



INZRAK

Enhanced environmental protection inspection for efficient control of air quality monitoring and of all entities under obligation within system of greenhouse gas emission allowance trading, in order to achieve better quality of air in Republic of Croatia



REPUBLIKA HRVATSKA

MINISTARSTVO ZAŠTITE
OKOLIŠA I ENERGETIKE



 **safu** | SREDIŠNJA AGENCIJA ZA
FINANCIARANJE I UGOVARANJE



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EKONERG

Energy research and Environmental Protection Institute



8. AIR QUALITY MONITORING STATIONS

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8.1. STATIONS WITH SAMPLING METHODS

For some pollutants sampling (manual) methods are used with subsequent analysis in laboratories. The most known is gravimetric method (reference method) for determine the floating particles that begin by sampling. There is a sampling method for almost all pollutants. The problem is that these methods are not reference and can not be used without a study of equivalence. Also, they have no time resolution of less than 24 hours. The advantage is more reliable measurement at low concentrations.

8.1. STATIONS WITH SAMPLING METHODS

- **Types of sampling**

sampling of the air
passive sampling on solid sorbent
active sampling on solid sorbent
active fluid sampling (impinger)
sampling on the paper filter

8.1. STATIONS WITH MANUAL METHODS

- **SAMPLING OF THE AIR**

Although it is not used in AQM we mention it because it is often used for sampling in cases of accident (fires, etc.) This is the simplest way of sampling where the pump is sampling the air into (most often) so-called. Tedler bags, or into the canisters. Saving the sample, in this case, should not be longer than 1-3 days, so it is best way to get it, as soon as possible, to the laboratory.

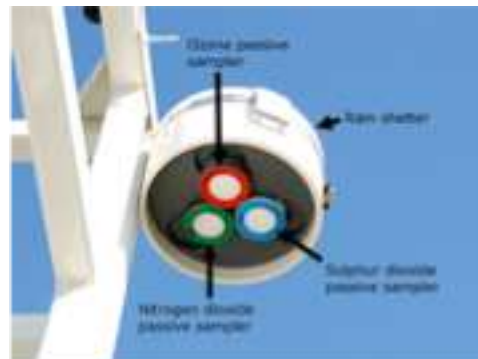
These samples are most often analysed by methods of GC-MS.



8.1. STATIONS WITH MANUAL METHODS

- **Passive sampling on solid sorbent**

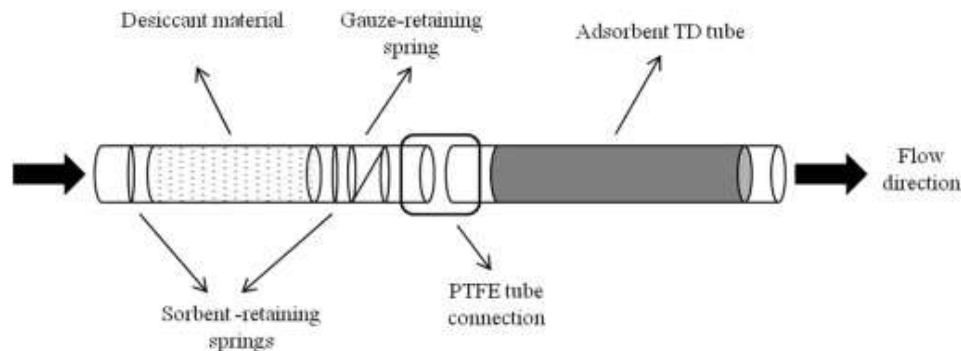
Air is sampled on a separate solid surface adapted to the pollutant which has to be sampled. Pollutant. The substance enters through passive diffusion and adsorbs on the surface. Later in the laboratory, a variety of methods have been using for desorption of the substance and determine its concentration in the sample. Some EU member countries (Austria), in this way, measure the concentration of benzene and very often this method is used for research of fugitive emissions with unpleasant smells on the border of the property. In Croatia we almost do not use this method in AQM, more often in the work environment.



8.1. STATIONS WITH MANUAL METHODS

- **Active sampling on solid sorbent**

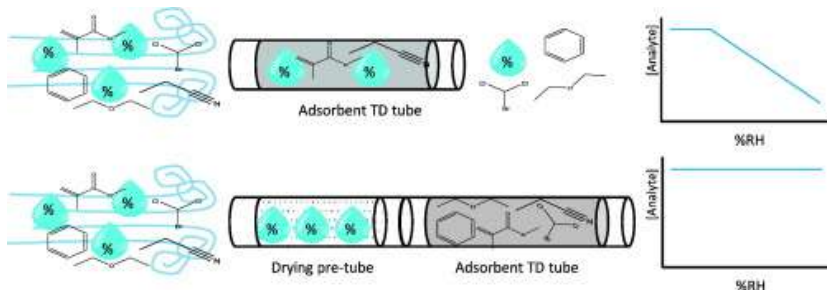
With this method, air is actively pumped through tanks containing more or less specific adsorbent to one pollutant or a group of compounds (eg. VOC, merkaptans, etc.). The passage of air through the adsorbent causes a chemical reaction sampled chemical compound and adsorbent. Later, different methods will be used for desorption and determine of pollutant content. For this method of sampling it is necessary to have reliable pump and traceable flow meter (volume) of the sampled air.



8.1. STATIONS WITH MANUAL METHODS

- **Active sampling on solid sorbent**

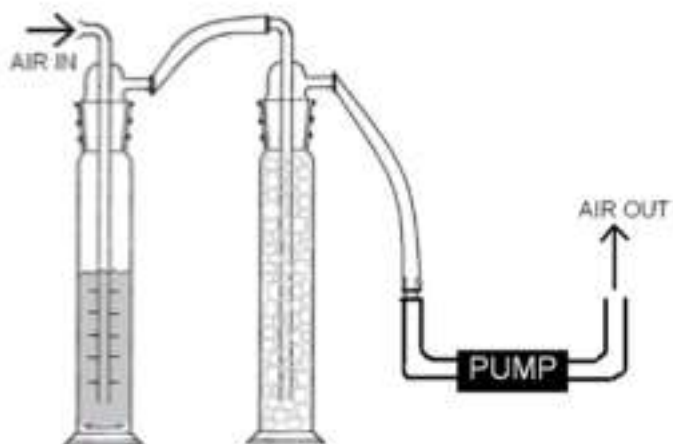
For different pollutants, there are different methods developed with the specific adsorbents and a known percentage of adsorption (efficiency). The most popular method used this kind of sampling is the reference method for the measurement of benzene in the air the HRN EN 14662-1 – Measurement of concentrations of benzene – part 1: Sampling with suction and thermal desorption and analysis of gas chromatography



8.1. STATIONS WITH MANUAL METHODS

- **Active fluid sampling (impinger)**

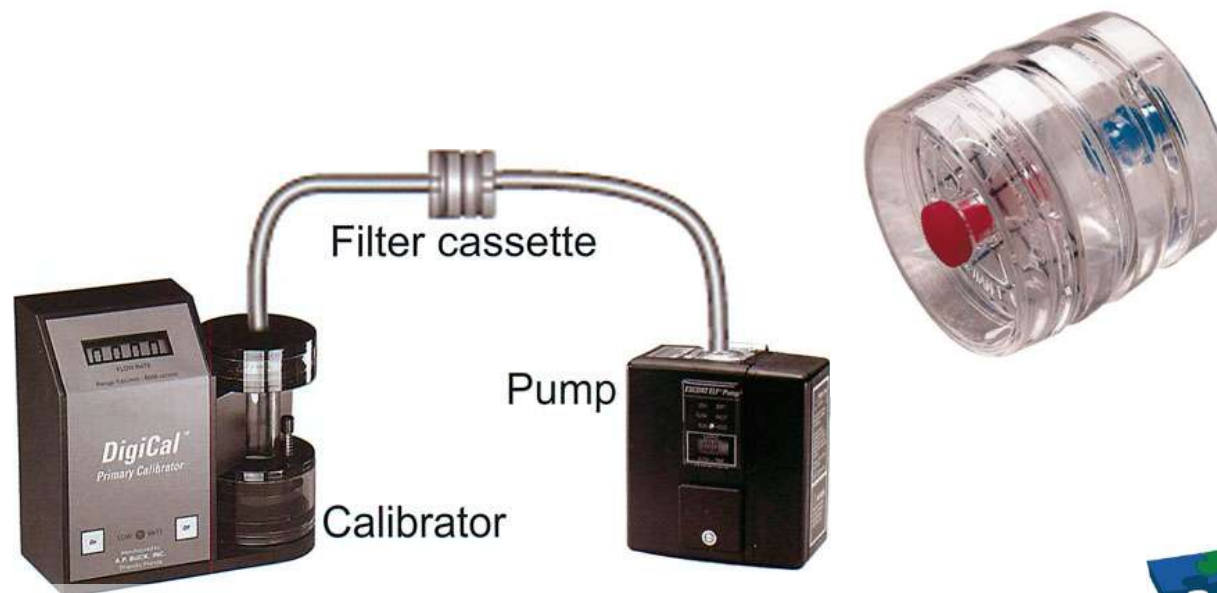
This method is very similar to the active sampling on solid sorbent. Air only passes through the liquid located in the specially designed cylinder (impinger). The method is less used because it is complicated and not a reference method.



8.1. STATIONS WITH MANUAL METHODS

- **Active sampling on the paper filter - vapor**

This method is very similar to the active sampling on solid sorbent. Air only passes through a filter located in the specially designed holder. One of these techniques is often used for the vaporous pollutant. The filter paper is impregnated with chemicals that causes a chemical reaction with the pollutant.



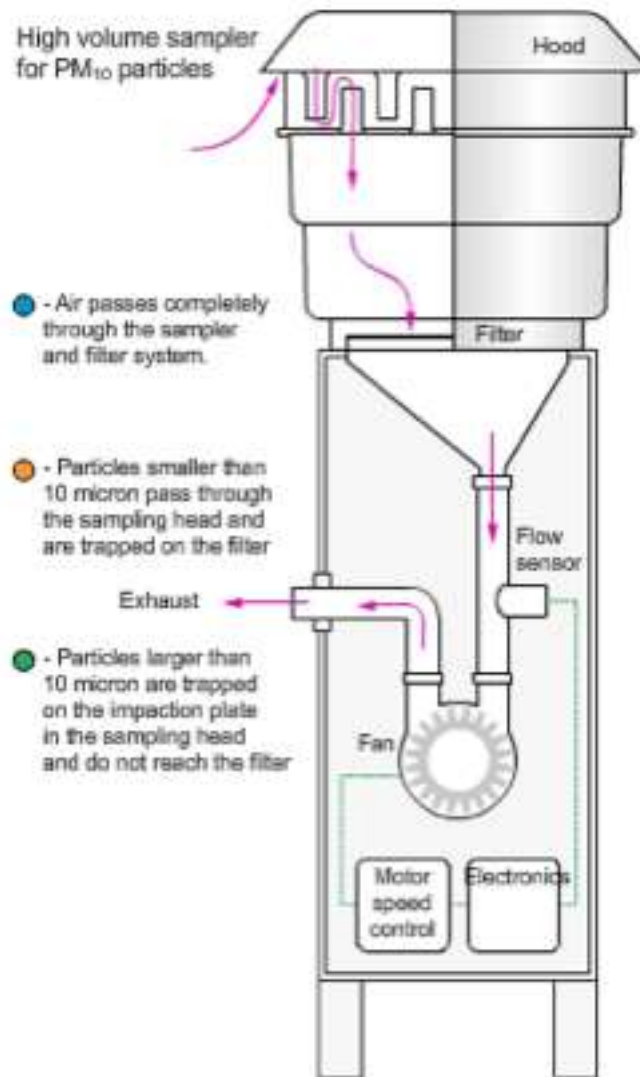
8.1. STATIONS WITH MANUAL METHODS

- **Active sampling on the paper filter - particles**

The reference method for the measurement of the particles PM₁₀/2.5 **HRN EN 12341 – Standard gravimetric measurement method for the determination of the mass concentration of PM₁₀ and PM 2.5 fraction of airborne particles** uses the sampling method of particles on the filter paper with the previously separation in specially designed "head" of sampler. This method separates only the particles of the default aerodynamic diameter and larger particles "stick" to the so-called impactor. So the filter separates particles of the same or smaller aerodynamic diameter than the default.

8.1. STATIONS WITH MANUAL METHODS

Sampling of PM₁₀



8.1. STATIONS WITH MANUAL METHODS

- **Active sampling on the paper filter - particles**

The reference method for the measurement of the particles PM₁₀/2.5
HRN EN 12341 – Standard gravimetric measurement method for the determination of the mass concentration of PM₁₀ and PM 2.5 fraction of airborne particles. The filters are weighed before and after sampling. The mass concentration of particles is determined by the difference in mass and the known volume of sampled air.



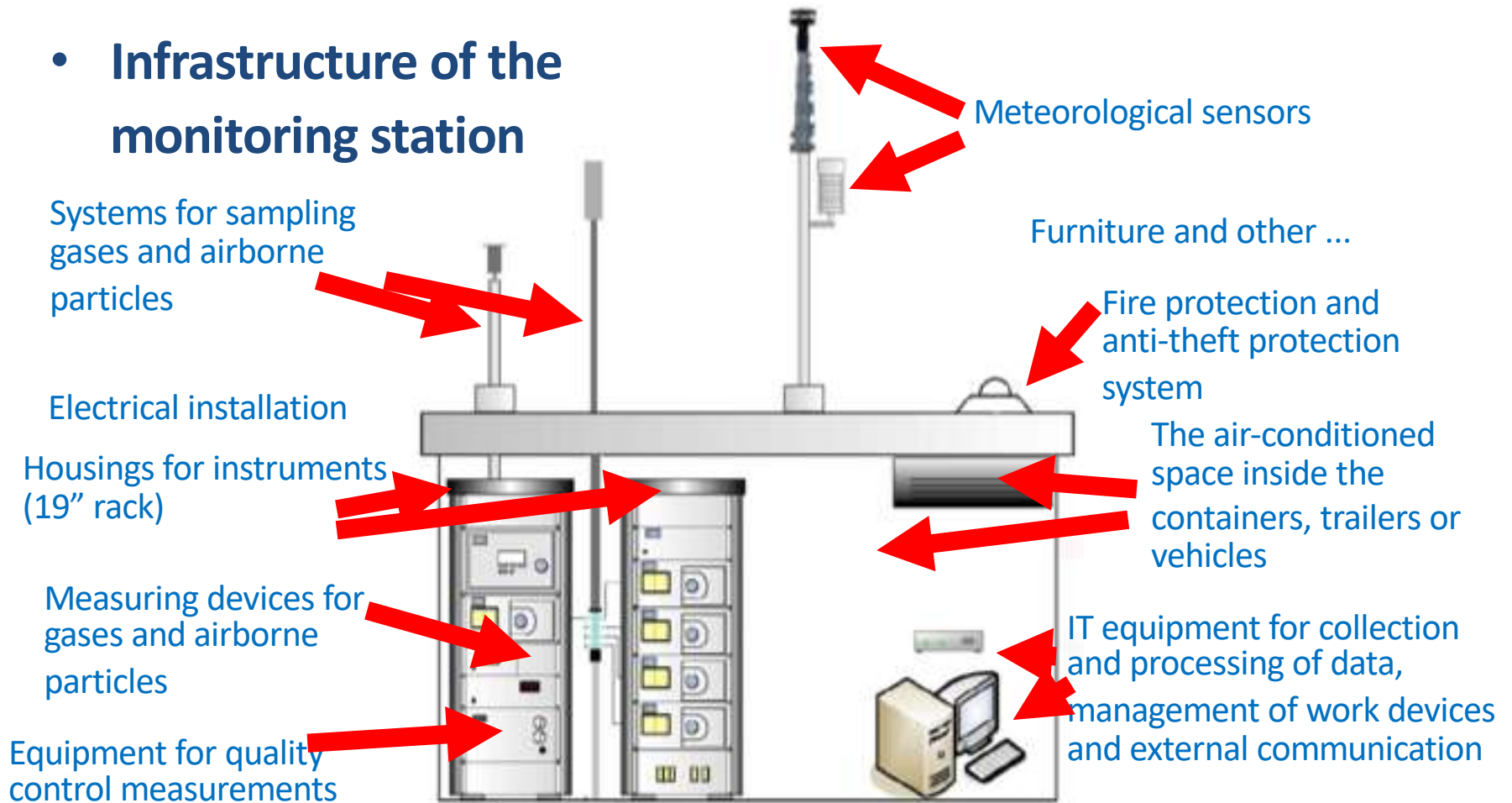
8.2 Automatic air quality monitoring stations

- **Types of monitoring stations**
 - Container type fixed station
 - Compact fixed monitoring station
 - Mobile monitoring station on the vehicle
 - Mobile monitoring station on trailer

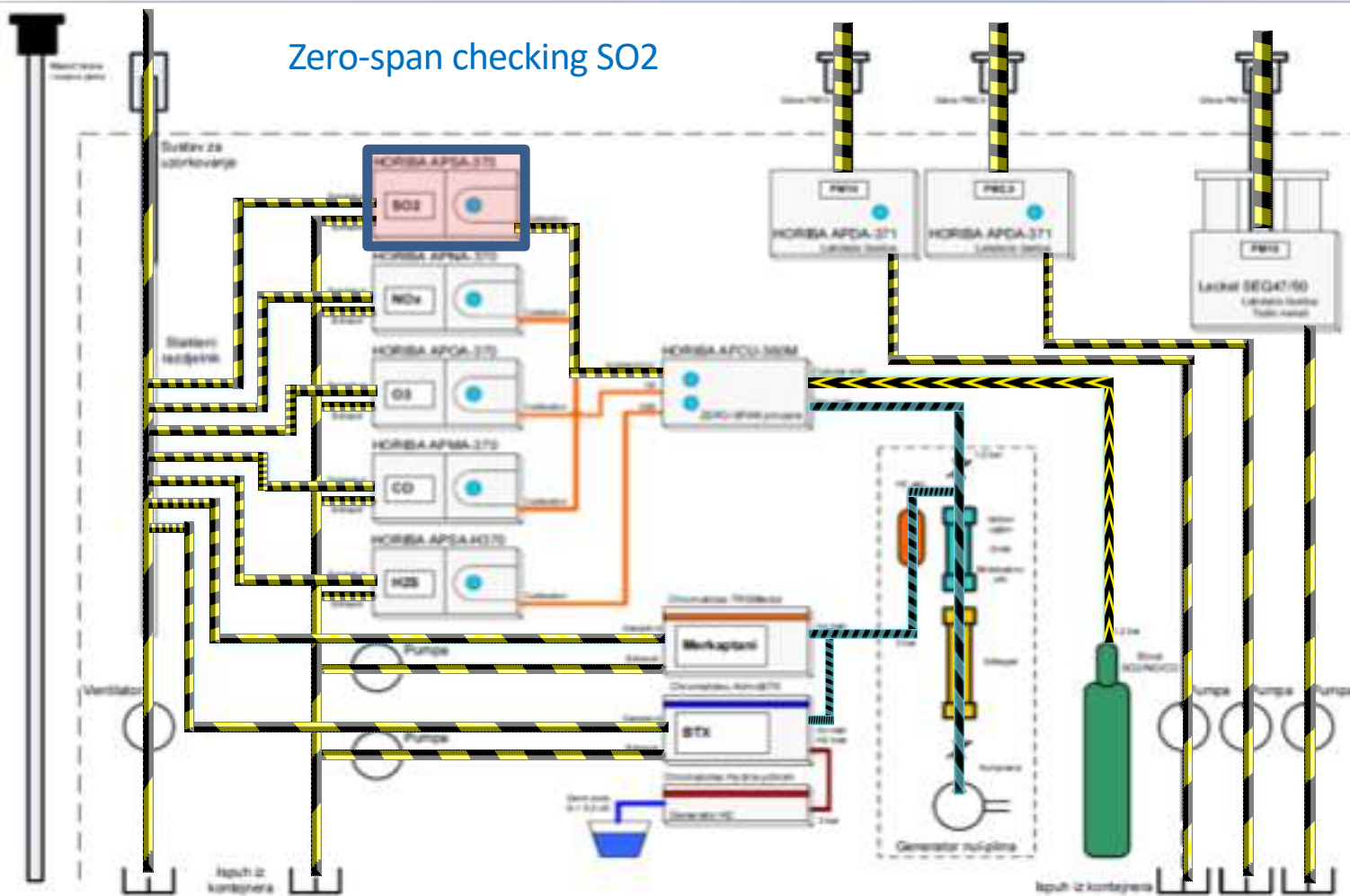


Infrastructure of the monitoring station

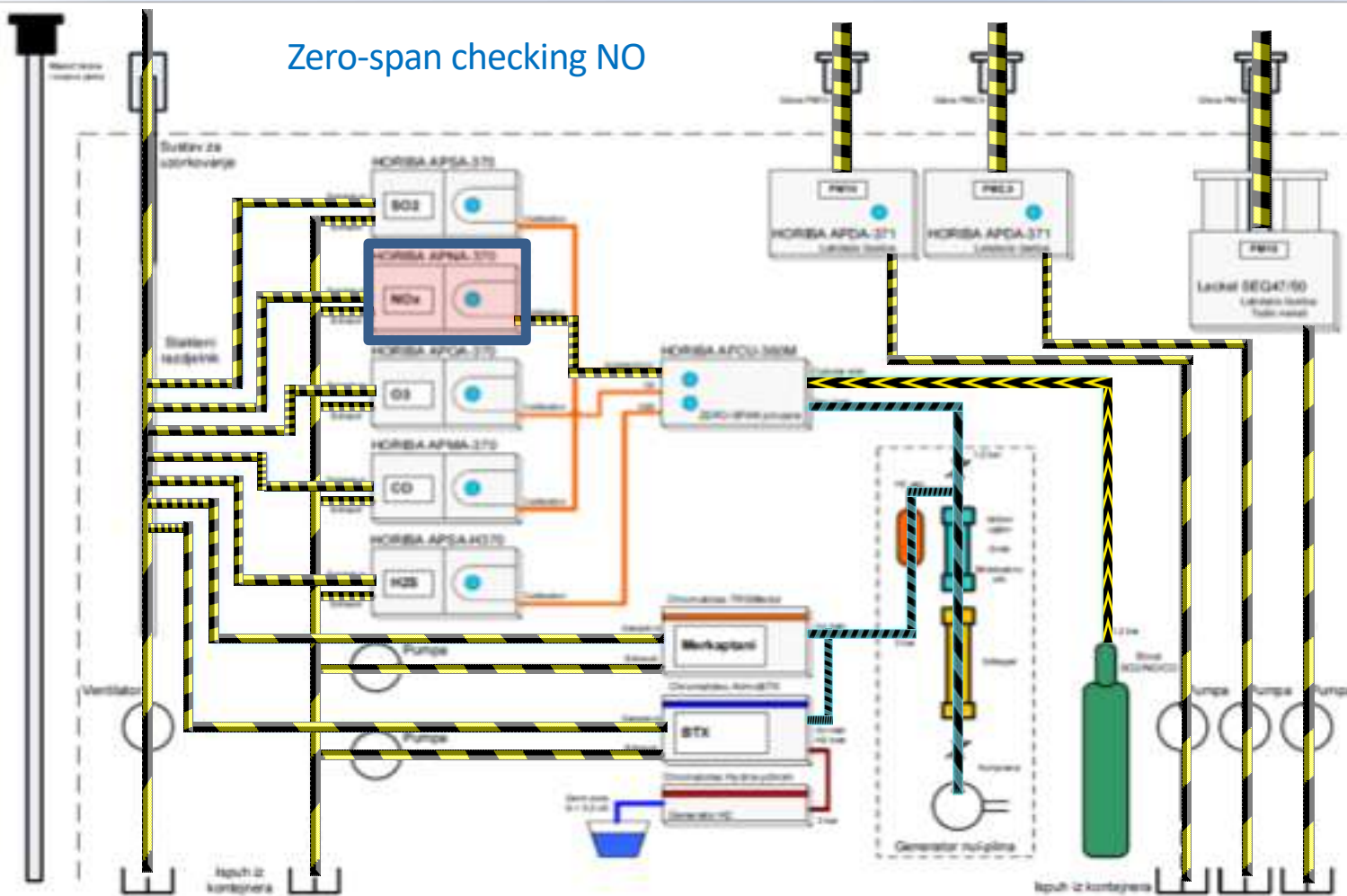
- **Infrastructure of the monitoring station**



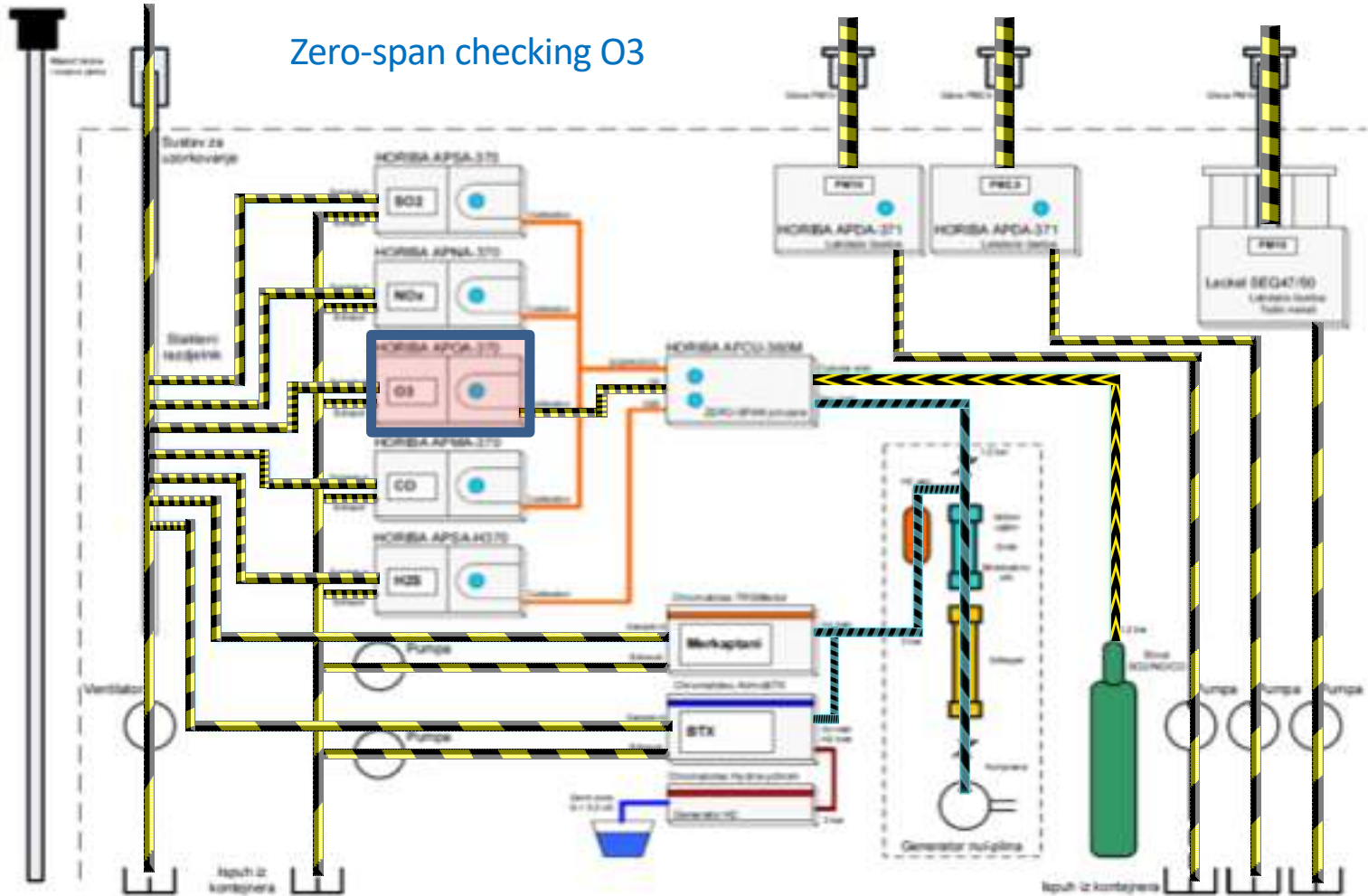
An example of connecting equipment in monitoring station (pneumatica)



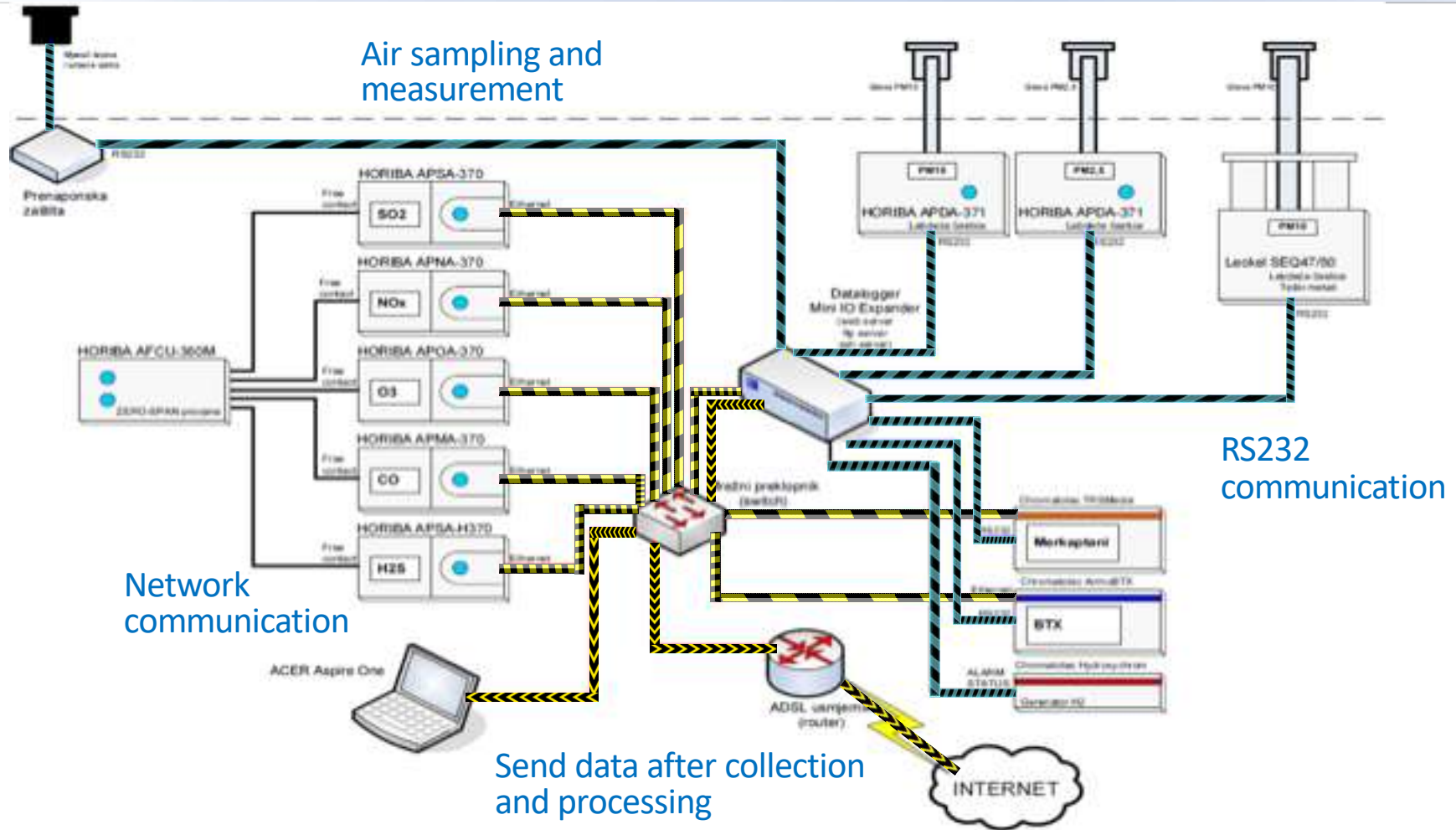
An example of connecting equipment in monitoring station (pneumatica)



An example of connecting equipment in monitoring station (pneumatica)

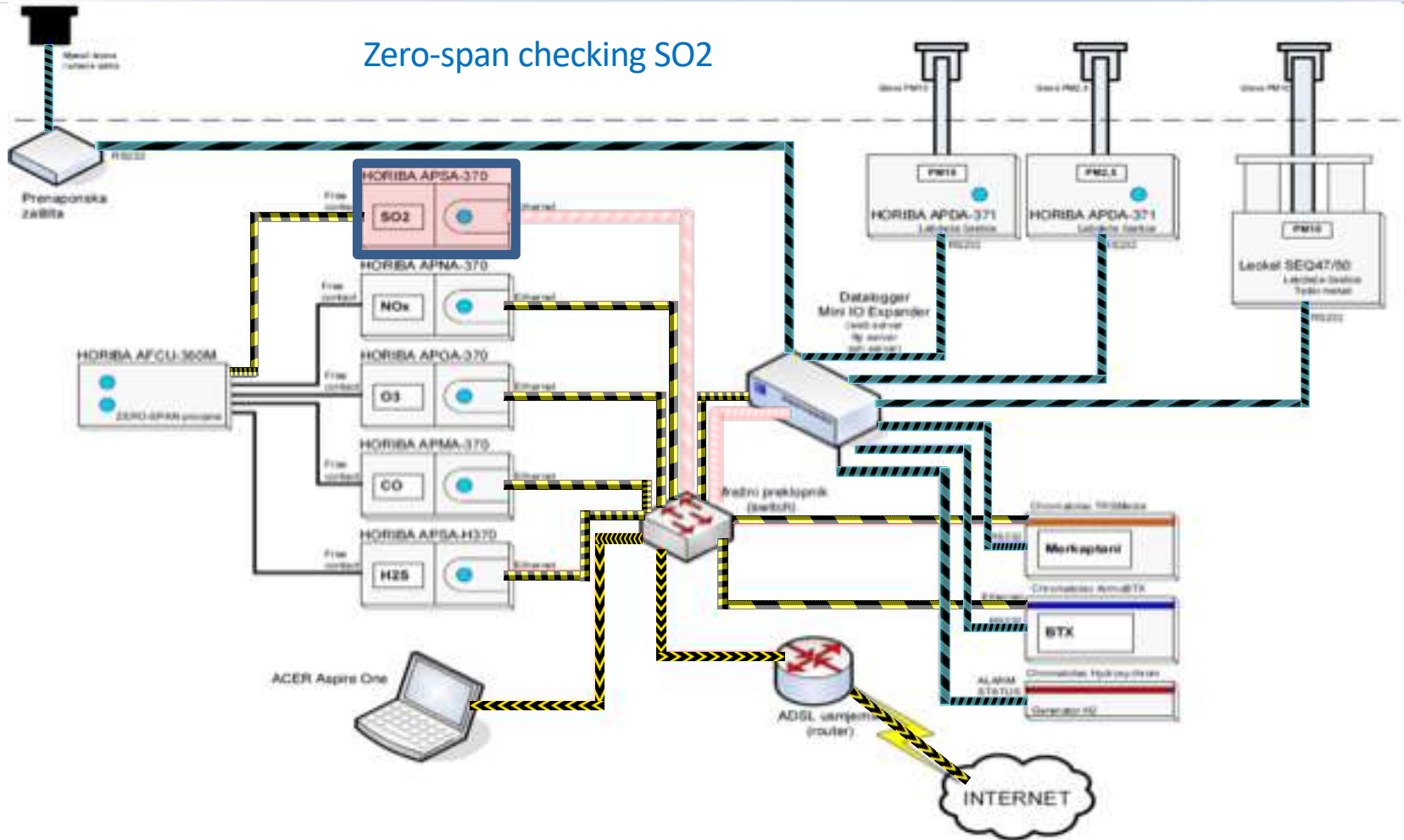


An example of connecting equipment in monitoring station (signal)

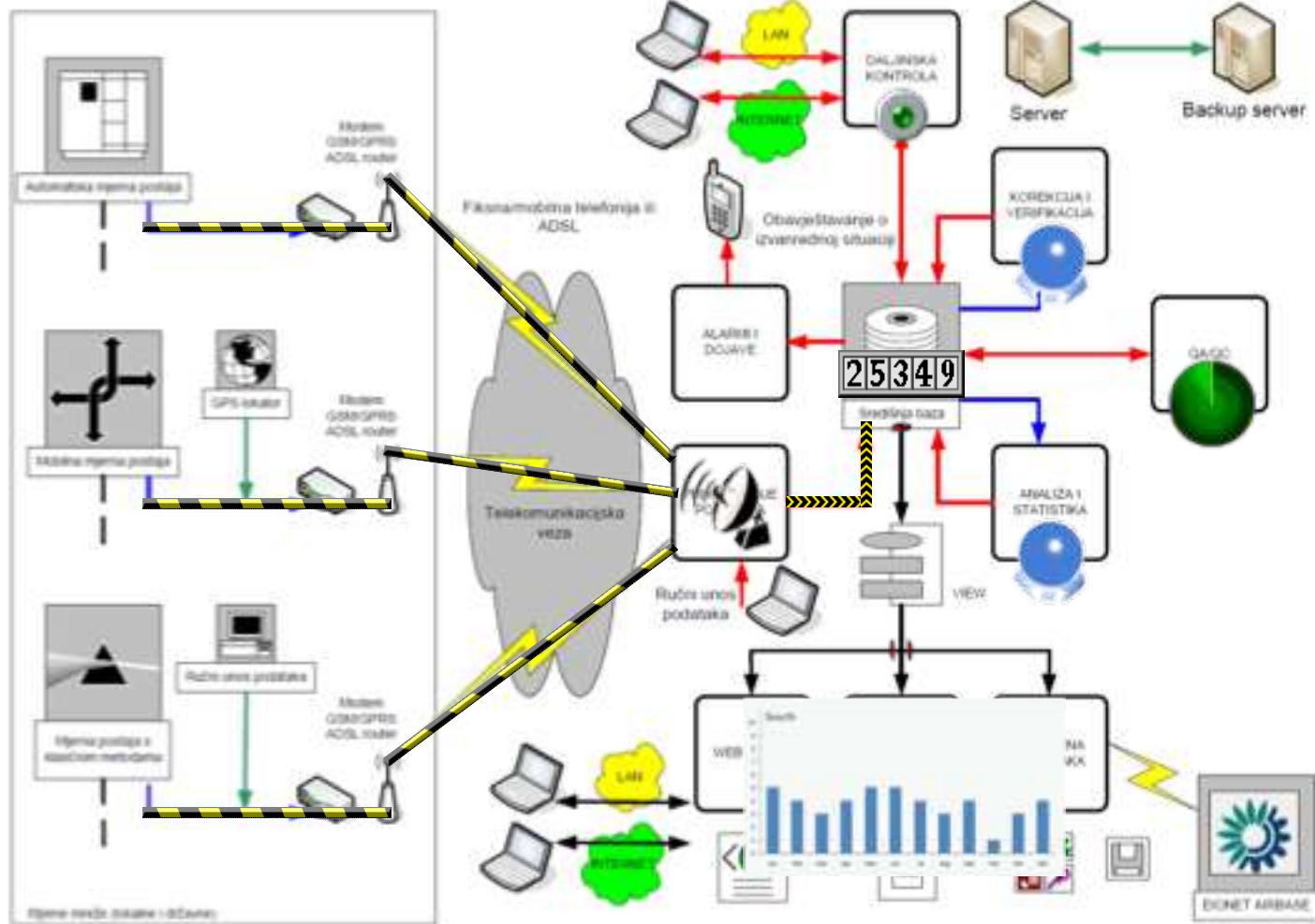


An example of connecting equipment in monitoring station (signal)

Zero-span checking SO2



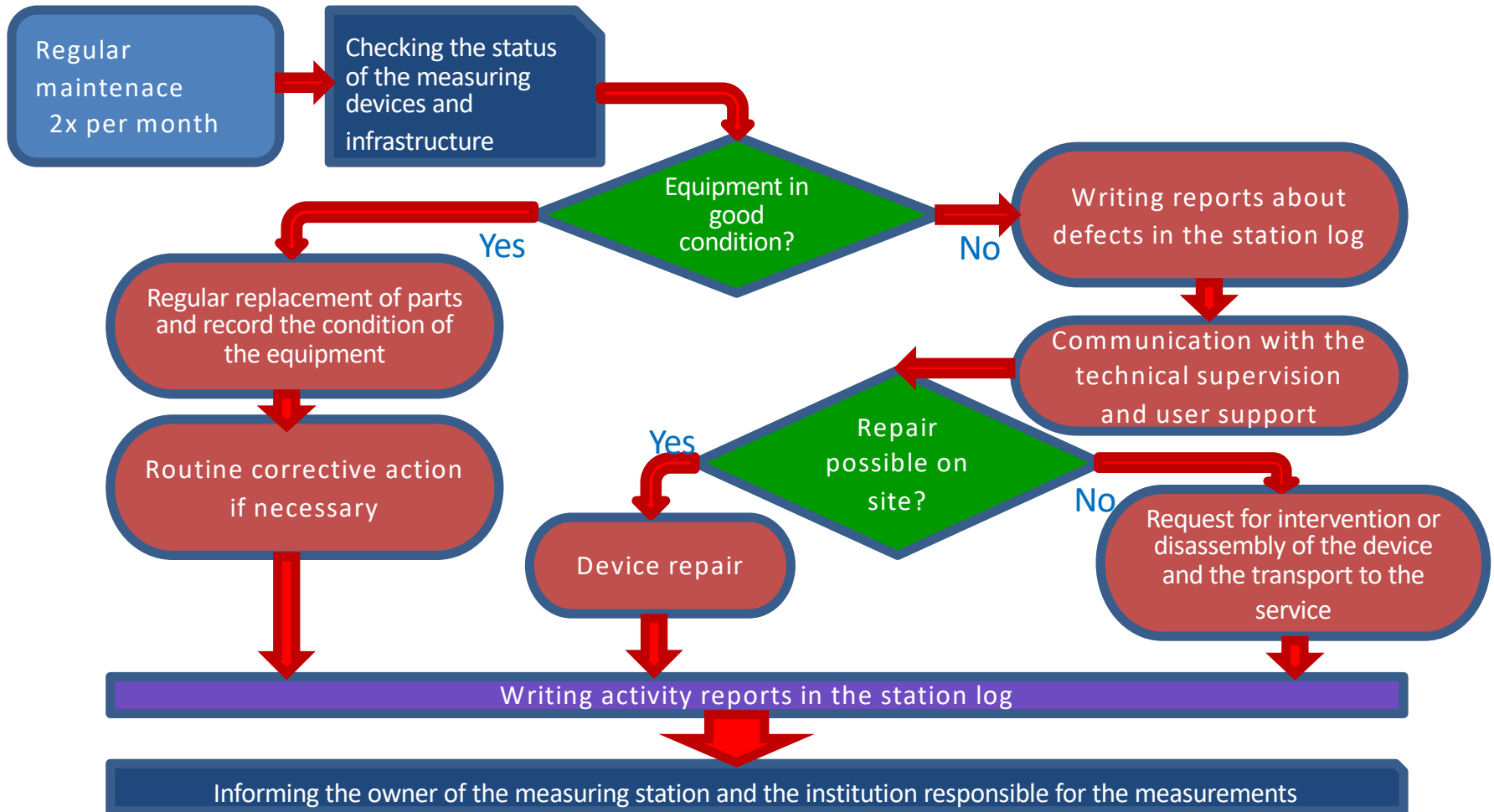
Network information system for air quality



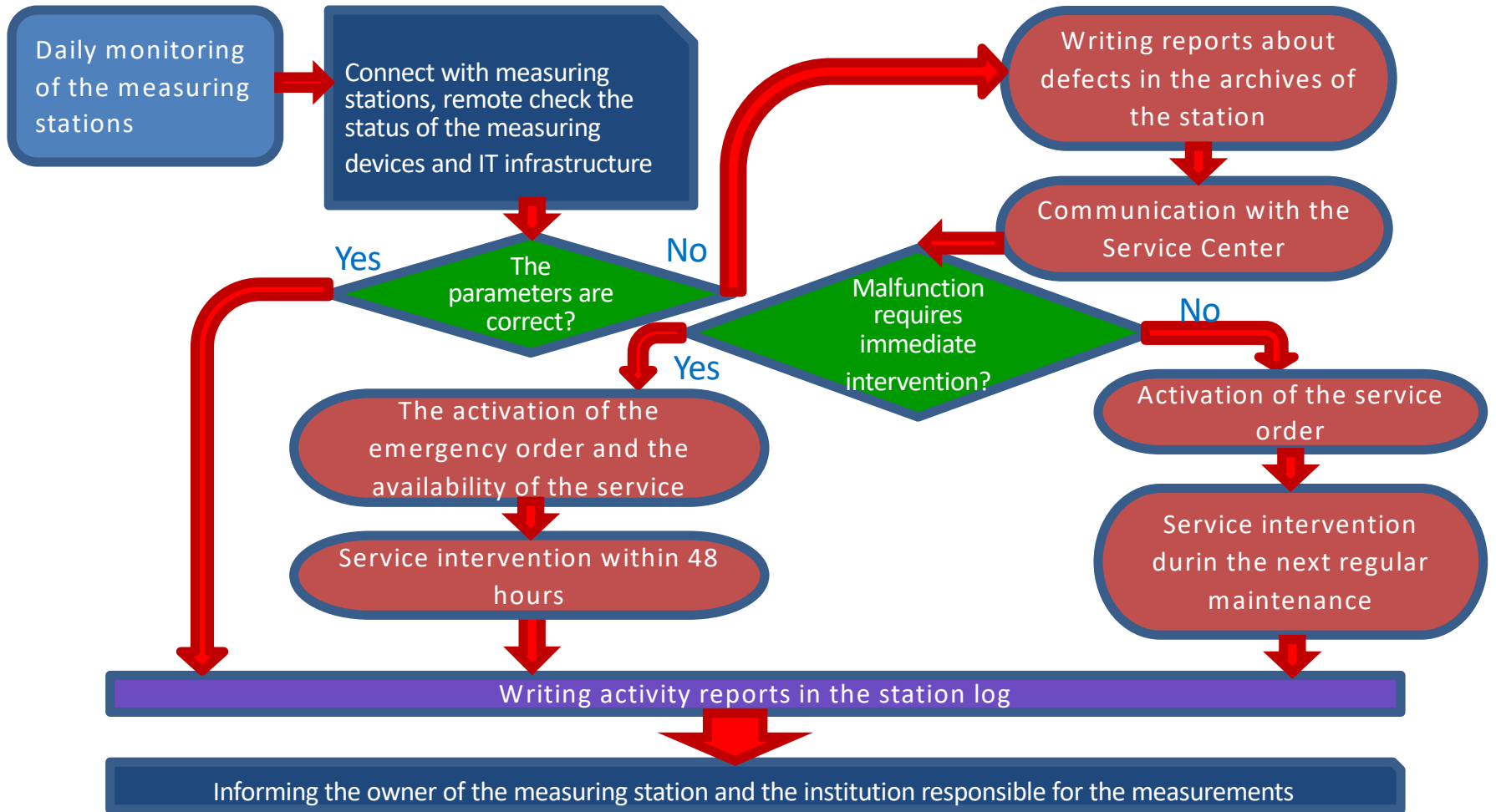
8.3 Maintenance of the monitoring stations

- **Regular maintenance**
 - Two weeks regular visits
 - Infrastructure checking, exchange of filters , minor corrections, devices parameter control
- **Intervention**
 - Extraordinary arrivals to the location upon call
 - carry out activities outside the regular maintenance, for example failures, interruptions of operation, system blockage caused by power supply interruption
- **Annual service**
 - works on infrastructure (air-conditioners, suction, pipes ...)
 - the regular changes of spare parts and chemicals in the analysers
- **Calibration**
 - usually after a larger intervention or annual service analysers are placed in the initial working range with calibration

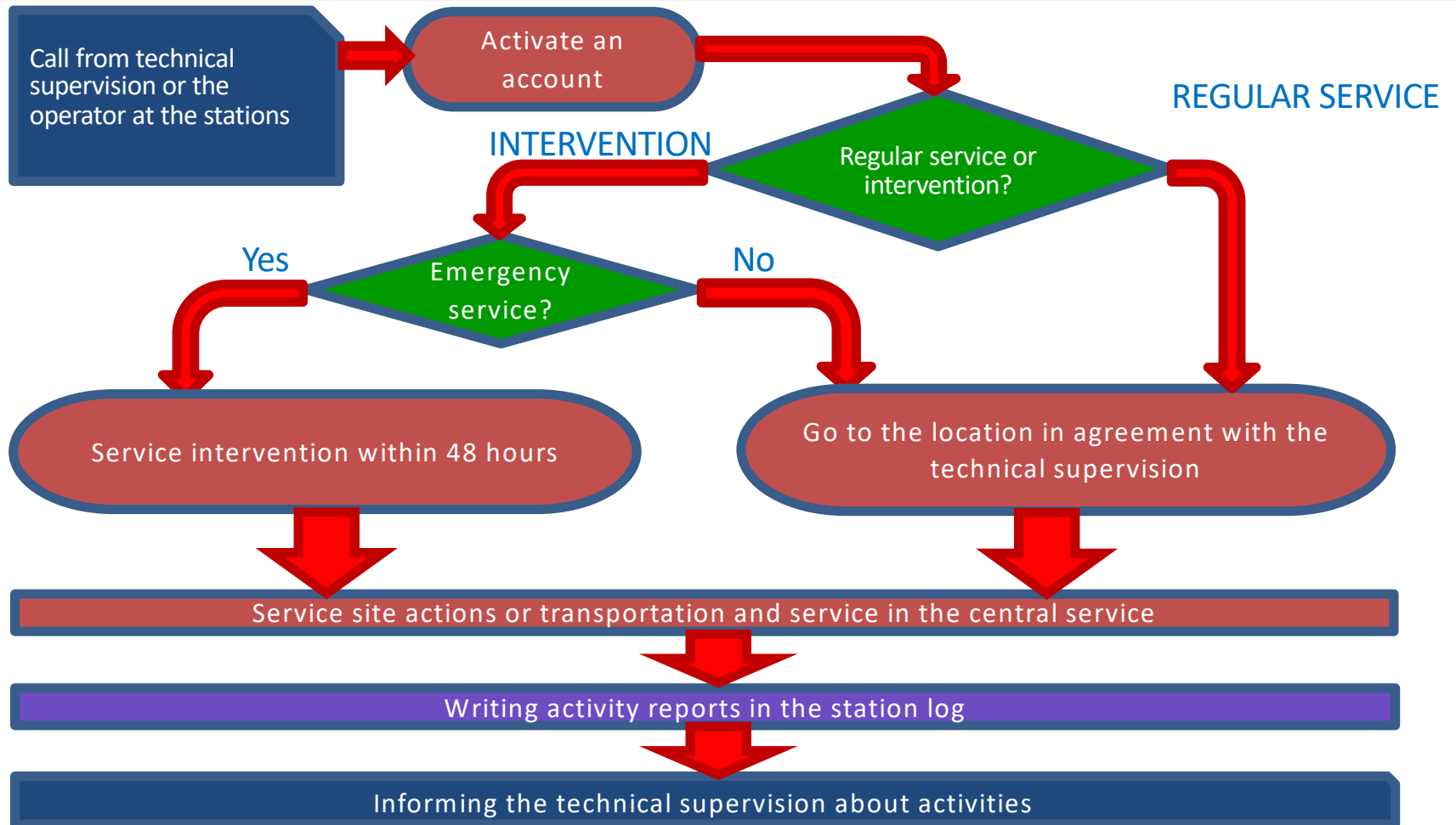
Example of regular maintenance procedures (SOP Ekoneg)



An example of technical supervision procedures (SOP EkonerG)






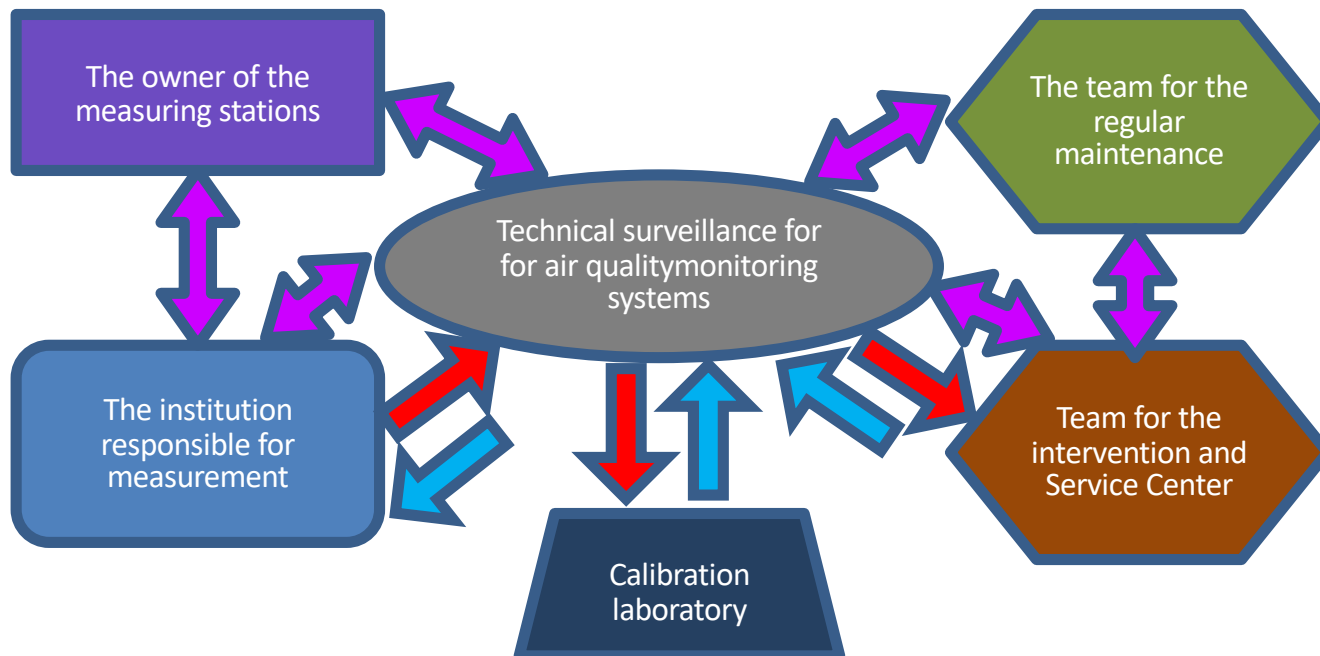
An example of the procedure of the service support (SOP EkonerG)



Communication in the air quality monitoring system

In the maintenance of the monitoring stations communication of technical staff with the testing laboratory, with the owners of the stations and, if necessary, with other relevant institutions has crucial importance.

-  Regular communication about the activities
-  Requesting for corrective actions on the AQM system
-  Reporting on reaction and performing corrective actions on the AQM system





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THANK YOU FOR YOUR ATTENTION

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