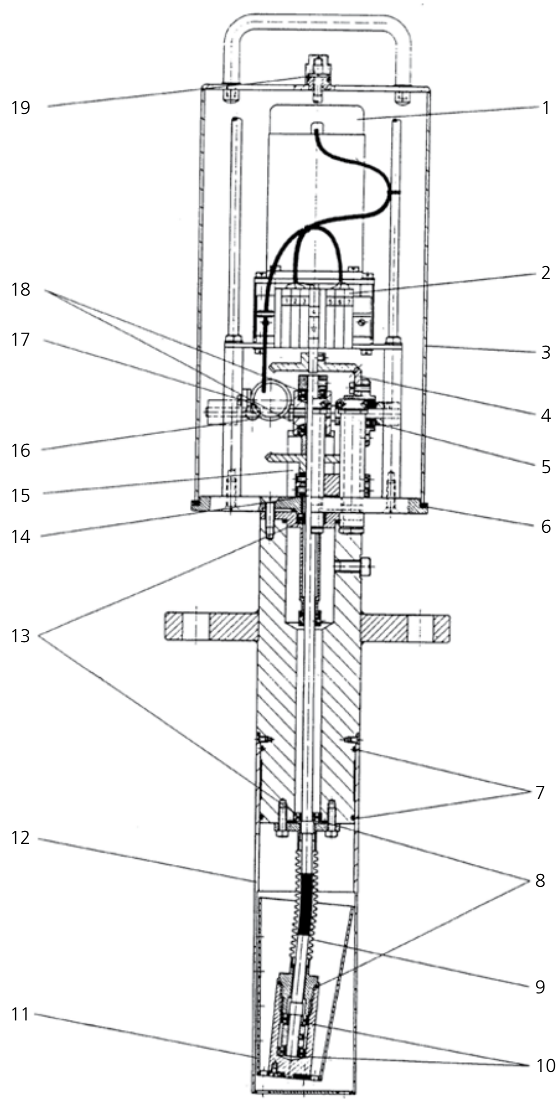

Figure 24.16 The convimeter: (1) geared motor with gear control; (2) terminal, explosion proof, cover; (4) bevel driving pinion; (5) two ball bearings, 6/19 mm, for nylon bevel driving pinion, rubber gasket; (7) two O rings Vitons for seat of protection sheath; (8) two O rings for connection pieces metal bellow; (9) metal bellow, with connecting pieces; (10) two ball bearings 7/19 mm, for drive shaft, lubricated with special oil; (11) conical mantle with three screws M4x6; (12) protection sheath, with two screws M4x6; (13) two ball bearings 7/19 mm, for drive shaft, lubricated with special oil; (14) drive shaft, with Teflon sleeve; (15) dash pot with Teflon sleeve; (16) metering spring, No. 1, 11 or 111, with barrels; (17) inductive transducer, explosion proof, with drive eye; (18) two ball bearings 7/19 mm, for dynamometer drive shaft; (19) cap nut for cover, with spring washer and O ring.

24.2.12 Recording particle size

This is the most commonly measured quality parameter, since it can be perceived directly by the consumer, with chocolate tasting grainy if the particles present are too coarse. This even overcomes the expected pleasant melting sensation. On the other hand, if extremely fine particles are present in excess, a large amount of free fat can be bound up, or the particles can come in contact with one other and form clusters, resulting in a sticky feeling in the mouth. In this case as well, the pleasant melting sensation is masked. Both of these sensations must be avoided by correct processing. To accomplish this, it is necessary to determine the fineness of the particles and monitor it appropriately.

The particle size is measured for raw materials and intermediate products as well as for finished products. Various measurement methods can be used. The micrometer and laser diffractometer methods are used in both the laboratory and production. Both methods are described in greater detail in Section 24.3.4.

The method of expression of the results usually depends on the method of measurement, as shown below:

- *Laser diffractometer*: Here the measured value D(90) = 25 μm means that 90% of the particles are less than or equal 25 μm.
- *Micrometer*: Here the measured value = 20 μm means that the largest particle is 20 μm in diameter.
- *Wet screen method (sieving)*: Here the measured value 1% > 75 μm means that 99% of the sample is less than 75 μm in size. This is based on the residue remaining on the 75 μm screen. The traditional sieving method can only be used within a separate laboratory because of the organic solvent employed. It has mainly been replaced by laser diffractometry.

Particle size measurements are also made on cocoa mass. In this particular case, oversized particles need to be removed. They can form during passage through ball mills and are removed by sieving the entire batch prior to further processing.

Milled material is produced during the manufacture of chocolate and filling masses. In order to measure its particle size, a bulk sample is often taken at the discharge from the milling line in order to determine the D(90) value. To check the settings of a five-roll refiner, for example (Chapter 9) as part of a throughput-fineness test, samples are taken from the left and right side as well as the centre of the upper roll. The throughput of a five-roll refiner can be determined with the aid of a belt weigher or similar monitor. In this way, it is possible to graphically chart fluctuations in the finenss over time. This procedure assumes that the throughput of the refiner can be held constant. It must be remembered that achievable fineness, operating hours of a roll set, consistency of the masse after the two-roll refiner, throughput, roll wear and five-roll refiner settings are all interrelated.