

Top roll camera

Mounting and operating instructions

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1. Safety instructions

Prior to connecting and starting the equipment read and understand the safety instructions and operating manuals.



The operating manuals must be kept in a safe place to give the operating personnel access to the documents at all times.

The manufacturer does not accept any liability for damages caused by improper manipulation and non-observance of the safety rules:

- It is imperative to wear proper safety glasses, face guards and refractory clothes when carrying out any work.
- When working on the equipment at the furnace, a further supervising person must be present.
- Never deposit the equipment and components belonging to it within a hot area exceeding 60°C without water flow and air cooling.
- The equipment must also be protected against water penetration and high moisture permeability.
- Only qualified service personnel is allowed to open the electrically operated equipment.
- Prior to connecting the equipment to the mains, all plugs and cables must be connected.
- Do not dismount the plug connections unless electrical power is disconnected.

2. Application

The development of furnace probes permitted a central monitoring of combustion chambers, burners, melting ends and other objects hard to reach because of heat and contamination.

Whenever monitoring is required in a furnace, a boiler or a melting end the installation of a furnace probe is recommended.

The small dimensions of a CCD-colour TV camera module with its special furnace probe lens permit the installation even in restricted space.

We can offer a variety of special probe types for different installation depths.

Please contact our technicians to discuss the conditions of use and the material selection of the probe.

3. Generalities

As the top roll monitoring cameras are constructed with a relative small diameter of 70 mm the radiate cold can be neglected. Consequently an additional insulation of the probe is not necessary.

Because of the intensive changes of temperatures the probe should be inserted slowly.

Independent of the type of montage (top roll support or manual device) the horizontal adjustment of the probe should be kept.

In case of contamination on the viewing orifice caused of small nitrogen admission on the probe a by-pass should be installed to the adjusting valve of the nitrogen. By operating the by-pass valve it is possible to blow off the impurity.

4. Technical Data

Power supply: 230 V
Mains frequency: 50-60 Hz
Power consumption: max. 500 W

We can offer a variety of water cooled furnace probes type FRS. Standard length about 1.000 mm, ambient temperature at the probe tip 2.500°C, water- and air-cooled.

Different fields of view:
axial (straight) view, angles of 60° and 90°.

The probes are made of different materials according to their application:

- Steel St
- Steel VA (Vanadium)
- Thermax
- Titanium
- Ceramic coated

Probe length according to the customer's specification:

max. probe length:	4 meters
diameter of standardized probes:	60 mm
diameter of probes longer than 1500 mm:	70 mm

Ambient temperature

at the probe tip:	max.	+ 2500° C
outer furnace wall:	max.	+ 80° C
camera cable (silicone):	max.	+ 250° C
camera cable (standard):	max.	+ 80° C

5. Water supply



The quality of the cooling water can badly influence the life expectancy of the probe house. Therefore the cooling water should have approximately the quality of drinking water.

In case of polluted water the use of a water re-cooling system is coercively required.

Admissible water contamination of insoluble materials:

max. 10 mg/l, pH value 6,0-8,0

Permissible water temperature in the cooling system max. 40°C after free outflow behind point of consumption. Delta "T" should not exceed 3°C.

The water consumption of a probe in a horizontal or downward inclined position is subjected to the tin bath temperature.

Standard values:

at + 1000°C	4 l/min.	2 bar at the probe
at + 1500°C	10 l/min	2 bar at the probe
at + 2500°C	16 l/min.	2 bar at the probe



These limit values are not allowed to fall short of the initial start-up of the system! They are recalibrated 24 hours after putting into operation.

See that the water outlet temperature of max. +40°C is not exceeded.

Make sure that the water supply pipes give a sufficient quantity of water at the inlet- and outlet connection piece of the probe housing. That means that the main feeding pipes under the tin bath must be installed in min. 1". The pipes going to the flexible ½" connection tubes should be laid in ¾".

6. Supply of air and nitrogen

Nitrogen input pressure at the probe: 5 kp/cm 6 bar. In case of higher input pressure a reducing regulator is required. The max. nitrogen temperature should not exceed 38°C. The proportioning of the sealing air depends on the operating conditions. If the tin bath is under high pressure, the sealing air must be adjusted in order to prevent the collapse of the atmosphere in the tin bath on the opening of the objective. For the initial start-up the consumption of nitrogen should be set at 5 m³/h.

24 hours after commissioning the consumption can be reduced according to the inner temperature of the housing.

The min. nitrogen throughput can't fall short of 2 m³.



The necessary connection tubes for the nitrogen supply should be installed in ¾" main feeding pipes to the tin bath. The tubes for the top roll cameras can be mounted in ½" up to the flexible connection tubes.

7. Assembly of the monitoring system

According to the attached Block Diagram you will see the mechanical and electrical assembly of the monitoring system.

The system consists of a water-cooled housing which is equipped with three media supplies. Two supplies are for water inlet and water outlet. As the probe is furnished with four chambers it is irrelevant on which connection the inlet or outlet of water is mounted. The third connection is provided for the inner supply of the camera housing with nitrogen.

- The camera carrier the prismatic optic and the camera are pushed into the above described water-cooled housing. The mounted flange on the camera carrier has to be used for fixing and adjusting the prismatic optic in the Y/XY-axis.
- The mounted plug on the end of the camera carrier transfers the necessary signals.
- The camera cable is completely Teflon manufactured with high temperature stability.
- The media box must be mounted in that way that the temperature does not exceed 70°C. The units which are installed in the box are controlling water and nitrogen and supply the camera.



The top roll camera should be mounted on a top roll support produced and delivered by SVA.

8. Start up of the monitoring system

When starting up the monitoring system you should proceed in the following way:

Control the video quality which has been adjusted by delivery in focus 0,5-1 m and angular pointing of the prism with 90°. This can be carried out by using a control monitor.

After controlling the picture quality the camera can be mounted on the camera carrier and inserted into the probe housing and by means of the housing flange adjusted in axis XY. This adjustment is necessary and important, as because of transport and separate packing the adjustment of camera and camera carrier could have changed.

The XY-adjustment has to be carried out in that way: Mounting of camera carrier with prism objective and inserting into the housing; take into account that the covering pane of the objective head is adjusted to the viewing orifice of the probe housing when finishing the montage.

If the picture is limited the camera can be adjusted again by unscrewing the coupling rings and lock nuts on the flange.

When starting up the system please watch the supply with water to 100%. That means: because of deairing of the pipe the water supply must be mounted on the water circuit 24 hours before the top roll camera will be inserted into the tin bath.

The nitrogen supply of the housing must be guaranteed.

The necessary connection dimensions see in Item 5 and Item 6. The media cabinet is described to detail in Item 11.

9. Set-up of the camera

In principle the cameras, which have been delivered by **SVA** are controlled and adjusted before dispatching. In case a new adjustment is necessary regulate the dip switches

- in the sensitivity factor and shutter factor white balance automatic and change from colour to black/white. The exact data please see from the attached specification sheet.
- The adjustment for focus and aperture can be done on the objective. The adjustment for aperture in the tin bath usually at "8". By unscrewing of the grub screws and carefully pushing to-and-from of the C-Mount-adapter you can adjust the focus.
- For adjusting of the picture to exactly 90° viewing direction also turn the C-Mount-adapter.

After adjustment of the camera head the adjustment of the camera carrier must be done.

- For adjusting the camera carrier longitudinally unscrew the lock ring under the coupling cap on the flange. The viewing area of the prism must be adjusted without limitation of the image to make sure that the picture on the monitor is shown without corner limitation
- After adjusting the lock rings they have to be fixed with the send special spanner and fixed totally with the coupling cap.



Adjusting has to be done outside the tin bath during the system is working for sure.

10. Mounting of the probe

Before putting into operation the probe in the tin bath must be supplied with water and nitrogen for about 2 hours in order to displace air bubbles which can occur in the water circuit.

For this purpose adjust the probe on the **SVA** support in horizontal position, and also adapt the probe exactly on the opening in the tin bath. Before inserting the probe into the tin bath control the correct water circuit in the ½" tubes. Set the necessary nitrogen quantity with 2m³/h and check it.

After the probe has been inserted for 2 ½ m into the tin bath controls the temperature of the water outlet which should not exceed 45°C. In case the temperature exceeded, increase the volume of water.

We recommend by using more than one probe to insert them successively into the tin bath. Control all the values of the first probe and then insert the second probe.

11. Media cabinet

All control units for nitrogen and water and for operating the camera are installed in the media cabinet which is mounted at the support, further the necessary control keys for operating the support will be mounted.

The electronic is mounted in metal housing protected from splash water. The dimension is according to the space requirement.

The electronic requirement is on demand of the customer. In principle the devices for evaluation for the sensors water and nitrogen, for the alarm and the camera supply unit are already installed, and also the motor-control for the support.

12. Recommended spare parts

The SVA monitoring systems are working trouble free based on our experiences of many years.

In case of unforeseen troubles on customer's site with lack of water or nitrogen certain devices could be destroyed. To make sure that the system can go into reopening within shortest time we recommend to store the following spare parts:

- objective prism head
- lens, objective
- camera
- water-cooled probe housing
- power supply component
- 15m camera cable completely assembled

All these spare parts we hold in storage and can be delivered normally within 14 days.

13. Maintenance work

In order to carry out the maintenance work we recommend to purchase a control monitor equipped with 30channel plug and 3 m camera control cable. By using this control set it is easier to carry out the optical and electrical adjustment of the camera on site.

More than that all working parts of the system as to temperature and nitrogen flow should be controlled routinely.

In case of contamination of the prism head please only use soft material for cleaning. Scratches will come on the safety glass plate when using a tapered object, and consequently it is necessary to exchange the complete glass plate.

In case of image drop-out it is also very important to retract the camera immediately out of the hot area in order to find out the reason for it.

Our technicians will be at your disposal to settle problems on site.