SattTop®

Distributed I/O

The SattTop System is a distributed I/O system with unique functionality leading to cost savings during installation and in a reduced commissioning time. It has open communication to a number of major PLC/DCS manufacturer's products.

The SattTop system provides data communication facilities and local interface units for control of valves, motors, control panels etc.

A Data Concentrator, SattTop STC, connects the I/O system to the host control system via a serial link.

The Operator's Panel, SattTop OP2, can be used to configure and supervise the field units.

The Configuration and Documentation tool, SattTop PCDoc, is used to facilitate the configuration and documentation work for the programmer.

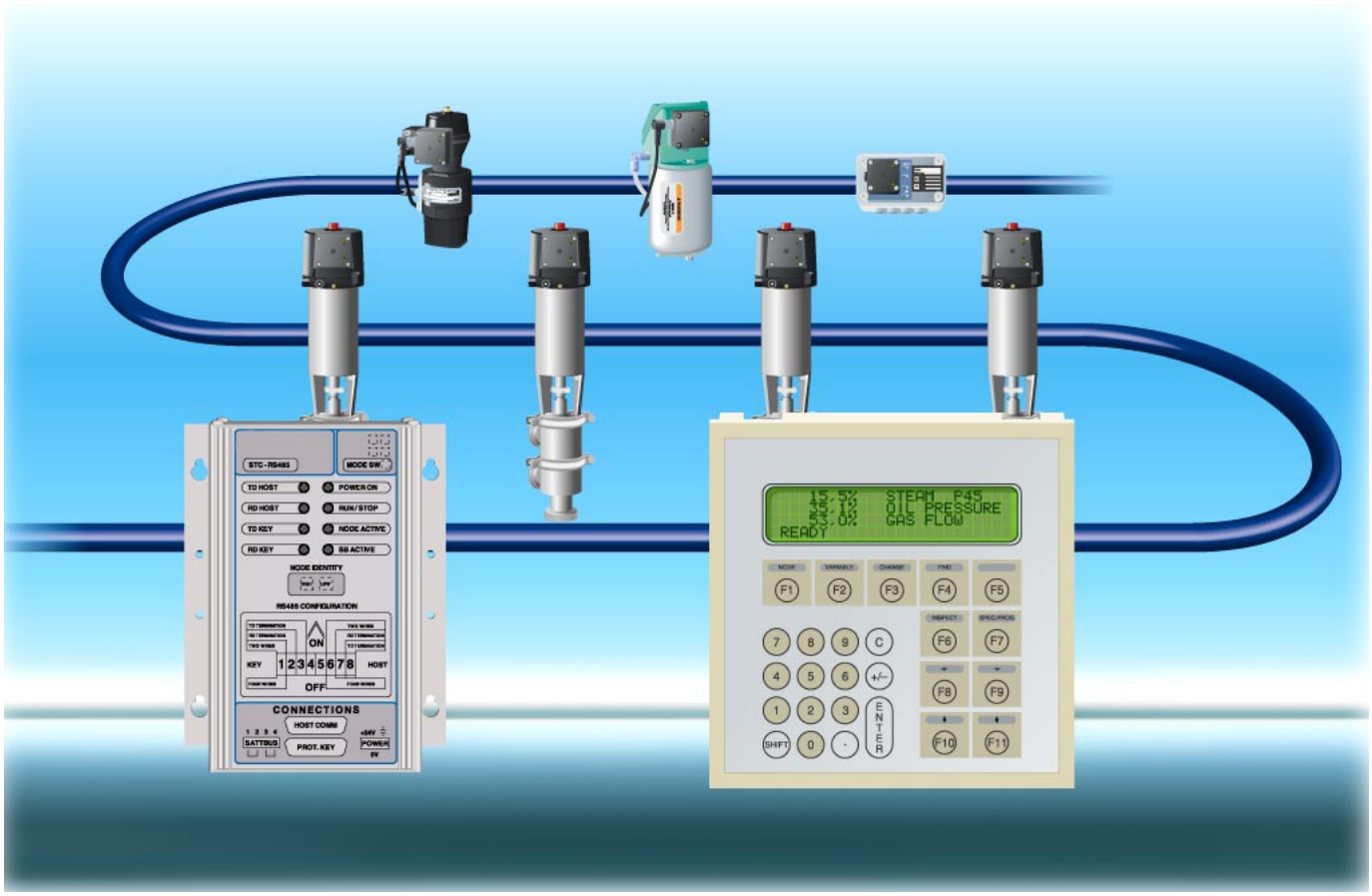
The following SattTop field units are available:

- Valve Top Unit, SattTop LKT-S.
- Valve box, SattTop VB.
- I/O box, SattTop I/O.

Each field unit is equipped with an Electronic Unit, SattTop EU.

The field units are connected via a SattTop trunk cable, a four core cable with two wires for communication and two for power supply.

SattTop OP2 and STC are also connected to the trunk cable.



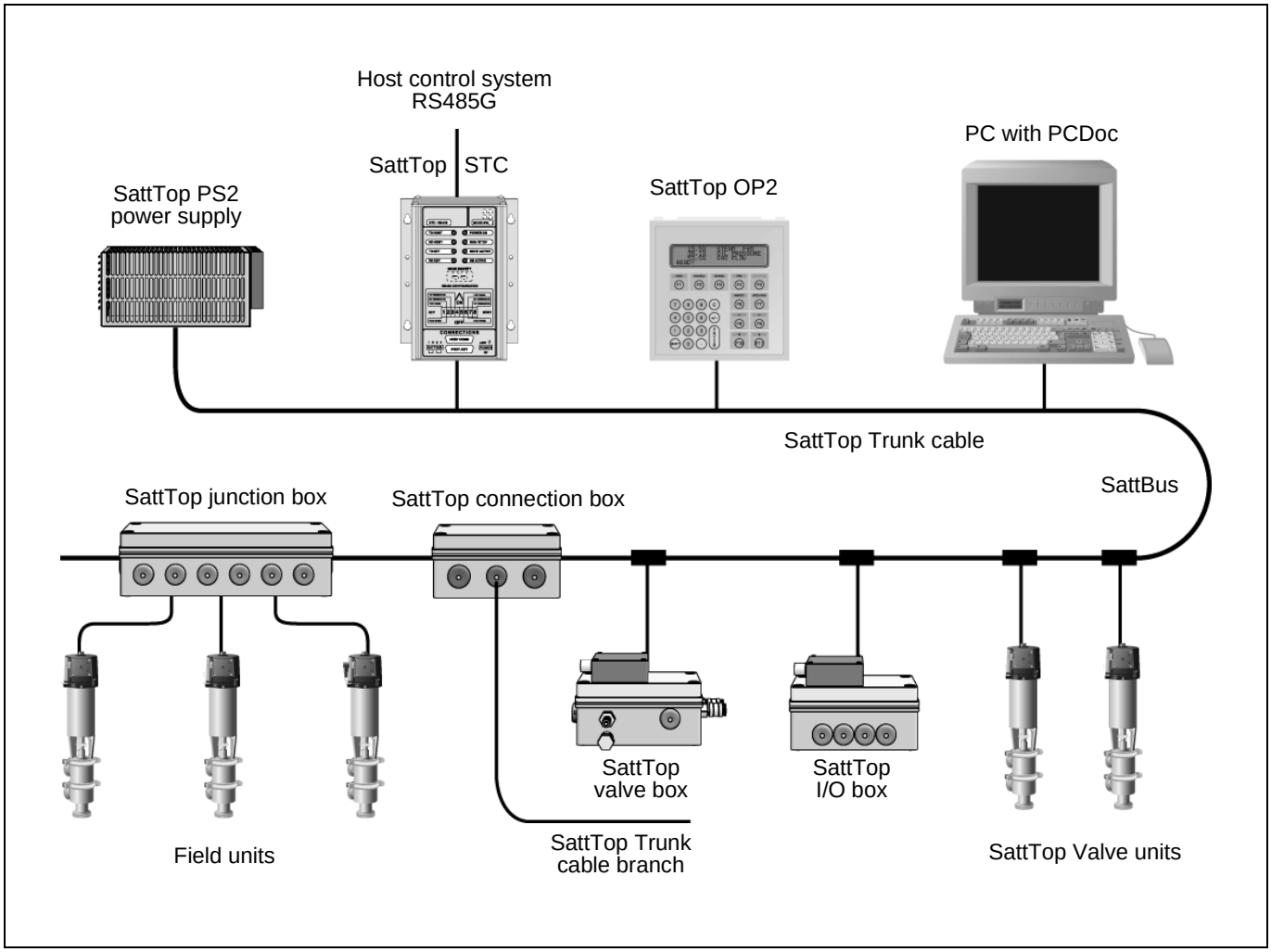
SattTop has the following main features:

- Lower installation costs.
- Up to 120 units on one bus.
- Open communication to major PLC's.
- Easy maintenance.
- Built-in feedback functions.
- Less PLC programming which saves memory capacity in the PLC system.
- PC-based configuration tool.
- Built-in solenoid valves eliminate the need for solenoid valve cabinets.
- CE approved.

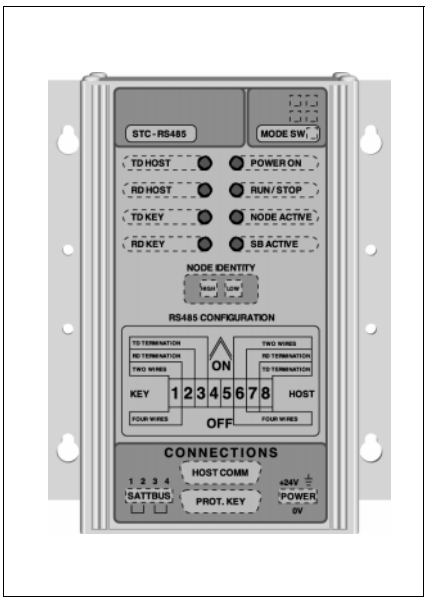
CE

ABB

Configuration overview



Data concentrator, SattTop STC



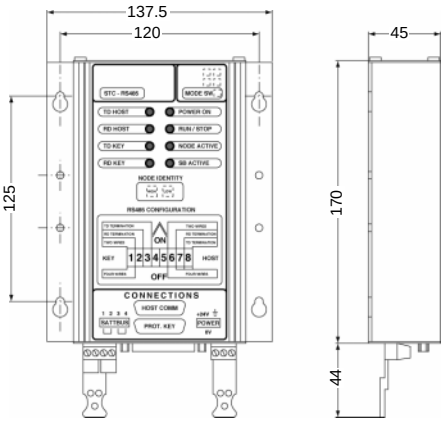
SattTop STC is the link between the host control system and the SattTop system. It has the following major functions:

- A data concentrating function which collects the current values of variables and parameters from SattTop field units thereby allowing a host control system to read and change the values of the variables.
- A SattBus supervising function:
  - initiating SattBus communication.
  - establishing token passing.
  - supervising SattBus communication
  - collecting data from field units.
  - distributing data to field units.

The SattTop STC communication hardware comprises a RS485G interface for serial line communication to host control system, with a selectable baud rate between 2400 and 9600.

Dimensions

All dimensions are given in mm.



Operator´s panel, SattTop OP2

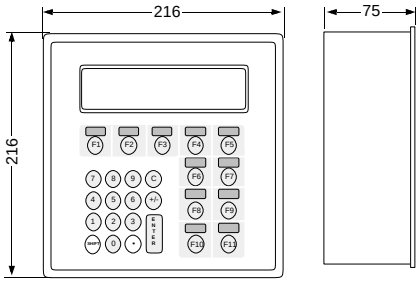
SattTop OP2 has the following major functions:

- An operator function to examine and change variables and parameters in SattBus modules such as SattTop LKT-S, SattTop VB, SattTop I/O or other field devices using SattTop EU.
- Displaying variables/parameters in the SattTop units.
- Changing variables/parameters in the SattTop units.

The SattTop OP2 communicates with the field units via SattTop trunk cable.

Dimensions

All dimensions are given in mm.



Keyboard and display

SattTop OP2 is equipped with a 4 x 40-character display and a 26-key membrane keyboard.

Plastic covered slots on the membrane keyboard allow labels to be fitted above the function keys.

The SattTop OP2 is an operator interface which includes a configuration tool to configurate the SattTop field units and the data concentrator function in the SattTop STC unit.

Most of the SattTop OP2 function setup can also be performed by using the Configuration and Documentation tool, SattTop PCDoc.

Operator interface

The operator can at any time display the variables and parameters stored in a SattTop field unit. At this access level some variables can be examined and changed but parameters can only be examined. The variables in the SattTop modules are stored in RAM.

Valve Top Unit, SattTop LKT-S

The Valve Top Unit, SattTop LKT-S, is an electro-pneumatic remote-controlled module. It can be mounted on the LKM valve types SRC, ARC, SMP-SC/EC/BC/TO and on the actuator type LKLA-T for butterfly and ball valves.

SattTop LKT-S has the following features:

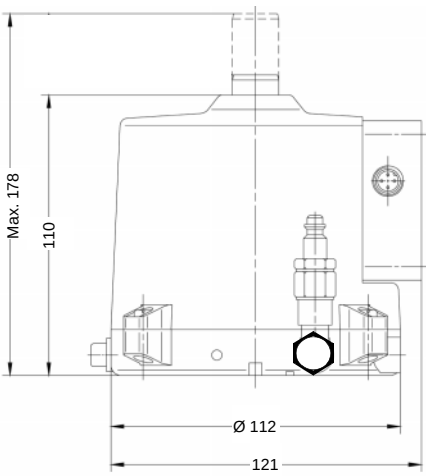
- Up to 120 units can be supplied from one trunk cable and one air tube.
- Open and closed valve positions are indicated locally by two LEDs and a visual valve stem extension, and can be remotely supervised via SattBus from SattTop OP2, PC with PCDoc or a host control system.
- Two Hall type proximity switches generate the feedback signals.
- The Valve Top units can be combined with Valve box units, SattTop VB and I/O units, SattTop I/O, on the same trunk cable for control of other types of valves, motors, etc.
- Assembly, adjustment, service, and dismantling are simple procedures requiring only standard tools.
- Protection class is IP 67.

There are seven versions of SattTop LKT-S to be used with different valve types.

All units are equipped with the Electronic Unit, SattTop EU.

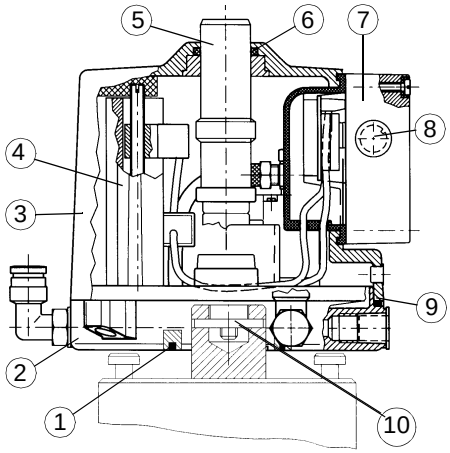
Dimensions

All dimensions are given in mm.



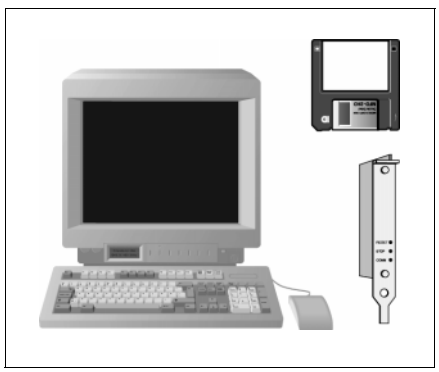
Cutaway view

Valve top unit LKT-S for SRC, SMP-SC, SMP-BC and ARC valves is shown below:



1 Quad-ring between base and actuator
2 Base with solenoid valve/es
3 Housing with screws
4 Frame with Hall element sensors
5 Activator stem extension
6 O-ring between housing and stem
7 SattTop EU
8 Drop cable connector, male
9 O-ring between housing and base
10 Retainer for stem

Configuration and documentation tool, SattTop PCDoc



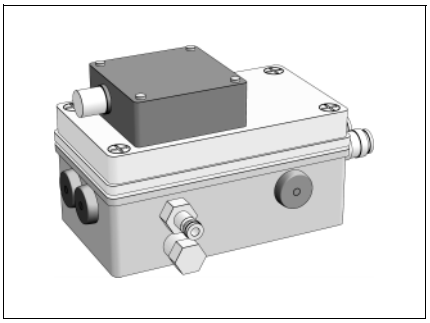
SattTop PCDoc is a configuration and documentation program designed to run on a PC. It is delivered on a 3.5" disk together with a SattBus PC board.

SattTop PCDoc is used to create, edit, back up, verify, transmit and print a SattTop configuration.

A total configuration includes the SattTop STC, all SattTop EU and an additional project description.

The link between SattTop PCDoc and the SattBus network is an ABB standard SattBus PC board. This board uses a half-size I/O channel slot in your PC.

Valve boxes, SattTop VB1 and VB2



SattTop VB is an electro-pneumatic remote-controlled module. There are two versions, VB1 with one solenoid valve and VB2 with two solenoid valves. Both versions are equipped with the Electronic Unit, SattTop EU.

SattTop VB has the following major functions:

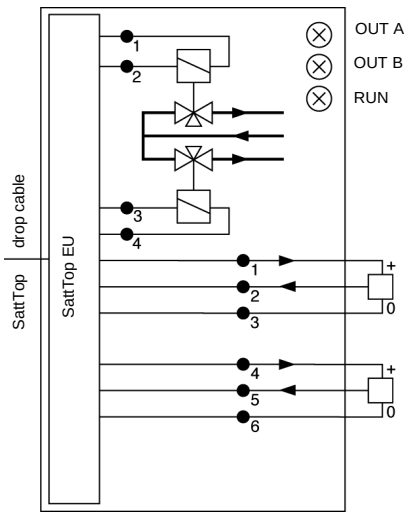
- Outputs with quick release air outlet connectors.
- Two current sinking inputs, 24 VDC, type 1, in accordance with IEC TC 65.
- Sensor type input is current sourcing, "PNP-type".
- Inputs are not galvanically separated from power line.
- Detachable screw terminal blocks.

LED indicators

Three LEDs are visible through the box cover. *Out A* and *Out B* show the status of the solenoid valves. The flashing *RUN* LED indicates that power is applied and the microprocessor is in run mode.

Connections to the trunk cable and the process

A function block diagram is shown below.



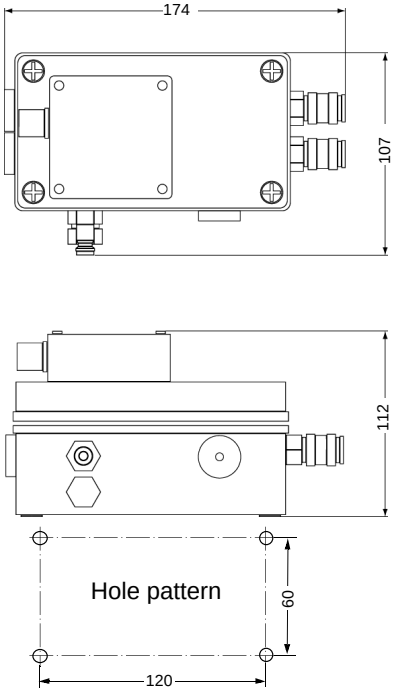
See the SattTop User's Manual for detailed instructions.

Power supply

The Electronic Unit, SattTop EU, the components inside the box, feedback sensors and solenoid valves, are powered from the SattTop trunk cable.

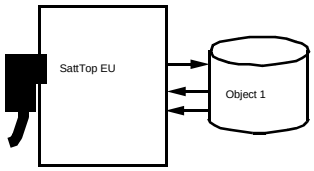
Dimensions

All dimensions are given in mm.

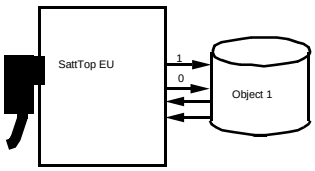


Applications

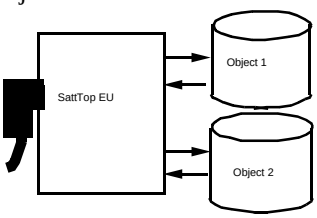
SattTop VB can be used in three different ways. Either an object error alarm based on one output and two feedbacks to and from one object:



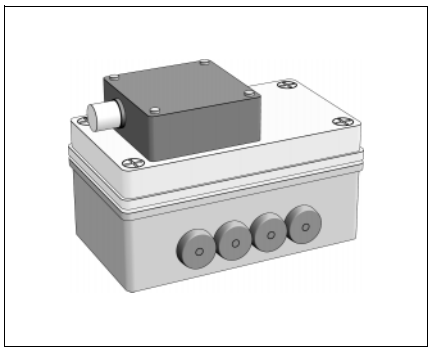
Or an object error alarm based on two outputs and two feedbacks to and from one object:



Or an object error alarm based on two outputs and two feedbacks to and from two objects:



I/O box, SattTop I/O



SattTop I/O is a relay module in the SattTop system for remote control.

The box is equipped with the Electronic Unit, SattTop EU.

SattTop I/O has the following major functions:

- Two relay contact outputs, 250 V, 2 A.
- Four versions of optocoupled inputs:
  - with two 24 V AC or DC,
  - with two 48 V AC or DC,
  - with two 110 V AC, or
  - with two 220 V AC.
- Detachable screw terminal blocks

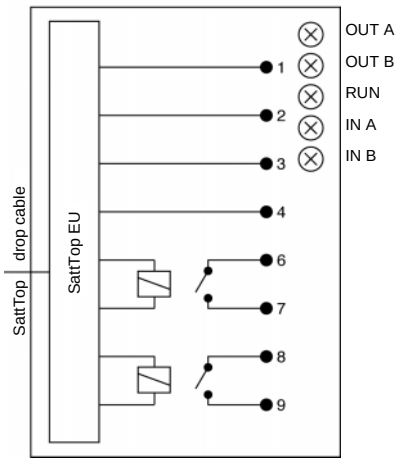
LED indicators

Five LEDs are visible through the box cover. *In A*, *In B*, *Out A* and *Out B* show the status of the inputs/outputs.

The flashing *RUN* LED indicates that power is applied and the microprocessor is in run mode.

Connections to the trunk cable and the process

A function block diagram is shown below. The inputs and outputs are sourced externally.

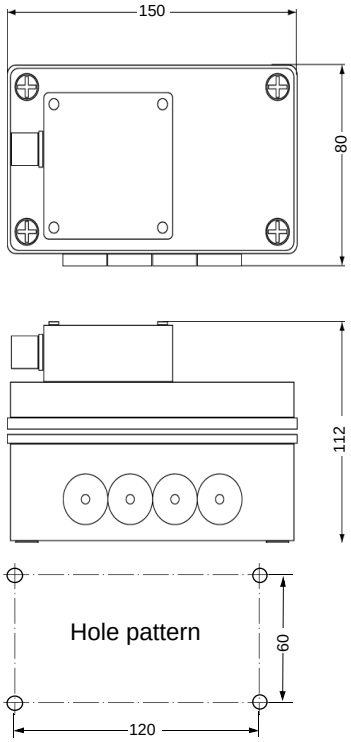


See the SattTop User's Manual for detailed instructions.

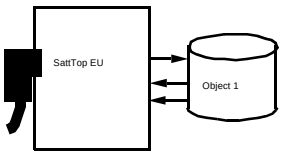
Power supply

The Electronic Unit, SattTop EU and components on the PC board (relays and LEDs) are powered from the SattTop trunk cable.

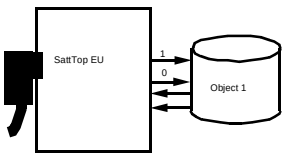
Dimensions
All dimensions are given in mm.



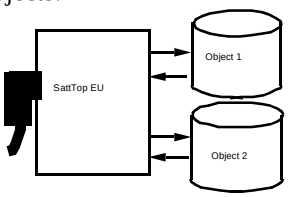
Applications
SattTop I/O can be used in four different ways. Either an object error alarm based on one output and two feedbacks to and from one object:



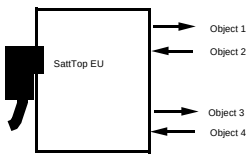
Or an object error alarm based on two outputs and two feedbacks to and from one object:



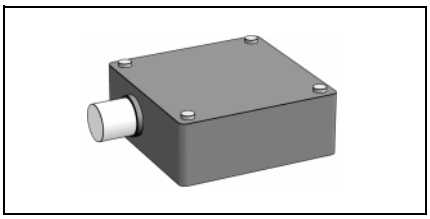
Or an object error alarm based on two outputs and two feedbacks to and from two objects:



Or a no object error alarm with two separate outputs and two separate inputs:



Electronic Unit, SattTop EU

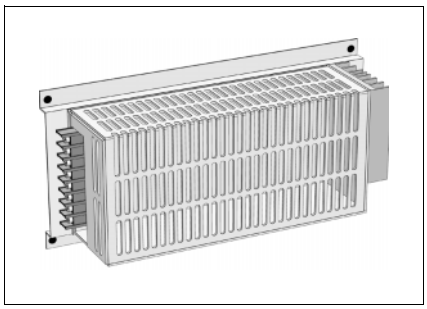


Each field unit includes a SattTop EU, which is mounted on the side of the unit.

SattTop EU transmits and receives the variables and parameters via SattBus. It controls signals for the solenoid valves and monitors the feedback signals indicating the conditions of the valves.

LED indicators
Two LEDs, *A* and *B*, normally indicate the status of the feedback signals, but also provide error indication under fault conditions. The control and feedback signals are compared and an alarm signal is produced if a deviation is detected, i.e. an object error alarm.

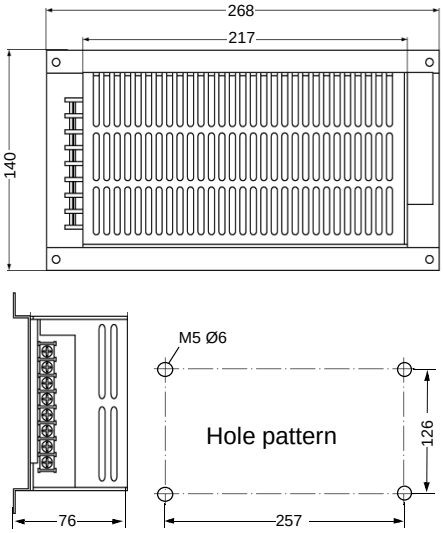
Power supply, SattTop PS2



The power supply, SattTop PS2 can supply up to 120 SattTop field units in a loop. Its output voltage (32 V DC) is connected to the trunk cable through a SattTop connection box or a screw terminal.

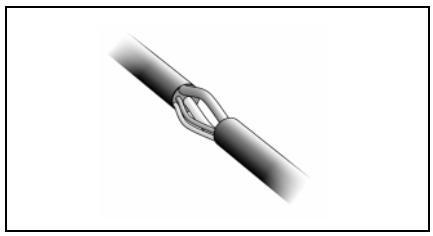
SattTop PS2 can operate from any normal mains supply (115–230 V AC).

Dimensions
All dimensions are given in mm.



SattTop Accessories
The SattTop Accessories below are required to construct a complete SattTop system.

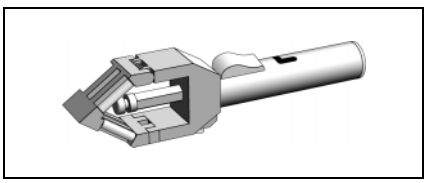
SattTop trunk cable



The SattTop trunk cable is specially designed and manufactured for the SattTop system.

The cable, which consists of four wires in twin pairs, serves two functions. The thin pair of leads (green and yellow) are for SattBus communication. The thick pair (blue and grey) supplies the power to the SattTop EUs. Both pairs are twisted to reduce interference.

Cable stripping tool



To make a connection between the SattTop trunk and drop cables, the outer insulation of the trunk cable must be removed. The cable stripping tool enables this to be carried out quickly and without damage to the inner wires. The stripping tool can be set to cut around and along the cable.

SattTop T-connector

A SattTop T-connector connects the SattTop field units to the trunk cable.

The T-connector is to be used on single valves. For valve clusters – see the SattTop junction box.

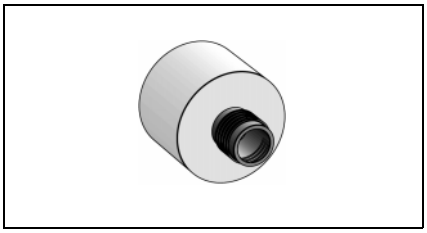
The T-connector consists of the SattTop drop cable and a T-piece, enclosed in a moulded plastic cover. This, together with gaskets, provides a watertight seal when the two halves of the connector are clamped and screwed together.

The T-connector is not to be installed where there is a risk of direct exposure to high-pressure washing.

The four exposed leads of the trunk cable are pressed into the slots of the T-piece to ensure correct connection.

The SattTop drop cable length is either 0.4, 2 or 3 metres. A screw connector is used at the SattTop EU end to provide an easy to install, watertight connection.

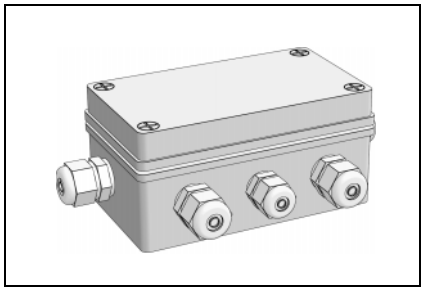
SattTop termination plug



A SattTop termination plug is used to terminate the SattBus. The SattBus must be terminated at both ends.

Using a termination plug instead of a permanent bus termination makes it easier to rearrange the bus system and move the termination.

SattTop connection box



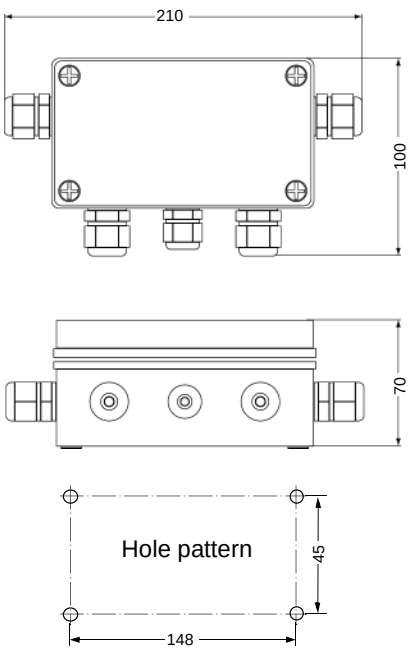
The SattTop connection box is used for cable joining, branching and trunk end termination.

The box has five watertight cable entries and a 6-way screw terminal block.

A 100 Ω resistor is supplied for use when the connection box is used for SattBus termination.

Dimensions

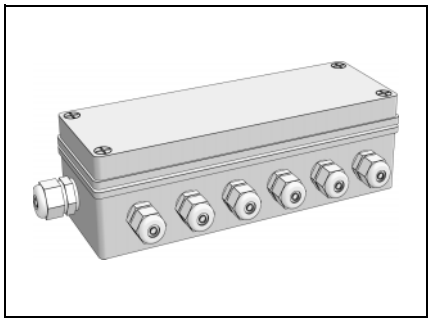
All dimensions are given in mm.



SattTop junction box

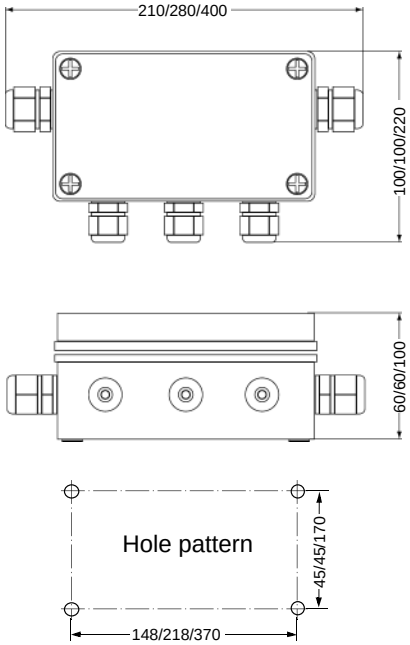
The SattTop junction box is similar to the connections box and used to connect SattTop field units in valve clusters.

There are three types of junction boxes, for either 3, 6 or 20 junctions. A drop cable (2 metres) is used to connect a SattTop field unit to the junction box.



Dimensions

All dimensions are given in mm.



NOTE! The first measure applies for a junction box for 3 valves, the second for a junction box for 6 valves, and the third for a junction box for 20 valves.

Technical data for Data concentrator, SattTop STC

Power supply	24 V DC (20 to 32 V DC).
Power consumption	5 W (24 V DC).
Memory backup	The configuration is retained at power down (capacitor back-up) for at least 24 hours.
Communication	SattBus connector. Attachable 4-pole screw terminal. Serial channel RS485G (and RS422). 25 pole D-sub connector (Canon).
SattBus channel	
Transfer rate	62.5 kbits/s.
Cable	Unshielded twisted pair, min. 3 turns/metre.
Characterist. impedance	80–150 Ω.
Area	≥0.20 mm^2, AWG 24.
Cable length	Max. 1000 m.
Serial channel	
Baud rate	9600, 4800 and 2400 baud.
Fixed parameters	8 data bits, 1 stop bit.
Fixed parity	Odd (COMLI, Modbus), Even (Allen-Bradley, Siemens)
Cable	Screened multi-core.
Cable length	Max. 1000 m.
Temperature	
Operating	±0 to +55°C.
Storage	–25 to +70°C.
Relative humidity	10 to 95%, non-condensing.
Protection class	IP 20
Electrical environment	Fulfils Electro-Magnetic Compatibility, EMC, directive 89/336 EEC.

Technical data for Operator's panel, SattTop OP2

Display & Keyboard	4 x 40 characters, 26 keys.
Power supply	24 V DC (20 to 32 V DC).
Power consumption	8 W (24 V DC).
Communication	SattBus connector. Attachable 4-pole screw terminal.
SattBus channel	
Transfer rate	62.5 kbits/s.
Cable	Unshielded twisted pair min. 3 turns/m.
Characterist. impedance	80–150 Ω.
Area	≥0.20 mm^2, AWG 24.
Cable length	Max. 1000 m.
Temperature	
Operating	±0 to +50°C.
Storage	–25 to +70°C.
Relative humidity	10 to 95%, non-condensing.
Protection class	Front IP 65 (mounted in panel). Other sides IP 20.
Electrical environment	IEC 801-4/; power 2 kV, other 1 kV. IEC 801-2; 8 kV.
Mounting panel aperture	205 x 205 mm ±1 mm.

Technical data, common for SattTop LKT-S, SattTop VB and SattTop I/O

Temperature		
Operating	IEC 68-2-1/2	+5 to +55°C
Storage	IEC 68-2-1/2	–25 to +70°C
Temperature change	IEC 68-2-14	–25 to +70°C
Vibrations	IEC 68-2-36	
Functional test		
Spectra	10–20 Hz, 4.0 x 10^{-4} g^2/Hz, 20–500 Hz, -3 dB/octave.	
Acceleration Amplitude	Max. 0.86 g, 0.17 g rms. Max. 0.45 mm.	
Life test		
Spectra	10–20 Hz, 5.0 x 10^{-3} g^2/Hz, 20–500 Hz, -3 dB/octave.	
Acceleration Amplitude	Max. 3.1 g, 0.61 g rms. Max. 1.6 mm.	
Transportation		
Spectra	Point 1, 1Hz, 60x10^{-6} g^2/Hz. Point 2, 4Hz, 10x10^{-3} g^2/Hz. Point 3, 16Hz, 10x10^{-3} g^2/Hz. Point 4, 40Hz, 1.0x10^{-3} g^2/Hz. Point 5, 80Hz, 1.0x10^{-3} g^2/Hz. Point 6, 200Hz, 10x10^{-6} g^2/Hz	
Acceleration Amplitude	Max. 2.6 g, 0.52 g rms. Max. 17 mm	
Humidity		
Cyclic	IEC 68-2-30, +25 / +55°C, 5 cycles.	
Operating	IEC 68-2-3, +40°C, 96h, 93 % R.H.	
Protection class	IP 67	

Technical data for Valve Top Unit, SattTop LKT-S

Compressed air	
Pressure	Max. 1 MPa (10 bar).
Particle size	Max. 0.01 mm.
Oil content	Max. 0.08 ppm.
Dew point of compr. air	Min. 10°C below amb. temp.
Water content	Max. 7.5 g/kg air.
Connection	R 1/8" (BSP), OD 10 mm tube, ID 6 mm tube.
Position sensors	
Type	Hall element sensors.
Signal output	On/off digital.
Supply voltage	8–30 V DC.
Supply current	Max. 25 mA.
Output	PNP open collector, max. 100 mA.
Solenoid valves	
Available voltage	24 V DC.
Power consumption	Max. 4 W.
Optional function	Manually operated.
Protection	Not earthed.
Materials	
Black plastic parts	Reinforced PA 6, polyamide.
Red plastic parts	POM, polyacetal.
Activating stem for SMP-EC valve	Acid-resistant steel AISI 316.
Seals for SMP valve stem	EPDM rubber.
Other seals	EPDM, NBR (nitrile), SEBS (Thermo-plastic elastomer).
Electronic parts	IP67-protected.

Technical data for Valve box, SattTop VB1 and VB2

Power supply (Trunk Cable)		
Voltage	20 to 32 V DC, max. 36 V DC.	
Supply current (electr.)	35 mA, no output load.	
Total current	45 mA (one solenoid activ.).	
Air supply		
Pressure	Max. 1 MPa (10 Bar).	
Particle size	Max. 0.01 mm.	
Oil content	Max. 0.08 ppm.	
Dew point of compr. air	Min. 10 °C below amb. temp.	
Water content	Max. 7.5 g / kg air.	
Air inlet connection	Quick coupling, Ø 8.3 mm. Camozzi 5053-1/8" (or comp.).	
Pneumatic outputs		
Number of outputs	1 or 2	
Nominal orifice	1.2 mm	
QNn	45 l/min	
Air outlet connection	Quick coupling. Camozzi 5450-6/4" (or comp.).	
Sensitivity to electrical interference		
Burst test trunk cable	IEC 801-4	2 kV Level 3
Burst test feedback cable	IEC 801-4	1 kV Level 3
Electrostatic discharges	IEC 801-2	8 kV
Input (feedback)		
Supply voltage to sensors	19 to 24 V DC	
Max. feeding current continuous	15 mA	
Max. feeding current mom. (duty cycle 10%)	60 mA	
Input voltage level ON	15 to 30 V	
Input voltage level OFF	0 to 5 V	
Input resistance	5 kΩ	
Feedback cable	Max. 1 m	

Technical data for I/O box, SattTop I/O

Power supply (Trunk Cable)

Voltage	20 to 32 V DC, max. 36 V DC.
Supply current	35 mA no output load.
Total current	55 mA (two relays activated).

Inputs

Input impedance	
24 V AC/DC	3.5 kΩ (typical).
48 V AC/DC	6.5 kΩ (typical).
110 V AC/DC	18 kΩ (typical).
220 V AC/DC	31 kΩ (typical).
Allowed input voltage DC	
24 V AC/DC	–30 V to +30 V max.
48 V AC/DC	–60 V to +60 V max.
Allowed input voltage AC	
24 V AC/DC	Max. 27 V rms.
48 V AC/DC	Max. 53 V rms.
110 V AC/DC	Max. 132 V rms.
220 V AC/DC	Max. 264 V rms.

Outputs

Number of outputs	2, Relay type.
Continuous voltage	Max. 250 V AC or DC.
Continuous current	Max. 2 A.
Control break load	Max. 50 W (DC), 1250 VA (AC)

Nominal detecting threshold

24 V AC	ON: ≥ 15 V	OFF: ≤ 5 V
24 V DC	ON: ≥ 14 V	OFF: ≤ 5 V
48 V AC/DC	ON: ≥ 34 V	OFF: ≤ 10 V
110 V AC	ON: ≥ 79 V	OFF: ≤ 20 V
220 V AC	ON: ≥ 164 V	OFF: ≤ 40 V

Signal delay due to input filter 20 ms (typical).

Sensitivity to electrical interference

Burst test trunk cable	IEC 801-4	2 kV Level 3
Electrostatic discharges	IEC 801-2	8 kV

Technical data for power supply, SattTop PS2

Parallell/serial connection	Not allowed.
Mains voltage	115/230 V AC, 47.5 to 63 Hz.
Mains voltage range	85 to 132 V AC (115 V) or 170 to 264 V AC (230 V).
Output voltage	32 V DC, 7.6 A.
Fuse	Located on the primary side. 6.3 A 250 V slow.
Ripple and noise	≈400 mVp-p
Input regulation	Max. 0.8%
Load regulation (0–100%)	Max. 0.9%
Over-current protect.	Constant current limiting, ≈12 A.
Over-voltage protect.	Output shutdown.
Gavanic isolation	
Input–output	3000 V AC (1 min).
Input–chassis	3000 V AC (1 min).
Output–chassis	500 V AC (1 min).
Inrush current	Max. 15 A (115 VAC) and max. 30 A (230 AC).
Hold-up time	Min. 20 ms.
Temperature	
Operation	±0 to +50°C
Storage	–20 to +85°C
Relative humidity	Max. 90%, non-condensing.
Power dissipation	Max. 40 W
Safety	IEC 950, EN 60950, UL1950, C-UL1950 (CSA)
EMC	
Emission	EN 55022/B conducted,
Immunity	VDE 0871/B.
	IEC 801-2, 4 and 5 (EN 61000-4-2, 4 and 5 as of Jan 1:st, 1997).
Protection class	IP20
Weight	1.1 kg

Technical data for SattTop trunk cable

4-wire cable	2 x 2.5 mm^2 + 2 x 0.5 mm^2	**Conductor 0.5**	Tin-coated Cu 7 x 0.31, PVC insulation
Cable	Unshielded twisted pair, min. 3 turns/m	**Conductor 2.5**	Tin-coated Cu 7 x 0.67, PVC insulation PVC 9.7 mm shealth.

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