

barnova

INNOVATIVE PRESSURE COMPETENCE

TECHNOMAT

Duo Plus

- ✓ Constant pressure
- ✓ Deaeration
- ✓ Make-up feed
- ✓ Feed evacuation
- ✓ Temperature measurement
- ✓ Oxygen measurement
- ✓ pH measurement
- ✓ Conductivity measurement
- ✓ Improving water quality

Remote monitoring
Remote control



Pressure holding technology

Degassing technology



📍 **CHP (Combined Heat and Power Plant)**

DÅVA 2, Umea, Sweden

1 x TECHNOMAT HD-E 8,9-240

1 x TECHNOMAT DS 4.500, 10.0 bar

1 x TECHNOFLEX TS 2.000

1 x TECHNOFLEX HT 1.000



Advantage!

Certified quality
Made in Germany

Barnova TECHNOMAT DUO PLUS

the compact power station which shows what it can do!

Its functionality, fully automatic operation and pump control allow the compact TECHNOMAT station to open up new possibilities for pressurising and degassing heating and cooling circuits.

The compact station DUO PLUS is used in large supply systems such as in district heating systems, in industry and in power stations.

The pressurising, degassing, makeup and discharge functions plus the measurement and evaluation of all parameters provide unique control over the condition of the medium and the operating states.

Complete redundancy option of pressure and level detection.

The Barnova TECHNOMAT DUO PLUS pressuriser station is suitable for both hot water generation systems in accordance with EN 12828, EN 12952 and EN 12953 and add-on equipment for hot water systems in accordance with TRD 604 Sheet 2.

The pressure holding unit's job is to hold the idle pressure for all operating states and at every point in the system, via the evaporating pressure at the highest permissible temperature or via the required static pressure.

The design of the pressuriser station warrants compliance with the operating pressures specified for each

of the system components. The membrane drip trays collect the extra water volume generated by expansion during the heating cycles and feed it back into the system network as the water cools down and contracts.

The pressuriser connects to the return of the heat generator or to the system return, i.e. the so-called zero point of the system. The exact point of this connection decides which static pressure to set the system to. The membrane high-pressure damper and the membrane expansion tank serve as a buffer for the pressurising pumps and the entire system.



📍 Palm Wörth paper mill

Standard version

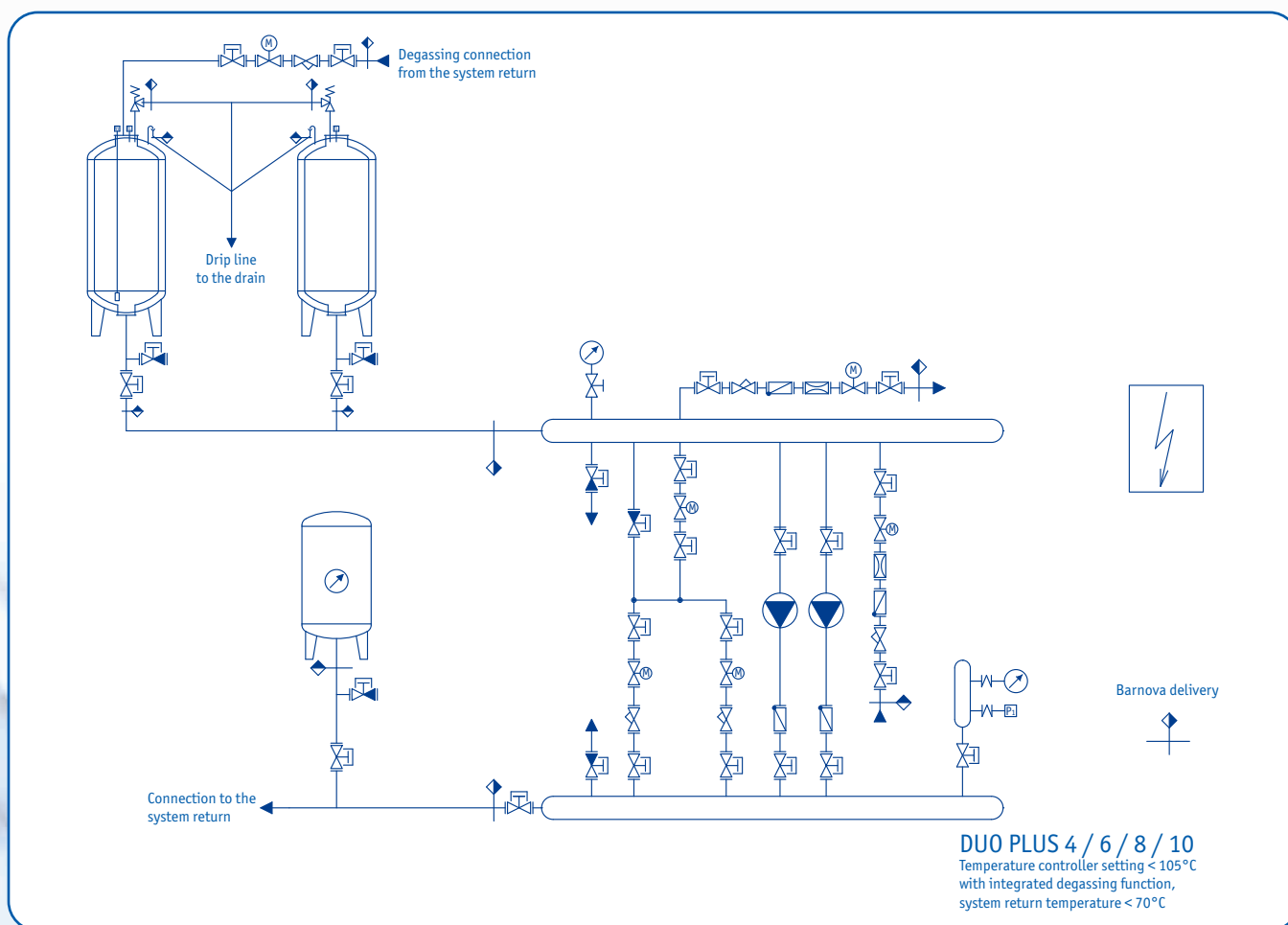
TECHNOMAT DUO PLUS – Types 4.1 / 6.1 / 8.1 / 4.2 / 6.2 / 8.2 / 10.2

Applications

- Hot water heating and cooling systems with up to 50 % glycol in accordance with DIN EN 12828, with safety requirements/equipment according to DIN EN 12952 and DIN EN 12953
- Temperature controller $\leq 105^{\circ}\text{C}$ to DIN EN 12828
- The system return temperature $\leq 70^{\circ}\text{C}$
- maximum operating pressure 16.0 bar
- from approx. 12 MW to approx. 35 MW

Construction

Built and tested with C € mark to Pressure Equipment Directive 2014/68/EU and EN 13831 or AD 2000. Electromagnetic compatibility in accordance with Regulation 2014/30/EU based on standards EN 61326-1:2013-07 and EN 61439-1:2012-06. Requirement of Low Voltage Directive 2014/35/EU based on standard EN 61010-1:2011-07/BGV A2. Electrical equipment in accordance with VDE 0116-1:2023-02 and EN 50156-1.



Membrane expansion tank

A membrane expansion tank (TECHNOFLEX HT, HN) should be built in on the pressure side of the pressure holding station, to minimise the switching frequency of the pumps and overflow valves for low variations of pressure or temperature.

The control unit

- Base plate

Solid construction with metal profiles, a single plate and crane lifting eyes

- Pressure holding pumps

Multi-stage with a mandatory start up every 24 h, manual - off - automatic switch, switch-over on fault and time monitor

- Check valves

Installed on the pressure side of the pumps to prevent the water in the system from flowing backwards into the tank(s)

- Cap ball valves

Locked to prevent unintentional closure

- Overflow valves

Mechanical and/or electrical versions for the controlled release of expanding water from the system into the tanks

- Dirt traps

Installed before the overflow valves to ensure fault-free operation

- Emergency adjustable valve

Installed in series with the overflow valves, with a bypass line for emergency operation of the pressure holding station should the valve fail

- Pressure sensor

Controls pumps, overflow valves and the emergency adjustable valve depending upon the pressure

- Safety temperature monitor (STW or STB)

Monitors the temperature of the water in the system

- MIN pressure switch

Controls the emergency adjustable valve

- Top up

Is switched by the level sensor and, controlled by the quantity, compensates for water losses in the system

- Excess drain off

This is switched by the level sensor and prevents too much water from accumulating in the tank(s)

- Drain

On both the pressure and suction sides

- Flange cap shut-off valve

To shut off the pressure holding station on the pressure side

- Switching cabinet

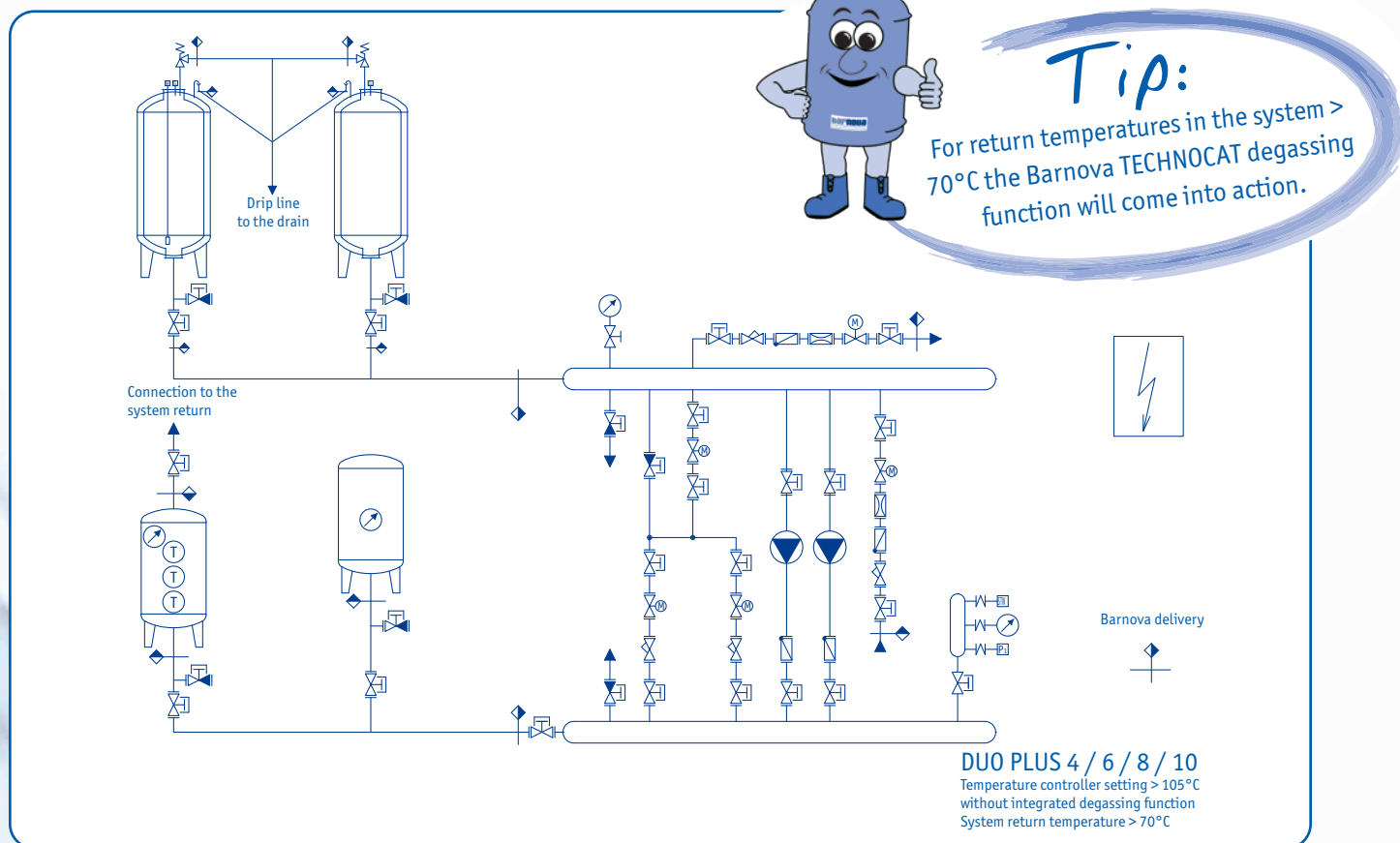
With a Barnova PLC



Advantage!
For higher safety requirements, additional pressure and level sensors can be used with switch-over on fault as standard.

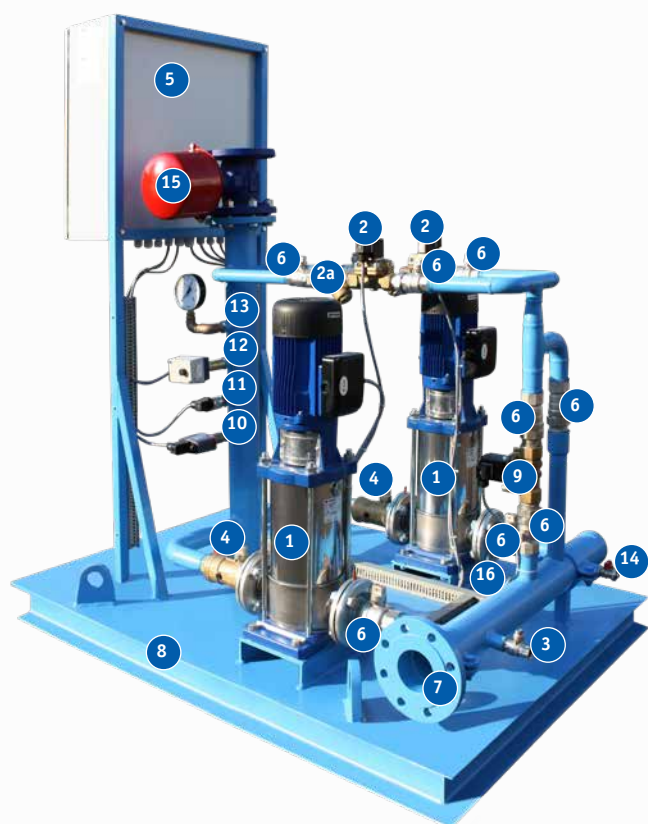
The membrane tank

- **Technomat DB** A free-standing, unpressurised version
- **Butyl membrane** Replaceable, to DIN 4807 part 3, as the water in the system heats up and expands, this accommodates it and keeps it safely separated from the atmosphere
- **Vacuum breaker elbow** Compensates for the pressure difference between the membrane and the inside wall of the tank (vacuum breaker)
- **Level sensor** Controls the topping up and draining off of water in the system
- **Degassing** This uses a separate solenoid valve which allows part of the system's main return flow to flow from above, directly into the membrane's water-free space. This deliberate degassing for a particular period or at regular intervals extracts gases from the water in the system.
- **Vent** Releases the extracted gases out into the atmosphere
- **Safety valve** This is used when the trigger pressure for the heater's safety valve exceeds 6.0 bar and is thus higher than the tank's maximum operating pressure
- **Flange cap shut-off valve** This is used to isolate the tank for holding etc. It is locked to prevent it from being unintentionally closed
- **Drain** This is used to empty the tank
- **Add-on tank** The capacity of the basic tank can be extended at will



Temperature reduction tank

For return temperatures > 70°C a temperature reduction tank is used to cool the water in the system down to ≤ 70°C. A safety temperature monitor or limiter serves to provide additional protection and will switch the heater off for temperatures above 70°C.



- 1) Pressure holding pumps
- 2) Overflow valves (mechanical/electrical)
- 2a) Dirt trap
- 3) Top up connection
- 4) Cap ball valve with integrated check valve
- 5) Switching cabinet
- 6) Cap ball valve
- 7) Connecting flange to the tank
- 8) Base plate
- 9) Emergency adjustable valve
- 10) Min. pressure switch
- 11) Pressure sensor
- 12) Safety temperature limiter
- 13) Pressure gauge
- 14) Drain
- 15) Flange cap shut-off valve
- 16) Excess drain off connection



- 1) Membrane expansion tank
- 2) Level sensor
- 3) Safety valve (if required)
- 4) Solenoid valve (degassing)
- 5) Degassing valve
- 6) Control pipe for unattended operation
- 7) High water sensor
- 8) Water shortage sensor
- 9) Pipe to control emptying of the system
- 10) Pipe to control the flange cap shut-off valve
- 11) Flange cap shut-off valve for the tank
- 12) Tank drain

Standard version

TECHNOMAT DUO PLUS – Types 4.3 / 6.3 / 8.3 / 10.3 – unattended operation for 72 h

Applications

- Hot water systems
- Temperature controller > 105°C
- System return temperature > 70°C according to TRD 604 sheet 2, DIN EN 12952 and 12953 for unattended operation over 72 h
- Max. operating pressure 16.0 bar
- From about 12 MW to approx. 35 MW

Construction

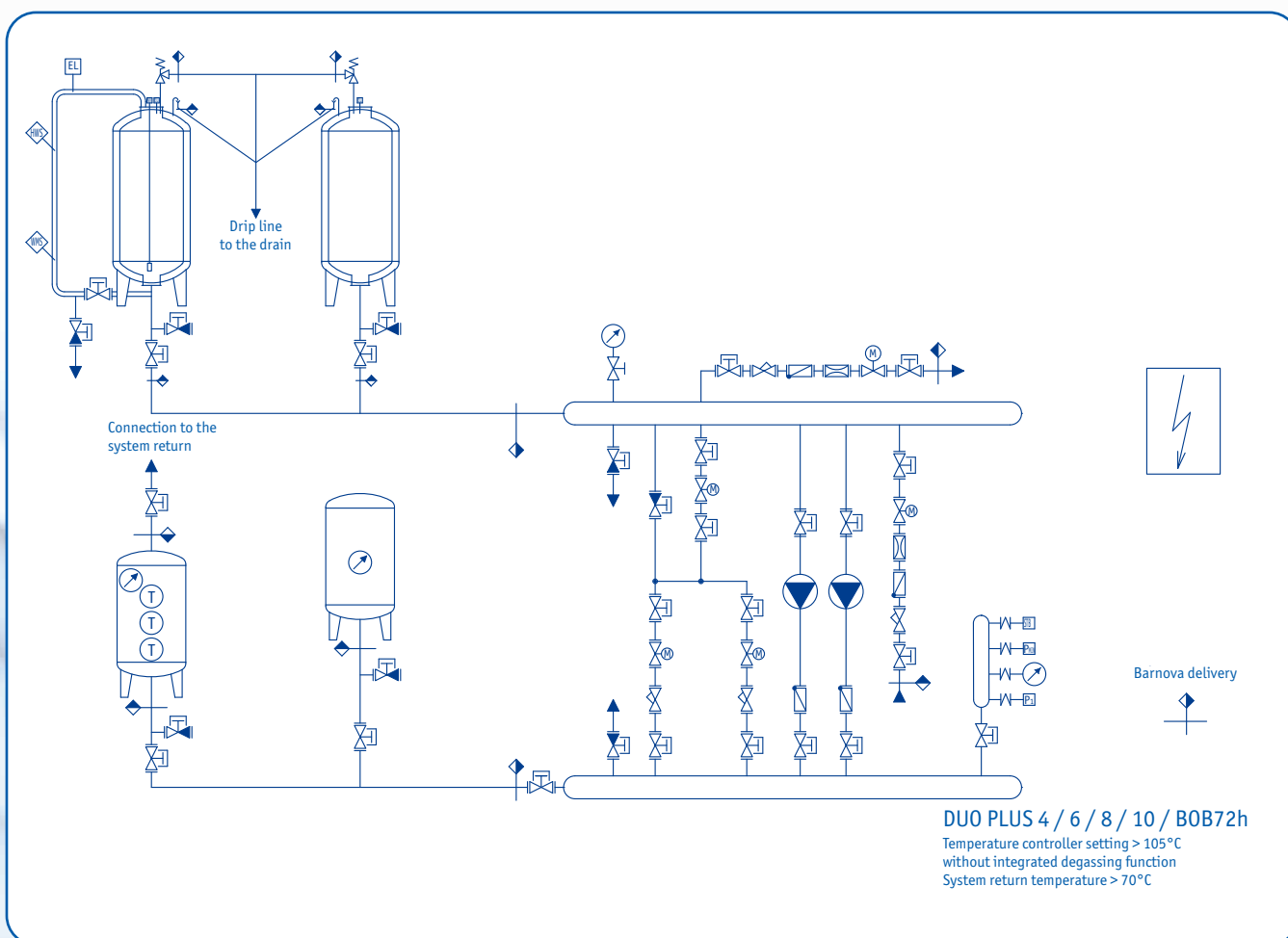
Built and tested with C € mark to Pressure Equipment Directive 2014/68/EU and EN 13831 or AD 2000. Electromagnetic compatibility in accordance with Regulation 2014/30/EU based on standards EN 61326-1:2013-07 and EN 61439-1:2012-06.

Requirement of Low Voltage Directive 2014/35/EU based on standard EN 61010-1:2011-07/BGV A2. Electrical equipment in accordance with VDE 0116-1:2023-02 and EN 50156-1.

Control unit

A safety temperature limiter and a minimum pressure switch are used as additional safety equipment.

A pipe to permit unattended operation, adjusted to the size of the tank contains the high water and water shortage probe.





Tip:

Almost anything is possible,
e.g. tanks up to 400 m³,
up to four pumps etc.

Custom version

TECHNOMAT DUO PLUS

Types 4.3 / 6.3 / 8.3 / 10.3 – unattended operation for 72 h

Applications

- Hot water systems
- Temperature controller > 105°C
- System return temperature > 70°C according to TRD 604 sheet 2, DIN EN 12952 and 12953 for unattended operation over 72 h
- Maximum operating pressure 40 bar and more
- From 35 MW

Construction

Built and tested with C € mark to Pressure Equipment Directive 2014/68/EU and EN 13831 or AD 2000.

Electromagnetic compatibility in accordance with Regulation 2014/30/EU based on standards EN 61326-1:2013-07 and EN 61439-1:2012-06.

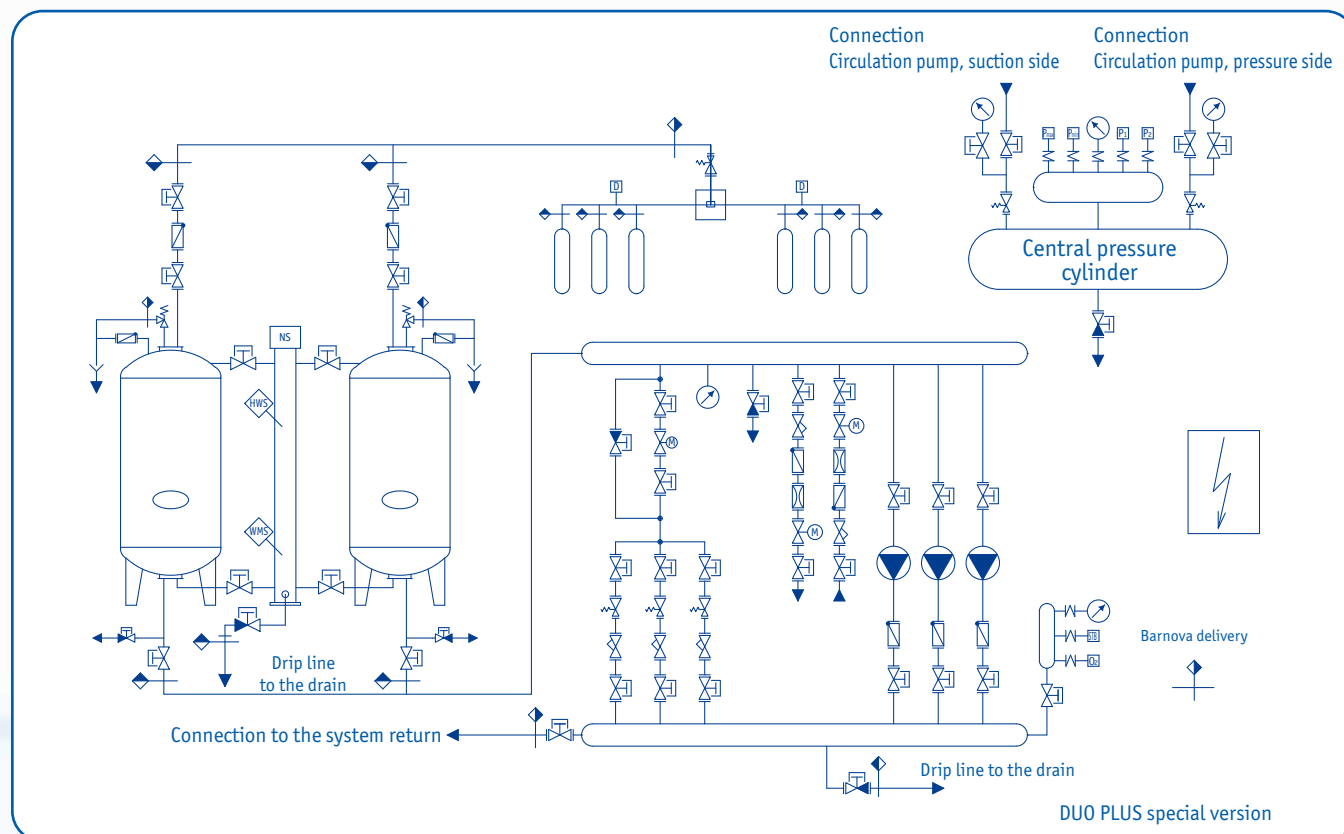
Requirement of Low Voltage Directive 2014/35/EU based on standard EN 61010-1:2011-07/BGV A2.

Electrical equipment in accordance with VDE 0116-1:2023-02 and EN 50156-1.

Examples:

If the volume of a tank is too large or if its operating temperature is too high, excluding the use of a membrane, once the level of water in the tank has reached its minimum, then the tank can be filled with nitrogen to a pressure of 0.2 bar, which must be ensured by an automatically switched pressure reduction station.

The pressure will be maintained at a “central” value if you would like to limit the pressure rise in the system or set it differently. Using measuring cylinders on the pressure and suction sides of the circulating pumps, a “central” pressure is produced which is made up of the static pressure in the system together with the dynamic pressure from the circulating pumps. It is set via a throttle valves in the connecting lines to the measuring cylinders.



Technical data

Electronic specifications and operating parameters

System	4.1	6.1	8.1	4.2 / 4.3	6.2 / 6.3	8.2 / 8.3	10.2 / 10.3
kW	2.2	4.4	4.4	2.2	4.4	4.4	6.0
A	16	28	28	6	12	12	14
max. operating pressure (bar)	16	16	16	16	16	16	16
max. holding pressure (bar)	4	6	8	4	6	8	10
max. operating temperature (°C)	70	70	70	70	70	70	70
max. ambient temperature (°C)	0 – 45	0 – 45	0 – 45	0 – 45	0 – 45	0 – 45	0 – 45
Protection level	IP 55	IP 55	IP 55	IP 55	IP 55	IP 55	IP 55
electrical connection	230 V / 50 Hz	230 V / 50 Hz	230 V / 50 Hz	400 V / 50 Hz	400 V / 50 Hz	400 V / 50 Hz	400 V / 50 Hz

Equipment in the switching cabinet

- 1x busbar system
- 2x pump controllers
- 2x overflow valves
- 1x emergency adjustable valve
- 1x emergency off button
- 1x main switch
- 1x controller for max. pressure limit
- 1x controller for min. pressure limit, type varies with the type of equipment
- 1x controller for water shortage
type varies with the type of equipment
- 1x controller for high water
type varies with the type of equipment
- 1x safety temperature limiter
type varies with the type of equipment
- 1x controller for top up
- 1x controller for excess drain off
- 1x level controller
- 1x evaluation unit for pressure signal
- 1x safety chain

Floating signals on terminals:

- Water shortage
- Min. pressure
- General fault
- Fault with the top up
- Fault on pump 1
- Fault on pump 2
- Other signals are possible

Selectable switching points

- Pump 1 on / off
- Pump 2 on / off
- Overflow valve 1 open / closed
- Overflow valve 2 open / closed
- High water on / off
- Water shortage on / off
- Top up on / off
- Excess drain off on / off
- Min. pressure on / off
- Max. pressure on / off
- Degassing on / off
- Temperature measurement on / off
- Oxygen measurement on / off

Indicator lights on the control panel

- Controller on
- Pump 1 on / off / fault
- Pump 2 on / off / fault
- Excess temperature in the expansion pipe
- Water shortage
- High water
- Min. pressure
- Lamp test
- Emergency adjustable valve

Plain text messages

in the control panel's display

- Pump 1 on / off / automatic / manual mode / fault
- Pump 2 on / off / automatic / manual mode / fault
- Pump run time exceeded
- Overflow valve 1 on / off
- Overflow valve 2 on / off
- Degassing on / off
- Water shortage
- High water
- Pressure dropped below minimum level
- Maximum pressure exceeded
- Top up time exceeded
- Electrical power failure
- Pressure sensor faulty
- Temperature sensor faulty
- Temperature limits exceeded
- Oxygen sensor faulty
- Oxygen limits exceeded
- Membrane break report
- Check dirt trap
- Maintenance interval
- General fault
- Electrical power failure
- Level dropped below minimum



Reference object in Umea



Reference object in Fenne

TECHNOMAT DS / DSB

Here you find the dimensions of the membrane collecting tanks as basic tank (DS) and add-on tank (DSB) for Barnova TECHNOMAT NOVA / DUO NOVA / DUO PLUS

Applications:

- Water heating systems compliant with DIN EN 12828
- Cooling water networks

Max. operating pressure:

- 2.0 bar

Max. membrane operating temperature:

- 70°C

Connection for NOVA/DUO NOVA:

- R 1" oder R 1 1/2"

CONNECTION FOR DUO PLUS:

- DN 80 or DN 100

Basic container:

- Tank equipment complete with control on the tank, depth about 400 mm, and safety valve and vent

Add-on container:

- Container equipment complete with safety valve and vent

Construction:

- TECHNOMAT with CE mark, built and tested in accordance with EU Pressure Equipment Directive 2014/68/EU and EN 13831 or AD 2000.

2.0 bar / 105°C / color: blue

Type/ Contents	Diameter (mm)	Height (mm)	Weight (kg)
150	550	1 400	65.0
200	550	1 530	75.0
300	650	1 550	95.0
400	650	1 860	105.0
500	750	1 880	110.0
600	750	2 108	120.0
800	850	2 180	135.0
1 000	1 000	2 111	170.0
1 250	1 000	2 354	185.0
1 600	1 250	2 100	275.0
2 000	1 250	2 400	295.0
2 500	1 250	2 800	320.0
3 000	1 600	2 300	495.0
3 500	1 600	2 550	545.0
4 000	1 600	2 800	595.0
5 000	1 600	3 300	670.0
6 000	1 600	3 800	720.0
7 000	1 600	4 300	810.0
8 000	1 600	4 800	840.0
9 000	1 600	5 300	890.0
10 000	1 600	5 800	930.0

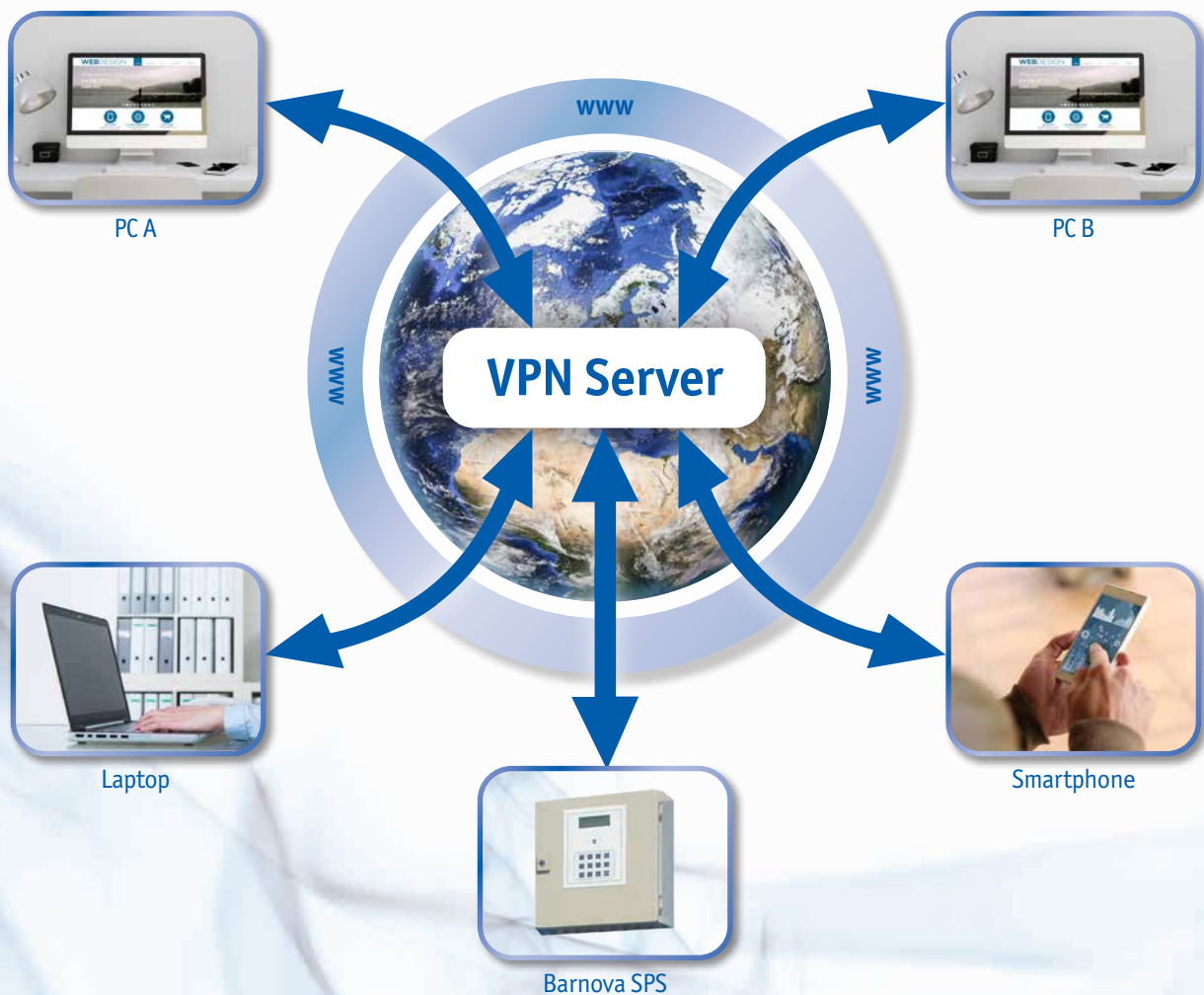
We reserve the right to make technical changes and special tanks are available on request.

VPN-M2M-NETWORKS

The Barnova VPN solution for remote monitoring, remote control, networking and alarms

With the VPN-M2M-NETWORK you are directly connected to the Barnova SPS. This makes it possible not only to view operating states, warnings and malfunctions, but also to intervene directly. Diagnoses, reconfiguration and resetting parameters can all be done from the convenience of your own home.

- ✓ Multi-client system, user groups scalable to any level
- ✓ Highest security standards through certificate-based VPN connections and firewall
- ✓ Low investment and operating costs
- ✓ Reduction of travel and personnel costs
- ✓ Troubleshooting and issue resolution 24/7
- ✓ Automatic notification of warnings and/or malfunctions



Barnova remote control, remote monitoring webshots

Überwiev

Druckhalteanlage barnova gmbh
Version: 5.40
Anlagennummer: 1622102
Herstellnummer: DS 169201286

barnova gmbh
Servicenummern #
Tel1: 02754/21251-0
Tel2: 0171/1961237

Datum: 01.08.16
Zeit: 13:37

Start/Stop der Dauerentgasung
Start-Zeit: 14:25
Restzeit: 01:00

Normalbetrieb:
Messwerte
Systemdruck: 2.7 bar
Niveau: 47 %
Pumpe P1: Automatik
Pumpe P2: Aus
Entgasung GAS: 1
Überströmer US1: OFF
Überströmer US2: OFF
Keine Störung
Laufzeit Pumpe 1: 20 h
Laufzeit Pumpe 2: 21 h
Restlaufzeit: 30 m
Wasserzähler: 31 L

Sensoren
Temperatur: 45 °C
Sauerstoff: 0.9 mg/l
pH-Wert: 8.7
Leitfähigkeit: 40 uS
Drucksensor 1: ./ bar
Drucksensor 2: ./ bar
Niveausensor 1: ./ %
Niveausensor 2: ./ %

Erweiterungsmodul (NICHT vorhanden)
Relaiszustände
R4: ./ R5: ./ R6: ./ R7: ./ R8: ./ R9: ./
Eingänge
IN5: ./ IN6: ./ IN7: ./ IN8: ./ IN9: ./ IN10: ./

Operator

statische Höhe: 20 m | Min.Druck: 2.1 bar | Max.Druck: 3.3 bar | maximal:

Grundlastpumpe:

Schaltpunkte:
Einschalt: 2.3 bar
Ausschalt: 2.5 bar

Verzögerung:
Einschalt: 3 Sek.
Ausschalt: 5 Sek.

Spitzenlastpumpe: (sofern 2 Pumpen vorhanden)

Schaltpunkte:
Einschalt: ./ bar
Ausschalt: ./ bar

Verzögerung:
Einschalt: ./ Sek.
Ausschalt: ./ Sek.

Entgasung:
Ansprech-Druck: 2.5 bar
Abströmzeit: 10 Sek.
Entgasungszeit: 5 min
Freigabe: 1 = uhrzeitabhängig
von 08:00 bis 16:00

Nachspeisung:
Normalbetrieb
Ein: 20 % Aus: 30 %
min. ./ % max. ./ %
Zeit: 60 min
Nachspeisung frei bei
Ueberströmer: 1 = ja

Klimabetrieb:
Ein: 000 %
Aus: ./ %
Zeit: ./ min

Abspeisung:
Einschalt: 000 %
Ausschalt: ./ %

Schaltdrücke der elektrischen Überströmer:
Einschalt U1: 3.0 bar Ausschalt U1: 2.8 bar
Einschalt U2: ./ bar Ausschalt U2: ./ bar

Communication modules

Modbus RTU/TCP; Profibus/Profinet; Bacnet

Professionally controlling the water quality in hot water heating systems in accordance with EN 12828, VDI guideline 2035, EN 1717 and EN 1988-100

In most cases, untreated/drinking water is inappropriate for refilling your heating system!

Its properties limit the extent to which untreated raw/drinking water can be used to fill/top up your heating system. The quality of the water you use to top up your heating system has a decisive influence on stone formation, calcification and corrosion. Hard and/or corrosive water will shorten the service life of heat generators, heat exchangers and the entire heating system, resulting in heat loss, malfunctions and reduced efficiency.

The substances dissolved in raw/drinking water are divided into cations and anions.

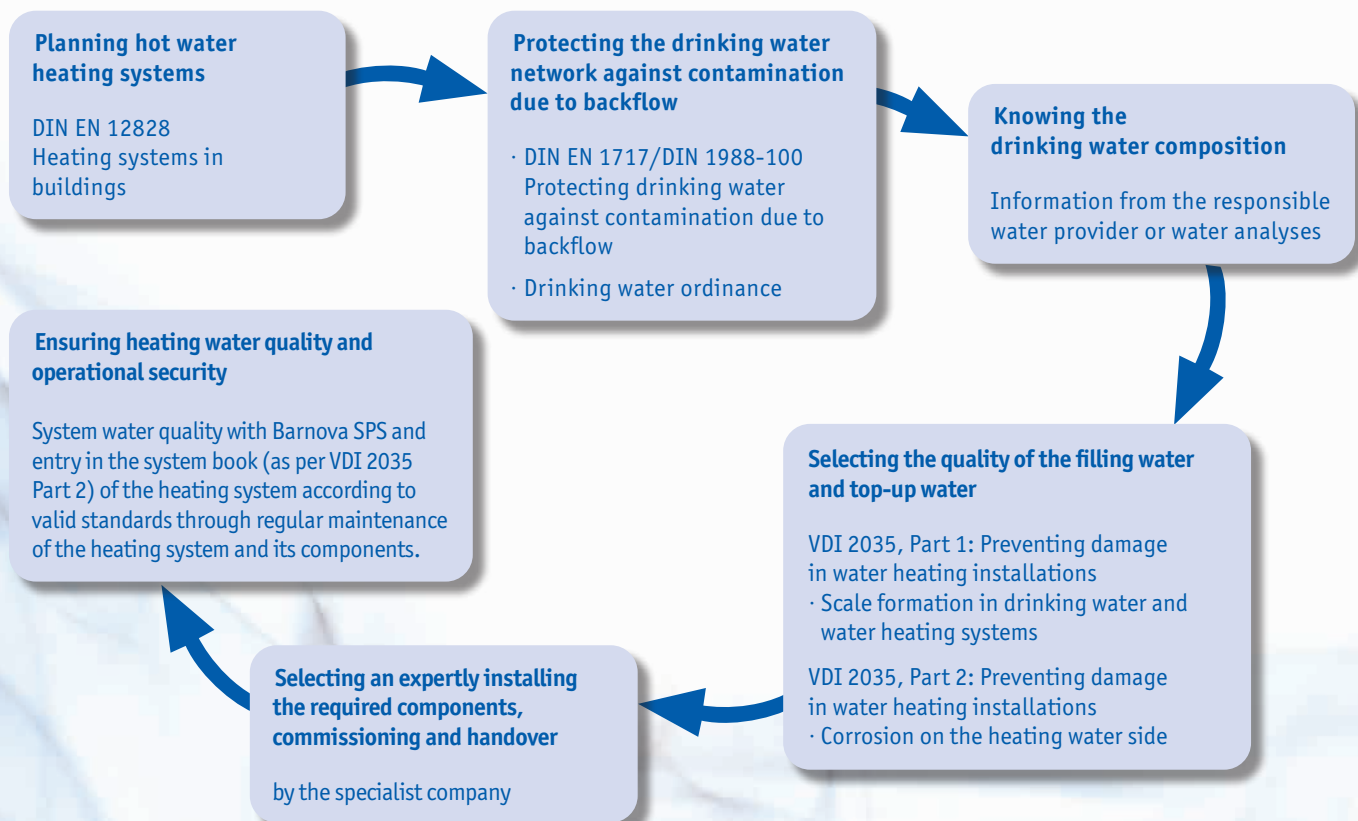
Cations are positively charged ions and are referred to as hardness components or carbonate hardness. Magnesium and calcium cations are mainly responsible for stone formation and calcification.

Anions are negatively charged ions and are known as neutral salts or non-carbonate hardness. Chloride, sulphate and nitrate anions are mainly responsible for corrosion.

Sheet 1 describes the prevention of stone formation and calcification. Sheet 2 describes the prevention of corrosion.

Standard-compliant steps – from planning to operation

Drinking water is not the same as heating water



Guideline Values

Improving water quality, avoiding breakdowns

The water quality in heating systems has a significant impact on operational security and efficiency. Poor water quality leads to breakdowns and system damage through deposits and corrosion. Our experience from numerous cases has shown that water quality is not a focus and therefore does not fulfil the respective requirements. Associated with this in many cases are difficulties having warranty claims granted by boiler manufacturers.

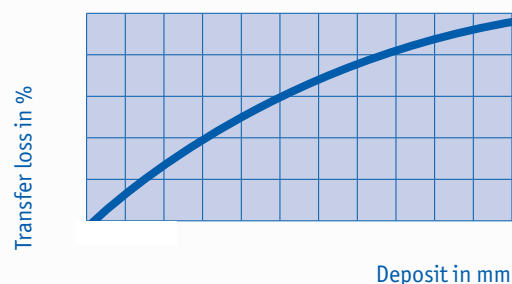
The rules define limits for the pH value, hardness, conductivity and oxygen content. **These parameters** have a significant impact on whether deposits, breakdowns and corrosion occur in a system. These values differ depending on whether the system is operated with high or low salt content. The pH value range to be maintained, by contrast, depends heavily on the boiler material. For example, the use of aluminium materials require maintaining a very tight pH value range (8.2 to 8.5). Therefore, in many cases, the low salt option is preferable, but due to the wide range of factors that could have an impact, we recommend a **technical consultation with our heating water experts for your individual application.**

Water quality requirements are defined in:

- VDI 2035
- AGFW worksheet ("Arbeitsblatt") FW 510
- the requirements of the boiler manufacturers



Just 3 mm of deposits lead to heat loss of 20%



Overview of guideline values

Requirements for the operational mode of the heating network	Low salt content		High salt content
Conductivity at 25 °C (µS/cm)	10 - 30	30 - 100	100 - 1500
Appearance	clear, free of suspended substances		
pH value at 25 °C	9.0 - 10.0*	9.0 - 10.5*	9.0 - 10.5*
Oxygen (mg/l)	< 0.1	< 0.05	< 0.02
Hardness (mmol/l)	< 0.02**	< 0.02**	< 0.02**

* does not apply to the use of aluminium materials (pH 8.2–8.5);

** Amounts to 0.11 dH° > Source: AGFW worksheet FW 510. VDI 2035

PLC control programme

Standard display

Power On

- Display

```
Constant pressure unit
-----
barnova gmbh
Version X.XX
```

Standard operation

Use the ▲ and ▼ buttons to move up and down the programme menu items.

- Display of function and operating parameters

```
System pressure: bar
Level:           %
P1 P2           NS GAS
ÜS1             ÜS2
```

- Display of the temperature and oxygen content

```
Temperature:    °C
Oxygen:         mg/l
```

- Display of additional pressure sensor

```
Pressure s. 1:   bar
Pressure s. 2:   bar
Active:
Switchover       with 1/2
```

- Display of pH value and conductivity

```
pH value:       °dH
Conductivity:    µS
```

- Display of additional level sensor

```
Level s.1:      %
Level s.2:      %
Active:
Switchover      with 1/2
```

- Display of the pump running times

```
Pump 1:         h
Pump 2:         h
Remaining running time: m
Water meter:    1
```

- Display of unit and maker's Nos.

```
U-number:**0000000**
M-number:**0000000**
```

- Display of the service phone numbers

```
barnova gmbh
# Service numbers #
Tel 1: XXXXX
Tel 2: XXXXX
```

- Display of the actual date and time

```
Date
Time
Change with 'No'
```

- Start/Stop of constant deaeration

```
Constant outflow
Start??
Time:         h
YES           NO
```

- Remaining time of the constant outflow

```
Constant outflow
in operation
Time remaining:    h
JA=Continue        NO=Stop
```

Altering the Parameter menu – 1: Operator

```
Programming mode *1*
1: Operator
2: Service
3: Malfunction memory
4: Data logger
```

- Language setting

```
Language:      **_**
0:German
1:English
2:Norwegian
3:Slovenian
```

- Setting the static height as well as the minimum and maximum pressure

```
Static height      m
Min.Pressure:      b
Max.Pressure:      b
maximum:           m
```

- Setting the time delay for the fault notification – Minimum pressure not reached

```
Delays
Min.Pressure:      min
Range: 0..30
0 = no delay
```

- Setting the switch-on and switch-off pressures of the basic load pump

Switch points
Base load pump
Cut-in pressure bar
Cut-out pressure bar



- Switch-on and switch-off pressures of the peak load pump

Switch points
Peak load pump
Cut-in pressure bar
Cut-out pressure bar



- Setting the delay times for the basic load pump

Delay basic load p.
Switch on sec.
Switch off sec.
Range: 0..20 sec.



- Setting the delay times for the peak load pump

Delay peak load p.
Switch on sec.
Switch off sec.
Range: 0..20 sec.



- Setting the response pressure for deaeration

Deaeration:
Response press: bar
00.0: without deaeration



- Setting the outflow and deaeration times

Deaeration:
Outflow time: s
Deaeration time m



- Release for degassing

Deaeration time

Release 0/1



- Setting the make-up feed as a % of the tank filling level

Make-up f.. On %
Make-up f.. Off %
Minimum %
Maximum %



- Setting the maximum make-up feed time

Make-up f.. On %
Make-up f.. Off %
Make-up f.. Time min
Maximum 240 min



- Blocking the make-up feed given non-closed relief valves

Make-up feed unobstructed
with relief valve
** **
0 = No 1 = Yes



- Settings of the make-up feed for air-conditioning operations as a % of the tank filling level and maximum make-up feed time

Air-cond. op.
Make-up f.. On %
Make-up f.. Off %
Make-up f.. Time min



- Settings for discharge as a % of the tank filling level

Discharging
Switch on: %
Switch off: %
0 = No discharging



- Setting the switching pressures for the electrical relief valves

Switch on U1 bar
Switch off U1 bar
Switch on U2 bar
Switch off U2 bar



Please wait..
BNHD V00XXX

You get back to the start image.



Tip:
Ask for other
PLC control products

Programming mode
2: service menu,
3: fault memory, and
4: data logger
can only be viewed and
edited after entering the
password

Selecting

Specifying your choice and order

Your selection of the best Technomat pressure holding stations from the Duo Plus series should be made depending upon the minimum operating pressure p_0 and on the system's nominal thermal capacity as well as the nominal volume V_n of the membrane expansion tank.

The minimum operating pressure determines the required pump pressure and the thermal capacity of the corresponding amount of water to be pumped.

The nominal volume of the membrane expansion tank is determined by the amount of water in the system as well as by the corresponding operating temperatures.

Thermal power	kW
Temperature of the safety limiter	°C
Supply temperature	°C
Return temperature	°C
Static height	m
Safety valve trigger pressure	bar

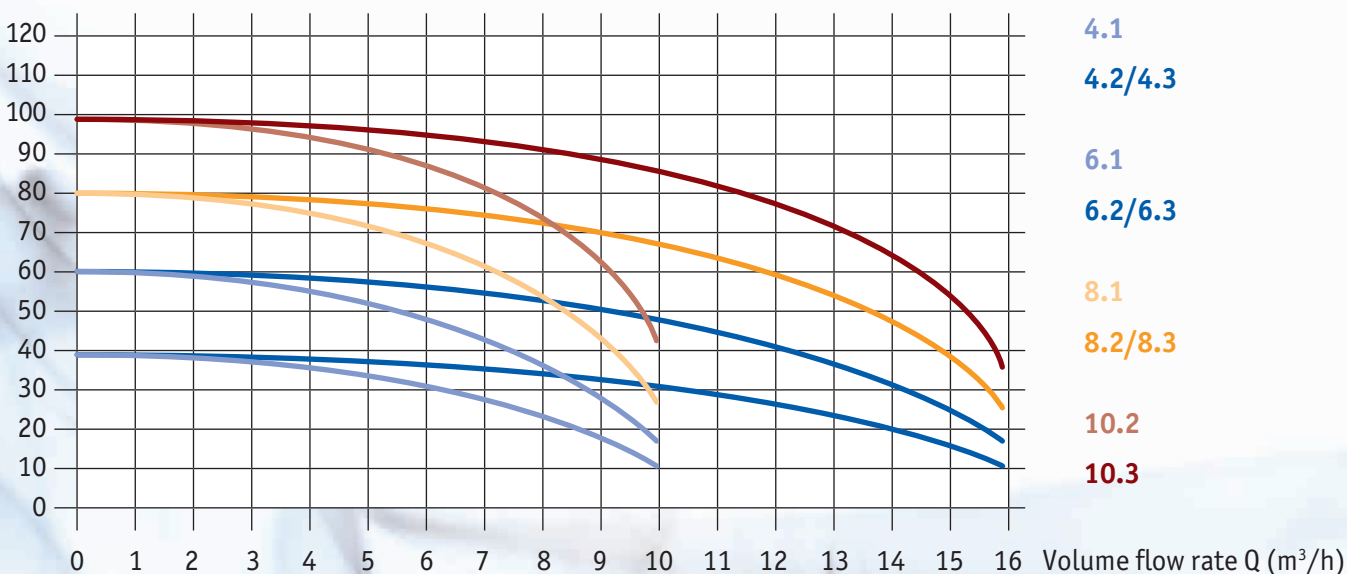
Calculation of the pump's capacity (volume flow rate Q)

Heating systems: Power (kW) x 0.85 $\frac{I}{\text{hkW}} = \frac{I}{h}$

Cooling systems: Power (kW) x 0.35 $\frac{I}{\text{hkW}} = \frac{I}{h}$

Pump characteristic curves

max. pump operating head (m)



Calculation of the required membrane expansion tank

$$V_e = n \frac{V_a}{100}$$

$$V_v = 0.5 \frac{V_a}{100}$$

$$V_n = \frac{(V_e + V_v)}{0.9}$$

Calculation of the temperature reduction tank

$$V_e = 0.5 \times V_a \times \frac{{}^n\text{Return temperature} - {}^n70^\circ\text{C}}{100}$$

V_a = the volume of water in the system

V_e = Expansion volume

V_v = precharged water

V_n = nominal volume

Expansion coefficient

Expansion factors n in % and the evaporation pressure pD in bar of excess pressure														
°C	n	pD	°C	n	pD	°C	n	pD	°C	n	pD	°C	n	pD
20	0.14	-	60	1.68	-	105	4.74	0.21	140	8.01	3.6	190	14.15	12.55
30	0.40	-	70	2.25	-	110	5.16	0.50	150	9.08	4.76	200	15.65	15.55
40	0.75	-	80	2.89	-	115	5.59	0.70	160	10.22	6.18	210	17.26	19.01
50	1.18	-	90	3.58	-	120	6.03	1.00	170	11.45	7.92	220	19.00	23.20
55	1.42	-	100	4.34	-	130	6.97	1.70	180	12.75	10.03	230	20.87	28.00

Example calculation

kW	=	21,000
Safety temperature limiter	=	165°C
Supply	=	150°C
Return	=	105°C
Static height	=	6.5 bar
Safety valve	=	10.0 bar
V_a	=	42 m ³

Tank

$$V_e = 9.08 \frac{42,000}{100} = 3813.6 \text{ litres}$$

$$V_v = 0.5 \frac{42,000}{100} = 210 \text{ litres}$$

$$V_n = \frac{(3813.6 + 210)}{0.9} = 4,470 \text{ litres}$$

Selected: TECHNOMAT DUO PLUS 8.3 - 5000

Temperature reduction tank

$$V_n = 0.5 \times 42,000 \times \frac{4.74 - 2.25}{100} = 507.8 \text{ litres}$$

Selected: TECHNOFLEX TS 600 / 10.0 bar



INNOVATIVE PRESSURE COMPETENCE

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