[0036] FIG. **11** schematically depicts an aspect of a sample analyzer in accordance with another embodiment of the present invention; and

[0037] FIG. **12** schematically depicts another aspect of the sample analyzer of FIG. **11**.

DETAILED DESCRIPTION OF THE DRAWINGS

[0038] It should be understood that the Figures are merely schematic and are not drawn to scale. It should also be understood that the same reference numerals are used throughout the Figures to indicate the same or similar parts.

[0039] FIG. **1** schematically depicts a disposable cartridge **10** for use with a sample analyzer. The disposable cartridge **10** comprises a sample collection unit **12**, e.g. a saliva swab stick made of a porous material for absorbing the sample that can be squeezed for the extraction of the sample there from, a sample extraction unit **14**, e.g. a squeeze unit for extracting the sample from the sample collection unit **12** and for transferring the sample to the sample analysis unit **18** by means of pressure exerted on the sample extraction unit **14**. The sample analysis unit **18** may be a bio-module consisting of a fluidic and an optical part in which the pretreatment of the saliva takes place, e.g. filtering and de-bubbling, and pressure decoupling. The optical part may contain a chamber, which is filled with the sample by capillary action. In case of a sample analyzer using the internal frustrated reflection principle, the sample analysis unit **18** may further include the dry assay reagents and the dry magnetic beads.

[0040] The disposable cartridge **10** further comprises a housing **16** for integrating the sample extraction unit **14** and the sample analysis unit **18**. This is shown in more detail in FIG. **2**. The housing **16** comprises inner grooves **26** for receiving the sample analysis unit **18**. The sample analysis unit **18** comprises a protrusion **24** for forming a fluid-tight coupling with a complementary protrusion **22** on the sample extraction unit **14**. Hence, the housing **16** is used to integrate the sample extraction unit **14** and the sample analysis unit **18**, and acts as a protection for these parts, as well as a mechanical interface to the sample analyzer.

[0041] In an embodiment, the sample collection unit **12** may be provided separately from the remainder of the disposable cartridge **10**, i.e. may be insertable into the disposable cartridge **10**. In an alternative embodiment, the sample collection unit **12** may form an integral part of the disposable cartridge **10**, e.g. may be mounted in the sample extraction unit **14**. For the remainder of this description, reference will be made to a separate sample collection unit **12** by way of non-limiting example only.

[0042] When performing a measurement, the sample collection unit **12** is unpacked and handed over to the person that needs to be tested. The housing **16** containing the sample analysis unit **18** and the sample extraction unit **14** is unpacked and inserted in the sample analyzer.

[0043] After inserting of the housing **16** into the sample analyzer, the disposable cartridge **10** may be optically and/or mechanically validated. This typically implies that the position of the part of the sample analysis unit **18** to be investigated with the sample analyzer is checked. This position needs to be within a certain tolerance window to ensure that the measurement results have the required accuracy. Optionally, in case of a sample analysis unit **18** being optically evaluated through an optical (transparent) surface, the integrity of the optical surface may also be checked, e.g. for scratches or stains.

[0044] After insertion of the sample collection unit **12** into the disposable cartridge **10**, i.e. into the sample extraction unit **14** and subsequent extraction of the sample from the sample collection unit **12**, e.g. by squeezing, the alignment of the disposable cartridge **10** in the sample analyzer is once again checked to determine if the cartridge is still within a predefined position window.

[0045] As is demonstrated in FIG. **3**, the disposable cartridge **10** has a large aspect ratio, i.e. it has an elongated shape. Such a shape is typically required to ensure that the sample collection unit **12** is large enough to collect a sufficient amount of sample, e.g. saliva from the mouth, efficiently. In addition, the disposable cartridge **10** must have a sufficient length to ensure that the sample analysis unit **18** can be positioned into the sample analyzer, which may comprise one or more electromagnets for magnetic actuation of magnetic nanoparticles in the sample in the sample analysis unit **18** in case of an assay-based disposable cartridge including magnetic beads, as previously explained.

[0046] As is shown in FIG. **4**, when the disposable cartridge **10** is inserted into slot **51** of the sample analyzer **50**, a large part of the cartridge **10** still protrudes from the analyzer. Consequently, when the disposable cartridge **10** is mechanically actuated, e.g. touched by the hands of the operator, it is difficult to avoid movement of the disposable cartridge **10** with respect to the sample analyzer **50** due to the leverage effect of the large part of the disposable cartridge that is external to the sample analyzer **50**.

[0047] This poses the following design challenge. Since the disposable cartridge **10** needs to be inserted by human force, the system design should allow for some mechanical tolerances. Nevertheless, it is very important that the sample analysis unit **18**, e.g. its optical read-out window is aligned robustly with respect to the optical read-out system of the sample analyzer **50** and, if present, with respect to the electromagnets for the reasons previously discussed.

[0048] It is noted that some of the movements and misalignment can be compensated in software, e.g. the software implemented on the sample analyzer **50**. Search and tracking algorithms are developed that measure the position of e.g. alignment markers on the housing **16**. However, the range and bandwidth of these search and tracking algorithms is limited. Moreover, in case of a magnetic particle based assay, such algorithms are of limited use because the magnetic fields cannot be (easily) compensated in software.

[0049] In accordance with an aspect of the present invention, the disposable cartridge **10** is designed to absorb at least some of the forces exerted on the disposable cartridge **10** when inserted into the sample analyzer **50**, such that the forces on the part of the disposable cartridge **10** inserted into the sample analyzer **50**, i.e. the sample analysis unit **18** are reduced to such an extent that the inadvertent displacement of the sample analysis unit **18** with respect to the read-out means of the sample analyzer can be avoided.

[0050] FIG. **5** shows a first embodiment of a disposable cartridge **10** of the present invention. In the disposable cartridge **10**, a fluid-tight, flexible connection **30** is provided between the sample extraction unit **14** and sample analysis unit **18**, with the sample extraction unit **14** being flexibly mounted in the housing **16**. FIG. **6** shows an alternative embodiment in which the fluid-tight, flexible connection **30** is provided between the sample extraction unit **14** and sample analysis unit **18**, with the analysis unit **18** being flexibly mounted in the housing **16**. The fluid-light flexible connection **30** may be any suitable connection, e.g. an elastomeric joint such as a rubber ring or gasket. As a result, the sample extraction unit **14** can move independently of the sample analysis unit **16** within certain design tolerances, as shown in FIGS. **5** and **6**, such that any pressure exerted on the sample extraction unit **14**, e.g. when extracting a sample from the