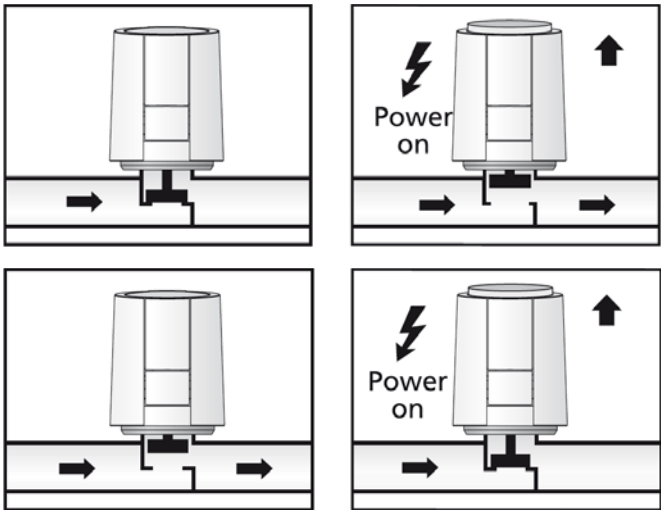
In case of the normally open version, the valve is closed evenly by the ram motion upon switching on the operating voltage and after expiry of the dead time.

After the operating voltage is cut and after expiry of the hold time the valve is opened evenly by the closing force of the compression spring.

Figure: Example for 4 mm stroke. Characteristic line for stroke 5 mm results analogous.

2.3 Function Indicator

The function indicator of the Macon ZMC / ZMO Series (all around view) allows identifying the operating condition (valve open or closed) at a glance. It is also possible to feel the current operating state when it's dark.



- In case of the **NC version**, an extended function display shows opening of the valve.
- In case of the **NO version**, an extended function display shows that the valve is closed.

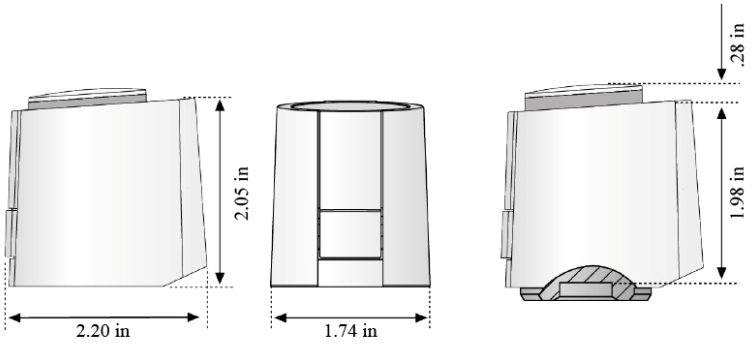
2.4 First-Open function (for NC only)

In its delivery condition, the Macon ZMC is kept open when de-energised due to the First-Open function. This enables heating operation during the carcass construction phase even when the electric wiring is not yet complete. During the later electrical start-up, the First-Open function is unlocked by applying the operating voltage for more than 6 minutes. The Macon ZMC will then be completely operable.

3) Technical Data

Operating voltage	24 V AC/DC +20%...-10%	
Max. inrush current	< 300 mA during max. 2 min.	
Operating power	1 W [1)]	
Stroke (actuator travel)	4.0 / 5.0 mm	
Actuating force	100 N ±5%	
Fluid temperature	32° F - 212° F [2)]	
Storage temperature	-130° F - 140° F	
Ambient temperature	32° F - 140° F	
Degree / class of protection	IP 54 [3)]	
CE conformity according to	EN 60730	
Housing material / housing color	Polyamide / light grey (RAL 7035)	1) measured with precision reference meter LMG95
Connection cable/ color	2 x 0.75 mm² PVC / light gray (RAL 7035)	
Cable length	3' 3"	2) in dependence of the adapter even higher
Weight with connecting cable (1 m)	approx. 5.3 oz	
Surge protection according to EN 60730-1	min. 2.5 kV	3) in all installation positions

3.1 Dimensions

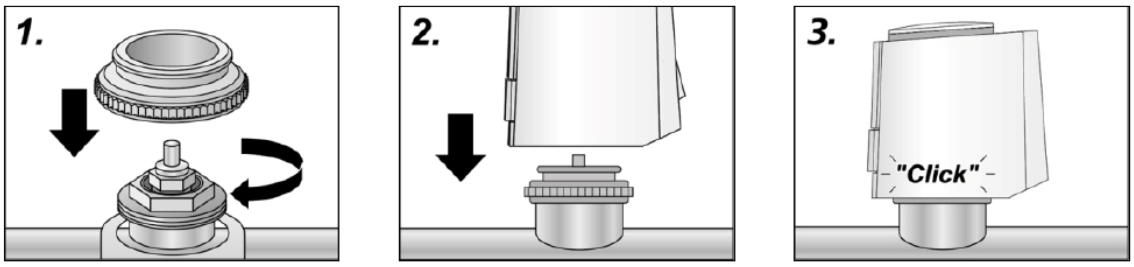


Dimensions | Installation height

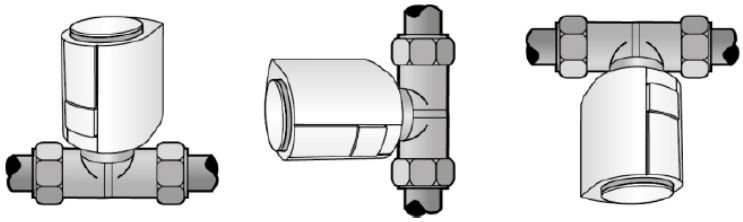
4) Installation notes

4.1 Installation with valve adapter

The valve adapter assortment guarantees a perfect match of the valve drive to almost any valve bottom and heating circuit distributor available on the market. Simply snap-on the Macon ZMC/ZMO Series to the manually pre-installed valve adapter.



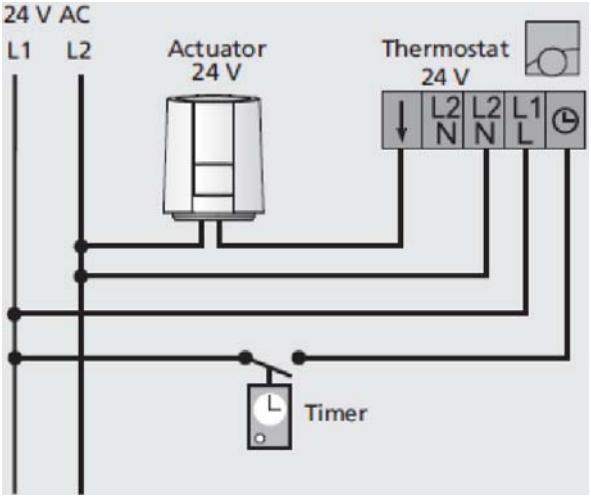
4.2 Installation position



vertical | horizontal | overhead

Preferred installation position of the Macon ZMC/ZMO Series is vertical or horizontal. An upside down position may reduce product life through special circumstances (e.g. contaminated water).

4.3 Electrical Installation



Calculation of maximum cable length (copper cable) for 24 V rated voltage

L = K x A / n

L	Cable length in m
K	Constant (269 m/mm²)
A	Conductor cross-section in mm²
n	Number of Alpha-Actuators

We recommend the following cables for installing a 24 V system:

Telephone wire	J-Y(ST)Y	0.8 mm²
Light plastic-sheathed cable:	NYM	1.5 mm²
Flat webbed building wire:	NYIF	1.5 mm²

Transformer:
A safety isolating transformer according to EN 61558-2-6 (Europe) must always be used. Transformer dimensioning results from the making capacity of the Macon ZMC/ZMO Series.

Rule-of-thumb formula:

$P_{Transformer}$ = 6 W x n
n = Number of Actuators

5) Accessories

- Protection Cap AA SK 1004

Protection against theft and vandalism, available for valve drives with a stroke of 4mm or 5mm

Macon ZMC - DDC

The Macon Model ZMC-DDC Proportional is a thermoelectric actuator for the discrete control of heating and cooling systems in direct proportion to the applied control voltage. The control of the actuators is performed by a 0-10 V DC signal via a central DDC system or by a room thermostat. Principal area of application is the building management systems range.

1) Features

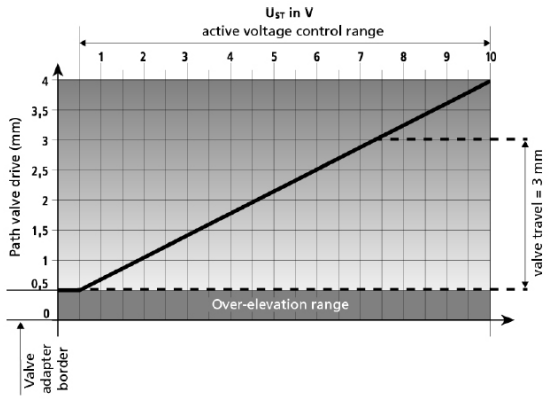
- Simple plug-in installation
- Travel path variants 4.0 mm / 5.0 mm (further variants on request)
- “normally closed” (NC)
- Power consumption of only 1 watt
- Control by a 0-10 V DC signal
- 360° installation position
- Short response times, resulting in improved control response
- Closing point verification and possible adaptation during operation
- All-round function display
- Complete compatibility to the valve adapter system
- Noiseless and maintenance-free
- High functional safety and long expected service life
- Patented 100% protection in case of leaky valves
- “First open” function
- Adaptation check on the valve
- Plug-in connecting cable
- Alignment aid on the valve
- Compact size, small dimensions

2) Function

The actuator mechanism of the Macon ZMC-DDC uses a PTC resistor-heated elastic element and a compression spring. The elastic element is heated by applying the operating voltage and moves the integrated plunger. The force generated by this movement is transferred to the plunger, thus opening or closing the valve.

2.1 Version NC: Normally Closed (valve closed)

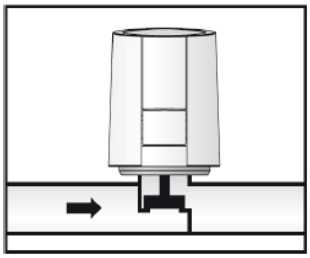
After switching on the operating voltage, the first-open function is unlocked. Directly after that, the actuator automatically detects the valve closing point and switches to regular operation. This process guarantees an optimum adaptation of the actuator to the valve. If a control voltage is applied after the closing point detection, the actuator opens the valve evenly with the plunger movement after the dead time has elapsed. An internal wear-free position detection controls the temperature required for the maximum stroke (minus over-elevation) and consequently the energy intake of the elastic element. No excess energy is stored inside the elastic element. If the control voltage is reduced, the electronic control system immediately adapts the heat input to the elastic element. In the range of 0 – 0.5 V (depending on the model) the actuator remains in a quiescent state in order to ignore ripple voltage occurring in long cables (rpm). The closing force of the compression spring is matched to the closing force of commercially available valves and keeps the valve closed when de-energized.

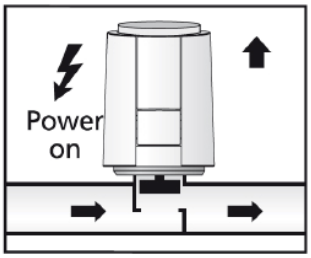


If a 4 mm actuator without valve path recognition is used or valves with an actuator travel of 3 mm, the actuator ravels without load for control voltages from 7.5 V to 10 V.

2.2 Function Display

The function display (all-round display) of the Macon ZMC - DDC shows at first glance whether the valve is open or closed; this can be also felt in the dark.





- In case of the NC version, an extended function display shows opening of the valve.

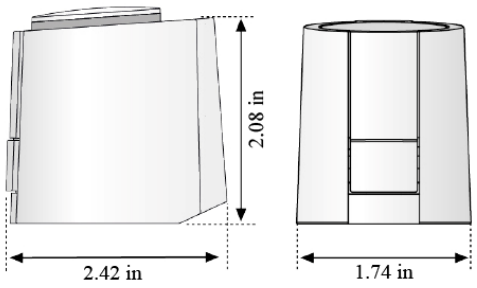
2.3 "First Open" function (for NC only)

In its delivery condition, the Macon ZMC-DDC is normally open due to the "First Open" function. This enables heating operation during the construction phase even when the electric wiring of the single room control is not yet complete. When commissioning the system at a later date, the "First Open" function is automatically unlocked by applying the operating voltage (for more than 6 minutes) and the actuator is fully operable.

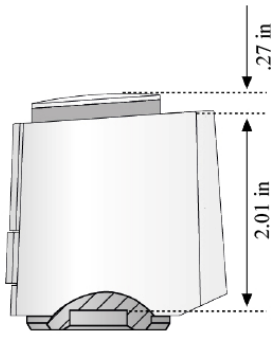
3) Technical Data

Voltage (according to variant)	24 V AC, -10% … +20-%, 50-60 Hz 24 V AC, -20% … + 20%,	
Control voltage range	0 V … 10 V (reverse polarity protected)	
Max. inrush current	< 300 mA during max. 2 min.	
Operating power	1 W [1)]	
Resistance of control voltage input	100 kΩ	
Stroke (actuator travel)	4.0 / 5.0 mm (minus 0.5 mm over-elevation)	
Actuating force	100 N ± 5%	
Fluid temperature	32° F - 212° F [2)]	
Storage temperature	-130° F - 149° F	
Ambient temperature	32° F - 140° F	
Degree / class of protection	IP 54 [3)] / III	
CE conformity according to	EN 60730	
Housing material / color	Polyamide / white	1) measured with precision reference meter LMG95
Connection line / color	3 x 0.22 mm² PVC / white	
Cable length	3' 3"	2) depending on the adapter even higher
Weight with connecting cable (1 m)	approx. 3.9 oz	
Surge protection according to EN 60730-1	min. 1 kV	3) in all installation positions

3.1 Dimensions



Dimensions

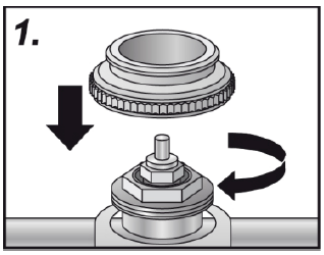


Installation height

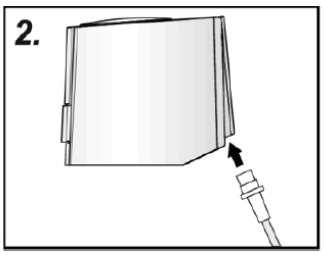
4) Installation notes

4.1 Installation with valve adapter

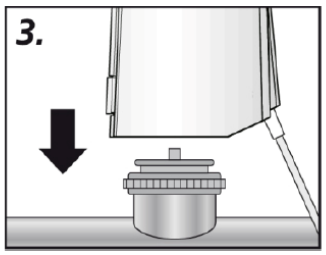
The valve adapter assortment guarantees a perfect match of the valve drive to almost any valve bottom and heating circuit distributor available on the market. Simply snap-on the Macon ZMC-ES to the manually pre-installed valve adapter.



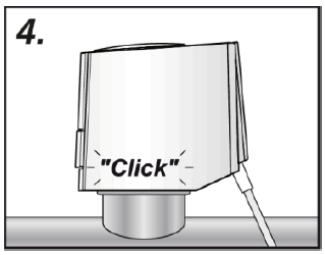
Screw the adaptor manually onto the valve.



Connect the line to the actuator.

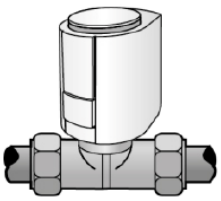


Place the Macon ZMC-DDC manually in vertical position to the valve adaptor.

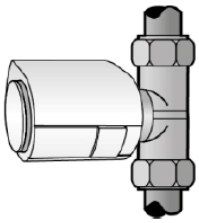


The Macon ZMC-ES snaps onto the valve adaptor with a “click” when pressed down vertically by hand.

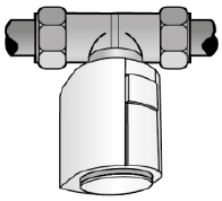
4.2 Installation position



vertical



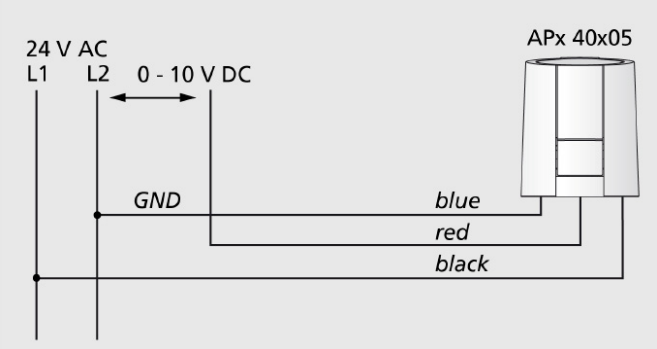
horizontal



overhead

The Macon ZMC-DDC must be installed preferably in vertical or horizontal installation position. For overhead” installation special circumstances (e. g. drainwater) can reduce the lifetime of the actuator.

4.3 Electrical connection



Calculation of maximum cable length (copper cable) for 24 V rated voltage

L = C x A / n
L Cable length in m
K Constant (269 m/mm²)
A Conductor cross-section in mm²
n Number of Alpha-Actuators

We recommend the following cables for installing a 24 V system:

Telephone wire: J-Y(ST)Y	0.8 mm²	
Light plastic-sheathed cable:	NYM	1.5 mm²
Flat webbed building wire:	NYIF	1.5 mm²

Transformer:
A safety isolating transformer according to EN 61558-2-6 (Europe) must always be used. Transformer dimensioning results from the making capacity of the Macon ZMC-DDC.

Rule-of-thumb formula:
$P_{Transformer}$ = 6 W x n
n = Number of Actuators

5) Accessories

- Protection Cap AA SK 1004

Protection against theft and vandalism available for valve drives with a stroke of 4mm or 5mm.

Macon ZMC - ES

Macon Model ZMC- ES 24V End switch is a thermoelectric valve drive for opening and closing valves and small valves used in the scope of HVAC technology. The integrated micro switch with floating contact allows direct operation of a pump or fan control unit. The Macon ZMC - ES 24V End switch is controlled by a 24 V room thermostat with two-point output or pulse-width modulation.

1) Features

- 360º installation position
- Integrated switch with floating contact
- Patented 100% protection against leaky valves
- Available in normally closed (NC)
- Power consumption 1 watt
- Simple snap-on installation
- High functional safety and long expected service life
- First-Open function
- Adaptation check on valve
- Alignment aid on the valve
- Compact size, small dimensions
- All round function display
- Noiseless and maintenance-free

2) Function

The actuator mechanism of the Macon ZMC-ES with end switch uses a PTC resistor heated wax element and a compression spring. The wax element is heated by applying the operating voltage and moves the integrated ram. The force generated by this movement is transferred on the valve lifter and opens and closes the valve. The integrated micro switch allows the use of its switching signal depending on the opening of the valve.

2.1 Version NC: Normally Closed (valve closed)

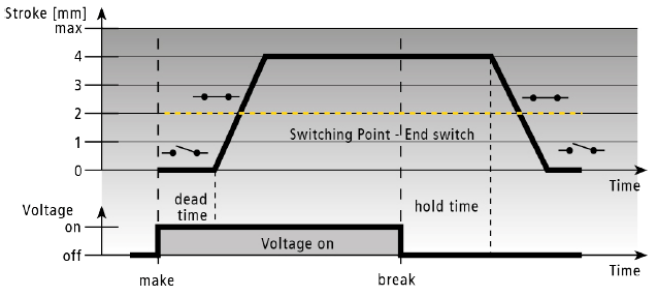


Figure: Example with respect to the travel path of 4 mm. The characteristic curves of the travel path of 5 mm result from this.

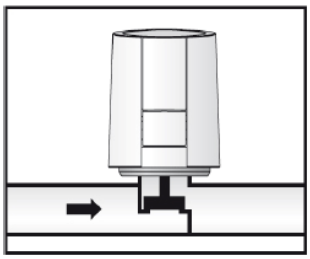
In case of the normally closed version, the valve is opened steadily by the ram motion upon switching on the operating voltage and after expiry of the dead time. The integrated micro switch is switched with a travel path of approx. 2 mm.

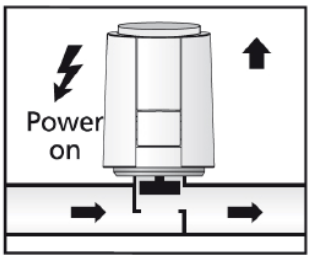
After the operating voltage is cut and after expiry of the hold time the valve is closed evenly by the closing force of the compression spring. The integrated switch is closed after an actuator travel of approx. 2 mm.

The closing force of the compression spring is matched to the closing force of commercially available valves and keeps the valve closed when de-energized.

2.2 Function Display

The function indicator of the Macon ZMC - ES (all around view) allows identifying the operating condition (valve open or closed) at a glance. It is also possible to feel the current operating state when it's dark.





- In case of the NC version, an extended function display shows opening of the valve.

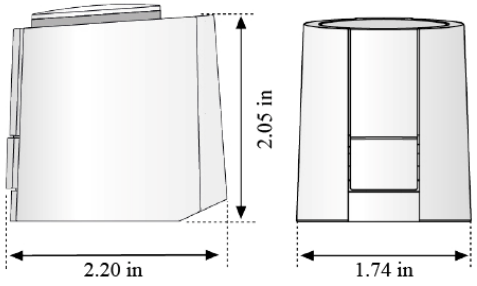
2.3 "First Open" function (for NC only)

In its delivery condition, the Macon ZMC - ES is kept open when de-energized due to the First-Open function. This enables heating operation during the construction phase even when the electric wiring of the individual room control is not yet complete. During the later electrical start-up, the First Open function is automatically unlocked by applying the operating voltage for more than 6 minutes. The valve drive is now fully operable.

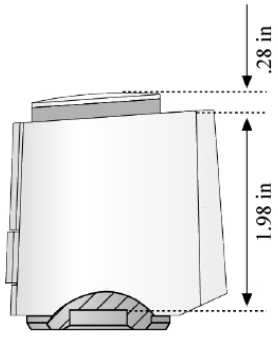
3) Technical Data

Operating voltage	24 V AC/DC +20%...-10%	
Max. inrush current	< 300 mA during max. 2 min.	
Operating power	1 W [1)]	
Stroke (actuator travel)	4.0 / 5.0 mm	
Actuating force	100 N ±5%	
Switching current for micro switch	24 V AC: 3 A resistive load 1 A inductive load	
Switching point of micro switch NC	approx. 2 mm	
Fluid temperature	32° F - 212° F [2)]	
Storage temperature	-130° F - 140° F	
Ambient temperature	32° F - 140° F	
Degree / class of protection	IP 54 [3)]	
CE conformity according to	EN 60730	
Housing material / color	Polyamide / light grey (RAL 7035)	1) measured with precision reference meter LMG95
Connection line / color	4 x 0.75 mm² PVC / light gray (RAL 7035)	
Cable length	3' 3"	2) depending on the adapter even higher
Weight with connecting cable (1 m)	approx. 5.3 oz	
Surge protection according to EN 60730-1	min. 2.5 kV	3) in all installation positions

3.1 Dimensions



Dimensions

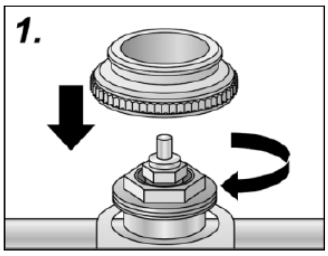


Installation height

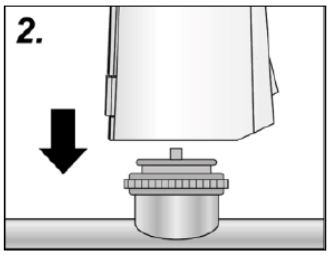
4) Installation notes

4.1 Installation with valve adapter

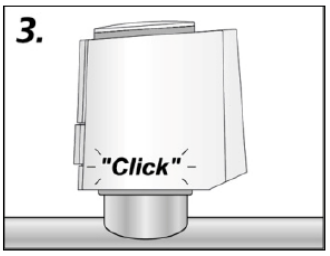
The valve adapter assortment guarantees a perfect match of the valve drive to almost any valve bottom and heating circuit distributor available on the market. Simply snap-on the Macon ZMC-ES to the manually pre-installed valve adapter.



Screw the adaptor manually onto the valve.

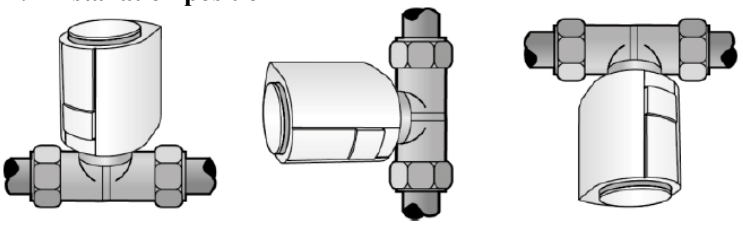


Place the Macon ZMC-ES vertically on the valve adaptor.



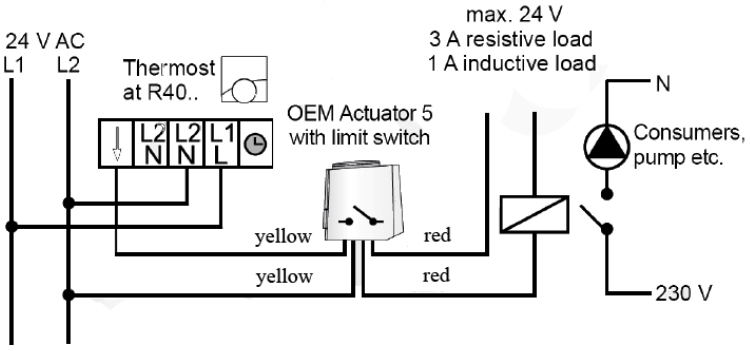
The Macon ZMC-ES snaps onto the valve adaptor with a “click” when pressed down vertically by hand.

4.2 Installation position



vertical **horizontal** **overhead**

Preferred installation position of the Macon ZMC-ES is vertical or horizontal. An upside down position may reduce product life through special circumstances (e.g. contaminated water).



Calculation of maximum cable length (copper cable) for 24 V rated voltage

$$L = C \times A / n$$

L	Cable length in m
K	Constant (269 m/mm²)
A	Conductor cross-section in mm²
n	Number of Alpha-Actuators

We recommend the following cables for installing a 24 V system:

Telephone wire	J-Y(ST)Y	0.8 mm²
Light plastic-sheathed cable:	NYM	1.5 mm²
Flat webbed building wire:	NYIF	1.5 mm²

Transformer:
A safety isolating transformer according to EN 61558-2-6 (Europe) must always be used. Transformer dimensioning results from the making capacity of the Macon ZMC-ES.

Rule-of-thumb formula:

$$P_{Transformer} = 6\ W \times n$$

n = Number of Actuators

5) Accessories

- Protection Cap AA SK 1004

Protection against theft and vandalism, available for valve drives with a stroke of 4mm or 5mm

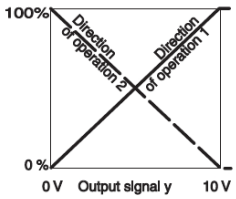
Areas of use

The Macon Motorized Actuator can be used on all Macon Valves (NT series 2-way valves, EDV 3-way mixing valves, EKV cooling valve and OPSK one pipe steam valve). For controllers with continuous output in conjunction with single-room control systems. Automatic valve adjustment and intelligent cut-off for maximum energy efficiency.

Specifications

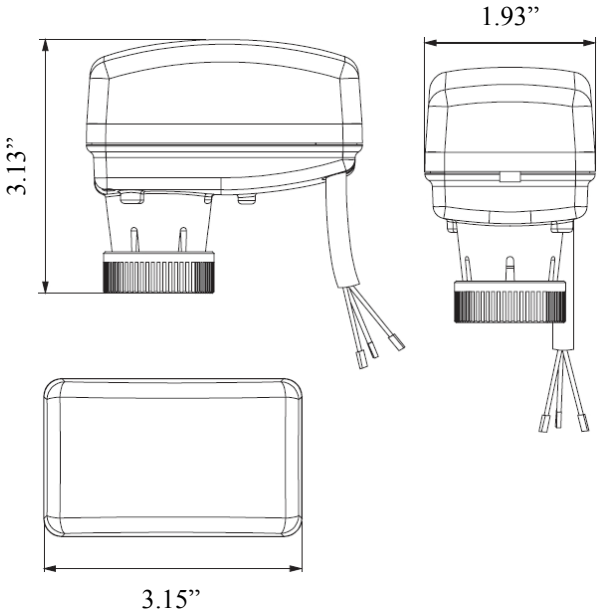
Design

- Two-piece plastic housing, light grey RAL7035
- Brass nut
- Plug-in cable, light grey, standard 1.50 m long, 3×0.35 mm², exchangeable
- Running time 13 s/mm
- Fitting position vertically upright to horizontal, not upside down.



Data

Direction of operation	NO/NC DIP switches
Running time	43 - 72 s (8s/mm)
Stroke	5.5 mm
Pushing force	120 N
Power supply	24V AC/DC, ±15%, 50 - 60 Hz
Power consumption	2.5 VA
Control signal	0 (2) - 10V
Max operating temperature	203°F at the valve
Noise level	<30 dB(A)
Perm ambient temperature	0 - 122°F
Perm ambient humidity	<75%rh
Ingress protection	IP 43 (EN 60529)
Protection class	III (EC 60730)



Operating

When being put into service (with valve fitted), the actuator moves to both end positions and stores the associated increments. The range of the control signal is then assigned to this effective stroke. The motor positions the valve and cuts out as soon as the stroke position matches the controller's output signal. In the end positions or in the event of an overload, the motor cuts out after 2 minutes at the latest. If the control voltage has not changed after 2 hours (in the range of 0 - 0.5 V), the motor briefly runs to the end position and corrects its position memory (if necessary). The MVA 2-10 performs a complete cycle every 24 hours in order to prevent the valve plug from jamming or sticking. The LED lights up if power is applied and flashes as long as the motor is running.

Direction of operation 1:
As the positioning signal increases, the actuator spindle extends on 2-way through valves and on the EDV 3-way valve the control passage opens.

Direction of operation 2:
As the positioning signal increases, the actuator spindle retracts on the 2-way through valves and on the EDV 3-way valve the control passage closes.

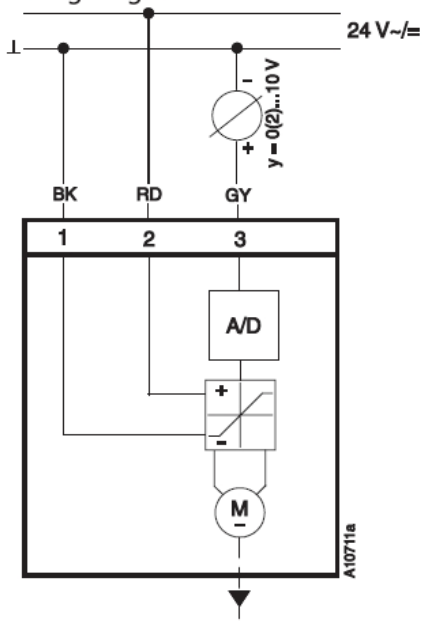
The black ground cable 1a (24 V~) and the blue ground cable 1b (control voltage) should both be connected to a common ground cable.

After removing the cap on the cover, the following settings can be made using jumpers:

- The input signal can be set to 0 - 10 V, 5.2 - 10 V or 0 - 4.8 V.
- The direction of operation 1 or 2 can be selected; the factory setting is 1 (DA).

Put the cap back on after making the settings.

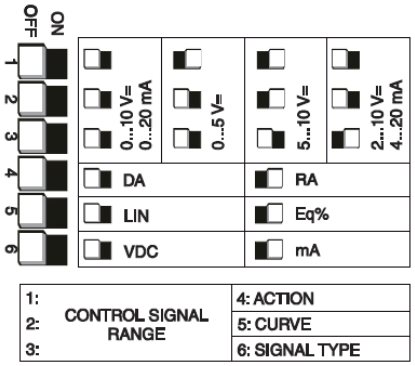
Wiring diagram

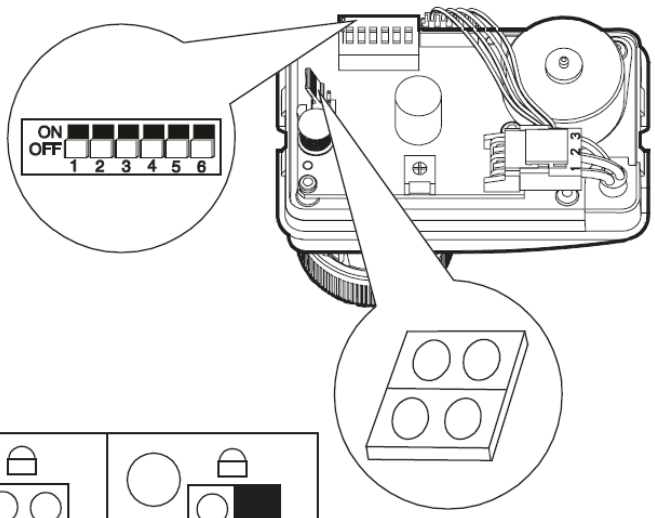


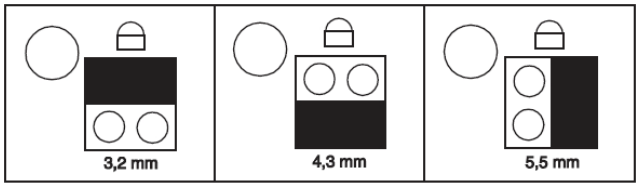
1	BK (black)
2	RD (red)
3	GY (grey)

LED Status Indicator	
Status	**Description**
OFF	No power applied
Flashing green	Actuator moving to position
Continuous green light	Position reached
Flashing red	Calibration cycle
Continuous red light	No input signal

DIP switch setting







Factory Setting: All the DIP switches in OFF position.

DIP switches 1-2-3
The DIP switches 1-2-3 are used for setting the control signal range.

DIP switch 4
The direction of operation of the actuator is set with DIP switch 4:
DIP switch 4 in OFF position: DA (Direct Acting)
DIP switch 4 in ON position: RA (Reverse Acting)

DIP switch 5
This switch can set the actuator so that the characteristic of the combination of valve with actuator corresponds to a linear or equal-percentage characteristic.
DIP switch 5 in OFF position: LIN
Use this setting if the valve has a linear or equal-percentage characteristic.
DIP switch 5 in ON position: Eq%
Use this setting with an open/close or a high-speed valve.

DIP switch 6
The voltage (VDC) or current (mA) is set with DIP switch 6.
DIP switch 6 in OFF position: VDC
DIP switch 6 in ON position: mA

Setting the stroke
The stroke can be set using a jumper.
Factory Setting: 4.3mm

This page left blank intentionally.

Motorized Actuator 0-10 Volt
MPVC-0-10

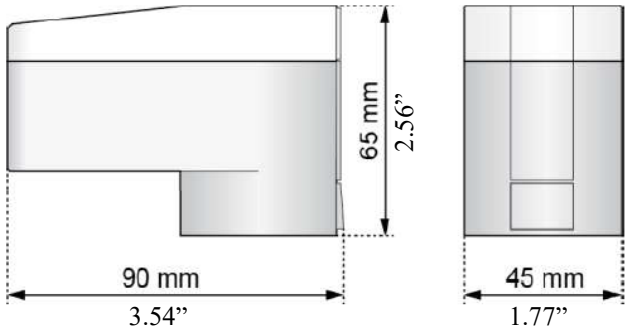
Areas of use

The Macon Motorized Actuator can be used on all Macon Valves (NT series 2-way valves, EDV 3-way mixing valves, EKV cooling valve and OPSK one pipe steam valve). For controllers with continuous output in conjunction with single-room control systems. Automatic valve adjustment and intelligent cut-off for maximum energy efficiency.

Design Specifications	
Casing	Two-piece plastic housing, light grey RAL7035 Polyamide
Casing Cover	Transparent Polycarbonade
Cable	White, 1.0 m long, 3 x .22 mm^2
LCD (H x W)	10 x 20 mm
LED	Multicolored - LED
Fitting position vertically upright to horizontal, not upside down.	

Technical Data	
Operating Voltage	24V AC/DC, ±20%, 50 - 60 Hz
Operating Power	2.6 VA / 1,4 W
Max Power Consumption	< 110 mA
Standby Power Consumption	< 10 mA
Feedback Signal	100 k Ω
Control Signal	0V - 10 V
Stroke	8.5 mm
Force	Standard 125 N ±20%
Regulating Time	15 s/mm
Storage Temperature	-4°F - 158°F
Ambient Temperature	-32°F - 122°F
Weight	0.34 lb
Max operating temperature	212°F at the valve
Ingress protection	IP 54 (EN 60730)
Protection class	III

Measurements

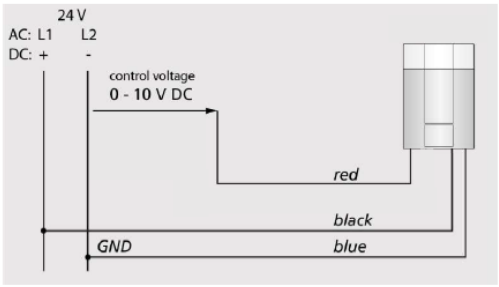


Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Start-Up

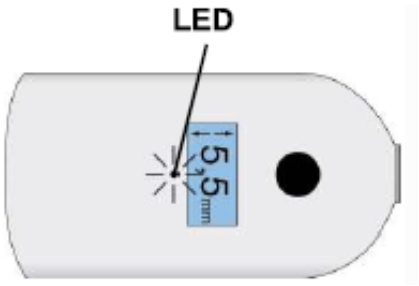
When being put into service (with valve fitted), the actuator moves to both end positions and stores the associated increments. It finds the closing mode and then the maximum position, then the actuator increases and decreases quickly to find the valve spindle stroke. If it does not detect the stroke of the valve, the actuator will use a stroke of 8.5mm. If the actuator looses power or receives a reduced voltage, a new calibration will be made. The calibration is done in about 15 minutes.

Connection line



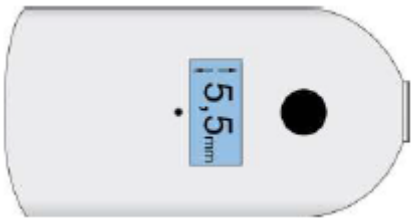
LED Display

- The motorized actuator MOVE is equipped with a multi-colored LED for the signaling of operating statuses.
- Green and red are used as signal colors. Signaling is only performed if the valve drive is supplied with operating voltage.
- Error conditions are indicated with steady red light.



LC Display

- The motorized actuator MPV alternately shows the setting position and the applied control voltage. In case of a control requirement, the current driving direction is shown in the LC display by means of an arrow.
- In case of an error, the corresponding error code is shown and the error is indicated by a steadily lighted LED.



NOTE! The mechanical play between actuator and valve adapter and the gear in the actuator is recognized as valve travel. This affects the position indicator and the control bandwidth is minimally reduced. In contrast to the actual valve stroke, thus an approx. 1 mm higher valve stroke is shown in the display.

Error Codes

Queued errors are indicated by an error code. The subsequent table explains the different error codes and error corrections.

E6 - Irregular position is determined

The actuator has to be disconnected from the power supply and the control shaft must be moved with the manual setting from the end position. After the power resumes, the initialization starts again. If the error recurs, contact factory.

E8 - Indicates an internal error

The actuator will perform a re-initialization after 10 seconds. If the error cannot be corrected automatically after a maximum of three attempts, there is a permanent error displayed. Contact factory.

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Operation

The motorized actuator MPV is performed by a 0-10 V DC control signal from a room thermostat or a building management system. After switching on the power supply, the actuator initializes. The initialization of the actuator determines the mechanical stroke of the actuator. In this period the display alternately shows ”In” (for initialization) and the control voltage applied to it.

First, the valves pressure plate is fully retracted, whereby the upper end-stop of the drive is determined. Following the valve plate extends fully and determined the bottom end stop. The closing point of the valve is detected.

Next, the valve stroke recognition will happen. The actuator moves with high speed to the upper position and back to the lower position slowly, in order to determine the valve stroke. In case of not sensing the valve, the actuator will work with the factory setting stroke (8,5 mm)

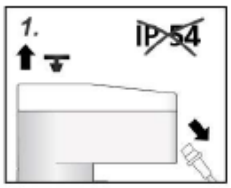
The stroke of the valve can be changed in practice by different conditions. The valve was adjusted, or the actuator was mounted to a new valve. In both cases, the data obtained at the initialization values has changed. Thus, the actuator adjusts to the new valve stroke, the power supply and the control voltage must be interrupted briefly. After the power has been switched on again, the actuator performs the re-initialization phase.

NOTE! For initialization MPV needs about 15 minutes.

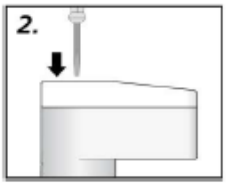
The motorized actuator MPV is performed by a 0-10 V DC control signal from a room thermostat or a building management system. The control signal allows a precise activation and positioning of the actuator. A 0-10 V or PWM signal can be applied to the control voltage input for control purposes.

Manual Valve Setting

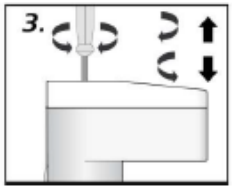
The manual valve setting allows to bring the valve pressure plate to the desired position in de-energized status. This facilitates maintenance and installation.



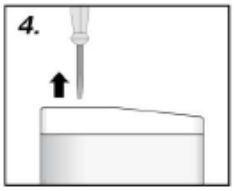
Remove the protective plug and the connection line, or switch off the voltage supply.



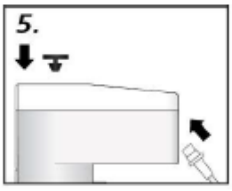
Insert a screwdriver (0,3 x 2 mm).



Turn to the right or left for extracting or retracting, respectively.



Remove the screwdrver after reaching the desired position.



Install the protective plug and connect the connection line.

This page left blank intentionally.

ONE-PIPE STEAM VALVE ASSEMBLY
OPSK

OPERATION

The Macon one-pipe steam valve assembly consists of the reliable EVO direct mounting thermostat. The thermostatic head contains a temperature sensitive wax which expands and contracts on a rise and fall of temperature in the sensed area. When the temperature rises above the temperature selected, pressure from the expanding wax closes the valve, preventing or restricting the flow of steam through the radiation unit. When the room temperature drops below the selected temperature, the valve opens and allows an increase of steam flow through the radiation unit. This modulating process continues automatically to maintain the temperature you selected. The OPSK controls room temperature by regulating the amount of air and steam in the radiator.

FEATURES & BENEFITS

- Compact dimensions
- Nickel-plated, forged brass valve
- Thermostat may be locked at or limited to any desired temperature or temperature range
- Actuators may be changed without shutting down the system
- Valve may be installed by dropping the system down to zero pressure
- Individual room control for greater comfort
- Replaceable insert
- Stainless steel spindle
- Fuel savings up to 30%
- Nonelectric - fully automatic
- Prevents over- and under-heating
- Reliability
- Remote thermostats available - call or write for the distributor nearest you!
- Vent and vacuum breaker included
- The OPSK helps to minimize large temperature swings inherent in one pipe steam systems.

OPTIONS

The OPSK can be fitted with the following thermostatic operators:

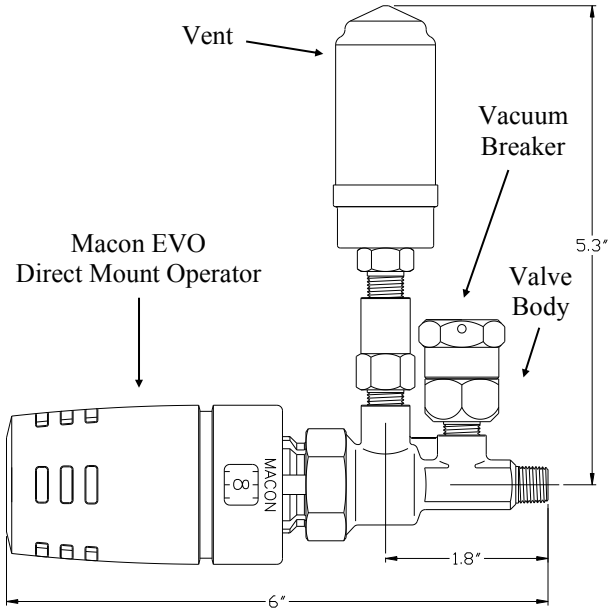
- EVO (Standard) - direct mount
- EVO-Z - direct mount w/remote sensor
- ENTL - wall mount w/remote dial
- ENTLZ - remote dial & remote sensor
- VA & VM Series - electric actuator
- Other operators available - contact factory

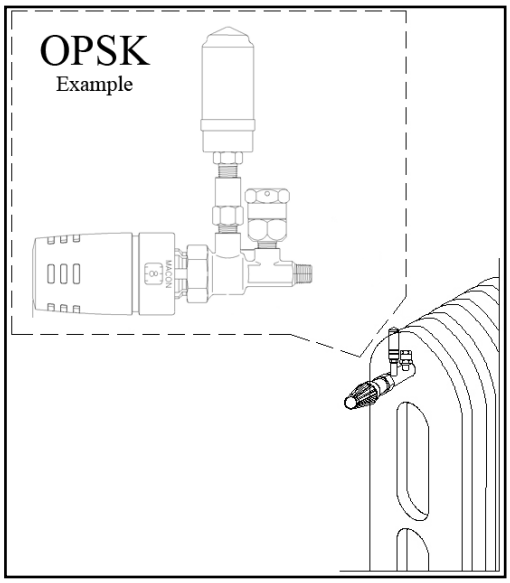
Important:

1. Installing the OPSK does not eliminate other controls in the system. The boiler must be cycled in some manner so that condensate can return to the boiler and eliminate boiler flooding.
2. If the boiler is cycled from a space thermostat in one zone, do not apply a radiator valve to that zone's radiation.
3. Do not apply a radiator valve in a one-pipe steam system that does not use steam air vents venting to the atmosphere on each radiation unit.
4. The VB-18 vacuum breaker is recommended and assists in the return of condensate. Integral installation reduces vacuum problems.
5. Very effective with system pressure range 0-1½ PSI. Suggested maximum operating pressure 2 PSI.

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

ONE-PIPE STEAM VALVE ASSEMBLY
OPSK





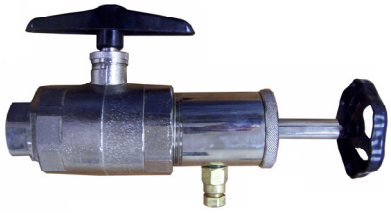
ONE PIPE STEAM

TECHNICAL DATA - One-Pipe Steam Valve Assembly	
Maximum Temperature	248ºF
Disc Material	EPDM
Valve Body Material	Forged, nickel-plated brass
Body Style	Straight Pattern
Connections	1/8″ male NPT, fits in vent tapping of the radiator
Temperature Setting Range	46ºF to 79ºF
Maximum Movement	0.125” (3mm)
Movement per 1 °F change in ambient	.007 (.15mm)

TECHNICAL DATA - EVO			
Temperature Setting Range	46ºF to 79ºF	Material	Engineered heat resistant thermoplastic (PBT,POM)
Maximum Storage & Ambient Temp.	122ºF	Nut	Low Lead Brass
Maximum Water Temp.	250ºF	Weight	4.16 oz.
Maximum Steam Pressure	15 psig	Color	White
Maximum Differential Pressure	20 psi	Width (A)	1.73”
Suggested Differential Pressure	0.5 to 2.9 psi	Height (B)	3.66”
Max. Movement	0.125”		
Nominal Opening	0.018 (3.6ºF)		
Long Term Test	5000 Cycles (1.3ºF)		

DIAL SETTINGS - Room temperature - °F								
0	*	1	3	5	6	7	8	9
Off	50	54	61	68	72	75	79	82
	Frost Protection							

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

T23000	NT Series Valve Insert for all 1/2”, 3/4” Valves & 1” N10877	
T25000 (LBSD)	NT Series Valve Insert (Large Body, Small Disc) for 1” N10777, 1” N10970	
T25000 (LBLD)	NT Series Valve Insert (Large Body, Large Disc) for 1” N10677, 1-1/4” N10697, 1-1/4” N10797, 1-1/4” N10897	
OPSK-Insert	Valve Insert for OPSK One Pipe Steam Valve	
ICT	Insert Changer Tool for Valves using T23000 Insert	

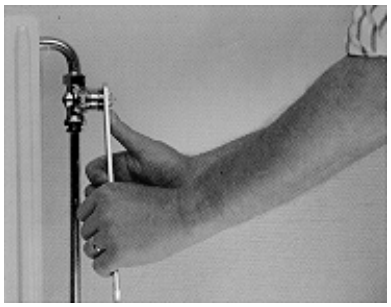
Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

ACCESSORIES

NHN	Metal Handwheel Operator w/Key (allen wrench) for NT Series Valves	
ENH	Manual Handwheel Operator for NT Series Valves	
PBR	Protection Ring for MTW, MTWZ, ENTL B46000 & ENTLZ B56000 (prevents removal of Thermostatic Operators)	
MFK	Protection Cover for MTW & MTWZ Thermostatic Operators	
T23000-Wrench	Wrench for T23000 Insert	
NT-Valve-Ext	Accessory Valve Extender for Heat Dissipation	

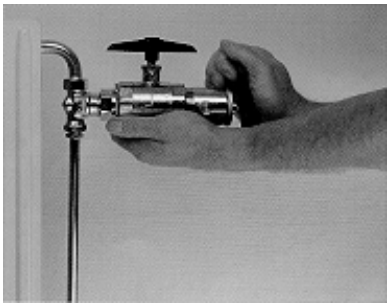
INSTRUCTION SHEET for Macon Insert Changer Tool (ICT)

The Macon Insert Changer allows removing an insert without shutting down a hot water or low pressure steam heating system. Follow the easy steps under the photographs. Reverse the procedure when re-installing the insert.

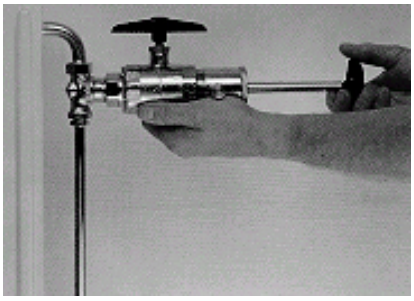


1. Using a 15/16” or 23 mm wrench, loosen the insert in the valve body by turning counterclockwise to break the metal to metal seal. Do not turn the insert out. Turn it back clockwise, tighten it lightly, if needed to prevent any objectionable leakage.

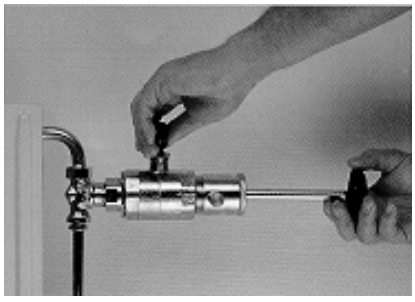
2. Place the socket of the insert changer onto the valve insert. Press in the stem handle of the tool to ensure a firm engagement.



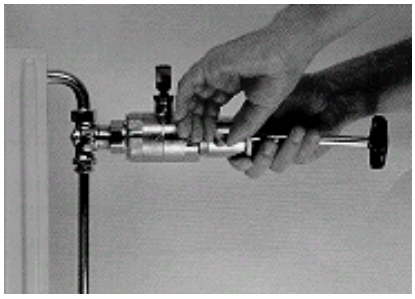
3. While continuing to press in on the stem handle, engage the thread of the union tailpiece of the changer with the thread on the neck of the valve. Turn the changer onto the valve neck until it is firmly in place and sealed.



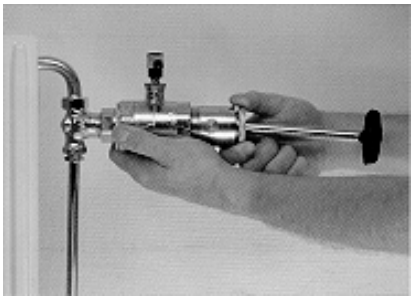
4. Check that the drain cock is closed and that the bonnet of the outer chamber of the changer is assembled securely. Turn the changer handle counterclockwise at least 3 full turns to ensure that the insert is free. Pull out on the changer handle to clear the ball valve.



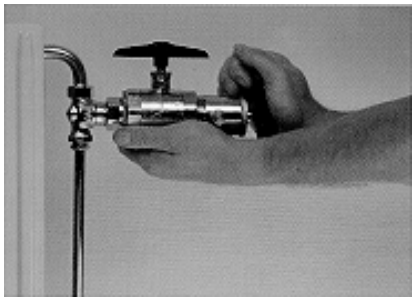
5. Close the ball valve by turning its handle so that it is across the axis of the changer.



6. Open the drain cock to relieve water or steam pressure in the chamber.



7. Holding the changer so that is does not turn, turn the bonnet out of the chamber.



8. Remove the insert and replace it.

Suitable for all
NT - T23000 Inserts

ACCESSORIES

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

This page left blank intentionally.

+

=

Existing Warren Webster 1/2" Sylphon Hand Valve

Tunstall/Macon E-Z Fit Conversion Kit #RSWW-1/2-SYL

New Self-Contained Valve w/Macon ENTZ Thermostatic Operator Shown

+

=

Existing Honeywell Braukmann V110 Series Valve with Remote Dial

Tunstall/Macon E-Z Fit Conversion Kit #RSBRK

New Self-Contained Valve w/Macon ENTL Thermostatic Operator Shown

+

=

Existing Flair Valve with Direct Mount

Tunstall/Macon E-Z Fit Conversion Kit #RSFL

New Self-Contained Valve w/Macon ENT Thermostatic Operator Shown

NOTE: ENT (old style) = MTW-28 (new style)
ENTZ (old style) = MTWZ (new style)

Tunstall®

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013

Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Existing Flair Valve with Direct Mount T'Stat

+

Tunstall/Macon E-Z Fit Conversion Kit #RSFL

=

New Self-Contained Valve w/Macon ENT Thermostatic Operator Shown

Existing Danfoss RA with RA-6 Control

+

Tunstall/Macon E-Z Fit Conversion Kit #RSDNF-RA

=

New Self-Contained Valve w/Macon ENTZ Thermostatic Operator Shown

Existing Danfoss RA2000 1/2" #013G8015

+

Tunstall/Macon E-Z Fit Conversion Kit #RSDNF-TT4

=

New Self-Contained Valve w/Macon ENT Thermostatic Operator Shown

CONVERSION INSERTS

NOTE: ENT (old style) = MTW-28 (new style)
ENTZ (old style) = MTWZ (new style)

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Tunstall / Macon E-Z Fit™ Conversion Kits for Manual Radiator Valve Applications

Part #	Valve Manufacturer
RSARM	Armstrong MV2, MV3
RSBJ	Barnes & Jones Series 88
RSBJ-F,K	Barnes & Jones Series F,K
RSDL	DAHL - Canada
RSDNB	Dunham 740, 840
RSHA	Hammond
RSHF	Hoffman 180
RSIL	Illinois 65
RSMA	Marsh
RSMEP	MEPCO
RSSA	Sarco
RSST	Sterling
RSTR	Trane
RSWW	Warren Webster
RSWW-SYL	Warren Webster Sylphon

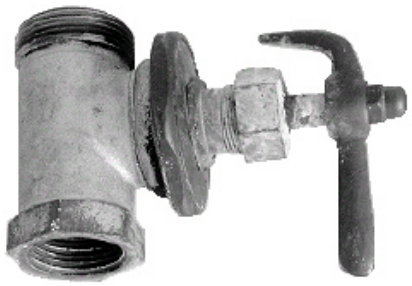
Macon RS Inserts for Conversion to Macon Thermostatic Operators

Part #	Valve Manufacturer
RSAMK-TT6	Ammark-SYR ½, ¾ 70 Series
RSBRK	Braukmann: V110, V105
RSB&G	Bell & Gossett (ITT)
RSDNF-RA	Danfoss: RA
RSDNF-TT1	Danfoss: RAV ¾" & 1" Hor. Angle
RSDNF-TT2	Danfoss: RAV ½", ¾" Vert. Angle, Straight
RSDNF-TT3	Danfoss: RA2000 ¾" Vert. Angle, Straight
RSDNF-TT4	Danfoss: RA2000 ½" Vert. Angle, Straight
RSFL	Flair
RSBRK-V100	Honeywell Braukmann V100
T23000	Minneapolis Honeywell V5061
RSTACO	Taco (Heat - Gard)
RSTACO-TT5	Taco (1990 On), Eire Techmate
RSTND	Tour & Andersson

If not listed, contact a distributor.

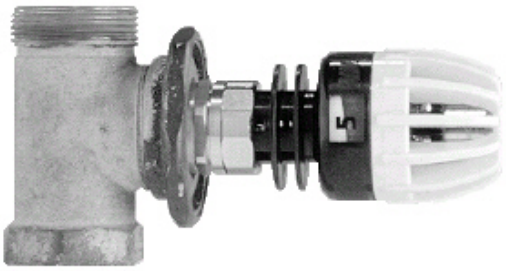
Tunstall E-Z Fit conversions can be engineered for all manual radiator valves. Sample may be required.

If not listed, contact your representative or the engineering staff at Tunstall Corporation.



Manual Radiator Valve

Converts into:

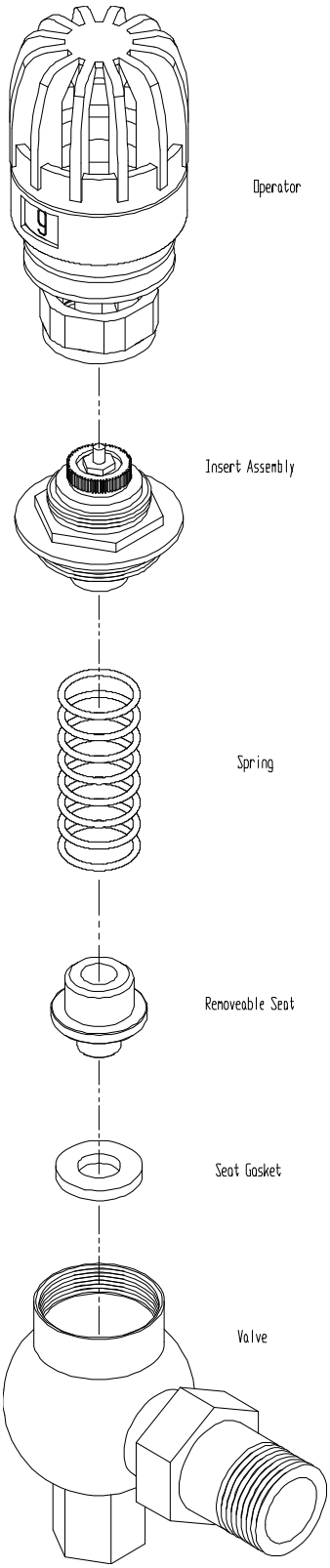


Macon ENT B26000 (old style shown)
Macon MTW-28 (new style)

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

This page left blank intentionally.

Tunstall E-Z-Fit™ Conversion Kit Instructions "T" Style (thread in)



1. Remove existing valve components. Thoroughly clean and inspect interior of valve.
2. Drop in the supplied removable seat. The seat should have a gasket on the bottom side and a spring affixed to the top.
3. Thread in Tunstall insert assembly and secure.
4. Affix the operator to the top of the insert assembly.

Pictured to the left is a typical installation. Retrofit kit may or may not include spring and removable seat. Skip the steps that do not apply and proceed with your installation.

That's it!

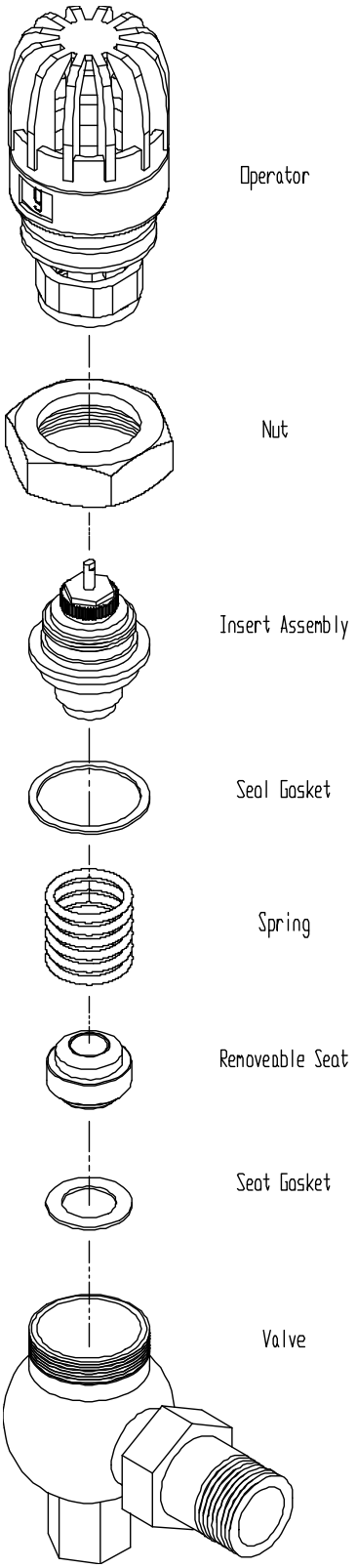
Now your radiator is under "Macon Control."

If you have any questions do not hesitate to call your representative or the factory.

CONVERSION INSERTS

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Tunstall E-Z-Fit™ Conversion Kit Instructions "N" Style (nut type)



1. Remove existing valve components. Thoroughly clean and inspect valve seat.
2. Drop in the supplied removable seat. Be certain the seat gasket is on the bottom. Now place the spring on top of the seat and make sure that it reaches the valve shoulder.
3. Drop the insert assembly and seal gasket (if applicable). Secure the Tunstall E-Z Fit™ conversion kit with the nut supplied.
4. Affix the operator to the top of the insert assembly.

Pictured to the left is a typical installation. Kit may or may not include spring, removable seat, or upper insert seal gasket. Skip the steps that do not apply and proceed with your installation.

That's it!

Now your radiator is under "Macon Control."

If you have any questions do not hesitate to call your representative or the factory.

CONVERSION INSERTS

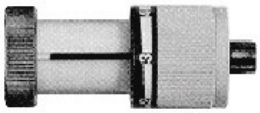
Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Umbrella Adaptor™ for Conversion to Macon EVO Series Operators

Macon Controls has a solution that upgrades an existing thermostatic control operator while the heating system is functioning. There is no need to shut off or drain the system with the Macon UA. Just identify the existing thermostatic operator, select the Macon UA, add a Macon thermostat and your valve is upgraded to the Macon Controls standard of quality!

American Steam → UA-AMS

Ammark Series 6 → UA-AMK/6



Ammark Series 7 → UA-AMK/7

Armstrong LV-4 → UA-ARM

Bell & Gossett (ITT) (Thermomate) → UA-B&G

Braukmann V110, V105 → UA-BRK-V110, V105

Honeywell Braukmann V100 → UA-BRK-V100

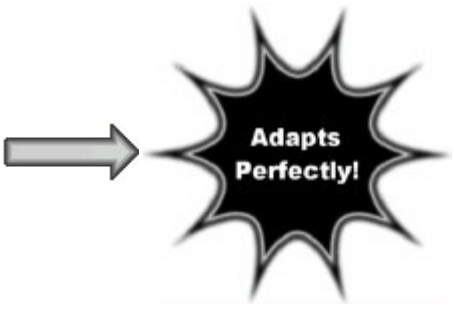
Danfoss/RAV → UA-DNF-RAV

Danfoss/RAVL → UA-DNF-RAVL

Danfoss/RA2000 → UA-DNF-RA2000

UMBRELLA ADAPTORS

MACON: NT NTB ENT MTW EVO



Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Bulletin-MC-UA-1705
Section: *Umbrella Adaptors*

Umbrella Adaptor™ for Conversion to Macon EVO Series Operators


Drayton TRV2


UA-DRY


ISTA

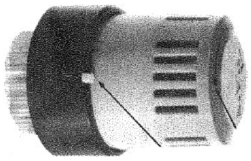

UA-ISTA


Erie/Techmate

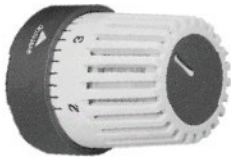

UA-ER


MNG/Regin


UA-MNG


Flair RP367, RP610


UA-FL-SP


Oventrop/Stadler/MEPCO


UA-OV


Flair RP257, RP266
RP258, RP518


UA-FL-SP2


Taco


UA-TACO


Flair RP510, RP511,
RP512, RP513


UA-FL-SP3


Tour & Anderson RVT


UA-TND-RVT


Heimeier


UA-HEIM


Tour & Anderson RVT


UA-TND-RVT


Honeywell Minor


UA-NM

Custom Engineering Available.

Consult Factory.

UMBRELLA ADAPTORS

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Bulletin-MC-UA-1705
Section: *Umbrella Adaptors*

12-Month Warranty

WARRANTY: All MACON products are under warranty for a period of 12 months from date of purchase against faulty workmanship or defective material under normal usage and service. Under the warranty we will replace any product or part F.O.B. our factory when goods have been returned prepaid to us, and which upon our examination shall disclose to have been defective. The company shall not be held liable for consequential damage of any kind and no other claims will be met. All goods repaired under warranty will be shipped back to customer transportation collect. Under no circumstances is the valve to be subjected to more than 15 psi steam.

RETURNED GOODS: Unauthorized return of materials is not accepted. Credit for authorized returns only will be issued at the invoice price or prevailing price, if lower, less a restocking charge of minimum 25%. Minimum charge $25.00.

Obsolete materials and articles made to order or specification cannot be returned.

If inspection shows goods returned are defective due to:

1. Manufacture - goods will be replaced or repaired at no charge under the guarantee and shipping costs will be reimbursed.
2. Usage - e.g., valves full of dirt, rust or any foreign material, incorrect usage, overtightening on threads, abuse or incorrect reassembly, etc. Goods will be replaced or repaired at cost and charged to the user, and cost of shipment will be charged to user.

Macon Controls obligation under this warranty is limited to the repair or replacement of defective parts and does not include reimbursement for expense of removing or installing the product.

NOTES:

- Prices subject to change without notice
- Design, specification and details subject to change without notice
- Full Terms and Conditions can be found at www.tunstall-inc.com

Straight valve with straight nipple.
NPT - female inlet, male union outlet.
1/2" - N10737
3/4" - N10757
1" - N10777
1-1/4" - N10797

Vertical angle valve with straight nipple.
NPT - female inlet, male union outlet.
1/2" - N10637
3/4" - N10657
1" - N10677
1-1/4" - N10697

Horizontal angle valve with straight nipple.
NPT - female inlet, male union outlet.
1/2" - N10837
3/4" - N10857
1" - N10877
1-1/4" - N10897

Sweat valve with female inlet and outlet.
1/2" - N10930
3/4" - N10950
1" - N10970

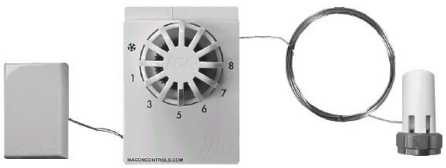
EDV - Designed for mixing or diverting flows in various water based heat or cooling transmission systems, such as radiator loops, floor heating, etc. Add appropriate operator.

OPSK - Consists of the reliable EVO direct mounting thermostat. It controls room temperature by regulating the amount of air and steam in the radiator.

EVO - Non-Electric direct mounting thermostat with a numerical window reading that corresponds to various temperatures. May be limited or locked if required. Features heat diffusing rings to dissipate heat away from sensor for added accuracy.

EVO-Z - Non-Electric, fully automatic thermostat with valve mounted temperature setting dial and remote sensor.

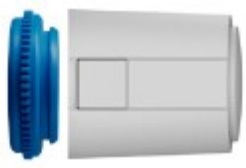
ENTL B46000 - Non-Electric, fully automatic remote thermostat with built-in remote sensor and temperature setting dial. (shown above with valve)



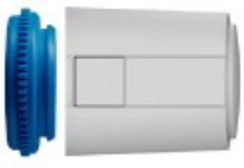
ENTLZ B56000 - Non-Electric, fully automatic thermostat with separate remote sensor and remote temperature setting dial.

VAC (normally closed) & VMO (normally open) - 24-Volt controller designed for use with the Macon NT series valves. Ideal for control of radiators, fin-tube, zones, fan coils, heat pumps, radiant floor, etc...

VM 2-10V is used to regulate valves in heating and cooling systems using a built-in processor.



ZMC ES (End Switch - normally closed) is controlled by a 24V room thermostat with two-point output or pulse-width modulation.



ZMC-DDC (Proportional - normally closed) is used to regulate valves via a central DDC system or by a room thermostat.

MVA 2-10V - Motorized Electric zone control actuator for controllers with continuous output in conjunction with single-room control systems.

Tunstall®

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Valves - Macon Straight, Vertical Angle, Horizontal Angle or Copper x Copper Sweat as Required:
Forged brass, nickel plated, female inlet, male union outlet or copper x copper brass body.
EPDM seat suitable for 15 psi steam, 250°F hot water, maximum static pressure 145psi.
Replaceable insert assembly with raised knurled serrations and stainless steel spindle and stainless steel spring.

Vertical Angle Valve with straight nipple. NPT - female inlet, male union outlet.
½" N10637
¾" N10657
1" N10677
1¼" N10697

Straight valve with straight nipple NPT - female inlet, male union outlet.
½" N10737
¾" N10757
1" N10777
1¼" N10797

Horizontal angle valve with straight nipple. NPT - female inlet, male union outlet.
½" N10837
¾" N10857
1" N10877
1¼" N10897

Sweat valve with female inlet and outlet.
½" N10930
¾" N10950
1" N10970

Direct Mount Operator - Macon Model EVO:
Direct acting, built in sensor, wax filled, hysteresis .9°F, max movement per 1°F = .007
Range 50°-82°F with limit and locking features
Must have positive shut off, maximum differential pressure 20psi H2O
Heat diffusing rings and knurled serration that lock the thermostatic dial to the valve body
Tamper proof, Non-Removable high impact plastic protection rings
12 month warranty, and must conform to ASHRAE Standard 102p-1983

EVO

Direct Mount Operator with Remote Sensor - Macon Model EVO-Z:
Valve mounted setting knob with remote temperature sensor
Capillary to be stainless steel, 78" long minimum
Provide high impact plastic sensor guard
Temperature range 50-82°F, with limit and locking features
Must have positive shut off, maximum differential pressure 20psi H2O
Heat diffusing rings and knurled serration that lock the thermostatic dial to the valve body
12 month warranty, and must conform to ASHRAE Standard 102p-1983

EVO-Z

Wall Mount Operator with Remote Dial - Model Macon EVOL:
Remote mounted dial with sensor behind dial, minimum 78" stainless steel capillary
High impact plastic dial operator, range 46°-80°F with limit and locking features
Must have positive shut off, maximum pressure differential 20psi H2O
12 month warranty, and must conform to ASHRAE Standard 102p-1983

EVOL
(Shown with NT Valve)

Wall Mount Operator w/ Remote Dial & Remote Sensor - Macon Model EVOLZ:
Combination remote setting dial/remote sensor, minimum 78" stainless steel capillary to
Setting dial and 78" stainless steel capillary to temperature sensor
Requires the capability to remove temperature sensor from dial with minimum 78" S.S. capillary
Provide high impact plastic sensor guard
Temperature range 46-80°F, with limit and locking features
Must have positive shut off, maximum differential pressure 20psi H2O
12 month warranty, and must conform to ASHRAE Standard 102p-1983

EVOLZ

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

HELPFUL HEATING HINTS

- 1 sq. ft. steam radiation in a room at 70° gives off 240 BTU/hr.
- 1 boiler horsepower is equivalent to 134 sq. ft. of steam radiation.
- 1 gal. of oil per hour heats 400 sq. ft. of steam radiation in 0°F weather.
- 1/3 gal. of oil per hour produces 1 boiler horsepower.
- 1 lb. of steam per hour is equivalent to 4 sq. ft. EDR.
- 1 lb. of steam per hour produces 1000BTU/hr.
- 1 boiler horsepower equals 33,500 BTU/hr.
- 1 kw equals 3412 BTU.
- 1 ton of refrigeration equals 12,000 BTU/hr.
- When multiple zoning and existing single zone system, be sure to install a condensate pump and vacuum breakers to avoid water hammer and related problems.
- On steam to water heat exchanges with steam in the shell, a vacuum breaker is required to break any induced vacuum.
- 1 GPM flowing through a heating system produces 10,000 BTU/hr. based on 20°F temperature drop.
- Based on a 20°F temperature drop:
  ¾” copper will handle up to 35,000 BTU
  1” copper will handle up to 75,000 BTU
  1-1/4” copper will handle up to 130,000 BTU
  1-1/2” copper will handle up to 200,000 BTU
- To estimate heat loss for a concrete block warehouse with average amount of glass, multiply length x width x height x 6 to arrive at BTU/hr.

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

MACON® CONTROLS

EQUIVALENTS & CONVERSION FACTORS

A MULTIPLY	B BY	C TO OBTAIN
Atmospheres	14.697	Pounds per sq. in.
Atmospheres	1.033	Kilograms per sq. in.
Atmospheres	29.92	Inches of mercury
Atmospheres	760	Millimeters of mercury
Atmospheres	407	Inches of water
Atmospheres	33.90	Feet of water
Barrels (petroleum)	42	Gallons
Barrels per day	0.0292	Gallons per minute
Bars-G.	14.5	Pounds per sq. in.
Centimeters	0.3937	Inches
Centimeters	0.03281	Feet
Centimeters	0.01	Meters
Centimeters	0.01094	Yards
Cubic Centimeters	0.06102	Cubic Inches
Cubic feet	7.48055	Gallons
Cubic feet	0.17812	Barrels
Cubic feet per second	448.833	Gallons per minute
Cubic inches	16.39	Cubic centimeters
Cubic inches	0.004329	Gallons
Cubic meters	264.17	Gallons
Cubic meters per hour	4.4	Gallons per minute
Feet	0.3048	Meters
Feet	0.3333	Yards
Feet	30.48	Centimeters
Feet of water	0.882	Inches of mercury
Feet of water	0.433	Pounds per sq. in.
Gallons (U.S.)	3785	Cubic centimeters
Gallons (U.S.)	0.13368	Cubic feet
Gallons (U.S.)	231	Cubic inches
Gallons (Imperial)	277.4	Cubic inches
Gallons (U.S.)	0.833	Gallons (Imperial)
Gallons (U.S.)	3.785	Liters
Gallons of water	8.328	Pounds (at 70ºF)
Gallons of liquid per minute	500 x Sp Gr	Pounds per hr. liquid (at 70ºF)
Gallons per minute	0.002228	Cubic feet per second
Horsepower (boiler)	34.5	Pounds water per hr. evaporation
Horsepower (boiler)	33479	Btu per hour
Inches	2.54	Centimeters
Inches	0.0833	Feet
Inches	0.0254	Meters
Inches	0.02778	Yards

A MULTIPLY	B BY	C TO OBTAIN
Inches of mercury	1.133	Feet of water
Inches of mercury	0.4912	Pounds per sq. in.
Inches of mercury	0.0345	Kilograms per sq. cm.
Inches of water	0.03613	Pounds per sq. in.
Inches of water	0.07355	Inches of mercury
Kilograms	2.205	Pounds
Kilograms	0.001102	Short tons (2000 lbs.)
Kilograms per minute	132.3	Pounds per hour
Kilograms per sq. cm	14.22	Pounds per sq. in.
Kilograms per sq. cm	0.9678	Atmospheres
Kilograms per sq. cm	28.96	Inches of mercury
Kilopascals	0.145	Pounds per sq. in.
Liters	1000	Cubic centimeters
Liters	0.2642	Gallons
Liters per hour	0.0044	Gallons per minute
Meters	3.281	Feet
Meters	1.0936	Yards
Meters	100	Centimeters
Meters	39.37	Inches
Megapascals	145.0	Pounds per sq. in.
Pounds	0.0005	Short tons (2000 lbs.)
Pounds	0.4536	Kilograms
Pounds	0.000454	Metric tons
Pounds	16	Ounces
Pounds per hour	6.32/M W	Cubic feet per minute
Pounds per hour liquid	0.002/Sp. Gr.	Gallons per minute Liquid (at 70ºF)
Pounds per sq. in.	27.684	Inches of water
Pounds per sq. in.	2.307	Feet of water
Pounds per sq. in.	2.036	Inches of mercury
Pounds per sq. in.	0.0703	Kilograms per sq. cm.
Pounds per sq. in.	51.71	Millimeters of mercury
Pounds per sq. in.	0.7037	Meters of water
Specific Gravity (of gas or vapors)	28.97	Molecular wt. (of gas or vapors)
Square centimeters	0.1550	Square inches
Square inches	6.452	Square centimeters
Tons (short ton 2000 lbs.)	907.2	Kilograms
Tons (short ton 2000 lbs.)	0.9072	Metric tons
Tons (metric) per day	91.8	Pounds per hour
Water (cubic feet)	62.3	Pounds (at 70ºF)
Yards	0.9144	Meters
Yards	91.44	Centimeters

This table may be used in 2 ways: (1) Multiply the unit under column A by the figure under column B. the result is the unit under column C.
(2) Multiply the unit under column C by the figure under column B. the result is the unit under column A.

Tunstall®

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

Bulletin-MC-ENG-DATA-0714
Warranty & Engineering Data

MACON® CONTROLS

EQUIVALENTS & CONVERSION FACTORS

Temperature Conversion - ºC / ºF

ºC	ºF	ºC	ºF	ºC	ºF
-17.8	0.0	21.7	71	57.2	135
-15.0	5	22.2	72	60.0	140
-12.2	10	22.8	73	62.8	145
-10.0	14	23.3	74	65.6	150
-9.4	15	23.9	75	68.3	155
-6.7	20	24.4	76	71.1	160
-5.0	23	25.0	77	73.9	165
-3.9	25	25.6	78	76.7	170
-1.1	30	26.1	79	79.4	175
0.0	32	26.7	80	82.2	180
1.7	35	27.2	81	85.0	185
4.4	40	27.8	82	87.8	190
5.0	41	28.3	83	90.6	195
7.2	45	28.9	84	93.3	200
10.0	50	29.4	85	96.1	205
12.8	55	30.0	86	98.9	210
15.0	59	30.6	87	100.0	212
15.6	60	31.1	88	101.7	215
16.1	61	31.7	89	104.4	220
16.7	62	32.2	90	110.0	230
17.2	63	35.0	95	115.6	240
17.8	64	37.8	100	121.1	250
18.3	65	40.6	105	126.7	260
18.9	66	43.3	110	132.2	270
19.4	67	46.1	115	137.8	280
20.0	68	48.9	120	143.3	290
20.6	69	51.7	125	148.9	300
21.1	70	54.4	130		

ENGLISH to ENGLISH

Atmospheres	x	14.7	= psi
Ft. of H_2O	x	0.4335	= psi
In. of H_2O	x	0.03613	= psi
In. of Hg	x	0.4912	= psi
Lb/hr (LIQ)	x	.002 / S.G.	= GPM
Lb/hr (GAS)	÷	Density*	= SCFH
ºR - 460			= ºF

ENGLISH to METRIC

psi	x	6.895	= Kpa
Lb/hr	x	0.4536	= Kg/hr
USGPM	x	0.2271	= M^3/hr
Ft/sec	x	0.3048	= M/sec
Ft^3/hr	x	0.02832	= M^3/hr
In.	x	25.4	= mm
[ºF - 32]	x	5/9	= ºC

Other Conversions:

C_v	= Kv x 1.16
GPM	= M3/HR x 4.13
GPM	= Liters/second x 15.85
Inches	= Meters (M) x 39.37
Inches	= Millimeters (mm) x 0.03937
Pounds	= Gallons on water (@65ºF) x 8.34
Pounds	= Gallons on water (@212ºF) x 7.99
PSI	= KPa x 0.145
PSI	= Feet of water (@62ºF) x 0.434

C_v Formulas:

The valve capacity is generally expressed by a C_v factor.

The equations used for the C_v factor calculations are:

$$C_v = \frac{GPM}{\sqrt{\Delta p}}$$

$$GPM = C_v \sqrt{\Delta\ p}$$

$$P = \left(\frac{GPM}{C_v}\right)^2$$

Where:
GPM = The water volume in gpm
P = The pressure drop in PSI across the valve

METRIC to METRIC

BARS	x	100	= KPa
Kg/Cm^2	x	98.07	= KPa
PASCALS	x	1000	= KPa
mm of Hg	x	0.1333	= KPA
ºK - 273			= ºC

METRIC to ENGLISH

KPa	x	0.145	= psi
BARS	x	14.5	= psi
Kg/hr	x	2.2	= Lb/hr
M^3/hr	x	4.4	= USGPM
M/sec	x	3.28	= Ft/sec
M^3/hr	x	35.31	= Ft^3/hr
Mm	x	0.03937	= In.
ºC (1.8) + 32			= ºF

*Density at Standard Atmospheric Conditions

Tunstall Corporation
118 Exchange Street • Chicopee, MA 01013
Phone (413) 594-8695 · Fax (413) 598-8109
www.tunstall-inc.com • www.maconcontrols.com

MACON CONTROLS NON-ELECTRIC THERMOSTATICALLY CONTROLLED RADIATOR VALVES

APPLICATION

The Valve Body is used with the Thermostatic Head to provide automatic control of baseboard units, convectors, or standing radiators in hot water systems and in 2-pipe steam heat systems. For 1-pipe steam systems, a 1-pipe steam radiator adapter assembly is available. A temperature sensitive element in the head modulates the valve in response to room temperature. Neither the valve nor the thermostatic head requires the use of electric power.

INSTALLATION

CAUTION

1. Installer must be a trained, experienced serviceperson.
2. When installing the valve body, the arrow must be in the direction of flow.
3. Always conduct a thorough checkout when installation is complete.

IMPORTANT

1. On Straight-through body models, do not install with thermostatic head directly above valve body. On angle body models, assemble with thermostatic head on the far side of the valve from the heating surfaces to minimize the effects of radiant heat.
2. If boiler for 1-pipe steam system is cycled by a space thermostat in one zone, do not apply a radiator valve to the radiator in that zone.
3. Do not apply a radiator valve in 1-pipe steam systems that do not use steam air vent valves venting to atmosphere on each radiation unit.

LOCATION

The valve may be used to control radiators, baseboard units or convectors in single or multi-zone hot water systems. The valve is used in 1-pipe (monoflo) or 2-pipe heating systems. When the valve is used to control a single radiator, baseboard unit or convector, the valve is installed on the inlet side (Fig. 1A). When a valve is used to control a series of radiators or baseboards, the valve should be installed on the return side of the series run (Fig. 1B). In a multi-zone heating system with a single radiator, baseboard unit, or convector in each zone, a valve is installed on the inlet side of each radiator in each zone (Fig. 1C and 1D). In a multi-zone heating system with a series of radiators or baseboards in a single zone, install the valve on the return side of the series run (Fig. 1D). In a 1-pipe steam system, a vacuum breaker must be installed between the steam vent and the radiator (Fig. 9).

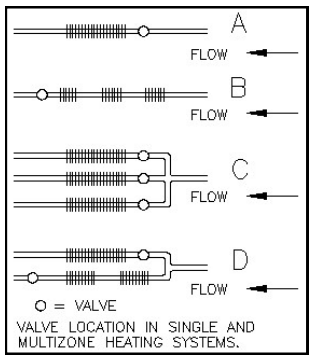


Fig. 1 Valve Location in Single and Multi-zone Hot Water Heating.

IMPORTANT (Fig. 2)

The location of the valve depends on the location of the thermostatic head. Be sure the thermostatic head is NOT located where it is subject to drafts, exposed to direct sunlight, or covered by draperies or curtains. Note: When installing the Thermostatic Head for remote mounting, the hole in the mounting surface must be plugged with suitable insulation to insure that it receives minimal radiated heat and properly senses room temperature.

VALVE BODY INSTALLATION

The valve body must be installed within the following specified limits:
Max. Static Pressure: 145 psig
Max. Differential Pressure: 20 psig
Sug. Differential Pressure: .5 to 2.9 psi
Max. Steam Pressure: 15 psig
Max. Water Temperature: 250°F
When installing the valve body in water and 2-pipe steam systems, the arrow must point in the direction of flow. For valve bodies with NPT threads, use new, properly reamed pipe, free of chips. Valve distortion or malfunction may result from excess pipe within the valve body.

For valves with sweat fittings:

IMPORTANT

Insert assembly MUST be removed from valve bodies with sweat fittings before installation to avoid heat damage to rubber components (Fig. 2).

1. Use steel wool to thoroughly clean areas inside of valve into which copper tubing fits and approximately ¾ inch(19mm) at ends of tubing.
2. Apply small amount of solder flux around outside ends of tubing.
3. Insert both pieces of tubing completely into valve body.
4. Use a propane torch to heat valve body at the general area in which tubing is fitted.
   Note: The hole in cover must be at least as large as the knurled setting knob on the thermostatic head to allow for baseboard cover removal.
5. When valve body and tubing reach melting temperature of solder, apply solder to joint. Solder should draw evenly around fitting.
6. Do not disturb until solder sets up.
7. After cooling reinstall insert and visibly inspect for leaks with water supply turned on.
8. If leak is found, drain water and repeat soldering procedure. Remember, only a clean, fluxed joint which is free from water will accept solder.

Note: Protective cap on body may be used to manually operate valve before head is installed.

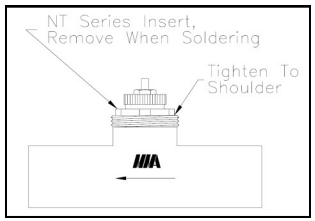


Fig. 2 NT Series Insert

THERMOSTATIC HEAD INSTALLATION

Models EVO / MTW (Fig. 3)

Direct Mounting on Radiator
Use the following procedure (Fig. 3):

1. Install the valve body on the radiator.
2. Remove the protective dust cover from the valve body. Do not discard it.
3. Open thermostat to highest number.
4. Install the thermostatic head to the valve body, **do not over tighten thermostat nut, finger tighten, snug 1/4 turn with wrench.**

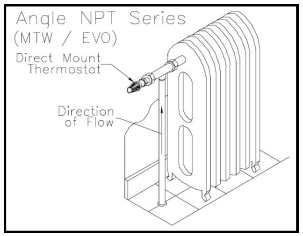


Fig. 3 Typical Installation of Valve (Angle Body) on Radiator

Direct Mounting on Radiator (Fig. 4)

Use the following procedure (Fig. 4):

1. Install the valve body on the baseboard unit.
2. Cut a hole in the baseboard unit directly in front of the valve connection.
   Note: The hole must be at least as large as the knurled setting knob on the thermostatic head to allow for base board cover removal.
3. Remove the protective dust cover from the valve body.
4. Open thermostat to highest number.
5. Install the thermostatic head to the valve body, **do not over tighten thermostat nut, finger tighten, snug 1/4 turn with wrench.**
6. Replace the baseboard cover.
7. Install pipe collar (collar not supplied) around the insulating sleeve.

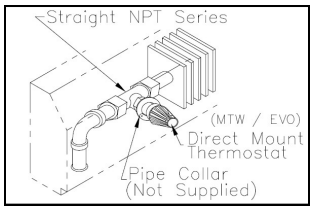


Fig. 4 Typical Installation of Direct Mount Thermostatic Head in Baseboard

Models ENTL-B46000 (Fig. 5)

Remote Wall Mounting.
The Thermostatic Sensor is remote mounted from the valve on a plasterboard wall.

IMPORTANT

When selecting a location to mount the thermostatic head, remember it must not be subject to drafts, exposed to direct sunlight, or covered by draperies or curtains. To mount the thermostat on a wall, use the following procedure (Figs. 5 & 8):

1. Select a location to mount the thermostatic head. In making the selection, locate the wall studs. Unnecessary and troublesome work can be avoided by mounting the thermostatic head and running the capillary between 2 wall studs.
2. After selecting a location, prepare two openings 1½ inches in diameter. Prepare one opening near the actuator behind the baseboard unit or convector and one at the thermostatic head location.
   Note: Capillary is 6'6" long.
3. Open thermostat to highest number.
4. Install the thermostatic head to the valve body, **do not over tighten thermostat nut, finger tighten, snug 1/4 turn with wrench.**
5. Replace the baseboard unit or convector cover.

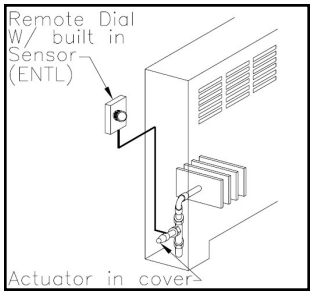


Fig. 5 Typical Wall Mounting of ENTL Installation for Convectors. *

Models EVO-Z / MTWZ (Fig. 6 & 7)
Remote Sensor Mounting

Use the following procedure (Fig. 6 & 7):

1. Install the valve body on the radiator.
2. Remove the protective dust cover from the valve body.
3. Open thermostat to highest number.
4. Install the thermostatic head to the valve body, **do not over tighten thermostat nut, finger tighten, snug 1/4 turn with wrench**.
5. Select a sensor location.
   Note: When selecting a location, remember that the sensor must not be exposed to drafts or direct sunlight, or covered by curtains or draperies.
7. Mount the sensor guard to the wall with 2 screws (not supplied).
8. Snap the sensor bulb into place on the sensor guard base.
9. Snap the sensor guard cover into place on the sensor guard base.

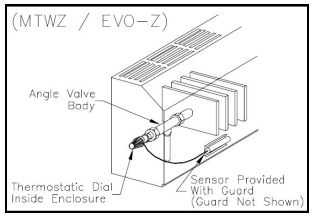


Fig. 6 Typical Wall Mounting of EVO-Z / MTWZ Installation for Baseboard. *

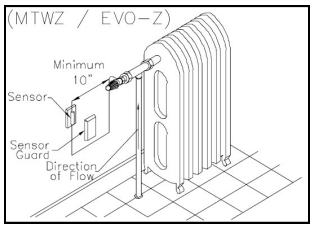


Fig. 7 Typical Free Standing Radiator Installation. *

Remote Mounting on Unit Cover

Use the following procedure (Fig. 8):

1. Install the valve body.
2. Select a location for the dial and drill a 1½ inch diameter hole at the location.
3. Feed the actuator through the hole to the valve body.
4. Remove the protective cover from the valve body.
5. Install the actuator on the valve body.

CHECKOUT

When the installation is complete, rotate the dial until steam or water flow is detected. After the room temperature has stabilized (4 or 5 hours), reset the dial to the desired setting between 1 and 7 for EVO/MTW Series. (See chart on back page for temperature settings.) The set point will vary with the location of the sensor. A floor level sensor on a baseboard radiator will control at a different set point than a wall level sensor.

Note: Repositioning of the actuator head may be necessary for convenient visibility of the index mark. Loosen the union between the actuator head and the valve body. Turn the actuator head to the desired position and retighten the actuator nut.

Models ENTLZ -B56000 (Fig. 8)

Remote Wall Mounting
Use the following procedure (Fig. 8):

1. Select a location on the wall to mount the dial. In making the selection, locate the wall studs and mount the dial so the capillary can be flush mounted.
2. After selecting a location, drill 2 holes 1½ inches in diameter, one at the dial location, the other behind the baseboard or convector unit. **Note:** Each capillary is 6'6" long.
3. Feed the actuator through the hole at the dial location behind the wall and out through the second hole.
4. Install the valve body.
5. Remove the protective cover from the valve body.
6. Open thermostat to highest number.
7. Install the thermostatic head to the valve body, **do not over tighten thermostat nut, finger tighten, snug 1/4 turn with wrench**.
8. Secure the dial to the unit cover with 4 screws (not supplied). Snap cover into place.

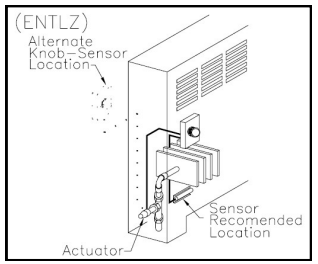


Fig. 8 Typical Wall Mounting of ENTLZ Installation for Convectors.

9. Mount the sensor below the radiation in the return air. **Note:** Secure the sensor guard base to the wall with 2 screws (not supplied). Snap the sensor bulb into place. The sensor guard cover may be used if desired.

***IMPORTANT**
(All Remote Sensing Models)

- Do not mount thermostat directly over cover.
- Do not mount sensor directly over baseboard unit.
- Do not locate sensor behind curtains, drapes or in direct sunlight.

ONE-PIPE STEAM SYSTEMS (Fig. 9)

Be sure boiler is cycled.
Keep pressure as low as possible (1-1/2 psi recommended).

1. Use direct or remote Thermostat with one-pipe steam valve.
2. Install as shown in Fig. 9. **Note:** Steam air vent must be mounted in upright position. Vacuum breaker required.
3. If the boiler is being cycled by a space thermostat, do not install a valve in this space (improper boiler control may result).

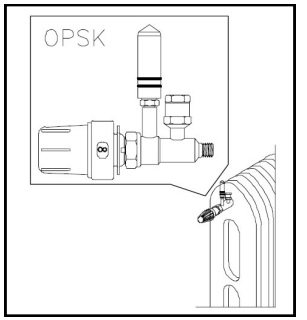


Fig. 9 One-Pipe Steam Valve Model OPSK.

SERVICE (All Models)

Recalibration
The thermostatic head is factory calibrated and should not need calibration. If, however, you feel that recalibration is required please contact factory.

CAUTION

Be careful not to damage "O" rings.

Insert Replacement

1. Relieve system pressure and drain below level of valve.
2. Remove thermostatic head.
3. Unscrew insert.
4. Screw new insert into body.
5. Replace thermostatic head and refill system.

Contact your local distributor for parts

MACON CONTROLS
Tunstall Corporation
118 Exchange St
Chicopee, MA 01013
Ph. 413-594-8695 • Fax 413-598-8109
www.maconcontrols.com

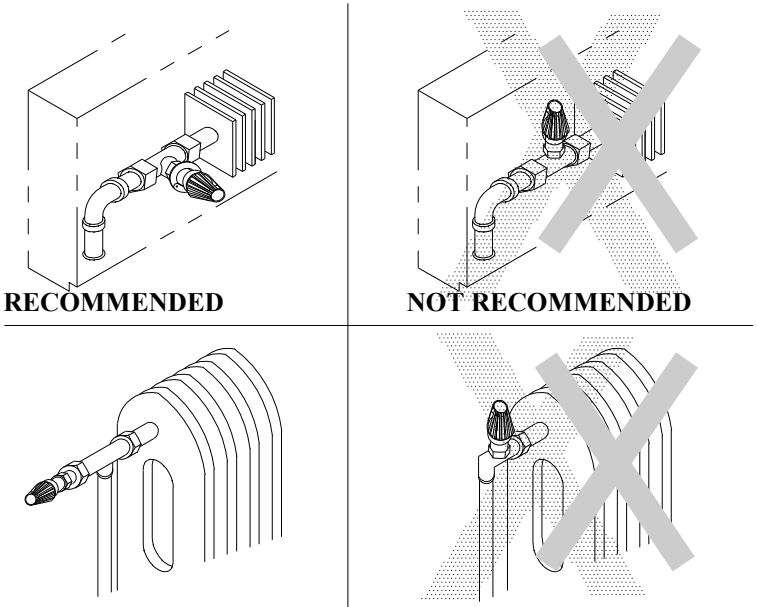
ADJUSTING ROOM TEMPERATURE

Set the dial on the thermostat to achieve the desired temperature as indicated by the charts below.

EVO Series Thermostats

Dial Setting	0	*	1	3	5	6	7	8	9
Room Temperature (ºF)	Off	50	54	61	68	72	75	79	82

INSTALLATION EXAMPLES (Direct Mount)



RECOMMENDED **NOT RECOMMENDED**

RECOMMENDED **NOT RECOMMENDED**

NT SERIES VALVES

Valve bodies for EVO, MTW & NT series thermostats are non-electric temperature control valves for radiators, convectors, fan coil units and hydronic central heating systems. The valve can be actuated by a handknob or thermostats with remote or direct sensors or VM electric actuators.

Vertical angle valve with straight nipple. NPT - female inlet, male union outlet.

1/2”	N10637
3/4”	N10657
1”	N10677
1-1/4”	N10697

Horizontal angle valve with straight nipple. NPT - female inlet, male union outlet.

1/2”	N10837
3/4”	N10857
1”	N10877
1-1/4”	N10897

Straight valve with straight nipple. NPT - female inlet, male union outlet.

1/2”	N10737
3/4”	N10757
1”	N10777
1-1/4”	N10797

Sweat valve with female inlet and outlet.

1/2”	N10930
3/4”	N10950
1”	N10970

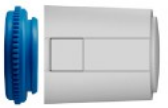
TROUBLE SHOOTING GUIDE		
SYMPTON	**POSSIBLE REASON**	**SOLUTION**
Not all sections of radiator heating up	1. Many radiators are over-sized and all sections are not required to heat up to maintain the set room temperature.	1. System is "A" OK.
Underheating	1. Sensor in the wrong location. 2. Thermostatic control mounted in vertical position. 3. Remote sensor located in convector or near heat source. 4. Flow through valve is in the wrong direction. 5. Inadequate system temperature or pressure. 6. Steam traps defective. 7. Air lock in hot water system. 8. Scale or debris blocking flow. 9. Heating cabinet dampers are closed.	1. Change the sensor location, or control type. See installation instructions. 2. These control types must be mounted horizontally. 3. Remove sensor away from direct heat source. 4. Check arrow on valve body. It should be in the direction of flow. Change valve direction, or flow direction. 5. Check operating and limiting controls on boiler. Check circulating pump and isolating valves. 6. Repair or replace traps with Tunstall traps. 7. Open valve fully to allow air to pass. Install vents. 8. Flush System. Do not use oil base additives. 9. Open or remove dampers.
Overheating	1. Sensor in the wrong location. 2. Control not properly installed. 3. Capillary tube broken, kinked, or bent sharply. 4. Dirt or scale under seat, preventing tight shutoff. 5. Flow through valve is in the wrong direction, damaging the valve seat. 6. Steam traps defective. 7. Excessive differential pressure is forcing valve open. (Hot water systems)	1. Change sensor location, or change control type. 2. Set bosses in grooves and tighten knurled ring to valve body. Do not over tighten. 3. Replace control. 4. Remove control from valve body, allowing valve to open fully and flush away scale and debris. Reinstall control and turn fully clockwise. If valve does not fully close, remove control and inspect valve seat area using cartridge changer tool or service socket tool. Change insert assembly. 5. Check arrow on valve body. It should be in the direction of flow. Change valve direction, or flow direction. Remove valve cartridge and inspect for damage to seat disc. 6. Repair or replace traps with Tunstall traps. 7. Install differential pressure regulator to maintain less than 2.9 psi differential between supply and return pipes.
Chattering or knocking	1. Flow through valve is in wrong direction. 2. Vacuum in system. 3. Excessive differential pressure. (Refer to Valve/T'Stat Specifications) 4. Binding of piping.	1. Check arrow on valve body. It should be in the direction of flow. 2. Steam - Check traps and vents. Hot water - check expansion tank operation and location. 3. Install differential pressure regulator to maintain less than 2.9 psi differential between supply and return pipes. 4. Ensure adequate space for piping.

THERMOSTATS:

EVO, MTW & ENT Series Thermostats are installed on NT series valves to automatically control the actions of the valve, thus monitoring room temperature and conserving fuel.

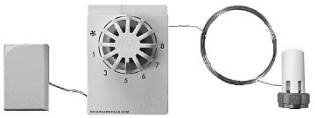
EVO-Z
Nonelectric, fully automatic thermostat with valve mounted temperature setting dial and remote sensor.

ENTL-B46000 (shown w/valve)
Nonelectric, fully automatic remote thermostat with remote sensor and temperature setting dial.



Zone Control ZMC-ES & ZMC-DDC
Electric zone actuator with end switch (ES) or proportional (DDC).

EVO
A non-electric positive mechanical shut-off direct mounting thermostat. Anti-freeze position and adjustable maximum / minimum temperature. Highly sensitive with very accurate temperature settings and reactions.



ENTLZ-B56000
Non-electric, fully automatic thermostat with separate remote sensor and remote temperature setting dial.

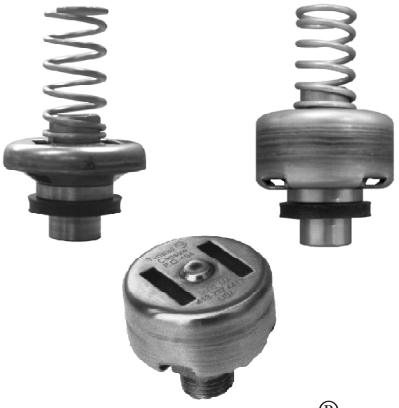
Zone Control VMC-24 & VMO-24
24-volt electric zone control for controlling individual room temperatures or zones (VMC-24 Normally Closed & VMO-24 Normally Open).

www.tunstall-inc.com

Tunstall®

Est. 1958

Steam Products



Tunstall Capsule®

Thermostatic Radiator Steam Traps

Thermal-Disc Steam Traps

Float & Thermostatic Steam Traps

Inverted Bucket Steam Traps

Pressure Action Pumps

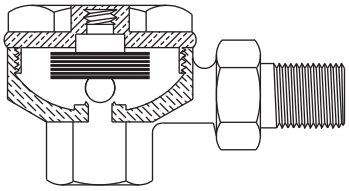
Distributed By:

Tunstall Associates, Inc. • 118 Exchange Street • Chicopee, MA 01013 • Phone: (413)594-8695 • Fax: (413)598-8109

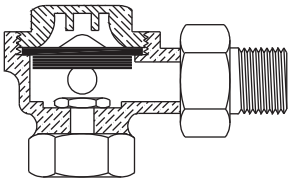
Tunstall Steam Trap Capsules®

100% Stainless Steel

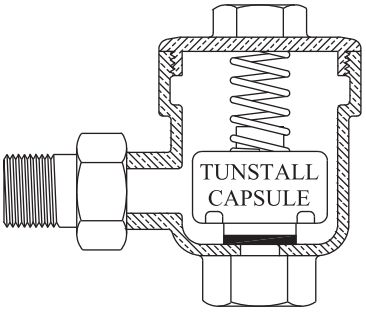
"Made in America"



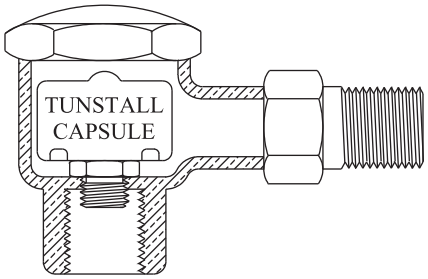
Dunham-Bush #1E
TCDB-1301



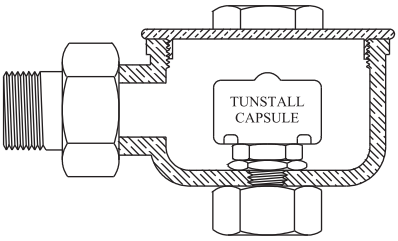
Sarco TB25
TCSA-2231



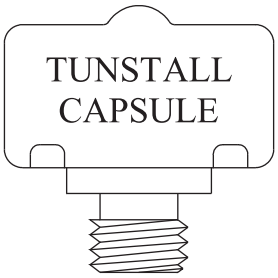
Trane B1
TCTR-2402



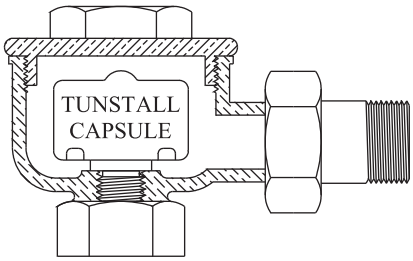
Sarco H
TCSA-2203



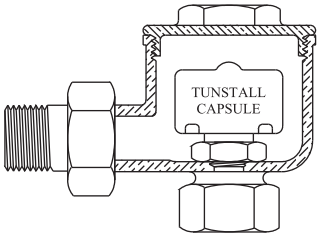
Warren Webster 512
TCWW-2507



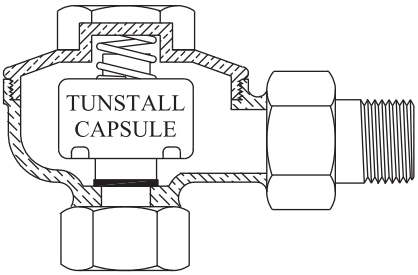
Sarco FT-15
Air Vent
TCSA-2230



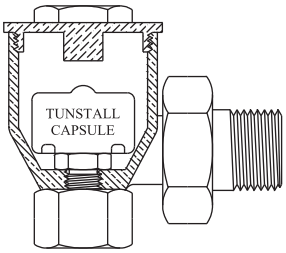
Illinois 1G
TCIL-1501



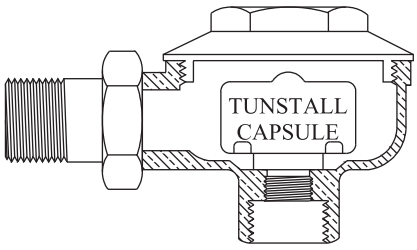
Warren Webster 02H
TCWW-2501



Barnes & Jones 122A
TCBJ-1001



Hoffman 17C
TCHF-1409



Tunstall TA-1/2-A
TCTA-2901

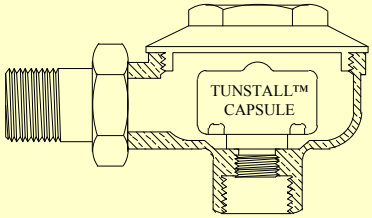
118 Exchange Street • Chicopee, MA 01013 • Phone: (413)594-8695 • Fax: (413)598-8109

Toll Free: 1-800-423-5578

At **TUNSTALL** we specialize in the manufacturing of interior thermostatic elements for steam traps using state-of-the-art technology. For maximum reliability and long term performance our **Tunstall Steam Trap Capsules®** are made of a 10 plate TIG welded stainless steel bellows and feature **orifice diameters up to 5/16", custom tooling, a one-year warranty, and pressure ratings from vacuum to 125 psig.** Each capsule is individually tested and calibrated before shipment. Now you can economically increase the performance of your old steam traps by replacing the interiors with new **Tunstall** technology. Made to retrofit almost all thermostatic steam traps, **Tunstall** Steam Trap Capsules® are by far the best choice for repairing or upgrading existing traps.

TUNSTALL CORPORATION

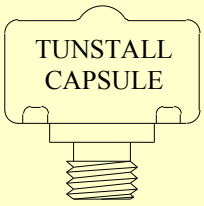
STAINLESS STEEL STEAM TRAP CAPSULES



Having been in service since 1985, with virtually failure-free performance, Tunstall Capsules® can offer your system years of trouble-free service.

For a FREE sample and complete catalog, call toll-free 1-800-423-5578. Please have the make, model and size of your steam trap. Your Free sample will be shipped the very same day.

TUNSTALL CORPORATION
118 Exchange Street
Chicopee, MA 01013
413-594-8695
Toll Free: 1-800-423-5578
Fax: 413-598-8109
Visit our web site at:
www.tunstall-inc.com

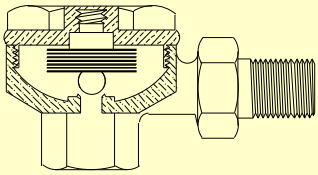


AIR VENTS
FOR ALL F&T TRAPS

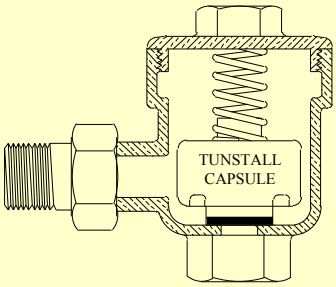
TUNSTALL CORPORATION

STAINLESS STEEL STEAM TRAP CAPSULES

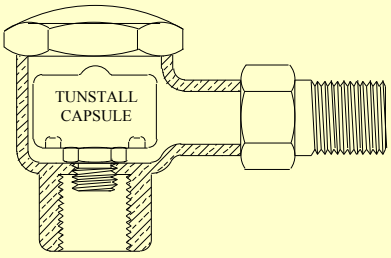
"Leading the Industry in Quality Steam Trap Repair"



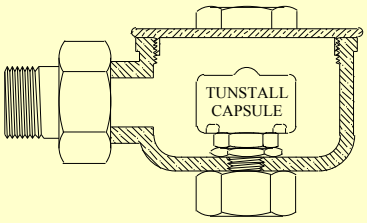
DUNHAM-BUSH # 1E
TCDB-1301



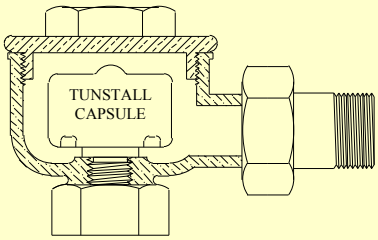
TRANE B1
TCTR-2402



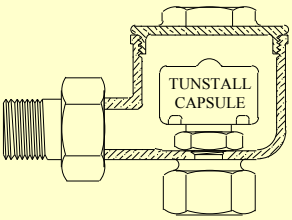
SARCO H
TCSA-2203



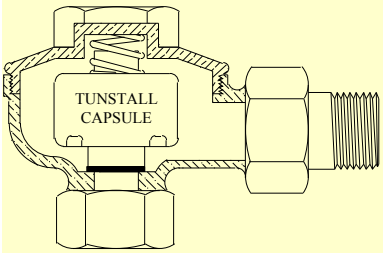
WARREN WEBSTER 512
TCWW-2507



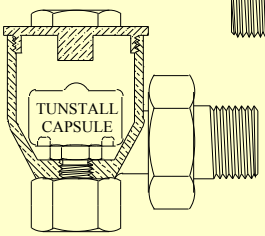
ILLINOIS 1G
TCIL-1501



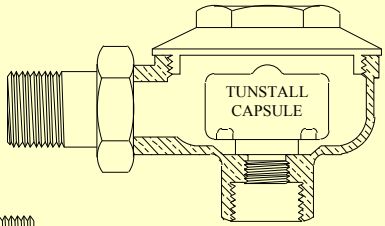
WARREN WEBSTER 02H
TCWW-2501



BARNES & JONES 122A
TCBJ-1001



HOFFMAN 17C
TCHF-1409



TUNSTALL TA-1/2-A
TCTA-2901

ORIGINAL MANUFACTURER**

ARMSTRONG
BARNES & JONES
BISHOP, BABCOCK & BECKER
BRAUKMANN
CASHIN/THERMOFLEX
DUNHAM-BUSH
ERWEL
HOFFMAN
ILLINOIS
MARSH
McALEAR
MILWAUKEE (MILVACO)
MONASH-YOUNKER
NAFCO
NATIONAL PUMP-AMERICAN STEAM
NICHOLSON
SARCO
STERLING
TRANE
TUNSTALL
WARREN WEBSTER

*** Consult factory or local representative for any and all applications.*

Installs as easy as 1 - 2 - 3

TUNSTALL CORPORATION
118 Exchange Street
Chicopee, MA 01013
413-594-8695
Toll Free: 1-800-423-5578
Fax: 413-598-8109
Visit our web site at:
www.tunstall-inc.com