

## heat exchangers - hot water systems - district heating stations

### DMS – Best water heating technology

Established in 1974, DMS is now one of the industrie's leading companies. Complete hot water equipment for a variety of applications is produced in three modern plants in Germany and Hungary.

DMS designs, builds, installs and services water heating systems for large to very large residential, hospitality, and institutional projects like hospitals, hotels, apartmenthouses, sport facilities, and old people residences, in compliance with the most stringent hygiene requirements.

The main advantages of our experience and technology:

- CAD designed equipment totally adaptable to every need and location
- Compatible with any heat source, fired, distant heating, solar, electric, etc.
- Maximal thermal efficiency, which saves energy
- Trouble free operation
- Easy maintenance
- Perfect hygiene eliminating legionellaes – LEGIOKILL®-SYSTEMS

Several thousand trouble-free installations in service for many years testify to the quality of our equipment.

**Contact us to test our productive capacity.**

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**Wasser- Wärmetechnik GmbH**

## General Informations

0

## Combined Water Heating Systems

DMS - KWS - K - System Series Top  
DMS - KWS - K - System Series Legiomin®

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## Legionellae Killing Water Heating Systems

DMS - HORNE - Legiokill® Systems  
VZD + TSD  
DMS - Legiokill® System Desin-Therm®

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## Compact District Heating Stations

3

## Heat Exchangers

DMS – Braced Plate Heat Exchangers  
DMS – Plate Heat Exchangers  
DMS – Shell and Coil Heat Exchangers

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## Hot Water Storage Tanks

DMS – EBS – TOP	Stainless Steel
DMS – EBS T / C	Stainless Steel
DMS – FM / FFM	Enamelled

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## Water Heater

DMS – NTE – 1 / 2	Stainless Steel
DMS – FH / FHM	Enamelled
DMS – Elektrawa	
DMS – Electric Heating Elements	

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## Thermostatic – Mixing – Systems

DMS – HORNE Tepidstat  
DMS - HORNE Mixing Valves  
Samson Water Temperature Regulators  
Grundfos Pumps  
TACO Balancing / Setting Valves

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## Question Sheets

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Heat

Hot water systems for any demand

65°C

65°C

Mischwasser zu den

geschlossen

# DMS

## Wasser-Wärmetechnik GmbH



For about 25 years, DMS Wasser-Wärmetechnik GmbH have been involved in water heating systems, heat exchangers and water treatment. We have experience in the construction, manufacture and distribution of complete pipe systems for use in hotels, sports facilities, hospitals, apartments, factories and homes for the elderly. We aim at being your competent partner starting with the design of the right system

Hospitals, old age residence quarters,  
sports facilities, multiple dwelling  
...seasonal housing!  
make your safety plans!

to suit your particular requirements through to commissioning. After the installation we take care of the required servicing and maintenance. The range of capacity for compact district heating stations is 10 kW to 6 MW, and for hot water systems from one family houses to larger systems of unlimited size. The benefit for our customers is our comprehensive service combined with the highest level of quality.

## EXCHANGING HEAT — HEATING WATER





# DMS-Legiokill-Systems

## Destruction of legionella in hot-water-systems and pipework with thermal disinfection

### Legionella in hot-water-systems

**Killing** of legionella in hot-water-systems by heating to disinfection temperature of at least 65°C/149°F.

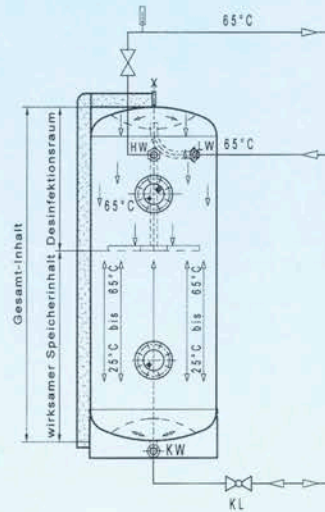
The **stationary dwell time** of the heated water in the disinfection tank is at least five minutes. The killing speed of legionella: about one power of ten within one minute.

**Cooling down** or **mixed** to the desired operating temperature of 45°C/113°F - 55°C/131°F without any loss of energy and, therefore, no danger of scalding at the taps.

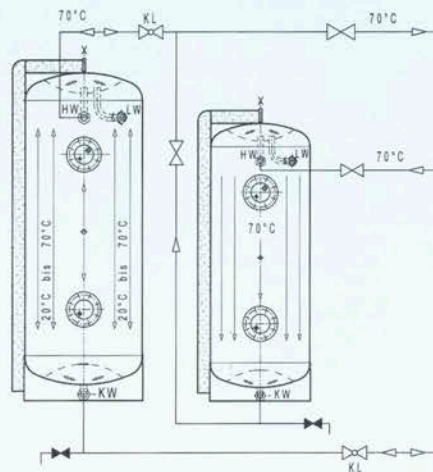
**Continuous disinfection** of a partial quantity of the circulation water by reheating to the disinfection temperature and keeping in the disinfection tank. The total volume of the distribution and circulation system will be disinfected about once in an hour.

The **thermal disinfection** is carried out as above, if so desired but with an additional automatic increase in the water temperature during the night. In this way, the whole drinking water, distribution-, and circulation-network will be disinfected.

**Thermal disinfection** of the whole system and network will be possible during commencement of operation and any time later.



**DMS-HORNE-Legiokill®-System**



**DMS-Legiokill-System Desin-Therm®**



### Advantages of Legiokill-Systems

- Designed as high quality modular systems, ready-for-use Legiokill-Systems are required to reduce the growth of a biofilm in the whole network by means of a special thermal process
- No highly sensitive measuring methods and water sensors to control the operation process.
- The efficiency of the system is independent of special content or qualities of which the water to be thermally disinfected.
- Fault-free operation because of turbidity based on fluctuations in the supply. Changing temperatures and pressure will not disturb the thermal disinfection process.

Ask for the special leaflet.

**DMS Legiokill®**

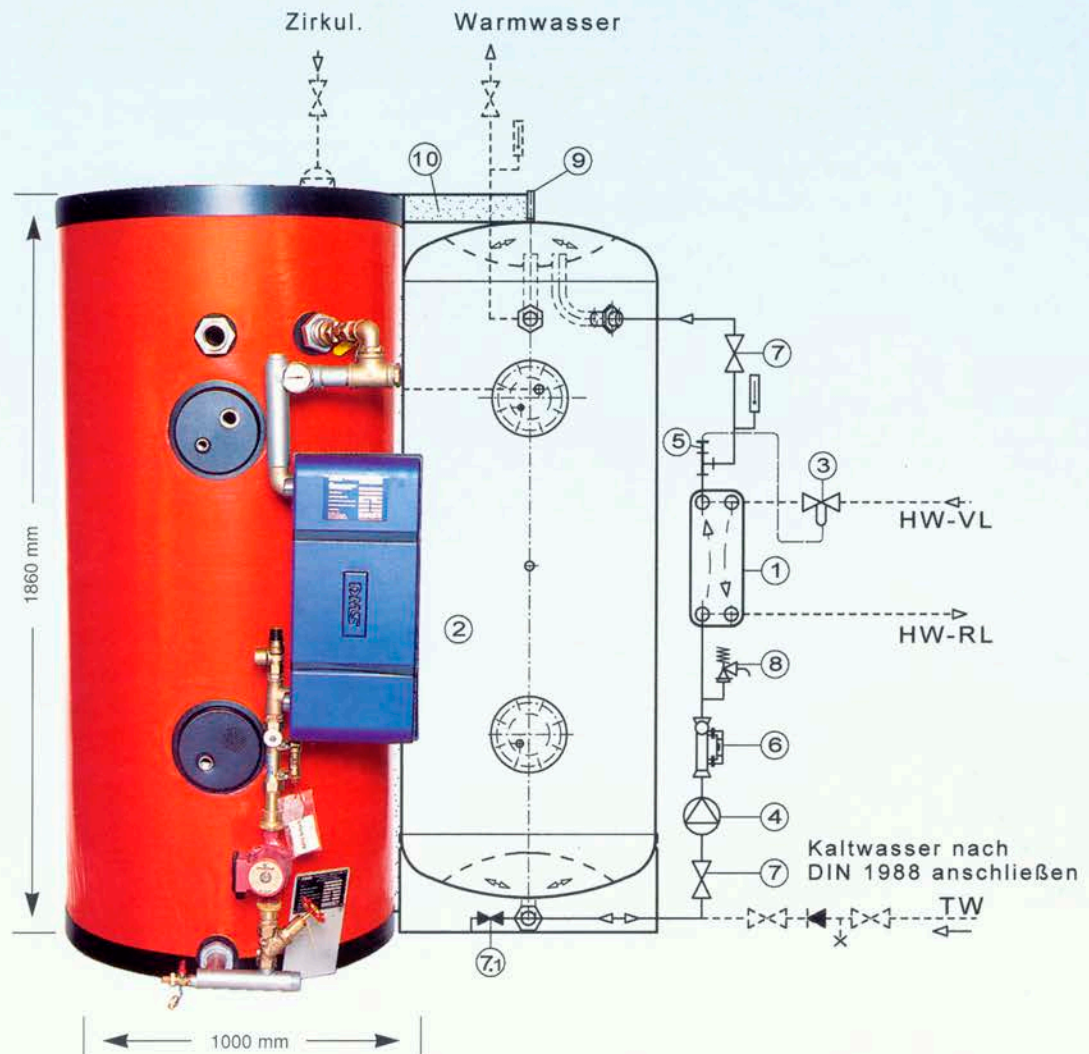
# DMS-KWS-System

Systems for storing and charging  
completely piped - ready for use  
the universal concept for central  
hot water systems for any demand

## Advantages of the system:

- suitable for any demand and condition
- large storage tanks combined with low capacity heat exchanger or vice versa lowest return temperatures
- suitable for solar energy, low temperature technology according to special flow circuits
- highest hygienic standard by completely heating the storage tank up to the set temperature
- special baffles prevent any mingling of cold and hot water
- stainless steel tanks and pipework with smooth inner surface absolutely no corrugated or flexible pipes in accordance with hygienic requirements

the picture beside shows the KWS-K-System - system ready for use storing and charging combined and completely made of stainless steel



## System consist of:

1. brazed plate-heat-exchanger
2. stainless steel storage tank
3. water temperature regulator
4. charging pump
5. sensor connection point
6. balancing/setting valve (hot water loading)
7. shut-off valve
- 7.1. drainage
8. safety valve
9. venting
10. insulation

## Example:

KWS-K 650-88-E suitable for:

- acc. to German DIN 4708 for N = 40 flats in a multiple dwelling house or
- old age residence quarters of 55 1-2 room apartments or
- wash-shower-room in a sports-facility with a demand of about 50 wash-shower activities within 10 minutes

We offer the comprehensive service:

- Consulting
- Designing
- Delivery
- Commissioning
- Maintenance



# Heat-Exchangers / Hot Water Generators / Compact District Heat Stations

**DMS plate heat exchangers - brazed and gasketed design - a comprehensive programme to solve any heat exchanger problem in an optimal way**

## DMS shell-and-tube heat exchanger

application for water heating-, district heating stations-, steam condensation-, heat recovery-, process technology.  
tube material: copper-Trufin-tube-, stainless steel,  
shell material: steel



brazed-heat-exchanger



gasketed clamped plate-heat-exchanger

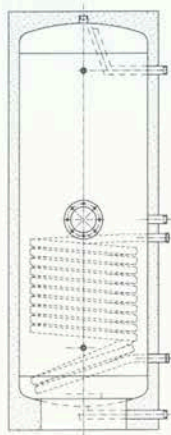
## DMS hot water storage tanks

manufactured according to pressure vessel regulations  
TÜV-type approval  
materials:

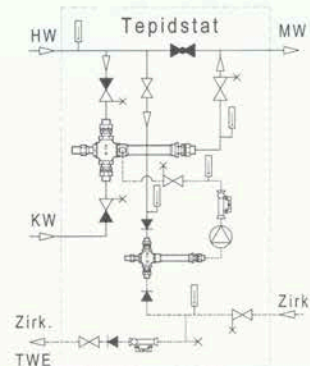
- stainless steel
- copper lined
- vacuum enamelled

## DMS accumulator water heater

made of stainless steel with one or two hot tube stainless steel registers removable or unremovable



DMS-HORNE-Hot-Water-Blender



DMS-HORNE-thermostatic mixing system

## HORNE mixing valves, HORNE TEPIDSTAT thermostatic mixing systems

to provide mixed water at a controlled temperature for distribution to a number of outlets.  
range of temperature adjustment 30 - 80°C (86 - 176°F) capacity 6 - 360 l/min

## Compact DMS district heat station

capacity 10 - 6000 kW direct or indirect operation mode with or without hot water generation

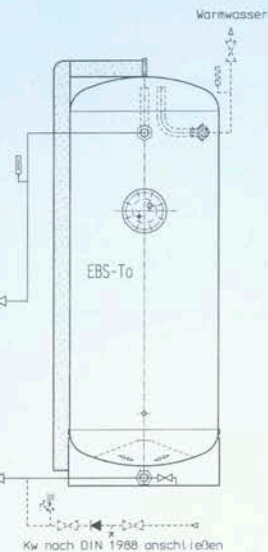
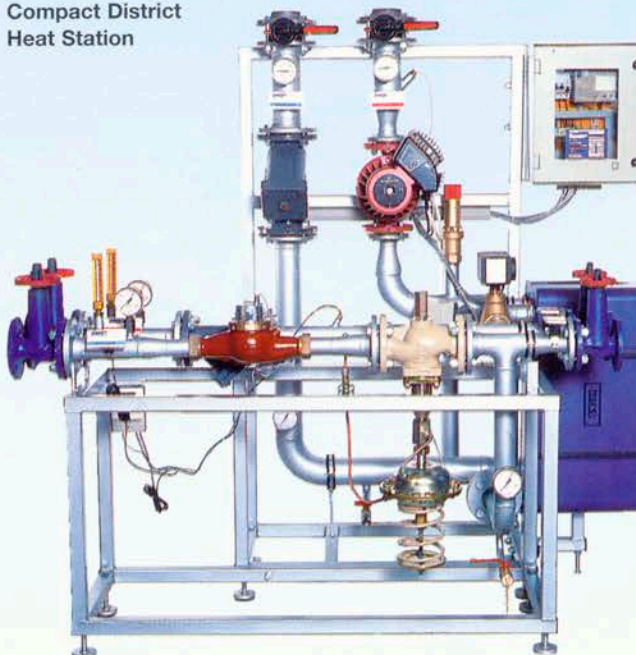
## DMS special programme

tube bundle heat exchanger  
steamheated high temperature water or oil heated steam generators

**Storage Steel Tanks any kind and capacity up to 30000 liter max. working pressure 25 bar cylindric or cornered according to any individual demand**

Accumulator Water-Heater

Compact District Heat Station



# heat exchangers - hot water systems - district heating stations

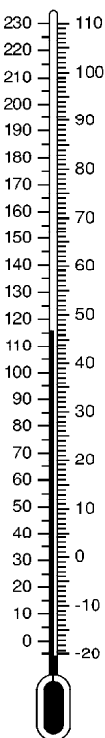
## CONVERSION TABLES

physical quantity	name of unit	symbol for unit
length	meter	m
mass	kilogram	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	kelvin	K
luminous intensity	candela	cd
area	square meter	m <sup>2</sup>
volume	cubic meter	m <sup>3</sup>
density	kilogram per cubic meter	kg/m <sup>3</sup>
velocity	meter per second	m/s

Physical quantity	name of unit	symbol for unit
pressure	kilopascal	kPa
bending moment	newton meter	N·m
kinematic viscosity,		
diffusion coefficient	square meter per second	m <sup>2</sup> /s
dynamic viscosity	newton second per sq. meter	ns/m <sup>2</sup>
electric field strength	volt per meter	V/m
magnetic field strength	ampere per meter	A/m
luminance	candela per square meter	cd/ m <sup>2</sup>

*Symbols for units do not take a plural form.*

### °FAHRENHEIT °CELSIUS



BOILING POINTS  
212°F / 100°C

FREEZING POINTS  
32°F / 0°C

Conversion °F to °C  
- Subtract 32  
- Divide by 1.8

Example  
131°F - 32 = 99  
99 : 1.8 = 55°C

Conversion °C to °F  
- Multiply by 1.8  
- Add 32

Example  
30°C x 1.8 = 54  
54 + 32 = 86°F

### Distance

Metric	Customary	Customary	Metric
1 millimeter (mm) =	0.03937 inch	1 inch =	25.4 millimeters
1 decimeter (dm) =	0.3281 foot	1 foot =	0.3048 meter
1 meter (m) =	3.281 feet	1 yard =	0.9144 meter
	= 1.094 yard	1 furlong =	201.17 meters
1 kilometer (km) =	0.6214 mile	1 mile =	1.609 kilometers
1 kilometer (km) =	1000 meters		
1 meter (m) =	100 centimeters		
1 centimeter (cm) =	10 millimeters		

### Inches into Millimeters

Inches	mm	Inches	mm	Inches	mm	Inches	mm
1	25.40	14	355.60	27	685.80	39	990.60
2	50.80	15	381.00	28	711.20	40	1016.00
3	76.20	16	406.40	29	736.60	41	1041.40
4	101.60	17	431.80	30	762.00	42	1066.80
5	127.00	18	457.20	31	787.40	43	1092.20
6	152.40	19	482.60	32	812.80	44	1117.60
7	177.80	20	508.00	33	838.20	45	1143.00
8	203.20	21	533.40	34	863.60	46	1168.40
9	228.60	22	558.80	35	889.00	47	1193.80
10	254.00	23	584.20	36	914.40	48	1219.20
11	279.40	24	609.60	37	939.80	49	1244.60
12	304.80	25	635.00	38	965.20	50	1270.00
13	330.20	26	660.40				

### Fractions of an inch into Decimals and into Millimeters

Inches	Decimals of an Inch	mm	Inches	Decimals of an Inch	mm	Inches	Decimals of an Inch	mm
1/32	.0312	0.79	3/8	.375	9.53	11/16	.6875	17.46
1/16	.0625	1.59	13/32	.4062	10.32	23/32	.7187	18.26
3/32	.0937	2.38	7/16	.4375	11.11	3/4	.750	19.05
1/8	.125	3.18	15/32	.4687	11.91	25/32	.7812	19.84
5/32	.1562	3.97	1/2	.500	12.70	13/16	.8125	20.64
3/16	.1875	4.76	17/32	.5312	13.49	27/32	.8437	21.43
7/32	.2187	5.56	9/16	.5625	14.29	7/8	.875	22.23
1/4	.250	6.35	19/32	.5937	15.08	29/32	.9062	23.03
9/32	.2812	7.14	5/8	.625	15.88	15/16	.9375	23.81
5/16	.3125	7.94	21/32	.6562	16.67	31/32	.9687	24.61
11/32	.3437	8.73				1	1.00	25.40

### Area

1 square inch =	645.16 square millimeters	1 square mile =	2.590 square kilometers
1 square foot =	0.0093 square meter	1 square millimeter =	.00155 square inch
1 square yard =	0.836 square meter	1 square meter =	10.76 square feet
1 acre =	0.405 hectare*	1 square meter =	1.196 square yard
1 square mile* =	259.0 hectares	1 hectare* =	2.471 acres
*1 hectare = 1 square hectometer = 10000 sqm		*1 square kilometer =	
		0.386 square mile	

### Weight

1 gram =	0.032 ounce (troy)
1 gram =	0.035 ounce (avoir)
1 kilogram =	2.679 pounds (troy)
1 kilogram =	2.205 pounds (avoir)
1 tonne =	1.102 ton (short)
1 ounce (troy) =	31.103 grams
1 ounce (avoir) =	28.350 grams
1 pound (troy) =	373.242 grams
1 pound (avoir) =	453.592 grams
1 ton (short) =	0.907 tonne*
1 kg =	1000 grams

\*1 tonne (t) = 1000 kilograms

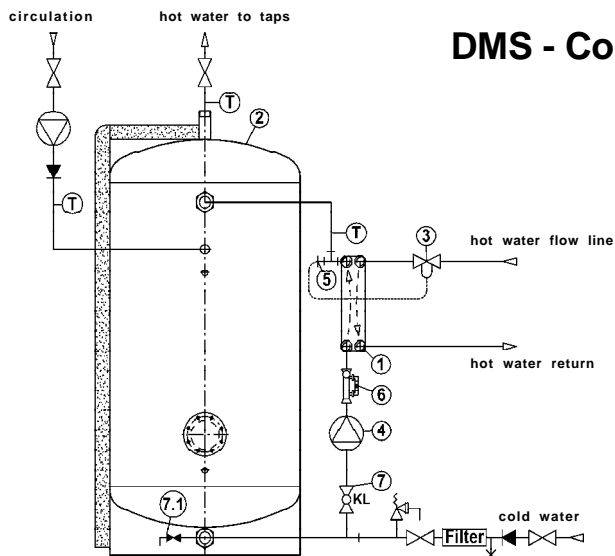
### Capacity

<b>U.S.</b>	
1 pint (U.S.) =	0.473 liter
1 quart (U.S.) =	0.946 liter
1 gallon (U.S.) =	3.785 liters
1 barrel (U.S.) =	158.98 liters
<b>Imperial</b>	
1 pint =	0.568 liter
1 gallon =	4.546 liters
1 bushel =	36.369 liters
1 liter* =	0.880 pint
1 liter* =	0.220 gallon
1 hectoliter** =	2.838 bushels
*1 liter (l) = 100 cl. **1 hectoliter (hl) = 100 liters	

### Volume

1 cubic inch =	16387 cubic mm
1 cubic foot =	0.0283 cubic meter
1 cubic yard =	0.765 cubic meter
1 cubic centimeter =	0.061 cubic inch
1 cubic meter =	35.315 cubic feet
	1.308 cubic yard

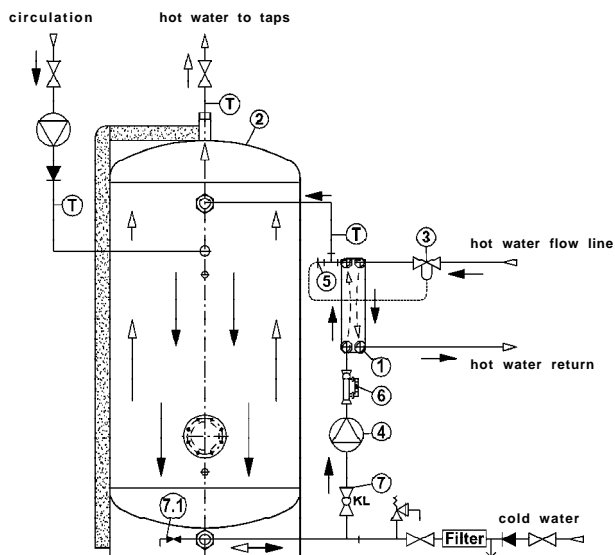
## heat exchangers - hot water systems - district heating stations



### DMS - Combined - Water - Heating - Systems storing and charging

#### System bevor starting (filled up)

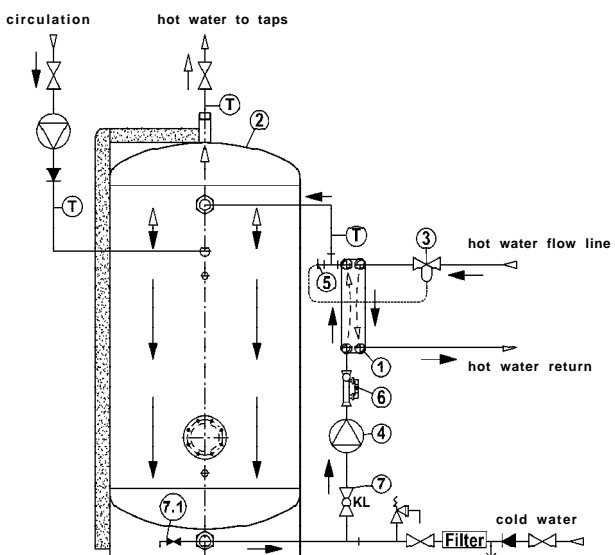
- 1) heat exchanger
- 2) hot water storage tank
- 3) water temperature regulator
- 4) charging pump
- 5) sensor connection point
- 6) taco-setter
- 7) shut of valve
- 7.1) draining



#### System loaded or unloaded

↓ charging

↑ unloading



#### System loaded - circulation running



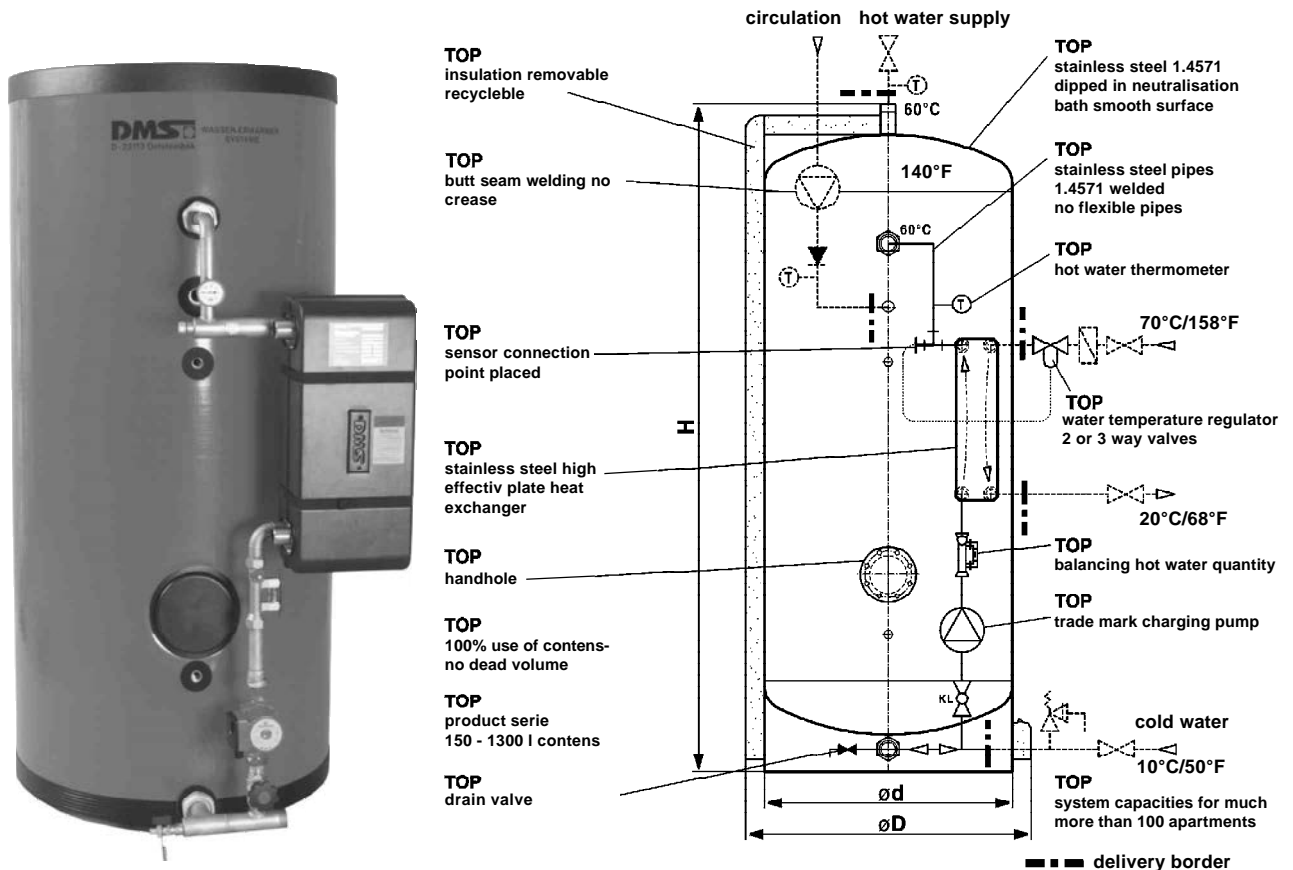
## heat exchangers - hot water systems - district heating stations

### KWS-K-System Series TOP

#### Central Water Heating System

shortest time of delivery

for apartment houses, designed according to German Standard DIN 4708  
and running according to DVGW-recommendation W551 (reducing growth of Legionellaes)  
DMS KWS-K Systems ready for use with welded stainless steel pipework  
on secondary side – removable



### KWS-K-System Series TOP

On request with additional Legiokill-Disinfection volume:  
System Legiomin® for killing of Legionellaes

\*Water temperature regulator will be designed and offered separately

## heat exchangers - hot water systems - district heating stations

### Data sheet for KWS-K-System Series TOP

water heating from 10 @ 60°C 50 @ 140°F

primary temperatures

A) 70 @ 40°C B) 80 @ 30°C C) 70 @ 25°C D) 75 @ 20°C E) 65 @ 25°C F) 70 @ 20°C  
158 @ 104°F 176 @ 86°F 158 @ 77°F 167 @ 68°F 149 @ 77°F 158 @ 68°F

KWS-K System tank contents (l) heat capacity (kW)	hot water supply acc. DIN 4708 Number of apartments	measures (mm)			weight
		H	ød	øD	kg
150 - 16 - ... *	3	1460	400	560	72
225 - 20 - ... *	6	1470	500	660	95
300 - 20 - ... *	8	1720	500	660	120
300 - 30 - ... *	11				122
300 - 40 - ... *	14				125
300 - 60 - ... *	20				128
300 - 85 - ... *	28				132
400 - 20 - ... *	11	1750	600	760	145
400 - 30 - ... *	15				147
400 - 40 - ... *	18				150
400 - 60 - ... *	25				153
400 - 85 - ... *	32				157
500 - 30 - ... *	17	1804	650	810	160
500 - 40 - ... *	21				163
500 - 60 - ... *	27				165
500 - 85 - ... *	37				168
500 - 110 - ... *	45				172
500 - 135 - ... *	56				175
650 - 40 - ... *	24	1830	750	910	195
650 - 60 - ... *	33				198
650 - 85 - ... *	43				200
650 - 110 - ... *	53				203
650 - 135 - ... *	63				210
750 - 60 - ... *	36	1850	800	960	220
750 - 85 - ... *	47				225
750 - 110 - ... *	58				230
750 - 135 - ... *	67				235
750 - 160 - ... *	77				240
750 - 180 - ... *	85				245
1000 - 85 - ... *	54	2103	850	1010	310
1000 - 110 - ... *	66				315
1000 - 135 - ... *	80				320
1000 - 160 - ... *	87				325
1000 - 180 - ... *	98				330
1000 - 205 - ... *	110				340

\* primary temperature A - F

max. operating temperature primary 185°C/365°F secondary 95°C/203°F max. head loss A) 100 mbar C) 95 mbar E) 60 mbar  
max. operating working pressure 25 bar 10 bar B) 40 mbar D) 70 mbar F) 40 mbar

**Water temperature regulator will be designed and offered separately**

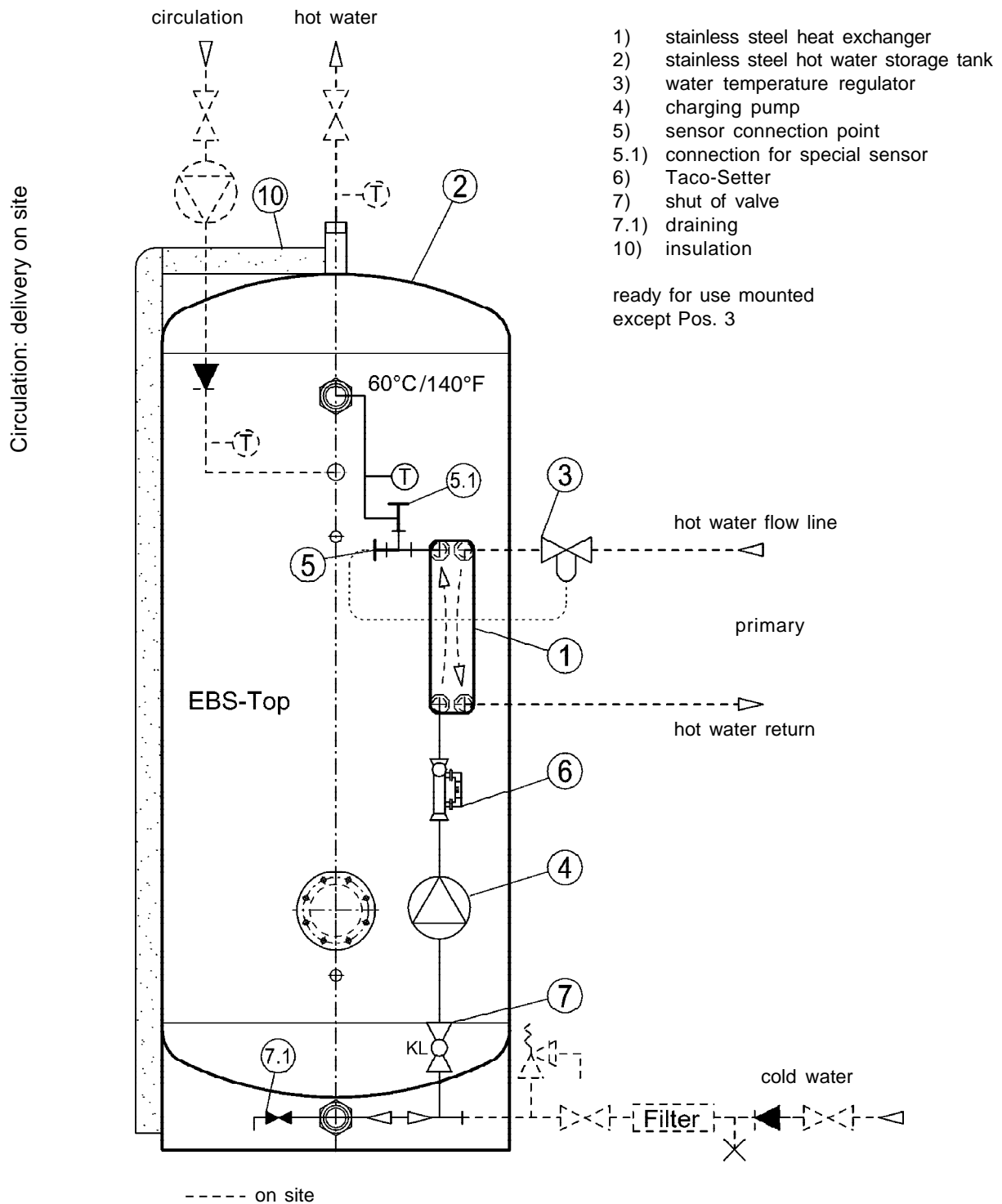
On request with additional Legiokill-Disinfection volume = System Legiomin®



**heat exchangers - hot water systems - district heating stations**

**DMS - KWS - K-TOP**

**Combined water heating system storing and charging**



## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<b>DMS KWS-K-TOP System</b> hot water system ready for use storing and charging combined pipework of welded stainless steel (no flexible pipes acc. to hygienic requirements) with gun metal fittings  <b>Type: KWS-K-TOP _____</b> consisting of:		
(1)		<b>brazed plate heat exchanger</b> material: steel 1.4401 (AISI 316) stainless steel with insulation Type: PS-LG _____		
(2)		<b>___ stainless steel hot water storage tank</b> Type: EBS -TOP _____ contents: _____ l constructed and built according to DIN 4753 part 1, vertical designed, material quality 1.4571 (conformant to US.AISI 316Ti) with all necessary connections and hand hole, pickled and neutralized with removable soft foam insulation with plastic cover		
(3)		<b>water temperature regulator</b> two-/three-way valve (not mounted) with/without safety thermostat Type: Samson _____		
(4)		<b>charging pump</b> material stainless steel/bronze Type: Grundfos / Wilo _____		
(6)		<b>balancing/setting valve</b> Type: TACO-Setter 23 - _____  including shutt/off valve and thermometer  max. working pressure/-temp. secondary: 10 bar/ 95°C/203°F) primary: 25 bar/ 185°C/365°F)  height: _____ mm diameter/width: _____ mm weight: _____ kg  boiler input: _____ kW  primary: temperature: _____ °C/°F head loss: _____ kPa  secondary: temperature: _____ °C/°F head loss: _____ kPa  <b>DMS Wasser- Wärmetechnik GmbH</b>  <b>Total Price:</b>		



## heat exchangers - hot water systems - district heating stations

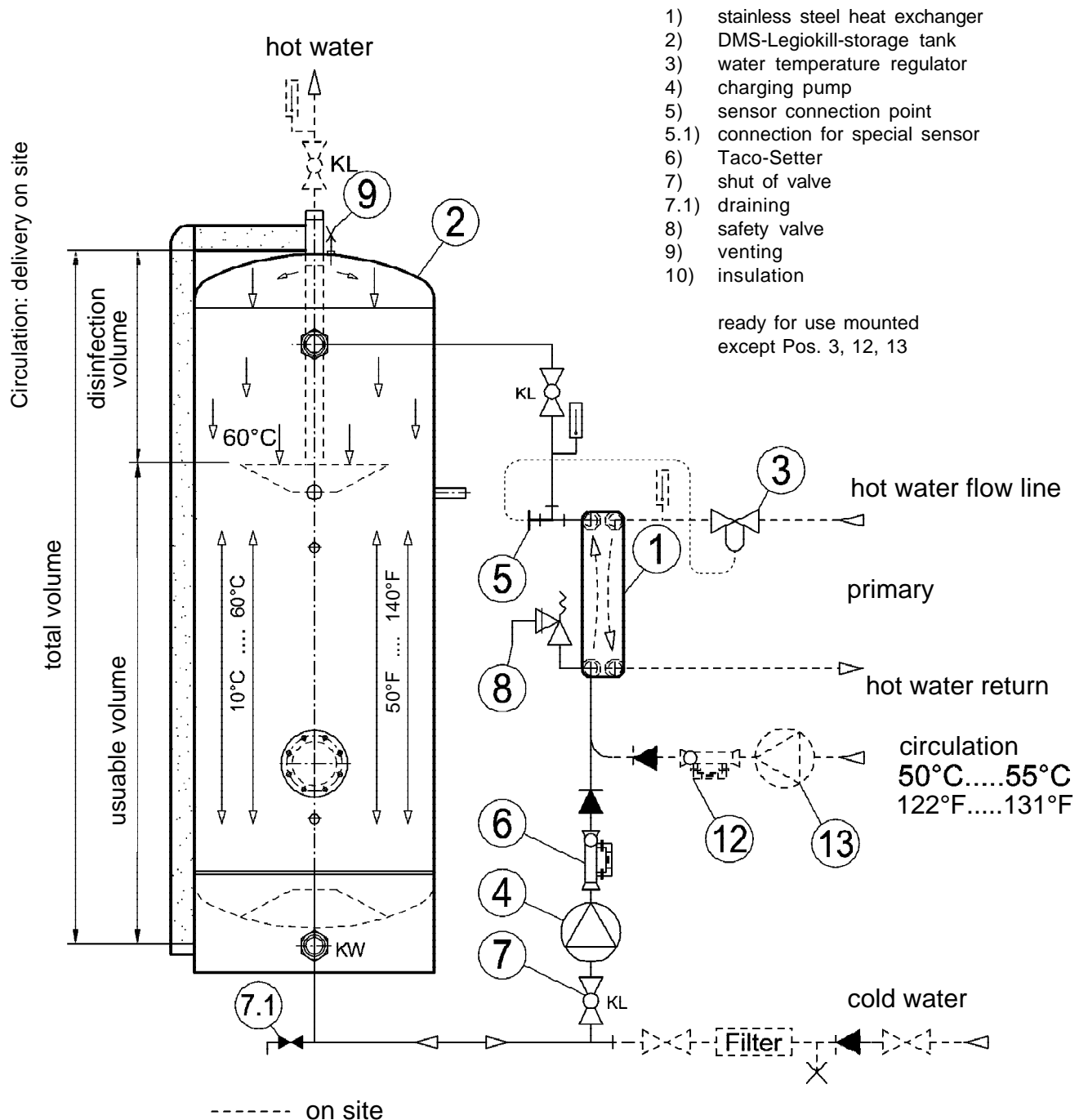
Position	Quantity	Article	single price EUR	total price EUR
		<b>DMS KWS-K-TOP System</b> hot water system ready for use storing and charging combined pipework of welded stainless steel (no flexible pipes acc. to hygienic requirements) with gun metal fittings  <b>Type: KWS-K-TOP _____</b> consisting of:		
(1)		<b>shell / coil heat exchanger</b> material: steel St37.2 / stainless steel 1.4571 (conformant to US.AISI 316Ti) with insulation Type: ER – SR _____		
(2)		<b>___ stainless steel hot water storage tank</b> Type: EBS -TOP _____ contents: _____ l constructed and built according to DIN 4753 part 1, vertical designed, material quality 1.4571 (conformant to US.AISI 316Ti) with all necessary connections and hand hole, pickled and neutralized with removable soft foam insulation with plastic cover		
(3)		<b>water temperature regulator</b> two-/three-way valve (not mounted) with/without safety thermostat Type: Samson _____		
(4)		<b>charging pump</b> material stainless steel/bronze Type: Grundfos / Wilo _____		
(6)		<b>balancing/setting valve</b> Type: TACO-Setter 23 - _____  including shutt/off valve and thermometer  max. working pressure/-temp. secondary: 10 bar/ 95°C/203°F) primary: 25 bar/ 185°C/365°F)  height: _____ mm diameter/width: _____ mm weight: _____ kg  boiler input: _____ kW  primary: temperature: _____ °C/°F head loss: _____ kPa  secondary: temperature: _____ °C/°F head loss: _____ kPa  <b>DMS Wasser- Wärmetechnik GmbH</b>  <b>Total Price:</b>		

## heat exchangers - hot water systems - district heating stations

# DMS - KWS - K - System Legiomin®

## Legionellae minimising hot water system

**with thermal disinfection in stationary dwell time of the 60°C/140°F heated water within Legiokill-storage tank**





## heat exchangers - hot water systems - district heating stations

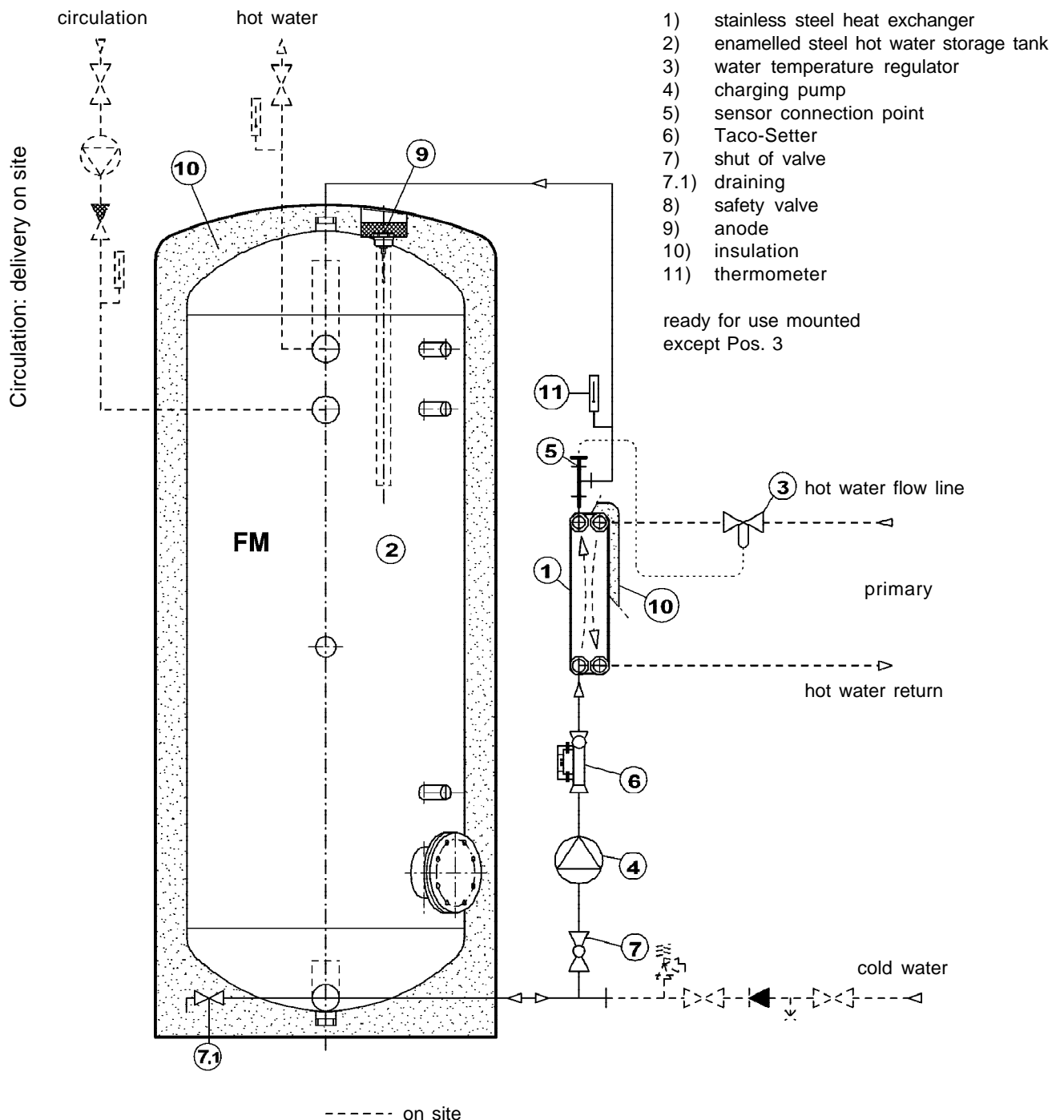
Position	Quantity	Article	single price EUR	total price EUR
		<b>DMS KWS-K System Legiomin®</b> hot water system legionellae protected ready for use, storing with disinfection volume and charging combined pipework of welded stainless steel (no flexible pipes acc. to hygienic requirements) with gun metal fittings <b>Type: KWS-K System Legiomin®</b> _____ consisting of:		
(1)		<b>brazed plate heat exchanger</b> material: steel 1.4401 (AISI 316) stainless steel with insulation Type: PS-LG _____		
(2)		<b>___ stainless steel hot water storage tank</b> Type: EBS -TOP-LK _____ usable contents: _____ l disinfection volume: _____ l constructed and built according to DIN 4753 part 1, vertical designed, material quality 1.4571 (conformant to US.AISI 316Ti) with all necessary connections and hand hole, pickled and neutralized with removable soft foam insulation with plastic cover		
(3)		<b>water temperature regulator</b> two-/three-way valve (not mounted) with/without safety thermostat Type: Samson _____		
(4)		<b>charging pump</b> material stainless steel/bronze Type: Grundfos / Wilo _____		
(6)		<b>balancing/setting valve</b> Type: TACO-Setter 23 - _____  including shutt/off valve and thermometer  max. working pressure/-temp. secondary: 10 bar/ 95°C/203°F primary: 25 bar/ 185°C/365°F  height: _____ mm diameter/width: _____ mm weight: _____ kg  boiler input: _____ kW  primary: temperature: _____ °C/°F head loss: _____ kPa  secondary: temperature: _____ °C/°F head loss: _____ kPa  <b>DMS Wasser- Wärmetechnik GmbH</b>  <b>Total Price:</b>		

## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<b>DMS KWS-K System Legiomin®</b> hot water system legionellae protected ready for use, storing with disinfection volume and charging combined pipework of welded stainless steel (no flexible pipes acc. to hygienic requirements) with gun metal fittings <b>Type: KWS-K System Legiomin®</b> _____ consisting of:		
(1)		<b>shell / coil heat exchanger</b> material: steel St37.2 / stainless steel 1.4571 (conformant to US.AISI 316Ti) with insulation Type: ER – SR _____		
(2)		<b>___ stainless steel hot water storage tank</b> Type: EBS -TOP-LK _____ usable contents: _____ l disinfection volume: _____ l constructed and built according to DIN 4753 part 1, vertical designed, material quality 1.4571 (conformant to US.AISI 316Ti) with all necessary connections and hand hole, pickled and neutralized with removable soft foam insulation with plastic cover		
(3)		<b>water temperature regulator</b> two-/three-way valve (not mounted) with/without safety thermostat Type: Samson _____		
(4)		<b>charging pump</b> material stainless steel/bronze Type: Grundfos / Wilo _____		
(6)		<b>balancing/setting valve</b> Type: TACO-Setter 23 - _____  including shutt/off valve and thermometer  max. working pressure/-temp. secondary: 10 bar/ 95°C/203°F primary: 25 bar/ 185°C/365°F  height: _____ mm diameter/width: _____ mm weight: _____ kg  boiler input: _____ kW  primary: temperature: _____ °C/°F head loss: _____ kPa  secondary: temperature: _____ °C/°F head loss: _____ kPa  <b>DMS Wasser- Wärmetechnik GmbH</b>  <b>Total Price:</b>		

# heat exchangers - hot water systems - district heating stations

## DMS - KWS - K Combined water heating system storing and charging enamelled performance



## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<b>DMS KWS-K System EM</b> hot water system ready for use volume and charging combined pipe-work of welded stainless steel (no flexible pipes acc. to hygienic requirements) with gun metal fittings <b>Type: KWS-K System EM</b> _____ consisting of:		
(1)		<b>brazed plate heat exchanger</b> material: steel 1.4401 (AISI 316) stainless steel with insulation Type: PS-LG _____		
(2)		<b>___ enamelled steel hot water storage tank</b> Type: FM / FFM _____ contents: _____ l constructed and built according to DIN 4753 part 1, vertical designed, material enamelled steel including protective anode with all necessary connections and hand hole, direct polyurethane foaming with outer shell of sheet steel up to 500 l contents 100 mm flexible foam insulation for 800 and 1000 l contents		
(3)		<b>water temperature regulator</b> two-/three-way valve (not mounted) with/without safety thermostat Type: Samson _____		
(4)		<b>charging pump</b> material stainless steel/bronze Type: Grundfos / Wilo _____		
(6)		<b>balancing/setting valve</b> Type: TACO-Setter 23 - _____  including shutt/off valve and thermometer  max. working pressure/-temp. secondary: 10 bar/ 95°C/203°F) primary: 25 bar/ 185°C/365°F)  height: _____ mm diameter/width: _____ mm weight: _____ kg  boiler input: _____ kW  primary: temperature: _____ °C/°F head loss: _____ kPa  secondary: temperature: _____ °C/°F head loss: _____ kPa  <b>DMS Wasser- Wärmetechnik GmbH</b>  <b>Total Price:</b>		



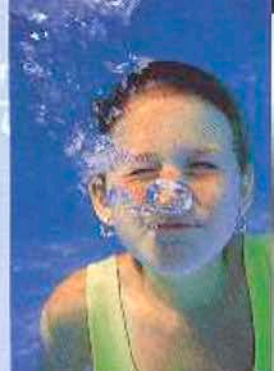
65°C 65°C Mischwasser zu den Ver  
geschlossen

# DMS

Wasser-Wärmetechnik GmbH

Hospitals, old age residence quarters,  
sports facilities, multiple dwelling  
...safety building!  
make your safety plans!

Water - health from the tap







# Water - the mere blessing?

Presumably by a big bang, the cosmos expanded 15 to 20 hundred million (US two billion) years ago, creating hydrogen and helium. Some time later, two hydrogen atoms were caught by an oxygen atom and fractioned into a water molecule. Water was born – the most precious substance of the universe – source of all life.

Our planet is the only one where it occurs in its liquid form, due to the proper distance to the sun. It follows an eternal circulation, containing dust, organic matter, air, carbon-dioxide, salts and – bacteria, the life of which depends on the proper temperature for bacterial growth.

Some bacteria are not harmful, others may involve a serious risk for us, if they occur in large numbers, and so is the *legionella pneumophila* which causes the legionnaire's disease, discovered as late as

in 1976. The microbes are introduced by cold drinking water. They feel at best in warm water installations at temperatures between 35°C/95°F and 45°C/113°F where they multiply into legions. Only temperatures of above 60°C/140°F will kill them, and this temperature is usually not reached in normal water heating plant.

Breathing in nebulized water – e.g. under the shower or in whirlpools – will take the bacteria to the lungs. Air conditioners as well are likely to spread them. An infectious disease similar to an influenza or pneumonia or even a true pneumonia may be the result. Moreover, for elderly and sick people, and for diabetics whose immune system is already weakened, the disease may take a serious course and may even be fatal. In Germany alone where hygiene is much more advanced compared to the worldwide standard, 2,000 people die every year from pneumonia caused by *legionella pneumophila*.

geschlossen

Kaltwasser

interne Verrohrung im Rohmengerüst



During the periods when no water is tapped, the charging pump of the DMS HORNE-Legiokill® System takes a partial quantity of the circulation water into the disinfecting tank where it is thermally disinfected. With a triple to quadruple circulation of the contents of the distribution and circulation system per hour, and of an assumed partial quantity of 25% of the water circulated through the disinfecting tank, the total contents of the distribution and circulation system will be disinfected about once in an hour.

#### Fields of Application:

Transplantation centres, hospitals, old age residence homes, sports facilities, and multiple dwelling houses.



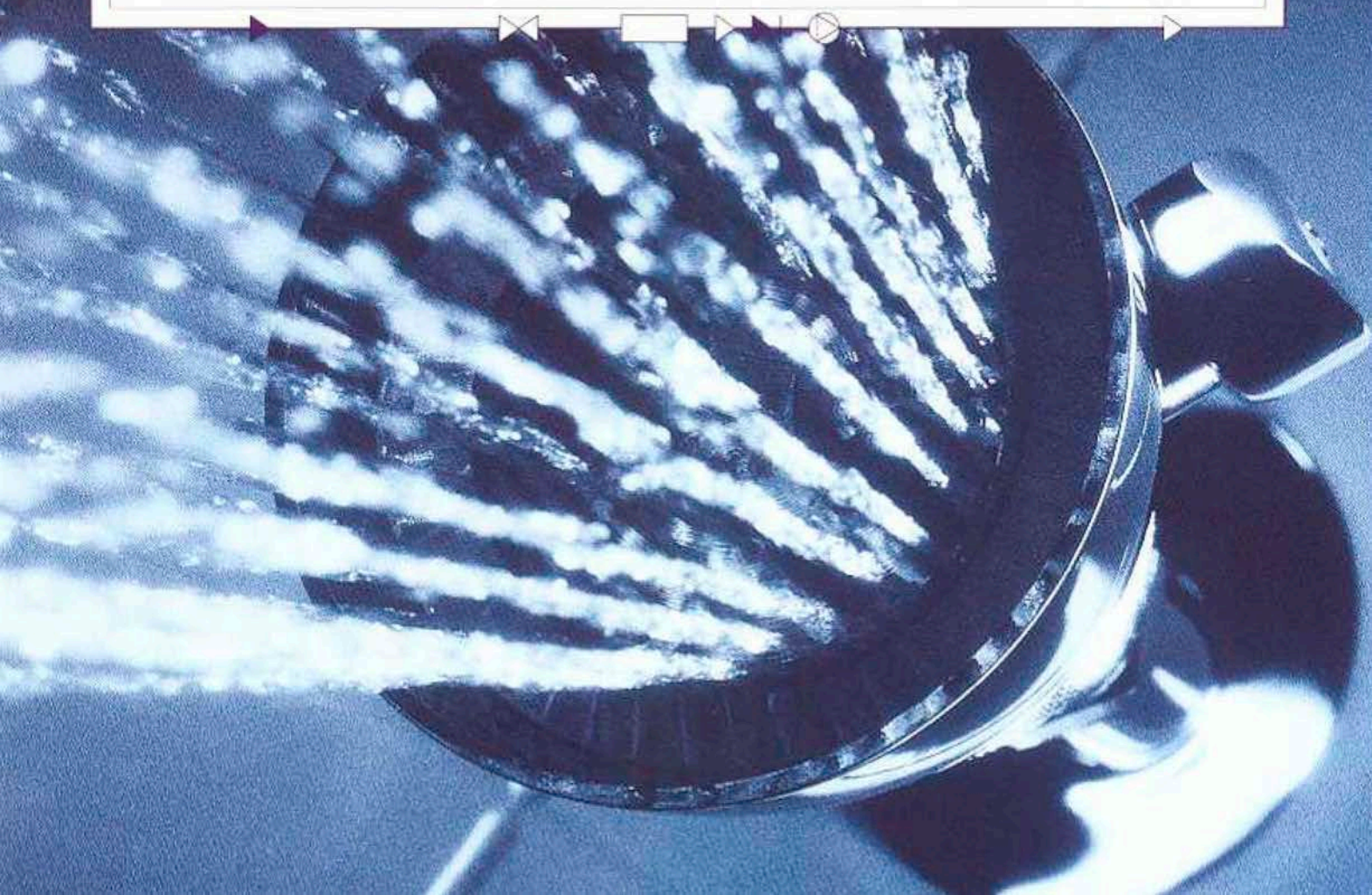
The DMS-Legiokill System Desin-Therm® will completely disinfect the volume stream of the circulation water during the night (e.g. between 1<sup>00</sup> and 2<sup>00</sup> o'clock) via the charging pump and the disinfection tank. Simultaneously, the temperature in the distribution system is raised for e.g. 65°C / 149°F to 70°C / 158°F in order to likewise kill any potential germs which may have deposited in place (biofilm). An increase in the number of germs in the distribution system (systemic contamination) is limited by this process, despite the reduced distribution temperature.



#### Fields of Application:

as above, but providing for a disinfecting temperature of 70°C / 158°F because of the expected increased risk. For larger quantities tapped, and for large circulation streams, a control via control technology will be possible.

# Water - germ free from the tap







# Water - the latest state of the art

The system operates in 4 steps:

- The incoming cold drinking water is first heated up to the disinfection temperature of at least 65°C / 149°F.
- The stationary dwell time of the heated water in the disinfection tank is at least five minutes in buildings class 2, and 10 minutes in buildings class 1.
- The legionella-free water is then mixed or cooled down to the desired operating temperature.
- With the DMS HORNE-Legiokill® System, the circulation water is taken back via a HORNE circulation water distribution valve and treated via the charging and flow-through water heater, subject to subsequent disinfection while the water stays in the disinfection room.
- With the DMS Legiokill System-Desin-Therm®, the thermal disinfection is carried out as above, but with an additional auto-

matic increase in the temperature during the night in the whole drinking water distribution and circulation network.

Based on proper planning, execution, operation and monitoring, a growth of legionella up to risky concentrations cannot occur in the system conceived and distributed by us. Several hundred installations may serve as a reference.

During the assembly of the systems we supply, we advise the installation firms on site whenever required. We do the initial operation together with the fitter and the operator.

In addition, we are available to the hygienist in charge of the project during the planning stage as well as for the assembly and later system monitoring and servicing in accordance with safety standards.

geschlossen

Kaltwasser

Interne Verrohrung im Rahmengerüst



For about 25 years, DMS Wasser-Wärmetechnik GmbH have been involved in heat exchangers and water heating systems and the pertaining hygienic aspects of the drinking water.

Since 1974, we have represented the British company THE HORNE ENGINEERING CO.LTD. who supplied the basic features of the DMS HORNE-Legiokill® System for which we are the market leader today. In this process, the water is first heated up to at least 65°C/149°F through a drinking water heating unit designed by us for the purpose. This water of 65°C/149°F is then mixed down to a temperature of 45°C/113°F to 55°C/131°F by adding previously cooled water. This mixed water, both quantities of which are free from legionella, is then taken to the user.

For hot drinking water supply units of large quantities tapped, of large circulation streams, or accompanied by electric heating of the distribution system as well as for installations which are to be operated at a temperature of more than 70°C/158°F due to a higher expected risk, we offer the patented DMS-Legiokill System-Desin-Therm® units developed by DMS.

Our delivery programme is completed by DMS district heat compact stations to heat entire buildings with and without hot water generation and providing for direct or indirect operation. Whatever requirements you or your orderer will have, we can always offer the optimum solution for your project.

DMS Wasser-Wärmetechnik GmbH

# Water - our service to health





The DMS district heat compact station with or without hot water generation in a direct or indirect operation, in a welded execution – mounted vibration free to an assembly frame – is the standard installation of our programme. It is completely piped and wired, consists of soldered DMS sheet type heating transmitters, is equipped with a weather dependent control giving priority for hot water generation and a limitation of the reflux temperature. On the primary side, it is equipped with a motor valve, a differential pressure regulator and a flow-through limiter as well as with an adapter for the heat quantity counter. On the secondary side, it is provided with a temperature control, heating circulation pump and a fore-running feeler.

Our DMS-KWS-K-System – a system ready-for-use for storing and charging – consists of a soldered DMS sheet type heat exchanger, a regulator not requiring auxiliary energy, a tank charging pump, a balancing and

65°C Mischwasser zu den Verbrauchern  
setting valve and the DMS hot water tank. The system is supplied completely piped on the drinking water side.

#### Fields of Application:

Dwelling houses for one family or more, hotels, hospitals, sports facilities, administration, and industrial premises.

#### Kind request to the reader:

You may order detailed technical information and special publications by the enclosed fax reply sheet.

Or you simply dial our information hotline 049 40/71 39 09 - 0, telefax 049 40/71 39 09 - 87.  
Internet: <http://www.dms-online.de>  
E-mail address: [info@dms-online.de](mailto:info@dms-online.de)

**DMS**  
Wasser-Wärmetechnik GmbH

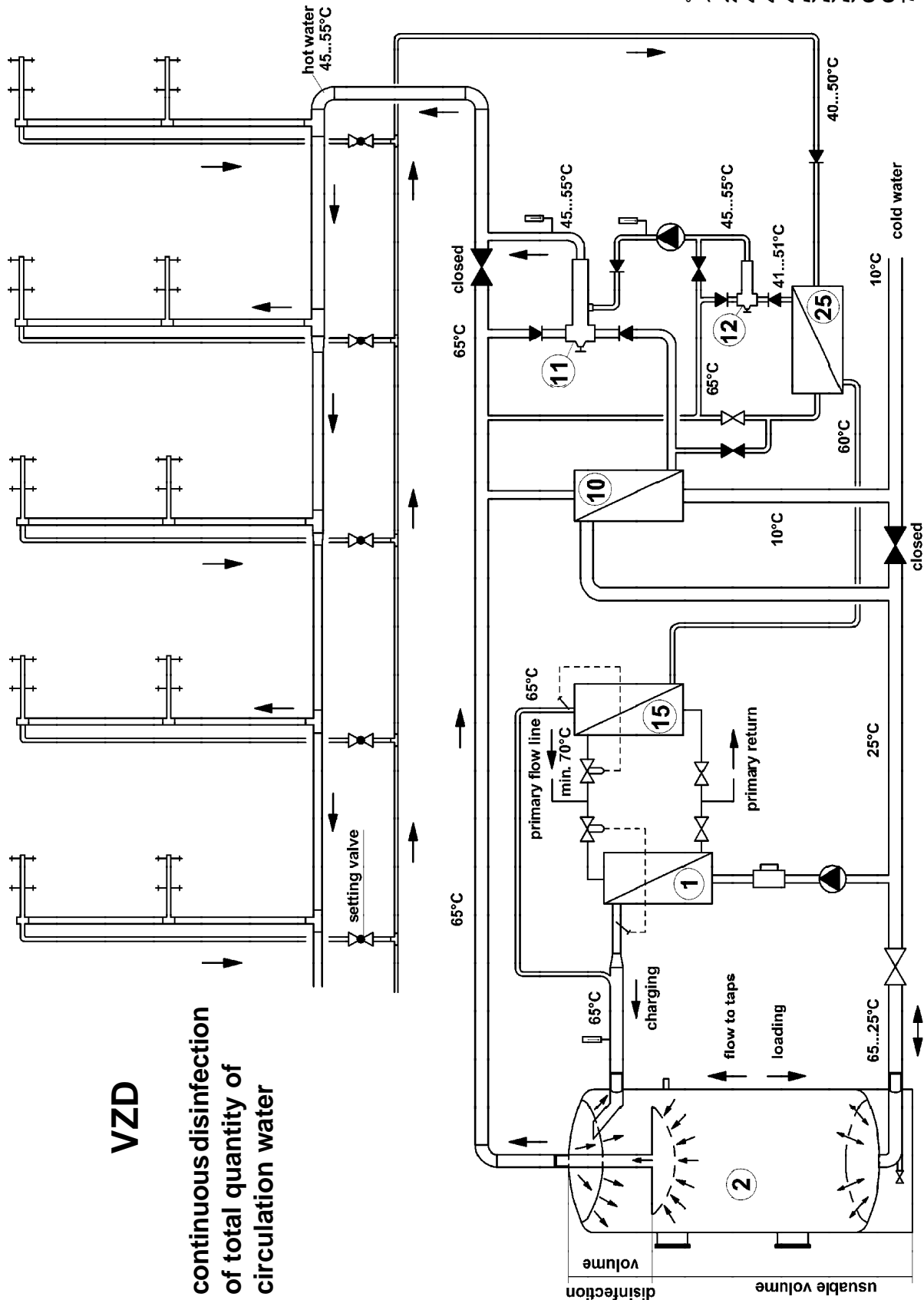
## Water - and heat for life



# DMS - HORNE - Legiokill® System VZD

VZD

continuous disinfection  
of total quantity of  
circulation water

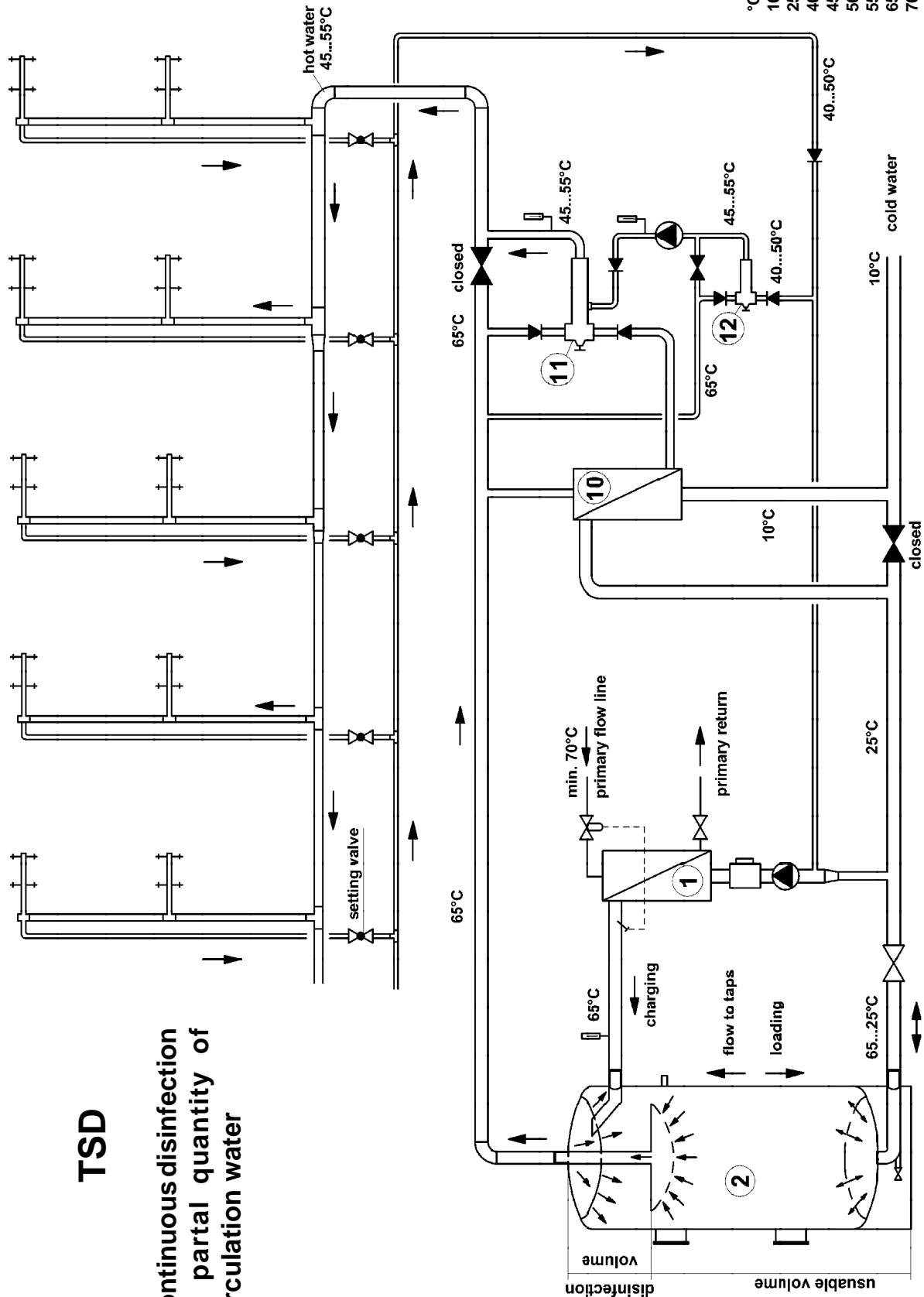




# DMS - HORNE -Legiokill® System TSD

**TSD**

continuous disinfection  
of partial quantity of  
circulation water



°C	°F
10	50
25	77
40	104
45	113
50	122
55	131
65	149
70	158

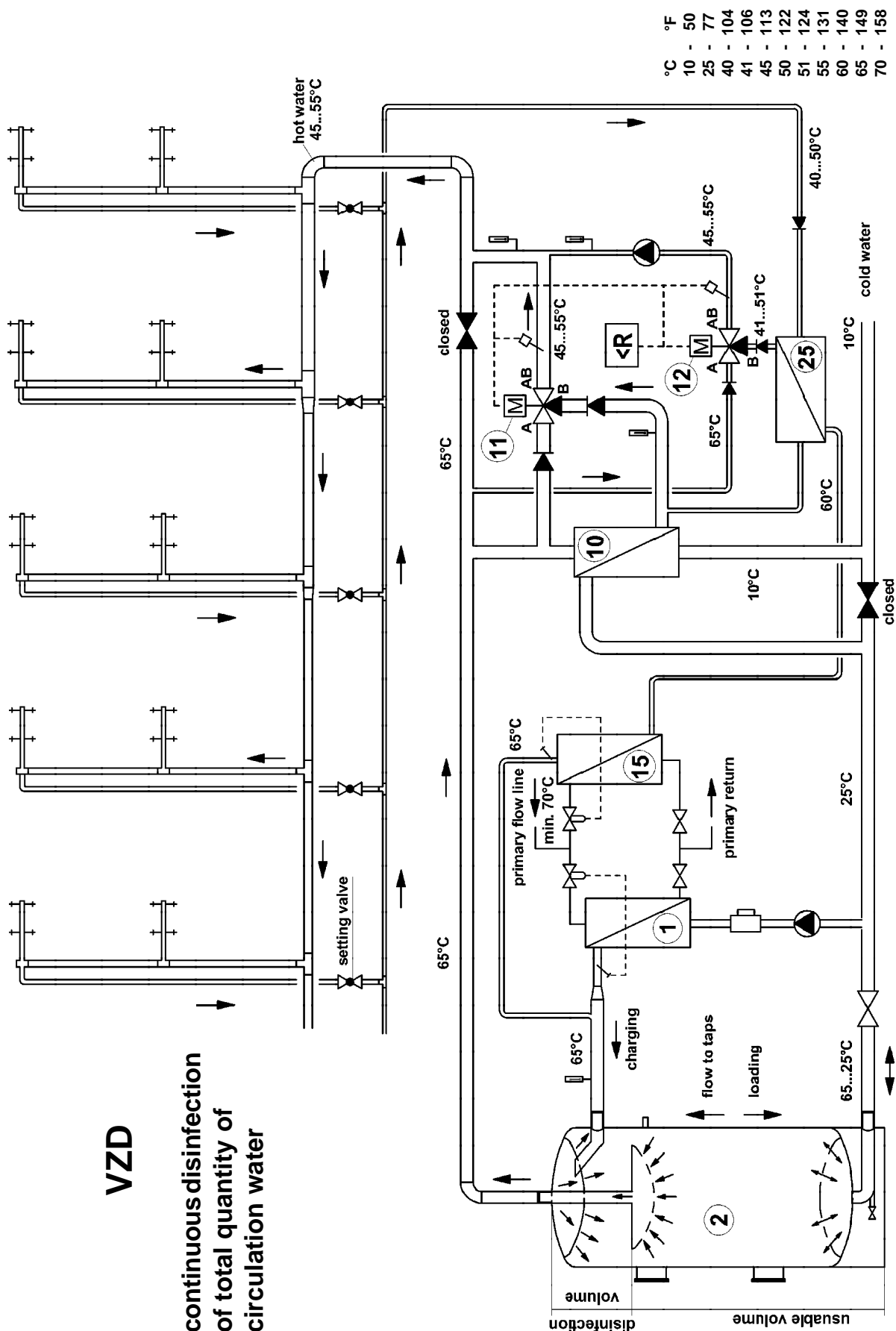


**heat exchangers - hot water systems - district heating stations**

# DMS - Legiokill - System Desin-Therm® VZD

**VZD**

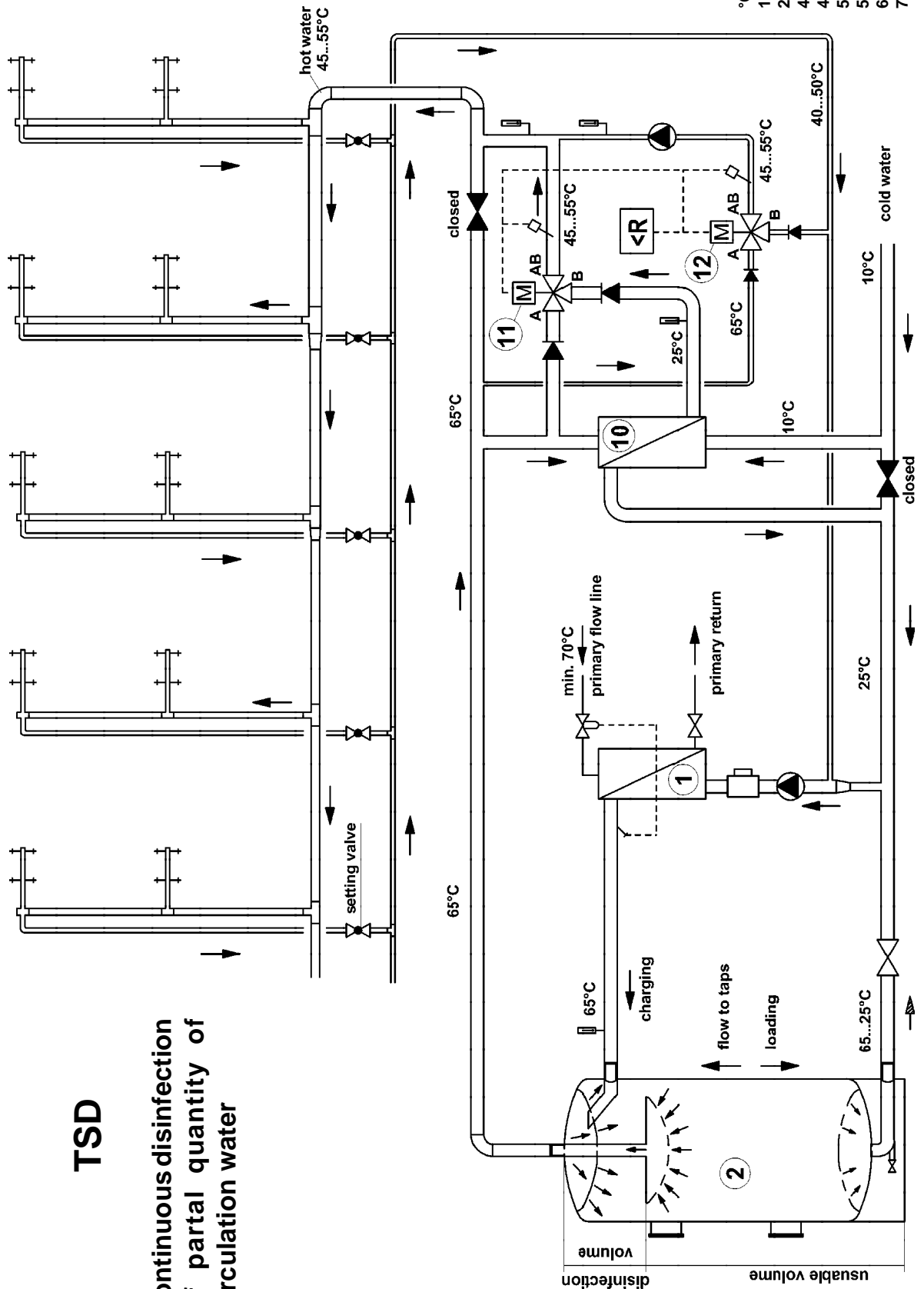
**continuous disinfection  
of total quantity of  
circulation water**



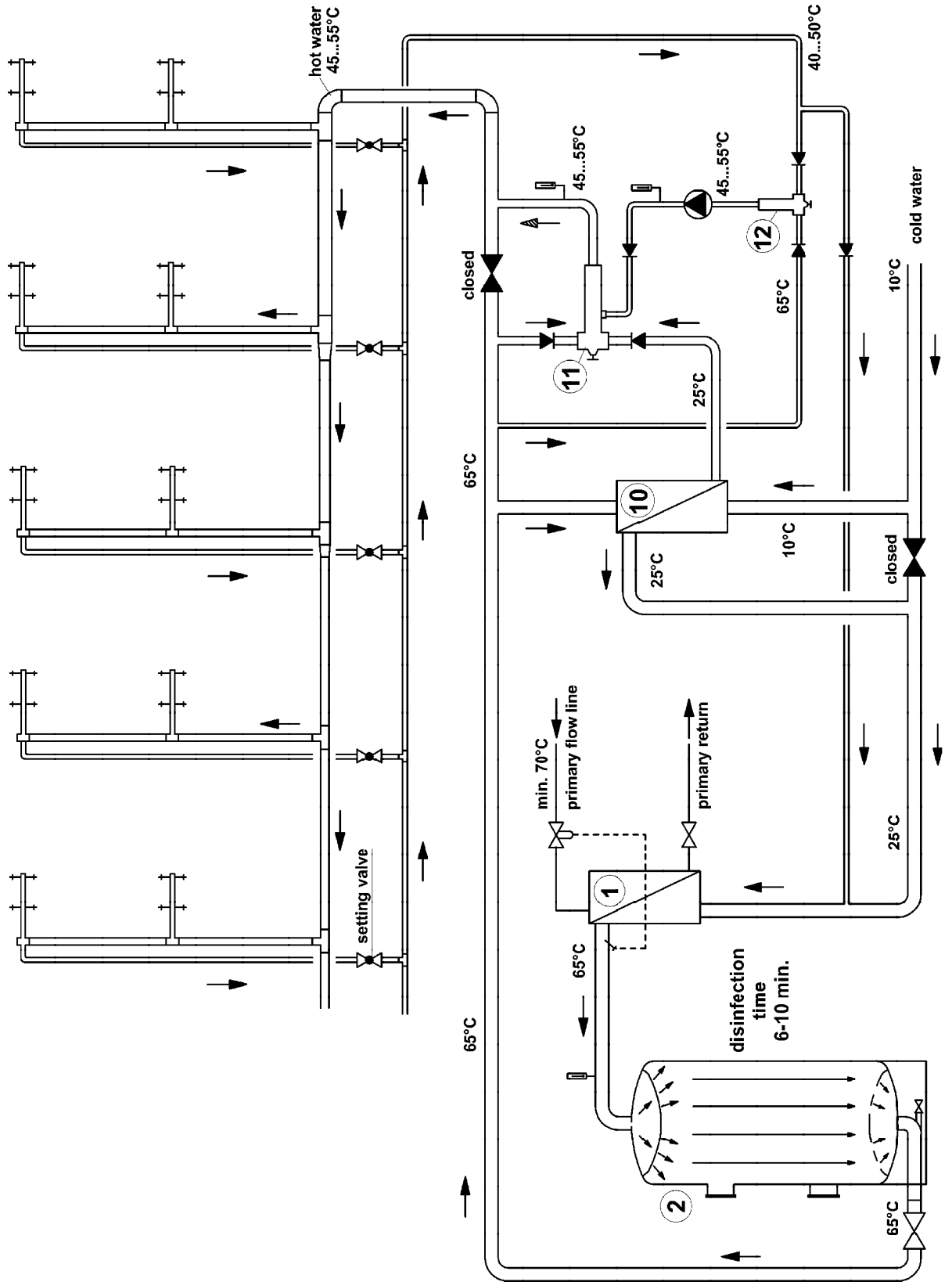
# DMS - Legiokill - System Desin-Therm® TSD

**TSD**

continuous disinfection  
of partial quantity of  
circulation water



# DMS - HORNE - Legiokill® Full - Flow - System



°C	°F
10	50
25	77
40	104
45	113
50	122
55	131
65	149
70	158

# DMS - Legiokill - System Desin-Therm® Full - Flow

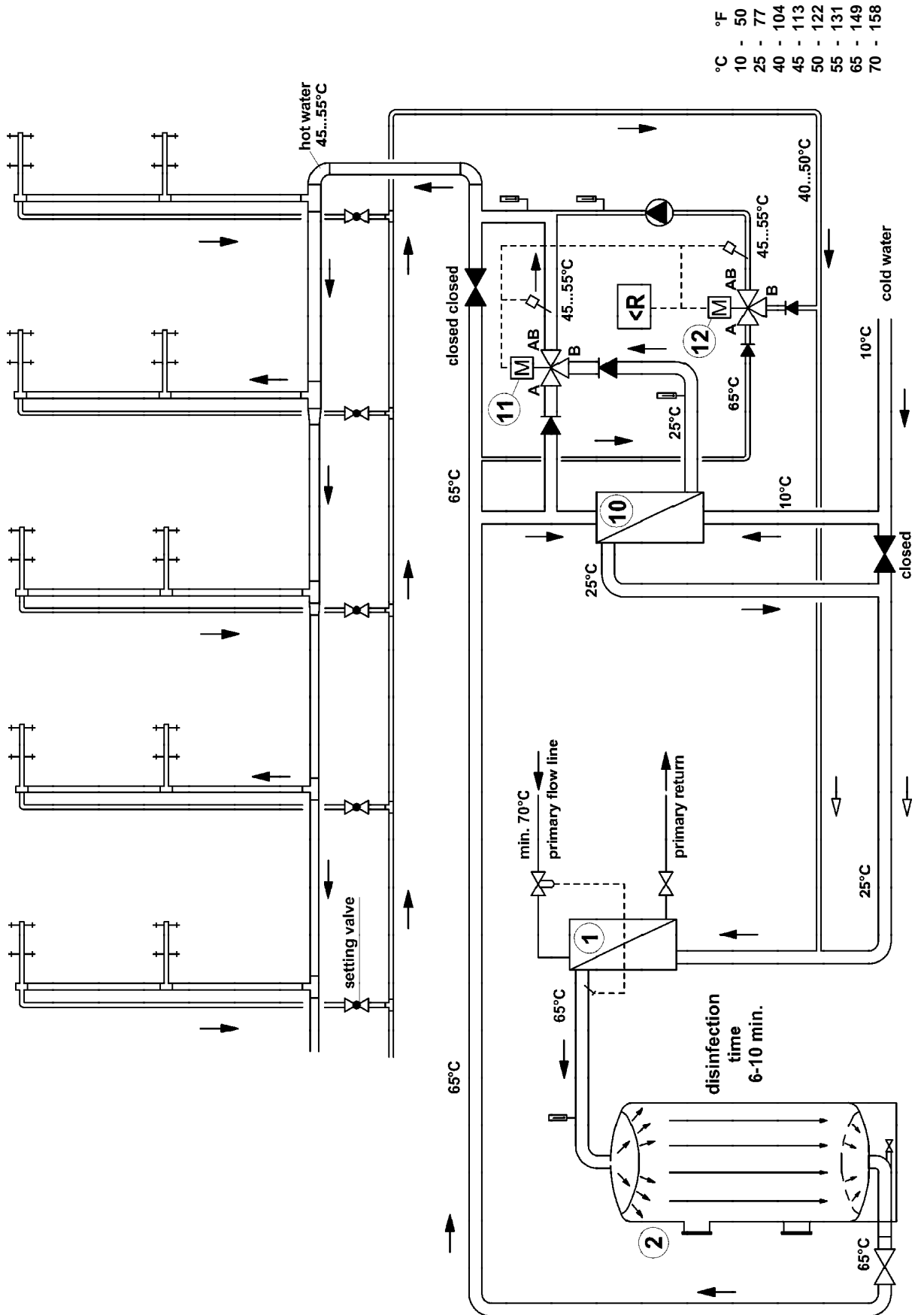
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**DMS**  
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heat exchangers - hot water systems - district heating stations





**heat exchangers - hot water systems - district heating stations**

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS - HORNE - Legiokill® - System VZD</b></p> <p>hot water generator with legionellae killing device, shown/designed acc. to flow-diagram Drawing-No.: _____ with continuous disinfection of <b>total quantity</b> of circulation water</p> <p>Killing of legionellae by heating to disinfection temperature of at least 65 to 70 °C (149 to 158 °F) Stationary dwell time within disinfection volume of storage tank 5 to 10 minutes</p> <p>Cooling down by hot water chiller and mixed to desired operating temperature 45 to 55 °C (113 to 131 °F) without any loss of energy and therefore no danger of scalding at the taps</p> <p>Continuous disinfection of total quantity of circulation water by reheating to disinfection temperature by separate heat exchanger and keeping in the disinfection volume of the storage tank</p> <p>Legiokill-unit inside painted frame construction pipework of inert gas welded and additonal glas bead blasted stainless steel 1.4571 (AISI 316TI) (no flexible pipes acc. to hygienic requirements!)</p> <p>Pipes and valves not insulated</p> <p>Glas covered flow diagram mounted into framework</p> <p>Primary pipework and electric wiring on site</p> <p>Storage tanks and heat exchangers with all necessary internals, connections, hand holes, and complete removable and recyclable insulation</p>		



## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
( 3 )		1 pc. <b>Water temperature regulator</b> without auxiliary energy two-/three-way valve*, according to heat exchanger (Pos. 1) Type: _____		
( 4 )		1 pc. <b>Charging pump</b> material: stainless steel/bronze 220 V 60 Hz 400 V three phase* Type: _____		
( 5 )		1 pc. <b>Sensor connection point</b> material: stainless steel		
( 7 )		1 pc. <b>Setting/balancing valve</b> setting range: ____ - ____ l/min Type: TACO-Setter: _____		
( 10 )		1 pc. <b>DMS hot-water chiller</b> designed as braced plate heat exchanger Type: PS-LG _____		
( 11 )		1 pc. <b>DMS-HORNE hot water mixing valve</b> material: gun metal, tinned copper, adjustable temperature range: 30-80 °C (86-176 °F) Type: B.78 ____"		
( 12 )		1 pc. <b>DMS-HORNE hot water mixing valve</b> temperature control and adjust circulation flow, designed as described above Type: B.78 ____"		
( 13 )		1 pc. <b>Setting/balancing valve</b> setting range: ____ - ____ l/min Type: TACO-Setter: _____		
( 14 )		1 pc. <b>Circulation pump</b> material: stainless steel/bronze 220 V 60 Hz / 400 V three phase* Type: _____		
( 15 )		1 pc. <b>DMS circulation flow re-heater</b> designed as braced plate heat exchanger as described above Type: PS-LG _____		
( 16 )		1 pc. <b>Circulation water temperature regulator</b> as described above Type: _____		
( 17 )		1 pc. <b>Sensor connection point</b> material: stainless steel		
( 25 )		1 pc. <b>DMS circulation flow chiller</b> designed as braced plate heat exchanger as described above Type: PS-LG _____		
( 30 )		1 pc. <b>Circulation pump regulator</b> microprocessor controlled		
		* paint out not applicable details		

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**Wasser- Wärmetechnik GmbH**

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## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>Internal pipework equipped with:</b></p> <p><b>2 combined non-return/shut off valves, DVGW-certified</b></p> <p><b>5 easy going non-return valves, DVGW-certified</b></p> <p><b>min. 15 shut-off valves, DVGW-certified</b></p> <p><b>min. 3 safety valves, TÜV-certified</b></p> <p><b>min. 5 water sampling valves</b></p> <p><b>2 draining-valves</b></p> <p><b>8 thermometers for industrial purposes</b> quality-class 1.0</p> <p><b>Producer: DMS Wasser- Wärmetechnik GmbH</b></p> <p><b>Total system price:</b></p> <p>Initial operation, introduction, and instruction of technical staff, including operator's manual and protocoll</p> <p><b>Price:</b></p>		

**heat exchangers - hot water systems - district heating stations**

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS - HORNE - Legiokill® - System TSD</b></p> <p>hot water generator with legionellae killing device, shown/designed acc. to flow-diagram Drawing-No.: _____ with continuous disinfection of <b>partial quantity</b> of circulation water</p> <p>Killing of legionellae by heating to disinfection temperature of at least 65 to 70 °C (149 to 158 °F) Stationary dwell time within disinfection volume of storage tank 5 to 10 minutes</p> <p>Cooling down by hot water chiller and mixed to desired operating temperature 45 to 55 °C (113 to 131 °F) without any loss of energy and therefore no danger of scalding at the taps</p> <p>Continuous disinfection of partial quantity of circulation water by reheating to disinfection temperature by separate HORNE-circulation distribution valve and keeping in the disinfection volume of the storage valve</p> <p>Legiokill-unit inside painted frame construction pipework of inert gas welded and additonal glas bead blasted stainless steel 1.4571 (AISI 316TI) (no flexible pipes acc. to hygienic requirements!)</p> <p>Pipes and valves not insulated</p> <p>Glas covered flow diagram mounted into framework</p> <p>Primary pipework and electric wiring on site</p> <p>Storage tanks and heat exchangers with all necessary internals, connections, hand holes, and complete removable and recyclable insulation</p>		





## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
( 3 )		1 pc. <b>Water temperature regulator</b> without auxiliary energy two-/three-way valve*, according to heat exchanger (Pos. 1) Type: _____		
( 4 )		1 pc. <b>Charging pump</b> material: stainless steel/bronze 220 V 60 Hz 400 V three phase* Type: _____		
( 5 )		1 pc. <b>Sensor connection point</b> material: stainless steel		
( 7 )		1 pc. <b>Setting/balancing valve</b> setting range: ____ - ____ l/min Type: TACO-Setter: _____		
( 10 )		1 pc. <b>DMS hot-water chiller</b> designed as braced plate heat exchanger Type: PS-LG _____		
( 11 )		1 pc. <b>DMS-HORNE hot water mixing valve</b> material: gun metal, tinned copper, adjustable temperature range: 30-80 °C (86-176 °F) Type: B.78 ____"		
( 12 )		1 pc. <b>DMS-HORNE hot water mixing valve</b> temperature control and adjust circulation flow, designed as described above Type: B.78 ____"		
( 13 )		1 pc. <b>Setting/balancing valve</b> setting range: ____ - ____ l/min Type: TACO-Setter: _____		
( 14 )		1 pc. <b>Circulation pump</b> material: stainless steel/bronze 220 V 60 Hz / 400 V three phase* Type: _____		
( 15 )		1 pc. <b>DMS circulation flow re-heater</b> designed as braced plate heat exchanger as described above Type: PS-LG _____		
( 16 )		1 pc. <b>Circulation water temperature regulator</b> as described above Type: _____		
( 17 )		1 pc. <b>Sensor connection point</b> material: stainless steel		
( 22 )		1 pc. <b>Setting/balancing valve</b> setting range: ____ - ____ l/min Type: TACO-Setter: _____		
		* paint out not applicable details		

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**Wasser- Wärmetechnik GmbH**

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## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>Internal pipework equipped with:</b></p> <p><b>2 combined non-return/shut off valves, DVGW-certified</b></p> <p><b>3 easy going non-return valves, DVGW-certified</b></p> <p><b>min. 12 shut-off valves, DVGW-certified</b></p> <p><b>min. 2 safety valves, TÜV-certified</b></p> <p><b>min. 4 water sampling valves</b></p> <p><b>1 draining-valves</b></p> <p><b>6 thermometers for industrial purposes</b> quality-class 1.0</p> <p><b>Producer: DMS Wasser- Wärmetechnik GmbH</b></p> <p><b>Total system price:</b></p> <p>Initial operation, introduction, and instruction of technical staff, including operator's manual and protocoll</p> <p><b>Price:</b></p>		

**heat exchangers - hot water systems - district heating stations**

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS - Legiokill - System Desin - Therm® TSD</b></p> <p>hot water generator with legionellae killing device, shown/designed acc. to flow-diagram Drawing-No. _____ with continuous disinfection of <b>partial quantity</b> of circulation water</p> <p>Killing of legionellae by heating to disinfection temperature of at least 65 to 70 °C (149 to 158 °F) Stationary dwell time within disinfection volume of storage tank 5 to 10 minutes</p> <p>Cooling down by hot water chiller and mixed to desired operating temperature 45 to 55 °C (113 to 131 °F) without any loss of energy and therefore no danger of scalding at the taps</p> <p>Continuous disinfection of partial quantity of circulation water by reheating to disinfection temperature by separate electric motor hot water mixing valve with microprocessor controlled switch board an keeping in the disinfection volume of the storage tank</p> <p>Legiokill-unit inside painted frame construction pipework of inert gas welded and additional glas bead blasted stainless steel 1.4571 (AISI 316Ti) (no flexible pipes acc. to hygienic requirements!)</p> <p>Pipes and valves not insulated</p> <p>Glas covered flow diagram mounted into framework</p> <p>Primary pipework and electric wiring on site</p> <p>Storage tanks and heat exchangers with all necessary internals, connections, hand holes, and complete removable and recyclable insulation</p>		



**heat exchangers - hot water systems - district heating stations**

Position	Quantity	Article	single price EUR	total price EUR
( 3 )		1 pc. <b>Water temperature regulator</b> without auxiliary energy two-/three-way valve*, according to heat exchanger (Pos. 1) Type: _____		
( 4 )		1 pc. <b>Charging pump</b> material: stainless steel/bronze 220 V 60 Hz 400 V three phase* Type: _____		
( 5 )		1 pc. <b>Sensor connection point</b> material: stainless steel		
( 7 )		1 pc. <b>Setting/balancing valve</b> setting range: ____ - ____ l/min Type: TACO-Setter: _____		
( 10 )		1 pc. <b>DMS hot-water chiller</b> designed as braced plate heat exchanger Type: PS-LG _____		
( 11 )		1 pc. <b>DMS - electromotorcontrolled hot water mixing valve</b> material: gun metal, adjustable temperature range: 30-80 °C (86-176 °F) Type: _____		
( 12 )		1 pc. <b>DMS - electromotorcontrolled hot water mixing valve</b> temperature control and adjust circulation flow, designed as described above Type: _____		
( 13 )		1 pc. <b>setting/balancing valve</b> setting range: ____ - ____ l/min Type: TACO-Setter: _____		
( 14 )		1 pc. <b>Circulation pump</b> material: stainless steel/bronze 220 V 60 Hz / 400 V three phase* Type: _____		
( 15 )		1 pc. <b>DMS circulation flow re-heater</b> designed as braced plate heat exchanger as described above Type: PS-LG _____		
( 16 )		1 pc. <b>Circulation water temperature regulator</b> as described above Type: _____		
( 17 )		1 pc. <b>Sensor connection point</b> material: stainless steel		
( 22 )		1 pc. <b>Setting/balancing valve</b> setting range: ____ - ____ l/min Type: TACO-Setter: _____  1 pc. <b>DMS-switchbox</b> , microprocessor control for electro motor hot water mixing valves, internal mounted and wired  * paint out not applicable details		



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## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>Internal pipework equipped with:</b></p> <p><b>2 combined non-return/shut off valves, DVGW-certified</b></p> <p><b>3 easy going non-return valves, DVGW-certified</b></p> <p><b>min. 12 shut-off valves, DVGW-certified</b></p> <p><b>min. 2 safety valves, TÜV-certified</b></p> <p><b>min. 4 water sampling valves</b></p> <p><b>1 draining-valves</b></p> <p><b>6 thermometers for industrial purposes</b> quality-class 1.0</p> <p><b>Producer: DMS Wasser- Wärmetechnik GmbH</b></p> <p><b>Total system price:</b></p> <p>Initial operation, introduction, and instruction of technical staff, including operator's manual and protocoll</p> <p><b>Price:</b></p>		

## heat exchangers - hot water systems - district heating stations

### Basis to design hot water systems with thermal disinfection for Hospitals, Old-people-homes and Hotels

Date: \_\_\_\_\_

Consulting engineer/Company: \_\_\_\_\_

Project: \_\_\_\_\_

To design the Legionellae killing hot water system with thermal disinfection

**DMS-HORNE-Legiokill®-System\***

**DMS-Legiokill-System Desin-Therm®\***

Type: \_\_\_\_\_

We used the following details:

1. **Number of beds** \_\_\_\_\_

2. <b>Number of</b>	<b>1-bed-rooms,</b>	_____ with a tub	_____ with a shower
	<b>1-bed-rooms,</b>	_____ with a tub	_____ with a shower
	<b>multi-bed-rooms,</b>	_____ with a tub	_____ with a shower

3. **Therapy department**

\_\_\_\_\_ bath tubs with \_\_\_\_\_ l contents \_\_\_\_\_ -operations /h\*/day\*

other facts: \_\_\_\_\_

4. **Restaurant/cafeteria**

Quantity of meals at main eating time: \_\_\_\_\_

other facts: \_\_\_\_\_

5. **Laundry**

☐ yes

☐ no

hot water demand for each operation: \_\_\_\_\_

max. washing operations within 1 h: \_\_\_\_\_

6. **Other users** \_\_\_\_\_

7. **Pipework-material**

galvanized

copper

synthetic

stainless-steel

cold water pipes

☐
☐
☐
☐

hot water pipes

☐
☐
☐
☐

## heat exchangers - hot water systems - district heating stations

### 8. primary energy:

gas-/oilfired boiler:	number of boilers	capacity of each boiler kW	min. flow temperature in summer °C/°F	how many boilers of which capacity are in use ____/____ kW
	_____	_____	_____	_____
district heating:	energy demand of the building			_____ kW
	max. flow temperature in winter			_____ °C/°F
	min. flow temperature in summer			_____ °C/°F
	hot water quantity per MW			_____ m³/h
	primary return flow (at nominal rated power of the hot water system)			_____ °C/°F

### 9. max. operating pressure

primary	_____ bar
secondary	_____ bar

### 10. head losses

incl. regulation	primary	_____ kPa
incl. Legiokill-system	secondary	_____ kPa

### 11. for equipment transportation to the place of installation

min. interior width of the door	_____ mm
overhead clearance of the room of	_____ mm

### 12. other remarks

### 13. result of a. m. positions 1 - 12

primary capacity needed:	_____ kW
secondary loading capacity:	_____ l/h 65°C / 149°F
disinfection volume:	_____ l with _____ minutes disinfection time
contents of hot water tank:	_____ l divided to _____ x _____ l
peak hot water demand:	_____ l/h = _____ l/min
circulation volume acc. to your specification	_____ l/h
or designed acc. to:	
number of taps x _____ l x triple circulation =	_____ l/h

**DMS-HORNE-Legiokill®-System \***

**DMS-Legiokill-System Desin-Therm® \***

Type: \_\_\_\_\_

If you have any question please ask: \_\_\_\_\_

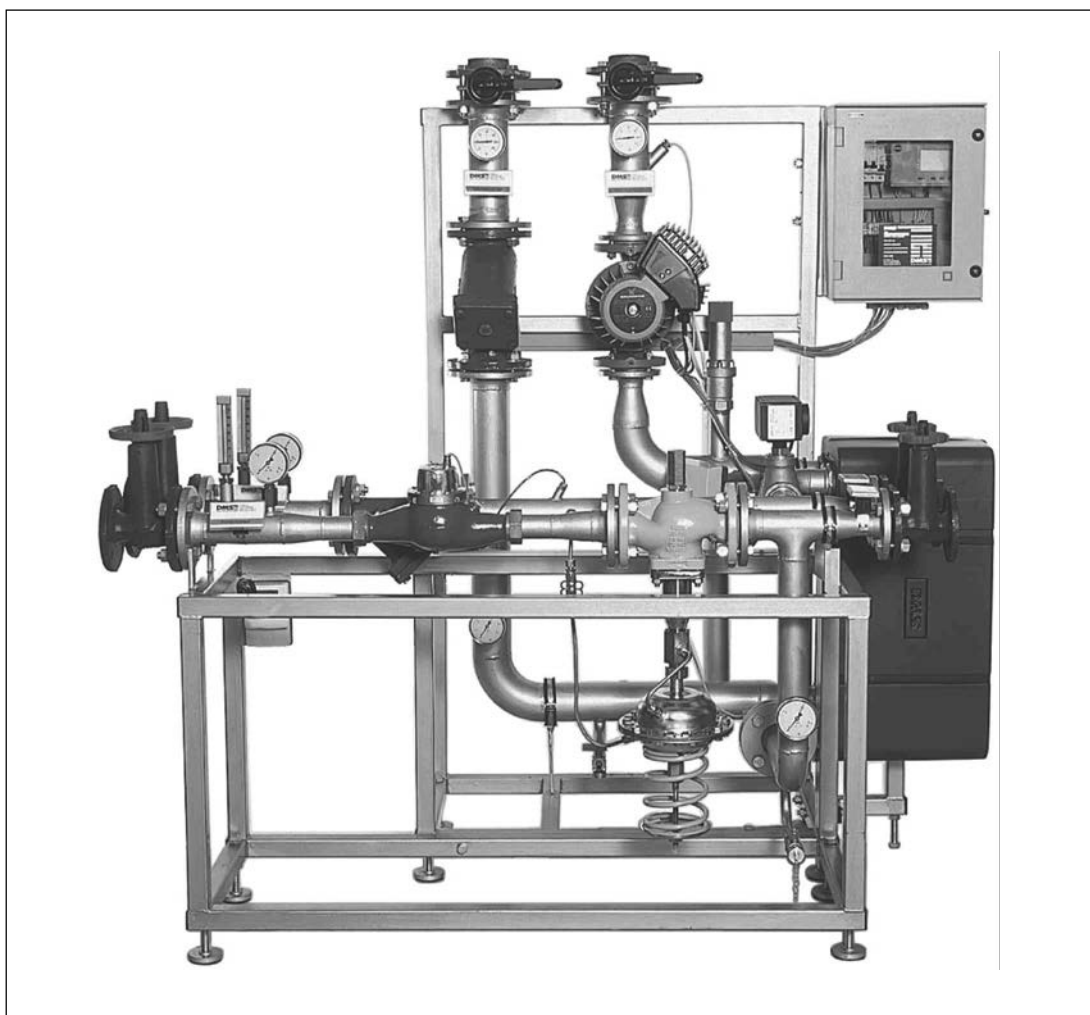
\*paint out not applicable details

heat exchangers - hot water systems - district heating stations

# **DMS – Compact District Heating Stations**

## **for buildings**

**with and without Water Heating Systems  
operating mode direct or indirect**

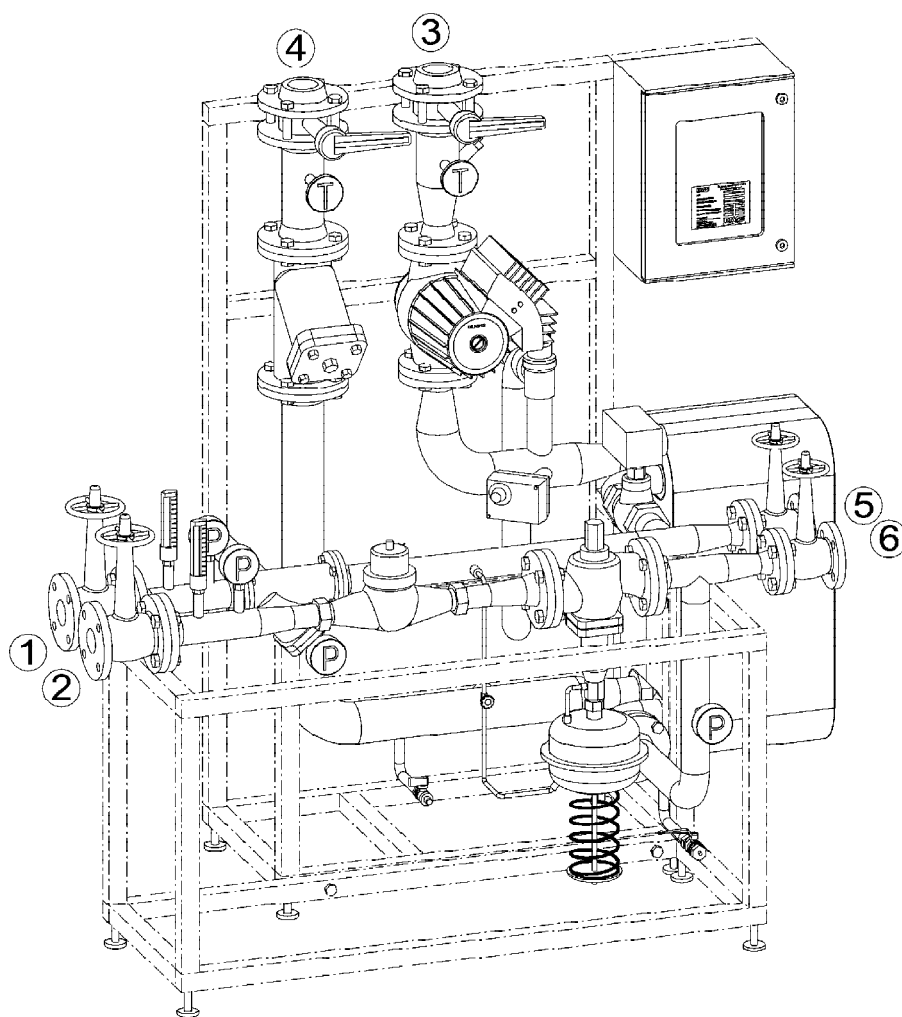


For each district heating network and heating systems parameter, the stations are dimensioned and manufactured according to the safety orders, the requested grade of equipment, and customers individual demand.

Capacity range from i.e. 50 kw up to several MW.

## heat exchangers - hot water systems - district heating stations

### Example: Operating mode indirect heating



measures:

width: 1300 mm  
height: 1600 mm  
depth: 1000 mm

1. primary flow line
2. primary return
3. secondary flow line
4. secondary return
5. hot water flow line
6. hot water return

Constructed with latest software and 3-D CAD

- individual adaptiv to any demand
- clear arranged valves and components
- optimal framework measures
- short and carefull construction time means short time of delivery



## heat exchangers - hot water systems - district heating stations

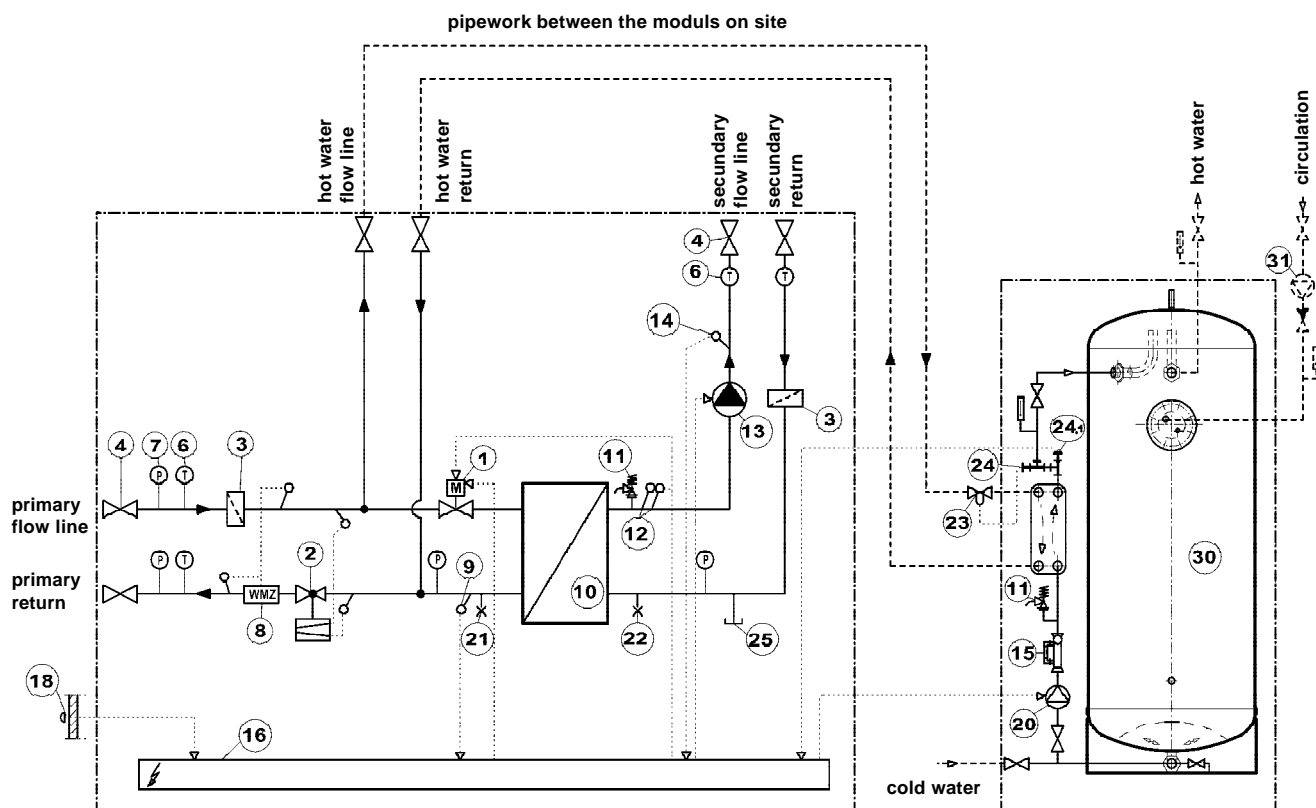
### Example:

Scheme of compact district heating stations, operating mode direct with hot water system KWS-K

DMS-Compact-District-Heating-Station welded finish in a painted framework, vibrationless mounted pipework, electric wired, consisting of braced stainless steel heat exchanger (10) weather controlled regulator (16) with hot water priority (24.1) and return temperature limiter (9).

Primary motor valve (1), differential pressure controller with flow limiter (2), and fitting piece for heat meter (8). Secondary temperature and overheat safety controlled (12), heating water circulation pump (13), and flow line sensor (14).

DMS-KWS-K-System consisting of DMS braced plate heat exchanger (10), water temperature regulator (23,24), charging pump (20), setting valve (15), and DMS hot water storage tank (30), welded stainless steel pipework with gun metal fittings, thermometer, and safety valve, mounted ready for use.





## heat exchangers - hot water systems - district heating stations

### 4.2) Heating circuits:

	HC 1	HC 2	HC 3
capacity [kW]	_____	_____	_____
with motorvalve	yes*/no*	yes*/no*	yes*/no*
temperatures flow line / return	_____ °C/°F	_____ °C/°F	_____ °C/°F
residual heat capacity heating circuit pump [kPa]	_____	_____	_____
heat measurement	yes*/no*	yes*/no*	yes*/no*

5.) Heat controll system: manufacturer \_\_\_\_\_ type \_\_\_\_\_  
\_\_\_\_\_

### 6.) Hot water system:

☐ apartments ☐ hotel ☐ hospital ☐ old people home

others see seperate question sheet

pipework

	galvanized	copper	stainless steel	plastic
cold water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
hot water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 7.) Maximum measures:

	width	height	depth
transportway	_____ m	_____ m	_____ m
place of installation	_____ m	_____ m	_____ m

8.) Additional remarks: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

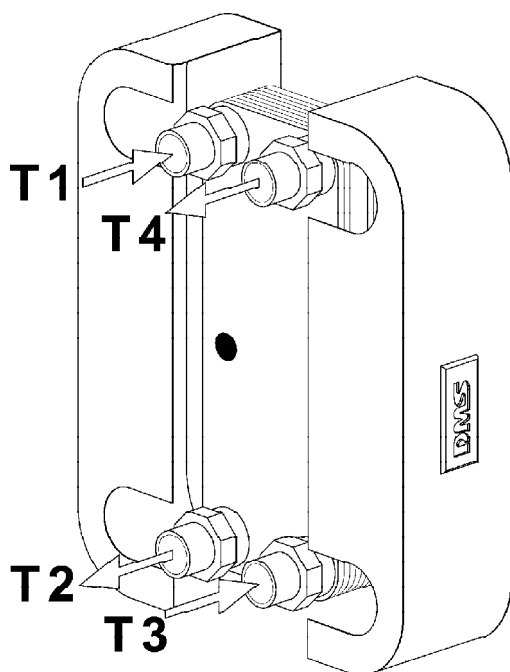
\_\_\_\_\_

\* paint out not applicable details

## heat exchangers - hot water systems - district heating stations

### DMS-Brazed Plate Heat Exchanger Series PS-LG

#### Connection example



#### Application:

Brazed plate heat exchangers can be utilized for heating and cooling of clean liquids which must not contain particles and dirt larger than one millimeter in size which would result in blockage. Furthermore the DMS brazed plate heat exchangers are suitable as evaporator and condenser units.

#### Typical applications are:

District heating, heating, and ventilation solar heating and air-conditioning units heating pumps and heating recovering units hydraulic and fuel oil units

#### Construction and mode for operation:

DMS brazed plate heat exchangers consist of: a number of thin, acid-resistant plates, precision stamped and assembled as a unit, each alternate plate being rotated 180°.

Material: copper brazed stainless steel AISI 316 (1.4401)  
The plate pack, assembled with two end plates and connections, is vacuum brazed at extremely high temperatures providing a permanently sealed heat exchange. The final result is a strong and compact plate heat exchanger with extremely high heat transmissions. The high heat transmission comes from the main pattern which is designed to create a turbulence prevents or minimizes blockages in the heat exchanger. Should the liquid or steam used cause restrictions the plate heat exchanger can be rinsed with cleaning agents according to the specifications in our installation, operating, and maintenance manual.

#### Accessories:

Insulating jackets, 4 three-part connections on request temperature adjustment sensor

#### To design the right type we have to know:

Kind of liquid  
primary and secondary temperatures and head losses

	IN	OUT
primary	T1	T2
secondary	T3	T4

## heat exchangers - hot water systems - district heating stations

### DMS-Brazed Plate Heat Exchanger Series PS-LG 23/

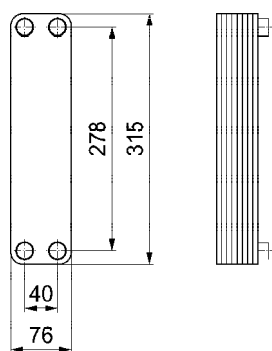
Compact-heat exchanger with fixed number of plates

**Material:** copper braced stainless steel AISI 316 (1.4401)

**max. operating pressure:** 25 bar

**max. operating temperature:** 185°C/365 ° F

**Connections:** 4 x ¾" outside thread, stainless steel  
3-part-connection, flat packing  
laid in part, bronce or steel  
insulating jacket



DMS - type	measures in mm			weight in kg
	longitud	width	height	
PS - LG 23/ 10 TL	32	76	315	1,7
PS - LG 23/ 14 TL	38	76	315	2,1
PS - LG 23/ 18 TL	47	76	315	2,5
PS - LG 23/ 24 TL	59	76	315	3,0
PS - LG 23/ 32 TL	76	76	315	3,8
PS - LG 23/ 40 TL	93	76	315	4,5
PS - LG 23/ 48 TL	110	76	315	5,3

### DMS-Brazed Plate Heat Exchanger Series PS-LG 34/

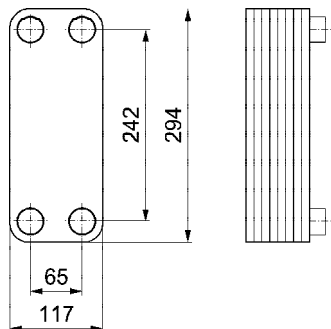
Compact-heat exchanger with fixed number of plates

**Material:** copper braced stainless steel AISI 316 (1.4401)

**max. operating pressure:** 25 bar

**max. operating temperature:** 185°C/365 ° F

**Connections:** 4 x 1" outside thread, stainless steel  
from 64 plates 1½"  
3-part-connection, flat packing  
laid in part, bronce or steel  
insulating jacket



DMS - type	measures in mm			weight in kg
	longitud	width	height	
PS - LG 34/ 10 TL	32	117	294	2,1
PS - LG 34/ 14 TL	41	117	294	2,6
PS - LG 34/ 18 TL	50	117	294	3,0
PS - LG 34/ 24 TL	63	117	294	3,8
PS - LG 34/ 32 TL	81	117	294	4,6
PS - LG 34/ 40 TL	99	117	294	5,6
PS - LG 34/ 48 TL	117	117	294	6,5
PS - LG 34/ 56 TL	134	117	294	7,4
PS - LG 34/ 64 TL	154	117	294	8,3
PS - LG 34/ 72 TL	170	117	294	9,2
PS - LG 34/ 80 TL	188	117	294	10,1
PS - LG 34/ 90 TL	210	117	294	11,2

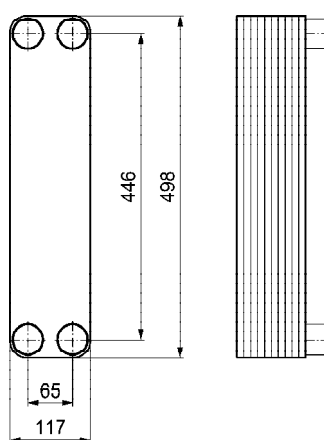
## heat exchangers - hot water systems - district heating stations

### DMS-Brazed Plate Heat Exchanger Series PS-LG PS-LG 70/

Compact-heat exchanger with fixed number of plates

**Material:** copper braced stainless steel AISI 316 (1.4401)  
**max. operating pressure:** 25 bar  
**max. operating temperature:** 185°C/365 ° F

**Connections:** 4 x 1½" outside thread, stainless steel  
3-part-connection, flat packing  
laid in part, bronce or steel  
insulating jacket



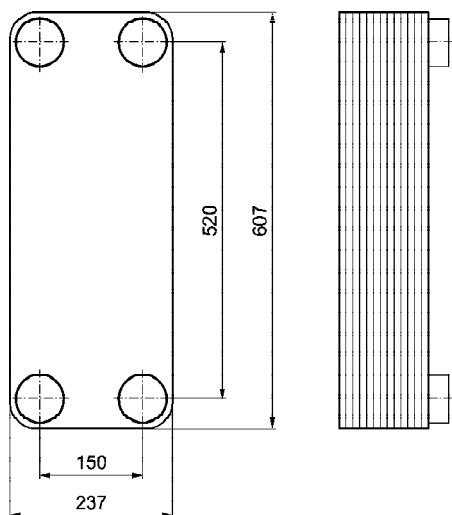
DMS - type	measures in mm					weight in kg
	longitud			width	height	
	TL	TM	TK			
PS - LG 70/ 10	32	35	36	117	498	4,2
PS - LG 70/ 14	41	46	48	117	498	5,0
PS - LG 70/ 18	50	57	60	117	498	5,8
PS - LG 70/ 24	63	74	77	117	498	7,1
PS - LG 70/ 32	81	97	100	117	498	8,8
PS - LG 70/ 40	99	119	123	117	498	10,5
PS - LG 70/ 48	117	141	147	117	498	12,3
PS - LG 70/ 56	134	164	170	117	498	14,0
PS - LG 70/ 64	154	186	193	117	498	15,7
PS - LG 70/ 72	170	209	216	117	498	17,4
PS - LG 70/ 80	188	231	239	117	498	19,1
PS - LG 70/ 90	210	259	268	117	498	21,2
PS - LG 70/100	232	287	297	117	498	23,4
PS - LG 70/110	255	315	326	117	498	25,5
PS - LG 70/120	277	343	355	117	498	27,7
PS - LG 70/130	299	371	384	117	498	29,8
PS - LG 70/140	322	399	413	117	498	32,0
PS - LG 70/150	344	427	442	117	498	34,1

### DMS-Brazed Plate Heat Exchanger Series PS-LG PS-LG 140/

Compact-heat exchanger with fixed number of plates

**Material:** copper braced stainless steel AISI 316 (1.4401)  
**max. operating pressure:** 16 bar  
**max. operating temperature:** 185°C/365 ° F

**Connections:** 4 x 2½" outside thread, stainless steel  
3-part-connection, flat packing  
laid in part, bronce or steel  
insulating jacket



DMS - type	measures in mm					weight in kg
	longitud			width	height	
	TL	TM	TK			
PS - LG 140/10	37	41	45	237	607	9,3
PS - LG 140/14	47	50	54	237	607	11,0
PS - LG 140/18	58	62	66	237	607	12,7
PS - LG 140/24	75	80	85	237	607	15,3
PS - LG 140/32	96	113	120	237	607	18,7
PS - LG 140/40	118	125	132	237	607	22,1
PS - LG 140/48	140	147	156	237	607	25,5
PS - LG 140/56	161	169	175	237	607	29,0
PS - LG 140/64	183	190	198	237	607	32,4
PS - LG 140/72	205	212	221	237	607	35,8
PS - LG 140/80	226	234	246	237	607	39,2
PS - LG 140/90	253	262	270	237	607	43,5
PS - LG 140/100	280	289	297	237	607	47,8
PS - LG 140/110	308	317	325	237	607	52,0
PS - LG 140/120	335	344	355	237	607	56,3
PS - LG 140/130	362	372	383	237	607	60,6
PS - LG 140/140	389	400	412	237	607	65,0
PS - LG 140/150	416	425	436	237	607	69,2
PS - LG 140/160	443	455	467	237	607	73,5
PS - LG 140/170	470	482	493	237	607	77,7
PS - LG 140/180	497	510	522	237	607	82,0
PS - LG 140/190	524	535	548	237	607	86,3
PS - LG 140/200	551	563	575	237	607	90,6



## heat exchangers - hot water systems - district heating stations

### DMS-Brazed Plate Heat Exchanger Series PS-LG PS-LG 333/

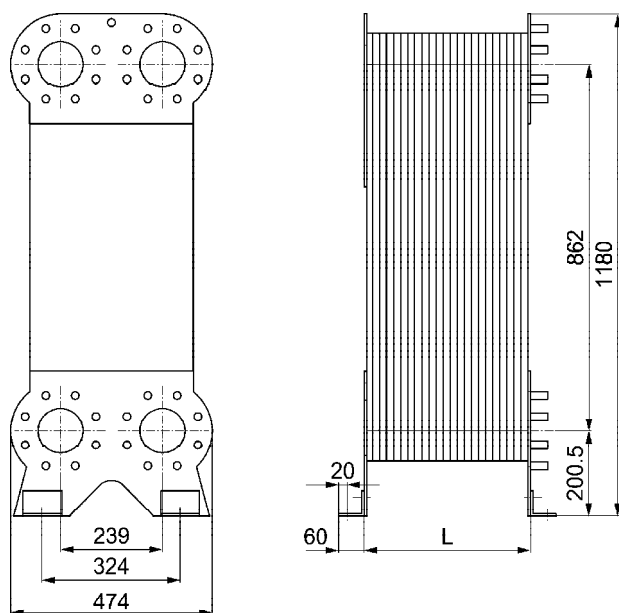
Compact-heat exchanger with fixed number of plates

**Material:** copper braced stainless steel AISI 316 (1.4401)

**max. operating pressure:** 25 bar

**max. operating temperature:** 185°C/365 ° F

**Connections:** stainless steel flange DN 100/PN 16 or PN 25



DMS - type	measures in mm					weight in kg
	longitud (L)			width	height	
	TL	TM	TK			
PS - LG 333/40	126	133	140	474	1180	102
PS - LG 333/50	150	157	164	474	1180	115
PS - LG 333/60	174	181	188	474	1180	128
PS - LG 333/70	198	205	212	474	1180	141
PS - LG 333/80	222	229	236	474	1180	154
PS - LG 333/90	246	253	260	474	1180	167
PS - LG 333/100	270	277	284	474	1180	180
PS - LG 333/110	294	301	308	474	1180	193
PS - LG 333/120	318	325	332	474	1180	206
PS - LG 333/130	342	249	256	474	1180	219
PS - LG 333/140	366	373	380	474	1180	232
PS - LG 333/150	390	397	404	474	1180	245
PS - LG 333/160	414	421	428	474	1180	258
PS - LG 333/170	438	445	452	474	1180	271
PS - LG 333/180	462	469	476	474	1180	284
PS - LG 333/190	486	493	500	474	1180	297
PS - LG 333/200	510	517	524	474	1180	310

## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS-Brazed Plate Heat Exchanger</b></p> <p><b>Type: PS-LG</b> _____ / _____</p> <p>A number of thin, acid-resistant plates, precision stamped and assembled as a unit, each alternate plate being rotated 180 degrees plate pack assembled with two end plates and connections, vacuum brazed. Plate material stainless steel AISI 316 (1.4401)</p> <p>capacity: _____ kW</p> <p>temperatures: primary / secondary _____ / _____ °C/°F</p> <p>headlosses: primary / secondary _____ / _____ kPa</p> <p>max. working pressure 16 * / 25 * bar</p> <p>max. working temperature 185°C/365°F</p> <p>connections: primary / secondary DN 100* _____ " outside thread *</p> <p>longitude _____ mm</p> <p>width _____ mm</p> <p>height _____ mm</p> <p>weight _____ kg</p> <p>inclusive 4 screwed connections and insulating jackets*</p> <p>(Pipework has to be mounted <b>stress-free</b> to the connections of the heat exchanger)</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b></p> <p><b>Price:</b></p> <p>* paint out not applicable details</p>		

## heat exchangers - hot water systems - district heating stations

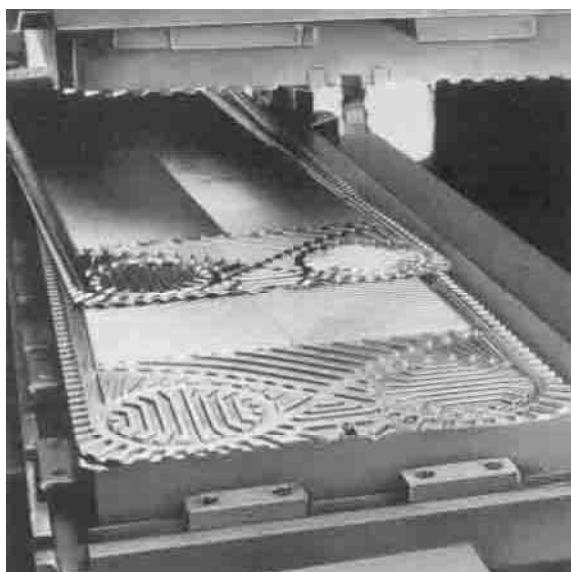
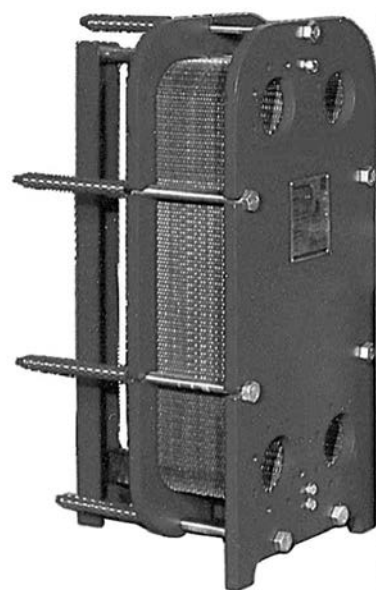
# DMS

## Plate Heat Exchanger

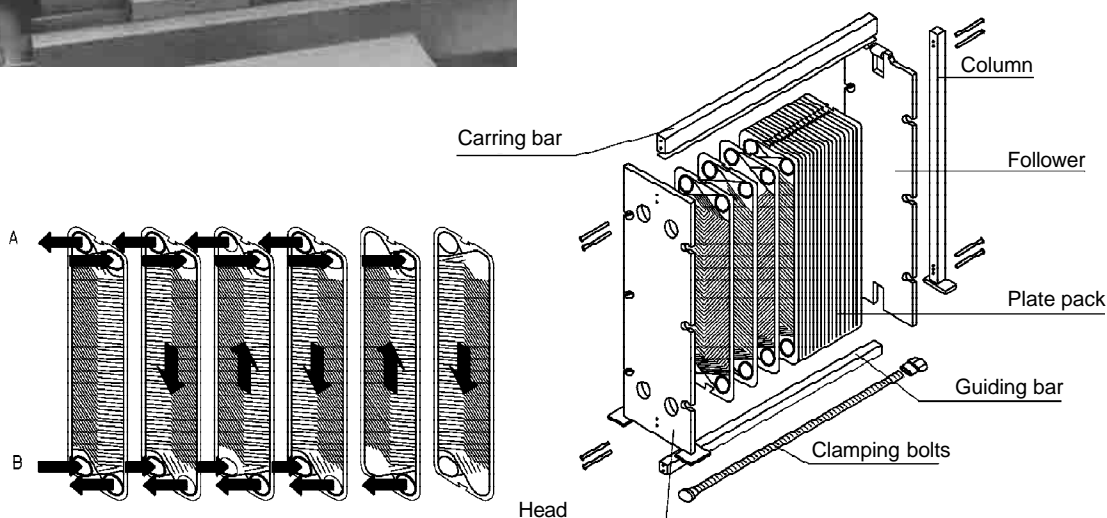
### The design and function

The plate heat exchanger consists of a frame, which in turn consists of a head, a follower, a column, a carrying bar, a guiding bar and a number of clamping bolts. In between the head and the follower a varying number of pressed plates are clamped together.

Each plate is supplied with a gasket, so that the plates form a closed system of parallel flow channels, through which the medias flow alternately at every second interval.



The pipe work has to be mounted **stress-free** to the connections of the plate heat exchanger



## heat exchangers - hot water systems - district heating stations

### Feature of the DMS plates

The construction is based on many years of experience. The demand made DMS plates has been that of high efficiency and flexibility together with the demand for suitability in high differential pressures.

#### The inlet part

The design of the inlet parts is provided with sloping lead grooves which guarantee the even distribution of liquids across the plate pattern. The result is a maximum utilization of the whole plate. Furthermore, this inlet design guarantees that the so-called "dead spots", which could cause the growth of bacteria in the plate heat exchanger, are completely avoid.

#### The plate pattern

The plate pattern chosen is the fishbone pattern. Even at low liquid speeds this pattern gives maximum turbulence and thereby an extremely effective heat transmission. DMS plates can be obtained in two different designs, respectively thermally short and thermally long. The two different designs have their own special thermal characteristics with regards to pressure drop and thermal efficiency.

#### Edges enforcement

In order to reinforce the gasket groove the DMS plate is designed with an edge on both sides of the gasket groove. On the inside with a straight edge and on the outside with corrugated edge. This design ensures that the plate is solidly supported, and it gives at the same time a good hold on the gasket.

#### The Gasket

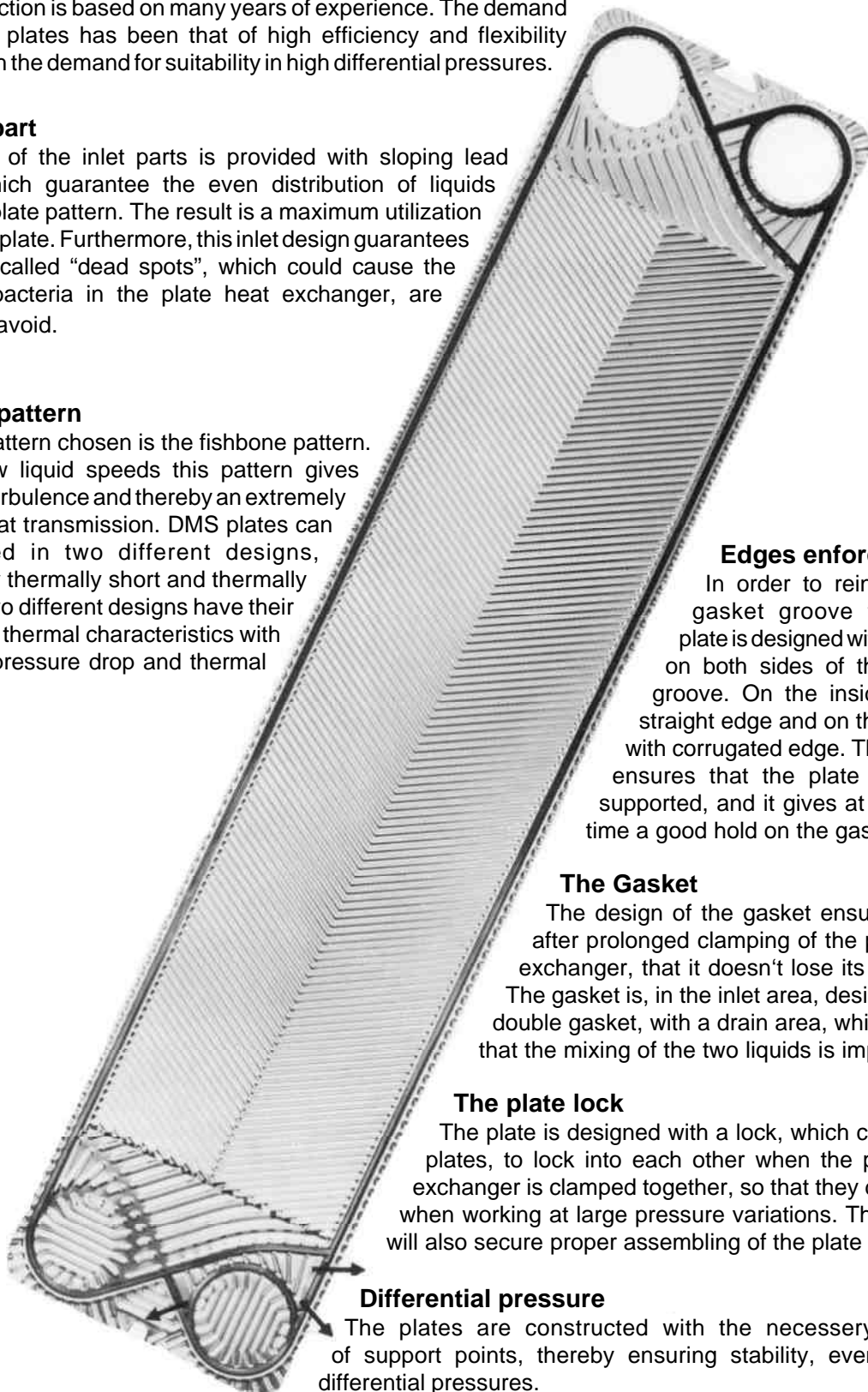
The design of the gasket ensures, even after prolonged clamping of the plate heat exchanger, that it doesn't lose its elasticity. The gasket is, in the inlet area, designed as a double gasket, with a drain area, which means that the mixing of the two liquids is impossible.

#### The plate lock

The plate is designed with a lock, which causes the plates, to lock into each other when the plate heat exchanger is clamped together, so that they don't slide when working at large pressure variations. This feature will also secure proper assembling of the plate stack.

#### Differential pressure

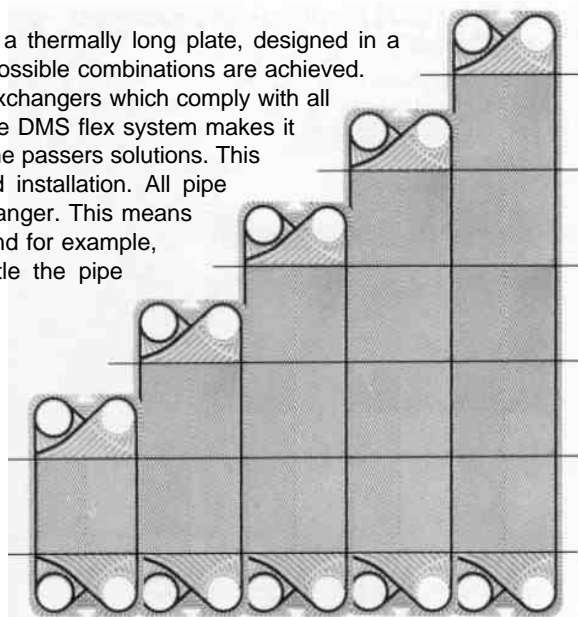
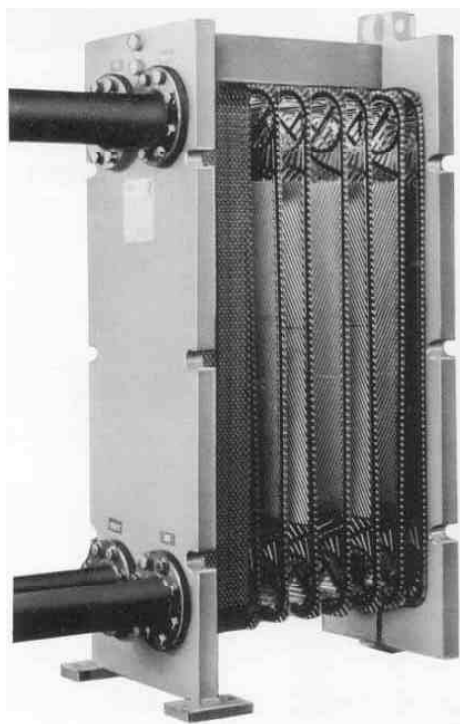
The plates are constructed with the necessary number of support points, thereby ensuring stability, even at high differential pressures.



## heat exchangers - hot water systems - district heating stations

### The DMS Flex system

The DMS Flex system is based on a thermally short and a thermally long plate, designed in a number of different lengths. In this way a large number of possible combinations are achieved. DMS as a result of this flex system, can supply plate heat exchangers which comply with all demands for both pressure drop and heat transmission. The DMS flex system makes it possible to supply most of the plate heat exchangers with one passers solutions. This has a number of advantages with regards to service and installation. All pipe connections are placed on the head of the plate heat exchanger. This means that the plate heat exchanger can be opened and closed and for example, extended to greater capacities without having to dismantle the pipe installation.

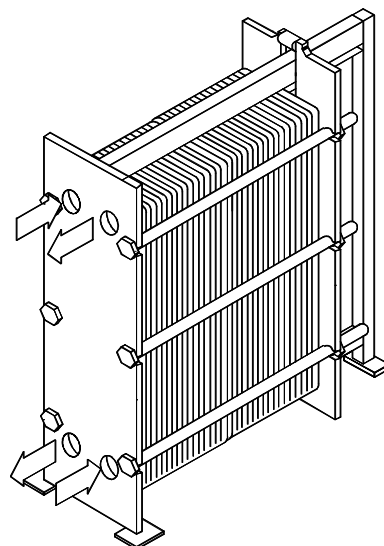


### Heat exchanger in the industrial sector and distant heating

The heat exchanger have been directly included both in the primary processes of production and in the secondary processes, such as cooling and recovery of heat from surplus heating. The greatest part of heat exchangers used are shell and tube and spiral heat exchangers. It is in fact a tradition, that the industrial sector uses this type of heat exchanger. We can supply plate heat exchangers for most of the applications for which traditional heat exchangers are normally supplied, only on a more efficient and economical basis. We can supply plate heat exchangers with differential pressures of up to 30kp/cm<sup>2</sup>, and temperatures ranging from -30°C / -86°F to 220°C / 428°F. DMS uses a pressing technique, which makes it possible to press plates in all pressable material such as stainless steel, Titanium, Hastelloy, Inconel etc. DMS plates can be supplied with gaskets, which can even cope with extremely harsh liquids. In comparison to shell and tube and spiral heat exchangers the plate heat exchanger has a number of advantages, as follows:

### Thermal efficiency

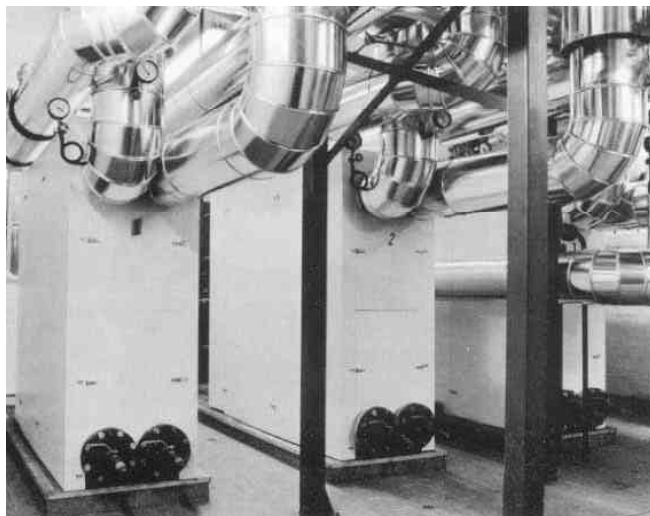
The thermal efficiency of plate heat exchangers is considerably better, than that of both shell and tube and spiral heat exchangers. The reason being primarily, that a plate heat exchanger constitutes a plate stack, consisting of corrugated plates. The plate pattern creates a high turbulence, which in turn gives a high heat transmission. In the development of these plate heat exchangers, we have aimed for high thermal efficiency in all heat exchanger applications. This is achieved with the help of a plate programme, which can fully utilize a specified pressure drop, i.e. by using the pressure drop to create turbulence and thereby heat transmission across the whole plate pattern. An effective turbulence in the plate heat exchanger will give a minimum of fouling on the transmission area in comparison to traditional heat exchangers. The DMS flex system is based on a varying plate length and two different plate patterns, thermally short and thermally long, for each plate length. That is why DMS can make most of the heat exchanger applications with one pass plate heat exchangers, simply because they offer optimal utilization of the plates by using the pressure drop to create turbulence, thereby giving an effective heat transmission. In the case where the plate heat exchanger is in more than one pass the result will be, that a part of the pressure drop will be used in the corner holes and inlet area of the plate. In other words as wasted pressure drop. Furthermore, it would create difficulties with regards to installation and service of the plate heat exchanger.



## heat exchangers - hot water systems - district heating stations

### Installation and service

The DMS flex system can as mentioned, cope with the majority of industrial applications with one pass solutions, meaning that all pipe connections will be placed on the head of the plate heat exchanger. This gives great advantages with regards to both service inspection and possible repairs. This means that the plate heat exchanger can be opened and closed without having to dismantle the pipe installations. DMS plate heat exchanger frames are designed so that they easily can be opened and closed. A minimum of clamping bolts are used and the follower is equipped with an easy running roller.



### Flexibility

DMS plate heat exchangers consist of standard components, which offer great flexibility. Plates and gaskets are designed, so they can be used as both right hand and left hand plates. This is done by simply turning the plate 180°. A possible increase or reduction in capacity would normally be a simple modification. The traditional shell and tube and spiral heat exchangers can not be adjusted to accomodate other capacities.

### Space requirement

The thermal efficiency of DMS plate heat exchangers results in a much smaller space requirement than for traditional heat exchangers. This is especially of great importance when opening or closing the heat exchanger, and for example in service inspection.

### Surplus heat

A waste of energy is a waste of money. This saying is, at the moment extremely relevant because of the energy situation which is completely incalculable. That is why all energy sources must be utilized as effectively as possible, and this of course also applies to areas which include surplus heating. DMS plate heat exchangers are extremely suitable for use for heat recovery, as they, with their working areas in the field of pressure and temperature, can be included in a series of processes, where it is possible to utilize surplus heat. Surplus heat can for example, be used in the district heating nets, or for international heating in industry. From an economical point of view, it would be an advantage, to utilize even small quantities of energy.

### DMS – Plates and Gaskets are available in following qualities:

#### Standard – Plates:

Stainless steel AISI 304, AISI 316, 1.4401, Titanium

#### Special – Plates:

Hastelloyed, Inconel and other pressable materials

#### Standard – Gaskets:

EPDM and Nitril

#### Special – Gaskets:

Viton, Hypalon, Klingerith and others

#### Special Designs:

Free-Flow, Semi-welded

#### The Possibilities:

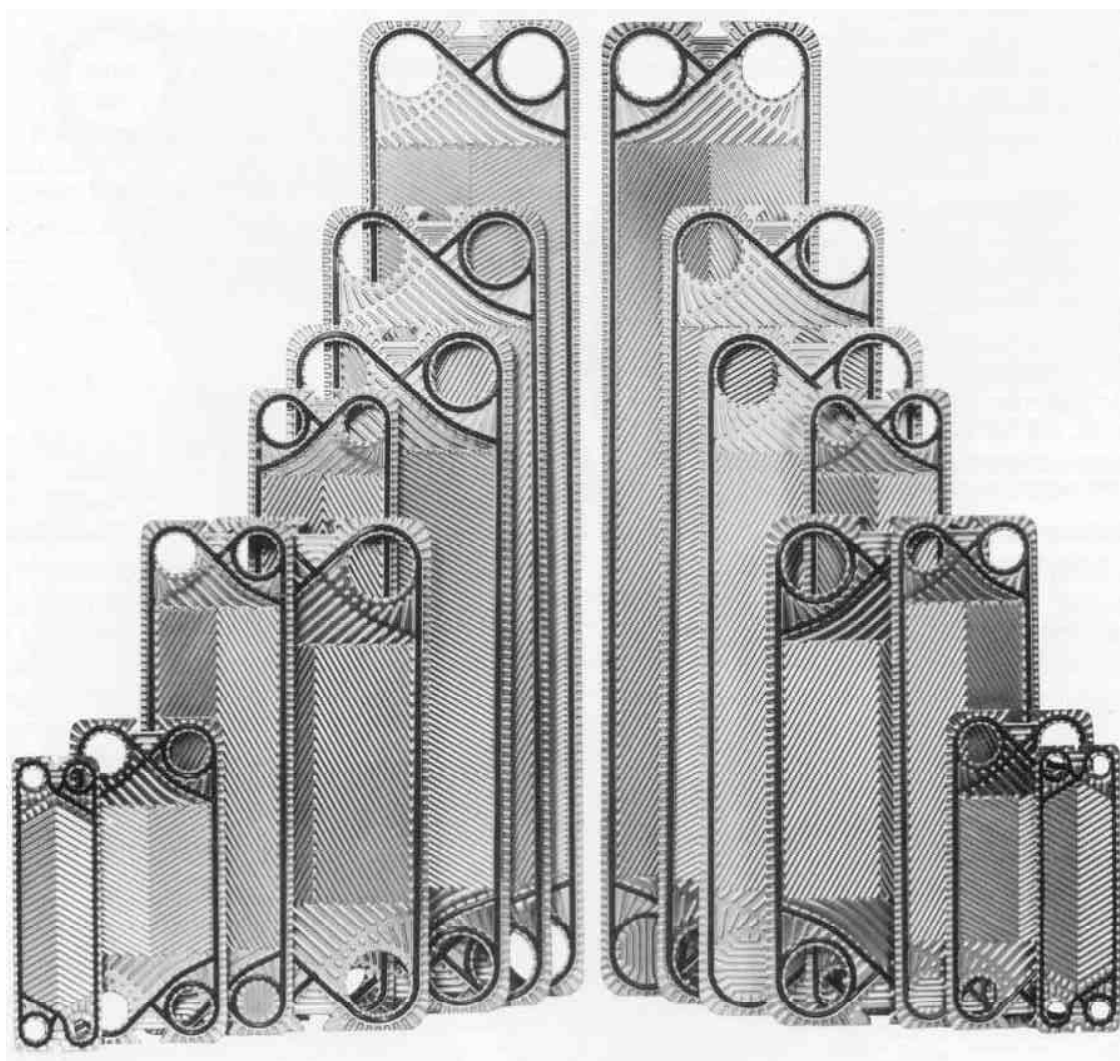
- more than 40 different sizes of plates
- various pattern with individual collection of plates
- Dimensions of connections R 1" to DN 500
- amount of volume up to 3000 cbm/h



## heat exchangers - hot water systems - district heating stations

### A part of the DMS plate programme

The plate programme of DMS is today so comprehensive, that any exchanger problem can be solved in an optimal way.

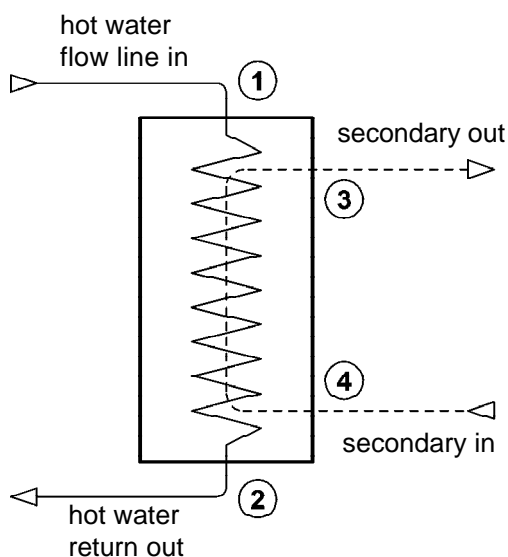


DMS places it's many years of experience concerning plate heat exchangers, at your disposal. You will get the right solution at a competitive price ...

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS - Plate Heat Exchanger</b></p> <p><b>Type:</b> _____</p> <p>consisting of:</p> <p>one fixed head and one follower plate of carbon steel, fixing by clamping bolts the plate pack of ..... Titanium*/stainless steel 1.4401 / AISI 316 plates, supplied with gaskets of Nitril* / EPDM* / VITON* or other according to individual demand.</p> <p>capacity: _____ kW</p> <p>temperatures: primary / secondary _____ / _____ °C/°F</p> <p>headlosses: primary / secondary _____ / _____ kPa</p> <p>max. working pressure _____ bar</p> <p>max. working temperature _____ °C/°F</p> <p>connections:</p> <p>primary DN _____ * _____ " thread *</p> <p>secondary DN _____ * _____ " thread *</p> <p>longitude _____ mm</p> <p>width _____ mm</p> <p>height _____ mm</p> <p>weight _____ kg</p> <p>(Pipework has to be mounted <b>stress-free</b> to the connections of the heat exchanger)</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b></p> <p><b>Price:</b></p>		
<p>* paint out not applicable details</p>				

## heat exchangers - hot water systems - district heating stations

### DMS - Coil and Shell Heat Exchanger

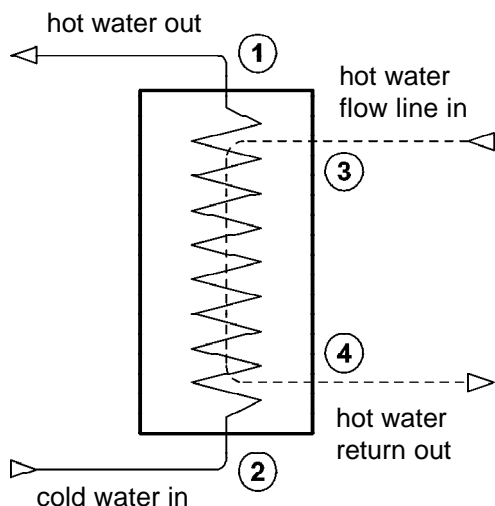


#### Heat exchange

- 1.) water / water
- 2.) steam / water

The primary side (lower amount of water/ steam) has to be mounted to the coil-connections IN 1 OUT 2 for heating the secondary side shell- connections: IN 4 OUT 3

Temperatur control according to technical rules.



#### Drinking water heating

- 1.) hot water / drinking water
- 2.) steam / drinking water

cold water is always running inside of the coil

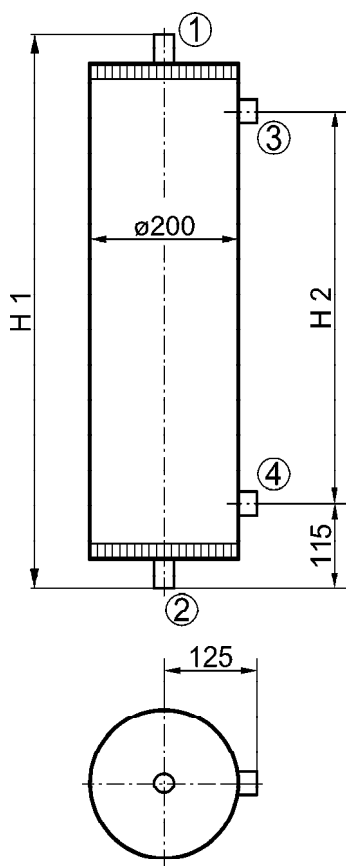
- (1) hot water out
- (2) cold water in
- (3) flow line/steam in
- (4) hot water return/condensate out

Temperatur control according to technical rules.

on request: shell manufactured complete out of stainless steel

## heat exchangers - hot water systems - district heating stations

### DMS – Coil and Shell Heat Exchanger Type H - 1 - ... Water heater



	shell			coil		
operating pressure bar	16	12	9	34	32	30
operating temperature °C	150	175	200	150	175	200
operating temperature °F	307	347	392	307	347	392

#### Working as heat exchanger

##### connections:

- (1) hot water flow line in
- (2) hot water return out
- (3) secondary out
- (4) secondary in
- (5) venting

#### Working as water heater

##### connections:

- (1) hot water out
- (2) cold water in
- (3) hot water flow line in
- (4) hot water return out
- (5) venting

Internal screwed thread

##### Material:

**shell:** steel ST 37-2

**coil:** SF-copper acc. to DIN 1787

fixed insulation 80 mm mineral wool completely covered with structured aluminium-plates

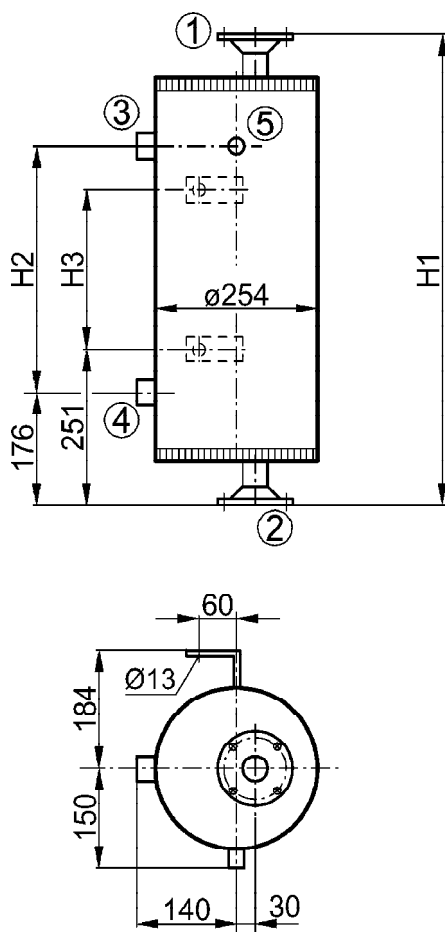
Approval: TÜV-Type Approval, manufactured according to EU-Pressure Vessel regulations 97/ 23 EG Design C acc. to DIN 1988 T 2

Type	H1 mm	H2 mm	(1) (2) Rp "	(3) (4) Rp "	contents ltr.		weight kg
					shell	coil	
H-1-A	750	520	¾	1	1,2	0,4	11
H-1-B	1100	870			1,6	0,6	15
H-1-C	1370	1140			2,2	0,8	19



## heat exchangers - hot water systems - district heating stations

### DMS – Coil and Shell Heat Exchanger Type H - 2 - ... Water heater



	shell			coil		
operating pressure bar	16	12	9	34	32	30
operating temperature °C	150	175	200	150	175	200
operating temperature °F	307	347	392	307	347	392

#### Working as heat exchanger

##### connections:

- (1) hot water flow line in
- (2) hot water return out
- (3) secondary out
- (4) secondary in
- (5) venting

#### Working as water heater

##### connections:

- (1) hot water out
- (2) cold water in
- (3) hot water flow line in
- (4) hot water return out
- (5) venting

Internal screwed thread

##### Material:

**shell:** steel ST 37-2

**coil:** SF-copper acc. to DIN 1787

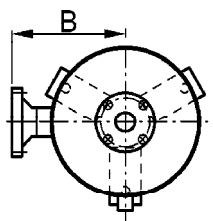
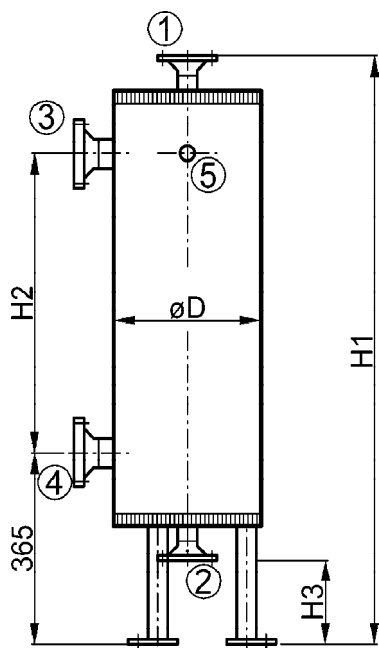
fixed insulation 80 mm mineral wool completely covered with structured aluminium-plates

Approval: TÜV-Type Approval, manufactured according to EU-Pressure Vessel regulations 97/ 23 EG Design C acc. to DIN 1988 T 2

Type	H1 mm	H2 mm	H3 mm	(1) (2) DN / PN	(3) (4) Rp "	contents ltr.		weight kg
						shell	coil	
H-2-A	752	580	250	25 / 40	1	3,0	0,7	16
H-2-B	1002	830	500			4,2	1,1	21
H-2-C	1582	1410	1080			8,3	1,6	33

## heat exchangers - hot water systems - district heating stations

### DMS – Coil and Shell Heat Exchanger Type H - 4 ... and H - 6 ... Water heater



	shell			coil		
operating pressure bar	16	12	9	34	32	30
operating temperature °C	150	175	200	150	175	200
operating temperature °F	307	347	392	307	347	392

#### Working as heat exchanger

##### connections:

- (1) hot water flow line in
- (2) hot water return out
- (3) secondary out
- (4) secondary in
- (5) venting

#### Working as water heater

##### connections:

- (1) hot water out
- (2) cold water in
- (3) hot water flow line in
- (4) hot water return out
- (5) venting

Internal screwed thread

##### Material:

**shell:** steel ST 37-2

**coil:** SF-copper acc. to DIN 1787

fixed insulation 80 mm mineral wool completely covered with structured aluminium-plates

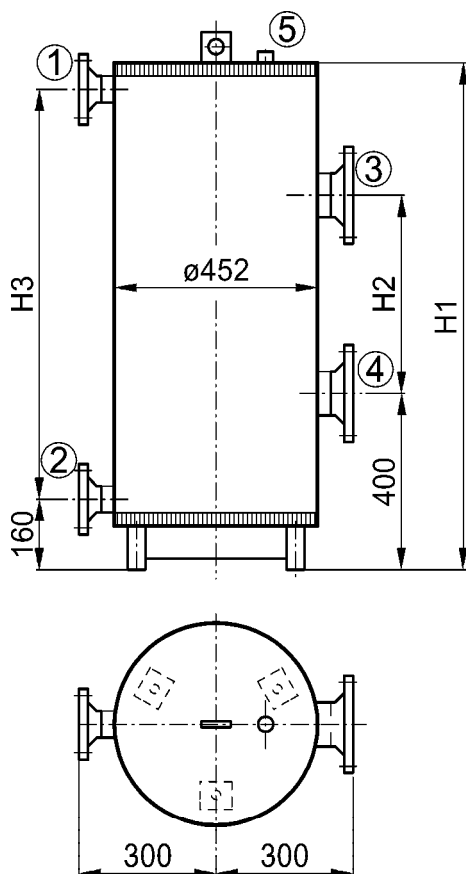
Erection on a rack with adjustable legs

Approval: TÜV-Type Approval, manufactured according to EU-Pressure Vessel regulations 97/ 23 EG Design C acc. to DIN 1988 T 2

Type	Ø D mm	H1 mm	H2 mm	H3 mm	B mm	(1) (2) DN / PN	(3) (4) DN / PN	contents ltr.		weight kg
								shell	coil	
H-4-A	306	975	425	180	215	25 / 40	40 / 16	5,3	2,2	29
H-6-A	340	930	345	170	240	32 / 40	50 / 16	7,3	2,8	38
H-4-B	306	1195	645	180	215	25 / 40	40 / 16	6,7	3,3	38
H-6-B	340	1210	625	170	240	32 / 40	50 / 16	9,3	3,8	49
H-4-C	306	1705	1150	180	215	25 / 40	40 / 16	12,3	4,2	52
H-6-C	340	1790	1230	170	240	32 / 40	50 / 16	22,3	6,8	75

## heat exchangers - hot water systems - district heating stations

### DMS – Coil and Shell Heat Exchanger Type H - 9 ... to H - 24 - ... Water heater



	shell			coil		
operating pressure bar	16	12	9	34	32	30
operating temperature °C	150	175	200	150	175	200
operating temperature °F	307	347	392	307	347	392

#### Working as heat exchanger

##### connections:

- (1) hot water flow line in
- (2) hot water return out
- (3) secondary out
- (4) secondary in
- (5) venting

#### Working as water heater

##### connections:

- (1) hot water out
- (2) cold water in
- (3) hot water flow line in
- (4) hot water return out
- (5) venting

Internal screwed thread

##### Material:

**shell:** steel ST 37-2

**coil:** SF-copper acc. to DIN 1787

fixed insulation 80 mm mineral wool completely covered with structured aluminium-plates

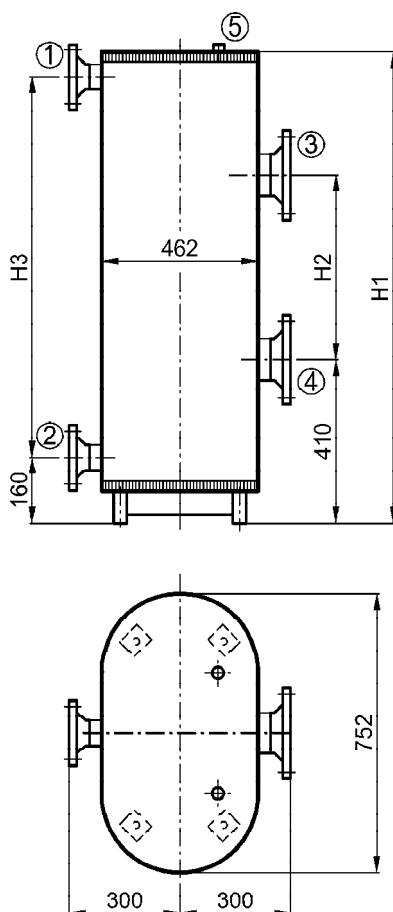
Erection on a rack with adjustable legs

Approval: TÜV-Type Approval, manufactured according to EU-Pressure Vessel regulations 97/ 23 EG Design C acc. to DIN 1988 T 2

Type	H1 mm	H2 mm	H3 mm	(1) (2) DN / PN	(3) (4) DN / PN	contents ltr.		weight kg
						shell	coil	
H- 9-A	1265	450	930	50 / 40	100 / 16	42	6	89
H-18-A						37	8	96
H-24-A						34	10	105
H- 9-B	1595	780	1260			57	9	117
H-18-B						50	12	129
H-24-B						45	16	147
H- 9-C	19500	1135	1615			73	12	146
H-18-C						61	17	163
H-24-C						56	22	189

## heat exchangers - hot water systems - district heating stations

### DMS – Coil and Shell Heat Exchanger Type H - 30 - ... to H - 48 - ... Water heater



		shell		coil	
operating pressure	bar	16	12	16	12
operating temperature	°C	205	300	205	300
operating temperature	°F	401	572	401	572

#### Working as heat exchanger

##### connections:

- (1) hot water flow line in
- (2) hot water return out
- (3) secondary out
- (4) secondary in
- (5) venting

#### Working as water heater

##### connections:

- (1) hot water out
- (2) cold water in
- (3) hot water flow line in
- (4) hot water return out
- (5) venting

Internal screwed thread

##### Material:

**shell:** steel ST 37-2

**coil:** SF-copper acc. to DIN 1787

fixed insulation 80 mm mineral wool completely covered with structured aluminium-plates

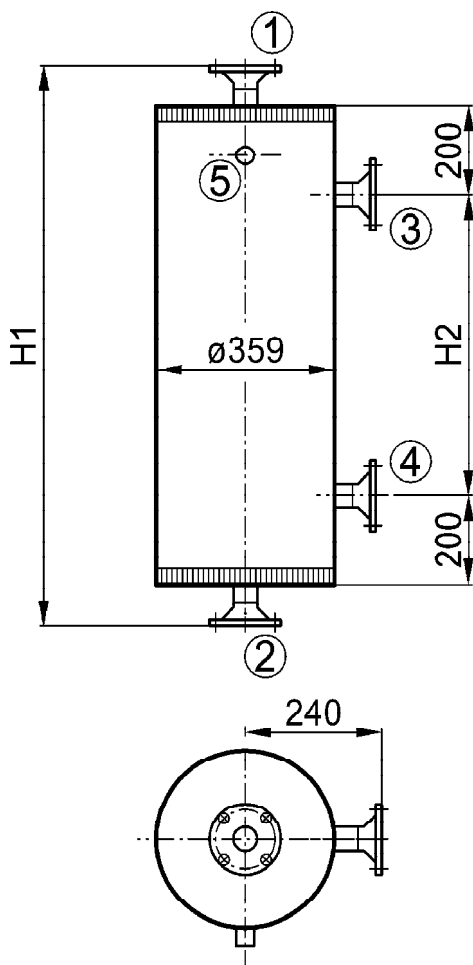
Erection on a rack with adjustable legs

Approval: TÜV-Type Approval, manufactured according to EU-Pressure Vessel regulations 97/ 23 EG Design C acc. to DIN 1988 T 2

Type	H1 mm	H2 mm	H3 mm	(1) (2) DN / PN	(3) (4) DN / PN	contents ltr.		weight kg				
						shell	coil					
H-30-A	1215	430	930	65 / 40	125 / 16	84	16	160				
H-36-A						79	18	167				
H-42-A						76	20	176				
H-48-A						68	22	185				
H-30-B	1545	760	1260			65 / 40	125 / 16	112	23	219		
H-36-B								105	26	230		
H-42-B								100	30	248		
H-48-B								90	34	266		
H-30-C	1900	1115	1615					65 / 40	125 / 16	139	31	279
H-36-C										127	36	296
H-42-C										122	41	322
H-48-C										112	46	347

## heat exchangers - hot water systems - district heating stations

### DMS – Coil and Shell Heat Exchanger Type ER - 2 - ... Water heater



		shell		coil	
operating pressure	bar	16	12	16	12
operating temperature	°C	205	300	205	300
operating temperature	°F	401	572	401	572

#### Working as heat exchanger

##### connections:

- (1) hot water flow line in
- (2) hot water return out
- (3) secondary out
- (4) secondary in
- (5) venting

#### Working as water heater

##### connections:

- (1) hot water out
- (2) cold water in
- (3) hot water flow line in
- (4) hot water return out
- (5) venting

Internal screwed thread

##### Material:

**shell:** steel ST 37-2  
pipe plate, bumed head and flanges of stainless steel 1.4404  
cross-gilled stainless steel coil 1.4404  
fixed insulation 80 mm mineral wool completely  
covered with structured aluminium-plates

Approval: TÜV-Type Approval, manufactured according to  
EU-Pressure Vessel regulations 97/ 23 EG Design C  
acc. to DIN 1988 T 2

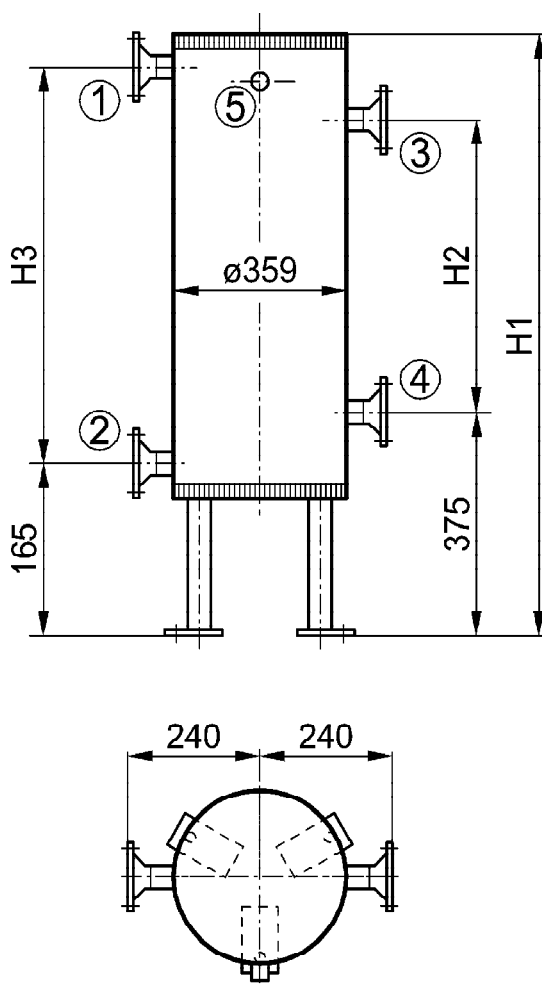
on request: shell manufactured complete out of stainless steel

Type	H1 mm	H2 mm	(1) (2) DN/PN	(3) (4) DN/PN	contents ltr.		weight kg
					shell	coil	
ER-2-A	590	190	40/16	40/16	5,5	1,5	32
ER-2-B	720	320			7,5	3	37
ER-2-C	850	450			9,5	4,5	42



## heat exchangers - hot water systems - district heating stations

### DMS – Coil and Shell Heat Exchanger Type ER - 5 - and ER - 8 - ... Water heater



		shell		coil	
operating pressure	bar	16	12	16	12
operating temperature	°C	205	300	205	300
operating temperature	°F	401	572	401	572

#### Working as heat exchanger

##### connections:

- (1) hot water flow line in
- (2) hot water return out
- (3) secondary out
- (4) secondary in
- (5) venting

#### Working as water heater

##### connections:

- (1) hot water out
- (2) cold water in
- (3) hot water flow line in
- (4) hot water return out
- (5) venting

Internal screwed thread

##### Material:

**shell:** steel ST 37-2  
pipe plate, bumed head and flanges of stainless steel 1.4404  
cross-gilled stainless steel coil 1.4404  
fixed insulation 80 mm mineral wool completely  
covered with structured aluminium-plates

Erection on a rack with adjustable legs

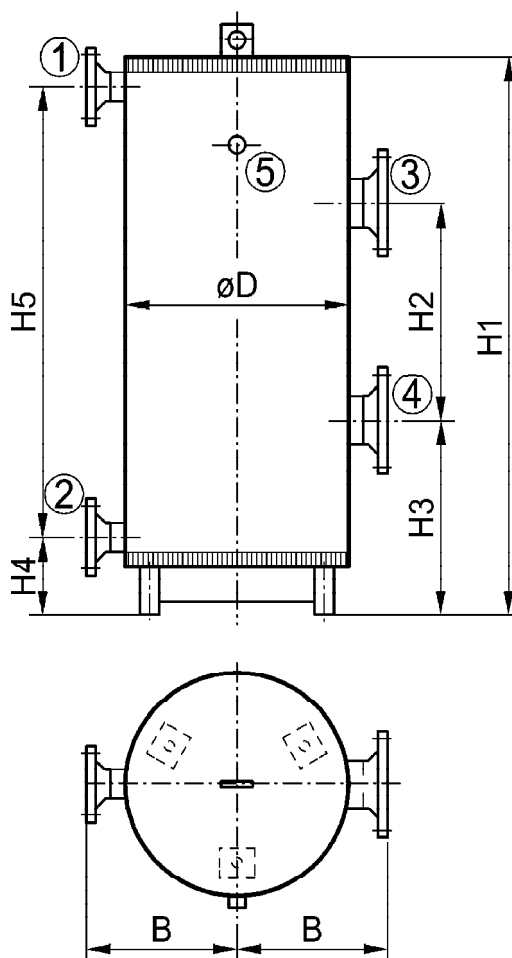
Approval: TÜV-Type Approval, manufactured according to  
EU-Pressure Vessel regulations 97/ 23 EG Design C  
acc. to DIN 1988 T 2

on request: shell manufactured complete out of stainless steel

Type	H1 mm	H2 mm	H3 mm	(1) (2) DN / PN	(3) (4) DN / PN	contents ltr.		weight kg
						shell	coil	
ER-5-A	970	330	750	40/16	40/16	11	3	41
ER-8-A	1100	460	880			12	4	47
ER-5-B	1220	580	1000			16	4	50
ER-8-B	1500	860	1280			20	6	62
ER-5-C	1470	830	1250			21	5	61
ER-8-C	1920	1280	1700			29	9	79

## heat exchangers - hot water systems - district heating stations

### DMS – Coil and Shell Heat Exchanger Type ER - 12 - ... to ER - 37 - ... Water heater



		shell		coil	
operating pressure	bar	16	12	16	12
operating temperature	°C	205	300	205	300
operating temperature	°F	401	572	401	572

#### Working as heat exchanger

##### connections:

- (1) hot water flow line in
- (2) hot water return out
- (3) secondary out
- (4) secondary in
- (5) venting

#### Working as water heater

##### connections:

- (1) hot water out
- (2) cold water in
- (3) hot water flow line in
- (4) hot water return out
- (5) venting

Internal screwed thread

##### Material:

**shell:** steel ST 37-2

pipe plate, bumed head and flanges of stainless steel 1.4404

cross-gilled stainless steel coil 1.4404

fixed insulation 80 mm mineral wool completely

covered with structured aluminium-plates

Erection on a rack with adjustable legs

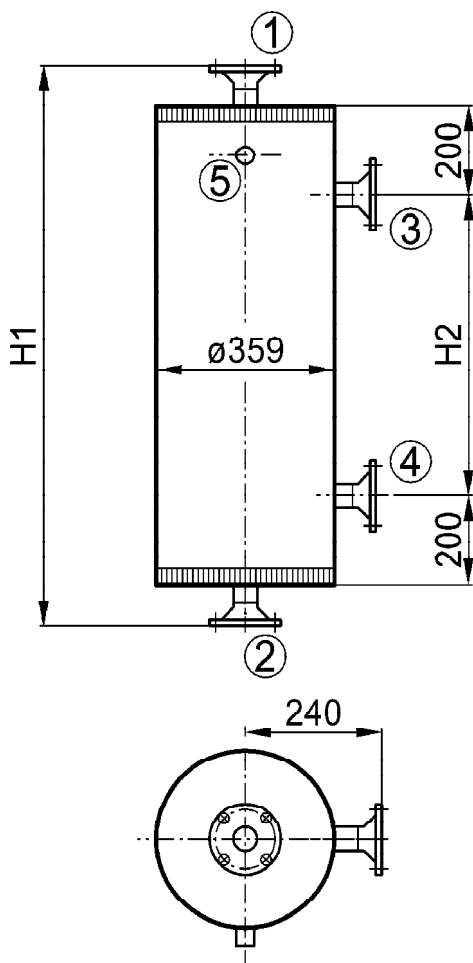
Approval: TÜV-Type Approval, manufactured according to  
EU-Pressure Vessel regulations 97/ 23 EG Design C  
acc. to DIN 1988 T 2

on request: shell manufactured complete out of stainless steel

Type	Ø D mm	H1 mm	H2 mm	H3 mm	H4 mm	H5 mm	(1) (2) DN / PN	(3) (4) DN / PN	contents ltr.		weight
									shell	coil	
ER-12-A	394	1265	450	400	160	930	50/16	100/16	16	9	65
ER-20-A	494								40	15	110
ER-30-A	494		430	410			65/16	125/16	35	19	125
ER-37-A	494								33	21	129
ER-12-B	394	1645	830	400		1310	50/16	100/16	25	12	84
ER-20-B	494								61	20	145
ER-30-B	494		810	410			65/16	125/16	54	27	167
ER-37-B	494								48	32	174
ER-12-C	394	2025	1210	400		1690	50/16	100/16	33	16	102
ER-20-C	494								84	26	177
ER-30-C	494		1190	410			65/16	125/16	72	36	205
ER-37-C	494								54	43	218

## heat exchangers - hot water systems - district heating stations

### DMS – Coil and Shell Heat Exchanger Type SR - 2 - ...



		shell	coil
operating pressure	bar	16	25
operating temperature	°C	205	205
operating temperature	°F	401	401

#### connections:

- (1) hot water flow line in
- (2) hot water return out
- (3) secondary out
- (4) secondary in
- (5) venting

Internal screwed thread

#### Material:

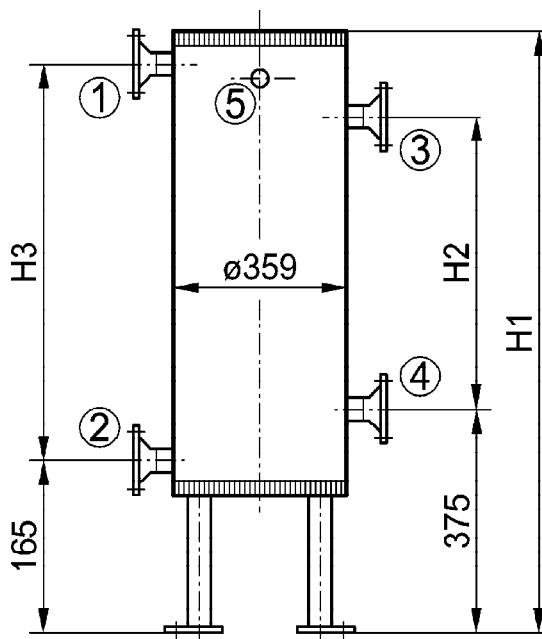
shell, pipe plate, bumed head and flanges of steel ST 37-2  
cross-gilled stainless steel coil 1.4404  
fixed insulation 80 mm mineral wool completely  
covered with structured aluminium-plates

Approval: TÜV-Type Approval, manufactured according to  
EU-Pressure Vessel regulations 97/ 23 EG Design C  
acc. to DIN 1988 T 2

Type	H1 mm	H2 mm	(1) (2) DN/PN	(3) (4) DN/PN	contents ltr.		weight kg
					shell	coil	
SR-2-A	590	190	40/40	40/16	5,5	1,5	33
SR-2-B	720	320			7,5	3	39
SR-2-C	850	450			9,5	4,5	43

## heat exchangers - hot water systems - district heating stations

### DMS – Coil and Shell Heat Exchanger Type SR - 5 - ... and SR - 8 - ...



		shell	coil
operating pressure	bar	16	25
operating temperature	°C	205	205
operating temperature	°F	401	401

#### connections:

- (1) hot water flow line in
- (2) hot water return out
- (3) secondary out
- (4) secondary in
- (5) venting

Internal screwed thread

#### Material:

shell, pipe plate, bumed head and flanges of steel ST 37-2  
cross-gilled stainless steel coil 1.4404  
fixed insulation 80 mm mineral wool completely  
covered with structured aluminium-plates

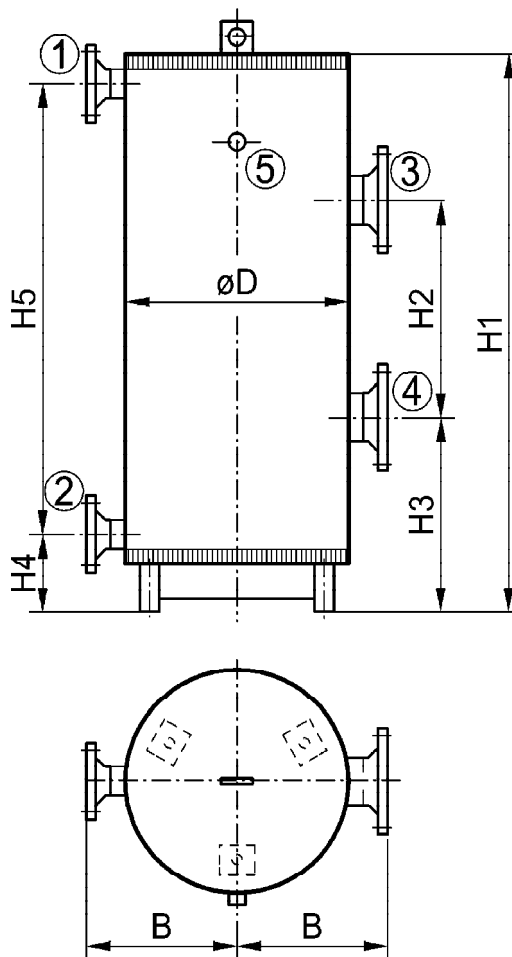
on request: shell manufactured complete out of stainless steel

Approval: TÜV-Type Approval, manufactured according to  
EU-Pressure Vessel regulations 97/ 23 EG Design C  
acc. to DIN 1988 T 2

Type	H1 mm	H2 mm	H3 mm	(1) (2) DN / PN	(3) (4) DN / PN	contents ltr.		weight kg
						shell	coil	
SR-5-A	970	330	750	40/40	40/16	11	3	42
SR-8-A	1100	460	880			12	4	49
SR-5-B	1220	580	1000			16	4	52
SR-8-B	1500	860	1280			20	6	64
SR-5-C	1470	830	1250			21	5	62
SR-8-C	1920	1280	1700			29	9	80

## heat exchangers - hot water systems - district heating stations

### DMS – Coil and Shell Heat Exchanger Type SR - 12 - ... to SR - 37 - ...



		shell	coil
operating pressure	bar	16	25
operating temperature	°C	205	205
operating temperature	°F	401	401

#### connections:

- (1) hot water flow line in
- (2) hot water return out
- (3) secondary out
- (4) secondary in
- (5) venting

Internal screwed thread

#### Material:

shell, pipe plate, bumed head and flanges of steel ST 37-2  
cross-gilled stainless steel coil 1.4404  
fixed insulation 80 mm mineral wool completely  
covered with structured aluminium-plates

on request: shell manufactured complete out of stainless steel

Approval: TÜV-Type Approval, manufactured according to  
EU-Pressure Vessel regulations 97/ 23 EG Design C  
acc. to DIN 1988 T 2

Type	Ø D mm	H1 mm	H2 mm	H3 mm	H4 mm	H5 mm	(1) (2) DN / PN	(3) (4) DN / PN	contents ltr.		weight kg
									shell	coil	
SR-12-A	394	1265	450	400	160	930	50/40	100/16	16	9	66
SR-20-A	494								40	15	112
SR-30-A	494		430	410			65/40	125/16	35	19	128
SR-37-A	494								33	21	132
SR-12-B	394	1645	830	400		1310	50/40	100/16	25	12	85
SR-20-B	494								61	20	147
SR-30-B	494		810	410			65/40	125/16	54	27	169
SR-37-B	494								48	32	177
SR-12-C	394	2025	1210	400		1690	50/40	100/16	33	16	103
SR-20-C	494								84	26	179
SR-30-C	494		1190	410			65/40	125/16	72	36	208
SR-37-C	494								54	43	221







## heat exchangers - hot water systems - district heating stations

### Data sheet for selecting heat exchanger

#### ☐ **Coil and Shell**

shell / coil	material	design
<input type="checkbox"/> <input type="checkbox"/>	steel St 37	vertical/horizontal *
<input type="checkbox"/> <input type="checkbox"/>	copper	
<input type="checkbox"/> <input type="checkbox"/>	stainless steel	

#### ☐ **Plate-Heat-Exchanger**

#### **Material**

<input type="checkbox"/> with gasket	<input type="checkbox"/> 1.4301
<input type="checkbox"/> copper brazed	<input type="checkbox"/> 1.4401
<input type="checkbox"/> nickel brazed	<input type="checkbox"/> Titanium
<input type="checkbox"/> welded (SPS)	

capacity	_____ kW
primary	temperatures _____/_____ °C/°F *
	max. headloss _____ kPa
	medium _____
secondary	temperatures _____/_____ °C/°F *
	max. headloss _____ kPa
	medium _____
max. operating pressure primary / secondary	_____/_____ bar
max. operating temperatures primary / secondary	_____/_____ °C/°F *

\* paint out not applicable details

**heat exchangers - hot water systems - district heating stations**

**DMS - Hot - Water - Storage - Tank**

**Series EBS-TOP**

**corrosionresistant**

Constructed according to DIN 4753 part 1

Contents 150 – 1300 l

Any special finish and contents on request

Combinable with any heat exchanger

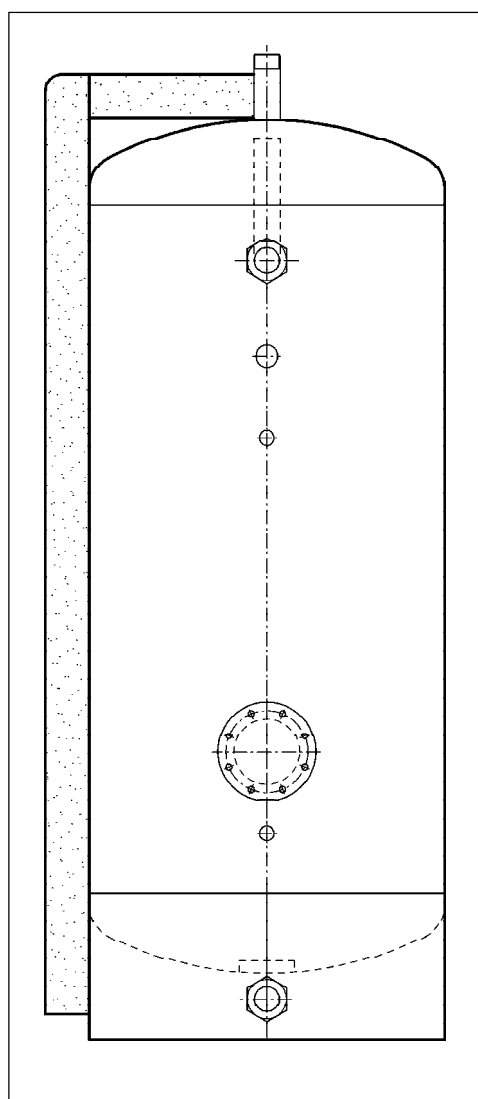
**Material:**

High quality stainless steel 1.4571  
(AISI 316 Ti)

Butt seam welding – no crease

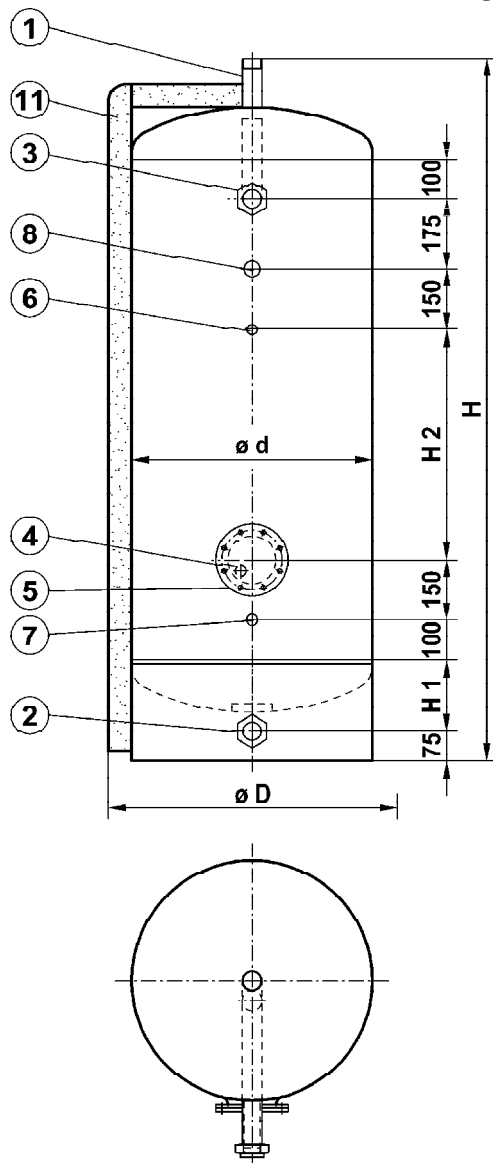
Completely pickled and neutralized

Insulation removable soft foam with plastic cover



## heat exchangers - hot water systems - district heating stations

### Stainless-Steel-Hot-Water-Storage-Tank Series EBS-TOP



#### Connections

- (1) hot water \*
- (2) cold water supply \*
- (3) charging \*
- (4) optional  $\frac{3}{4}$ "
- (5) handhole DN 120/180
- (6) thermometer  $\frac{1}{2}$ "
- (7) sensor  $\frac{3}{4}$ "
- (8) circulation 1"

(11) insulation

\* (1)

EBS-TOP 150 up to 225: R 1"

EBS-TOP 300 up to 750: R 1½"

EBS-TOP 1000 up to 1300: R 2"

\* (2) (3)

EBS-TOP 150 up to 225: orifice cross-section 1"

EBS-TOP 300 up to 750: orifice cross-section 1½"

EBS-TOP 1000 up to 1300: R 2"

- high quality stainless steel 1.4571
- butt seam welding – no crease
- completely pickled and neutralized
- insulation removable soft foam with plastic cover

max. operating temperature 95°C / 203°F

max. operating pressure 10 bar

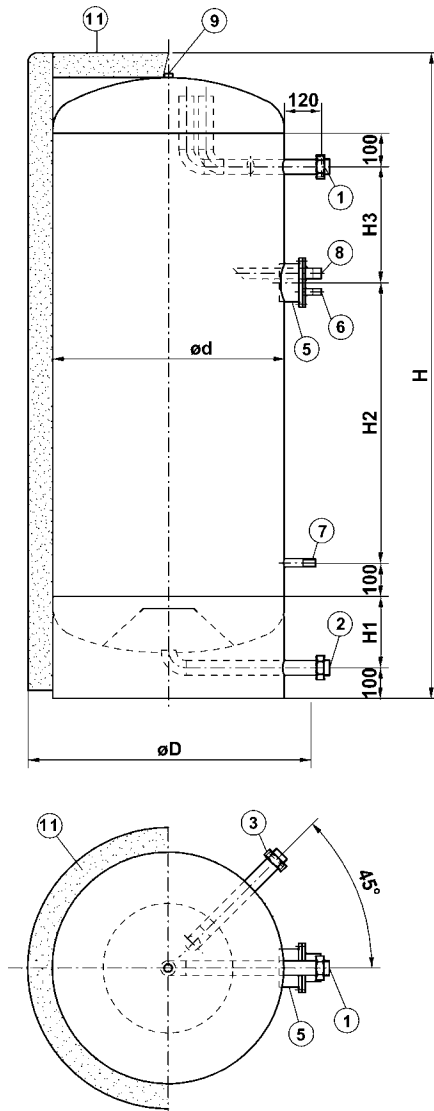
Type EBS-TOP		150	225	300	400	500	650	750	1000	1300
contents	l	150	225	300	400	500	650	750	1000	1300
weight	(ca.) kg	53	62	70	95	125	145	165	245	365
diameter	D mm	560	660	660	760	810	910	960	1010	1060
diameter	d mm	400	500	500	600	650	750	800	850	900
height	H mm	1460	1470	1720	1750	1804	1830	1850	2103	2388
handhole		120/180	120/180	120/180	120/180	120/180	120/180	120/180	120/180	120/180
height	H1 mm	155	160	160	175	202	215	225	227	243
length	H2 mm	325	325	575	575	575	575	575	825	1075

**heat exchangers - hot water systems - district heating stations**

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS – Hot – Water – Storage – Tank</b></p> <p><b>Series EBS - TOP</b></p> <p><b>Type: EBS - TOP</b> _____</p> <p>constructed and built according to DIN 4753 part 1, vertical designed</p> <p>max. operating pressure 10 bar max. operating temperature 95°C/203°F</p> <p>Cold water connection placed at deepest point of the storage tank to ensure 100% use of contents, incl. flow damper, easy removable and recyclable soft foam insulation with plastic cover, all necessary connections and hand- manhole</p> <p>Material: stainless steel 1.4571 / AISI 316TI pickled and neutralized. Butt seam welded – no crease</p> <p><b>Contents:</b> _____ l</p> <p><b>Connections:</b></p> <p>hot water _____"outside thread</p> <p>cold supply/charging _____ " inside/outside* thread</p> <p>circulation _____ " inside thread</p> <p>thermometer _____ " inside thread</p> <p>sensor _____ " inside thread</p> <p><b>Measures:</b></p> <p>diameter with insulation _____ mm</p> <p>diameter without insulation _____ mm</p> <p>total height _____ mm</p> <p><b>Weight:</b> ca. _____ kg</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b></p> <p><b>Price:</b></p> <p>* paint out not applicable details</p>		

## heat exchangers - hot water systems - district heating stations

### Stainless-Steel-Hot-Water-Storage-Tank Series EBS-To



#### Connections

- (1) hot water \*
- (2) cold water supply \*
- (3) charging \*
- (5) handhole DN 120/180
- (6) thermometer Rp 1/2" i.G.
- (7) sensor Rp 3/4" i.G.
- (8) circulation Rp 1" i.G. (EBS-To 160 Rp 3/4" i.G.)
- (9) venting 3/8"

(11) insulation

\* (1) (2) (3)

EBS-To 160: Rp 3/4" i.G. inside thread  
EBS-To 200: orifice cross-section 1"  
EBS-To 260-750: orifice cross-section 1 1/2"  
EBS-To 1000: R 2" a.G. outside thread

constructed and built according to  
DIN 4753 part 1

- high quality stainless steel 1.4571
- butt seam welding – no crease
- completely pickled and neutralized
- insulation removable soft foam with plastic cover

max. operating temperature 95°C/203°F  
max. operating pressure 10 bar

Type EBS-To	160	200	260	300	350	500	650	750	1000	1200
contents l	160	200	260	300	350	500	650	750	1000	1200
weight kg	53	62	70	85	95	125	145	165	245	365
diameter D mm	560	660	660	660	660	810	910	910	910	910
diameter d mm	400	500	500	500	500	650	750	750	750	750
height H mm	1426	1490	1754	1855	2000	1812	1860	2110	2600	3030
handhole DN	125	125	125	125	125	125	125	125	125	125
height H1 mm	106	177	177	177	177	206	230	230	250	250
height H2 mm	624	536	668	798	835	668	668	835	1148	1428
height H3 mm	316	250	382	352	465	382	382	465	622	762

ask for greater or other types

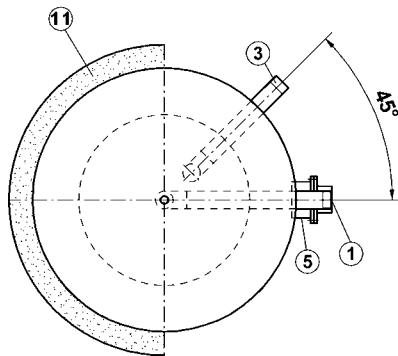
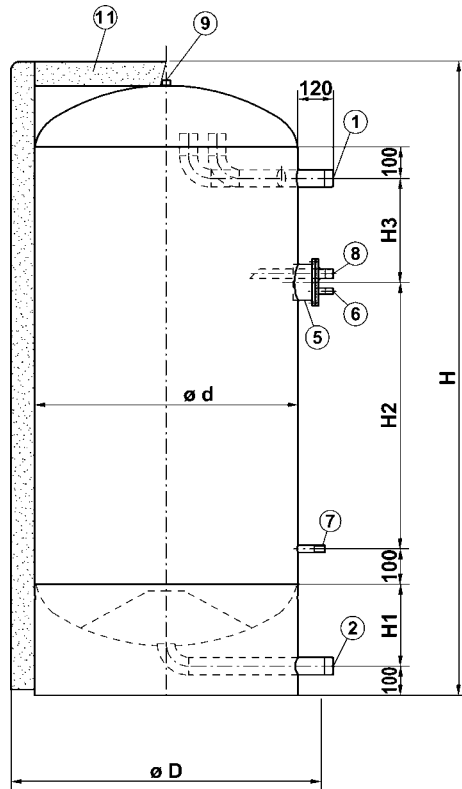


## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS – Hot – Water – Storage – Tank</b></p> <p><b>Series EBS - To</b></p> <p><b>Type: EBS - To</b> _____</p> <p>constructed and built according to DIN 4753 part 1, vertical designed,</p> <p>max. operating pressure 10 bar max. operating temperature 95°C/203°F</p> <p>Cold water connection placed at deepest point of the storage tank to ensure 100% use of contents, incl. flow damper, easy removable and recyclable soft foam insulation with plastic cover, all necessary connections and hand- manhole</p> <p>Material: stainless steel 1.4571 / AISI 316TI pickled and neutralized. Butt seam welded – no crease</p> <p><b>Contents:</b> _____ l</p> <p><b>Connections:</b></p> <p>cold supply/hot water _____ " inside/outside* thread</p> <p>charging _____ " inside/outside* thread</p> <p>circulation _____ " inside thread</p> <p>thermometer _____ " inside thread</p> <p>sensor _____ " inside thread</p> <p><b>Measures:</b></p> <p>diameter with insulation _____ mm</p> <p>diameter without insulation _____ mm</p> <p>total height _____ mm</p> <p><b>Weight:</b> ca. _____ kg</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b></p> <p><b>Price:</b></p> <p>* paint out not applicable details</p>		

## heat exchangers - hot water systems - district heating stations

### Stainless-Steel-Hot-Water-Storage-Tank Series EBS-Co



#### Connections

- (1) hot water  
EBS-Co 1000 - 1250 2" outside thread  
EBS-Co 1500 - 3200 flange DN 65\*
- (2) cold water supply  
EBS-Co 1000 - 1250 2" outside thread  
EBS-Co 1500 - 3200 flange DN 65\*
- (3) charging 2" outside thread
- (5) handhole DN 120/180
- (6) thermometer 1/2"
- (7) sensor 3/4"
- (8) circulation 1"
- (9) venting 3/8"

(11) insulation

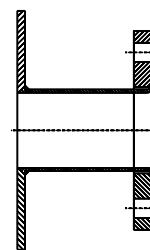
constructed and built according to  
DIN 4753 part 1

- high quality stainless steel 1.4571
- butt seam welding – no crease
- completely pickled and neutralized
- insulation removable soft foam with plastic cover

max. operating temperature 95°C/203°F

max. operating pressure 10 bar

test pressure 13 bar



\* loose flange

Type	EBS-Co		1000	1250	1250-B	1500	2000	2500	3200
contents	l		1000	1250	1250	1500	2000	2500	3200
weight	kg		255	280	280	325	355	445	570
diameter	D	mm	1100	1100	1200	1200	1400	1500	1600
diameter	d	mm	900	900	1000	1000	1200	1300	1400
height	H	mm	1938	2188	1978	2228	2306	2344	2384
handhole	DN		125	125	125	125	125	125	125
height	H1	mm	279	279	299	299	338	357	377
height	H2	mm	668	835	668	835	702	683	663
height	H3	mm	382	465	382	465	398	417	437

ask for greater or other types

**heat exchangers - hot water systems - district heating stations**

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS – Hot – Water – Storage – Tank</b></p> <p><b>Series EBS - Co</b></p> <p><b>Type: EBS - Co</b> _____</p> <p>constructed and built according to DIN 4753 part 1, vertical designed,</p> <p>max. operating pressure 10 bar max. operating temperature 95°C/203°F</p> <p>Cold water connection placed at deepest point of the storage tank to ensure 100% use of contents, incl. flow damper, easy removable and recyclable soft foam insulation with plastic cover, all necessary connections and hand- manhole</p> <p>Material: stainless steel 1.4571 / AISI 316TI pickled and neutralized. Butt seam welded – no crease</p> <p><b>Contents:</b> _____ l</p> <p><b>Connections:</b></p> <p>cold supply/hot water DN 65 * _____ " outside thread*</p> <p>charging _____ " outside thread</p> <p>circulation _____ " inside thread</p> <p>thermometer _____ " inside thread</p> <p>sensor _____ " inside thread</p> <p><b>Measures:</b></p> <p>diameter with insulation _____ mm</p> <p>diameter without insulation _____ mm</p> <p>total height _____ mm</p> <p><b>Weight:</b> ca. _____ kg</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b></p> <p><b>Price:</b></p> <p>* paint out not applicable details</p>		

**heat exchangers - hot water systems - district heating stations**

**DMS – Hot-Water-Storage-Tank**

**Series EBS-T**

**corrosionresistant**

Constructed according to DIN 4753 part 1

Contents 260 – 1200 l

Any special finish and contents on request if required with TÜV-approval

Combinable with any heat exchanger

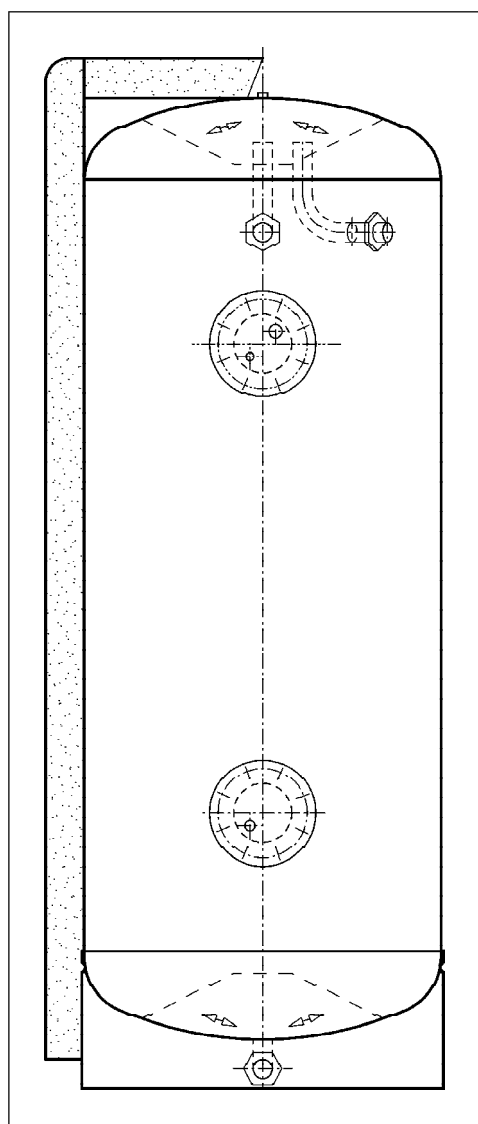
**Material:**

High quality stainless steel 1.4571  
(AISI 316 Ti)

Butt seam welding – no crease

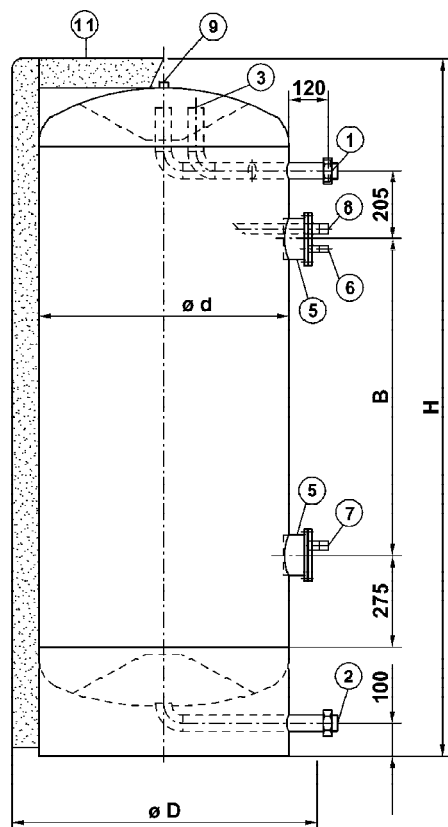
Completely pickled and neutralized

Insulation removable soft foam with plastic cover



## heat exchangers - hot water systems - district heating stations

### Stainless-Steel-Hot-Water-Storage-Tank Series EBS-T



#### Connections

- (1) hot water \*  
orifice cross-section 1 1/2"  
(EBS-T 1000-1200: 2" outside thread)
- (2) cold water supply \*  
orifice cross-section 1 1/2"  
(EBS-T 1000-1200: 2" outside thread)
- (3) charging \*  
orifice cross-section 1 1/2"  
(EBS-T 1000-1200: 2" outside thread)
- (5) handhole DN 120/180
- (6) thermometer 1/2"
- (7) sensor 3/4"
- (8) circulation 1"
- (9) venting 3/8"
- (11) insulation

constructed and built according to  
DIN 4753 part 1, TÜV – pre approved

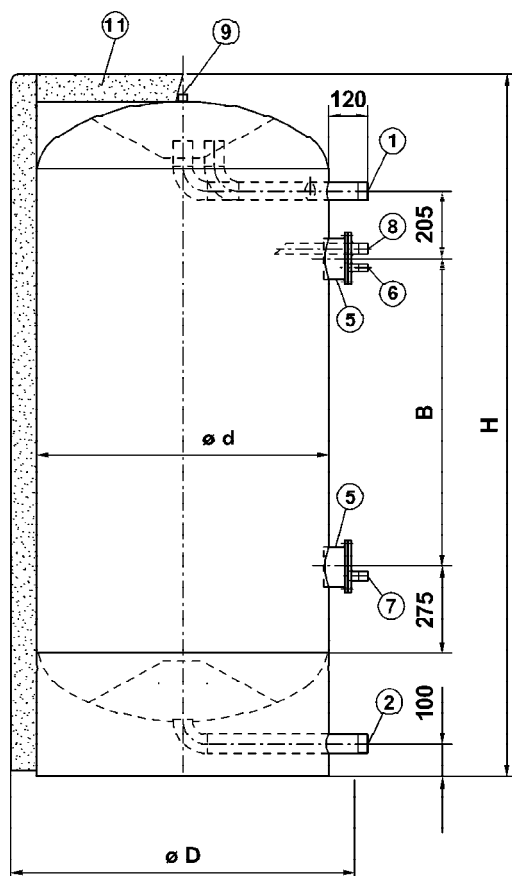
- high quality stainless steel 1.4571
- butt seam welding – no crease
- completely pickled and neutralized
- insulation removable soft foam with plastic cover

max. operating temperature 95°C/203°F  
max. operating pressure 10 bar

Type EBS-T		260	350	500	650	750	1000	1200
contents	l	260	350	500	650	750	1000	1200
weight	kg	85	110	145	173	195	287	315
diameter	ØD	mm	660	660	810	910	910	910
diameter	Ød	mm	500	500	650	750	750	750
height	H	mm	1754	2000	1812	1860	2110	2600
handhole	DN		125	125	125	125	125	125
height	B	mm	700	950	700	700	950	1420
							1840	

## heat exchangers - hot water systems - district heating stations

### Stainless-Steel-Hot-Water-Storage-Tank Series EBS-C



#### Connections

- (1) hot water  
EBS-C 1000 - 1250 2" outside thread  
EBS-C 1500 - 3200 flange DN 65\*
- (2) cold water supply  
EBS-C 1000 - 1250 2" outside thread  
EBS-C 1500 - 3200 flange DN 65\*
- (3) charging 2" outside thread
- (5) handhole DN 120/180
- (6) thermometer 1/2"
- (7) sensor 3/4"
- (8) circulation 1"
- (9) venting 3/8"

(11) insulation

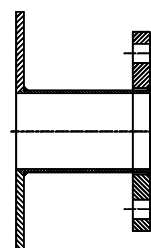
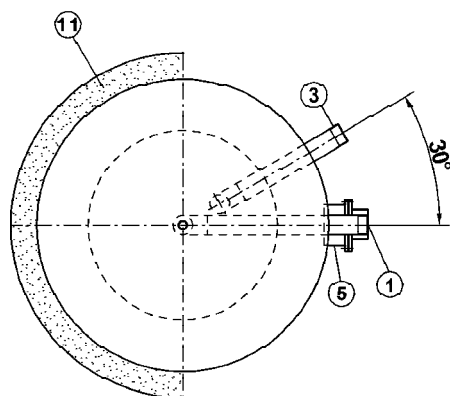
constructed and built according to  
DIN 4753 part 1, TÜV – pre approved

- high quality stainless steel 1.4571
- butt seam welding – no crease
- completely pickled and neutralized
- insulation removable soft foam with plastic cover

max. operating temperature 95°C/203°F

max. operating pressure 10 bar

test pressure 13 bar



\* loose flange

Type	EBS-C	1000	1250-A	1250-B	1500	2000	2500	3200
contents	l	1000	1250	1250	1500	2000	2500	3200
weight	kg	300	330	350	370	420	525	672
diameter	D mm	1100	1100	1200	1200	1400	1500	1600
diameter	d mm	900	900	1000	1000	1200	1300	1400
height	H mm	1938	2188	1978	2228	2306	2344	2384
handhole	DN	125	125	125	125	125	125	125
height	B mm	700	950	950	950	950	950	950



## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS – Hot – Water – Storage – Tank</b></p> <p><b>Series EBS - T</b></p> <p><b>Type: EBS - T</b> _____</p> <p>constructed and built according to DIN 4753 part 1, vertical designed, TÜV – pre/approved</p> <p>max. operating pressure 10 bar max. operating temperature 95°C/203°F</p> <p>Cold water connection placed at deepest point of the storage tank to ensure 100% use of contents, incl. flow damper, easy removable and recyclable soft foam insulation with plastic cover, all necessary connections and hand- manhole</p> <p>Material: stainless steel 1.4571 / AISI 316TI pickled and neutralized. Butt seam welded – no crease</p> <p><b>Contents:</b> _____ l</p> <p><b>Connections:</b></p> <p>cold supply/hot water _____ " inside/outside* thread</p> <p>charging _____ " inside/outside* thread</p> <p>circulation _____ " inside thread</p> <p>thermometer _____ " inside thread</p> <p>sensor _____ " inside thread</p> <p><b>Measures:</b></p> <p>diameter with insulation _____ mm</p> <p>diameter without insulation _____ mm</p> <p>total height _____ mm</p> <p><b>Weight:</b> ca. _____ kg</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b></p> <p><b>Price:</b></p> <p>* paint out not applicable details</p>		

**heat exchangers - hot water systems - district heating stations**

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS – Hot – Water – Storage – Tank</b></p> <p><b>Series EBS - C</b></p> <p><b>Type: EBS - C</b> _____</p> <p>constructed and built according to DIN 4753 part 1, vertical designed, TÜV – pre/approved</p> <p>max. operating pressure 10 bar max. operating temperature 95°C/203°F</p> <p>Cold water connection placed at deepest point of the storage tank to ensure 100% use of contents, incl. flow damper, easy removable and recyclable soft foam insulation with plastic cover, all necessary connections and hand- manhole</p> <p>Material: stainless steel 1.4571 / AISI 316TI pickled and neutralized. Butt seam welded – no crease</p> <p><b>Contents:</b> _____ l</p> <p><b>Connections:</b></p> <p>cold supply/hot water DN 65 * _____ " outside thread*</p> <p>charging _____ " outside thread</p> <p>circulation _____ " inside thread</p> <p>thermometer _____ " inside thread</p> <p>sensor _____ " inside thread</p> <p><b>Measures:</b></p> <p>diameter with insulation _____ mm</p> <p>diameter without insulation _____ mm</p> <p>total height _____ mm</p> <p><b>Weight:</b> ca. _____ kg</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b></p> <p><b>Price:</b></p> <p>* paint out not applicable details</p>		

**heat exchangers - hot water systems - district heating stations**

**DMS – Hot-Water-Storage-Tank  
enamelled according to DIN 4753**

**Series FM / FFM**

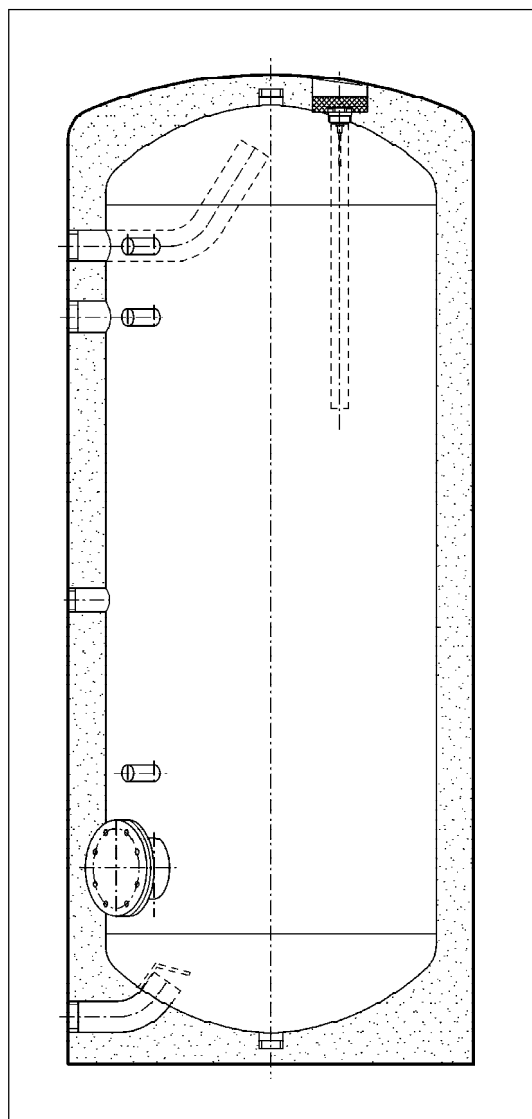
Internal tank corrosionresistant by  
enamell including protective anode

Combinable with any heat  
exchanger

Contents 200 – 1000 l

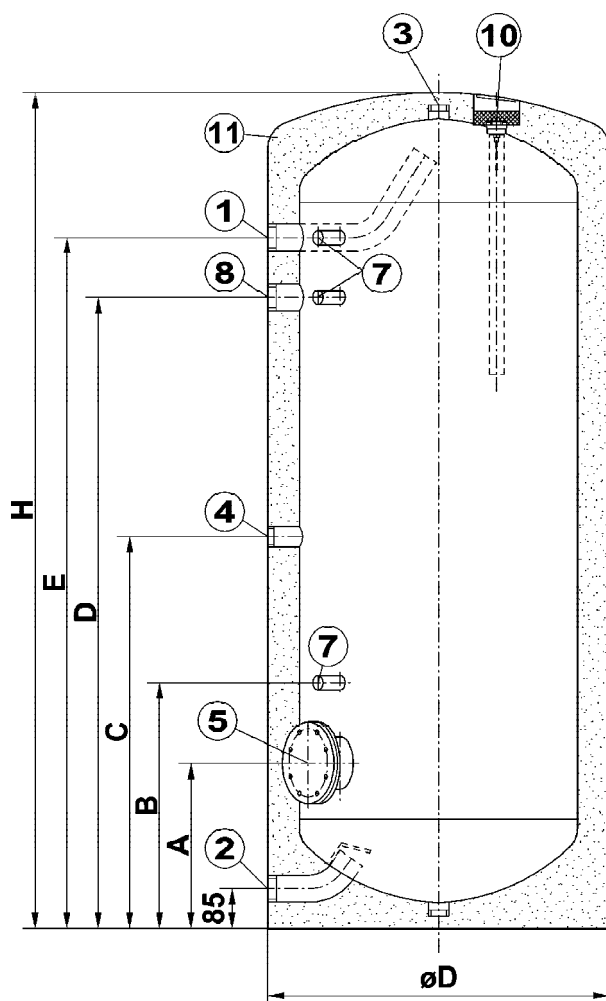
**Material:**  
ST 37.2 DIN 17100  
with protective anode

Polyurethane high-resistance  
foam insulation  
covered by powder coated sheet  
steel



## heat exchangers - hot water systems - district heating stations

### DMS - Enamelled - Hot - Water - Storage - Tank Series FM 200, 300, 400 and 500



enamelled without internal tube heat exchanger

**Connections:** (all inside thread)

- (1) hot water 1½"
- (2) cold water 1½"
- (3) charging 1" 400 + 500 | 1¼"
- (4) sensor 1"
- (5) handhole ø 180 mm
- (7) thermometer, sensor ½"
- (8) circulation 1½"
- (10) anode 1¼"

(11) insulation

Enamell corrosionprotected according to  
DIN 4753 part 3 with anode

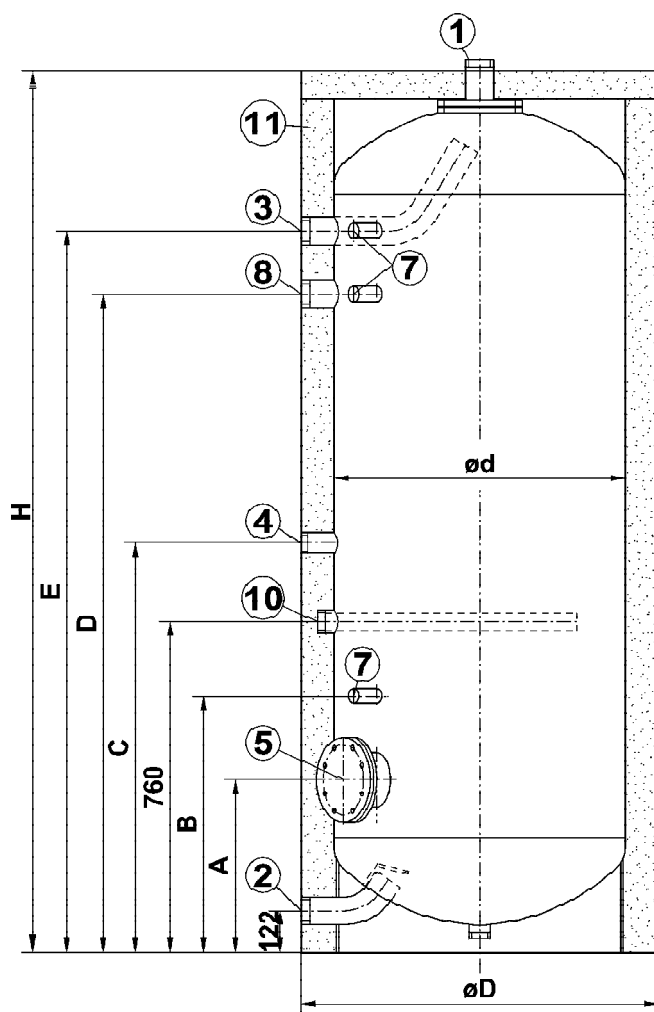
Steel ST 37-2 DIN 17100

max. operating temperature 95°C/203°F  
max. operating pressure 10 bar  
test pressure 15 bar

Type	Ø D [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	H [mm]	weight [kg]
FM 200	600	305	485	615	914	1044	1300	83
FM 300	600	305	485	780	1264	1394	1650	112
FM 400	670	345	525	850	1380	1510	1785	139
FM 500	750	370	550	870	1410	1540	1865	162

## heat exchangers - hot water systems - district heating stations

### DMS - Enamelled - Hot - Water - Storage - Tank Series FFM 800 and FFM 1000



enamelled without internal tube heat exchanger

**Connections:** (all inside thread)

- (1) hot water 1½"
- (2) cold water 1½"
- (3) charging 1½"
- (4) sensor 1"
- (5) handhole Ø 180 mm
- (7) thermometer, sensor ½"
- (8) circulation 1½"
- (10) anode 1¼"

(11) insulation

Enamell corrosionprotected according to  
DIN 4753 part 3 with anode

Steel ST 37-2 DIN 17100

max. operating temperature 95°C/203°F  
max. operating pressure 10 bar  
test pressure 15 bar

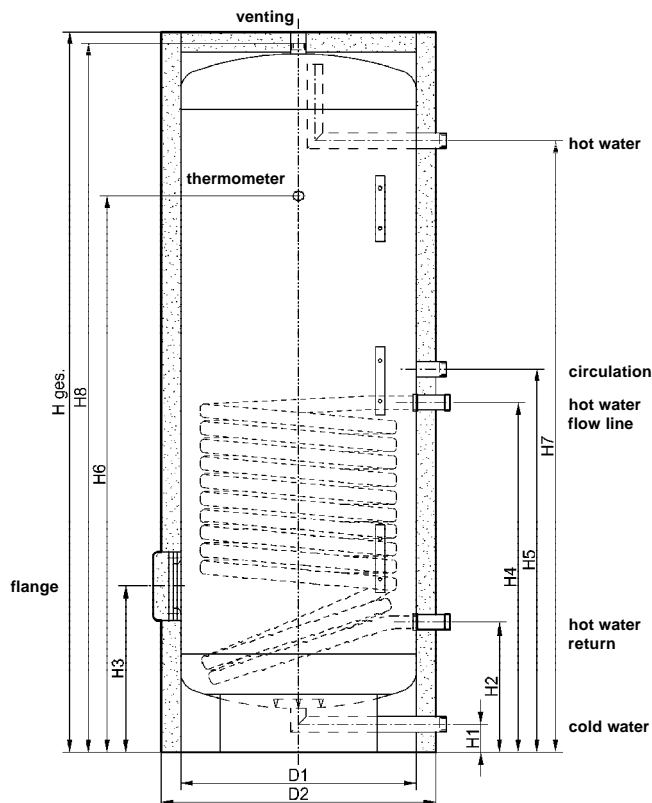
Type	Ø D [mm]	Ø d [mm]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	H [mm]	weight [kg]
FFM 800	990	790	406	620	900	1450	1580	1972	278
FFM 1000	990	790	406	620	1075	1630	1760	2318	303

## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS – Hot – Water – Storage – Tank</b> without internal tube heat exchanger</p> <p><b>Series FM/FFM</b></p> <p><b>Type: FM * / FFM * _____</b></p> <p>constructed and built according to DIN 4753 part 1, vertical designed</p> <p>max. operating pressure 10 bar max. operating temperaure 95°C/203°F</p> <p>removable and recycleble polyurethane foam insulation covered by powder coated sheet steel</p> <p>connections with inside thread handhole acc. to DIN 4753</p> <p>Anode ( ) (A) Magnesium (B) Electric</p> <p><b>Contents:</b> _____ l</p> <p><b>Connections:</b> all inside thread cold and hot water 1½ "</p> <p>charging _____ "</p> <p>circulation _____ "</p> <p>thermometer ½ "</p> <p><b>Measures:</b> diameter with insulation _____ mm diameter without insulation _____ mm height _____ mm</p> <p><b>Weight:</b> _____ kg</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b></p> <p><b>Price:</b></p> <p>* paint out not applicable details</p>		

## heat exchangers - hot water systems - district heating stations

### DMS - High Performance-Stored-Water-Heater NTE 1



- Material: stainless steel 1.4571 / AISI 316Ti
- sensor guidance for sensor diameter 6 to 12 mm
- 1 tube heat exchanger – material 1.4571/AISI 316Ti
- constructed and built according to DIN 4753
- butt seam welded – no crease
- completely pickled and neutralized

#### Optional accessories:

- Man hole cover with socket end 1 ½" inside thread for screwed type electric heating system up to 12 kW
- Immersion sleeve

#### Insulation:

Removable 100 mm soft foam plastic covered or  
70 mm polyurethane foam plastic covered all recycleble

max. operating pressure: tank 10 bar  
coil 25 bar

max. operating temperature: tank 95°C/203°F  
coil 110°C/230°F

All Rp-connections are inside thread acc. to DIN 2999 part 1 extended to 90 mm.

All G-connections are outside thread acc. to DIN 259 extended to 115 mm.

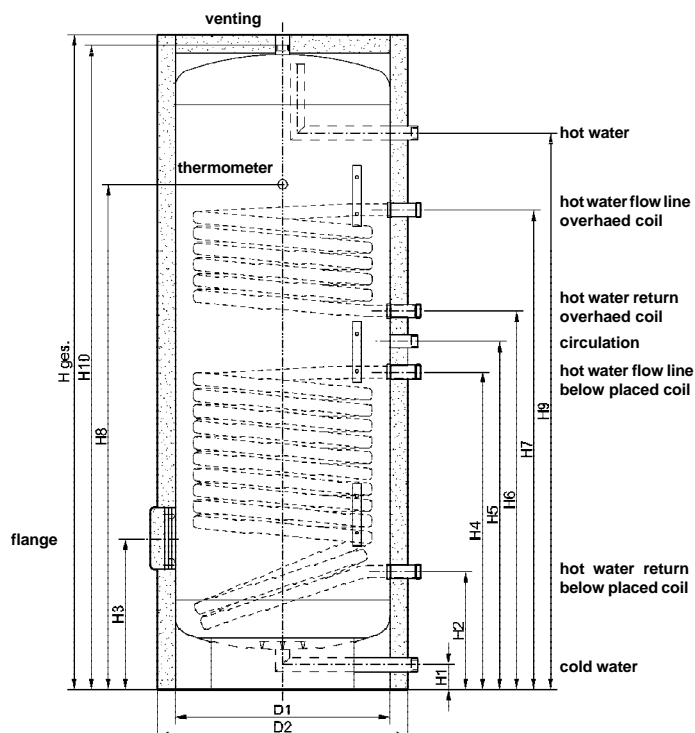
contents (l)	150	200	300	400	500	600	750	1000
H1	65	65	65	70	70	70	80	90
H2	260	305	305	330	330	330	380	405
H3	340	365	365	390	390	390	440	465
H4	685	605	795	890	890	890	940	1005
H5	760	685	870	975	975	975	1025	1140
H6	1100	1115	1345	1375	1430	1430	1480	1725
H7	1130	1145	1375	1420	1670	1670	1720	1995
H8	1325	1362	1612	1640	1910	1910	1990	2275
H ges.	1375	1410	1660	1690	1960	1960	2040	2345
D1	400	500	500	600	600	650	750	800
D2-polyurethane foam	540	640	640	740	740	790	890	980
D2-soft foam	600	700	700	800	800	850	950	1000
weight kg	50	65	88	103	108	126	168	190
<b>connections</b>								
flange	120/180	120/180	120/180	120/180	120/180	120/180	120/180	120/180
cold-, hotwater	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1 1/2"	Rp 1 1/2"
circulation	Rp 3/4"	Rp 3/4"	Rp 3/4"	Rp 3/4"	Rp 3/4"	Rp 3/4"	Rp 3/4"	Rp 3/4"
thermometer	Rp 1/2"	Rp 1/2"	Rp 1/2"	Rp 1/2"	Rp 1/2"	Rp 1/2"	Rp 1/2"	Rp 1/2"
venting	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1"
sensor guidance	3x300	3x300	3x300	3x300	3x300	3x300	3x300	3x300
coil	G 1"	G 1"	G 1 1/4"	G 1 1/2"	G 1 1/2"	G 1 1/2"	G 1 1/2"	G 1 1/2"
heating surface m²	0,9	0,9	1,4	1,8	1,8	1,8	2,4	2,8
diameter	18,0	18,0	26,9	33,7	33,7	33,7	33,7	33,7
<b>capacity datas</b>								
no. of flats	2	4	12	20	23	26	35	46
acc. to DIN 4708*								
permanent capacity* l/h	926	978	1522	1743	1924	2012	2413	2846

\* on 10/80/45°C 50/176/113°F



## heat exchangers - hot water systems - district heating stations

### DMS - High Performance-Stored-Water-Heater NTE 2



- Material: stainless steel 1.4571 / AISI 316Ti
- sensor guidance for sensor diameter 6 to 12 mm
- 2 tube heat exchanger – material 1.4571/AISI 316Ti
- constructed and built according to DIN 4753
- butt seam welded – no crease
- completely pickled and neutralized

#### Optional accessories:

- Man hole cover with socket end 1 ½" inside thread for screwed type electric heating system up to 12 kW
- Immersion sleeve

#### Insulation:

Removable 100 mm soft foam plastic covered or  
70 mm polyurethane foam plastic covered all recycleble

max. operating pressure: tank 10 bar  
coil 25 bar

max. operating temperature: tank 95°C/203°F  
coil 110°C/230°F

All Rp-connections are inside thread acc. to DIN 2999 part 1 extended to 90 mm.

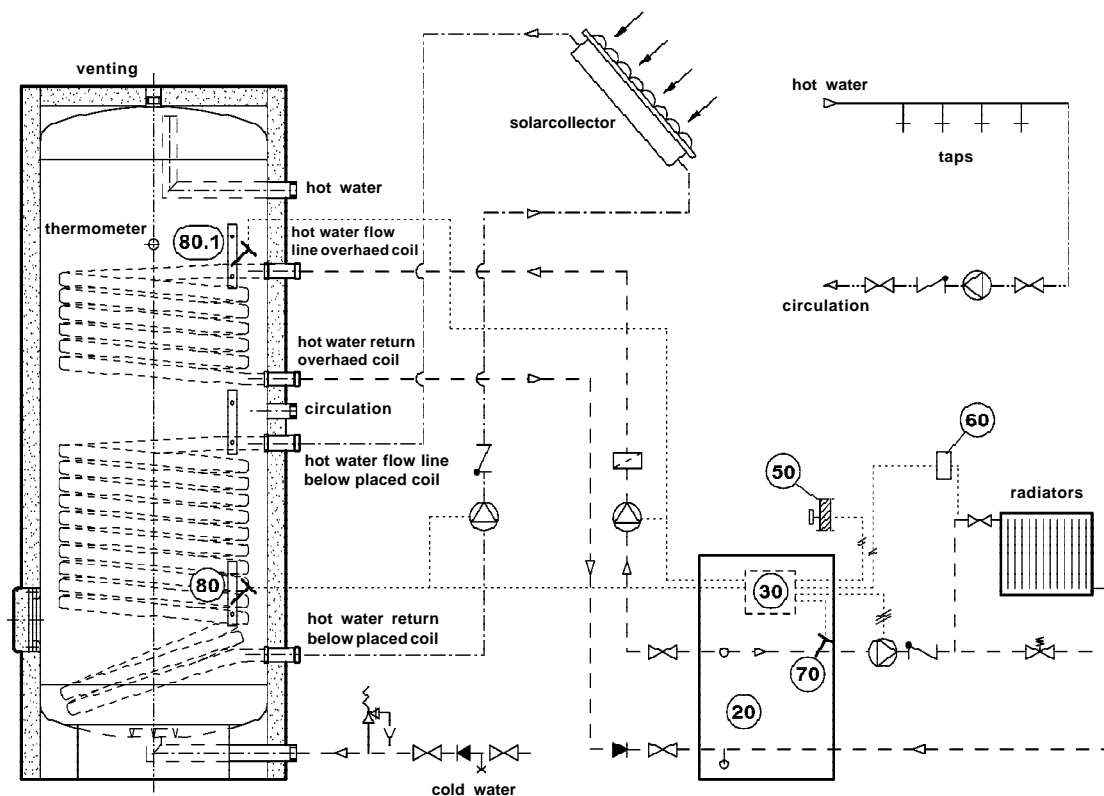
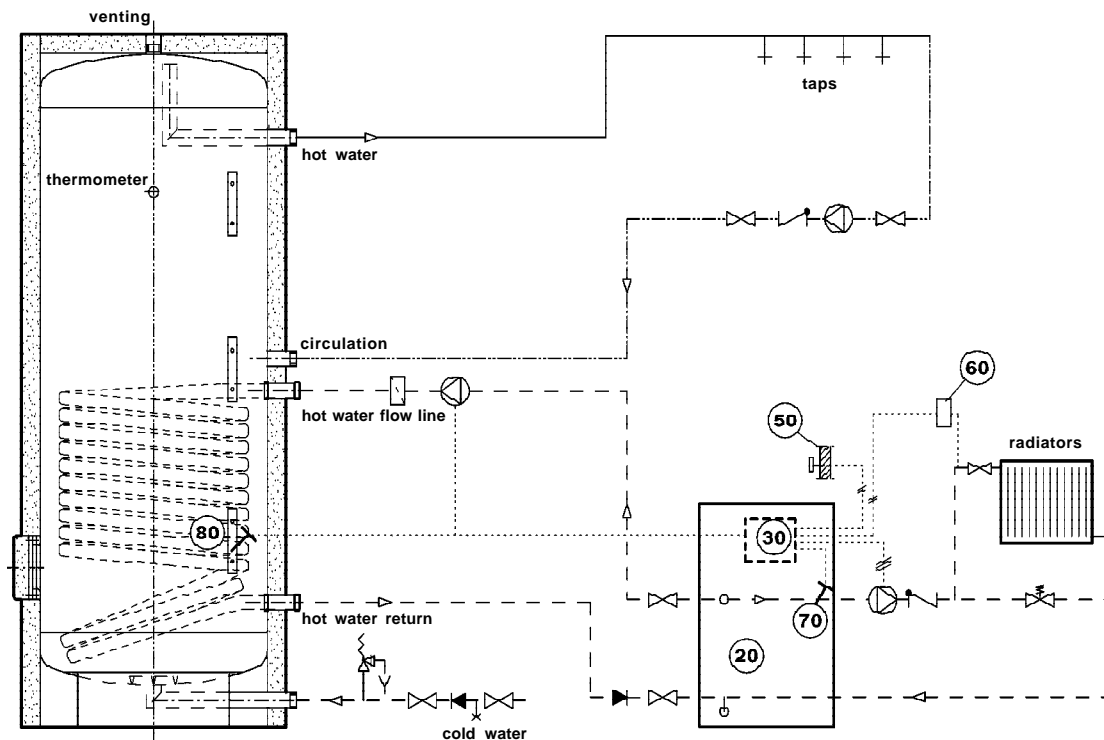
All G-connections are outside thread acc. to DIN 259 extended to 115 mm.

contents (l)	200	300	400	500	600	750	1000
H1	65	65	70	70	70	80	90
H2	305	305	330	330	330	380	405
H3	365	365	390	390	390	440	465
H4	605	795	890	890	890	940	1005
H5	685	870	975	975	975	1025	1140
H6	765	945	1055	1110	1060	1115	1275
H7	1065	1260	1325	1380	1380	1430	1675
H8	1115	1345	1375	1430	1430	1480	1725
H9	1145	1375	1420	1670	1670	1720	1995
H10	1362	1612	1640	1910	1910	1990	2275
H ges.	1410	1660	1690	1960	1960	2040	2345
D1	500	500	600	600	650	750	800
D2-polyurethane foam	640	640	740	740	790	890	980
D2-soft foam	700	700	800	800	850	950	1000
weight kg	75	100	115	120	140	185	210
<b>connections</b>							
flange	120/180	120/180	120/180	120/180	120/180	120/180	120/180
cold-, hotwater	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1 1/2"	Rp 1 1/2"
circulation	Rp 3/4"	Rp 3/4"	Rp 3/4"	Rp 3/4"	Rp 3/4"	Rp 3/4"	Rp 3/4"
thermometer	Rp 1/2"	Rp 1/2"	Rp 1/2"	Rp 1/2"	Rp 1/2"	Rp 1/2"	Rp 1/2"
venting	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1"	Rp 1"
sensor guidance	3x300	3x300	3x300	3x300	3x300	3x300	3x300
coils	G 1"	G 1 1/4"	G 1 1/2"	G 1 1/2"	G 1 1/2"	G 1 1/2"	G 1 1/2"
heating surface m² below placed coil	0,9	1,4	1,8	1,8	1,8	2,4	2,8
heating surface m² overhaed coil	0,9	0,9	0,9	0,9	1,1	1,4	1,6
diameter	18,0	26,9	33,7	33,7	33,7	33,7	33,7
<b>capacity datas</b>							
no. of flats acc. to DIN 4708* overhaed coil	2	3	3	4	7	10	14
no. of flats acc. to DIN 4708* below placed coil	4	12	20	23	26	35	46
permanent capacity* l/h overhaed coil	476	784	820	943	1016	1215	1348
permanent capacity* l/h below placed coil	978	1522	1743	1924	2012	2413	2846

\* on 10/80/45°C 50/176/113°F

## heat exchangers - hot water systems - district heating stations

### DMS - High Performance-Stored-Water-Heater NTE



- (20) gas-/ oil fired boiler
- (30) boiler regulator
- (50) outdoor temperature sensor
- (60) indoor temperature sensor

- (70) boiler temperature sensor
- (80) thermostat water heater
- (80.1) thermostat water heater

## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS - High Performance-Stored-Water-Heater NTE Series NTE-1</b></p> <p><b>Type:</b> _____</p> <p>vertical designed, constructed and built according to DIN 4753, material stainless steel 1.4571 /AISI 316 TI pickled and neutralized, butt seam welded – no crease max. operating pressure 10 bar, max. operating temperature 95°C / 203°F, with all necessary connections and handhole, cold water placed at deepest point to ensure 100% use of contents, incl. flow damper. Fix installed stainless steel spiral tube heat exchanger placed at deepest part, max. operating pressure 25 bar, max. operating temperature 110°C / 230°F. Removable soft foam insulation, plastic covered.</p> <p><b>Technical datas:</b></p> <p><b>Contents:</b> _____ l</p> <p><b>Water-heater temperature:</b> _____ °C/°F</p> <p><b>Coil:</b> _____ m<sup>2</sup></p> <p>capacity: _____ kW</p> <p>hot water flow-line / -return _____ / _____ °C/°F</p> <p>headloss _____ kPa</p> <p>heating water flow _____ m<sup>3</sup>/h</p> <p><b>Connections water-heater:</b></p> <p>cold-/hot water Rp _____ "inside thread</p> <p>circulation Rp _____ "inside thread</p> <p>venting Rp _____ "inside thread</p> <p>thermometer/sensor Rp _____ "inside thread</p> <p><b>Connections coil:</b></p> <p>hot water flow-line / -return G _____ "outside thread</p> <p><b>Measures:</b></p> <p>diameter incl. insulation : _____ mm</p> <p>diameter without insulation: _____ mm</p> <p>height: _____ mm</p> <p><b>Weight:</b> _____ kg</p> <p><b>DMS Wasser- Wärmetechnik GmbH</b></p> <p><b>Price:</b></p>		

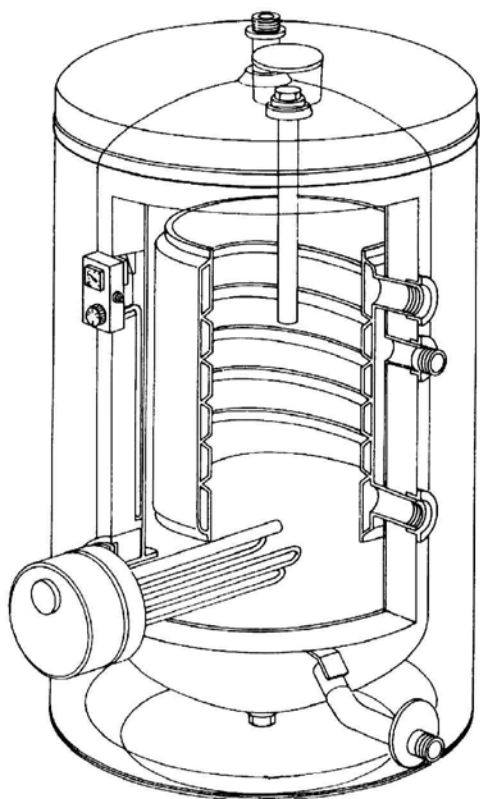
## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS - High Performance-Stored-Water-Heater NTE Series NTE-2</b></p> <p><b>Type:</b> _____</p> <p>vertical designed, constructed and built according to DIN 4753, material stainless steel 1.4571 /AISI 316 TI pickled and neutralized, butt seam welded – no crease max. operating pressure 10 bar, max. operating temperature 110°C / 230°F, with all necessary connections and handhole, cold water placed at deepest point to ensure 100% use of contents, incl. flow damper. Fix installed stainless steel spiral tube heat exchanger placed at deepest part, second fix installed stainless steel spiral tube heat exchanger overhaed placed, max. operating pressure 25 bar, max. operating temperature 110°C / 230°F. Removable soft foam insulation, plastic covered.</p> <p><b>Technical datas:</b></p> <p><b>Contents:</b> _____ l</p> <p><b>Water-heater temperature:</b> _____ °C/°F</p> <p><b>Overhaed Coil:</b> _____ m<sup>2</sup></p> <p>capacity: _____ kW</p> <p>hot water flow-line / -return _____ / _____ °C/°F</p> <p>headloss _____ kPa</p> <p>heating water flow _____ m<sup>3</sup>/h</p> <p><b>Below placed Coil:</b> _____ m<sup>2</sup></p> <p>capacity: _____ kW</p> <p>hot water flow-line / -return _____ / _____ °C/°F</p> <p>headloss _____ kPa</p> <p>heating water flow _____ m<sup>3</sup>/h</p> <p><b>Connections water-heater:</b></p> <p>cold-/hot water Rp _____ "inside thread</p> <p>circulation Rp _____ "inside thread</p> <p>venting Rp _____ "inside thread</p> <p>thermometer/sensor Rp _____ "inside thread</p> <p><b>Connections coil:</b></p> <p>hot water flow-line / -return G _____ "outside thread</p> <p><b>Measures:</b></p> <p>diameter incl. insulation: _____ mm</p> <p>diameter without insulation: _____ mm</p> <p>height: _____ mm</p> <p><b>Weight:</b> _____ kg</p> <p><b>DMS Wasser- Wärmetechnik GmbH</b></p> <p><b>Price:</b></p>		

## heat exchangers - hot water systems - district heating stations

### DMS - Enamelled-Stored-Water-Heater

#### FH 200



#### Technical datas

**VACUTHERM high performance stored water heater**

**Type: FH 200**

**Contents: 200 l**

- VACUMAIL – internal tank enamelled acc. to DIN 4753 including protective anode
- Energy-Saving polyurethane insulation, directly foamed
- Outer shell of powder coated sheet steel
- Operating pressure: storage tank max. 10 bar, heat exchanger max. 4 bar
- Heat exchanger suitable for a mono-, bi-, and multivalent energy supply for water heating
- Enamelled heat exchanger is welded into the water heater

#### Optional:

- 180 mm diameter flange, suitable for installation of reconnectable built-in electric heating system or ribbed tube heat exchanger
- Capillary tube thermometer
- Thermometer/charging pump regulator combination
- Correx electric anode

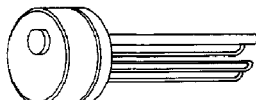
max. operating pressure 10 bar

max. operating temperature 95°C / 203°F

#### Accessories:



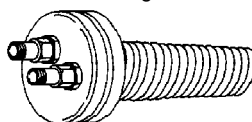
#### Built-in electric heating system



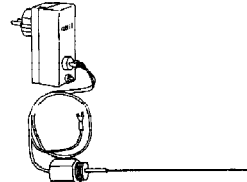
#### Screwed type electric heating system



#### Built-in ribbed tube heat exchanger



#### Electric anode



Fittable with following components

Type	capillary tube thermometer ATH	thermometer/ charging pump regulator combination ATR	additional heat exchanger/electric heating systems						ribbed tube heat exchanger
				electric heating time (10 to 55°C / 50 to 131°F)					
				8 hours	6 hours	4 hours	3½ hours	2½ hours	
FH 200	yes	yes	flange 180 ø	REU 1-2,0	REU 1-2,5	RDU 1-3,8	RDU 1-5,0	RDU 1-6,0	RWT 1-110
					RDU 1-2,5				

## heat exchangers - hot water systems - district heating stations

### DMS - Enamelled-Stored-Water-Heater

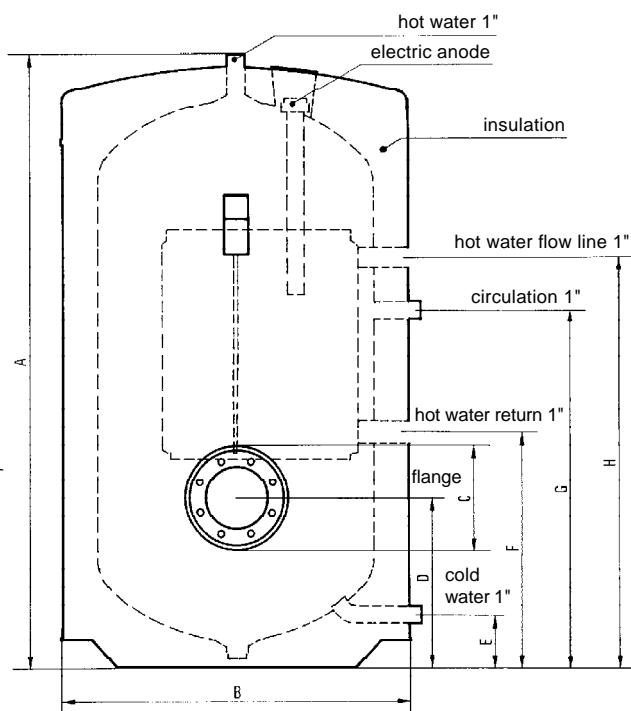
#### FH 200

**Technical datas of internal fixed heat exchanger 1,1 m<sup>2</sup>**  
with various heating water flow rates (1000 – 5000 l/h)

VL = hot water flow line temperatures

TWE = water heating from 10 – 45/60°C / 50 – 113/140°F

- flow capacity kW
- hot water flow rate l/h
- heating-up time minutes
- head loss mbar
- stand by energy loss 1,5 kWh/24h



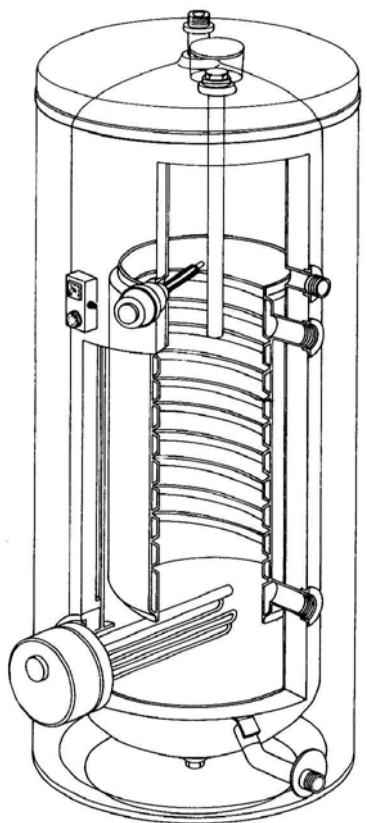
VL/TWE		1000 l/h	2000 l/h	3000 l/h	4000 l/h	5000 l/h
90/45	kW	25,0	32,5	36,0	38,0	39,5
	l/h	615	800	885	935	970
	min	11,5	8,5	8,0	7,5	6,5
70/45	kW	15,0	19,0	21,5	23,0	23,5
	l/h	370	465	530	565	580
	min	19,5	15,5	13,5	12,5	12,0
50/45	kW	6,0	7,5	8,0	8,5	9,0
	l/h	150	185	200	210	220
	min	58,0	48,5	44,0	41,5	41,0
90/60	kW	22,0	27,5	31,0	33,0	34,5
	l/h	380	475	535	570	595
	min	19,5	14,5	14,0	13,5	13,0
70/60	kW	12,0	14,0	15,5	16,5	17,0
	l/h	205	240	265	285	290
	min	42,0	33,0	30,0	28,5	27,5
mbar		5	30	68	125	185

Type	measures mm									heating surface m <sup>2</sup>	weight kg
	A	B ø	C ø	built-in depth flange	D	E	F	G	H		
FH 200	1189	665	180	580	324	100	454	692	792	1,1	110

## heat exchangers - hot water systems - district heating stations

### DMS - Enamelled-Stored-Water-Heater

#### FHM 300/FHM 500



#### Technical datas

**VACUTHERM high performance stored water heater**

**Type: FHM 300 / FHM 500**

**Contents: 300 l / 500 l**

- VACUMAIL – internal tank enamelled acc. to DIN 4753 including protective anode
- Energy-Saving polyurethane insulation, directly foamed
- Outer shell of powder coated sheet steel
- Operating pressure: storage tank max. 10 bar, heat exchanger max. 4 bar
- Heat exchanger suitable for a mono-, bi-, and multivalent energy supply for water heating
- Enamelled heat exchanger is welded into the water heater

#### Optional:

- 180 mm diameter flange, suitable for installation of reconnectable built-in electric heating system or ribbed tube heat exchanger
- 1½" inside thread to install additional electric heating system 1,5 - 9,0 kW
- Capillary tube thermometer
- Thermometer/charging pump regulator combination
- Correx electric anode

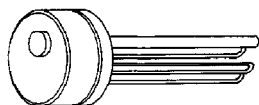
max. operating pressure 10 bar

max. operating temperature 95°C / 203°F

#### Accessories:



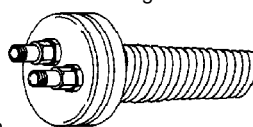
Built-in electric heating system



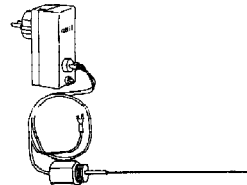
Screwed type electric heating system



Built-in ribbed tube heat exchanger



Electric anode



Fittable with following components

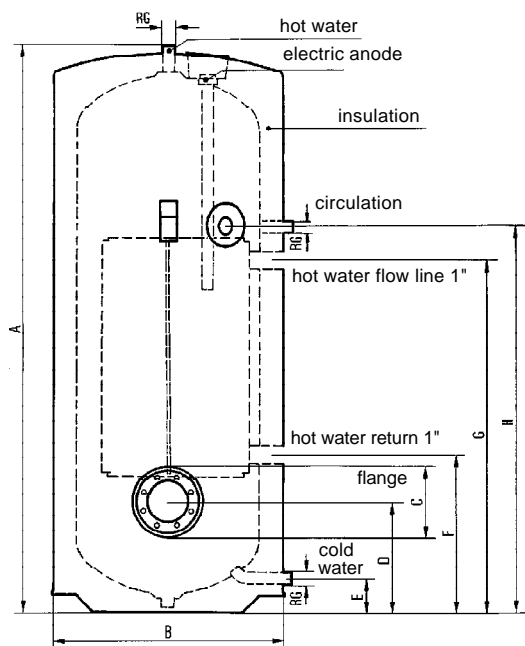
Type	capillary tube thermometer ATH	thermometer/ charging pump regulator combination ATR	additional heat exchanger/electric heating systems						ribbed tube heat exchanger
				electric heating time (10 to 55°C / 50 to 131°F)					
				8 hours	6 hours	5 hours	3½ hours	2½ hours	
FHM 300	yes	yes	flange 180 Ø	RDU 1-3,3 RDE 1-3,0	RDU 1-3,8	RDU 1-6,0	RDU 1-7,5	RDU 1-10	RWT 1-110
				EHS-2,0	-	EHS-3,0	EHS-4,5	EHS-6,0	
FHM 500	yes	yes	flange 180 Ø	RDU 1-5,0	RDU 1-6,0	RDU 1-10	RSW 1-12	RSW 1-15	RWT 1-110
				EHS-3,0	EHS-4,5	EHS-6,0	EHS-9,0	-	



## heat exchangers - hot water systems - district heating stations

### DMS - Enamelled-Stored-Water-Heater

#### FHM 300 / FHM 500



#### Technical datas of internal fixed heat exchanger

with various heating water flow rates (1000 – 5000 l/h)

VL = hot water flow line temperatures

TWE = water heating from 10 – 45/60°C / 50 – 113/140°F

- flow capacity kW
- hot water flow rate l/h
- heating-up time minutes
- head loss mbar
- stand by energy loss  
FHM 300 1,9 kWh/24h  
FHM 500 2,1 kWh/24h

Type	measures mm											heating surface m <sup>2</sup>	weight kg
	A	B Ø	C Ø	built-in depth flange	D	E	RG	F	G	H	built-in depth 1½" inside thread socket		
FHM 300	1667	665	180	580	324	100	1"	464	1031	1133	590	1,9	159
FHM 500	1838	776	180	690	349	100	5/4"	490	1057	1288	710	1,9	210

#### FHM 300 heating surface 1,9 m<sup>2</sup>

VL/TWE		1000 l/h	2000 l/h	3000 l/h	4000 l/h	5000 l/h
90/45	kW	40,0	58,5	65,0	68,5	70,5
	l/h	985	1440	1600	1685	1730
	min	14,0	11,0	9,5	8,5	8,0
70/45	kW	26,0	35,0	39,5	42,0	43,5
	l/h	640	860	970	1030	1070
	min	24,0	17,0	14,5	14,0	13,5
50/45	kW	11,0	13,0	14,5	16,0	16,5
	l/h	270	320	355	395	405
	min	62,0	48,0	43,0	40,0	39,0
90/60	kW	35,5	51,0	56,5	60,0	61,5
	l/h	610	880	970	1030	1060
	min	25,0	17,5	16,0	15,0	14,5
70/60	kW	19,0	25,0	28,5	30,5	31,5
	l/h	325	430	490	525	540
	min	47,0	35,5	31,0	29,0	28,5
mbar		15	55	130	230	360

#### FHM 500 heating surface 1,9 m<sup>2</sup>

VL/TWE		1000 l/h	2000 l/h	3000 l/h	4000 l/h	5000 l/h
90/45	kW	38,0	53,5	60,0	64,0	67,0
	l/h	935	1315	1475	1575	1645
	min	24,0	18,5	15,0	13,5	13,0
70/45	kW	23,0	31,5	36,0	38,5	40,0
	l/h	565	775	885	945	985
	min	40,0	32,0	27,0	24,0	22,5
50/45	kW	10,0	12,0	13,0	14,0	15,0
	l/h	245	295	320	345	370
	min	109,0	85,0	76,0	72,0	70,0
90/60	kW	33,0	46,0	52,0	55,5	58,0
	l/h	570	790	895	955	1000
	min	40,5	29,5	26,0	24,0	23,0
70/60	kW	17,0	22,5	25,5	27,5	29,0
	l/h	295	390	440	475	500
	min	79,0	60,0	52,5	49,0	46,5
mbar		15	55	130	230	360



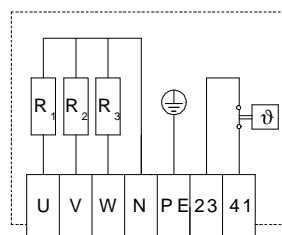
## heat exchangers - hot water systems - district heating stations

### DMS – Electric –Water – Heater Type Elektrawa

Electric built-in heater, shell material steel ST 37.2 or stainless steel 1.4571/AISI 316Ti, constructed for longterm running. Max. operating pressure 5 bar/steel 10 bar/stainless steel. Incl. insulation, painted steel sheet coated.

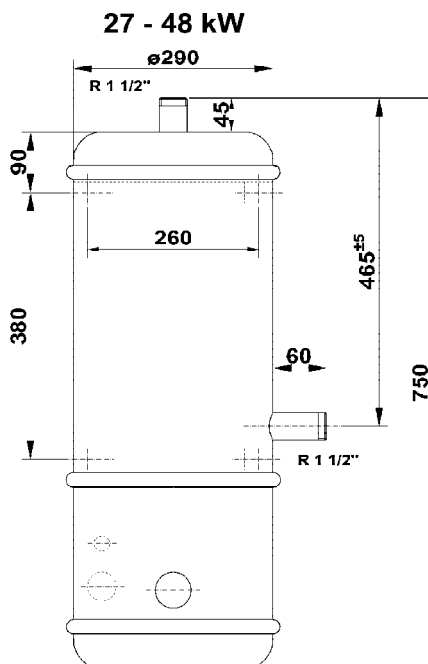
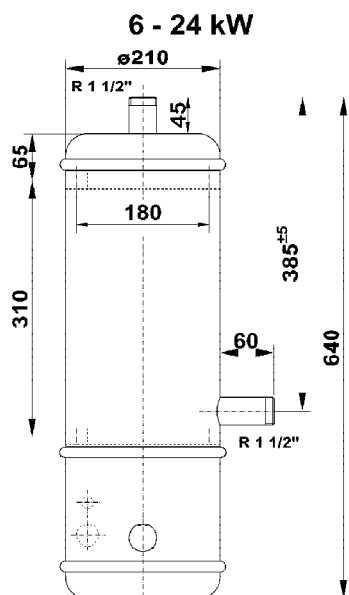
Appropriate number of high-quality tubular radiators are mounted on a flange plate.

Infinitely variable temperature control from 15 to 85°C  
59 to 185°F, with safety temperature limiter 105°C /  
221°F or 60°C / 140°F



Types ZA 15 - 48 kW with internal powersteps. Connections 1 1/2" outside thread, on request others, return connection selective left or right  
Electric connection: 3 phase, 380 V, with contactor

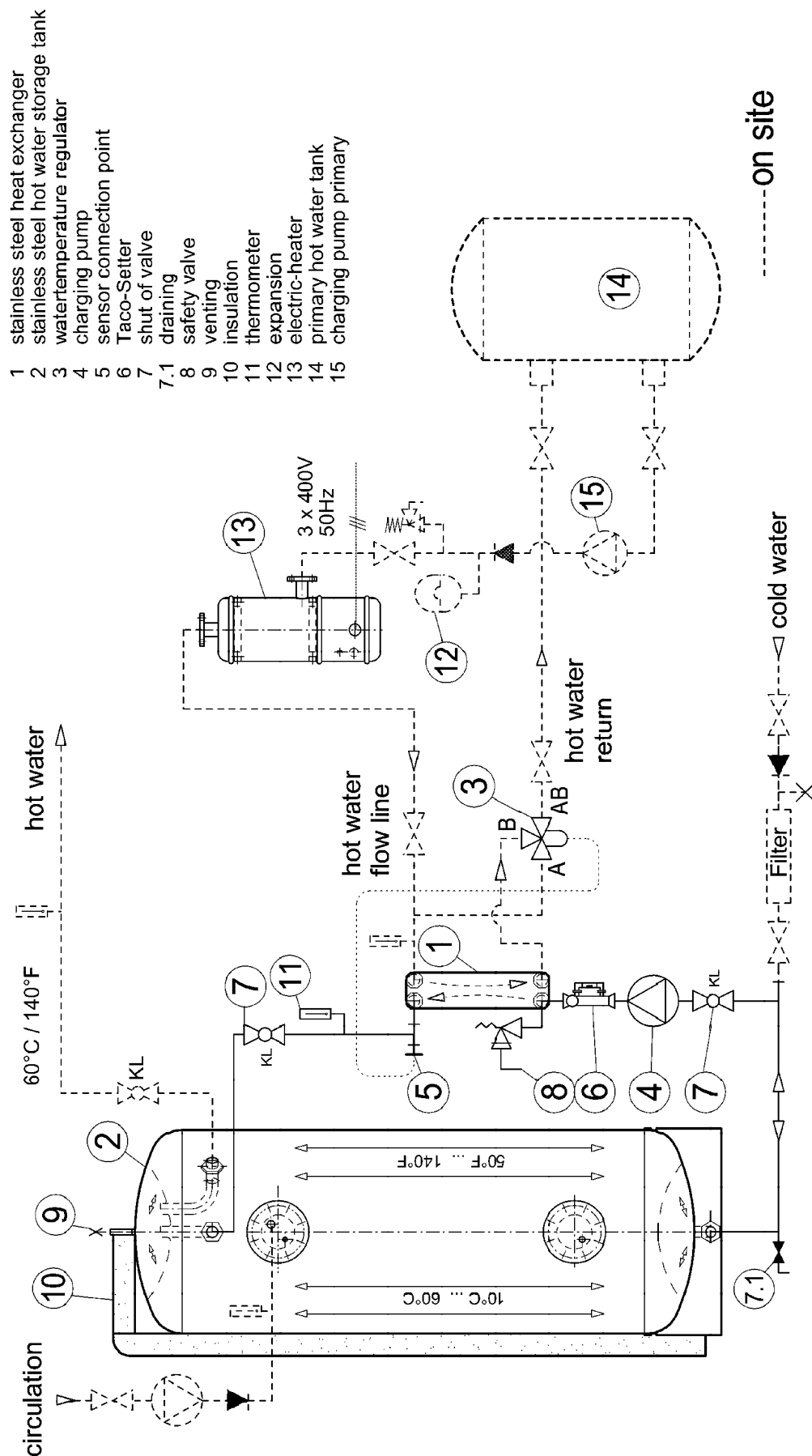
Type	capacity	weight	diamter	height
	kW	kg	mm	
ZA 6	6	15,0	210	640
ZA 9	9	15,0	210	640
ZA 12	12	15,5	210	640
ZA 15	15	16,0	210	640
ZA 18	18	16,0	210	640
ZA 24	24	16,5	210	640
ZA 27	27	23,0	290	750
ZA 36	36	24,0	290	750
ZA 48	48	31,0	290	750





# heat exchangers - hot water systems - district heating stations

## DMS - KWS - K - System with electric-heater type Elektra (9 - 48 kW)



## heat exchangers - hot water systems - district heating stations

### Screw type heating systems

The screw type heating systems of the types of the SH series have been constructed for an additional heating and / or an emergency heating of water in closed tanks. Due to the 1" brass screw type head, retrofitting our water heaters is quite simple.

- Isolatedly built-in Incoly-tubular radiators
- Infinitely variable temperature control from 15 to 85°C / 59 to 185°F
- Reconnectable model (up to 3 kW)
- All-pole safety-temperature limiter
- Plastic cap black, rotatably constructed



Type	power kW	mains voltage V	fitting depth mm	assembly position
EHS-2,0	2,0	3~400 reconnectable ~230	430	horizontally
EHS-2,5	2,5			
EHS-3,0	3,0			
EHS-3,8	3,75	3~400	470	
EHS-4,5	4,5		630	
EHS-6,0	6,0		720	
EHS-7,5	7,5		780	
EHS-9,0	9,0		780	

### built-in electric heating systems

The built-in heating systems consist of an appropriate number of high-quality tubular radiators which are mounted on a flange plate. You can choose the appropriate type of built-in heating system from our vast product range depending on the required power and installation position, the available fitting length and the required heating groups.

- Infinitely variable temperature control from 15 to 85°C / 59 to 185°F
- Energy-saving position at 65°C / 149°F
- Antifreezing position
- All-pole safety-temperature limiter
- Optimum protection against corrosion of the heating elements



Type	nominal power   kW	nominal voltage V	fitting length   mm	flange   Ø mm	assembly position
HF-186	6	3~400	300	180	horizontally
HF-189	9		400		
HF-2812	12			280	
HF-2815	15				
HF-2818	18				
HF-2821	21				
HF-2824	24				
HF-2827	27				
HF-2836	36				
HF-2848	48				

### built-in ribbed tube heat exchangers

By using a built-in ribbed tube heat exchanger it is possible to heat a boiler indirectly by a flange and thus to retrofit it or to convert it into a register boiler. The possible heating fuel may be heating water from alternative energy like solar plants and heat pumps, but also from long-distance energy and conventional boilers.

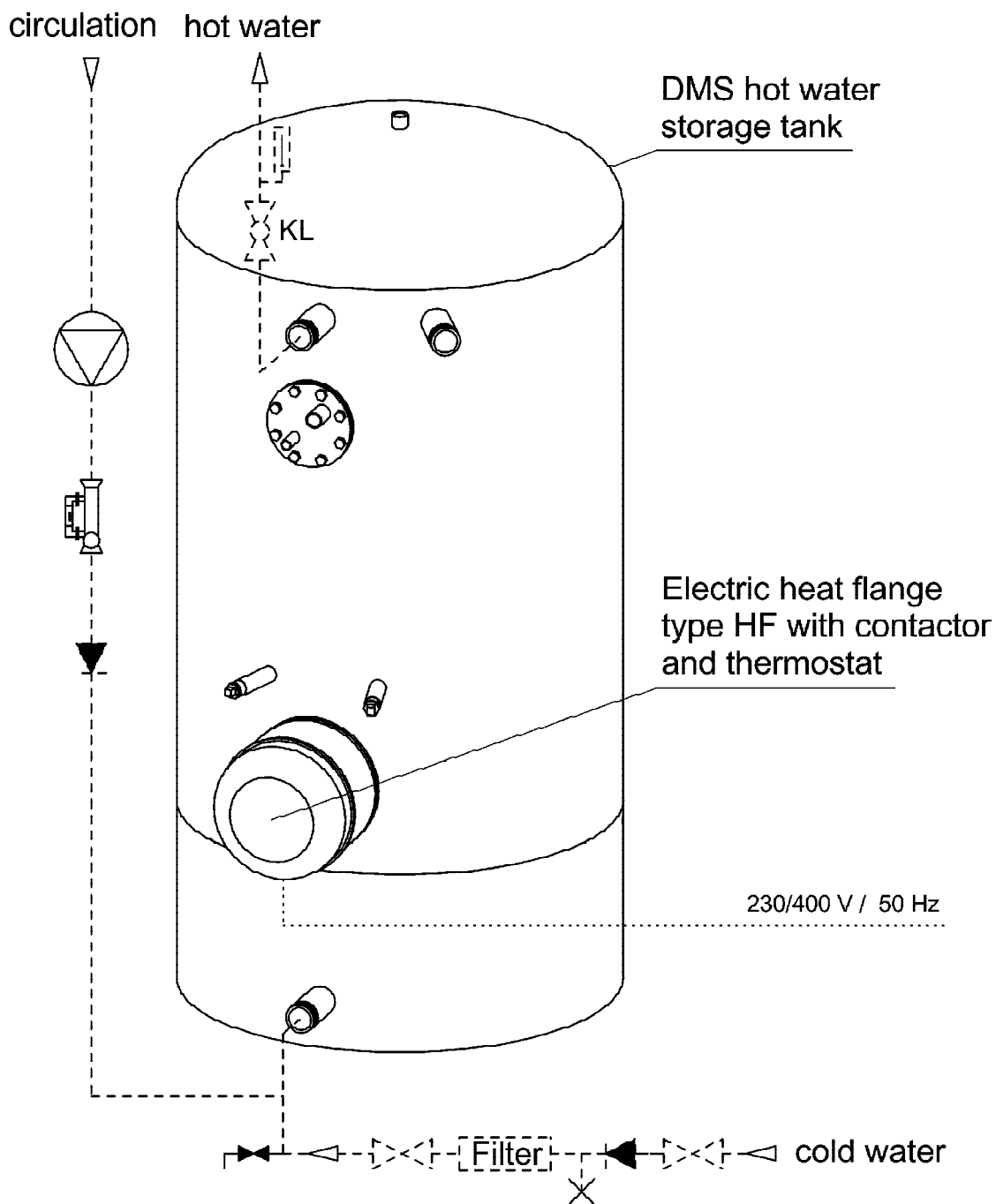
- Helically coiled SF-Cu ribbed tube
- Flange plate enamelled
- Electrically insulated model
- Earthed current shunting resistor installed
- Heat insulated, matt black enamelled covering cap made of steel



Type	effective heating surface m²	flange Ø mm - hole	ribbed tube max. Ø mm	fitting length mm	connection G
RWT 1-110	1,1	180 - 8	105	500	¾
RWT 1-140 D	1,4			440	
RWT 2-180	1,8			450	
RWT 2-230	2,3	240 - 12	170	530	
RWT 2-230 D	2,3			450	
RWT 2-360	3,6			650	1"
RWT 2-360 D	3,6			530	
RWT 2-450	4,5			790	

heat exchangers - hot water systems - district heating stations

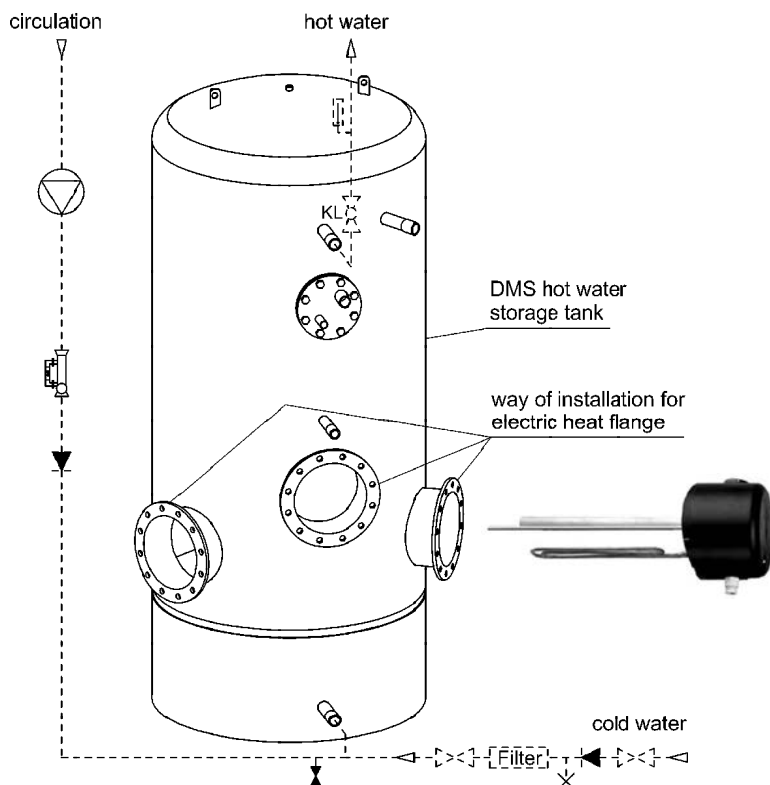
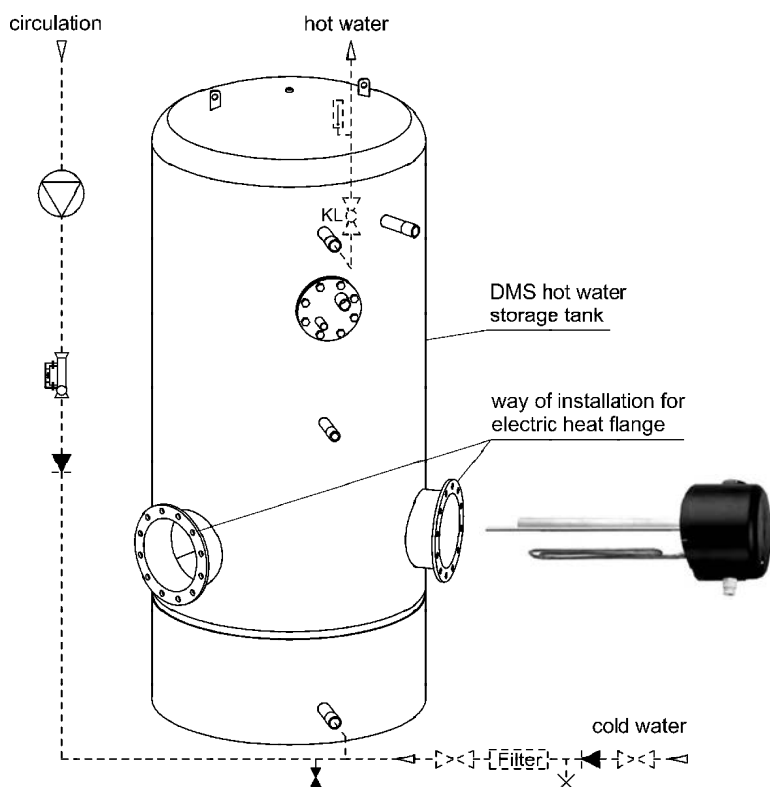
## DMS Electric Water Heater





## heat exchangers - hot water systems - district heating stations

### DMS Electric Water Heater (further examples)



## heat exchangers - hot water systems - district heating stations

### DMS - HORNE - Thermostatic - Mixing - System

#### Tepidstat 2001

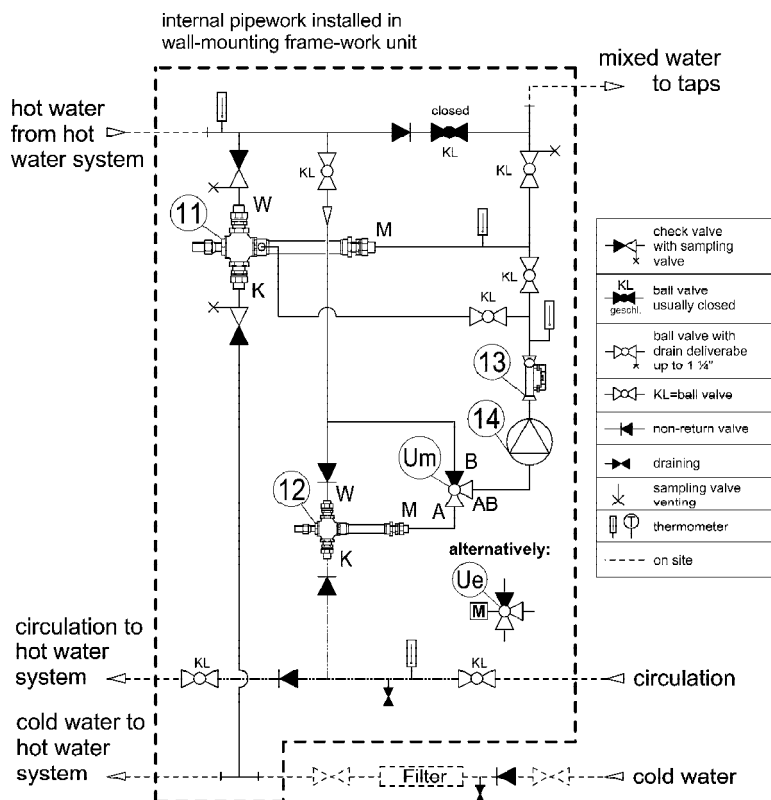
The **Tepidstat 2001** was developed to provide mixed water at a exact controlled temperature for distribution through flow and return pipework for domestic or ablutionary purposes with a number of outlets. The system is a pre-plumbed, compact, wall-mounting unit.

The unit comprises a thermostatic mixing valve HORNE B. 78 which controls the temperature when mixed water is being used, and a HORNE B. 78 working as a thermostatic return which controls the recirculation temperature during dormant periods, so that water at the correct temperature is always available at the outlets. The assembly also includes check-valves, to prevent cross-flow through the mixing valve, and to prevent back-flow in the return pipework, strainers, to protect the mixing valve mechanism, isolating valves on all inlet and outlet connections, which allows for maintenance with no draining down, thermometers, and circulation pump.

The pipework is made of inert gas welded and additional glas bead blusted stainless steel 1.4571/AISI 316Ti, all valves are gunmetal, brass, and the outer tube of the mixing valves tinned copper.

The drawing in this leaflet show the "right hand" version of the mixing system i. e. the mixed water outlet is at the right hand side.

The "left hand" version is a mirrow image and has to be optioned out in the order.



Before final fitting, ensure that the hot, and cold supply, and circulation return pipework is internally clean – if possible, flush thru before final connection to the mixing-system.

#### Operating conditions:

max. hot water supply temperature 85/185 °C/°F

min. hot water supply temperature mixed temperature + 10/50 °C/°F

max. cold water supply temperature mixed temperature – 10/50 °C/°F

max. operating pressure 10 bar

hot an cold supply pressure should be nominally equal (the cold and hot static head should be equal)

#### Commissioning and temperature adjustment:

To flood the system, open both hot and cold inlet isolating valves. Ensure that the hot and cold supplies are at their designed pressures and temperatures.

Open a few mixed water outlets and wait until the hot and cold inlet temperatures are stable. Note the mixed water temperature. If the mixed water temperature requires adjustment, turn the ajustment key clockwise to reduce or anti-clockwise to increase the temperature. Turn the key only ½-turn at a time allow a few seconds for the temperature to settle. When the mixed water temperature has been set, close the taps which have been running and start the recirculation pump. Observe the temperture and adjust the HORNE B78-temp. limiting valve like the mixing valve.

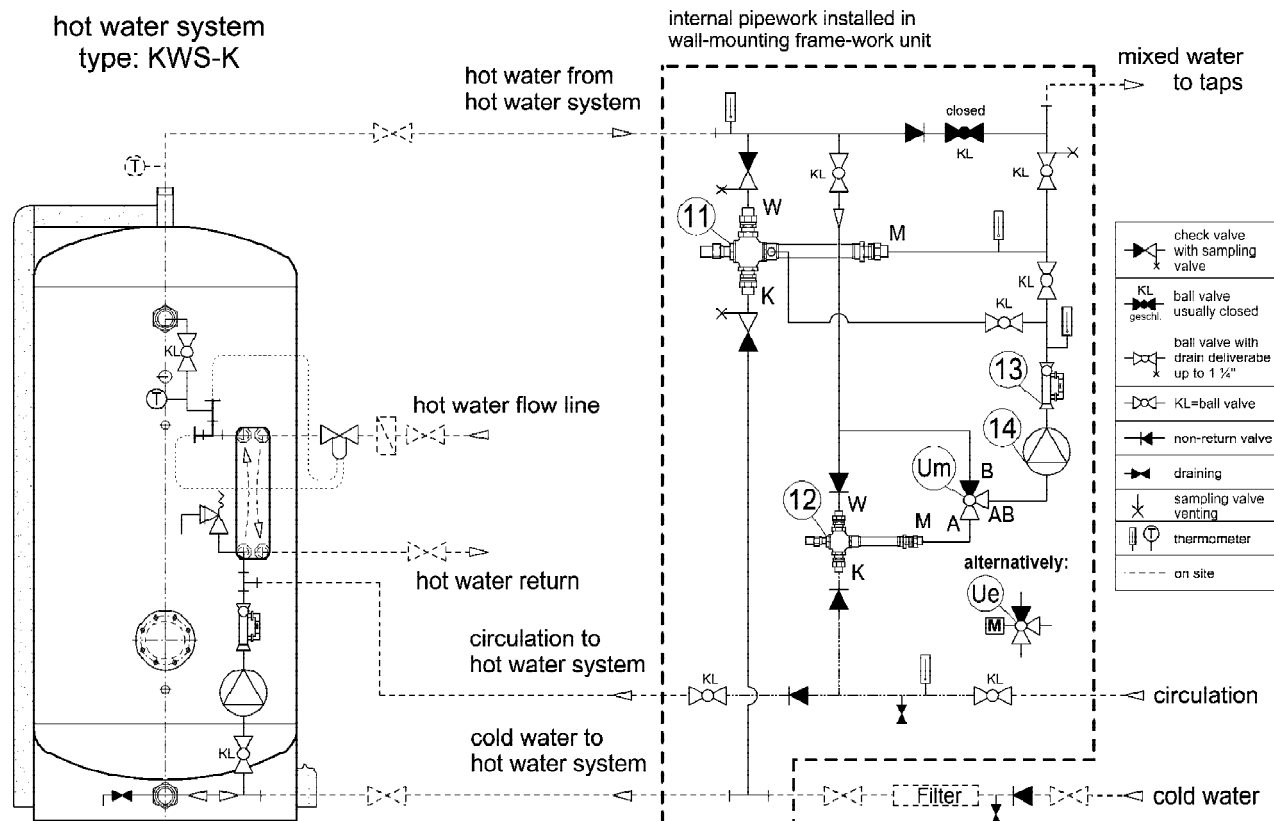
The mixing system should be inspected annually, or more fequently on sites where scaling is prevalent.

With manual turning the valve (Um) it is possible to make a thermal disinfection of the hot water pipework during low demand times, i.e. at night with the hot temperature of the hot water system i.e. 60/140 °C/°F or automatic turning of the valve (Ue) electric time controlled.

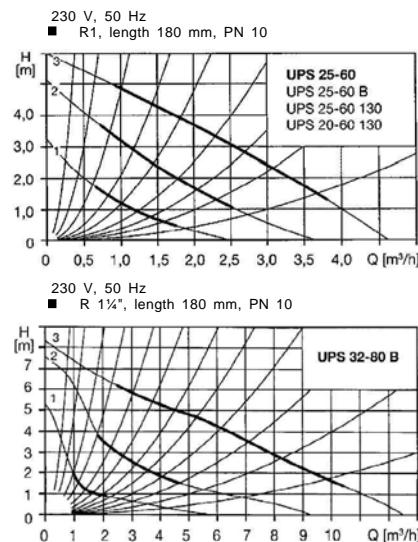
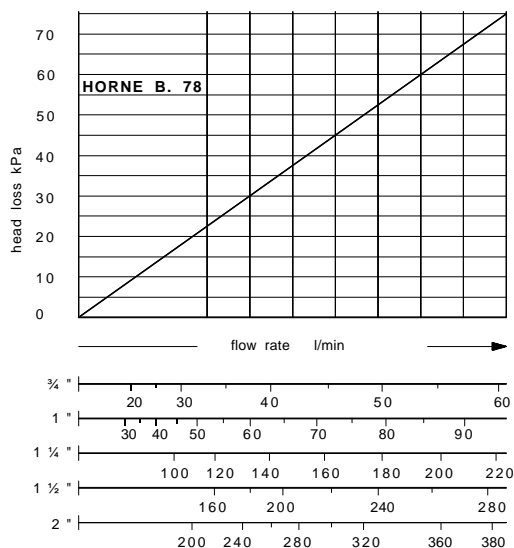
# heat exchangers - hot water systems - district heating stations

## DMS - HORNE - Thermostatic - Mixing - System

### Tepidstat 2001



Type	capacity range	head loss	circulation pump head in pipework			connections		measures	weight
Tepidstat	max. flow rate [l/min]	max. capacity [kPa]	Type UPS	capacity [m³/h]	head loss valve pos. (12) [kPa]	cold warm mixed	circ. water	frame work B x H x T [ca.]	[kg]
2001 - 32 - 20	10 - 200	70	25 - 60 B	1,5	30	1 ¼ "	1 "	1100 x 1500 x 450	ca. 45
2001 - 40 - 25	30 - 250	70	25 - 60 B	2,1	25	1 ½ "	1 ¼ "	1100 x 1600 x 500	ca. 60
2001 - 50 - 32	50 - 360	70	32 - 80 B	4,0	32	2 "	1 ½ "	1250 x 1750 x 650	ca. 80



**heat exchangers - hot water systems - district heating stations**

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS - HORNE - Thermostatic - Mixing - System</b></p> <p><b>Tepidstat 2001</b></p> <p><b>Type: Tepidstat 2001 - _____</b></p> <p>consisting of:</p> <p>1 pc. (Drwg. pos. 11) <b>DMS-HORNE-mixing-valve B. 78</b> Type: B. 78 _____ " gunmetal and tinned copper adjusting range: 25-80°C / 77-176°F flow-rate/head-loss: _____ l/min _____ kPa</p> <p>1 pc. (Drwg. pos. 12) <b>DMS-HORNE-mixing-valve B. 78</b> Type: B. 78 _____ " as described before adjusting range: 25-80°C / 77-176°F flow-rate/head-loss: _____ l/min _____ kPa</p> <p>1 pc. (Drwg. pos. 13) <b>DMS-TACO-Setter</b> Type: 23- _____ adjusted for _____ l/min</p> <p>1 pc. (Drwg. pos. 14) <b>Circulation pump</b> Type: _____ capacity/head: _____ m³/h _____ mbar</p> <p>Pipework inert gas welded and additional gas blasted stainless steel 1.4571/AISI 316TI all necessary isolating valves, check valves, non return valves and thermometers</p> <p>All pre-plumbed, compact, wall- or ground-mounting</p> <p>Right- or left-hand version</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b></p> <p><b>Price:</b></p>		

heat exchangers - hot water systems - district heating stations

**DMS**

**HORNE**

## Thermostatic Mixing Valve B.82 + B.78 Thermostatic Limiter Valve H.220

Thermostatic mixing of hot and cold water to provide warm water to taps and showers at a exact controlled temperature over a wide range of flow rates.



**H. 220**



**B. 82**



**B.78**

The Theromostatic Limiter Valve H. 220, fitted in a circulation system, controls the amount of mixed water returned to the hot water system for re-heating to make up heat losses in the pipeworks.

## heat exchangers - hot water systems - district heating stations

### Thermostatic Mixing Valve B.82

#### Applications:

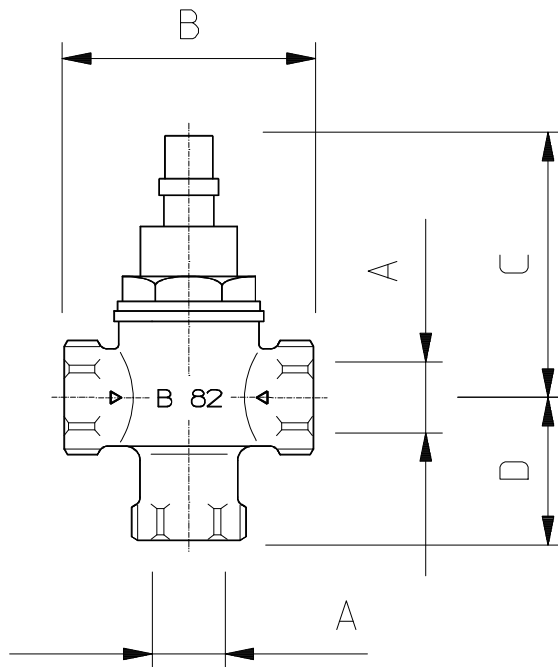
Thermostatic mixing of hot and cold water to provide warm water to taps and showers at a controlled temperature over a wide range of flow rates

#### Features:

Simplicity, reliability, easy maintenance. Rapid response for temperature fluctuations at inlets. Hot supply shuts off if cold supply fails or is turned off. Slide valve fitted with PTFE seal to reduce build up of scale in hard water areas. Temperature adjustment by removable key prevent alternation of setting by unauthorized personnel.

#### Range of Temperature Adjustment:

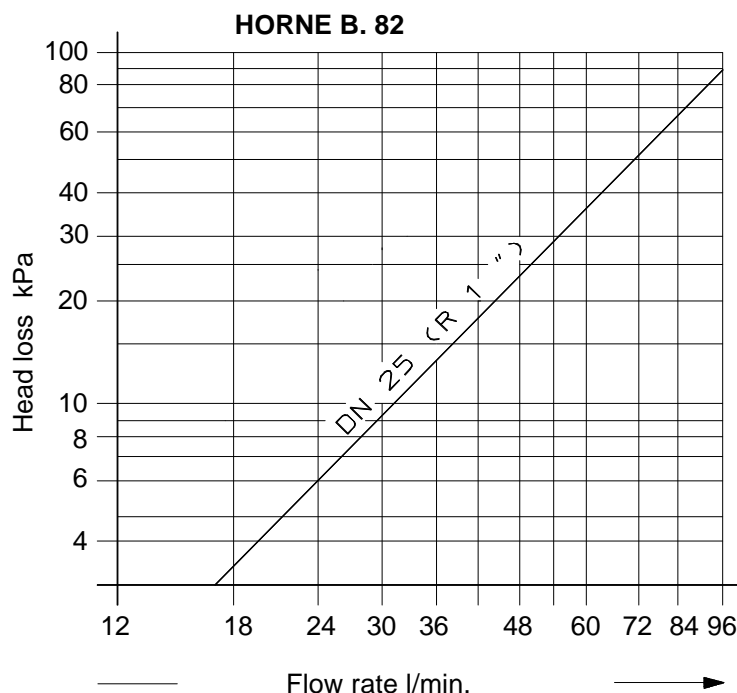
35 – 55°C / 85 – 131°F



Approximately equal pressures at the mixing valve inlets should be given.

The recommended head losses are 50 to 80 kPa.

Sizes	A	B	C	D	BSB connections
20 mm	R ¾"	95	97	58	¾"
25 mm	R 1"	105	102	60	1"



## heat exchangers - hot water systems - district heating stations

### Thermostatic Mixing Valve B.78

#### Application:

Mixing hot and cold water to provide water at a controlled temperature to taps or showers.

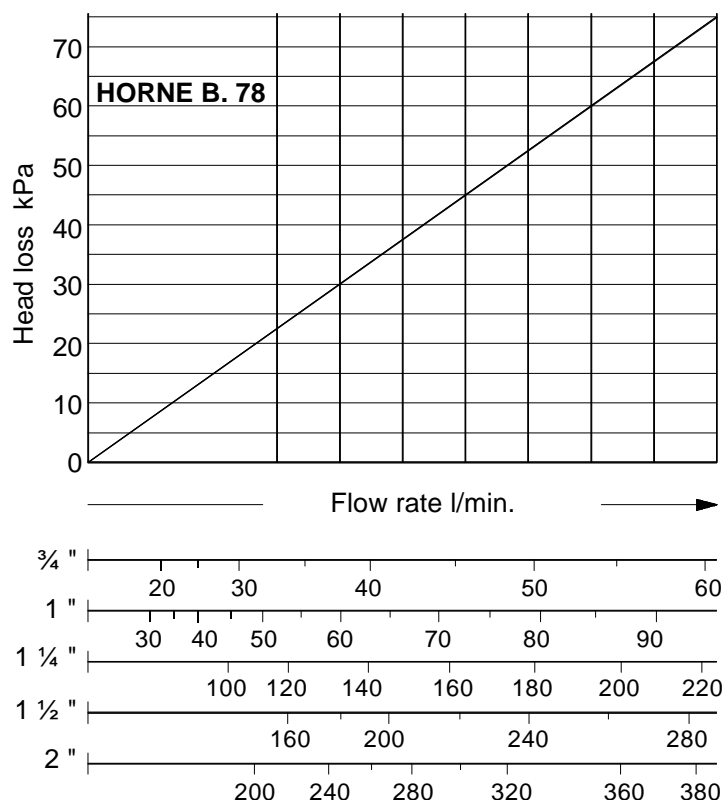
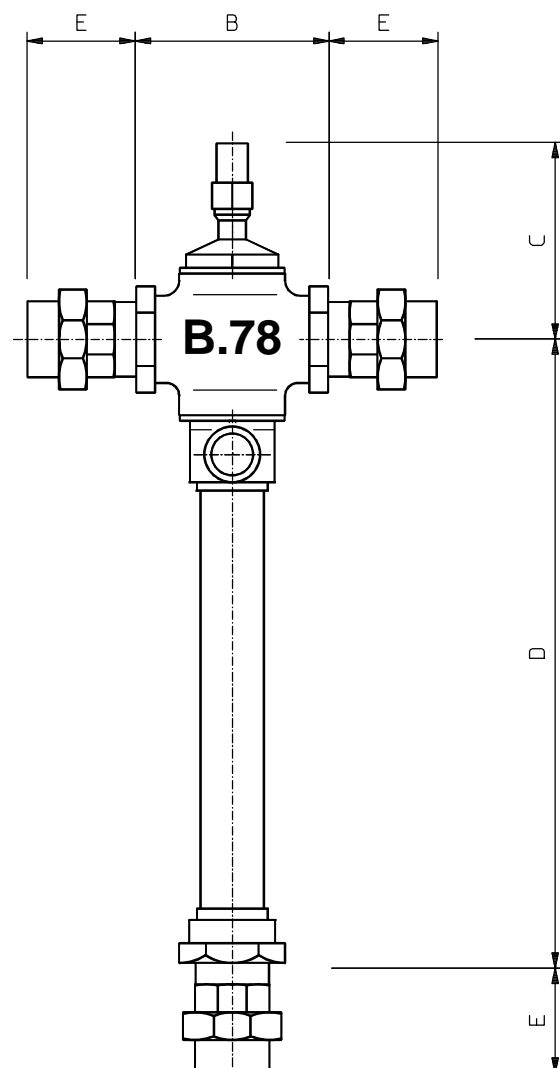
#### Features:

Simplicity, reliability and easy maintenance. Thermostat with rapid response to control the temperature of the water at the temperature of the water at the outlet. The thermostat automatically shuts off the hot water supply if the cold water supply fails or is turned off. Temperature adjustment by removable key to prevent alteration of the setting by unauthorized personnel. Components made from non-desincifying materials. Dial thermometer optional extra on 32 mm, 40 mm and 50 mm sizes. Approved by the National Water Council.

**Range of Outlet Temperature Adjustment:** 25-82°C / 77-180°F

**Maximum Working Pressure:** 10 bar

The temperature of the mixed water at the outlet is controlled by the slide valve which moves between the hot inlet valve and cold inlet valve. The slide valve is connected to the thermostat element and the element responds to any change in temperature of the mixed water passing along it. The temperature at the outlet can be set by turning the temperature adjusting screw. When the required temperatures has been set, any change in temperature at either inlet will make the thermostat element expand or contract and move the slide valve to alter the flow at the inlets to maintain the original setting. If the cold supply fails or is turned off, the thermostat element will immediately expand and move the slide valve to close the hot inlet valve provided the temperature of the hot water is 12°C higher than the temperature at the outlet. The overheat spring protects the thermostat element from damage when making any reductions in temperature settings. Non-return valves giving a tight shut off against a small back pressure must be fitted at the hot and cold inlets.



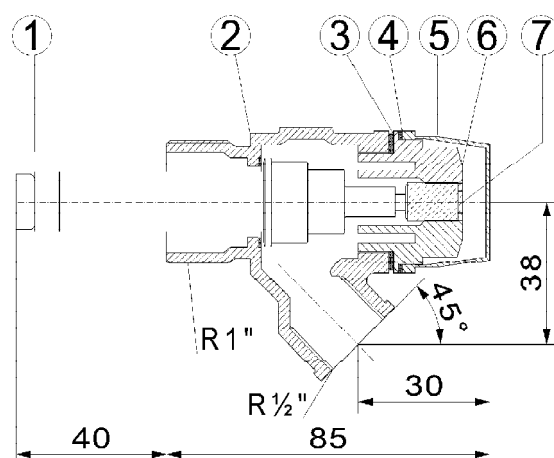
Sizes	A	B	C	D	E
3/4"	22	95	100	210	38
1"	28	106	127	271	46
1 1/4"	35	121	140	360	52
1 1/2"	42	124	147	473	58
2"	54	153	155	478	65

## heat exchangers - hot water systems - district heating stations

### Horne H.220 Temperature Limiter Valve

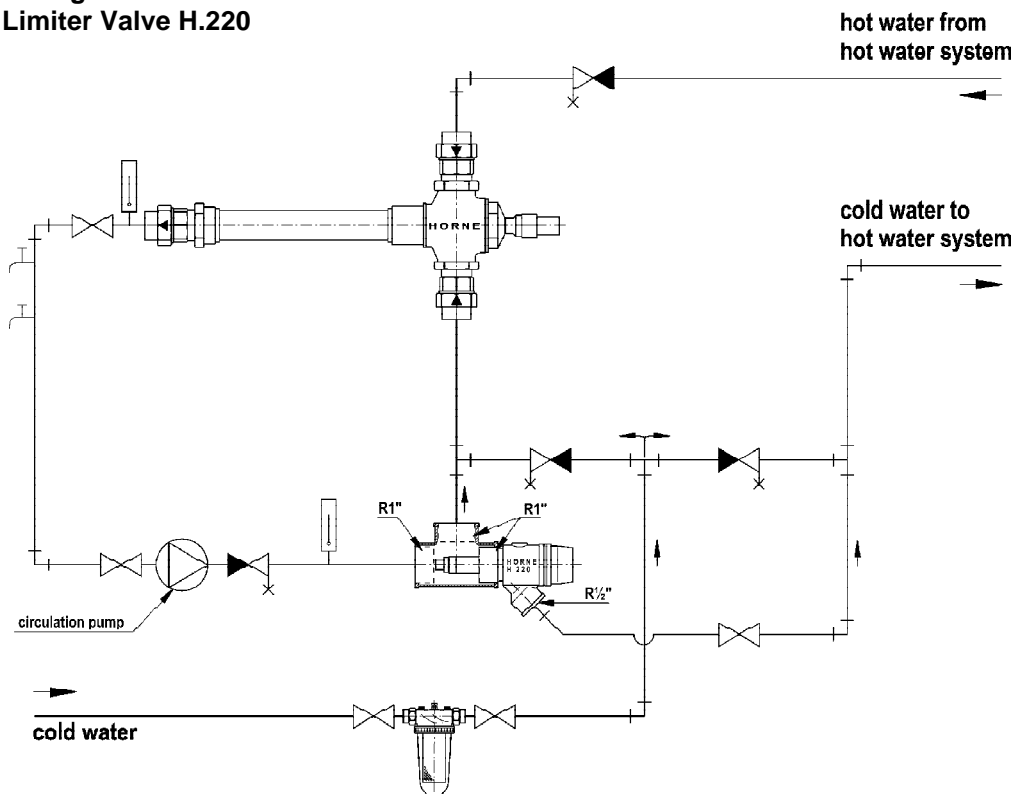
In a recirculation system, when the taps or showers are turned off, the H.220 Temperature Limiter Valve controls the amount of mixed water returning to the calorifier for re-heating to make up heat losses in the pipework. The valve is fitted to a tee-piece connected to the mixed water return with the thermostat element immersed in the return. Only a relatively small amount of water needs to be passed back to the calorifier for re-heating and most of the water from the return is passed to the B78 Thermostatic Mixing Valve cold inlet for recirculation. If the temperature of the mixed water return tends to fall, the Temperature Limiter Valve will tend to open and allow more water back to the calorifier for re-heating and therefore, maintain the required temperature. Conversely, if there is a rise in temperature in the mixed water return, the valve will tend to close and reduce the amount of water returned to the calorifier. The H.220 Temperature Limiter Valve is normally in a throttling position and a steady temperature is maintained in the system at all times. The valve has a temperature adjusting screw behind a cap.

- |                      |                   |
|----------------------|-------------------|
| 1 thermostat element | 5 cap             |
| 2 valve body         | 6 screw socket    |
| 3 gasket             | 7 adjusting screw |
| 4 gasket             |                   |



### installation pattern

Thermostatic Mixing Valve B.82 + B.78 with  
Thermostatic Limiter Valve H.220





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**Wasser- Wärmetechnik GmbH**

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## heat exchangers - hot water systems - district heating stations

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS-HORNE-Thermostatic-Mixing-Valve</b></p> <p><b>Type B.82_____ "</b></p> <p>Thermostatic mixing of hot and cold water to provide warm water at an exact controlled temperature, adjustable between 35-55°C/85-131°F by removable key. Hot supply shuts off if cold supply fails or is turned off.</p> <p><b>Material:</b> gun metal with BSB connections</p> <p>flow rate _____ l/min</p> <p>head loss _____ kPa</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b> DIN EN ISO 9001 certified</p> <p><b>Price:</b></p>		
		<p><b>DMS-HORNE-Thermostatic-Limiter-Valve</b></p> <p><b>Type H.220</b></p> <p>Valve to control amount of mixed water returning to the hot water system for re-heating to make up heating to make up head losses and to prevent temperature increase during long periods of no warm water demand, to be fitted into an included 1" inside thread T-piece, and separat adjusting key, connection 1/2" inside thread</p> <p><b>Material:</b> gun metal and copper thermostat element</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b></p> <p><b>Price:</b></p>		

**heat exchangers - hot water systems - district heating stations**

Position	Quantity	Article	single price EUR	total price EUR
		<p><b>DMS-HORNE-Thermostatic-Mixing-Valve</b></p> <p><b>Type B.78 _____ "</b></p> <p>Thermostatic mixing of hot and cold water to provide warm water at an exact controlled temperature, adjustable between 25-82°C/77-180°F by removable key. Hot supply shuts off if cold supply fails or is turned off.</p> <p><b>Material:</b> gun metal, thermostat tube copper or tinned copper with BSB connections</p> <p>flow rate _____ l/min</p> <p>head loss _____ kPa</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b> DIN EN ISO 9001 certified</p> <p><b>Price:</b></p>		
		<p><b>DMS-HORNE-Thermostatic-Limiter-Valve</b></p> <p><b>Type H.220</b></p> <p>Valve to control amount of mixed water returning to the hot water system for re-heating to make up heating to make up head losses and to prevent temperature increase during long periods of no warm water demand, to be fitted into an included 1" inside thread T-piece, and separat adjusting key, connection 1/2" inside thread</p> <p><b>Material:</b> gun metal and copper thermostat element</p> <p><b>DMS Wasser-Wärmetechnik GmbH</b></p> <p><b>Price:</b></p>		

### Temperature Regulators Type 43-1 · Type 43-2

#### Application

Regulators for district heating systems, heating systems, heat exchangers, and other building services and industrial plants. For temperature set point values from **0 to 150 °C** · Valves in nominal sizes **G 1/2 to G 1** · **DN 15 to DN 50** · **Nominal pressure PN 25** · For liquids up to 150 °C and for non-flammable gases up to 80 °C.

The valve closes when the temperature rises.

#### Note

Typetested temperature regulators (TR), safety temperature monitors (STM) and safety temperature limiters (STL) are available.



#### Special features

- Low-maintenance P-regulators requiring no auxiliary energy
- Temperature sensor suitable for installation in any desired position and for operation at high permissible excess temperatures (50 K above the adjusted set point), designed for operating pressures up to 40 bar
- Globe valves with plug balanced by a piston
- Especially suitable for use in district heating systems
- For liquids and gases
- Special version: fast-responding thermostats for instantaneous water heaters (see page 4 "pressure thermostats")

#### Versions (Figs. 1 and 2)

The regulators consist of a control valve and a control thermostat containing a set point adjustment ring, a capillary tube and a temperature sensor which functions according to the adsorption principle.

Versions with double adapter for the attachment of additional control thermostats or a manual adjuster (see Data Sheet T 2176 EN).

**Type 43-1** · Temperature regulator with Type 2431 K Control Valve · Nominal sizes G 1/2 to G 1 with female thread · Type 2430 K Control Thermostat - sensor available optionally with or without thermowell.

**Type 43-2** · Temperature regulator with Type 2432 K Control Valve · Nominal sizes DN 15 to DN 50 · Connection nuts with weld-on fittings (special version with threaded ends or flanges) · Type 2430 K Control Thermostat - sensor available optionally with or without thermowell.

#### Typetested safety devices

Register numbers are available on request.

**Temperature Regulators (TR)** Type 43-1 and Type 43-2 whose max. operating pressures must not exceed the max. differential pressure  $\Delta p$  specified in the "Technical data". For sensors with thermowells, only SAMSON thermowells can be used.

Details about the selection and application of typetested devices can be found in Information Sheet T 2181 EN.

**Safety Temperature Monitors (STM)** and **Safety Temperature Limiters (STL)** are also available. Further details can be found in Data Sheets T 2183 EN and T 2185 EN.

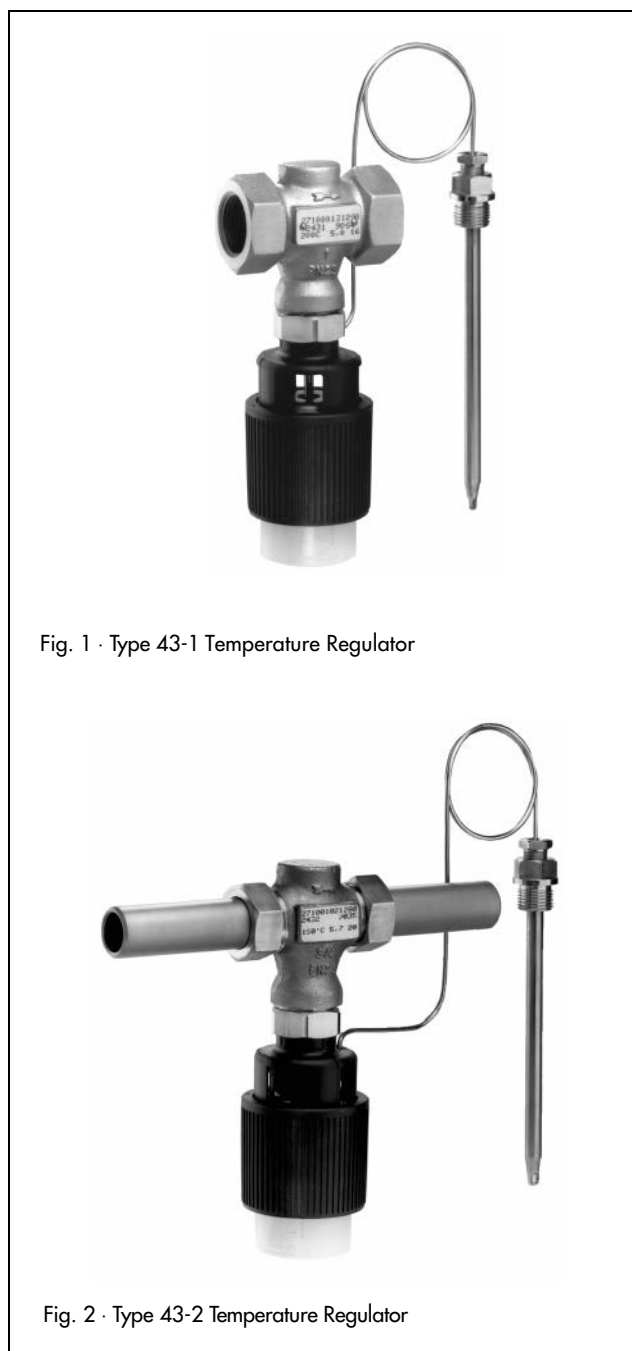


Fig. 1 · Type 43-1 Temperature Regulator

Fig. 2 · Type 43-2 Temperature Regulator

## Accessories

- Thermowell made of: Copper , PN 40  
CrNiMo steel, PN 40
- Double adapter Do3 K or manual adjuster

## Special versions

- 5 m long capillary tube
- Reduced  $K_{VS}$  value for DN 15 or G $\frac{1}{2}$
- Oil-resistant internal parts
- Fast-responding thermostats (see page 4 "vapor pressure thermostats") available on request
- ANSI version (see Data Sheet T 2175 E)

## Principle of operation (Fig. 3)

The temperature of the medium produces in the measuring sensor a pressure proportional to the actual temperature measured. This pressure is transmitted through the capillary tube (11) to the operating element (9), where it is converted into a positioning force. Depending on the adjusted set point, this force acts via the pin of the operating element (10) on the valve plug (3). By turning the set point adjustment ring (8), the point of response of the thermostat is changed so that the valve plug travels through its full travel range within a higher or lower temperature range measured by the sensor.

## Installation

Only the same kind of materials can be combined, for example, a thermowell made of stainless steel WN 1.4571 installed in a stainless steel heat exchanger.

### • Control valves

The valves must be installed in horizontal pipelines. The thermostat must hang downwards - other installation positions are also possible at temperatures lower than 110 °C. The medium must flow through the valve in the direction indicated by the arrow on the valve body.

### • Capillary tube

The capillary tube should be run in such a way that the ambient temperature does not exceed the permissible range, this ambient temperature is kept as even as possible, and the tube cannot be damaged. The smallest permissible bending radius is 50 mm.

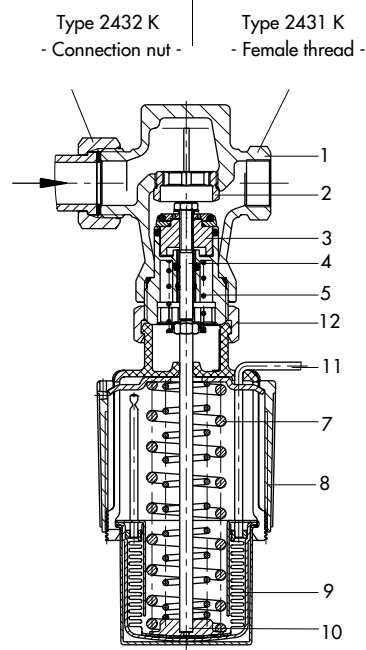
### • Temperature sensor

The sensor may be installed in any desired position. Its whole length must be immersed in the medium to be controlled. The sensor should be installed in a location where overheating or appreciable idle times cannot occur.

**Table 1 · Materials** (WN = Material Number acc. to DIN)

Body	Red brass G-CuSn5ZnPb
Seat	Stainless steel WN 1.4301
Plug	WN 1.4104 and brass, free of dezincification, with EPDM soft seal <sup>1)</sup>
Valve spring	Stainless steel WN 1.4310
Sensor	Capillary tube
	Thermowell
	Copper or stainless steel WN 1.4571
Set point adjustment ring	Glass fibre-reinforced PETP

<sup>1)</sup> With special versions for oils (ASTM I, II, III): FPM (FKM) soft seal

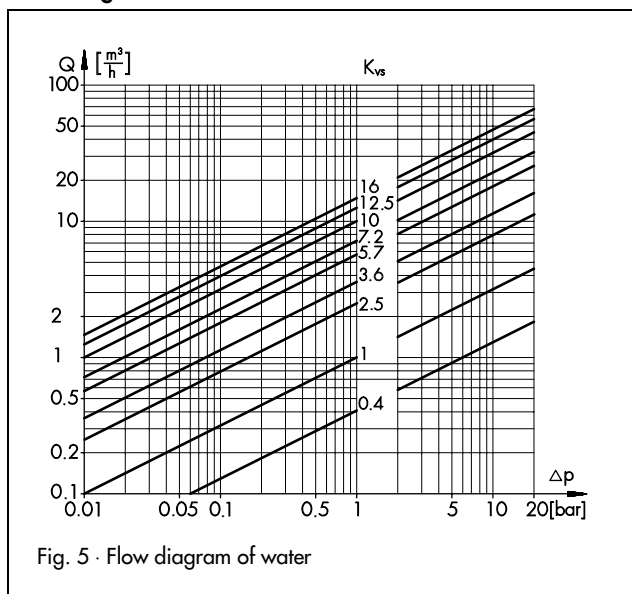


**Fig. 3 · Type 43-1 and Type 43-2 Regulators, principle of operation**

Both types have the same principle of operation. The control valve is shown for Type 2432 K (left) and for Type 2431 K (right).

- |                             |   |
|-----------------------------|---|
| 1 Valve body                | 9 Operating element                               |
| 2 Valve seat                | 10 Pin of the operating element                   |
| 3 Valve plug                | 11 Capillary tube                                 |
| 4 Plug stem                 | 12 Coupling nut (connecting thermostat and valve) |
| 5 Valve spring              |   |
| 7 Positioning spring(s)     |   |
| 8 Set point adjustment ring |   |

## Flow diagram of water



**Fig. 5 · Flow diagram of water**

**Table 2 · Technical data · All pressures in bar (gauge)**

Type 2431 K/Type 2432 K Control Valve							
Nominal size <sup>1)</sup>	G/DN	G ½ / 15	G ¾ / 20	G 1 / 25	32	40	50
K <sub>VS</sub> value		3.6 <sup>2)</sup>	5.7	7.2	10	12.5	16
Nominal pressure (acc. to DIN 2401)	PN 25						
Max. perm. differential pressure	20 bar				12 bar		
Max. perm. valve temperature	150 °C						
Type 2430 K Control Thermostat							
Set point range <sup>3)</sup>	Continuously adjustable from 0 to 35 °C, 25 to 70 °C, 40 to 100 °C, 50 to 120 °C or 70 to 150 °C						
Capillary tube	2 m (special version 5 m)						
Max. perm. excess temp. at the sensor	50 K above the adjusted set point						
Max. perm. ambient temperature range	–20 to +80 °C						
Perm. pressure at sensor/at thermowell	PN 40						

<sup>1)</sup> Type 2431 K Control Valve : Nominal size G 1/2 to G 1

<sup>2)</sup> Special version: K<sub>VS</sub> value 0.4, 1.0 or 2.5

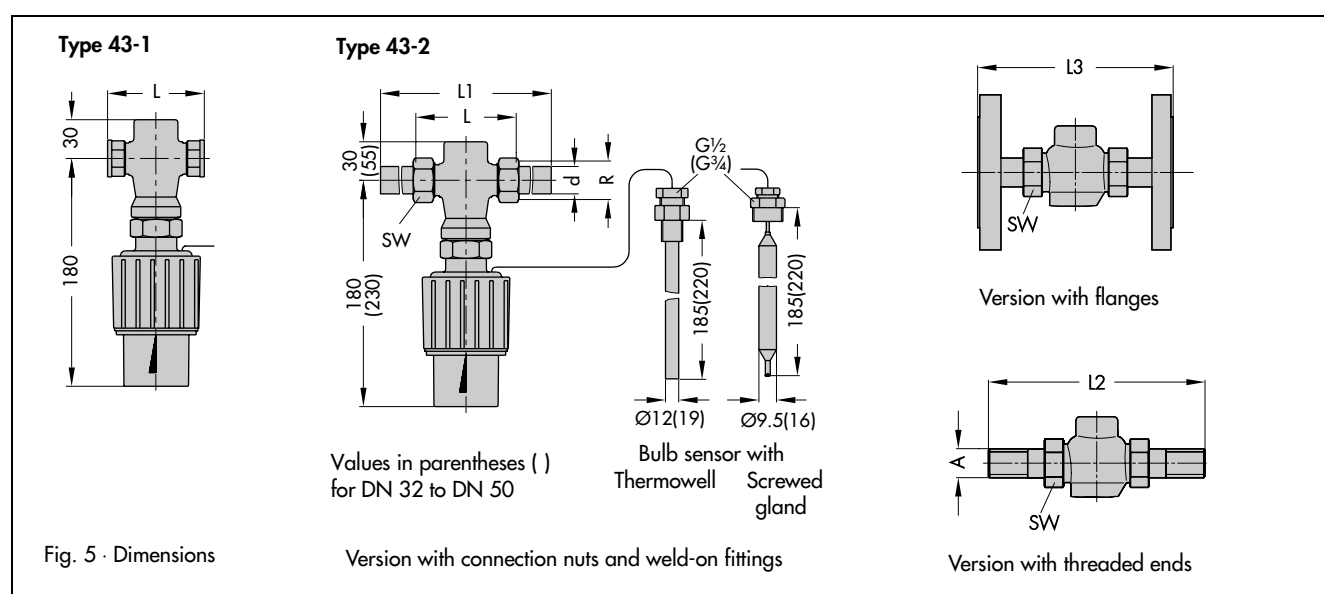
<sup>3)</sup> Other set point ranges available on request

**Table 3 · Dimensions in mm and weights**

Type 43-1 Temperature Regulator							
Nominal size	G	½	¾	1			
Length L		65	75	90			
Weight <sup>1)</sup> , approx. in kg		1.4	1.5	1.6			
Type 43-2 Temperature Regulator							
Nominal size	DN	15	20	25	32	40	50
Pipe diameter d		21.3	26.8	32.7	42	48	60
Connection R		G ¾	G 1	G 1 ¼	G 1 ¾	G 2	G 2 ½
Width across flats SW		30	36	46	59	65	82
Length L		65	70	75	100	110	130
L1 with weld-on fittings		210	234	244	268	294	330
Weight <sup>1)</sup> , approx. in kg		1.7	2	2.3	4.4	5.1	5.9
Special versions							
With connection nuts and <b>threaded ends</b> (male thread)							
Length L2		129	144	159	180	196	228
Male thread A		G ½	G ¾	G 1	G 1 ¼	G 1 ½	G 2
Weight <sup>1)</sup> , approx. in kg		1.7	2	2.3	4.4	5.1	5.9
With connection nuts and <b>flanges</b> PN 16/25 <sup>2)</sup>							
Length L3		130	150	160	180	200	230
Weight <sup>1)</sup> , approx. in kg		3.1	4	4.8	7.6	9.1	11

<sup>1)</sup> Version without thermowell: minus 0.2 kg

<sup>2)</sup> Flange version: with DN 40 and DN 50, the flanges are already mounted on the valve



**Special version - pressure thermostat -**  
Temperature regulator with short time delays

**Application**

The temperature sensors functioning according to the pressure principle are especially suitable for the use in instantaneous water heaters<sup>1)</sup> due to their short time constants of approx. 3 seconds.

Temperature set points from **45 °C** to **65 °C** · Type 2430 K Control Thermostat combined with Type 2431 K (Type 43-1) or Type 2432 K (Type 43-2) Control Valve · **G 1/2** to **G 1** · **DN 15** to **DN 50** · **Nominal pressure PN 25** · Sensor made of copper or CrNiMo steel · Special installation position of the sensor must be observed !

<sup>1)</sup> Versions for plate heat exchanger on request

**Principle of operation**

Type 43-1/2 Temperature Regulator with a **sensor** which functions according to the **pressure principle**.

The temperature sensor is partially filled with a liquid which vaporizes depending on the temperature. This causes a pressure proportional to the temperature to form in the sensor. The pressure is transferred through the capillary tube to the positioning bellows and is converted into a positioning force. It moves the valve plug depending on the set point adjustment.

**Installation**

- To utilize the fast response characteristics of the pressure sensor, the sensor must always be installed in the best position for the application. In instantaneous water heaters, it should be installed directly in front of the flow outlet from the heat exchanger, yet in front of the hot water inlet (see Fig. 7).
- The ambient temperature must be at least 15 K below the set point adjusted at the thermostat.
- The installation position of the sensor depends on its type.

**Table 4 · Installation position** - only for Type 2430 K Vapor Pressure Thermostat

2750-05 ...		003	053	004
Sensor position	Horizontal	•	•	•
	Tip facing upwards			•
	Tip facing downwards	•	•	

- Installation *without* thermowell only !

**Ordering text**

Temperature Regulator **Type 43-1**

G ...

Set point range ...°C

Optionally, special version .../accessories ...

Temperature Regulator **Type 43-2**

DN ...

with connection nuts and weld-on fittings/threaded ends/flanges

Set point range ...°C

Optionally, special version .../accessories ...

Specifications subject to change without notice.

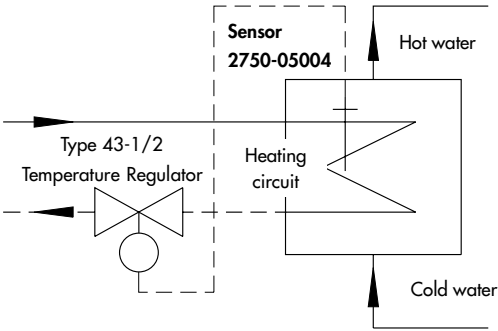
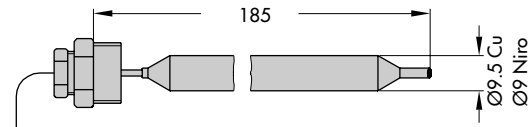


Fig. 6 · Installation position of the pressure thermostat (principle)



**Type 2430 K**  
2750-05003  
2750-05053  
2750-05004  
Value in parentheses ( )  
for DN 32 to DN 50

Fig. 7 · Dimensions of pressure thermostats

- Only the same kind of materials can be combined, for example, a sensor of stainless steel WN 1.4571 installed in a stainless steel heat exchanger.

**Table 5 · Materials**

Type 2430 K Pressure Thermostat				
2750-05 ...		003	053	004
Sensor material	Copper	•		•
	Stainless steel		•	
Sensor connection		G 1/2		



# Self-operated Temperature Regulators

## Series 43



### Temperature Regulators Type 43-5 · Type 43-7 · Valve closes when the temperature rises

### Type 43-6 · Valve opens when the temperature rises

#### Application

Temperature regulators for **set point values** from 0 to 150 °C · Valves **G 1/2 to G1** · **DN 15 to DN 50** · **Nominal pressures PN 16 or PN 25** · For gases up to 80 °C, for liquids and steam up to 200 °C · For heating and cooling installations

#### Note

Typetested temperature regulators (TR), safety temperature monitors (STM) and safety temperature limiters (STL) are available.



#### Special features

- Low-maintenance P-regulators requiring no auxiliary energy
- Temperature sensors suitable for installation in any desired position and for operation at high permissible excess temperatures (50 °C above the adjusted set point value), designed for operating pressures up to 40 bar
- Globe valves with plug balanced by a metal bellows
- Compact design and a particularly low overall height
- Suitable for liquids, gases and steam

#### Versions (Figs. 1 to 3)

The regulators consist of a control valve and a control thermostat with a set point adjustment ring, a capillary tube and a temperature sensor which functions according to the adsorption principle.

**Temperature regulators** with Type 2430 K Control Thermostat and a control valve with **G 1/2**, **G 3/4** or **G1** female thread.

**Type 43-5** · For heating installations · Type 2435 K Control Valve for PN 25 · For liquids and steam up to 200 °C

**Type 43-6** · For cooling installations · Type 2436 K Control Valve for PN 16 · For gases up to 80 °C and liquids up to 150 °C

**Temperature regulators** with Type 2430 K Control Thermostat and a control valve in sizes **DN 15 to DN 50** with connection nuts and weld-on fittings (special version with threaded ends or flanges).

**Type 43-6** · For cooling installations · Type 2436 K Control Valve for PN 25 · Nominal sizes DN 32 to DN 50 · For gases up to 80 °C and liquids up to 150 °C

**Type 43-7** · For heating installations · Type 2437 K Control Valve for PN 25 · Nominal sizes DN 15 to DN 50 · For liquids and steam up to 200 °C

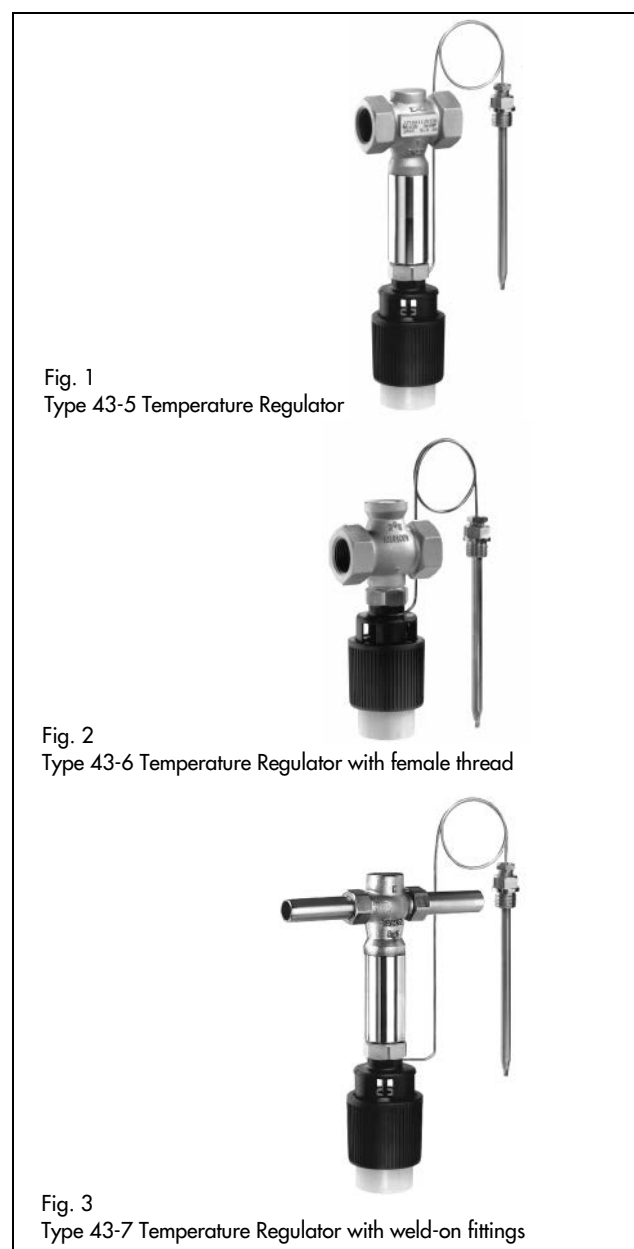
#### Typetested safety devices

Register numbers are available on request.

**Temperature Regulators** Type 43-5 and Type 43-7 whose max. operating pressure must not exceed the max. differential pressure  $\Delta p$  specified in the "Technical data". For sensors with thermowells, only SAMSON thermowells can be used.

Details about the selection and application of the typetested devices can be found in the Information Sheet T 2181 EN.

**Safety Temperature Monitors (STM)** and **Safety Temperature Limiters (STL)** are also available.



Details can be found in the associated Data Sheets T 2183 EN and T 2185 EN.

## Accessories and combinations

- Thermowell made of: Copper, PN 40  
CrNiMo steel, PN 40
- Types 43-5/6/7: Double adapter Do3 K or manual adjuster  
(see Data Sheet T 2176 EN)

## Special versions

- 5 m long capillary tube
- Reduced  $K_{VS}$  value for DN 15 or G 1/2
- Oil-resistant internal parts for Type 43-6
- ANSI versions available on request (see Data Sheet T 2174 EN)

## Principle of operation (Figs. 4 and 5)

The temperature regulators function according to the adsorption principle. The temperature of the medium produces a pressure in the sensor which is proportional to the actual temperature measured. This pressure is transmitted through the capillary tube (11) to the operating element (9), where it is converted into a positioning force. This force acts on the pin (10) which moves the plug stem (4) and the valve plug (3). By turning the set point adjustment ring (8), the point of response of the regulator is changed by the spring (5).

The valve is pressure-balanced by a metal bellows (6). This balancing bellows compensates for any changes in the upstream pressure since a hole in the valve plug (3) allows the upstream pressure also to act on the inside of the bellows.

Type 43-5 and Type 43-7 Regulators are suitable for heating installations. The valves close when the temperature rises.

Type 43-6 Regulator has a valve with a plug which opens when the temperature rises. This design is therefore suitable for cooling installations.

## Installation

Only the same kind of materials can be combined, for example, a thermowell made of stainless steel WN 1.4571 installed in a stainless steel heat exchanger.

### • Control valve

The valves must be installed in horizontal pipelines. The medium must flow through the valve in the direction indicated by the arrow on the valve body. The control thermostat must hang downwards (for Type 2436 K other installation positions are possible for temperatures lower than 110 °C )

### • Temperature sensor

The temperature sensor may be installed in any desired position. Its whole length must be immersed in the medium to be controlled. The sensor should be installed in a location where overheating or appreciable idle times cannot occur.

Type 2436 K Control Valve

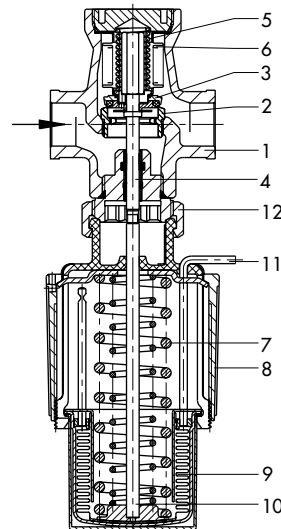


Fig. 4 · Type 43-6 Temperature Regulator, principle of operation

Type 2437 K Control Valve | Type 2435 K Control Valve

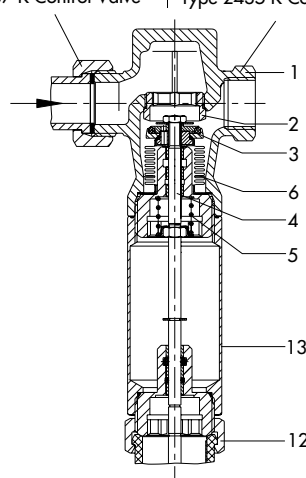


Fig. 5 · Type 43-5/Type 43-7 Temperature Regulator, principle of operation (thermostat not shown)

- |   |                           |    |                                   |
|---|---------------------------|----|-----------------------------------|
| 1 | Valve body                | 9  | Operating element                 |
| 2 | Seat (exchangeable)       | 10 | Pin of operating element          |
| 3 | Plug                      | 11 | Capillary tube                    |
| 4 | Plug stem                 | 12 | Coupling nut                      |
| 5 | Valve spring              |    | (connecting valve and thermostat) |
| 6 | Balancing bellows         | 13 | Insulating pipe                   |
| 7 | Positioning spring(s)     |    |                                   |
| 8 | Set point adjustment ring |    |                                   |

### • Capillary tube

The capillary tube must be run in such a way that the ambient temperature surrounding the tube does not exceed the permissible range, this ambient temperature is kept as even as possible and the tube cannot be damaged. The smallest permissible bending radius is 50 mm.



**Table 1 · Technical data** · All pressures in bar (gauge)

Temperature Regulator	Type	43-6	43-5	43-7
Control Valve	Type	2436 K	2435 K	2437 K
Connection	G	1/2 to 1		–
Nominal size	DN	32 to 50 <sup>1)</sup>	–	15 to 50 <sup>1)</sup>
Nominal pressure		PN 25 <sup>2)</sup>		
Max. permissible temperature		150 °C	200 °C	
Max. perm. differential pressure		Version with stainless steel bellows: 16 bar <sup>3)</sup>		

<sup>1)</sup> Flange version in DN 40 and DN 50: Flanges are already mounted to the valve

<sup>2)</sup> With Type 43-6 and G  $\frac{1}{2}$  to G 1: PN 16

<sup>3)</sup> With Types 43-6, 43-7 and DN 32 to 50: max. 8 bar

Kvs value with							
Connection	G	$\frac{1}{2}$	$\frac{3}{4}$	1	–		
Nominal size	DN	15	20	25	32	40	50
Kvs value		3.2	4	5	10	12.5	16
Special version		0.4; 1.0; 2.5 <sup>4)</sup>			–		

<sup>4)</sup> Type 43-6

Type 2430 K Control Thermostat	
Set point range <sup>5)</sup>	Continuously adjustable: 0 to 35 °C, 25 to 70 °C, 40 to 100 °C, 50 to 120 °C or 70 to 150 °C
Capillary tube	2 m (special version 5 m)
Permissible temperature at sensor	50 °C above the adjusted set point value
Max. permissible ambient temperature range	– 20 to + 80 °C
Permissible pressure at sensor/at thermowell	PN 40

<sup>5)</sup> Other set point ranges available on request

**Table 2 · Material** (WN = Material Number acc. to DIN)

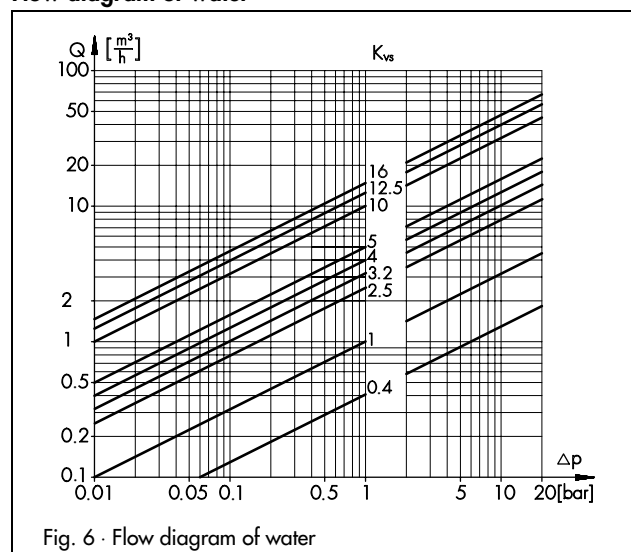
Body	Red brass G-CuSn5ZnPb <sup>1)</sup>	
Seat	Stainless steel WN 1.4104 <sup>2)</sup>	
Plug	Type 43-6	Brass, free from dezincification (CuZn40Pb) and WN 1.4104 with EPDM soft seal <sup>3) 4)</sup>
	Types 43-5/-7	Brass, free from dezincification (CuZn40Pb) and WN 1.4104 with PTFE soft seal <sup>4)</sup>
Balancing bellows	Stainless steel WN 1.4571	
Valve spring	Stainless steel WN 1.4310	
Sensor	Capillary tube	Copper
	Thermowell	Copper or stainless steel WN 1.4571
Set point adjustment ring	Glass-fiber reinforced PETP	

<sup>1)</sup> With Type 43-6 G  $\frac{1}{2}$  to G 1: Brass CuZn37Pb

<sup>2)</sup> With Type 43-6 G  $\frac{1}{2}$  to G 1: WN 1.4541

<sup>3)</sup> Special version for oils (ASTM I, II, III): FKM (Viton) soft seal

<sup>4)</sup> For Kvs 0.4 and 1.0: WN 1.4305

**Flow diagram of water**

**Table 3 · Dimensions in mm and weights**

**Type 43-5 and Type 43-6** (G 1/2 to G 1)

Connections		G 1/2	G 3/4	G 1
Length L		65	75	90
Type	Height H	Weight, approx. in kg Version with bulb sensor and thermowell <sup>1)</sup>		
43-5	260	1.8	1.9	2
43-6	190	1.8	1.9	2

<sup>1)</sup> Version without thermowell: minus 0.2 kg

**Type 43-7** (DN 15 to 50) and **Type 43-6** (DN 32 to DN 50)

Nominal size	DN	15	20	25	32	40	50
Pipe Ø d		21.3	26.8	32.7	42	48	60
Connection R		G 3/4	G 1	G 1 1/4	G 1 3/4	G 2	G 2 1/2
Width over flats SW		30	36	46	59	65	82
Length L		65	70	75	100	110	130
L1 with weld-on fittings		210	234	244	268	294	330
Weight <sup>1)</sup> , approx. kg		2	2.3	2.8	4.7	5.1	7.5
<b>Special versions</b>							
With connection nuts and <b>threaded ends</b> (male thread)							
Length L2		129	144	159	180	196	228
Male thread A		G 1/2	G 3/4	G 1	G 1 1/4	G 1 1/2	G 2
Weight <sup>1)</sup> , approx. kg		2	2.3	2.8	4.7	5.1	7.5
With connection nuts and <b>flanges</b> PN 16/25							
Length L3		130	150	160	180	200	230
Weight <sup>1)</sup> , approx. kg		3.1	3.9	4.6	7.6	8.4	11.4

<sup>1)</sup> Version with bulb sensor and thermowell; without thermowell: minus 0.2 kg.

### Ordering text

Temperature Regulator **Type 43-6**

G ... or

DN ... with connection nuts and weld-on fittings/threaded ends/flanges

with stainless steel bellows

Set point range ... °C

Optionally, accessories ... /special version ...

Temperature Regulator **Type 43-5/Type 43-7**

G ... or

for Type 43-7

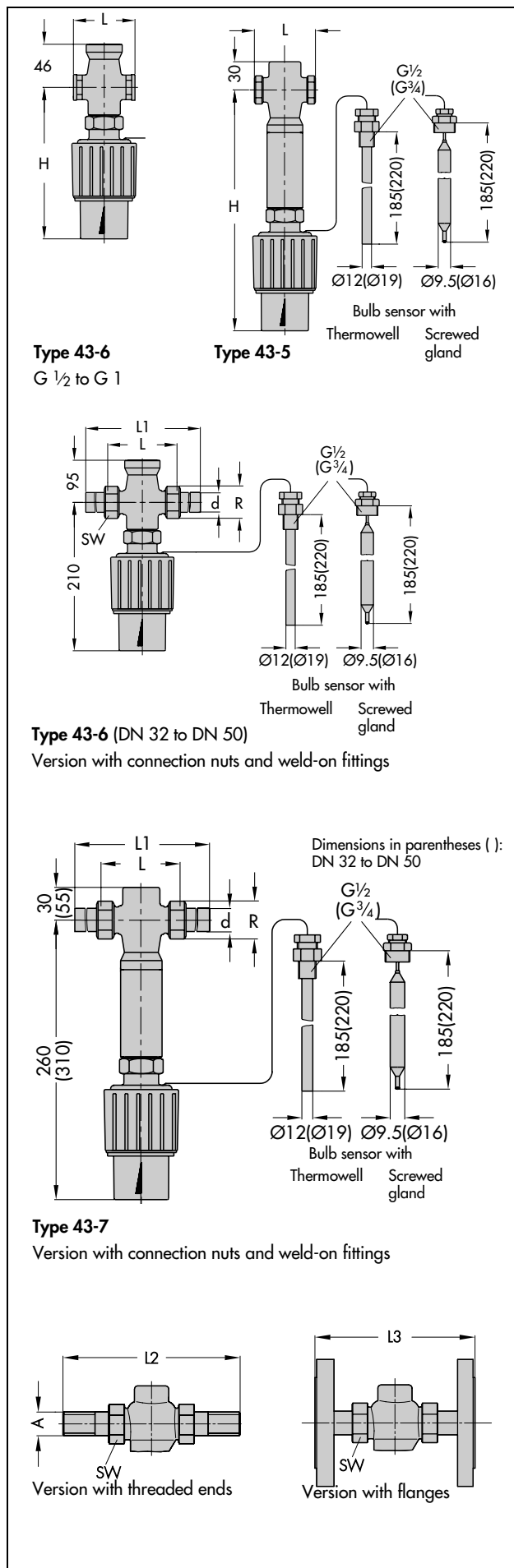
DN ... with connection nuts and weld-on fittings/threaded ends/flanges

with stainless steel bellows

Set point range ... °C

Optionally, accessories ... /special version ...

Specifications subject to change without notice.



### Temperature Regulator with Three-way Valve Type 43-3

#### Application

Temperature regulators for mixing and flow-diverting<sup>1)</sup> service in heating or cooling installations · Set points from 0 to 150 °C · Valves G 1/2 to G 1 female thread · DN 15 to DN 50 with connection nuts for weld-on fittings, threaded ends, flanges · Nominal pressure PN 25 · For liquids up to 150 °C

#### Note

Typetested temperature regulators (TR), safety temperature monitors (STM) and safety temperature limiters (STL) are available.



#### Special features

- Low-maintenance P-regulators requiring no auxiliary energy
- Temperature sensor suitable for installation in any desired position and for operation at high excess temperatures, designed for operating pressures up to 40 bar
- Easy set point adjustment on a scale
- Three-way valve for mixing and flow-diverting service, flow across section AB independent from the valve plug position
- Suitable for heat transfer media - water and oil
- Version with double adapter Do3 K for the attachment of additional control thermostats or manual adjuster (see Data Sheet T 2176 EN)

#### Versions

The regulators consist of a three-way valve with a control thermostat containing a set point adjustment ring, a capillary tube and a temperature sensor which functions according to the adsorption principle.

**Type 43-3** (Figs. 1 and 2) Temperature Regulator with an unbalanced Type 2433 K Three-way Valve · Female thread connection G 1/2 to G 1 · Male thread DN 15 to DN 50 for connection nuts with weld-on fittings, threaded ends or flanges · Oil and water resistant · Type 2430 K Control Thermostat.

#### Typetested safety devices

Register numbers are available on request.

**Temperature Regulator (TR)** Type 43-3 whose maximum operating pressure must not exceed the maximum differential pressure  $\Delta p$  specified in the "Technical data". For sensors with thermowells, only SAMSON thermowells can be used.

Details about the selection and application of typetested devices can be found in the Information Sheet T 2181 EN.

**Safety Temperature Monitors (STM)** and **Safety Temperature Limiters (STL)** are also available. Further details can be found in Data Sheets T 2183 EN and T 2185 EN.

#### Accessories

- Thermowell made of: Copper, PN 40, G 1/2  
CrNiMo steel, PN 40, G 1/2
- Combinations available on request

<sup>1)</sup> Used as a flow-diverting valve, only with male thread connection for weld-on fittings, threaded ends or flanges



Fig. 1 · Type 43-3 Temperature Regulator  
- DN 25 connection with weld-on fittings -

#### Special versions

- ANSI versions available on request
- 5 m long capillary tube

## Principle of operation (Fig. 2)

The temperature of the medium produces a pressure in the sensor, which is proportional to the actual temperature measured. This pressure is transmitted through the capillary tube (6) to the positioning bellows (9), where it is converted into a positioning force. It acts on the valve plug (3) according to the set point adjusted.

The three-way valve is used only for mixing services with the female thread connection or for mixing or diverting services in the version with male thread connection (DN 15 to 50).

When used as a **mixing valve**, the media to be mixed enter A and B ports. The combined stream flows off through AB. The flow from A or B to AB is determined by the free area between the seat (2) and the plug (3) and, as a result, depends on the position of the plug stem (4). When the temperature rises, port A opens and port B closes.

When used as a **flow-diverting valve**, the medium enters at AB and the diverted streams flow off at port A or port B. The flow from AB to A or B is determined by the position of the plug stem and the plugs. When the temperature rises, port A closes and port B opens.

## Installation

### Control valves

The valves must be installed in horizontal pipelines. The thermostat should preferably hang downwards - other installation positions are possible for temperatures up to 110 °C. The medium must flow through the valve in the direction indicated by the arrow on the valve body. The flow direction at ports A, B and AB must correspond with the regulator arrangement specific to the installation (see Fig. 4).

### • Capillary tube

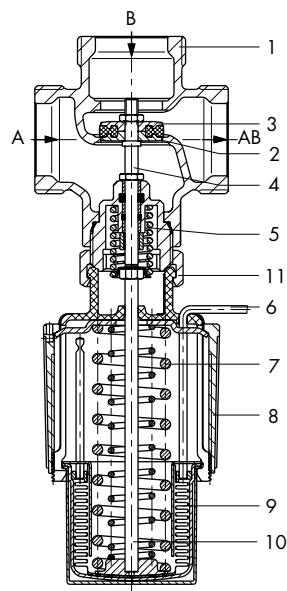
The capillary tube must be laid in such a way that the ambient temperature does not exceed the permissible temperature limit, the temperature is kept as even as possible (ambient temperature approx. +20 °C) and the tube cannot be damaged. The smallest permissible bending radius is 50 mm.

### • Temperature sensor

The temperature sensor can be installed in any desired position. Its whole length must be immersed in the medium to be controlled. The sensor should be installed in a location where overheating or considerable idle times cannot occur.

Only the same kind of materials should be combined, for example, a thermowell made of stainless steel WN 1.4571 installed in a stainless steel heat exchanger.

Type 43-3  
Mixing Valve



Type 43-3  
Flow-diverting  
Valve

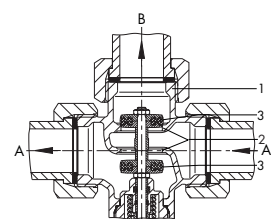


Fig. 2 · Type 43-3 Temperature Regulator  
Male thread connection for DN 15 to DN 50

- |                             |                             |
|-----------------------------|-----------------------------|
| 1 Valve body                | 7 Positioning spring(s)     |
| 2 Valve seat                | 8 Set point adjustment ring |
| 3 Valve plug (exchangeable) | 9 Positioning bellows       |
| 4 Plug stem                 | 10 Pin of operating element |
| 5 Valve spring              | 11 Coupling nut             |
| 6 Capillary tube            |                             |

## Flow diagram of water

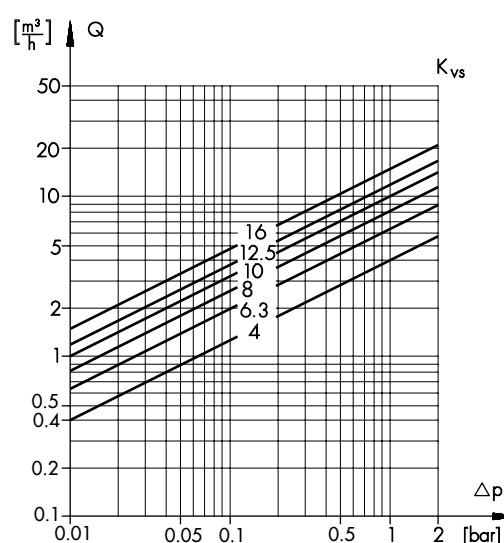
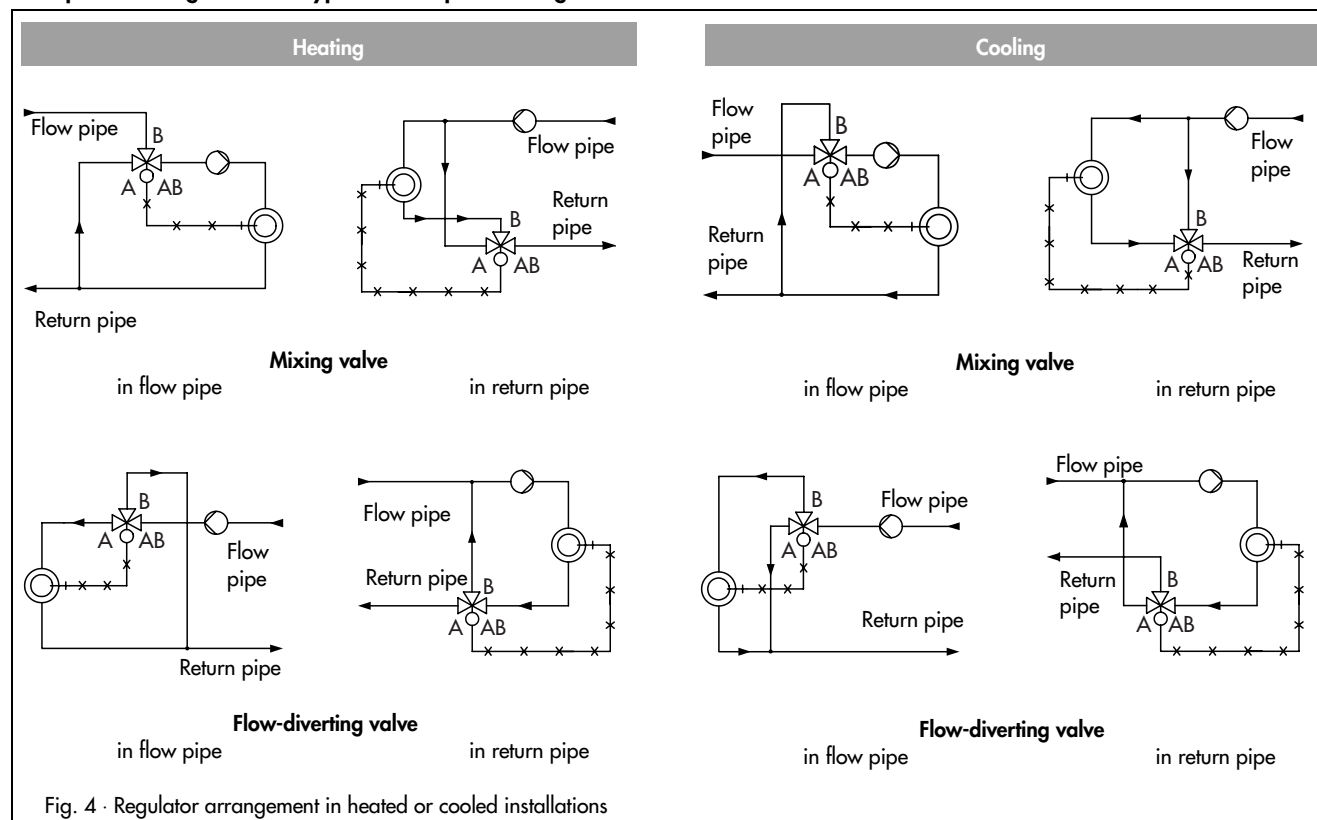


Fig. 3 · Flow diagram for water

## Examples of arrangements for Type 43-3 Temperature Regulators



**Table 1 · Technical Data** · All pressures in bar (gauge)

Type 2433 K Three-way Valve										
Connection	Female thread			Male thread						
Nominal size	G	½	¾	1	–					
Nominal size	DN	–			15	20	25	32	40	50
Medium	Water · Oil									
Used as	Mixing valve			Mixing valve · Flow-diverting valve						
K <sub>VS</sub> value		4	6.3	8	4	6.3	8	10	12.5	16
Nominal pressure	PN	25								
Max. permissible differential pressure		4.4	2.6	1.8	4.4	2.6	1.8	0.9	0.6	0.6
Max. permissible temperature of valve		150 °C								
Type 2430 K Control Thermostat										
Set point range	Continuously adjustable 0 to 35 °C, 25 to 70 °C, 40 to 100 °C, 50 to 120 °C or 70 to 150 °C									
Capillary tube	2 m (special version 5 m)									
Max. perm. excess temperature at sensor	50 °C above the adjusted set point value									
Max. perm. ambient temperature	80 °C									
Perm. pressure at sensor/thermowell	PN 40									

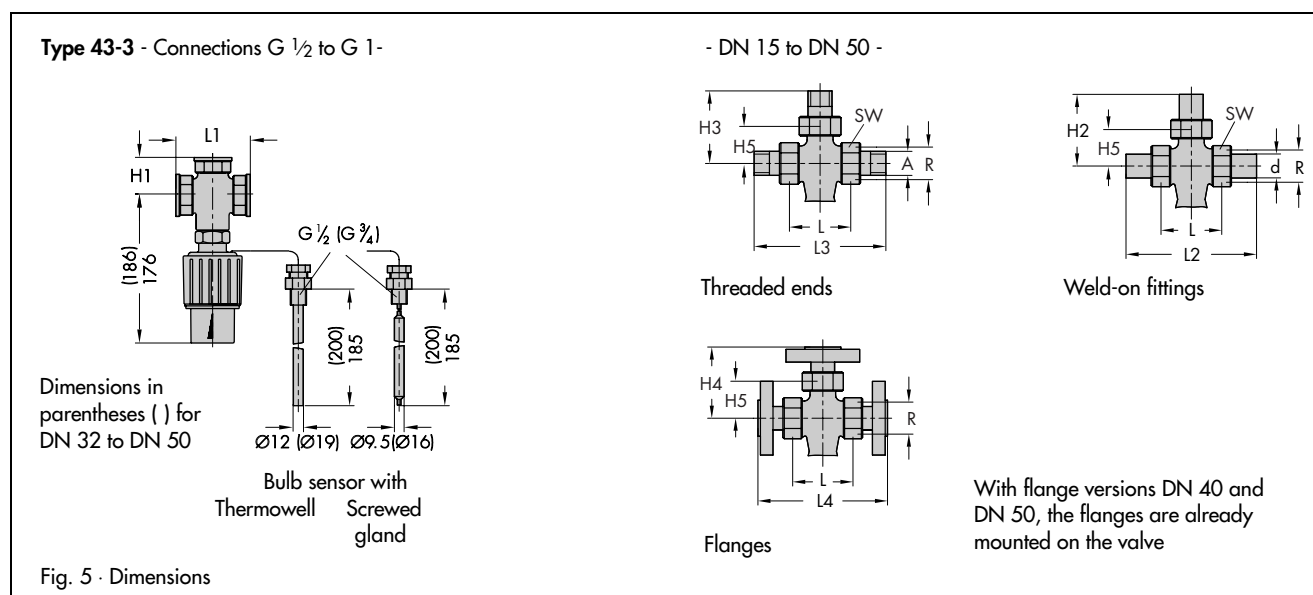
**Table 2 · Materials** (WN = Material Number acc. to DIN)

Body	Red brass G-CuSn5ZnPb (2.1096.01)
Plug	Brass, free from dezincification (CuZn40) with EPDM soft seal
Valve spring	Stainless steel WN 1.4310
Sensor	Capillary tube Copper
	Thermowell Nickel-plated copper or stainless steel WN 1.4571
Set point adjustment ring	Glass fiber-reinforced PETP

**Table 3 · Dimensions in mm and weights**

Nominal size	G	1/2	3/4	1	–	
Nominal size	DN	15	20	25	32	40 50
Pipe Ø d		21.3	26.8	32.7	42	48 60
Connection R		G 3/4	G 1	G 1 1/4	G 1 3/4	G 2 G 2 1/2
SW		30	36	46	59	65 82
Length L		65	70	75	100	110 130
Length L1		65	75	90		–
Height H1		40	40	40	65	70 75
Weight <sup>1)</sup> , approx. kg		1.5	1.6	1.7	2.7	2.8 3.7
With connection nuts and weld-on fittings, threaded ends and flanges						
Height H5		40			60	65
With connection nuts and weld-on fittings						
Length L2		210	234	244	268	294 330
Height H2		112	122	124	144	157 165
Weight <sup>1)</sup> , approx. kg		2	2.3	2.5	3.9	4.2 5.5
With connection nuts and threaded ends (male thread)						
Male thread A		G 1/2	G 3/4	G 1	G 1 1/4	G 1 1/2 G 2
Length L3		129	144	159	180	196 228
Height H3		72	77	82	100	108 114
Weight <sup>1)</sup> , approx. kg		2	2.3	2.5	3.9	4.2 5.5
With connection nuts and flanges PN 16/25						
Length L4		130	150	160	180	200 230
Height H4		70	80	85	100	105 120

## Dimensions



## Ordering text

Temperature Regulator with three-way valve **Type 43-3**

Female thread G ...

Male thread for DN ... with connection nuts and weld-on fittings/threaded ends/flanges

Used as mixing valve/flow-diverting valve

Set point range ...°C

On option, special version

On option, accessories

Specifications subject to change without notice.



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Telefon (069) 4 00 90 · Telefax (069) 4 00 95 07  
Internet: <http://www.samson.de>

**T 2173 EN**

### Safety Temperature Monitors (STM) with Safety Thermostat Type 2403 K

#### Application

Safety temperature monitoring of an energy supply to heat generators or heat exchangers by closing the control valve.

For limit signals from **60 to 120 °C** · Valves sizes **G 1/2 to G 1** · **DN 15 to DN 50** · **Nominal pressure PN 16 or PN 25** · **Max. 200 °C**

#### Note

Details about the application of safety temperature monitors can be found in the Information Sheet T 2181 EN.

Typetested devices for installations according to DIN 4747 or DIN 4751 are available.



**Safety Temperature Monitors (STM)** with a **control valve** and a **Type 2403 K Safety Thermostat** operate without auxiliary energy and are designed for "Extended Safety" according to DIN 3440. The control valve is closed by a spring mechanism when the temperature reaches the limit value adjusted, when the capillary tube ruptures or when there is a leak in the sensor system. It resets itself automatically when the fault has been removed and the temperature has fallen below the limit value.

#### Version

Type 2403 K Safety Thermostat consists of a sensor with a thermowell, a limit value adjustment, a capillary tube and a connecting element.

**Safety Temperature Monitors (STM)** (Figs. 1 to 3)

**Type 2431 K/2403 K** · with Type 2431 K Globe Valve for G 1/2 to G 1 · PN 25 · Type 2403 K Thermostat · 150 °C

**Type 2433 K/2403 K** · with Type 2433 K Three-way Valve for G 1/2 to G 1 or DN 15 to DN 50 · PN 25 · Type 2403 K Thermostat · 150 °C

**Type 2435 K/2403 K** · with Type 2435 K Globe Valve for G 1/2 to G 1 · PN 25 · Type 2403 K Thermostat · 200 °C

**Type 2432 K/2403 K** · with Type 2432 K Globe Valve for DN 15 to DN 50 · PN 25 · Type 2403 K Thermostat · 150 °C

**Type 2437 K/2403 K** · with Type 2437 K Globe Valve for DN 15 to DN 50 · PN 25 · Type 2403 K Thermostat · 200 °C

**Type 2436 K/2403 K** · with Type 2436 K Globe Valve for G 1/2 to G 1 with PN 16 or DN 32 to DN 50 with PN 25 · Type 2403 K Thermostat is not typetested; the valve opens in case of emergency · 150 °C

**Temperature Regulators and Safety Temperature Monitors (TR/STM)** shown in Figs. 4 to 6, consist of a Type .../2403 K device listed above and a typetested Type 2430 K Control Thermostat, for example:

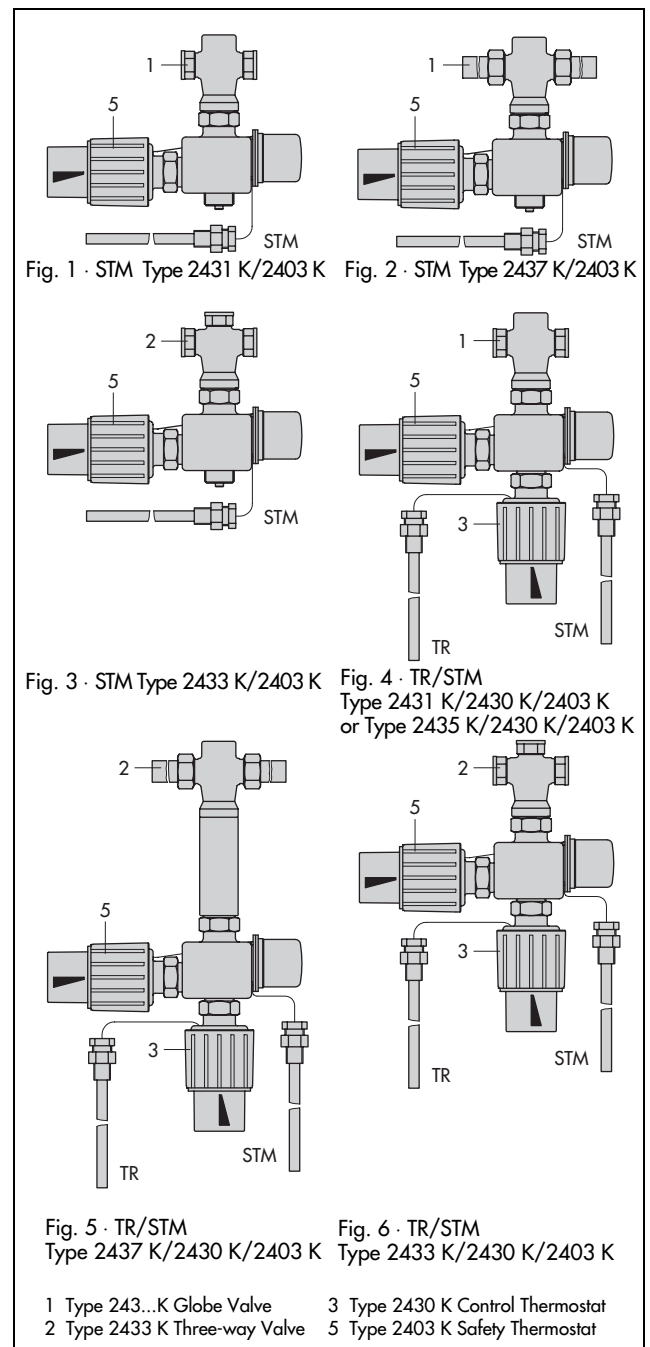
**Type 2431 K/2430 K/2403 K** · with Type 2431 K Control Valve for G 1/2 to G 1 · PN 25 · Type 2430 K Control Thermostat and Type 2403 K Safety Thermostat

Details and technical data about the control valves and Type 2430 K Control Thermostats can be found in:

Data Sheet T 2171 EN - Type 2431 K/Type 2432 K Globe Valves

Data Sheet T 2172 EN - Type 2435 K, Type 2436 K and Type 2437 K Globe Valves

Data Sheet T 2173 EN - Type 2433 K Three-way Valve



### Principle of operation (Fig. 7)

The safety temperature monitors operate according to the vapor pressure principle. The temperature of the medium produces a pressure in the sensor (9) proportional to the actual temperature measured. This pressure is transferred via the capillary tube (8) to the metal bellows of the operating element where it is converted into a positioning force. It moves the pin (11) and the attached plug stem (4). The positioning of the valve plug determines the flow rate of the heating medium through the free area between the plug (3) and the valve seat (2).

When the capillary tube ruptures or when there is a leak in the sensor, the spring mechanism is released and the pin (11) closes the valve due to the pressure decrease in the system.

The Type 2403 K Safety Thermostat is available in two versions which differ in their sensor installation positions:

Version 1: Sensor horizontal or the sensor tip facing upwards.

Version 2: Sensor horizontal or the sensor tip facing downwards.

**Register number** of the devices type tested according to DIN 3440:

Type 2431 K, Type 2432 K, Type 2433 K, Type 2435 K and Type 2437 K Control Valves with

Type 2403 K Safety Thermostat  
Type 2430 K Control Thermostat } on request

### Installation

#### Control valves

The valves must be installed in horizontal pipelines. The operating element must hang downwards. Other installation positions are also possible for temperatures up to 110 °C for Types 2431 K, 2432 K, 2433 K and 2436 K. The medium must flow through the valve in the direction indicated by the arrow on the valve body.

#### Capillary tube

The capillary tube should be run in such a way that the ambient temperature does not exceed the permissible range, the ambient temperature is kept as even as possible, and the tube cannot be damaged. The smallest possible bending radius is 50 mm.

#### Temperature sensor

The installation position of the sensor must be carefully observed. Depending on the version, the sensor tip must either lie horizontally, face upwards or downwards. The sensor may be installed at an angle. Its whole length must be immersed in the medium to be controlled. The sensor should be installed in a location where overheating or considerable idle times cannot occur.

Only the same kind of materials can be combined, for example, a thermowell made of stainless steel WN 1.4571 installed in a stainless steel heat exchanger.

#### Special installation regulations according to VdTÜV:

Type .../2403 K Safety Temperature Monitors (STM) are only to be used in combination with SAMSON thermowells.

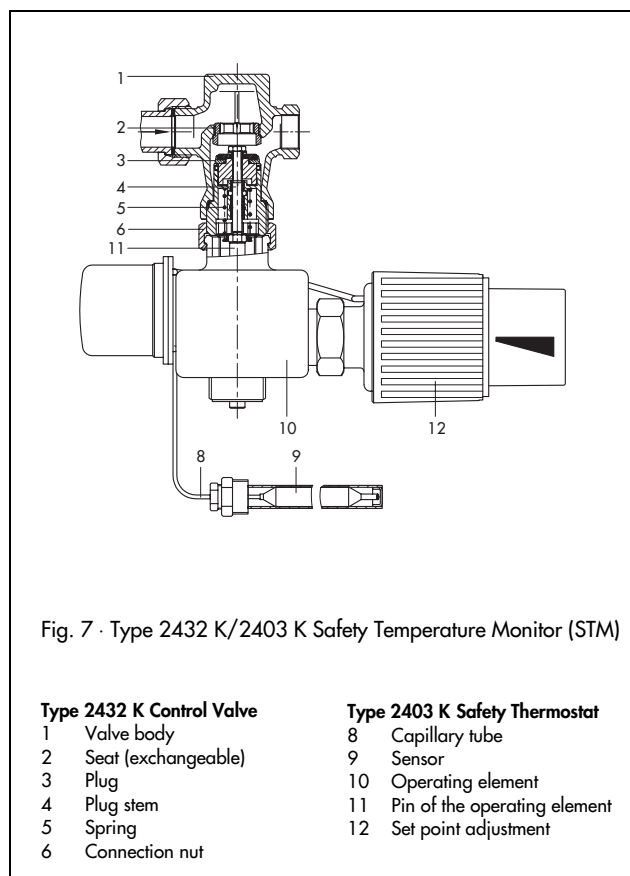


Fig. 7 · Type 2432 K/2403 K Safety Temperature Monitor (STM)

#### Type 2432 K Control Valve

- 1 Valve body
- 2 Seat (exchangeable)
- 3 Plug
- 4 Plug stem
- 5 Spring
- 6 Connection nut

#### Type 2403 K Safety Thermostat

- 8 Capillary tube
- 9 Sensor
- 10 Operating element
- 11 Pin of the operating element
- 12 Set point adjustment

#### Special version

- Reduced Kvs value with DN 15 or G 1/2
- Thermowell made of copper or of CrNiMo steel, G 1/2

#### Combinations

- STM with Type 2430 K Control Thermostat
- STM with differential pressure/flow control

#### Ordering text

##### Safety Temperature Monitor Type 243...K /2403 K

with Control Valve Type 243..., G ... or DN ...

with weld-on fittings/threaded ends/flanges - only with Type 2432/37 -

For mixing/flow-diverting service - only with Type 2433 K - PN ...

with **Safety Thermostat Type 2403 K**, Limit value range ...°C optionally

Version 1: Sensor horizontal or the sensor tip facing upwards

Version 2: Sensor horizontal or sensor tip facing downwards

Optionally, special version ... /accessories ...



**Table 1 · Technical data** · All pressures in bar (gauge)

Control valve	Type	2431 K	2433 K	2435 K	2436 K	2432 K	2437 K
Connection	G	$\frac{1}{2}$ to 1 · Female thread				–	–
Nominal size	DN	–	15 to 50	–	–	32 to 50	15 to 25 32 to 50
Nominal pressure	PN	25	25	25	16	25	25
Max. permissible temperature	°C	150	150	200	150	150	200
Max. perm. differential pressure $\Delta p$		20	4.4 <sup>1)</sup>	16	16	8	20 12 16 8
<b>K<sub>VS</sub> values with</b>							
Connection	G	$\frac{1}{2}$	$\frac{3}{4}$	1	–	–	–
Nominal size	DN	15	20	25	32	40	50
K <sub>VS</sub> values with Type 2433 K		4	6.3	8	10	12.5	16
K <sub>VS</sub> values with Types 2435 K, 2436 K, 2437 K		3.2	4	5	10	12.5	16
Special versions		0.4; 1.0; 2.5 <sup>2)</sup>	–	–	–	–	–
K <sub>VS</sub> values with Types 2431 K, 2432 K		3.6	5.7	7.2	10	12.5	16
Special versions		0.4; 1.0; 2.5	–	–	–	–	–

<b>Type 2403 K Safety Thermostat for STM</b>	
Limit value adjustment range	60 to 75 °C, 75 to 100 °C, 100 to 120 °C
Permissible ambient temperature	max. 50 °C
Perm. temperature at the sensor	25 K above the adjusted set point
Permissible pressure at the sensor with thermowell	40 bar
Capillary tube length	5 m
<b>Type 2430 K Thermostat for TR</b>	
Set point range	Continuously adjustable 0 to 35 °C, 25 to 70 °C, 40 to 100 °C, 50 to 120 °C or 70 to 150 °C
Permissible ambient temperature	0 to 50 °C
Permissible temperature at the sensor	25 K above the adjusted set point
Permissible pressure at the sensor	25 bar, with thermowell 40 bar
Capillary tube length	2 m (special version 5 m)

<sup>1)</sup> For exact values for other nominal sizes, see Data Sheet T 2173 EN

<sup>2)</sup> Only for Type 2436 K

**Table 2 · Materials** (WN = Material No. according to DIN)

Control Valve	Type	2431 K	2432 K	2435 K	2436 K	2437 K	2433 K
Body		Red brass CuSn5ZnPb (WN 2.1010) <sup>1)</sup>					
Seat		Stainless steel WN 1.4571					
Valve plug		Stainless steel with brass <sup>3)</sup> and EPDM soft seal <sup>2)</sup>					
Spring		Stainless steel WN 1.4310					
Balancing bellows		–	–	Stainless steel WN 1.4571			–
Type 2403 K Safety Thermostat for STM and Type 2430 K Thermostat for TR							
Connecting element Type 2403 K		Noryl GTX 830 with brass coupling nut					
Set point adjustment		Glass-fiber reinforced PETP					
Sensor		WN 1 4571					
Capillary tube		Copper					
Thermowell		Copper or stainless steel WN 1.4571					

<sup>1)</sup> With Type 2436 K, G  $\frac{1}{2}$  to G 1: Brass CuZn37Pb (WN 2.0332)

<sup>2)</sup> With special version for oils (ASTM I, II, III): FKM (Viton) soft sealing

<sup>3)</sup> All brass materials are free from dezincification

**Table 3 · Dimensions in mm and weights**

**Types 2431 K/2403 K · 2433 K/2403 K · 2435 K/2403 K  
2436 K/2403 K**

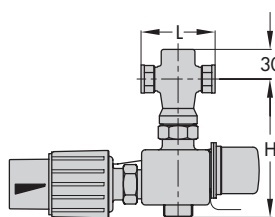
Connections	G	1/2	3/4	1
Length	L	65	75	90
2431 K/2403 K	Height H	140		
Type	Height H	140		
2433 K/2403 K	Height H1	40		
2435 K/2403 K	Height H	220		
Type	Height H	145		
2436 K/2403 K	Height H1	46		
Type	Weight, approx. kg	2.0	2.1	2.2
2431 K/2403 K	Weight, approx. kg	2.2	2.3	2.4
2433 K/2403 K	Weight, approx. kg	2.5	2.6	2.7
2435 K/2403 K	Weight, approx. kg	2.4	2.5	2.6
2436 K/2403 K	Weight, approx. kg			

**Types 2432 K/2403 K · 2433 K/2403 K · 2436 K/2403 K  
2437 K/2403 K**

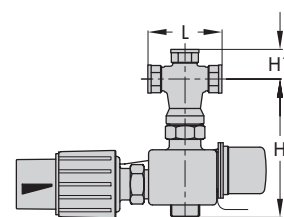
Nominal size		DN	15	20	25	32	40	50
Pipe Ø		d	21.3	26.8	32.7	42	48	60
SW			30	36	46	59	65	82
Length		L	65	70	75	100	110	130
L1 with weld-on fittings			210	234	244	268	294	330
L2 with threaded ends			129	144	159	180	196	228
L3 with flanges			130	150	160	180	200	230
Male thread		A	G 1½	G ¾	G 1	G 1¼	G 1½	G 2
2432 K/2403 K	Height	H	140			190		
	Height	H1	30			55		
Type 2433 K/2403 K	Height	H	135			145		
	Height	H2	112	122	124	144	157	165
	Height	H3	72	77	82	100	108	114
	Height	H4	72	80	82	105	110	115
2436 K/2403 K	Height	H	—			160		
	Height	H1	—			95		
2437 K/2403 K	Height	H	220			270		
	Height	H1	30			55		
Weight, approx. kg								
Type 2432 K/2403 K with	Weld-on fittings		2.5	2.8	3.1	5.1	5.8	7.6
	Threaded ends		2.4	2.7	3.0	5.0	5.7	7.5
	Flanges		3.9	4.8	5.6	8.3	9.8	11.6
Type 2433 K/2403 K with	Weld-on fittings		2.9	3.2	3.4	4.8	5.1	6.4
	Threaded ends		2.9	3.2	3.4	4.8	5.1	6.4
	Flanges		5.0	6.2	7.1	9.6	11	14
Type 2436 K/2403 K with	Weld-on fittings					3.8	4.2	4.6
	Threaded ends					3.8	4.2	4.6
	Flanges					7.0	8.2	9.6

## Dimensions

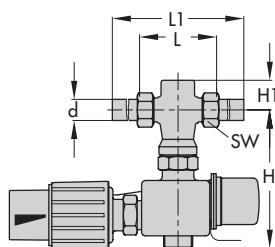
### Safety Temperature Monitors (STM)



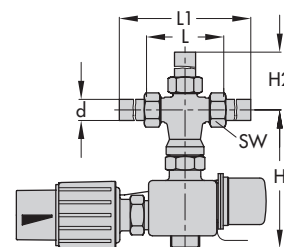
Type 2431 K/2403 K  
Type 2435 K/2403 K



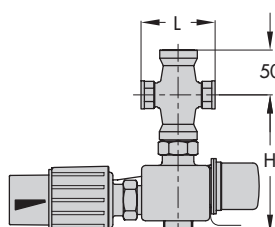
Type 2433 K/2403 K  
Version with female thread



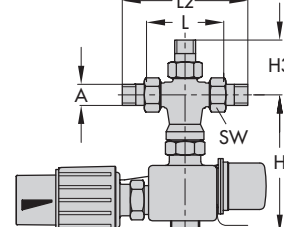
Type 2432 K/2403 K  
Type 2436 K/2403 K  
(DN 32 to DN 50)



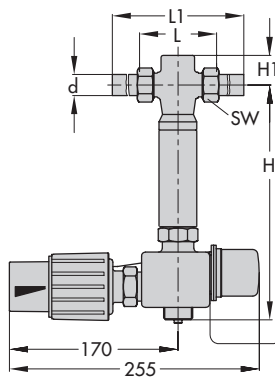
Type 2433 K/2403 K  
Version with weld-on fittings



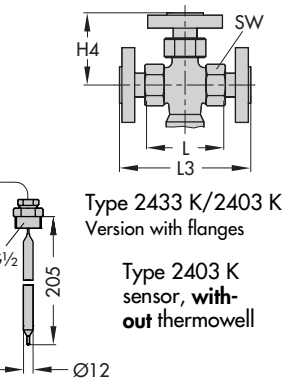
Type 2436 K/2403 K  
G 1/2 to G 1



Type 2433 K/2403 K  
Version with threaded ends



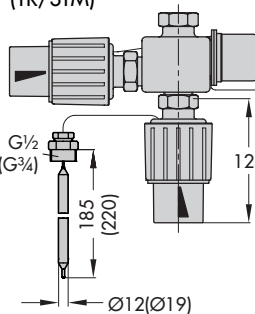
Type 2437 K/2403 K



Type 2433 K/2403 K  
Version with flanges

Type 2403 K  
sensor, **without**  
thermowell

### Temperature Regulator with Safety Temperature Monitor (TR/STM)



Type 2403 K  
sensor, **with**  
thermowell

Dimensions in parentheses ( ) for DN 32 to DN 50

Type 243...K/2430 K/2403 K

Fig. 8 · Dimensions

Specifications subject to change without notice.



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**T 2183 EN**

### Safety Temperature Limiters (STL) with Safety Thermostat Type 2439 K

#### Application

Safety temperature limitation of an energy supply to heat generators and heat exchangers by closing or locking a valve.

**For limit signals from 40 to 120 °C · Valve sizes G 1/2 to G 1 · DN 15 to DN 50 · Nominal pressure PN 16 or PN 25 · Max. 200 °C**

#### Note

Details about the application of safety temperature limiters can be found in the Information Sheet T 2181 EN.

Typetested devices for installations in acc. with DIN 4747 or DIN 4751 to 4753 are available.



**Safety Temperature Limiters (STL)** with a control valve and a Type 2439 K Safety Thermostat operate without auxiliary energy and are designed for "Extended Safety" according to DIN 3440.

The control valve is closed and locked by a spring mechanism when the temperature reaches the limit value adjusted, when the capillary tube ruptures or when there is a leak in the sensor. It can only be reset and put back into operation with a tool when the fault has been removed and the temperature has fallen below the limit value.

#### Versions (Fig. 1 to 4)

Type 2439 K Safety Thermostat consisting of a housing with a spring mechanism and a thermostat with a capillary tube, a bulb sensor and a thermowell.

The device can be equipped optionally with an electric signal transmitter which produces a signal for fault indication.

**Safety Temperature Limiters (STL)** with a Type 2439 K Safety Thermostat (Fig. 1 and 2)

**Type 2431 K/2439 K** · with Type 2431 K Globe Valve for G 1/2 to G 1 · PN 25 · 150 °C

**Type 2435 K/2439 K** · with Type 2435 K Globe Valve for G 1/2 to G 1 · PN 25 · 200 °C

**Type 2432 K/2439 K** · with Type 2432 K Globe Valve for DN 15 to DN 50 · PN 25 · 150 °C

**Type 2437 K/2439 K** · with Type 2437 K Globe Valve for DN 15 to DN 50 · PN 25 · 200 °C

**Type 2436 K/2439 K** · without a DIN register no.; the valve opens in case of emergency · with Type 2436 K Globe Valve for G 1/2 to G 1 with PN 16 or DN 32 to DN 50 with PN 25 · 150 °C

**Type 2433 K/2439 K** · with Type 2433 Three-way Valve for G 1/2 to G 1 or DN 15 to DN 50 · PN 25 · 150 °C

**Temperature Regulators and Safety Temperature Limiters (TR/STL)**, shown in Figs. 3 and 4, consist of a Type 243 ...K/2439 K device as listed above and a typetested Type 2430 K Control Thermostat, for example:

**Type 2431 K/2439 K/2430 K** · with Type 2431 K Control Valve, Type 2439 K Safety Thermostat and Type 2430 K Control Thermostat.

#### Safety Temperature Limiters (STL)

with valve with female thread  
G 1/2 to G 1

with valve DN 15 to DN 50

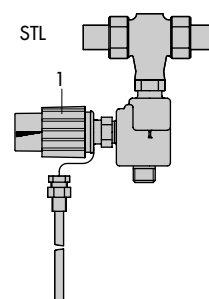
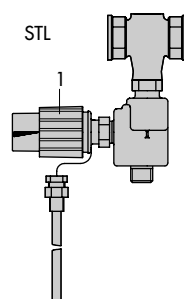


Fig. 1

Type 2431 K/2439 K  
Type 2435 K/2439 K  
Type 2436 K/2439 K

Fig. 2

Type 2432 K/2439 K  
Type 2436 K/2439 K  
Type 2437 K/2439 K

#### Temperature Regulators and Safety Temperature Limiters (TR/STL)

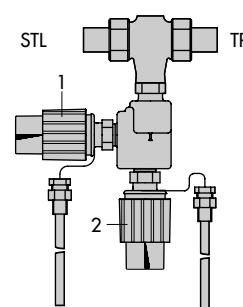
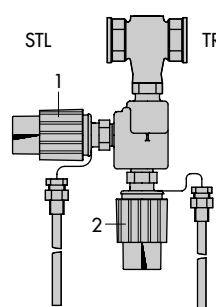


Fig. 3

Type 2431 K/2439 K/2430 K  
Type 2435 K/2439 K/2430 K  
Type 2436 K/2439 K/2430 K

Fig. 4

Type 2432 K/2439 K/2430 K  
Type 2436 K/2439 K/2430 K  
Type 2437 K/2439 K/2430 K

1 Type 2439 K Safety Thermostat

2 Type 2430 K Control Thermostat

Details and technical data about the control valves and the Type 2430 K Control Thermostat can be found in the following Data Sheets:

Data Sheet T 2171 EN - with Type 2431 K and Type 2432 K Globe Valves.

Data Sheet T 2172 EN - with Type 2435 K, Type 2436 K and Type 2437 K Globe Valves.

Data Sheet T 2173 EN - with Type 2433 K Three-way Valve.

### Principle of operation (Fig. 5)

The safety temperature limiters (STL) have a sensor functioning according to the adsorption principle.

The temperature of the heating medium produces a pressure in the sensor (11) proportional to the actual temperature measured. This pressure is transferred via the capillary tube (12) to a positioning bellows where it is converted into a positioning force and is compared with the tension of a spring. This spring force is a function of the limit value adjustment (13). When the temperature exceeds the limit value adjusted, when the capillary tube ruptures or there is a leak in the sensor, the spring mechanism in the connecting element (9) is released. It moves the pin (10) of the spring mechanism and the plug stem (4) attached to it, causing the valve to close and lock. It can only be reset and taken back into operation with a screw driver when the temperature has fallen below the limit value and the fault has been removed.

**Register number** of the devices tested according to DIN 3440:

The register number of Type 2431 K, Type 2432 K, Type 2433 K, Type 2435 K and Type 2437 K Control Valves with Type 2439 K Safety Thermostat or Type 2430 K Control Thermostat are available on request.

### Installation

#### Control valves

The safety temperature limiters must be installed in horizontal pipelines. The operating element must hang downwards. Other installation positions are also possible at temperatures up to 110 °C with the Types 2431 K, 2432 K, 2433 K and 2436 K. The medium must flow through the valve in the direction indicated by the arrow on the valve body.

#### Capillary tube

The capillary tube should be run in such a way that the ambient temperature does not exceed the permissible range, the ambient temperature is kept as even as possible, and the tube cannot be damaged. The smallest permissible bending radius is 50 mm.

#### Temperature sensor

The sensor may be installed in any desired position. Its whole length must be immersed in the medium to be controlled. The sensor should be installed in a location where overheating or considerable idle times cannot occur.

Only the same kind of materials can be combined, for example, a thermowell made of stainless steel WN 1.4571 installed in a stainless steel heat exchanger.

#### Special installation regulations according to VdTÜV:

The Type .../2439 K Safety Temperature Limiters (STL) are only to be used in combination with SAMSON thermowells.

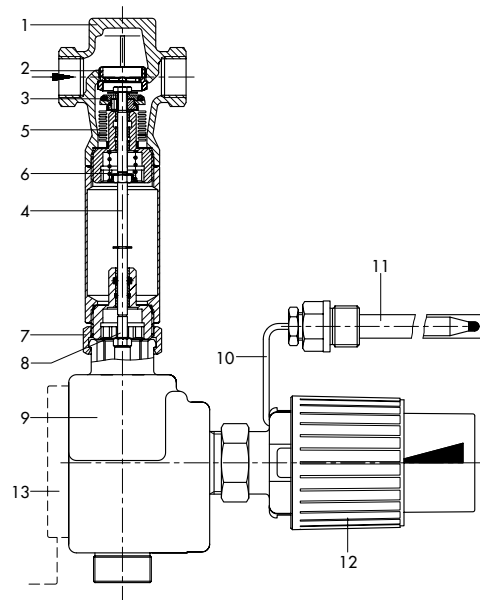


Fig. 5 · Type 2435 K/2439 K Safety Temperature Limiter (STL)

#### Type 2435 K Control Valve

- 1 Valve body
- 2 Seat (exchangeable)
- 3 Plug
- 4 Plug stem
- 5 Balancing bellows
- 6 Spring
- 7 Coupling nut (connecting valve and connecting element)

#### Type 2439 K Safety Thermostat

- 8 Pin of spring mechanism
- 9 Connecting element with spring mechanism
- 10 Capillary tube
- 11 Sensor with thermowell
- 12 Limit value adjustment
- 13 Signal transmitter (optional)

### Special version

- Reduced  $K_{VS}$  value with DN 15 or G  $\frac{1}{2}$
- 5 m long capillary tube
- Thermowell made of CrNiMo steel, G  $\frac{1}{2}$
- With electric signal transmitter

### Combinations

- STL with Type 2430 K Control Thermostat (TR/STL)
- STL with Type 2400 K Pressure Element (STL/PL)
- STL with differential pressure/flow control

### Ordering text

Safety Temperature Limiter Type ... /2439 K

with Control Valve Type ..., G ..., DN ...

For Types 2432 K/2437 K with weld-on fittings/threaded ends/flanges

PN ...,  $K_{VS}$  ...

with Safety Thermostat Type 2439 K

Limit value adjusted/lead-sealed to ... °C

Optionally, special version ... / accessories ...

**Table 1 · Technical data** · All pressures in bar (gauge)

Control valve	Type	2431 K	2433 K	2435 K	2436 K	2432 K	2437 K
Connection	G	G 1/2 to G 1 Female thread				–	–
Nominal size	DN	–	15 to 50	–	–	32 to 50	15 to 25   32 to 50
Nominal pressure	PN	25	25	25	16	25	25
Max. permissible temperature	°C	150		200	150		200
Max. perm. differential pressure	Δ p	20	4.4 <sup>1)</sup>	16	16	8	20   12   16   8
<b>Kvs values with</b>							
Connection	G	1/2	3/4	1	–	–	–
Nominal size	DN	15	20	25	32	40	50
Kvs values with Type 2433 K		4	6.3	8	10	12.5	16
Kvs values with Types 2435 K, 2436 K, 2437 K		3.2	4	5	10	12.5	16
Special versions		0.4; 1.0; 2.5 <sup>2)</sup>					
Kvs values with Types 2431 K, 2432 K		3.6	5.7	7.2	10	12.5	16
Special versions		0.4; 1.0; 2.5					

<b>Type 2439 K Safety Thermostat for STL</b>	
Limit value adjustment range	40 to 95 °C or 70 to 120 °C <sup>3)</sup>
Permissible ambient temperature	80 °C; with electric signal transmitter 60 °C
Permissible temperature at the sensor	20 °C above the adjusted limit value
Perm. pressure at the sensor w. thermowell	40 bar
Switching cycle acc. to DIN 3440	500
Capillary tube length	2 m (special version 5 m)
Electric signal transmitter	Permissible load 230 V~, 16 A with resistive load
<b>Type 2430 K Thermostat for TR</b>	
Set point range	Continuously adjustable 0 to 35 °C, 25 to 70 °C, 40 to 100 °C, 50 to 120 °C or 70 to 150 °C
Permissible ambient temperature	max. 80 °C
Permissible temperature at the sensor	50 °C above the adjusted set point
Permissible pressure at the sensor	40 bar
Capillary tube length	2 m (special version 5 m)

<sup>1)</sup> For exact values for other nominal sizes, see Data Sheet T 2173 EN

<sup>2)</sup> Only for Type 2436 K

<sup>3)</sup> Higher limit values available on request

**Table 2 · Materials** (WN = Material No. according to DIN)

Control valves	Type	2431 K	2432 K	2435 K	2436 K	2437 K	2433 K
Body		Red brass CuSn5ZnPb (WN 2.1010) <sup>1)</sup>					
Seat		Stainless steel WN 1.4571					Integrated in the body
Valve plug		Stainless steel WN 1.4305 <sup>2)</sup> with brass <sup>3)</sup> and EPDM soft seal					CuZn40 <sup>3)</sup> with EPDM soft seal
Spring		Stainless steel WN 1.4310					
Balancing bellows		–	–	Stainless steel WN 1.4571			–
Type 2439 K Safety Thermostat for STL and Type 2430 K Thermostat for TR							
Connecting element Type 2439 K		Glass-fibre reinforced PETP					
Set point adjustment		Glass-fibre reinforced PETP					
Sensor		Copper					
Capillary tube		Copper					
Thermowell		Copper or stainless steel WN 1.4571					

<sup>1)</sup> With Type 2436, G 1/2 to G 1: Brass CuZn37Pb (WN 2.0332)

<sup>2)</sup> With special version for oils (ASTM I, II, III): FKM (Viton) soft sealing

<sup>3)</sup> All brass materials are free from dezincification

Connection	G	G 1/2	G 3/4	G 1
Length	L	65	75	90
Type 2431 K/2439 K	Height H	170		
Type 2433 K/2439 K	Height H	165		
	Height H1	40		
Type 2435 K/2439 K	Height H	255		
Type 2436 K/2439 K	Height H	180		
Type 2431 K/2439 K	Weight approx. kg	1.9	2.0	2.1
Type 2433 K/2439 K	Weight approx. kg	2.1	2.2	2.3

Nominal size		DN	15	20	25	32	40	50
Pipe Ø		d	21.3	26.8	32.7	42	48	60
SW			30	36	46	59	65	82
Length		L	65	70	75	100	110	130
L1 with weld-on fittings			210	234	244	268	294	330
L2 with threaded ends			129	144	159	180	196	228
L3 with flanges			130	150	160	180	200	230
Male thread		A	G ½	G ¾	G 1	G 1¼	G 1½	G 2
Type 2432 K/2439 K	Height H		175			225		
	Height H1		30			55		
	Height H		171			181		
Type 2433 K/2439 K	Height H2		112	122	124	144	157	165
	Height H3		72	77	82	100	108	114
	Height H4		72	80	82	105	110	115
Type 2436 K/2439 K	Height H		–			195		
	Height H1		–			95		
Type 2437 K/2439 K	Height H		255			305		
	Height H1		30			55		
<b>Weight, approx. in kg</b>								
Type 2432 K/2439 K with ...	Weld-on fittings		2.2	2.5	2.8	4.9	5.5	7.3
	Threaded ends		2.1	2.4	2.7	4.7	5.4	7.3
	Flanges		3.6	4.5	5.3	8.0	9.5	11.3
Type 2433 K/2439 K with ...	Weld-on fittings		2.8	3.1	3.3	4.6	4.9	6.2
	Threaded ends		2.8	3.1	3.3	4.6	4.9	6.2
	Flanges		4.9	6.1	7.1	9.4	10.9	13.7
Type 2436 K/2439 K with ...	Weld-on fittings					3.8	4.2	4.6
	Threaded ends					3.8	4.2	4.6
	Flanges					7.0	8.2	9.6
Type 2437 K/2439 K with ...	Weld-on fittings		2.4	2.7	3.0	5.2	5.9	7.8
	Threaded ends		2.3	2.6	2.9	5.5	5.9	7.8
	Flanges		3.8	4.7	5.5	8.2	9.7	11.7

Technical drawings of various types of Temperature Regulator with Safety Temperature Limiter (TR/STL).

Types shown include:

- Type 2431 K/2439 K
- Type 2432 K/2439 K
- Type 2433 K/2439 K (Version with female thread)
- Type 2433 K/2439 K (Version with weld-on fittings)
- Type 2433 K/2439 K (Version with threaded ends)
- Type 2433 K/2439 K (Version with flanges)
- Type 2437 K/2439 K (Version with weld-on fittings)

Dimensions are indicated in millimeters (mm). Values in parentheses ( ) are for DN 32 to DN 50.

Labels for components include:

- Stabfühler mit Tauchhülse
- G 1/2 (G 3/4)
- G 1/2
- Ø 12 (Ø 19)

Fig. 6 . Dimensions

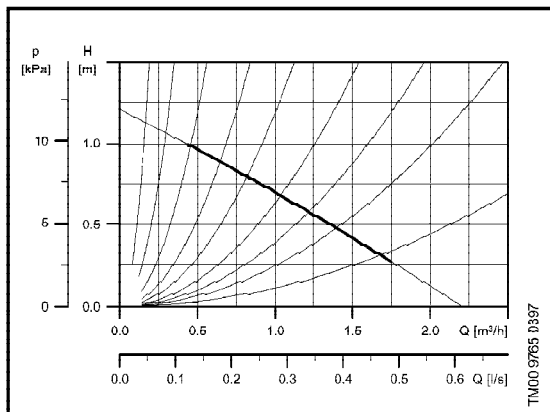
# heat exchangers - hot water systems - district heating stations

## Grundfos pumps for DMS Combined Water Heating Systems

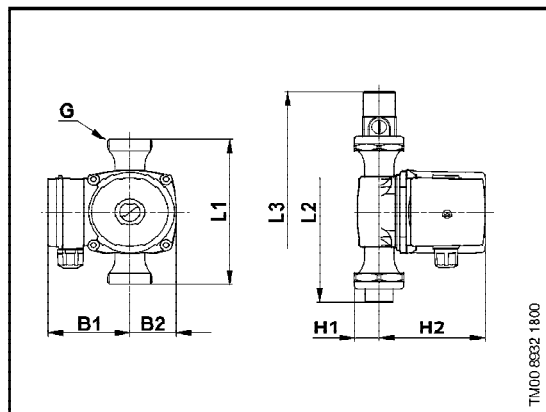
### UP 20-15 N

150

1 x 230 V, 50 Hz



Speed	P <sub>1</sub> [W]	I <sub>n</sub> [A]
1	65	0.28

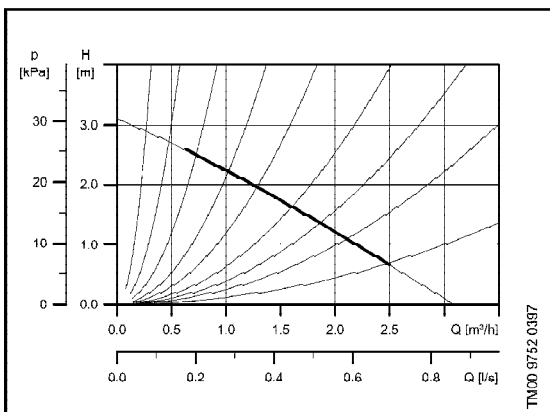


Connections: 3/4" or 22 mm unions and valves  
System pressure: Max. 10 bar  
Liquid temperature: +2°C to +110°C (TF 110)

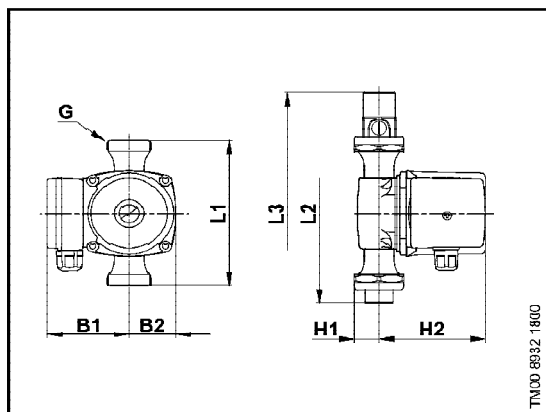
### UP 20-30 N

150

1 x 230 V, 50 Hz



Speed	P <sub>1</sub> [W]	I <sub>n</sub> [A]
1	75	0.31

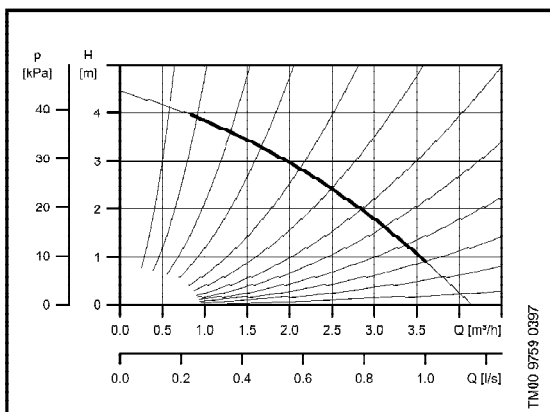


Connections: 3/4" or 22 mm unions and valves  
System pressure: Max. 10 bar  
Liquid temperature: +2°C to +110°C (TF 110)

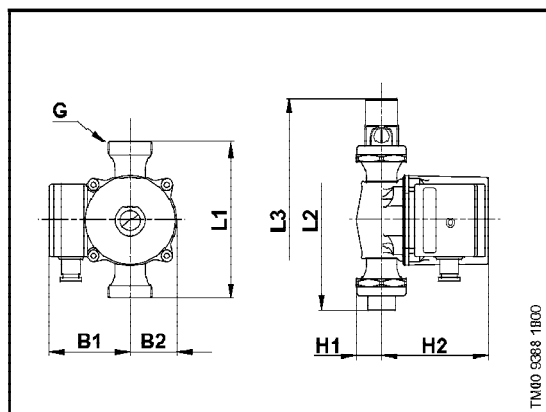
### UP 20-45 N

150

1 x 230 V, 50 Hz



Speed	P <sub>1</sub> [W]	I <sub>n</sub> [A]
1	115	0.50



Connections: 3/4" or 22 mm unions and valves  
System pressure: Max. 10 bar  
Liquid temperature: -25°C to +110°C (TF 110)

Pump type	Dimensions [mm]										Weights [kgs]		Ship. vol. [m³]
	L1	L2	L3	H1	H2	H3	B1	B2	B3	G	Net	Gross	
UP 25-15 N / 20-30 N	150	198	242	28	100		75	43		1¼	2.1	2.3	0.004
UP 20-45 N	150	198	242	28	123		82	51		1¼	4.0	4.3	0.004

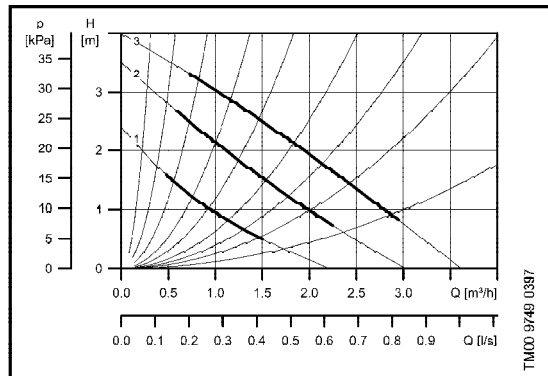
# heat exchangers - hot water systems - district heating stations

## Grundfos pumps for DMS Combined Water Heating Systems

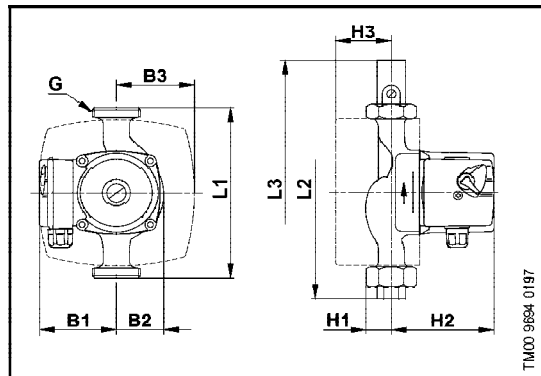
### UPS 25-40 B

180

1 x 230 V, 50 Hz



Speed	P <sub>1</sub> [W]	I <sub>n</sub> [A]
3	60	0.26
2	45	0.20
1	30	0.13

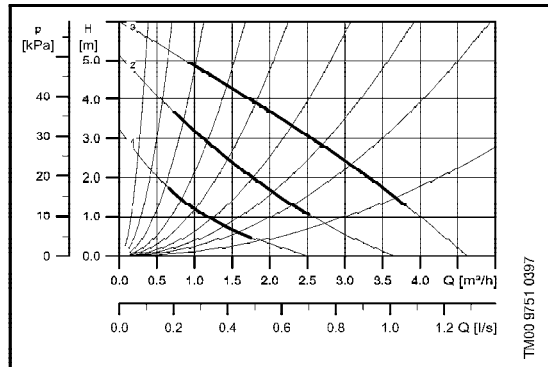


Connections: 3/4", 1", 22 or 28 mm unions and valves  
System pressure: Max. 10 bar  
Liquid temperature: +2°C to +110°C (TF 110)

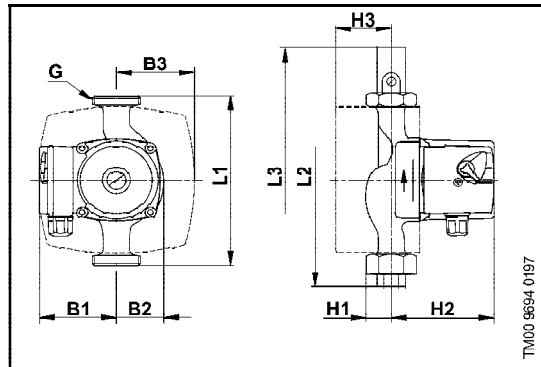
### UPS 25-60 B

180

1 x 230 V, 50 Hz



Speed	P <sub>1</sub> [W]	I <sub>n</sub> [A]
3	90	0.40
2	65	0.30
1	45	0.20



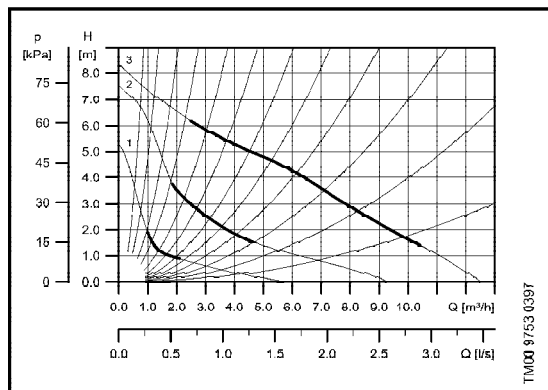
Connections: 3/4", 1", 22 or 28 mm unions and valves  
System pressure: Max. 6/10 bar  
Liquid temperature: +2°C to +110°C (TF 110)  
Cold water version: Type BK for -25°C to +95°C (TF 95)

Pump type	Dimensions [mm]										Weights [kgs]		Ship. vol. [m³]
	L1	L2	L3	H1	H2	H3	B1	B2	B3	G	Net	Gross	
UPS 25-40 B / 25-60 B	180	236	290	32	102	57	75	51	77	1 1/2	2.9	3.1	0.004

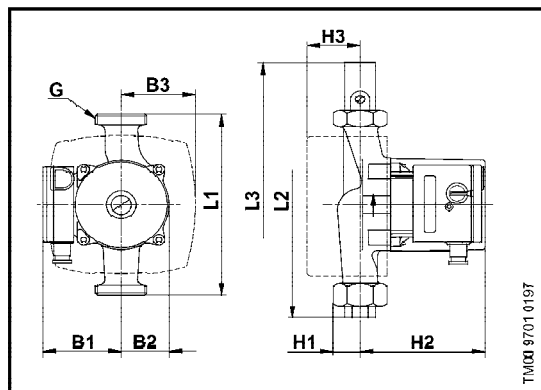
### UPS 32-80 B

180

1 x 230 V, 50 Hz



Speed	P <sub>1</sub> [W]	I <sub>n</sub> [A]
3	245	1.05
2	220	0.95
1	145	0.65



Connections: 1 1/4", 28 or 42 mm unions and 1 1/4" valves  
System pressure: Max. 10 bar  
Liquid temperature: -25°C to +110°C (TF 110)

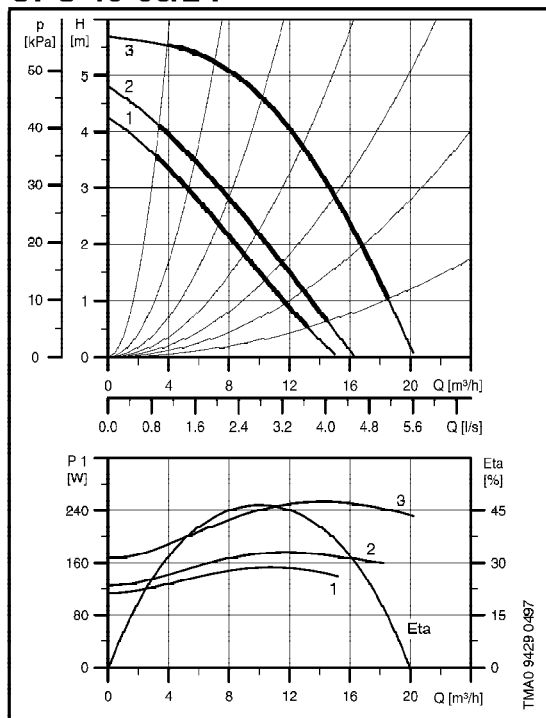
Pump type	Dimensions [mm]										Weights [kgs]		Ship. vol. [m³]
	L1	L2	L3	H1	H2	H3	B1	B2	B3	G	Net	Gross	
UPS 32-80 B	180	244	302	39	130	72	82	60	85	2	5.2	5.5	0.0102



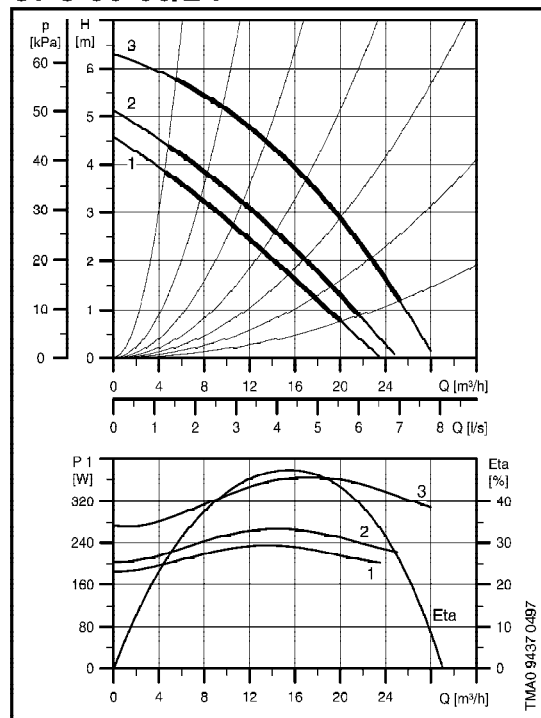
## heat exchangers - hot water systems - district heating stations

### Grundfos pumps for DMS Combined Water Heating Systems

#### UPS 40-60/2 F



#### UPS 50-60/2 F



#### Inlet pressure

$t_m$ [°C]	75	90	120
$H_{min}$ [bar]	0.15	0.45	1.75

$t_m$ [°C]	75	90	120
$H_{min}$ [bar]	0.05	0.35	1.65

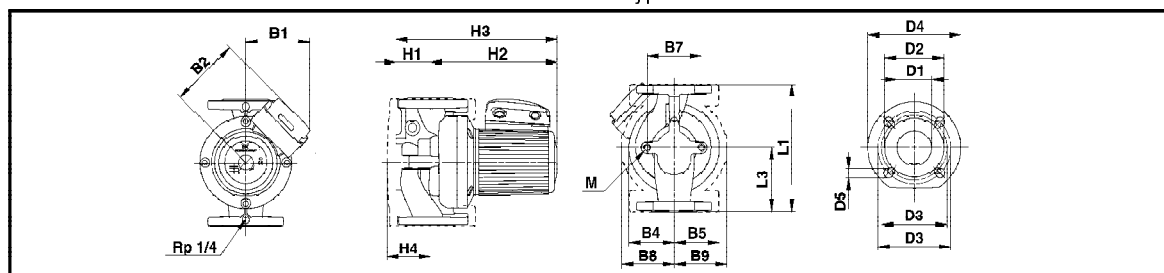
#### Electrical data

		$P_{max}$ [W]	$P_{min}$ [W]	$I_{1/1}$ [A]	$\cos \varphi$
3 x 230 V	Speed 1	155	115	0.43	0.89
	Speed 2	175	125	0.50	0.87
	Speed 3	250	170	0.80	0.78
3 x 400-415 V	Speed 1	155	115	0.25	0.89
	Speed 2	175	125	0.29	0.87
	Speed 3	250	170	0.46	0.78

		$P_{max}$ [W]	$P_{min}$ [W]	$I_{1/1}$ [A]	$\cos \varphi$
3 x 230 V	Speed 1	235	185	0.68	0.87
	Speed 2	270	205	0.78	0.87
	Speed 3	360	270	1.29	0.70
3 x 400-415 V	Speed 1	235	185	0.39	0.87
	Speed 2	270	205	0.45	0.87
	Speed 3	360	270	0.74	0.70

Series 200 is also available for 1 x 230-240 V.

Single-head pumps are available with bronze housing, type B.



#### Dimensions and weights

Pump type	PN	Dimensions [mm]																				Weights [kg]*		Ship. Vol [m³]		
		L1	L2	L3	B1	B2	B3	B4	B5	B6	B7	B8	B9	H1	H2	H3	H4	D1	D2	D3	D4	D5	M		Net	Gross
UPS 40-60/2 F	6/10	250		125	135	141		75	75		80	110	110	68	245	313	103	40	66	100/110	150	14/19	M12	18.3	19.6	0.027

Pump Type	PN	Dimensions [mm]																				Weights [kg]*		Ship. Vol. [m³]		
		L1	L2	L3	B1	B2	B3	B4	B5	B6	B7	B8	B9	H1	H2	H3	H4	D1	D2	D3	D4	D5	M		Net	Gross
UPS 50-60/2 F	6/10	280		140	135	141		95	75		120	122	111	75	253	328	123	50	102	110/125	165	14/19	M12	21.8	23.4	0.034

\* Weights of bronze versions are approx. 10% higher.

## heat exchangers - hot water systems - district heating stations

### TACO Balancing/Setting Valves

#### Application:

Direct regulation, reading and shut-off of flows in systems. Direct hydraulic balancing and control of flows to consumers or in a subsystem. Balancing valves offer a quick, easy and accurate method of adjusting the flow rates through heating, ventilation, air conditioning and cooling systems. Correct balancing of hydraulic circuits ensures optimum energy distribution, resulting in more efficient and economical operation in accordance with the energy saving regulations provided for by legislation. With SETTER Bypass SD Safety Design balancing valves, any expert can set the appropriate water distribution on the premises in question, thus avoiding investments in training and costly measuring devices.

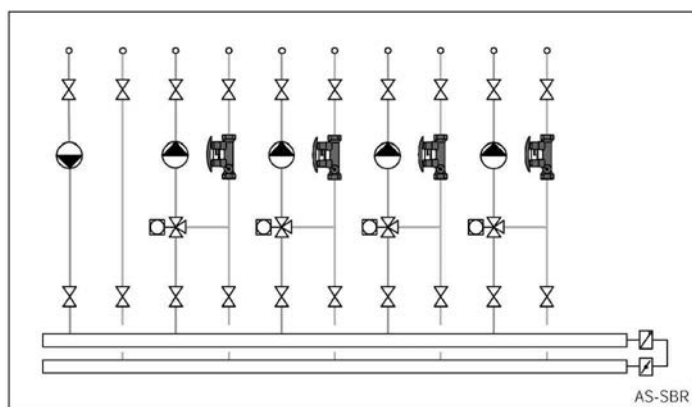
#### Installation:

The balancing valve requires a straight section of pipe of the same length and diameter as the system. The valve can be installed in a horizontal, vertical or inclined position. Care should be taken in order to ensure that the arrow is pointing in the direction of the flow.



#### Advantages:

- Precise and quick balancing without diagrams, tables or measuring devices
- Flow rate is displayed directly in l/min
- Regulating valve with adjustment scale and isolating facility (rest leakage possible)
- Can be installed in any position
- Maintenance free
- Prepositioning of the flow rate to be regulated
- Accuracy: +/- 5 % of the adjusted value
- Male and female thread versions in the standard product range



#### Operation:

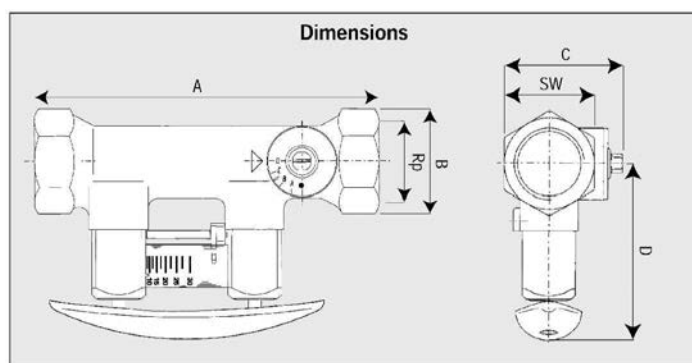
The flow measurement is based on the principle of a baffle float. Two check valves separate the measuring device from the valve body in normal operation. The visual flow indication is only activated once the button is pressed. The flow rate indicated on the measuring device does not change if the check valves are automatically shut off for operation.

#### Fluids:

- Water and proprietary additives used against corrosion and freezing
- Heating / Cooling / Potable water

#### Technical data:

- Max. operating temperature 100°C
- Max. operating pressure 10 bar
- kVs value and flow measurement range, see type programme table
- Valve housing in Ms 58 brass
- Sight glass: high-grade plastic
- Seals: EPDM
- Threads according to ISO 7 / DIN 2999
- Measuring accuracy +/- 5 % of the adjusted value
- EPDS insulation material



Type	DN	connection	measurement range (l/min)	kvs (m³/h)	A	B	C	D	SW
23-2262	15	½"	2 - 8	1,95	142	39	46	79	34
23-2360	20	¾"	4 - 15	3,3	129	39	46	79	34
23-2362	20	¾"	8 - 30	5,0	129	39	46	79	34
23-2460	25	1"	6 - 20	5,1	152	47	58	82	41
23-2461	25	1"	10 - 40	8,1	152	47	58	82	41
23-2561	32	1¼"	20 - 70	17	161	56	65	84	49
23-2661	40	1½"	30 - 120	30	173	64	79	90	59
23-2861	50	2"	50 - 200	54	197	76	91	97	70

## heat exchangers - hot water systems - district heating stations

### Hot Water System for Hotels

Questionnaire to obtain information about the heat requirement and the combination of heat exchanger and hot water tank for a potable hot water system.

Company: \_\_\_\_\_ Date: \_\_\_\_\_

Project: \_\_\_\_\_

Please answer as much questions as possible. For unanswered questions we try to use realistic assumptions.

1.) Pipework material:                      galvanized                      copper                      stainless steel                      plastic

cold water                      ☐                      ☐                      ☐                      ☐

hot water                      ☐                      ☐                      ☐                      ☐

2.) Number of beds \_\_\_\_\_

3.) Number of 1-bed-rooms: \_\_\_\_\_ , with a shower: \_\_\_\_\_ , with a tub: \_\_\_\_\_  
2-bed-rooms: \_\_\_\_\_ , with a shower: \_\_\_\_\_ , with a tub: \_\_\_\_\_

4.) Kind of Hotel:  
Garni\*\* ☐      standard\*\* ☐      improved standard\*\*\* ☐      first class\*\*\*\* ☐

5.) Food offered:  
breakfast only / no breakfast \_\_\_\_\_  
breakfast + restaurant \_\_\_\_\_  
number of meals offered \_\_\_\_\_

6.) Hotel own laundry requiring hot water?  
yes ☐                      no ☐

If so, no. of washing-mashines: \_\_\_\_\_

hot-water requirement for each operation \_\_\_\_\_ l/min \_\_\_\_\_ °C/°F

no. of operations per hour and machine \_\_\_\_\_

Is soft hot water required?

If so, degree of hardness \_\_\_\_\_ °dH, \_\_\_\_\_ gpg/ppm

quantity required \_\_\_\_\_ m<sup>3</sup>/h

## heat exchangers - hot water systems - district heating stations

### 7.) Primary energy:

gas-/oilfired boiler:      number of      capacity of      min. flow      how many boilers  
   boilers      each boiler      temperature      of which capacity  
        kW      in summer      are in use  
   \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_ °C/°F      \_\_\_\_/\_\_\_\_ kW

### district heating:

max. flow temperature in winter      \_\_\_\_\_ °C/°F  
min. flow temperature in summer      \_\_\_\_\_ °C/°F  
hot water quantity per MW      \_\_\_\_\_ m<sup>3</sup>/h  
primary return flow      \_\_\_\_\_ °C/°F  
(at nominal rated power of the hot water system)

8.) Max. operating pressure:      primary      \_\_\_\_\_ bar  
   secondary      \_\_\_\_\_ bar

9.) Head losses incl. regulation:      primary      \_\_\_\_\_ kPa  
   secondary      \_\_\_\_\_ kPa

10.) For equipment transportation to the place of installation:  
min. interior width of the door      \_\_\_\_\_ mm  
overhead clearance of the room of      \_\_\_\_\_ mm

### 11.) Other remarks:

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## heat exchangers - hot water systems - district heating stations

### 6.) Primary energy:

gas-/oilfired boiler:      number of      capacity of      min. flow      how many boilers  
   boilers      each boiler      temperature      of which capacity  
        kW      in summer      are in use  
   \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_ °C/°F      \_\_\_\_/\_\_\_\_ kW

### district heating:

max. flow temperature in winter      \_\_\_\_\_ °C/°F  
min. flow temperature in summer      \_\_\_\_\_ °C/°F  
hot water quantity per MW      \_\_\_\_\_ m<sup>3</sup>/h  
primary return flow      \_\_\_\_\_ °C/°F  
(at nominal rated power of the hot water system)

7.) Max. operating pressure:      primary      \_\_\_\_\_ bar  
   secondary      \_\_\_\_\_ bar

8.) Head losses incl. regulation:      primary      \_\_\_\_\_ kPa  
   secondary      \_\_\_\_\_ kPa

9.) For equipment transportation to the place of installation:  
min. interior width of the door      \_\_\_\_\_ mm  
overhead clearance of the room of      \_\_\_\_\_ mm

### 10.) Other remarks:

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## heat exchangers - hot water systems - district heating stations

### Hot Water System for Hospital

Questionnaire to obtain information about the heat requirement and the combination of heat exchanger and hot water tank for a potable hot water system.

Company: \_\_\_\_\_ Date: \_\_\_\_\_

Project: \_\_\_\_\_

Please answer as much questions as possible. For unanswered questions we try to use realistic assumptions.

1.) Number of beds: \_\_\_\_\_

2.) Pipework material:	galvanized	copper	stainless steel	plastic
cold water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
hot water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.) Number of 1-bed-rooms: \_\_\_\_\_ , with a wash basin: \_\_\_\_\_ , with a shower: \_\_\_\_\_  
 2-bed-rooms: \_\_\_\_\_ , with a wash basin: \_\_\_\_\_ , with a shower: \_\_\_\_\_  
 \_\_\_-bed-rooms: \_\_\_\_\_ , with a wash basin: \_\_\_\_\_ , with a shower: \_\_\_\_\_

4.) Therapy department:

\_\_\_\_\_ tubs of \_\_\_\_\_ I used \_\_\_\_\_ - times for \_\_\_\_\_ hours a day

5.) How much water of which temperature °C/°F will be used for the first filling of the tubs?

6.) Other potential facts for the hot-water requirement in the therapy department:

7.) Bathrooms for employees:

No. of bathrooms \_\_\_\_\_ , with showers \_\_\_\_\_ , with wash-basins \_\_\_\_\_

8.) Are nurse's living quarters available nearby, which will be supplied by the same hot water system? If yes, how many rooms/flats etc.?

## heat exchangers - hot water systems - district heating stations

9.) What is the sanitary equipment like in the bathrooms?

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10.) I own laundry requiring hot water?

yes ☐

no ☐

If so, no. of washing-machines: \_\_\_\_\_

hot-water requirement for each operation \_\_\_\_\_ l/min \_\_\_\_\_ °C/°F

no. of operations per hour and machine \_\_\_\_\_

Is soft hot water required?

If so, degree of hardness \_\_\_\_\_ °dH, \_\_\_\_\_ gpg/ppm

quantity required \_\_\_\_\_ m<sup>3</sup>/h

11.) Primary energy:

gas-/oilfired boiler:	number of boilers	capacity of each boiler kW	min. flow temperature in summer _____ °C/°F	how many boilers of which capacity are in use _____/____ kW
	_____	_____		

district heating:

max. flow temperature in winter \_\_\_\_\_ °C/°F

min. flow temperature in summer \_\_\_\_\_ °C/°F

hot water quantity per MW \_\_\_\_\_ m<sup>3</sup>/h

primary return flow \_\_\_\_\_ °C/°F  
(at nominal rated power of the hot water system)

12.) Max. operating pressure:	primary	_____ bar
	secondary	_____ bar

13.) Head losses incl. regulation:	primary	_____ kPa
	secondary	_____ kPa

14.) For equipment transportation to the place of installation:		
min. interior width of the door		_____ mm
overhead clearance of the room of		_____ mm

15.) Other remarks:

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## heat exchangers - hot water systems - district heating stations

### 9.) Primary energy:

gas-/oilfired boiler:      number of      capacity of      min. flow      how many boilers  
   boilers      each boiler      temperature      of which capacity  
        kW      in summer      are in use  
   \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_ °C/°F      \_\_\_\_/\_\_\_\_ kW

### district heating:

max. flow temperature in winter      \_\_\_\_\_ °C/°F  
min. flow temperature in summer      \_\_\_\_\_ °C/°F  
hot water quantity per MW      \_\_\_\_\_ m<sup>3</sup>/h  
primary return flow      \_\_\_\_\_ °C/°F  
(at nominal rated power of the hot water system)

10.) Max. operating pressure:      primary      \_\_\_\_\_ bar  
   secondary      \_\_\_\_\_ bar

11.) Head losses incl. regulation:      primary      \_\_\_\_\_ kPa  
   secondary      \_\_\_\_\_ kPa

12.) For equipment transportation to the place of installation:  
min. interior width of the door      \_\_\_\_\_ mm  
overhead clearance of the room of      \_\_\_\_\_ mm

### 13.) Other remarks:

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## heat exchangers - hot water systems - district heating stations

### Hot Water System for Bathrooms

Questionnaire to obtain information about the heat requirement and the combination of heat exchanger and hot water tank for a potable hot water system.

Company: \_\_\_\_\_ Date: \_\_\_\_\_

Project: \_\_\_\_\_

Please answer as much questions as possible. For unanswered questions we try to use realistic assumptions.

1.) Pipework material:                      galvanized                      copper                      stainless steel                      plastic

cold water                      ☐                      ☐                      ☐                      ☐

hot water                      ☐                      ☐                      ☐                      ☐

2.) Multi-station wash units / single wash basins

Quantity of washbays \_\_\_\_\_, which are used within a washing period.

fittings:                      mix fittings                      yes ☐                      no ☐

with self acting time limiter                      yes ☐                      no ☐

flow rate of fitting                      \_\_\_\_\_ l/min

3.) Multi shower benches / single showers:

Quantity of showers \_\_\_\_\_

fittings:                      mix fittings                      yes ☐                      no ☐

with self acting time limiter                      yes ☐                      no ☐

rose head flow rate                      \_\_\_\_\_ l/min

4.) How many persons will take showers to wash themselves?

a. industry                      after shifts                      \_\_\_\_\_

b. sports ground                      after games                      \_\_\_\_\_

c. camping ground                      during the main time more than 1h \_\_\_\_\_

d. swimming pools                      during the main time more than 1h \_\_\_\_\_

## heat exchangers - hot water systems - district heating stations

### 5.) Primary energy:

gas-/oilfired boiler:      number of      capacity of      min. flow      how many boilers  
   boilers      each boiler      temperature      of which capacity  
        kW      in summer      are in use  
   \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_ °C/°F      \_\_\_\_/\_\_\_\_ kW

### district heating:

max. flow temperature in winter      \_\_\_\_\_ °C/°F  
min. flow temperature in summer      \_\_\_\_\_ °C/°F  
hot water quantity per MW      \_\_\_\_\_ m<sup>3</sup>/h  
primary return flow      \_\_\_\_\_ °C/°F  
(at nominal rated power of the hot water system)

6.) Max. operating pressure:      primary      \_\_\_\_\_ bar  
   secondary      \_\_\_\_\_ bar

7.) Head losses incl. regulation:      primary      \_\_\_\_\_ kPa  
   secondary      \_\_\_\_\_ kPa

8.) For equipment transportation to the place of installation:  
min. interior width of the door      \_\_\_\_\_ mm  
overhead clearance of the room of      \_\_\_\_\_ mm

### 9.) Other remarks:

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