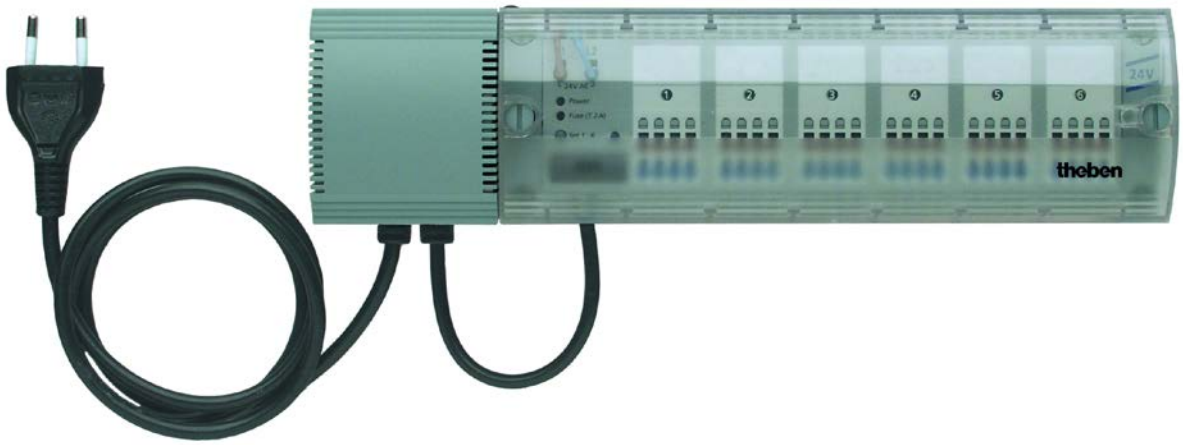
Heating Actuators for 24V Thermal Connected Valves

HMT 6 and HMT 12



HMT 6	490 0 273
HMT 12	490 0 274

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Functional Characteristics

The heating actuators HMT 6 and HMT 12 can be used for the control of 24V thermal connected valves.

The HMT 6 can control up to 6 rooms through a maximum of 4 thermal connected valves per channel.
The HMT 12 can control up to 12 rooms with a maximum of 2 connected valves each.

The total number of connected valves for the HMT 6 as well as the HMT 12 amounts to maximum 13.

The following functions are available
- Channel-wise selection of the mode between ON/OFF and continuous control
- Monitoring of the "Actuating value" objects: An emergency program is started in the absence of an actuating value
- Override possibilities of the actuating value through the "Forced mode" objects
- The heating actuator is deactivated using the "Summer mode" object.
- In the summer mode, a valve protection program can be implemented if desired.
- Calculation of the maximum continuous actuating value for the flow control of a boiler
- Automatic release of the thermal connected valve after switch-on

Advantages

- Convenient heating regulation in connection with the different EIB controllers
- Silent switching thanks to triac outputs
- Emergency program in case of timeout of the actuating value (e.g. in case of defective or failed EIB controller)
- In addition to the requirements of the codes and standards, all outputs are protected against short circuit and overload.
- Outer shape especially well-suited for heating circuit distributors (protective low voltage)
- Convenient and clear wiring through screwless plug-in terminal technique

Technical Data

General

Operating voltage	230 V +10%, -15 % = 207..253 V 50-60Hz
Output voltage	24V AC
Output current	Max 1A/ heating zone
Max. number of thermal connected valves	13
Dimensions (mm) H/W/L	70 / 75 / 302
Storage temperature range	-25 - + 60°C

Connection Data

Type of connection: Thermal connected valve outputs	Screwless plug-in terminal technique
Type of connection:	EIB input
Operating voltage	24 V / AC +/- 20%
Power consumption (without load) at nominal voltage	Ca. 5 W
Fuse:	2A, slow-blow, common for all outputs
Operating temperature range	-5 – 50°C
Outputs - number	6 / 12
Type of outputs	Triac
Displays:	green LED: 24V operating voltage available red LED: Defective fuse red LED, physical address 6 / 12 red LED : Channel switched on
Automatic release of thermal connected valves after switching on	10 min
Valve protection switching	Once per day for 6 min. if not controlled
Protective switch in case of timeout of the EIB part	Emergency program 12 min on / 60 min off

Connection Picture

The “Heating, Continuous/On-Off, Forced, Summer, Timeout“ Application Program

Function	Description
General	Basic settings: Type of device and actuating value monitoring
Channel 1...6 or 12	Individual specifications for the control of the connected valves. Each channel can be parameterised individually.

Selection in the Product Databank

Manufacturer:	THEBEN-WERK ZEITAUTOMATIK
Product family:	Heating actuators
Product type:	triac actuators
Article name:	HMT 6 / HMT 12 for 6/12 heating circuits

Download the application from: http://www.theben.de

Communication Objects

Characteristics

No.	Object Name	Function	Type	Behaviour
0...5 or 11	Actuating values channel 1... 6 or 12	Control of the connected valves	1 Bit / 1 Byte	Receive
12...17 (23)	Forced mode channel 1 ... 6 (12)	Activate forced mode	1 Bit	Receive
24	Summer mode	Activate summer mode[1]	1 Bit	Receive
25	Highest Actuating Value of all channels	Send largest actual actuating value of all 6 (12) channels (only during continuous control)	1 Byte	Send
26...37	Timeout of actuating value signal, channel 1...6 (12)	Send status report 0 = OK 1 = Timeout of the actuating value signal of channel ..	1 Bit	Send

[1]The summer mode status is saved internally and remains unchanged after bus failure and restoration of the bus supply.

Description

- **Objects 0...11 "Actuating Value Channel X"**

Input for the actuating value of the particular channel.
Every channel can be connected individually with an ON/OFF or continuous regulating room thermostat.
The use of the continuous actuating value is recommended thereby.
In this case, it is possible to react more quickly to changes and coupling with a boiler controller is possible (refer to Object 25).

- **Objects 12...23 "Forced Mode Channel X"**

A value of 1 on one of these objects puts the related channel into forced operation. The channel then heats constantly with the fixed actuating value (0...100%) set on the "Channel X" parameter page.

- **Object 24 "Summer Mode"**

A value of 1 on this object sets all channels parameterised for it into summer mode and heating is discontinued. During summer mode, a valve protection program can be implemented optionally.

The *summer mode* object cannot be read.

- **Object 25 "Highest Actuating Value of all Channels"**

This object is available if at least one channel has been parameterised as a continuous controller.
The actuating values of the channels are permanently compared with each other and the currently highest value is always sent to this object.
In this way, the current heat demand of the system can always be transmitted to the heating boiler which can adapt its capacity exactly to the true demand.

For every channel, it is possible to select individually whether or not it should be taken into account for the calculation of the maximum actuating value. In this way, rooms to be ignored for the heat demand can remain out of consideration.

- **Objects 26...37 "Timeout of Actuating Value signal Channel 1...12"**

Only available if cyclical monitoring of the actuating value of the room thermostat has been selected for the associated channel.

If the monitoring is selected, the channel must receive an actuating value telegram regularly from the room thermostat. Recommendation: To guarantee fault-free operation, the cyclical sending time of the room thermostat should not amount to more than half of the monitoring time.
Example: Monitoring time 30min, cyclical sending time of the thermostat at least every 15 min.

If a new actuating value is not received within the parameterised monitoring time, a failure of the room thermostat will be assumed and an emergency program with a fixed actuating value (0 ... 100%) will be started.

This function can be selected or deactivated individually for every channel.
The monitoring time is set for all channels together on the "General" page.

The Parameters

General

The basic characteristics of the application can be defined on the "General" page.
The following can be set:

Table 1: Parameters on the "General" Page

Item	Values	Meaning
Used device	HMT 6 **HMT 12**	Select type of device in use
Send status of the actuating value monitoring	Always send at the end of the monitoring period **Send only in case of timeout of the actuating value**	Should the status be sent in general or only in case of timeout of the actuating values ?
Time for cyclical monitoring of the actuating values	**ca. 30 min** ca. 60 min	Time setting after which a failure of the room thermostat should be recognised if no further actuating value has been received.

Valve protection (Comment):
If the "Valve protection" function is activated, the valves included are actuated once for 6 minutes every day during summer mode.
In this way, the seizing of the valve is effectively prevented.

Table 2: Parameters on the "Channel 1 – 12" Pages

Item	Values	Meaning
Type of actuating value	**Continuous** Switching	The room thermostat sends an actuating value in % The room thermostat sends only switch-on and switch-off signals.
Time of one control cycle (PWM period)	4, 5, 6, 8, 10, 12, **15**, 20, 25, 30 min	With "continuous" actuating values. A switching cycle consists of one switch-on and one switch-off operation and comprises a PWM period. Examples: - Actuating value = 20%, Time = 10min Means: Within the actuating cycle of 10min, switched on for 2min (i.e.. 20% of the actuating cycle) and switched off for 8 min. - Actuating values = 70% / Time = 10min Means: 7min on / 3min off. See Appendix: PWM cycle

Table 2: Continued

Item	Values	Meaning
Time for an actuating cycle for forced mode and emergency program	4, 5, 6, 8, 10, 12, **15**, 20, 25, 30 min	With "On/off" actuating value. In forced operation and in the emergency program, the on/off switching commands of the thermostat are replaced by a fixed actuating cycle. The cycle time is defined here.
Direction of control action of connected valve	**Channel ON --> Heating ON (Theben connected valves)** Channel ON --> Heating OFF	Adaptation to the connected valves installed, depending upon whether the valve: Is open when deenergised or Is closed when deenergised
Summer mode and valve protection	Ignore summer mode Summer mode without valve protection **Summer mode with valve protection**	The channel should continue to work normally in summer mode. No heating during summer mode No heating during summer mode, but the valve should be activated for 6 minutes every day. In this way, seizing of the valve will be prevented effectively.
Actuating value during forced mode	**0%**, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%	Select fixed actuating value which should control the valve in the forced mode.
Monitoring of actuating value	Without monitoring **with cyclical monitoring**	Should it be monitored whether or not the room thermostat regularly sends an actuating value? In this way, a malfunction of the thermostat can be recognised quickly and an emergency program started.
ON/OFF ratio for timeout of actuating value	0%, 10%, 20%, 30%, 40%, **50%**, 60%, 70%, 80%, 90%, 100%	Select fixed actuating value which should replace the actuating value of the thermostat during the emergency program.
Consider for determining the "Highest Actuating Value of all channels" (Obj. 25)	No **Yes**	With actuating value "continuous". Should the channel be included in the calculation of the Highest Actuating Value of all channels? See also: Obj. 25
Limitation of the actuating value	**None** User-defined (H… limits Page)	No limitation desired It should be possible to parameterise the highest and the lowest actuating values.

Table 3: Parameters on the "Limitation Channel 1 – 12" Pages

Item	Values	Meaning
Minimum actuating value	0%, 5%, **10%**, 15%, 20%, 25%, 30%, 35%, 40%, 45%, 50%	Smallest permissible actuating value
Actuating value if less than the minimum actuating value	0% **0% = 0%, otherwise minimum actuating value**	Limit if an actuating value which lies below the minimum actuating value is received from the room thermostat: Control channel with 0%. Every actuating value received which lies beneath the minimum value will be limited to the value of the minimum actuating value previously set. If there is however no heat requirement (Actuating value = 0%), then the connected valve will be switched off completely (0%).
Maximum actuating values	55%, 60%, 65%, 70%, 75%, 80%, 85%, **90%**, 95%, 100%	Largest permitted actuating value. A maximum value of 90% lengthens the lifetime of the thermal connected valves. A maximum value of 100% reduces the number of switching cycles.
Actuating value if more than the maximum actuating value	**Maximum actuating value** 100%	Limit if an actuating value which lies over the maximum actuating value is received from the room thermostat: Limit channel to the maximum actuating value previously parameterised. Control channel with 100%.

See Appendix: Limitation of the actuating value

Remark:
The standard values for the actuating value limitation are set to 10% and 90%.

The minimum value of 10% enables faster reaction capability of the thermal connected valves during heating requirement.

A maximum value of 90% preserves the connected valves without restricting the heating power.
In this way, their lifetime will be extended significantly.

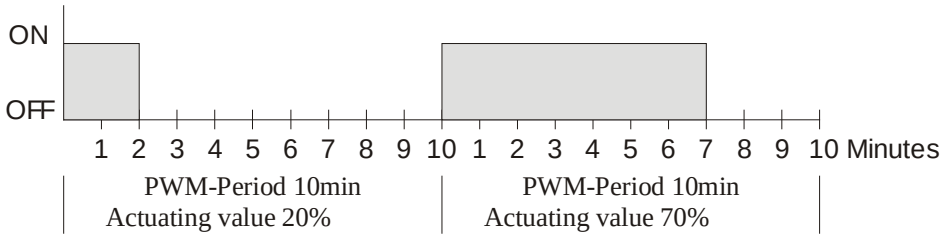
Appendix

PWM Cycle

Basic Principle

To obtain, for example, a heating performance of 50%, the actuating value of 50% is converted into on/off cycles.
Over a fixed period (10 minutes in our example), the connected valve is switched on 50% of the time and switched off 50% of the time.

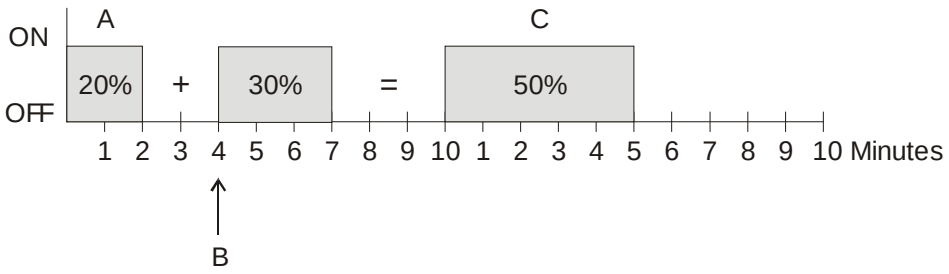
Example:
Two different switch-on times of 2 and 7 minutes represent the implementation of 2 different actuating values, one of 20% and one of 70%, in one PWM period of 10 minutes.



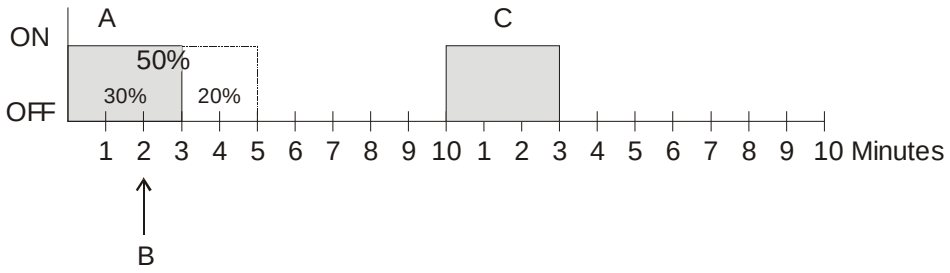
Reaction to Changes in Actuating Values

In order to be able to react as quickly as possible to changes, every actuating value is transferred directly to the PWM cycle.

Example 1:
The last actuating value amounted to 20% (A).
A new actuating value of 50% is received during the cycle (B).
The output is switched on immediately and the missing 30% switch-on time is thereby added.
The next cycle will be implemented with 50% (C).



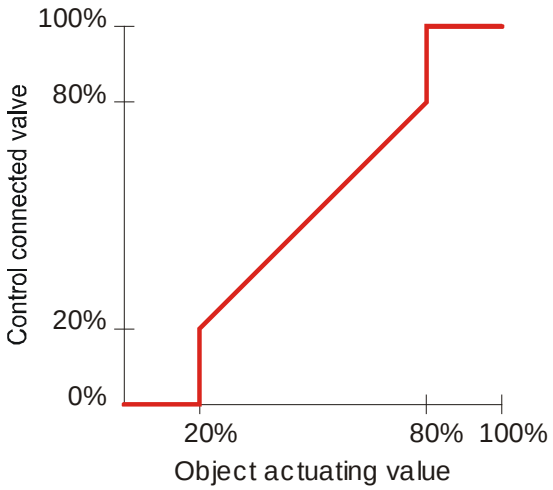
Example 2:
The last actuating value amounted to 50% (A) .
A new actuating value of 30% is received during the cycle (B).
After the expiry of 30% of the PWM cycle, the output is switched off and thereby the new actuating value is already implemented.



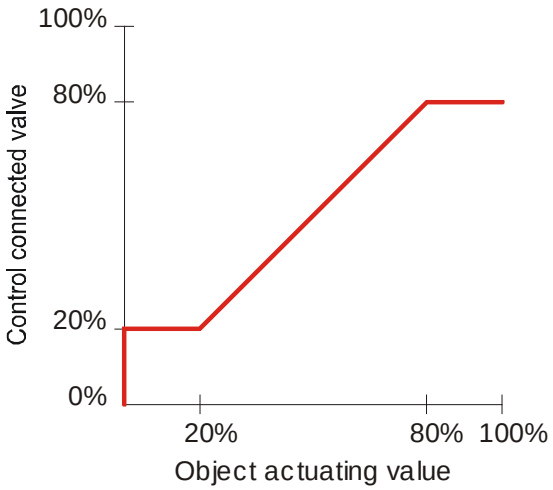
Remark:
If the new target switch-on time has already been exceeded at the time of the receipt of the new actuating value for the current cycle, the output will be switched off immediately and the new actuating value will be implemented with the next cycle.

Limitation of the Actuating Values

Example 1



Example 2



Minimum actuating value	20%	Minimum actuating value	20%
Maximum actuating value	80%	Maximum actuating value	80%
Actuating value if less than the min. actuating value	0%	Actuating value if less than min.	0%=0% otherwise min. actuating value
Actuating value if more than the max. actuating value	100%	Actuating value if more than max.	Maximum actuating val.