

FIRST®



IDCS3-1210-Product_range_2010

PRODUCT RANGE 2010/1

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TABLE OF CONTENTS

ELECTRIC MOTOR ACTUATED BALL VALVE

Two way electro-motor ball valve.....	5
EMV 110..series 700, 800,801	6
EMV 110..series 820.....	8
EMV 110..series 602, 603 Compact	10
EMV 110..series 502, 503	14
Three way electro-motor ball valve.....	19
EMV 110..series 710.....	20
EMV 110..series 830.....	22
EMV 110..series 930.....	24
EMV 110..ROTODIVERT.....	26
MOTORIZED BALL VALVES FOR COOLING SYSTEMS.....	30
MOTORIZED BALL VALVE WITH BATTERY SUPPORT	36

MIXING VALVES

EUROMIX MV 120/.....	38
MV 120/..	42
MV 120/09E	44
MV 120/210.....	46
MV 120/360.....	48
ROTOMIX.....	50

UNI ACTUATORS

UNI 2P.....	52
UNI 3P	56
UNI D2P.....	60
UNI MOD 690	65

DIFERENTIAL THERMOSTATS

DTC 100/2.....	72
DTC 100/3.....	84
DTC 100/2TDG	100
DTC 100/4TD	114
DTC 200/2G.....	132
DTC 200/4.....	146

HEATING CONTROLLERS

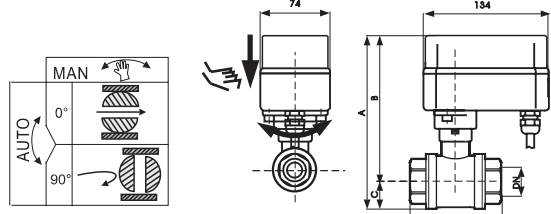
ROTOTERM MR-TR “plus”.....	159
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Two way electro-motor actuated ball valve series **EMV110...**

Series 800



- Ball valve :
 - flow type - 2 way
 - full section
 - ends: female/female
- Rotation time: 30s/90°
- Output torque: max 8Nm
- Actuator protection class: IP55
- Power consumption: max 3,5W
- Power supply: 230V, 50Hz
- With or without relay module

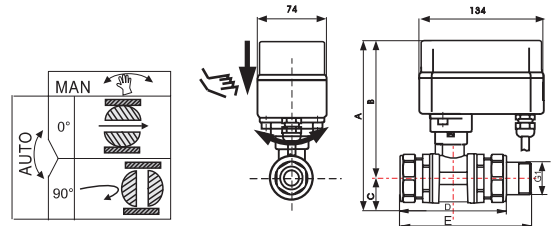


G	DN	A	B	C	D	H	PN	KV	USA C.V	IP	CODE
½"	15	139	121.5	17.5	63	79	10	17	22	0.90	10212
¾"	20	144	124.5	19.5	57	85	10	41	50	0.83	10213
1"	25	153	129.5	23.5	68	93	10	68	84	1.04	10214

Series 801



- Ball valve :
 - flow type - 2 way
 - full section
 - ends: female/union
- Rotation time: 30s/90°
- Output torque: max 8Nm
- Actuator protection class: IP55
- Power consumption: max 3,5W
- Power supply: 230V, 50Hz

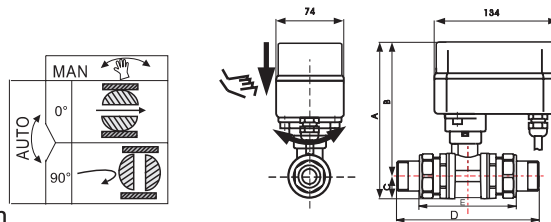


G	DN	A	B	C	D	E	H	G1	KV	IP	CODE
½"	15	137	119.5	17.5	63	99	79	½"	17	1.1	10232
¾"	20	146	124	22	74	110	84	¾"	41	1.3	10233
1"	25	153	127	25.5	88	120	93	1"	68	1.5	10234

Series 700



- Ball valve :
 - flow type - 2 way
 - full section
 - ends: union/union
- Rotation time: 30s/90°
- Output torque: max 8Nm
- Actuator protection class: IP55
- Power consumption: max 3,5W
- Power supply: 230V, 50Hz

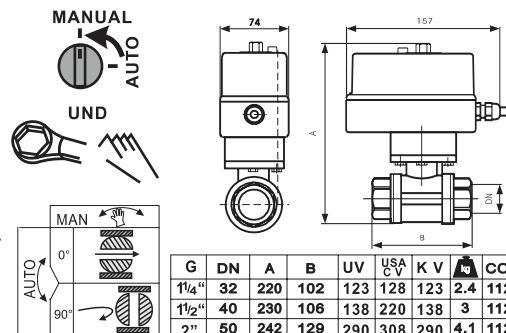


G	DN	A	B	C	E	D	H	PN	KV	USA C.V	IP	CODE
¾"	20	158	135.5	22.5	85	145	88	16	41	50	1.66	10253
1"	25	164	139	25	95	165	95	16	68	84	2.0	10254

Series 820



- Ball valve :
 - flow type - 2 way
 - full section
 - ends: female/female threads
- Rotation time: 105s/90°
- Output torque: max 25Nm
- Actuator protection class: IP54
- Power consumption: max 5W
- Power supply: 230V, 50Hz



G	DN	A	B	UV	USA C.V	K V	IP	CODE
1¼"	32	220	102	123	128	123	2.4	11225
1½"	40	230	106	138	220	138	3	11226
2"	50	242	129	290	308	290	4.1	11227

FIRST®

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We reserve rights to modify the instructions and the technical data of the product without prior notice.

C8-0013-EMV-ang-2/wege

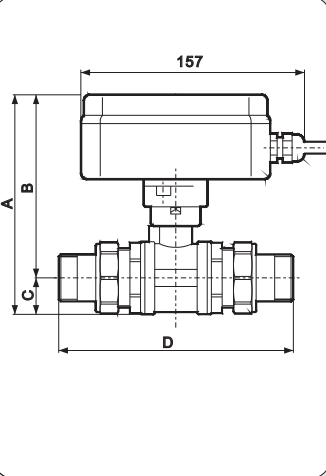
GB ELECTRIC MOTOR ACTUATED BALL VALVE
D KUGELHAHN MIT ELEKTROMOTORISCHEM ANTRIEB
 EMV 110..
 SERIES 700, 800, 801



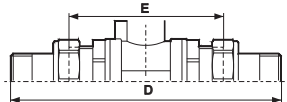
INSTALLATION INSTRUCTION AND USER'S MANUAL
MONTAGEANWEISUNG UND BEDIENUNGSANLEITUNG

Installation should be carried out only by a qualified person!
 Die Montage darf nur Fachmann ausführen!

DIMENSIONS AND ELECTRICAL CONNECTION
ABMESSUNGEN UND ELEKTRISCHER ANSCHLUSS

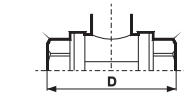


Series 700..



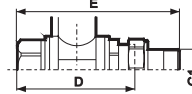
G	DN	A	B	C	D	E	$\frac{m}{kg}$
3/4"	20	157	135	22.0	145	85	1.66
1"	25	164	138	25.5	165	95	2.0

Series 800..

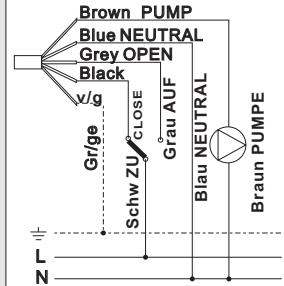


G	DN	A	B	C	D	$\frac{m}{kg}$
1/2"	15	148	130	17.5	63	1.0
3/4"	20	157	135	22.0	74	1.15
1"	25	164	138	25.5	88	1.4

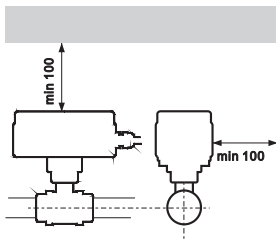
Series 801..



G	DN	A	B	C	D	E	$\frac{m}{kg}$
1/2"	15	148	130	17.5	63	99	1.1
3/4"	20	157	135	22.0	74	110	1.3
1"	25	164	138	25.5	88	127	1.5



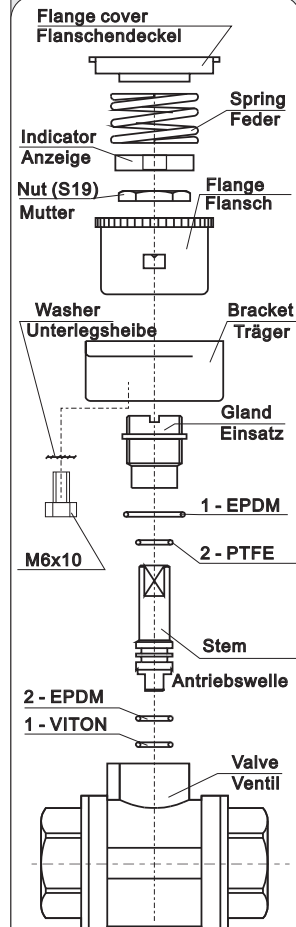
BUILD-IN ROOM
EINBAURAUM



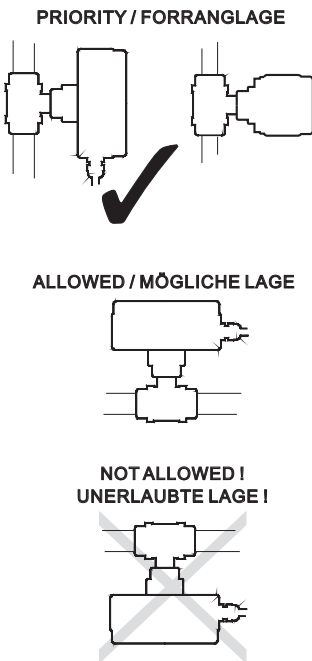
TECHNICAL DATA
TECHNISCHE DATEN

Main connectionNennspannung230VAC, 50Hz (EMV110..530)
 *24VAC, 50Hz (EMV110..533)
 Power consumptionNennleistung3,5 W max
 Rotation time.....Rotationszeit30s /90°
 Microswitch ratingBelastung der Mikroswitcher5(1)A, 250 VAC
 Insulation classElektromotor isolationsklasseF140°C
 Actuator protection classAntriebsschutzartIP 55
 Terminals.....Anschlussklemmen0,5 ... 1 mm²
 Cable length.....Kabellänge1500 mm
 Ambient temperature.....Umgebungstemperatur0...50 °C
 Humidity.....FeuchtRH0% - 80% NON CONDESED
 Fluid temperature.....Temperatur des Fluids.....0...110°C max

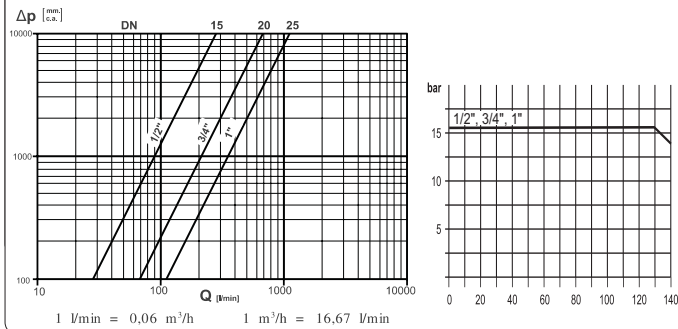
INDEXING BRACKET
EINSTELLBARER TRÄGER



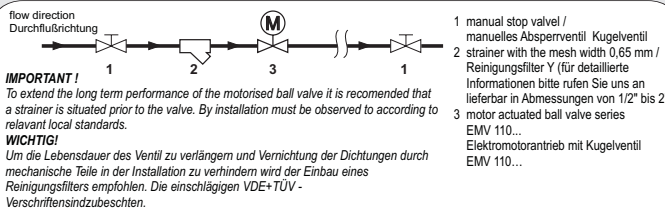
BUILD-IN POSITION
EINBAULAGE



Flow/pressure drop characteristic
Volumen Durchfluss und Druckabfall



HYDRAULIC INSTALLATION: recommended instalation of the electric actuated ball valve
SCHEMA DER MASCHINENINSTALLATION: Empfohlener einbau des kugelventils mit elektromotorantrieb



CONDITIONS FOR USE
BETRIEBSBEDINGUNGEN

Fluids and gasses (water, nonaggressive media) up to 16 bar.
 Flüssige und gasförmige Fluide (Wasser, nicht aggressive Fluide) bis zu 16 bar.

O-rings / O-Dichtungen

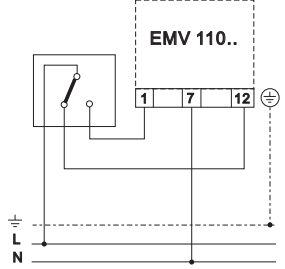
	1/2"	3/4" & 1"
1	14x1.78	15.6x1.78
2	8.73x1.78	9.25x1.78

Cx4-4008-EMV78NA-170236

THERMOSTAT CONNECTION ANSCHLUSS AUF DEM THERMOSTAT

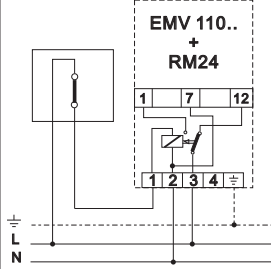
3-wire connection/3-Aderverbindung

switch over contact
anschlaltung kontakt



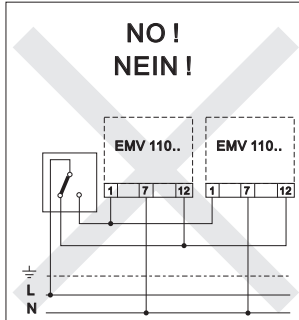
2-wire connection/2-Aderverbindung

normal open (close) contact
Arbeits (Ruhig) kontakt

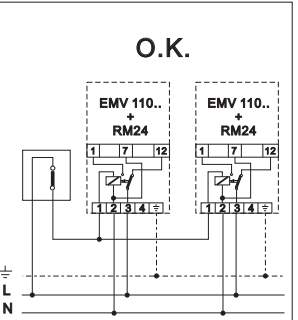


PARRALLEL CONECTION PARALLEL VERBINDUNG

without relay / ohne Relais



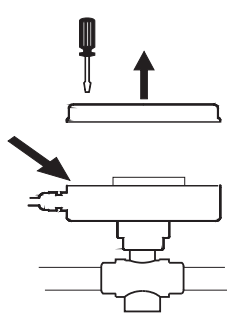
with a relay / mit Relais



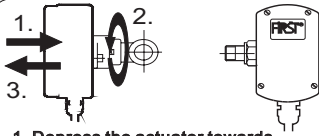
RELAY MODULE BUILD-IN INSTRUCTION RELAIS - EINBAUEN

RELAY MODULE RM 24
RELAIS MODUL RM 24

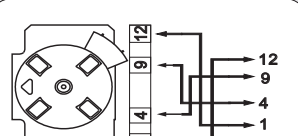
1. Unscrew cover screws
Die Schrauben des Antriebsdeckel herausdrehen
2. Disconnect connection cord
Anschlusskabel abklemmen
3. Insert a relay module
Relais Modul einsetzen
4. Connect a relay module according to scheme
Relais Modul anschliessen
5. Return the cover
Antriebsdeckel anschrauben



POSITION EXCHANGE LAGE VERWECHSLUNG



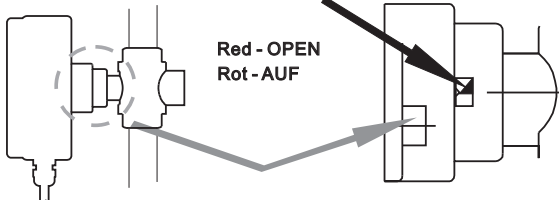
1. Depress the actuator towards the valve
Den Antrieb nach Ventil drücken
2. Rotate the actuator manually
Den Antrieb drehen und loslassen
3. The spring returns the actuator and snaps it
Die Druckfeder bringt den Antrieb wieder zurück und schnappt in die eingestellte Lage



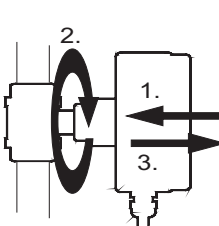
1. open the cover
das Gehäuse öffnen
2. exchange wire connection 1 and 12, 4 and 9
die Anschlussader auf Fessel 1 und 12, 4 und 9 wechseln

POSITION VALVE INDICATOR ZEIGER DER VENTILLAGE

INDIKATOR / ANZEIGE



MANUAL OPERATION HANDSTEUERUNG

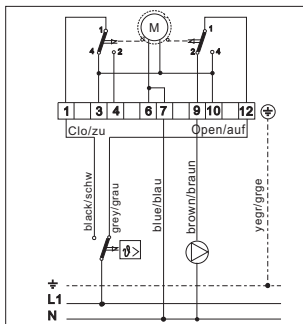


1. depress the actuator towards the valve
Den Antrieb nach Ventil drücken
2. rotate the actuator
Den Antrieb drehen
3. the spring returns and snaps the actuator
Die Druckfeder bringt den Antrieb wieder zurück und schnappt in die eingestellte Lage

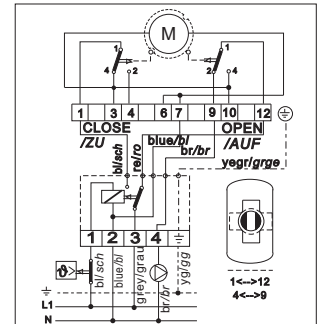
FOR AUTOMATIC MOTOR OPERATION, RETURN THE ACTUATOR INTO IT'S ORIGINAL POSITION!
NACH HANDSTEUERUNG BRINGEN SIE DEN ANTRIEB IN DIE ANFANGSLAGE ZURÜCK!

ELECTRICAL SCHEME ELEKTRISCHE STEUERSCHHEME

Without relay / ohne Relais



with a relay / mit Relais



Ord. code: RM_24 - 230VAC: 10024
RM_48ST/24VAC: 100049

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Data subject to change without notice. / Technische Änderungen vorbehalten.

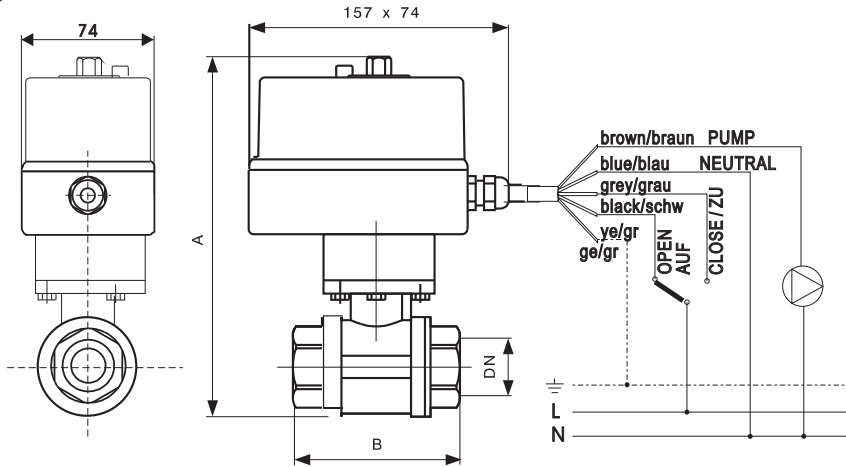
GB ELECTRIC MOTOR ACTUATED BALL VALVE
D KUGELHAHN MIT ELEKTROMOTORISCHEM ANTRIEB
EMV 110..
SERIES 820



INSTALLATION INSTRUCTION AND USER'S MANUAL
MONTAGEANWEISUNG UND BEDIENUNGSANLEITUNG

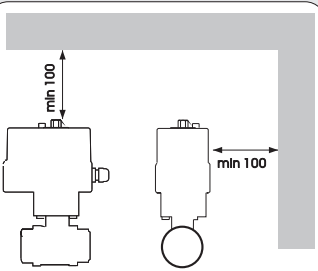
Installation should be carried out only by a qualified person !
 Die Montage darf nur Fachmann ausführen !

DIMENSIONS AND ELECTRICAL CONNECTION
ABMESSUNGEN UND ELEKTRISCHER ANSCHLUSS



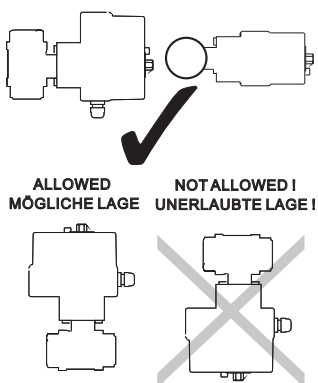
DN	A	B	Kv	kg
32 - 1 1/4"	220	102	123	2,40
40 - 1 1/2"	230	106	198	3,00
50 - 2"	242	129	290	4,10

BUILD-IN ROOM
EINBAURAUM



BUILD-IN POSITION
EINBAULAGE

PRIORITY / FORRANLAGE



CONDITIONS FOR USE
BETRIEBSBEDINGUNGEN

Fluids and gasses (water, nonaggressive media) up to 16 bar.

Flüssige und gasförmige Fluide (Wasser, nicht aggressive Fluide) bis zu 16 bar.

TECHNICAL DATA
TECHNISCHE DATEN

Main connection.....Nennspannung230VAC, 50Hz (EMV110..410)
*24VAC, 50Hz (EMV110..413)
 Power consumptionNennleistung 5 W max
 Rotation time.....Rotationszeit..... 105s /90°
 Microswitch ratingBelastung der Mikroschalter5(1)A, 250 VAC
 Actuator protection classAntreibsschutzartIP 54
 TerminalsAnschlussklemmen0,5 ... 1 mm²
 Ambient temperatureUmgebungstemperatur0...50 °C
 Humidity.....FeuchtRH0% - 80% NON CONDESED
 Fluid temperature.....Temperatur des Fluids0...110°C max
 Max. operating torque.....Max Ausgangsmoment25Nm

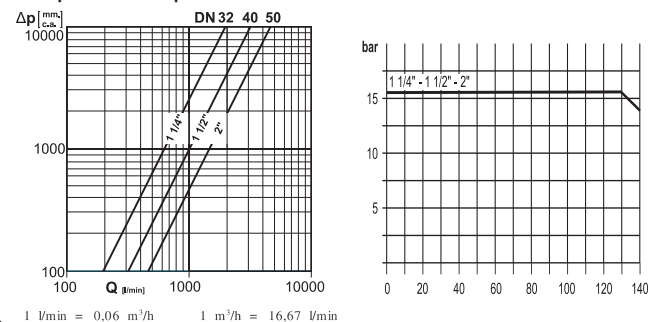
CODE	TYPE	DN	VOLTAGE	TIME
11225	EMV 110 820/410-5	32- 1 1/4"	230VAC, 50Hz	105s / 90°
11226	EMV 110 820/410-6	40 - 1 1/2"	230VAC, 50Hz	105s / 90°
11227	EMV 110 820/410-7	50 - 2"	230VAC, 50Hz	105s / 90°
*11290	EMV 110 820/413-5	32- 1 1/4"	24VAC, 50Hz	105s / 90°
*11291	EMV 110 820/413-6	40 - 1 1/2"	24VAC, 50Hz	105s / 90°
*11292	EMV 110 820/413-7	50 - 2"	24VAC, 50Hz	105s / 90°

with a relay / mit Relais

CODE	TYPE	DN	VOLTAGE	TIME
*11228	EMV 110 820/310-5	32- 1 1/4"	230VAC, 50Hz	105s / 90°
*11229	EMV 110 820/310-6	40 - 1 1/2"	230VAC, 50Hz	105s / 90°
*11230	EMV 110 820/310-7	50 - 2"	230VAC, 50Hz	105s / 90°
*11293	EMV 110 820/313-5	32- 1 1/4"	24VAC, 50Hz	105s / 90°
*11294	EMV 110 820/313-6	40 - 1 1/2"	24VAC, 50Hz	105s / 90°
*11295	EMV 110 820/313-7	50 - 2"	24VAC, 50Hz	105s / 90°

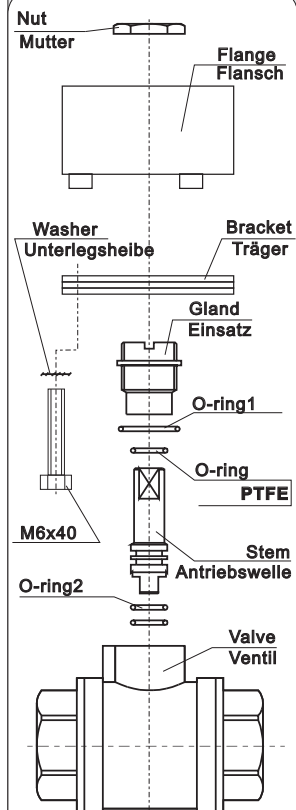
* by special request

Flow/pressure drop characteristic / Volumen Durchfluss und Druckabfall



1 l/min = 0,06 m³/h 1 m³/h = 16,67 l/min

INDEXING BRACKET
EINSTELLBARER TRÄGER

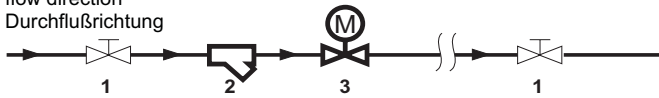


O-rings / O-Dichtungen	
5/4"	6/4" & 2"
15.6x1.78	19x2
9.25x1.78	13.5x2
Material : VITON (FPM)	

Cx4-4108-EMV820-ang-nem-170302.cdr

HYDRAULIC INSTALLATION: recommended instalation of the electric actuated ball valve
SCHEMA DER MASCHINENINSTALLATION: Empfohlener einbau des kugelventils mit elektromotorantrieb

flow direction
Durchflußrichtung



- 1 manual stop valve / manuelles Absperrventil Kugelventil
- 2 strainer with the mesh width 0,65 mm / Reinigungsfilter Y (für detaillierte Informationen bitte rufen Sie uns an lieferbar in Abmessungen von 1/2" bis 2"
- 3 motor actuated ball valve series EMV 110... / Elektromotorantrieb mit Kugelventil EMV 110...

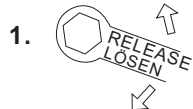
IMPORTANT !

To extend the long term performance of the motorised ball valve it is recommended that a strainer is situated prior to the valve. By installation must be observed to according to relevant local standards.

WICHTIG!

Um die Lebensdauer des Ventil zu verlängern und Vernichtung der Dichtungen durch mechanische Teile in der Installation zu verhindern wird der Einbau eines Reinigungsfilters empfohlen. Die einschlägigen VDE+TÜV - Verschriftensindzubeschten.

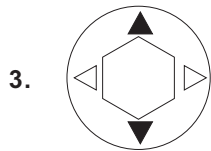
MANNUAL OPERATION / HANDSTEUERUNG



With a key 13 move slightly the valve in clockwise or contra clockwise direction in order to release the gears
Schlüssel Nr. 13 auf Achse stecken



Press and rotate the button
Knopf drücken

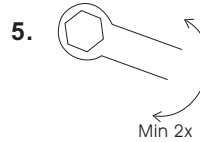


Rotate the valve with the key in desired position :
- red : OPEN
- blue : CLOSE
Schlüssel in gewünschte Richtung drehen
- rot = AUF
- blau = ZU



Depress and rotate the button back to the original position
Knopf loslassen

IMPORTANT / WICHTIG

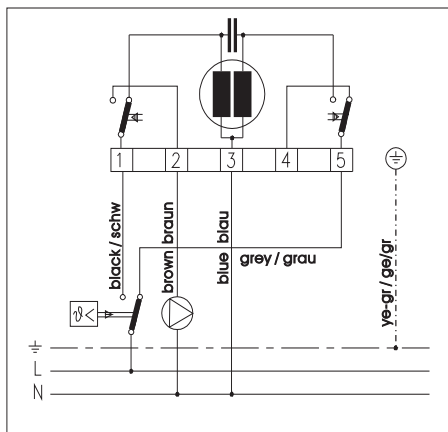


AFTER LONG STANDSTILL PERIOD
Manually rotate the valve with a key for at least two full rotations to release the valve and to clean away impurities from the ball

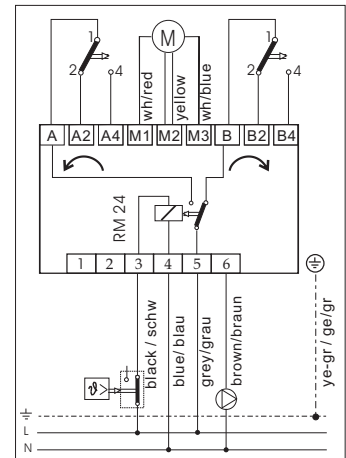
NACH LÄNGEREM STILLSTAND
Das ventil manuell mindestens zweimal um den Vollöffnungswinkel drehen, um die Verschmutzung von Ventilkugel zu entfernen und den Antrieb zu entlasten.

ELECTRICAL SCHEME / ELEKTRISCHE STEUERSCHHEME

EMV 110..410 (230VAC)
EMV 110..413 (24VAC)



* with relay / mit relais
EMV 110..310 (230VAC)
EMV 110..313 (24VAC)



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ELECTRO-MOTOR ACTUATED ZONE BALL VALVES
SERIES EMV 110 602 in EMV 110 603
 with standard built in relay
 (EMV 110..4230-CR, EMV 110..4233-CR)

FIRST®

GENERAL

Electric motor driven ball valves, EMV 110 602 and 603 series, are used as locking elements for heating systems (solar, remote, house-heating), for hot blast heating, cooling systems, swimming pools, petrochemical industry, alternative heating sources and agricultural purposes.

With pride and joy we present to you our new generation of electric motor driven ball valves. They are constructed in compliance with most European standards and currently valid safety regulations. They are made of environmentally material.

Follow the instructions for use carefully and our many years experience in the production of electric motor drives will be a guarantee for a long life and reliable operation of the ball valve.



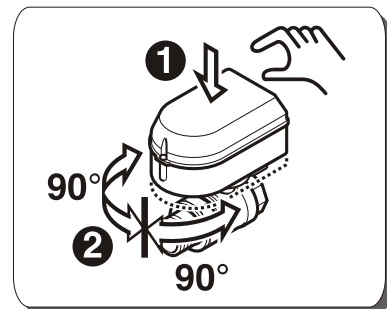
Series 602



Series 603

Advantages

- * Compact version enables quick installation and electrical connection without opening drive.
- * Clutch assembly enables manual opening / closing and unlocking of the valve if it locks during longer stand-stills.
- * All models have built-in relay module which enables two wire control SPST.
- * Simple disassembly of the drive with two screws only.
- * Electric signal - L (live) when the valve is open and can control the pump.
- * Main flow indicator on the support of the valve: RED-OPEN.
- * Additional flow indicator on the cover of the actuator
- * Moderate velocity of ball rotation prevents hydraulic shocks in installation.
- * Disassembly of installation is not required for the replacement of neck seals.
- * Due to self cleaning effect the valve need not be disassembled (if solid particles enter the valve), because motor turn ball to opposite direction.



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+386 3 898 35 00



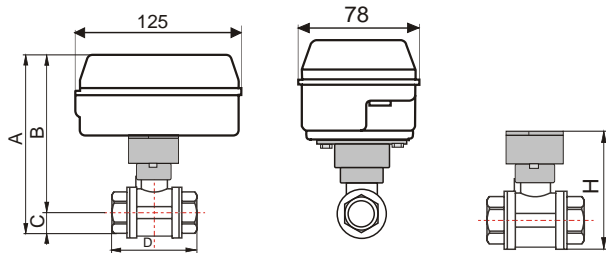
+386 3 898 35 35

Cx4-4108-Emv4230-CR-a-170293.cdr

SERIES 602

ELECTRO-MOTOR ACTUATED ZONE BALL VALVE Ends: female/female

Electro-motor actuator
EMV 110...4230-CR (230VAC)
EMV 110...4233-CR (24VAC)
Rotation time 30s/90°
Built in relay
Drive protection class IP 44
Electrical protection: class II



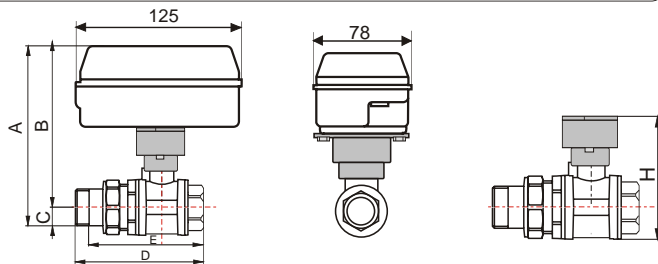
DESCRIPTION	DIMENSIONS	ORDER CODE	kg
Ball valve with electro-motor actuator EMV 110...4230-CR	DN15	10102	0.90
	DN 20	10103	0.83
	DN 25	10104	1.04
	DN 32	10105	1.24

G	DN	A	B	C	D	H	PN	KV	USA C V
1/2"	15	139	121.5	17.5	63	79	16	17	22
3/4"	20	144	124.5	19.5	57	85	16	41	50
1"	25	153	129.5	23.5	68	93	16	68	84
1 1/4"	32	163	134.5	28.5	81	103	16	123	153

SERIES 603

ELECTRO-MOTOR ACTUATED ZONE BALL VALVE Ends: male/ female hose union

Electro-motor actuator
EMV 110...4230-CR (230VAC)
EMV 110...4233-CR (24VAC)
Rotation time 30s/90°
Built in relay
Drive protection class IP 44
Electrical protection: class II



DESCRIPTION	DIMENSIONS	ORDER CODE	kg
Ball valve with electro-motor actuator EMV 110...4230-CR	DN 15	10112	0.93
	DN 20	10113	0.88
	DN 25	10114	1.10
	DN 32	10115	1.42

G	DN	A	B	C	D	E	H	PN	KV	USA C V
1/2"	15	139	121.5	17.5	99	86	79	16	17	22
3/4"	20	144	124.5	19.5	90.5	77.5	84	16	41	50
1"	25	153	129.5	23.5	104	90	93	16	68	84
1 1/4"	32	163	134.5	28.5	119.5	105.5	103	16	123	153

SPECIFICATIONS Electric actuator

Power supply: 230 V, 50/60 Hz (EMV 110..4230)
24V, 50Hz (EMV 110..4233)

Micro-switch rating: 5 (1) A, 250 V, 50 Hz

Power consumption: 7,5 VA by operation
3 VA by stand by

Electrical protection: class II according to EN-60335-1
IP 44 according to IEC 529

Rotation time: 30s/90°

Ambient temperature: 0°C to max. 55°C

Humidity: RH0% - 80% NON CONDESED

Operating temperature: 0°C do 110°C

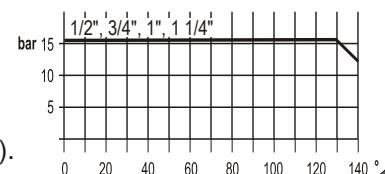
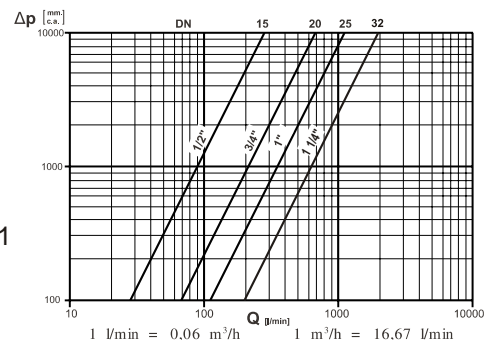
Max. operating pressure: PN 16

Max. operating torque: 8 Nm

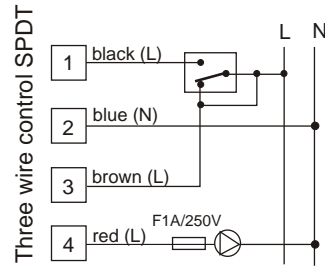
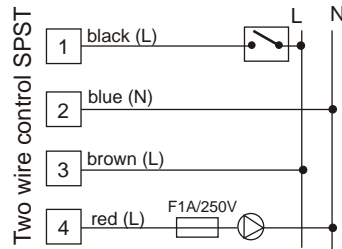
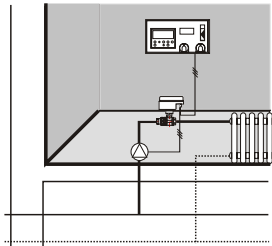
connection cord: 4 x 0.5 mm², length 2m

Note:

The motorized ball valve is designed for operation by SPST (— —).



WIRING DIAGRAM:

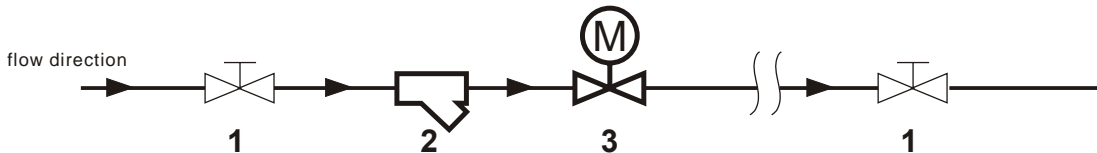


Circulation pump can be controlled at OPEN valve position by RED wire. Signal on the red wire is live (L) and can be used for inductive load up to one (1) A, 250VAC. For load which consumption is more than 1 A must be used external relay.

! IMPORTANT !

The electrical line supplying the actuator, the time counter and room thermostat must start from the thermal plant, so as to avoid tampering by user. Before any repair of the valve or the actuator disconnect the supply voltage.

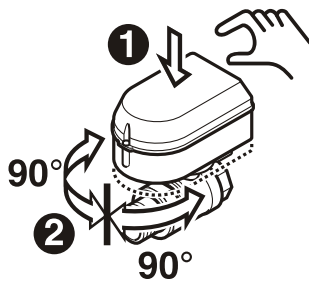
Hydraulic installation - recommended installation



- 1 - manual stop valve
- 2 - strainer with the mesh width 0,65 mm
- 3 - motor actuated ball valve series EMV 110...4230-CR

IMPORTANT !

To extend the long term performance of the motorized ball valve it is recommended that a strainer is situated prior to the valve. By installation must be observed to according to relevant standards.

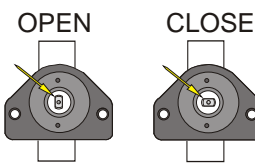


MANUAL CONTROL

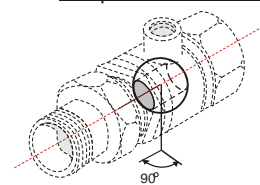
Press the actuator towards the valve and turn it to left or right direction for angle 90°. Check also the position on indicator.

BALL VALVE'S STEM POSITION

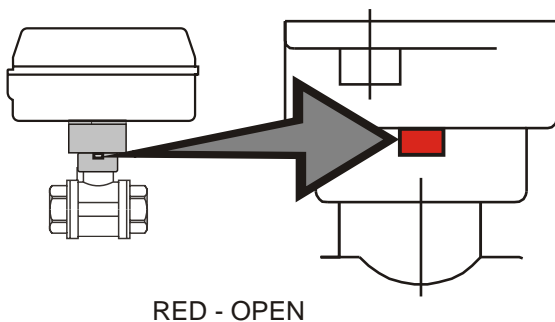
By valve which is built in installation, OPEN/CLOSE condition is recognized from stem position.



Ball position in the valve

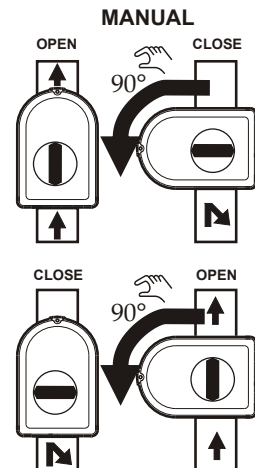
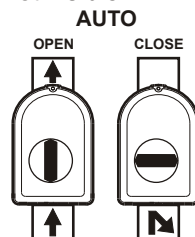


MAIN FLOW INDICATOR ON THE SUPPORT OF THE VALVE

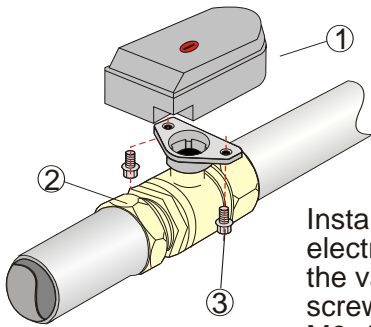


ADDITIONAL FLOW INDICATOR ON THE COVER OF THE ACTUATOR

... in case when the indicator on the support is not visible



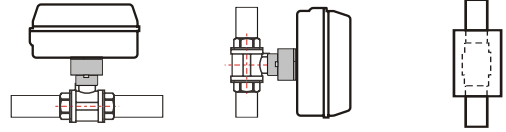
Assembly of the electric actuator on the ball valve



Install or remove the electric actuator ① on the valve ② by screwing two screws ③ M6x15

WARNING: the actuator must be in Parallel with the valve and pipes

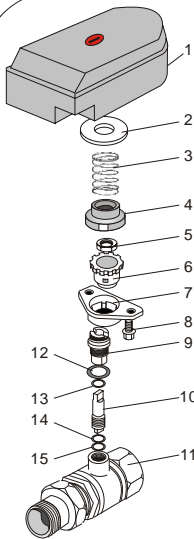
RECOMMENDED INSTALLATION



! FORBIDDEN !



Assembly of the EMV 110...4230-CR



The electrical actuator is connected to the ball valve by hexagonal locking nut (5) which prevent the unscrewing the gland screw (2). On the valve is clutch assembly which offer manual operation like with the handle. Maintenance of the valve to replace the O-rings in the stem or replace the stem is easy and should be carried out as follows:

A- To separate valve and the actuator unscrew two hexagonal nuts (8) dimension M6 x 15 with fork tool nr. 10
B- Slightly turn in direction a plastic flange (2) cover as shown arrow on it.

WARNING! BY OPENING PLASTIC FLANGE SPRING CAN JUMP OUT AND DAMAGE THE EYES OR THIRD PERSON!

C- Pull the spring (3) and the red plastic indicator (4)
D- Unscrew hexagonal nut S19 (5) and separate the clutch assembly signed as (6) and (7) from the valve (11)
E- Unscrew gland screw (9) and pull it from the valve body

F- separate stem (10) and gland screw (9) by pull the stem from gland screw

G- Check the O-rings signed as 12, 14 and 15 and PTFE seal 13. If they are damaged, replace them
H- For assembling the and actuator repeat the operations in reverse order

O-rings

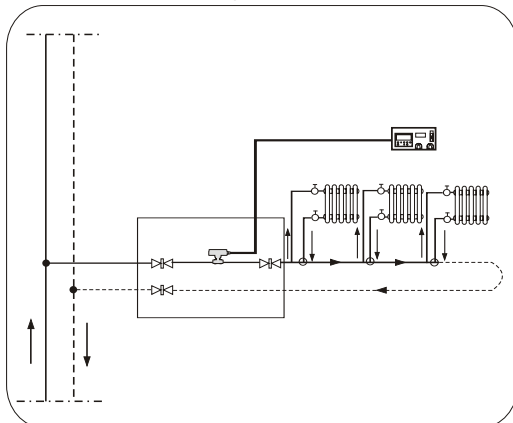
- (12) 14x1.78 EPDM
- (13) 12x 10x1 PTFE Unterlegscheibe
- (14) 8.73x 1.78 EPDM
- (15) 8.73x1.78 Viton

Advantages: O-rings in stem ensures maximum functionality, safety and tightness

WARNING: BEFORE DISASSEMBLY THE VALVE CHECK IF IN THE INSTALLATION IS NO PRESSURE OR HOT MEDIA. THIS CAN CAUSE INSTALLER SERIOUS DAMAGES ON EYES AND SKIN!

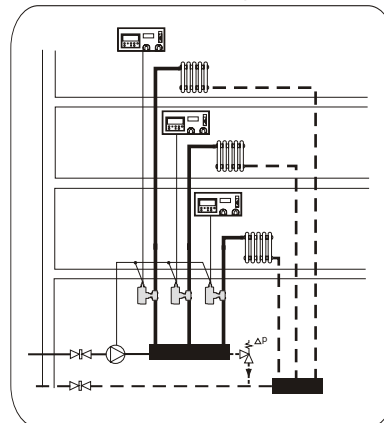
Examples for use:

Building with single-pipe hot water heating system



Heating control with one room thermostat and one electric actuated ball valve

Building with two pipe hot water heating system



Heating control of each flat separated with one room thermostat and one electric actuated ball valve

- ball valve with electro-motor actuator EMV 110...4230-CR
- room thermostat ELTHERM AT8 ELTHERM ST8

ELECTRO-MOTOR ACTUATED ZONE BALL VALVES
SERIES **EMV 110 502** in **EMV 110 503**
with standard built in relay
(EMV 110..7930)

FIRST[®]

GENERAL

Electric motor driven ball valves, EMV 110 502 and 503 series, are used as closing elements for heating systems (solar, remote, house-heating), for hot blast heating, cooling systems, swimming pools, petrochemical industry, alternative heating sources and agricultural purposes.

With pride and joy we present to you our new generation of electric motor driven ball valves. They are constructed in compliance with most European standards and currently valid safety regulations. They are made of environmentally material.

Follow the instructions for use carefully and our many years experience in the production of electric motor drives will be a guarantee for a long life and reliable operation of the ball valve.



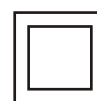
Series 502



Series 503

Advantages

- * Compact version enables quick installation and electrical connection without opening drive.
- * All models have built-in relay module which enables two wire control SPST.
- * Simple disassembly of the drive with clip
- * Electric signal - L (live) when the valve is open and can control the pump.
- * Flow indicator on the cover of the actuator
- * Moderate velocity of ball rotation prevents hydraulic shocks in installation.
- * Disassembly of installation is not required for the replacement of neck seals.
- * Due to self cleaning effect the valve need not be disassembled (if solid particles enter the valve), because motor turn ball to opposite direction.



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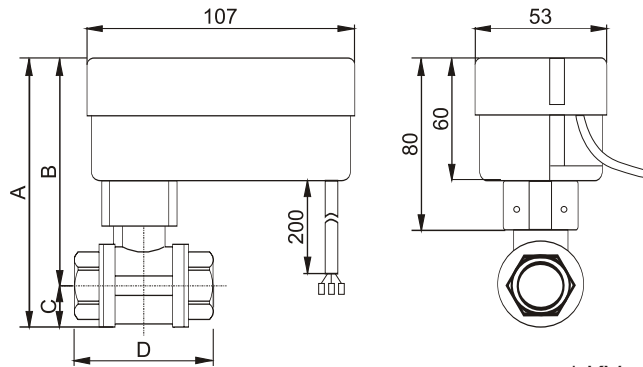
FIRŠT-ROTOTEHNIKA, s.p.: Radegunda 54, 3330 Mozirje
tel: 03/ 898 35 00, fax: 03/ 898 35 35
e-mail: info@first.si, www.first.si

Cx4-1010-EMV502-7930-eng.cdr

SERIES 502

ELECTRO-MOTOR ACTUATED ZONE BALL VALVE Ends: female/female

Electro-motor actuator
EMV 110...7930
Rotation time: 30s/90°
Power supply: 230V, 50 Hz
Built in relay
Drive protection class IP 44
Electrical protection: class II



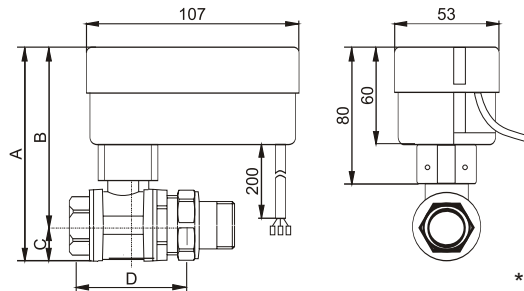
* KV=m³/h Δp=1bar

TYPE	DN	G	A	B	C	D	Kv	Kg	CODE
EMV 110 502/7930-2	15	1/2"	121	103,5	17,5	63	17	0,86	10502
EMV 110 502/7930-3	20	3/4"	124	104,5	19,5	57	41	0,82	10503
EMV 110 502/7930-4	25	1"	129	105,5	23,5	68	68	0,98	10504

SERIES 503

ELECTRO-MOTOR ACTUATED ZONE BALL VALVE Ends: male/ female hose union

Electro-motor actuator
EMV 110...7930
Rotation time: 30s/90°
Power supply: 230V, 50 Hz
Built in relay
Drive protection class IP 44
Electrical protection: class II



* KV=m³/h Δp=1bar

TYPE	DN	G	A	B	C	D	E	Kv	Kg	CODE
EMV 110 503/7930-2	15	1/2"	121	103,5	17,5	99	86	17	0,89	10512
EMV 110 503/7930-3	20	3/4"	124	104,5	19,5	90,5	77,5	41	0,87	10513
EMV 110 503/7930-4	25	1"	129	105,5	23,5	104	90	68	1,04	10514

SPECIFICATIONS

Electric actuator

Power supply: 230V, 50/60Hz (EMV 110..7930)
24V, 50/60Hz (EMV 110..7933)

Micro-switch rating: 5 (1) A, 250 V, 50 Hz

Power consumption: 7VA by operation
3 VA by stand by

Electrical protection: class II according to EN-60335-1

Drive protection class: IP 44 according to IEC 529

Rotation time: 30s/90°

Ambient temperature: 0°C to max. 55°C

Humidity: RH0% - 80% NON CONDESED

Max. operating torque: 8 Nm

connection cord: 4 x 0.5 mm², length 2m

Note: The motorized ball valve is designed for operation by SPST (—) type of control.

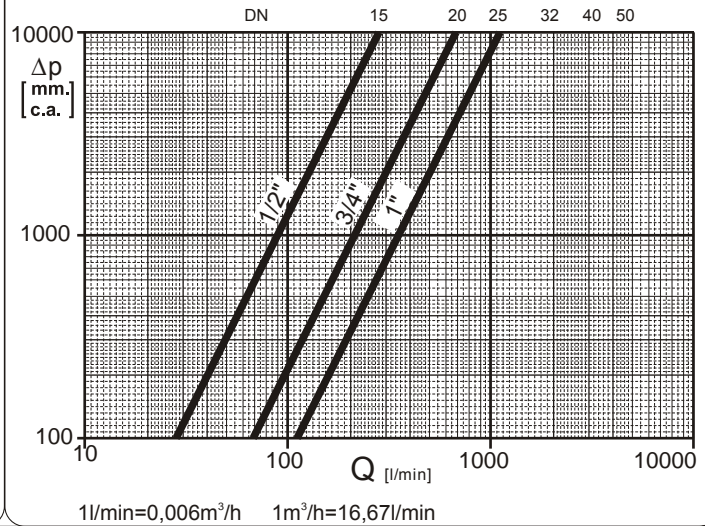
Valve:

Medium temperature: 5°C.. 110°C

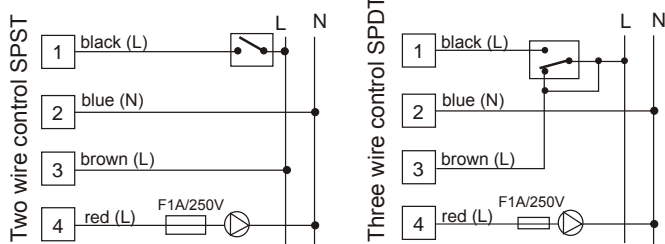
Max. operating pressure: PN 16

Medium: water, nonagressive fluid

FLOW DIAGRAM



WIRING DIAGRAM:

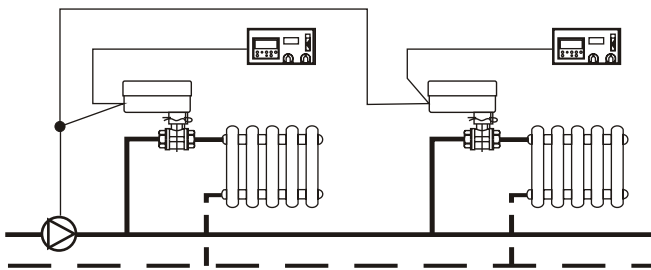


Circulation pump can be controlled at OPEN valve position by RED wire. Signal on the red wire is live (L) and can be used for inductive load up to one (1) A, 250VAC. For load which consumption is more than 1 A must be used external relay.

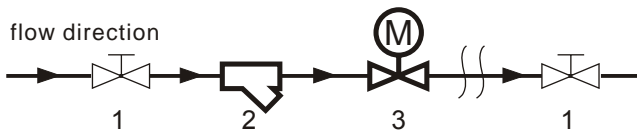
! IMPORTANT !

The electrical line supplying the actuator, the time counter and room thermostat must start from the thermal plant, so as to avoid tampering by user. Before any repair of the valve or the actuator disconnect the supply voltage.

Examples for use:



Hydraulic installation - recommended installation



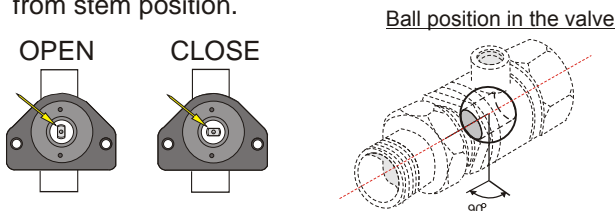
- 1 - manual stop valve
- 2 - strainer with the mesh width 0,65 mm
- 3 - motor actuated ball valve series EMV 110...

IMPORTANT !

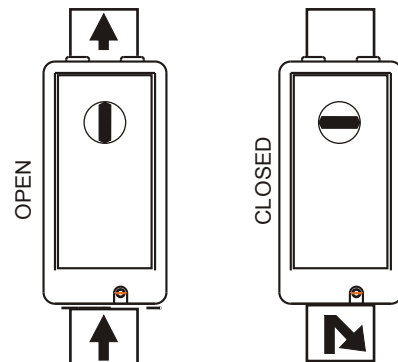
To extend the long term performance of the motorized ball valve it is recommended that a strainer is situated prior to the valve. By installation must be observed to according to relevant standards.

BALL VALVE'S STEM POSITION

By valve which is built in installation, OPEN/CLOSE condition is recognized from stem position.



FLOW INDICATOR ON THE COVER OF THE ACTUATOR



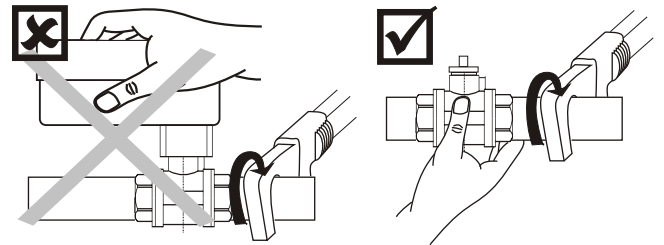
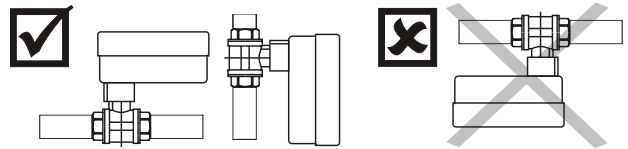
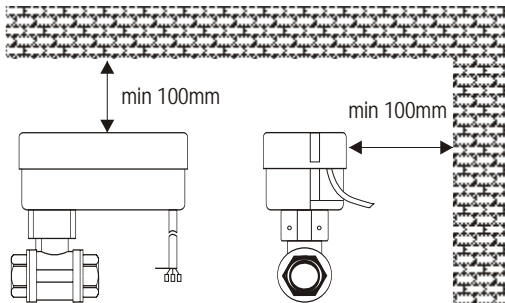
INSTALLATION

Warning

Installation should be carried by a qualified person!

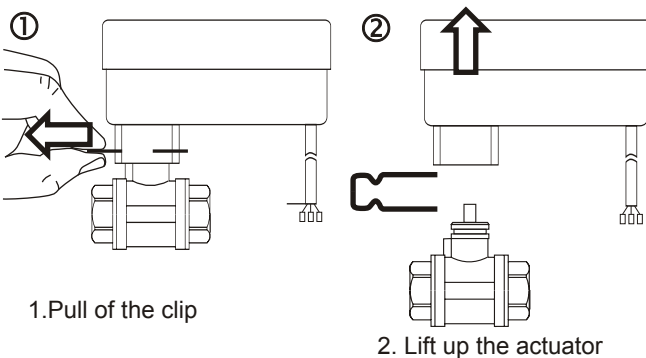
Before the installation:

- Carefully read this manual. Unconsideration of manual could cause damage or wrong working of product.
- After installing check correct working.

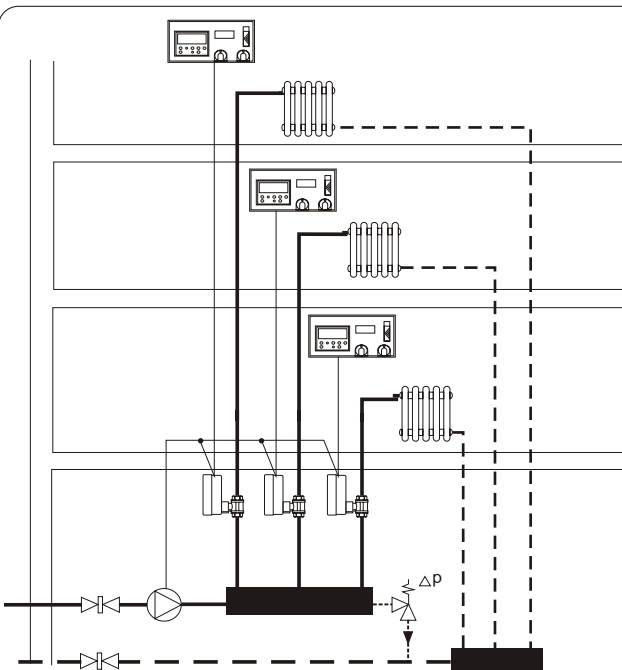
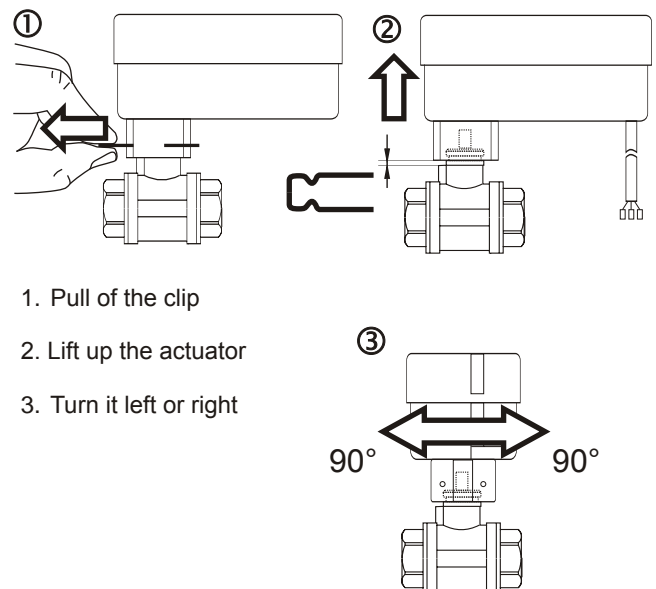


INSTALLING:

* Before installing the valve into pipe system you can remove the actuator from the valve.

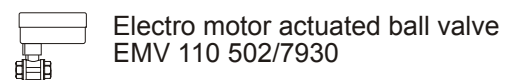


MANUAL OPENING / CLOSING



EXAMPLES FOR USE:

Heating control of each flat separated with one room thermostat and one electric actuated ball valve

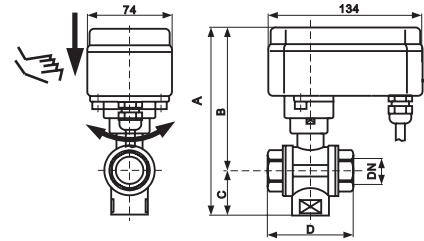
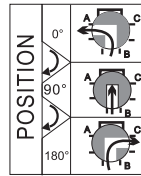


Three way electro-motor actuated ball valve series EMV110...

Series 710



- Ball valve :
- flow type - 3 way L
- ends: female threads
- Rotation time: 60s/180°
- Output torque: max 8Nm
- Actuator protection class: IP55
- Power consumption: max 3,5W
- Power supply: 230V, 50Hz
- With or without relay modul

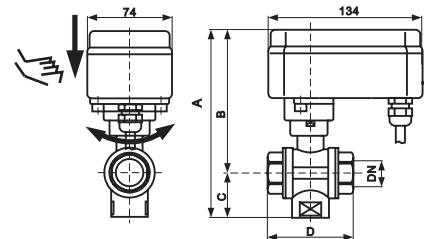
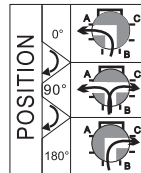


G	DN	A	B	C	D	KV	ΔP	CODE
½"	15	174	135	39	74	3.81	0.9	10312
¾"	20	174	135	39	74	7.68	1.2	10313
1"	25	185	139	46	88	11.6	1.5	10314

Series 710s



- Ball valve :
- flow type - 3 way L
- ends: female threads
- Rotation time: 60s/180°
- Output torque: max 8Nm
- Actuator protection class: IP55
- Power consumption: max 3,5W
- Power supply: 230V, 50Hz
- With or without relay modul

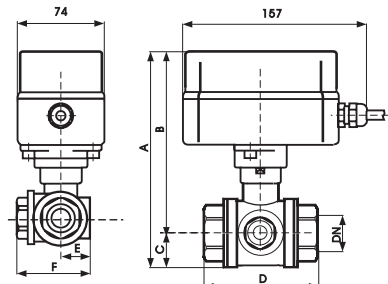
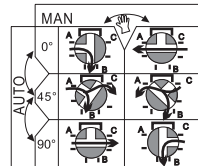


G	DN	A	B	C	D	KV	ΔP	CODE
½"	15	174	135	39	74	3.81	0.9	10232
¾"	20	174	135	39	74	7.68	1.2	10233
1"	25	185	139	46	88	11.6	1.5	10234

Series 830



- Ball valve:
- flow type - 3 way T
- ends: female threads
- Rotation time: 25s/90°
- Output torque: max 8Nm
- Actuator protection class: IP55
- Power consumption: max 3,5W
- Power supply: 230V, 50Hz
- With or without relay modul
- option: version with 180° rotation

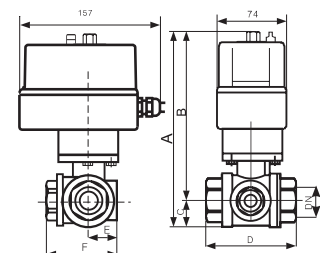
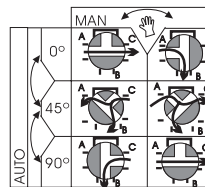


G	DN	A	B	C	D	E	F	KV	ΔP	CODE
¾"	20	164	136	24	80	30	73	5.5	1.7	10323
1"	25	172	140	27	114	57	88	9.2	2.4	10234

Series 930



- Ball valve:
- flow type - 3 way T
- ends: female threads
- Rotation time: 105s/90°
- Output torque: max 25Nm
- Actuator protection class: IP54
- Power consumption: 5 max 5W
- Power supply: 230V, 50Hz
- option: version with 180° rotation



G	DN	A	B	C	D	E	F	KV	ΔP	CODE
1¼"	32	226	193	33	130	64	100	20	4	10025
1½"	40	239	200	39	150	70	115	37.2	5	10026
2"	50	254	207	47	170	90	135	48.7	7	10027

FIRST®

Radegunda 54, 3330 MOZIRJE - SLOVENIA
 ☎ +386 3 898 35 00 ☎ +386 3 898 35 35
<http://www.rototehnika-sp.si>
 e-mail: info@rototehnika-sp.si



C8-0013-EMV-ang

We reserve rights to modify the instructions and the technical data of the product without prior notice.

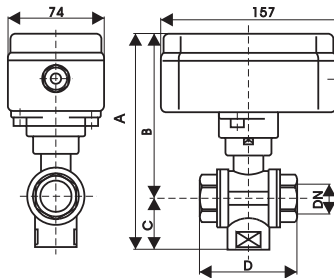
GB ELECTRIC MOTOR ACTUATED BALL VALVE
D KUGELHAHN MIT ELEKTROMOTORISCHEM ANTRIEB
 EMV 110..
 SERIES 710



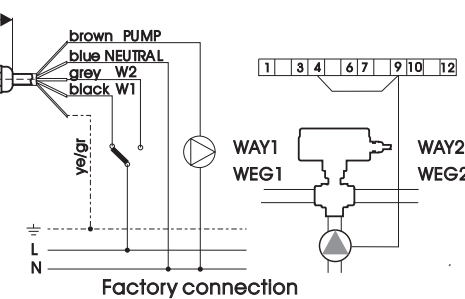
INSTALLATION INSTRUCTION AND USER'S MANUAL
MONTAGEANWEISUNG UND BEDIENUNGSANLEITUNG

Installation should be carried out only by a qualified person !
 Die Montage darf nur Fachmann ausführen !

DIMENSIONS AND ELECTRICAL CONNECTION
ABMESSUNGEN UND ELEKTRISCHER ANSCHLUSS

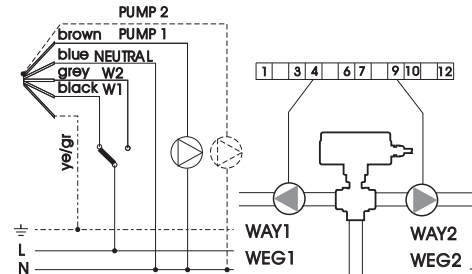


	A	B	C	D	KV	kg
DN15-1/2"	164	125	39	74	3,81	0,9
DN20-3/4"	164	125	39	74	7,68	1,2
DN25-1"	175	129	46	88	11,6	1,5



Factory connection
 Pump is operating when way 1 or way 2 is open. Between the operation of the motor actuator, pump doesn't work.

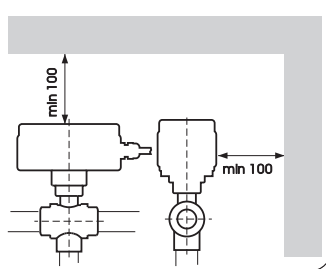
Pumpe läuft, wenn Weg 1 oder Weg 2 geöffnet ist
 Wenn der Motor läuft, die Pumpe steht.



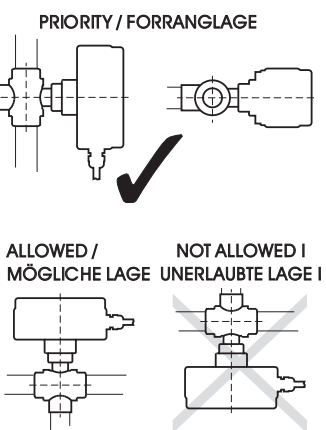
possible connection
 Between the operation of the motor actuator both pump rest, they are working only if they have flow possibility.

Pumpe1 läuft, wenn Weg 1 geöffnet ist und
 Pumpe2 läuft, wenn Weg 2 geöffnet ist. Wenn
 der Motor läuft, beide Pumpen stehen.

BUILD-IN ROOM
EINBAURAUM



BUILD-IN POSITION
EINBAULAGE



CONDITIONS FOR USE
BETRIEBSBEDINGUNGEN

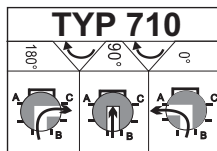
Fluids and gasses (water, nonaggressive media) up to 16 bar.

Flüssige und gasförmige Fluide (Wasser, nicht aggressive Fluide) bis zu 16 bar.

TECHNICAL DATA
TECHNISCHE DATEN

Main connection / Nennspannung: 230 V, 50/60Hz
 *24V, 50Hz
 Power consumption / Nennleistung: 3,5 W max
 Rotation time / Rotationszeit: 60s / 180°/50s/ 60Hz
 Microswitch rating / Belastung der Mikroschalter: 5(1)A, 250 VAC
 Actuator protection class / Antriebsschutzart: IP 55
 Terminals / Anschlussklemmen: 0,5 ... 1 mm²
 Cable length / Kabellänge: 1500 mm
 Ambient temperature / Umgebungstemperatur: 0 ... 50 °C
 Fluid temperature / Temperatur des Fluids: 0 ... 110°C max

FLOW SCHEME
DURCHFLUSS SCHEMA



TYP / TYPE:EMV110 710

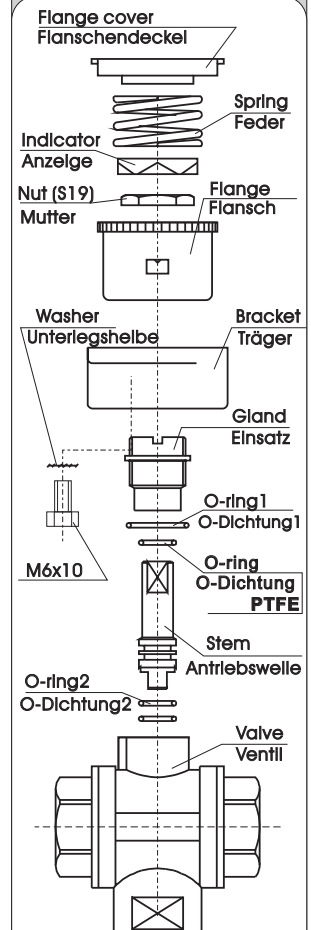
CODE	TYPE	DN	VOLTAGE	Kg
10312	EMV 110 710/550-2	15-1/2"	230VAC	0,9
10313	EMV 110 710/550-3	20-3/4"	230VAC	1,2
10314	EMV 110 710/550-4	25-1"	230VAC	1,5
*10318	EMV 110 710/553-2	15-1/2"	24VAC	0,9
*10338	EMV 110 710/553-3	20-3/4"	24VAC	1,2
*10339	EMV 110 710/553-4	25-1"	24VAC	1,5

With relay/ mit Relais

		DN	VOLTAGE	Kg
*10013	EMV 110 710/250-2	15-1/2"	230VAC	0,94
*10014	EMV 110 710/250-3	20-3/4"	230VAC	1,24
*10015	EMV 110 710/250-4	25-1"	230VAC	1,54
*10340	EMV 110 710/253-2	15-1/2"	24VAC	0,94
*10341	EMV 110 710/253-3	20-3/4"	24VAC	1,24
*10343	EMV 110 710/253-4	25-1"	24VAC	1,54

* on request / nach Sonderbestellung

INDEXING BRACKET
EINSTELLBARER TRÄGER



O-rings / O-Dichtungen		
	1/2"	3/4" & 1"
1	14x1.78	15.6x1.78
2	8.73x1.78	9.25x1.78

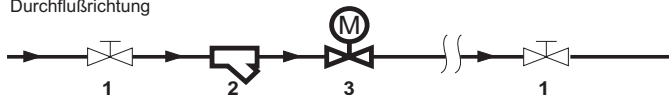
Material : VITON (FPM)

C13-2306-EMV710-na-170320.cdr



SCHEMA DER MASCHINENINSTALLATION EMPFOHLENER EINBAU DES KUGELVENTILS MIT ELEKTROMOTORANTRIEB

Durchflußrichtung



- 1 manual stop valve /
manuelles Absperrventil Kugelventil
- 2 strainer with the mesh width 0,65 mm /
Reinigungsfilter Y (für detaillierte
Informationen bitte rufen Sie uns an
lieferbar in Abmessungen von 11/4" bis 2")
- 3 motor actuated ball valve series
EMV 110...
Elektromotorantrieb mit Kugelventil
EMV 110...

IMPORTANT !

To extend the long term performance of the motorised ball valve it is recommended that a strainer is situated prior to the valve. By installation must be observed to according to relevant local standards.

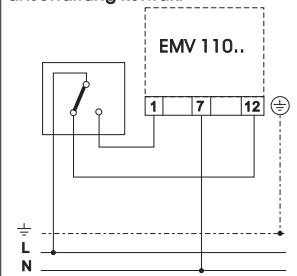
WICHTIG!

Um die Lebensdauer des Ventils zu verlängern und Vernichtung der Dichtungen durch mechanische Teile in der Installation zu verhindern wird der Einbau eines Reinigungsfilters empfohlen. Die einschlägigen VDE+TÜV - Verschriftensindzubeschten.

THERMOSTAT CONNECTION / ANSCHLUSS AUF DEM THERMOSTAT

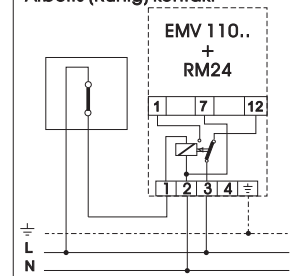
3-wire connection/3-Aderverbindung

switch over contact
anschlusshaltung kontakt



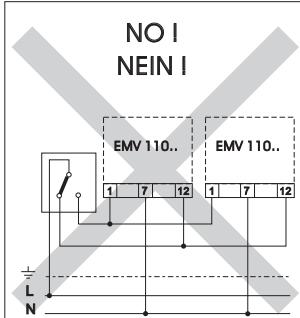
2-wire connection/2-Aderverbindung

normal open (close) contact
Arbeits (Ruhig) kontakt

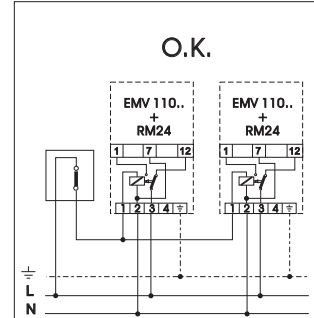


PARRALLEL CONECTION / PARALLEL VERBINDUNG

without relay / ohne Relais



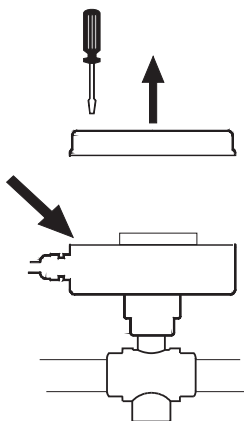
with a relay / mit Relais



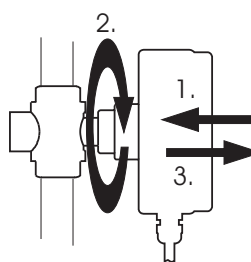
RELAY MODULE BUILD-IN INSTRUCTION / RELAIS - EINBAUEN

RELAY MODULE RM 24
RELAIS MODUL RM 24

1. Unscrew cover screws
Die Schrauben des Antriebdeckel
herausdrehen
2. Disconnect connection cord
Anschlusskabel abklemmen
3. Insert a relay module
Relais Modul einsetzen
4. Connect a relay module
according to scheme
Relais Modul anschliessen
5. Return the cover
Antriebdeckel anschrauben



MANUAL OPERATION / HANDSTEUERUNG

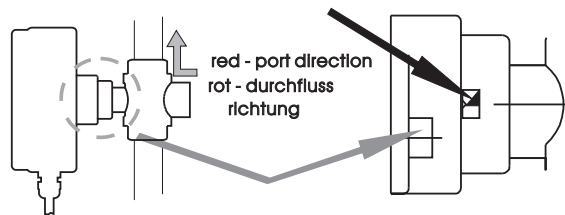


1. depress the actuator towards the valve
Den Antrieb nach Ventil drücken
2. rotate the actuator
Den Antrieb drehen
3. the spring returns and snaps the actuator
Die Druckfeder bringt den Antrieb
wieder zurück und schnappt in die
eingestellte Lage

FOR AUTOMATIC MOTOR OPERATION, RETURN
THE ACTUATOR INTO IT'S ORIGINAL POSITION !
NACH HANDSTEUERUNG BRINGEN SIE DEN
ANTRIEB IN DIE ANFANGSLAGE ZURÜCK !

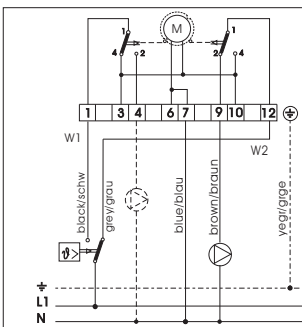
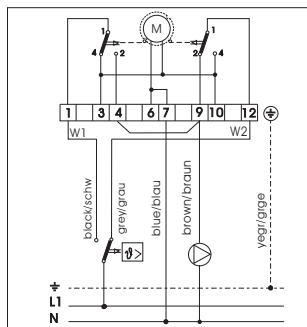
POSITION VALVE INDICATOR / ZEIGER DER VENTILLAGE

INDIKATOR / ANZEIGE



ELECTRICAL SCHEME - ELEKTRISCHE STEUERSCHEMA

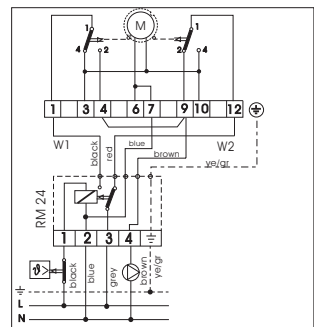
factory connection



If necessary you can connect one pump for each line. When the way 1 is open, pump 1 is operating, when the way 2 is open, pump 2 is operating.

Man kann am beiden Gängen eine Pumpe anschliessen. Wenn der Weg 1 geöffnet ist, Pumpe 1 läuft und wenn der Weg 2 geöffnet ist, Pumpe 2 läuft.

with a relay / mit Relais



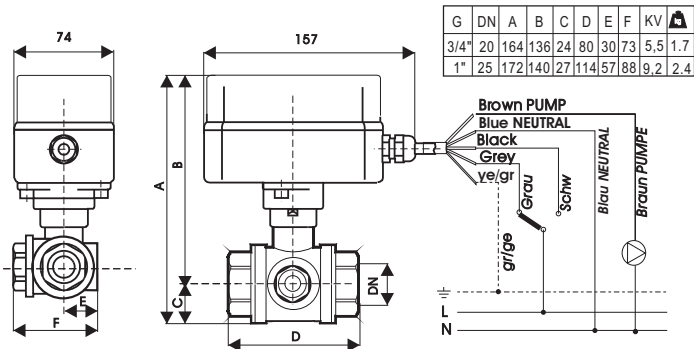
GB ELECTRIC MOTOR ACTUATED BALL VALVE
D KUGELHAHN MIT ELEKTROMOTORISCHEM ANTRIEB
 EMV 110..
 SERIES 830



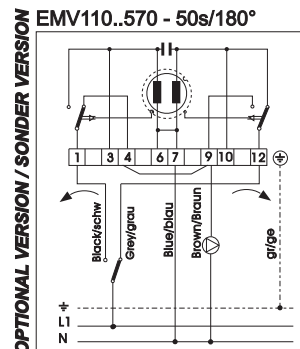
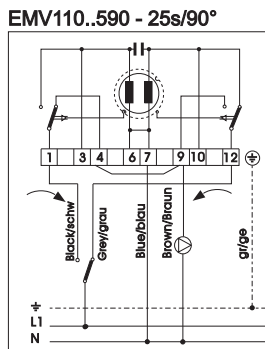
INSTALLATION INSTRUCTION AND USER'S MANUAL
MONTAGEANWEISUNG UND BEDIENUNGSANLEITUNG

Installation should be carried out only by a qualified person!
 Die Montage darf nur vom Fachmann ausgeführt werden!

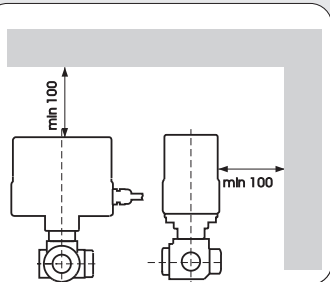
DIMENSIONS
ABMESSUNGEN



ELECTRICAL CONNECTION
ELEKTRISCHER ANSCHLUSS



BUILD-IN ROOM
EINBAURAUM

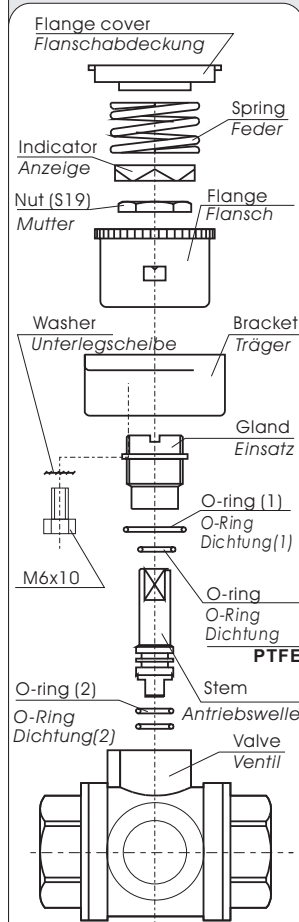


TECHNICAL DATA
TECHNISCHE DATEN

Main connectionNennspannung**230V, 50Hz**
 Option: 24V, 50Hz
 Power consumptionNennleistung**3,5 W max**
 Rotation time.....Rotationszeit**25s/90°, 50s/180°**
 Microswitch ratingBelastung der Mikroschalter**5(1)A, 250 VAC**
 Actuator protection class ...Antriebschutzart**IP 55**
 Terminals.....Anschlussklemmen**0,5 ... 1 mm²**
 Cable length.....Kabellänge**1500 mm**
 Ambient temperature.....Umgebungstemperatur**0...55 °C**
 HumidityLuftfeuchtigkeit**RH0% - 80% NON CONDESED**
 Fluid temperature.....Temperatur des Mediums.....**0...110°C max**

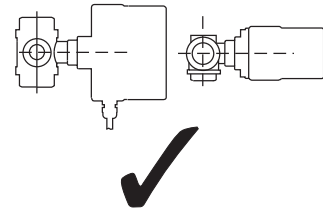
Fluids and gasses (water, nonaggressive media) up to 16 bar.
 Flüssige und gasförmige Medien (Wasser, nicht aggressive Medien) bis zu 16 bar.

INDEXING BRACKET
EINSTELLBARER TRÄGER

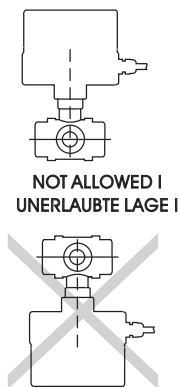


BUILD-IN POSITION
EINBAULAGE

PRIORITY / VORRANGIGE EINBAULAGE

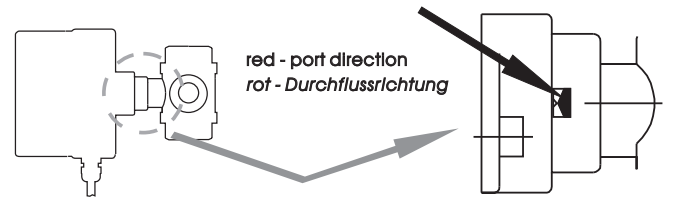


ALLOWED / MÖGLICHE LAGE

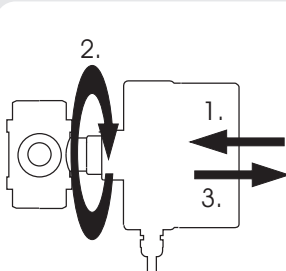


POSITION VALVE INDICATOR
ZEIGER DER VENTILLAGE

INDIKATOR / ANZEIGE



MANUAL OPERATION
HANDSTEUERUNG



1. Depress the actuator towards the valve
Den Antrieb in Richtung des Kugelhahns drücken
2. Rotate the actuator
Den Antrieb drehen
3. The spring returns and snaps the actuator
Die Druckfeder bringt den Antrieb wieder zurück und schnappt in die eingestellte Lage

FOR AUTOMATIC MOTOR OPERATION, RETURN THE ACTUATOR INTO ITS ORIGINAL POSITION!
 NACH HANDSTEUERUNG BRINGEN SIE DEN ANTRIEB IN DIE ANFANGSLAGE ZURÜCK!

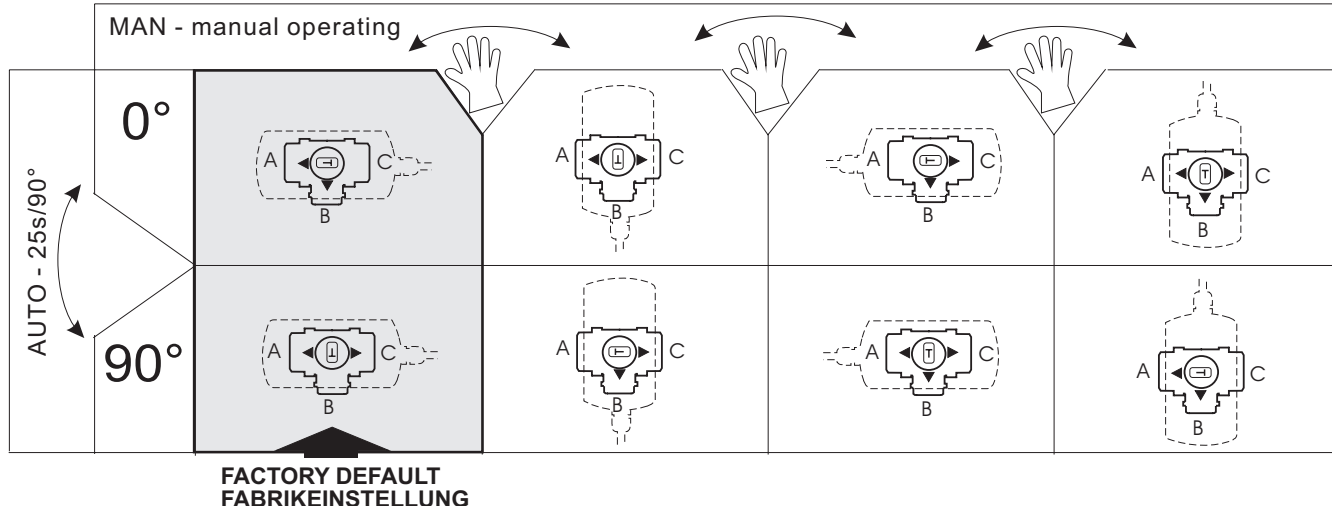
O-rings / O-Ring Dichtungen		
	1/2"	3/4" & 1"
1	14x1.78	15.6x1.78
2	8.73x1.78	9.25x1.78
Material : VITON (FPM)		

C13-3206-EMV830na-170323.cdr

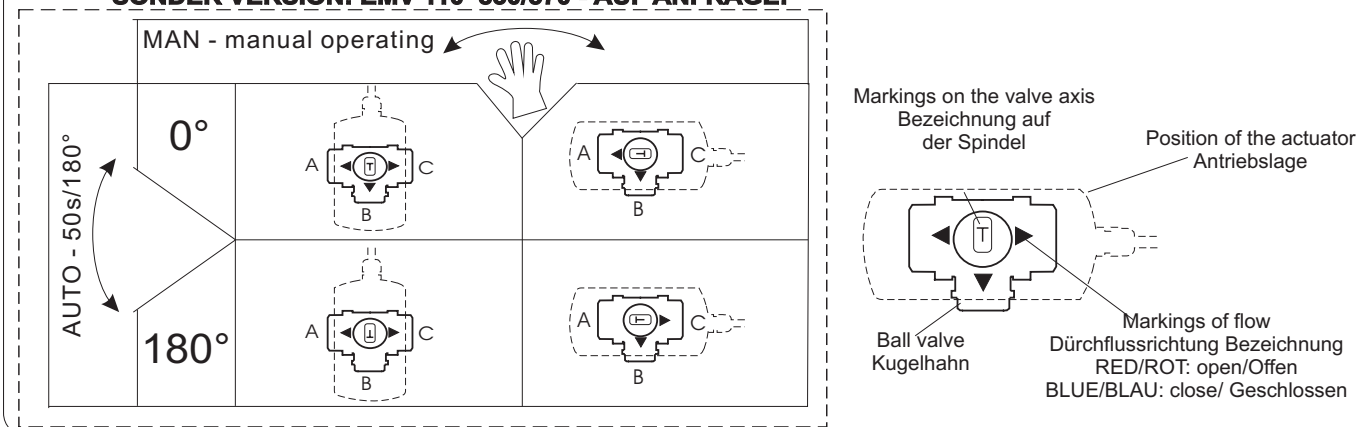
FIRŠT-ROTOTEHNIKA, s.p., Radegunda 54, SI-3330 Mozirje, SLOVENIJA
 tel: +386 3 898 35 00, fax:+386 3 898 35 35, e-mail:info@first.si, http://www.first.si

FLOW SCHEMES DURCHFLUSS RICHTUNGEN

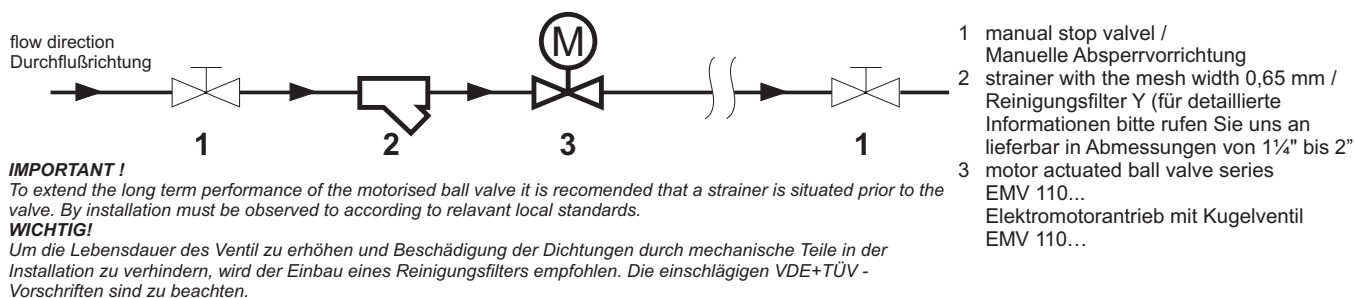
1.) STANDARD VERSION EMV 110 830/590



2.) OPTIONAL VERSION: EMV 110 830/570 - BY SPECIAL REQUEST! SONDER VERSION: EMV 110 830/570 - AUF ANFRAGE!

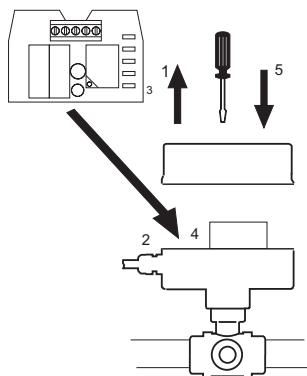


HYDRAULIC INSTALLATION: recommended installation of the electric actuated ball valve SCHEMA DER MASCHINENINSTALLATION: Empfohlener Einbau des Kugelhahnes mit Elektromotorantrieb



RELAY MODULE BUILD-IN INSTRUCTION (ONLY for 230V, 50Hz) / RELAIS-EINBAU (NUR FÜR 230V, 50Hz)

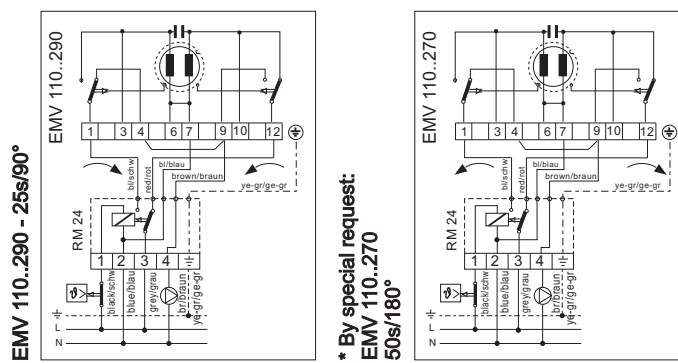
RELAY MODULE RM 24 / RELAIS MODUL RM 24



1. Unscrew cover screws
Die Schrauben des Antriebdeckel herausdrehen
2. Disconnect connection cord
Anschlusskabel abklemmen
3. Insert a relay module
Relais Modul einsetzen
4. Connect a relay module
according to scheme
Relais Modul anschliessen
5. Return the cover
Abdeckung anschrauben

Code Nr. / Art. Nr: **10024** - 230VAC
100049 - 24VAC

ELECTRICAL CONNECTION / ELEKTRISCHER ANSCHLUSS



Data subject to change without notice. / Technische Änderungen vorbehalten.

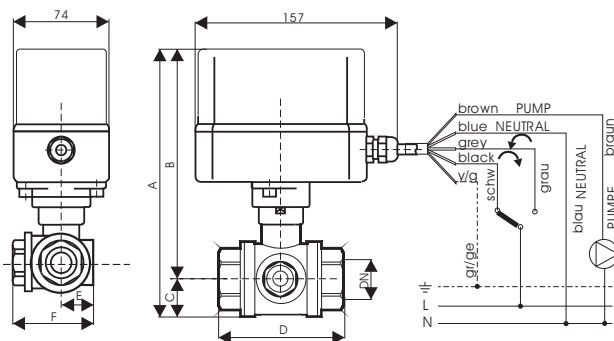
(GB) ELECTRIC MOTOR ACTUATED BALL VALVE
 (D) KUGELHAHN MIT ELEKTROMOTORISCHEM ANTRIEB
 EMV 110..
 SERIES 930



INSTALLATION INSTRUCTION AND USER'S MANUAL
 MONTAGEANWEISUNG UND BEDIENUNGSANLEITUNG

Installation should be carried out only by a qualified person!
 Die Montage darf nur vom Fachmann ausgeführt werden!

DIMENSIONS
 ABMESSUNGEN



DIMENSIONS / ABMESSUNGEN

G	DN	A	B	C	D	E	F	KV
1 1/4"	32	226	193	33	130	64	100	20
1 1/2"	40	239	200	39	150	70	115	37.2
2"	50	254	207	47	170	90	135	48.7

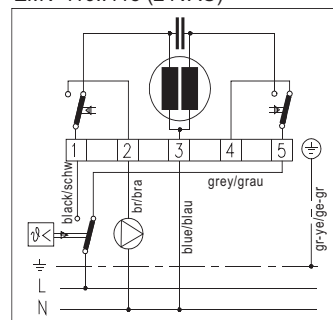
TYP / TIP	CODE	G	DN	A
930/410	10025	1 1/4"	32	4
930/410	10026	1 1/2"	40	5
930/410	10027	2"	50	7

* EMV 110 930/310
 with relay / mit Relais

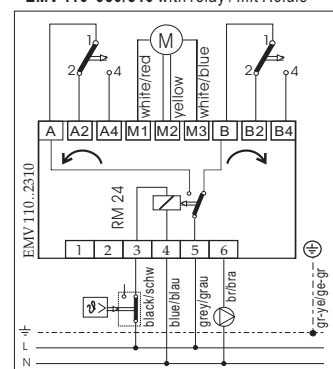
TYP / TIP	CODE	G	DN	A
930/310	10030	1 1/4"	32	4
930/310	10031	1 1/2"	40	5
930/310	10032	2"	50	7

ELECTRICAL CONNECTION
 ELEKTRISCHER ANSCHLUSS

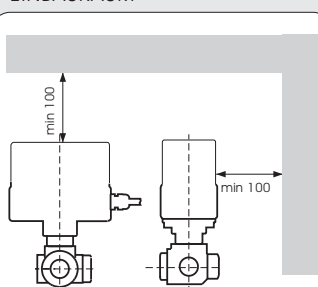
EMV 110..410 (230VAC)
 EMV 110..413 (24VAC)



* EMV 110 930/310 with relay / mit Relais



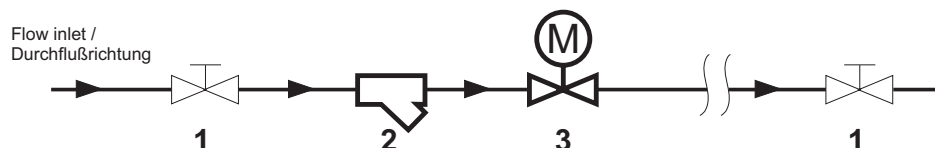
BUILD-IN ROOM
 EINBAURAUM



TECHNICAL DATA
 TECHNISCHE DATEN

Mains connection / Nennspannung 230 V~, 50Hz
 * 24 V~, 50Hz
 Power consumption / Nennleistung 3,5 W max
 Rotation time / Rotationszeit 105s /90°
 Microswitch rating / Belastung der Mikroschalter 5(1)A, 250 VAC
 Actuator protection class / Antriebsschutzart IP 54
 Terminals / Anschlussklemmen 0,5 ... 1 mm°
 Cable length / Kabellänge 1500 mm
 Ambient temperature / Umgebungstemperatur 0 ... 50°C
 Fluid temperature / Temperatur des Fluids 0 ... 110°C max
 Output torque / Ausgangsmoment 25 Nm
 Fluids and gasses (water, nonaggressive media) up to 16bar.
 Flüssige und gasförmige Medien (Wasser, nicht aggressive Fluide) bis zu 16 bar.

HYDRAULIC INSTALLATION - RECOMENDED INSTALLATION OF THE ELECTRIC ACTUATED BALL VALVE
 SCHEMA DER MASCHINENINSTALLATION EMPFOHLENER EINBAU DES KUGELVENTILS MIT ELEKTROMOTORANTRIEB



- 1 manual stop valve /
Manuelle Absperrvorrichtung
- 2 strainer with the mesh width 0,65 mm /
Reinigungsfilter Y (für detaillierte
Informationen bitte rufen Sie uns an
lieferbar in Abmessungen von 1 1/4" bis 2"
- 3 motor actuated ball valve series
EMV 110...
Elektromotorantrieb mit Kugelventil
EMV 110...

IMPORTANT !

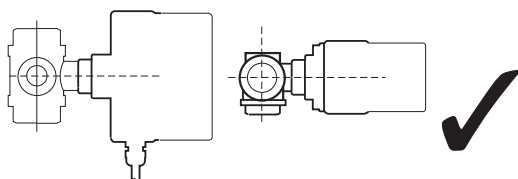
To extend the long term performance of the motorised ball valve it is recommended that a strainer is situated prior to the valve. By installation must be observed to according to relevant local standards.

WICHTIG!

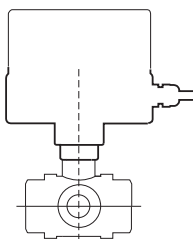
Um die Lebensdauer des Ventil zu erhöhen und Beschädigung der Dichtungen durch mechanische Teile in der Installation zu verhindern, wird der Einbau eines Reinigungsfilters empfohlen. Die einschlägigen VDE+TÜV - Vorschriften sind zu beachten.

BUILD-IN POSITION / EINBAULAGE

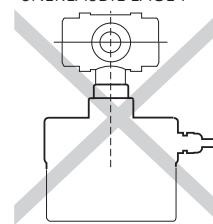
PRIORITY / VORRANGIGE EINBAULAGE



ALLOWED / MÖGLICHE LAGE



NOT ALLOWED !
 UNERLAUBTE LAGE !



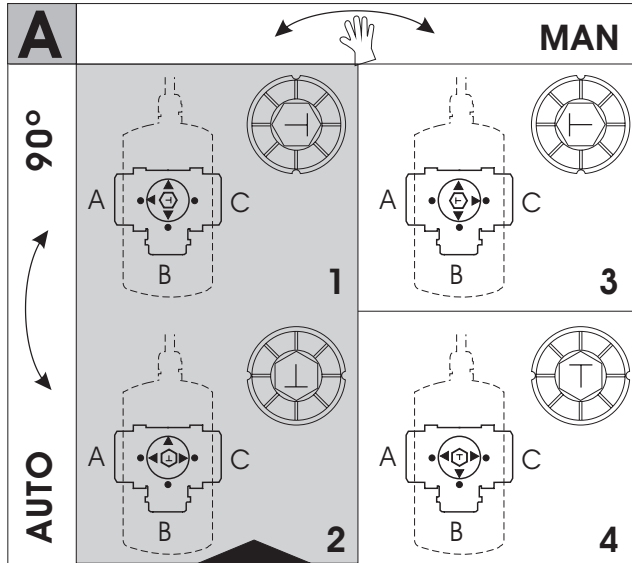
C12-1106-EMV930na-170327.cdr

FIRST-ROTOTEHNIKA, s.p., Radeguna 54, SI-3330 Mozirje, SLOVENIJA
 tel: +386 3 898 35 00, fax:+386 3 898 35 35, e-mail:info@first.si, http://www.first.si

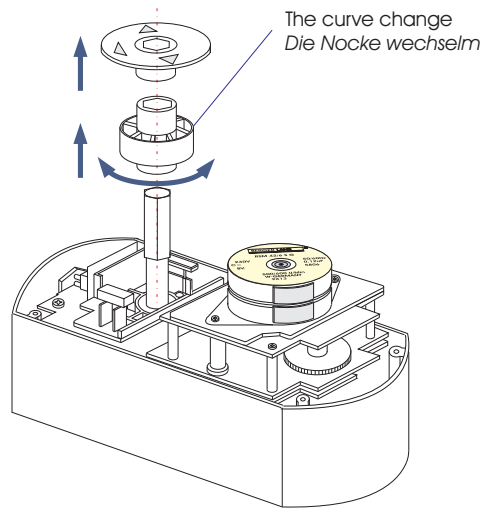


**FLOW SCHEMES
DURCHFLUSS RICHTUNGEN**

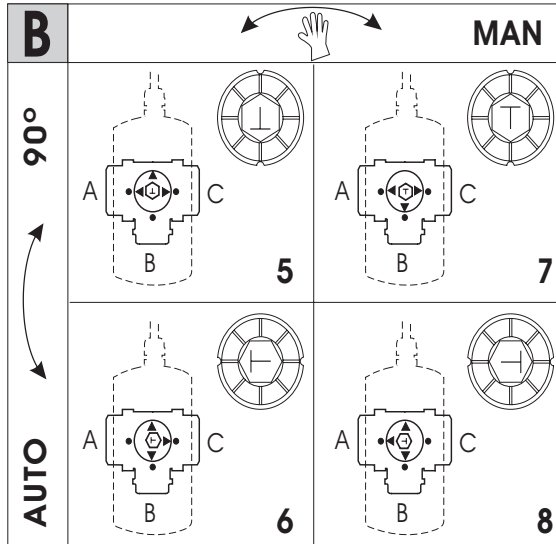
STANDARD VERSION / STANDARD AUSFÜHRUNG



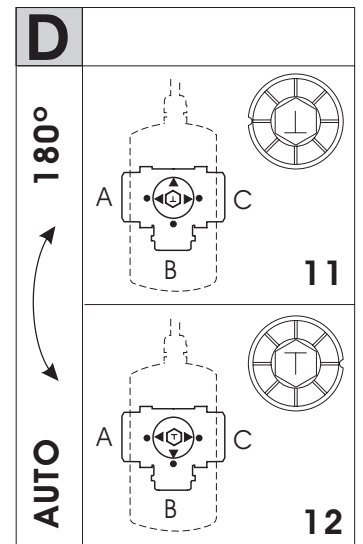
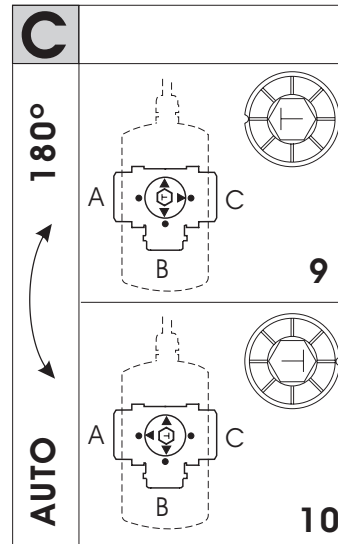
FACTORY DEFAULT / FABRIKEINSTELLUNG



Possible position with 90° curve / Mögliche stellung mit 90° nocke



Possible position with 180° curve / Mögliche stellung mit 180° nocke



AUTO - Automatic position of curves for 90° or 180°
Automatische Stellung der Nocken für 90° oder 180°

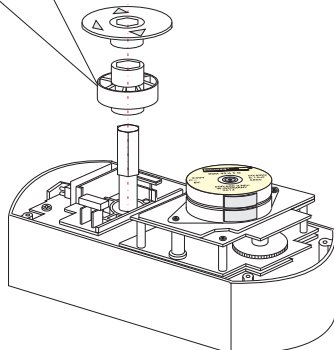
MAN - Position of curves with hand for 90°
Stellung der Nocken mit Hand für 90°



Curve for 90° rotation / Die Nocken für 90° Umdrehung
code: 130040



Curve for 180° rotation / Die Nocken für 180° Umdrehung
code: 130282

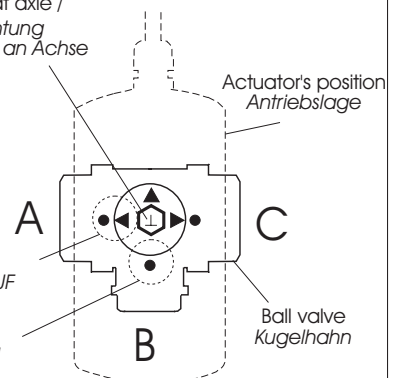


Flow direction
designation at axle /
Durchflussrichtung
Bezeichnung an Achse

Flow direction
designation at housings
Durchfluss richtung
Bezeichnung
an gehäuse

Open
Weg AUF

Close
Weg ZU



Diverter motor driven valve of EMV 110 F3L series

FIRST®

ROTODIVERT



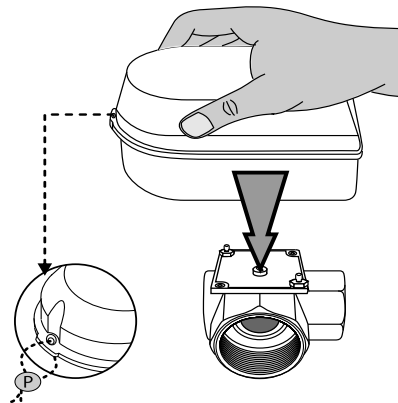
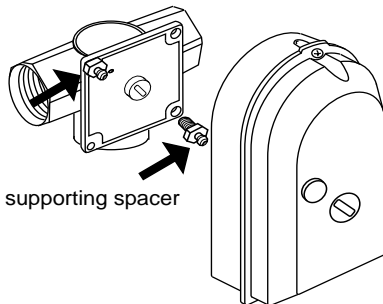
GENERAL:

Electric motor driven EMV110 actuator with installed 3-way brass valve operate as diverting or separating element in closed systems of remote (warm water), air blast or combined heating systems using either of the sources, remote or air blast heating.

FEATURES:

- Compact version enables quick assembly and electrical connection.
- Actuator is simply and quickly assembled and disassembled from reversible valve by means of "clip" system, no screwing is required.
- Effectively and economically used as reversible element in systems where two heating sources are used or for supply of heating to two consumers - heating and sanitary water.
- Dimensions of reversible valve from 1/2" to 1 1/4" are suitable for systems with copper pipes
- Two-wire control with thermostat and other devices
- Connecting cord enables external connection.
- Built-in relay enables SPST and SPDT connection.
- Quick replacement of O-rings without disassembling the valve from installation.

MOUNTING/REMOVING THE ACTUATOR ON/FROM VALVE



The actuator push perpendicular to valve so that it seats on carrying holders. The mounting is finished. If you need to remove the actuator from the valve simply pull it out.

M4 screw is inserted at the bottom of the actuator and prevents removal of the actuator from the valve by unauthorized person

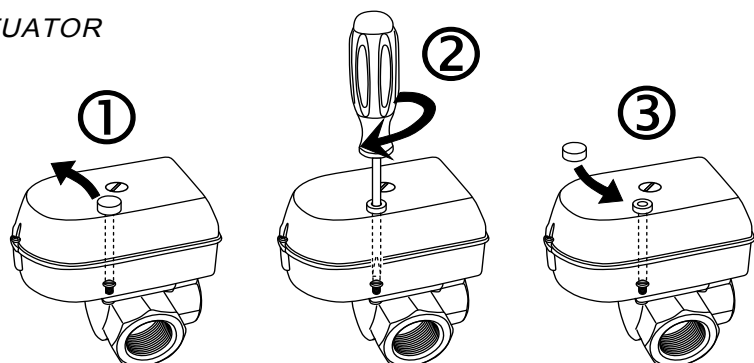
Possibility of sealing the actuator to prevent unauthorized person to interfere with it.

OPTIONAL SCREWING OF THE ACTUATOR ON THE VALVE

To fix the actuator on the valve it is NOT REQUIRED TO OPEN it!

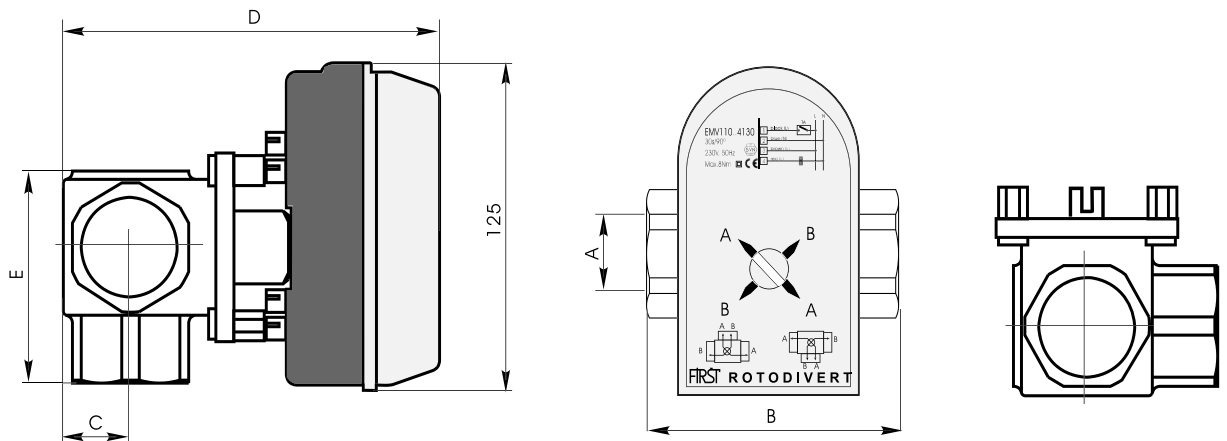
The screw for the actuator screwing on the valve is inserted in drive bottom!

1. Remove protective tap.
2. Use flat screwdriver to screw the drive on the valve.
3. Replace protective tap into the opening.



SERIES F3L

DIVERTING BRASS VALVE WITH ELECTRIC MOTOR DRIVEN ACTUATOR



CODE	TYPE	DN	A	B	C	D	E	Kvs	kg
10170	EMV ROTODIVERT F3L	15	1/2"	72	18,5	116	54	4	1,1
10171	EMV ROTODIVERT F3L	20	3/4"	72	18,5	116	54	7	1,0
10172	EMV ROTODIVERT F3L	25	1"	90	24	122	69	8,5	1,12
10173	EMV ROTODIVERT F3L	32	1 1/4"	90	24	122	69	12	1,37

TECHNICAL CHARACTERISTICS

EMV110 F3L actuator

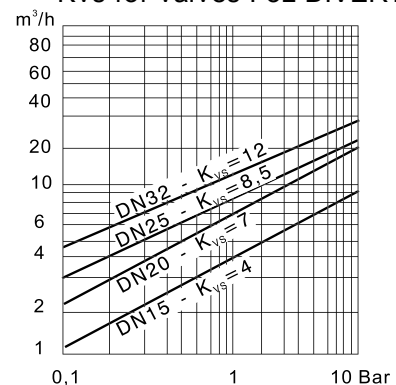
Supply voltage 230V, 50Hz (EMV 110..4680)
 * 24V, 50Hz (EMV 110..4683)
 Limit switch 5(1)A, 250V, 50Hz
 Consumption 7.5VA during operation
 3VA during standstill
 Electrical connection class II acc. to EN60355-1
 Actuator protection class IP44 acc. to IEC 529
 Rotation time 18s/90°
 Output torque max 8Nm
 Ambient temperature from 0° C do 50°C
 Connecting cord 4 x 0.5 mm², 2m long

Forged brass valve:

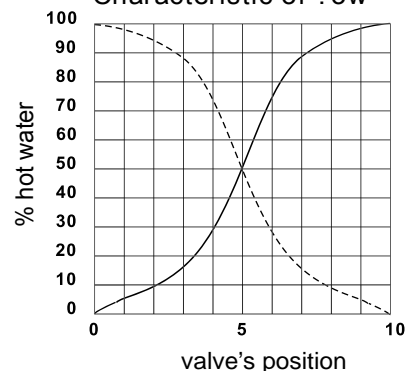
Max. operating temperature 110°C
 Max. operating pressure 6 bar
 Torque 0.5 Nm

Diverting valves are used for controlling flow direction in heating systems in which a certain leakage can be accepted and in which a defined flow characteristic is not required.

Kvs for valves F3L DIVERT type

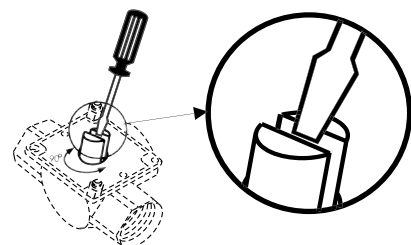


Characteristic of flow



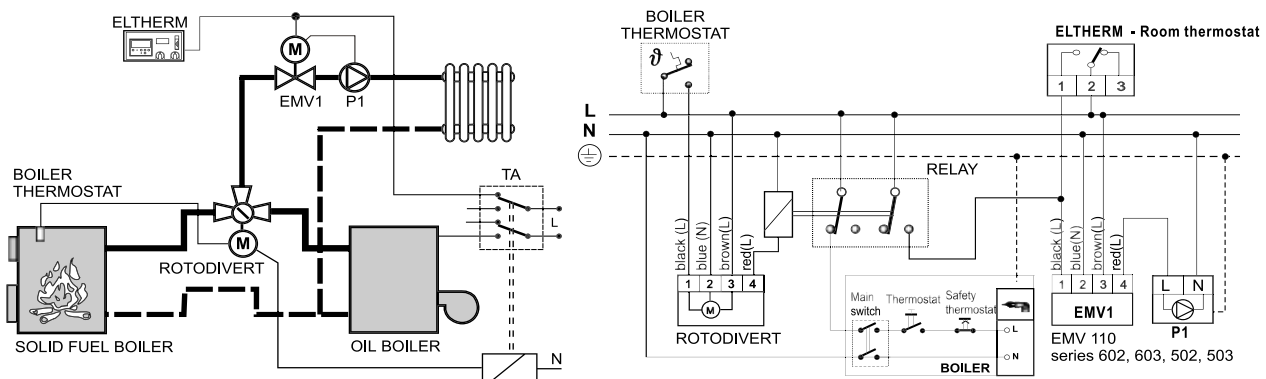
MANUAL SETTING OF FLAP POSITION

Flap position is set with a screwdriver, coin or the like.
 First check proper adjustment of the flap and then mount the actuator.



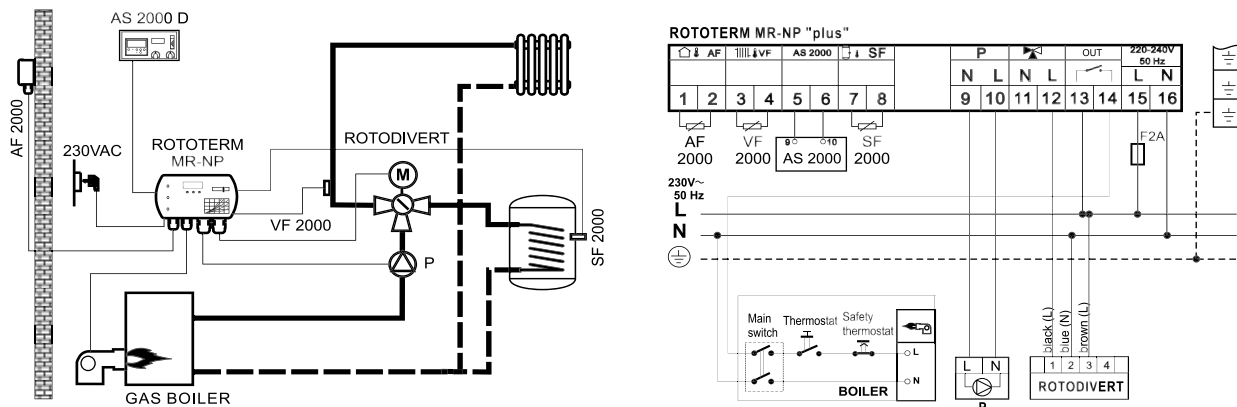
EXAMPLES OF USE

EXAMPLE 1



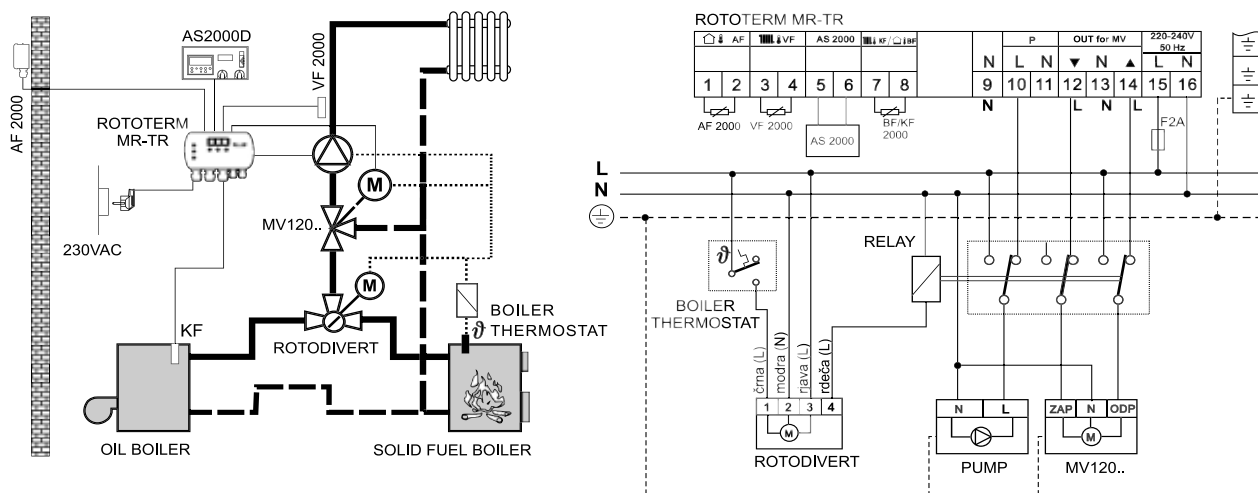
Diverter valve switches between two heating sources. This combination ensures utilisation of cheaper energy source. When this source is consumed, reversible valve switches to the second energy source and with limit switches, which are in the actuator, activates the second energy source. The flow through the pump is never completely closed by F3L reversible valve, therefore no pressure shocks appear.

EXAMPLE 2



In combination with " ROTOTERM MR-NP" automatic control system of the house this separating valve enables heating of a residential unit and sanitary water with just one pump, where sanitary water has priority. The flow through the pump is never completely closed by ROTODIVERT diverter valve, therefore no pressure shocks appear.

EXAMPLE 3



Diverter valve switches between two heating sources. This combination ensures utilisation of cheaper energy source. When this source is consumed, reversible valve switches to the second energy source and with limit switches, which are in the actuator, activates the second energy source. For heating regulation is used regulator ROTOTERM MR-TR.

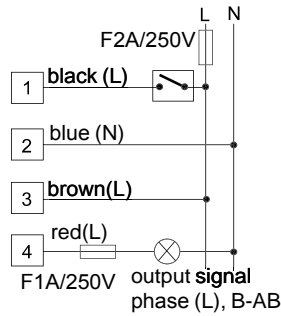
IMPORTANT!

The safety valve must be installed in case of overheating of solid fuel boiler. Up two examples are only for showing the basic installation.

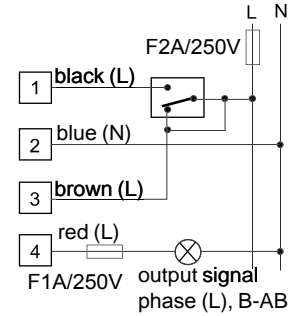
To extend the long term performance of the motorised ball valve it is recommended that a strainer is situated prior to the valve. By installation must be observed to according to relevant local standards.

ELECTRICAL CONNECTION

Two wire SPST control

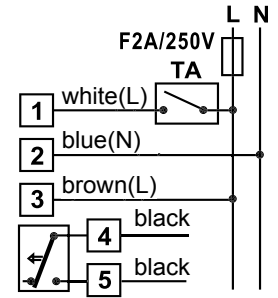


Three wire SPDT control



special version:
EMV 110..4680-S1

(built in non voltage out-
put switch for controlling
burners, ...)

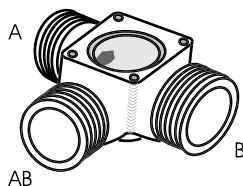


WARNING

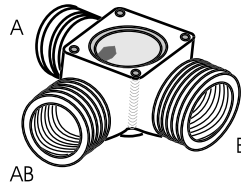
When making electrical connection, an element which enables at least 3mm separation from the mains (switch or socket) must be installed between conductor of electric motor driven actuator and power supply. In case of an intervention inside the actuator, disconnect the device must from power supply.

SPECIAL VERSIONS

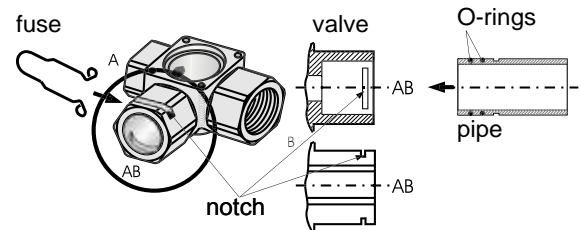
Outer thread on all
three connections
(A, B, AB)



Outer and inner thread
on all three connections
(A, B, AB)

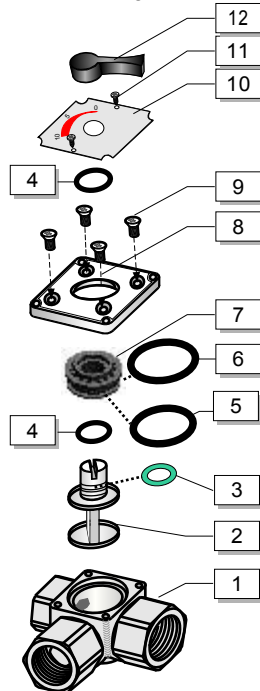


WITH INSIDE SMOOTH HOLE (AE WITH O-RINGS AND
GROOVE FOR USE



MIXING VALVE'S PARTS

DIVERT F3L



POS	NAME	PCS
1	Body Hot stamped CuZn39Pb3	1
2	Flap stem Brass CuZn39Pb3	1
3	O- seat 8.73x1,78 Viton FKM	1
4	O-ring 11.6x2.4 EPDM	2
5	O-ring 23.3x2.4 EPDM	2
6	O-Ring 27x2.5 EPDM	1
7	Insert RYTON R-4-200 BL	1
8	Valves top alloy	1
9	Screw M5x10 DIN 965	4
10	Position plate Al	1
11	Screw 2.9x6.5 DIN 7981 BC	2
12	Handle of the valve PA	1

By installation must be observed to
according to relevant local standards.
The installation must be grounded!

Reserve O-ring
(position 4)
code: 500075



FIRST®

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**MOTORISED BALL VALVES FOR
COOLING SYSTEMS**
**MOTORISCHE KUGELHAHNEN FÜR
KÜHLUNGSSYSTEMEN**



Use in:

- systems of industrial cooling, climatisation, termoregulation
- cooling and heating systems
- water chillers - for clean drinking water (schools, hospitals, offices ...)

Verwendung:

- *Industrie-Kühlungssysteme, Klimatisierung, Termoregelungen*
- *Kühl- und Heizungssysteme (Weinbau, Kehler, Kunststoffbau)*
- *Wasserkühler für reine Trinkwasser (Schülen, Krankenhäuser, Biros)*

TECHNICAL DATA / TECHNISCHE DATEN

	Series EMV 110..	800HL	830HL	820HL	930HL
Electric motor actuator	Power supply	230VAC, 50/60Hz			
	Operating	Auto / Manual			
	Ambient temperature	0°C do 50°C			
	Electric signal - L(live) open	200VA, 50Hz			
	relay module which enables two (SPST) or three (SPDT) wire control	option			
	Micro-switch rating	5(1)A, 250VAC			
	Control	2-point	3-point	3-point	3-point
	Power consumption	3.5W		5W	
	Actuator protection class	IP 55		IP 54	
	Max. operating torque	6Nm		25Nm	
Rotation time	30s/90°	25s/90°; 50s/180°		105s/90°	
Valve	Application range	two way ball valve	three way ball valve	two way ball valve	three way ball valve
	Connection type	Internal thread connectors			
	Body	brass, nickel plated			
	Ball / flap	Ball: brass, hard chromium plated			
	"O-ring" gasket	VITON 3x, PTFE		VITON 3x, PTFE	
	Media	water, non-aggressive media, glycol ...			
	Fluid temperature	-10°C...+80°C			
	Coefficient of the conductivity of coupling	F=0,064		F=0,225	
	Example of limits where the condensation appears	Media temperature: -10°C Surrounding temperature: 30°C Max relative humidity: Rmax=80%		Media temperature: -10°C Surrounding temperature: 30°C Max relative humidity: Rmax=60%	
		<i>The condensation will not appear to this limit.</i>			
Elektromotorische Antriebe	Elektr. Anschluß	230VAC, 50/60Hz			
	Stellung	Auto / Manual			
	Umgebungstemperatur	0°C do 50°C			
	Elektrisches Signal - L (Phase) geöffnet	200VA, 50Hz			
	Relais zur Ansteuerung über 2-Punkt-Steuersignal (SPST) oder direkter über pot.-freien Umschaltkontakt (SPDT).	Option			
	Endschalter	5(1)A, 250VAC			
	Kontrolle	Zweipunktregelung	Dreipunktregelung	Dreipunktregelung	Dreipunktregelung
	Leistungsaufnahme	3.5W		5W	
	Antriebsschutz	IP 55		IP 54	
	Max. Ausgangsmoment	6 Nm		25Nm	
Rotationszeit	30s/90°	25s/90°; 50s/180°		105s/90°	
Ventile	Einsatzbereich	Zweiwege Motor Kugelventile	Dreiwege Motor Kugelventile	Zweiwege Motor Kugelventile	Dreiwege Motor Kugelventile
	Anschlußart	Innengewinde			
	Gehäuse	Messing, Vernickelt			
	Kugel / Klappe	Kugel: Messing hartverchromt			
	"O-Ring" - Dichtung	VITON 3x, PTFE		VITON 3x, PTFE	
	Betriebsbedingungen	Wasser, nicht aggressive Fluide			
	Temperatur des Fluids	-10°C...+80°C			
	Coefficient of the conductivity of coupling	F=0,064		F=0,225	
	Beispiel der atmosphärischen Grenzeinflüsse:	Medientemperatur: -10°C Umgebungstemperatur: 30°C Max relative Luftfeuchtigkeit: Rmax=80%		Medientemperatur: -10°C Umgebungstemperatur: 30°C Max relative Luftfeuchtigkeit: Rmax=60%	
		<i>Bis diesen Werten wird nicht zu Kondensierung der Luftfeuchtigkeit kommen.</i>			



DIMENSIONS / ABMESSUNGEN

serija 800HL		serija 820HL		serija 830HL		serija 930HL					
TIP	DN	G	A	B	C	D	Kv	PN	code		
800HL/530-2	15	½"	182	164	17,5	64	17	16	1,09 11412		
800HL/530-3	20	¾"	191	169	22,0	74	41	16	1,24 11413		
800HL/530-4	25	1"	198	173	25,5	88	68	16	1,49 11414		
TIP	DN	G	A	B	C	D	Kv	PN	code		
820HL/510-5	32	1¼"	250	222	28	101	123	16	2,8 11238		
820HL/510-6	40	1½"	260	225	35	105	198	16	3,4 11239		
820HL/510-7	50	2"	272	228	44	130	290	16	4,5 11240		
TIP	DN	G	A	B	C	D	E	F	Kv	PN	code
830HL/590-3	20	¾"	213	185	24	80	30	73	73	16	1,8 11513
830HL/590-4	25	1"	221	189	27	114	57	88	88	16	2,5 11514
TIP	DN	G	A	B	C	D	E	F	Kv	PN	code
930HL/510-5	32	1¼"	256	223	33	130	64	100	20	16	4,4 11325
930HL/510-6	40	1½"	269	230	39	150	70	115	37,2	16	5,4 11326
930HL/510-7	50	2"	284	237	47	170	90	135	48,7	16	7,4 11327

Data subject to change without notice. / *Technische Änderungen vorbehalten.*



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tel. +386 3 898 35 00, fax. +386 3 898 35 35, e-mail: info@first.si, http://www.first.si



GB MOTORISED BALL VALVES FOR COOLING SYSTEM
D MOTORISCHE KUGELHANEN FÜR KÜHLUNGSYSTEMEN
 EMV 110.. series
 800HL, 820HL, 830HL, 930HL, 710HL, 910HL **-15°..+80°C**

FIRST®

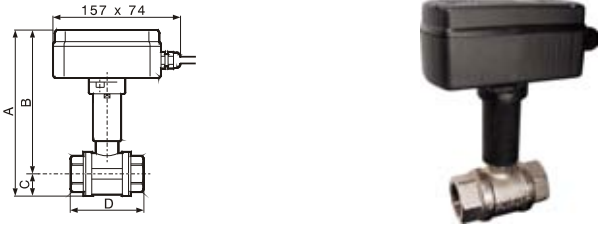
INSTALLATION INSTRUCTION AND USER'S MANUAL
MONTAGEANWEISUNG UND BEDIENUNGSANLEITUNG

Installation should be carried out only by a qualified person!
 Die Montage darf nur Fachmann ausführen!

DIMENSIONS
ABMESSUNGEN



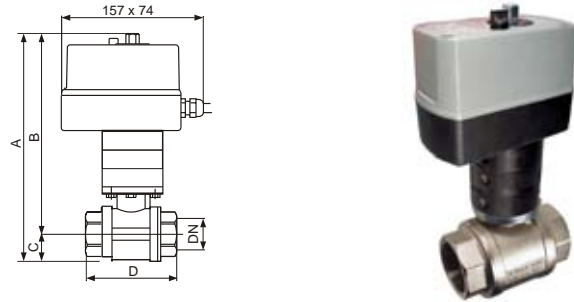
series 800HL



TIP/TYPE	DN	G	A	B	C	D	Kvs	PN	⚠	šifra
800/530HL-2	15	1/2"	186	168	17,5	64	17	16	1,09	11412
800/530HL-3	20	3/4"	194	172	22,0	74	41	16	1,24	11413
800/530HL-4	25	1"	202	177	25,5	88	68	16	1,49	11414

TIP/TYPE	DN	G	A	B	C	D	Kvs	PN	⚠	šifra
*800/533HL-2	15	1/2"	186	168	17,5	64	17	16	1,10	11422
*800/533HL-3	20	3/4"	194	172	22,0	74	41	16	1,25	11423
*800/533HL-4	25	1"	202	177	25,5	88	68	16	1,50	11424

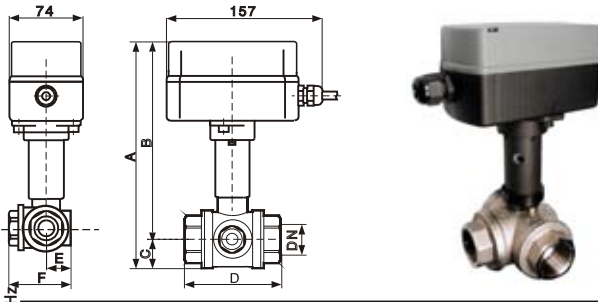
series 820HL



TIP/TYPE	DN	G	A	B	C	D	Kv	PN	⚠	šifra
820/410HL-5	32	1 1/4"	269	241	28	101	123	16	2,8	11238
820/410HL-6	40	1 1/2"	285	250	35	105	198	16	3,4	11239
820/410HL-7	50	2"	297	253	44	130	290	16	4,5	11240

TIP/TYPE	DN	G	A	B	C	D	Kv	PN	⚠	šifra
*820/413HL-5	32	1 1/4"	269	241	28	101	123	16	2,9	11241
*820/413HL-6	40	1 1/2"	285	250	35	105	198	16	3,5	11242
*820/413HL-7	50	2"	297	253	44	130	290	16	4,6	11243

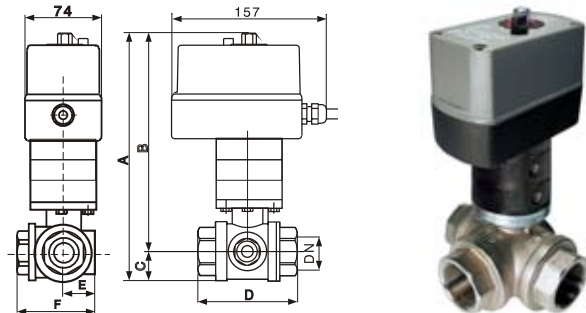
series 830HL



TIP/TYPE	DN	G	A	B	C	D	E	F	Kv	PN	⚠	šifra
830/590HL-3	20	3/4"	202	178	24	80	30	73	5,2	16	1,8	11513
830/590HL-4	25	1"	210	183	27	114	57	88	9,2	16	2,5	11514

TIP/TYPE	DN	G	A	B	C	D	E	F	Kv	PN	⚠	šifra
*830/593HL-3	20	3/4"	202	178	24	80	30	73	5,2	16	1,81	11523
*830/593HL-4	25	1"	210	183	27	114	57	88	9,2	16	2,51	11524

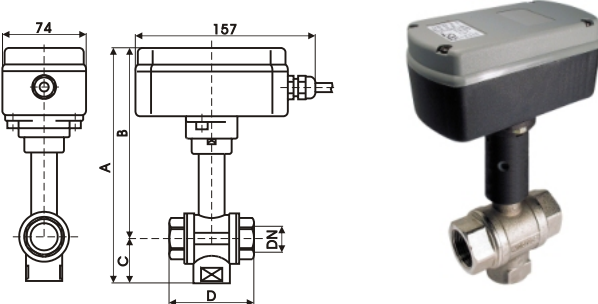
series 930HL



TIP/TYPE	DN	G	A	B	C	D	E	F	Kv	PN	⚠	šifra
930/410HL-5	32	1 1/4"	278	245	33	130	64	100	20	16	4,4	11325
930/410HL-6	40	1 1/2"	287	248	39	150	70	115	37,2	16	5,4	11326
930/410HL-7	50	2"	304	257	47	170	90	135	48,7	16	7,4	11327

TIP/TYPE/TYPE	DN	G	A	B	C	D	E	F	Kv	PN	⚠	šifra
*930/413HL-5	32	1 1/4"	278	245	33	130	64	100	20	16	4,4	11525
*930/413HL-6	40	1 1/2"	287	248	39	150	70	115	37,2	16	5,4	11526
*930/413HL-7	50	2"	304	257	47	170	90	135	48,7	16	7,4	11527

series 710HL

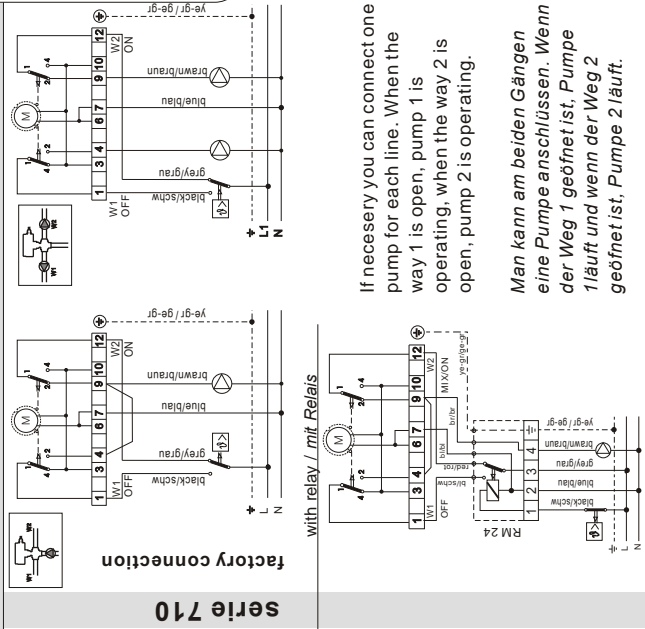
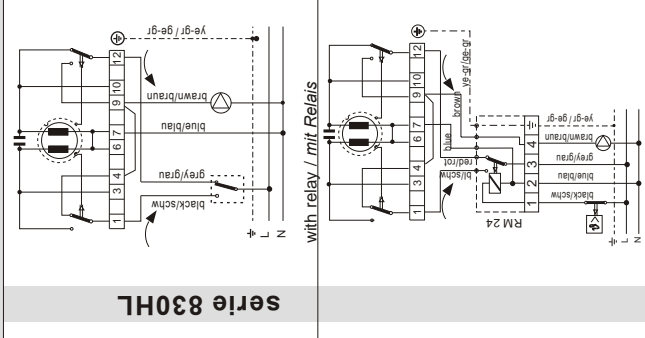
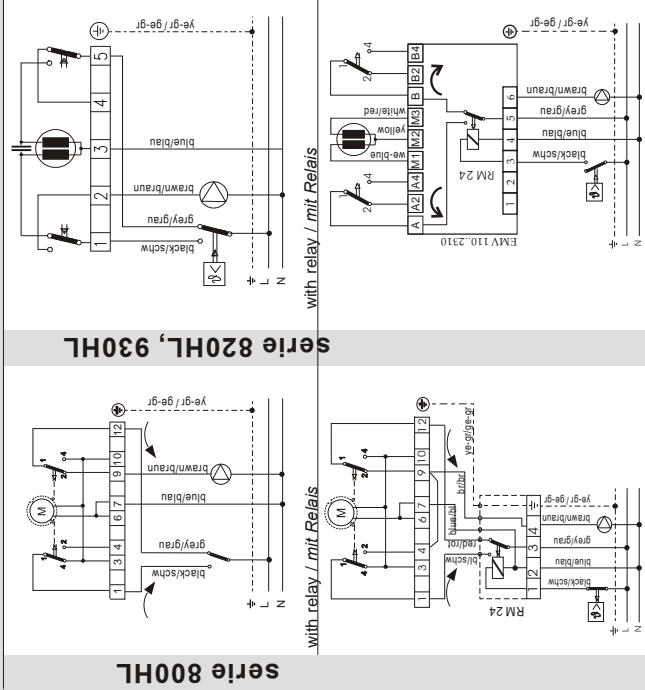


TIP/TYPE	DN	G	A	B	C	D	Kv	PN	⚠	šifra
710/550HL-2	15	1/2"	200	160	39	74	3,81	16	1,00	11312
710/550HL-3	20	3/4"	200	160	39	74	7,68	16	1,30	11313
710/550HL-4	25	1"	210	164	46	88	11,6	16	1,60	11314

SERIE EMV 110 ..	800HL	820HL	830HL	930HL	710HL
Power supply/Elekt. anschluss	230VAC, 50/60Hz	230VAC, 50/60Hz	230VAC, 50/60Hz	230VAC, 50/60Hz	230VAC, 50/60Hz
Operating / Stellung	Auto / Manual	Auto / Manual	Auto / Manual	Auto / Manual	Auto / Manual
Flow indicator	On valve's support An Ventil Träger	On the cover An Deckel	On valve's support An Ventil Träger	On the cover An Deckel	On valve's support An Ventil Träger
Ambient temperature / Umgebungstemperatur	0°C - 55°C	0°C - 55°C	0°C - 55°C	0°C - 55°C	0°C - 55°C
El. signal (open) - L Elek. Signal (geöffnet) - L	200VA, 50Hz	200VA, 50Hz	200VA, 50Hz	200VA, 50Hz	200VA, 50Hz
Relay modul / Relais modul	possibility möglichkeit	possibility möglichkeit	possibility möglichkeit	possibility möglichkeit	possibility möglichkeit
Micro-switch rating / Endschalter	5(1)A, 250VAC	5(1)A, 250VAC	5(1)A, 250VAC	5(1)A, 250VAC	5(1)A, 250VAC
Control / Kontrolle	2-point	3-point	3-point	3-point	2-point
Power consumption / Leistungsaufnahme	3.5W	5W	3.5W	5W	3.5W
Actuator protection class / Antriebsschutz	IP 55	IP 54	IP 55	IP 54	IP 55
Max. operating torque / Max Ausgangsmoment	6Nm	25 Nm	6Nm	25 Nm	6Nm
Rotation time / Rotationszeit	30s/90°	105s/90°	* 50s/180° (tip 830HL/570)	105s/90°	60s/180°
Ventil	2 way ball valve	2 way ball valve	3 way ball valve	3 way ball valve	3 way ball valve
Connection type / Anschlussart	Internal thread connectors / innengewinde	Internal thread connectors / innengewinde	Internal thread connectors / innengewinde	Internal thread connectors / innengewinde	Internal thread connectors / innengewinde
Coefficient of the conductivity of coupling ¹⁾	F=0,064	F=0,225	F=0,064	F=0,225	F=0,064

Actuator / Antrieb

ELECTRICAL CONNECTION/ ELEKTRISCHER ANSCHLUSS



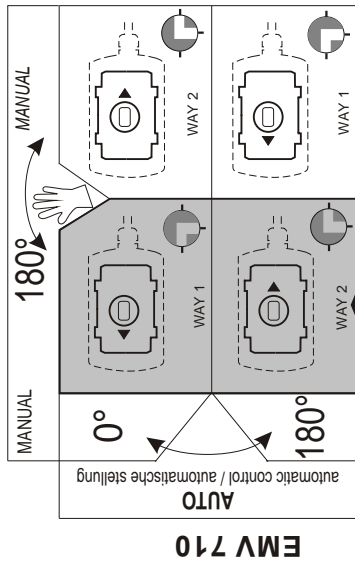
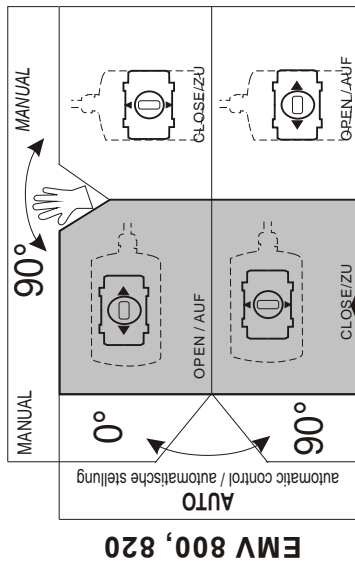
If necessary you can connect one pump for each line. When the way 1 is open, pump 1 is operating, when the way 2 is open, pump 2 is operating.

Man kann am beiden Gängen eine Pumpe anschließen. Wenn der Weg 1 geöffnet ist, Pumpe 1 läuft und wenn der Weg 2 geöffnet ist, Pumpe 2 läuft.

Valve's body: brass, nickel plated
 Gehäuse: Messing, Vernickelt
 Ball: brass, nickel plated
 Kugel: Messing hartverchromt
 O-ring gaskets: VITON 3x, PTFE
 O-ring Dichtung: VITON 3x, PTFE
 Medium: water, non-aggressive media, glycol...
 Betriebsbedingungen: Wasser, nicht aggressive Fluide
 Fluid temperature: -15°C..+80°C²⁾
 Temperature des Fluid: -15°C..+80°C²⁾
 Max. pressure: 16 bar

1) Temperature measurements are made on University of Ljubljana, faculty of mechanical engineering, laboratory for cooling technique.

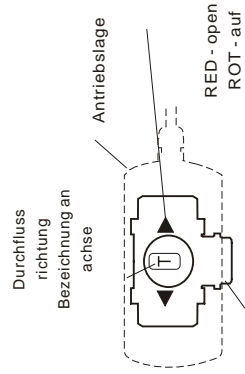
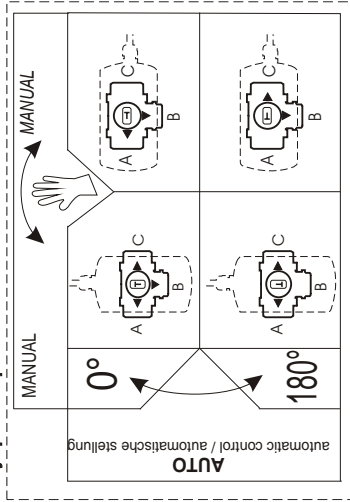
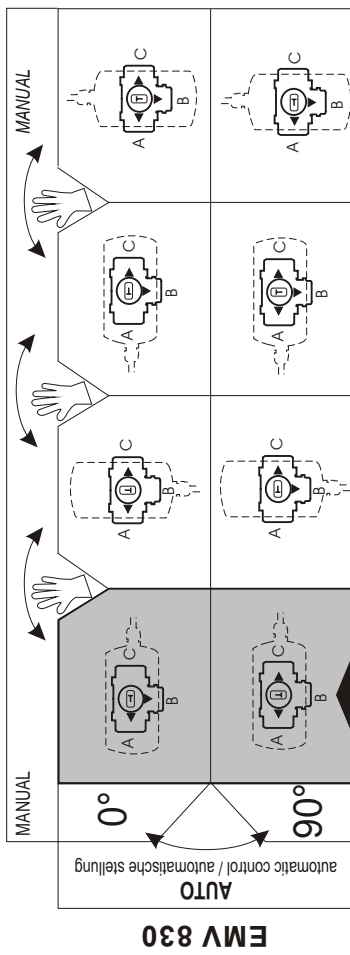
2) The pipes and valves should be insulated.



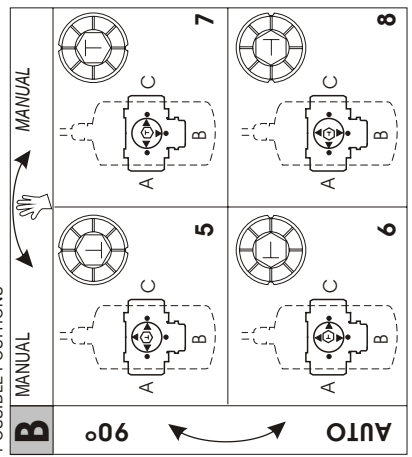
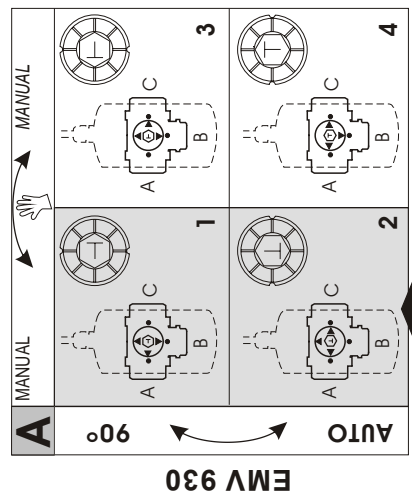
FACTORY SETTINGS / FABRIK ANSTELLUNG

FACTORY SETTINGS / FABRIK ANSTELLUNG

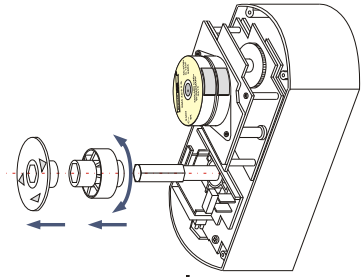
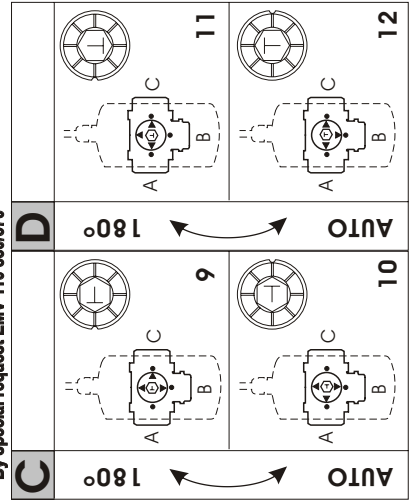
* By special request EMV 110 830/570



POSSIBLE POSITIONS



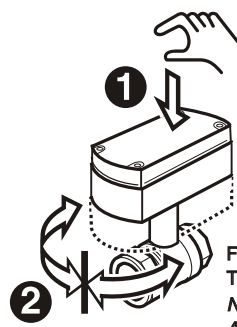
* By special request EMV 110 830/570



FACTORY SETTINGS / FABRIK ANSTELLUNG

MANUAL OPERATION / HANDSTEUERUNG

serie 800, 830, 710

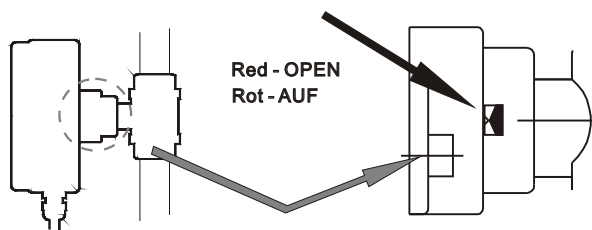


1. depress the actuator towards the valve
Den Antrieb nach Ventil drücken
2. rotate the actuator
Den Antrieb drehen
3. the spring returns and snaps the actuator
Die Druckfeder bringt den Antrieb wieder zurück und schnappt in die eingestellte Lage

FOR AUTOMATIC MOTOR OPERATION, RETURN THE ACTUATOR INTO IT'S ORIGINAL POSITION!
NACH HANDSTEUERUNG BRINGEN SIE DEN ANTRIEB IN DIE ANFANGSLAGE ZURÜCK!

POSITION VALVE INDICATOR ZEIGER DER VENTILLAGE

INDIKATOR / ANZEIGE



MANUAL OPERATION

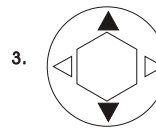
series EMV 110 820, 930



With a key 13 move slightly the valve in clockwise or contra clockwise direction in order to release the gears
Schlüssel Nr. 13 auf Achse stecken



Press and rotate the button
Knopf drücken

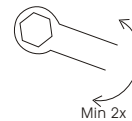


Rotate the valve with the key in desired position:
- red : OPEN / blue : CLOSE
Schlüssel in gewünschte Richtung drehen
rot = AUF / blau = ZU



Depress and rotate the button back to the original position
Knopf loslassen

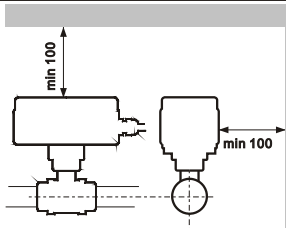
IMPORTANT ! / WICHTIG!



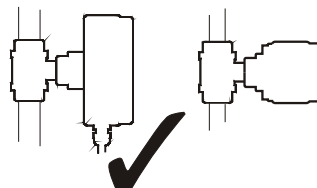
AFTER LONG STANDSTILL PERIOD
Manually rotate the valve with a key for at least two full rotations to release the valve and to clean away impurities from the ball

NACH LÄNGEREM STILLSTAND
Das Ventil manuell mindestens zweimal um den Vollöffnungswinkel drehen, um die Verschmutzung von Ventilkugel zu entfernen und den Antrieb zu entlasten.

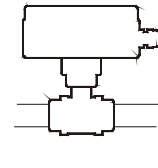
BUILD-IN ROOM / EINBAURAUM



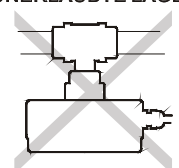
PRIORITY / VORRANGLAGE



ALLOWED / MÖGLICHE LAGE

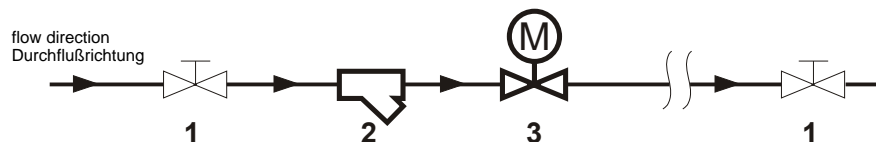


NOT ALLOWED! UNERLAUBTE LAGE!



HYDRAULIC INSTALLATION: recommended installation of the electric actuated ball valve

SCHEMA DER MASCHINENINSTALLATION: Empfohlener einbau des kugelventils mit elektromotorantrieb



- 1 manual stop valve /
manuelles Absperrventil Kugelventil
- 2 strainer with the mesh width 0,65 mm /
Reinigungsfilter Y (für detaillierte
Informationen bitte rufen Sie uns an
lieferbar in Abmessungen von 1¼" bis 2"
- 3 motor actuated ball valve series
EMV 110...
Elektromotorantrieb mit Kugelventil
EMV 110...

IMPORTANT !

To extend the long term performance of the motorised ball valve it is recommended that a strainer is situated prior to the valve. By installation must be observed to according to relevant local standards.

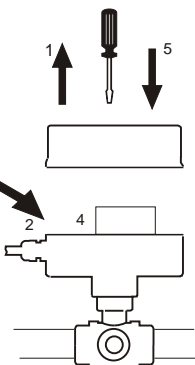
WICHTIG!

Um die Lebensdauer des Ventil zu verlängern und Vernichtung der Dichtungen durch mechanische Teile in der Installation zu verhindern wird der Einbau eines Reinigungsfilters empfohlen. Die einschlägigen VDE+TÜV - Verschriftensindzubesuchen.

RELAY MODULE BUID-IN INSTRUCTION (ONLY for 230V, 50Hz) / RELAIS-EINBAUEN (NUR FÜR 230V, 50Hz)

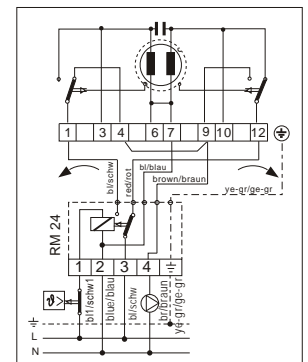
RELAY MODULE RM 24 RELAIS MODUL RM 24

Code Nr.
Art. Nr: 10024



1. Unscrew cover screws
Die Schrauben des Antriebdeckel herausdrehen
2. Disconnect connection cord
Anschlusskabel abklemmen
3. Insert a relay module
Relais Modul einsetzen
4. Connect a relay module according to scheme
Relais Modul anschliessen
5. Return the cover
Antriebdeckel anschrauben

ELECTRICAL CONNECTION / ELEKTRISCHE ANSCHLUSS



MOTORIZED BALL VALVE WITH BATTERY BACK-UP OPERATION

EMV 110 602/1590-B

FIRST®

Installing and mounting instructions



EMV 110..1590-B is used in system, where in case of power failure opens/closes ball valve. It can be used as safety element in various systems.

PROPERTIES

- manual ball valve opening/closing possibility
- setting the position of the ball valve in case of power failure - open/closed
- sound signaling possibility - additional connection of beeper
- battery power supply - 4x LR6-1.5V/AA-alkaline Duracell (batteries are inserted in the actuator)
- long lifespan and operation reliability

FEATURES

Nominal voltage: 230V, 50Hz, 0.5W
 Connection cable: 1.5m (including plug)
 Batteries: Battery power supply 4x LR6-1.5V/AA (DURACEL MN1500-alkaline)
 Life span of batteries: approx 2 years
 Opening / closing time: 25s/90°
 Medium temperature: 0 ° C. .130 ° C
 Ambient: 0 ° C. .55 ° C, 5..90% relative humidity
 Actuator protection class: IP55
 Protection class: 1 DIN VDE 0700-T1/EN 60335-1
 Ball valve: DN20-3 / 4 ", DN25-1" or DN32-11 / 4 "

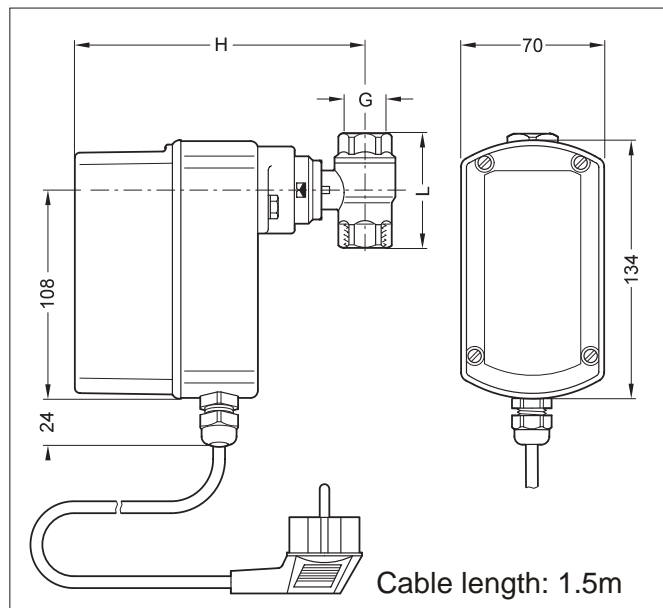
OPERATION

When you connect actuator to power supply, ball valve is turned in the basic position - closed (factory default).

In case of power failure actuator opens the ball valve using battery power.

The actuator has output for power failure. It can be used for voice signaling (additional connection of beeper 4-7VDC). However it reduces the life span of batteries.

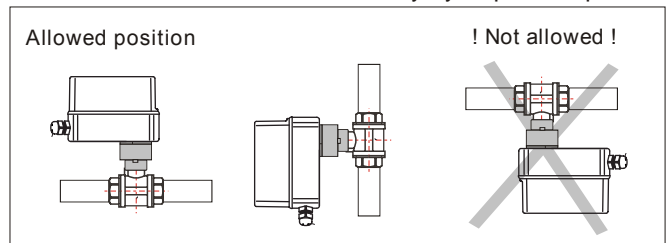
DIMENSIONS



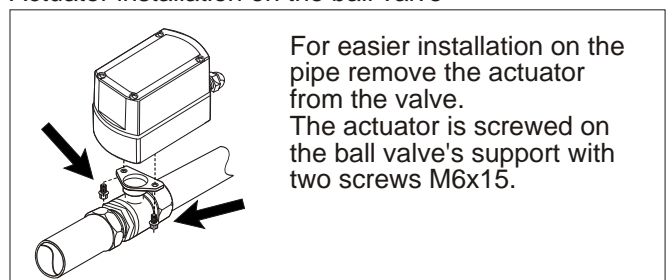
Type	G	DN	H	L	Kvs	Kg
EMV 110 602/1590-B-3	3/4"	20	152	57	41	1,1
EMV 110 602/1590-B-4	1"	25	163	68	68	1,3
EMV 110 602/1590-B-5	1 1/4"	32	173	81	123	1,5

INSTALLATION

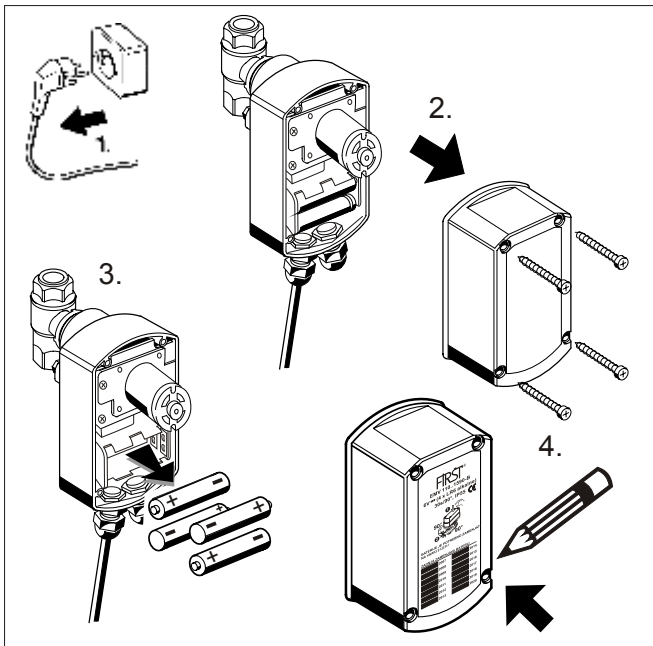
Installation should be carried out only by a qualified person!



Actuator installation on the ball valve



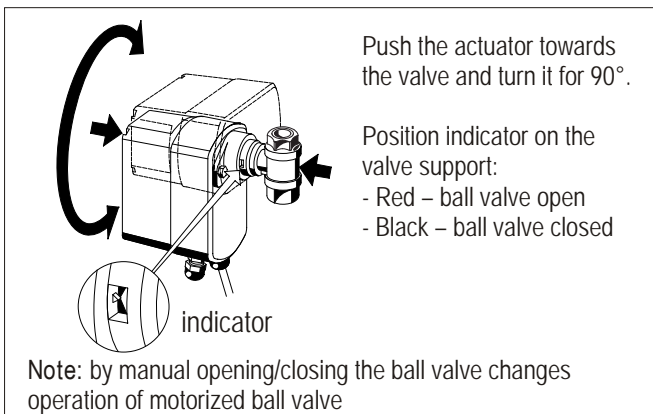
INSERT/EXCHANGE BATTERIES



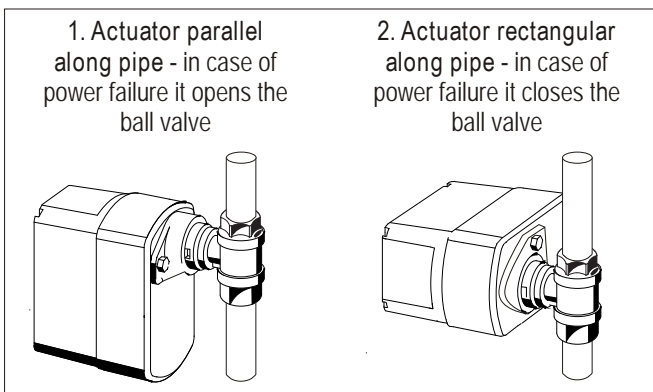
- Batteries provide power supply to actuator in case of power failure.
1. Remove the plug from mains
 2. Unscrew 4 screws on the actuator's cover and remove it
 3. Pull out used batteries and replace them with new 4x LR6 – 1,5V/AA
 4. On the cover write down when you replaced batteries
 5. Assemble the actuator together

Batteries should be replaced approximately every two year.
 ⚠ Before every intervention inside actuator must be power supply unplugged. Installation should be carried out only by a qualified person! After batteries exchange must be controlled proper function of actuator.

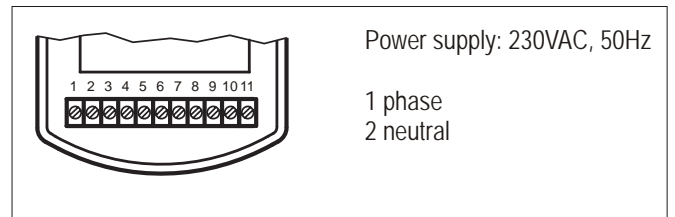
MANUAL OPENING / CLOSING THE BALL VALVE



ACTUATOR FUNCTION REGARDING ACTUATOR POSITION



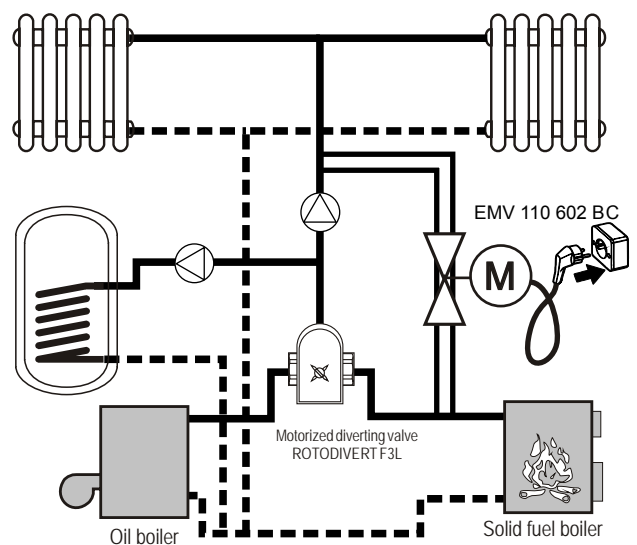
ELECTRICAL CONNECTION:



⚠ In case that actuator doesn't work, check correct batteries insertion. By transport or by strong mechanical impact could happens that batteries fallout from their seats. Therefore are protected with scotch tape.

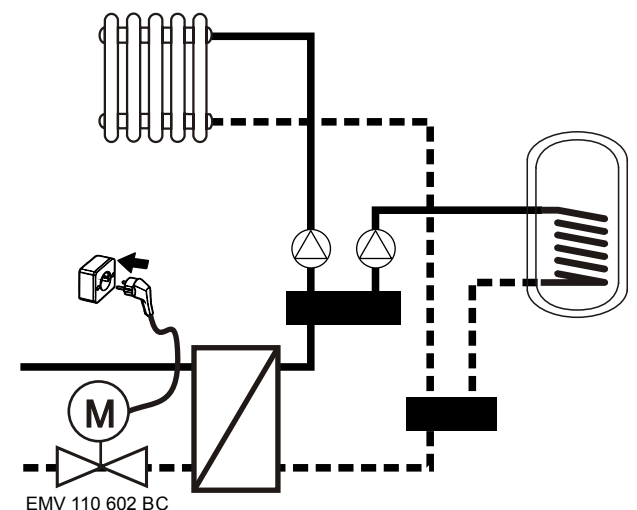
EXAMPLE OF USE

1. In case of power failure motorized ball valve opens by-pass pipe past all regulating elements.



The installation must be properly made that allows thermosyphon circulation.

2. In case of power failure motorized ball valve closes return pipe and prevents overheating the exchanger.

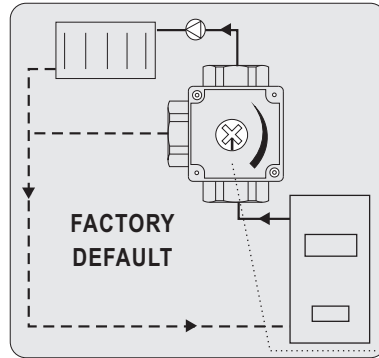
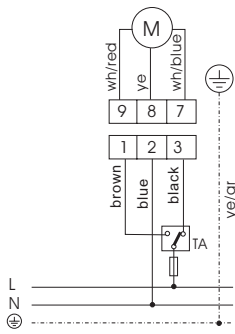


* Data subject to change without notice.

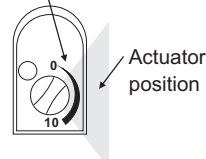
ELECTRIC CONNECTION (with three way brass mixing valve)

The motor is equipped with cord of connection to the mains. When connecting the drive it is not necessary to open it.

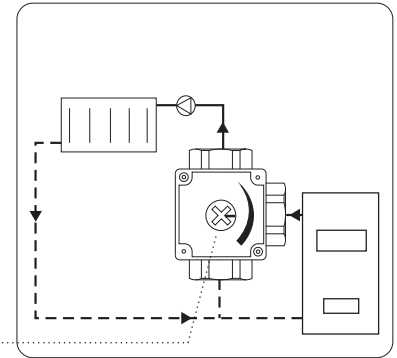
1. 2. Boiler on right



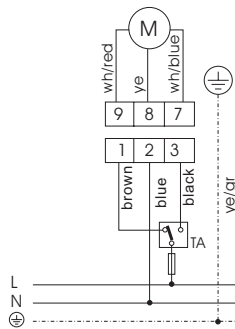
Red dial of rotating angle



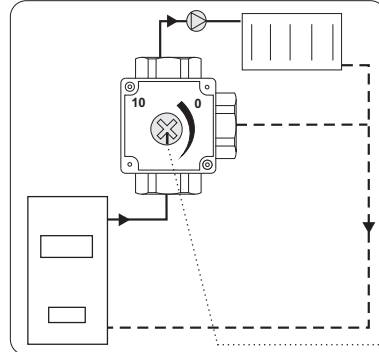
Incision shows rotor position in valve



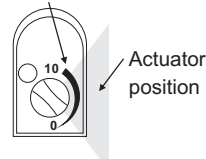
2. Boiler on left



C.) Inlet from bottom

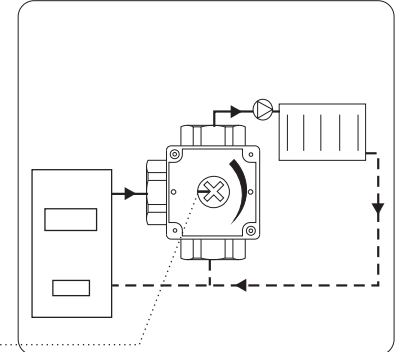


Red dial of rotating angle



Incision shows rotor position in valve

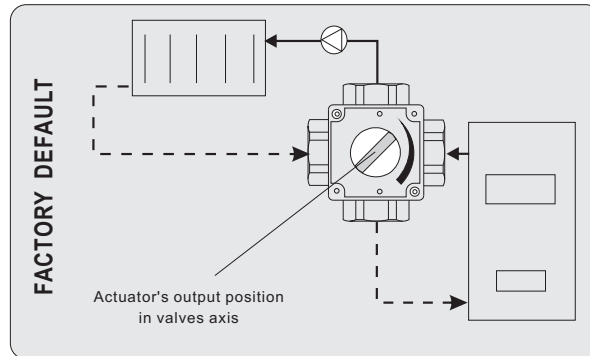
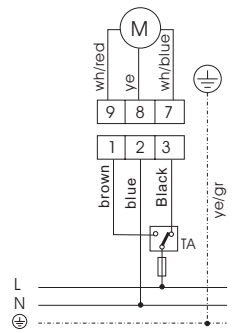
D.) Inlet from left



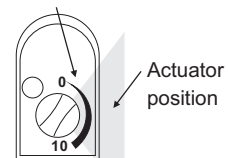
ELECTRIC CONNECTION (with four way brass mixing valve)

The motor is equipped with cord of connection to the mains. When connecting the drive it is not necessary to open it.

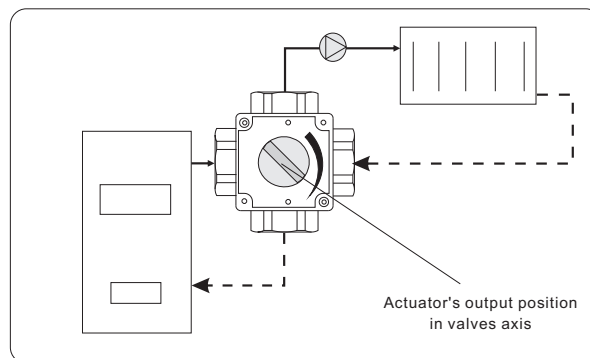
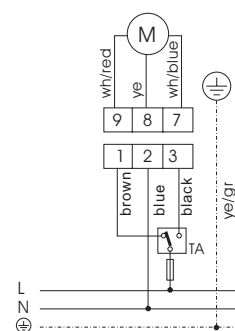
1. Boiler on right



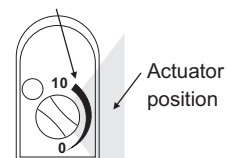
Red dial of rotating angle



2. Boiler on left

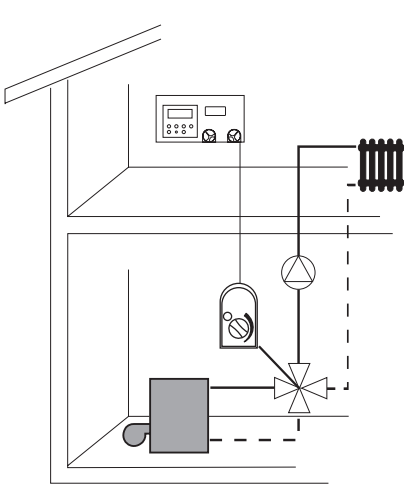


Red dial of rotating angle



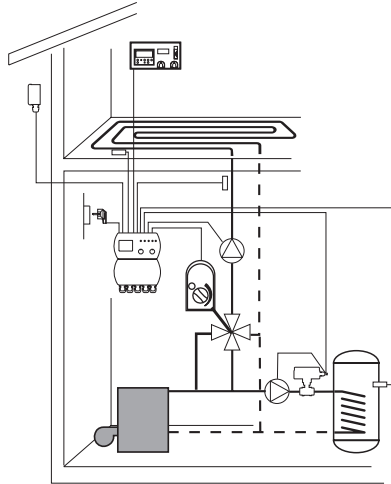
⚠ I WARNING ! Electrical connection to the mains can be performed only by qualified person in compliance with local regulations.

EXAMPLES FOR USE OF THE DRIVE IN HEATING SYSTEMS



VALVE CONTROL OPEN/CLOSE:

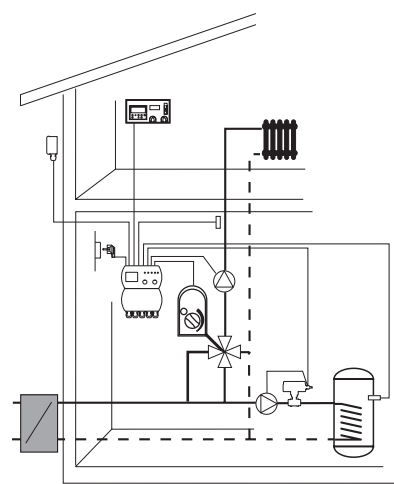
It is performed with the connection of the drive on room thermostat thought a switching contact. The above example shows our ELTHERM AT8 room thermostat. When the drive is connected to room thermostat thought operating contact only, use an external relay or a drive version built-in relay module.



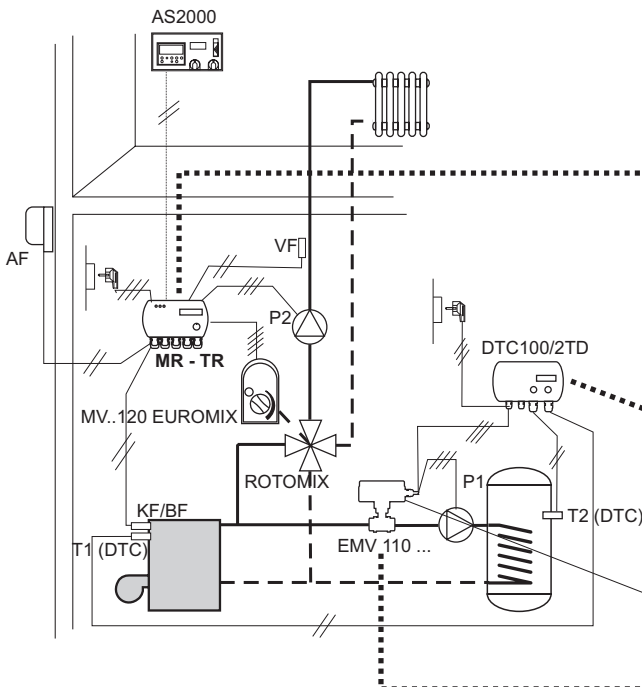
CONTROL OF VALVE POSITION:

The control is performed with the connection of the drive to 3-point regulation control unit which regulates the temperature of heating water with mixing valve in dependance from outer and/of room temperature (programme ROTOTERM). The left above example shows the regulation of floor heating with programmable regulation control unit ROTOTERM AT2000. The right example shows remote heating system. Heating is regulated with programmable control unit ROTOTERM R2000. There can be used also other ROTOTERM control units from our production range, witch are mounted on the wall.

In both cases the heating of sanitary water in water heater is separately regulated thought the probe of the heater. Output from the regulator is controlled by motor driven ball valve EMV110.. of our production range and it controls also the pump for water heater. Use of EMV prevents thermal circulation of water thought water heater.



Example of use with heating controller ROTOTERM MR-TR "plus"



ROTOTERM MR-TR "plus"

3-point regulator, which regulates the temperature of heating water with mixing valve.



Contents of the package

- ROTOTERM MR-TR regulator
- complete of sensors (outside sensor, mixed flow sensor and boiler sensor)
- mounting kit
- Indoor programming unit AS2000-D

EMV 110..602 Motorized ball valve



- built-in relay

DTC100/2TD Differential thermostat



MR-TR regulator



AS 2000 room unit



DTC100/2TD differential thermostat



Electromotor drive for brass mixing valve EUROMIX MV 120..



ROTOMIX 3 or 4 way brass mixing valve ROTOMIX F3 or F4



T - sensor

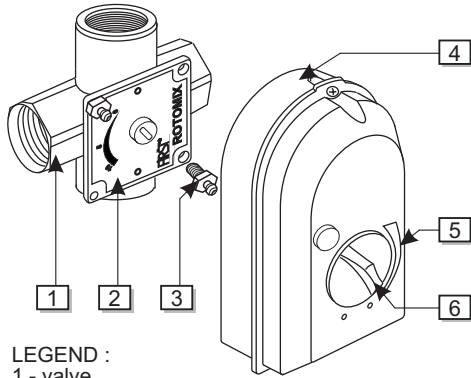


EMV 110..compact



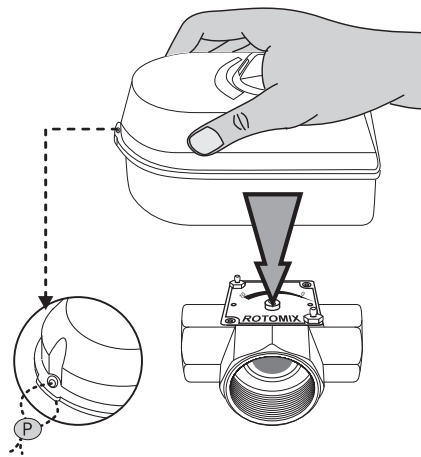
P1, P2
P1 - pump for sanitary water heating
P2 - pump for heating circle

MOUNTING THE ACTUATOR ON THREE OR FOUR WAY BRASS MIXING VALVE



LEGEND :

- 1 - valve
- 2 - valve indicating plate
- 3 - screw with supporting spacer
- 4 - rotary actuator
- 5 - valve position pointer
- 6 - knob for manual control



Push the actuator direct on the mixing valve, that it sit on supporting spacers and the mounting is finished.

If you want to remove drive because of any kind of the reason, you can simply pull it off the valve !

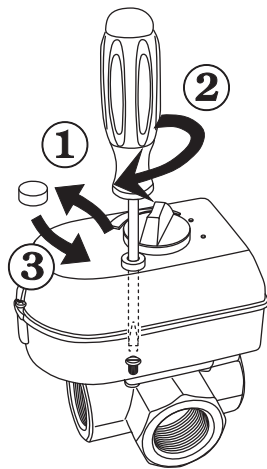
Possibility of sealing the housing of the actuator.

OPTION FOR ACTUATOR SCREWING ON VALVE

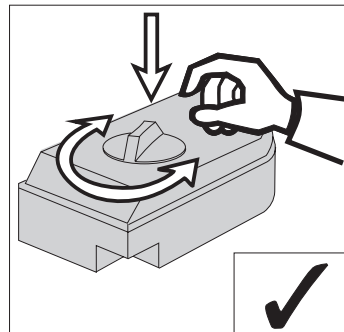
To fix the actuator on the valve it is NOT REQUIRED TO OPEN it!

The screw for the actuator screwing on the valve is inserted in drive bottom!

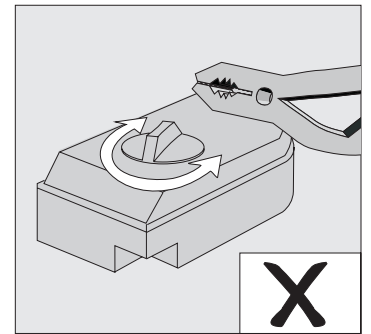
1. Remove protective tap.
2. Use flat screwdriver to screw the drive on the valve.
3. Replace protective tap into the opening.



MANUAL CONTROL



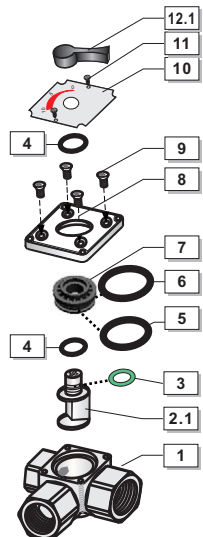
The rotary actuator is equipped with a knob for manual control (in case of current breakdown). Press the knob towards the valve and turn it to the left or right direction (depends whether you want to open or close it).



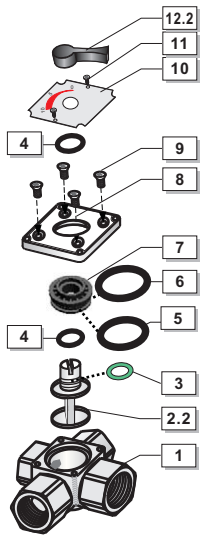
Do not try turning the knob with tongs, because you can damage the gear box! In case the knob can not be turned with hand, disassemble the mixing valve, clean and lubricate it.

MIXING VALVE'S PARTS

ROTOMIX F3



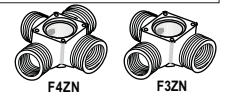
ROTOMIX F4



POS	NAME	PCS
1	Body	1
2.1	Hot stamped CuZn39Pb3	1
2.2	Rotor with stem Brass CuZn39Pb3	1
3	Flap stem Brass CuZn39Pb3	1
4	O-seat 8.73x1,78 Viton FKM	1
5	O-ring 11.6x2,4 EPDM	2
6	O-ring 27x2,5	1
7	Insert RYTON R-4-200 BL	1
8	Valves top alloy	1
9	Screw M5x10 DIN 965	4
10	Position plate Al	1
11	Screw 2.9x6.5 DIN 7981 BC	2
12.1	Handle of 3-way valve PA	1
12.2	Handle of 4-way valve PA	1

Special versions of valves: inner/outer threads

TYP	Inner/Outer(DN)	CODE
MV120 F3ZN/540	DN20 / DN25 - 3/4" / 1"	10059
MV120 F3ZN/540	DN25 / DN40 - 1" / 1 1/2"	10060
MV120 F4ZN/540	DN20 / DN25 - 3/4" / 1"	10061
MV120 F4ZN/540	DN25 / DN40 - 1" / 1 1/2"	



Actuator versions:

TYP	VOLTAGE	TIME	CODE
MV120..540	230VAC, 50/60Hz	210s/90°	10046
* MV120..510	230VAC, 50/60Hz	105s/90°	10047
* MV120..543	24VAC, 50/60Hz	210s/90°	10168
* MV120..513	24VAC, 50/60Hz	105s/90°	10179

* Only by special request

Spare O-ring
(position 4)
code: 500075

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Radegunda 54, 3330 Mozirje

tel: ++386 3 898 35 00, fax: ++386 3 898 35 35

info@first.si, <http://www.first.si>

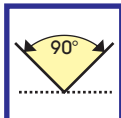
Electric actuator



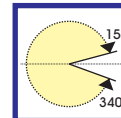
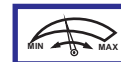
MV 120/...

for 3- and 4-way rotary mixing valves

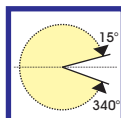
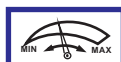
MV 120/09E



MV 120/210



MV 120/360



Electric motor rotary actuator is supplied with handle and adapters for mounting on mixing valves. It contains plastic security part which is in function of fuse and will break down by overcharging to avoid damage on sinchro motor or gears.

Functions of motor rotary actuators in heating systems are:

1. ON/OFF CONTROL OF ACTUATOR: with room thermostats which has changeover type of output
2. POSITION CONTROL: all type of three point controllers with or without outside compensated temperature control

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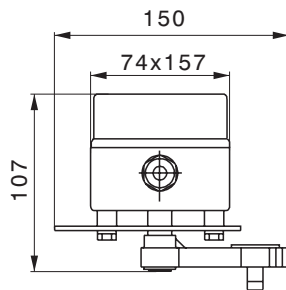
e-mail: info@first.si

MV 120/09E



Rotation angle 90°
 Output torque 6 Nm
 Protection degree IP 55

- For mixing valves up to 1½".
- Possibility of built in relay module RM 24 for 2-point control of actuator.
- Built in 3rd switch for controlling the pump.
- Dimensions: 157x150x107

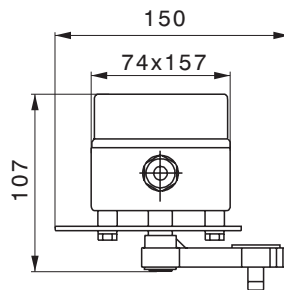


MV 120/210



Rotation angle 15°-340°
 Output torque 6 Nm
 Protection degree IP 55

- Rotation angle from 15 up to 340°
- For mixing valves up to 1½".
- Built in 3rd switch for controlling the pump.
- Dimensions: 157x150x107

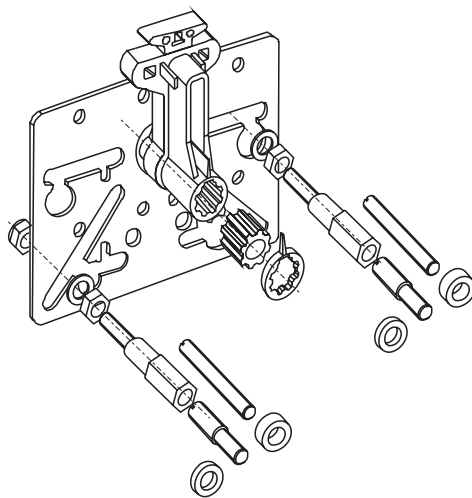
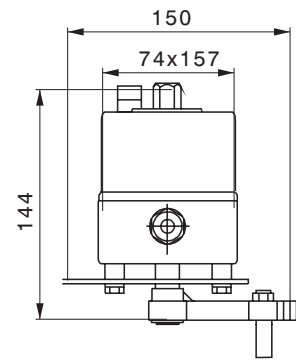


MV 120/360



Rotation angle 15°-340°
 Output torque 25 Nm
 Protection degree IP 54

- For mixing valves up to 4"
- Built in 3rd switch for controlling the pump.
- Dimensions: 157x150x144

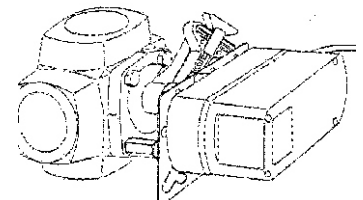


Standard adapters for mounting on mixing valves:

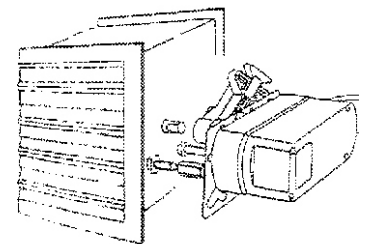
FIRŠT Rotomix F3 in F4, ACASO, Landis&Gyr, Besser, IKA, V.I.L.B., Meibes, Termomix, Besser, MUT, FIRŠT Rotomix MSVA, MSVBA, Ferrotherm, ESBE, IMP, IMT, Honeywell LŽ, Sauter, Centra (ZRK), API, Danfoss, Tekmar, TEM, Barberi

By special orders we supply adapters for following mixing valves: Viessmann, Centra, V.I.L.B., TVT-STADLER, Honeywell (medeninasti), Vailant, VITA, Meibes, AEG, IKA, Caleffi, MUT 1000, ...

ACTUATOR WITH MIXING VALVE



ACTUATOR WITH VENTILATION FLAP



TECHNICAL DATA

Power connection	220-240V, 50Hz, 3.5W
Rotation time	210s, 105s
Microswitch rating	5(1)A, 250VAC
Ambient temperature	0 bis 55°C
Connection cable length	5x0.75mm ² , L=1500mm



Data subject to change without notice.

ACTUATOR FOR ROTARY MIXING VALVES

MV 120/09E

for 3- and 4-way mixing valves



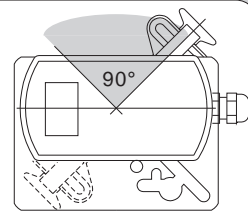
FIRST®

USER MANUAL

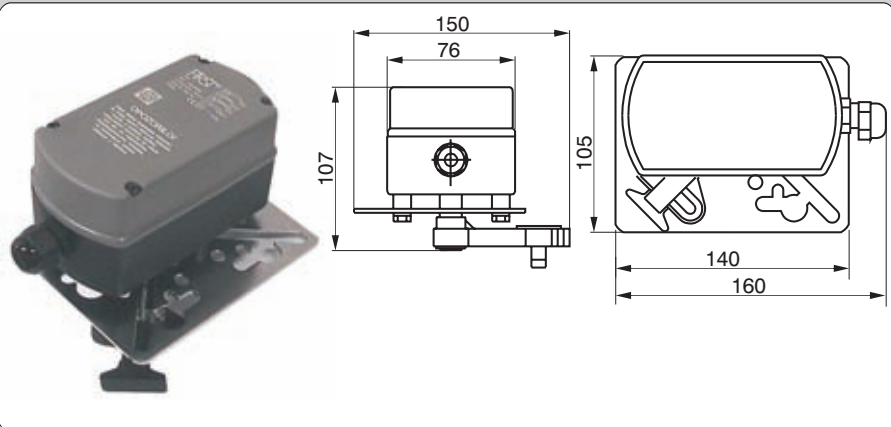
Montage and power connection should be done only by a trained person !

BEFORE FIRST TIME USE

Electric motor rotary actuator is supplied with handle as it is shown on the illustration. Before exploitation be sure that handle move in accurate sector, to void breaking plastic security part called lever, which is junction between handles of mixing valve and actuator. If it is necessary is possible to change moving and rotating angle of handle. Before every heating season it is advisable to move by hand a few times handle for 90° to avoid breaking because of high starting torque. Instead plastic security part which is in function of fuse and will break. If it happened many times it is necessary to open and clean the mixing valve.



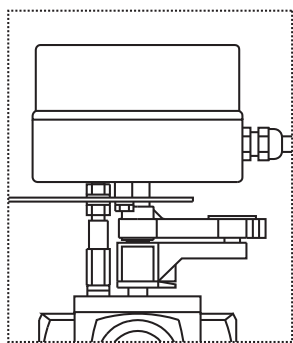
DIMENSIONS



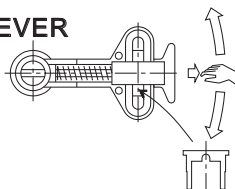
WARNING !

Actuator has no fuse inside, so it is necessary that fuse is included in electrical installation outside of actuator. Also be aware that connection is carried out crossing the switch which can unplugged the actuator if necessary

ASSEMBLY



SECURITY LEVER

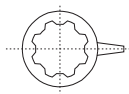


Coupling part with plastic security lever break down by overcharging to avoid damage on sinchro motor or gears.

REPLACEMENT:

- pull the handle and place the lever into the mid position
- remove broken plastic security element
- replace it with enclosed one, by pressing it into required gap
- return handle to previous position

INDICATOR



Place it in position in which you can see actualy position of valve.

Adapter kit

Support bolts



FIRST Rotomix LŽVM, Rotomix LŽVDM, Rotomix F3 in F4, Landis&Gyr, Besser, IKA, V.I.L.B., Meibes, Termomix, Besser, MUT

FIRST Rotomix MSVA, MSVBA, Ferrotherm, ESBE, IMP, Honeywell LŽ, Sauter, Centra (ZRK), API, Danfoss, Tekmar, TEM, Barberi



Valve handle adapters



FIRST Rotomix MS, IMP, ESBE, Ferrotherm, Besser, API, Termomix, Barberi



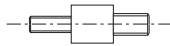
Landis&Gyr



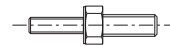
FIRST Rotomix F3 in F4, Honeywell LŽ, MS

By special request:

Support bolts



TVT Stadler



Centa, Vaillant



Viessmann do 1" M6

Valve handle adapters



TVT STADLER



WITA, MEIBES, AEG



Viessmann



CENTRA DR, ZR <=1" Vaillant <=1", TVT Stadler □14



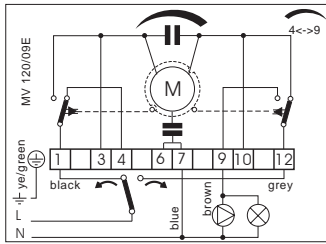
IKA, CALEFFI, MUT 1000



CENTRA ZRK <=1"

TECHNICAL DATA

Factory connection



Power supply	230 V, 50 Hz, 3.5 W
Rotation angle	90°
Rotation time for 90°	210s, 105s
Output torque	6 Nm
Protection degree	IP 55
El. motor insulation class	120°
Ambient temperature	0 ... 55 °C
Microswitch rating	5(1)A, 250 VAC
Connection cable length	5x0.75 mm ² , L=1500 mm

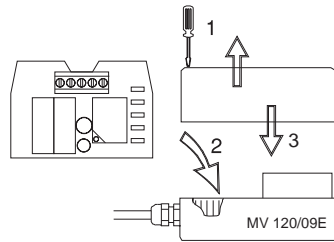
ELECTRIC CONNECTION execute according shown wiring diagram.

ON/OFF CONTROL OF ACTUATOR: with room thermostats which has changeover type of output.

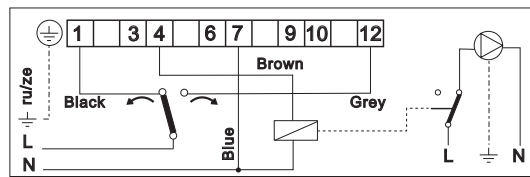
POSITIONING CONTROL: all type of three point controllers with or without outside compensated temperature control.

ADDITIONAL EQUIPMENT - RELE MODUL RM 24

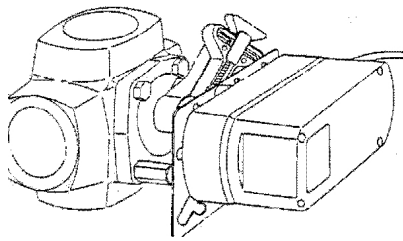
In case of controlling actuator by thermostat is recommended, that you connect the pump over standstill contact outside relay which disconnect the pump when the mixing valve is closed.



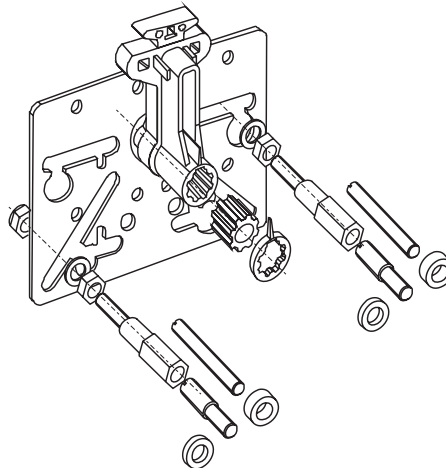
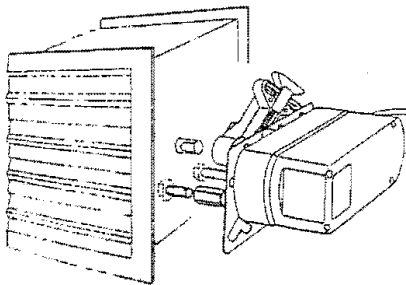
Relay module RM 24 is necessary to built in in case of controlling the actuator with the room thermostat with one working (standstill) contact SPST. Functionaly is RM 24 input relay for the actuator and output relay for the pump.



ACTUATOR WITH MIXING VALVE



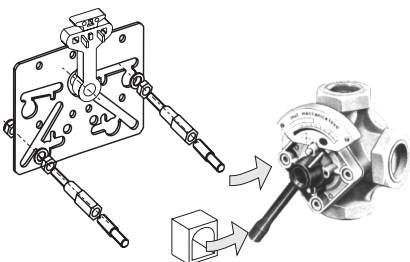
ACTUATOR WITH VENTILATION FLAP



Standard adapters for mounting on mixing valves:

FIRŠT Rotomix F3 in F4, ACASO, Landis&Gyr, Besser, IKA, V.I.L.B., Meibes, Termomix, Besser, MUT, FIRŠT Rotomix MSVA, MSVBA, Ferrotherm, ESBE, IMP, IMT, Honeywell LŽ, Sauter, Centra (ZRK), API, Danfoss, Tekmar, TEM, Barberi

By special orders we supply adapters for folowing mixing valves: Viessmann, Centra, V.I.L.B., TVT-STADLER, Honeywell (medeninasti), Vailant, VITA, Meibes, AEG, IKA, Caleffi, MUT 1000, ...



Example of mounting the actuator on mixing valve IKA.

The handle of the valve is not replaced, but it remains original. The valve handle adapter is put on it.

It is the same for valves Viessmann.

FIRŠT-ROTOTEHNIKA, s.p., RadeGUNda 54, SI-3330 Mozirje, SLOVENIJA
tel: +386 3 898 35 00, fax:+386 3 898 35 35, e-mail:info@first.si, http://www.first.si

We reserve the right to changes in manual and of technical characteristics of the product without previous notice.

ACTUATOR FOR ROTARY MIXING VALVES

MV 120/210

for 3- and 4-way mixing valves



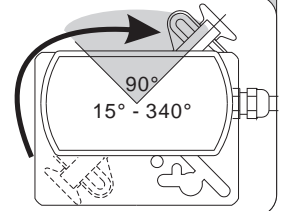
FIRST®

USER MANUAL

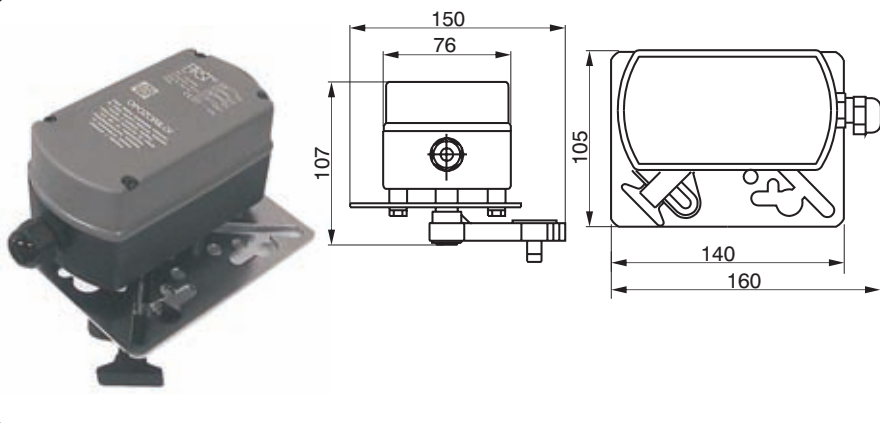
Montage and power connection should be done only by a trained person !

BEFORE FIRST TIME USE

Electric motor rotary actuator is supplied with handle as it is shown on the illustration. Before exploitation be sure that handle move in accurate sector, to void breaking plastic security part called lever, which is junction between handles of mixing valve and actuator. If it is necessary is possible to change moving and rotating angle of handle. Before every heating season it is advisable to move by hand a few times handle for 90° to avoid breaking because of high starting torque. Instead plastic security part which is in function of fuse and will break. If it happened many times it is necessary to open and clean the mixing valve.



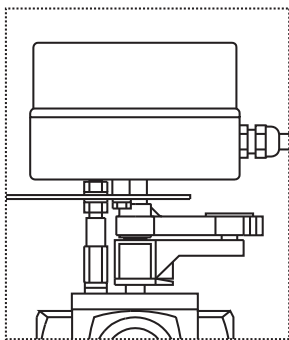
DIMENSIONS



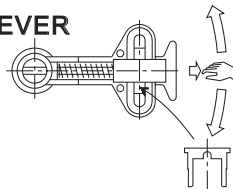
WARNING !

Actuator has no fuse inside, so it is necessary that fuse is included in electrical installation outside of actuator. Also be aware that connection is carried out crossing the switch which can unplugged the actuator if necessary

ASSEMBLY



SECURITY LEVER

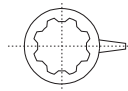


Coupling part with plastic security lever break down by overcharging to avoid damage on sinchro motor or gears.

REPLACEMENT:

- pull the handle and place the lever into the mid position
- remove broken plastic security element
- replace it with enclosed one, by pressing it into required gap
- return handle to previous position

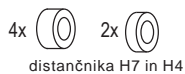
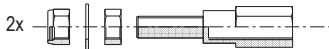
INDICATOR



Place it in position in which you can see actualy position of valve.

Adapter kit

Support bolts



FIRST Rotomix LŽVM, Rotomix LŽVDM, Rotomix F3 in F4, Landis&Gyr, Besser, IKA, V.I.L.B., Meibes, Termomix, Besser, MUT

FIRST Rotomix MSVA, MSVBA, Ferrotherm, ESBE, IMP, Honeywell LŽ, Sauter, Centra (ZRK), API, Danfoss, Tekmar, TEM, Barberi



Valve handle adapters



FIRST Rotomix MS, IMP, ESBE, Ferrotherm, Besser, API, Termomix, Barberi



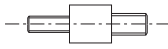
Landis&Gyr



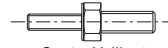
FIRST Rotomix F3 in F4, Honeywell LŽ, MS

By special request:

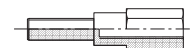
Support bolts



TVT Stadler



Centa, Vaillant



Viessmann do 1" M6

Valve handle adapters



TVT STADLER



WITA, MEIBES, AEG



Viessmann



CENTRA DR, ZR <=1" Vaillant <=1", TVT Stadler □14

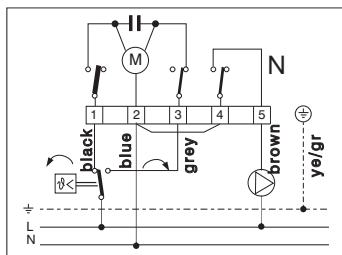


IKA, CALEFFI, MUT 1000



CENTRA ZRK <=1"

TEHNIICAL DATA



Power supply.....	230 V, 50 Hz, 3.5 W
Rotation angle.....	preset to 90°, possible from 15° up to 340°
Rotation time for 90°.....	210s
Output torque.....	6 Nm
Protection degree.....	IP 55
Electric motor insulation class..	E 120
Ambient temperature.....	0... 55°C
Microswitch rating.....	5(1)A, 250 VAC
Connection cable length.....	5x0.75 mm, L=1500 mm
Weight.....	0.95 kg

ELECTRIC CONNECTION execute according above shown wiring diagram. To change the rotating direction interchange terminals 1 and 3. Beside this do not forget to reposition also curve for pump for appropriate operating.

PRESSETTING THE CURVES

WARNING: BEFORE EVERY OPENING DISCONNECT THE ACTUATOR FROM LINE VOLTAGE!

Curves are factory pre set to enable rotation of actuator for 90°. In case of different desired rotation angle you can set the rotation angle from 15° up to 340°. **Presetting of curves should be done by a qualified person!**

NOTE: Rotating direction of curves is opposite from rotating direction of actuators output axis.

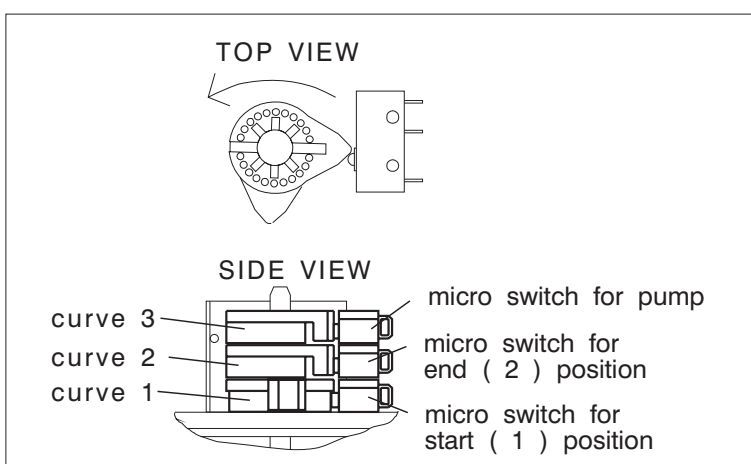
Turn the actuator into base position by electricity. Open the cover of actuator and manual preset the curves :

- With curve signed on drawing below with 1, starting position of mixing valve.
- With curve number 2 preset end position of mixing valve
- The curve signed on drawing with 3, act third micro switch, which in most of application turn on and off the pump.

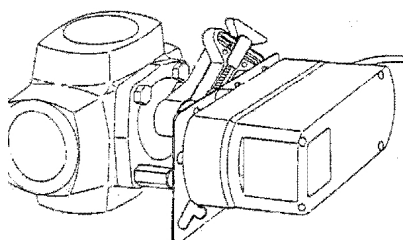
It is advisable to preset third curve to deactivate micro switch before curve for start position deactivate micro switch for basic position.

After setting the curves fit the cover.

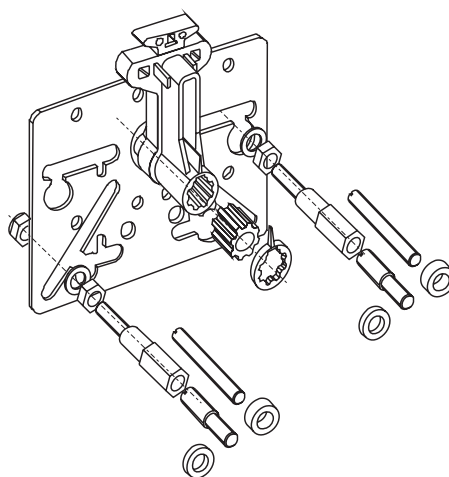
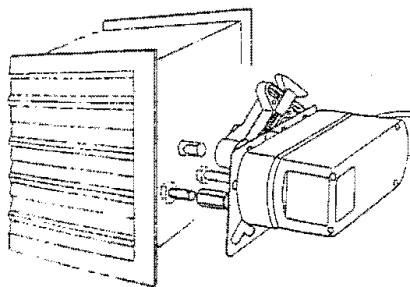
NOTE: Those position are valid by factory electrical wiring. When you electrically change the rotation, while signal for open is feed to terminal 1 and for close on terminal 3, the meaning of curves are opposite. Take care in this case for appropriate setting of curve 3 for pump switch!



ACTUATOR WITH MIXING VALVE



ACTUATOR WITH VENTILATION FLAP



Standard adapters for mounting on mixing valves:

FIRŠT Rotomix F3 in F4, ACASO, Landis&Gyr, Besser, IKA, V.I.L.B., Meibes, Termomix, Besser, MUT, FIRŠT Rotomix MSVA, MSVBA, Ferrotherm, ESBE, IMP, IMT, Honeywell LŽ, Sauter, Centra (ZRK), API, Danfoss, Tekmar, TEM, Barberi

By special orders we supply adapters for following mixing valves: Viessmann, Centra, V.I.L.B., TVT-STADLER, Honeywell (medeninasti), Vailant, VITA, Meibes, AEG, IKA, Caleffi, MUT 1000, ...

FIRŠT-ROTOTEHNIKA, s.p., Radegunda 54, SI-3330 Mozirje, SLOVENIJA
tel: +386 3 898 35 00, fax:+386 3 898 35 35, e-mail:info@first.si, http://www.first.si

We reserve the right to changes in manual and of technical characteristics of the product without previous notice.

ELECTRIC ROTARY ACTUATOR

MV 120/360

for 3-way and 4-way rotary mixing valves and ventilation flaps

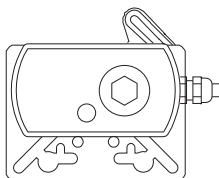


INSTRUCTIONS FOR MONTAGE AND USE

Assembly should be carried out by qualified person

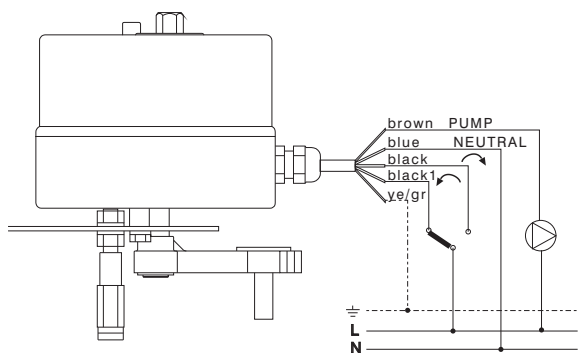
WARNING

Actuator is supplied with handle in position as it is shown on drawing. Before put into operation check that handle moves in desired area, if not press and rotate the button to position MAN and rotate lever for 180°.

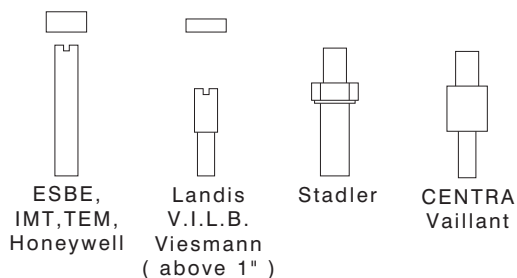


Before first start and before each heating season, operate the valve manually with a lever for several times in order to avoid overload of the actuator.

ASSEMBLY



ENCLOSED BOLTS AND DISTANCE RINGS



MANUAL OPERATING



1. To release actuator turn slightly axle with a spanner Nr.13



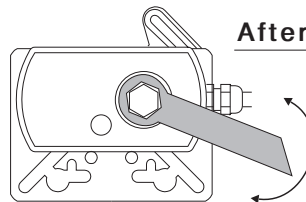
2. Push and rotate the button to position MAN



3. Turn the axle of actuator with the spanner Nr.13 to required position



4. Release the button and turn it to position AUTO

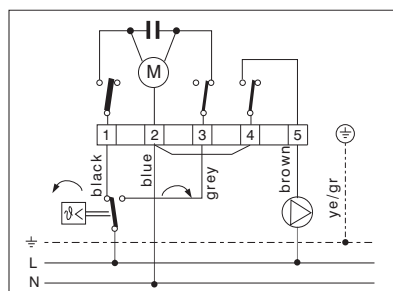


After long standstill period

Operate manually the actuator at least twice to override possible blocking of the mixing valve.

Min 2x

TEHNIICAL DATA



Power connection	230 V, 50Hz
Consumption	3,5 W max
Rotation time	105s or 210s
Rotation angle	preset to 90°, possible from 15° to 340°
Micro switch capacity	5(1)A, 250 VAC
Electric motor insulation class	IP 54
Ambient temperature	0 ... 50°C
Medium temperature	0 ... 130°C max
Output torque	25 Nm

Perform connection according to this short instructions.

- ON-OFF CONTROL : controlling the actuator with room thermostat or chronoterm
- 3 POINT POSITIONING : possible with OTC controllers in hydronic system to supply require hot and mixed water

Cx4-4609-Mv120360a-grey

FIRŠT-ROTOTEHNIKA, s.p., Radegunda 54, SI-3330 Mozirje, SLOVENIJA
tel: +386 3 898 35 00, fax:+386 3 898 35 35, e-mail:info@first.si, http://www.first.si

PRESSETTING THE CURVES

WARNING :
BEFORE EVERY OPENING DISCONNECT THE ACTUATOR FROM LINE VOLTAGE !

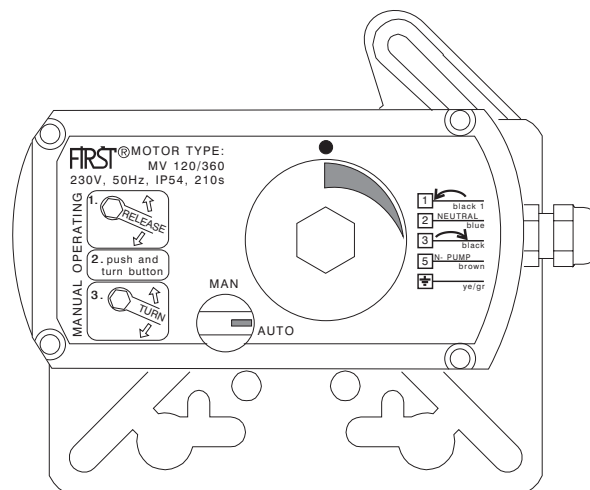
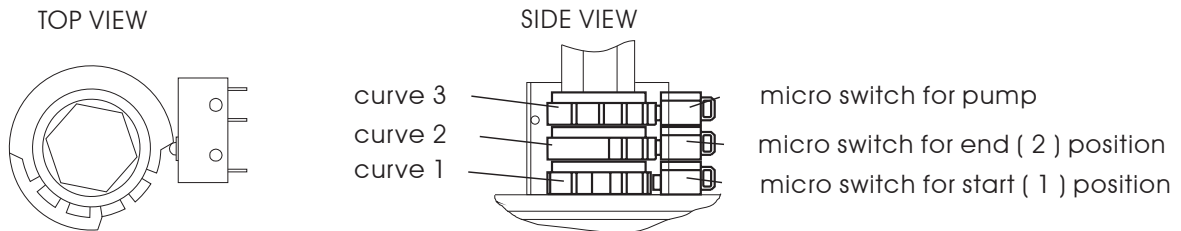
Curves are factory pre set to enable rotation of actuator for 90°. In case of different desired rotation angle you can set the rotation angle from 15 up to 340°. Presetting of curves should be done by a qualified person !

1. Turn the actuator into base position by electricity.
2. With screwdriver remove the indicator of valve position
3. Open the cover of actuator
4. Remove the knob above curves
5. Manual preset the curves :
 - With curve signed on drawing below with 1, starting position of mixing valve.
 - With curve number 2 preset end position of mixing valve
 - The curve signed on drawing with 3, act third micro switch, which in most of application turn on and off the pump.

It is advisable to preset third curve to deactivate micro switch before curve for start position deactivate micro switch for basic position.

After setting the curves fit the cover.

NOTE: Those position are valid by factory electrical wiring. When you electrically change the rotation, while signal for open is feed to terminal 1 and for close on terminal 3, the meaning of curves are opposite. Take care in this case for appropriate setting of curve 3 for pump switch!



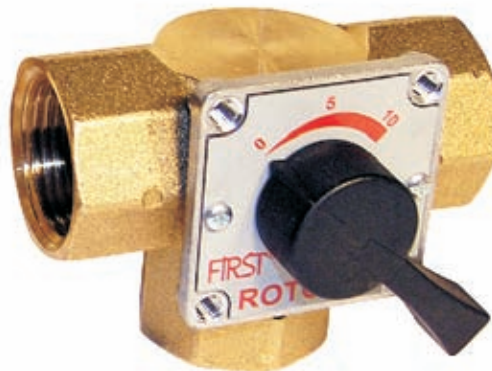
Rotary brass mixing valves

ROTOMIX

ROTOMIX F4



ROTOMIX F3

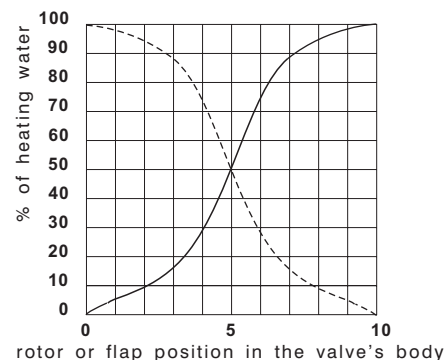


TECHNICAL CHARACTERISTICS

Technical data:

Max. medium temperature.....	110°C
Max. medium pressure.....	6 bar
Rotation angle.....	90°
Torque.....	0.5 Nm
Housing.....	stamped brass
Rotor.....	brass
Bearing.....	4x O-ring, EPDM
To be used with actuators.....	EUROMIX

FLOW CHARACTERISTICS



ROTOMIX -3 and -4 way brass mixing valves are suitable for small and medium size heating applications.

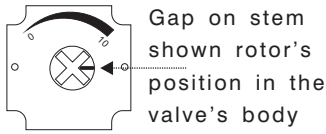
Mixing valves ROTOMIX are optimized for operating with actuators (very low rotation torque). We recommend actuators of our production, MV 120/...EUROMIX, other MV120/..

FEATURES

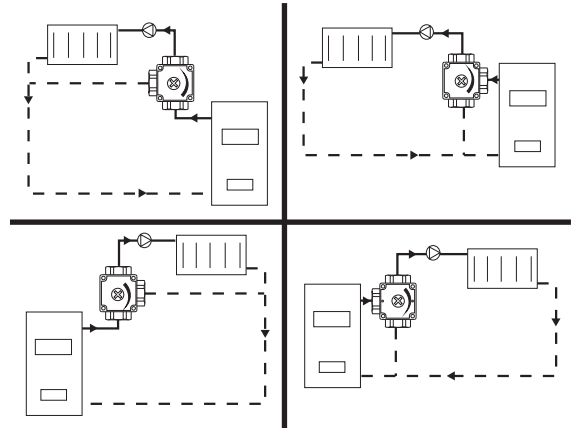
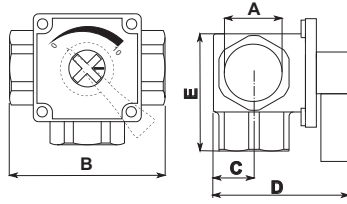
- ▶ Mixing valves are suitable for long-lasting operation because of special construction of bearings on axis.
- ▶ Small rotation torque of the valve allow motor actuator operation and in the same time reduce possibility of valve blocking .
- ▶ Compact housing construction does not allow any damages during mounting and also make possible quick and easy mounting of actuator.
- ▶ Valves are specially suitable for upgrading with actuators EUROMIX.
- ▶ Change first O-ring without discharging hydronic system.

ROTOMIX F3 - 3-way mixing valves

ROTOMIX F3



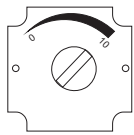
Gap on stem shown rotor's position in the valve's body



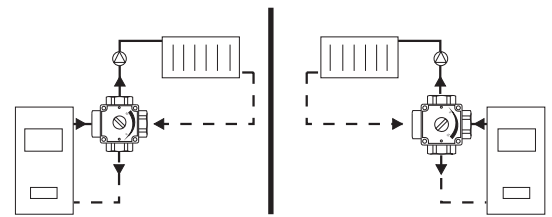
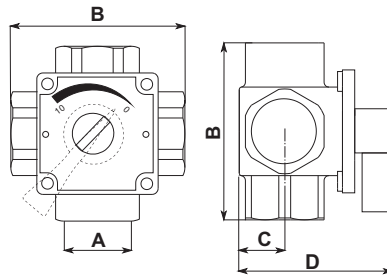
CODE	DN	A	B	C	D	E	K _{vs}	kg	
41000	½"	15	½"	72	18.5	64	54	4	0.65
41001	¾"	20	¾"	72	18.5	64	54	7	0.55
41002	1"	25	1"	90	24	64	69	10	0.67
41003	1¼"	32	1¼"	90	24	64	69	15	0.89

ROTOMIX F4 - 4-way mixing valves

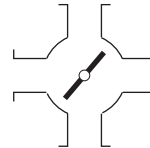
ROTOMIX F4



Gap on stem shown rotor's position in the valve's body

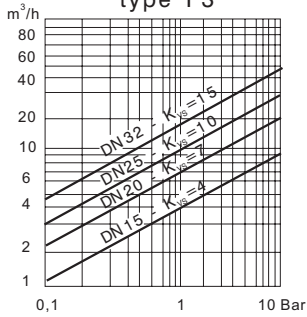


P_{MAX} = 6 bar
T_{MAX} = 110°C

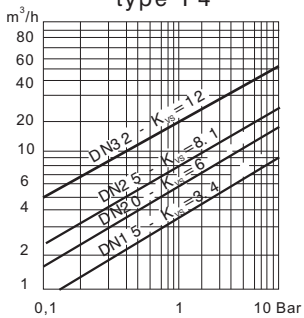


CODE	DN	A	B	C	D	K _{vs}	kg	
41008	½"	15	½"	72	18.5	64	3.4	0.70
41009	¾"	20	¾"	72	18.5	64	6	0.58
41010	1"	25	1"	90	24	64	8.1	1.33
41011	1¼"	32	1¼"	90	24	64	12	0.92

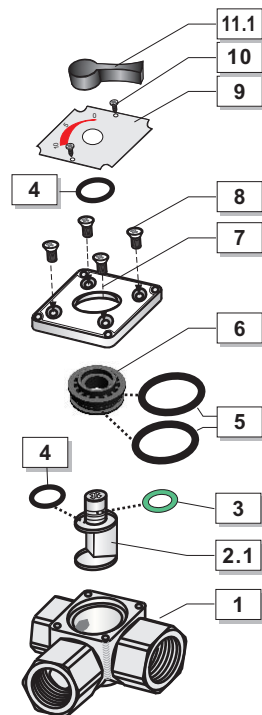
K_{vs} for valves type F3



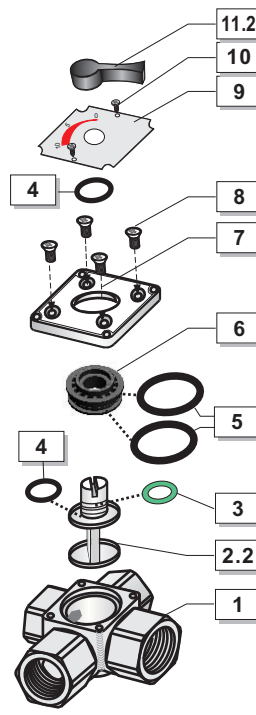
K_{vs} for valves type F4



ROTOMIX F3



ROTOMIX F4



POS	NAME	PCS
1	Body Hot stamped CuZn39Pb3	1
2.1	Rotor with stem Brass CuZn39Pb3	1
2.2	Flap stem Brass CuZn39Pb3	1
3	O-seat 8.73x1,78 Viton FKM	1
4	O-ring 11.91x2.62 EPDM	2
5	O-ring 23.35x2.4 EPDM	2
6	Insert RYTON R-4-200 BL	1
7	Valves top alloy	1
8	Screw M5x10 DIN 965	4
9	Position plate Al	1
10	Screw 2.9x6.5 DIN 7981 BC	2
11.1	Handle of 3-way valve PA	1
11.2	Handle of 4-way valve PA	1

We reserve the right to modify the instructions and the technical data of the product without prior notice

UNI 2P

FIRST®

Firšt actuators series UNI 2P are designed for mounting on ball valves series 800 (1/2" - 1"). Actuators have a fixed angle rotation of 90° and possibility of manual control.

Operation:

Factory built in relay module provides 2 or 3 wire control. It can be controlled by the 2 or 3-point signal. With the button for manual control is possible to manual override – gear is disengaged for as long the button is locked.

Variants:

Actuator is available with 24VAC or 230VAC, 50Hz power supply. At choice are different speeds of rotation 16s/90°, 32s/90° and 49s/90°. All actuators are equipped with output signal (L) at the end position of the actuator (OPEN).

Mounting kit

Actuator is equipped with mounting kit for assembly on ball valve series 800. By special request is also available mounting kit for mounting on ISO 5211 ball valve (series 860).



CONTROL
2-POINT

1 / 0

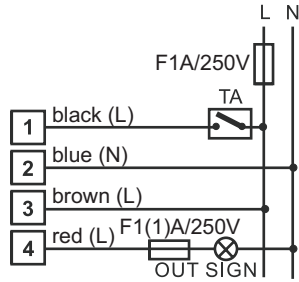
Technical data

Electrical data	Nominal voltage	230VAC, 50Hz, ± 10% 24VAC, 50Hz, ± 10%
	Power	6VA
	Connection cable	length 2m
	Motor type control	2-point SPST
	Output signal - OPEN position	phase L, 1(1)A, 250VAC
Functional data	Torque (at nominal voltage)	UNI 2P 10320 and UNI 2P 10490 - max 12Nm UNI 2P 10160 - max 7Nm
	Rotation time	16s/90°, 32s/90°, 49s/90°
	Manual override	Manual or permanent with pushbutton (for maintenance purposes)
	Position indication	Handle position on actuator's cover
	Recommended mounting position	all position except upside down
	Anti-blocking feature	In case of blockade actuator turns in other position
Safety	Protection class	II <input type="checkbox"/>
	Degree of protection	IP44
	Ambient temperature	0..+50°C (by working cycle 50/25s)
	Media temperature	according to valve characteristics
	Non-operating temperature	-20°...+80°C
	Maintenance	Maintenance-free
	Weight	approx. 480g (without valve)
Enclosed mounting kit	FIRŠT ball valve serie 800	

cX4-0610-UNI-2P-product-info-v10-en.cdr

Electrical installation

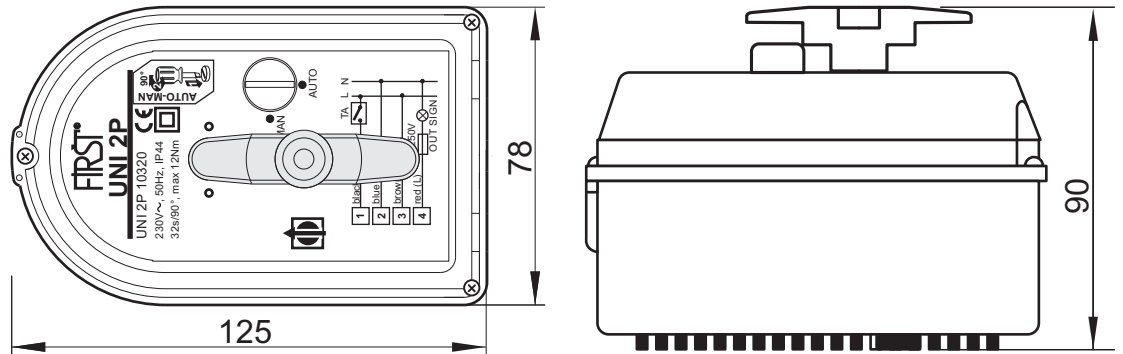
CONTROL
2-POINT 1 / 0



Circulation pump can be controlled at OPEN valve position by RED wire. Signal on the red wire is live (L) and can be used for inductive load up to one (1) A, 250VAC. For load which consumption is more than 1 A must be used external relay.

The electrical line supplying the actuator, the time counter and room thermostat must start from the thermal plant, so as to avoid tampering by user. Before any repair of the valve or the actuator disconnect the supply voltage.

Dimensions

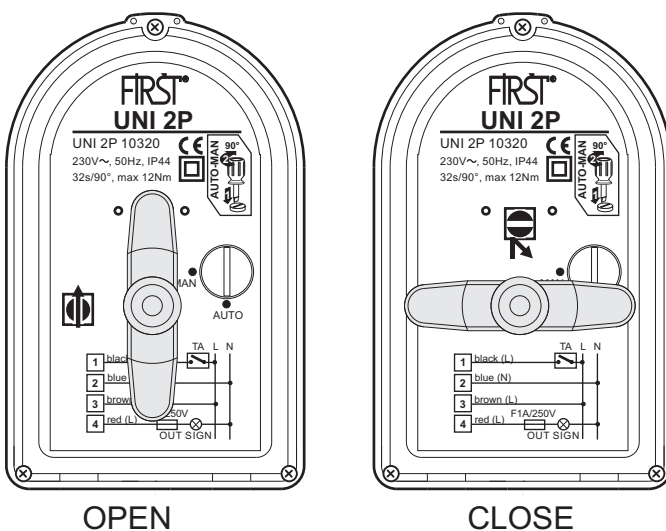


Order information

šifra	naziv	napetost	čas vrtenja	navor	
12500	UNI 2P 10320	230VAC, 50Hz	32s/90°	max 12Nm	230VAC 2-point control
12501	UNI 2P 10490	230VAC, 50Hz	49s/90°	max 12Nm	
12508	UNI 2P 10160	230VAC, 50Hz	16s/90°	max 12Nm	
12511	UNI 2P 10323	24VAC, 50Hz	32s/90°	max 12Nm	24VAC 2-point control
12512	UNI 2P 10493	24VAC, 50Hz	49s/90°	max 12Nm	

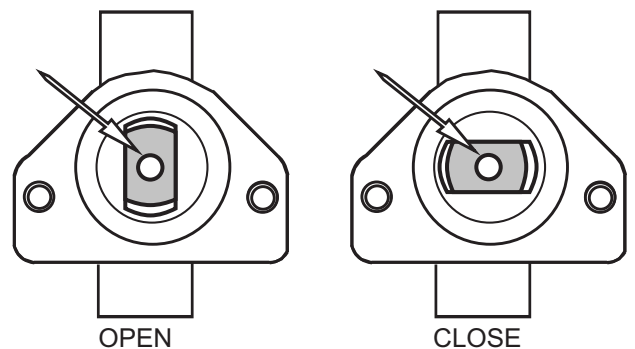
Position indication

1.Handle's position



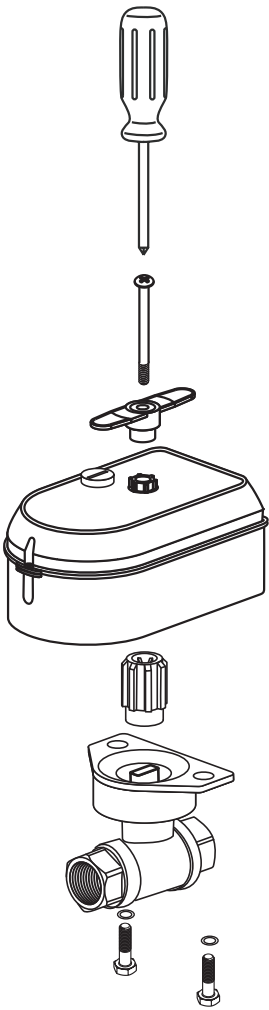
2.ball valve's stem position

By valve which is built in instalation, OPEN/CLOSE condition is recognized from stem position

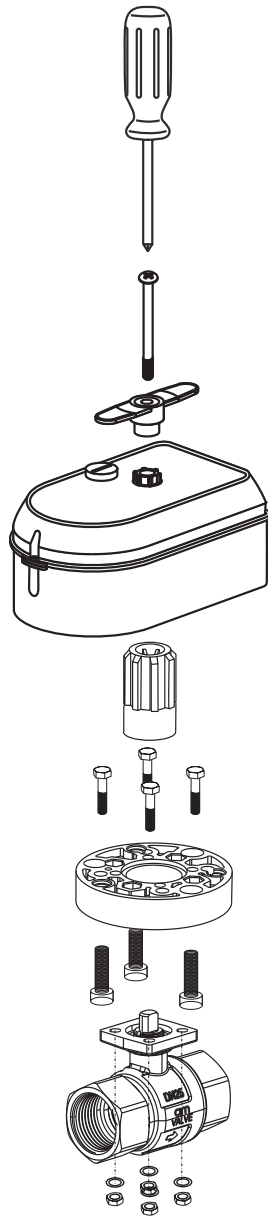


Mounting

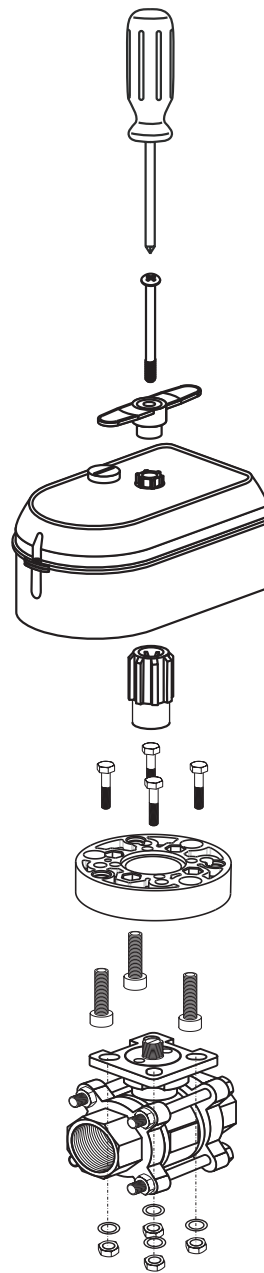
2-way ball valve 800



2-way ISO 5211
INOX VT



2-way ISO 5211
860



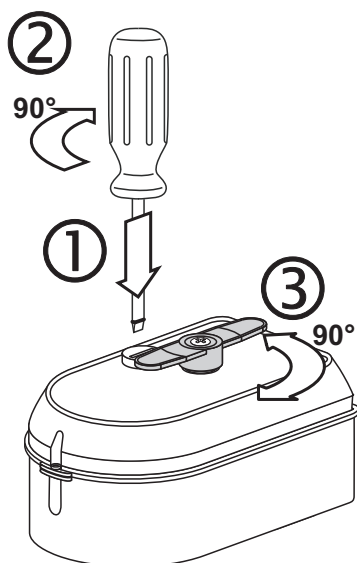
Mounting kit

Code **Enclosed mounting kit**
58000 EMV 110 800

By special request

58019 ISO INOX-VT - F05, □11 (1 1/2"-2")
58020 EMV 110 series 860 - F05, □11 (1 1/2"-2")
58022 EMV 110 series 860 - F03 □9 in □11 (1/2"-1 1/4")
58023 ISO INOX-VT - F03 □9 in □11 (1/2"-1 1/4")

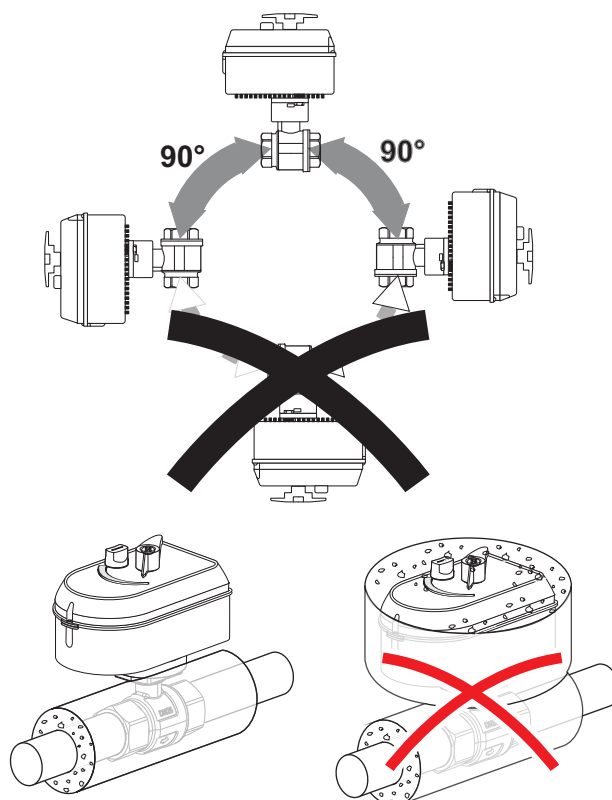
Manual operation



Note:

When button for manual operating is in <MAN> position, actuator stays in temporary position irrespective of control signal.

Mounting position



Safety notes

- The actuator has been designed for use in stationary heating, ventilation and air-conditioning systems and is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- Caution power supply voltage!
- It may only be installed by suitably trained personnel. All applicable legal or institutional installation regulations must be complied with.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- The cable must not be removed from the device.
- The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

In compliance with standards

All our products fulfil the essential safety and protection requirements for CE conformity marking according to the following directives: EMC directive: 2004/108/EEC / LV directive: 2006/95/EEC / PAH directive 2005/69/EEC.

In compliance with standards:

EN 60730-2-14; 1997 + A1:2001 + A11:2005 + A2:2008
EN60730-1:2000 + A12:2003 + A12:2004 + A14:2005 + A16:2007 + A2:2008
EN 55014-1:2006
EN 61000-3-2:2006
EN 61000-3-3:2006
EN 62233:2008
ZEK 01.2-08

We reserve the right to modify the instructions and the technical data of the product without prior notice.

UNI 3P

Firšt actuators series UNI 3P are designed for mounting on mixing valves Rotomix. They are also equipped with mounting kit for assembly on mixing valves of other manufacturers. Actuators have a fixed angle rotation of 90° and possibility of manual control.

Operation:

UNI 3P actuator is designed as actuator for mixing valves DN15-DN50. It is controlled by the 3-point signal and especially suitable for mixing circuit regulation. With the button for manual control it is possible to manual override – gear is disengaged for as long the button is locked.

Variants:

Actuator is available with 24VAC or 230VAC, 50Hz power supply. At choice are different speeds of rotation 48s/90°, 73s/90°, 147s/90°, 178s/90°. All actuators are equipped with output signal (L) at the end position of the actuator.

Mounting kit

Actuators are equipped with mounting kit for assembly on mixing valves of well known manufacturers. By special request are also available mounting kits for mounting on mixing valves less known manufacturers.

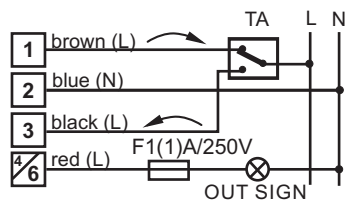


Technical data

Electrical data	Nominal voltage	230VAC, 50Hz, ± 10% 24VAC, 50Hz, ± 10%
	Power	6VA
	Connection cable	length 2m
	Motor type control	3-point SPDT
	Output signal - OPEN position	phase L, 1(1)A, 250VAC
Functional data	Torque (at nominal voltage)	max 12Nm
	Rotation time	48s/90°, 73s/90°, 147s/90°, 178s/90°
	Manual override	Manual or permanent with pushbutton (for maintenance purposes)
	Position indication	Handle position on actuator's cover
	Recommended mounting position	all position except upside down
Safety	Protection class	II
	Degree of protection	IP44 (IEC 60529 (2001-02))
	Ambient temperature	0..+50°C (by working cycle 50/25s)
	Media temperature	according to valve characteristics
	Non-operating temperature	-20°...+80°C
	Maintenance	Maintenance-free
	Weight	approx. 480g (without valve)

Enclosed mounting kit	FIRŠT (ROTOMIX, ROTOMIX G), ESBE (VRG, VRB), ACASO (TERMOMIX), BARBERI, FEROTERM, PAW, EURONORM, ESBE, IMP, DANFOSS, BESSER
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Electrical connection

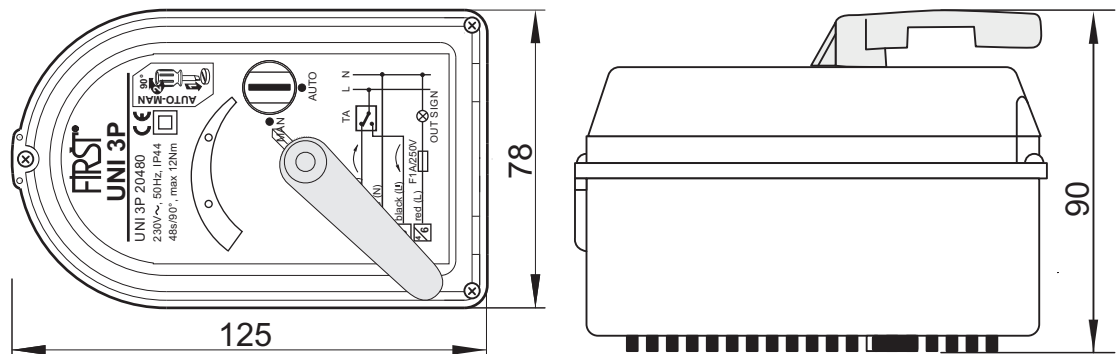


The electrical line supplying the actuator, the time counter and room thermostat must start from the thermal plant, so as to avoid tampering by user. Before any repair of the valve or the actuator disconnect the supply voltage.

Circulation pump can be controlled at end valve position by RED wire. If you need output signal at end position, you have to move red wire inside actuator at terminal 4.

Signal on the red wire is live (L) and can be used for inductive load up to one (1) A, 250VAC. For load which consumption is more than 1 A must be used external relay.

Dimensions



Order information

Code	Actuator type	Nominal volatage	Rotation time	Torque	
12502	UNI 3P 20480	230VAC, 50Hz	48s/90°	max 12Nm	230VAC 3-point control SPDT
12503	UNI 3P 20730	230VAC, 50Hz	73s/90°	max 12Nm	
12506	UNI 3P 21470	230VAC, 50Hz	147s/90°	max 12Nm	
12507	UNI 3P 21780	230VAC, 50Hz	178s/90°	max 12Nm	
12513	UNI 3P 20483	24VAC, 50Hz	48s/90°	max 12Nm	24VAC 3-point control SPDT
12514	UNI 3P 20733	24VAC, 50Hz	73s/90°	max 12Nm	
12515	UNI 3P 21473	24VAC, 50Hz	147s/90°	max 12Nm	
12516	UNI 3P 21783	24VAC, 50Hz	178s/90°	max 12Nm	

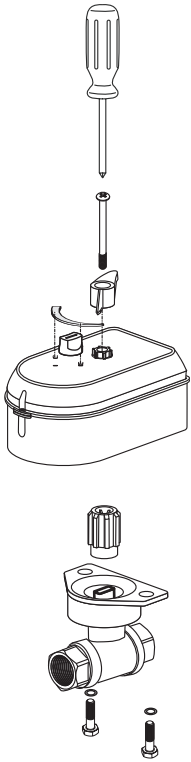
Enclosed mounting kit for following mixing valves: FIRŠT (ROTOMIX, ROTOMIX G), ESBE (VRG, VRB), ACASO (TERMOMIX), BARBERI, FEROTERM, PAW, EURONORM, ESBE, IMP, DANFOSS, BESSER.

Safety notes

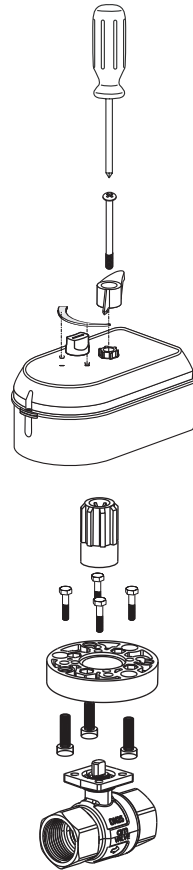
- The actuator has been designed for use in stationary heating, ventilation and air-conditioning systems and is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- Caution power supply voltage!
- It may only be installed by suitably trained personnel. All applicable legal or institutional installation regulations must be complied with.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- The cable must not be removed from the device.
- The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Mounting on the valve

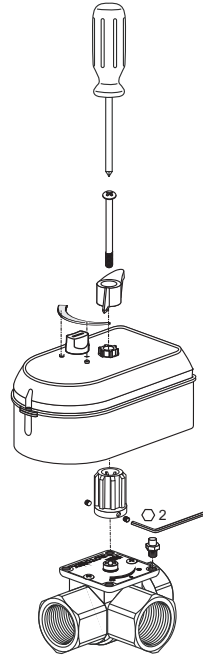
2-way ball valve
series 800



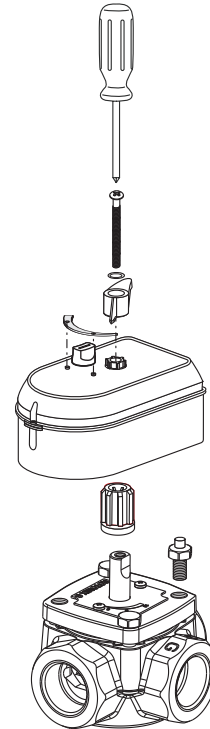
2-way ISO5211
860, 690



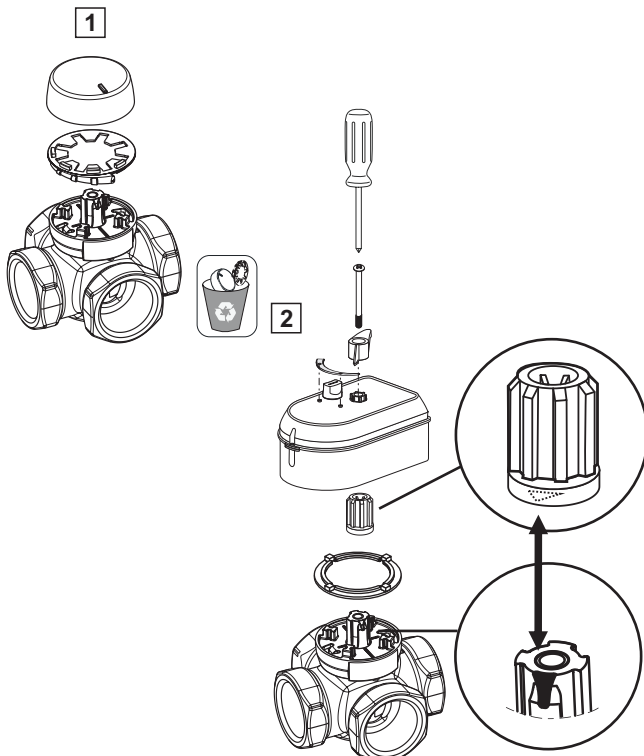
Brass mixing valve
ROTOMIX F3
ROTOMIX F4



Cast iron mixing valve FIRŠT (ROTOMIX
G), ESBE, ACASO (TERMOMIX),
BARBERI, FEROTHERM, PAW,
EURONORM, IMP, DANFOSS, BESSER



Installation of UNI actuator on mixing valves ESBE VRB, VRG

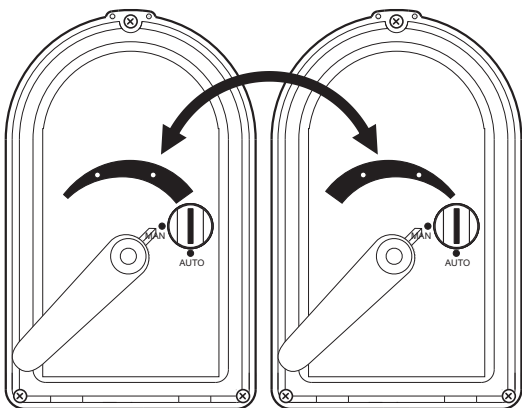


Mounting kit

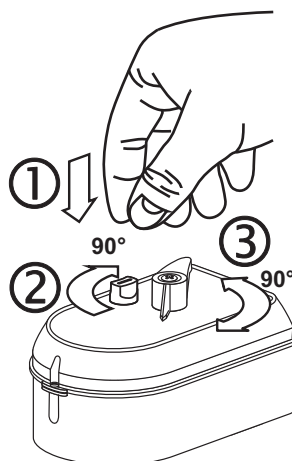
Code	Enclosed mounting kit
58024	FIRŠT (ROTOMIX, ROTOMIX G), ESBE (VRG, VRB), ACASO (TERMOMIX), BARBERI, FEROTHERM, PAW, EURONORM, ESBE, IMP, DANFOSS, BESSER
	By special request
58025	SELTRON, LOVATO, PAW
58026	LAZZARI, LANDIS
58027	HONEYWELL MS
58028	SIEMENS
58029	MUT
58030	W.I.L.B
58031	CENTRA
58032	MEIBES, WITA, OVENTROP, HOLTER HORA BR80 SMD/SMV
58033	TEHNOPLANT, EXCELSIOR, KRAMER, DE PALA
58000	EMV 110 800
58020	EMV 110 series 860, 690 - F05, □11 (1 1/2"-2")
58022	EMV 110 series 860, 690 - F03 □9 in □11 (1/2" - 1 1/4")

Position indication

Set red indicator regarding to your application

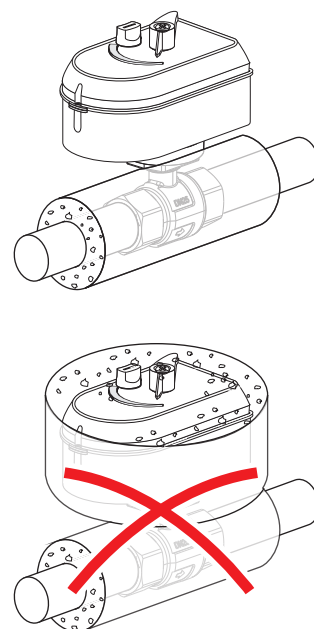
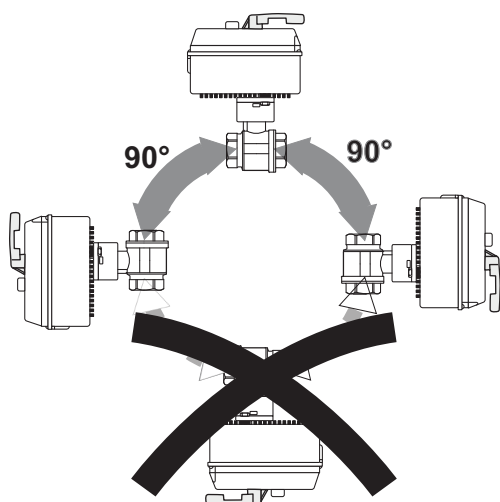


Manual operation



Note:
When button for manual operating is in <MAN> position, actuator stays in temporary position irrespective of control signal.

Mounting position



In compliance with standards

All our products fulfil the essential safety and protection requirements for CE conformity marking according to the following directives: EMC directive: 2004/108/EEC / LV directive: 2006/95/EEC / PAH directive 2005/69/EEC.

In compliance with standards:

EN 60730-2-14; 1997 + A1:2001 + A11:2005 + A2:2008
EN60730-1:2000 + A12:2003 + A12:2004 + A14:2005 + A16:2007 + A2:2008
EN 55014-1:2006
EN 61000-3-2:2006
EN 61000-3-3:2006
EN 62233:2008
ZEK 01.2-08

We reserve the right to modify the instructions and the technical data of the product without prior notice.

UNI D2P

FIRST®

Operation:

Factory built in relay module provides 2 or 3 wire control. It can be controlled by the 2 or 3-point signal. With the button for manual control is possible to manual override – gear is disengaged for as long the button is locked.

Variants:

Actuator is available with 24VAC or 230VAC, 50Hz power supply. At choice is speed of rotation 16s/90°. Actuator is equipped with output signal (L) at the end position of the actuator.

Mounting kit

Actuator is equipped with mounting kit for assembly on diverting valve Divert and Divert G.



CONTROL
2-POINT

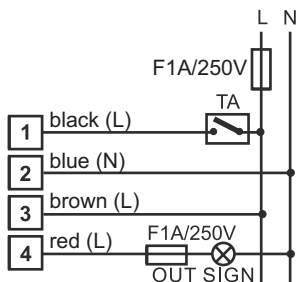
1 / 0

Technical data

Electrical data	Nominal voltage	230VAC, 50Hz, ± 10% 24VAC, 50Hz, ± 10%
	Power	6VA
	Connection cable	length 2m
	Motor type control	2-point SPST
	Output signal - OPEN position	phase L, 1(1)A, 250VAC
Functional data	Torque (at nominal voltage)	max 7Nm
	Rotation time	16s/90°
	Manual override	Manual or permanent with pushbutton (for maintenance purposes)
	Position indication	Handle position on actuator's cover
	Recommended mounting position	all position except upside down
	Anti-blocking feature	In case of blockade actuator turns in other position
Safety	Protection class	II
	Degree of protection	IP44
	Ambient temperature	0..+50°C (by working cycle 50/25s)
	Media temperature	according to valve characteristics
	Non-operating temperature	-20°...+80°C
	Maintenance	Maintenance-free
	Weight	approx. 480g (without valve)
Enclosed mounting kit	FIRŠT (series Divert, Divert G)	

Electrical installation

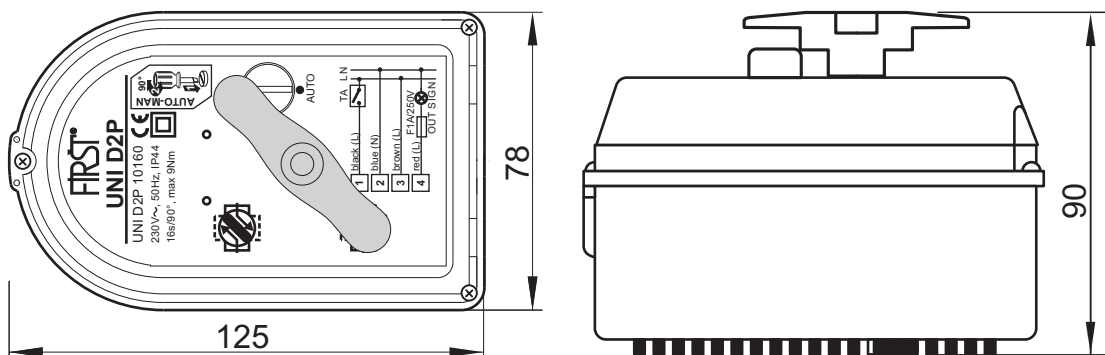
CONTROL 2-POINT 1 / 0



Circulation pump can be controlled at OPEN valve position by RED wire. Signal on the red wire is live (L) and can be used for inductive load up to one (1) A, 250VAC. For load which consumption is more than 1 A must be used external relay.

The electrical line supplying the actuator, the time counter and room thermostat must start from the thermal plant, so as to avoid tampering by user. Before any repair of the valve or the actuator disconnect the supply voltage.

Dimensions

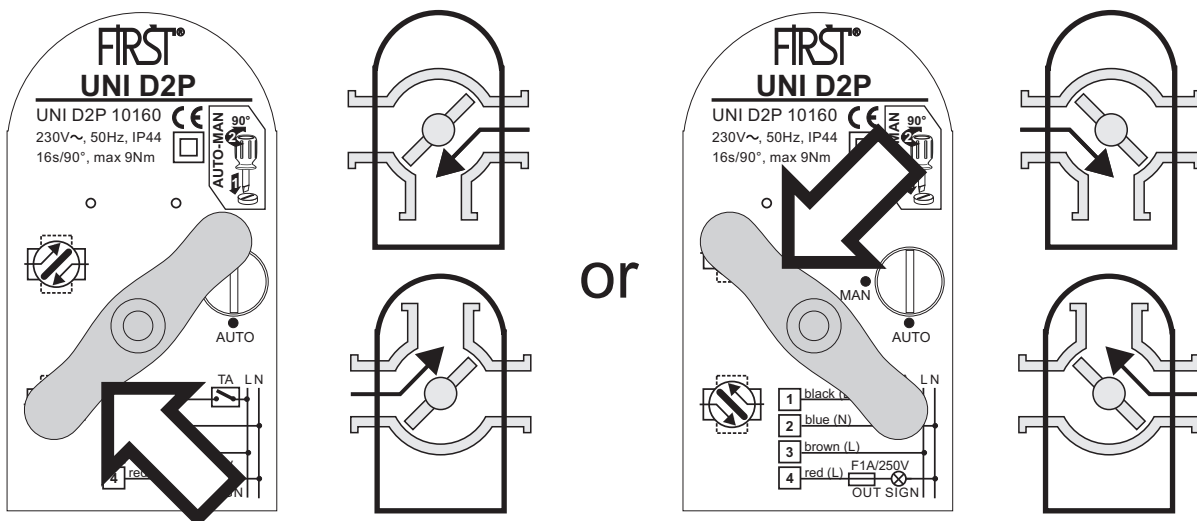


Order information

code	Actuator type	Voltage	Rotation time	Torque	2-point control
12505	UNI D2P 10160	230VAC, 50Hz	16s/90°	max 12Nm	
12510	UNI D2P 10163	24VAC, 50Hz	16s/90°	max 12Nm	

Position indication

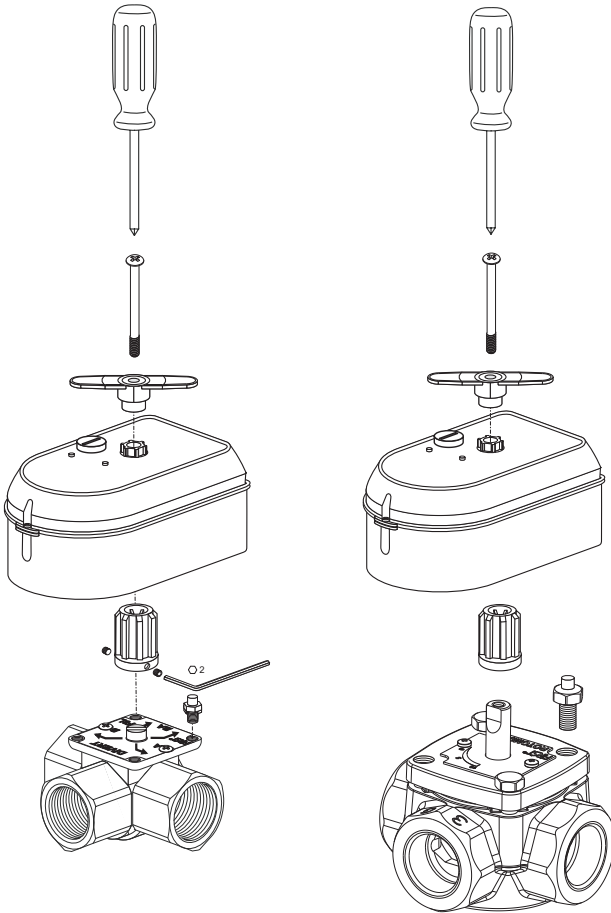
1. Handle's position



Mounting

3-way diverting brass valve
DIVERT

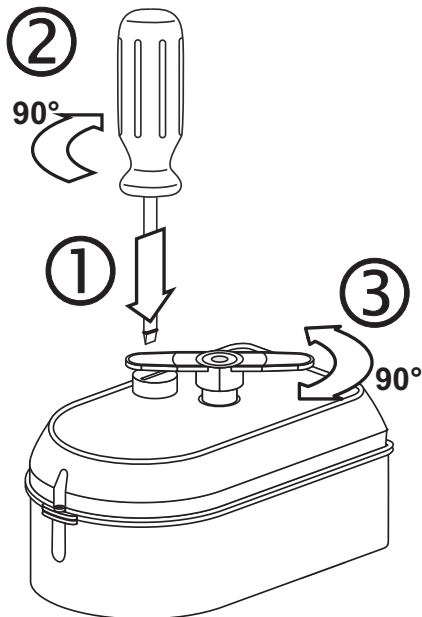
3-way diverting cast iron
valve **DIVERT G**



Mounting kit

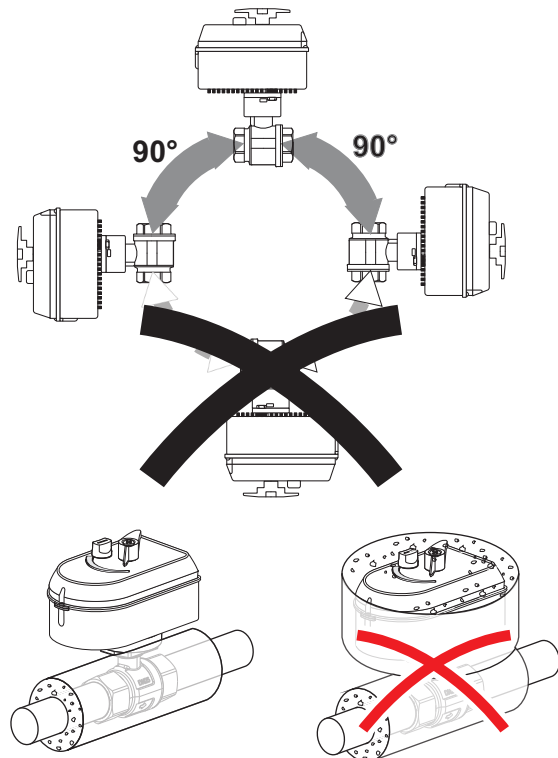
Code **Enclosed mounting kit**
58034 FIRŠT (DIVERT, DIVERT G)

Manual operation



Note:
When button for manual operating is in <MAN> position, actuator stays in temporary position irrespective of control signal.

Mounting position



Safety notes

- The actuator has been designed for use in stationary heating, ventilation and air-conditioning systems and is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- Caution power supply voltage!
- It may only be installed by suitably trained personnel. All applicable legal or institutional installation regulations must be complied with.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- The cable must not be removed from the device.
- The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

In compliance with standards

All our products fulfil the essential safety and protection requirements for CE conformity marking according to the following directives: EMC directive: 2004/108/EEC / LV directive: 2006/95/EEC / PAH directive 2005/69/EEC.

In compliance with standards:

EN 60730-2-14; 1997 + A1:2001 + A11:2005 + A2:2008
EN60730-1:2000 + A12:2003 + A12:2004 + A14:2005 + A16:2007 + A2:2008
EN 55014-1:2006
EN 61000-3-2:2006
EN 61000-3-3:2006
EN 62233:2008
ZEK 01.2-08

We reserve the right to modify the instructions and the technical data of the product without prior notice.



Modulating rotary actuator **UNI MOD** with ISO 5211 modulating ball valve **690WA**

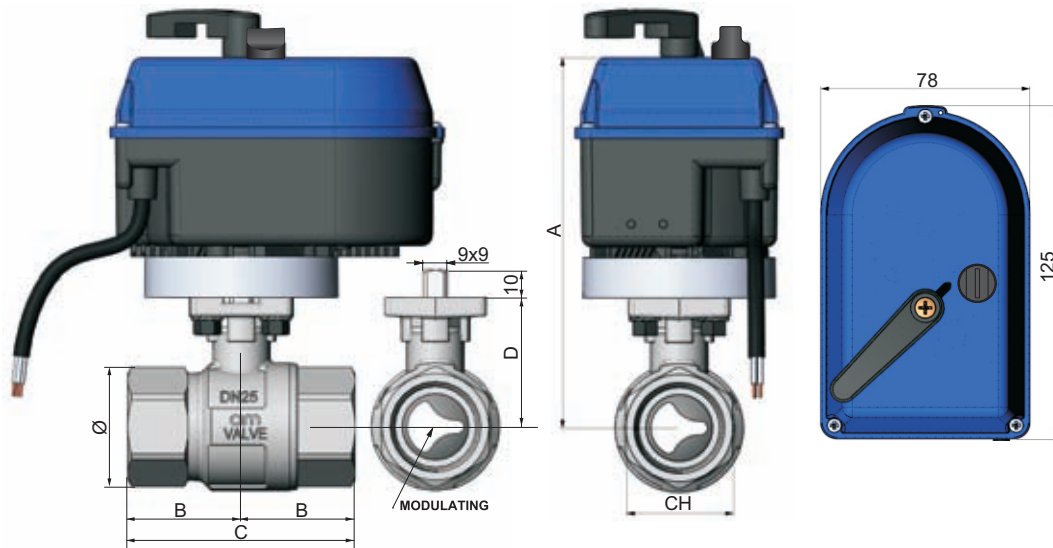
- Actuators UNI MOD are designed also for mounting on ball valve CIM 690WA according ISO 5211 dimensions 1/2"-2"
- The actuator is controlled with standard modulating signal of DC 0..10V (factory default) and moves to the position defined by control signal. That allows actuator to be controlled by controllers with modulating output.
- With DIP switches inside actuator is possible to choose control signal (voltage, current), rotation direction, signal range and resolution and opening curve characteristic
- Rotation time: 73s/90°, optional on request 147s/90°
- Possibility of manual override with button on actuators cover (gear is disengaged for as long the button is locked)
- Construction of valve's ball with special modulating insert - one for all - linear or logarithm flow characteristic

UNI MOD

Dimensions:

TEP° : UNI MOD with ISO 5211 modulating ball valve CIM 690WA (Y03)

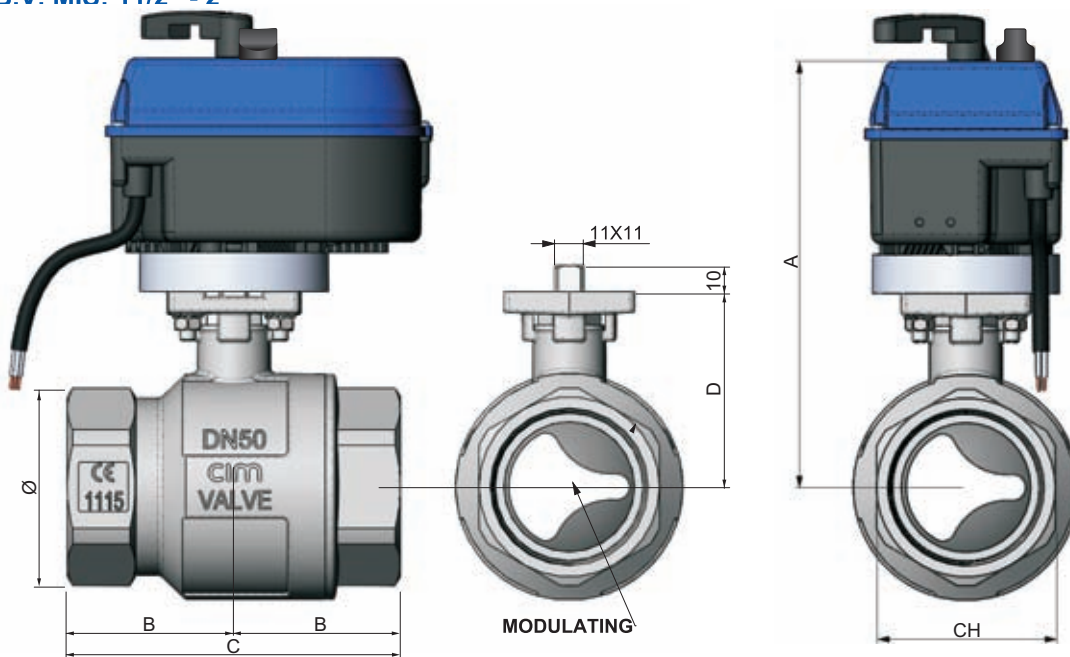
B.V. MIS: 1/2"-3/4"-1"-1 1/4"



Valve type	DN	A	B	C	D	CH	O	Fg
CIM 690WA (Y03)	1/2"	130	31,60	63,20	41,0	25	30	0,975
	3/4"	134	34,95	70,05	44,5	31	39	1,095
	1"	138	42,50	85,00	48,5	40	48	1,350
	1 1/4"	146	47,20	94,55	56,5	49	57	1,640

TEP° : UNI MOD with ISO 5211 modulating ball valve CIM 690WA (Y05)

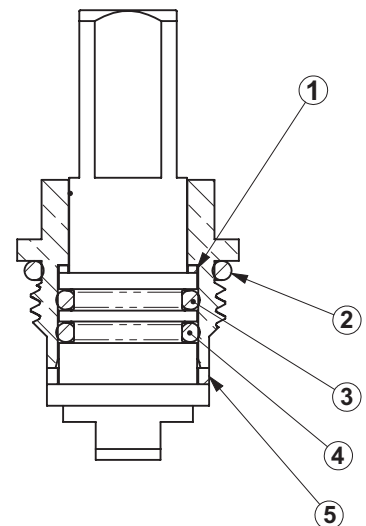
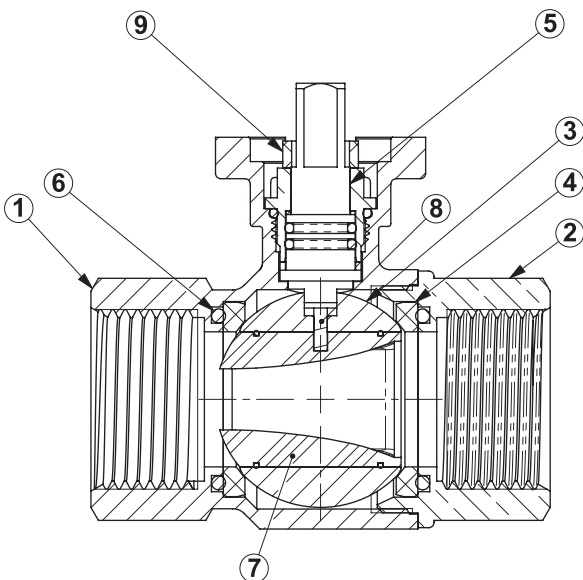
B.V. MIS: 1 1/2" - 2"



Valve type	DN	A	B	C	D	CH	O	Fg
CIM 690WA (Y05)	1 1/2"	156,9	54	108,0	67,3	55	71	2,060
	2"	164,1	63,6	127,4	74,5	69	87	2,800

Technical data

UNI MOD Electrical data	Nominal voltage	24VAC, 50Hz, + 10%/-15%
	Control signal	voltage: 0..10VDC current: 0..20mA, 4..20mA
	Power consumption - in operation	6VA
	Connection cable	length 2m
	Type of control	modulating
Functional data	Nominal torque (at nominal voltage)	max 12Nm
	Rotation time	73s/90°, optional on request 147s/90°
	Manual override	Gearing latch disengaged with button
	Position indication	mechanical, handle position on the cover
	Installation position	all position except actuator upside down
Safety	Protection class	II □
	Degree of protection	IP44 (IEC 60529 (2001-02))
	EMC low-voltage directive	CE in accordance with 2004/108/EC
		CE in accordance with 2006/95/EC
	Ambient temperature	0..+55°C (@ duty cycle 50%)
	Storage temperature	-20°...+80°C
	Maintenance	Maintenance-free
	Actator weight	Approx. 480g (without valve)
ISO modulating ball valve 690WA 1/2"-11/4"-> F03, 9x9 11/2", 2"-> F05, 11x11	Medium temperature	0..110°C
	Max. working pressure	16bar
	Medium	water, non-agresive medium, air



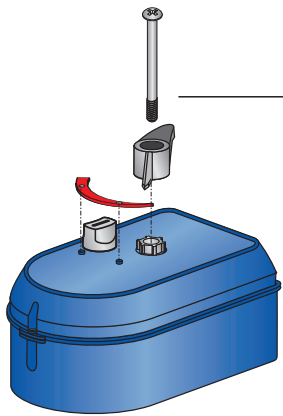
1	Valve's body	CW 617N nickel pltd
2	Screwed ends	CW 617N nickel pltd
3	Ball	CW 617N chrome pltd
4	Ball seat	1502
5	Stem ISO Q.9X9	CW 617N
6	O-ring 28.25X2.62	HNBR 75SH
7	Valve insert	PPS
8	Spine	AISI304
9	Spacer	PTFE

1	Washer	PTFE
2	O-ring	EPDM
3	O-ring	EPDM 70
4	O-ring	FPM
5	Washer	PTFE

Assembly

**Adapter kit
UNI-ISO 5211 Y03**
Ord. code: 126021
1/2", 3/4", 1", 1 1/4"

**Adapter kit
UNI-ISO 5211 Y05**
Ord. code: 126035
1 1/2", 2"



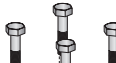
Screw B 4.2x75 A2K DIN7981



insert U ISO 5211 11 pl/sint

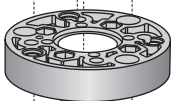


ISO 5211 adapter 9x9
* only by 1/2" - 1 1/4"

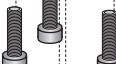


Screw M5x20 DIN 933 A2K

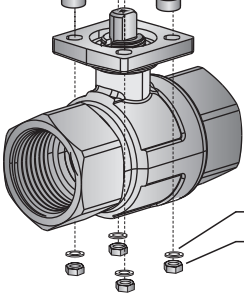
Screw M6x25 DIN933 A2K



ISO 5211 adapter
F03/F05, F04



Screw imbus M6x20 A2K



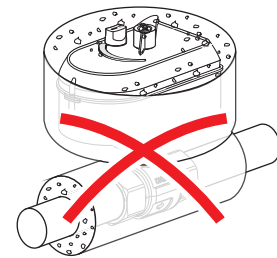
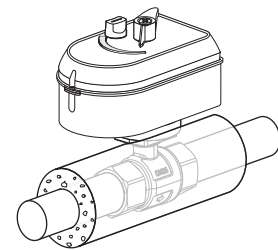
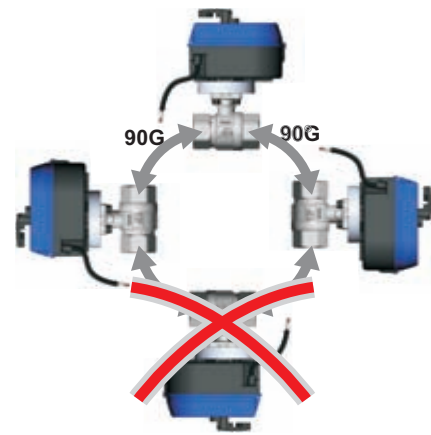
Washer M5 DIN 127 A2

Nut M5 DIN 934 A2

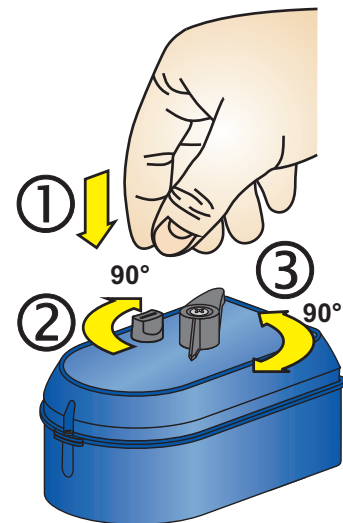
Washer M6 DIN 127 A2

Nut M6 DIN 934 A2

Installation position

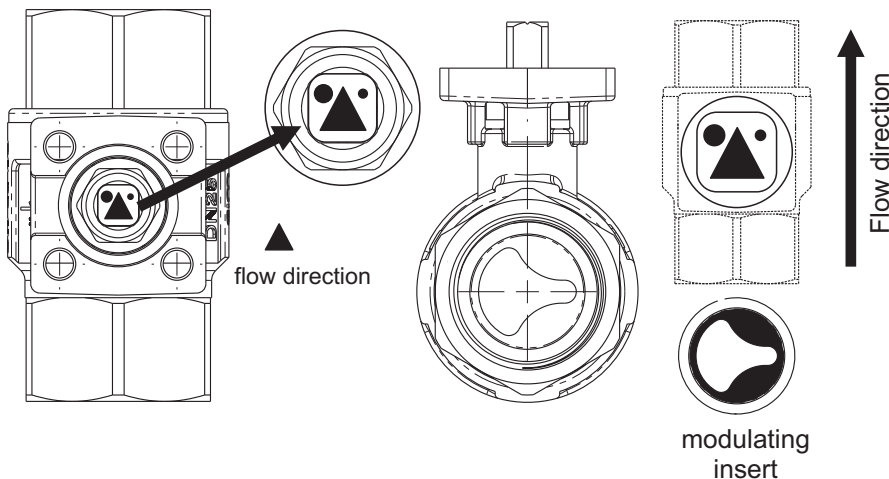


Manual override



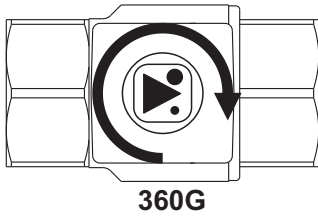
Note:
When button for manual operation is locked (in position MAN), you can manually choose position that is valid till you put knob in AUTO position.

Flow indication

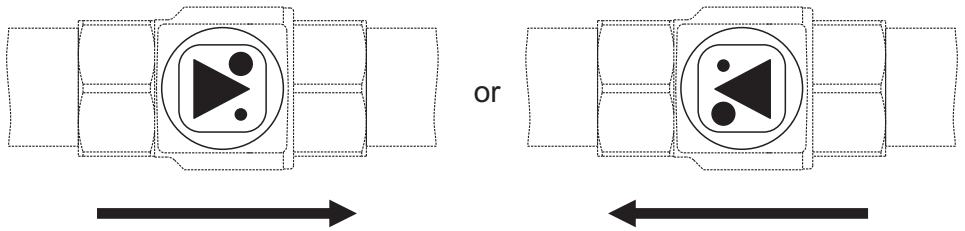


Installation

1 Before first use turn valve shaft completely for at least 360°



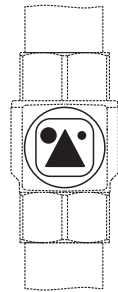
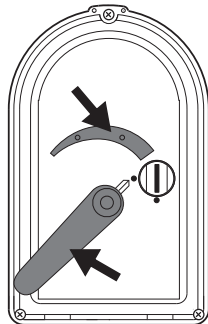
2 By turning valve shaft define flow direction and leave valve in OPEN position



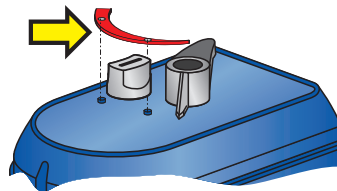
3 Choose valve function characteristic: linear 3.1 or logarithmic 3.2

3.1 MONTAL ° 1 - 8IN° AR Y8OW CHARACT° RISTIC

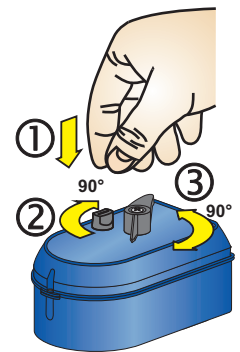
⚠ Before mounting the actuator on the valve **manually set** the indicator and handle position in required position!



Flow direction



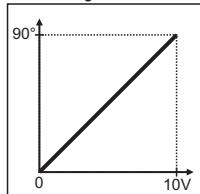
1. Set the red indicator according to the picture on the left



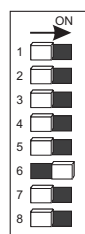
2. Manually turn handle according to the picture on the left

1. example

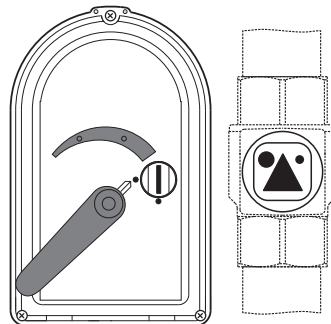
Control signal



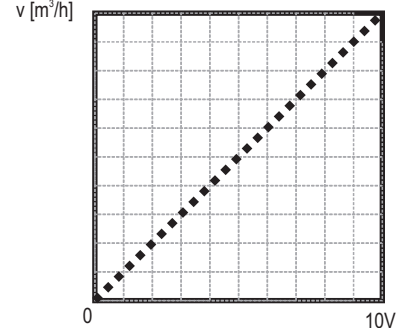
DIP SWITCH settings



Position at 10V

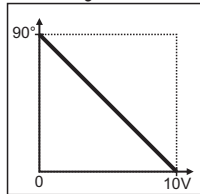


Flow characteristic

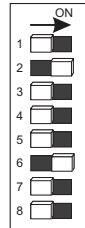


2. example

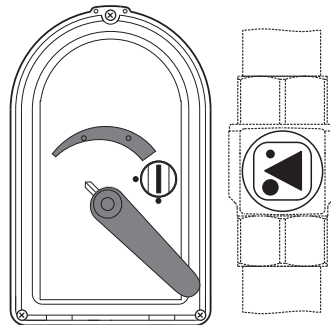
Control signal



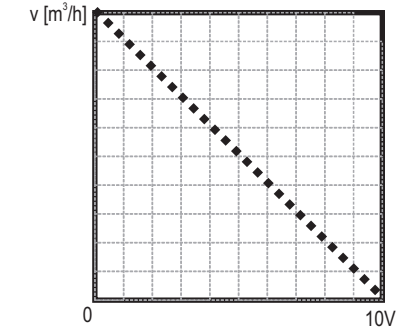
DIP SWITCH settings



Position at 10V



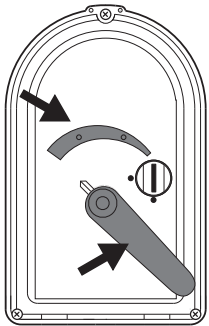
Flow characteristic



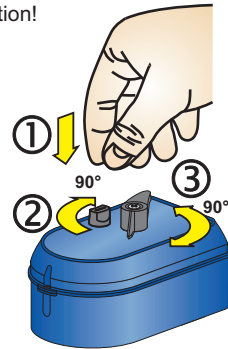
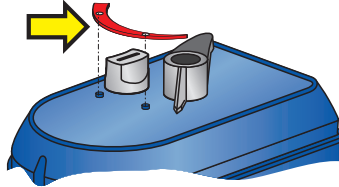
Instalation

3.2 MONTAL ° 1 - 8OLARITHMIC Y8OW CHARACT° RISTIC

⚠ Before mounting the actuator on the valve **manually set** the indicator and handle position in required position!



Flow direction

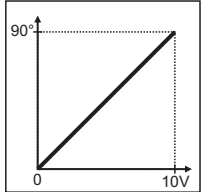


1. Set the red indicator according the picture on the left

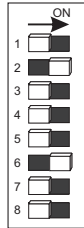
2. Manually turn handle according the picture on the left

1. example

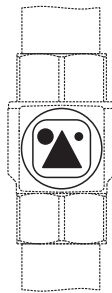
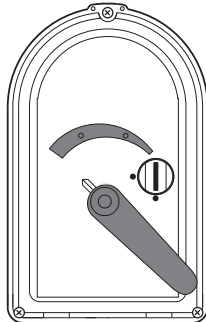
Control signal



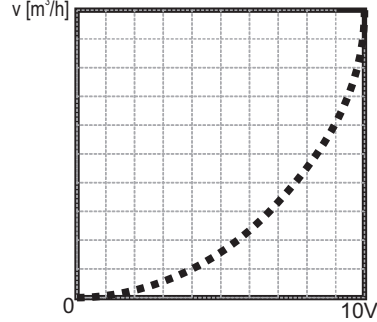
DIP SWITCH settings



Position at 10V

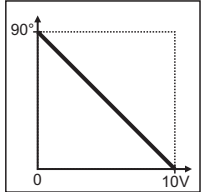


Flow characteristic



2. example

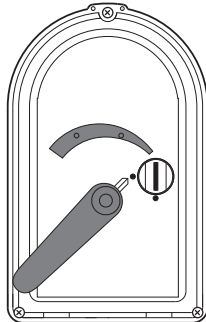
Control signal



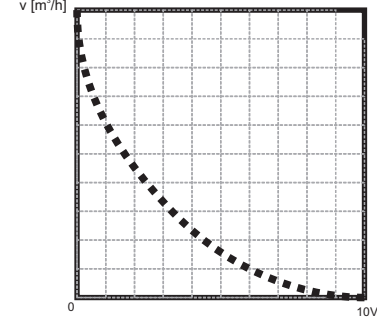
DIP SWITCH settings



Position at 10V



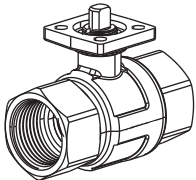
Flow characteristic



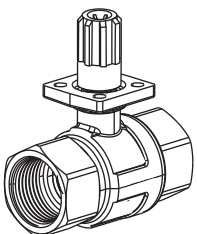
4



ISO 5211 adapter 9x9
* only 1/2" - 1 1/4"



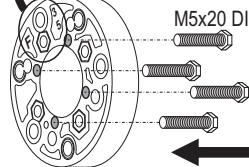
5



6



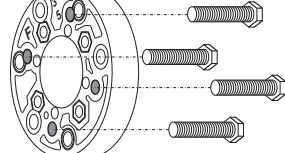
Y03 (1/2", 3/4", 1", 1 1/4")



* Push screw to end

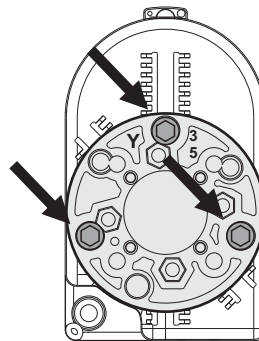
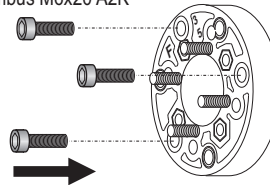
Y05 (1 1/2", 2")

M6 X 25 DIN933

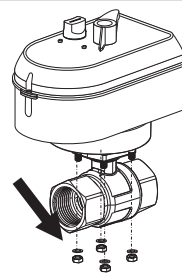


7

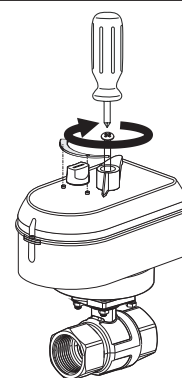
imbus M6x20 A2K



!



9



UNI MOD

Electrical connection

Modulating control

<input type="checkbox"/> grey	Nominal voltage
<input type="checkbox"/> black	24VAC +10/-15% / 50Hz
<input type="checkbox"/> brown - GND signal	Control signal:
<input type="checkbox"/> blue - Y signal (+)	0..10VDC
	0..20mA
	4..20mA

WARNING!

Black and brown wire are inside actuator connected.

DIP switches for choosing actuator parameter

-The actuator is controlled with standard modulating signal of DC 0..10V (factory default) and moves to the position defined by control signal. That allows actuator to be controlled with microprocessor controllers with modulating output. With DIP switches inside actuator is possible to choose control signal (voltage, current), rotation direction, signal range and resolution and opening curve characteristic

Factory default:

- 1 Voltage control signal
- 2 Inverse control signal
- 3,4,5 0-10VDC, 80mV
- 6,7 Curve 1

1	ON								
2									
3									
4									
5									
6									
7									
8									

	U(V)	I(A)
	-	ON

	CW	CCW
	-	ON

U (V)	0,16..9,84V 80mV	2..9,84V 80mV	0,16..4,88 V 40mV	5,12..9,84 V 40mV	2,16..5,84 V 40mV	6,16..9,84 V 40mV	0,16..10V 40mV	0..10V 10mV
I (mA)		4..20mA						0..20mA
	-	ON	-	ON	-	ON	-	ON
	-	-	ON	ON	-	-	ON	ON
	-	-	-	-	ON	ON	ON	ON

-	ON	-	ON
-	-	ON	ON

		for service purpose only
-	ON	

X Possibility of custom control signal curve - logarithmic curve, for example

We preserve the right to modify the instructions and technical data of product without prior notice.

*Differential thermostat for solar system
and combined multi-source heating*

DTC 100/2

*User manual
Instructions for installation and maintenance*



FIRŠT-ROTOTEHNIKA, s.p.

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PE VELENJE

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tel. 03 / 898 35 30

031 / 608 393, 041 / 608 393

e-mail: servis@first.si

<http://www.first.si>

DEAR CUSTOMER

We congratulate you on your choice.

By purchasing the differential thermostat DTC... you have selected a product, that complies with all the most recent quality and safety standards. It includes state-of-the-art knowledge of how to harness solar energy and other alternative sources for water heating purposes in homes and offices. We are convinced that you will find using our product highly cost-efficient.

Thanks for your trust,

FIRŠT Rototehnika

THE KIT INCLUDES:

1. Differential thermostat DTC 100/2
2. Sensor T1 with a silicon conductor for the collectors
3. Sensor T2 with a PVC conductor for the DHWS
4. A clamp with two fastening springs - to fasten the sensor
5. Instructions for use
6. Warranty card

In case any of these are missing or damaged, demand your seller to supply you with a replacement !

Read these instructions carefully, as this will allow you to benefit from all the possibilities offered by this product.

NOTICE

The examples of how to use the DTC/2 listed in this booklet are only schematic. We accept no responsibility for incorrect hydraulic coupling of the mechanical part of the installations. The mechanical installations must, as well as the electrical ones, comply with all the safety regulations prescribed by the law and the regulation books.

We reserve the right to modify the instructions and the technical data of the product without prior notice.

GENERAL INFORMATION

DTC 2 is a single differential thermostat designed for heating water in homes and offices from one source. (solar collectors, hot water boilers, heat pumps, etc.)

The thermostat controls one pump or electrically actuated motor ball valve.

The thermostat allows setting two parameters, that is:

1. Setting the maximum temperature in the DHWS (Domestic Hot Water Storage) between 10°C and 90°C. This temperature is determined by sensor T2, which is usually installed in the upper third of the exchanger.

2. Setting the difference between the temperature in the boiler and the source of heating (collectors). It can be set between 5 and 15 K. By means of this setting we define, by how many degrees the temperature of the source of heating needs to exceed the temperature of the water around the exchanger in the DHWS in order to start the operation of the valve and put the pump into operation. The setting of the difference depends on the amount of temperature losses on the system. These losses mainly depend on the length and the quality of the insulation of the tubes leading from the source to the DHWS.

OPERATION


Single differential thermostat DTC 100/2 measures the temperature in the source (collectors, the stove) and in the consumer (DHWS).

In order to achieve heating effects, the temperature of the heating body (the heater in the boiler) needs to exceed the temperature of the water in the consumer (the boiler) by at least 3 to 5 K. This is why the minimum adjustable difference is 5 K (factory setting). When the temperature in the source exceeds the temperature of the water around the exchanger in the consumer, the thermostat opens the valve (EMV), or actuates the pump and closes the valve, or switches off the pump when the difference in temperature is lower than 3 to 4 K.

The thermostat de-activates the pump also in the case when the achieved temperature of the water in the boiler equals the pre-set temperature (adjustable between 10 and 90°C).

The kit includes two sensors (T1 and T2), of which one is installed into the heating source and the other into the upper half of the exchangers in individual boilers.

ADVANTAGES

- * The adjustable temperature difference between the source and the consumer is within 5 and 15 K.
- * Potential output with a reversing contact SPDT () 230V, 50Hz.
- * The setting of the required temperature in the consumer (DHWS) is between 10 and 90°C.
- * The system is supported either by a circulation pump or by an electrically actuated motor ball valve.
- * Manual control is provided to allow for operation checks if required, or to be used in the case of a sensor breakdown.
- * The thermostat can be completely turned off.

INSTALLATION OF THE THERMOSTAT

The thermostat is fastened upon the coat of the DHWS (Domestic Hot Water Storage) or to its immediate neighbourhood. By simply using the outline of the boreholes drawn on page 11 of this booklet, the thermostat can easily be fastened to the wall in the heating room. Do not fasten the thermostat below tube joints or valves to avoid water dropping on its housing.

INSTALLATION OF THE SENSOR INTO THE COLLECTOR

Sensor T1 is inserted as an immersion sensor into the immersion tube provided on the upper side of the collectors (figure A). The sensor is connected to clips 1 and 2. To lengthen the cable up to 50m you can use the 2x0.75 mm² standard cable. It is recommendable, to allocate a VDR resistor (Figure B) to the point where the cable of the sensor and the lengthening cable join to prevent sudden jumps of voltage (due to lightning strokes, for example). For greater lengths or in the areas where lightning strikes are more likely to happen, it is advisable to use an armoured cable, where the armoured coating is connected to the grounding terminals.

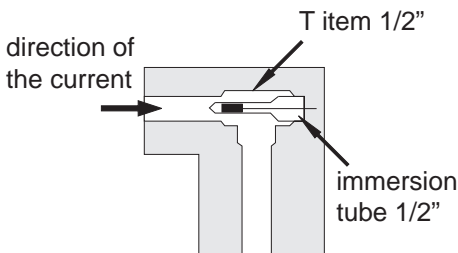


figure: A

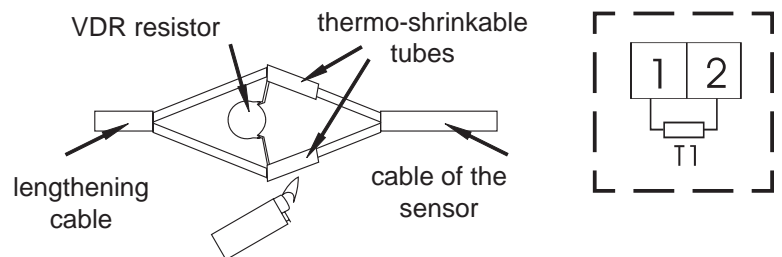
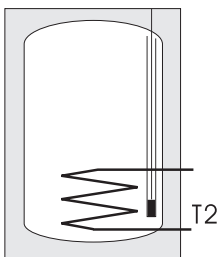
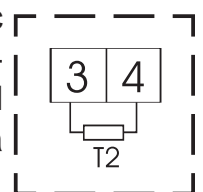


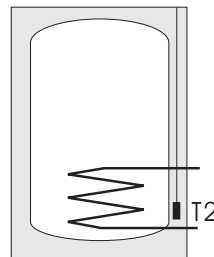
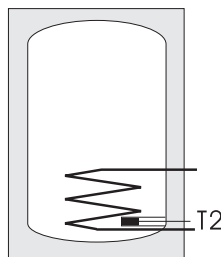
figure: B

INSTALLATION OF THE SENSOR INTO THE BOILER

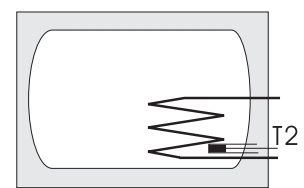
Sensor T2 must be fixed to the provided location in the DHWS (Domestic Hot Water Storage) or to the DHWS wall below the insulation as a surface-mounted sensor in the upper half of the exchanger. If the sensor is installed in the surface-mounted way, it is advisable to lubricate it beforehand with a heat conducting grease or liquid metal.



Installation of T2 into a specially provided vertical or horizontal tube (protect the sensor against unwanted extraction)



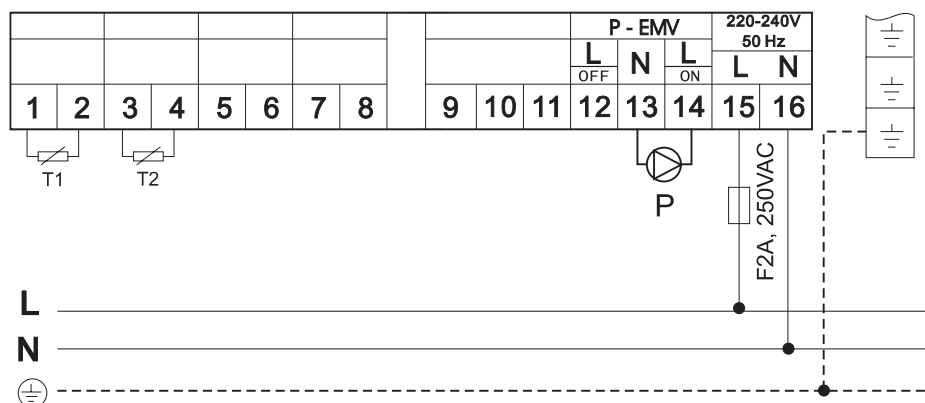
Installation of T2 upon the boiler by means of a clamp and a spring ribbon. (use grease for better conductivity of heat.)



Installation into a specially designed lateral tube (protect from unwanted extraction)

ELECTRICAL CONNECTION

The grounding cables are to be connected to the specially designed terminals, to the right of the coupling terminals.




TERMINAL	CONNECTION
1,2	sensor T1 - sensor of the source (collector) KF, silicon, 2x0.25 mm ² , 2 m long, with two spring ribbons and one angle clamp, orange
3,4	sensor T2 - DHWS sensor, 2x0.34mm ² 1.5 m long, gray
12	phase (L) for closing the electrically actuated motor valve (EMV 110)
13	neutral connector (N)
14	phase (L) of the pump, i.e. opening of the electrically actuated motor valve (EMV 110..., find in our production line)
15	L - phase, mains connection 230 V, 50 Hz.
16	N - neutral, mains connection 230 V, 50 Hz.

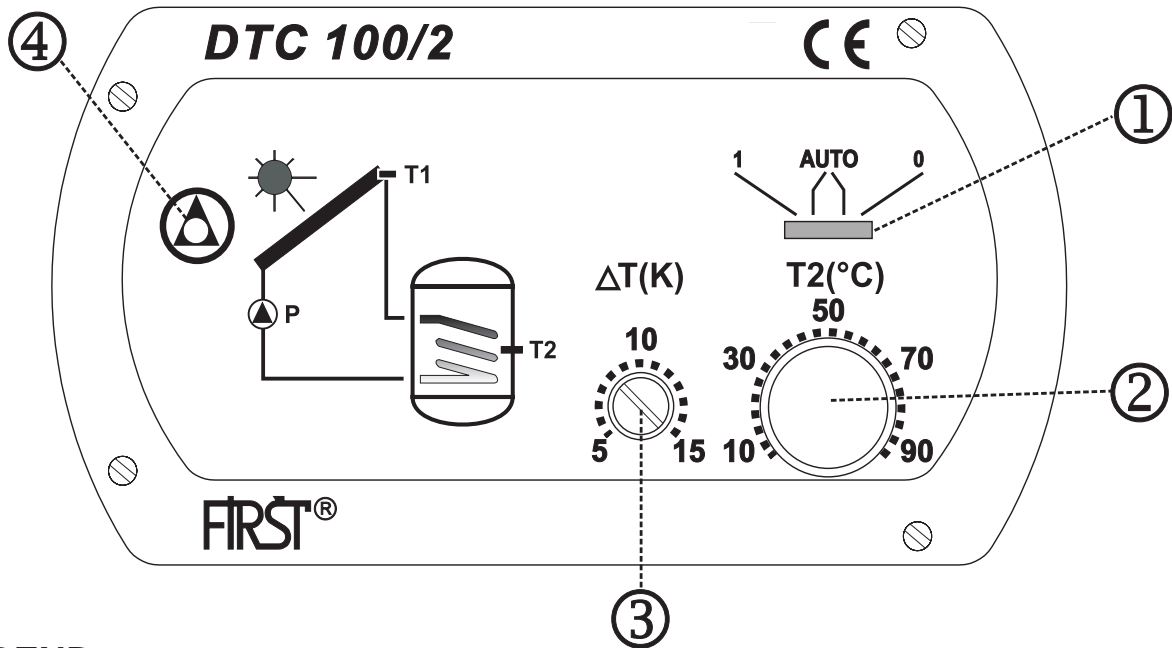
NOTICE

The thermostat is designed to be fastened permanently. While putting in the electrical installation, it is necessary to insert a safety element to allow the thermostat at least a 3mm - distance from the mains (a switch or a power cord). For any repairs inside the thermostat, it must be fully disconnected from the mains.

TECHNICAL DATA

Supply voltage	230V 50Hz +/- 10%
Power consumption	4 VA
Pump relay rating	3A/230VAC cos 0,6
Type of thermostat.....	P
Max. temp. of water	100°C
Interval of operation.....	10 - 90°C
Setting the difference.....	5 - 15K
Hysteresis of the thermostat.....	1 - 2K
Nr. of sensors	2
Nr. of outputs.....	1 (230 VAC reversing SPDT )

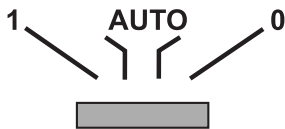
DESCRIPTION OF THE FRONT PANEL ELEMENTS



LEGEND :

- 1 - The switch for manual control (selection of a mode of operation)
- 2 - Button for adjustment of the temperature of the water in the DHWS (operates only when the gliding switch (1) is in position AUTO.)
- 3 - Potentiometer for the adjustment of the switching off temperature difference between the DHWS and the source of heating. (recommended setting is between 5 and 10K)
- 4 - LED to signal operation

USE OF THE MANUAL CONTROL SWITCH



- 0** No matter what the value of the temperature is, the pump is off, the valve remains closed.
- AUTO** Thermostat operates automatically (normal operation)
- 1** No matter what the value of the temperature is, the valve remains open, the pump keeps operating.

Setting the temperature in the DHWS

By turning the right button (2) on the cover of the thermostat, you can set the maximum temperature of the water in the DHWS (Domestic Hot Water Storage) between 10 and 90°C. When the set temperature is achieved, the thermostat closes the valve and turns off the pump. This allows connection of appliances using hot water while operating, such as the washing machine and the dish-washing) While using this option, attention needs to be paid to the allowed input temperature of the water, as prescribed by the manufacturer for each individual appliance.

WARNING:

If heating the water in a system including a heat pump, it is necessary to consult the heat pump manufacturer concerning the appropriate coupling. It is forbidden to switch on the thermostat, where this, provided that the temperature of the water is risen, turns the compressor off.

With the appliances using hot water, additional protection against overheating is required, which is to close the supply of water in case of thermostat failure.

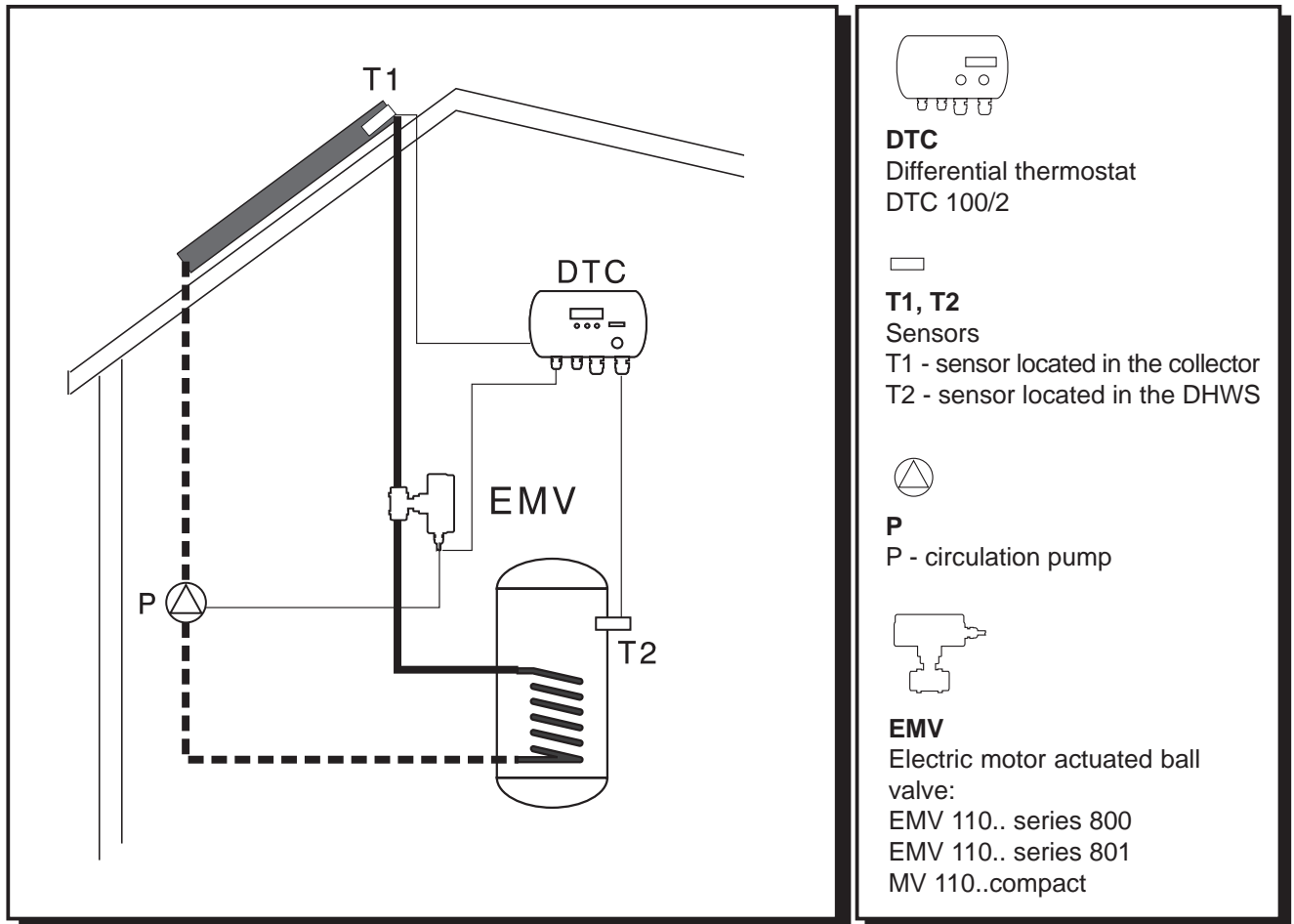
Setting the temperature difference (the switching difference)

The temperature difference between the source of heating and the consumer (the DHWS) is set to the value required by the mechanical part of the installation by means of a screw-drive and the potentiometer (3) on the cover of the thermostat.

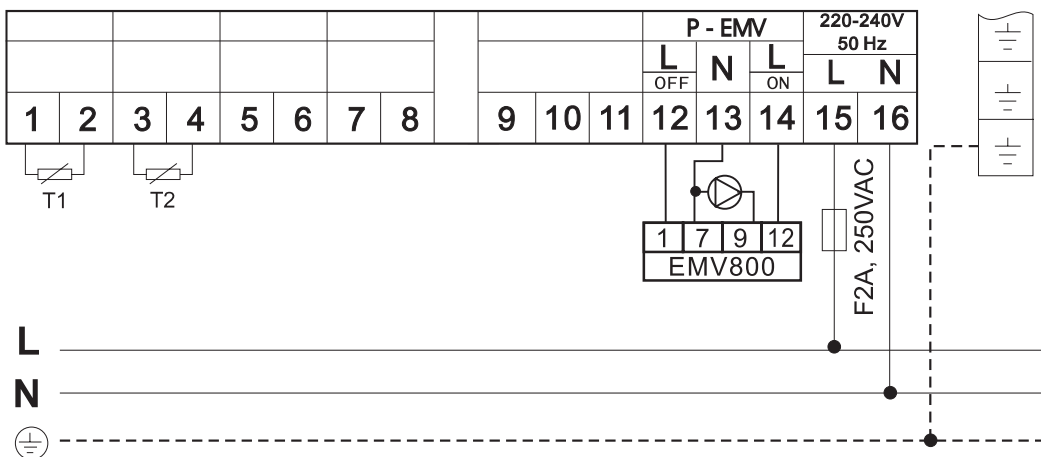
When using collector heating this difference is between 5 and 10 K, depending on the length of the tubes and the quality of their insulation. If the tubes connecting the collectors with the boiler are insulated and their total length does not exceed 15 meters, the difference can be 5 K, whereas it needs to be increased in proportion to their length and poorer insulation.

Basic coupling with a pump controlled by an electric motor actuated ball valve (EMV 110 series 800)

When the conditions required for the boiler to start heating are met, the EMV 110 series 800 opens. The pump however, is put into operation only when the valve is open.

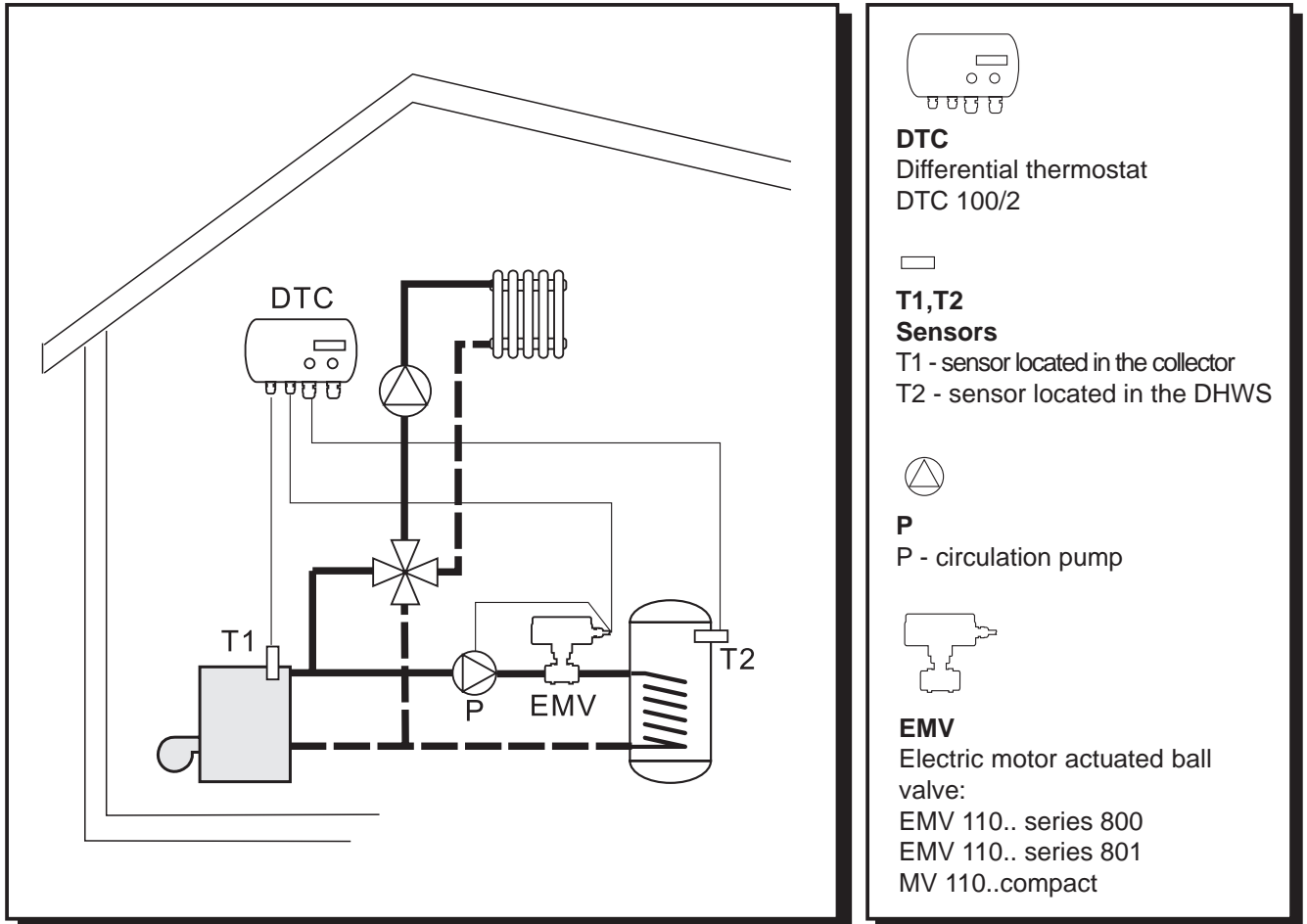


Electrical connection

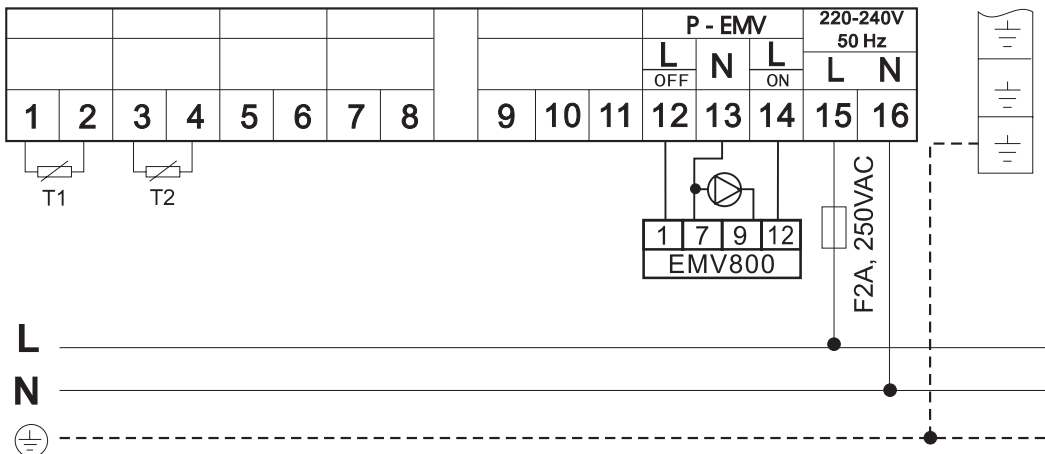


Basic coupling with a pump controlled by the electrically actuated motor ball valve EMV 110 series 800.

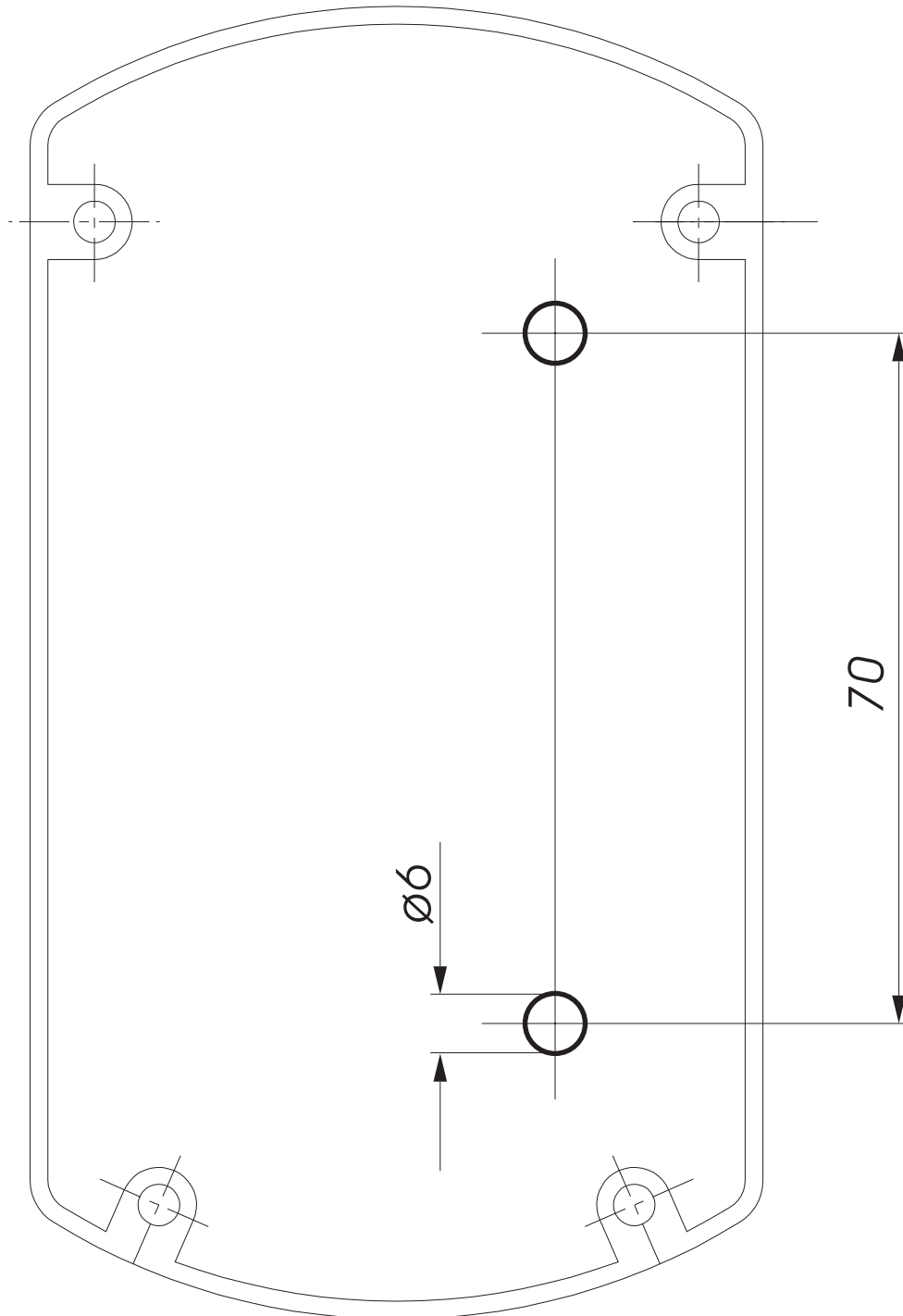
It is used in cases which require temperature regulation of sanitary water in the classical oil or solid fuel powered boiler. When the conditions which require heating of the DHWS (Domestic Hot Water Storage) have been met, the valve EMV 110 series 800 opens, but the pump is put into operation only when the valve is open.



Electrical connection



An outline of borehole positions - to facilitate the installation of the differential thermostat upon the wall.



Most frequently occurring failures

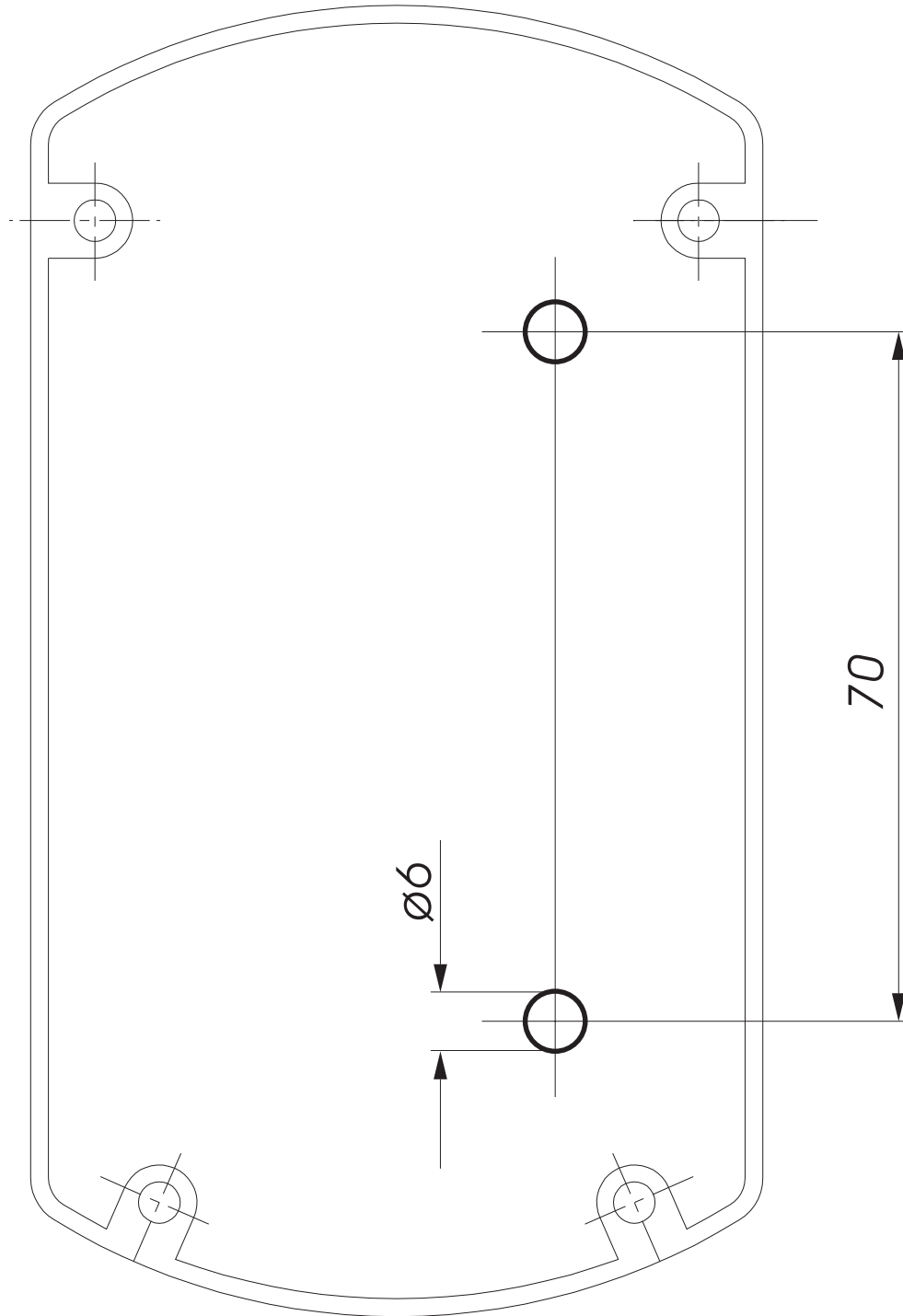
PROBLEM	POSSIBLE FAILURE	ELIMINATION
No matter what the temperature is, the pump never operates	<ul style="list-style-type: none"> - there is no mains voltage - the switch is in 0-position - short-circuited DHWS sensor - short-circuited collector sensor 	<ul style="list-style-type: none"> - check the mains voltage - put the switch into AUTO position - check the sensors
No matter what the temperature is, the pump keeps operating	<ul style="list-style-type: none"> - the switch in position 1 - disconnected collector sensor - short-circuited DHWS sensor 	<ul style="list-style-type: none"> - put the switch into position AUTO - check the sensors
Temperature limits do not work	- the motor actuated ball valve remains open, the closing flap stays open (thermal circulation of water is possible)	- check the machine installation
Despite the warmth of the collectors, the sanitary water is cool or not warm enough	<ul style="list-style-type: none"> - the setting of T2 is too low - the difference is set too high 	- check the settings

*Differential thermostat for solar systems
and combined heating sources*

DTC 100/3

*User's manual
Installation and maintenance instructions*

HOLES FOR EASIER INSTALLATION OF
DIFFERENTIAL THERMOSTAT ON WALL



DEAR CUSTUMER

Congratulations

you have bought a DTC 100/3 differential thermostat, manufactured according to the latest quality and safety standards. It is made according to the state of art and efficiently utilises solar energy or alternative sources for domestic water heating.

We are convinced that the use of our product will satisfy your needs too and help you to save your money.

Thanks for your confidence

FIRŠT Rototehnika

THE SET CONSIST OF:

- Diferential thermostat DTC 100/3
- T1 collector sensor with silicone conductor
- T2 and T3 hot water tank sensor with PVC conductor
- Clip for sensor fastening with fixing springs
- Instruction for use
- Warranty certificate

In case any of above specified elements are missing or are defective require your dealer to replace it.

Read the instructions carefully in order to be able to make use of all advantages of the product.

! WARNING !

All examples listed in the instructions are merely indicativ. The manufacturer accepts no responsebility for incorrect hydraulic connection of machine part of installations should comply with all safety regulations defined by law and the rules.

We reserve the right to modify the instructions and the technical data of the product without prior notice

GENERAL

DTC 100/3 is a double differential thermostat, designed for domestic water heating with two storage tanks from one heating source (solar collectors, boilers, heating pumps,...). It is used in the systems where during the day one storage tank cannot accumulate whole energy, which is disposal from solar collectors.

The thermostat controls circulation pump and motorised diverter valve (ROTODIVERT) or 3-way motorised ball valve (EMV 710, 830, 930). With special el. connection it can control two pumps or 2-way motorised ball valve.

The thermostat enables setting of two parameters, i.e.:

1. Regulation of maximum temperature in hot water storage tank from 10° to 90°C.

This temperature is defined by T2 and T4 sensor witch is generally mounted in upper third of heat exchanger in water storage tank.

2. Regulation of difference for higher exchanger from 2° to 15°C

With this parameter you define how much the value of the source temperature (collector, boiler,...) should exceed the temperature of water around the exchanger in storage tank, that the regulator activates the pump.

The difference is set in relation to the volume of heat losses of the system which depend on lenghts of pipelines from source to hot water tank and on pipeline insulation.

OPERATION

Double differential thermostat DTC 100/3 measures the temperature in the heating source (solar collector, heating boiler ...) and the temperature in two storage tanks (boiler, swimming pool ...).

One of the storage tanks has precedence over other - in practice means usually the smaller boiler - in the smaller boiler is need for domestic hot water. When the boiler's temperature is reached, then thermostat changeover the 3-way ball valve or diverter valve for heating second larger storage tank.

If the temperature from heating source (solar collector) is not high enough according the set temperature for primary storage tank but is higher then the temperature from second storage tank, then thermostat changeover the 3-way ball valve or diverter valve for heating second larger storage tank.

When the both temperatures are reached to maximum temperature, the pump is switched off.

Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank). Consequently minimum adjustable difference is 5° (factory set). When the difference is smaller then the set difference, thermostat switches off the pump.

In the set are three sensors. One is installed in the heating source (solar collector) and another two in two storage tanks in upper part of exchanger.

Sensors T1 and T2 are used for primary heating circuit, which heats water in smaller storage tank (domestic hot water storage tank).

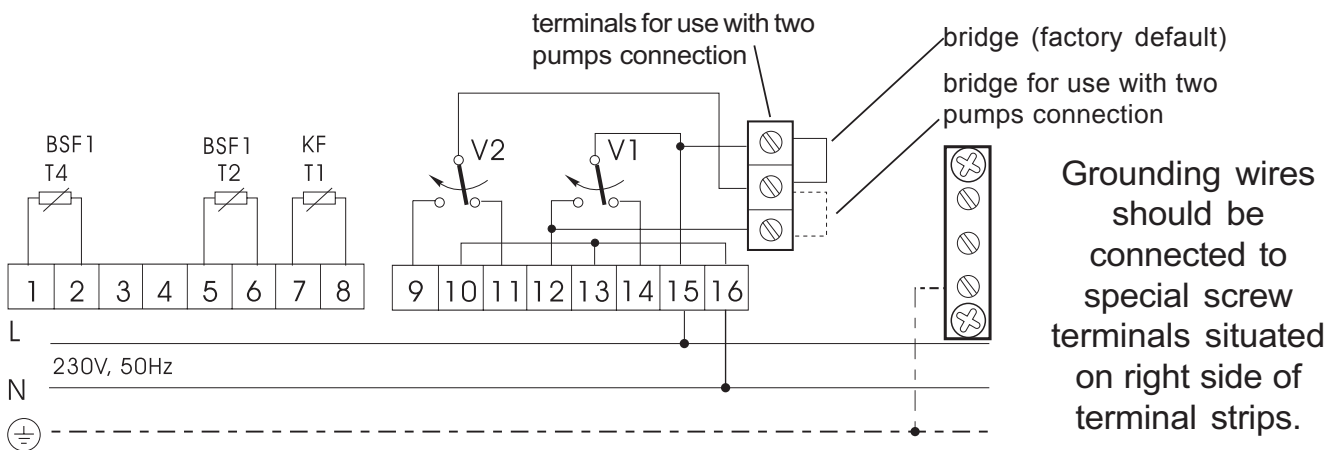
Sensors T1 and T4 are used for secondary heating circuit, which heats water in larger boiler (or swimming pool, etc). Sensor T1 is heating source sensor (usually solar collector), sensors T2 and T4 are storage tank sensors.

Differential thermostat DTC 100/3 can be used like a single differential thermostat, but without connection of sensor T4.

INSTALLATION OF THERMOSTAT

Install the thermostat on hot water tank chasing or close to it. Do not install it under the pipe fittings or valves due to possible water dripping on its housing.

ELECTRICAL CONNECTION



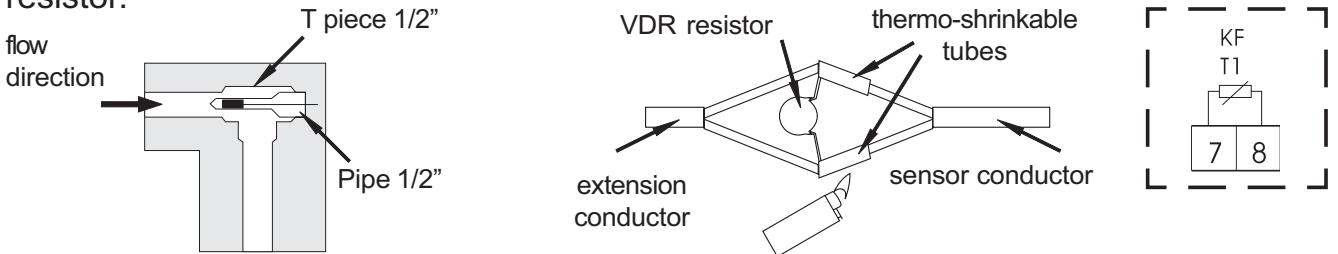
TERMINAL	CONNECTION
1,2	Sensor T4 - secondary water storage tank, grey
5,6	Sensor T2 - primary domestic hot water tank, grey
7,8	Sensor T1 - heating source (solar collector, ...), red silicon
9	L - phase: changeover 3-way electric motor ball valve to position for heating secondary storage tank
10	N - neutral
11	L - phase: changeover 3-way electric motor ball valve to position for heating primary domestic hot water storage tank
12	L - phase: circulation pump or phase for opening 2-way electric motor ball valve
13	N - neutral
14	L - phase: for closing 2-way electric motor ball valve
15	L - phase: connection for mains: 230VAC, 50Hz
16	N- neutral: connection for mains: 230VAC, 50Hz

! WARNING !

The thermostat is designed for fixed installation. When performing electric installation, an element should be inserted which enables at least 3 mm separation of thermostat from the mains (switch or socket). Prior to each intervention in the thermostat, first disconnect it from the mains.

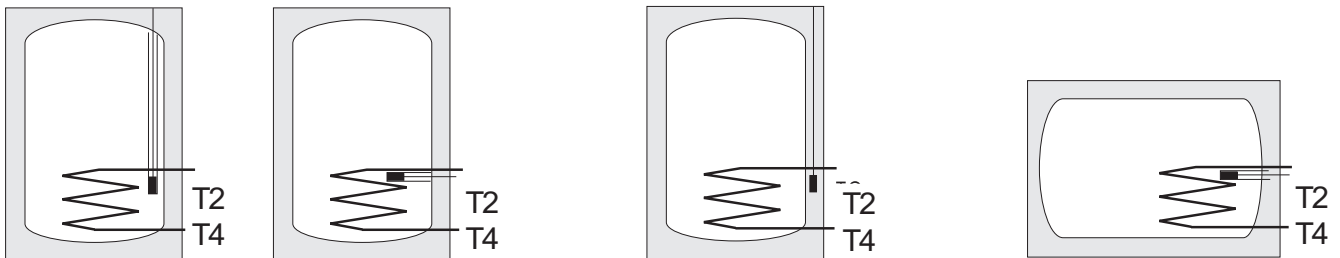
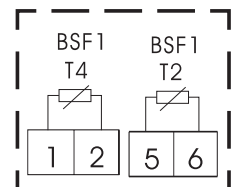
SENSOR INSTALLATION IN COLLECTOR:

Install T1 as immersion sensor in collecting pipe at the top of the collectors in provided sleeve. Connect the sensor on terminals 7 and 8. For extension the sensor's cable to 50m use cable 2x0.75mm², for longer cables use cable 2x1,5mm². On the spot, where is connection with sensor's cable and extension cable, is recommended to use VDR resistor.



SENSORS INSTALLATION IN HOT WATER TANK:

Install T2 and T4 sensor to provided place in hot water tank or on hot water tank wall under isolation as contact sensor in upper part of exchanger. When sensor is mounted as contact one we recommend to coat it with heat conducting paste or liquid metal.

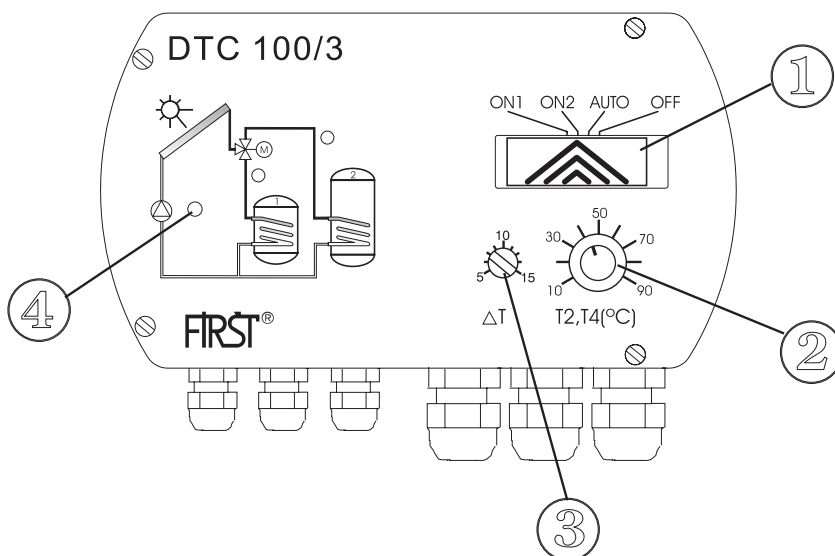


In special purpose vertical or horizontal tube (sensor should be protected against accidental extraction).

On hot water tank with clip, wire and spring strip (use paste for better heat transmission).

In special purpose side tube (protect against extraction).

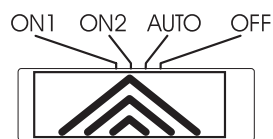
CONTROL PANEL



- 1 Operation switch for operating mode selector
- 2 Regulation of maximum required temperature in water storage tanks
- 3 Settings the difference
- 4 LED indicator of working circulation pump

USE OF SELECTOR SWITCH FOR MANUAL CONTROL

With selector switch (2) you select one of the following models of operation:



- ON 1** Continuously heating of primary water tank, secondary is out of function. There is no limit of water tank temperature
- ON 2** Continuously heating of secondary water tank, primary is out of function. There is no limit of water tank temperature.
- OFF** Irrespective of temperature values, the pump is off.
- AUTO** Automatic operation of thermostat (normal operation)

! WARNING !

OFF does not enable galvanic separation from mains. When replacing the pump, disconnect supply voltage!

Temperature setting of storage tank

You can set maximum water temperature of both storage tanks (from 10° to 90°). When the temperature is reached in the primary storage tank, the thermostat changeover 3-way electric motor ball valve to heating the secondary storage tank. When the temperature is reached in the secondary storage tank, deactivate the pump regardless the temperature of heating source. If the appliance with limited maximum temperature of inflow uses hot water, this setting is very useful.

WARNING

In the systems with heating pump is recommended to consult with manufacturer. It's forbidden to directly control the compressor of heating pump with the thermostat!

It is recommended that you built in system protection for over heating the storage tank (in case of error).

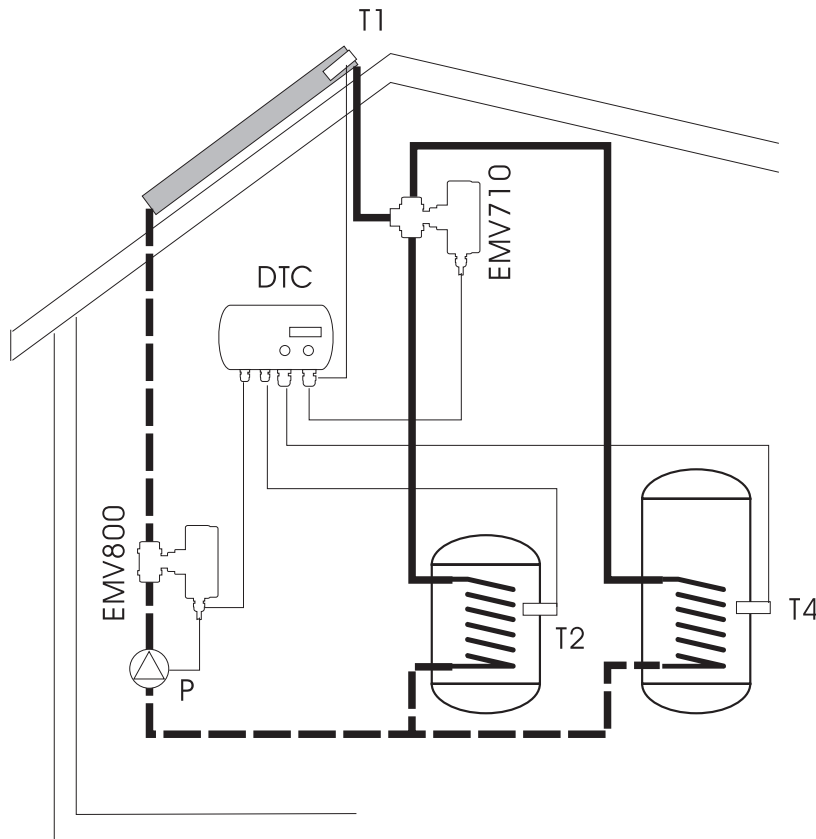
Differential thermostat DTC 100/3 can be used like a single differential thermostat(one storage tank), but without connection of sensor T4. If you later built in second storage tank, than you built in 3-way motor ball valve and connect the sensor T4.

Difference setting:

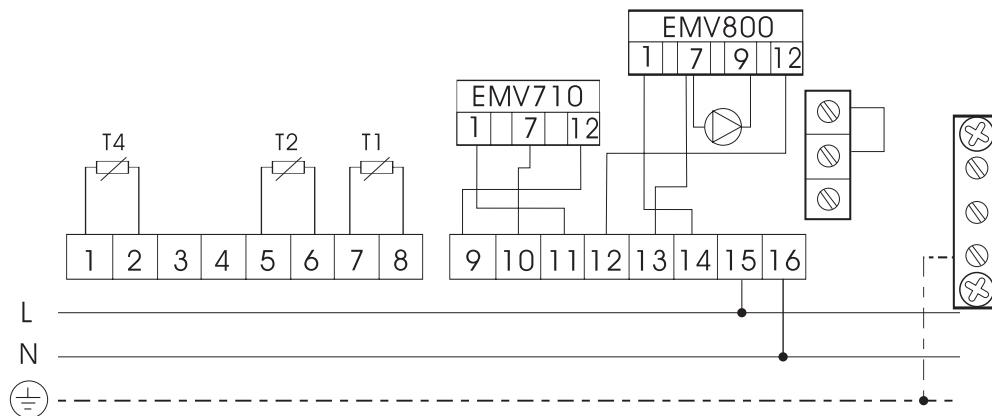
The difference is set with the knob depending of heat losses of the system, which depend on lengths of pipelines from source to storage tank and on pipeline insulation. It can be set from 5° to 10°C. If the pipes of installation are good insulate and they are not longer than 15m, the difference should be 5°. With the pipes length or weaker insulation the difference must be higher.

Basic connection with one circulation pump **controlled by 2-way electric motor ball valve and** **3-way electric motor ball valve.**

When is fulfil a condition for heating water tank, thermostat opens the 2-way ball valve and when the valve is open it switch on the pump. Instead of ball valve can be connected only the pump and nonreturn valve. Pump is connected directly on terminals.



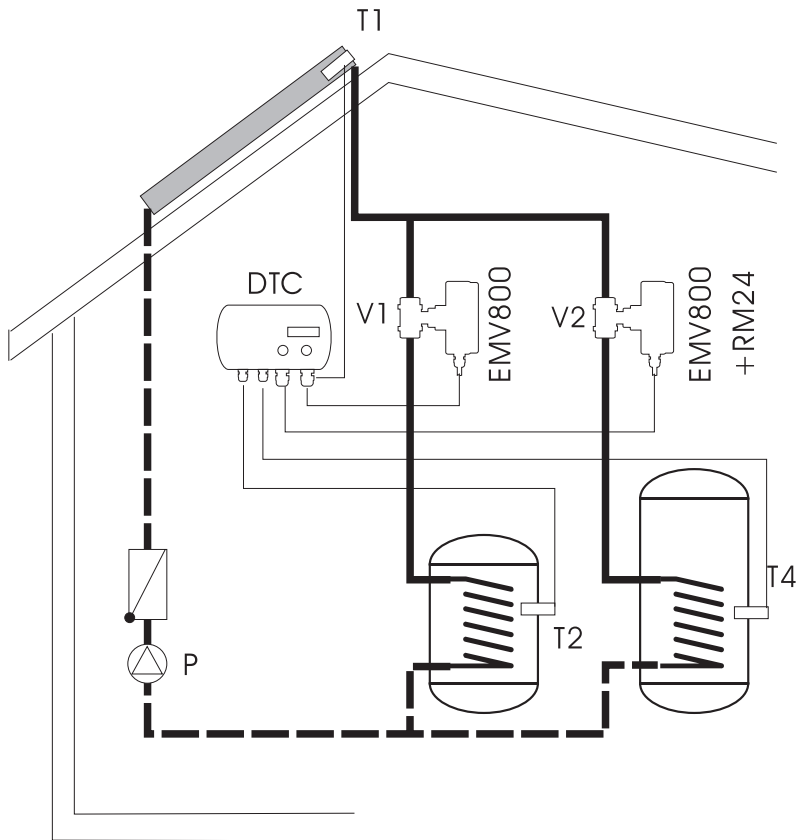
Electrical connection:



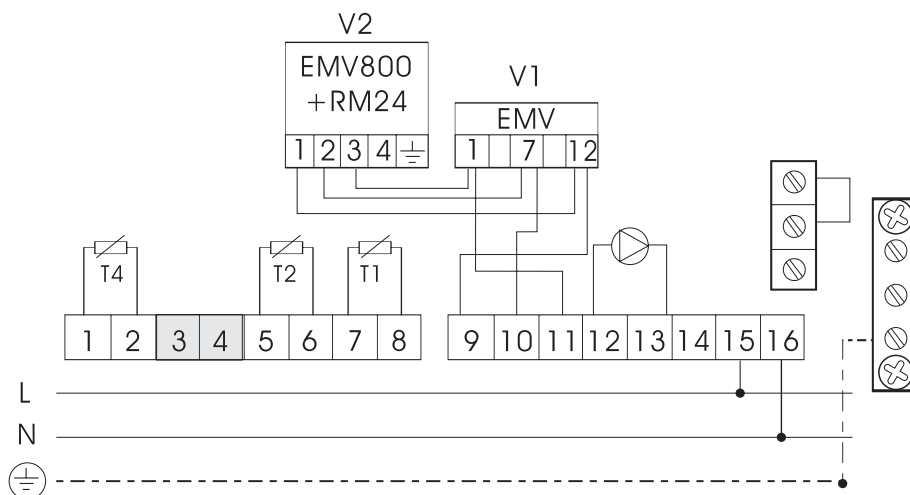
Instead of ball valve can be connected only the pump and nonreturn valve. Pump is connected directly on terminals 12 and 13.

Connection with circulation pump with nonreturn valve and two 2-way electric motor ball valve

This connection is recommended when you use differential thermostat as single differential thermostat. Later is easier to add second water tank.

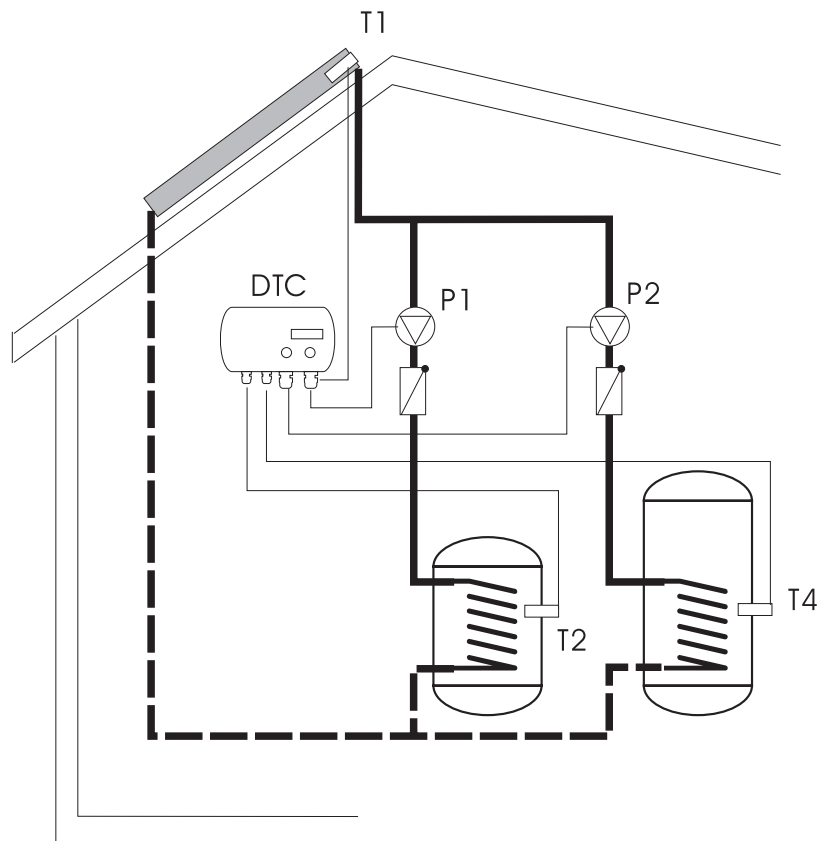


Electrical connection:

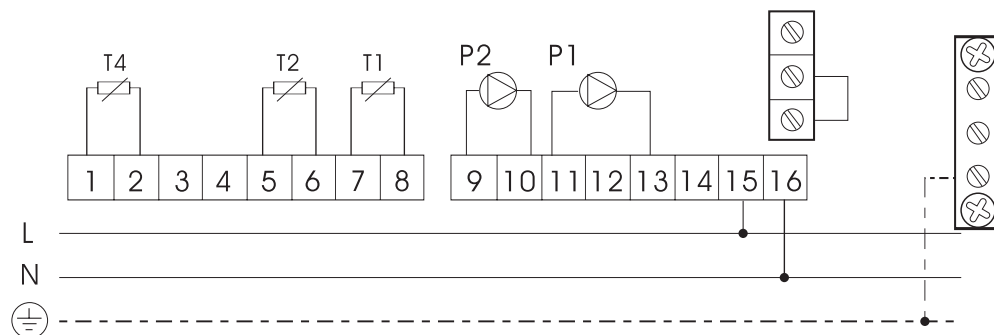


Connection with two pumps

To prevent the termosyphonic circulation is built in nonreturn valve in each circuit. Instead of use the nonreturn valves is recommended use 2-way electric motor ball valves. In the connection with two pumps, the factory-installed bridge on the right side of terminals must be moved in lower position as it is shown on the picture.



Electrical connection:



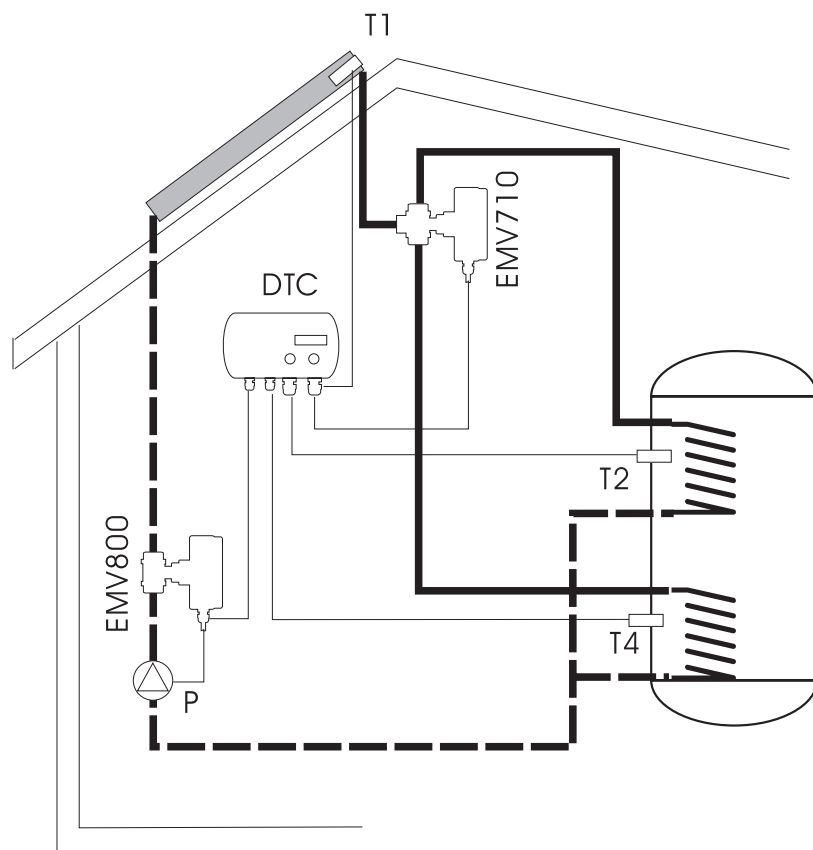
WARNING

The bridge is under supply voltage, so thermostat must be disconnected from supply voltage when you move it.

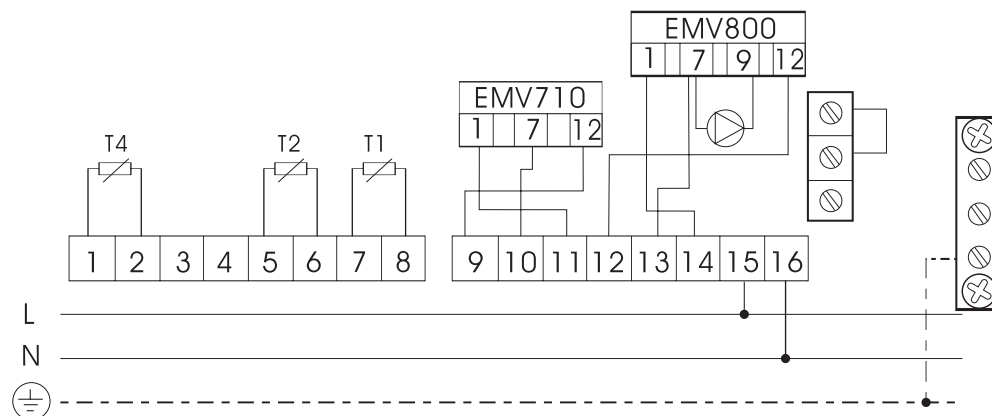
Water tank with two exchangers - connection with one circulation pump controlled by 2-way electric motor ball valve and 3-way electric motor ball valve

The connection enables fast warming of upper part of water tank. When is warm enough, than thermostat heats a whole water tank.

This connection is very efficient in heating systems with solar collectors. Even by weak intensity of sun (at mornings, cloudy weather...) enough heats the smaller quantity of water.



Electrical connection:



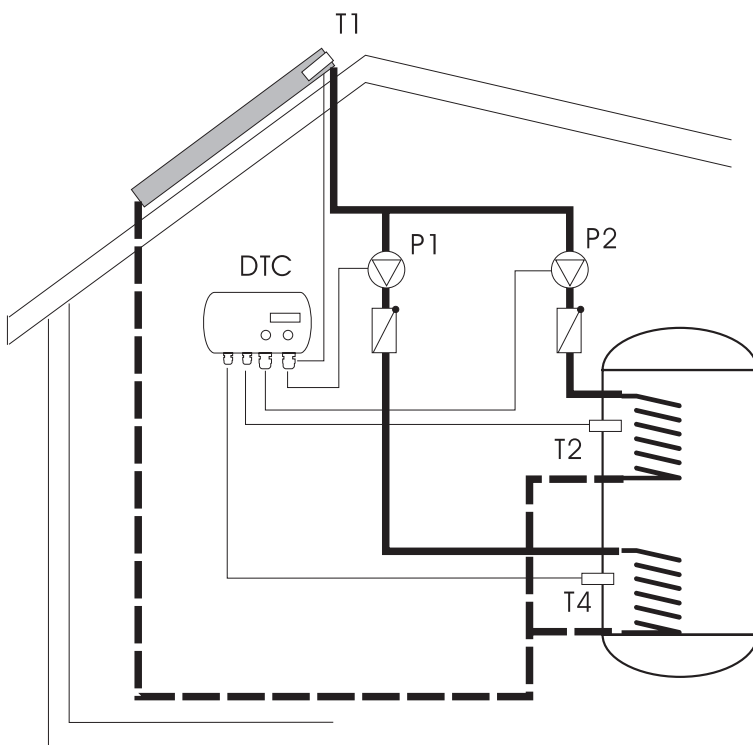
Instead of ball valve can be connected only the pump and nonreturn valve. Pump is connected directly on terminals 12 and 13.

Water tank with two exchangers

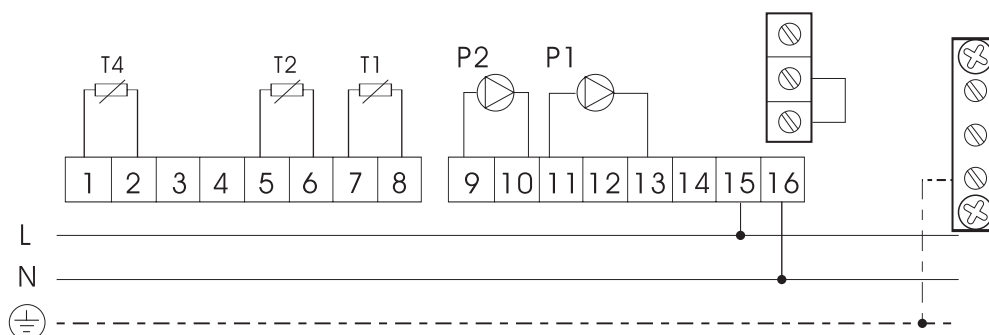
- connection with two pumps

The connection enables fast warming of upper part of water tank. When is warm enough, than thermostat heats a whole water tank.

This connection is very efficient in heating systems with solar collectors. Even by weak intensity of sun (at mornings, cloudy weather...) enough heats the smaller quantity of water. In the connection with two pumps, the factory-installed bridge on the right side of terminals must be moved in lower position as it is shown on the picture



Electrical connection:

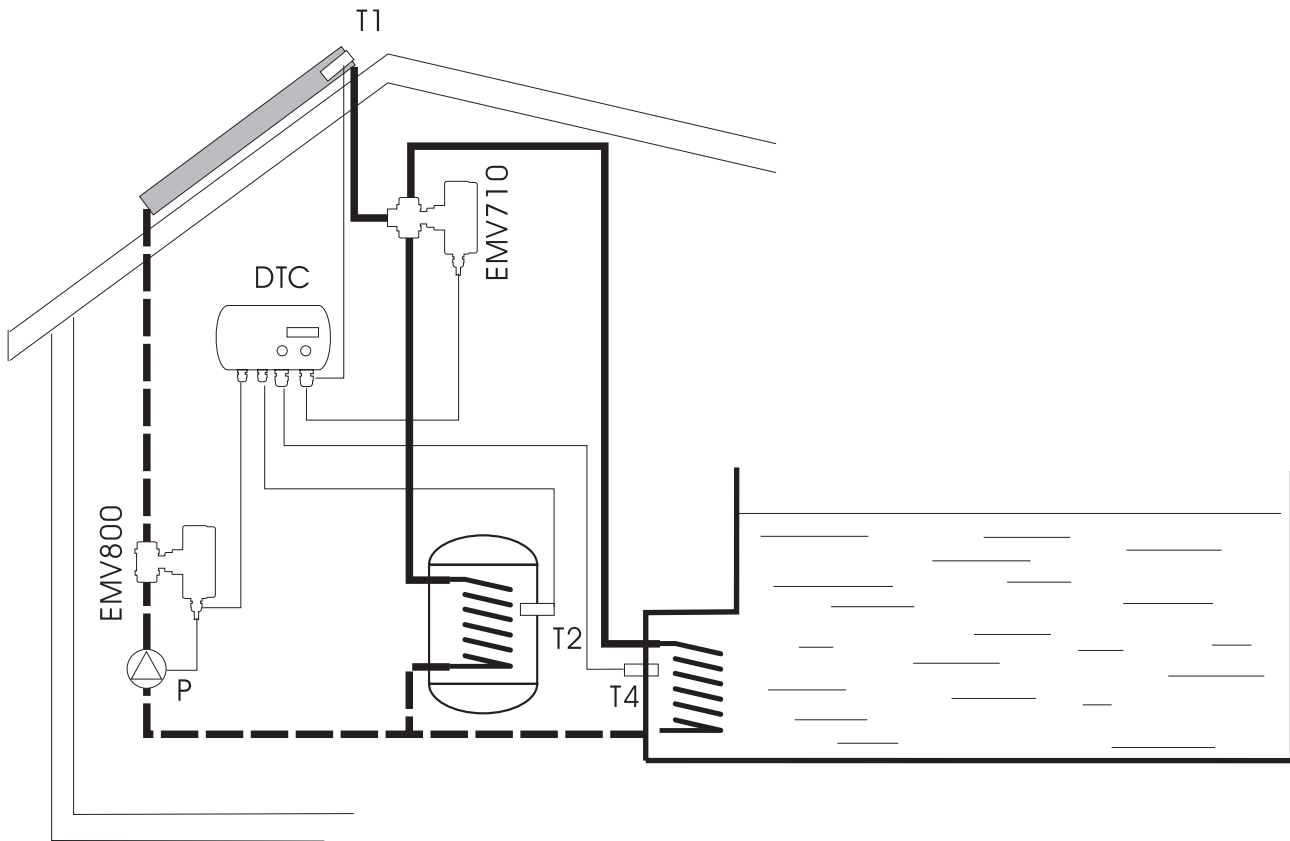


WARNING

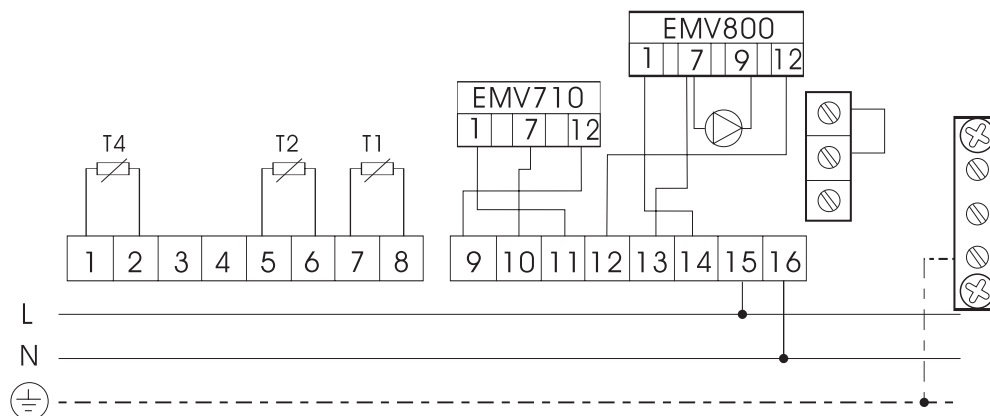
The bridge is under supply voltage, so thermostat must be disconnected from supply voltage when you move it.

Heating the domestic hot water tank (DHWT) and water in the pool with solar collectors.

Priority has the domestic hot water tank. When the temperature in DHWT is reached, the surplus of energy of solar collectors in the summer is directed for heating the swimming pool.



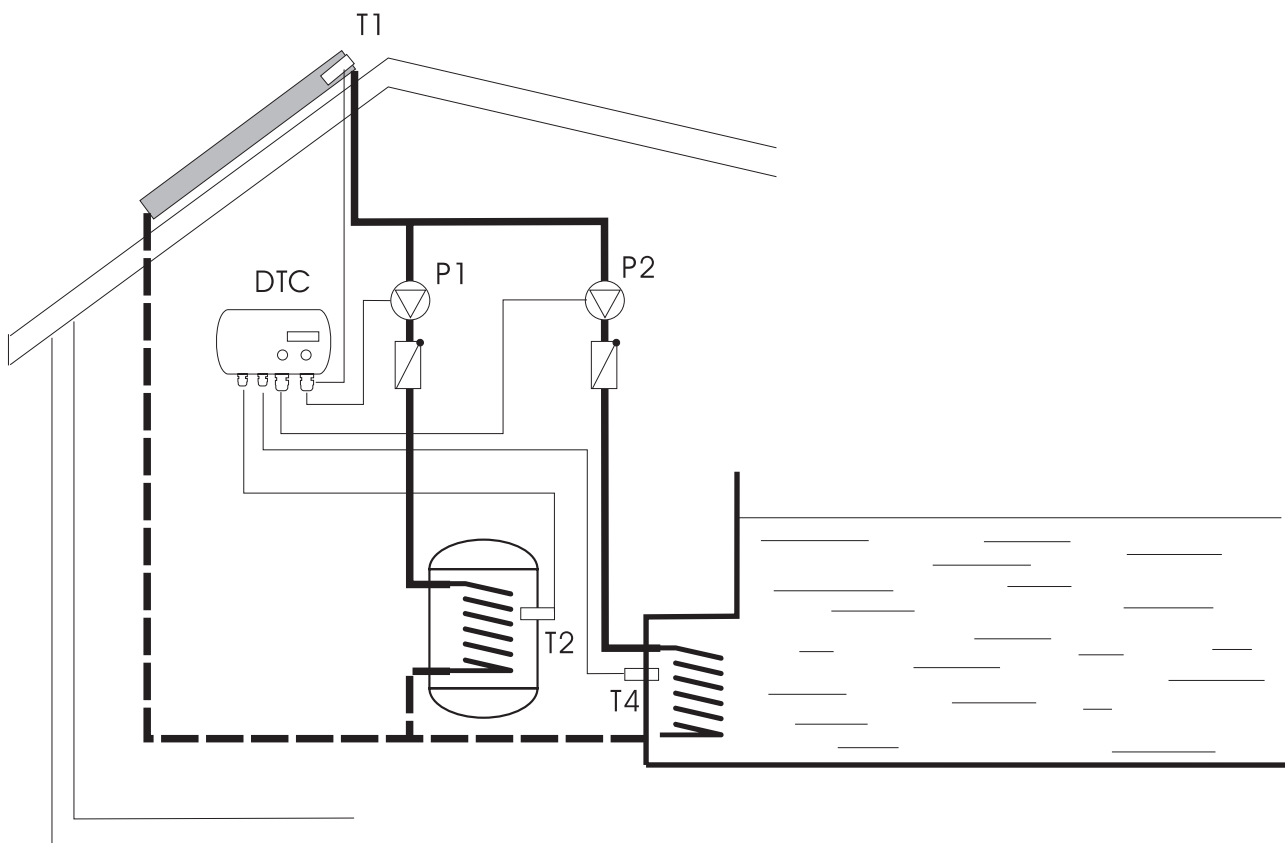
Electrical connection:



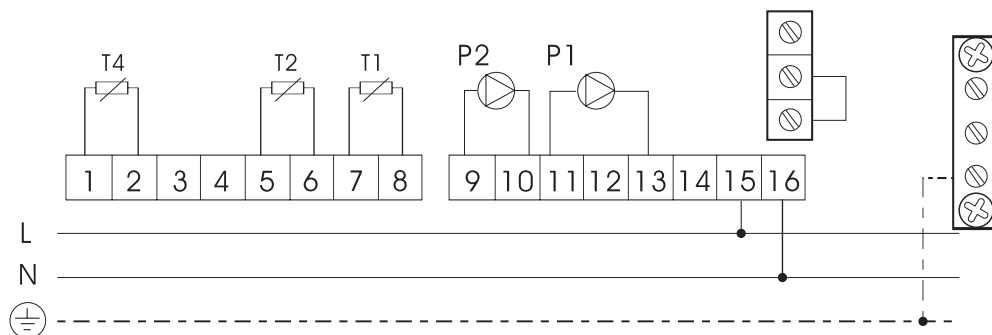
Instead of ball valve can be connected only the pump and nonreturn valve. Pump is connected directly on terminals 12 and 13.

Heating the domestic hot water tank (DHWT) and water in the pool with solar collectors - two pumps connection.

Priority has the domestic hot water tank. When the temperature in DHWT is reached, the surplus of energy of solar collectors in the summer is directed for heating the swimming pool. In the connection with two pumps, the factory-installed bridge on the right side of terminals must be moved in lower position as it is shown on the picture.



Electrical connection:



WARNING

The bridge is under supply voltage, so thermostat must be disconnected from supply voltage when you move it.

TECHNICAL DATA

Supply voltage	230V, 50Hz +/-10%
Power consumption	4 VA
Pump relay rating	3A/230VAC cos ρ 0.6
Type of thermostat	P
Adjustable temperature range	10°C - 90°C
Temperature difference setting	5°C - 15°C
Hysteresis of difference	2°K
Hysteresis of the thermostat	1° - 2°K
Nr. of sensors	3
Nr. of outputs	2 (230 VAC)

Trouble-shooting guide

TROUBLE	POSSIBLE FAULIRE	REMEDY
Irrespective of the temperatures all circuits are inactive	Plug not connected	Check main power
	The selector switch is in "0" position	Set the selector switch in position "AUTO"
	Sensors T2 and T4 are interrupted	Check sensors
	Sensor T1 is short circuit	
Irrespective of the temperature the primary water tank is continuously heated	The selector switch is in position "ON1"	Set the selector switch in position "AUTO"
	Sensor T2 is short circuit	Check sensor
Irrespective of the temperature the secondary water tank is continuously heated	The selector switch is in position "ON2"	Set the selector switch in position "AUTO"
In spite of enough temperature in collectors, the water is not warm enough	The water tank temperature is not set high enough	Check settings
	The difference is set too high	

Advantages of motor actuated ball valves of EMV110..series with incorporated relay module for solar heating systems

In solar heating systems motor actuated ball valves can prevent various inconveniences.

- Effectively prevent hydraulic shocks in systems as they require 30 seconds for complete opening.
- Due to their shape they do not impede the flow.
- Springs are not included, therefore noise does not appear.
- When closed, 100% sealing is guaranteed.
- They have an output for pump up to 1000 W in open position, therefore they do not present a hydraulic load for pump in closed position. They enable pump switching on only in completely open position.
- Due to installed RELAY module they enable control with make contact only.
- If during closing or opening process impurities enter in valve, which could block it, the valve stops and immediately afterwards continues with opening or closing process in opposite direction, so that water flow can rinse the impurities up to cleaning net (anti-blocking system).



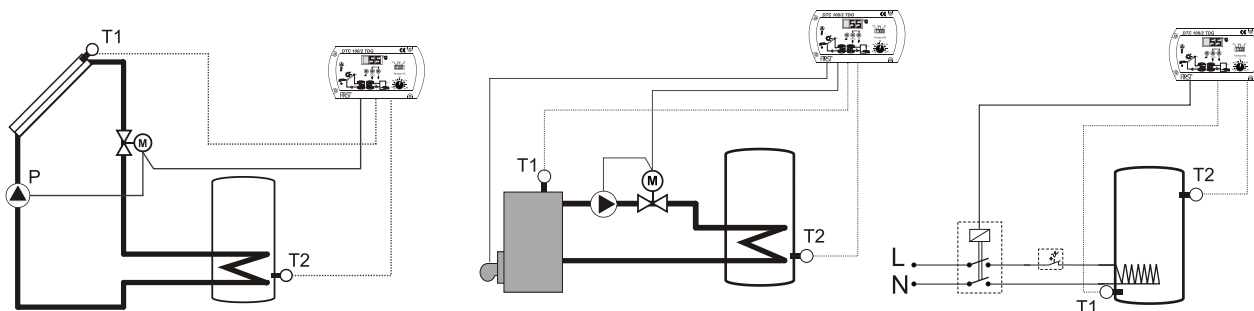
DIFFERENTIAL THERMOSTAT

DTC 100/2TDG



DTC 100/2TDG is a single differential thermostat which displays the temperature in domestic hot water tank, maximum pre-set temperature of hot water tank and of heating source (collectors, boiler etc.). It is designed for heating of domestic water from one source (solar collectors, boilers of central heating system). It incorporates upgraded microprocessor technology, nevertheless it is very easily handled. Its main advantages are: simple handling, reliable operation, compact and convenient version and low price for its quality class.

Applications for heating domestic hot water tank from collectors or boiler:



Technical Data

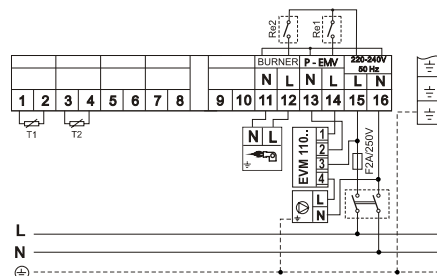
Supply voltage:	230VAC, 50Hz
Power consumption:	4 VA
No. of sensors:	2 (KTY10)
No. of outputs:	2 (1(1)A/230VAC)
Hysteresis of difference:	2K
Hysteresis of thermostat:	3K
Temperature difference setting:	2K - 15K
Installation:	wall (on hot water tank)

Features and Functions

- Digital display of all sensors temperatures.
- Regulation of maximum temperature: 10° - 90°C.
- Regulation of temperature difference: 2° - 15°.
- Display of sensor errors (Er1 - interrupted, Er2 - short circuited).
- Display of pump and burner operation.
- Manual starting and stopping of the pump and burner
- Built in pump working hours counter

DTC 100/2TDG single differential thermostat measures the temperature of two heating sources (collectors, boiler ...) and in user (hot water tank). Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank). Consequently minimum adjustable difference is 2° (factory set to 5°). When the temperature of the source (collector) exceeds the temperature around the user for pre-set difference it switches ON the pump and opens motor actuated ball valve. The thermostat switches OFF the pump if pre-set temperature is reached in hot water tank (adjustable from 10° to 90°C). If boiler or electric heating element is connected, the thermostat can switch it ON. When is heating required, thermostat switches ON heating source. When the temperature of the source (collector) exceeds the temperature around the user for pre-set difference the thermostat switches ON the pump and opens motor actuated ball valve. If any sensor is faulty (interrupted or short circuited), thermostat immediately switches off the pump and signalizes the condition on the display.

Electrical connection:



*Differential thermostat for solar systems and
combined heating sources and regulation of burner or
electric heating element*

DTC 100/2 TDG

***User's manual Installation and
maintenance instructions***



FIRŠT-ROTOTEHNIKA, s.p.

Radegunda 54, 3330 MOZIRJE

PE VELENJE

Koroška cesta 56a, 3320 VELENJE
tel. 03/ 898 35 00, fax. 03/ 898 35 35
www.first.si, e-mail: info@first.si

DEAR CUSTUMER

Congratulations

You have bought a DTC 100/2TDG differential thermostat, manufactured according to the latest quality and safety standards. It is made according to the state of art and efficiently utilizes solar energy or alternative sources for domestic water heating. We are convinced that the use of our product will satisfy your needs too and help you to save your money.

Thanks for your confidence

FIRŠT Rototehnika

THE SET CONSIST OF:

- Differential thermostat DTC 100/2TDG
- T1 collector sensor with silicone conductor
- T2 hot water tank sensor with PVC conductor
- Clip for sensor fastening with fixing springs
- Instruction for use
- Warranty certificate

In case any of above specified elements are missing or are defective require your dealer to replace it.

Read the instructions carefully in order to be able to make use of all advantages of the product.

! WARNING !

All examples listed in the instructions are merely indicative. The manufacturer accepts no responsibility for incorrect hydraulic connection of machine part of installations should comply with all safety regulations defined by law and the rules.

We reserve the right to modify the instructions and the technical data of the product without prior notice

GENERAL

DTC 100/2TDG is a single differential thermostat featuring temperature display, designed for domestic water heating from one heating source (solar collectors, boilers, heat pumps,...) The thermostat controls pump or motor actuated ball valve (EMV 110...) and burner or electric heating element.

Parameter settings:

1. Regulation of maximum temperature in hot water tank from 10° to 90°C.

This temperature is defined by T2 sensor which is generally mounted in upper third of heat exchanger.

2. Regulation of difference for higher exchanger from 2K to 15K

With this parameter you define how much the value of the source temperature (collector, boiler,...) should exceed the temperature of water around the exchanger in hot water tank, that the regulator activates the pump or opens motor actuated valve. The difference is set in relation to the volume of heat losses of the system which depend on lengths of pipelines from source to hot water tank and on pipeline insulation. Built-in digital display enables prompt reading of the temperatures of individual sensors and of all set values as well.

3. It has built in counter of pump working hours.

OPERATION

DTC 100/2TDG single differential thermostat measures the temperature of two heating sources (collectors, boiler ...) and in user (hot water tank).

Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank). Consequently minimum adjustable difference is 2° (factory set to 5°). When the temperature of the source (collector) exceeds the temperature around the user for pre-set difference it switches ON the pump and opens motor actuated ball valve.

The thermostat switches OFF the pump if pre-set temperature is reached in hot water tank (adjustable from 10° to 90°C).

If boiler or electric heating element is connected, the thermostat can switch it ON. When is heating required, thermostat switches ON heating source. When the temperature of the source (collector) exceeds the temperature around the user for pre-set difference the thermostat switches ON the pump and opens motor actuated ball valve.

If any sensor is faulty (interrupted or short circuited), thermostat immediately switches off the pump and signalizes the condition on the display ("Er1" - sensor interrupted, "Er2" - sensor short circuited).

INSTALLATION OF THERMOSTAT

Install the thermostat on hot water tank chasing or close to it. Do not install it under the pipe fittings or valves due to possible water dripping on its housing.

SENSOR INSTALLATION

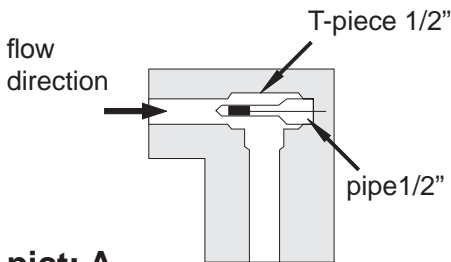
SENSOR INSTALLATION IN COLLECTOR OR BOILER (KF)

⚠ Install sensor with silicon (red) isolation!

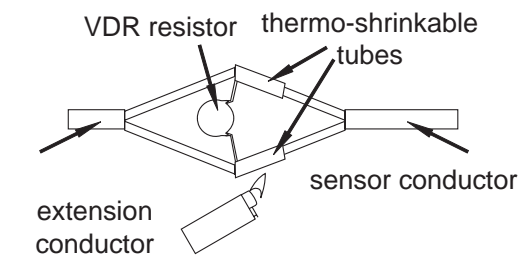
Install it as immersion sensor in collecting pipe at the top of the collectors in provided sleeve (picture A).

Connect it on terminals 1 and 2. Recommended type of cable: J-Y (St) 1x2x0,6.

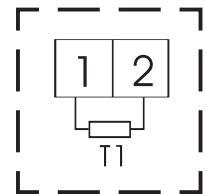
For cables longer than 15m we recommend over-voltage protection with CDR resistor (picture B)



pic: A



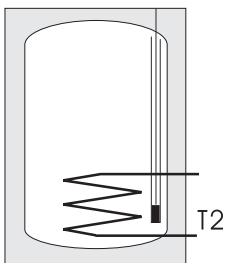
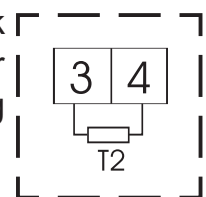
pic: B



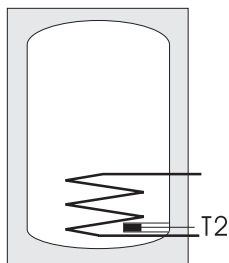
SENSOR INSTALLATION IN HOT WATER TANK.

⚠ Install sensor with PVC (gray) isolation!

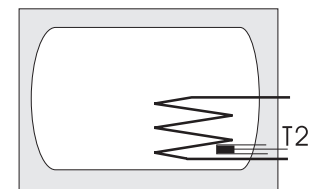
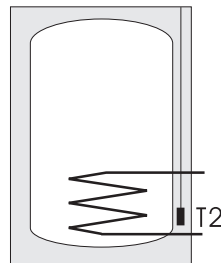
Install T2 sensor to provided place in hot water tank or on hot water tank wall under isolation as contact sensor in lower part of exchanger. When sensor is mounted as contact one, we recommend coating it with heat conducting paste or liquid metal.



In special purpose vertical or horizontal tube (sensor should be protected against accidental extraction).



On hot water tank with clip, wire and spring strip (use paste for better heat transmission).



In special purpose side tube (protect against extraction).

Warning

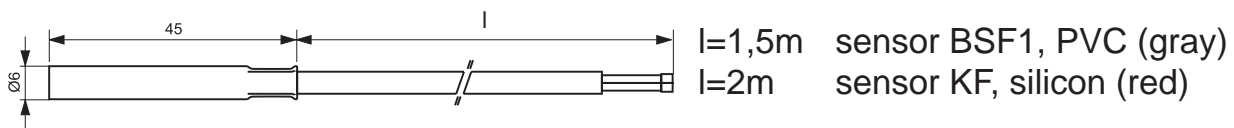
By mounting sensors must be assured suitable mechanical protection and sensors must be protected against atmosphere influence.

TESTING SENSORS

For testing purposes you can simulate temperatures with resistors.

Temp. (°C)	R _T (Ω)	Temp. (°C)	R _T (Ω)	Temp. (°C)	R _T (Ω)	Temp. (°C)	R _T (Ω)
-50	1040,51	-5	1578,51	40	2229,63	85	2993,87
-45	1094,70	0	1645,27	45	2308,96	90	3085,77
-40	1150,29	5	1713,43	50	2389,69	95	3179,07
-35	1207,27	10	1782,98	55	2471,81	100	3273,76
-30	1265,65	15	1863,93	60	2555,33	105	3369,85
-25	1325,43	20	1926,28	65	2640,24	110	3467,33
-20	1386,61	25	2000,02	70	2726,56	115	3566,21
-15	1449,18	30	2075,16	75	2814,26	120	3666,49
-10	1513,14	35	2151,70	80	2903,37	125	3768,16

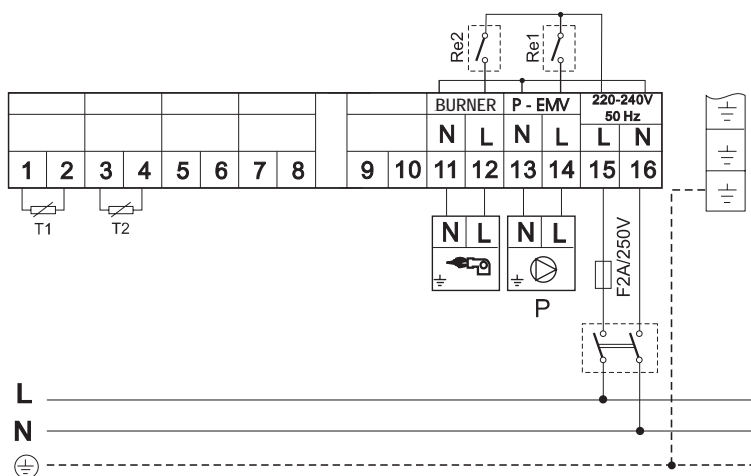
Sensor dimensions:



ELECTRICAL CONNECTION



Before opening unplug power supply! Only qualified person can maintain the thermostat.



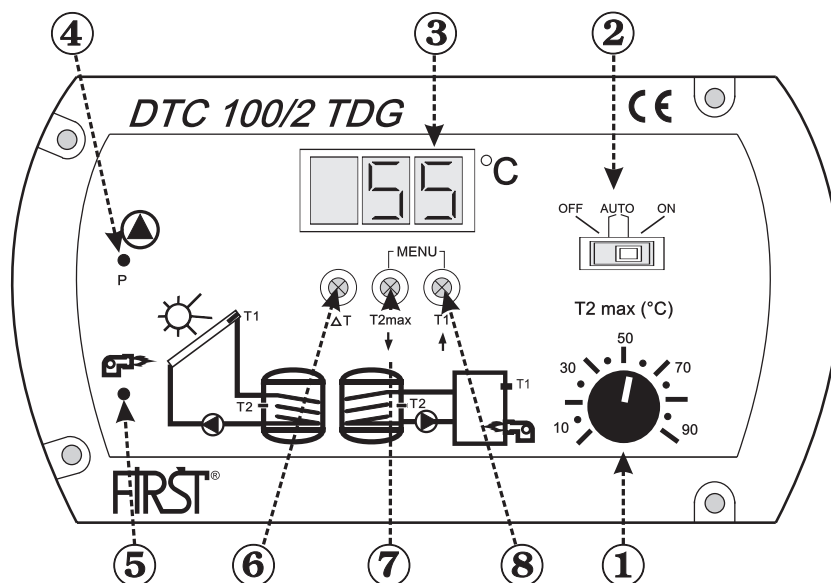
Grounding wires should be connected to special screw terminals situated on right side of terminal strips.



The thermostat is designed for fixed installation. When performing electric installation, an element should be inserted which enables at least 3 mm separation of thermostat from the mains (switch or socket). Prior to each intervention in the thermostat, first disconnect it from the mains.

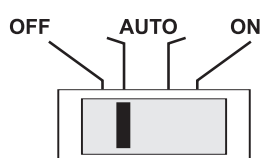
Terminal	Connection
1,2	sensor T1 - heating source
3,4	sensor T2 - hot water tank
11	N - neutral conductor
12	L - phase - boiler control 1(1)A, 250V~, 50Hz
13	N - neutral conductor
14	L - phase - pump control 1(1)A, 250V~, 50Hz
15	L - phase - connector for mains 230V~, 50Hz
16	N - neutral conductor for mains

CONTROL PANEL



- 1..... Regulation of maximum required temperature in hot water tank (10°-90°)
- 2..... Operation switch for operation mode selector (OFF, AUTO, ON)
- 3..... Display
- 4..... Control light for pump operation
- 5..... Control light for burner operation
- 6..... Key for adjustment of thermostat difference
- 7..... Key for max. required temperature display or difference decreasing
- 8..... Key for collector temperature display or difference increasing

USE OF SELECTOR SWITCH FOR MANUAL CONTROL



- OFF** Irrespective of temperature values, the pump and burner are off.
- AUTO** Automatic operation of thermostat (normal operation)
- ON** Irrespective of temperature values, the pump and burner are on.

OFF and ON positions are used only for operation tests. OFF position does not enables galvanic separation from mains.

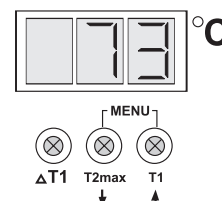
TEMPERATURE DISPLAY:

During normal use display shows "T2" witch is the temperature of water in hot water tank.

If you press "T1" key the display shows the temperature in collectors (T1).

Temparature remains displayed until the key is presed.

If you press "T2max" key the display shows the maximum temperature set with the knob (1).



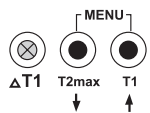
TEMPERATURE SETTING OF HOT WATER TANK

You can set maximum water temperature of hot water tank (from 10° to 90°) with the right key. When the temperature is reached, the thermostat deactivate the pump regardless the temperature of heating source. If hot water is used by the appliance with limited maximum temperature of inflow, this setting is very useful.

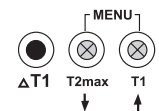
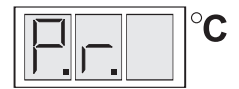
NOTE!

Regulator reaction time is 5 sec. max., therefore after each change of knob (1) position you must wait 5 sec. to see the change on the display

DIFFERENCE SETTING:



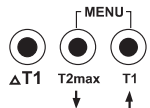
The difference is set with three keys, situated under the display. Press "dT" key and on display "d" and "pre-set difference" appear. With "↓" and "↑" keys decrease or increase the pre-set value. When new required value is entered, press once again the "dT" key to store this new value. It will remain stored also if thermostat is disconnected from the mains.



*When you set the required difference, press key T1 and **hold it!***

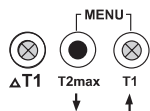
On the display appears **P.r.** and hold down the key (approximately 3s), until the sign **P.r.** disappear and on display appears the temperature T1. Then release the key.

If you release the key too soon, entered value is not effective.



COUNTER OF PUMP WORKING HOURS

Press all three keys together and hold them about 5sec, on display appears value of pump working hours.

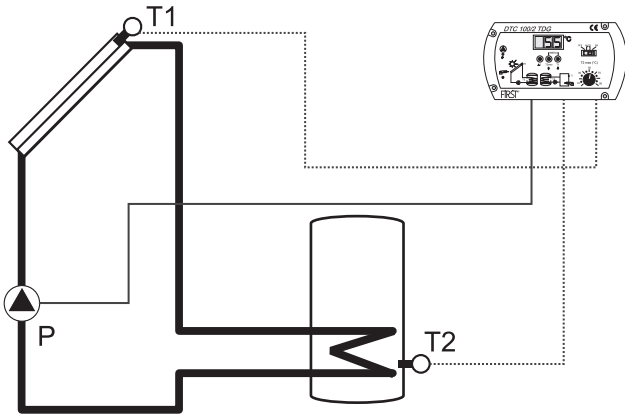


RESETTING COUNTER OF PUMP WORKING HOURS

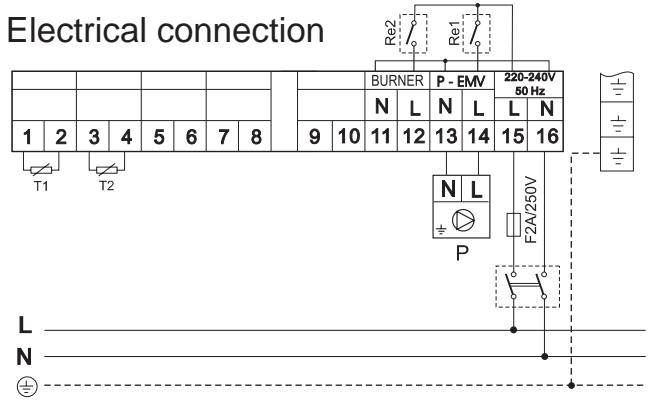
Press the middle key and hold it about 10sec until reset of the counter. On display appears value 0.

Examples:

1. Heating DHWT (domestic hot water tank) with solar collectors

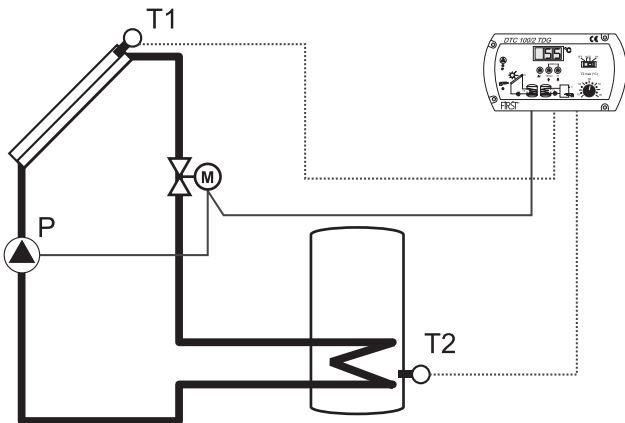


Electrical connection

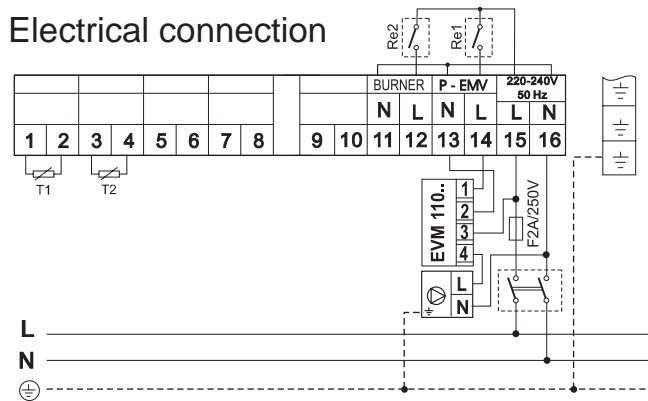


2. Heating DHWT with solar collectors

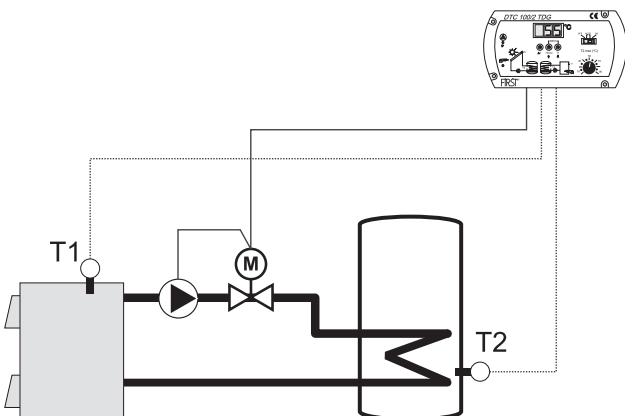
To prevent thermo circulation of water at night time, we recommend use of motor actuated ball valve. More on last page.



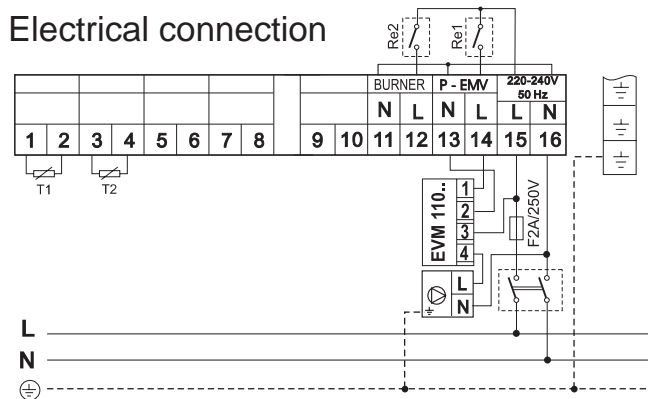
Electrical connection



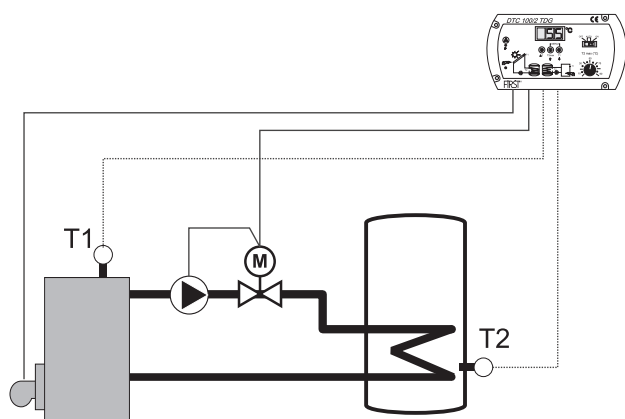
3. Heating DHWT with solid fuel boiler.



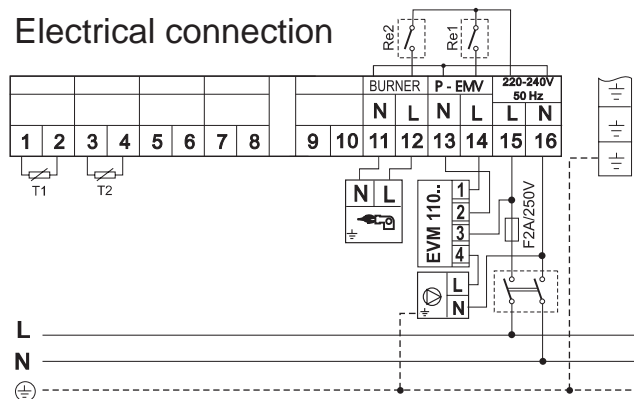
Electrical connection



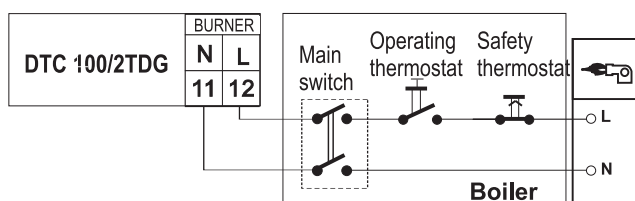
4. Heating DHWT with oil or gas boiler.



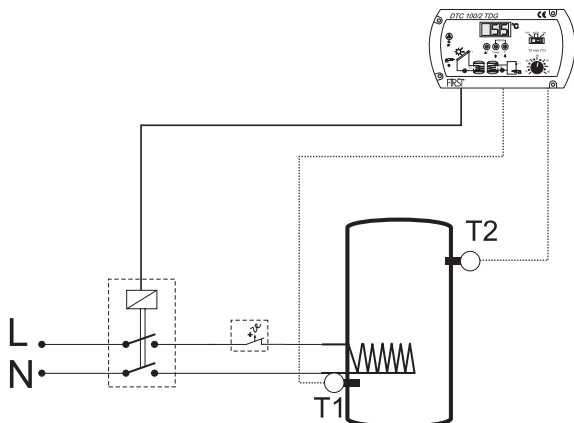
Electrical connection



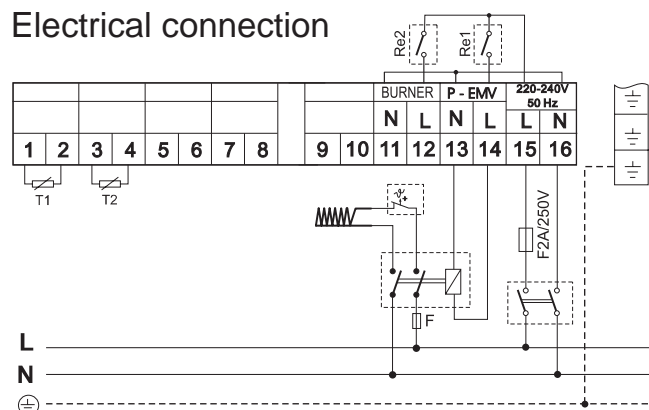
Boiler control:



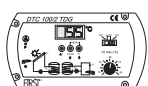
5. Heating DHWT with electrical heater.



Electrical connection



Legend:



DTC
Differential thermostat
DTC 100/2 TDG



Electric motor actuated ball valve
EMV 110 .. series 602, 603



T1, T2
Sensors
T1 - collector sensor
T2 - DHWT sensor



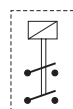
Electrical heater



Safety thermostat of electric heater



P
Pump

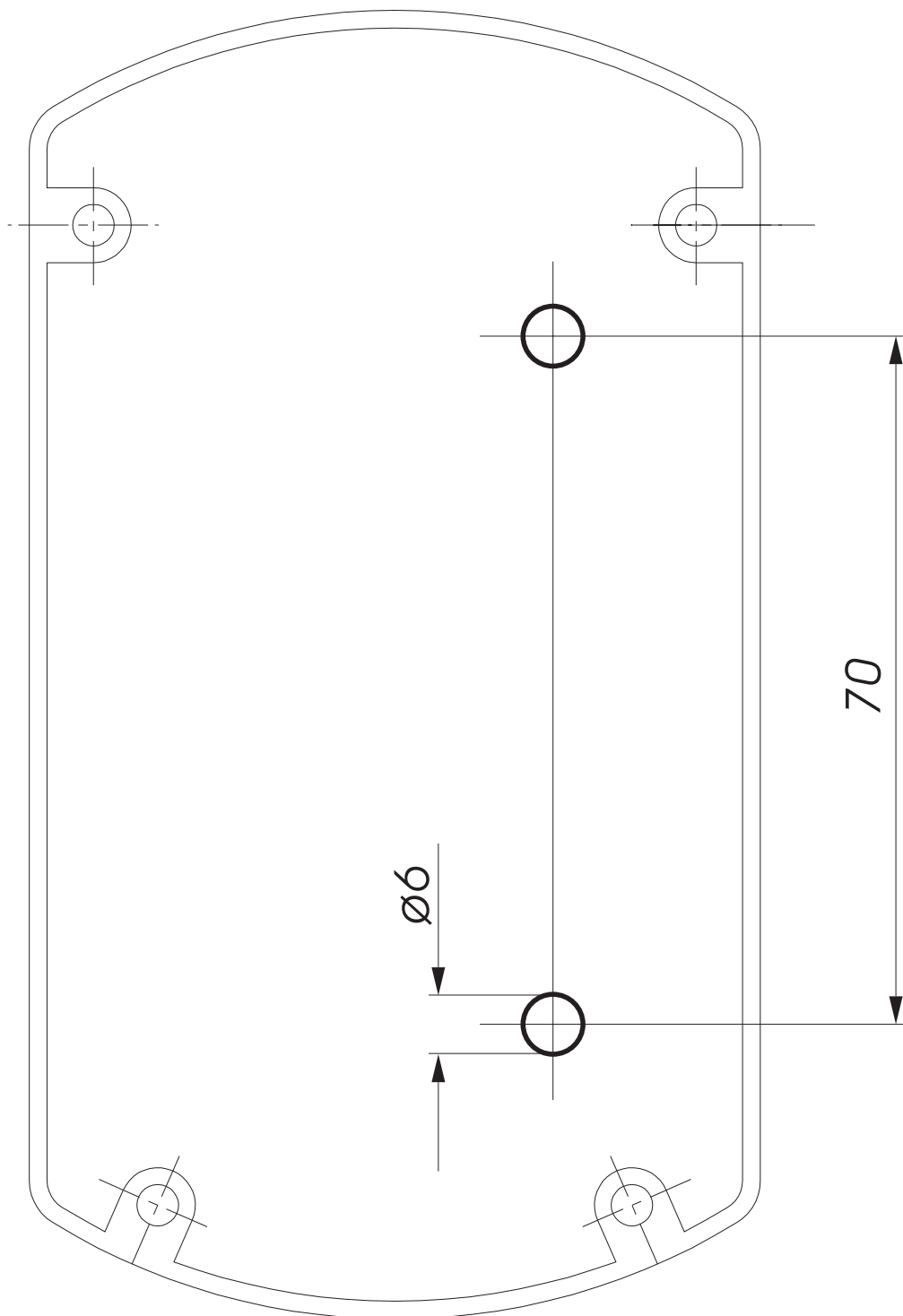


Relay




Non return valve

HOLES FOR EASIER INSTALLATION OF DIFFERENTIAL THERMOSTAT ON WALL



Technical data

Supply voltage:.....	230V, 50Hz +/-10%
Power consumption.....	4 VA
Type of thermostat.....	P
Measurement area	-40°C do 160°C
Adjustable temperature range	10°C - 90°C
Adjustable difference settings.....	2K - 15K
Hysteresis of difference	1K - 2K
Number of sensors	2
Output:	2x relay: 230V ~, 50Hz, 1(1)A, SPST  :
	- pump control
	- burner control
Input:	2x sensors
	- BSF1- PVC (gray) cable, lenght 1,5m (DHWT sensor)
	- KF - Silicon (red) cable, lenght 2m (collector sensor)
Humidity:.....	5% - 70% (non condensed)
Storehouse temperature:	0°C-70°C

Trouble-shooting guide

TROUBLE	POSSIBLE FAILURE	REMEDY
Thermostat inoperative	Plug not connected	Connect plug in socket
Water cools down during night	-Selector switch not in AUTO position -One of retaining valves of the system inoperative (enables thermosiohon water circulation)	-Set the switch to AUTO position -Check machine installation We recommend installation of motor actuated ball valve
When pump is active, unplesant noise in installation is heard	Retaining valve makes noise (weak spring)	Replace nonreturn valve with motor actuated ball valve
Irrespective of the temperatures, pump is inoperative	- Selector switch (2) in position »OFF« - "T2max."(1) set too low(under 20°C)	- Set selector switch (2) to AUTO position - Increase T2max
Irrespective of the temp., pump is continuously switched on.	Selector switch (2) in "ON" position	Set the switch to AUTO position
When "T1" key(7) is pressed Er1 appears	T1 sensor is interrupted	Check T1 sensor
When "T1" (7)key is pressed Er2 appears	T1 sensor is short circuited	Check T1 sensor
Er1 is shown on display	T2 sensor is interrupted	Check T2 sensor
Er2 is shown on display	T2 sensor is short circuited	Check T2 sensor
Control light of the pump is on, but the pump is inoperative	Pump bloked or cable of the pump interrupted	Chek the pump and connection to regulator

Advantages of motor actuated ball valves of EMV110.. series with incorporated relay module for solar heating systems

In solar heating systems motor actuated ball valves can prevent various inconveniences.

- Effectively prevent hydraulic shocks in systems as they require 30 seconds for complete opening.
- Due to their shape they do not impede the flow.
- Springs are not included, therefore noise does not appear.
- When closed, 100% sealing is guaranteed.
- They have an output for pump up to 1000 W in open position, therefore they do not present a hydraulic load for pump in closed position. They enable pump switching on only in completely open position.
- Due to installed RELAY module they enable control with make contact only.
- If during closing or opening process impurities enter in valve, which could block it, the valve stops and immediately afterwards continues with opening or closing process in opposite direction, so that water flow can rinse the impurities up to cleaning net (anti-blocking system).

EMV 110 603/4230

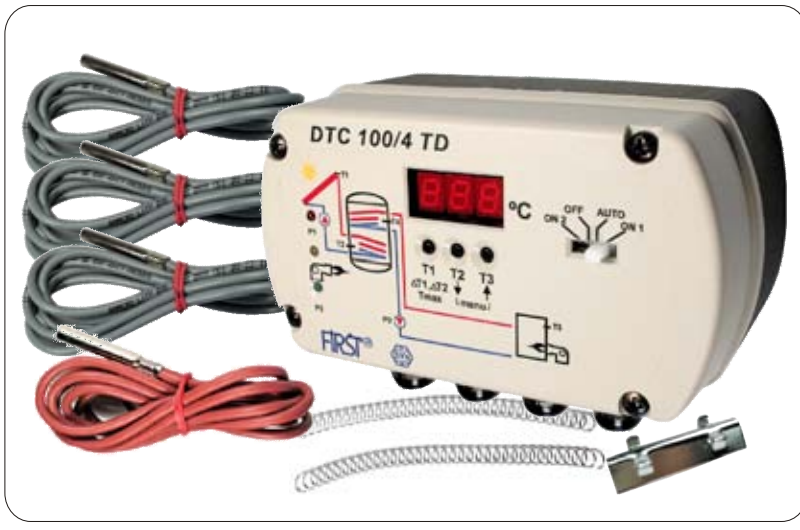


EMV 110 602/4230



DIFFERENTIAL THERMOSTAT

DTC 100/4TD



DTC 100/4TD is a double differential thermostat used for domestic water heating in one domestic hot water tank by means of two or three heating sources. The logic of choosing the cheapest energy source enables maximum energy savings. If the temperature in collectors is higher than the temperature in lower part of domestic hot water tank, regulator activates the pump of collector circuit. In case that the collectors are not heated enough, regulator tries to heat water from boiler. In case that the boiler is cold too, it switches on the burner and when the boiler heats up, it activates the pump. Basic application

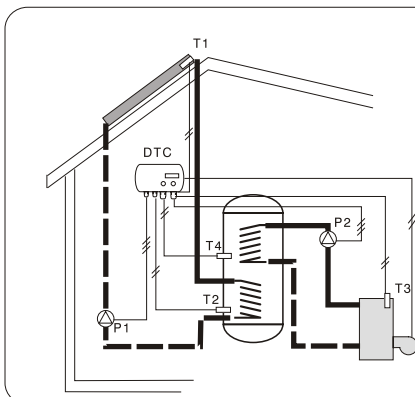
controls two pumps and one oil or gas burner. If power relay and safety capillary type thermostat are added, it can control electric heating element instead of a burner. Digital display continuously shows the temperature of water in upper part of domestic hot water tank. If you press individual keys, you can display also the temperatures of other sensors. Its advantages are: simple handling, reliable operation, compact and convenient version and low price for

Technical Data

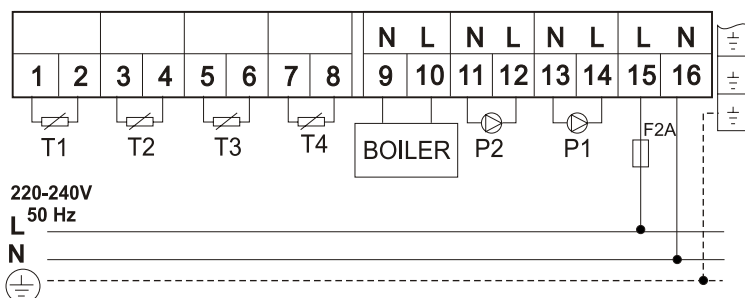
Supply voltage:	230V, 50Hz, +/-10%
Power consumption:	4VA
Pump power supply:	1(1)A/230VAC
Thermostat type:	P
Max. measured temperature:	180°C
Min. measured temperature:	- 20°C
Adjustable temperature range:	10°-90°C
Temperature difference setting:	2K-15K
Hysteresis of differences:	2K
Hysteresis of thermostat:	3K
No. of sensors:	4 (KTY10)
No. of outputs:	3 (1(1)A/230VAC)

Features and Functions

- It controls two pumps and oil / gas burner or electric heating element.
- Digital display of all sensors temperatures.
- Regulation of maximum temperature.
- Individual regulation of temperature differences.
- Display of sensor errors (Er1 - interrupted, Er2 - short circuited).
- Control lights indicating operation of individual pumps and burner or electric heating element.
- Possibility of permanent deactivation of operation of individual heating circuit (with T=0).
- Manual starting of individual pump and permanent switching off of regulator.



Electrical connection



Differential thermostat for regulation of two heating circuits in combination of solar and classic heating with temperature display and regulation of burner or electric heating element

DTC 100/4 TD

***User's manual
Installation and maintenance instructions***

DEAR CUSTOMER

Congratulations !

You have bought a DTC 100/4TD differential thermostat, manufactured according to the latest quality and safety standards. It is made according to the state of art and efficiently utilises solar energy or alternative sources for domestic water heating.

It is designed in compliance with strict criteria and requirements of West European markets and enables efficient use of solar energy which enables considerable savings of other sources for domestic water heating.

Our products are available in the markets for several years and satisfy the needs of demanding customers from hot Greece to north Germany.

We are convinced that the use of our product will satisfy your needs too and help you to save your money.

Thanks for your confidence !

The set consist of:

1. Differential thermostat DTC 100/4TD
2. T1 collector sensor with silicone conductor
3. T2 hot water tank sensor with PVC conductor
4. T3 sensor for installation in boiler or to upstream conduit in front of mixing valve (PVC)
5. T4 hot water tank sensor with PVC conductor
6. Fixing screws with wall inserts (2 pcs)
7. Clip for T4 sensor fastening with fixing springs
8. Instructions for use
9. Warranty certificate

In case any of these are missing or damaged, demand your seller to supply you with a replacement.

Read these instructions carefully, as this will allow you to benefit from all the possibilities offered by this product.

WARNING !

All examples listed in the instructions are merely indicative. The manufacturer accepts no responsibility for incorrect hydraulic connection of machine part of installation.

Machine and electric installations should comply with all safety regulations defined by law and the rules.

We reserve the right to modify the instructions and the technical data of the product without prior notice

GENERAL

DTC 100/4TD is a microprocessor aided double differential thermostat, designed for heating of domestic water from two heating sources (collectors, boilers, heat pumps,...), using its logic of additional energy source switching on (boiler of central heating system). The thermostat controls two pumps or two motors actuated ball valves (EMV 800...) and one burner or electric heating element.

The thermostat enables regulation of four parameters, i.e.:

1. Regulation of maximum temperature in hot water tank from 10 to 90°C.
2. Regulation of difference for higher exchanger from 2 to 15K (after-heating circuit)
3. Regulation of difference for lower exchanger from 2 to 15K (collector circuit)
4. Setting two working regimes - C.n.b (normal) and C.d.t. (switching off the limitation of boiler temperature for collector circuit).

With first two regulation options you define how much the value of the source temperature (collector, boiler,...) should exceed the temperature of water around the exchanger in hot water tank, that the regulator activates the pump or opens the valve.

The difference is set in relation to the volume of heat losses of the system which depend on lengths of pipelines from source to hot water tank and on pipeline insulation.

Built-in digital display enables prompt reading of the temperatures of individual sensors and of all set values as well.

OPERATION:

DTC 100/4TD double differential thermostat measures the temperature of two heating sources (collectors, boiler, ...) and of two spots in user (hot water tank). Heating effect is provided, when heating unit (heating element in hot water tank) exceeds the temperature of the user (water in hot water tank) for at least 3 - 5K. Consequently minimum adjustable difference is 2K (factory set to 5K).

When the temperature of the source exceeds the temperature around the exchanger for at least 5K, the thermostat opens the valve (EMV...) or activates the pump; it closes the valve or stops the pump, when temperature difference is one degree lower than pre-set value. The thermostat also switches off a pump if pre-set temperature is reached in hot water tank (adjustable from 10 to 90°C).

If gas flow boiler, oil boiler or electric heating element (which is switched off during summer seasons), is connected to after-heating circuit, the regulator can switch on the boiler by means of the third output, if domestic water is to be additionally heated by means of after-heating circuit. In summer seasons a few days of cloudy weather can appear or use of domestic water increases. In such cases domestic water is to be after-heated from additional source (central heating system boiler or electric heating element). Classic differential thermostat would require hot boiler throughout the year, which is not recommended from ecological and economic point of view. DTC 100/4TD, with its third additional output, enables activation of after-heating source. When after-heating of water is required, regulator first switches on the burner of the boiler and when the condition of difference for after-heating circuit is also assured (pre-set difference of boiler has higher temperature than hot water tank), pump is switched on.

When pump operates for primary heating circuit (collectors), operation of after-heating circuit and burner of boiler or electric heating element is prevented. This assures maximum energy savings during summer seasons and is also the main role of solar systems.

The set comprises four sensors (T1, T2, T3, T4). Two of them are mounted into individual heating sources and two into upper half of individual exchangers in hot water tank. T1 and T2 are designed for primary (main) heating circuit, which heats entire quantity of water in hot water tank (lower exchanger), where T1 is a sensor of heating source (generally collectors) and T2 is a sensor in lower part of hot water tank. T3 and T4 are designed for additional, i.e. after-heating circuit which additionally heats water in hot water tank (upper exchanger). T3 is a sensor of heating source (generally boiler) and T4 is a sensor in upper part of hot water tank.

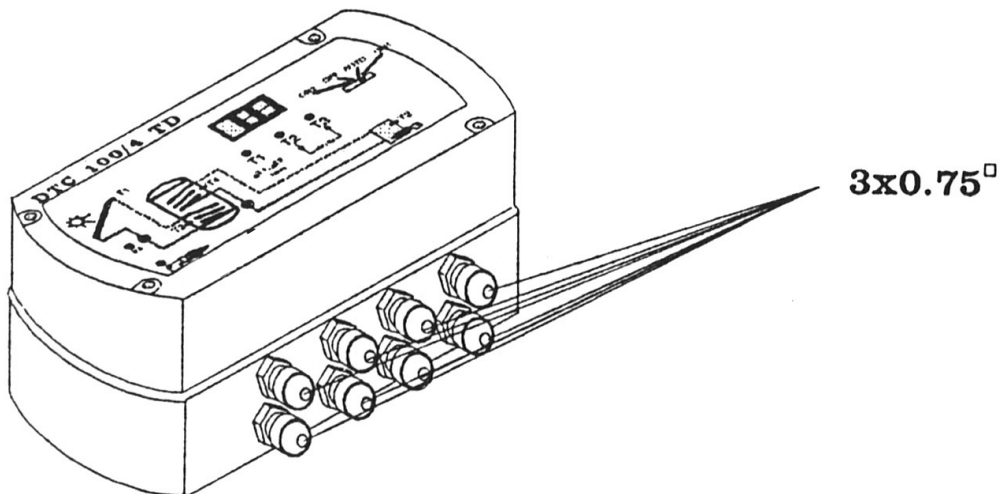
TEHNICAL DATA:

Supply voltage	230V, 50Hz +/- 10%
Power consumption	4 VA
Pump relay rating	3A/230VAC cos 0.6
Type of thermostat.....	P
Max. measured temperature	180°C
Min. measured temperature	-20°C
Adjustable temperature range	10 - 90°C
Temperature difference settings	2 - 15K
Hysteresis of difference	2°K
Hysteresis of the thermostat.....	3°K
Nr. of sensors	4
Nr. of outputs	3 (230 VAC)

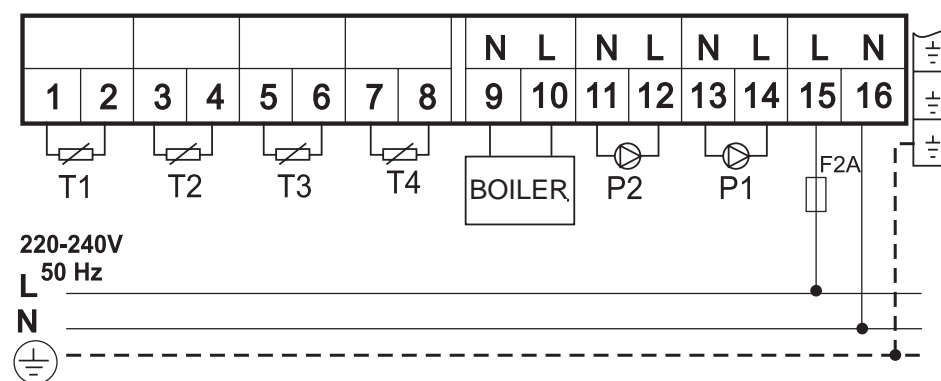
INSTALLATION OF THERMOSTAT:

Install the thermostat on hot water tank casing or close to it. Do not mount it under pipe fittings or valves due to possible water dripping on its housing.

EXTERNAL CONNECTIONS:



ELECTRIC CONNECTION:



Grounding wires should be connected to special terminal pins situated on right side of terminal strips.

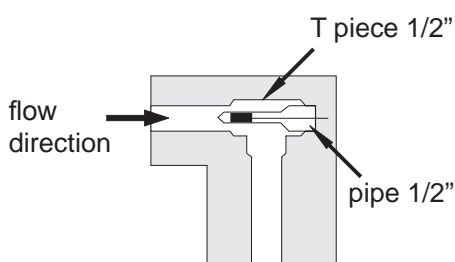
TERMINAL	CONNECTION
1,2	T1 sensor – heating source sensor (collectors, boiler...)
3,4	T2 sensor – hot water tank sensor
5,6	T3 sensor – heating source sensor for higher heating circuit (boiler)
7,8	T4 sensor – hot water tank sensor in upper part of hot water tank neutral conductor
9	neutral conductor
10	phase for boiler (burner) switching on
11	neutral conductor
12	phase of pump for secondary heating circuit
13	neutral conductor
14	phase of pump for collector heating circuit
15	phase connector for mains 230V, 50 Hz
16	neutral conductor - connector for mains 230 V, 50 Hz

WARNING:

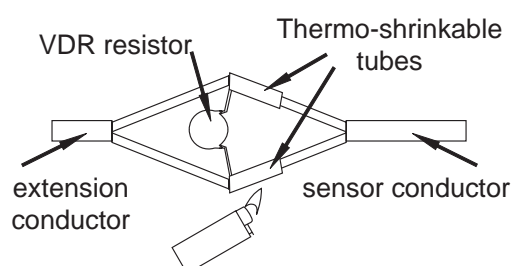
Boiler control should be performed behind the main switch for burner but in front of boiler thermostat. Care must be taken that differential thermostat and boiler connection are performed at the same phase otherwise inter-phase contact can occur.

SENSOR INSTALLATION IN COLLECTOR:

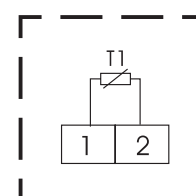
Install it as immersion sensor in collecting pipe at the top of the collectors in provided sleeve



For cables longer than 15m we recommend over-voltage protection with VDR resistor.

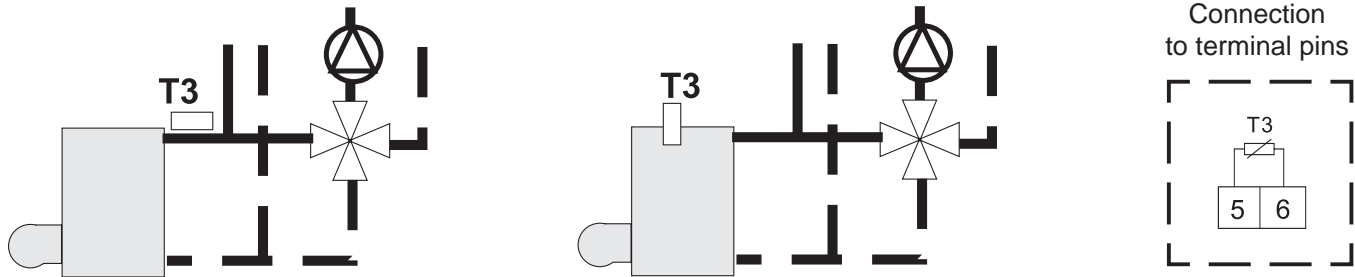


Connection to terminal pins



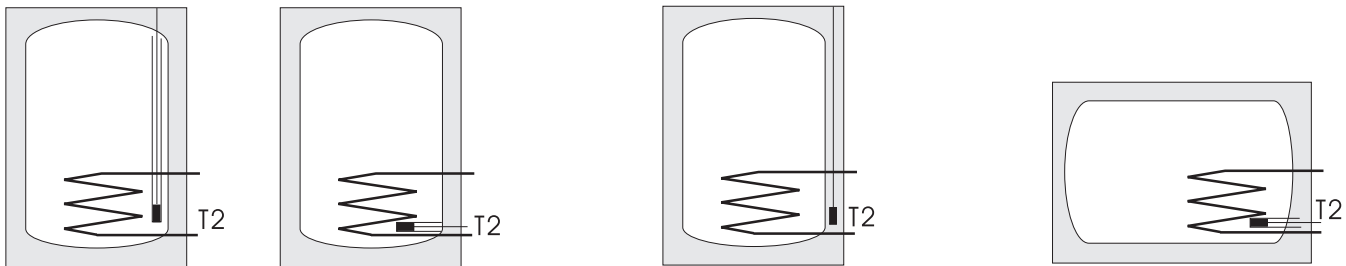
SENSOR INSTALLATION IN BOILER:

Built T3 sensor in a boiler as immersion sensor in front of mixing valve in upstream flow or next to boiler sensor in a sleeve. If this is not possible you can mount it as contact sensor in upstream flow in front of mixing valve. In such a case we recommend to isolate it.



SENSORS INSTALLATION IN HOT WATER TANK:

Install T2 and T4 sensors to provided place in hot water tank or on hot water tank wall under isolation as contact sensor in upper part of exchanger. When sensor is mounted as contact one we recommend to coat it with heat conducting paste or liquid metal.

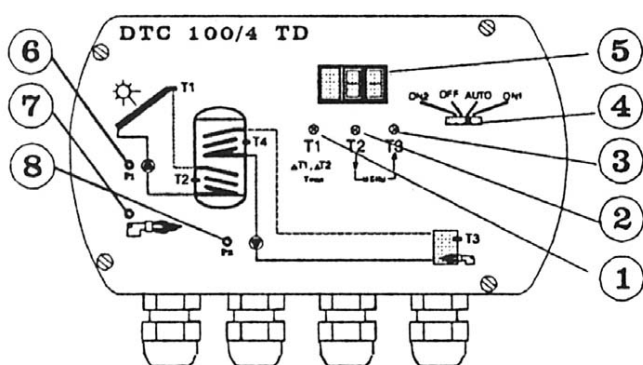


In special purpose vertical or horizontal tube (sensor should be protected against accidental extraction).

On hot water tank with clip, wire and spring strip (use paste for better heat transmission).

In special purpose side tube (protect against extraction).

CONTROL PANEL



- 1 Key for collector temperature display
- 2 Key for the display of the temperature in lower part of hot water tank
- 3 Key for boiler temperature displayed
- 4 Selector switch for manual control
- 5 Display
- 6 Control light of collector pump operation
- 7 Control light of burner operation
- 8 Control light of after-heating pump operation

THERMOSTAT REGULATION

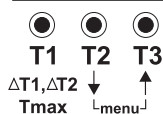
The following settings are performed with keys situated under display:

- Maximum temperature in hot water tank.
- Difference of collector circuit.
- Difference of after-heating circuit (boiler).
- Setting two working regimes - C.n.b and C.d.t.
- Collector circuit operation switching off with automatic operation of after-heating circuit. (Used when liquid is discharged from collector system.)
- After-heating circuit operation switching off with automatic operation of collector circuit. (Used if after-heating circuit is not required.)

Simultaneously press once central and right keys under the display to enter in set-up meni

1. Temperature setting in hot water tank (10-90°C)

On the display appear “b” and current pre-set temperature of hot water tank (in our case 55°C). With keys T2 in T3 set required temperature.



Recommendation:

Set the temperature in hot water tank to least 10° lower value as boiler temperature in boiler is set.

Warning:

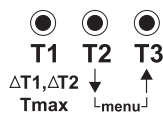
If you additionally heat water with heat pump, you must limit the water temperature to 55°C max. and connect output from terminal 12 and 14 through temperature safety fuse in hot water tank or through additional safety

thermostat.

When you set the required temperature, press key T1 to pass over the next setting.

2. Setting of difference of collector circuit (0-15)

On the display appear “C” and current difference of collector circuit (factory set to 5K).



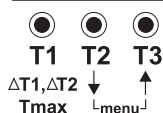
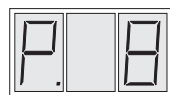
With keys T2 in T3 set required difference.

The difference defines the value for which source temperature should exceed the temperature of the user (collectors or boiler: hot water tank) that the pump is activated. It is generally 5K for collectors and 8K for boiler (factory setting). Of course it depends on lengths and isolation of pipelines.

If you decrease the difference to “0”, collector circuit is switched off.

When you set the required temperature, press key T1 to pass over the next setting.

3. Setting of difference of after-heating circuit (0-15)



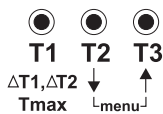
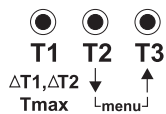
On the display appear “P” and current difference of collector circuit (factory set to 8K). With keys T2 in T3 set required difference.

If you decrease the difference to “0”, after-heating circuit is switched off.

When you set the required temperature, press key T1 to pass over the next setting.

4. Setting the working regimes - C.n.b and C.d.t.

On the display appears signs "C.n.b." or "C.d.t."



Regime: C.n.b.

Normal state of thermostat. Limitations of temperatures valid for collector circuit and after-heating circuit. This regime must be used in systems with heat pump.

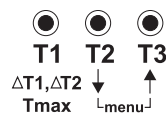
Regime: C.d.t.

Thermostat heats domestic water from collector circuit irrespective of setting of max. temperature in boiler (no limitation of max. temperature of the boiler for collector circuit). Choose that regime in case, that you want to use max. energy of collector and the crossing temperature of the boiler will not damage no one of connected consumer of hot water.

With keys T2 in T3 set required regime.

*When you set the required regime, press key T1 and **hold it!***

On the display appears **P.r.** and hold down the key (approximately 3s), until the sign



P.r. disappears and on display appears the temperature T1 (temperature of collector circuit). Now release the key.

If you release the key too soon, entered values are not effective.

We mentioned before, that we have the possibility to disconnect the collector circuit and after-heating circuit. For such step we decide in following cases:

Disconnection of Collector Circuit Operation

It is used in cases of mechanical faults of collector system, which requires draining of liquid (water) from collector system, but after-heating circuit should operate in automatic mode. Disconnection is useful also in systems where water is discharged from collectors during winter, which prevents "dry operation" of the pump.

The procedure of disconnection is described in point 2 - set the parameter C to value 0. When you want again connection of the collector circuit, set the parameter C to value different from 0 (factory set to 5K).

Disconnection of After-heating Circuit Operation

It is used in cases of mechanical faults of after-heating system which requires draining of liquid (water) from the system but collector circuit should operate in automatic mode. It disconnects after-heating pump operation as well as burner (or electric heating element) switching on.

The procedure of disconnection is described in point 3 - set the parameter P to value 0. When you want again connection of the after-heating circuit, set the parameter P to value different from 0 (factory set to 8K).

WARNING!

If T2 and T3 keys are simultaneously pressed, you enter set-up menu. If in about 1 minute the values are not changed, regulator automatically leaves this menu (it shows T4 temperature in hot water tank). If you have changed the values and you haven't left the set-up menu, entered values are not effective.

TEMPERATURE DISPLAY:

During normal use display shows "T4" temperature, which is the temperature of water in upper part of hot water tank. If you press "T1" key, the display shows temperature in collectors (T1). Temperature remains displayed until the key is pressed.

If you press "T2" key the display shows temperature of lower part of hot water tank (T2). Temperature remains displayed until the key is pressed.

If you press "T3" key, the display shows temperature in boiler (T3). Temperature remains displayed until the key is pressed.

WARNING!

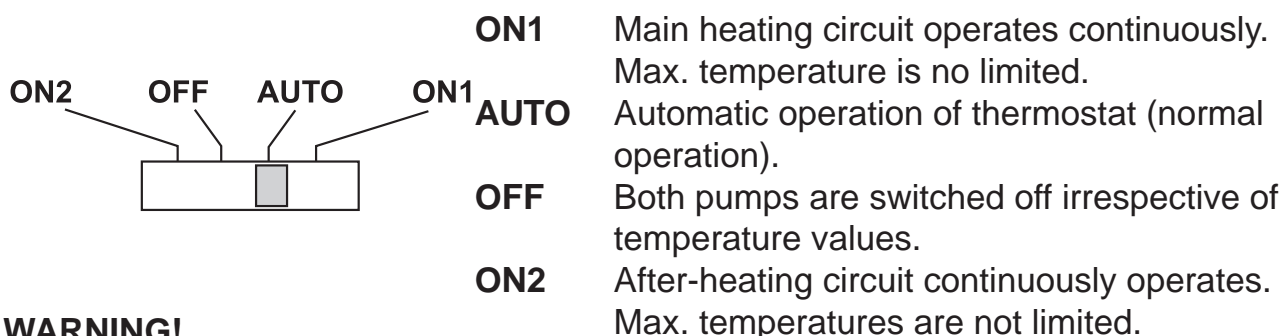
Regulator reaction time is 5 sec. max., therefore after each change of temperature you must wait for 5 sec. to see the change on the display.

Display of Sensor Errors:

Errors of sensors (short circuit, interrupted sensor) are listed on the display. If the sensor is short circuited the display shows "Er2" and if it is interrupted "Er1". For T4 sensor this is permanently shown and for other sensors you must press "T1", "T2" or "T3" keys.

If T1 or T2 sensor is faulty, collector heating circuit is inoperative and after-heating circuit operates normally in automatic mode.

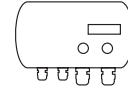
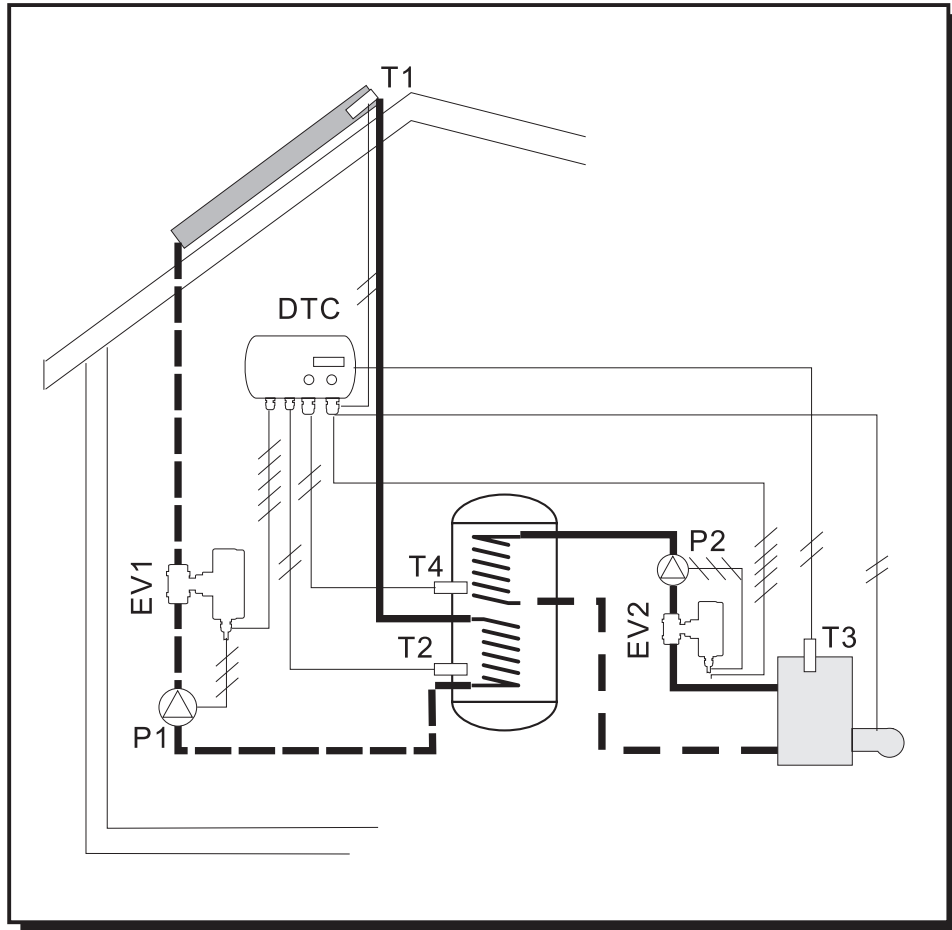
If T3 or T4 sensor is faulty, after-heating circuit is inoperative and collector circuit operates normally in automatic mode.

USE OF SELECTOR SWITCH FOR MANUAL CONTROL**WARNING!**

ON1, ON2 and OFF positions are used only for **operation tests** of pumps and maintenance disconnection of pump operation when charging and venting the system, but not during normal operation. OFF position does not enable galvanic separation from mains. When replacing the pump, disconnect supply voltage!

Connection with two electric motor actuated ball valves

When conditions for heating of a heating circuit are achieved, EMV110...800 series, opens afterwards, when the valve is opened, pump switches on.



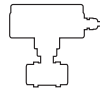
DTC
Differential thermostat
DTC 100/4TD



T1, T2, T3, T4
Sensors
T1 - collector sensor
T2 - hot water tank sensor
T3 - boiler sensor
T4 - hot water tank sensor

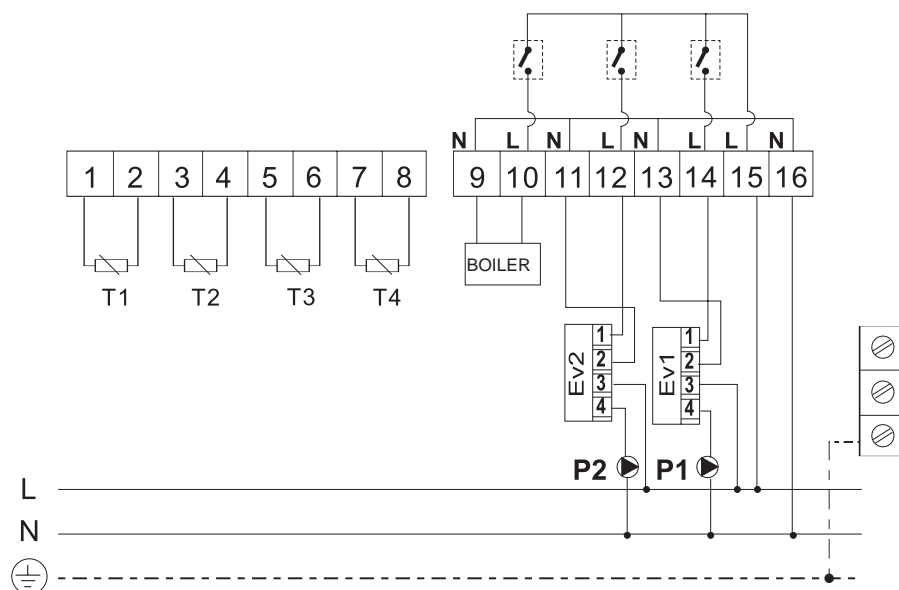


P1, P2
Circuit pump
P2 - primary circuit pump
P1 - after-heating circuit pump



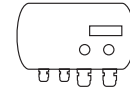
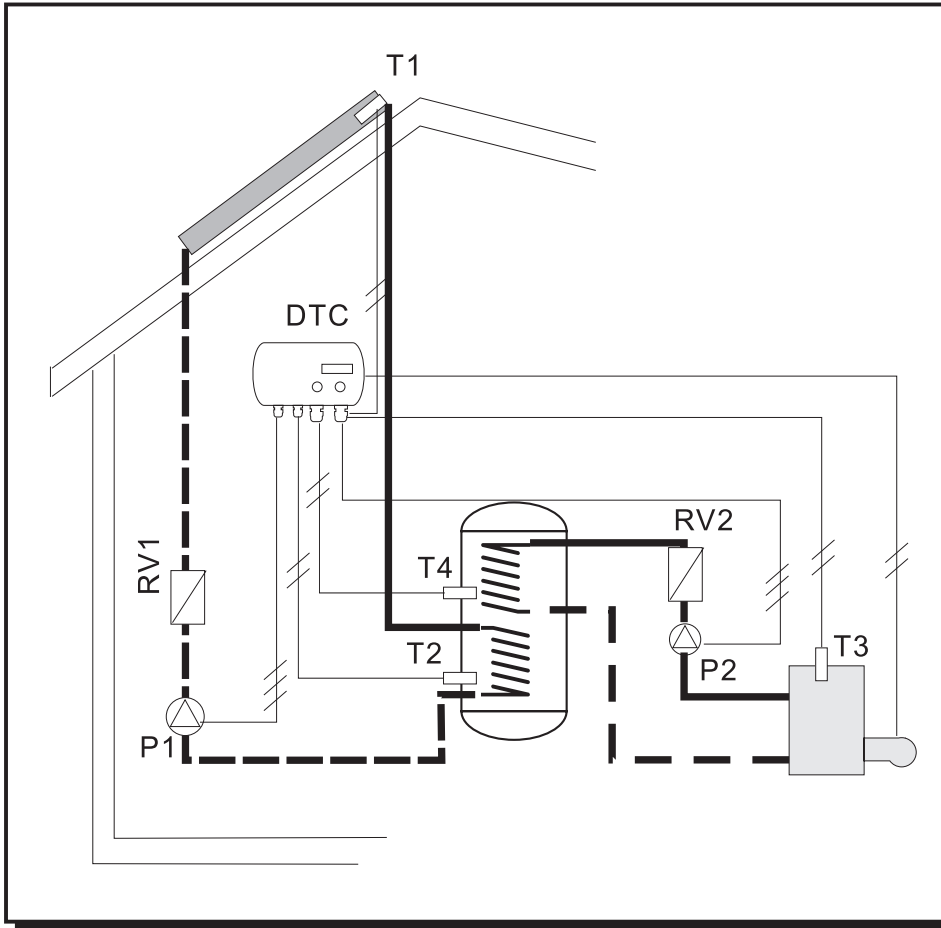
EMV1, EMV2
Electric motor actuated ball valve:
EMV 110..4230 series
EMV 110..3230 series compact

Electric connection



Connection with Two Pumps

In order to prevent water circulation, behind the pump a retaining valve should be installed. When conditions for heating a heating circuit are achieved, pump switches on.



DTC
Differential thermostat
DTC 100/4TD



T1, T2, T3, T4
Sensors
T1 - collector sensor
T2 - hot water tank sensor
T3 - boiler sensor
T4 - hot water tank sensor

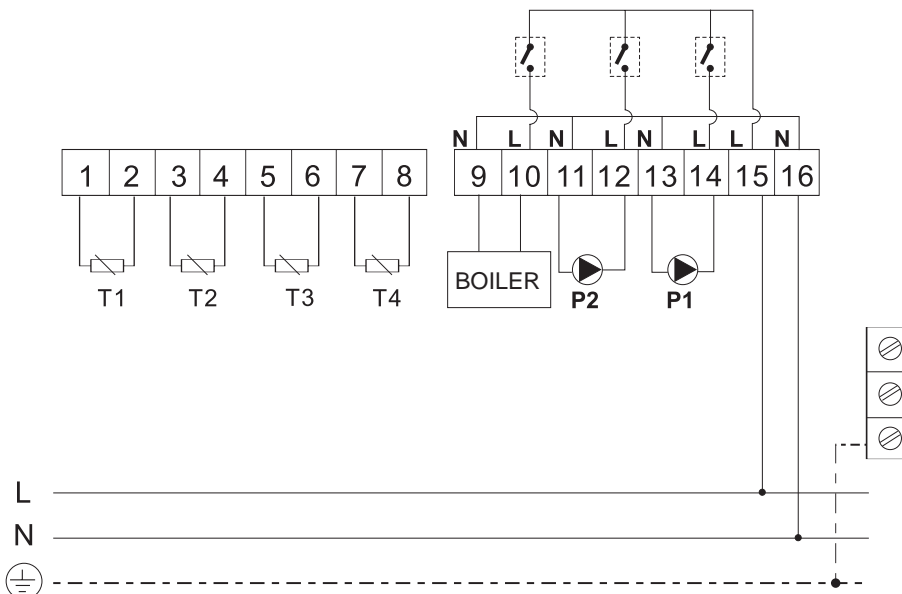


P1, P2
Circuit pump
P2 - primary circuit pump
P1 - after-heating circuit pump



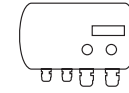
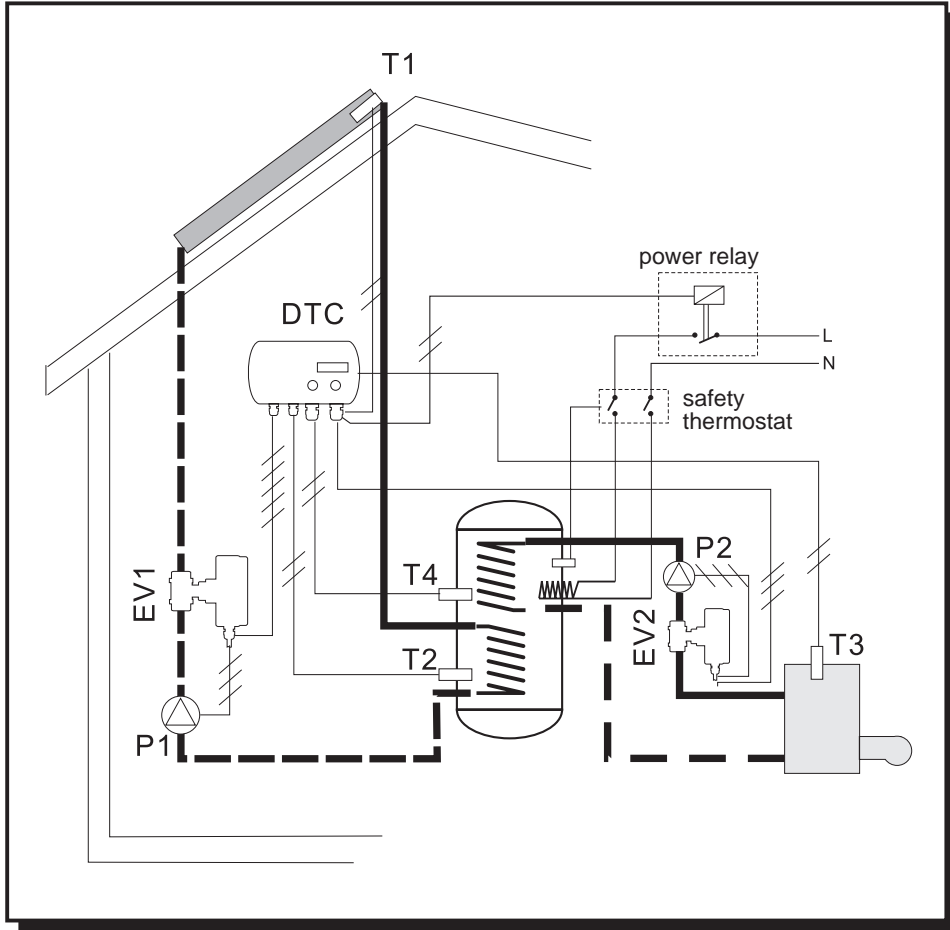
RV1, RV2
Nonreturn valve

Electric connection



Water After-heating with Electric Heating Element

When water is after-heated by means of electric heating element, it must be connected through additional power relay and safety immersion thermostat. T4 sensor should be installed above electric heating element.



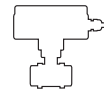
DTC
Differential thermostat
DTC 100/4TD



T1, T2, T3, T4
Sensors
T1 - collector sensor
T2 - hot water tank sensor
T3 - boiler sensor
T4 - hot water tank sensor



P1, P2
Circuit pump
P2 - primary circuit pump
P1 - after-heating circuit pump

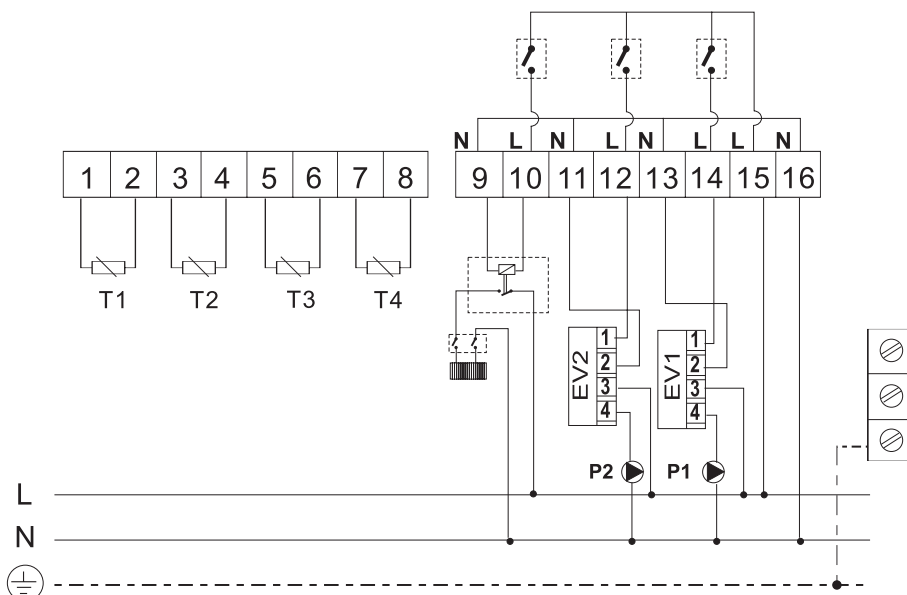


EMV1, EMV2
Electric motor actuated ball valve:
EMV 110..4230 series
EMV 110..3230 series compact

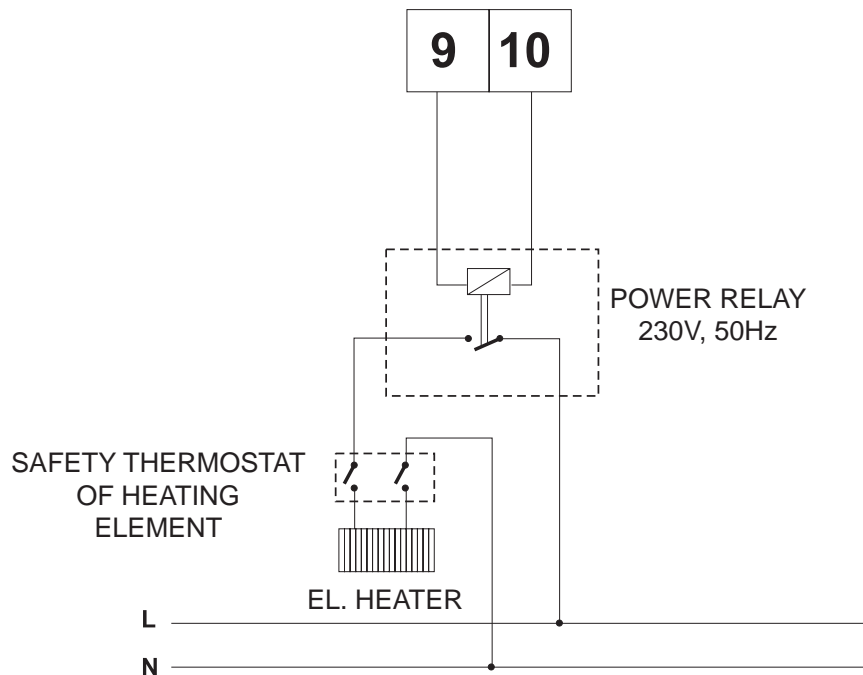


electric heating element

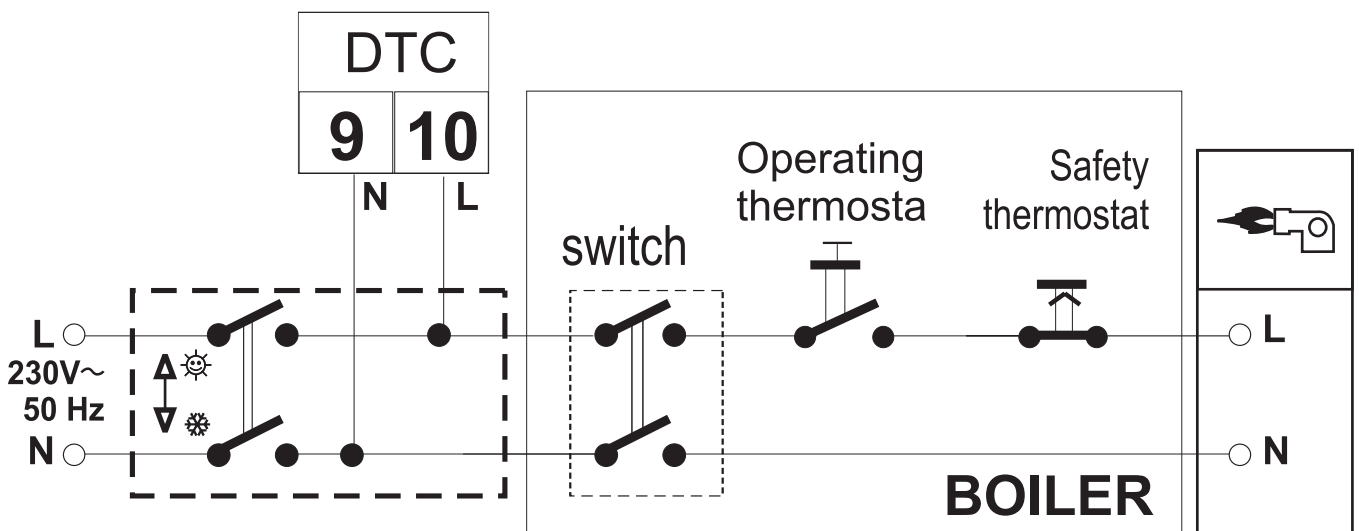
Electric connection



CONNECTION OF ELECTRIC HEATING ELEMENT



BURNER CONTROL

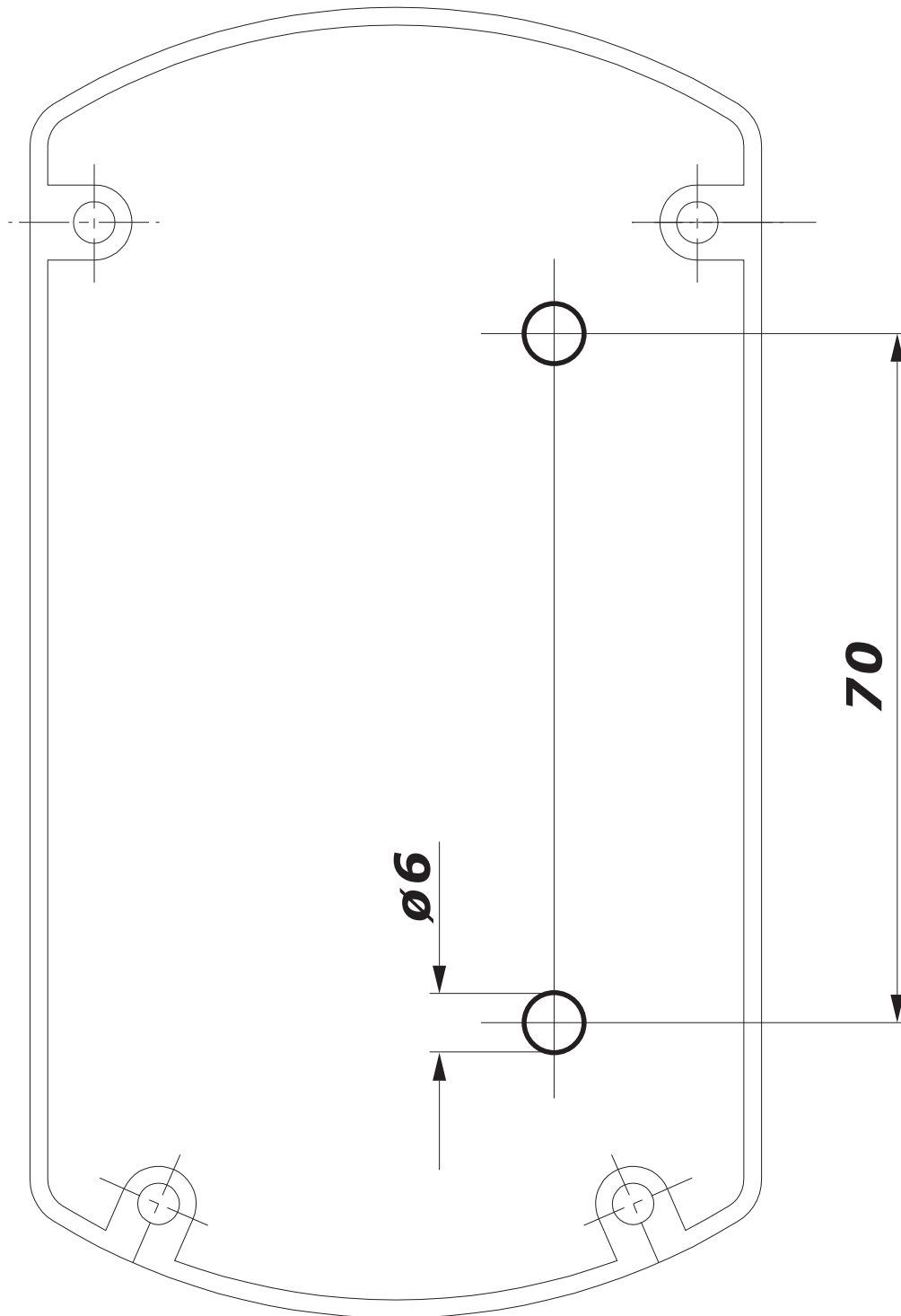


WARNING:

Before opening, unplug from power supply.

Only qualified person can maintain the apparatus.

HOLES FOR EASIER INSTALLATION OF
DIFFERENTIAL THERMOSTAT ON WALL



Trouble-shooting guide

TROUBLE	POSSIBLE FAILURE	REMEDY
Thermostat inoperative	Plug not connected	Connect plug in socket
Water cools down during night	-Selector switch not in AUTO position -One of retaining valves of the system inoperative (enables thermosiphon water circulation)	-Set the switch to AUTO position-Check machine installation. We recommend installation of motor actuated ball valve "EMV110 800/230.."
When pumps are active, unpleasant noise in installation is heard	Retaining valve makes noise (weak spring)	Replace nonreturn valve with motor actuated ball valve "EMV110 800/230.."
Irrespective of the temperatures, all pumps are inoperative	Selector switch in position "OFF" Temperature limit of hot water tank too low	Set selector switch to AUTO position Increase max. temperature in hot water tank (see: Temperature regulation in hot water tank)
Irrespective of the temp., collector pump is continuously switched on and after-heating pump is inoperative	Selector switch in "ON1" position	Set the switch to AUTO position
Irrespective of the temp., after-heating pump is continuously switched on and collector pump is inoperative	Selector switch in "ON2" position	Set selector switch to AUTO position
Collector pump operates normally and after heating pump not	After-heating circuit disconnected	Connect after-heating circuit See: Settings
After-heating pump operates normally and collector pump not	Collector circuit disconnected	Connect collector circuit See: Settings
Control light of individual pump is on, but the pump is inoperative	Pump blocked or cable of the pump interrupted	Check the pump and connection to regulator
When "T1" key is pressed Er1 appears	T1 sensor is interrupted	Check T1 sensor
When "T1" key is pressed Er2 appears	T1 sensor is short circuited	Check T1 sensor
When "T2" key is pressed Er1 appears	T2 sensor is interrupted	Check T2 sensor
When "T2" key is pressed Er2 appears	T2 sensor is short circuited	Check T2 sensor
When "T3" key is pressed Er1 appears	T3 sensor is interrupted	Check T3 sensor
When "T3" key is pressed Er2 appears	T3 sensor is short circuited	Check T3 sensor
Er1 is shown on display	T4 sensor is interrupted	Check T4 sensor
Er2 is shown on display	T4 sensor is short circuited	Check T4 sensor

Advantages of motor actuated ball valves of EMV110..series with incorporated relay module for solar heating systems

In solar heating systems motor actuated ball valves can prevent various inconveniences.

- *Effectively prevent hydraulic shocks in systems as they require 30 seconds for complete opening.*
- *Due to their shape they do not impede the flow.*
- *Springs are not included, therefore noise does not appear.*
- *When closed, 100% sealing is guaranteed.*
- *They have an output for pump up to 100 W in open position, therefore they do not present a hydraulic load for pump in closed position. They enable pump switching on only in completely open position.*
- *Due to installed RELAY module they enable control with make contact only.*
- *If during closing or opening process impurities enter in valve, which could block it, the valve stops and immediately afterwards continues with opening or closing process in opposite direction, so that water flow can rinse the impurities up to cleaning net (anti-blocking system).*

DIFFERENTIAL THERMOSTAT

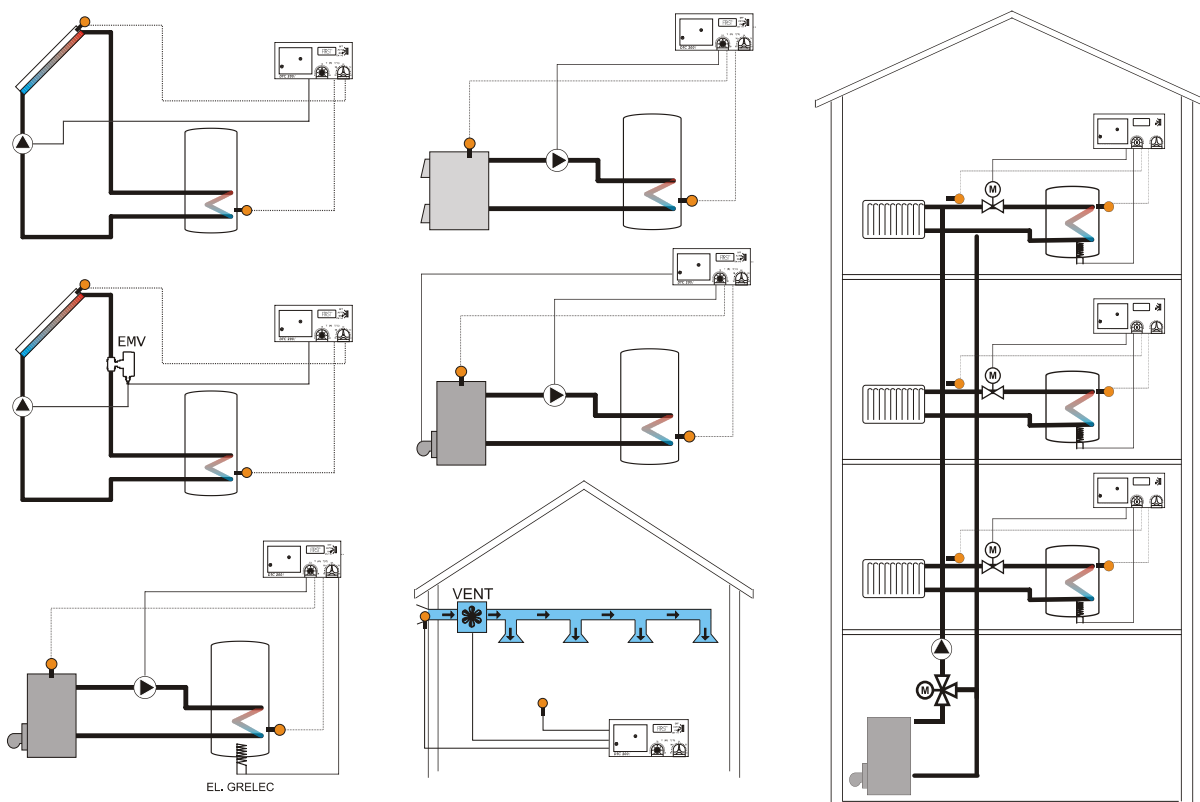
DTC 200/2G



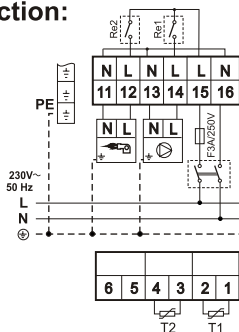
DTC 200/2G is a single differential thermostat. It is designed for heating of domestic water from one source (solar collectors, boilers of central heating system) with controlling burner. It can be also used for cooling room space.

Main advantages are: simple handling, reliable operation, compact and convenient version and low price for its quality class.

Applications for heating domestic hot water tank from collectors or boiler:



Electrical connection:



Technical Data

Two working regimes:	Heating, Cooling
Supply voltage:	230VAC, 50Hz
Power consumption:	4 VA
No. of sensors:	2 (KTY10)
No. of outputs:	2 (230VAC, 1(1) max.), SPST
Hysteresis of thermostat:	1K - 2K
Temperature setting:	5°C..85°C
Temperature difference setting:	0K - 15K
Installation:	wall (on hot water tank)



DTC 200/2G

Differential thermostat can be used for:

- Heating sanitary water with possibility to control the burner.
- Cooling living space with blowing the cool outside air into the living space



DEAR CUSTOMER

You have bought a DTC 200/2G differential thermostat, manufactured according to the latest quality and safety standards. It is designed in compliance with strict criteria and requirements of West European markets and enables efficient use of solar energy which enables considerable savings of other sources for domestic water heating. It was tested at TUV institute in München.

Our products are available in the markets for several years and satisfy the needs of demanding customers from hot Greece to north Germany.

We are convinced that the use of our product will satisfy your needs too and help you to save your money.

Thanks for your confidence !

FIRST

USER'S MANUAL

This manual is for user. It describes the operation of differential thermostat and it's correct use. Before setting the parameters be sure in which way of use is used. Carefully read the instructions to make good use of the product.

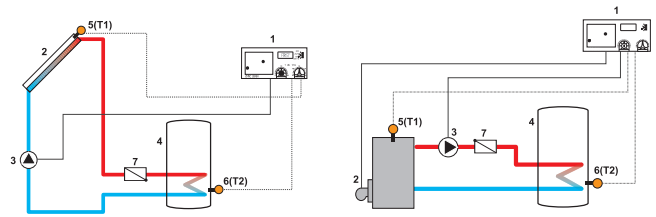
We reserve the right to modify the instructions and the technical data of the product without prior notice.

GENERALLY:

With differential thermostat there are three possible ways of use:

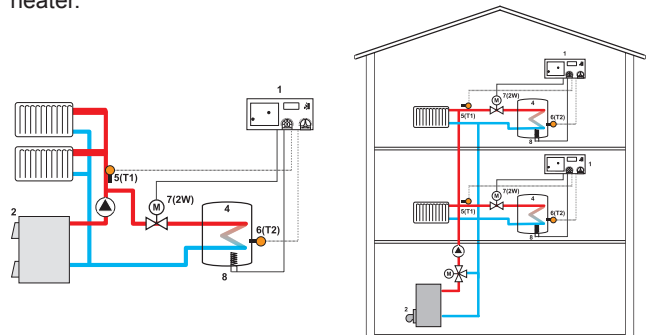
1. HEATING THE DOMESTIC HOT WATER FROM ONE HEATING SOURCE (SOLAR COLLECTORS, BOILERS, HEAT PUMP...) WITH CONTROLLING THE HEATING SOURCE (BURNER).

Differential thermostat controls the electric motor actuated ball valve (EMV 110..) and the circulation pump. If it necessary, turns ON or OFF the heating source (burner).



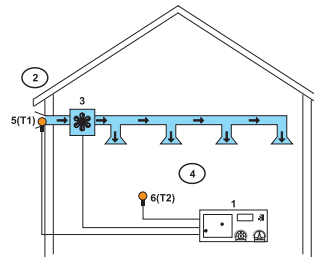
2. HEATING THE DOMESTIC HOT WATER FROM ONE HEATING SOURCE (SOLAR COLLECTORS, BOILERS, HEAT PUMP...) WITH ADDITIONAL HEATING WITH ELECTRICAL HEATER.

Differential thermostat controls the electric motor actuated ball valve (EMV 110..) and the circulation pump. In case that the primary heating source (solar collectors, boilers...) has not enough energy, water in water tank is heated with electrical heater.



3. COOLING LIVING SPACE WITH BLOWING THE COOL OUTSIDE AIR INTO THE LIVING SPACE

Differential thermostat controls the ventilator.



1st WAY OF USE

HEATING THE DOMESTIC HOT WATER FROM ONE HEATING SOURCE (SOLAR COLLECTORS, BOILERS, HEAT PUMP...) WITH CONTROLLING THE HEATING SOURCE (BURNER).

OPERATION

DTC 200/2G single differential thermostat measures the temperature of heating source (collectors, boiler, ...) and in user (hot water tank).

Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank). Consequently minimum difference should be 3K-5K. Recommendable minimal value is 5K.

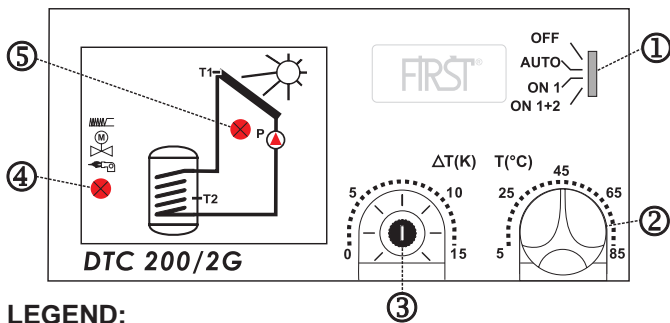
When the temperature of the source exceeds the temperature around the user for pre-set difference opens the electric motor actuated ball valve and switches the pump.

The thermostat switches off the pump if pre-set temperature is reached in hot water tank (adjustable from 5° to 85°C).

If it's need for heating the hot water tank and the temperature of heating source (boiler) is to low, then thermostat switch on the burner of the boiler and when the conditions of the difference is assured, pump is switch on.

The burner is always on, when the heating is needed.

CONTROL PANEL:

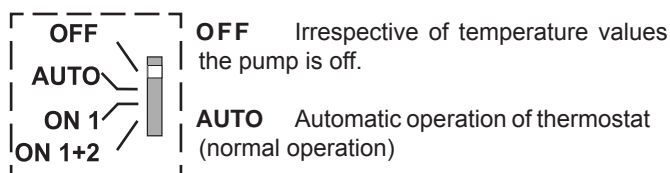


LEGEND:

1. Selector switch for choosing the operation
2. Knob for setting temperature in DHWT (domestic hot water tank)
3. Knob for setting temperature difference of heating source (collectors, boiler, ...) and in user (hot water tank).
4. LED indicator for burner operation.
5. LED indicator for pump operation.

Use of selector switch:

With selector switch (1) you select one of the following modes of operation:



ON 1 Irrespective of temperature values the pump is on. This mode is designed for testing purposes, servicing and in case of troubles.

ON 1+2 Irrespective of temperature values the pump and burner are on. This mode is designed for testing purposes, servicing and in case of troubles.

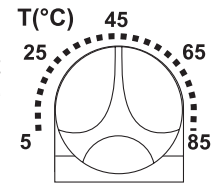
⚠ Mode OFF doesn't enable galvanic separation from mains. When replacing the pump, disconnect supply voltage!

TEMPERATURE SETTING OF HOT WATER TANK

With knob (2) you can set max. temperature in water tank between 5°C and 85°C.

When the temperature is reached, thermostat deactivates pump and close motorised ball valve regardless the temperature of heating source.

If hot water is used by the appliance with limited max. temperature of inflow, this setting is very useful.

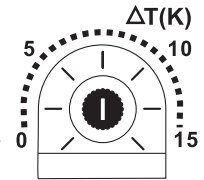


DIFFERENCE SETTING

With knob (3) you can set temperature difference of heating source (collectors, boiler, ...) and in user (hot water tank) between 0K and 15K.

Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank). Consequently minimum difference should be 3K-5K.

The difference is set in relation to the volume of heat losses of the system which depend on lengths of pipes from source to the water tank and on pipeline insulation.



2nd WAY OF USE

HEATING THE DOMESTIC HOT WATER FROM ONE HEATING SOURCE (SOLAR COLLECTORS, BOILERS, HEAT PUMP...) WITH ADDITIONAL HEATING WITH ELECTRICAL HEATER.

Differential thermostat controls the electric motor actuated ball valve (EMV 110..) and the circulation pump. In case that the primary heating source (solar collectors, boilers...) has not enough energy, water in water tank is heated with electrical heater.

OPERATION:

DTC 200/2G single differential thermostat measures the temperature of heating source (collectors, boiler, ...) and in user (hot water tank).

Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank). Consequently minimum difference should be 3K-5K. Recommendable minimal value is 5K.

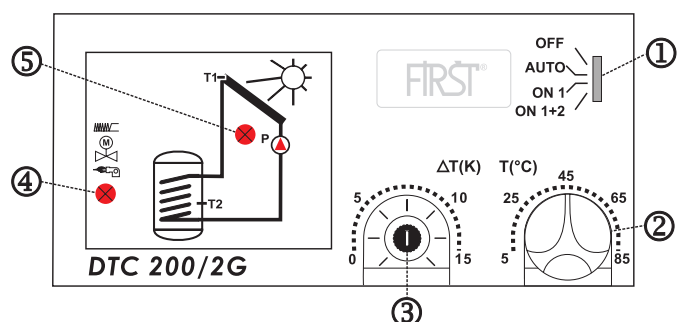
When the temperature of the source exceeds the temperature around the user for pre-set difference opens the electric motor actuated ball valve and switches the pump.

The thermostat switches off the pump if pre-set temperature is reached in hot water tank (adjustable from 5° to 85°C).

If it's need for heating the hot water tank and the temperature of heating source (boiler, collector) is to low, then thermostat switch on electrical heater. Electrical heater heats water to desire temperature.

Electrical heater is active, when the primary heating source is inactive - they never work at same time. Priority has main heating source (collector, boiler, ...).

CONTROL PANEL:

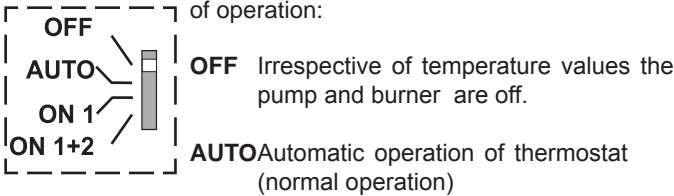


LEGEND:

1. Selector switch for choosing the operation
2. Knob for setting temperature in DHWT (domestic hot water tank)
3. Knob for setting temperature difference of heating source (collectors, boiler, ...) and in user (hot water tank).
4. LED indicator for need for heating water in DHW tank. It doesn't show working of el. heater.
5. LED indicator for pump operation.

Use of selector switch:

With selector switch (1) you select one of the following modes of operation:



ON 1 Irrespective of temperature values the pump is on. This mode is designed for testing purposes, servicing and in case of troubles.

ON 1+2 Irrespective of temperature values the pump and el. heater are on. This mode is designed for testing purposes, servicing and in case of troubles.

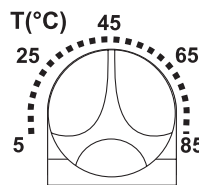
⚠ Mode OFF doesn't enable galvanic separation from mains. When replacing the pump, disconnect supply voltage!

TEMPERATURE SETTING OF HOT WATER TANK

With knob (2) you can set max. temperature in water tank between 5°C and 85°C.

When the temperature is reached, thermostat deactivates pump and closes motorised ball valve regardless the temperature of heating source.

If hot water is used by the appliance with limited max. temperature of inflow, this setting is very useful.



DIFFERENCE SETTING

With knob (3) you can set temperature difference of heating source (collectors, boiler, ...) and in user (hot water tank) between 0K and 15K.

Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank). Consequently minimum difference should be 3K-5K.

The difference is set in relation to the volume of heat losses of the system which depend on lengths of pipes from source to the



3rd WAY OF USING

Cooling living space with blowing the cool outside air into the living space

OPERATION

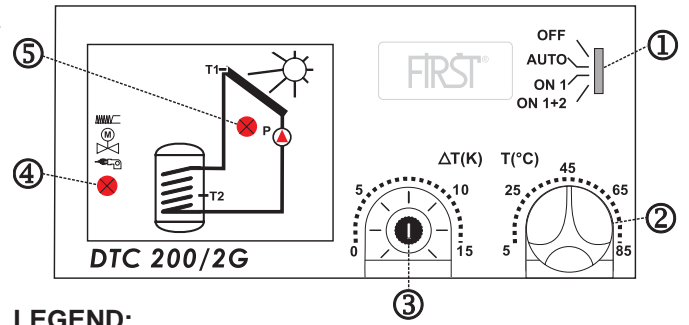
DTC 200/2G single differential thermostat measures the temperature of outside air and inside air.

Cooling effect is provided, when cooling source temperature is lower than the temperature of inside air. Consequently minimum difference should be 2K.

When the temperature of outside air is below the temperature of inside air it switches on the ventilator.

The thermostat switches off the ventilator if pre-set minimum temperature is reached (adjustable from 5° to 85°C).

CONTROL PANEL:

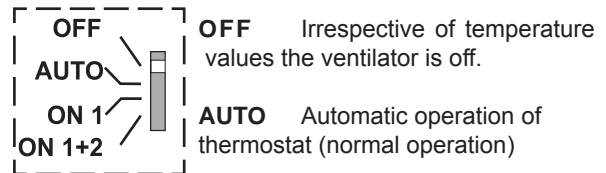


LEGEND:

1. Selector switch for choosing the operation
2. Knob for setting minimal ambient temperature
3. Knob for setting temperature difference of cooling source (outside air) and ambient.
4. LED indicator - not in function
5. LED indicator for ventilator operation.

Use of selector switch:

With selector switch (1) you select one of the following modes of operation:



ON 1 Irrespective of temperature values the ventilator is on. This mode is designed for testing purposes, servicing and in case of troubles.

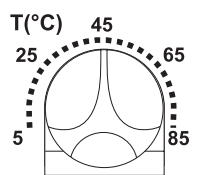
ON 1+2 Irrespective of temperature values the ventilator is on. This mode is designed for testing purposes, servicing and in case of troubles.

⚠ Mode OFF doesn't enable galvanic separation from mains. When replacing the pump, disconnect supply voltage!

MINIMAL TEMPERATURE SETTING OF AMBIENT

With knob (2) you can set min. temperature in ambient 5°C and 85°C.

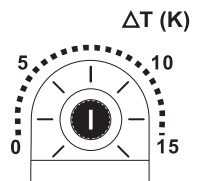
When the ambient temperature is reached, thermostat deactivates ventilator regardless the temperature of cooling source (outside air).



DIFFERENCE SETTING

With knob (3) you can set temperature difference of cooling source (outside air) and in ambient between 0K and 15K.

Cooling effect is provided, when cooling source temperature is lower than the temperature of inside air. Consequently minimum difference should be 2K.



Trouble shooting guide

TROUBLE	POSSIBLE FAILURE	REMEDY
The pump is not operating irrespective of temperature	- Power supply is not connected - Selector switch is in position OFF - DHWT sensor T2 is disconnected - Collector sensor T1 is short circuited	- Check power supply - Set the selector switch in position AUTO - Check sensor - Check sensor
The pump operating permanently irrespective of temperature	- Selector switch is in position ON1 - Collector sensor T1 is disconnected - DHWT sensor T2 is short circuited	- Set the selector switch in position AUTO - Check sensor - Check sensor
The pump and burner operating permanently irrespective of temperature	- Selector switch is in position ON1+2 - Collector sensor T1 is disconnected - DHWT sensor T2 is short circuited	- Set the selector switch in position AUTO - Check sensor - Check sensor
Temperature regulation of DHW tank is not working	- Motorised ball valve is permanently open or nonreturn valve is open (thermosiohon water circulation is enabled)	Check the installation
In spite of enough collector's energy the water temperature in DHWT is not high enough – water is too cold	-Setting of DHWT temperature is too low -The difference setting is set to high	-Check settings
The temperature is reached, but the heating/cooling is still running	- Jumpers are not set correctly	- Check jumper's settings
In AUTO position nothing happens	- Jumpers are pulled out	- Set jumpers in suitable position

Advantages of motor actuated ball valves of EMV110..series with incorporated relay module for solar heating systems

In solar heating systems motor actuated ball valves can prevent various inconveniences.

- o Effectively prevent hydraulic shocks in systems as they require 30 seconds for complete opening.
- o Due to their shape they do not impede the flow.
- o Springs are not included, therefore noise does not appear.
- o When closed, 100% sealing is guaranteed.
- o They have an output for pump up to 100 W in open position, therefore they do not present a hydraulic load for pump in closed position. They enable pump switching on only in completely open position.
- o Due to installed RELAY module they enable control with make contact only.
- o If during closing or opening process impurities enter in valve, which could block it, the valve stops and immediately afterwards continues with opening or closing process in opposite direction, so that water flow can rinse the impurities up to cleaning net (anti-blocking system).
- o Possibility of manual control. This function relieves airing the system or filling the system with water.
- o It prevents coaxial cooling of DHWT by one pipe in night-time.

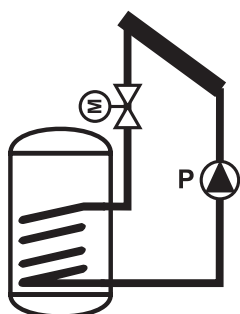
EMV 110 602/4230



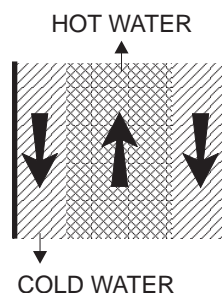
EMV 110 502/7930



EMV 110 316/8910



For preventing coaxial cooling in night-time it is necessary to build in motorised ball valve EMV 110... in heating pipe of DHW tank exchanger.



In night-time the temperature of water in DHWT is usually higher than in collector. In this case it is possible coaxial cooling of the DHWT through one pipe. If the pipe has enough diameters and it is straight and vertical, then water circulation begins in just one pipe. In the middle, water goes upwards, and at the edges downwards.

One solution for this is to build in nonreturn valve. But with its use is increased the load of pump, the flow reduced, and the ventilation of the system hindered.

All these problems are solved by the motorised ball valve series EMV 110 ...



DTC 200/2G

Differential thermostat can be used for:

- Heating sanitary water with possibility to control the burner.
- Cooling living space with blowing the cool outside air into the living space



WARNING!

Installation instructions are meant for specialist. All examples listed in the instructions are merely indicative. The manufacturer accepts no responsibility for incorrect hydraulic connection of machine parts of installations should comply with all safety regulations defined by law and the rules. Carefully read the instructions to make good use of the product.

INFORMATION FOR ORDER:

DTC 200/2G 13017

The set consists of:

Differential thermostat DTC 200/2G, sensor BSF1, sensor KF, mounting kit, installation instructions and instruction for use

Tube TV2.....27080

(1/2", l=100mm, inner diameter 14mm)

CODE

INDEX:

Technical data	2
Testing sensors	
Mounting the thermostat	
Cables connection	
Choosing the working regime.....	3

1. HEATING THE DOMESTIC HOT WATER FROM ONE HEATING SOURCE

SOURCE (SOLAR COLLECTORS, BOILERS, HEAT PUMP...) WITH CONTROLLING THE HEATING SOURCE (BURNER)3

1.1 Basics	
1.2 Operation	
1.3 Sensors installation	
1.4 Electrical connection	4
1.5 Examples of use	

2. HEATING THE DOMESTIC HOT WATER FROM ONE HEATING SOURCE (SOLAR COLLECTORS, BOILERS, HEAT PUMP...) WITH ADDITIONAL HEATING WITH ELECTRICAL HEATER

2.1 Basics	
2.2 Operation	
2.3 Sensors installation	
2.4 Electrical connection	
2.5 Examples of use	7

3. COOLING LIVING SPACE WITH BLOWING THE COOL OUTSIDE AIR INTO THE LIVING SPACE

2.1 Basics	
2.2 Operation	
2.3 Sensors installation	
2.4 Examples of use	
2.5 Electrical connection	

WITH DIFFERENTIAL THERMOSTAT ARE THREE POSSIBLE WAY OF USE:

1. HEATING THE DOMESTIC HOT WATER FROM ONE HEATING SOURCE (SOLAR COLLECTORS, BOILERS, HEAT PUMP...) WITH CONTROLLING THE HEATING SOURCE (BURNER).

Differential thermostat controls the electric motor actuated ball valve (EMV 110..) and the circulation pump. If it necessary turns ON or OFF the heating source (burner).

2. HEATING THE DOMESTIC HOT WATER FROM ONE HEATING SOURCE (SOLAR COLLECTORS, BOILERS, HEAT PUMP...) WITH ADDITIONAL HEATING WITH ELECTRICAL HEATER.

Differential thermostat controls the electric motor actuated ball valve (EMV 110..) and the circulation pump. In case that the primary heating source (solar collectors, boilers...) has not enough energy, water in water tank is heated with electrical heater.

3. COOLING LIVING SPACE WITH BLOWING THE COOL OUTSIDE AIR INTO THE LIVING SPACE

Differential thermostat controls the ventilator.

We reserve the right to modify the instructions and the technical data of the product without prior notice.

Technical data: DTC 200/2G

Dimensions: 80x150x42 mm
Weight: 0,43 kg
Protection degree: IP 40/ DIN 40050
Heat class: B
Type of thermostat: P
Range of measuring temperature: -40°C ... +120°C
Setting working regime:
 With jumpers (heating or cooling)
Limitation of temperature (depends of working regime):
 Tmax: 5°C ... 85°C (heating regime)
 Tmin: 5°C ... 85°C (cooling regime)
Temperature difference setting: 0K ... 15K
Hysteresis of thermostat: 1K-2K
Temperature of ambient: 0°C ... 40°C
Outputs: 2 relay outputs: 230V ~, 50Hz, 1(1)A,
 working contact SPST —•—•—:
 - controlling the electric motor actuated ball valve and pump
 - burner
Inputs: 2 - sensors
 - BSF1- PVC cable (1,5m long) - DHWT sensor
 - KF - silicon cable (2m long) - collector's or boiler's sensor
Supply voltage: 230V ~, 50Hz
Power consumption: 4VA
Humidity: 5% - 70% (brez kondenza)
Storage temperature: 0°C-70°C
 For housing is used material with resistance PTI=175>250
Mounting: on the wall
Recommendable cables:
 sensors cables: J-Y (St) 1X 2X0,6
 pump cables: H03VV-F 3x0,75

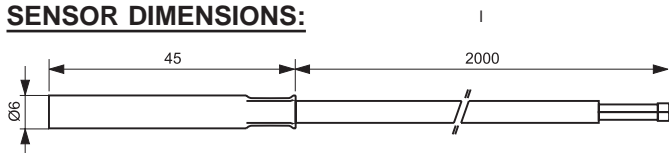
SENSORS TESTING:

For testing purposes of working of differential thermostat sensors are simulated with resistors. Values of the resistors are stated in the following table:

Temp. (°C)	R _T (Ω)	Temp. (°C)	R _T (Ω)	Temp. (°C)	R _T (Ω)
-50	1040,51	-5	1578,51	40	2229,63
-45	1094,70	0	1645,27	45	2308,96
-40	1150,29	5	1713,43	50	2389,69
-35	1207,27	10	1782,98	55	2471,81
-30	1265,65	15	1863,93	60	2555,33
-25	1325,43	20	1926,28	65	2640,24
-20	1386,61	25	2000,02	70	2726,56
-15	1449,18	30	2075,16	75	2814,26
-10	1513,14	35	2151,70	80	2903,37

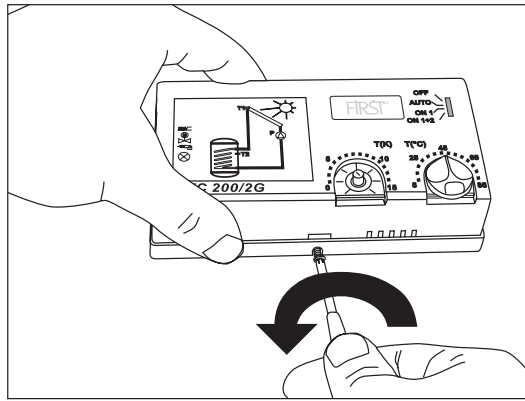
Temp. (°C)	R _T (Ω)
85	2993,87
90	3085,77
95	3179,07
100	3273,76
105	3369,85
110	3467,33
115	3566,21
120	3666,49
125	3768,16

SENSOR DIMENSIONS:

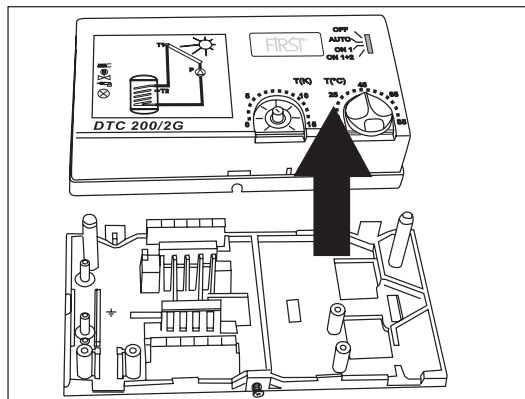


l=1,5m sensor BSF1, PVC, (gray cable) - DHWT sensor
 l=2m sensor KF, silicon (red cable) - collector's or boiler's sensor

INSTALLATION OF THERMOSTAT

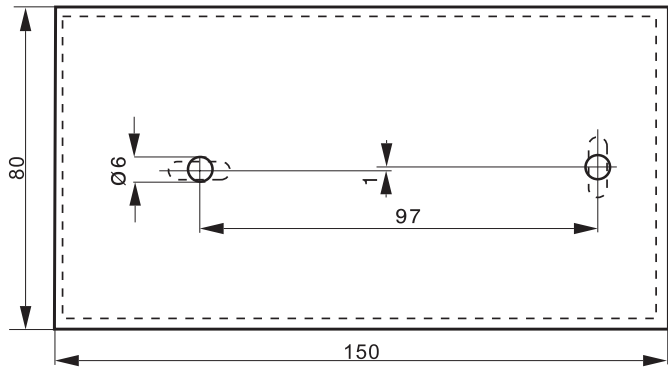


1.) Unscrew the screw from bottom part of thermostat's housing.

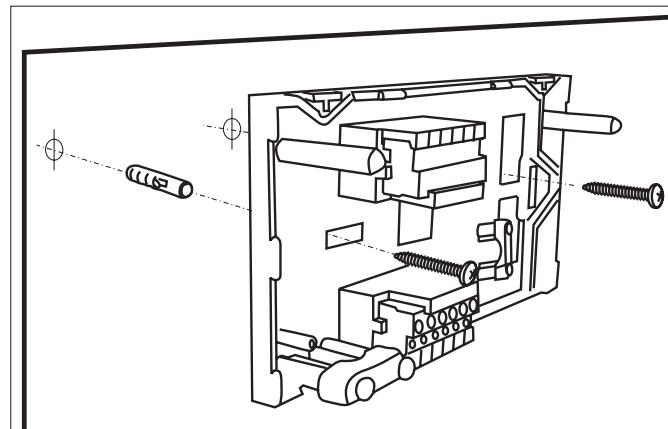


2.) Remove the thermostat's cover.

Installation of housing bottom on the wall



With the printable template on the packaging drill two holes (Ø6mm) on the wall.

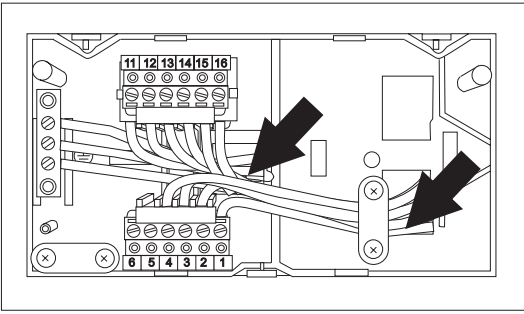


Put the enclosed two wall inserts into drilled holes (Ø6mm) and with two screws mount the housing bottom on the wall. Do not mount the thermostat under water dropping.

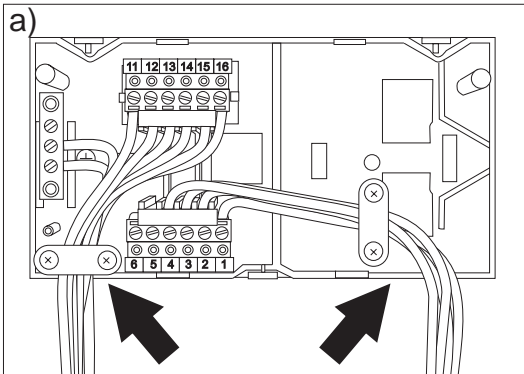
ELECTRICAL CABLES CONNECTION

1. Flush mounted connection

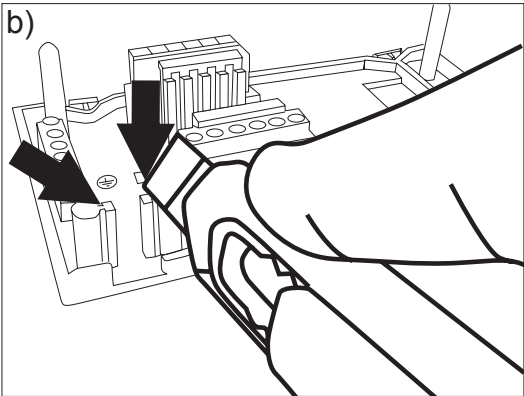
Cables in the wall case lead through the holes in the bottom of thermostat.



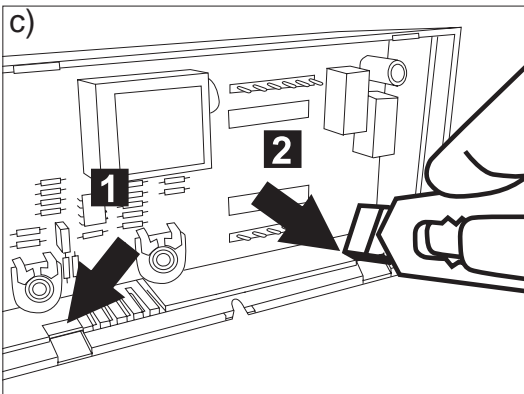
2. On-wall connection



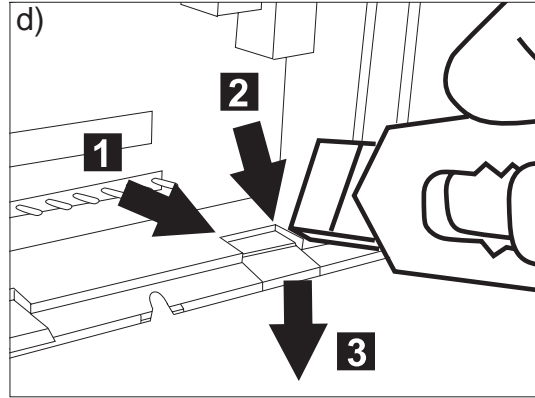
a) Lead cables into the thermostat housing like as shown on the picture. On one side lead the sensor cables and on the other the rest. With two discharger screw the cables very tight to prevent the extraction.



b) If it's not enough space for cables, use the knife and widen the lead.



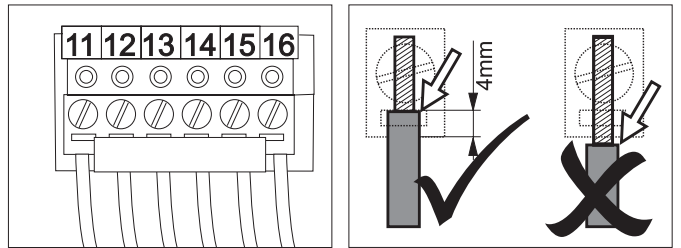
c) Cut the holes for cables lead on the housing cover



d) Use the knife and cut on spots 1 and 2 and brake remain.

ELECTRICAL CONNECTION:

⚠ Before each interventions in the thermostat first disconnect the main power!



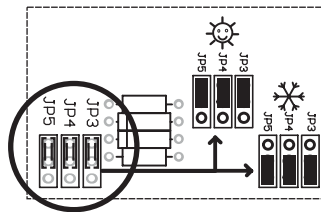
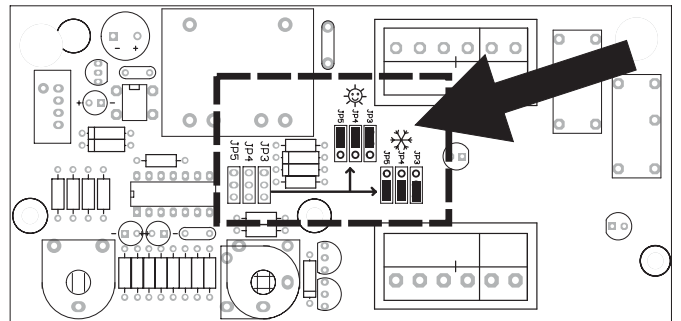
Non-isolated part of the conductor must be in the terminal housing!

CHOOSING WORKING REGIME

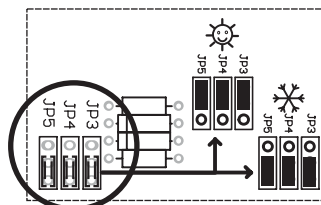
Before first use the working regime must be selected. It is set by jumpers on the electronic circuit.

Differential thermostat can be used for:

- Heating sanitary water with possibility to control the burner.
- Cooling living space with blowing the cool outside air into the living space



If it's used for heating, the jumpers must be in position "sun" (factory settings)



If it's used for cooling, the jumpers must be in the position "snowflake"

1. HEATING THE DOMESTIC HOT WATER FROM ONE HEATING SOURCE (SOLAR COLLECTORS, BOILERS, HEAT PUMP...) WITH CONTROLLING THE HEATING SOURCE (BURNER).

1.1 BASICS

Differential thermostat controls the electric motor actuated ball valve (EMV 110..) and the circulation pump. If it necessary turns ON or OFF the heating source (burner).

The thermostat enables setting of two parameters:

1. Regulation of maximum temperature in hot water tank from 5° to 85°C. This temperature is defined by T2 sensor witch is generally mounted in upper third of heat exchanger.

2. Regulation of difference for exchanger from 0K to 15K.

With these regulation you define how much the value of the source temperature (collector, boiler,...) should exceed the temperature of water around the exchanger in hot water tank, that the thermostat opens the valve and activates the pump. The difference is set in relation to the volume of heat losses of the system which depend on lengths of pipelines from source to hot water tank and on pipeline insulation.

1.2 OPERATION

DTC 200/2G single differential thermostat measures the temperature of heating source (collectors, boiler, ...) and in user (hot water tank).

Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank). Consequently minimum difference should be 3K-5K. Recommendable minimal value is 5K.

When the temperature of the source exceeds the temperature around the user for pre-set difference opens the electric motor actuated ball valve and switches the pump.

The thermostat switches off the pump if pre-set temperature is reached in hot water tank (adjustable from 5° to 85°C).

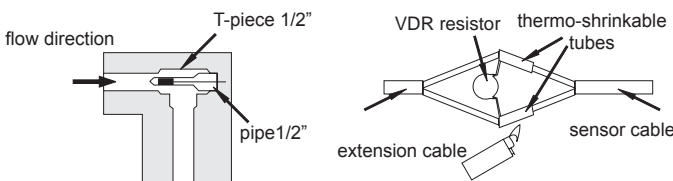
If it's need for heating the hot water tank and the temperature of heating source (boiler) is to low, then thermostat switch on the burner of the boiler and when the conditions of the difference is assured, pump is switch on.

The burner is always on, when the heating is needed.

1.3 SENSOR INSTALLATION

T1 SENSOR'S INSTALLATION INTO SOLAR COLLECTOR OR BOILER:

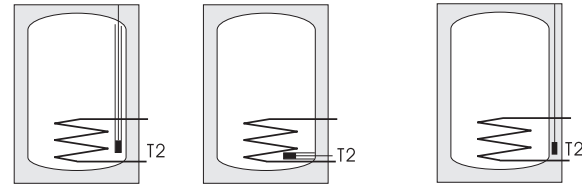
Use KF sensors with silicon cable insulation (RED colour)!
 Install it as immersion sensor in collecting pipe at the top of the collectors or boiler in provided sleeve. Sensor connect on the terminals 1 and 2. Use the cable J-Y (St) 1X 2X0.6. For cables longer than 15m we recommend over-voltage protection with VDR resistor. For over voltage protection is recommended use of armoured cable and it must be earthing.



T2 SENSOR'S INSTALLATION INTO DOMESTIC HOT WATER TANK (DHWT):

Use BSF1 sensors with PVC cable insulation (GRAY colour)!

Install T2 sensor to provided place in hot water tank or on hot water tank wall under isolation as contact sensor in upper part of exchanger. When sensor is mounted as contact one we recommend to coat it with heat conducting paste or liquid metal.



In special purpose vertical or horizontal tube (sensor should be protected against accidental extraction).

On hot water tank with clip, wire and spring strip (use paste for better heat transmission).

WARNING!

At mounting protect sensors against ambient influence and assure suitable mechanical protection.

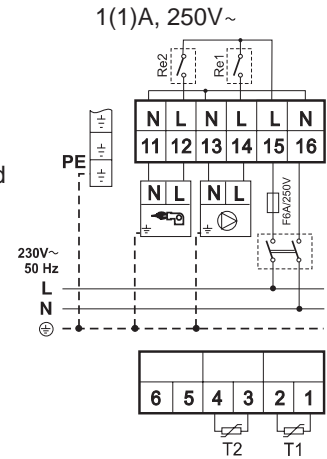
ELECTRIC CONNECTION

Before each intervention in the thermostat first disconnect the main power!

Grounding wires should be connected to special terminal pins situated on left side of terminal strips.

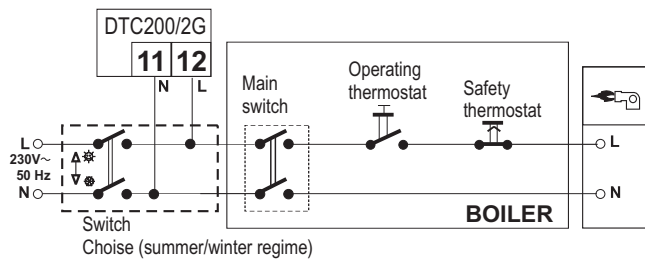
The thermostat is designed for fixed installation.

When performing electric installation, an element should be inserted which enables at least 3 mm separation of thermostat from the mains (switch or socket). Prior to each intervention in the thermostat, first disconnect it from the mains.



TERMINAL	CONNECTION
1,2	sensor T1 - heating source (collector, boiler...)
3,4	sensor T2 - hot water tank
11	N - neutral - burner
12	L - phaze - burner, 1(1)A, 250V~, 50Hz
13	N - neutral
14	L - phaze -pump 1(1)A, 250V~, 50Hz
15	L - phaze mains 230V~, 50Hz
16	N - neutral mains 230V~, 50Hz

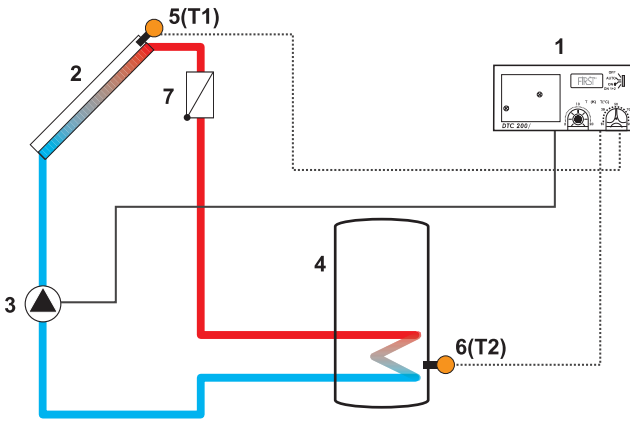
BURNER control



1.5 EXAMPLES OF USE

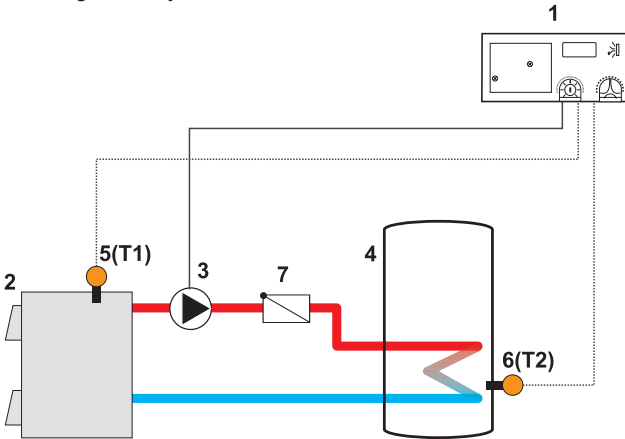
example: 1

Heating sanitary water with solar collectors.

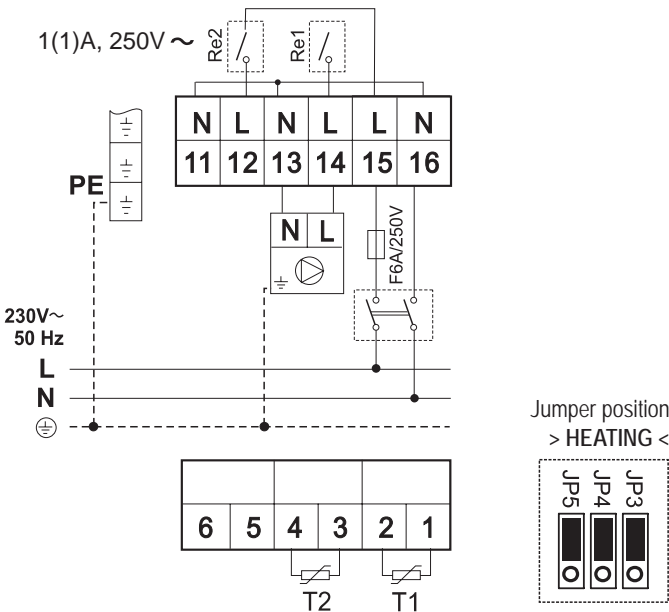


example: 2

Heating sanitary water with solid fuel boiler.

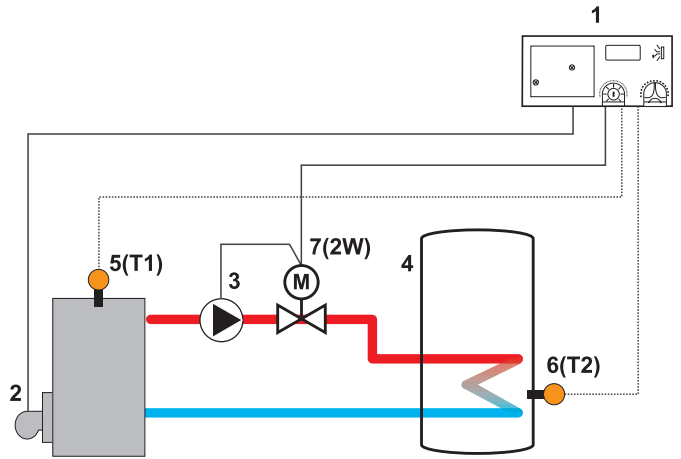


Electric connection for examples 1 and 2

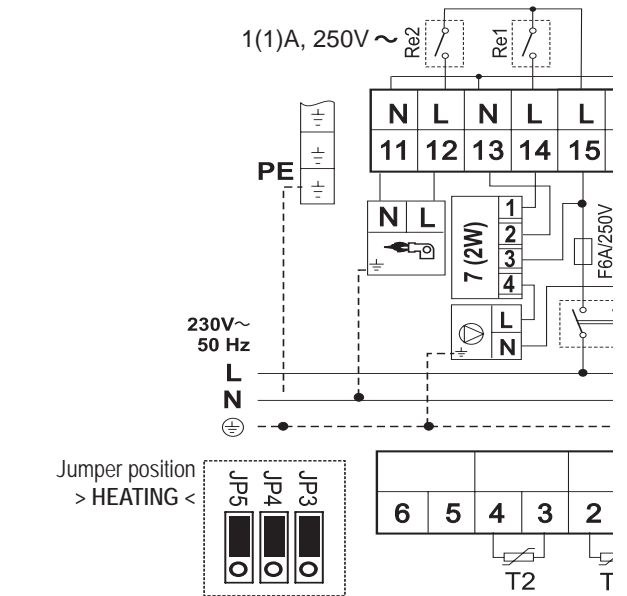


example: 3

Heating sanitary water with oil or gas burner.

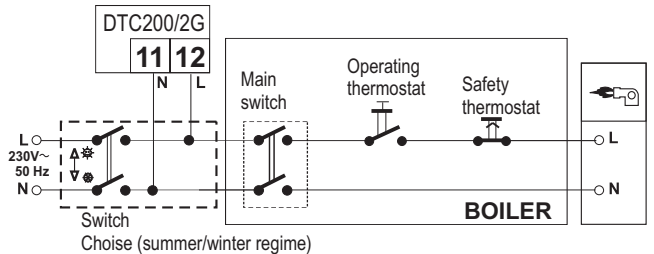


Electric connection for example 3



7 (2W) - Electric motor actuated ball valve
EMV 110..series 602, 502

BURNER control



2. HEATING THE DOMESTIC HOT WATER FROM ONE HEATING SOURCE (SOLAR COLLECTORS, BOILERS, HEAT PUMP...) WITH ADDITIONAL HEATING WITH ELECTRICAL HEATER.

Differential thermostat controls the electric motor actuated ball valve (EMV 110..) and the circulation pump. In case that the primary heating source (solar collectors, boilers...) has not enough energy, water in water tank is after-heated with electrical heater.

2.1 BASICS

The thermostat enables setting two parameters:

1. Regulation of maximum temperature in hot water tank from 5° to 85°C.

This temperature is defined by T2 sensor which is generally mounted in upper third of heat exchanger.

2. Regulation of difference for exchanger from 0K to 15K.

With these regulation you define how much the value of the source temperature (collector, boiler,...) should exceed the temperature of water around the exchanger in hot water tank, that the thermostat opens the valve and activates the pump.

The difference is set in relation to the volume of heat losses of the system which depend on lengths of pipelines from source to hot water tank and on pipeline insulation.

2.2 OPERATION

DTC 200/2G single differential thermostat measures the temperature of heating source (collectors, boiler, ...) and in user (hot water tank).

Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank). Consequently minimum difference should be 3K-5K. Recommendable minimal value is 5K.

When the temperature of the source exceeds the temperature around the user for pre-set difference opens the electric motor actuated ball valve and switches the pump.

The thermostat switches off the pump if pre-set temperature is reached in hot water tank (adjustable from 5° to 85°C).

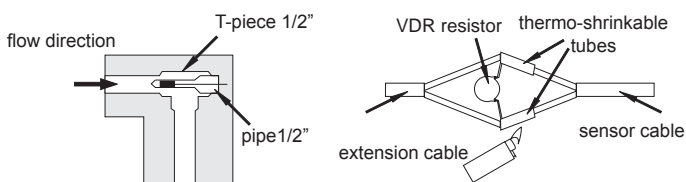
If it's need for heating the hot water tank and the temperature of heating source (boiler) is to low, then thermostat switch on electrical heater. Electrical heater after-heats water to desire temperature.

Electrical heater is active, when the primary heating source is inactive - they never work at same time. Priority has main heating source (collector, boiler, ...).

2.3 SENSORS INSTALLATION

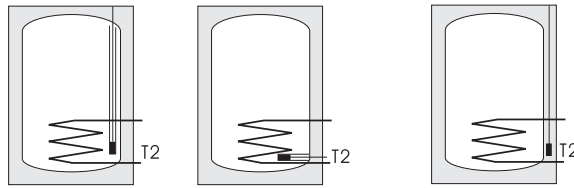
Install it as immersion sensor in collecting pipe at the top of the collectors or boiler in provided sleeve. Connect sensor on the terminals 1 and 2. Use the cable J-Y (St) 1X 2X0,6.

For cables longer than 15m we recommend over-voltage protection with VDR resistor. For over voltage protection is recommended use of armoured cable and it must be earthed.



SENSORS INSTALLATION IN HOT WATER TANK:

Install T2 sensor to provided place in hot water tank or on hot water tank wall under isolation as contact sensor in upper part of exchanger. When sensor is mounted as contact one we recommend to coat it with heat conducting paste or liquid metal.



In special purpose vertical or horizontal tube (sensor should be protected against accidental extraction).

On hot water tank with clip, wire and spring strip (use paste for better heat transmission).

WARNING!

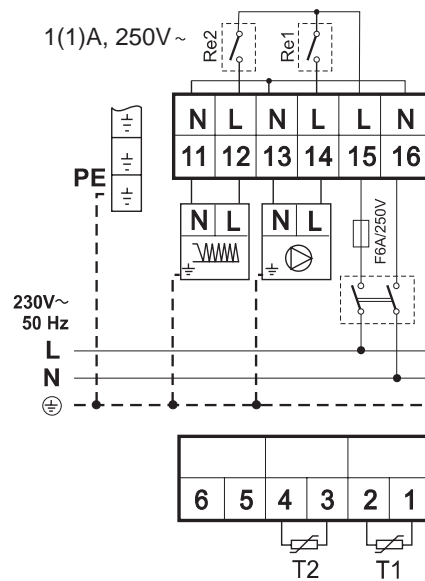
At mounting protect sensors against atmosphere influence and assure suitable mechanical protection.

ELECTRIC CONNECTION

⚠ Before each intervention in the thermostat first disconnect the main power!

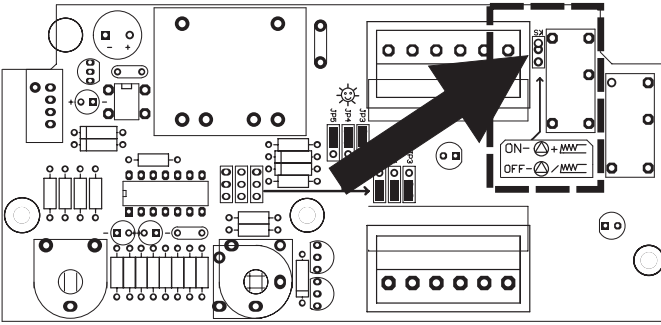
Grounding wires should be connected to special terminal pins situated on left side of terminal strips.

⚠ The thermostat is designed for fixed installation. When performing electric installation, an element should be inserted which enables at least 3 mm separation of thermostat from the mains (switch or socket). Prior to each intervention in the thermostat, first disconnect it from the mains.

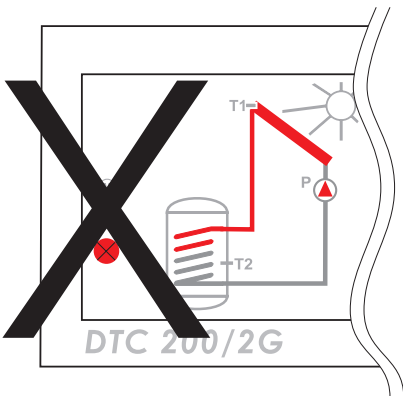


TERMINAL	CONNECTION
1,2	sensor T1 - heating source (collector, boiler...)
3,4	sensor T2 - hot water tank
11	N - neutral - el. heater
12	L - phase - el. heater 1(1)A, 250V~, 50Hz
13	N - neutral
14	L - phase - pump 1(1)A, 250V~, 50Hz
15	L - phase mains 230V~, 50Hz
16	N - neutral mains 230V~, 50Hz

For this way of use, you have to cut jumper, which is shown on lower picture.



This action causes activity for only one heating source. They never work at the same time. Priority has pump for solar heating. If there is not enough solar energy, el. heater heats water.



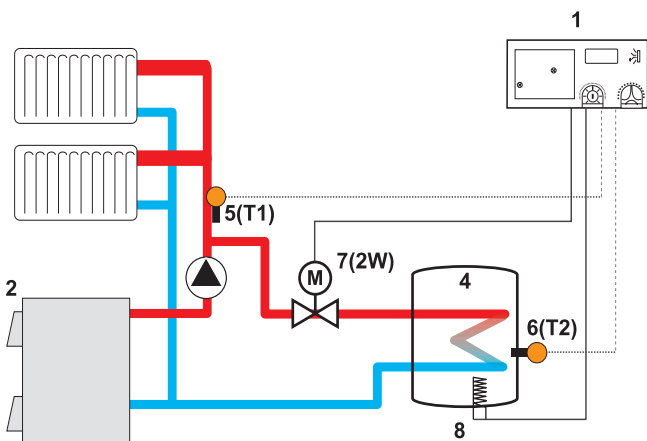
WARNING:

In this way of use, the LED indicator does not show working of el. heater. It shows only need for heating sanitary water.

2.5 EXAMPLES OF USE

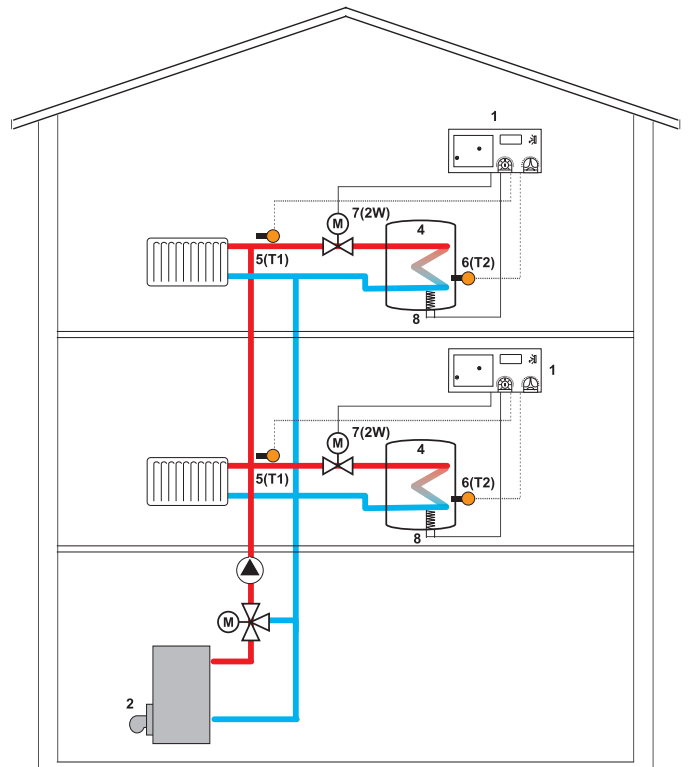
example: 4

Heating water with solid fuel boiler. When there is not enough energy, the water in storage tank is after-heated by el. heater.

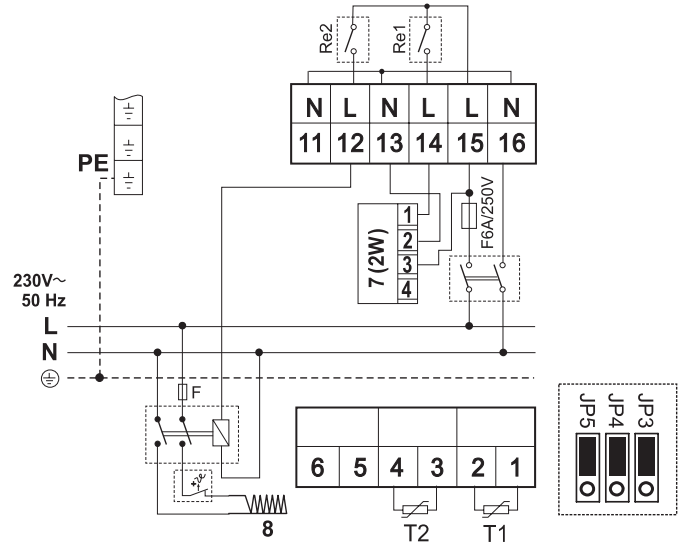


example: 5

Heating sanitary water by central heating water. When energy of central heating water is too low, the water in storage tank is after-heated by el. heater.



Electric connection for example 4 and 5



7 (2W) - Electric motor actuated ball valve EMV 110..series 602, 502

Jumper position > HEATING <

3. COOLING LIVING SPACE WITH BLOWING THE COOL OUTSIDE AIR INTO THE LIVING SPACE

Differential thermostat controls the ventilator.

3.1 BASICS

The thermostat enables setting two parameters:

1. Regulation of minimum temperature in living space 5° to 85°C.

This temperature is defined by T2 sensor which is generally mounted in reference position in the room.

2. Regulation of difference of outside and inside temperature 0K to 15K.

With this regulation you define how much the value of the source temperature (outside air) should be lower than inside temperature that thermostat switches on the ventilator.

3.2 OPERATION

DTC 200/2G single differential thermostat measures the temperature of outside air and inside air.

Cooling effect is provided, when cooling source temperature is lower than the temperature of inside air. Consequently minimum difference should be 2K.

When the temperature of outside air is below the temperature of inside air the ventilator switches on.

The thermostat switches off the ventilator if pre-set minimum temperature is reached (adjustable from 5° to 85°C).

3.3 SENSORS INSTALLATION

Installation of outside sensor T1

Install it next to entrance of suction opening of the ventilator or next to entrance of suction channel.

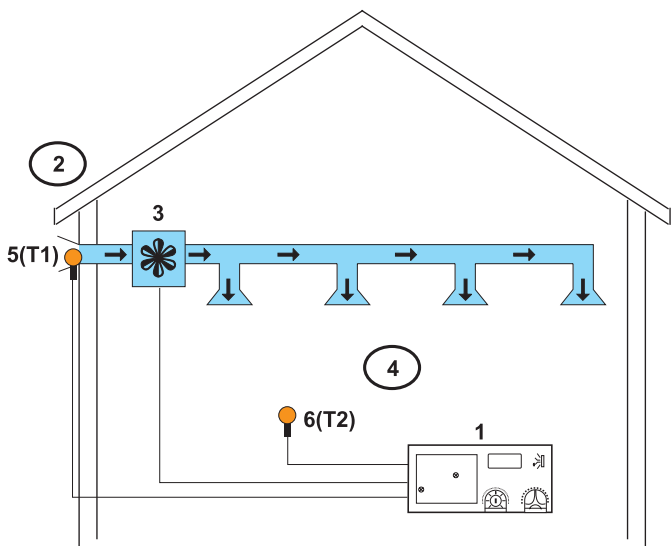
Installation of inside sensor T2

Install it on desired height, approximately on the centre in the room space at least 0,5m from the ceiling. If not install correctly the sensor will not detect real room temperature.

3.4 EXAMPLES OF USE

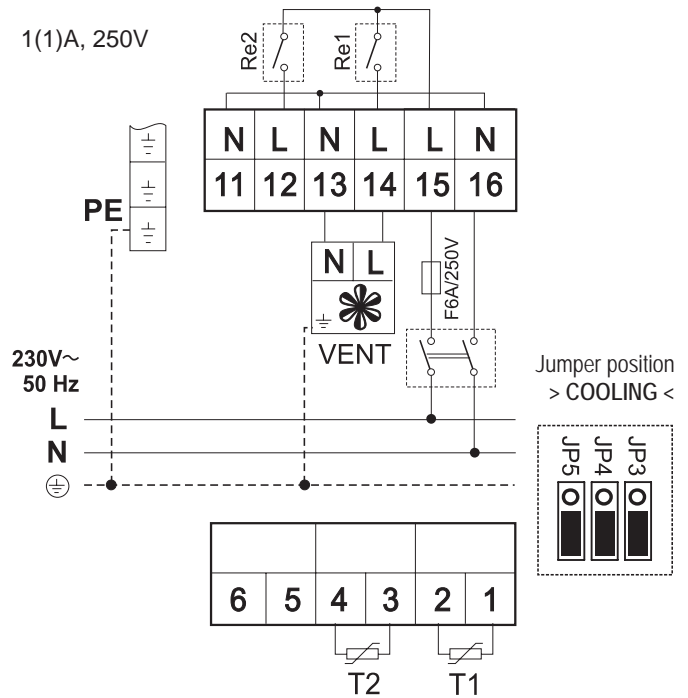
example: 6

Cooling living space with blowing the cool outside air into the living space



3.5 ELECTRIC CONNECTION

⚠ Before each interventions in the thermostat first disconnect the main power!



Grounding wires should be connected to special terminal pins situated on left side of terminal strips.

⚠ The thermostat is designed for fixed installation. When performing electric installation, an element should be inserted which enables at least 3 mm separation of thermostat from the mains (switch or socket). Prior to each intervention in the thermostat, first disconnect it from the mains.

TERMINAL	CONNECTION
1,2	sensor T1 - cooling source (outside air)
3,4	sensor T2 - ambient
11	N -
12	L -
13	N - neutral ventilator
14	L - phaze - ventilator 1(1)A, 250V ~, 50Hz
15	L - phaze mains 230V ~, 50Hz
16	N - neutral mains 230V ~, 50Hz

DIFFERENTIAL THERMOSTAT

DTC 200

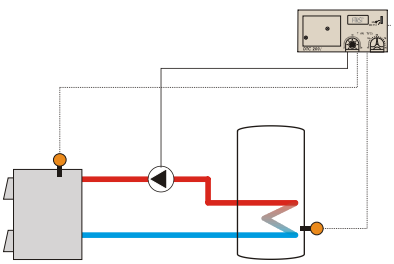
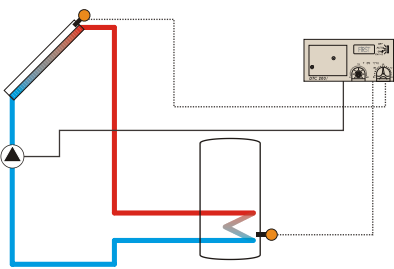


DTC 200/ is double differential thermostat. It is designed for heating of domestic water from one or two sources (solar collectors, boilers of central heating system).

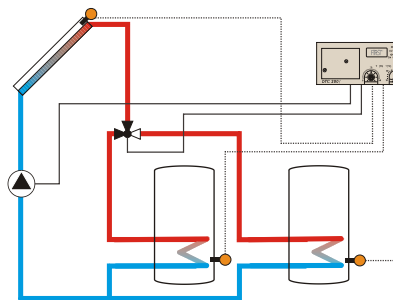
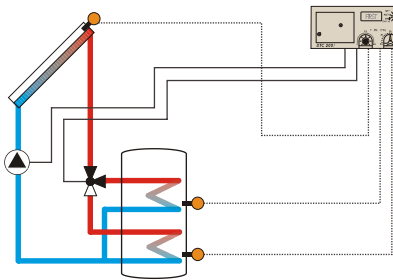
Main advantages are: simple handling, reliable operation, compact and convenient version and low price for its quality class.

Applications for heating domestic hot water tank from collectors or boiler:

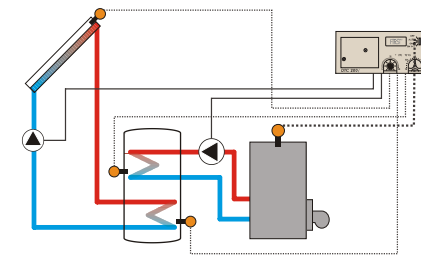
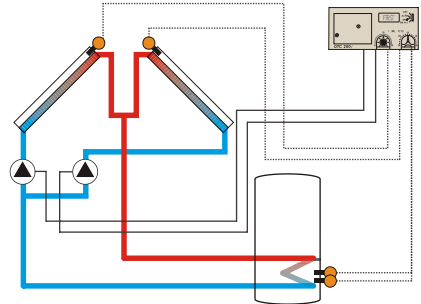
DTC 200/2 (2 sensors)



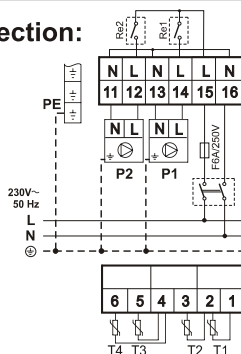
DTC 200/3 (3 sensors)



DTC 200/4 (4 sensors)



Electrical connection:



Technical Data

Working regimes:	controls two heating circuit
Supply voltage:	230VAC, 50Hz
Power consumption:	4 VA
No. of sensors:	4 (KTY10)
No. of outputs:	2 (230VAC, 1(1)A max.), SPST
Hysteresis of thermostat:	1K - 2K
Temperature setting:	10°C..90°C
Temperature difference setting:	0K - 15K
Installation:	wall (on hot water tank)

DTC 200

DTC 200 is a double differential thermostat used for domestic hot water heating.



DEAR CUSTOMER

You have bought a DTC 200/2G differential thermostat, manufactured according to the latest quality and safety standards. It is designed in compliance with strict criteria and requirements of West European markets and enables efficient use of solar energy which enables considerable savings of other sources for domestic water heating. It was tested at TUV institute in München.

Our products are available in the markets for several years and satisfy the needs of demanding customers from hot Greece to north Germany.

We are convinced that the use of our product will satisfy your needs too and help you save your money.

Thanks for your confidence !

FIRST

USER'S MANUAL

This manual is for user. It describes the operation of differential thermostat and it's correct use. Before setting the parameters be sure in which way of use is used. Carefully read the instructions to make good use of the product.

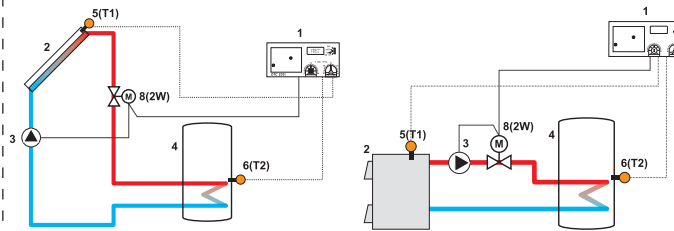
We reserve the right to modify the instructions and the technical data of the product without prior notice.

GENERALLY

WITH DIFFERENTIAL THERMOSTAT THERE ARE THREE POSSIBLE WAYS OF USE:

SYSTEM 1 (two sensors)

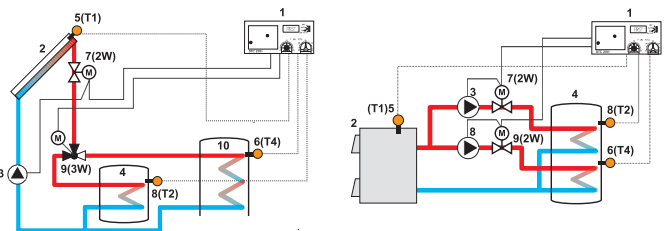
Heating the domestic hot water from one heating source (solar collectors, boilers, heat pump...).



SYSTEM 2 (three sensors)

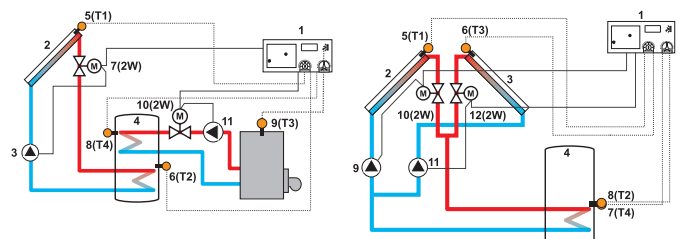
Heating the domestic hot water from one heating source (solar collectors, boilers, heat pump...) in:

- two water tank
- one hot water tank with two exchanger
- water tank and swimming pool



SYSTEM 3 (four sensors)

Heating the domestic hot water from two heating sources (collector, boiler, ...) in one water tank.



DTC 200/ (2 sensors)

1. Heating the domestic hot water from one heating source (solar collectors, boilers, heat pump...).

1.1 Basic

Differential thermostat controls the electric motor actuated ball valve (EMV 110..) and the circulation pump.

The thermostat enables setting two parameters:

1. Regulation of maximum temperature in hot water tank from 10° to 90°C.

This temperature is defined by T2 sensor witch is generally mounted in upper third of heat exchanger.

2. Regulation of difference for exchanger from 0K to 15K.

With these regulation you define how much the value of the source temperature (collector, boiler,...) should exceed the temperature of water around the exchanger in hot water tank, that the thermostat opens the valve and activates the pump.

The difference is set in relation to the volume of heat losses of the system which depend on lengths of pipelines from source to hot water tank and on pipeline insulation.

1.2 Operation

DTC 200 works as single differential thermostat, which measures the temperature of heating source (collectors, boiler, ...) and in user (hot water tank).

Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank). Consequently minimum difference should be 3K-5K. Recommended minimal value is 5K.

When the temperature of the source exceeds the temperature around the user for pre-set difference opens the electric motor actuated ball valve and switches the pump.

The thermostat switches off the pump if pre-set temperature is reached in hot water tank (adjustable from 10° to 90°C).

2DTC 200 (3 sensors)

2. Heating the domestic hot water from one heating source (solar collectors, boilers, heat pump...) in two water tanks - DTC 200/ (3 sensors).

2.1 Basic

In this case of use is DTC200 in function of double differential thermostat. It is used for heating the domestic hot water in two water tanks from one heating source. This is convenient in cases when one water tank cannot accumulate whole energy from solar collectors. At weakly sunny days is assured enough heated water. Differential thermostat controls circulation pump and changeover motor valve for diverting or two motorised ball valves and two pumps for each water tank.

The thermostat enables setting two parameters:

1. Regulation of maximum temperature in hot water tanks from 10° to 90°C.

This temperature is defined by T2 and T4 sensors witch are generally mounted in upper third of heat exchangers.

2. Regulation of temperature difference between heating source (T1) and exchanger (T2) from 0K to 15K.

With these regulation you define how much the value of the source temperature (collector, boiler,...) should exceed the temperature of water around the exchanger in hot water tank, that the thermostat opens the valve and activates the pump.

The difference is set in relation to the volume of heat losses of the system which depend on lengths of pipelines from source to hot water tank and on pipeline insulation.

2.2 Operation

DTC 200 double differential thermostat measures the temperature of heating source (collectors, boiler, ...) and in two users (hot water tank).

One of users has priority. Usually is smaller water tank or upper exchanger.

When the temperature is achieved, differential thermostat changeover heating to second user - second water tank, lower exchanger, swimming pool ...

Differential makes changeover also in following cases:

1. Temperature of water in first water tank is achieved
2. Temperature of water in second water tank is lower than preset temperature

When the temperature in both water tanks is achieved, the pump is switch off.

The thermostat switches off the pump if pre-set temperature is reached in both hot water tanks (adjustable from 10° to 90°C).

For this way of use you need three sensors (T1, T2 and T4). One is mounted in solar collector other two in upper third of individual exchangers in hot water tanks.

Sensors T1 and T2 are designed for controlling first heating circuit, which heats water in smaller water tank.

Sensors T1 and T4 are designed for controlling secondary heating circuit, which heats water in larger water tank or swimming pool.

Sensor T1 is collector's sensor.

DTC 200 (4 sensors)

3. Heating the domestic hot water from two heating sources (solar collectors, boilers, heat pump...) in one water tank - DTC 200 (4 sensors).

In this case of use is DTC200 in function of double differential thermostat. It is used for heating the domestic hot water in one water tanks from two heating sources (collector-boiler or collectors east-west). Differential thermostat controls motorised ball valves and pump for each heating circuit.

3.1 Basics

The thermostat enables setting two parameters:

1. Regulation of maximum temperature in hot water tanks from 10° to 90°C.

This temperature is defined by T2 and T4 sensors.

2. Regulation of temperature difference between primary heating source (T1) and exchanger (T2) from 0K to 15K.

3. Regulation of temperature difference between secondary heating source (T3) and exchanger (T4) from 0K to 15K.

With these regulations you define how much the value of the source temperature (collector, boiler...) should exceed the temperature of water around the exchanger in hot water tank, that the thermostat opens the valve and activates the pump.

The difference is set in relation to the volume of heat losses of the system that depend on lengths of pipelines from source to hot water tank and on pipeline insulation.

3.2 Operation

DTC 200 is double differential thermostat measures the temperature of two heating sources (collectors, boilers,...) and of two spots in user (hot water tank). Heating effect is provided, when heating unit(heating element in hot water tank) exceeds the temperature of the user for set difference.

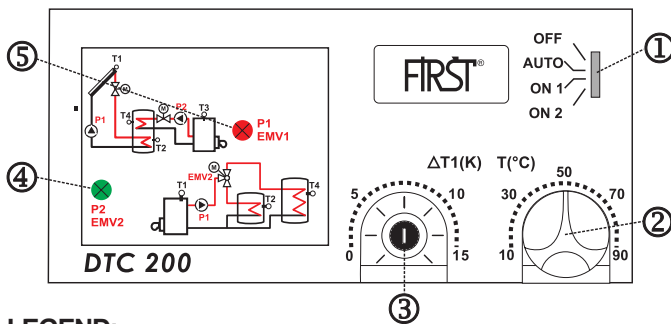
When the temperature of the source exceeds the temperature around the exchanger for set difference, the thermostat opens the valve (EMV110..) and activates the pump.

Thermostat closes the valve and switch of pump, when temperature difference is lower than pre-set value. Thermostat also switches off a pump if pre-set temperature is reached in hot water tank.

When pump operates for primary heating circuit (collectors), operation of after-heating circuit is prevented. This assures maximum energy savings during seasons and this also the main role of solar systems.

For those applications you need four sensors. Two of them are mounted into individual heating sources and two into upper half of individual exchangers in hot water tank. T1 and T2 are designed for primary (main) heating circuit which heats entire quantity of water in hot water tank (lower exchanger), where T1 is a sensor of heating source (generally collectors) and T2 is a sensor in lower part of hot water tank. T3 and T4 are designed for additional, i.e. after-heating circuit which additionally heats water in hot water tank (upper exchanger). T3 is a sensor of heating source (generally boiler) and T4 is a sensor in upper part of hot water tank.

CONTROL PANEL:

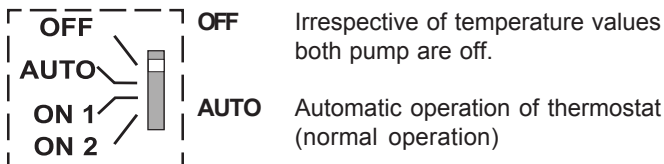


LEGEND:

1. Selector switch for choosing the operation
2. Knob for setting temperature in DHWT (domestic hot water tank)
3. Knob for setting temperature difference of heating source (collectors, boiler, ...) and in user (hot water tank).
4. LED indicator for pump of secondary heating circuit
5. LED indicator for pump of primary heating circuit

USE OF SELECTOR SWITCH:

With selector switch (1) you select one of the following modes of operation:



ON 1 Irrespective of temperature values the pump of primary (collector) circuit is on. This mode is designed for testing purposes, servicing and in case of troubles.

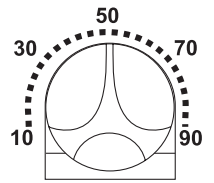
ON 2 Irrespective of temperature values the pump of secondary (boiler) circuit is on. This mode is designed for testing purposes, servicing and in case of troubles.

⚠ Mode OFF doesn't enable galvanic separation from mains. When replacing the pump, disconnect supply voltage!

Temperature setting of domestic hot water tank

Temperature setting of hot water tank

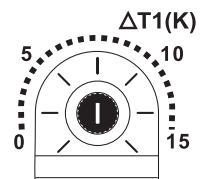
With knob (2) you can set max. temperature in water tank between 10°C and 90°C. When the temperature is reached, thermostat deactivates pump and closes motorized ball valve regardless the temperature of heating source.



If hot water is used by the appliance with limited max. temperature of inflow, this setting is very useful.

Difference setting of primary heating circuit (ΔT1)

With knob (3) you can set temperature difference of heating source (collectors, boiler, ...) and in user (hot water tank) between 0K and 15K.



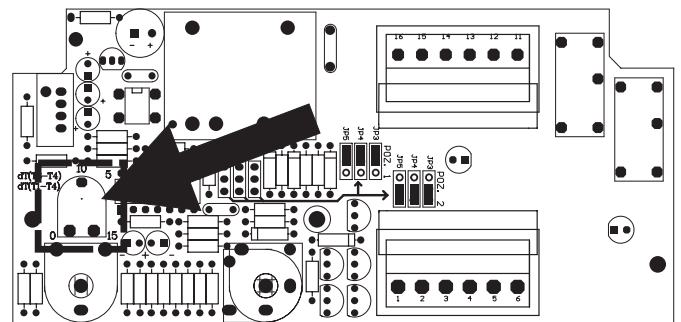
Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank).

Consequently minimum difference should be 3K-5K.

The difference is set in relation to the volume of heat losses of the system which depend on lengths of pipes from source to the water tank and on pipeline insulation.

Difference setting of secondary heating circuit (ΔT2)

With trimmer on electronic circuit you can set temperature difference of secondary heating source (boiler, ...) and in user (hot water tank) between 0K and 15K.



Trouble shooting guide

TROUBLE	POSSIBLE FAILURE	REMEDY
The pumps are not operating irrespective of temperature	- Power supply is not connected	- Check power supply
	- Selector switch is in position OFF	- Set the selector switch in position AUTO
	- DHWT sensors T2 or T4 are disconnected	- Check sensor
	- Collector sensor T1 or T3 are short circuited	- Check sensor
The pumps are operating permanently irrespective of temperature	- Selector switch is in position ON1 or ON2	- Set the selector switch in position AUTO
	- Collector sensor T1 or T3 are disconnected	- Check sensor
	- DHWT sensor T2 or T4 are short circuited	- Check sensor
Temperature regulation of DHW tank is not working	- Motorised ball valve is permanently open or nonreturn valve is open (thermosiphon water circulation is enabled)	- Check the installation
In spite of enough collector's energy the water temperature in DHWT is not high enough – water is too cold	- Setting of DHWT temperature is too low - The difference setting is set to high	- Check settings
The temperature is reached, but the heating/cooling is still running	- Jumpers are not set correctly	- Check jumper's settings
In AUTO position nothing happens	- Jumpers are pulled out	- Set jumpers in suitable position

Advantages of motor actuated ball valves of EMV110..series with incorporated relay module for solar heating systems

In solar heating systems motor actuated ball valves can prevent various inconveniences.

- o Effectively prevent hydraulic shocks in systems as they require 30 seconds for complete opening.
- o Due to their shape they do not impede the flow.
- o Springs are not included, therefore noise does not appear.
- o When closed, 100% sealing is guaranteed.
- o They have an output for pump up to 100 W in open position, therefore they do not present a hydraulic load for pump in closed position. They enable pump switching on only in completely open position.
- o Due to installed RELAY module they enable control with make contact only.
- o If during closing or opening process impurities enter in valve, which could block it, the valve stops and immediately afterwards continues with opening or closing process in opposite direction, so that water flow can rinse the impurities up to cleaning net (anti-blocking system).
- o Possibility of manual control. This function relieves airing the system or filling the system with water.
- o It prevents coaxial cooling of DHWT by one pipe in night-time.

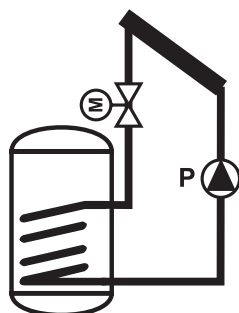
EMV 110 602/4230



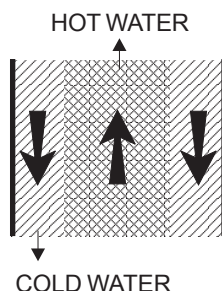
EMV 110 502/7930



EMV 110 316/8910



For preventing coaxial cooling in night-time it is necessary to build in motorised ball valve EMV 110... in heating pipe of DHW tank exchanger.



In night-time the temperature of water in DHWT is usually higher than in collector. In this case it is possible coaxial cooling of the DHWT through one pipe. If the pipe has enough diameters and it is straight and vertical, then water circulation begins in just one pipe. In the middle, water goes upwards, and at the edges downwards.

One solution for this is to build in nonreturn valve. But with its use is increased the load of pump, the flow reduced, and the ventilation of the system hindered.

All these problems are solved by the motorised ball valve series EMV 110 ...



DTC 200

DTC 200 is a double differential thermostat used for domestic hot water heating.



WITH DIFFERENTIAL THERMOSTAT ARE THREE POSSIBLE WAY OF USE:

SYSTEM 1 (two sensors)

Heating the domestic hot water from one heating source (solar collectors, boilers, heat pump...) with controlling the heating source (burner).

SYSTEM 2 (three sensors)

Heating the domestic hot water from one heating source (solar collectors, boilers, heat pump...) in:

- two water tank
- one hot water tank with two exchanger
- water tank and swimming pool

SYSTEM 3 (four sensors)

Heating the domestic hot water from two heating sources (collector, boiler, ...) in one water tank.

INDEX:

Technical data	2
Testing sensors	
Mounting the thermostat	
Cables connection	
Choosing the working regime.....	3
Sensors installation	
1. DTC 200 (2 sensors)	4
1.1 Basics	
1.2 Operation	
1.3 Electrical connection	
1.4 Examples of use	
2. DTC 200 (3 sensors)	5
2.1 Basics	
2.2 Operation	
2.3 Electrical connection	
2.4 Examples of useji	
3. DTC 200 (4 tipala)	7
3.1 Basics	
3.2 Operation	
3.3 Electrical connection	
3.4 Examples of use	

WARNING!

Installation instructions are meant for specialist. All examples listed in the instructions are merely indicative. The manufacturer accepts no responsibility for incorrect hydraulic connection of machine parts of installations should comply with all safety regulations defined by law and the rules. Carefully read the instructions to make good use of the product.

INFORMATION FOR ORDER:

	CODE
DTC200/4	13020
The set consists of: Differential thermostat DTC 200, 2 x sensor BSF1, 2 x sensor KF, 2 x mounting kit, installation instructions and instruction for use	
DTC200	13018
The set consist of: Differential thermostat DTC 200, installation instructions and instruction for use	
Sensor BSF1	27072
KTY 10-6 PVC (1,5m), max 70°C	
Sensor KF	27073
KTY 10-6 SILICON (2m), max 180°C	
Mounting kit	27089
Tube TV2	27080
(1/2", l=100mm, inner diameter 14mm)	

We reserve the right to modify the instructions and the technical data of the product without prior notice.

P7-3703-08-DTC200-english-montaza

Technical data: DTC 200**Dimensions:** 80x150x42 mm**Weight:** 0,43 kg**Protection degree:** IP 40/ DIN 40050**Heat class:** B**Type of thermostat:** P**Range of measuring temperature:** -40°C ... +120°C**Limitation of temperature (depends of working regime):**

Tmax: 10°C ... 90°C

Temperature difference setting for primary heating circuit:

0K ... 15K

Temperature difference setting for secondary heating circuit:

0K ... 15K

Hysteresis of thermostat: 1K-2K**Temperature of ambient:** 0°C ... 40°C**Outputs:** 2 relay outputs: 230V, 50Hz, 1(1)A, Working contact SPST :

- controlling the electric motor actuated ball valve and pump

Inputs: 4 - sensors

- BSF1- PVC cable (1,5m long) - DHWT sensor

- KF - silicon cable (2m long) - collector's and boiler's sensors

Supply voltage: 230V , 50Hz**Power consumption:** 4VA**Humidity:** 5% - 70% (without condense)**Storage temperature:** 0°C-70°C**For housing is used material with resistance PTI=175>250****Mounting:** on the wall**Recommendable cables:**

sensors cables: J-Y (St) 1X 2X0,6

pump or electric motors ball valve's cables: H03VV-F 3x0,75

SENSORS TESTING:

For testing purposes of working of differential thermostat sensors are simulated with resistors. Values of the resistors are stated in the following table:

Temp. (°C)	R _T (Ω)	Temp. (°C)	R _T (Ω)	Temp. (°C)	R _T (Ω)
-50	1040,51	-5	1578,51	40	2229,63
-45	1094,70	0	1645,27	45	2308,96
-40	1150,29	5	1713,43	50	2389,69
-35	1207,27	10	1782,98	55	2471,81
-30	1265,65	15	1863,93	60	2555,33
-25	1325,43	20	1926,28	65	2640,24
-20	1386,61	25	2000,02	70	2726,56
-15	1449,18	30	2075,16	75	2814,26
-10	1513,14	35	2151,70	80	2903,37

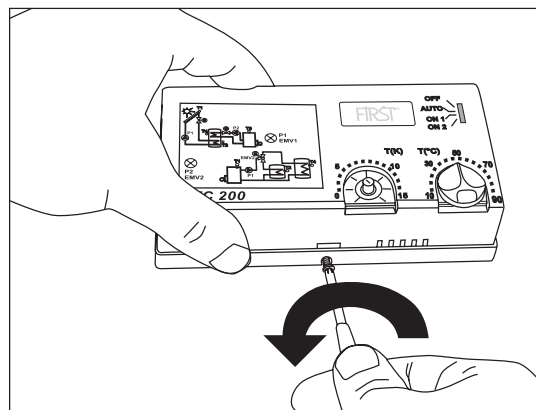
Temp. (°C)	R _T (Ω)
85	2993,87
90	3085,77
95	3179,07
100	3273,76
105	3369,85
110	3467,33
115	3566,21
120	3666,49
125	3768,16

Do nepravilnega delovanja termostata pride v primerih, ko pride kratkega stika ali prekinitve kabla tipal (glej tabelo možnih okvar v navodilih za uporabnika).

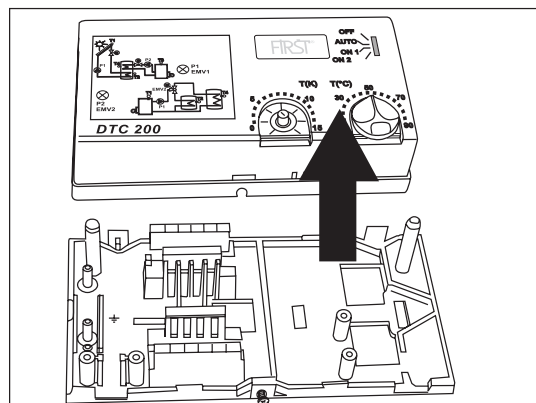
SENSOR DIMENSIONS:

l=1,5m sensor BSF1, PVC, (grey cable) - DHWT

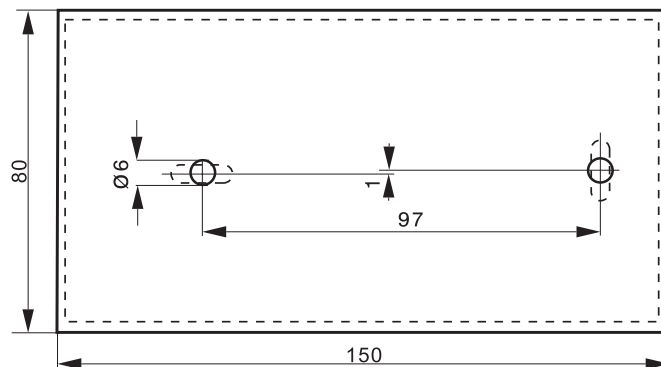
l=2m sensor KF, silicon (red cable) - collector, boiler

INSTALLATION OF THERMOSTAT

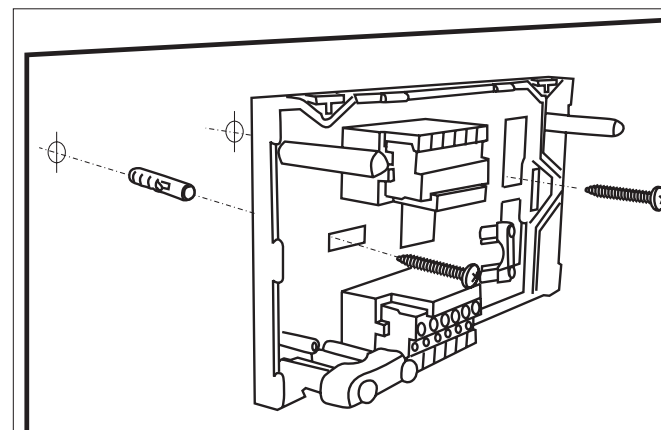
1.) Unscrew the screw from bottom part of thermostat's housing.



2.) Remove the thermostat's cover.

Installation of housing bottom on the wall

With the printable template on the packaging drill two holes (Ø6mm) on the wall.

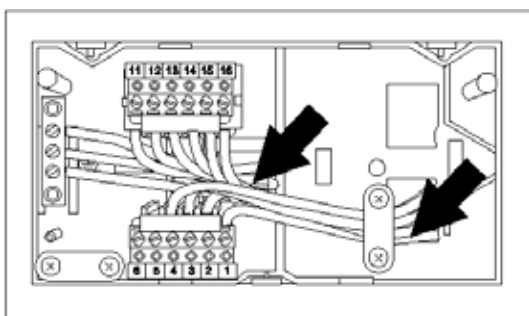


Put the enclosed two wall inserts into drilled holes (Ø6mm) and with two screws mount the housing bottom on the wall. Do not mount the thermostat under water dropping.

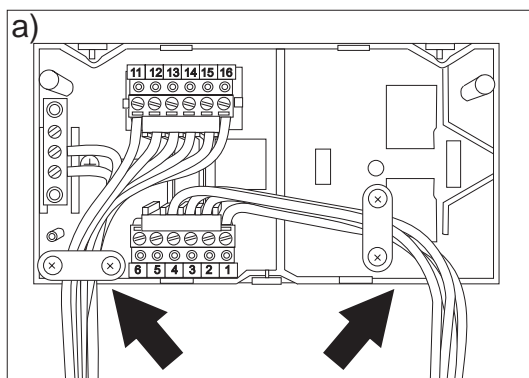
ELECTRICAL CABLES CONNECTION

1. Flush mounted connection

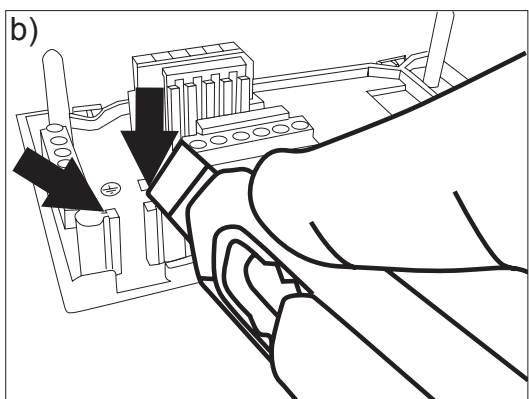
Cables in the wall case lead through the holes at the bottom of thermostat.



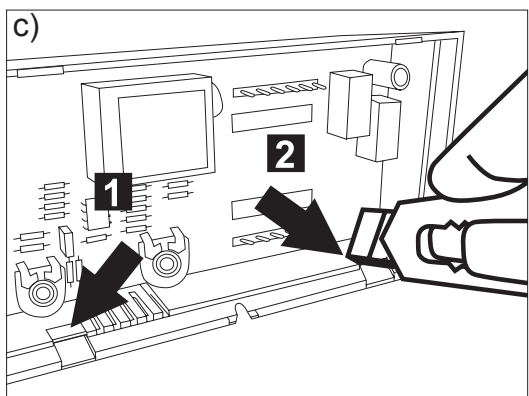
2. On-wall connection



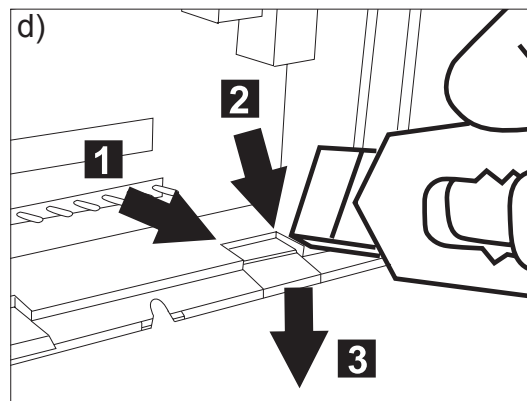
a) Lead cables into the thermostat housing like as shown on the picture. On one side lead the sensor cables and on the other the rest. With two discharger screw the cables very tight to prevent the extraction.



b) If it's not enough space for cables, use the knife and widen the lead.



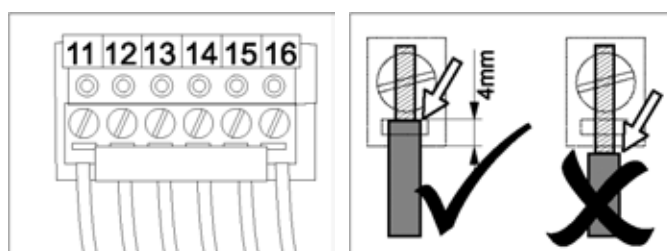
c) Cut the holes for cables lead on the housing cover



d) Use the knife and cut on spots 1 and 2 and brake remain.

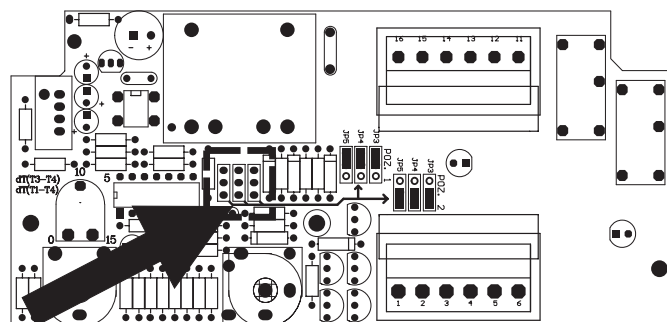
ELECTRICAL CONNECTION:

Before each interventions in the thermostat first disconnect the main power!



Non-isolated part of the conductor must be in the terminal housing!

CHOOSING WORKING REGIME

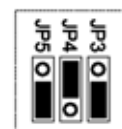


Choosing working regime

Before first of use, the working regime must be selected. It is set by jumpers in the electronic circuit. - For each application is specific jumper position.

In further by every example is stated jumper's position.

for example:



Possible jumper's settings:

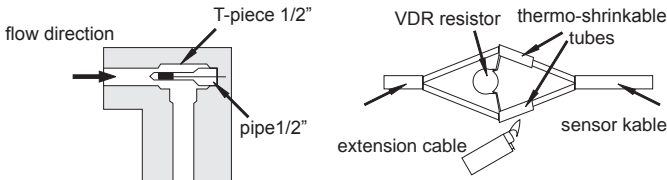
Jp3	Jp4	Jp5	DTC 200 - 2 sensors one heating circuit	Jp3	Jp4	Jp5	DTC 200/4 - 4 sensors two heating circuits without temperature limitation of collector's circuit
Jp3	Jp4	Jp5	DTC 200 - 3 sensors two pumps	Jp3	Jp4	Jp5	DTC 200/4 - 4 sensors two heating circuits with temperature limitation of collector's circuit
Jp3	Jp4	Jp5	DTC 200 - 3 sensors motor diverter valve and pump	Jp3	Jp4	Jp5	DTC 200/4 - 4 sensors two heating circuits collectors east-west

SENSORS INSTALLATION

T1 AND T3 SENSORS INSTALLATION IN TO SOLAR COLLECTOR OR BOILER:

⚠ **Use KF sensors with silicon cable insulation (RED colour)!**

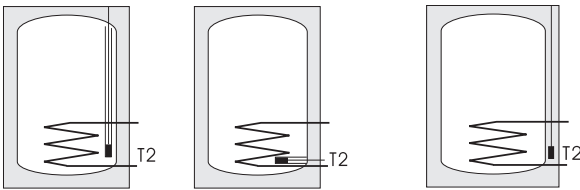
Install it as immersion sensor in collecting pipe at the top of the collectors or boiler in provided sleeve. Connect sensors on the terminals 1 and 2. Use sensors KF with red silicon cable and use cable type J-Y (St) 1X 2X0,6 for connection. For cables longer than 15m we recommend over-voltage protection with VDR resistor. For over voltage protection is recommended use of armoured cable and it must be earthed.



T2 AND T4 SENSORS INSTALLATION IN DOMESTIC HOT WATER TANK (DHWT):

⚠ **Use BSF1 sensors with PVC cable insulation (GRAY colour)!**

Install T2 sensor to provided place in hot water tank or on hot water tank wall under isolation as contact sensor in lower part of exchanger. When sensor is mounted as contact one we recommend to coat it with heat conducting paste or liquid metal. Use sensors BSF1 with PVC cable.



In special purpose vertical or horizontal tube (sensor should be protected against accidental extraction).

On hot water tank with clip, wire and spring strip (use paste for better heat transmission).

WARNING!

At mounting protect sensors against ambient influence and assure suitable mechanical protection.

DTC 200/ (2 sensors)

1. Heating the domestic hot water from one heating source (solar collectors, boilers, heat pump...).

1.1 Basic

Differential thermostat controls the electric motor actuated ball valve (EMV 110..) and the circulation pump.

The thermostat enables setting of two parameters:

1. Regulation of maximum temperature in hot water tank from 10° to 90°C.

This temperature is defined by T2 sensor witch is generally mounted in upper third of heat exchanger.

2. Regulation of difference for exchanger from 0K to 15K.

With these regulation you define how much the value of the source temperature (collector, boiler,...) should exceed the temperature of water around the exchanger in hot water tank, that the thermostat opens the valve and activates the pump.

The difference is set in relation to the volume of heat losses of the system which depend on lengths of pipelines from source to hot water tank and on pipeline insulation.

1.2 Operation

DTC 200 works as single differential thermostat, which measures the temperature of heating source (collectors, boiler, ...) and in user (hot water tank).

Heating effect is provided, when heating source temperature is higher than the temperature of the user (water in hot water tank). Consequently minimum difference should be 3K-5K. Recommended minimal value is 5K.

When the temperature of the source exceeds the temperature around the user for pre-set difference opens the electric motor actuated ball valve and switches the pump.

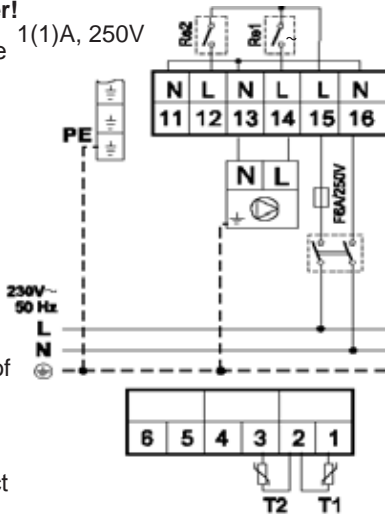
The thermostat switches off the pump if pre-set temperature is reached in hot water tank (adjustable from 10° to 90°C).

ELECTRIC CONNECTION

⚠ **Before each intervention in the thermostat first disconnect the main power!**

Grounding wires should be connected to special terminal pins situated on left side of terminal strips.

⚠ The thermostat is designed for fixed installation. When performing electric installation, an element should be inserted which enables at least 3 mm separation of thermostat from the mains (switch or socket). Prior to each intervention in the thermostat, first disconnect it from the mains.

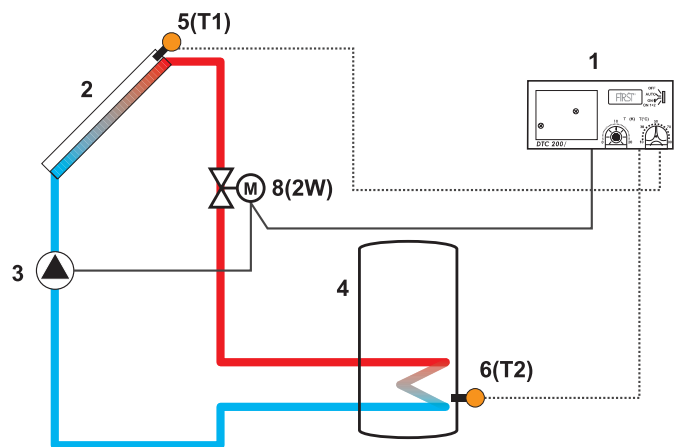


TERMINAL	CONNECTION
1,2	sensor T1 - primary heating source (collector, boiler...)
2,3	sensor T2 - hot water tank
11	N - not in use
12	L - not in use
13	N - neutral
14	L - phaze -pump 1(1)A, 250V~, 50Hz
15	L - phase mains 230V~, 50Hz
16	N - neutral mains 230V~, 50Hz

1.5 EXAMPLES OF USE

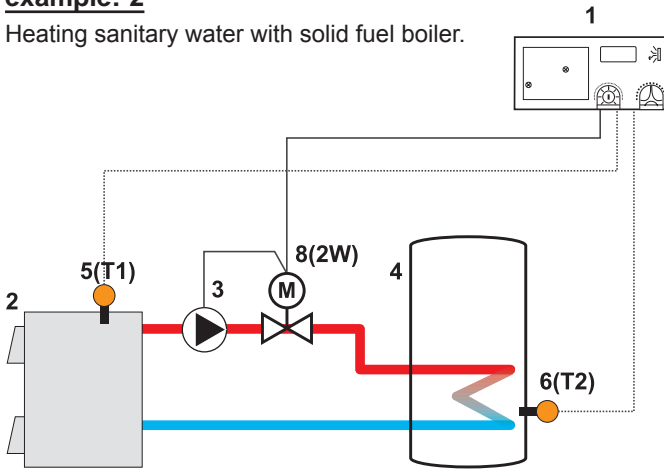
example: 1

Heating sanitary water with solar collectors.

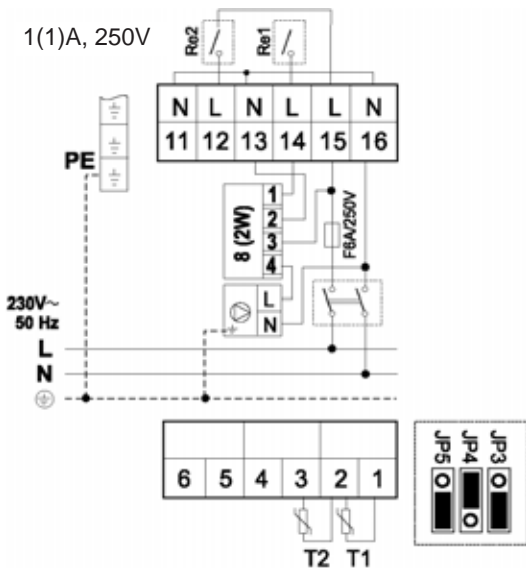


example: 2

Heating sanitary water with solid fuel boiler.



Electric connection for examples 1 and 2



8 (2W) - Electric motor actuated ball valve
EMV 110..series 602, 502

DTC 200 (3 sensors)

2. Heating the domestic hot water from one heating source (solar collectors, boilers, heat pump...) in two water tanks - DTC 200/ (3 sensors).

2.1 Basic

In this case of use is DTC200 in function of double differential thermostat. It is used for heating the domestic hot water in two water tanks from one heating source. This is convenient in cases when one water tank cannot accumulate whole energy from solar collectors. At weakly sunny days is assured enough heated water. Differential thermostat controls circulation pump and changeover motor valve for diverting or two motorised ball valves and two pumps for each water tank.

The thermostat enables setting two parameters:

1. Regulation of maximum temperature in hot water tanks from 10° to 90°C.

This temperature is defined by T2 and T4 sensors witch are generally mounted in upper third of heat exchangers.

2. Regulation of temperature difference between heating source (T1) and exchanger (T2) from 0K to 15K.

With these regulation you define how much the value of the source temperature (collector, boiler,...) should exceed the temperature of water around the exchanger in hot water tank, that

the thermostat opens the valve and activates the pump. The difference is set in relation to the volume of heat losses of the system which depend on lengths of pipelines from source to hot water tank and on pipeline insulation.

2.2 Operation

DTC 200 double differential thermostat measures the temperature of heating source (collectors, boiler, ...) and in two users (hot water tank).

One of users has priority. Usually is smaller water tank or upper exchanger.

When the temperature is achieved, differential thermostat changeover heating to second user - second water tank, lower exchanger, swimming pool ...

Differential makes changeover also in following cases:

1. Temperature of water in first water tank is achieved
2. Temperature of water in second water tank is lower than preset temperature

When the temperature in both water tanks is achieved, the pump is switch off.

The thermostat switches off the pump if pre-set temperature is reached in both hot water tanks (adjustable from 10° to 90°C).

For this way of use you need three sensors (T1, T2 and T4). One is mounted in solar collector other two in upper third of individual exchangers in hot water tanks.

Sensors T1 and T2 are designed for controlling first heating circuit, which heats water in smaller water tank.

Sensors T1 and T4 are designed for controlling secondary heating circuit, which heats water in larger water tank or swimming pool.

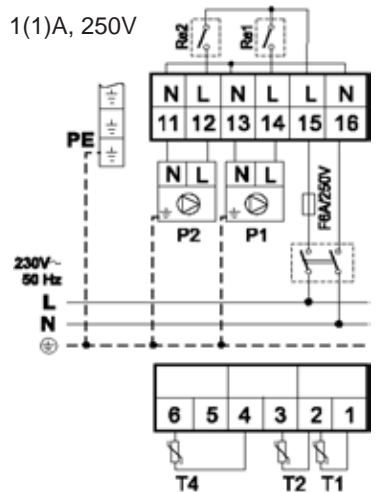
Sensor T1 is collector's sensor.

ELECTRIC CONNECTION

⚠ Before each intervention in the thermostat first disconnect the main power!

Grounding wires should be 1(1)A, 250V connected to special terminal pins situated on left side of terminal strips.

⚠ The thermostat is designed for fixed installation. When performing electric installation, an element should be inserted which enables at least 3 mm separation of thermostat from the mains (switch or socket). Prior to each intervention in the thermostat, first disconnect it from the mains.

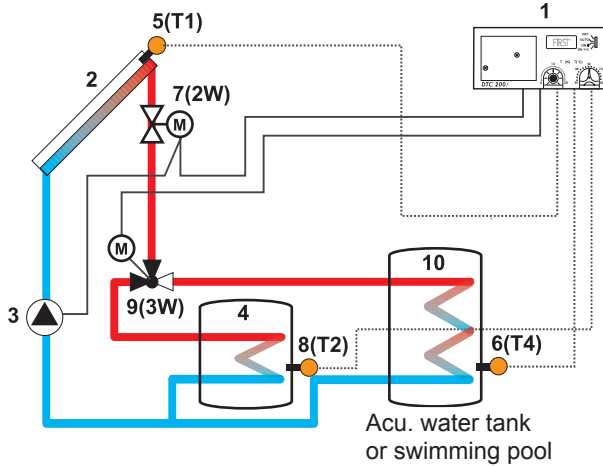


TERMINAL	CONNECTION
1,2	sensor T1 - primary heating source (collector, boiler...)
2,3	sensor T2 - hot water tank
4,6	sensor T4 - secondary hot water tank
11	N - neutral
12	L - phase - pump for secondary circuit 1(1)A, 250V ~, 50Hz 1(1)A
13	N - neutral
14	L - phase -pump for primary circuit 1(1)A, 250V ~, 50Hz 1(1)A
15	L - phase mains 230V ~, 50Hz
16	N - neutral mains 230V ~, 50Hz

2.4 EXAMPLES OF USE

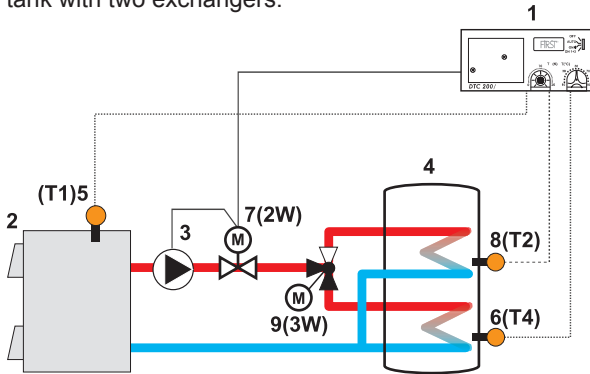
example: 3

Heating sanitary water with solar collectors into two hot water tanks.

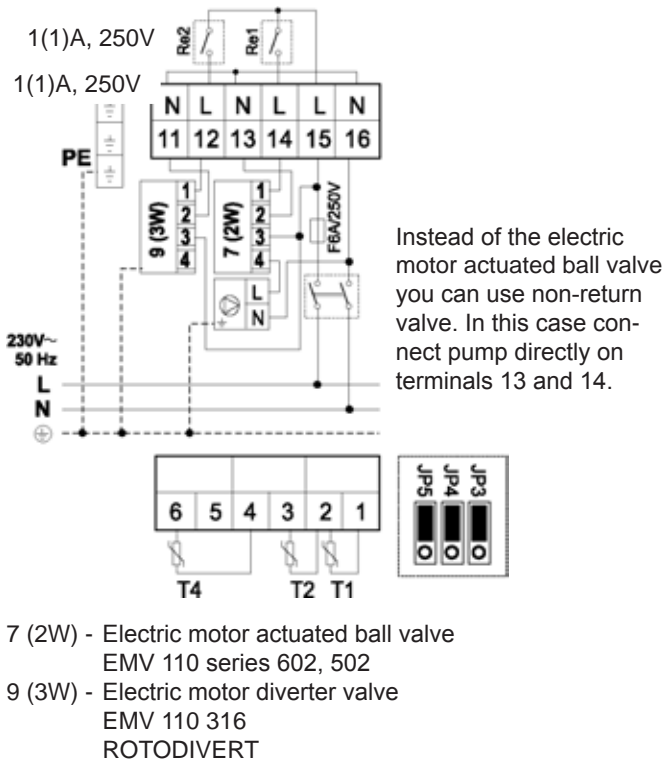


example: 4

Heating sanitary water with solid fuel boiler into one hot water tank with two exchangers.

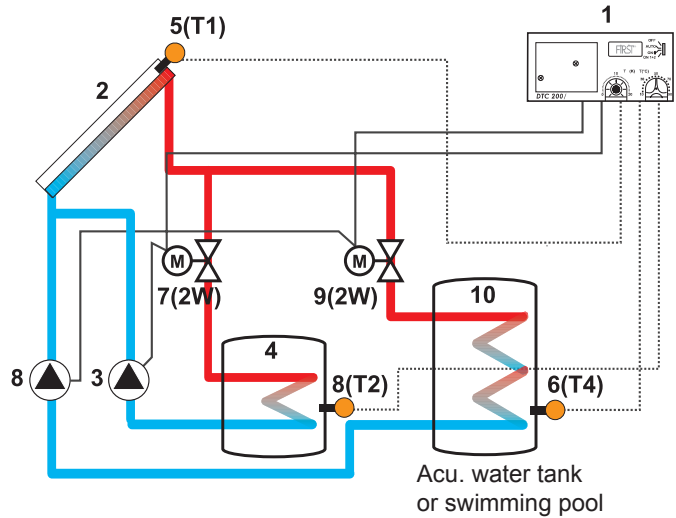


Electric connection for examples 3 and 4



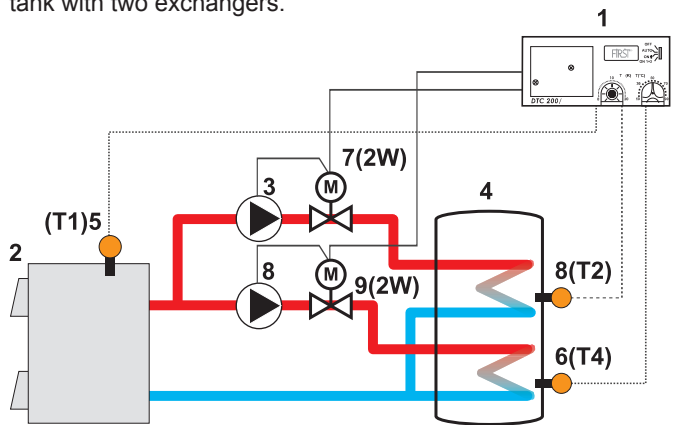
Example 5

Heating hot water in two water tanks with solar collectors.

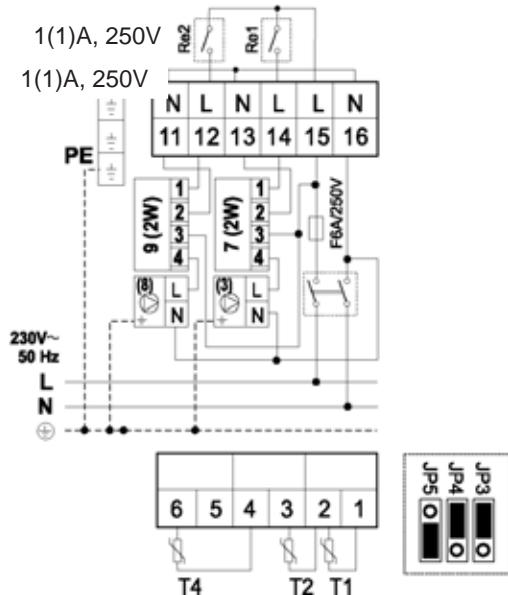


Example 6

Heating sanitary water with solid fuel boiler into one hot water tank with two exchangers.



Electric connection for examples 5 and 6



- 7 (2W) - Electric motor actuated ball valve
EMV 110 series 602, 502
- 9 (2W) - Electric motor actuated ball valve
EMV 110 series 602, 502

Instead of the electric motor actuated ball valves 7 and 9 you can use non-return valves. In this case connect pumps directly on terminals 11-12 and 13-14.

DTC 200 (4 sensors)

3. Heating the domestic hot water from two heating sources (solar collectors, boilers, heat pump...) in one water tank - DTC 200 (4 sensors).

In this case of use is DTC200 in function of double differential thermostat. It is used for heating the domestic hot water in one water tanks from two heating sources (collector-boiler or collectors east-west). Differential thermostat controls motorised ball valves and pump for each heating circuit.

3.1 Basics

The thermostat enables setting two parameters:

1. Regulation of maximum temperature in hot water tanks from 10° to 90°C.

This temperature is defined by T2 and T4 sensors witch are generally mounted in upper third of heat exchangers.

2. Regulation of temperature difference between primary heating source (T1) and exchanger (T2) from 0K to 15K.

3. Regulation of temperature difference between secondary heating source (T3) and exchanger (T4) from 0K to 15K.

With these regulations you define how much the value of the source temperature (collector, boiler...) should exceed the temperature of water around the exchanger in hot water tank, that the thermostat opens the valve and activates the pump.

The difference is set in relation to the volume of heat losses of the system that depend on lengths of pipelines from source to hot water tank and on pipeline insulation.

3.2 Operation

DTC 200 is double differential thermostat measures the temperature of two heating sources (collectors, boilers,...) and of two spots in user (hot water tank). Heating effect is provided, when heating unit(heating element in hot water tank) exceeds the temperature of the user for set difference.

When the temperature of the source exceeds the temperature around the exchanger for set difference, the thermostat opens the valve (EMV110..) and activates the pump.

Thermostat closes the valve and switch of pump, when temperature difference is lower than pre-set value. Thermostat also switches off a pump if pre-set temperature is reached in hot water tank.

When pump operates for primary heating circuit (collectors), operation of after-heating circuit is prevented. This assures maximum energy savings during seasons and this also the main role of solar systems.

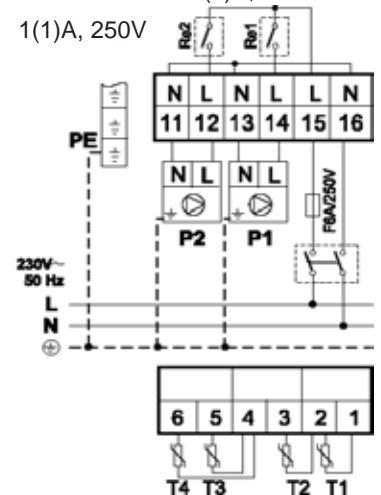
For those applications you need four sensors. Two of them are mounted into individual heating sources and two into upper half of individual exchangers in hot water tank. T1 and T2 are designed for primary (main) heating circuit which heats entire quantity of water in hot water tank (lower exchanger), where T1 is a sensor of heating source (generally collectors) and T2 is a sensor in lower part of hot water tank. T3 and T4 are designed for additional, i.e. after-heating circuit which additionally heats water in hot water tank (upper exchanger). T3 is a sensor of heating source (generally boiler) and T4 is a sensor in upper part of hot water tank.

3.3 ELECTRIC CONNECTION

⚠ Before each intervention in the thermostat first disconnect the main power!

Grounding wires should be connected to special terminal pins situated on left side of terminal strips.

⚠ The thermostat is designed for fixed installation. When performing electric installation, an element should be inserted which enables at least 3 mm separation of thermostat from the mains (switch or socket). Prior to each intervention in the thermostat, first disconnect it from the mains.

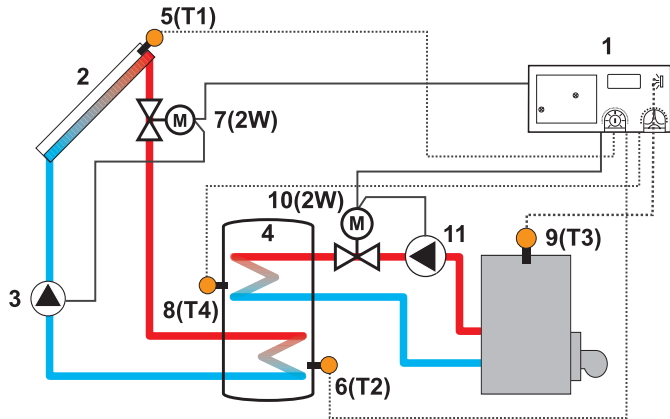


TERMINAL	CONNECTION
1,2	sensor T1 - primary heating source (collector, solid fuel boiler...)
2,3	sensor T2 - hot water tank
4,5	sensor T3 - secondary heating source (boiler...)
4,6	sensor T4 - secondary hot water tank
11	N - neutral
12	L - phase - pump for primary circuit 1(1)A, 250V ~, 50Hz
13	N - neutral
14	L - phase - pump for secondary circuit 1(1)A, 250V ~, 50Hz
15	L - phase mains 230V ~, 50Hz
16	N - neutral mains 230V ~, 50Hz

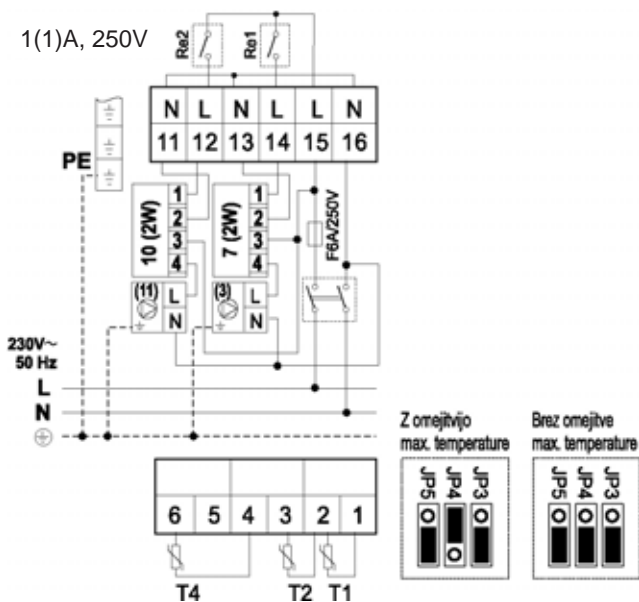
3.4 Examples of use

example 7

Heating sanitary water in one water tank with two exchangers with solar collectors and boiler.



Electric connection:

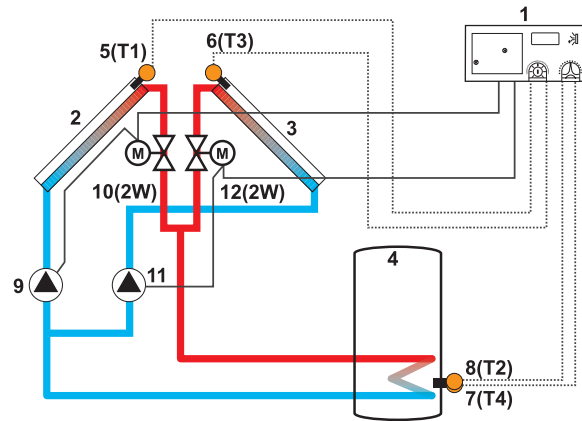


- 7 (2W) - Electric motor actuated ball valve EMV 110 series 602, 502
- 10 (2W) Electric motor actuated ball valve EMV 110 series 602, 502

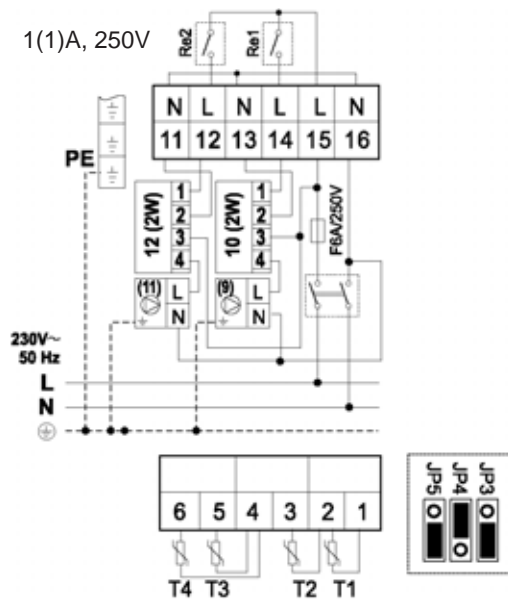
Instead of the electric motor actuated ball valves 7 and 10 you can use non-return valves. In this case connect pumps directly on terminals 11-12 and 13-14.

example 8

Heating sanitary water with collectors (east - west)



Electric connection:



- 10 (2W) - Electric motor actuated ball valve EMV 110 series 602, 502
- 12 (2W) - Electric motor actuated ball valve EMV 110 series 602, 502

Instead of the electric motor actuated ball valves 10 and 12 you can use non-return valves. In this case connect pumps directly on terminals 11-12 and 13-14.

*Regulator for central heating system
for regulation of radiator or underfloor heating
with output for 3-port control of mixing valves motors*

ROTOTERM MR-TR

**User's Manual
Instructions for installation and maintenance**



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DEAR CUSTOMER,

Congratulations for selecting our product!

MR-TR is a micro-processor regulator for radiator or under floor heating with output for 3-port control of motor mixing valve. Depending on exterior temperature it can be used in one or more apartment buildings, and is designed in such a manner, which allows it to be controlled from inside the building. Buying the MR-TR micro-processor regulator means that you've decided to select a product manufactured in compliance with latest quality and safety standards. The regulator is easy to install and simple to control. It is a result of latest knowledge of heating systems.

This will help you save money and assure all the comfort of your warm dwelling.

Thank you for your trust - **FIRŠT Rototehnika**

INDEX

CONTENTS OF THE PACKAGE, TECHNICAL DATA, WARNINGS.....	3
REGULATOR ROTOTERM MR-TR - OPERATION	4
INSTALLATION OF THE MR-TR REGULATOR.....	5
MOUNTING OF SENSORS	6
TABLE OF SENSOR RESISTANCE	7
ELECTRICAL INSTALLATION	
CONNECTION OF THE REGULATION MOTOR.....	8
CONNECTING THE CIRCULATION PUMP	
EXAMPLES OF MAIN CONNECTIONS.....	9
REGULATOR CONTROL PANEL, DATA DISPLAY.....	10
REGULATOR PARAMETERS	11
REGULATOR TYPE	11
HEATING CURVE RATIO	
CURVE PARALLEL SHIFT	
SELECTION OF HEATING CURVE	12
TEMPERATURE LIMIT OF MIXED FLOW.....	13
PUMP SWITCHING OFF	
INFLUENCE OF ROOM UNIT.....	14
TEMPERATURE OF BOILER CONDENSE POINT	
UNDER FLOOR TEMPERATURE LIMIT	
REGULATOR PARAMETER SETTING.....	15
REGULATOR ROOM UNITS	17
AS 2000-C ROOM UNIT	18
CONTROL PANEL DESCRIPTION	
OPERATING MODE SELECTION	19
BATTERY REPLACEMENT	
SWITCH FOR CHOOSING REGIME	20
ELECTRICAL CONNECTION	
MOUNTING OF UNIT.....	21
PARAMETER SETTINGS	22
MOST FREQUENT FAULTS WHICH APPEAR DURING OPERATION	25

CONTENTS OF THE PACKAGE

1. Regulator ROTOTERM MR-TR
2. Mixed flow sensor VF
3. BF/KF floor or boiler sensor
4. Outside air sensor AF
5. Fixing bolts with wall inserts (2 pcs.)
6. User's manual
7. Cardboard with table for quick setting of parameters
8. Guarantee certificate
9. AS 2000-C indoor programming unit - only with package MR-TR "Plus"
(Ord. code No. 21128)

TECHNICAL DATA

Supply voltage	230VAC, 50Hz
Power consumption	max. 4VA
Supply voltages of users	1(1)A, 230VAC
Sensor type	PTC KTY 10-6
Temperature measuring range	-40°C...160°C
Room temperature setting	5°C...25°C
Heating curve ratio setting.....	0,1...2
Parallel shift.....	+/- 10°C
Room unit influence.....	1...15
Regulator type	PID
Floor temperature limit.....	15°C...35°C
Summer periodic run of pump and mixing valve	every 72 hours for 30s
Connection mode	terminal pins
Parameters selection mode	keys
Parameters	default values

WARNINGS

Manufacturer shall not be liable for incorrect hydraulic connection of the machine part. Machine and electric installation shall comply with valid safety regulations, as defined by law and legislation. Installation works shall be carried out by experienced professional or authorised technician! The guarantee does not cover eventual damage caused by failure to consider the installation instructions. Not included in the guarantee is also damage caused by force majeure (direct or indirect flash of lightning, floods...). For such cases we recommend insurance with your insurance agency.

Read the manual carefully in order to assure proper operation of the product and to learn of all the possibilities it offers.

We reserve the right to changes in manual and of technical characteristics of the product without previous notice.

REGULATOR ROTOTERM MR-TR - OPERATION

The MR-TR regulator is a 3-port PID regulator used for under floor or radiator heating. Via its outputs it controls the motor actuator for mixing valve and circulation pump.

Basically it controls the temperature of mixed flow in dependence on exterior temperature, deviation of the required and actual room temperature and parameters set. The regulator operates according to non-linear heating curves, which enables correct heating even with higher exterior temperatures. Setting of the curve ratio is possible also from 0,1 do 2 in resolution per 0,1 (20 curves). Parallel shift of the curve enable settings within the limits from -10 to +10, which means, that the starting points of the curves can be moved by +/- 10°C.

By means of the three digit display and the three keys it is possible to set all the parameters and to control all the temperatures. The display also shows all errors of the sensors (disconnection "Er1" and short circuit "Er2").

The design of regulator allows also operation without room unit or operation with corrector. This is especially useful for under floor heating, where night reductions do not present any advantage, due to the system inertia.

When the regulator switches over to under floor operating mode, the regulator automatically assumes individual limits: temperature of the mixed flow is 50°C, setting of heating curve ratio is possible only from 0.1 - 1 and influence of the room units is possible only between 0 and 5. The under floor sensor of the regulator prevents the under floor to get too hot, thus prevents the unpleasant feeling of warmth in your feet.

When used with radiator version, the sensor is located into the boiler in order to prevent condensation or overheating of the boiler. In case the boiler temperature falls bellow the condensing temperature, the regulator momentarily chokes the mixing valve, thus reducing the consumption and assuring quick and easy heating of the boiler to the required temperature. If for any reasons the temperature of the boiler exceeds 95°C, the regulator opens the mixing valve, speeds up the consumption and prevents overheating of the boiler and cut-off of the thermal breaker.

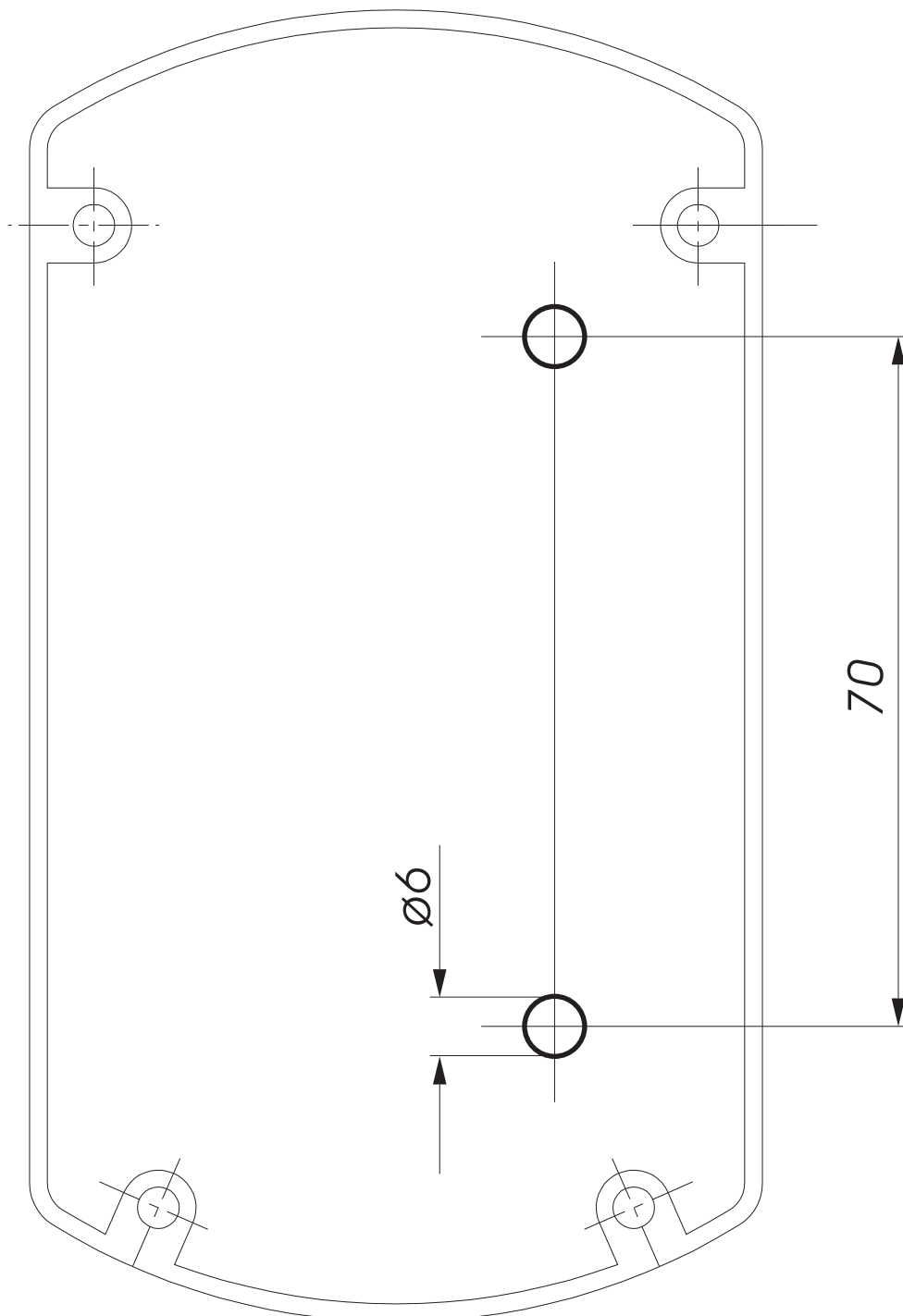
The regulator automatically activates the pump, immediately when heating is required and switches it off when the heating water line is cooled down bellow the set temperature. This temperature can be adjusted within the range of 20°C to 45°C.

When switched on, the display of the ROTOTERM MR-TR regulators illuminates and shows the tests of sensor, pump and mixing valve operation. After some 5 seconds the regulator starts with normal operation.

INSTALLATION OF THE MR-TR REGULATOR

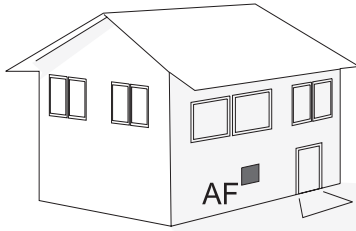
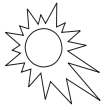
The regulator includes power supply cable and plug for connection to power supply network. We recommend connection to earthed socket, protected with separate fuse. The regulator can be mounted to the wall, provided that there is no danger of water overflow or other liquid and at least 1 m away from the sources of electric interference (pumps, electric motors, phone exchanges, cell phones...).

TEMPLATE FOR HOLES FOR EASIER INSTALLATION OF THE MR-TR REGULATOR TO THE WALL.



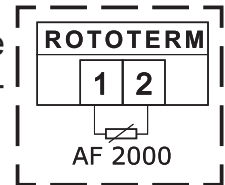
MOUNTING OF SENSORS

MOUNTING OF OUTSIDE AIR SENSOR AF 2000

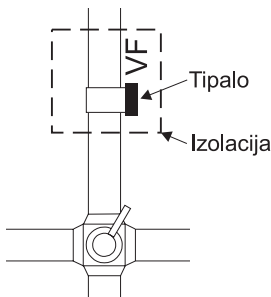


Fix the sensor to the north side wall (or shady side) of the building at least 1.5 m from the under floor and from all possible heat sources (window, door, ventilating channels, stacks, direct sunlight, above the windows...)

Connect the sensor cable to the terminal pins 1 and 2 in the automatics connection box.

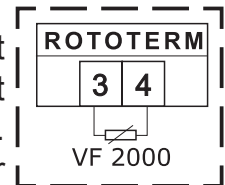


MOUNTING OF CLAMP-ON SENSOR VF 2000 - to the mixed flow line

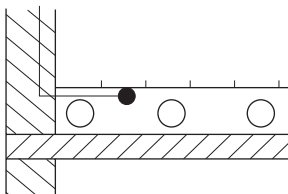


Mount the sensor at least 20 cm above the mixing valve before or after the pump, as close-fit sensor on the mixed flow hose under the isolation or as immersion sensor in the cap.

Be careful not to let the sensor cable to touch the hot pipes (use proper isolation). Provide good contact with the heating water line and apply thermal isolation. Connect it to terminal pins 3 and 4 in the regulator connection box.



MOUNTING OF FLOOR SENSOR VF 2000 - for under floor heating only

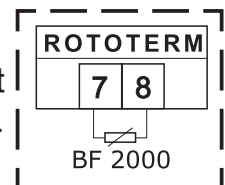


Mount the sensor into flexible hose as close to the composition under floor surface as possible, somewhere in the middle of the feeding and returning conduit.

Do not place it under thick carpet or furniture.

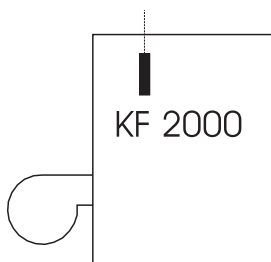
Be careful not to let the sensor cable to touch the hot pipes (use proper isolation) and apply thermal isolation.

Connect it to terminal pins 7 and 8 in the regulator connection box.



If you don't install the sensor, the terminal pins 7 and 8 should be connected to 2 kW resistance and parameter [t] set to value 35 (see setting of temperature limits for under floor - parameter [t]).

MOUNTING OF BOILER SENSOR KF 2000 - for radiator heating only



Mount the sensor into the cap next to the other boiler sensors. In case of 4-way mixing valve it can also be mounted as close-fit sensor to the heating water line after the furnace output.

If you don't install the sensor, the terminal pins 7 and 8 should be connected to 2,9kΩ and parameter [t] set to value 30 (see setting of temperature limits for under floor - parameter [t]).

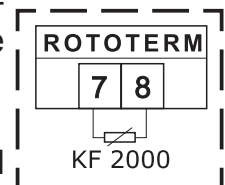


TABLE OF SENSOR RESISTANCE

In order to test the automatics we can simulate the sensors with resistance. Values are selected from the table bellow. Simulation example of AF sensor:

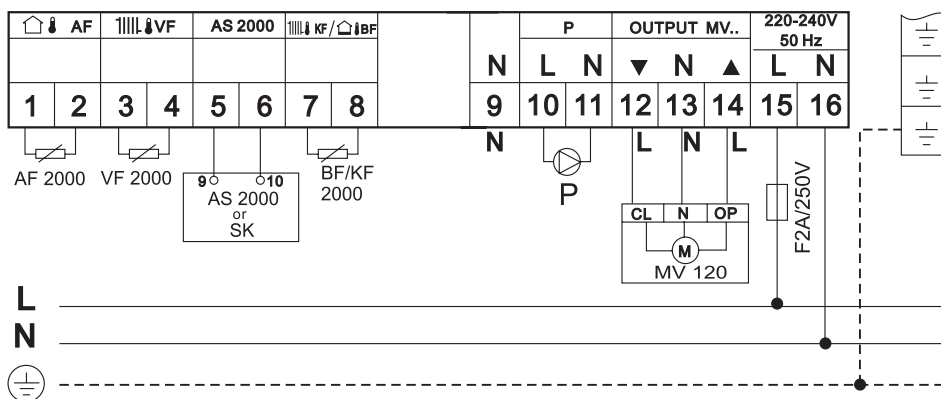
- for 0°C terminal pins 1 and 2 are connected to resistance 1645W (to the nearest 1500Ω + 150Ω)

Sensor resistance table with dependence on temperature - type KTY10-6

Temp. (°C)	R _T (Ω)	Temp. (°C)	R _T (Ω)	Temp. (°C)	R _T (Ω)	Temp. (°C)	R _T (Ω)
-50	1040,51	-5	1578,51	40	2229,63	85	2993,87
-45	1094,70	0	1645,27	45	2308,96	90	3085,77
-40	1150,29	5	1713,43	50	2389,69	95	3179,07
-35	1207,27	10	1782,98	55	2471,81	100	3273,76
-30	1265,65	15	1863,93	60	2555,33	105	3369,85
-25	1325,43	20	1926,28	65	2640,24	110	3467,33
-20	1386,61	25	2000,02	70	2726,56	115	3566,21
-15	1449,18	30	2075,16	75	2814,26	120	3666,49
-10	1513,14	35	2151,70	80	2903,37	125	3768,16

ELECTRICAL INSTALLATION OF THE REGULATOR

Programming and regulating automatics of the ROTOTERM MT-TR is furnished with standard plug, protective conduit for connection to power supply network 230V, 50 Hz. Immediately after connection, it can be operated, set and programmed. Since the automatics do not include a fuse, one should be installed on the plug.



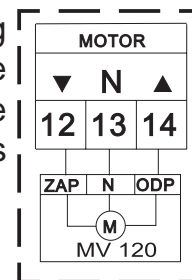
Earthing conduits shall be connected into separate terminal pins, on the right side of the connecting pins.

To completely switch off the operation of the regulator you need to disconnect it from the power supply network

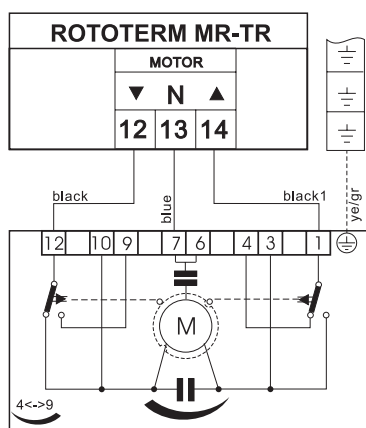
PIN	CONNECTION
1,2	Putside air sensor AF 2000
3,4	Mixed flow sensor VF2000 (gray color)
5,6	Room unit AS2000 or SK (5-9, 6-9)
7,8	Floor sensor (BF2000) or boiler sensor (KF2000) - red color
9	N - Neutral conduit
10	L - Phase for switching on the pump
11	N -Neutral conduit for pump
12	L - Closing the valve
13	N -Neutral conduit
14	L - Opening the valve
15	L - Phase connection to power supply network 230V, 50 Hz
16	N - Neutral conduit, connection to power supply network 230V, 50 Hz

CONNECTION OF THE REGULATION MOTOR

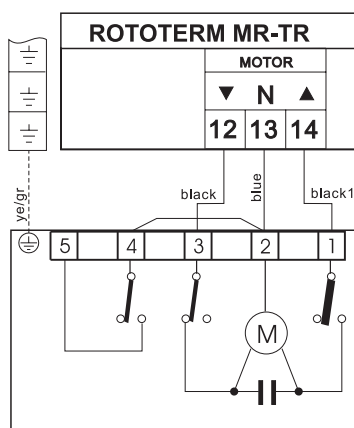
After the regulation motor is mounted to the mixing valve (for mounting see chapter "Instructions for mounting the regulation motor"), connect the motor to the terminal pins in the connection box of the regulator. Should the closing direction be changed, change the connecting wires on terminal pins 12 and 14.



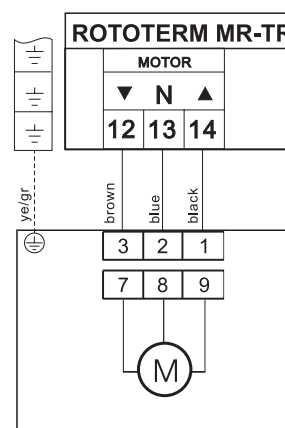
We recommend the use of our regulation motors:



MV 120/09E



MV 120/210
MV 120/360



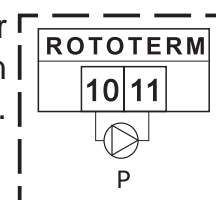
MV 120..540 (EUROMIX)

Recommendation:

As an extra precaution for under floor heating we recommend use of regulation motor series MV 120/210 for mixing valves up to DN 40 or series MV 120/360 for larger mixing valves. Advantage of these two regulation motors is, that it can be set an angle of opening of the mixing valve. This way the maximum temperature of heating water coming into under floor heating system can be limited.

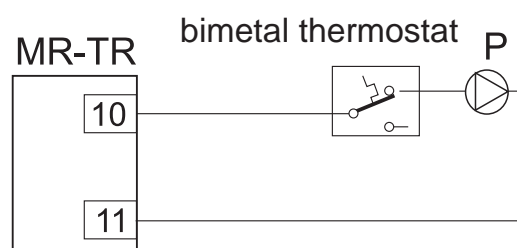
CONNECTING THE CIRCULATION PUMP

The regulator controls the circulation pump whenever there is a signal for heating and shuts it off as soon as the heating water line is cooled down below the set temperature (see "Setting pump switch off" - parameter [c]). It shall be connected to terminal pins 10 and 11.



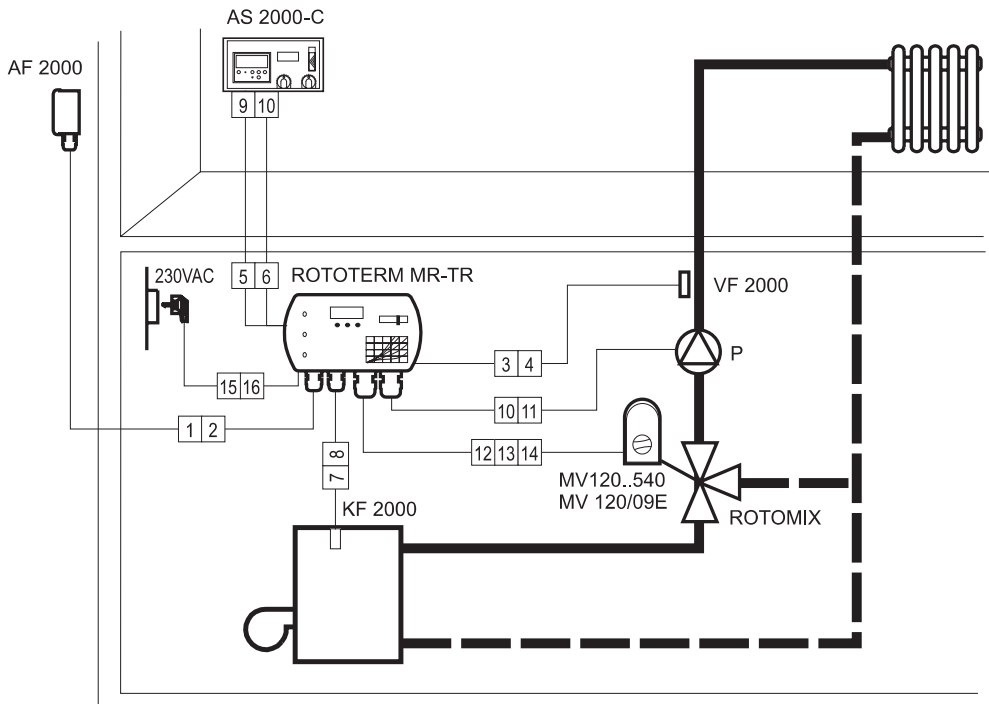
Recommendation:

For under floor heating we recommend installation of an extra safety bimetal thermostat on the mixed flow line. The thermostat shall be set to some 50°C and shall switch off the circulation pump after the temperature in the heating water line exceeds 50°C. The use of thermostat is recommended as precaution in order to prevent hot water to breaking into under floor heating system.

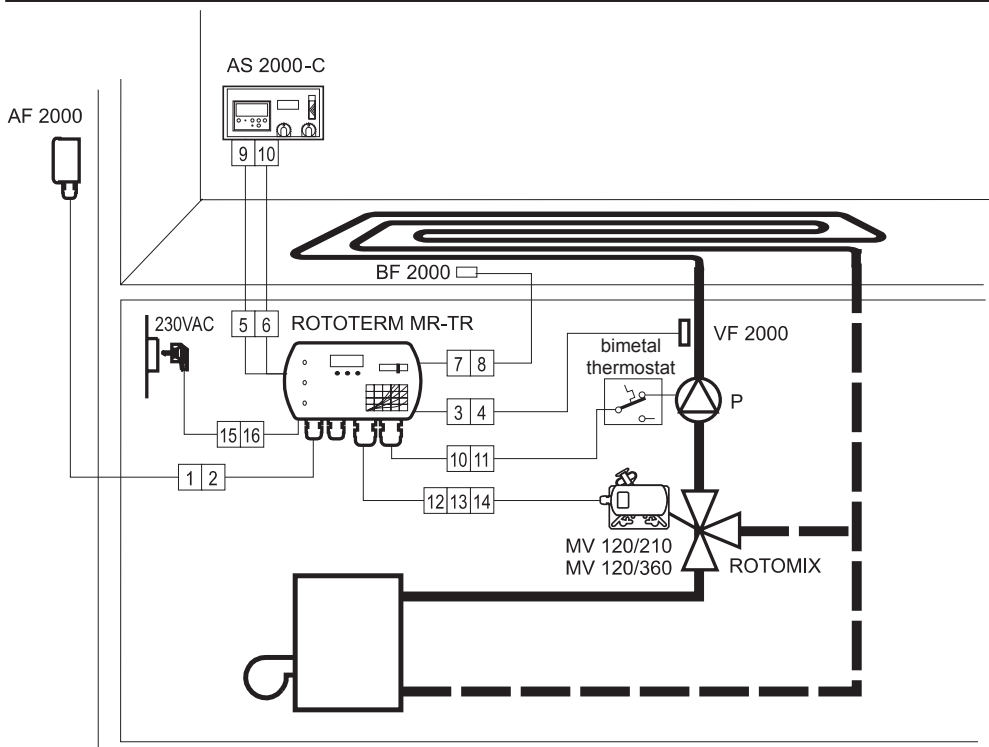


EXAMPLES OF MAIN CONNECTIONS

Radiator heating



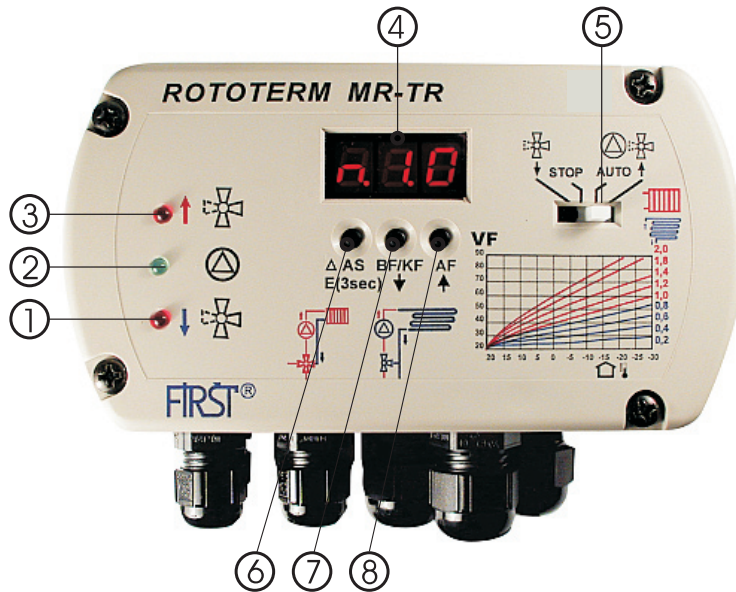
Under floor heating



Recommendation:

For under floor heating we recommend installation of an extra safety bimetall thermostat on the mixed flow line. The thermostat shall be set to some 50°C and shall switch off the circulation pump after the temperature in the heating water line exceeds 50°C. The use of thermostat is recommended as precaution in order to prevent hot water to breaking into under floor heating system.

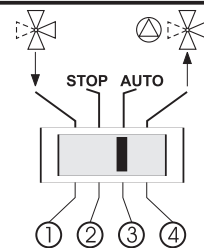
REGULATOR CONTROL PANEL



- 1 LED indicator mixing valve closing
- 2 LED indicator pump operation
- 3 LED indicator mixing valve opening
- 4 Display
- 5 Selector switch for operating mode selection
- 6 Key T1 (E)
- 7 Key T2 (▼)
- 8 Key T3 (▲)

Selector switch for operating mode selection

- 1 Permanently closed valve, pump switched off.
- 2 Mixing valve stopped in current position, pump operates continuously (in case of failure provides for partial heating and offers the possibility of manual control of mixing valve).
- 3 Regulator functions acc. to pre-set parameters.
- 4 Permanently opened mixing valve, pump operates.



The selector switch is meant for service reasons - for only qualified persons

Data display

During complete operating period the display shows temperature of VF mixed flow.

When T1 (ΔAS) key is pressed

the display shows the difference between actual temperature of mixed flow (T_{actual}) and temperature of mixed flow acc. to preset curve ($T_{per\ curve}$) in $^{\circ}C$.

$$\Delta AS = (T_{actual}) - (T_{per\ curve})$$

When value " ΔAS " is negative it indicates that the temperature in the room is too high and regulator decreases the temperature of heating water line. When value " ΔAS " is positive it indicates that the temperature in the room is too low and regulator increases the temperature of heating water line. The parameter E, selected from displayed value AS, can be used for calculation of the difference (ΔT_{room}) between actual room temperature and required room temperature.

Example 1:

$$E = 8 \quad \Delta AS = -4 \quad \Rightarrow \quad \Delta T_{room} = \frac{\Delta AS}{E} = \frac{-4}{8} = -0,5^{\circ}C$$

Room temperature is $0,5^{\circ}C$ higher than required.

Example 2:

$$E = 8 \quad \Delta AS = 12 \quad \Rightarrow \quad \Delta T_{room} = \frac{\Delta AS}{E} = \frac{12}{8} = 1,5^{\circ}C$$

Room temperature is $1,5^{\circ}C$ lower than required.

When T2 (BF/KF) key is pressed

the display shows floor temperature or temperature in the boiler.

When T3 (AF) key is pressed

the display shows outside temperature.

REGULATOR PARAMETERS

ROTOTERM MR-TR microprocessor controlled regulator of radiator and under floor type heating provides for setting of the following parameters:

1. REGULATOR TYPE: [rAd] or [tAL]

range selection: or

[rAd] - radiator heating system

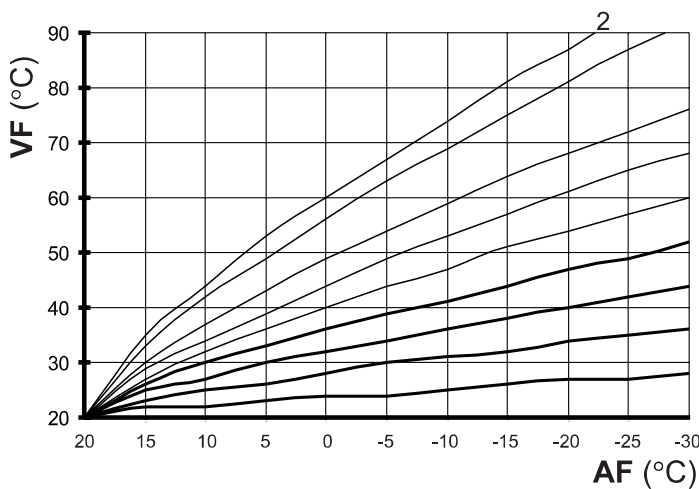
[tAL] - under floor heating system

Select the type of regulator in order to define the type of heating system and sensor function (BF/KF).

You define whether BF/KF sensor, connected to terminal pins 7 and 8, is used as boiler or under floor type sensor. If under floor type heating is selected the BF/KF sensor functions as floor sensor and if radiator heating is selected it functions as boiler sensor.

2. HEATING CURVE RATIO: [n]

range selection: or



The ratio of heating curve defines the temperature of mixed flow at certain outside temperature.

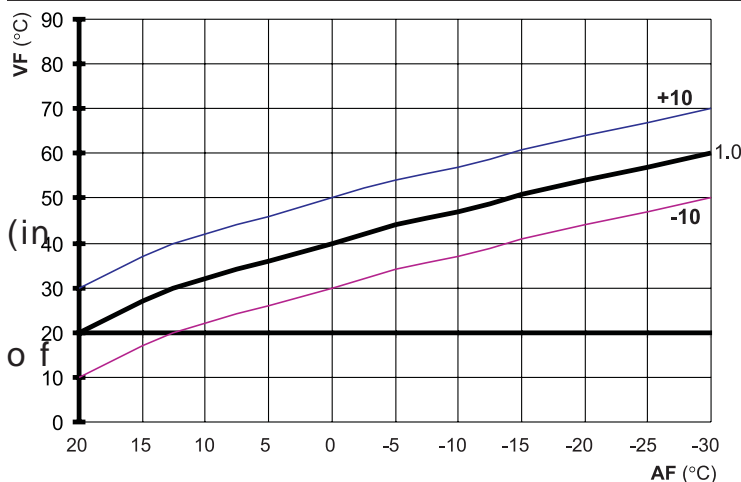
Considering the type of heating, the regulator has the following limits:

Under floor heating: from 0,1 to 1 (factory setting 0,5).

Radiator heating: from 0,1 to 2 (factory setting 1,0).

3. CURVE PARALLEL SHIFT: [P]

range selection: or



Parallel shift of a curve enables displacement of heating curve for +/- 10°C (factory setting 0).

When heating curve ratio is adequate case deviation of required temperature is the same in cold and transition periods), it can be modified by means heating curve ascent or descent.

Range of parallel curve shift for heating curve 1.0

SELECTION OF HEATING CURVE

Heating curves represent an interconnection between outside temperature and temperature of heating water. In short: the lower is outside temperature, the higher is the temperature of mixed flow and room temperature depends on the temperature of mixed flow.

The selection of optimum curve depends on several factors: heat insulation of a building, heating type, heating system inertia, etc. The selection of optimum curve enables the highest fuel savings. The consequence of wrong selection of heating curve slope is deviation from required room temperature (e.g.: when it is cold outside, the room is warm enough but in transition periods room temperature is too low).

For well-insulated house (radiator type heating), for example, the slope of heating curve is 1.0 and for poorly insulated house it can be 1.6.

For under floor type heating it is about 0.5.

PRACTICAL TIPS FOR CURVE SELECTION

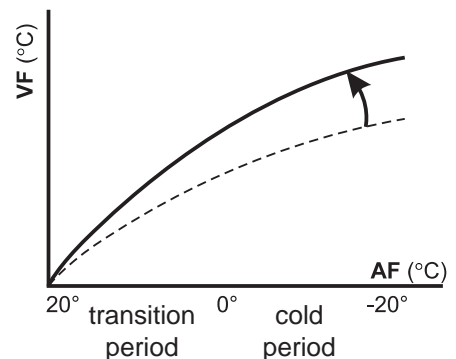
The slope of heating curve is selected according to experiences considering insulation of the building, heating type, system inertia, etc.

Taking into account that optimum selection of heating curve is not readily achieved, it should afterwards be modified.

1st example

Room temperature in transition period corresponds but is too low in cold periods.

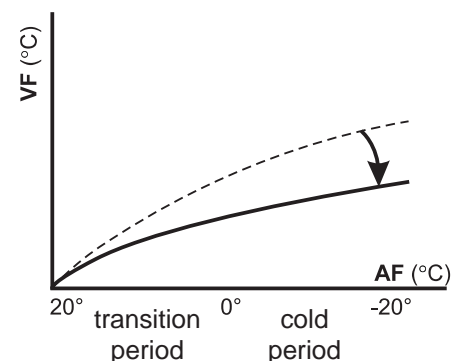
In this case the slope of heating curve [n] should be set to higher value.



2nd example

Room temperature in transition period corresponds but is too high in cold periods.

In this case the slope of heating curve [n] should be set to lower value.



3rd example

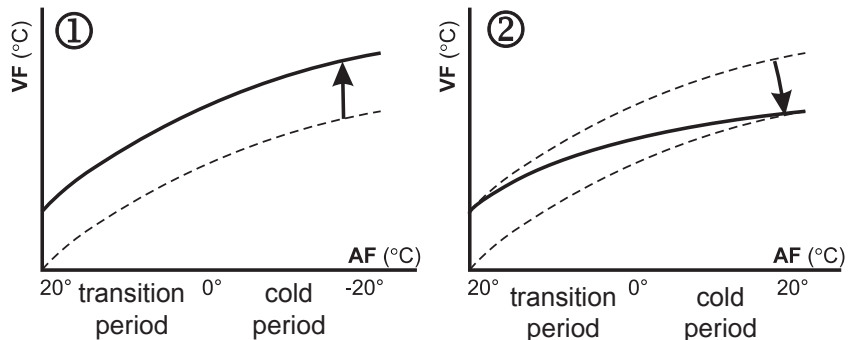
Room temperature in transition period too low but in cold period corresponds.

1st step

Increase parallel shift of curve [P] to higher value.

2nd step

Set ratio of heating curve [n] to lower value.



4th example

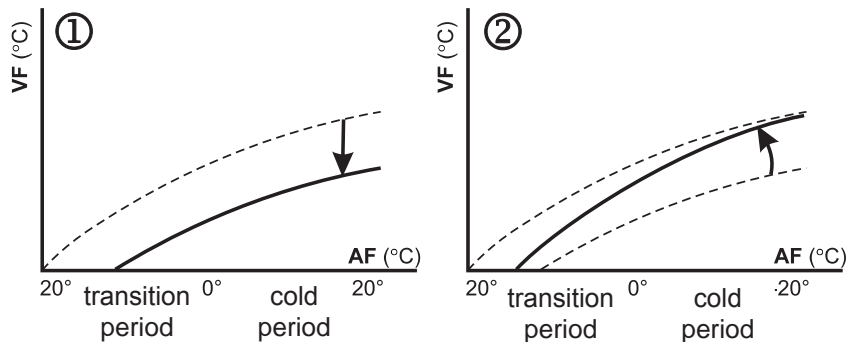
Room temperature in transition period too high but in cold period it corresponds.

1st step

Increase parallel shift of curve [P] to lower value.

2nd step

Set ratio of heating curve [n] to higher value.



4. TEMPERATURE LIMIT OF MIXED FLOW: [o]

from: to

Temperature limit of mixed flow is used in systems where smaller areas of under floor are heated with pipes of radiator heating (bathrooms, toilet rooms). To prevent damages of under floor systems or under floor linings (ceramic tiles) the temperature in pipes should be limited under certain temperature value (50°C). Such limit value, used in radiator heating systems, prevents fast rise of temperature of heating units during very cold mornings; consequently the time required to reach the desired room temperature is extended. Therefore in this case it is recommended to pre-set the time for morning start up of heating

WARNING: If the temperature of heating water line for radiator heating is limited to too low value it is possible that very low morning temperatures prevent reaching of required room temperature.

Considering the type of heating the regulator enables the following settings:

Under floor heating: from 30°C to 50°C (factory setting 50).

Radiator heating: from 30°C to 85°C (factory setting 80).

5. PUMP SWITCHING OFF: [c]

from: to

This setting specifies the temperature at which the regulator switches off the pump, when mixing valve is already closed. This function enables that all heating units are uniformly cooled down after termination of higher operating mode.

Factory settings of deactivation: radiator heating: 30°C, under floor heating: 25°C.

6. INFLUENCE OF ROOM UNIT: [E]

from:  to 

This setting specifies the degree of increase or decrease of the temperature of heating water line if room temperature changes for 1°C. Higher is the inertia of the system, lower should be the influence of room unit and vice versa.

Under floor heating: the influence of room temperature can be set between 0 and 5 (factory setting 3); **radiator heating:** between 0 and 15 (factory setting 8).

When MR-TR regulator is used solely as temperature regulator of mixed flow with reference to outside temperature (without room unit), the terminal pins 5 and 6 remain free.

IN THIS CASE THE INFLUENCE OF ROOM UNIT MUST BE SET TO 0!

7. PARAMETER: [t]

Parameter [t] has two functions and depends on the type of selected regulator (radiator of under floor type heating).

Radiator heating

from:  to 

7.1 TEMPERATURE OF BOILER CONDENSE POINT: [t]

When boiler has more users (mixing valves with pumps) or the boiler is under-dimensioned, condense frequently appear during morning start-ups in boiler and flues due to too high consumption, especially at radiator heating. For this reason the regulator is equipped with KF boiler sensor, which reads boiler temperature. If the temperature of the boiler decreases under the set value, the regulator begins closing the mixing valve and enables the burner to quickly heat the boiler to set temperature. The temperature of condense point can be set between 30°C and 75°C (factory set to 65).

The very same KF sensor protects the boiler against overheating. It opens the mixing valve and activates the pump, if the temperature of boiler exceeds 95°C. In this way it prevents deactivation of thermal fuse in boiler regulation unit.

If the sensor is not connected a resistance should be used instead of it - see chapter: Installation of boiler sensor!

Under floor heating

from:  to 

7.2 UNDER FLOOR TEMPERATURE LIMIT: [t]

When MR-TR is used as under floor regulator, maximum floor temperature can be set. Floor temperature is read by means of BF sensor installed in screed close to floor surface. This sensor has a function of protection.

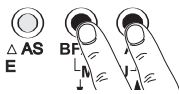
The temperature of condense point is set between 15°C and 35°C (factory set to 29).

If the sensor is not connected a resistance should be used instead of it - see chapter Installation of boiler sensor!

REGULATOR PARAMETER SETTING



Press **MENU** key to enter programme mode. The display shows parameter [n] and numeric value of ratio:



Programming is executed in three procedures. For easier understanding see the diagram on the following page.

First procedure: set the ratio of heating curve and parallel shift.

Second procedure: set the limit of mixed flow temperature, pump deactivation, influence of room unit and limit of floor temperature or boiler condense point.

Third procedure: set the type of regulator (radiator/under floor type heating).

When you press **MENU** key you enter the first procedure, where you can set the parameter [n]. Change the value by pressing arrow keys.

To set the parameters in the second procedure, first press **MENU** key and afterwards keep pressing **E** key for 10 sec. until parameter [o] is displayed, i.e. Limit of mixed flow temperature.

To set the parameters in the third procedure, first press **MENU** key and afterwards keep pressing **E** key for 20 sec. until parameter [rAd] or [tAL] is displayed, i.e. Heating type.

When you enter the desired procedure you can change the parameter by pressing (↓) and (↑) keys. To move to the following parameter shortly press **E** key.

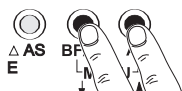
When the last setting of the procedure is entered, press and keep pressing **E** key. The display shows P.r. Keep pressing the **E** key (about 3 sec) until P.r. disappears.

If you do not perform above stated step, all entered parameters are lost. If you do not press a key for a longer period of time during programming procedure, the regulator leaves programming mode and returns to normal mode of operation.

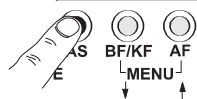
When setting regulator parameters for the first time, first set regulator type [rAd] or [tAL] because when you change the type of regulator factory settings are loaded.

Setting example: REGULATOR TYPE SETTING

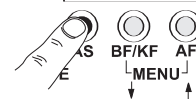
1. Press **MENU** key.



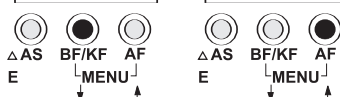
2. [n] value is displayed. Press **E** key for > 20 sec.



3. After 10 sec. value [o] is displayed, but keep pressing E key.



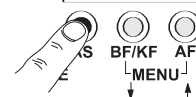
4. Value [rAd] or [tAL] is displayed.



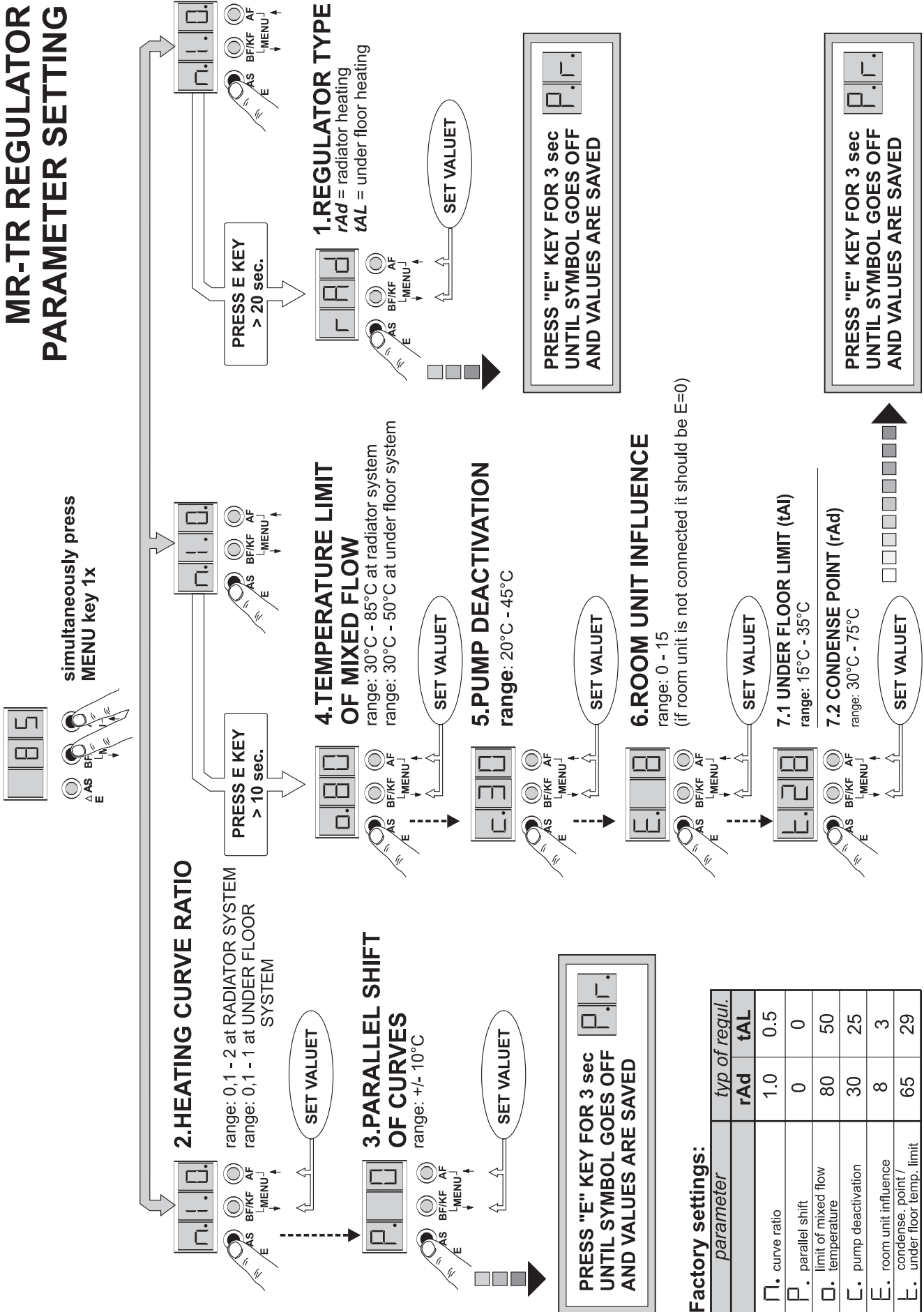
Set regulator type with (↓) and (↑) keys.

[rAd] - radiator heating
[tAL] - under floor heating

5. Keep pressing **E** key until P.r. disappears and save set values.



MR-TR REGULATOR PARAMETER SETTING

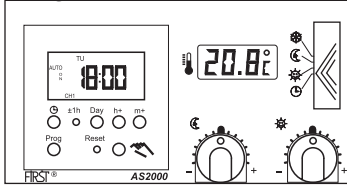


REGULATOR ROOM UNITS AND CORRECTORS

The ROTOTERM MT-TR regulator can be used connected with the following units:

1. Room unit AS 2000-C

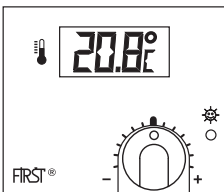
Programmable room unit AS 2000-C with incorporated digital timer is an electronic time switch which is used for programming daily and weekly mode of operation. Two temperature levels can be set - day time and night time level. The design of the timer enables simple operation with keys as well as control of actual hour, day and heating conditions in any time. Additionally it is equipped with room temperature display.



Room unit AS 2000-C has additional switch on the right side. It makes possible to choose two heating regimes:

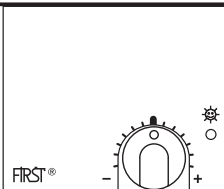
- temperature control of mixed flow depends on exterior and internal room temperature (normal operation)
- temperature control of mixed flow depends on exterior temperature

2. Room corrector unit SK1



If there is no need for time regulation of the room temperature (the room is constantly heated) the room corrector SK1 is used. Room corrector SK1 is equipped with sensor and room temperature display and is used for buildings where the temperature of the main room shall be measured and corrected for practical reasons. The corrector enables raising and lowering of the room temperature.

3. Corrector unit SK2



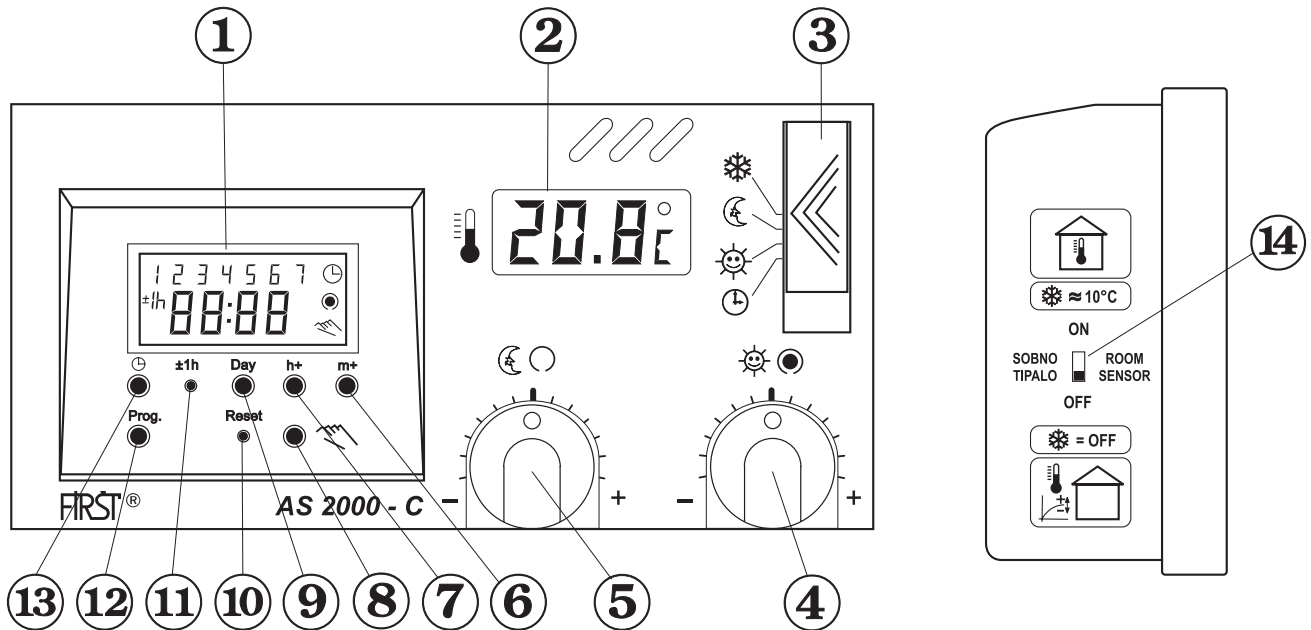
Corrector without sensor is designed for use in buildings where heating water temperature is to be corrected from one room (e.g. from maintenance room). The corrector enables raising and lowering of temperature in the mixed flow - heating curve parallel shift.

4. Operation without room unit

When ROTOTERM MT-TR regulator is used only as regulator of mixed flow temperature with dependence to exterior temperature, the room unit or the room corrector shall not be connected to terminal pins 5 and 6. In this case the influence of the room unit must be switched off - the parameter [E] shall be set to value 0 (see chapter: "Setting of room unit influence parameter [E]).

AS 2000 C ROOM UNIT

DESCRIPTION OF CONTROL PANEL

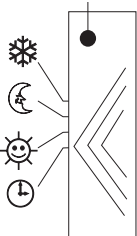


LEGENDA :

- 1 LCD display for exact time and state of program
- 2 LCD display for room temperature
- 3 Slide switch for choosing way of operating
- 4 Knob for setting higher (comfort) temperature (☀, ☀)
- 5 Knob for setting lower (economic) temperature (☾, ☾)
- 6 - key for setting minutes
- 7 - key for setting hours
- 8 key for the temporarily manual override of program

- 9 key for setting the day of the week
- 10 reset key - factory default
- 11 key for switching in summer time and back
- 12 key for input the program
- 13 key for setting the exact time
- 14 switch on the right side. It makes possible to choose two heating regimes:
 - temperature control of mixed flow depends on exterior and internal room temperature (normal operation)
 - temperature control of mixed flow depends on exterior temperature

Slide switch for choosing the way of operating



Four ways of operating are available:

- ☀ Protection against freezing (8°C)
- ☾ Non-stop working on lower (economic) temperature
- ☀ Non-stop working on higher (comfort) temperature
- 🕒 Automatic working according set program

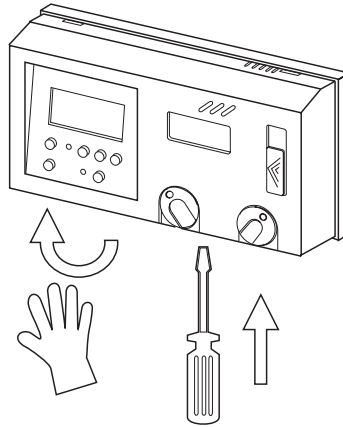
With key < ⏏ > (8) is possible temporary switch of working after program. This function switches the program from lower - economic (☾, ☾) to higher - comfort (☀, ☀) temperature operation or reverse, and it's active until next switch in program.

That switching between lower - economic to higher - comfort temperature operation is working after set program, the slide switch (3) must be in position "☀" !

BATTERY REPLACEMENT

IT IS RECOMMENDED TO REPLACE THE BATTERY CELL AT THE BEGINNING OF HEATING PERIOD IN ORDER TO ATTAIN RELIABLE OPERATION OF ROOM UNIT!

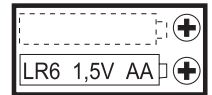
Use screwdriver to separate AS 2000-C from wall console: press the screwdriver in the notch on bottom part of AS 2000-C, lift it with hand and remove it.



AS 2000 uses alkaline battery cell LR06 1,5 V. To replace it insert new cell in empty compartment and afterwards remove old one.

AS 2000 operates regardless the network conditions (during eventual current breakdowns programme is not deleted) due to supply from battery. Life time of battery cell is about 2 years from the date of installation of new one and it becomes worn out when the display becomes pale.

Use exclusively alkaline battery cells type LR 06 in order to prevent leakage and damages to electronic circuit.



TEMPERATURE CORRECTION

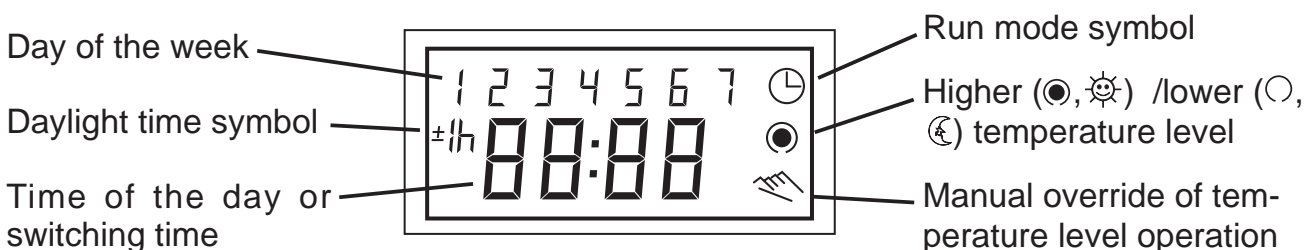
Weekly adjustable AS 2000-C room unit enables setting of two temperature levels:

- Higher or comfort temperature level (☉, ☀) with knob nr. 4
- Lower or economic temperature level (☾, ☿) with knob nr. 5

Settings of lower and higher temperature are independent of each other.

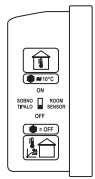
ELEMENTS OF LCD DISPLAY

LCD incorporates a number of different elements to display various data and information.



Heating regime selector switch

Room unit has additional switch on the right side. It makes possible to choose two heating regimes:



1. ON - heating depends on exterior and internal room temperature (normal operation).



ON

SOBNO TIPALO ROOM SENSOR

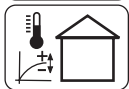
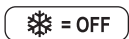
With built-in temperature sensor it assures constant room temperature. With connection with regulator ROTOTERM MR-TR it corrects temperature of mixed flow.

Two temperature levels can be set - day time and night time level. The design of the timer enables simple operation with keys as well as control of actual hour, day and heating conditions in any time. Additionally it is equipped with room temperature display.

2. OFF - temperature control of mixed flow depends only on exterior temperature

SOBNO TIPALO ROOM SENSOR

OFF



Room unit works independently of room temperature. This is suitable, when we have additional heating sources in the room (fireplace, ...).

The temperature of mixed flow is dependent of heating curve. Room unit in this regime allows parallel shift of heating curve. Two temperature shifts can be set - day time and night time level. The design of the timer enables simple operation with keys as well as control of actual hour, day and heating conditions in any time. Additionally it is equipped with room temperature display.

Warning!



When is regime selector switch in position OFF, then slide switch for choosing way of operating (3) does not assure protection against freezing, but it has function of stopping operation of regulator. It closes the mixing valve.

ASSEMBLY OF ROOM UNIT AS 2000-C

Use the enclosed bolts and mount the room unit to the wall. The unit shall be fixed at least 1.5 m above the floor.

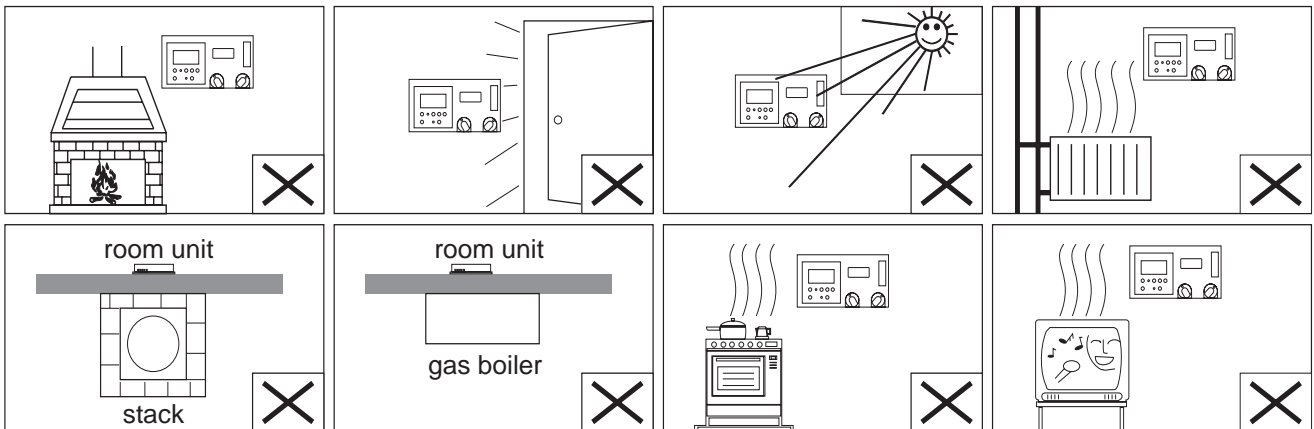
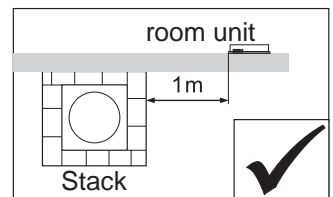
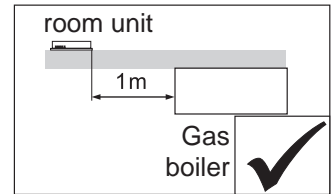
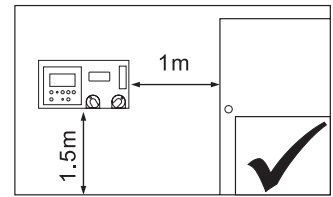
Carefully select the location of the room unit!

The room unit shall be placed to a neutral location in a room, which means that it shall be at least 1m away from all heating sources (radiator, fireplace...) or ventilating sources (window, door) as well as stacks.

Do not expose the room unit to direct sunlight!

In case of incorrect mounting, the room sensor will not detect the correct room temperature and various temperature influences will prevent maintenance of correct room temperature (the temperature will be too high or in probably most cases too low).

Gas boilers, stoves, cookers or stacks also warm up the walls to which they are attached to so when mounting the thermostat always consider the location of heat sources.

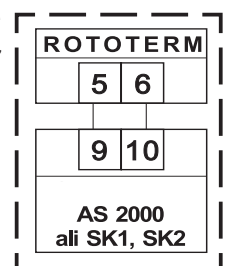


Few examples of incorrect mounting

ELECTRICAL CONNECTION

Connection between the room unit and the regulator is of low voltage type (two-wire 2 x 0.5 mm²). When longer wires are required or where stronger interference is to be expected, we recommend use of sheathed cable.

DO NOT CONNECT ROOM UNIT AS 2000-C TO POWER SUPPLY NETWORK OR ANY OTHER VOLTAGE SOURCE!



Room unit is supplied with its own power supply source (battery cells), which need to be replaced every two years!

Sensor cables shall not be placed parallel to live power supply cables, as in case of electric shock there is danger of induced current which can damage the regulator or room unit. In case that power supply cable and sensor cable are parallel, the minimum distance between them shall be 10 cm. It is allowed however the sensor cable to transversely cross the supply cable.

SETTING THE TIME

NOTE: If the “h” and “m” keys are held down longer than 2 seconds, the numbers will advance rapidly.

Press and hold the key “⊖” during the following:

1. Press “h” to advance to the current hour (while holding down “⊖” the key)
2. Press “m” to advance to the current minute (while holding down “⊖” the key)
3. Press “Day” repeatedly to advance to current day (while holding down “⊖” the key)

NOTE: If the days are flashing, it indicates the day of the week was not set when setting the time. The timer cannot be programmed unless days of the week is entered.

MANUAL DAYLIGHT TIME CHANGEOVER

Each year, in the spring, press “±h” to advance the time an hour. In the fall, press “±h” to set back an hour.

PROGRAM SETTINGS

The programmable weekly timer will accept up to 20 programs switches.

For every program switch is necessary to set

1. Heating level: lower (○, ☹) or higher (☺, ☀) temperature level
2. Time of day (Hour and Minutes)
3. Single day or multiple days

A program is required for each higher-level event (☺, ☀), and a program is required for each lower-level event (○, ☹).

NOTE: MULTIPLE EVENTS MAY BE PROGRAMMED.

For example,

Program switch 1 may turn the office heating on higher level at 08.00 Mon.-Fri.

Program 2 may turn the heating on lower level at 17.00 Mon.-Fri.

If someone is working late, they may press the override key < ↵ > to turn the office heating on higher level. If they forget to press the override key < ↵ > again when they leave, the heating will stay on higher level all night or all weekend.

To prevent this from occurring, additional program switches may be programmed.

- Program 3 can turn the heating on lower level at 18.00.
- Program 4 can turn the heating on lower level at 19.00.
- Program 5 can turn the heating on lower level at 20.00., etc.

IMPORTANT:

Before proceeding with setting the time and programming the unit, press the “RESET” key to clear all data from the memory.

PROGRAMMING SETTING

It is helpful to write out the program schedules before beginning. See last page !

IMPORTANT: The current time of day and day of week must be set prior to programming. See "setting the time"

Example:

Program switch 1:

heating on higher level at 7:00 Monday thru Saturday

Program switch 2:

heating on lower level at 17:00 Monday thru Friday

Program switch 3:

heating on lower level at 19:00 Saturday

Three programs switches need to be entered. For program setting press "**Prog.**" key only once. Display shows factory settings:

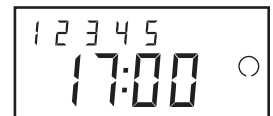
Program switch 1 (higher level at 7:00 Monday thru Saturday)

- Press "☞" key until symbol ● appears
- Press "h" key to 07
- Press "m" key to 00
- Press "day" key to 1 2 3 4 5 6 is displayed
- Press "**Prog.**" key to enter to next program switch



Program switch 2 (lower level at 17:00 Monday thru Friday)

- Press "☞" key until symbol ○ appears
- Press "h" key to 17
- Press "m" key to 00
- Press "day" key to 1 2 3 4 5 is displayed
- Press "**Prog.**" key to enter to next program switch



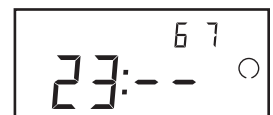
Program switch 3 (lower level at 19:00 Saturday)

- Press "☞" key until symbol ○ appears
- Press "h" key to 19
- Press "m" key to 00
- Press "day" key until only 6 is displayed
- Press "**Prog.**" key to enter to next program switch



Program switch 4 is factory set. So you have to delete it.

- Press "m" key to :59 and press once more to blank out or
- press "h" key to 23 and press once more to blank out
- Press "☺" key display will flash for several sconds (--) and then enter Run Mode (--)



IMPORTANT:

Timer is in the same state (temperature level), which was before program setting. New program will be reflected on the next program switch (timer does not "look back" to determine if it should be on higher or lower level after programming). If state of timer is not accord to program then manually temporary override it with key "☞". At the next scheduled switching time, automatic control resumes, eliminating the override.

DAY KEY SELECTION

Press "DAY" key	Display	Days
0 x	1 2 3 4 5 6 7	Every day
1 x	1 2 3 4 5 6	Monday-saturday
2 x	1 2 3 4 5	monday-friday
3 x	6 7	saturday and sunday
4 x	1	monday
5 x	2	tuesday
6 x	3	wednesday
7 x	4	thursday
8 x	5	friday
9 x	6	saturday
10 x	7	sunday

REVIEWING PROGRAM SWITCHES

To review the programs at any time, press "**Prog.**" key. Programs switches will appear in the order they were entered with repeated presses of the "**Prog.**" key. After all programs have been reviewed, the blank display (-- --) will appear to allow entering another program. Another press of the "**Prog.**" key will display the number of free program switches available, such as "Fr 16" if 4 program switches have been entered.

MANUAL OVERRIDE

TEMPORARY: While is selector switch in position "☉", pressing the "☞" key once will reverse the output; higher level to lower level or lower to higher level. The symbol "☞" appears in the display to indicate a temporary override. At the next scheduled switching time, automatic control resumes, eliminating the override.

CHANGING A PROGRAM SWITCH

Select the program switch to be changed with the "**Prog.**" key. A new set of days may be selected with the "**Day**" key just as in initial programming. Hour and minute can be changed with the "**h**" and "**m**" keys.

Press "**Prog.**" to proceed to next program switch or "☉" key to store the new program.

DELETING A PROGRAM SWITCH

To delete only one or a few programs: press "**Prog.**" key until the desired program switch is displayed.

Press "**m**" key to 59 and press once more to blank out (--).

Press "**h**" key to 23 and press once more to blank out (--).

Press "☉" key, display will flash for several seconds and then enter the Run Mode.

Using the "**RESET**" key will delete ALL programs, the time of day, and day of the week and program is set to factory settings.

FACTORY SETTINGS

PROGR.	Heating level higher(☉, ☼) - lower (☾, ☽)	hours (H)	minutes (min)	days (DAY)
1	☉, ☼ (higher)	06	00	monday-friday
2	☾, ☽ (lower)	22	00	monday-friday
3	☉, ☼ (higher)	07	00	saturday-sunday
4	☾, ☽ (lower)	23	00	saturday-sunday

Program switch 1: heating on higher level at 06:00 Monday thru Friday

Program switch 2: heating on lower level at 22:00 Monday thru Friday

Program switch 3: heating on higher level at 07:00 Saturday and Sunday

Program switch 4: heating on lower level at 23:00 Saturday and Sunday

Four programs switches need to be entered.

TROUBLESHOOTING

PROBLEM	SOLUTION
Days are flashing, pressing any key does nothing except “☞” key turns output on lower or higher temperature level.	Time of the day and day of the week have not been set. See “setting time”.
Time of the day was set while holding the “☉” key down, but days are still flashing.	Current day of the week was not set while holding down key. See “Setting the time”.
It is 10.00 and program switch for higher temperature level (☉, ☼) at 8.00 was entered, but the output is on lower level state (☾, ☽) . Display shows the “☉” and “☾” simbol.	After programming, the timer does not look back to determine if it should be on higher temperature level. Press the “☞” key (temporary override) to turn the output on higher level; ☞ and ☉ appears in display. The timer will assume automatic operation at the next programmed event.
A program for 8AM Monaday thru friday was entered, but it will not accept it and “☉” is flasing.	The higher (☉, ☼) / lower (☾, ☽) level switch was not entered as part of the programm. ☉ or ☾ must be selected.
Display is beginning to fade or relay is not switching.	Batteries are exploitated. Expired time of batteries is approxomately 2 years.

Most frequent faults which appear during operation of automatic regulation unit and are consequence of wrong settings or wrong connection.

Faults of operation, described in the table are consequence of wrong installation and wrong settings. You can eliminate them by yourself and need not call a serviceman.

If eventually a change of operating mode of automatic unit appears which is not common, first check eventual faults of settings and installation. See Instructions for MR-TR regulator and check if connection between regulator and AS 2000 room unit is correctly performed.

Before starting up and if error occurs we recommend to first check the following:

- is electric fuse in phase of automatic unit installed and if operates,
- is main switch ON,
- are all connections performed,
- is fuel in reservoir or inlet gas valve open,
- is heating really required - check outside temperature,
- is boiler temperature high enough regarding setting of boiler condense point.

If all above specified conditions are fulfilled and you haven't find the cause for fault, see the following table. In case you still can not find and eliminate the fault, call our authorised technician.

STATUS	POSSIBLE FAULT	REMEDY
At outside temp. +10°C the room is warm enough, at temp. -10° it is too cold.	Heating curve set too low.	Set the curve to higher value.
In room should be higher (day) temperature but is too cold.	- Timer setting. - Digital timer - overlapping of ON and OFF function	- Check timer setting (status ON and status OFF).
Regulation motor does not rotate.	- No supply from regulator - faulty motor - too hard (blocked) mixing valve.	- Check terminal pins 17, 18 and 19, - check mixing valve and its rigidity.
Regulation motor rotates, mixing valve does not respond.	- Broken safety forks, - broken lever on handle.	- Replace safety forks on handle, - replace handle. - preveriti končne lege ročice
Regulation motor does not stop in final positions.	- Valve handle displaced.	- Check final positions of handle.

STATUS	POSSIBLE FAULT	REMEDY
LED for valve opening (▲) is ON on regulator, mixing valve is fully open, hot in the room	Interrupted - outside sensor AF, - mixed flow sensor VF, - AS 2000 room unit .	Check - resistance of AF, - resistance of VF, - supply from AF - supply from VF - room unit.
LED for valve closing (▼) is ON on regulator, mixing valve is closed, too cold in the room	Short circuited - outside air sensor AF, - AS 2000 room unit , - sensor VF - under floor sensor BF, - slide switch in ❄ position.	Check - resistance of AF, VF and BF - supply from AF, VF, BF and room unit - set selector switch to ⊕ position.
LED for valve closing (▼) is ON on regulator, mixing valve is opened, heating water line is hot	- Motor MV 120/... rotation direction inverted regarding mixing valve.	- Check motor rotation direction left and right.
Temperature in the room is always the same regardless programme status ON and OFF	Slide switch position ❄ ☾ ☀	- Set slide switch to ⊕ position
Too cold in the room.	- slide switch in position ❄, - terminal pins 9 and 10 on room unit inverted, - knob ☀ set too low, - digital timer in OFF position.	- set slide switch to ⊕ position, - check connection of room unit, - set knob ☀, - set ON and OFF times.
At timer status ON, cold in the room, at status OFF warmer.	- Inverted terminal pins 9 and 10 on room unit.	- Check room unit connections.
If T2 or T3 key is pressed, Er1 is displayed.	- Sensor T2 or T3 interrupted, - Sensor out of function.	- Check T2 and T3 sensors.
If T2 or T3 key is pressed, Er2 is displayed.	- Sensor T2 or T3 short circuited.	- Check T2 and T3 sensors.

ROTOTERM MR-TR

PROGR.	Heating level higher(☀, ☀) - lower (☁, ☁)	hours (H)	minutes (min)	days (DAY)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

