90.26 - Instruments and apparatus for measuring or checking the flow, level, pressure or other variables of liquids or gases (for example, flowmeters, level gauges, manometers, heat meters), excluding instruments and apparatus of heading 90.14, 90.15, 90.28 or 90.32.

9026.10 - For measuring or checking the flow or level of liquids

9026.20 - For measuring or checking pressure

9026.80 - Other instruments or apparatus

9026.90 - Parts and accessories

Apart from instruments or apparatus more specifically covered by other headings of the Nomenclature, such as :

(a) Pressure-reducing valves and thermostatically controlled valves (**heading 84.81**);

(b) Anemometers (wind gauges) and hydrological level gauges (**heading 90.15**);

(c) Thermometers, pyrometers, barometers, hygrometers and psychrometers (**heading 90.25**);

(d) Instruments and apparatus for physical or chemical analysis, etc. (**heading 90.27**),

this heading covers instruments and apparatus for measuring or checking the flow, level, pressure, kinetic energy or other process variables of liquids or gases.

The instruments and apparatus of this heading may be fitted with recording, signalling or optical scale-reading devices or transmitters with an electrical, pneumatic or hydraulic output.

Measuring or checking apparatus generally incorporates an element sensitive to variations in the quantity to be measured (e.g., Bourdon tube, diaphragm, bellows, semiconductors) moving a needle or a pointer. In some devices the variations are converted into electrical signals.

Measuring or checking instruments or apparatus of this heading combined with taps, valves, etc., are to be classified as indicated in the Explanatory Note to heading 84.81.

(I) APPARATUS FOR MEASURING OR CHECKING THE FLOW OR RATE OF FLOW OF LIQUIDS OR GASES

(A) **Flowmeters**. These indicate the rate of flow (in volume or weight per unit of time) and are used for measurement of flow both through open channels (rivers, waterways, etc.) and through closed conduits (piping, etc.).

Some flowmeters use the principle of the fluid meters of heading 90.28 (turbine-type, piston-type, etc.), but the majority are based on the principle of differential pressure. These include :

(1) **Differential pressure** (fixed aperture) **flowmeters**. These comprise essentially :

(i) a primary device (e.g., Pitot or Venturi tube, simple diaphragm, orifice plates, shaped nozzle) to set up a differential pressure, and

(ii) a differential pressure gauge (float, diaphragm, differential pressure, oscillating ring balance or flow transmitters, etc., type).

(2) **Variable area** (variable aperture) **flowmeters**. These usually consist of a graduated cone-shaped tube containing a heavy float which is carried along by the current until the flow of the liquid between the float and the wall reaches equilibrium. For high pressure liquids, use is made either of magnetic flowmeters (the position of an iron float in a non-magnetic tube being shown externally by a magnet), or of valve flowmeters (an iris diaphragm fitted inside the tube being connected in parallel with a small flowmeter).

(3) **Flowmeters** which operate by using magnetic fields, ultrasound or heat.

This heading **excludes** :

(a) Hydrometric paddle-wheels for measuring the rate of flow in rivers, canals, etc., which fall in **heading 90.15** as hydrological instruments.

(b) Apparatus which merely indicate the total amount of liquid delivered over a period, which are classified as supply meters in **heading 90.28**.

(B) **Anemometers** of the special types used for recording the rate of flow of air currents in mines, tunnels, chimneys, furnaces and conduits in general, and consisting essentially of a bladed fan and a calibrated dial. In some devices the measured values are converted into electrical signals.

(II) INSTRUMENTS AND APPARATUS FOR MEASURING OR CHECKING THE LEVEL OF LIQUIDS OR GASES

Level indicators for liquids and **indicators for the content of gasometers**.

Level indicators for liquids include :

(1) **Float-type**. These may give a direct reading on a graduated column mounted on the float, or the effect may be transmitted to a dial needle by means of a cable and drum or be converted into an electrical signal.

(2) **Pneumatic and hydrostatic type**. These are used to measure the level in pressure tanks, by means of a differential pressure gauge.

(3) **Two-colour light type, for boilers**. These are based on the difference in the refractive indices of water and steam. They consist of a set of lamps, coloured screens, an optical system and a level which indicates in different colours the respective heights of the water and the steam.

(4) **Electrical-type**, based, for example, on the variations of resistance, capacitance, ultrasound, etc.

This heading covers not only level indicators for closed reservoirs or tanks, but also those for open basins and canals (hydroelectric works, irrigation systems, etc.).

To ascertain the content of a gasometer, the level of the "bell" is measured, either directly or from a dial needle to which the bell is connected by means of a cable and drum.

Instruments for measuring or checking the level of solid materials are **excluded** (**heading 90.22** or **90.31**, as the case may be).

(III) INSTRUMENTS AND APPARATUS FOR MEASURING OR CHECKING THE PRESSURE OF LIQUIDS OR GASES

Pressure gauges (e.g., manometers), apparatus for measuring the pressure of a liquid or gas. These differ from barometers in that the latter measure atmospheric pressure while pressure gauges indicate the pressure of a liquid or gas in a closed space. The main types of pressure gauges are as follows :

(1) **Liquid-type pressure gauges** (mercury, water or other liquids, or two non-miscible liquids). The liquid is contained in a glass or metal tube; these gauges may be of the single column type, U-tube type, inclined tube or multitube type, or be in the form of an oscillating ring balance.

(2) **Metallic pressure gauges**. Like aneroid barometers, these may have a single or multiple diaphragm, a capsule, Bourdon tube or spiral metal tube or some other pressure sensitive element which directly moves a pointer or varies an electrical signal.

(3) **Piston-type pressure gauges**. In these, the pressure is applied either directly or via a diaphragm on to a piston which is weighted or held by a spring.

(4) **Electrical pressure gauges** based on variations of an electrical phenomenon (e.g., resistance, capacitance) or using ultrasound.

Vacuum gauges for measuring very low pressures, including ionisation gauges using thermionic vacuum tubes (triodes). In these, positive ions produced by collision of the electrons with the molecules of the residual gas are attracted towards a negative plate. Thermionic vacuum tubes (triodes) presented separately are **excluded (heading 85.40)**.

The heading also covers the **maximum and minimum type pressure gauges. Differential pressure gauges**, used to measure differences in pressure, include the following types : two-liquid, float, oscillating ring balance, diaphragm, capsule, ball (without liquid), etc.

(IV) HEAT METERS

Heat meters measure the quantities of heat consumed in an installation (e.g., a hot water type heating system). They consist essentially either of a liquid supply meter, two thermometers placed respectively at the intake and outlet of the conduit, and a counting and totalising mechanism. This group also covers thermocouple heat meters.

Small heat meters of the types mounted on radiators in blocks of flats so that central heating costs can be fairly divided resemble thermometers and contain a liquid which evaporates under the effect of heat.

PARTS AND ACCESSORIES

Subject to the provisions of Notes 1 and 2 to this Chapter (see the General Explanatory Note), separately presented parts and accessories of apparatus or appliances of this heading remain classified here. Examples include separate graphical recording devices (including those in which the indications supplied by several measuring or checking instruments are recorded), whether or not fitted with devices for signalling, pre-selection or control.