SuperVario-N

MULTIPURPOSE CENTRIFUGE FOR THE DAIRY LABORATORY

This centrifuge stands out due to its exceptional engine smoothness. That it is largely free of vibration and has swing out butyrometer buckets positively effects the life-time of your butyrometers. Correspondingly, good results (reproducibility and comparability) are assured. For these reasons, the SuperVario-N is often used as a reference centrifuge for calibration purposes. Due to its versatility, the SuperVario-N is widely accepted in dairy laboratories. High versatility means free programmability of rpm, temperature and time ("free mode") as well as 4 set programs for the following tests:

Dr. N. Gerber's method (determination of fat content)
Roese-Gottlieb's method (determination of fat content, reference method)*
Babcock's method (determination of fat content)
Solubility (determination of the solubility of powdered milk)

* Operation only possible under observation of respective safety regulations

Properties:

- Stainless steel housing
- Programmable rotor speed from 600 to 1130 rpm in increments of 10 rpm (corresponds to a g-value of 77 to 372 g)
- Programmable heater up to 68°C in 1°C increments
- Programmable centrifugation time from 1 to 99 minutes
- Automatic interlocking safety lid
- Automatic shut down in case of unbalance
- Automatic brake

Technical specifications:

Connection values:	230 V/50 ... 60 Hz/1200 VA
Weight, empty:	26 kg
Total height with lid:	460 mm
Filling height:	370 mm
Rotor speed range:	600 to1130 rpm**
Temperature range:	room temperature up to 68°C

** For the determination of fat content due to Gerber's method, a g-value of 350 g ± 50 g is required. With a **r**elative **c**entrifugal **f**orce **(RCF)** of 365 g in its unloaded state (idle running) and 340 g in its fully loaded state, the SuperVario-N fulfils the standard specifications in an exemplary manner.

MILK LABORATORY CENTRIFUGES

Centrifuges for butyrometric determination of fat content according to Dr. N. Gerber

K. Schaefer, graduate engineer, reports

QUIET OPERATION

In order to avoid glass breakage and to increase butyrometer lifetime, it is very important that the centrifuge operates with the lowest level of vibration possible. The different types of centrifuges are:

TYPE 1: Centrifuge with flat-lying butyrometers

This way of loading butyrometers guarantees that they will be gently treated during centrifugation. However, this type of centrifuge tends to lead to a renewed intermixing of the separated phases after the centrifugal process.

TYPE 2: Centrifuge with angular rotor

The butyrometers are held in the angular rotor at a fixed angle. Unfortunately, this causes the long, thin butyrometer necks considerable stress. This design is predominately found in small, inexpensive centrifuges.

TYPE 3: Centrifuge with swing-out butyrometer holders

The butyrometers swing out horizontally in mounted movable holders. The butyrometers are only stressed along their vertical axis. For this reason, this type of centrifuge is preferable.

These special centrifuges differ from other laboratory centrifuges in several ways. The following points should be taken into consideration when purchasing and using centrifuges for the determination of fat content according to Dr. N. Gerber's method:

UNBALANCE

The centrifuge should be equipped with an unbalance shut-down mechanism. In case of glass breakage (butyrometer breakage) or other types of unbalance, the centrifuge shuts itself off automatically.

INTERLOCKING LID

For safety purposes, more and more centrifuges are being equipped with an interlocking lid.

HEATING

Heating a centrifuge reduces butyrometer cooling. This means that the subsequent tempering time in the water bath can be kept to a minimum and leads to a more reliable realization of the analysis. The temperature in the centrifuge tank should be at least 50°C.

SET-UP

The centrifuge must be set up on a flat, secure surface (e.g. a stable tabletop or platform). The lowest possible humidity and a room temperature of less than 30°C are preferable.

ROUTINE OPERATION/MAINTENANCE

The centrifuge should be loaded in such a way that it is as balanced as possible, i.e. the butyrometers must always be evenly positioned. In case of glass breakage, the centrifuge should be cleaned immediately after standstill is reached. This prevents unnecessary corrosion and guarantees a long lifetime.

RPM

The determination of fat content according to Gerber's method specifies a **"RCF"** (**r**elative **c**entrifugal **f**orce) or 350 g with a maximum variation of ± 50 g. The RCF does not only depend on the rpm but also on the effective radius. The effective radius is defined as the distance between the rotor and the outer end of the butyrometer. For this reason, the rpm of different centrifuge types varies as a function of their respective radii. What is important is that the rpm is constant or only changes negligibly (within the range of tolerance, see above), depending on whether the centrifuge is fully or only partially loaded.

The **RCF** is calculated in the following way:

$$RCF = 1{,}12 \times 10^{-6} \times R \times N^2$$

$$N = \sqrt{\frac{RCF}{1{,}12 \times 10^{-6} \times R}}$$

whereby:
R = effective horizontal radius in mm;
N = revolutions per minute [min^{-1}].

SYNOPTICAL TABLE OF THE DEPENDENCE OF G-FORCE AND RPM

rpm (min $^{-1}$)	Head A (ø=52 cm) g force	Head B (ø=38 cm) g force	Head C (ø=38 cm) g force
600	104.8 g	76.6 g	76.6 g
610	108.4 g	79.2 g	79.2 g
620	111.9 g	81.8 g	81.8 g
630	115.6 g	84.5 g	84.5 g
640	119.3 g	87.2 g	87.2 g
650	123.0 g	89.9 g	89.9 g
660	126.8 g	92.7 g	92.7 g
670	130.7 g	95.5 g	95.5 g
680	134.7 g	98.4 g	98.4 g
690	138.6 g	101.3 g	101.3 g
700	142.7 g	104.3 g	104.3 g
710	146.8 g	107.3 g	107.3 g
720	151.0 g	110.3 g	110.3 g
730	155.2 g	113.4 g	113.4 g
740	159.5 g	116.5 g	116.5 g
750	163.8 g	119.7 g	119.7 g
760	168.2 g	122.9 g	122.9 g
770	172.7 g	126.2 g	126.2 g
780	177.2 g	129.5 g	129.5 g
790	181.7 g	132.8 g	132.8 g
800	186.4 g	136.2 g	136.2 g
810	191.1 g	139.6 g	139.6 g
820	195.8 g	143.1 g	143.1 g
830	200.6 g	146.6 g	146.6 g
840	205.5 g	150.2 g	150.2 g
850	210.4 g	153.7 g	153.7 g
860	215.4 g	157.4 g	157.4 g
870	220.4 g	161.1 g	161.1 g
880	225.5 g	164.8 g	164.8 g
890	230.7 g	168.6 g	168.6 g
900	235.9 g	172.4 g	172.4 g

Drehzahl (min $^{-1}$)	Head A (ø=52 cm) g force	Head B (ø=38 cm) g force	Head C (ø=38 cm) g force
910	241.1 g	176.2 g	176.2 g
920	246.5 g	180.1 g	180.1 g
930	251.9 g	184.1 g	184.1 g
940	257.3 g	188.0 g	188.0 g
950	262.8 g	192.1 g	192.1 g
960	268.4 g	196.1 g	196.1 g
970	274.0 g	200.2 g	200.2 g
980	279.7 g	204.4 g	204.4 g
990	285.4 g	208.6 g	208.6 g
1000	291.2 g	212.8 g	212.8 g
1010	297.1 g	217.1 g	217.1 g
1020	303.0 g	221.4 g	221.4 g
1030	308.9 g	225.8 g	225.8 g
1040	315.0 g	230.2 g	230.2 g
1050	321.0 g	234.6 g	234.6 g
1060	327.2 g	239.1 g	239.1 g
1070	333.4 g	243.6 g	243.6 g
1080	339.7 g	248.2 g	248.2 g
1090	346.0 g	252.8 g	252.8 g
1100	352.4 g	257.5 g	257.5 g
1110	358.8 g	262.2 g	262.2 g
1120	365.3 g	266.9 g	266.9 g
1130	371.8 g	271.7 g	271.7 g
1140	378.4 g	276.6 g	276.6 g
1150	385.1 g	281.4 g	281.4 g
1160	391.8 g	286.3 g	286.3 g
1170	398.6 g	291.3 g	291.3 g
1180	405.5 g	296.3 g	296.3 g
1190	412.4 g	301.3 g	301.3 g
1200	419.3 g	306.4 g	306.4 g

Example:
A centrifuge with an effective radius of 260 mm necessitates an rpm of 1100 in order to reach the required RCF of 350 g.

3680-L

Safety centrifuge for fat content determination

according to Roese-Gottlieb's method

3680

SuperVario-N

multi-purpose centrifuge for all butyrometers

see p. 48 for more details

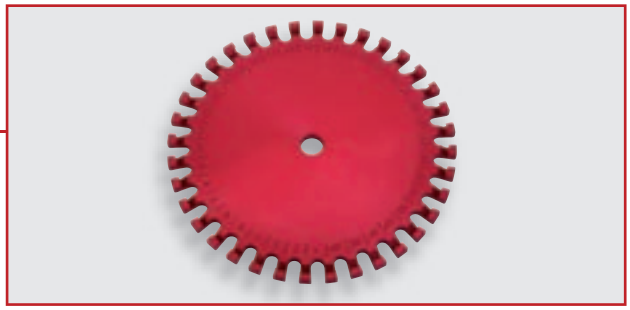
Accessories for SuperVario-N

3685

Head A

centrifuge head for a maximum
of 36 butyrometer buckets or 18 Babcock buckets
Radius of head A: 260 mm

Accessories:
Butyrometer bucket: art. no. 3631, p. 46
Babcock bucket: art. no. 3632, p. 46



3686

Head B

centrifuge head (protective tank)
for a maximum of 8 Mojonnier tubes
Radius of head B: 190 mm

Accessory:
Mojonnier tubes: art. no. 3870, 3871, p. 55

3687

Head C

centrifuge head
for a maximum of 6 buckets for solubility index tubes
Radius of head C: 190 mm

Accessories:
Bucket for solubility index tubes: art. no. 3633, p. 46
Solubility index tube (ADPI glass): art. no. 3634, p. 46