

Automation System TROVIS 6400



Process Control Stations TROVIS 6412 and 6442

For panel mounting (front frame 72 x 144 mm/2.83 x 5.67 inch)
or 19" rack-mounting

Application

Microprocessor-controlled process control stations suitable for simple and complex control tasks in industrial and processing plants.



Function blocks which are permanently stored in memory allow the user to define preconfigured control circuits and select various functions.

Configuration and parameterization data are entered directly on the station using keys located on the front panel. Instead of local entry, data can also be entered on a computer with an optional program. Moreover, data can be transferred to and from the control stations via a specially designed COPA pen (COPA = CONfigure and PArAmeterize).

The process control stations can be fitted with a serial interface for use in a digital process control system.

Special features

Preconfigured control circuits:

- Fixed setpoint control for single or multi-component control
- Slave control, optionally with internal/external switchover
- Synchronous control
- Ratio control with internal/external switchover
- Cascade control (master and slave control)

Additional features include, among other functions:

- Filtering, square roots and function generalization of inputs
- Logical operations of input quantities (addition, subtraction, multiplication, averaging, comparison, ratio)
- Operation with dual reference variables (setpoints)
- Setpoint ramp and manipulated variable ramp
- Optionally linear or non-linear control algorithms, plus compensation algorithms
- Control signal limits (fixed, variable or by an input quantity)
- Split-range operation
- Definition of start-up and re-start conditions, alarms for violation of predetermined limits
- Tuning of control parameters or control of process parameters via an external signal
- Limiting control
-

Versions

| TROVIS | 64x2 |
|----------------|------|
| Panel mounting | 1 |
| Rack mounting | 4 |



Fig. 1 · TROVIS 6412 Process Control Station (panel mounting)



Fig. 2 · TROVIS 6412 Process Control Station (rack mounting)

Inputs and outputs (Fig. 3)

The process control stations are available with three different input cards offering either three or four analog inputs. Universal input options include: Current or voltage signals, potentiometers, Pt 100 temperature sensors or transmitter supply (see Technical data). In addition, each station contains three binary inputs.

A jack of the integrated serial interface (Figs. 4, 12) is located on the front panel, to which either a COPA pen or a special COPA adapter (to a computer) can be attached.

In addition, an RS-485 serial interface can optionally be integrated in the process control stations.

Standard outputs include: One continuous-action control output; one two-point/three-point output; one binary output for fault alarms.

The functional range of the process control stations can optionally be enhanced with any of the following: One additional continuous control output; one analog output; two limit (alarm) relays; two binary outputs.

Operating the process control stations (Fig. 4)

The process control stations operate according to a clear, three-level operating structure: operating level, parameter level and configuration level.

Besides the three operating levels, additional levels are available which support the following series of functions: Display all input and output variables as absolute values; tune control parameters; configure the RS-485 serial interface; display analog input variables in standardized form; display firmware numbers of the process control station and the serial interface; select code number for the parameter and configuration levels; resetting data to default setting; level for checking the entire display field.

All levels can be directly accessed on the station over the assigned keys (1 to 8), which can be locked.

Operating level

This is the standard operating level of the process control station. All values relating to the reference variable (setpoint) and the controlled variable (actual value) are digitally displayed in the LCD (10). The system deviation and the manipulated variable are shown in bar graphs. Additional functions of the operating level include, for example: Modifying the reference variable; manually operating the connected control valve; opening the cascade (with cascade control).

Parameter level

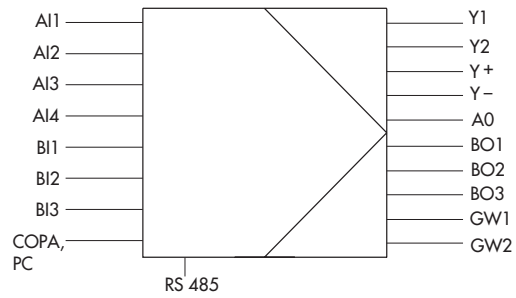
This level is used to numerically define all process parameters (control parameters, transit times, constants) that are specified in the configuration. They can be viewed on the LCD.

This level can also be protected against unauthorized access by means of a code number or over the software.

Configuration level

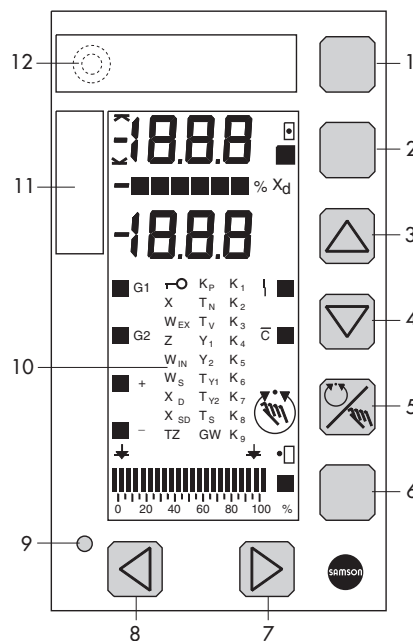
This level sets up the process control station for the required control task. For this purpose, a maximum of 59 configuration blocks must be selected and configured. The configuration blocks selected determine the parameters, which can be defined in the parameter level.

The configuration level can be protected either by a code number, a remote signal or over the software.



| | | | |
|------|-------------------|----|----------------|
| AI | Analog input | Y | Control output |
| BI | Binary input | AO | Analog output |
| COPA | Configuration pen | BO | Binary output |
| PC | Computer | GW | Limit relay |

Fig. 3 · Equipment



- 1 Display and activation key for all level
- 2 Switchover key W_{EX}/W_{IN} or opening or closing of cascade
- 3 Arrow key to increase values (reference variable, parameter values, configuration blocks)
- 4 Arrow key to reduce values
- 5 Manual/automatic key
- 6 Reset key to changeover into the operating level
- 7 Key to increase the manipulated variable
- 8 Key to reduce the manipulated variable
- 9 Reading of measuring range violations, faults
- 10 LCD with readings for reference variable and controlled variable; parameters; bar graphs for system deviation and manipulated variable; various in/out readings
- 11 Exchangeable label
- 12 Port for COPA pen or computer

Fig. 4 · Display and operating elements

Technical data

| Inputs | | Input card 1 | Input card 2 | Input card 3 |
|---------------------------|---------------------------------|---|--|--|
| Input 1 | | mA input, V input, potentiometer or transmitter supply | Pt 100 temperature sensor in 2-/3-wire or 4-wire circuit | |
| Input 2 | | mA input, V input or transmitter supply | | Pt 100 temperature sensor in 2-/3-wire or 4-wire circuit |
| Input 3 | | mA input or V input | mA input, V input or transmitter supply | – |
| Input 4 | | mA input, V input or potentiometer | | mA input, V input, potentiometer or transmitter supply |
| Input for mA or V | Measuring ranges | 4(0) to 20 mA or 2(0) to 10 V; 0.2(0) to 1 V; 1(0) to 5 V | | |
| | Measuring range changeover | Soldered joints | | |
| | Maximum permissible values | Current ± 50 mA, voltage ± 25 V | | |
| | Internal resistance | Current $R_i = 50 \Omega$, voltage $R_i = 20 \text{ k}\Omega$ | | |
| | Permissible common mode voltage | 0 to 10 V | | |
| | Fault | Zero $< 0.2 \%$, span $< 0.2 \%$, linearity $< 0.2 \%$ | | |
| | Temperature influence | Zero $< 0.1 \%/10 \text{ K}$, span $< 0.1 \%/10 \text{ K}$ | | |
| Pt 100 temperature sensor | Measuring ranges ¹⁾ | –50 to 100 °C 0 to 200 °C 100 to 600 °C | | |
| | Measuring range changeover | Soldered joints and configuration | | |
| | Wire resistance | Two-wire $R_{L1} = R_{L2} < 10 \Omega$, three-wire $R_{L1} = R_{L2} = R_{L3} < 50 \Omega$, four-wire $R_L < 100 \Omega$ each | | |
| | Fault | Zero $< 0.2 \%$, gain $< 0.2 \%$, linearity $< 0.2 \%$ | | |
| | Temperature influence | Zero $< 0.2 \%/10 \text{ K}$, span $< 0.2 \%/10 \text{ K}$ | | |
| Potentiometer | Measuring range | 0 to 1 k Ω , $\pm 100 \Omega$, three-wire | | |
| | Wire resistance | $R_L < 10 \Omega$ each | | |
| | Fault | Zero $< 0.2 \%$, gain $< 0.2 \%$ | | |
| | Temperature influence | Zero $< 0.1 \%/10 \text{ K}$, span $< 0.2 \%/10 \text{ K}$ | | |
| Transmitter supply | | 16 to 23 V, max. 50 mA, resistant to short circuit | | |
| Binary inputs | | Three binary inputs, switch contact (load 36 V DC, approx. 3 mA) or external switching voltage 24 V DC, $\pm 30 \%$; max. 6 mA), selected over soldered joint | | |
| Outputs | | | | |
| Continuous-action output | Signal range | 4(0) to 20 mA, permissible load $< 750 \Omega$ or 2(0) to 10 V, permissible load $> 3 \text{ k}\Omega$ | | |
| | Control range | –10 to 110 % | | |
| | Fault | Zero $< 0.3 \%$, rated final value $< 0.3 \%$, linearity $< 0.3 \%$ | | |
| | Temperature influence | Zero $< 0.1 \%/10 \text{ K}$, rated final value $< 0.1 \%/10 \text{ K}$ | | |
| Switching output | | One two-point or three-point output, 250 V AC, max. 250 V DC (1 A AC, $\cos \varphi = 1$) | | |
| Binary output (BO 3) | | Isolated transistor output, $U_{\min} = 3 \text{ V DC}$, $U_{\max} = 42 \text{ V DC}$, $I_{\max} = 30 \text{ mA DC}$ | | |
| Options | Control output | One second continuous-action control output for split-range operation; signal range, control range, fault and temperature influence same as first continuous-action output | | |
| | Analog output | 4(0) to 20 mA, permissible load $< 750 \Omega$ or 2(0) to 10 V or –10 to 10 V, permissible load $> 3 \text{ k}\Omega$ Fault and temperature influence same as first continuous-action output | | |
| | Limit relays | Two relays, floating contacts, max. 250 V AC (1 A AC, $\cos \varphi = 1$) or max. 250 V DC (0.1 A DC) | | |
| | Binary outputs | Two outputs, floating contacts; max. 42 V AC (0.1 A AC); 42 V DC (0.05 A DC) | | |

Technical data (continued)

| Interfaces | | |
|---------------------------------|------------------------------------|--|
| Serial interface on front panel | | RS-232 in combination with COPA adapter |
| | Transfer protocol | SAMSON protocol 6482 |
| | Number of subscribers | 1 |
| | Cable length | < 2 m |
| | Transferable data | Configuration and parameterization data |
| COPA pen | | Read/write pen for uploading and downloading configuration and parameterization data to and from the process control station over the interface on the front panel |
| Serial interface (front panel) | Transfer protocol | Modbus RTU 584 |
| | Data transfer | Asynchronous, half duplex, 2-wire or 4-wire |
| | Character format | RTU (8 bits), 1 start bit, 8 data bits, 1(2) stop bit(s), optional parity bit |
| | Transfer rate | 300 to 19200 bit/s |
| | Number of addressable stations | 246 |
| | Number of subscribers | 32 (extendable with repeater) |
| | Cable length | < 1200 m, max. 4800 m on using a repeater |
| | Transferable data | Configuration and parameterization data, operating state, process variables, alarms |
| General details | | |
| Display | Read-off angle | Readable from all sides, high-contrast and illuminated LCD |
| | Readings | 3½-digit reference variable (setpoint) reading and 3½-digit controlled variable reading; bar graph displays for system deviation and manipulated variable; LED for range violation, alarms issued on limit violation, manual operation, faults etc.; parameter reading (in parameter level only) |
| Configuration | | Function blocks saved in memory for fixed set point and slave control with/without internal/external changeover, cascade control, synchronous control, ratio control, SPC control, limiting control, DDC backup fixed setpoint control over binary contact |
| Power supply | | 230 V AC (200 to 250 V AC), 120 V AC (102 to 132 V AC), 24 V AC (21.5 to 26.5 V AC), Optional: 24 V DC (19 to 34 V DC), 48 to 62 Hz |
| Power consumption | | Approx. 18 VA |
| Temperature range | | 0 °C to 50 °C (operation), -20 °C to 70 °C (shipping and storage) |
| Degree of protection | | Panel-mounted unit: Front panel IP 54, housing IP 30, terminals IP 00; Rack-mounted unit: IP 00 |
| Overvoltage category | | II |
| Degree of contamination | | 2 |
| Design and testing | | Conforming to EN 61010, edition 3.94 |
| Electrical connection | Functional earthing | Panel-mounted unit: On housing with copper braid > 2.5 mm ² Rack-mounted unit: Connector Type F (DIN 41612); copper flexible lead > 2.5 mm ² |
| | Supply voltage and process signals | Panel-mounted unit: 1.5 mm ² screw terminals Rack-mounted unit: Two connectors Type F (DIN 41612); soldering or crimp types |
| Total delay time ²⁾ | | Approx. 100 ms |
| Resolution | | Input and output approx. 11 bits |
| Dimensions | | See dimensional diagrams |
| Weight | | Panel-mounted unit: approx. 1.9 kg; rack-mounted unit: approx. 1.0 kg |

1) Special measuring ranges on request

2) Depending on the number of configured functions

Front-panel serial interface (Fig. 5)

This serial interface enables the user to configure and parameterize the process control station via a special COPA adapter (order no. 1170-1141) or COPA pen (order no. 1170-1142).

When a PC is connected to the process control station, the user is able to enter configuration and parameter data over the menu-driven software program TROVIS 6482, which is a user-friendly Microsoft Windows application. In addition to entering configuration and parameter data, this program also contains functions for documenting the station.

The software can be downloaded from the Internet at <http://www.samson.de>.

The COPA pen can be used to upload or download data applicable to the parameter or configuration levels. This data is stored in the COPA pen until it is overwritten. In this way, the data contents of the process control station can very easily be duplicated and archived directly on the premises.

Communication with a control station

The serial interface, which can be optionally integrated, meets the RS-485 hardware requirements (RS = Recommended Standard) according to EIA (Electronic Industries Association).

The process data can be transmitted up to a distance of 1200 meters. If a broader coverage is required, repeaters have to be connected between segments. How many depends on the number of stations connected and the length of the cable.

Coupling the process control station to a control station requires that an RS-485/RS-232 interface converter be connected.

The TROVIS 6412 or TROVIS 6442 Process Control Stations communicate with the control station according to the master/slave principle, based on the Modbus RTU protocol. All of the stations coupled on the bus are cyclically interrogated and send their reply to the master control station directly following a request.

Monitoring and operator control with the primary control station provides the user with maximum transparency and reliable process control, this of which is backed by user-configurable process graphics software:

- Display of process data (digital, analog)
- Trend characteristics
- Display of operating and fault alarms
- Process visualization through free vector graphics
- Filing of process data for later retrieval

The standardized data format allows the process data to be processed afterwards on a computer using off-the-shelf data base and spreadsheet programs.

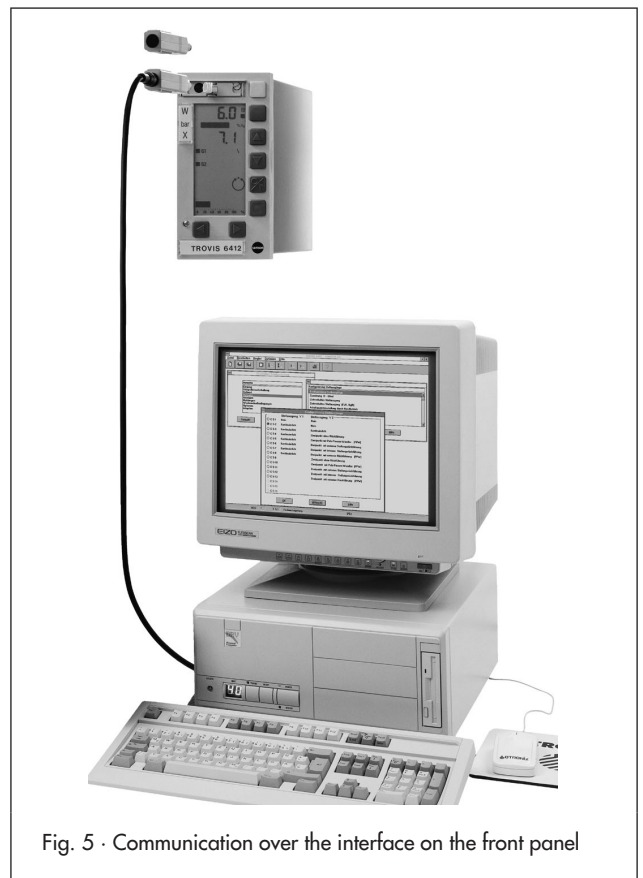
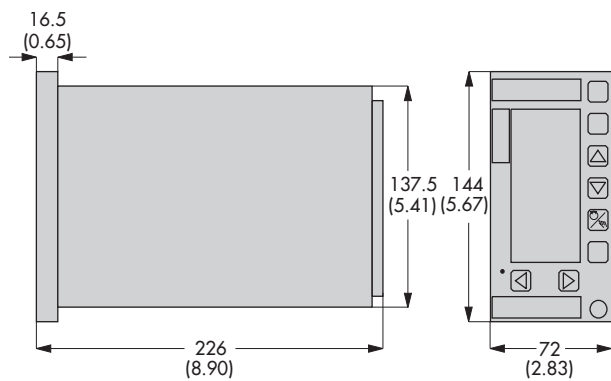


Fig. 5 · Communication over the interface on the front panel

Dimensions in mm (inch)



Panel cut-out $68^{+0.7} \times 138^{+1.0}$ mm ($2.68^{+0.02} \times 5.43^{+0.04}$ inch)

Fig. 6 · TROVIS 6412 Process Control Station (panel mounting)

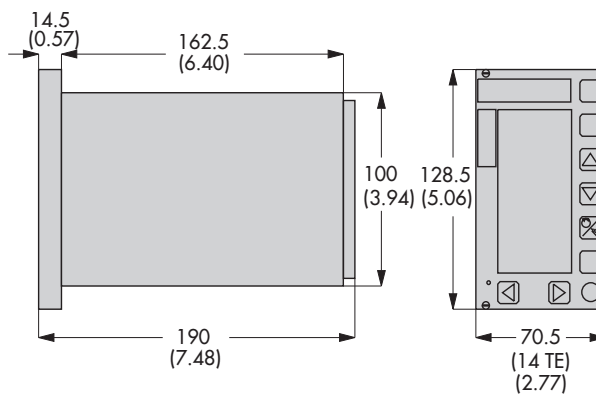


Fig. 6 · TROVIS 6412 Process Control Station (rack mounting)

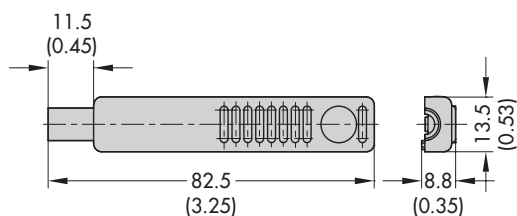


Fig. 8 · COPA pen

Installation

TROVIS 6412 panel-mounting unit

With two standard attaching components C according to DIN 43835 for mounting in a control panel

TROVIS 6442 rack-mounting unit for 19-inch racks

Ordering text

Process Control Station TROVIS 6412/6442

Input card 1/2/3

Power supply 230/120/24 V AC/24 V DC

With/without RS-485 serial interface

COPA pen (order no. 1170-1142)

COPA adapter (order no. 1170-1141)

Specifications subject to change without notice.

