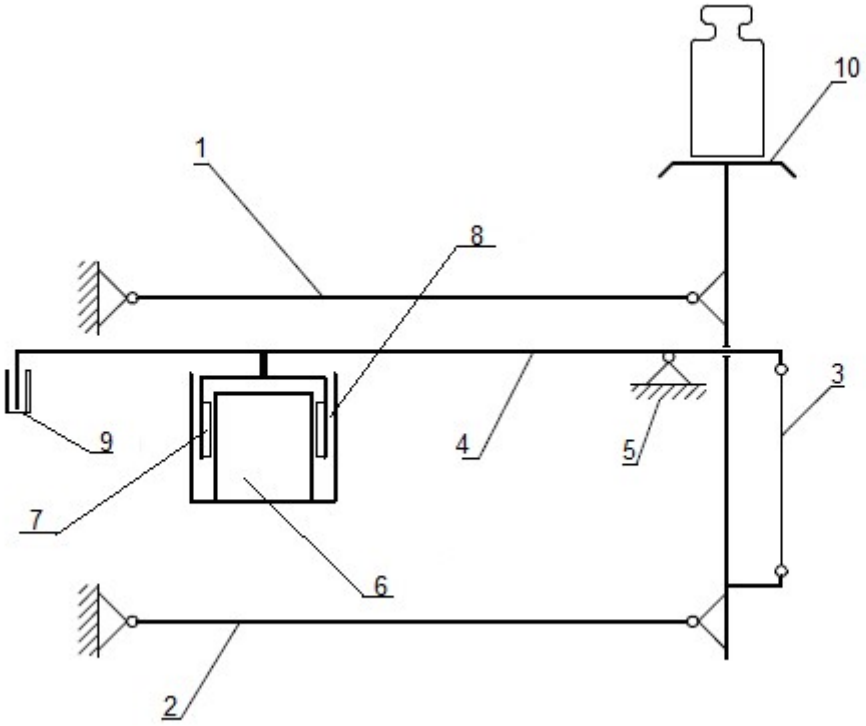
Operation description - X family of balances



1, 2 – parallel guides
3 - vertical elastic element
4 – leverage system
5 – fulcrum
6 – permanent magnet
7 – air coil
8 – air gap
9 – position sensor
10 – load receptor

The operating principle of AS and PS X balances consists in electromagnetic compensation of the force of gravity applied to the load receptor 10. Generally the rule of operation is to keep the whole unit in equilibrium by generating an adequate current Ic that flows through air coil 7. If a load is applied to the weighing pan, it generates a force of gravity related to the mass of the object on the load receptor 10. The leverage system 4 to which the air coil 7 and position sensor 9 are attached changes position so that the unit becomes unbalanced. Electronics detect the position sensor imbalance and reacts by changing the current Ic. In other words, said force causes a deviation of the system from equilibrium, the deviation being transferred by the mechanical system to the coil placed in a magnetic field of a permanent magnet 6 placed within the actuator. The air coil 8 can move freely in the air gap 8 according to leverage system 4 movements. AS X and PS X weighing mechanism is hybridic, made of many parts linked by screws. PS X.M balance is equipped with monolithic weighing mechanism, that is cut out of one piece of metal.

The position of the coil in the field of the solenoid actuator is detected by the position sensor 9. Due to the change in signal from the position sensor 9, the value of the current Ic flowing in

the coil also changes, with this operation the mass measurement system regains its initial equilibrium with another Ic value.

The precise measuring resistor converts the coil current into voltage. The measured value of the voltage is transferred to an A/D converter which supplies the digital value of the measurement signal and transfers it to a microprocessor. The digital signal related to measured mass is then filtered (software). Owing to filtering, demanded resolution is provided. Thus prepared measurement signal is corrected by factors accounting for changes occurring within mass measuring system, which changes are a result of temperature variation. Next, in order to get accurate linear relation between measured load and measurement signal value, the signal is subjected to so called linearity correction. At the end the measurement signal is scaled using adjustment coefficient, this is to provide weighing result, displayed on the screen. The weighing result is considered to be stable when it varies less than specified by stability criterion value described below. All operations mentioned here are performed by embedded software. The weighing result is displayed on the LCD display. The weighing results can be saved in the internal memory or passed to other devices via interfaces. One of those interfaces is wireless. FCC certified module is applied to connect R weighing scales to an external WiFi network. AS X weighing scales are additionally equipped in internal electronic level sensor that passes the information on the device level in real time to the main microprocessor through an internal interface and allows to display an animation of bubble level indicator on the display and level the scale by regulating the feet.