

Translation :

The invention, which relates to sampling valves with linear displacement especially for the transfer of blood samples, concerns more specifically the structure of the valve and its fixing device which is advantageous for its assembly and disassembly whilst ensuring more effective sealing-tightness.

This type of linear displacement valve is well known, it being essentially constituted by a mobile central element sandwiched between two fixed external elements. The said central element is provided with at least one transverse passage orifice and is displaced in translational movement from a first fixed position to a second fixed position wherein, for each, the orifice in question is aligned with one or two opposite orifices provided in the external elements, allowing the connecting of two conduits or the cutting off of a sample volume and its transfer to another path of flow. The central element slides between the two fixed elements due to the action of a jack rod with a return spring. This type of valve is particularly suitable for the transfer of liquids such as blood, but the conduits and the orifices must always be correctly drained and cleaned so that the sampling operations are effected under the best operating and hygienic conditions. Although precise manufacturing tolerances have been observed, and the seals are correctly maintained, in valves of this type it is always indispensable to be able to obtain access frequently to the main component parts which are the mobile central element and the external elements in order to clean and scavenge the orifices, regulate or improving the displacement travel of the sliding part, etc.

Another device is known from US-A-3 990 853 wherein a linear displacement valve is essentially constituted by a

mobile central element sandwiched between two fixed elements placed above and below the central element.

In conventional valves these disassembly operations are long and tedious since they involve the unscrewing of a plurality of parts, the disconnecting of the inlet and outlet conduits, and the positioning of protective components before the central parts can be released.

Also with the object of simplifying these assembly-disassembly operations at the same time as reducing the parts constituting the valve, and to obtain a reduction in the bulk of the complete device and improve the operation thereof, the invention proposes a valve and a device for fixing its elements which then obviates the disadvantages characteristic of the known-type linear displacement valves.

Thus the present invention provides a sampling valve with linear displacement, and the device for fixing its elements, essentially constituted by a mobile central element provided with at least one transverse passage orifice and adapted to effect a sliding movement due to the action of a driving part of a jack, so that the transverse orifice is aligned with one or other of a plurality of opposite orifices provided on fixed guide parts situated at the respective sides of the said central element, wherein the sliding central element and its two fixed lateral guide parts are profiled and chamfered to have bearing faces having a reduced friction surface and constitute a parallelepipedic assembly which is held at four of its faces by fixed parts serving as its cradle, and which is held at its fifth face by a manual-release locking end plate, and at its sixth face by a rapid-release pivoting clamping means.

According to the invention especially the assembly constituted by the sliding central element and the two fixed

lateral guide parts bears, along its lower and upper longitudinal faces, on a lower guide and an upper guide which are integral with one and the same fixed support, and along one of its end faces on a base part which is fixed to a support plate.

According to other features of the invention the locking end plate is fitted on to the lower and upper guides and held applied against these by screws integral with the guides, co-operating with holes of the end plate which are designed for allowing the locking or unlocking of the said end plate on the guides in the manner known per se of a bayonet joint.

Moreover the clamping means is a rocker mounted to be pivotable about a pin fixed to the base part, with one end forming a head which bears on one of the fixed guide parts of the central assembly, a clamping spring pressing the head on to the external face of the said guide part.

The following description will show the advantages of the invention and other special features. It refers to the accompanying drawings wherein :

Fig. 1 is an overall perspective view of the fixing device of the sampling valve;

Fig. 2 shows an exploded view in perspective of the component parts of the valve and the fixing parts;

Fig. 3 is an overall view in perspective of the valve partly disassembled;

Fig. 4 shows a view in section on a larger scale of the central element;

Fig. 5 shows a view in section on a larger scale of a fixed guide part.

The sampling valve shown in the Figures uses a central element 1 with linear displacement, which slides with an easy fit between two fixed guide parts 2 which are situated at the respective sides, the central element having

a transverse passage orifice 3 adapted to be positioned, depending on the position of the said element, opposite one or other of two neighbouring orifices 4 which are provided on each of the lateral guides 2, and thus to make them communicate. Small conduits made of flexible plastics material 5 are fitted over nozzles 6 provided opposite the orifices 4.

The mobile central element 1 is in the form of a small rectangular plate whose four longitudinal edges 33 are chamfered and whose two larger faces comprise in their middle region a longitudinal recess 34 as is shown in Fig. 4.

Each of the fixed lateral guide parts 2 is in the form of a small rectangular plate whose longitudinal edges 35 of that guide part face which is directed towards the mobile central element 1 are chamfered and whose corresponding face comprises at its middle region a longitudinal recess 36 as is shown in Fig. 5.

Thus chamfered and provided with longitudinal recesses, the central element 1 and the guide parts 2 which enclose it have reduced-friction-surface bearing faces, which facilitates the sealing-tight displacement of the central element with respect to the two others. Moreover a lower guide 7 and an upper guide 8 which are in the form of parallelepipedic blocks bear on the aforesaid assembly above and below, that is to say along its lower and upper faces. On their bearing surfaces, grooves 9 are provided which reduce the surface of frictional contact with the sliding central element 1. These guides 7 and 8 are fixed at one of their sides to one and the same vertical metal supporting plate 10 by screws 20. This metal plate 10 is also fixed by a screw 20 to a supporting base part 11 on which the end face of the central element comes to bear, which base part comprises a central aperture 12 and two orifices 13, a top and a bottom orifice, by means of which the said base part

is also fixed by screws 21 to the lower and upper guides 7 and 8. Other orifices 22 in the upper and lower regions of the base part 11 allow it to be fixed to a support plate 23, which is a fixed plate fitted to the apparatus or which forms part of the frame of the apparatus. This plate is perforated with an aperture 24 for the passage of a screwthreaded sleeve 25 provided on the rear face of the base part coaxially with the aperture 12. The sleeve 25 serves as a support for a drive jack not shown, which is situated behind the plate 23. Two other orifices 32 are also provided in the plate 23 to receive screws 21 for the fixing of the base part 11. The metal plate 10 also constitutes a bearing face for one of the guide parts of the central assembly.

At the side opposite from the base part 11 a locking end plate 14 is put on to the lower and upper guides 7 and 8 and held applied against these by fixing screws 15 integral with the guides co-operating with holes 16 of the end plate, designed in the manner of a bayonet joint system to allow the release of the end plate by a pivoting movement as the arrows in Fig. 1 show.

The three central parts 1 and 2 which constitute a substantially parallelepipedic assembly are thus gripped in a cradle constituted at one of the ends of its longitudinal extent by the base part 11, at its lower and upper sides by the guides 7 and 8, and at one flank by the metal plate 10. At the side opposite from the metal plate there comes to bear against the guide part 2 the head 17 of a rocker 18 mounted to be pivotable about a vertical pin 19, which pin is journaled on the supporting base part 11 in such a manner that the rocker is pivotably mounted on the said base part. The rocker 18 is returned by a clamping spring 26 bearing against the plate 23,

which exerts pressure on the corresponding arm of the rocker and consequently pressure of the head 17 on the external face of the guide part 2, substantially at its centre. Thus the rocker constitutes the system for clamping the three main elements of the valve.

Furthermore, the sliding central element 1 is moved between the guide parts 2 by the rod of the jack which is not shown here, and through the agency of a control pin 27 which extends through the sleeve 25 and the aperture 12 to abut against the end of the central element 1. At the other side of this latter there comes to abut a return pin 28 on which is fitted a spring 29 the end of which is immobilised in a central orifice 30 of the end plate 14 by a clip 31. The central elements 1 and 2 of the sampling valve are thus held on all sides as Fig. 1 shows. When it is desired to disassemble the valve, first of all the small conduits 5 are released directly from the nozzles 6 over which they are fitted, and the screws 15 are unscrewed several turns as the arrows show. Then the locking end plate 14 is gripped and, by making it turn in the direction of the arrows in Fig. 1, each hole 16 is disengaged at the larger-diameter portion of its extent from the head of each screw 15, such that the said end plate can be disengaged in a forward direction. When the end plate is disengaged the spring 29 and the return pin 28 are also disengaged, these remaining held in the orifice 30 of the said end plate because of their configuration. Finally, pressure is exerted on the rocker lever 18 as is shown in Fig. 3. This action causes pivoting of the rocker 18 about its pin 19 in opposition to the force of the clamping spring 26, and consequently the head 17 of the rocker moves away from the external wall of the fixed guide part 2. Therefore, the assembly constituted by these three central parts 1 and 2

can be rapidly removed forwardly, as is shown by the arrow in Fig. 3. Since these parts are in bearing contact with each other they can easily be taken apart and inspected and cleaned without difficulty. To re-assemble them, the rocker lever 18 is pressed again to allow them to be put back in a good position between the lower and upper guides 7 and 8, before re-mounting the end plate 14 and connecting the small conduits 5.

The sealing-tightness of the valve during operation is effective since the force of the regulating spring 26 is exerted by way of the head 17 of the rocker, at the centre of the valve, which thus distributes the application pressure. Also, because of the particular profile of the central element and of the guide parts which surround it, the friction surfaces are reduced, and displacement of the central part 1 is effected with ease with a low-powered jack. Moreover, because of the small number of parts used, the said valve does not cost much. Finally, as Fig. 1 shows, the elements which surround and hold the central part are of modest dimensions, and thus the sampling valve is of reduced bulk, allowing it to be positioned very near to the extracting or take-up element, and thus allowing the length of connections to be reduced.

CLAIMS

1. Sampling valve with linear displacement, and device for fixing its elements, which are essentially constituted by a mobile central element (1) provided with at least one transverse passage orifice (3) and adapted to effect a sliding movement due to the action of a driving part of a jack, so that the transverse orifice (3) is aligned with one or other of a plurality of opposite orifices (4) provided on fixed lateral guide parts (2) situated at the respective sides of the said central element (1), characterised in that the sliding central element (1) and its two fixed lateral guide parts (2) are profiled and chamfered to have bearing faces having a reduced friction surface and constitute a parallelepipedic assembly which is held at four of its faces by fixed parts (7, 8, 10, 11) serving as its cradle, and which is held at its fifth face by a manual-release locking end plate (14), and at its sixth face by a rapid-release pivoting clamping means (17, 18, 26).

2. Sampling valve according to claim 1, characterised in that the mobile central element (1) is in the form of a small rectangular plate whose four longitudinal edges (33) are chamfered and whose two larger faces comprise in their middle region a longitudinal recess (34).

3. Sampling valve according to claims 1 and 2, characterised in that the lateral guide parts (2) are each in the form of a small rectangular plate, wherein the longitudinal edges (35) of their face which is directed towards the mobile central element (1) are chamfered and whereof the corresponding face comprises in its middle region a longitudinal recess (36).



4. Sampling valve according to claims 1 and 3, characterised in that nozzles (6) are arranged on the external face of each fixed lateral guide part (2), opposite the transverse passage orifices (3).

5. Sampling valve according to claim 1, characterised in that the assembly constituted by the sliding central element (1) and the two fixed lateral guide parts (2) bears, along its lower and upper longitudinal faces, on a lower guide (7) and an upper guide (8) which are integral with one and the same fixed support (10).

6. Sampling valve according to claim 1, characterised in that the assembly constituted by the sliding central element (1) and the two fixed lateral guide parts (2) bears, along one of its end faces, on a base part (11) which is fixed to a support plate (23).

7. Sampling valve according to claims 5 and 6, characterised in that the fixed support (10) to which the lower (7) and upper (8) guides are attached is a metal plate having a holding function and constituting a lateral face of the cradle of the central assembly (1, 2), and in that the said metal plate is itself fixed to the supporting base part (11).

8. Sampling valve according to claim 5, characterised in that the guides (7 and 8) are provided with longitudinal grooves (9) on their face which bears on the central assembly (1, 2).

9. Sampling valve according to claim 6, characterised in that the plate (23) is perforated with an aperture (24)



for the passage of a screwthreaded sleeve (25), projecting from the rear face of the base part (11) and coaxial with an aperture (12) provided at the centre of the said base part (11).

10. Sampling valve according to claims 1 and 5, characterised in that the locking end plate (14) is fitted on to the lower (7) and upper (8) guides and held applied against these by screws (15) integral with the guides, co-operating with holes (16) of the end plate (14) which are designed for allowing the locking or unlocking of the said end plate (14) on the guides (7, 8) in the manner of a bayonet joint.

11. Sampling valve according to claims 1 and 6, characterised in that the clamping means is a rocker (18) mounted to be pivotable about a pin (19) fixed to the base part (11), with one end (17) forming a head which bears on one of the fixed guide parts (2) of the central assembly (1, 2), a clamping spring (26) pressing the head (17) on to the external face of the said fixed guide part (2).

12. Sampling valve according to claims 1 and 9, characterised in that the mobile central element (1) is manipulated at the one side by means of a control pin (27) extending through the sleeve (25) and the base part (11), a return pin (28) coming to abut at the other side of the said mobile element (1) and co-operating with a spring (29) held by the locking end plate (14).

