VISONIK®

Optimum Start/Stop Program BPS

Function sheet

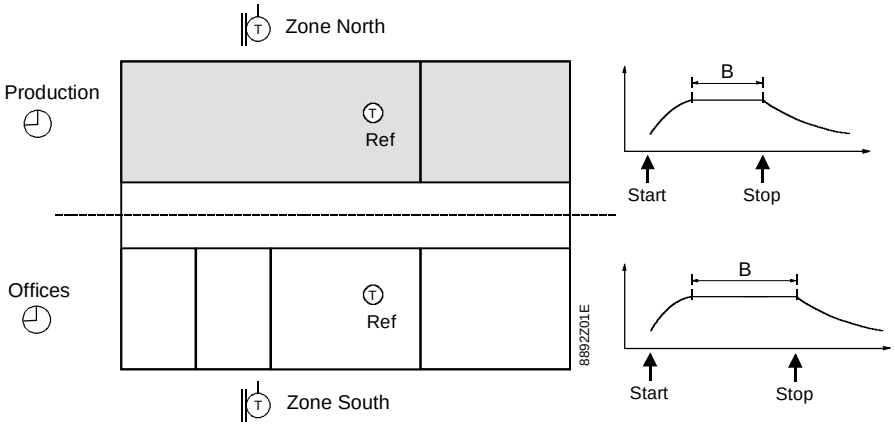
OSTP

The Optimum Start/Stop Program OSTP of the VISONIK BPS is used to optimally control energy consumption of building zones. The OSTP aims at achieving the longest possible temperature setback on heating and temperature increase on cooling during the night, weekends, and holidays.

Use

Building zones for optimal control

To achieve optimal energy control of a building, it is divided into zones as shown below by two heating zones:



Conditions for the building zones

A building zone may comprise one or several rooms. The building zone must fulfil the following conditions:

– All rooms within a building zone are controlled by the same building services system.
– All rooms within a building zone have the same occupancy hours (B).
– Each building zone must have a designated reference room. This room's inside temperature (T Ref) serves as the comfort temperature's actual value to control all rooms belonging to this building zone.

OSTP functions

List of functions

The OSTP programs automatically conducts the following functions:

Function	Explanation
Optimum Start	The start-up time for heating or cooling of a building zone is calculated by the OSTP to reach the desired setpoint temperature (inside temperature of a building zone) at the beginning of occupancy.
Optimum Stop	The switch-off time for heating or cooling of the building zone is calculated by the OSTP to allow the inside temperature to be lowered (heating) or to be increased (cooling) by at most the predefined value until the end of occupancy.
Frost protection	If either the outside temperature assigned to the building zone or the inside temperature drops below the set limit values, frost-related zone reactions are triggered. Example: – Frost protection outside: Circulation pumps ON – Frost protection inside: Heating ON at reduced stage
Setpoint increase	Depending on how long a building zone has not been used, the zone-internal setpoint at the beginning of the next occupancy is increased for heating. This temporary setpoint increase e.g. following weekends or holidays compensates for the higher heat loss a room occupant experiences due to cold radiation from the cooled-off interior building walls.
Zone reactions	The programmed zone reactions are triggered on each status change of the building zone such as: – Boost heating ON – Control operation – Frost protection outside – etc.

Calculation

OSTP calculation is characterised as follows:

– To calculate the optimal start and stop time, occupancy hours, present outside and inside temperature values, and thermic response (insulation, storage capacity) are considered separately for each building zone.

– The calculation process is a self-learning process. Therefore, the user does not need to define parameters to describe the building's dynamics. They are calculated by the OSTP.

OSTP as part of the timeswitch program TSP

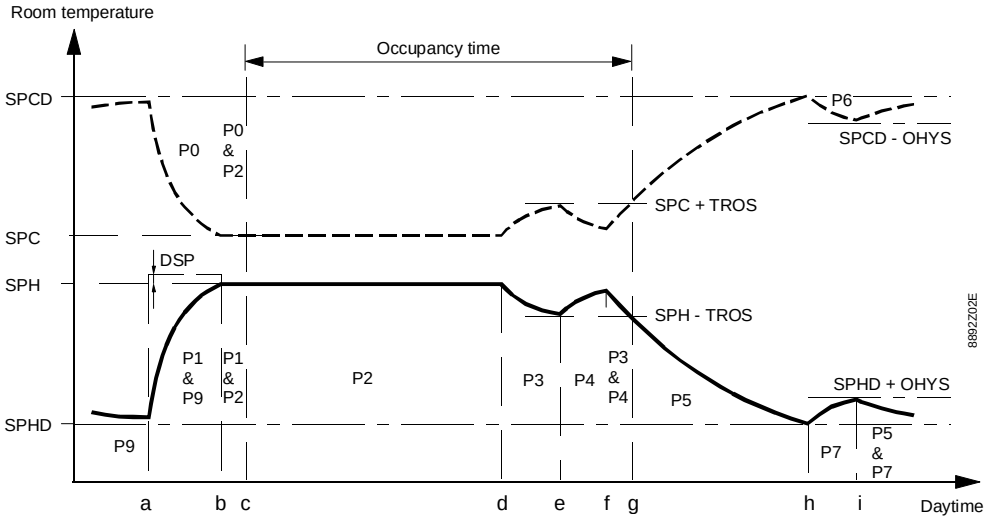
The OSTP is a subprogram of the VISONIK BPS's timeswitch (scheduler) program. If entries are configured in the weekday (WDC) or exception day (EXC) catalogues, the TSP processes them.

Accordingly, OSTP is also referred to as a shifting/optimising scheduler program. VDI3814, sheet 2, lists OSTP as "shifting switching" in the "Calculation/Optimisation" category.

OSTP phases

Diagram

A zone controlled by OSTP can experience several phases with the associated start and end points in the course of a phase (normally 24 hours). These phases are shown below.



Legend (diagram)

The values and times designated in the diagram mean the following:

Designation	Meaning
SPH/SPC	Setpoint Heating or Cooling during occupancy
SPHD/SPCD	Setpoint Heating or Cooling outside of occupancy
DSP	Maximum setpoint increase for boost heating phase P1
a	Optimum start for heating: P1 reactions/for cooling: P0 reactions
b	Setpoint reached prematurely: P2 reactions
c	Start of occupancy: P2 reactions, if not already at b
d	Optimum Stop: P3 reactions
e	Reduced setpoint reached prematurely: P4 reactions
f	End of holding phase: P3 reactions
g	End of occupancy: P5 reactions
h	Frost protection inside: P6 reactions
i	End of frost protection phase inside: P5 reactions
SPH-TROS	Reduced setpoint for optimal stop during heating
SPC+TROS	Increased setpoint for optimal stop during cooling
OHYS	ON/OFF hysteresis for phases P5 and P10

The individual phases mean:

Phase	Meaning
P0	Optimum Start Cooling (boost cooling)
P1	Optimum Start Heating (boost heating)
P2	Controlled phase (Comfort)
P3	Optimum Stop (premature switch-off)
P4	Holding phase (after Optimum Stop)
P5	Setback phase (heating OFF) or heat-up phase (cooling OFF)
P6	Sustained cooling (ECO cooling)
P7	Sustained heating (ECO heating)
P8	Frost protection outside (outside temperature below frost limit) *Note:* Phase P8 may occur simultaneously to any other phase
P9	Energy demand (heat generator ON)
P10	Frost protection inside (inside temperature below a set limit)

The time at which a phase starts or ends depends on various conditions that are processed cyclically by the OSTP program. Refer to the next page.

Energy-optimised control

Introduction

Energy-optimised control occurs through interaction of both the Optimum Start/Stop Program OSTP and the timeswitch program TSP and plant control.
The OSTP program does not contain any control functions. However, it issues commands via the zone reactions to the plant control. Example:

– Switching commands to plant elements
– New setpoints to the controller blocks of the associated building zones

Requirements

For energy-optimised control of the building zone, specific requirements must be fulfilled on two sides:

– At the building services system (plant) and
– on part of the software (TSP)

The requirements for both sides are listed below:

Page	Requirements
Plant	– The sensors (room and outside temperature) for energy-optimised control of building zones exist; see drawing on page 1. – The sensor input signals are supplied to the OSTP which calculates the output signals and transmits them to the associated control elements in the building services system (plant). *Note:* If the outside temperature is measured jointly for all building zones via one single sensor, the room temperature (T Ref) must still be acquired separately for each individual building zone.
TSP	– The timeswitch program TSP is active. – The weekday (WDC) or the exception day (EXC) catalogues contain at least one entry for the associated building zone. – The associated zone is not set to "Out of Service" (parameter OSV).

Processing steps

The OSTP determines the required status of a zone for energy-optimised control at minute intervals. The following steps are taken for this purpose:

1. Search the WDC and EXC catalogues for zone entries
2. If zone entries exist: Determination on whether a phase change is required
3. If a phase change is required: Triggering of the zone reaction defined for the associated plant during engineering.

Additional information

Refer to the following document for more information on OSTP:

VISONIK System Basics, "Optimum Start Stop Program in the BPS"