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Ekviterm Regulator of Heating Circle MTR01 Installation and Service Manual (version 5.1)

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The Manufacturer certifies that they have issued the Declaration of Conformity for this product in accordance with the Act No. 22/97 Coll. and Government Decree No. 281 and 282

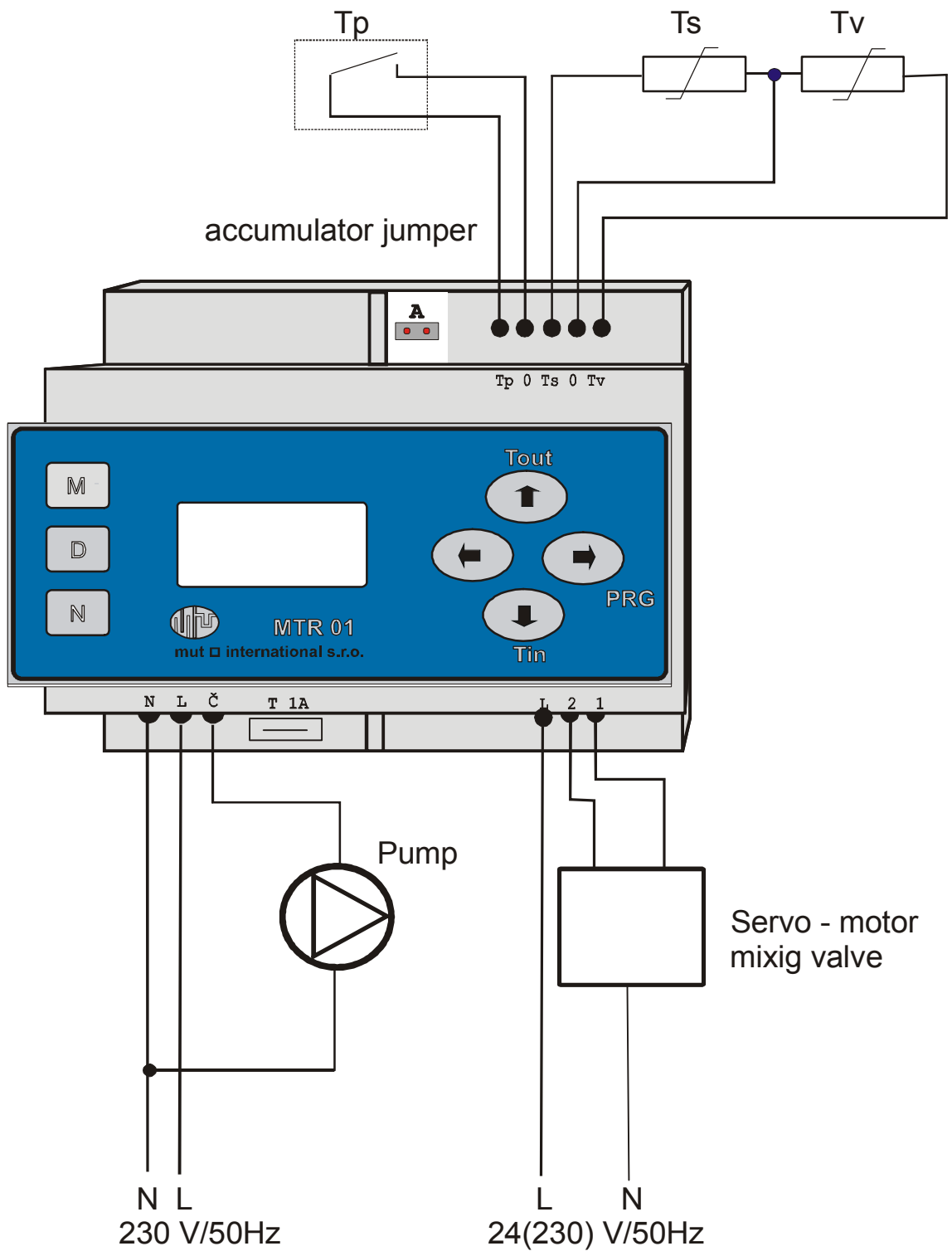
**Warning: Before use of the regulator, carefully read this manual. The regulator must be installed according to regulations in force.
The function controller does not replace the mandatory security features of the system.**

Ekviterm Regulator of Heating Circle – Connection

To = outdoor temp.sensor

Ts = heating water temp. Sensor

Tp = room thermostat (optional)

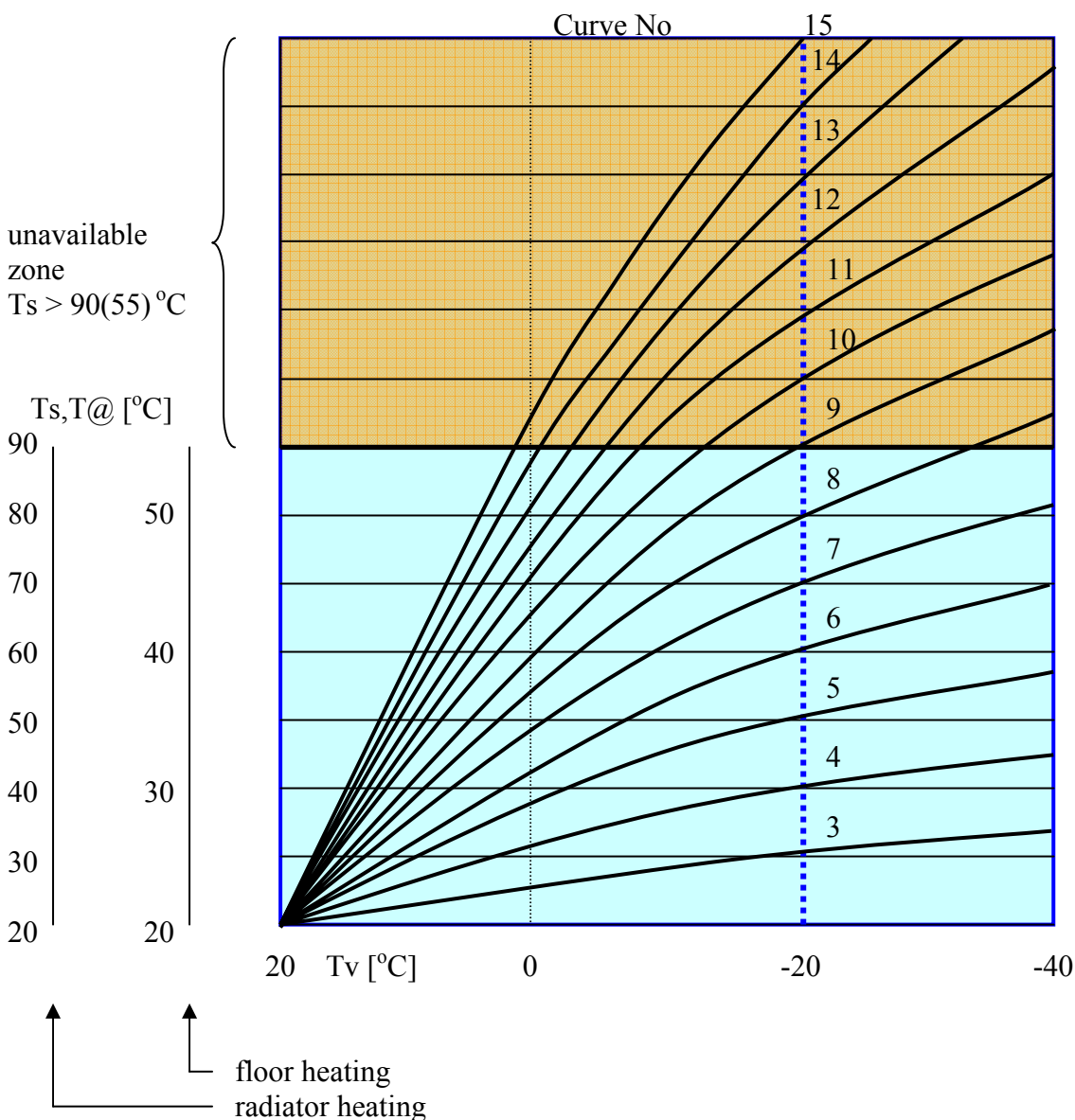


Ekviterm Regulator of Heating Circle

MTR01 PID regulator, designed to control a mixing valve with a servo-motor and a pump in the heating circle. Regulator can be used in all types of warm-water systems (heaters, floor heating) equipped with a mixing valve.

The control of heating water temperature can be carried out as follows:

- *ekviterm control* – a regulator controls the temperature of heating water, which is determined by outdoor temperature and a specific ekviterm curve.
- *ekviterm control with the reference room temperature effect* – the reference input is the variation of the requested room temperature from the actual room temperature. The regulation is also affected by the specific ekviterm curve.
- *control with a programmable attenuation of the ekviterm temperature of heating water* – the regulator switches to a specific lower ekviterm curve within the attenuation period.
- *control with a programmable room attenuation* – the control of the room temperature and attenuation is taken over by a programmable room thermostat. The regulator controls the heating water temperature according to the set ekviterm curve.



Device protection

- pump and servo-motor protection through everyday startup during the non-heating period.
- protection of radiators, event. floor heating through pump switch off when the output temperature T_s exceeds 90°C , event. 55°C – not an emergency function (from the version 5.2)
- display indication and pump switch off in case of T_s temperature sensor failure (cutoff, short-circuit). (from the version 5.2)
- installation and user code to limit the possibility of misuse.

Operation

- simple operation - 7 buttons
- statuses and program steps on LCD alphanumeric display

User

- temperature measuring
- regulator on / off
- time and calendar setup
- a week heating program setup
- holiday attenuation setup
- ekvitem curves correction setup (vertical advance + T_s)
- thermometers correction setup

Installation

- all User's functions
- control parameters setup
- testing

Regulator

- | | |
|---------------------------------|--|
| - power supply | 230V+10% -15% , 50 – 60 Hz |
| - allowed overvoltage | category II – acc. to IEC 664 |
| - input power | 1.8VA (regulator only) |
| - pump output | 230V 50Hz / 1A max |
| - output relay | AC / DC 24V 230V |
| - rated current | 5 mA.....1 A ($\cos \varphi > 0,6$) |
| - output \check{C} protection | T 1A |
| - output 1.2 protection | T 1A |
| - max. operating temperature | 5 up to 40°C |
| - max. humidity | 80% |
| - protection | IP20 |
| - dimensions | 90x106x60mm ³ |
| - weight | 400 g |
| - temperature sensors | thermistor NR355 20k Ω /25 $^{\circ}\text{C}$ |
| - data backup | 1 month (at 25 $^{\circ}\text{C}$ max.) |
| - accumulator used | NiCd 3.6V 65mAh |

Contains cadmium, do not dispose into mixed refuse containers, only sorted waste!

Description

The regulator performs all standard functions of the ekviterm regulator designed to control the heating mode in buildings equipped with warm-water furnace and a mixing valve:

- outdoor temperature measuring (T_v)
- calculation of required heating water temperature according to entered temperature curves ($T@$)
- measuring and control of heating water temperature (T_s) with PID characteristics (gradual step adjustment of the mixing valve according to the variation of heating water temperature)
- parallel characteristics advance
- actual time clock and calendar for 2005 - 2099
- week and holiday heating attenuation setup
- daily start up of drives within the non-heating period
- manual or remote setup of modes DAY, NIGHT, MAX. output

further regulator functions:

- display of outdoor temperature T_v , calculated ekviterm temperatures $T@$ and system temperatures T_s
- misuse protection through 2 codes (Installation, User)
- output test (check of output, connection and operation efficiency of the servo-drive and the pump)
- reference room temperature control according to the attached room thermostat through circulating pump control
- temperature limitation through pump switch-off in case the output temperature T_s exceeds 90°C, event. 55°C (from the version 5.2)
- multilingual menu

Regulator Installation

The regulator is stored in a plastic box with dimensions 90x106x60mm. Control elements are placed on the front panel and consist of LCD display, 4 foil buttons and 3 buttons for standby control of regulator functions.

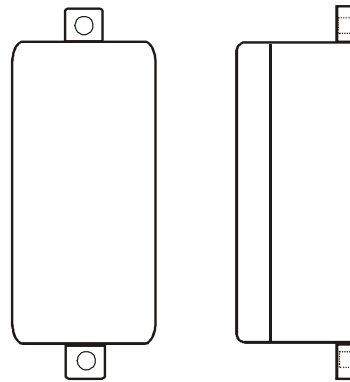
The box is designed for vertical positioning in a distribution board on DIN mounting rail. The shape of the regulator's back side fits the rail so that there is no need for any other connection elements. The device is mechanically secured on the DIN rail with a flexible lock which is a part of the regulator box.

The regulator MTR01 must be installed by a specialist appropriately qualified in electrotechnics and the installation must comply with all regulations in force. The regulator is interconnected with screw clamps, see figure on page 2. Power supply must be provided by a cable with a minimum profile 3x0.75mm², the value of securing elements P_o can be max. 1A.

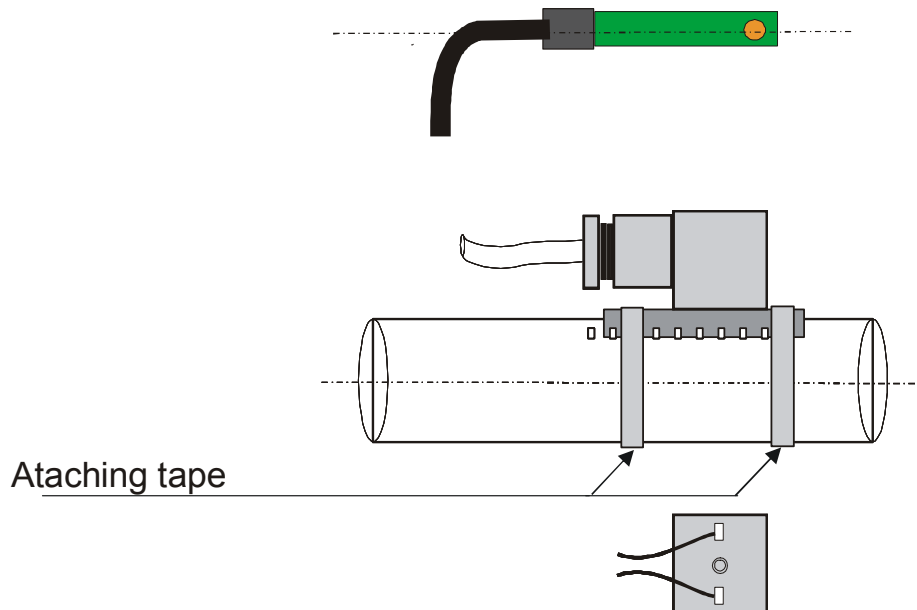
Installation of Outdoor Sensor – Tv

The outdoor temperature sensor is located in a plastic box with the protection IP54 and dimensions 84x46x40. The box is attached to the outside building wall (preferably north or northwest) in the height of approx. 4m so that the sensor is neither affected by heat escaping from the building nor by sunshine. The sensor is connected to the regulator via a twin-core cable. Do not lay the cable in parallel with power conductors.

Outdoor sensor To



Heating water sensor Ts



Minimal diameters of cables for sensor as function of lenght up to 20 m $2 \times 0,5 \text{ mm}^2$, up to 5 m $2 \times 0,7 \text{ mm}^2$

Installation of Heating Water Sensor – Ts

The heating water sensor is located on the output pipeline behind the mixer and the circulating pump and it is attached by supplied elastic tape. The contact area must be clean (remove any paint). The sensor must be attached firmly to the surface. Use heat-conductive paste and prevent all heat sources from affecting the sensor.

Servo-drive Connection

Any servo-drive with the supply voltage of 24V...230V and the consumption of max 1A can be connected to the regulator.

Pump Connection

Any circulating pump with the supply voltage of 230V AC and the consumption of max 1A can be connected to the regulator.

Room Thermostat, Remote Control - Tp

Any room thermostat with the contact output with the on/off function for the circulating pump can be connected to the regulator (the room thermostat is open if the temperature rises and closed if the temperature drops). The use of the room thermostat with MUT remote control enables manual setup of the regulator to normal day mode or to the attenuation mode regardless of a preset week or holiday mode in progress (room thermostat switch PRG-NIGHT-DAY).

Regulator setup procedure

Startup – when the regulator is connected to mains power supply, the display shows **00 : 00** (00 hours, 00 minutes, date 1.1.2006) and the time starts to count (refreshes every minute).

Backup accumulator – the accumulator is connected through A jumper and provides the backup of preset values and actual time in case of power loss, event. in case the regulator has been temporarily disconnected (for approx. 1 month).

Note: The mains power supply of the regulator should not be disconnected for a long time (e.g. for the whole summer period)

Regulation - now the regulator is serviceable. It works according to ekvitem curve 9 (heating water temperature of 90°C at the outdoor temperature of -20°C) and with other parameters, see. "factory configuration" in chapter Programming. All parameters can be re-programmed.

The regulator can be reset to factory (initial) configuration if the power supply is disconnected and then reconnected in approx. 10s. While reconnecting, it is necessary to press the button ▼ until the display shows text, then confirm the reset to initial values by ► or start the regulator with previous setup by pressing ◀.

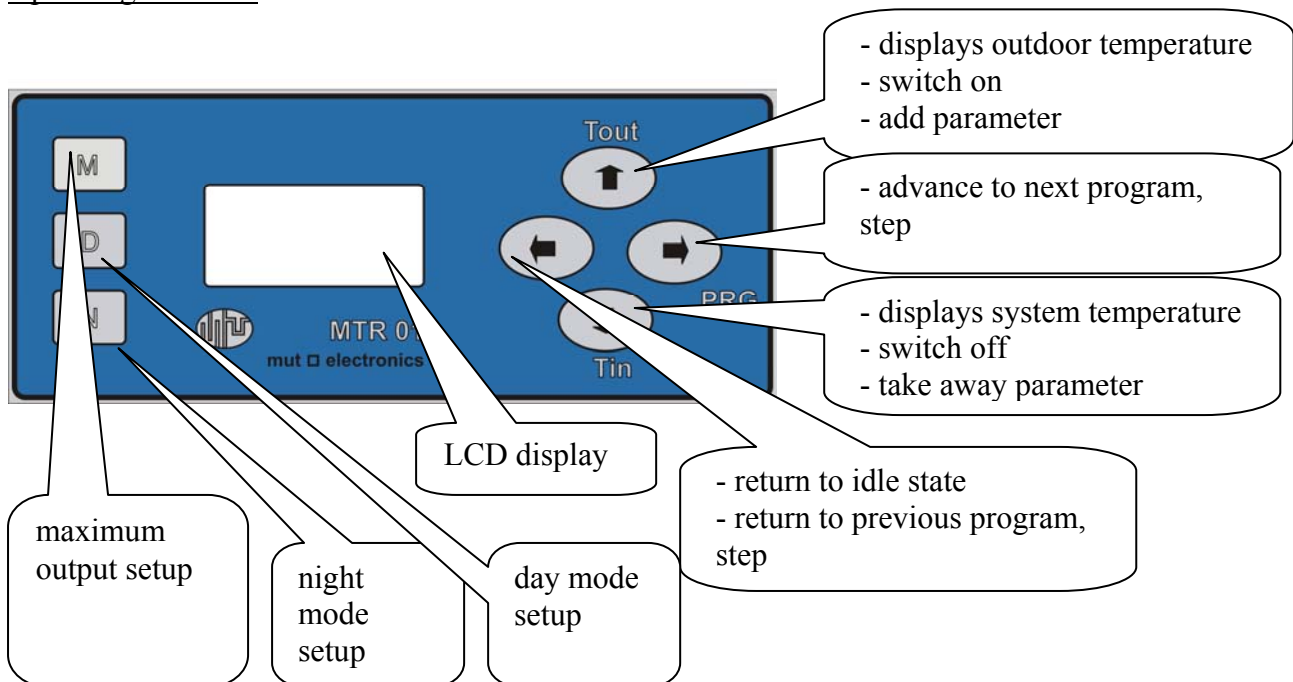
reset ?
no< >yes

Note: Similarly, it is possible to display the software version and serial number of the regulator by pressing ▲.

ver. 5.31
12345678

Ekvitem Regulator – Programming

Operating elements



Idle state

Displays time (HH hours MM minutes)
 heating mode - day or night (D / N)
 outdoor temperature Tv (button ▲)
 system temperature Ts (button ▼)
 calculated ekvitem temperature T@ (repeatedly press ▼)
 Note: T@ is calculated and thus changes the display only if regulation is on and only within the regulating period (otherwise the display shows the last previous value)

HH:MM D/N
Tv/Ts/T@

Switch to maximum heating output - button. **M**
 Setup of operating time with maximum heating output - buttons ▲ ▼

max M
 hrs

Switch to DAY heating mode - button **D** (outside preset program)
 Setup of D mode operating time - buttons ▲ ▼

day D
 hrs

Switch to NIGHT heating mode - button. **N** (outside preset program)
 Setup of N mode operating time - buttons ▲ ▼

night N
 hrs

The impressed maximum, day or night modes finish after their preset time elapses (the system switches to day or night mode according to schedule) or you can abort the impressed mode - button ◀.

HH:MM D/N
Tv ...°C

Entering the Programming Mode

► Enter the code – buttons ▲ ▼,
 Confirm - button ►

code

Wrong code has been entered

code
????

ATTENTION: the regulator is in idle state during programming (i.e. outputs are inactive) regardless regulation setup (on/off) (except manual startups of tests)

Programming at Installation Level

After entering right Installation Code, all sections are available.

§ Programming at User's level

After entering the right User Code (only § entries are available)

Switch menu - buttons ► ◀

REGULATION

§ ► Regulation (winter mode) on/off

▲ ▼ on / off

regul
on/off

Regulator startup – enter “ON”(at the beginning of winter season) and **regulator switch-off** - enter “OFF” (at the end of winter season)

ATTENTION: Use this function to switch the regulator on/off. Do not switch off the regulator power supply during the non-heating period. If the regulator is switched off longer than approx. 1 month, the backup accumulator will discharge and set data will be lost. When the regulator is switched on again, it shows factory configuration and must be reprogrammed.

§ ► Correction (advance) of ekvitem curves ▲ ▼

– vertical advance +Ts from 20 to 40 °C
for the radiator heating system and
from 20 to 30 °C for floor heating.

shift
.... °C

► Thermometer reading correction Tv ▲ ▼

from +3 to -3 °C

corr. Tv
.... °C

► Thermometer reading correction Ts ▲ ▼

from +3 to -3 °C

corr. Ts
.... °C

(if temperature sensors are not placed appropriately, both thermometer readings can be adjusted in the program by +/- 3°C)

TESTS

► Servo-motor test

servo
test

Servo-motor opens the valve (1 step) ▲

servo
open

Servo-motor closes the valve (1 step) ▼

servo
close

► Pump test

Pump on/off ▲ ▼

pump
test on/off

CODES

Misuse protection – the system enables the use through 2 codes:

Installation code - only technician who installed the system and entered here his/her code of two digits can enter programming sections (factory configuration 01).

User code – only authorized person can control the system - it is possible to enter the user code of two digits (factory configuration 02)

In case the user loses (forgets) his/her code, a new user code can be entered by the technician.
In case the technician loses (forgets) the installation code, the regulator must be reset to factory configuration and reprogrammed.

- Overwrite the **Installation Code**
- §► Overwrite the **User Code** ▲ ▼

install/user
code

§ CLOCK

Actual time clock setup – this setup (incl. calendar entries – i.e. year, month and day) is important when using automatic switch to holiday or attenuation mode.

- enter the **date** ▲ ▼ (DD day, MM month, RR year)

date
DD.MM.RR

- enter the **time** ▲ ▼ (HH hour, MM minute)

time
HH:MM

REGULATION PARAMETERS SETUP

- heating system option ▲ ▼

The regulator is designed for classical radiator heating (max. system temperature 90 °C) as well as floor heating (max. system temperature 55 °C)

radiator/floor

- Setup of **system temperature in day mode** ▲ ▼

(curve No. 3 - 15) from 30 to 90 °C (at outside temp. -20 °C)
Option of an ekvitem curve, according to which the regulator calculates the requested system temperature $T@$ from the outdoor temperature T_v and then regulates (T_s). The parameter is set up with reference to heat loss of the building and heating system performance (factory configuration – curve No. 9)

radiator/floor
day ...

- Setup of **temperature during the night attenuation** ▲ ▼

(Curve No. 3 - 15) from 30 to 90 °C (at outside temp. -20 °C)
Option of lower ekvitem curve, according to which the regulation proceeds during the heating attenuation (factory configuration – curve No. 8).

radiator/floor
night ...

► Setup of a **step** opening (closing) the **mixing valve**

▲ ▼ 1 to 99sec. – setup of a period corresponding approx. 1/20 of time required to adjust the position of the valve. The complete readjustment of the valve is done in 20 steps (the factory configuration is set to 6s, suitable for servo-valves with the adjustment time of approx. 120s)

step

.... S

► Setup of **switching period** of servo-motor ▲ ▼ 1 up to 30 min

The switching period is a period, after which the regulation is repeatedly carried out. The value should be chosen with reference to maximum valve adjustment time and anticipated dynamic behaviour of the heating system (system time constants, transmission delay) – factory configuration to 2 min.

period

.... min

Note: The room thermostat status is also senses with this period and thus the circulating pump responses to the changes of the room thermostat with the above delay.

thermost.

yes/no/optim

► System **room thermostat** option ▲ ▼ :

ne ... is not available (circulating pump is always on)

ano ... the room thermostat controls the circulating pump

optim ...optimalization mode (from the version 5.3)

If you use the room thermostat in the system in order to sense the reference room temperature, this thermostat controls the on/off status of the circulating pump in the normal heating mode (option “no” = without the room thermostat the circulating pump will be always on)

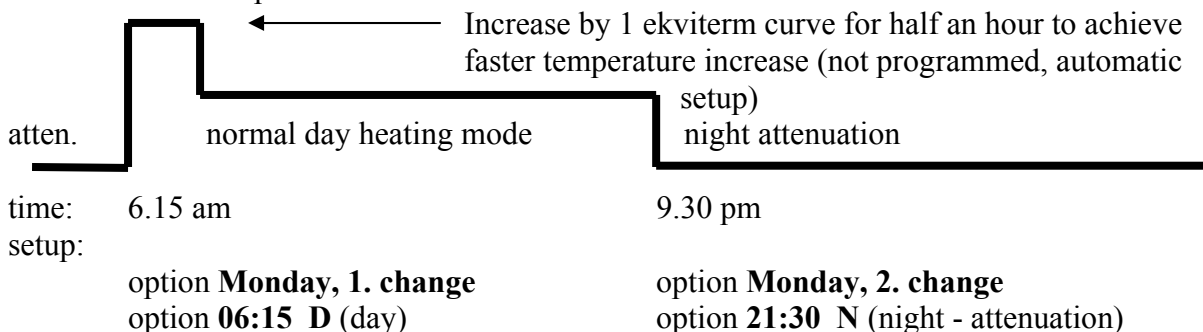
The optimalization mode can be selected if the room thermostat is connected – then the regulator optimizes the setup of ekvitem curves on a long-term basis so that the regulator works in an optimum mode and maximum thermal comfort is achieved in the building (from the version 5.3)

Note: during the circulating pump off-time, the regulation of heating water temperature is inactive (servo-motor readjustment)

§ ATTENUATION MODE PROGRAMMING (max 4 changes per day)

Programming week schedules of transition to attenuation mode and back to normal mode.

E.g.: the transition from the attenuation mode to normal mode at 6:15 a.m. and back to the attenuation at 9:30 pm



Note.: The entry “00 hrs 00 min. D-normal mode” is interpreted as blank (item deletion), transition to normal mode at 00:00 thus cannot be programmed.



► Switch to next menu, or

select ▲ day (Monday, Tuesday...)

▼ and the sequence number of change (1 – 4)

► Enter hour, minute (each 15 min)

Select the night attenuation mode N

or the normal day mode D ▲ ▼

► enter the next day and further changes (further change is offered)

◄ return to the start prg week and ► switch to next menu

prg
week

Mon/Tue/...1/2/3/4

Mon/Tue/... 1/2/3/4
D/N HH:MM

§ COPYING DAYS

Copying – overwriting entries from one day to another day

► copy day programs

► switch to next menu, or

Enter the day from which to copy ▲

Enter the day to which copy ▼

► Enter next copy (next day is offered)

◄ Return to the start of copy and ► switch to the next menu

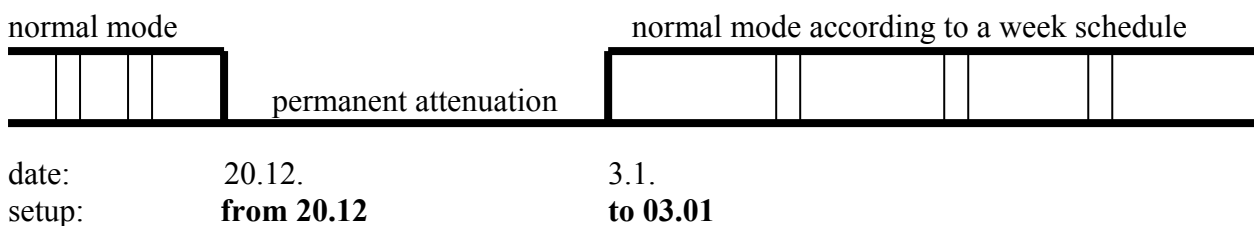
copy
from to

Mon
Tue

§ PROGRAMMING OF HOLIDAY INHIBITION

Programming holiday attenuation – entry of the date (day, month) for system transition to the permanent attenuation mode and the date (day, month) for normal mode restoration (at this time the system does not carry out programmed transitions to the normal heating mode but remains permanently in the attenuation mode)

E.g.: transition to the permanent attenuation mode on 20.12. and normal heating mode restoration on 3.1.



Note: The entry “00” for month or day is interpreted as blank (an appropriate start or end of the holiday attenuation will not be performed).

An early interruption of the holiday attenuation mode and the transition to then normal heating mode (early return from holiday) must be programmed in all steps **00**

► Enter the date of **holiday**

prg
holiday

► Enter the **attenuation start** - „from“ day **DD**, month **MM**
Enter the **attenuation end** - „to“ day **DD**, month **MM** ▲▼

s **DD.MM**
e **DD.MM**

§ LANGUAGE OPTION

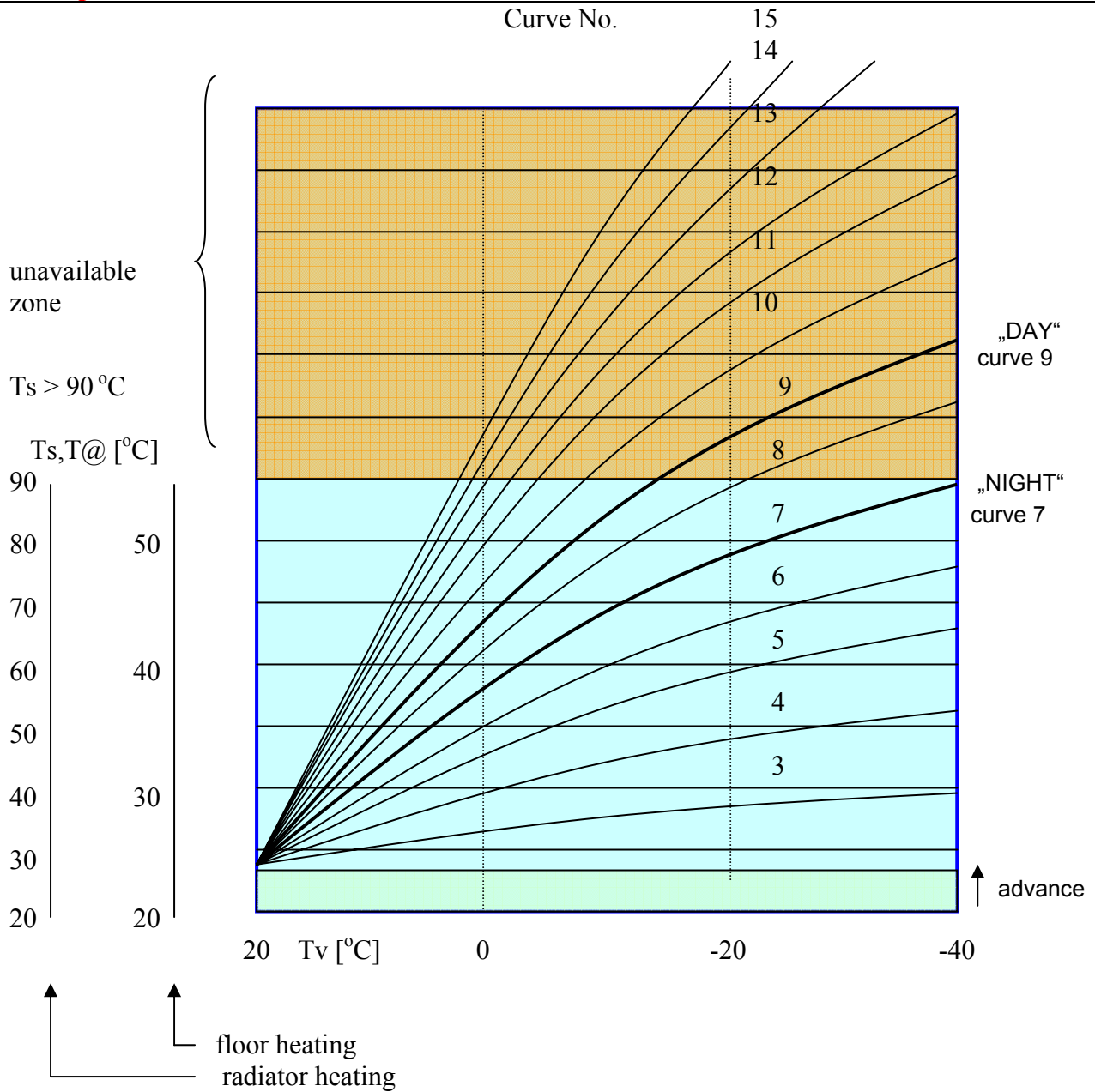
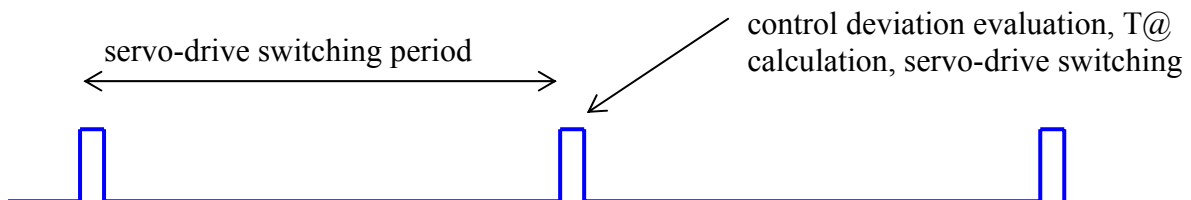
► language option ▲▼

Language
English

jazyk
cestina

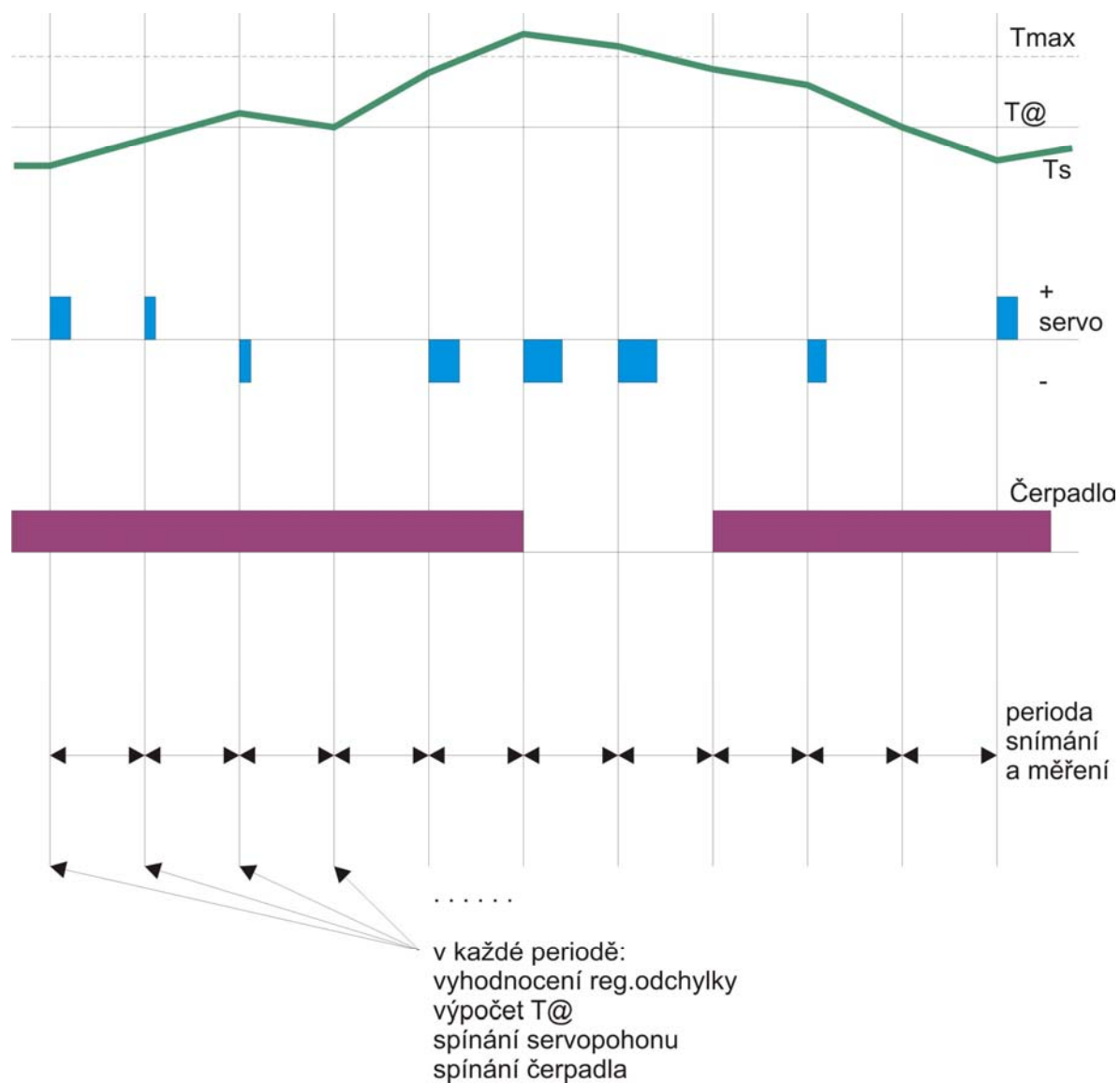
etc

► Quit menu

Example:**Temperature measuring and calculation:**

The servo-drive rotation rate depends on the control deviation extent.

ALGORITMUS ŘÍZENÍ



The Manufacturer reserves all rights to make alterations to the regulator construction in order to improve the properties of the device.