B 280
10.09.02 LB

CONTROLLER FOR DISTRICT HEATING SUBSTATIONS

C ←BUS C ←RING

DTT 618 C2 Eng.

- **Temperature control of secondary circuit with modulating control (3-wire) of primary circuit valve:**
  – At fixed point
  – Compensated with correction of heating curve origin
  – Variable in relation to desired temp. of consumer plants (with controllers in C-Ring)
- **Communication systems:**
  – **C-Bus** for Telemanagement
  – **C-Ring** for sharing common data between local controllers.
- **Power supply 230 V~ , DIN rail mounting**

CE

1. APPLICATION

DTT 618 controller is designed for temperature control in the secondary circuit of heat exchangers in district heating substations.

2. FUNCTIONS

The principal functions of DTT 618 are:
- Temperature control of secondary circuit:
  – At fixed point
  – Compensated with correction of heating curve origin
  – Variable in relation to temp. requested by controllers of the consumer circuits (C-Ring).
- Modulating (3-wire) control of regulating valve of primary exchanger circuit with
  – Forced closure for:
    - Minimum limit opening;
    - Minimum limit Flow or Energy Primary circuit (from calorie meter).
  – Limitations valve opening for :
    - Maximum limit opening;
    - Maximum limit Flow or Energy primary circuit (from calorie meter);
    - Maximum limit temperature difference between primary and secondary return;
    - Maximum limit of primary circuit return temperature.
- Minimum and maximum limits of flow temperature.
- On-Off control of secondary pump in relation to thermal demand.
- Input for metering flow or energy for limits or On-Off alarm.
- Input water loss detector or On-Off alarm.
- Input water loss detector or On-Off alarm.
- Alarms for operational status plant and alarms for short and open circuits detectors.
- C-Ring connection for exchange of data with other local controllers.
- C- Bus connection for exchange data with local PCs or remote Telemanagement PC.
- Simulation of operation for testing electrical connections at start up.
- Data recorder with automatic download to Telemanagement PC.

3. DETECTORS

No.	Description		Type	Sensing element	Code	Data sheet
1	Secondary flow water temp. detector	(0…99 °C)	**SIH 010**	NTC 10 kΩ	B1	–
1	Outside temperature detector	(–30…40 °C)	**SAE 001**	NTC 1 kΩ	B2	–
1	Primary flow temp. immersion detector	(0…200 °C)	**STH 001**	Pt 1 kΩ	B3	–
	or	(0…99 °C)	**SIH 010**	NTC 10 kΩ	B5	–
1	Primary return temp. immersion detector	(0…200 °C)	**STH 001**	Pt 1 kΩ	B4	–
	or	(0…99 °C)	**SIH 010**	NTC 10 kΩ	B6	–
1	Secondary return water temp. detector	(0…99 °C)	**SIH 010**	NTC 10 kΩ	B7	–

4. TECHNICAL DATA

• Electrical

Power supply	230 V~ ± 10%
Frequency	50 … 60 Hz
Consumption	5 VA
Protection	IP40
Radio disturbances	VDE0875/0871
Vibration test	with 2g (DIN 40 046)
Voltage-free output contacts:	
Maximum switching voltage	250 V~
Maximum switching current	5 (1) A
Construction standards	Italian Electrotech. Committee CEI
Storage data in memory	5 years
Software	Class A

• Mechanical

Case	DIN 6E module
Mounting	on DIN 35 rail
Materials:	
Base	NYLON
Cover	ABS
Room temperature:	
Operation	0 … 45°C
Storage	– 25 … + 60°C
Room humidity	Class F DIN 40040
Dimensions	105 x 115 x 71.5 mm
Weight	0.6 kg

• Measurement ranges

Primary flow temperature	0…200 °C
Primary return temperature	0…200 °C
Secondary flow temperature	0…99 °C
Secondary return temperature	0…99 °C
Outside temperature	– 30…+ 40 °C

• Setting ranges

Output 3-wire modulating control:	
Time valve run	30…**75**…3,600 s
Proportional Band	±1…±**10**…±50 °C
Integral Time	0…**10**…255 min
Increase flow temp. over plants temp.	0…**5**…40 °C
Design outside temperature	– 30…**– 5**…20 °C
Design flow temperature	0…**80**…99 °C
Correction origin winter curve	**20**…40 °C
Minimum limit flow temperature	**1**…99 °C
Maximum limit flow temperature	1…**99** °C
Desired temperatures: :	
Fixed point	0…**80**…99 °C
Tele On	0…**80**…99 °C
Correction compensated temperature	**0**…±40 °C

• Setting ranges for Primary limits

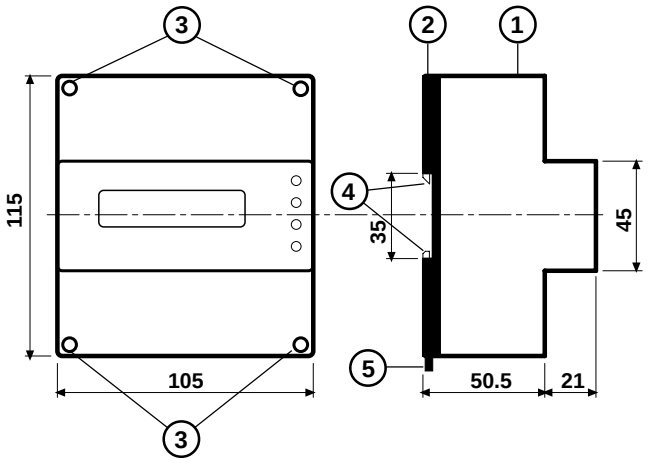
Flow rate per pulse	**10**…1000 l/p
Energy per pulse	**0.010**…1 KW/p
Minimum limit flow	**0.01**…650 m³h
Minimum limit power	**0.001**…65 KW
Maximum limit flow	0.01…**650** m³h
Maximum limit power	0.001…**6,500** KW
Maximum temp. primary return	0…**99**…200 °C
TO to eliminate max. primary return	**–30**…40 °C
Max. difference temp. returns	0…**99** °C
Valve run:	
Minimum	**0**…100 %
Maximum	0…**100** %
Reduction secondary Tº for closure limits	1…**5**…15 °C

• Setting ranges for Telemanagement & alarms

Telemanagement (settings by PC):	
Attempts to make alarm calls	1…**5**…255
Interval between alarm calls	2…**10**…255 min.
Alarm thresholds (settings by PC):	
Diff. secondary temperature (B1)	0…**5**…99 °C
Diff. max.temp. primary return (B4 or B6)	0…**5**…99 °C
Diff. temp. returns (B4-B7 or B6-B7)	0…**5**…99 °C
Delay alarms (settings by PC):	
Secondary temp.	2…**30**…255 min.
Difference temp. returns (B7 - B4/6)	2…**30**…255 min.
Max. temp. primary return (B4/6)	2…**30**…255 min.
Closure valve for limits	2…**30**…255 min.
Interval between data recordings	5…**60**…240 min.

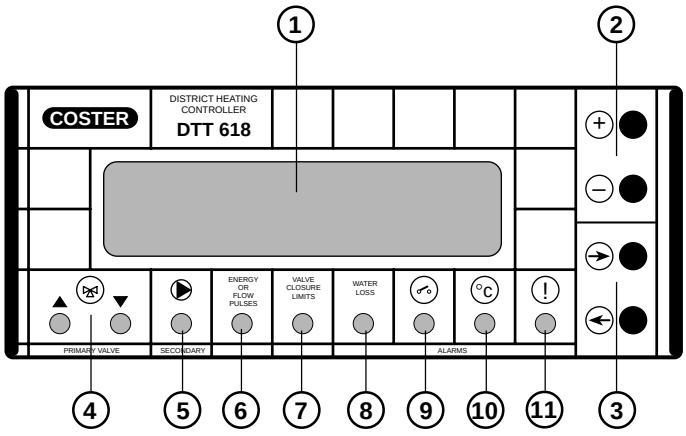
In the presence of electrical disturbances the output controls of the controller may change status but this will be automatically restored.

5. OVERALL DIMENSIONS



1 – Protective cover for electronic components
2 – Base with transformer, relay and terminal blocks
3 – Screws for securing base and cover
4 – DIN rail securing elements
5 – DIN rail release lever

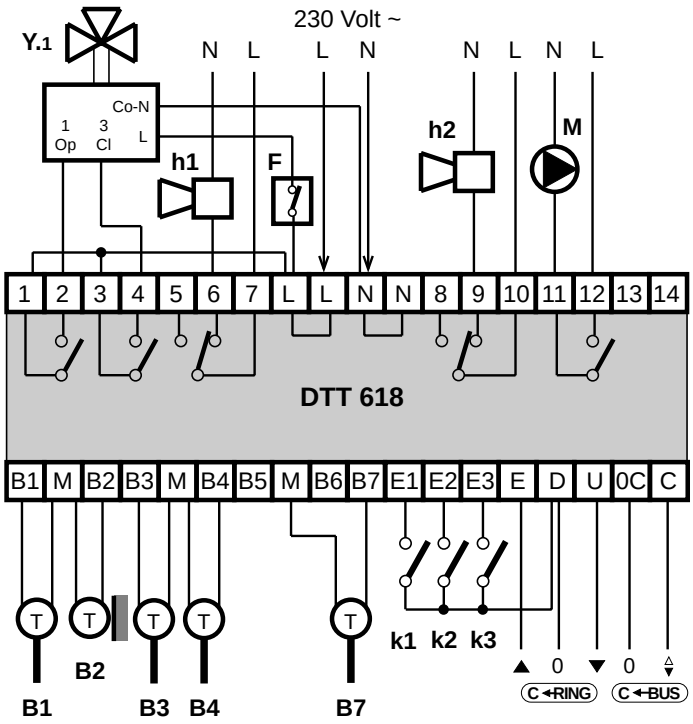
6. FRONT PANEL



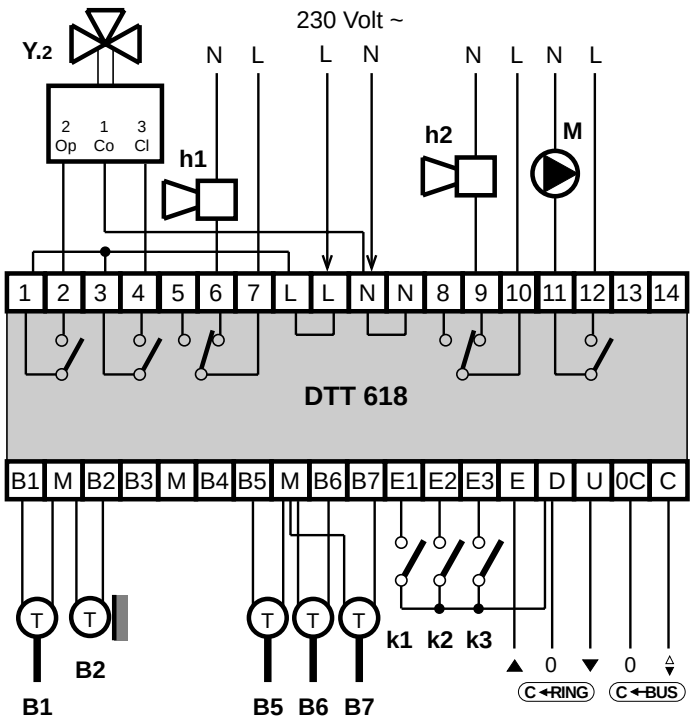
1 – Backlighted alphanumeric display
2 – + and – keys
3 – ← and → keys
LEDS :
4 – Opening - closing heating valve
5 – Secondary circuit pump
6 – Arrival pulses from energy or flow meter
7 – Intervention valve closure limits
8 – Water loss alarm
9 – On-Off alarm
10 – Measurement alarms
11 – Fault

7. WIRING DIAGRAMS

7.1 Plant with primary temp. above 100 °C



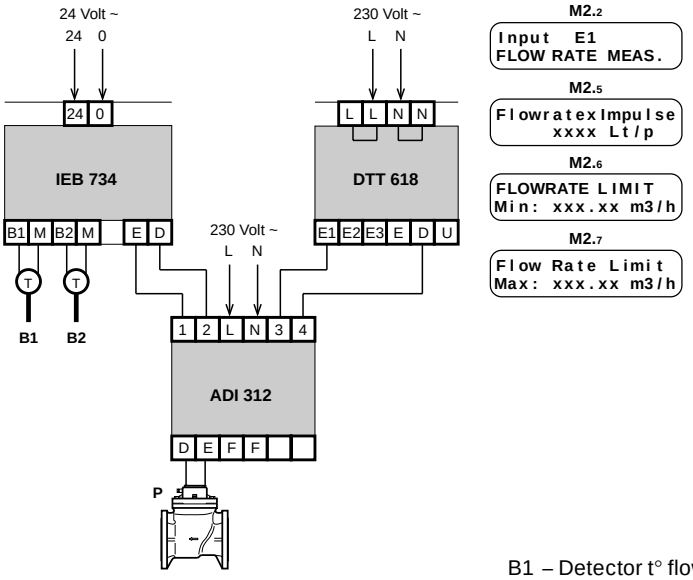
7.2 Plant with primary temp. below 100 °C



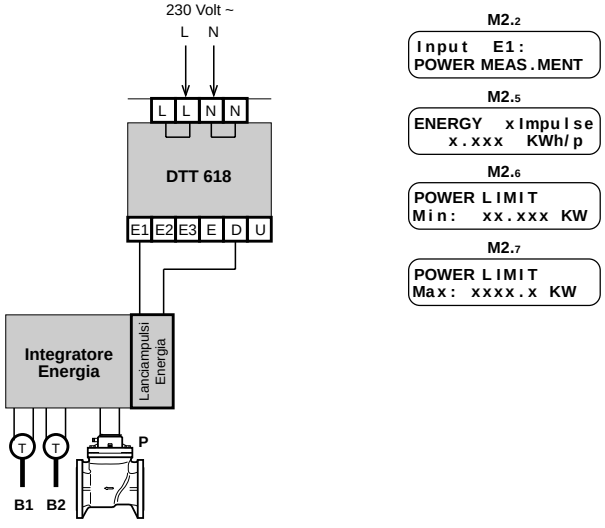
B1 – Secondary flow t° detector NTC 10kΩ (0...99°C)
B2 – Outside t° detector NTC 1 kΩ (–30…40 °C)
B3 – Primary flow t° detector Pt 1 kΩ (0…200 °C)
B4 – Primary return t° detector Pt 1 kΩ (0…200 °C)
B5 – Primary flow t° detector NTC 10 kΩ (0…99 °C)
B6 – Primary return t° detector NTC 10 kΩ (0…99 °C)
B7 – Secondary return t° detector NTC 10 kΩ (0…99 °C)
M – Secondary pump
Y.1 – Primary valve with emergency closure
Y.2 – Primary valve without emergency closure

F – Secondary safety thermostat
h 1 – Intervention limits valve closure LED
h 2 – Water loss LED
k 1 – On-Off switch alarm or energy or flow meter
k 2 – On-Off switch alarm or water loss
k 3 – On-Off switch alarm or TeleOn control
C-Bus – Transmission data Telemanagement
C-Ring – Transmission data between controllers

7.3 Connection with pulse transmitter volumetric meter for primary flow limits



7.4 Connection with pulse transmitter energy integrator for limiting primary power



B1 – Detector t° flow metering
B2 – Detector t° return metering
P – Pulse transmitter volumetric meter

8. ELECTRICAL CONNECTIONS

Proceed as follows:

- Separate the base from the cover
- Mount the base on the DIN rail and check that it is firmly anchored by the securing elements (5.4) l
- Carry out the wiring as in the diagram in compliance with the regulations in force and using:
  - 1.5 mm^2 cables for power supply and relay control outputs.
  - 1 mm^2 for the detectors.
  - 1 mm^2 for C-Bus and for C-Ring. For length limits see data sheets T 021 and T 022.
- Apply power (230 V~) and check its presence across terminals L and N.
- Remove power, replace cover on base/terminal block and secure it with the four screws supplied (5.3).

You are advised not to insert more than two cables in a single terminal of the controller and, if necessary, to use an external junction box.

9. SITING OF CONTROLLER & DETECTORS

9.1 Controller

The controller must be installed in a dry location that meets the ambiental limits given under TECHNICAL DATA. If installed in spaces classified as “Dangerous” it must be mounted in a cabinet for electrical appliances constructed according to the regulations in force for the type of danger concerned. The controller can be mounted on a DIN rail and housed in a DIN standard enclosure.

9.2 Outside temperature detector B2

This must be installed outside the building on the north or north-west side at least three meters from the ground, protected from direct sunlight and as far as possible from windows, doors, fireplaces or other possible sources of thermal disturbances.

9.3 Primary flow temperature detector B3 or B5

This must be installed on the flow pipe of the primary circuit of the heat exchanger.

9.4 Primary return temperature detector B4 or B6

This must be installed on the return pipe of the primary circuit of the heat exchanger.

9.5 Secondary flow temperature detector B1

This must be installed on the flow pipe of the secondary circuit of the heat exchanger.

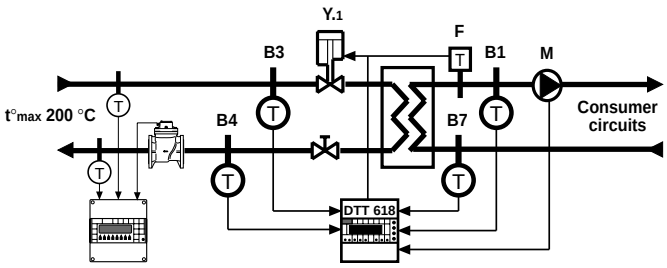
9.6 Secondary return temperature detector B7

This must be installed on the return pipe of the secondary circuit of the heat exchanger.

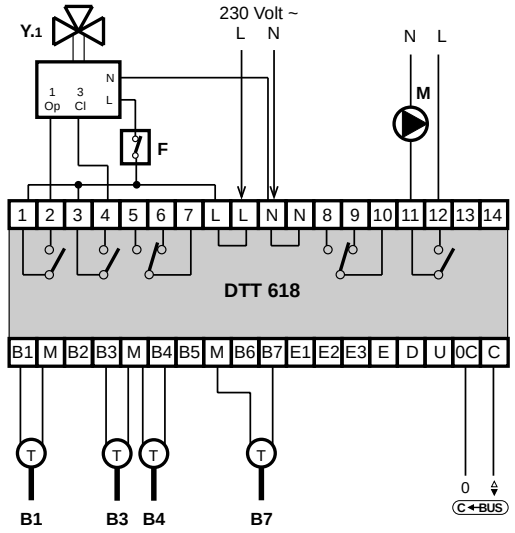
10. EXAMPLES OF PLANTS

10.1 Control of temperature at fixed point

Primary at high temperature

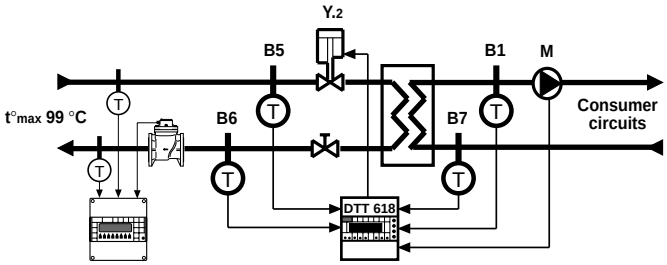


B1 – Secondary flow t° detector NTC 10 kΩ (0…99 °C)
B3 – Primary flow t° detector Pt 1 kΩ (0…200 °C)
B4 – Primary return t° detector Pt 1 kΩ (0…200 °C)
B7 – Secondary return t° detector NTC 10 kΩ (0…99 °C)
M – Secondary pump
Y.1 – Primary valve with emergency closure
F – Secondary safety thermostat

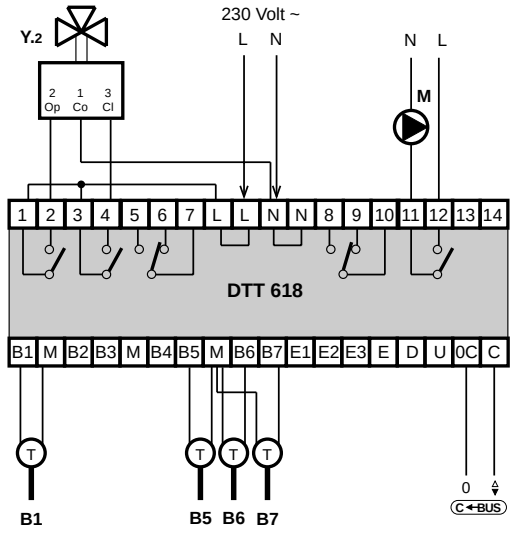


M2.1	M1.1	M0.10
Config.Detectors 1 – 3 4 – – 7	Type of Control FIXED POINT	Desired Temper. Fixed Point :xxc

Primary at low temperature



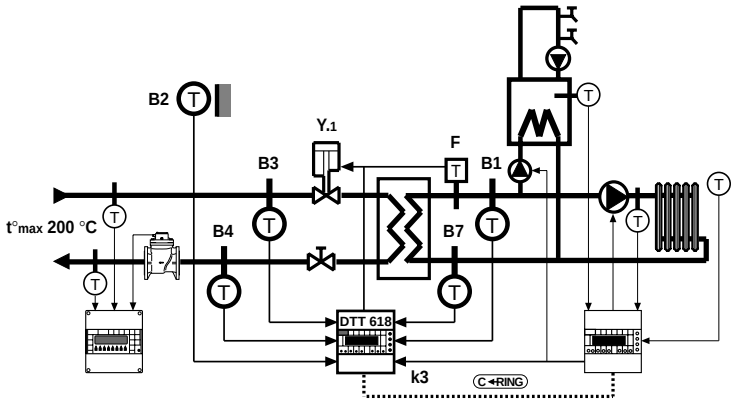
B1 – Secondary flow t° detector NTC 10 kΩ (0…99 °C)
B5 – Primary flow t° detector NTC 10 kΩ (0…99 °C)
B6 – Primary return t° detector NTC 10 kΩ (0…99 °C)
B7 – Secondary return t° detector NTC 10 kΩ (0…99 °C)
M – Secondary pump
Y.2 – Primary valve without emergency closure

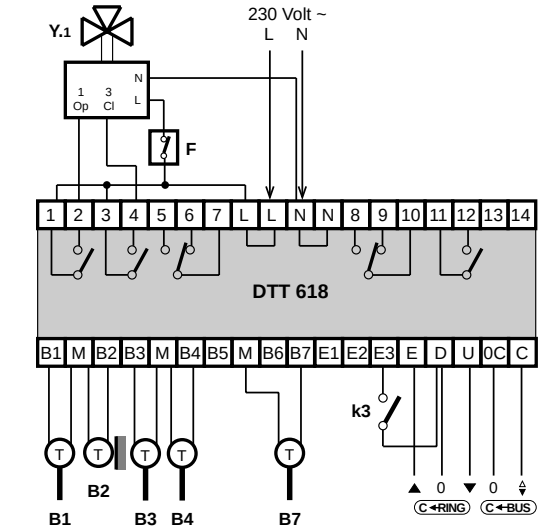


M2.1	M1.1	M0.10
Config.Detectors 1 – – – 5 6 7	Type of Control FIXED POINT	Desired Temper. Fixed Point :xxc

10.2 Control of variable temperature at request of compensated heating plant and at fixed point at request of plant producing DHW

Primary at high temperature



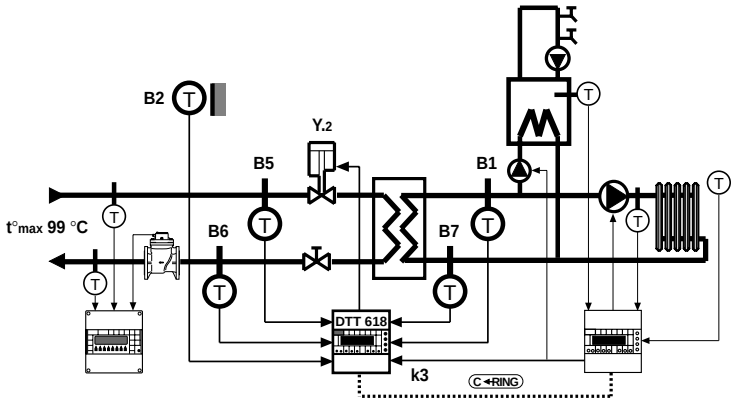


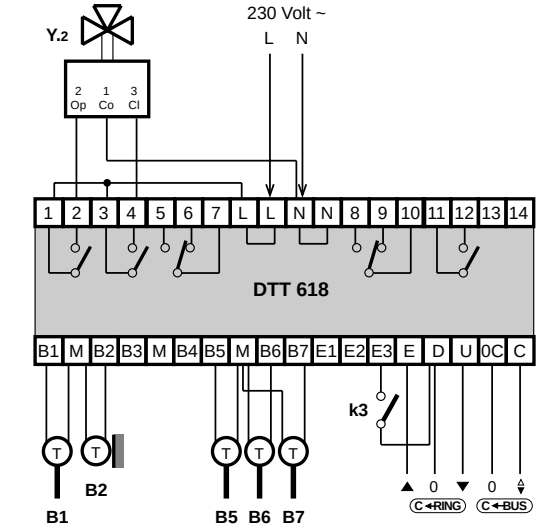
B1 – Secondary flow t° detector NTC 10 kΩ (0…99 °C)
B2 – Outside t° detector (for sending measurement in C-Ring)
B3 – Primary flow t° detector Pt 1 kΩ (0…200 °C)
B4 – Primary return t° detector Pt 1 kΩ (0…200 °C)
B7 – Secondary return t° detector NTC 10 kΩ (0…99 °C)
Y.1 – Primary valve with emergency closure
F – Secondary safety thermostat
k3 – Calorifier pump relay switch
Calorifier pump On = - TeleOn function enabled
- Heating pump Off

M2.1	M1.1	M1.2
Config.Detectors 1 2 3 4 – – 7	Type of Control PLANTS	Increase Flow on Plants T.: 0c

M2.4	M0.11
Input E3: REMOTE ON	Desired Temper. Remote On :xxc

Primary at low temperature





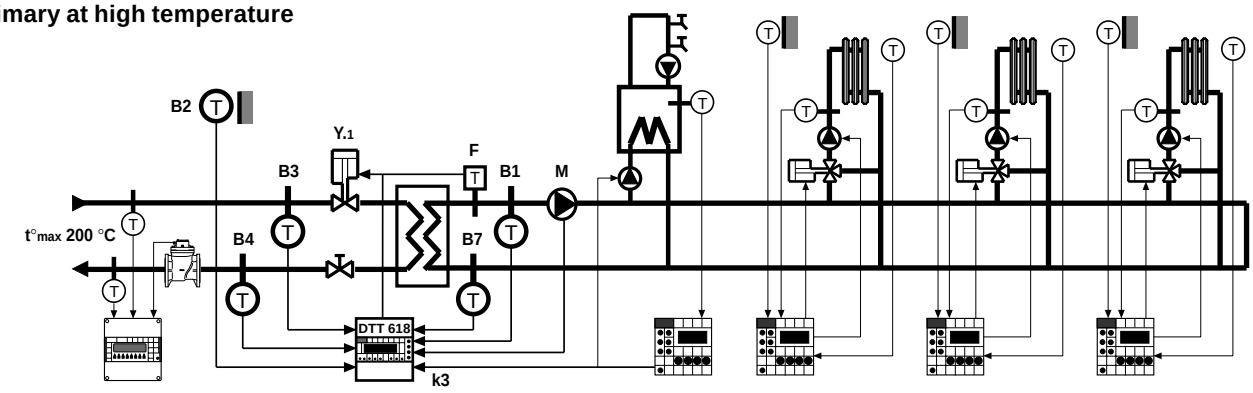
B1 – Secondary flow t° detector NTC 10 kΩ (0…99 °C)
B2 – Outside t° detector (for sending measurement in C-Ring)
B5 – Primary flow t° detector NTC 10 kΩ (0…99 °C)
B6 – Primary return t° detector NTC 10 kΩ (0…99 °C)
B7 – Secondary return t° detector NTC 10 kΩ (0…99 °C)
Y.2 – Primary valve without emergency closure
k3 – Calorifier pump relay switch
Calorifier pump On = - TeleOn function enabled
- Heating pump Off

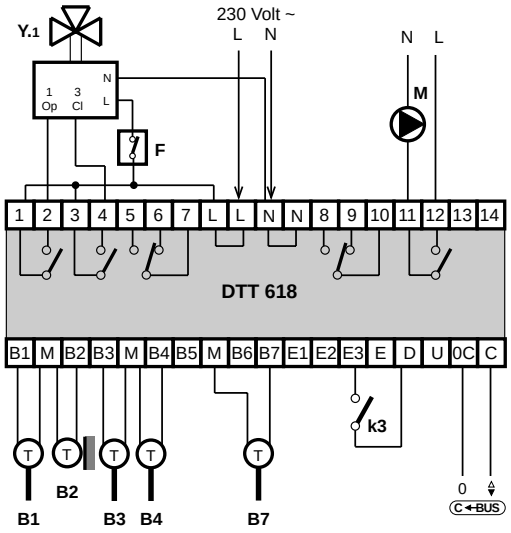
M2.1	M1.1	M1.2
Config.Detectors 1 2 – – 5 6 7	Type of Control PLANTS	Increase Flow on Plants T.: 0c

M2.4	M0.11
Input E3: REMOTE ON	Desired Temper. Remote On :xxc

10.3 Control of variable temperature at request of consumer plants

Primary at high temperature

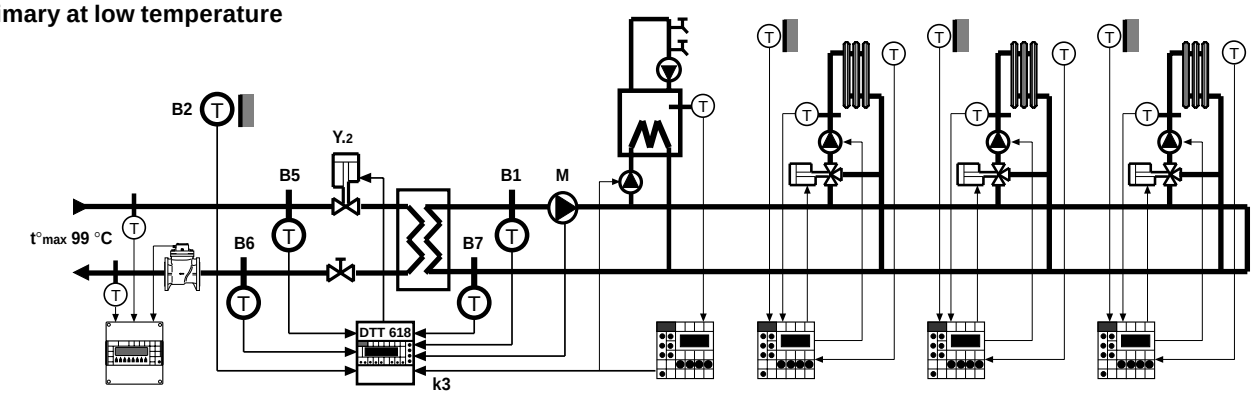


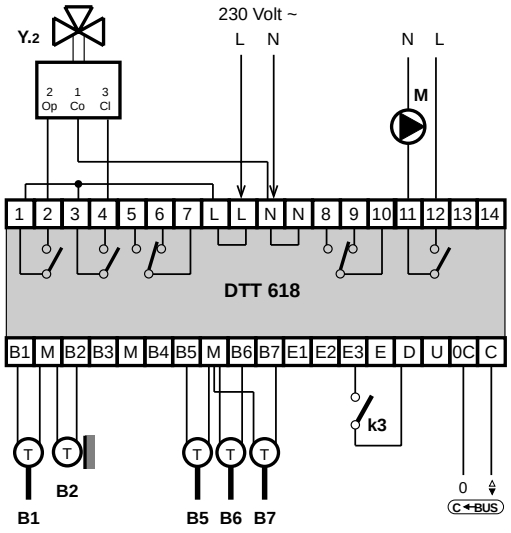


B1 – Secondary flow t° detector NTC 10 kΩ (0…99 °C)
B2 – Outside t° detector (for sending measurement in C-Ring)
B3 – Primary flow detector Pt 1 kΩ (0…200 °C)
B4 – Primary return t° detector Pt 1 kΩ (0…200 °C)
B7 – Secondary return t° detector NTC 10 kΩ (0…99 °C)
Y.1 – Primary valve with emergency closure
F – Secondary safety thermostat

M2.1	M1.1	M1.2
Config.Detectors 1 2 3 4 – – 7	Type of Control PLANTS	Increase Flow on Plants T.: 5c

Primary at low temperature



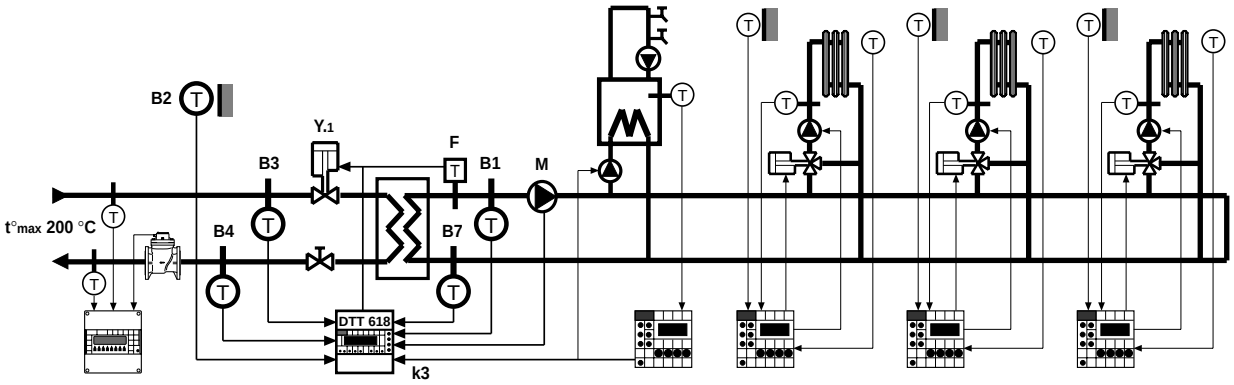


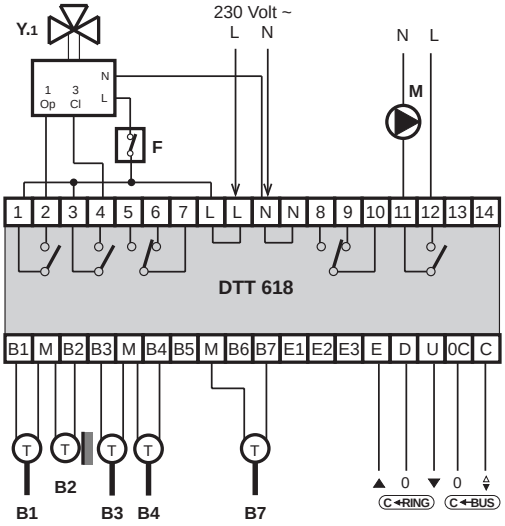
B1 – Secondary flow t° detector NTC 10 kΩ (0…99 °C)
B2 – Outside t° detector (for sending measurement in C-Ring)
B5 – Primary flow t° detector NTC 10 kΩ (0…99 °C)
B6 – Primary return t° detector NTC 10 kΩ (0…99 °C)
B7 – Secondary return t° detector NTC 10 kΩ (0…99 °C)
Y.2 – Primary valve without emergency closure

M2.1	M1.1	M1.2
Config.Detectors 1 2 – – 5 6 7	Type of Control PLANTS	Increase Flow on Plants T.: 5c

10.4 Control of compensated temperature for manifold heating plants and at fixed point at request of plant producing DHW

Primary at high temperature





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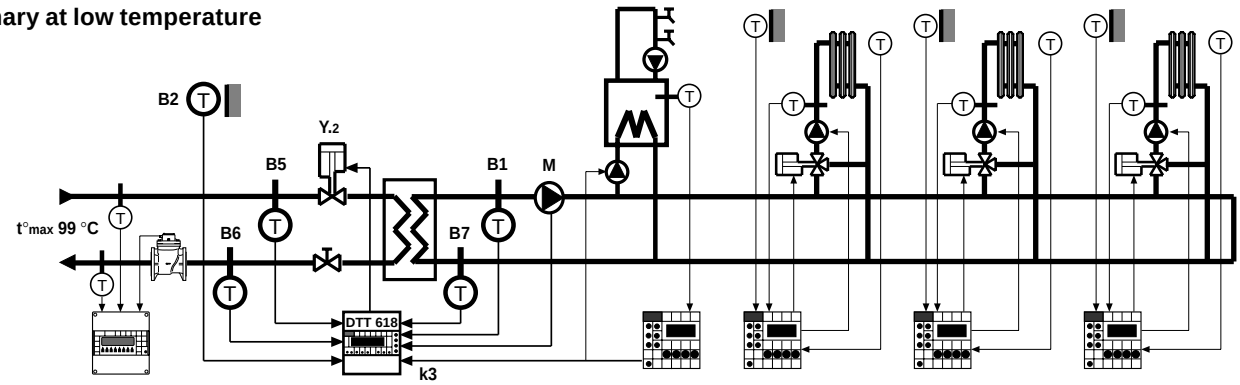
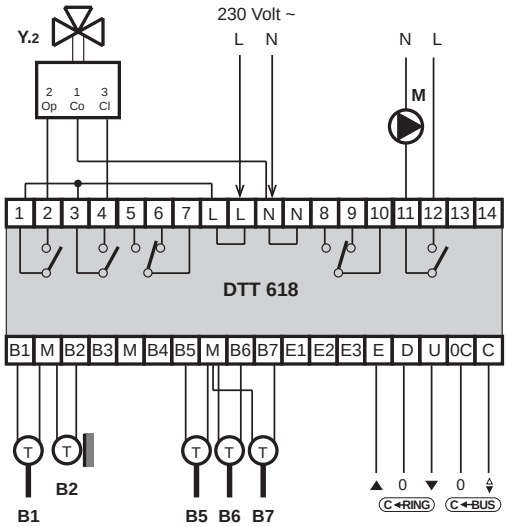
B4 – Primary return t° detector Pt 1 kΩ (0…200 °C)
B7 – Secondary return t° detector NTC 10 kΩ (0…99 °C)
Y.1 – Primary valve with emergency closure
F – Secondary safety thermostat
k3 – Calorifier pump relay switch
Calorifier pump On = - TeleOn function enabled

M2.1	M1.1	M0.12
Config.Detectors 1 2 3 4 – – 7	Type of Control COMPENSAT.	Compensation T Correction :+ 5c

M2.4	M0.11
Input E3: REMOTE ON	Desired Temper. Remote On :xxc

Primary at low temperature





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B5 – Primary flow t° detector NTC 10 kΩ (0…99 °C)
B6 – Primary return t° detector NTC 10 kΩ (0…99 °C)
B7 – Secondary return t° detector NTC 10 kΩ (0…99 °C)
Y.2 – Primary valve without emergency closure
k3 – Calorifier pump relay switch
Calorifier pump On =- TeleOn function enabled

M2.1	M1.1	M0.12
Config.Detectors 1 2 – – 5 6 7	Type of Control CLIMATICA	Compensation T Correction :+ 5c

M2.4	M0.11
Input E3: REMOTE ON	Desired Temper. Remote On :xxc

11. COMMUNICATION

11.1 C-Ring communication between controllers (for detailed information please see data sheet T 022).

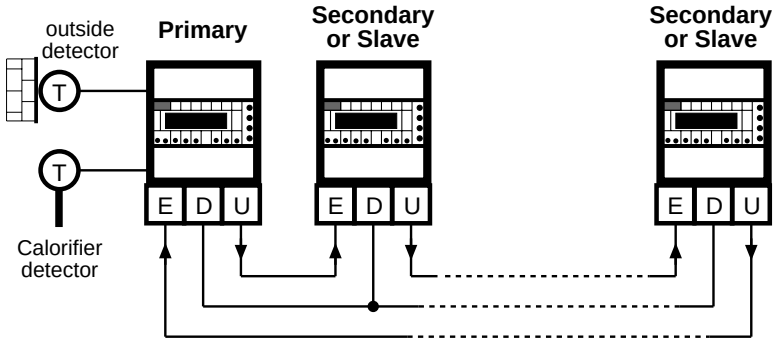
Controller DTE 618 can only be **"Primary"**.
In the serial C-Ring the following signals are transmitted:
- permission to operate as **Slave** controllers.
- measurement of **outside temperature** - use of a single detector for several controllers.
- value of **flow temperature** requested by consumer controllers. Used by "PRIMARY" controller for regulation of temperature boilers (if scheduled).
- **priority calorifier** and/or **anticondensing** function = modulating control of valve closure of heating circuits.

M2.15

Anello CRing: NO

NO = connection to C-Ring circuit not scheduled.
PRIMARY = connected to C-Ring and configured as "Primary"

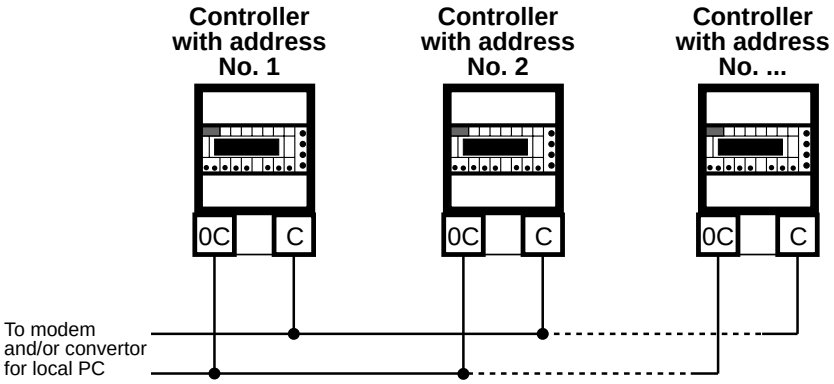
11.2 Electric connection to C-Ring



11.3 C-Bus communication for Telemanagement (for detailed information please see data sheet T 021)

By means of its C-Bus output DTT 618 can be Telemanaged – bidirectional communication of data – with one or more local PCs and/or the remote central computer via the telephone network.
From the PC or PCs you can see and modify:
- the data and values set on the display pages of the controller and those of configuration dedicated exclusively to Telemanagement (see "Technical Data").
- the operational status of the plant components (pumps, auxiliaries in general).
- receive alarms coming from the plant.
- read the detector measurements (temperatures: outside, flow, boiler, etc).

11.4 Electrical connection C-Bus



11.5 Address for Telemanagement

M2.14

Address : –
Group : –

In Telemanagement, so that the controllers can be identified by the central PC and/or by the local PCs, they have to be given a progressive address number. For convenience, the controllers can be assigned to groups of various categories:

Note

When Telemanagement is not scheduled, leave the address in memory (–).
To cancel the values, press the + and – keys at the same time.

11.6 Sending alarms

M2.13

Send Alarms: NO
PassWTeleman: NO

- **Sending alarms**: NO = alarms not transmitted.
  YES= alarms are transmitted to central PC and indicated by the appearance of the word "ALARM" on the display.
- **PassWTeleman** : NO = password not inserted
  YES= password enabled

12. OPERATION

DTT 618 is a microprocessor-based digital controller for the control of secondary circuit flow temperature in district heating substations having a heat exchanger with regulating valve on the primary circuit.

M2.1
Config.Detectors
1 – – – – – –

To adapt the controller to the plant requirements it must be configured according to the detectors connected.

13. CONTROL OF SECONDARY FLOW TEMPERATURE

The secondary circuit flow temperature is monitored by detector B1 and can be regulated in three ways:

M1.1
Type of Control
XXXXXXXXXX

– FIXED POINT
– COMPENSATED
– PLANTS

13.1 Fixed Point

M1.1
Type of Control
FIXED POINT

"FIXED POINT" control is used when "Plants" or "Compensated" regulation Is not possible because the controller cannot know the temperature requested by the plants or the controls for the plants are not only of the compensated type (see Examples of Plants 10.1).

M0.10
Desired Temper.
Fixed Point :xxc

The controller keeps the temperature constant at the desired value.

13.2 Compensated

M1.1
Type of Control
COMPENSATED

"COMPENSATED" control can be used when the auxiliary circuit has to be kept at a temperature that varies according to the outside temperature so that it satisfies the request of the heating plants with autonomous compensated controllers that are unable to communicate the request for temperature to DTT 618 (see Examples of Plants 10.4).

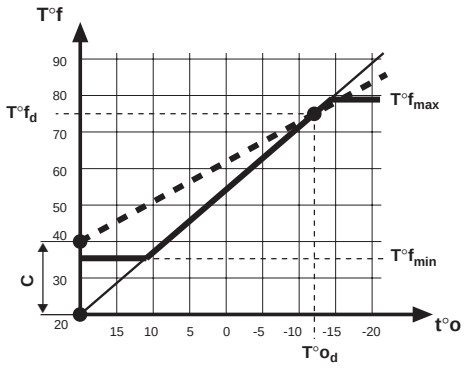
The controller calculates the desired flow temperature according to the outside temperature measured by detector B2 or coming from C-Ring and from the **heating curve** set by means of the values:

M1.3
Design outside
Temp. :–xx.xc

– design outside temperature

M1.3
Design Flow
Temp. : xx.xc

– design flow temperature



C – correction curve origin
$T°f_d$ – desired flow temp.
$T°f_{dn}$ – design flow temp.
$T°O_{dn}$ – design outside temp.
$T°f_{max}$ – maximum limit flow temp.
$T°f_{min}$ – minimum limit flow temp.
t° o – actual outside temp.

The **origin of the heating curve** (flow temp, = 20°C with outside temp. = + 20°C) can be adjusted by an increase in the flow temperature (20 … 40 °C). This may be necessary to avoid difficulties due to possible unbalances in the efficiency of the heat emitters with mild outside temperatures and to the reduced heating period used in the intermediate seasons.

M1.5
Curve OriginOT20
Flow T. : xx.xc

The value of the flow temperature calculated from the heating curve can be increased in order to guarantee that the consumer circuits always have a sufficient temperature available.

M0.12
Compensation T.
Correction: xxc

13.3 Plants

M1.1
Type of Control
PLANTS

M1.2
Increase Flow T.
on Plants T.:xxc

The "PLANTS" control can be used when DTT 618 is connected in C-Ring with the consumer controllers and is consequently in a position to know the maximum temperature requested by the consumers (see Examples of Plants 10.2 and 10.3).
The controller is able to program itself automatically according to the requirements of the consumer plants without the need for its own timed programme.

The flow temperature calculated according to the request of the plants can be increased in order to ensure that the consumer circuits always have available a sufficient temperature.

13.4 Minimum and maximum flow limits

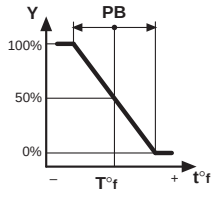
M1.6
Flow T. Limits
Min:xxc Max:xxc

When the secondary flow temperature (detector B1) reaches one of the limit values it is kept constant at that value.

Warning ! **The maximum temperature limit does not replace the security measures required by law.**

13.5 Control of regulation valve Y

The controller, in order to maintain the secondary flow temperature at the desired value (Fixed Point, Compensated or Plants), compares it with the value measured by detector B1, and, in the event of a difference, controls the primary regulating valve Y with PI modulating action according to the data set.



M1.7
Propor.Band:±xxc
Integr.Time: xxm

M1.9
Run Time
Valve : xxsec

13.6 Control of secondary pump M

M1.10
Second.Pump : ON
Delay Off :xxmin

The pump of the secondary circuit can be controlled in two ways:
- Principal pump : *ON* = Pump always in operation
  OFF = Pump always off
  AUT = Pump in operation when "plants" call for temperature
- Delay Off : *xx* min = Delay time before stopping.

13.7 Remote On function

M2.4
Input E3:
REMOTE ON

The input E1-D can be used as a remote control for the REMOTE ON function.

When switch k3 is closed, DTT 618 controls the temp. of the secondary circuit at fixed point with the temp. set in

M0.11
Desired Temper.
Remote On :xxc

When switch k3 is open control is according to setting in

M1.1
Type of Control
XXXXXXXXXXXX

14. PRIMARY CIRCUIT LIMITS

The district heating primary circuit may have limits imposed by the energy supplier contract:
- Primary return maximum temperature limit
- Minimum and maximum limits flow or primary thermal energy
- Minimum and maximum limits opening of regulating valve
- Maximum limit difference temperature between primary and secondary return.

14.1 Maximum limit primary return temperature

M2.8
```
Primary Return
Max Temp. :  xxc
```

This limit is set by the district heating boiler plant.
The controller measures the return temperature of the primary circuit (**B4** or **B6**), and, when this exceeds the maximum limit set, regulates the closure of the valve until the temp. measured by detector B1 falls, in respect of the temp. desired by the controller, by the value set in

M2.12
```
Second.Tdecrease
withLimitsOn:xxc
```

14.2 Minimum and maximum limit Flow rate or Power

M2.2
```
Input   E1:
FLOW RATE MEAS.
```
```
Input   E1:
POWER MEAS.MENT
```

The controller uses the input E1-D (as an alternative to Alarm input) to acquire the pulse measurement signals of:

- Flow rate (from pulse transmitter of volumetric meter)
  or
- Thermal power (from pulse transmitter of energy integrator)

The measurement unit per pulse must be set M2.5
```
Flowrate/Impulse
xxxx Lt/p
```
or M2.5
```
Energy / Impulse
xxxx.xxx KXh/p
```

The **minimum limit** of Flow rate (l/h) or of Power (KW) prevents the user from withdrawing energy from the district heating plant with excessive metering errors (flow rates below Qmin of volumetric meter).
When the value measured (E1-D) is below the minimum value set, the controller closes the valve **Y1** until the temperature measured by detector B1 falls, in respect of the temperature required by the controller, by the value set in "Second.TdecreasewithLimitsOn".

M2.12
```
Second.Tdecrease
withLimitsOn:xxc
```

M2.6
```
FLOW RATE LIMIT
Min: xxx.xx m3/h
```
```
POWER LIMIT
Min:  xx.xxx KW
```

The controller only examines the minimum limit again when the temp. measured by detector B1 returns to the desired value.
The closure operation is repeated until the calculated opening value ensures a flow rate or power measurement above the minimum limit.

The **maximum limit** of Flow rate (l/h) or Power (KW) prevents the user from withdrawing too much energy from the district heating plant thereby avoiding crises of shortage on the part of the plant, especially at the first daily start-up.
When the measured value (E1-D) is above the maximum value set, the controller adjusts the closure of the valve in proportion to the percentage by which the maximum limit is exceeded and to the percentage "Authority" set in.
Even if the temperature control required a greater opening.

M2.7
```
Flow Rate Limit
Max: xxx.xx m3/h
```
```
Power Limits
Max:  xxxx.x KW
```

M1.8
```
FlowRate Max Lim
Autority :  xx%
```
```
Power Max Limits
Autority :  xx%
```

14.3 Minimum and maximum opening limit of regulating valve

Instead of the minimum and maximum limits for Flow rate and Power it is possible to utilise the minimum or maximum run limits of the regulating valve.
When the percentage opening of the valve, calculated by the controller, is below the minimum value, the controller closes it completely until the calculated position returns to the higher value.
When it is above the maximum value set, the controller keeps it at the maximum value until the calculated value falls below this.

M2.11
```
Valve Run %
Min:xx   Max:xx
```

14.4 Maximum limit of the temperature difference between primary return and secondary return

To reduce peak loads in the district heating network it is possible to use the limitation of maximum temperature difference between the primary return **B4** or **B6**) and the secondary return (**B7**).
When the difference between the two temperatures reaches the maximum limit set, the controller regulates the valve closure until the temperature measured by detector B1 falls in respect of the temperature requiredby the controller, by the value set in

M2.10
```
Returns Differ.
   Max:xxc
```

M2.12
```
Second.Tdecrease
withLimitsOn:xxc
```

The controller returns to examining the "Returns Differ." only when the temperature measured by detector B1 again becomes equal to the desired value.

14.5 Removal of maximum limits for outside temperature

M2.9
```
OT to Disable
Max Limits :-xxc
```

To avoid the heating plants becoming insufficient when the outside temperature (B2) is very low, it is possible to set an outside temperature value below which the maximum limits (Flow rate or Power, valve opening and difference returns) are inactive.

15. COMPLEMENTARY FUNCTIONS

15.1 Access keynumber

M2.19

```
Choice Keynumber
      ----
```

Choice and enabling of the access keynumber which prevents the use of + and – keys and thereby any modification of the data. Enter the number (1900 … 1999) using + and – keys.
To cancel keynumber press + and – at the same time until the dashes re-appear.

```
Password
      ----
```

When the keynumber is enabled, if you press + or – keys on the display will appear the request to enter the keynumber. Only after entered the correct number is it possible to use + and – keys.
If for 15 minutes no key is pressed the keynumber is automatically re-enabled.

15.2 Denomination of plant site

M2.20

```
Plant Name
   ----------
```

On the first page of the display enter name of plant site.
Each dash can be replaced, using + and – keys, by a letter of the alphabet (A…Z) or by a number (0…9). The → key serves to position the cursor.

15.3 Display of measurements and operating data

The controller displays all the measurements made by the detectors and the data useful for understanding the operational status of the plant.

M0.1

```
Site------------
Fixed Point :xxc
```

- type of control: Compensated; Plants; Fixed Point at desired temperature.

M0.2

```
Secodary Flow T.
Des:xxc  Rea:xxc
```

- Desired or Actual secondary flow temperature (**B1**).

M0.3

```
Secondary Return
Temperature: xxc
```

- Actual secondary return temperature (only if **B7** connected).

M0.4

```
Primary Flow
Temper.    : xxc
```

- Actual primary return temperature (only if **B3** or **B5** connected).

M0.5

```
Primary Return
Difference : xxc
```

- Actual primary return temperature (only if **B3** or **B5** connected).

M0.6

```
Returns Temper.
Difference : xxc
```

- Difference between primary and secondary return temperatures (only if **B4** and **B7** or **B6** and **B7** connected).

M0.7

```
Outside actual
Temper.  : –xx.xc
```

- Outside temperature: - Actual (only if B2 connected); C-Ring (if coming from C-Ring).

M0.8

```
  FlowRate m3/h
     xxxxx
```

- Primary flow (if in **M2.2** FLOW RATE MEAS.).

```
  Power  kw
     xxxxx
```

- Primary power (if in **M2.2** POWER MEAS.MENT)

M0.9

```
Calculated Valve
Position   : xx%
```

- Position of regulating valve calculated by controller.

15.4 Data recording

Every 5…240 minutes (set by Telemanagement PC) the controller records a series of data indicative of the operational status of the plant.
This data is displayed only on the Telemanagement computer :

- Current time, day and type of recording (change of mode or expiry time).
- Values required and calculated by controller.
- Values measured by detectors connected.
- Calculated position of regulating valve Y.
- Status of On-Off contacts.

M0.13

```
12.18 MONDAY
10.02.96 GMT
```

The controller can memorise 40 complete recordings and the last recording brings about the cancellation of the oldest one.

M0.14

```
BST Period
Fr:25.03to:27.10
```

It is indispensable to set the current time, day of the week and date.

and the dates of start and end of the BST period.

16. ALARMS

The alarms processed by the controller are of three types:
- alarms for malfunctioning of the controller (LED 6.11) and of the plants controlled (LED 6.10)
- alarms for short or open circuits to the detectors connected (LED 6.10)
- alarms from outside switches (LED 6.9)

Alarm status is signalled by the LEDs on the front panel of the controller and by the word ALARM appearing on the display when the alarm is transmitted to the PC, and is identified, on the configuration page, by the appearance of the letter "A" with the number of the alarm concerned.

With C-Bus connection the alarms can be transmitted to a local PC and/or a central Telemanagement PC

16.1 Functional alarms

M2.16

```
Fuctional Alarms
–  – –     – 8
```

The functional alarms are triggered in the presence of prolonged differences between actual and desired values.
With the exception of the internal clock alarm (8) these do not affect the correct operation of the controller.
Factory setting: all disabled except for internal clock alarm (8).
Using + and – keys enable the alarms of interest by replacing the dashes with the numbers.

When the number flashes = alarm triggered.

The limit values and wait times before sending alarms can be modified only by PC.

Type of alarm and causes:

1 = secondary flow temperature (B1)
- enabled when pump M in operation.
- triggered when actual temperature below or above that desired.

3 = limits valve closure.
- enabled when pump M in operation.
- triggered when intervention of flow limit or power or valve run brings about valve closure..

4 = maximum primary return temperature (B4 or B6).
- enabled when pump M in operation.
- triggered when actual temperature above that required.

7 = difference between primary and secondary return temperatures (B4 and B7 or B6 and B7).
- enabled when pump M in operation.
- triggered when too great a difference between actual and desired temperature.

8 = internal clock – cannot be disabled.
- triggered when clock assumes meaningless values.

16.2 Detector alams

The detector alarms are triggered in the event of **short** or **open** detector circuits.

M2.17

```
Detector Alarms
– – – – – – – –
```

The presence of the alarm is indicated after one minute.

Factory setting: all disabled.
Using + and – keys enable required alarms by replacing dashes with numbers.

Type of alarm and effect:

1 = secondary flow detector (B1).
2 = outside detector (B2).
3 = primary flow detector (B3 as alternative to B5).
4 = primary return detector (B4 as alternative to B6).
5 = primary flow detector (B5 as alternative to B3).
6 = primary return detector (B6 as alternative to B4).
7 = secondary return detector (B7).
8 = C-Ring: open electric circuit or fault in one of controllers in ring.

16.3 Alarms or status from external switches (K)

Only if

M2.2
```
Input  E1:
ALARM
```
M2.3
```
Input  E2:
ALARM
```
M2.4
```
Input  E3:
ALARM
```
have been configured

M2.18

```
K Alarms
– – –
```

Alarms triggered by closure of voltage-free switches **k1**, **k2** and **k3** regarding plant components (pumps, burners, etc).

The presence of the alarm is indicated after about 60 seconds.

Factory setting: all disabled.
Using + and – keys enable required alarms by replacing dashes with numbers.
If not used as alarms they can be used as status indicators.

16.4 Water loss alarm

M2.4

```
Input      E2:
WATERLOSS
```

Input E2-D can be used for connecting a waterloss detector (switch B2).

When switch k2 is closed, DTT 618 switches off output relay 8-9-10 to power a remote alarm signal h2 (switch 9-10).

16.5 Remote alarm for valve closure

It is possible to connect an alarm warning h1 (switch 6-7) to signal at a distance the closure of the regulating valve when the minimum Power or Flow rate limit and/or the minimum limit of the valve run is reached.

17. TESTING AT PLANTSTART UP

Testing to be carried out when installation has been concluded and electrical wiring and configuration completed and tested.

17.1 Testing C-Ring

The C-Ring testing page appears only if it is configured in

M2.15

```
CRing connection
PRIMARY
```

M3.1

```
CRing:??
```

Ensure that all the other controllers connected in C-Ring are:

– correctly powered at mains voltage (230 V~).

– slave controllers or configured as SECONDARIES in

```
CRing connection
SECONDARY
```

– selected on testing page

```
CRing:??
```

The PRIMARY controller sends via C-Ring a signal every 10 seconds. On all the displays appears “??”. If the connection if satisfactory the word “YES” replaces “??” on all the displays. If on one or more displays “YES” does not appear this means that there is a break in the connection between the last controller with “YES” and the first with “??”.
Examples of testing a C-Ring with four controllers:
– Cont.1 "YES" – Cont.2 "YES" – Cont.3 "YES" – Cont.4 "YES" : Connection OK
– Cont.1 "??" – Cont.2 "YES" – Cont.3 "YES" – Cont.4 "YES" : Break between 4 & 1
– Cont.1 "??" – Cont.2 "SI" – Cont.3 "??" – Cont.4 "??" : Break between 2 & 3
– Cont.1 "??" – Cont.2 "??" – Cont.3 "??" – Cont.4 "??" : Break between 1 & 2

17.2 Testing outputs

M3.2

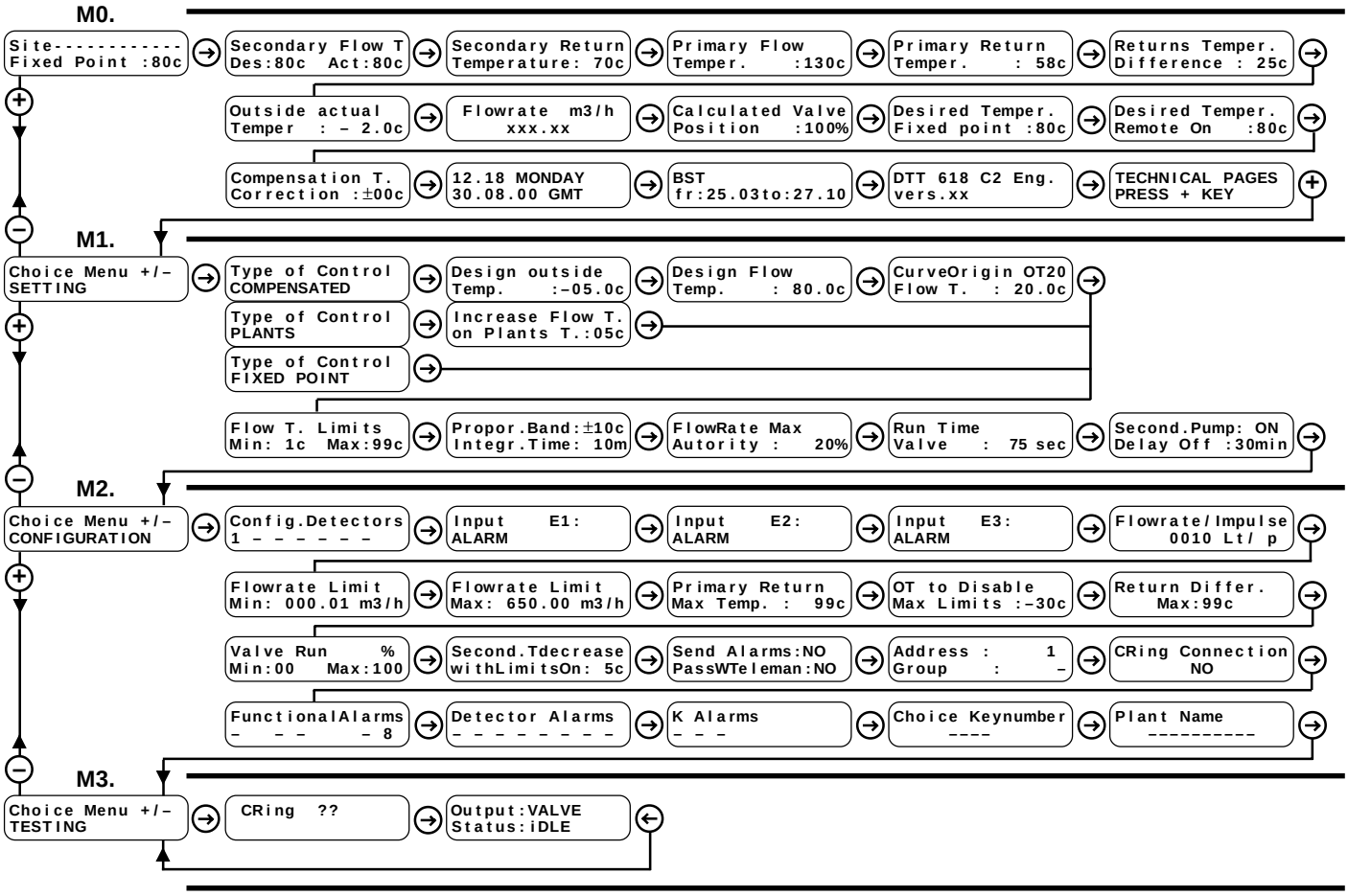
```
Output:VALVE
Status:IDLE
```

With + and – keys select:

- output to test:
  – *VALVE* ;
  – *PUMP* ;
  – *WATERLOSS* ;
  – *LIMITS* ;
- status:
  – with VALVE: IDLE; CLOSES; OPENS
  – PUMP, WATERLOSS, LIMITS: ON; OFF.

Check the result.

18. SEQUENCE OF DISPLAY PAGES (data and functions are those in memory at delivery)



⊖ ⊕ Keys for scrolling pages on the display and positioning the cursor ▮ on adjustable data on the pages.

The adjustable data, in the following descriptive list of display pages, are highlighted thus

By pressing these keys at the same time, or in any event after 15 minutes, the first page reappears

```
Site----------
FIXED POINT :80c
```

⊖ ⊕ Keys for : – adjusting the values indicated by the cursor ▮

– seeing how a function can be configured, for example:

```
Input E3:
ALARMS
```

or

```
Input E3:
REMOTE ON
```

– going directly from one menu (series of pages) to another.

M0. NORMAL USE

Ref.	Display	Description	Notes	Sect.
M0.1	Site---------- Fixed Point :80c	Name plant site Current type of control & desired temperature: *Compensat. ; Plants; Fixed Point*	Set in **M2.20** Instead of type of control may appear: *Minimum* FLOW; *Maximum* FLOW; *Minimum* POWER; *Maximum* POWER; *Min* VALVE RUN; *Max*VALVE RUN *Max* DIFF.RETURNS; *Max*PRIMARY RET.; *REMOTE ON.*	15.3
M0.2	Secondary Flow T Des:80c Act:80c	Flow temp. required by controller. Flow temp. measured by detector **B1**.	Detector **B1** must always be connected & configured.	15.3
M0.3	Secondary Return Temperature: 70c	Secondary return temp. measured by **B7**.	Appears only if detector **B7** connected & configured.	15.3
M0.4	Primary Flow Temper. :130c	Primary flow temp. measured by detector **B3** or **B5**.	Appears only if detector **B3** or **B5** connected & configured.	15.3
M0.5	Primary Return Temper. : 58c	Primary return temp. measured by detector **B4** or **B6**.	Appears only if detector **B4** or **B6** connected & configured	15.3
M0.6	Returns Temper. Difference : 25c	Difference temp. measured between detectors **B4** and **B7** or **B6** and **B7**.	Appears only if connected & configured detector **B4** or **B6** and detector **B7**.	15.3
M0.7	Outside actual Temper. : – 2.0c	– Actual: Value outside temp. measured by **B2**. – CRing : Value outside temp. from C-Ring.	.	15.3
M0.8	Flowrate m3/h xxx,xx	Value of primary Flow (from volumetric meter) or of thermal Power (from energy meter).	Appears only if in **M2.2** FLOW RATE MEAS.	15.3
	Power KW xxxx,x		Appears only if in **M2.2** POWER MEAS.MENT.	15.3
M0.9	Calculated Valve Position :100%	Calculated position of regulating valve.	.	14.3
M0.10	Desired Temper. Fixed point :80c	Desired fixed point temp. of secondary flow.	Appears only if **M1.1** is FIXED POINT.	13.1
M0.11	Desired Temper. Remote On :80c	Desired fixed point temp. of secondary flow when switch **k3** is closed.	Appears only if **M2.4** is REMOTE ON.	13.7
M0.12	Compensation T. Correction :± 0c	Correction of desired compensation temp.	Appears only if **M1.1** is COMPENSAT.	13.2
M0.13	12.18 MONDAY 10.02.96 GMT	Setting: Time, day of week & date. Current time period: GMT or BST.	BST dates set in **M0.14**	15.4
M0.14	BST Period Fr:25.03to:27.10	Dates of start and end of BST		15.4
M0.15	DTT 618 C2 Eng. Vers.xx	Identifying data of controller.		

M1. SETTING

Ref.	Display	Description	Notes	Sect.
M1.1	Type of Control FIXED POINT	Type of control of secondary flow: COMPENSAT.: according to outside temp. PLANTS: according to demand of plants. FIXED POINT: at fixed point.	PLANTS: only if **M2.15** is PRIMARY. The desired temp. comes from C-Ring.	13.
M1.2	Increase Flow T. on Plants T.: 5c	Increase of secondary flow temp. in respect of temp. requested by plants.	Appears if **M1.1** is PLANTS	13.3
M1.3	Design Outside Temp. :– 5.0c	Value of design outside temp. for compensated control.	Appears if **M1.1** is COMPENSAT.	13.2
M1.4	Design Flow Temp. : 80.0c	Value of design flow temp. for compensated control.	Appears if **M1.1** is COMPENSAT.	13.2
M1.5	CurveOrigin OT20 Flow T. : 20.0c	Correction of heating curve origin.	Appears if **M1.1** is COMPENSAT.	13.2
M1.6	Flow T. Limits Min: 1c Max:99c	Value of minimum & maximum limit of secondary flow temperature.	.	13.4
M1.7	Propor.Band:±10c Integr.Time: 10m	Proportional band & Integral time for secondary flow control.		13.5
M1.8	FlowRate Max Lim Autority : 20%	Value of authority of maximum primary flow limit	Appears if **M2.2** is FLOW RATE MEAS.	14.2
	Power Max Lim Autority : 20%	Value of authority of maximum primary thermal power	Appears if **M2.2** is POWER MEAS.MENT	14.2

M1. SETTING

Rif.	Display	Description	Notes	Sect.
M1.9	**Run Time** **Valve : 75sec**	Run time of regulating valve.		**13.5**
M1.10	**Second.Pump : ON** **Delay Off: 30min**	Control secondary pump : *ON* ; *OFF* ; *AUT*. Delay switching off pump (only if AUT).	*ON*: always switched on; OFF: always switched off; *AUT* : On with call for temperature. *AUT* : appears only if **M1.1** is PLANTS.	**13.6**

M2. CONFIGURATION

Rif.	Display	Description	Notes	Sect.
M2.1	**Config.Detectors** **1 – – – – – –**	Configuration detectors connected (input B-M). – = detector not connected. number = detector connected. Factory setting: only B1 configured.	1 : Secondary flow detector NTC 10 kΩ **B1** already configured as default. 2 : Outside detector NTC 1 kΩ **B2**. 3 : Primary flow detector Pt 1 kΩ **B3** as alternative to detector B5. 4 : Primary return detector Pt 1 kΩ **B4** as alternative to detector B6. 5 : Primary flow detector NTC 10 kΩ **B5** as alternative to detector B3. 6 : Primary return detector NTC 10 kΩ **B6** as alternative to detector B4. 7 : Secondary return detector NTC 10 kΩ **B7**.	**12.**
M2.2	**Input E1:** **ALARM**	Configuration input E1-D : *ALARM* = alarm switch connected. *FLOW RATE MEAS.* = flow meter with pulse transmitter connected. *POWER MEAS.MENT* = thermal energy meter with pulse transmitter connected.		**14.2** **16.3**
M2.3	**Input E2:** **ALARM**	Configuration input E2-D : *ALARM* = alarm switch connected. *WATERLOSS* = water loss detector connected	The action of the water loss detector triggers relay output 8-9-10.	**16.3**
M2.4	**Input E3:** **ALARM**	Configuration input E3-D : *ALARM* = an alarm switch connected. *REMOTE ON* = Remote On contact connected		**13.7** **16.1.4**
M2.5	**Flowrate/Impulse** **0010 Lt/p**	Flow per pulse of switch k1. 10…1,000 l/p	Appears if **M2.2** is FLOW RATE MEAS.	**14.2**
	Energy /Impulse **0.010 KWh/p**	Power per pulse of switch k1. 0.010…1 KWh/p	Appears if **M2.2** is POWER MEAS.MENT	**14.2**
M2.6	**FLOWRATE LIMIT** **Min: 000,01 m3/h**	Minimum limit flow in primary circuit. 0.01…650 m³/h	Appears if **M2.2** is FLOW RATE MEAS.	**14.2**
	POWER LIMIT **Min: 00.001 kW**	Minimum limit power in primary circuit. 0.001…65 KW	Appears if **M2.2** is POWER MEAS.MENT	**14.2**
M2.7	**Flow Rate Limit** **Max: 650,00 m3/h**	Maximum limit flow in primary circuit. 0.01…650 m³/h	Appears if **M2.2** is FLOW RATE MEAS.	**14.2**
	Power Limit **Max: 6500.0 kW**	Maximum limit power in primary circuit. 0.001…6,500 KW	Appears if **M2.2** is POWER MEAS.MENT	**14.2**
M2.8	**Primary Return** **Max Temp.: 99c**	Maximum limit primary return temp. Adjusts valve with this limit as setpoint.	Appears only if **B4** or **B6** configured and connected.	**14.1**
M2.9	**OT to Disable** **Max Limits :–30c**	Outside temperature below which controller does not take account of all maximum limits set.	Appears only if **B2** configured and connected .	**14.5**
M2.10	**Returns Differ.** **Max:99c**	Limits of temp difference between primary return temp. (B4 or B6) & secondary return (B7). Adjusts valve with this limit as set point.	Appears only if **B4** and **B7** or **B6** and **B7** configured.. Reduces peak loads in district heating network.	**14.4**
M2.11	**Valve Run %** **Min: 0 Max:100**	Limits valve run	Min. : when calculated position of valve is lower, the valve itself is closed completely and operates **h1**. Max. : when calculated position of valve is higher, the valve itself is kept at this maximum value.	**14.3**
M2.12	**Second.Tdetector** **withLimitsOn: 5c**	Desired reduction of secondary control temp. to restart control after the intervention of a limit closing the valve.	Used when the valve is closed because of limits: min. Flow or Power (**M2.6**) ; max. primary return temp. (**M2.8**) ;max. difference return temperatures (**M2.10**).	**14.1** **14.2** **14.4**

M2. CONFIGURATION

Ref.	Display	Description	Notes	Sect.
M2.13	Send Alarms : NO PassWTeleman : NO	Enabling alarms to send to Teleman. PC. Enabling PassWTeleman.	Only if connected in C-Bus.	11.6
M2.14	Address : – Group : –	Telematic address of controller. Group to which controller belongs.	Only if connected in C-Bus.	11.5
M2.15	CRing Connection NO	NO : not connected in C-Ring. PRIMARY : Connected as Primary.		11.1
M2.16	FunctionalAlarms – – – – 8	Enabling functional alarms. Factory setting: only 8 enabled (cannot be disabled)	1 : Secondary flow temp. alarm **B1** 3 : Valve closure limits alarm. 4 : Max. temp. primary return alarm **B4** or **B6**. 7 : Difference temp. returns alarm **B4-B7** or **B6-B7** 8 : Alarm internal real time clock.	16.1
M2.17	Detector Alarms – – – – – – – –	Enabling alarms short or open detector circuit. Only alarms of detectors **M2.1** can be enabled. Factory setting: all disabled.	1 : Secondary flow detector NTC 10 kΩ **B1**. 2 : Outside detector NTC 1 kΩ **B2**. 3 : Primary flow detector Pt 1 kΩ **B3**. 4 : Primary return detector Pt 1 kΩ **B4**. 5 : Primary flow detector NTC 10 kΩ **B5**. 6 : Primary return detector NTC 10 kΩ **B6**. 7 : Secondary return detector NTC 10 kΩ **B7**. 8 : C-Ring alarm.	16.2
M2.18	K Alarms – – –	Enabling On-Off alarms. Only the inputs configured as ALARM (**M2.2.3.4**) can be enabled. Factory setting: all disabled.	Appears if at least one of **M2.2.3.4** is ALARM. 1 : Input E1, alarm with k1 closed. 2 : Input E2, alarm with k2 closed. 3 : Input E3, alarm with k3 closed.	16.3
M2.19	Choice keynumber - - - -	Choice number to disable + and – keys. – ---- … 9999	To cancel keynumber press + and – at the same time	15.1
M2.20	Plant name - - - - - - - - - -	Entering name plant site.	Use + and – to enter letters or numbers. Use ← and → to position cursor	15.2

M3. TESTING

Ref.	Display	Description	Notes	Sect.
M3.1	CRing:??	Page of testing C-Ring connections. ?? = C-Ring test in progress or negative. YES = result test OK.	Appears only if **M2.15** is PRIMARY	17.1
M3.2	Uotput: VALVE Status: IDLE	Choice outputs to test. Choice output status.	Choice output: VALVE; PUMP; WATERLOSS; LIMITS ; Choice status: With VALVE: IDLE; CLOSES; OPENS. With LIMITS, WATERLOSS & PUMP: ON; OFF.	17.2

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