

Visibility Monitor VisGuard Installation Alternatives

SIGRIST's VisGuard visibility monitor offers unique installation flexibility that makes it possible to achieve precisely the right concept for each user and each application. The fundamental alternatives are:

- In-situ or extractive measurement
- Single-point or multiple-point sampling
- Local operation of each instrument or multichannel operation in the tunnel control room

This description of various applications explains the different alternatives with the aim of facilitating selection of the best possible system.



In-situ installation right in the tunnel

The simplest and lowest-cost solution is to mount the VisGuard right on the tunnel wall (or in an SOS niche). The VisGuard's built-in fan draws in the surrounding ambient air and the instrument measures the visibility with the scattered light method. So: one sensor for each detection point. If humidity causes problems, an optional heater is available to eliminate its effects.

Three alternatives are available for instrument operation and data transmission:

- Installation proposal 1: Control unit „SIREL Robust” mounted right next to the VisGuard in the tunnel. The fully enclosed housing contains a display, the keypad for operation, and the power supply for the VisGuard. Signals are transmitted with 4 .. 20 mA or using 2 switching contacts.
- Installation proposal 2: Control unit SIREL placed as far as 100 m away, outside the tunnel cavity. Display and keypad readily visible. Signal transmission with 4 .. 20 mA or using 2 switching contacts.
- Installation proposal 3: Multichannel control of a number of VisGuards with SIBUS. As many as 8 VisGuards can be operated and signals processed centrally via a digital bus. Where the Visguards are installed right in the tunnel, it can be convenient to have not only the readings, but also status information, error reports, etc., easily accessible at any time. The power supply and bus connection are taken care of by a SITRA mounted right at each VisGuard. For troubleshooting or correction of problems at a given instrument, a SIREL can be connected to the SITRA.

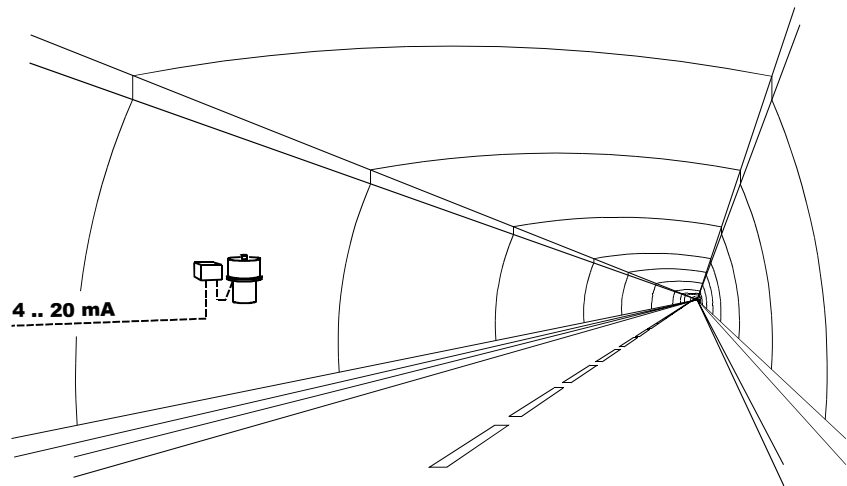


Illustration of installation proposal 1:
In-situ with local control unit „SIREL Robust“

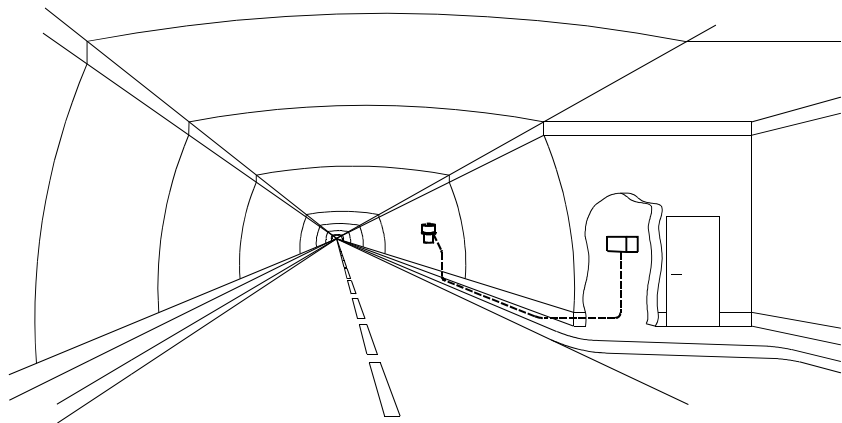


Illustration of installation proposal 2:
In-situ with remote control unit SIREL

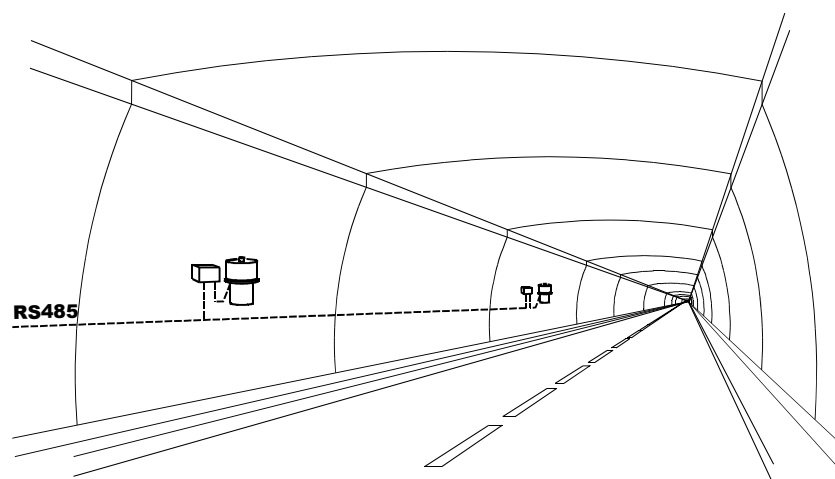


Illustration of installation proposal 3:
In-situ with central multichannel control unit SIBUS via bus

Extractive detection – installation outside the tunnel cavity

For installations outside of the actual tunnel in the control room, cross tunnel, emergency exists, etc. The obvious advantage here is easier access to the instrument without ever having to interrupt tunnel traffic. This simplifies servicing and correction of malfunctions. The arrangement is identical to that used in the past for UP/KTN/CTN installations. Existing sampling systems can be used unchanged. The following sample extraction alternatives are available:

- Installation proposal 4: Mounting in enclosed niche (such as SOS-niche). Extraction length 0 .. 0.75 m with VisGuard in-situ, no additional blower. Instrument operation and signal transmission same as installation proposals 2 and 3.
- Installation proposal 5: Extraction length 0 .. 5 m with blower SE12. Instrument operation and signal transmission same as installation proposals 2 and 3.
- Installation proposal 6: Extraction length 5 .. 30 m with blower SE12. Instrument operation and signal transmission same as installation proposals 2 and 3.
- Installation proposal 7: Extraction length 30 .. 500 m with blower SD4n. Instrument operation and signal transmission same as installation proposals 2 and 3.
- Installation proposal 8: Multiple sampling from as many as 8 detection points feeding one VisGuard via a valve unit with detection-point switching. Extraction length up to 200 m. In the case of extractive systems, this arrangement is usually more economical. The SIBUS multichannel control unit serves as many as 8 detection points.

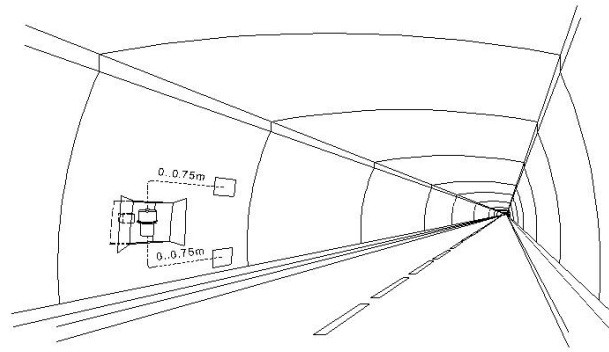


Illustration of installation proposal 4: Mounting in enclosed niche, extractive 0 .. 0.75 m with in-situ unit and local control unit SIREL

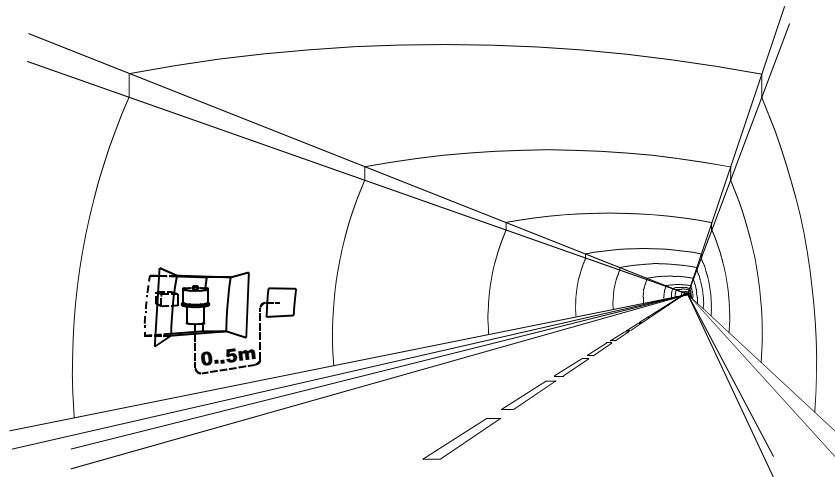


Illustration of installation proposal 5:
Extractive 0 .. 5 m with local control unit SIREL

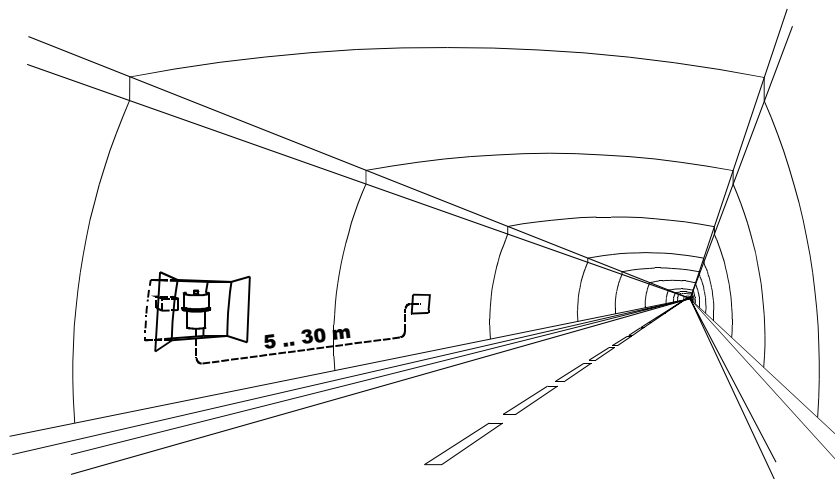


Illustration of installation proposal 6:
Extractive 5 .. 30 m with local control unit SIREL

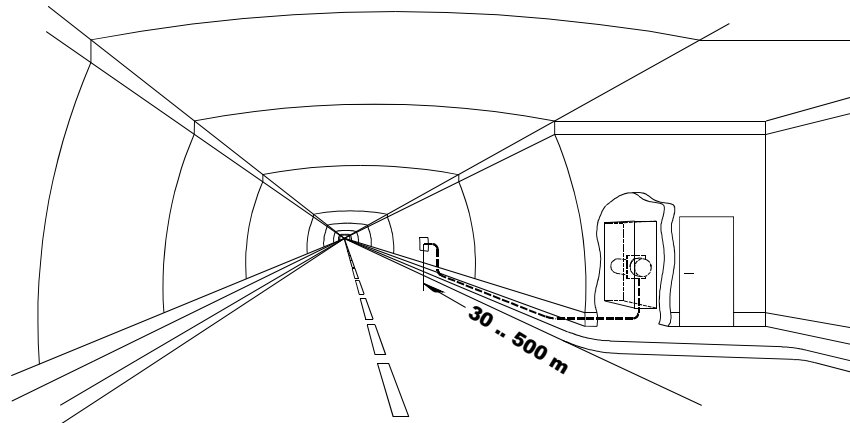


Illustration of installation proposal 7:
Extractive 30 .. 500 m with local control unit SIREL

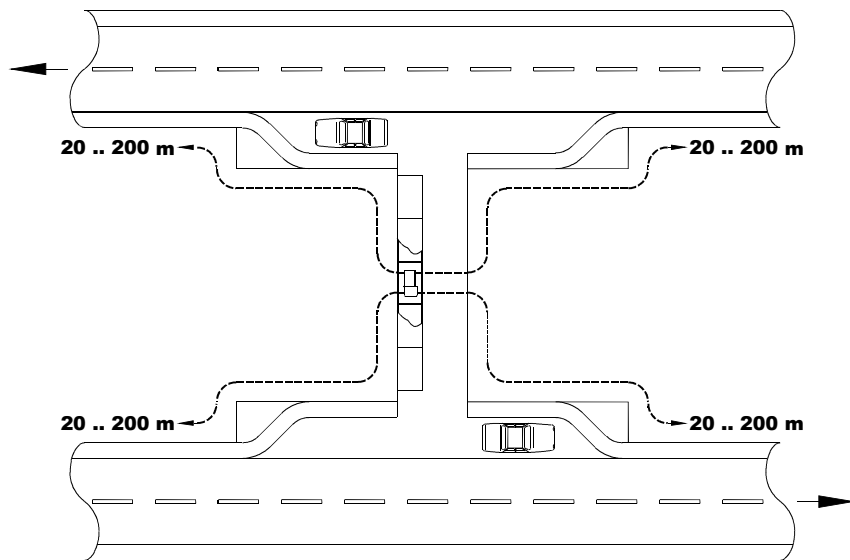


Illustration of installation proposal 8:
Extractive 0 .. 200 m with multiple sampling

Sampling lines

For the sampling lines of the extractive systems, a hard material with smooth inner surface has to be used. In this way, friction losses and material deposition can be reduced. Best results in test measurements have been obtained with PE.

Depending on the intake length, diameters are recommended as below:

intake length [m]	diameter [mm]	sampling system
* 0 .. 0.75	22 mm air in 10 mm air out	Internal blower of VisGuard
0 .. 5	20	GSS 5
5 .. 30	8	GSS 30
30	22	GSS 500
50	24	GSS 500
70	26	GSS 500
100	28	GSS 500
150	30	GSS 500
200	32	GSS 500
300	35	GSS 500
500	40	GSS 500

* Air intake and outlet have to be in the same room. Use of a non-congestive splash water protection is mandatory. The outlet tube should be as short as possible.

For system configurations with multiple sampling line diameters can be calculated on request.

Electrical connections

The electrical connections required for the various installation alternatives are shown in Figures 8 to 12. For further details, please refer to the instrument documentation.

for installation proposal 1

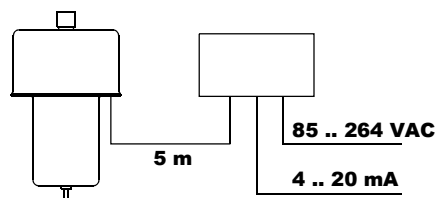


Fig. 4: VisGuard with „SIREL Robust“

**for installation proposals
 2, 5, 6, 7**

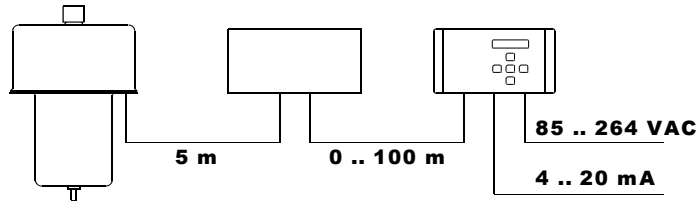


Fig. 5: VisGuard with SIREL (terminal box required for line lengths over 5 m)

**Alternative for installation
 proposals 1, 2**

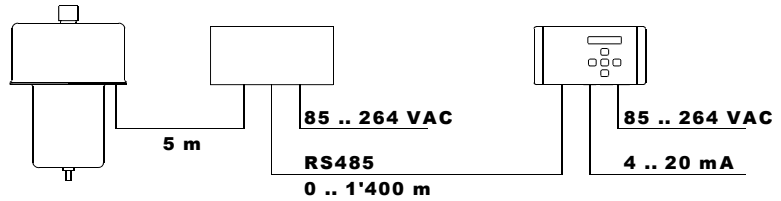


Fig. 6: VisGuard with SIREL for remote call-up of readings and status information (local SITRA required)

**Alternative for installation
 proposals 2, 5, 6, 7**

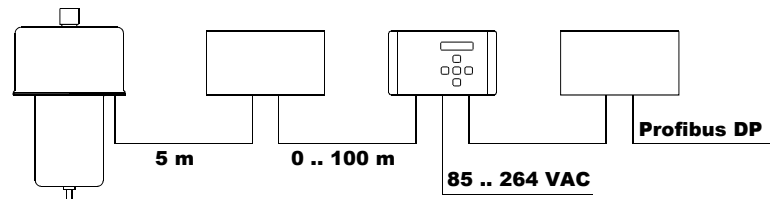


Fig. 7: VisGuard with SIREL and additional connection to Profibus DP network

for installation proposal 3

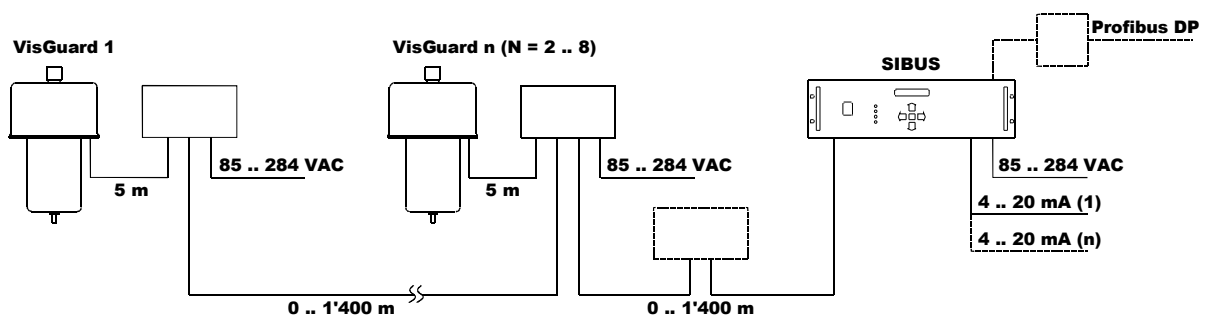


Fig. 8: Multichannel arrangement; for distances longer than 1'400 m an additional SITRA is required

Multichannel control unit SIBUS

SIBUS makes it possible to display the results of up to 8 detection points and to transmit the respective signals. Various inputs can be used:

- 8 VisGuard visibility monitors, In-situ or Extractive
- up to 8 channels of a multiple sampling system. It is also possible to combine VisGuard with such a multiple sampling system and single detection points, e.g. a 4-channel system and 4 single stations.
- VisGuard visibility monitors, In-situ or Extractive plus other sensors (e.g. CO, NO, wind velocity, etc). The total number of detection stations is always 8, e.g. 3 units visibility, 3 units CO, 2 units wind velocity. All of these sensors must have a signal output of 4 .. 20 mA. The sensors can then be connected either to the optionally available analog input card of the SIBUS or directly to a VisGuard. In the latter case, the signal is transmitted to the SIBUS over the digital bus. Any desired units can be chosen for the display (such as ppm, m/s, etc.).

Cabinet components

Normally the extractive sampling systems are housed in cabinets. Figures 13 and 14 illustrate typical equipment installed in these cabinets. Of course the cabinets can also house detection systems for other components, such as CO or NO. In this case part of the extracted sample flow is diverted for the gas detection. Naturally the cabinet dimensions can be adapted to the available space in each case.

Fig. 9: Typical cabinet arrangement for extractive detection, single-instrument sampling

- A Photometer VisGuard
- B Control unit SIREL
- C Sample divider
- D Blower
- E Sample intake
- F Connection for auxiliary equipment
- G Pressure monitor
- H Venturi nozzle
- I Sample heater
- K Silencer
- L Motor protecting switch
- M Purge air filter
- N Purge air hose
- O Hose to blower
- P Hoses for pressure monitors
- Q Hoses for internal connections
- R Terminal block for electrical connections
- S Other measurements, e.g. CO, NO
- T Outlet 230V for heater

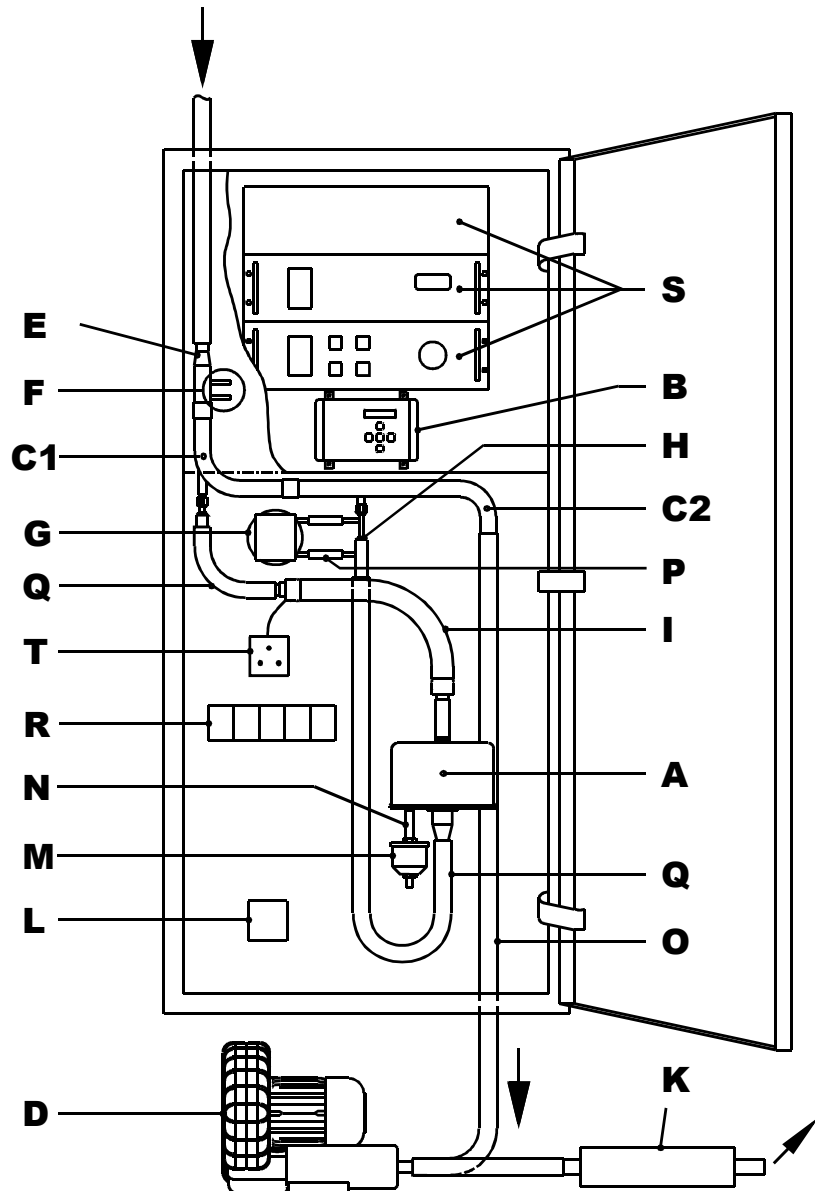


Fig. 10: Typical cabinet arrangement for extractive detection, multiple sampling

- A Photometer VisGuard
- B Control unit SIBUS
- C Valve unit
- D Blower
- E Differential pressure connection
- F Connection for auxiliary equipment
- G Sample intake
- H Intake pressure monitor
- I Pressure monitor, instrument flow
- K Venturi nozzle
- L Sample heater
- M Silencer
- N Motor protecting switch
- O Purge air filter
- P Purge air hose
- Q Hose to blower
- R Hoses for pressure monitors
- S Hoses for internal connections
- T Terminal block for electrical connections
- U Other measurements, e.g. CO, NO
- V Outlet 230V for heater

