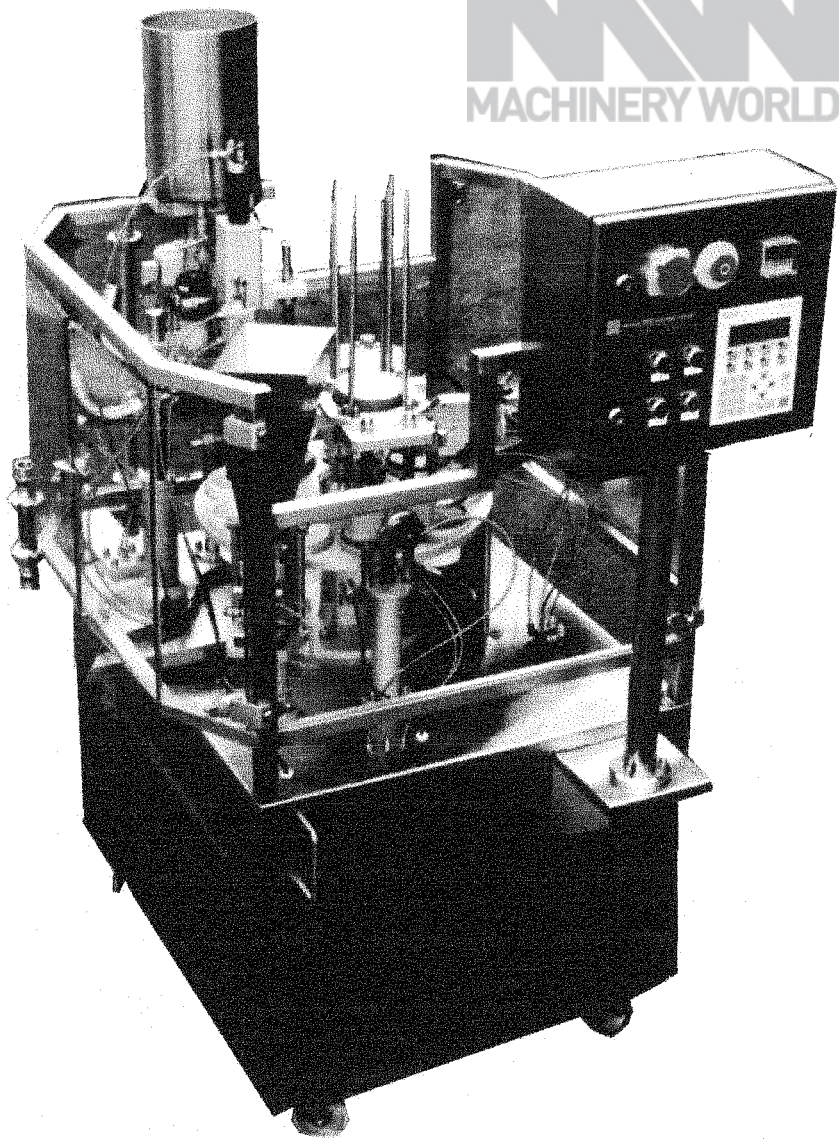
ICE system
ice - cream machines

POLAND, 44-200 Rybnik, ul. Chrobrego 39
tel./fax +48 32 422 97 08
+48 32 422 97 09
+48 32 422 95 89
e-mail: ice-syst@silesia.pik-net.pl
www.icesystem.com.pl

EXPERT 4000



Instruction
machine for ice-cream packing
type: cups, horns, calippo

DECLARATION OF CONFORMITY

"ICE system" sp. z o.o. Rybnik hereby certifies that

Machine for ice-cream packing

EXPERT 4000

(serial no. 426)

to which present declaration regards, is consistent with obligatory standards, concerning safety and hygiene of work conditions.

ICE system
KIEROWNIK PRODUKCJI
Sławomir Polek

Rybnik, 15 Oktober 2001

.....
(Directors's seal and signature)

Congratulations due to your good choice. Thank you for your trust.

Content:

A. DESCRIPTION

I. SAFETY OPERATION - CONDITIONS OF SAFETY WORK AND HYGIENE.

1. Before machine placing and starting, it is necessary to get familiar with this service manual. Misuse of its instructions may cause loss of warranty rights and complaints, and it may cause accident.
2. Machine can be operated only by qualified staff. Producer ensures training of User's staff before starting.
3. Machine ready for operation shall be levelled, stable and shall be protected against moving.
4. Work-place should be well lightened.
5. During work operator shall wear well fastened protective clothes, and he shall have head gear. Clothes should exclude possibility of catching any parts of clothes by mobile and exposed machine elements.
6. Machine cannot be oparated by drunk person nor person after the use of stupefacients.
7. Smoking near machine is prohibited.
8. Working machine cannot be left without operator's supervision.
9. Work with removed or unlocked guards is prohibited.
10. Machine cannot be regulated during work, except cases which are described in service manual (for example capacity adjustment). Regulation during work may cause damage of machine or injury.
11. In the case of machine disturbances it must be immediately switched off by emergency switch (push-button). Elimination of disturbances (for example correction of packages in working seats) during machine operation may cause accident.
12. Washing of machine during its work is prohibited.
13. Before washing machine shall be disconnected.
14. Elements of electrical and automatic systems cannot be wet nor moist.
15. Any repairs and technical inspections shall be conducted only by qualified person.
16. During warranty period and in case of machine failure, it is recommended to call producer's service.
17. Before machine maintenance, repairs or technical inspections, it is necessary to switch it off by the main switch.
18. Before repairs of electric system, machine shall be switched off, and before repairs of pneumatic system it is necessary to disconnect also compressed air supply.
19. Worn or damaged elements shall be replaced only by new ones.

Machine is admitted by the State Hygiene Office. Rubber hoses used for ice mass supply have also certificate of the State Hygiene Office. Machine is protected against short-circuit by the means of S-193 electric switch. Motor is protected by the means of individual magnetothermic protection of M-250 type. Fire protection is realized by protective neutralization. Heater circuits are additionally protected by the means of automatic differential-current switch. Control circuits are made for safe voltage 24 V. Used electric box is made in protection class IP65 according to PN-92/E-08106. Both, electric box and transparent work table cover are protected against opening by the means of mechanical door lock, which in the case of its opening gives immediately machine switching off. Machine is protected against mechanical damages by adjusted safety coupling.

II. COMPLETE DELIVERY.

1. Machine for ice-cream packing EXPERT 4000 at configuration (suitable working stations) choosen by the customer.
2. Crank handle for table rotation - 1 pce
3. Toolbox with:
   - flat wrenches - 1 set
   - wrenches - 1 set
   - screwdriver - 1 pce
   - teflon hammer - 1 pce
   - wrench for electrical box - 1 pce
4. Printing types - 1 set
5. Tampon - 1 pce
6. Ink - 1 l
7. Thinner - 1 l
8. Spare parts:
   - "Merkel" gackets - 1 pcs
   - "O-ring" gackets – 1 set
   - "Clamp" gackets – 1 set
   - teflon sleeves - 1 pcs
   - driving pin of the Maltese cross mechanizm - 1 pce
   - bulbs 24V - 2 pcs
   - air conections – 1set
   - Power conections – 1pcs
9. Service manual - 1 pce

III. TECHNICAL DATA.

Operating efficiency	720 ÷ 3900 pcs/ h
Number of table working sockets	9 or 18 pcs depending on design
Number of working stations	9
Installed power: - motor of main drive	max. 1 kW 0,75 kW
Supply: - electrical - compressed air	380 V, 50 Hz 6 bar
Compressed air consumption	max. 500 l/ min
Dimensions (l x b x h)	1600 x 1000 x 1800 mm
Weight	about 450 kg depending on configuration

IV. APPLICATION.

EXPERT 4000 is designed mainly for automatic ice-mass dozing into cups or horns, and then for closing of packages and putting on them all kind of different data (date, series, etc.).
According to client's needs, machine may be adjusted for filling by ice-mass other packages (little bumpers, "calippo", 0,5 l packages), and it can by equipped with devices for any additional decorations (ice-cream of two- or three-tastes, chocolate spraying on the outer surface of horns, crumbles, icing and other additives). In the case of standard execution for production of "calippo" ice syrups, machine has rotational table with double number of working seats and working stations adapted for mating with it.
Depending on execution, control of machine operation may be done automatically or by the means of SIEMENS S7 controller. It is possible to mount central lubrication system. Selection of machine configuration in each case depends on detailed coordinations with the client.
Device is designed for cooperation with TYTAN freezers of continuous work. The best efficiency is reached at cooperation with freezers of total output 400-600 l/ h, depending on the kind and size of used package.
Machine is designed for work in automatic mode. However, its control system enables in manual mode switching on given working stations. That option serves as a checking of proper operation after inspections, repairs, maintenance or regulations. Ice mass supply system is adapted for flowing washing in C.I.P. closed system.
Machine shall be operated by two persons. One person shall replenish packages and lids in dispensers or decoring products (syrup, chocolate, crumbles). The second person shall collect ready products and move them to the hardening tunnel.

V. STRUCTURE AND OPERATION.

EXPERT 4000 independently takes package from dispenser, fills it by the ice mass and decoring additives, and then closes package by the suitable lid taken from the second dispenser, and finally prints the date and releases ready product. Machine output is fixed by lenght of working strokes. Time of pneumatical functions within one stroke depends on the shape of drive cam (in pneumatically controlled machine) or value recorded in controller.
Device is made from stainless steel or aluminium. All elements coming into contact with product are made from acid - proof stainless steel OH18N9 (AISI 304), allowed for contacts with food.
Machine consists of following sub-assemblies: body with drive system, rotational table, 9 working stands (on which are mounted working stations) and control panel. Manufacturer installs suitable working station on the machine according to client's needs. In the case of multi - purpose machine (operation with different packages, different kinds of ice-cream) working stations may be exchanged on the machine. After replacement of the station, it is necessary to make the full turn of the work table, turning main motor shaft by the means of delivered crank (see: Chapter II: Complete delivery). It enables checking of operation and mating of installed working stations. Motor shaft may be rotated only when the machine is off.

1. Body (Draw. No. 1 - part "B").
Machine body is placed on castoring wheels, so machine may be moved and placed in given place of the production room. Wheels have locks which give machine stability during its operation. Inside the body there are placed elements of the drive system. The main drive of the machine is realized by the electric motor, connected with serviceless variator and worm reducer. By the means of handwheel placed on the side of machine it is possible to increase or decrease rotational speed of work table, and at the same time machine efficiency, in the range of 12 ÷ 65 cycles per minute.

Attention !
Changes of machine speed may be done only during its work.

Turning of the handwheel during machine standstill, may cause damage of motovariator. Manufactures doesn't take any responsibility for such damages.
Drive from worm reducer is transmitted on the main shaft by the globular safety coupling, preset on moment 75 ÷ 80 Nm. Cams and eccentrics fixed on the main shaft drive levers fixed on the auxiliary shaft. On the lever ends there are jointly mounted flexible connectors with adjustable length, which drive mechanism of each working station. From the main shaft, by the means of angular gear transmission it is driven Maltese cross mechanism driver, ensuring intermittent rotary motion of the work table. By the means of chain transmission, from the main shaft, it is driven shaft with cams, starting pneumatic functions or encoder (in the case of machine controlled by microprocessor), from which signal is given to the controller responsible for switching on pneumatic functions.
To the body there is fixed transparent guard of the working space, equipped with limit switches, switching off the machine in the case of opening of guard door.

2. Work table (Draw. No. 1 - part "B").
Cyclic work table motion is characterized by two phases: stop and turn. When the table is immobi-le, working stations which are at given seats, make given operations: from package taking and putting it in the work table seat, to ejecting of the ready product on the collecting gutter. When the table is turning, working elements of the station are moved away from it. Table has 9 (for production of horns or ice-cream in cups) or 18 (for production of "calippo" ice-cream) working seats, size of which is adjusted to package size used by the client. Seats in the table can be replaced after screws loosening, which are on the side - egde of the table.

3. "Package collecting" station (Draw. No. 2 and 3 - part "B").

Process of ice-cream production begins from the station of package feed at the machine "A" stand. Depending on package type there are three dispensers: for cups, horns and "calippo" ice syrups.

Dispenser of cups is shown on Draw. No. 2. Cups shall be manually put between guiding rods. Du-ring machine operation package are individually released from the dispenser by the means of short stroke servo-motors. Coming out suction nozzle (invisible on the drawing) catches the cup and puts it into the work table seat. Installation of that station shall be done in following order: through the seat in rotational table screw out special conical screw, and in its place screw in lengthening pipe with the suction nozzle, on the machine body place the station and on 3 pins screw in mounting nuts of station column to the body connect pneumatic hoses. Then adjust the height of the station in relation to the table, loosening the screw on the column and screw on the mounting ring, fixing the station at required height and tightening screws. Regulation of the distance between servo-motor jaws depends on package size. In order to do it: loosen nuts, move servo-motors taking into consideration their central position, tighten nuts. Distance between guiding rods is adjusted after loosening of screws fixing rods. For packages of smaller size one has anticipated additional plate of small cups which shall be fixed in the place of guiding rods. Rods shall be fixed to the plate of small cups.

Dispenser of horns is shown on the Draw. No. 3. Horns shall be manually put between guiding rods. From the dispenser, due to coordinated motions of unclamping and feeding jaws and taking needles , the horn comes down to the rotational table seat. Regulation of horns feed it is setting of jaws and needles actuation (on the cams or in the servo-motor). Horns dispenser shall be installed as follows: through the seat in rotational table, by the means of special conical screw stop a hole of pneu-matic suction supply (screw off the lengthening pipe with suction nozzle, if necessary) place the sta-tion on machine body and on pins tighten 3 clamping nuts of the station column to the body, inside the body (take off covers) tighten the flexible connector, connecting eccentric lever with mobile station shaft, mount body covers, connect pneumatic hoses. Station is preset by the producer, according to the size of used horn and does not need any additional regulations. Distance sleeves lift up of dispenser in case of work with horn „premium".

Dispenser of "calippos": Packages shall be manually put between guiding rods, and they are holded by special screws. During machine operation packages are individu-ally pulled down to the seat of rotational table due to mobile station jaws. Installation of dispenser shall be done in following order: through the seat in rotational table by the means of special conical screw stop a hole of pneumatic suction supply (screw off the lengthening pipe with suction nozzle, if necessary) place the station on machine body and on pins tighten 3 clamping nuts of the station co-lumn to the body, inside the body (take off covers) fix, the lowest as possible, one element of guiding mechanism on the bottom part of column, and second - on the mobile shaft of the station and tighten the flexible connector connecting eccentric lever with mobile station shaft, mount body covers, co-nnect pneumatic hoses. That station is also preset by the producer, according to the size of used packa-ges and it does not need any additional regulations.

4. "Package setting" station (Draw. No. 4 - part "B").

At machine "B" stand takes place package centering in the rotational table seat. It is realized by conical plate fixed on the mandrel with adjustable length. Such operation is necessary because packages (especially for horns) are very often distorted or they irregularly come into the seat, what causes impossible proper mass proportioning. Centerer enables straightening possible package distortions and levelling of package positions in the seats. Centerer installation consists of its putting into mounting grip and tightening of nuts. Mounting grip is fixed to the central column by two M8 screws. Height regulation is made by clamp nuts. In case of large packages (or packages with irregular shape), it is delivered interchangeable centerer, fixed on machine in the same way.

At this stand there is realized operation of dating on the side surface of package, by the means of pneumatic dater. In the case of low cup the date is put on its bottom. Dater operation is described in Para. 16: "Dating" station.

5. "Chocolate spraying" station (Draw. No. 5 - part "B").

Mainly this stand is used during production of ice-cream in horns or wafer cups. It is used for topping of inner surface of wafer by chocolate layer. Amount of chocolate is set by the means of adjusting screw, which after selecting right amount should be countered by the nut. Amount of supplied air decides about degree of chocolate spraying. Amount of supplied air is changed by the throttle valve. Station installation (mainly at the "C" stand of machine) consists of its clamping in the mounting grip by the means of clamp bolt. Mounting grip is tightened to the central column plate by two screws with M8 cap nuts. Sprayer setting height is adjusted by its clamping in suitable position in mounting grip. Chocolate for spraying is taken by the station from the container, which is placed on the column fixed to machine body. Container has two blowdown connections, from which one shall be connected with chocolate supply connector pipe on sprayer by the means of DN 20 rubber hose.

6. "Mass proportioning" station (Draw. No. 6 - part "B").

Product proportioning is realized by pneumatically started proportioner. Depending on the kind of manufactured ice-cream there are two primary types of proportioners: the first one for ice mass (cups, horns), and the second one for ice syrup "calippo". Amount of supplied product depends on the time given by the cam shape or set on the controller (value, which may be changed by programming change) or depends on current (set by the user) machine output and freezers output. There is placed drop gutter under the place of mass proportioning. In case of lock of package in the seat, mass drops on the gutter, from where goes onto the placed container.

Proportioning station is shown on Draw. No. 5. Mass is fed to the proportioner though the joint. Proportioning servo-motor opens the poppet valve. Then the mass is forced by the pressure produ-ced in installation by the freezer; then mass flows through the nozzle filling the package. Station is fixed by the mounting grip to the central column plate by the means of two M8 screws. Height of station is preset by the manufacturer and it does not need any additional regulations.

Ice mass is fed to the proportioning station through the "by-pass" valve. Sto-ppage of the machine may cause excessive pressure in installation because mass is fed under the pre-ssure. That is why during machine stoppage "by-pass" valve is automatically opened and mass flows to the container, placed under the valve.

Due to RIPPLE pump mass may be decorated by strips of syrup. Container with syrup is placed on the column fixed to the machine body and it has two connector pipes. Pump forces syrup from container to syrup joint on the mass proportioner. See - pump service manual - part "D" enclosures. Assembly of RIPPLE pump consists in its fixing by four M4 screws to the machine body, connecting of pneumatic joint through T-pipe to the hose giving air impulse for raising of servo-motor proportio-ning the mass and respectively syrup connectings: entering one to the connector pipe on the syrup con-tainer, exit one - to the syrup connecting on the mass proportioner.

Proportioning of "calippo" ice-cream: It is equipped with two servo-motors: rotational, starting syrup distribution valve, and line one , performing two functions, i.e. suction of syrup to the proportioner and dozing of syrup to packages. In order to assembly the station on machine: unfasten pneumatic hoses and unscrew stations of chocolate spra-ying, mass proportioning and decorating, then unfasten pneumatic hoses and remove vibrator; at "D" stand place "calippo" proportioner and fix it by two M8 screws; proportioning servo-motor connect to the pneumatic system in place of ice mass proportioner, and opening servo-motor in place of de-corating station. Then it is necessary to replace the cam controlling the work of decorating station (in pneumatically controlled station) or set times of controlling pulses on servo-motors (in machine con-trolled by microprocessor). The height of station for "calippo" proportioning is preset by the manufac-turer and does not need any additional

regulations.
For ice-cream with special taste and aesthetic effects (for example ice-cream with two or three tastes, "radial devision", "pencil filler", ice-cream with chewing gum, etc.) there are special ice mass proportioners. Their structure and operation depend on type of manufactured ice-cream.
Extruders of mass for ice-cream with two or three tastes do not differ from structure of the typical mass proportioner. They only have suitable number of ice mass connections. Also principle of operation and the way of their fixing are the same, as in the case of typical proportioner.
Two tastes proportioner, arranging ice-cream radiantly inside the cup, is shown on the Draw. No. 10. It has two connector pipes of mass inflow and special inner structure and the nozzle, which gives the effect of "radial devision". Proportioner is fixed like the typical mass proportioner, through the mounting grip to the central column plate by the means of two M8 screws.

7. "Icing" station (Draw. No. 7 - part "B").
This station is used for decorating the upper layer of ice-cream by chocolate strips. Because opening time of proportioner is constant (determinated by cam shape or placed on the controller), so amount of dosed chocolate may be changed by the means of adjusting screw, placed on opening servo-motor. Screwing in or screwing out gives decrease or increase of servo-motor stroke and at the same time change of chocolate amount. In order to ensure proper operation of station, it is necessary to point out that during work the end with nozzles musn't contact with ice mass. Station is mounted by the means of mounting grip to the central column plate by two M8 screws. The height of station is preset by the manufacturer and does not need any additional regulations. Chocolate is taken from container, which is placed on the column fixed to the machine body. Container has two connector pipes, from which one is connected with chocolate connector pipe on decorating station by the means of rubber hose DN 20.

8. "Cruble throwing" station (Draw. No. 8 - part "B").
At this stand takes place ice mass throwing by dry granulated product, for example particles of nuts. Granulated product filled up the container is pouring on the gutter of pneumatic vibrator. Amount of fed granulated product is regulated by the screen. That amount also depends on amplitude and freguency of multivibrator vibrations, which can be changed by throttling of air outlet by gland seals placed near the vibrating module. Station of crumble throwing is placed on the column, which is fixed to the machine body by three screws. Container of crumble is fixed to the column by two M8 screws with nuts.

9. "Lids putting" station (Draw. No. 9 - part "B").
Here takes place lids putting on package with ice-cream. Lids shall be placed between guiding rods. Lids are taken from dispenser by rotationable suction nozzle and they are put on packages, which are placed in seats of work table. Negative pressure vaccum is realized by venturi tube. Lids putting station has pneumatic connections for drive of rotational motion of suction nozzle head, and it is tightened by three screws for column to the machine body. Station adjustment it is setting of distan-ce of dispenser rods, respectively to lids diameter and it is necessary to set those lids in such way that they are centrally fed on packages. There are different dispensers for different types of lids. Replacement is realized by mounting dispenser plate on the pin of station housing and tightening of cap nuts. Adjustment of level on which suction nozzle vertically moves, is realized by turning of Ro-man screw on the station flexible connector inside the machine body. In case of dispenser of lids for "calippo" ice-cream it is necessary to unscrew the ring on suction nozzle head and shift distance plate from the bottom of dispenser plate to its top, under nuts.

10. "Package closing" station (Draw. No. 10, 11 -part "B").
Here takes place package closing (by closing device for cups or horns).
In case of cups closing consists in tight sliding the lid over the cup collar. Adjustment of the cup closing device consists in its centrally positioning over the package, placed in the work table seat and regulation of height of the closing device plate. Height of the plate position is regulated by its screwing on suitable length on mandrel thread. Settings are secured by adjusting nut. Assembly of clo-sing device consists in its tightening to the mounting grip and tightening of the nut. Mounting grip is tightened to the central column plate by two M8 screws.
Horns closing device puts the bottom of paper package on the lid. Such type of closing de-vice does not need any height regulations because it is designed for mating with horns and seats in work table. During operation falling body causes bend of the horn wrapper to the inside and coming out piston rod turns the wrapper downside and pushes it to the lid. Closing device for horns is mounted in the same way as closing device for cups.

11. "Sealing" station.
Sealing of lids for cups or "calippo" it is the option for package closing station. Here takes place sealing of given lid with the package collar. Sealing quality depends on three elements : heater temperature, pressure force and sealing time. Sealing temperature is set by temperature control, placed on the machine control panel. Change of settings - see part "D" - enclosures, service manual for temperature control. Sealing temperature is within the range 150°C ÷ 250°C and must be selected to the kind of package. If temperature is too low, lids won't be sealed with package. If temperature is too high, the edge of the lid will be overheated and the lid won't hold tight the package. Time of sealing depends on preset capacity of machine. Optimum machine output during work with sealed packages is 2000 pcs/hour. Sealing station is tightened by the column to machine body.

12. "Dating " station (Draw. No. 12 - part "B")
Here takes place printing of the date and other markings on ice-cream packages. Dating can be made by pneumatical dater at "H" stand (the one before last working station), and dating at the side package surface (small cups, horns, "calippo") at "B" stand.
Rotationally fixed dater head is equipped with rubber, where are placed letters or it is equipped with T-shaped groove, to which there are inserted letters having suitable foot. In upper extreme posi-tion of the head letters take ink from the tampon, placed in the station plate. Tampon is imbided with ink from the tampon fixed in the tampon station seat. Tampon is imbided with ink from the container pressed down by tampon fixing to the seat of station. After the turn by 90°, in its bottom extreme position, date is printed on the lid of package. Head movements are forced by pneumatic ser-vo-motor with the aid of pusher. Service manual of the dater - see part "D" – enclosures. Dating station is tightened by screw to the holder. That screw controls height, where is made printing at the date on the package. After regulation, set-up is protected by tighten up a nut. Holder is fixed to the central column by two screws M8.
Pneumatic dater can works with centerer at "B" stand, which works identicaly. Only date is printing at the side package surface. In this case dater is mounted on the bracket fixed to the machine body. Set-up regulation can make after loosening of suitable mounting screws.

13. "Product receipt" station (Draw. No. 13, 14 - part "B").
It is the last working station of the machine ("I" stand). Here takes place receipt of the ready product from the rotational table.
Line servo-motor with scraper for cups is presented at Draw. 11. In cycles it takes packages advanced from the table seat. That drawing out is mechanically realized by so called "pusher" tightened to the mandrel guiding by sliding sleeve. That mandrel has one more function. Compressed air supplied to the mandrel during pusher falling down escapes through the drilled hole, removing from the seat ob-

jects, which may accidentally enter there, and which moved to "A" station could disturb package feed. Station of cups receipt is tightened by three screws for column to the machine body.
For horns and "calippo" collection serves chute gutter and "pusher" tightened to the mandrel guiding by sliding sleeve. Mandrel has the hole with supplied compressed air, which blows out unwanted objects from the seat. Depending on the type of used packages for ice-cream, there are delivered different kinds of pushers, which except the pusher for "calippo", are fixed to the mandrel by the lengthening pipe. Chute gutter is tightened by three screws for the column to the ma-chine body.

14. Control panel (Draw. No. 1 - part "B").
Control panel also serves as an electric box shut by the key, in which there are placed all elements of electric system. Control panel has emergency switch, supply switch illuminated START and STOP buttons, and switch of AUTOMATIC/ MANUAL operation mode, and buttons switching on gi-ven machine functions in manual mode (in case of pneumatically controlled machine) or controller pa-nel (in case of machine controlled by microprocessor).
Number of buttons on control panel is suited to configuration required by the client. In case configuration with sealing station - there is mounted temperature control on the panel. Service manual of the temperature control - see part "D" - enclosures. There is data plate on control panel.

VI. MOUNTING AND CONNECTING.

1. Unloading and displacement.
Machine is transported on transporting pallet covered by the box.
Before uncloading check the weight of machine in order to select fork truck (Draw. 12). Machine weight is given in the table of technical data (Chapter III).
In case of uncloading by means of lift it is necessary to compare its lifting capacity with machine weight. For uncloading the box should be protected by lines and belts as it is presented on Draw. 12.

2. Unpacking and positioning.
Unscrew 12 screwa locking the box. Lift up the box and take off from the pallet. Take off from the pallet the tool box and other elements, which are separately mounted (spare parts, changeable working stations, wheels). Lift up the machine and unscrew 4 locking screws, securing the machine from the bottom. Take off the pallet, and in place of screws tighten wheels. In order to displace machine without the box, unlock brakes on wheels.
After posistioning of the machine at working place, it is necessary to secure it against displacement, by locking brakes on wheels. Machine must be stabile at working place.

3. Connecting and preparation for work.
Before connecting and starting machine shall be washed and disinfected according to instructions enclosed in Chapter VII. Assembly selected working stations on machine. Check stability of machine and stability of working stations fixed on it.
According to client's requirements machine feeding cable (min. cable section is 1,5 mm^2) is equipped with plug having 4 or 5 contacts. Device shall have protection against electric shock i.e. it has protective earthing. Check if voltage is consistent with voltage suitable for that device. Connect current supply to the main switch. Electric connections shall be consistent with valid norms. After connection it is necessary to check directions of work table rotations. Table must turn counter clockwise.
Compressed air shall be connected to the machine by the means of coupling. Flexible hose (of inside diameter 9 mm) feeding compressed air from client's installation shall be put on the terminal of delivered coupling. Machine is equipped with FESTO pneumatic elements, which do not need any air oiling.

CAUTION !
For proper machine work it is necessary to supply dry air and free of oil particles, with constant pressure 6 bar. That is why installation of compressed air shall be equipped with dewaterer and air filter. In case of pressure drop below 4,5 bar, some elements of pneumatic system and machine won't work correctly.

Finally, connect installation of ice mass to the mass proportioner (standard dairy joint DN 40).
Check leak tightness of pneumatic and dairy joints.
Insert in suitable seats tampon with ink, letters, packages and lids. Fill appropriate containers with crumble, syrup, chocolate and other additives.

4. Storage.
In case of storage it is necessary to take into consideration that machine shall be stored in dry place due to electric installation and electronic systems. If storage takes more then 7 days you must:
- take off and secure tampon with ink,
- take off and wash letters by the means of thinner,
- thoroughly wash and disinfect machine from any contaminations (acc. to Chapter VIII),
- lubricate all lubrication points acc. to Chapter IX.

VII. PRINCIPLE OF OPERATION.

1. Start.
Machine delivered to Polish customer is started by producer's service. During machine start up producer ensures training of client's personnel. After connection of electrical pneumatical and dairy supply to the machine and after selection of its mechanical options, machine may be started.

In case of machine, controlled by microprocessor you shall do following operations:
- check positions of safety cut-out switches,
- set the main switch on position "1",
- select the mode of work at display (horn, cup, "calippo") and switch on each working stations (see: "Service manual of SIEMENS S7 controller" in part "D" enclosures),
- by the means of operation mode switch select automatic mode and switch on heater of lids sealing station if necessary,
- inform personnel about machine start up and then start the machine by pushing the green button "START".

The green lamp of "START" button lights up. Machine does not feed packages, so expect proportioner, pneumatic options shouldn't be started. After starting on package feed, machine begins appropriate work mode, successively starting all switched on pneumatic options. When machine initiates pneumatic options at switched off package feed or it doesn't initiate those options at switched on package feed, it means that photocell is wrong positioned (at empty work table seat LED placed in its housing should constanly light, when the package comes in, the LED should extinguish).
In case of pneumatically controlled machine:
- check positions of safety cut-out switches,
- set the main switch on position "1",
- open each valve of pneumatic functions on the collector at machine side,
- by the means of operation mode switch select automatic mode and switch on heater of lids sealing station, if necessary,
- inform personnel about machine start up and then start the machine by pushing the green button "START".

The green lamp "START" button shall light up. Machine begins normal operation. At the beginning of work it is necessary to pass through the proportioner some amount of ice mass till the feeding installation is coolled. Then turn on package feed and all other working stations.

2. Service.
During operation, operating personnel shall mind receipt of ready product, given by the last working station, replenish packages and lids in dispensers and ensure continuity of product supply (nuts, chocolate, syrup). Don't remove body protective sheets. Don't open door of casing of working space.
Machine output may be regulated by hand wheel placed on the body side.

CAUTION !
Hand wheel of machine output may be rotated only during machine operation.

When you notice wrong machine operation, switch it off by emergency switch.

CAUTION !
Any regulations of machinery and any "cosmetic" operations (cleaning of work table, cleaning of station mobile elements) during machine work is forbidden.
It may cause damage of machine or accident.

3. Stop.

In order to stop the machine:

- push the red button "STOP" (the red lamp "STOP" should light and "by-pass" valve shall activate)
- turn off the heater of lids sealing station,
- shut following valves of pneumatic functions on the collector on the machine side (in case of machine pneumatically controlled),
- set the main switch on "0" position.

After machine stop it is necessary to wash it according to constructions contained in Chapter VIII.

4. Manual work mode.

This option serves only for inspection of proper operation of given working stations after occasional surveys, repairs, maintenance or machine regulations.

In order to activate manual work mode, in case of machine controlled by microprocessor:

- check positions of safety cut-out switches,
- set the main switch on "1" position,
- select the work mode on the display (horn, cup, "calippo") or switch on suitable working stations (see: "Service manual of SIEMENS S7 controller - part "D" - enclosures),
- select manual mode by the means of mode switch,
- inform personnel about machine start and then start the machine by pushing the green button "START".

Machine will work untill the "START" button is pushed.

In case of machine pneumatically controlled:

- check positions of safety cut-out switches,
- set the main switch, on "1" position,
- open following valves of pneumatic functions on the collector on the machine side,
- select manual mode by the means of mode switch,
- inform personnel about machine start and then start the machine by pushing the green button "START".

Machine will work untill the "START" button is pushed. After machine disengage shut the valve of switched on pneumatic function.

VIII. WASHING.

CAUTION !
Before washing take off the main conduit from the socket, remove and protect tampon with ink.

Before production and also after each finished shift wash the machine. Residues of ice mass, juice and other contaminations shall be removed from machine by running lukewarm water by the means of sponge, soft cloth and standard cleaning agents or cleaning-disinfecting agents.
During washing and disinfection pay attention to use agents harmless for stainless steel and aluminium (agents on the base of hydrogen peroxide solution, phosphoric acid sulfuric acid and chlorine with low concentration). Washing by steam is prohibited.
Mass proportioners, "by-pass" valve, chocolate sprayer, station of glazing and dairy hoses may be washed by flowing. It is recommended to disassemble above mentioned stations for each washing. Dozing servo-motors of mass proportioners servo-motors of "by-pass" valve and glazing stations shall be disassembled by unscrewing clamping screws and releasing catch connecting piston rod with valve spindle. Way of disassembly for each station is shown at the drawing. Recommended way of washing ensures proper disinfection of elements, which have direct contact with ice mass.

CAUTION !
After each use machine must be washed, otherwise it may come to bacterial infection during primary production.

IX. LUBRICATION AND PERIODICAL INSPECTIONS.

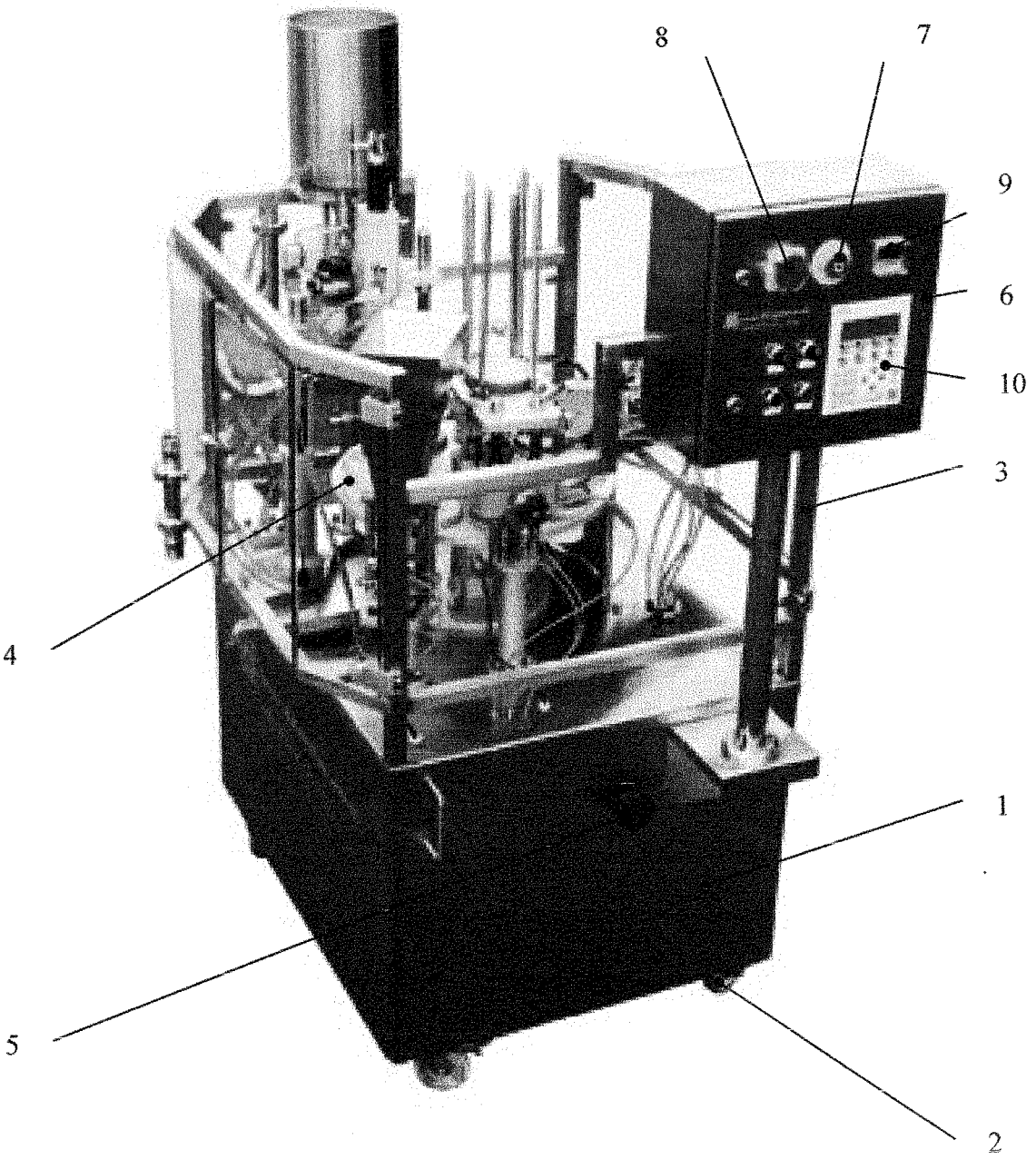
CAUTION !
Before any maintenance of machine, it is necessary to switch it off by the main switch. Before repairs of electric system disconnect the current and before repairs of pneumatic system disconnect supply of compressed air.

1. Lubrication.
Every time after the shift and machine washing , lubrication nipples placed on the column of work table, stations of package (horns, "calippo") and lids feed and sleeves guiding pusher mandrel and cup suction nozzle mandrel must be filled by STP grease, and lubrication nipple in package feed station must be filled by small amount of grease (1÷2 pushings of the greaser).
Every 50 working hours lubricate eccentrics (three lubricating nipples inserted on the cross-bar of the supporting structure under the protective sheet of machine body), race-ways and cams.

2. Periodical inspections.
After machine unpacking and after each 100 working hours check and tighten screws.
Once a year replace bearings, sliding sleeves, worm out elements of pneumatic system and eliminate clearance in given mechanical elements.
When the user does not have qualified technical staff, the Producer proposes annual machine inspection at its workshop.

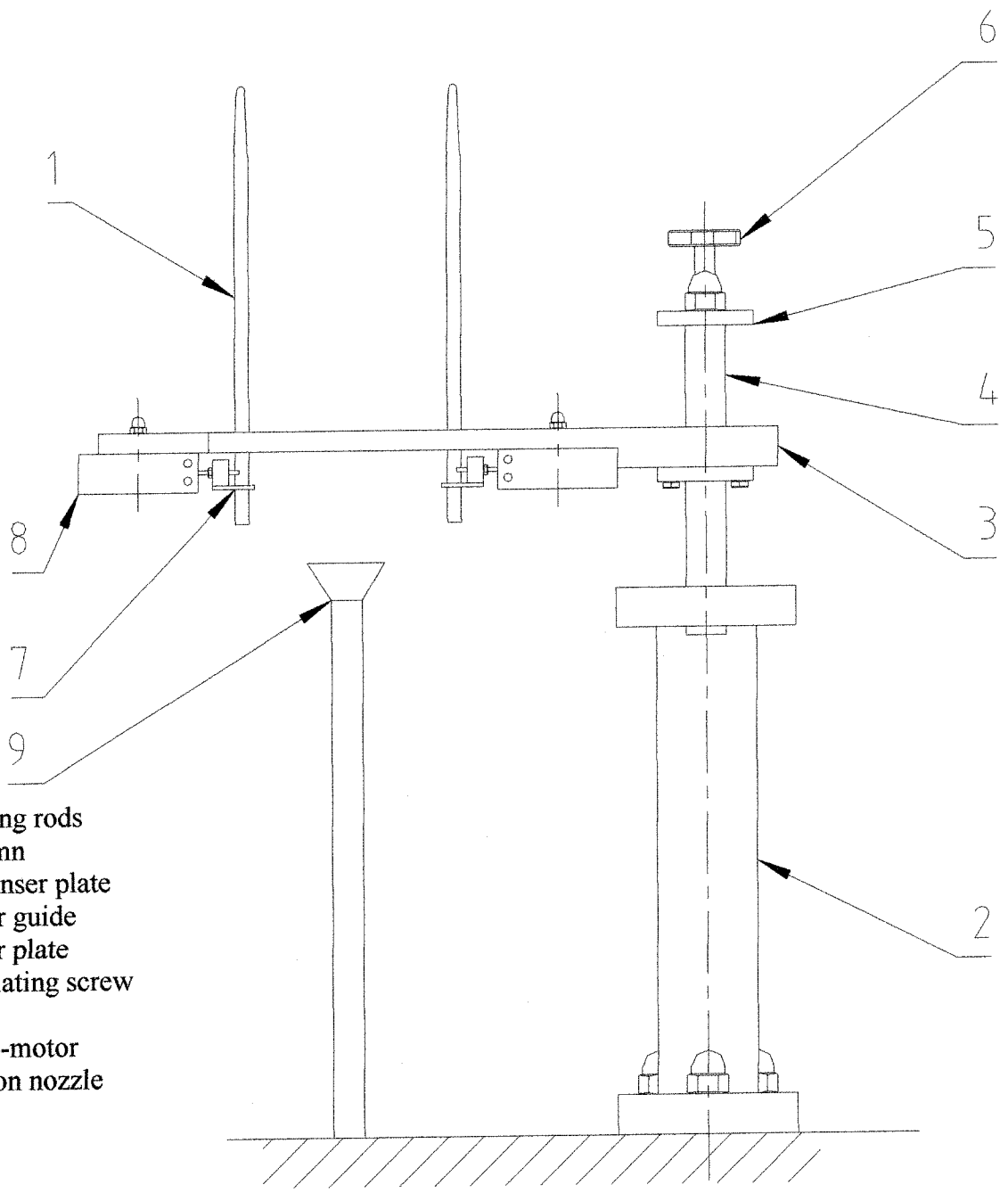
B. DRAWINGS

Drawing No. 1 : GENERAL VIEW OF MACHINE.



1. Housing
2. Castoring wheel with blocking
3. Safety casing
4. Work table
5. Capacity handwheel
6. Control desk
7. Emergency switch
8. Supply switch
9. Temperature control
10. Controller panel

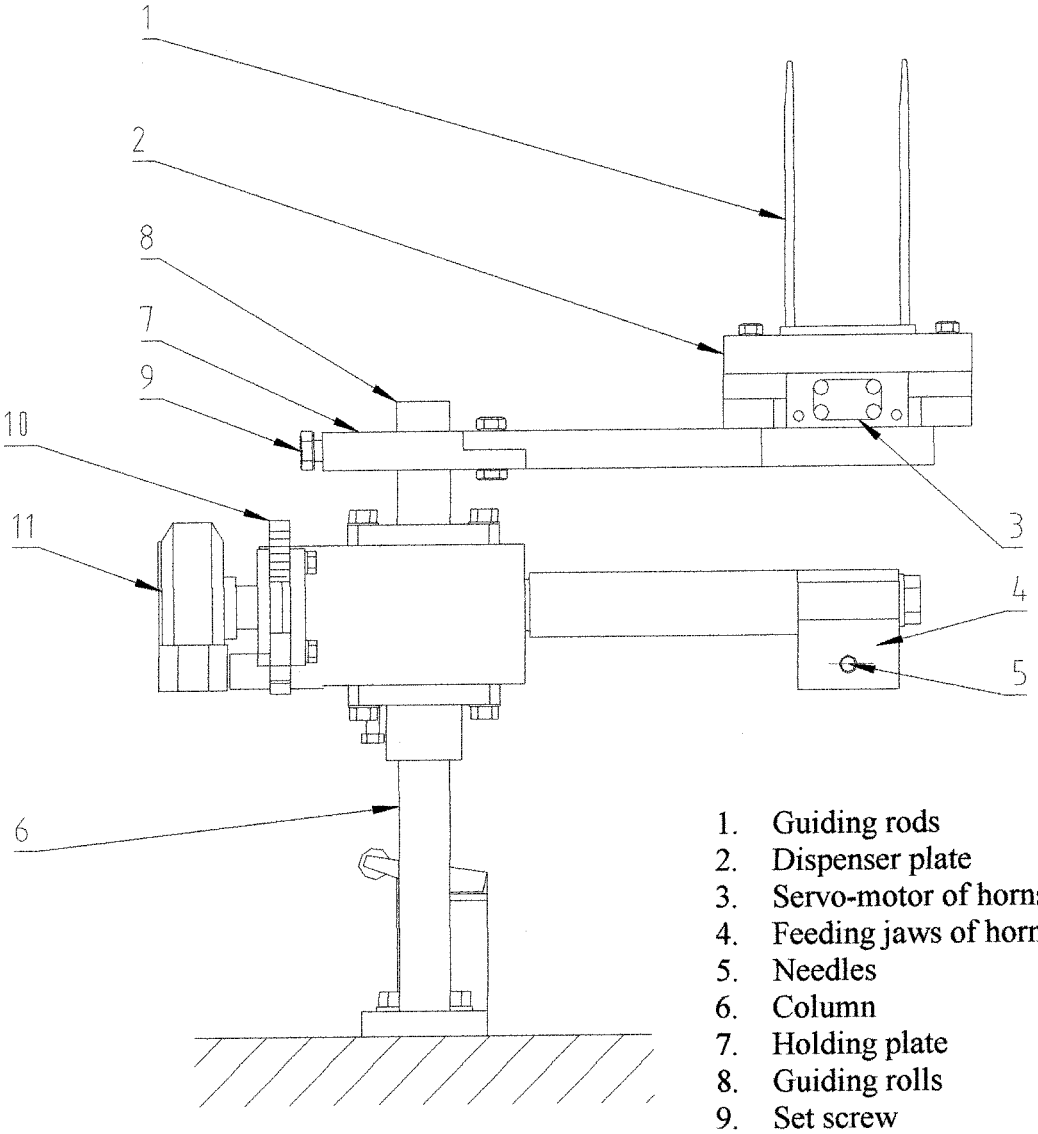
Drawing No. 2 : CUPS DISPENSER.



1. Guiding rods
2. Column
3. Dispenser plate
4. Roller guide
5. Upper plate
6. Regulating screw
7. Jaws
8. Servo-motor
9. Suction nozzle

Konstruował				Masa [kg]	Nr zlecenia
Sprawdził					
Emitował	Agnieszka Godziek	6.03.01			
Nazwa maszyny: EXPERT 4000	Nazwa zespołu: Podajnik kubka		Nazwa detalu: Podajnik kubka		
ICE system ice - cream machines	Podziałka	Il. szt.	Materiał	Nr rysunku: RK-03	

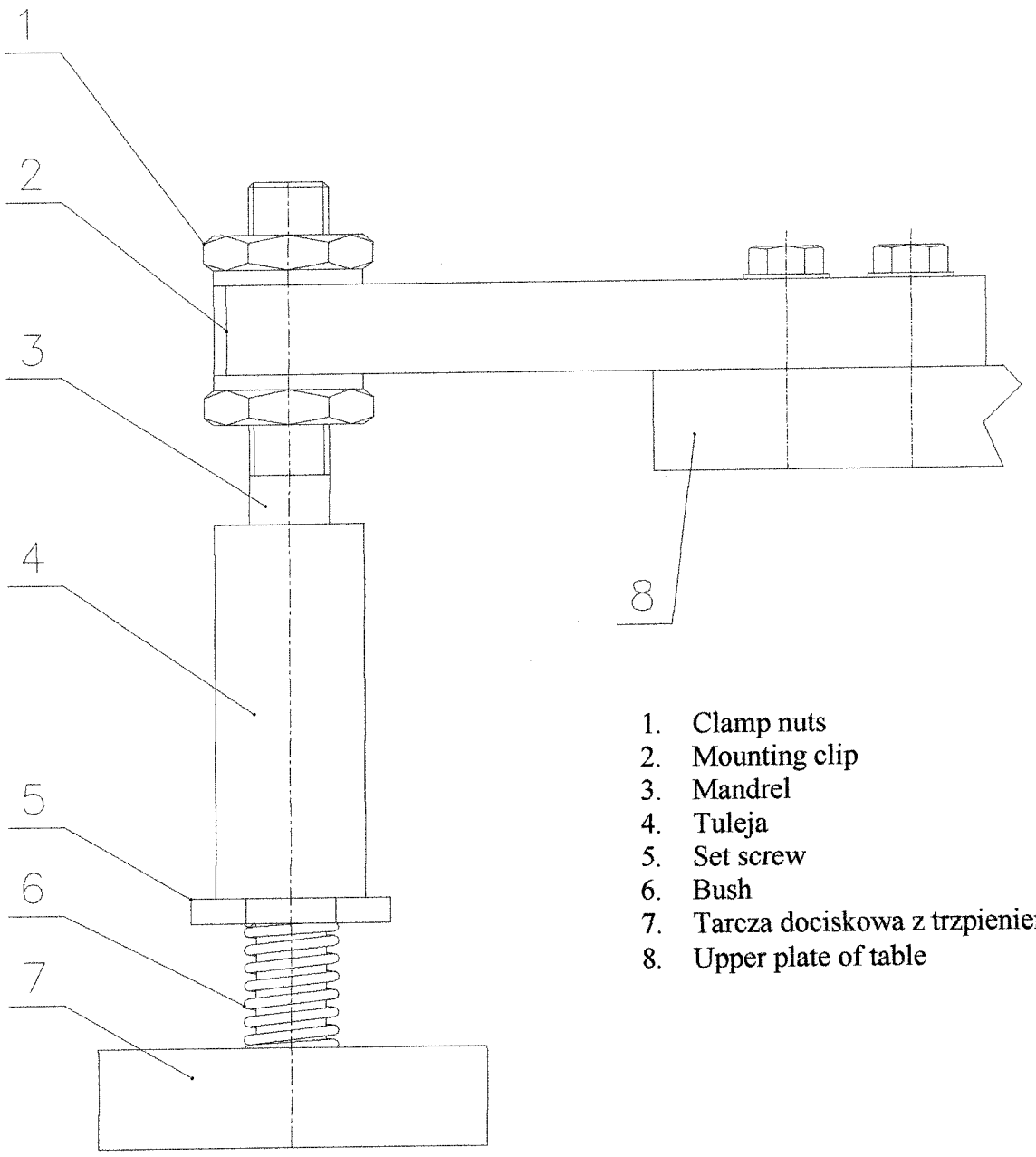
Drawing No. 3 : HORNS DISPENSER.



1. Guiding rods
2. Dispenser plate
3. Servo-motor of horns unclamping
4. Feeding jaws of horns
5. Needles
6. Column
7. Holding plate
8. Guiding rolls
9. Set screw
10. Segment of cog-wheel
11. Rotating engine

Konstruował				Masa [kg]	Nr zlecenia
Sprawdził					
Emitował	Adam Ogrodniczek	7.03.01			
Nazwa maszyny: EXPERT 4000	Nazwa zespołu: Podajnik rozka		Nazwa detalu: Podajnik rozka		
ICE system Ice - cream machines	Podziałka	Il. szt.	Materiał	Nr rysunku: RK-04	

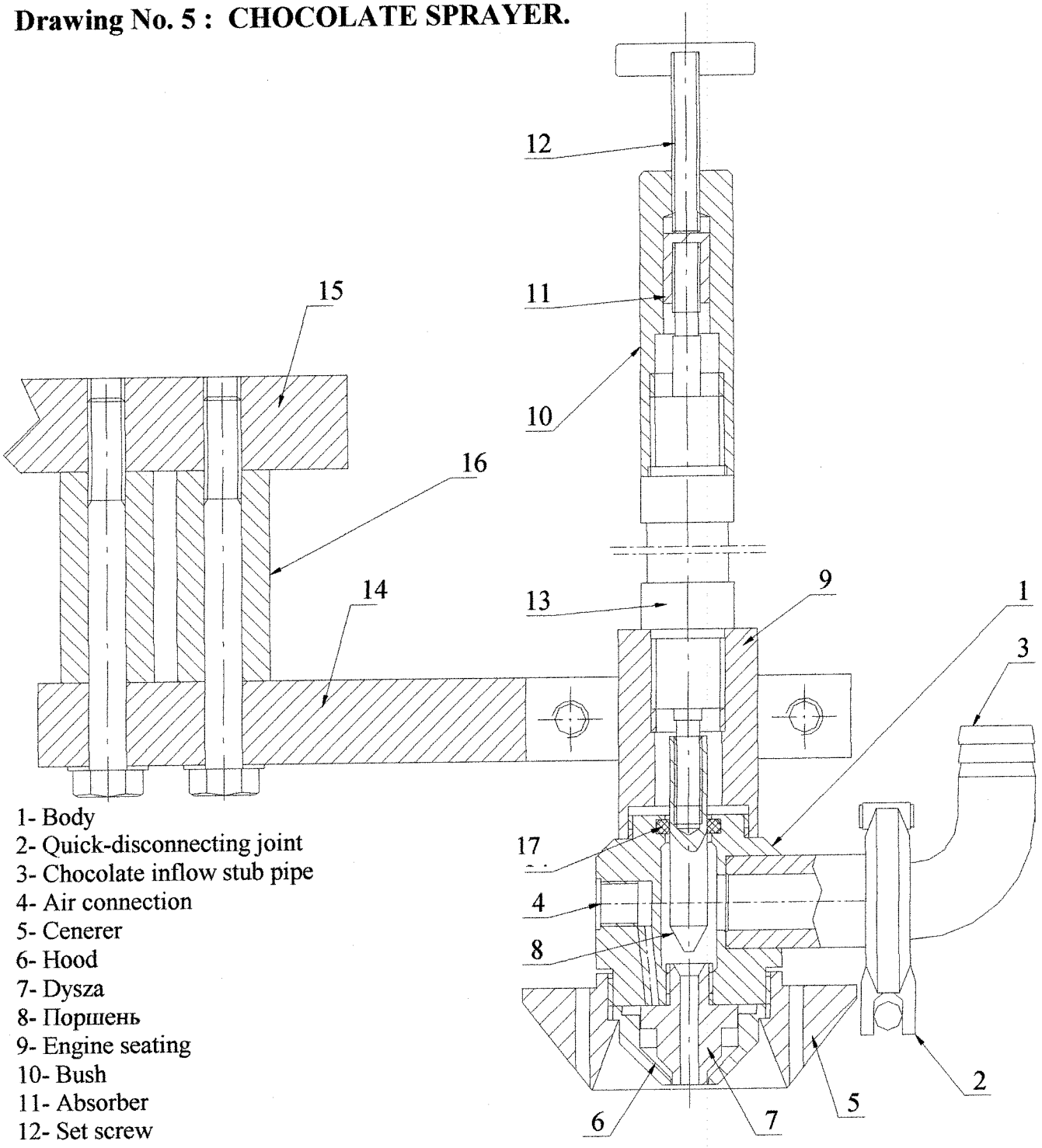
Drawing No. 4 : CENTERER.



1. Clamp nuts
2. Mounting clip
3. Mandrel
4. Tuleja
5. Set screw
6. Bush
7. Tarcza dociskowa z trzpieniem
8. Upper plate of table

Konstruował				Masa [kg]	Nr zlecenia
Sprawdził					
Emitował					
Nazwa maszyny: EXPERT 4000	Nazwa zespołu: Ustawiak kubka		Nazwa detalu: Ustawiak kubka		
ICE system ice - cream machines	Podziałka	Il. szt.	Materiał	Nr rysunku: RK-11	

Drawing No. 5 : CHOCOLATE SPRAYER.

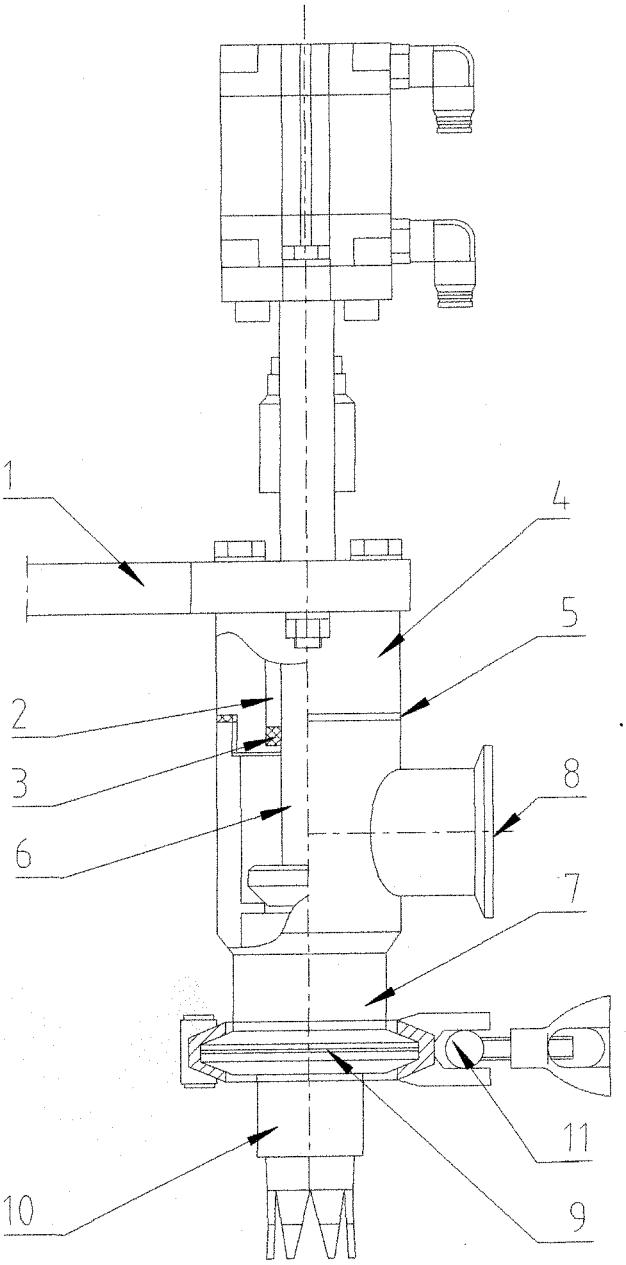


1- Body
2- Quick-disconnecting joint
3- Chocolate inflow stub pipe
4- Air connection
5- Cenerer
6- Hood
7- Dysza
8- Поршень
9- Engine seating
10- Bush
11- Absorber
12- Set screw
13- Motor
14- Mounting plate
15- Upper plate of table
16- Bushes
17- Seal

Konstruował				Masa [kg]	Nr zlecenia
Sprawdził					
Emitował	Agnieszka Godziek				
Nazwa maszyny: EXPERT 4000	Nazwa zespołu: Spray z centrownikiem		Nazwa detalu: Spray z centrownikiem		
ICE system ice - cream machines	Podziałka	Il. szt.	Materiał	Nr rysunku: RK-32.00	

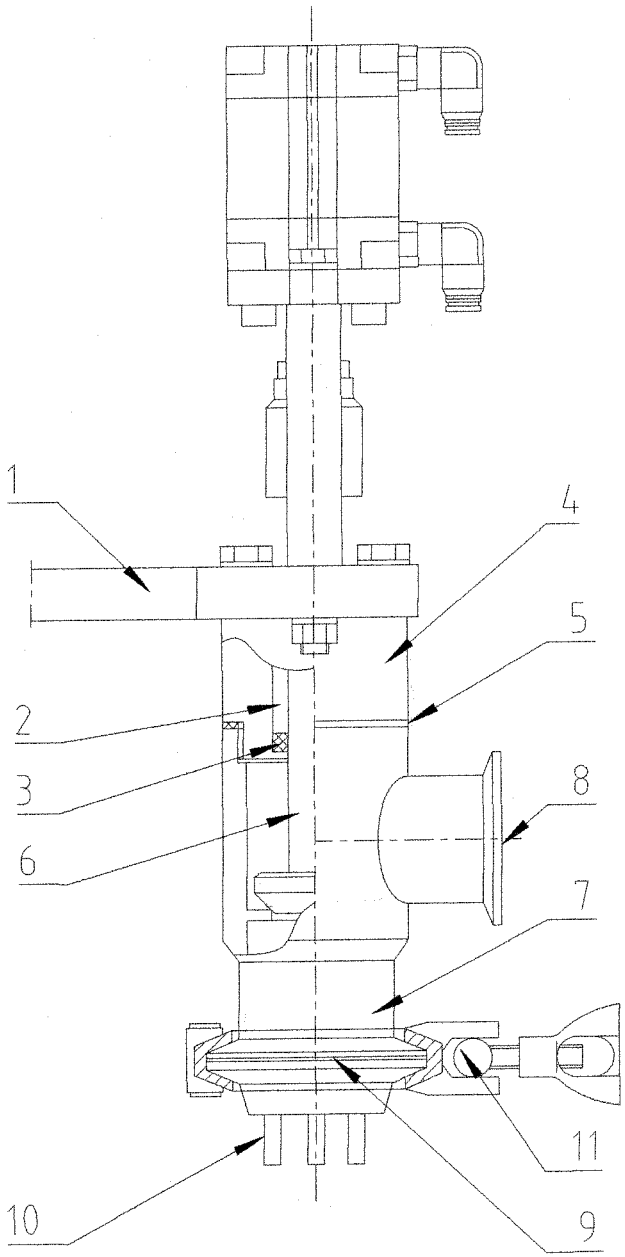
Drawing No. 6 : MASS PROPORTIONER.

1. Mounting grip
2. Teflon bushing
3. Merkel packer
4. Short body of proportioner
5. Teflon washer
6. Poppet valve mandrel
7. Proportioner body
8. Mass inflow stub pipe
9. Dairy packing
10. Proportioner nozzle
11. Quick-disconnecting joint



Konstruował				Masa [kg]	Nr zlecenia
Sprawdził					
Emitował					
Nazwa maszyny: EXPERT 4000	Nazwa zespołu: Dozownik		Nazwa detalu: Dozownik		
ICE system ice - cream machines	Podziałka	Il. szt.	Materiał	Nr rysunku	

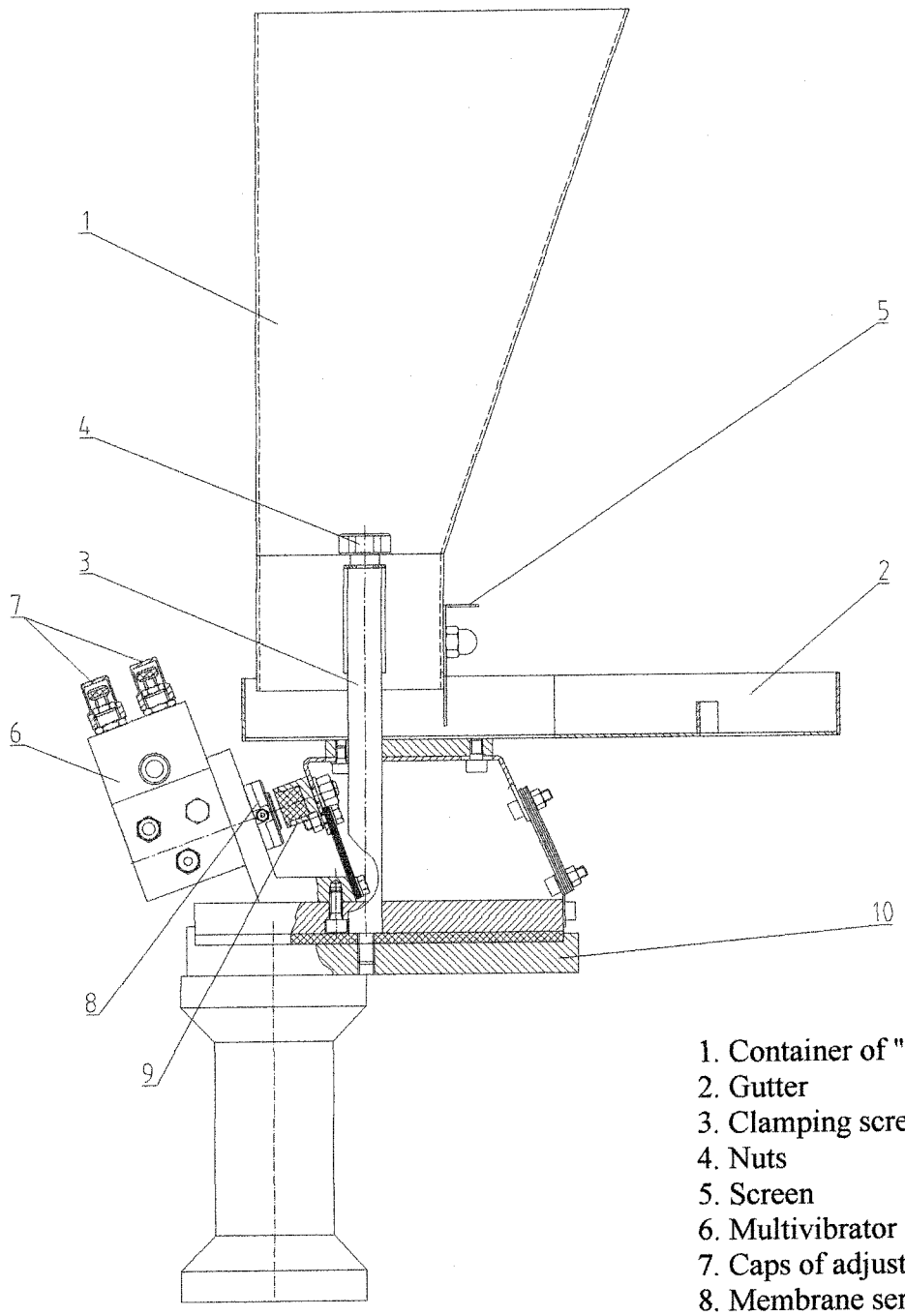
Drawing No. 7 : GLAZE DECORING STATION.



1. Mounting grip
2. Teflon bushing
3. Merkel packer
4. Short body of proportioner
5. Teflon washer
6. Poppet valve mandrel
7. Proportioner body
8. Mass inflow stub pipe
9. Dairy packing
10. Proportioner nozzle
11- Quick-disconnecting joint

Konstruował				Masa [kg]	Nr zlecenia
Sprawdził					
Emitował					
Nazwa maszyny: EXPERT 4000	Nazwa zespołu: Topping		Nazwa detalu: Topping		
ICE system Ice - cream machines	Podziałka	Il. szt.	Materiał	Nr rysunku	

Drawing No. 8 : VIBRATOR.



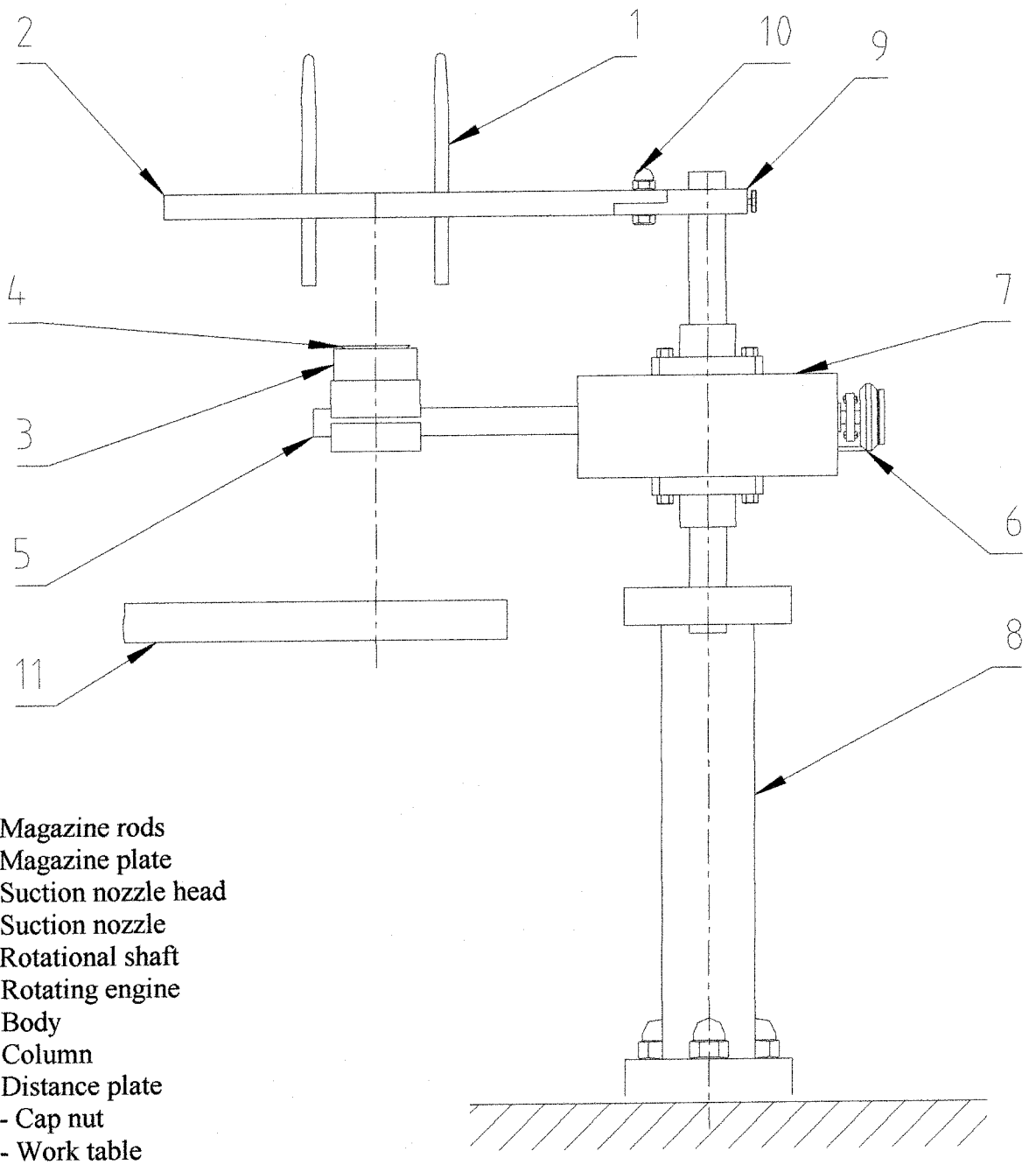
1. Container of "chips"
2. Gutter
3. Clamping screws
4. Nuts
5. Screen
6. Multivibrator
7. Caps of adjusting screws
8. Membrane servo-motor
9. Connector
10. Base

Konstruował	Jacek Pałka	16.05.01		Masa [kg]	Nr zlecenia
Sprawdził					
Emitował					

Nazwa maszyny	Nazwa zespołu	Nazwa detalu
EKSPERT	Wibrator	Wibrator

	Podziałka	Il. szt.	Materiał	Nr rysunku
ICE system ice - cream machines	1:1	1	—	RK–10.00

Drawing No. 9 : STATION OF LIDS PUTTING.



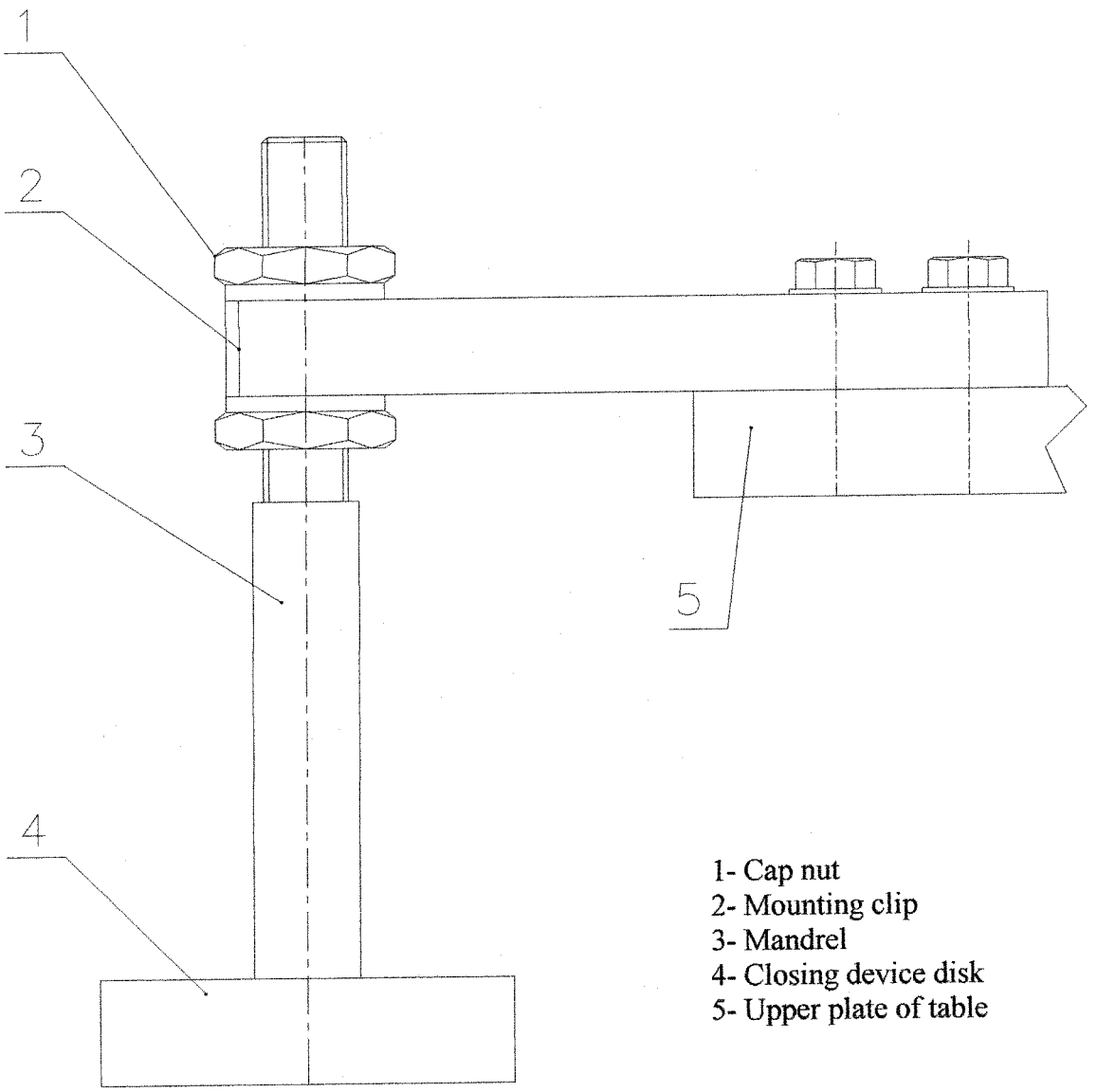
1. Magazine rods
2. Magazine plate
3. Suction nozzle head
4. Suction nozzle
5. Rotational shaft
6- Rotating engine
7- Body
8- Column
9- Distance plate
10- Cap nut
11- Work table

Konstruował	Agnieszka Godziek	19.05.01		Masa [kg]	Nr zlecenia
Sprawdził					
Emitował					

Nazwa maszyny	Nazwa zespołu	Nazwa detalu
EKSPERT 4000	Podajnik wieczek	Podajnik wieczek

	Podziałka	Il. szt.	Materiał	Nr rysunku
ICE system ice - cream machines	1:1	1	—	RK-11

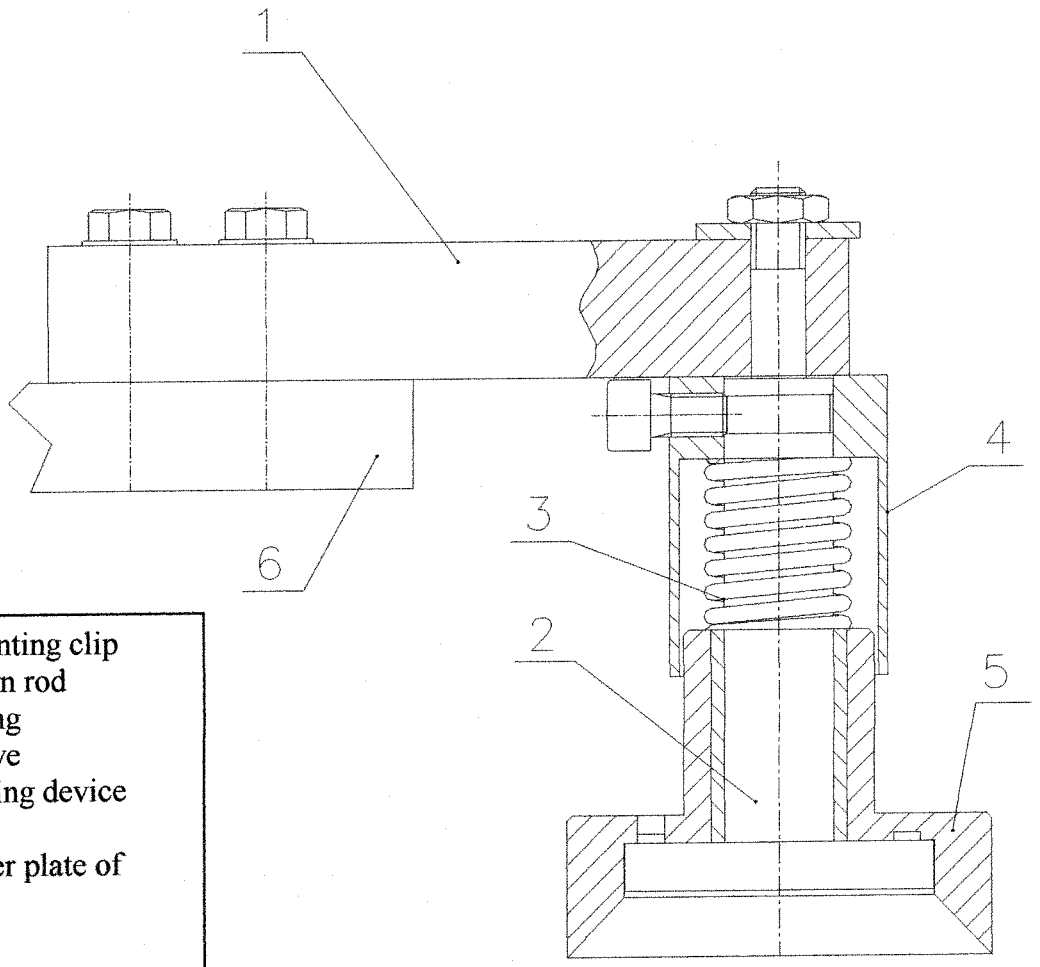
Drawing No. 10 : CUPS CLOSING DEVICE.



1- Cap nut
2- Mounting clip
3- Mandrel
4- Closing device disk
5- Upper plate of table

Konstruował				Masa [kg]	Nr zlecenia
Sprawdził					
Emitował					
Nazwa maszyny: EXPERT 4000	Nazwa zespołu: Zamykacz kubka		Nazwa detalu: Zamykacz kubka		
ICE system ice - cream machines	Podziałka	Il. szt.	Materiał	Nr rysunku: RK-10	

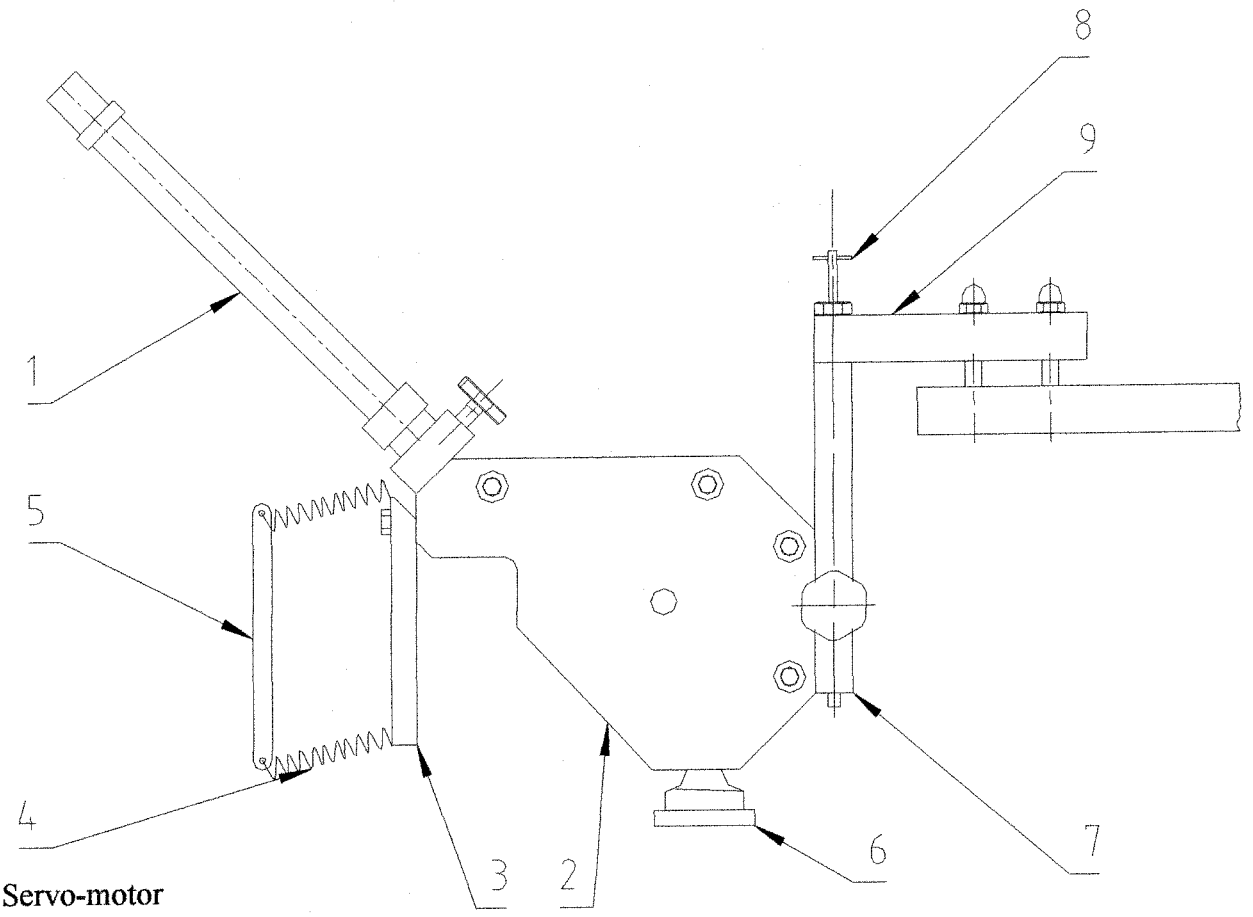
Drawing No. 11 : HORNS CLOSING DEVICE.



1. Mounting clip
2. Piston rod
3. Spring
4. Sleeve
5. Closing device body
6. Upper plate of table

Konstruował				Masa [kg]	Nr zlecenia
Sprawdził					
Emitował					
Nazwa maszyny: EXPERT 4000	Nazwa zespołu: Zamykacz rozka		Nazwa detalu: Zamykacz rozka		
ICE system ice - cream machines	Podziałka	Il. szt.	Materiał	Nr rysunku: RK-12	

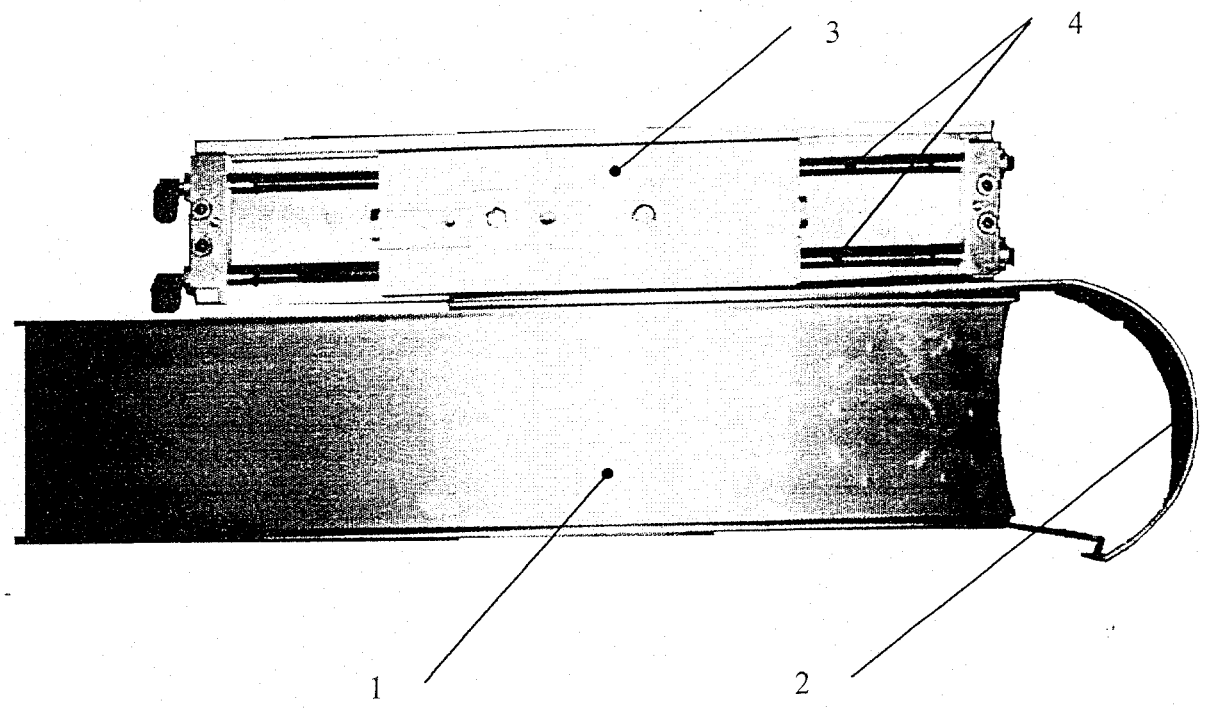
Drawing No. 12 : STATION OF DATING.



1. Servo-motor
2. Body
3. Seat of tampon
4. Spring
5. Tampon fixing
6. Dater head
7. Bush
8. Set screw
9. Mounting clip

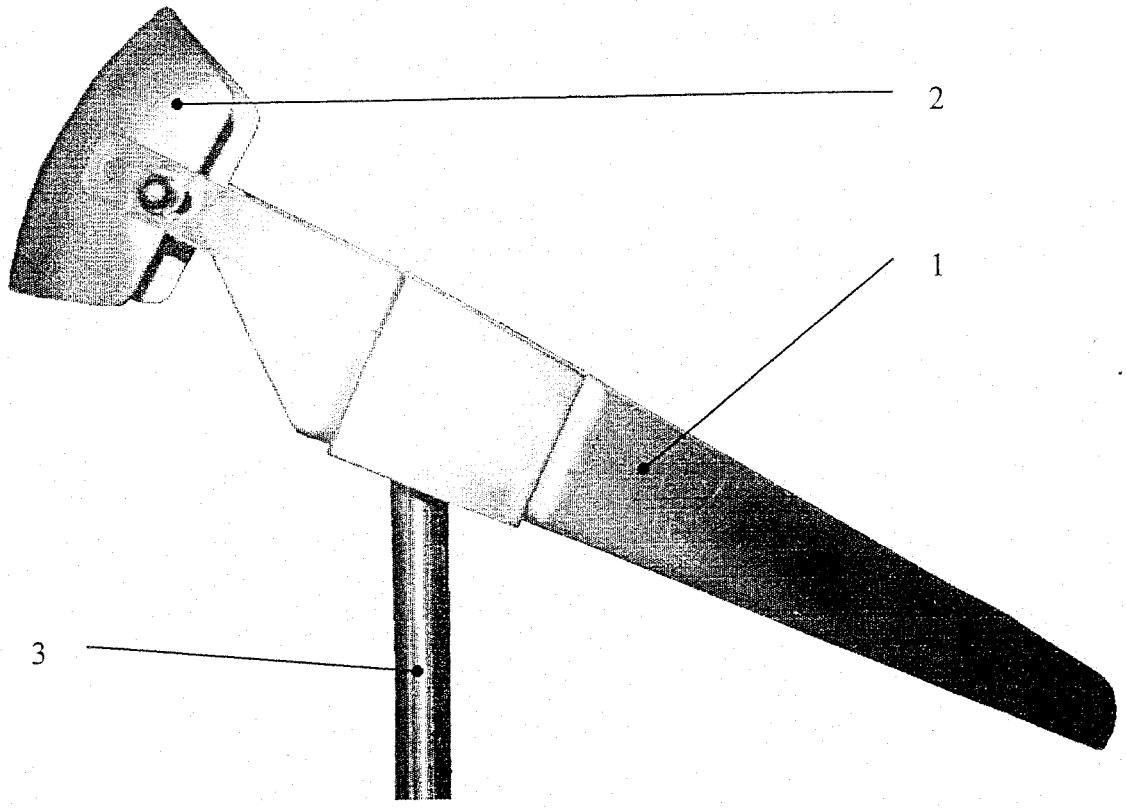
Zespol: Datownik						Czas	Urzadzenie: EXPERT 4000			Masa:	kg
Szkicował	Adam Ogrodniczek						Data	6.03.01	Nazwa:		
Toczenie									Datownik		
Frezowanie											
Montaż											
Podziałka /	Materiał					ICEsystem ice – cream machines			Nr rysunku RK – 16		

Drawing No. 13 : STATION OF CUPS RECEIPT.



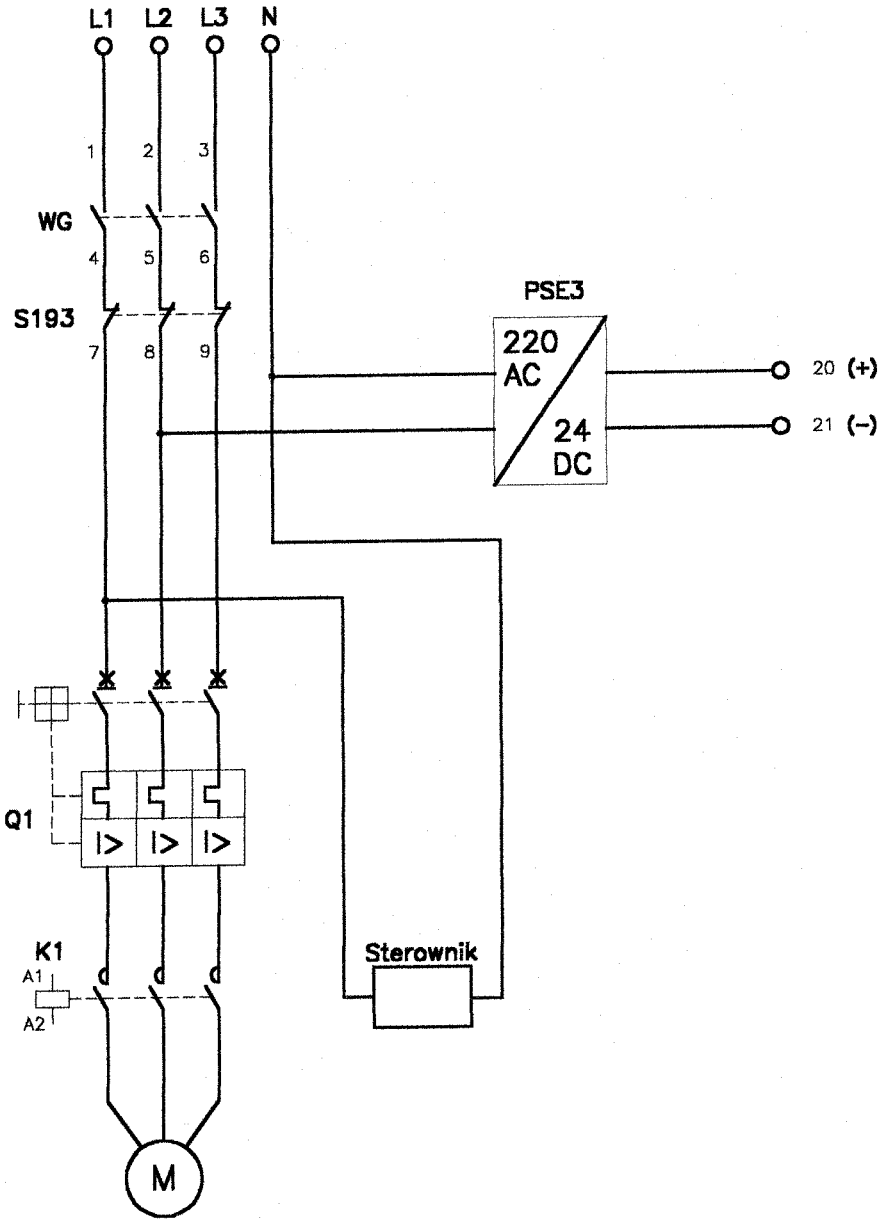
1. Collecting gutter
2. Scraper
3. Scraping servo - motor
4. Guides

Drawing No. 14 : STATION OF HORNS EJECTING.

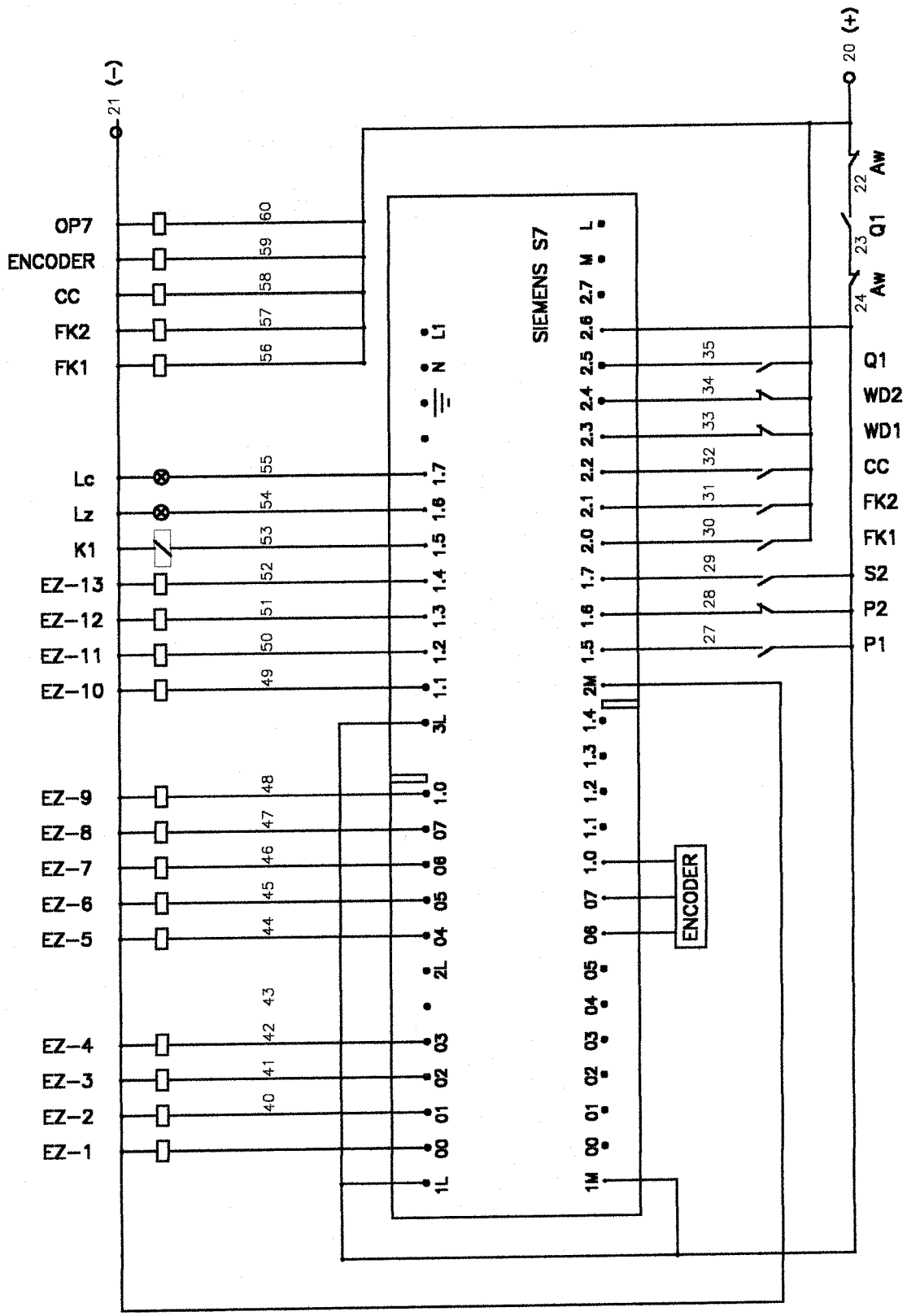


1. Collecting gutter
2. Directing elbow
3. Column

Drawing No. 15 : ELECTRICAL DIAGRAM.



Konstruowal				Masa [kg]	Nr zlecenia
Sprawdzil					426
Emitowal					
Nazwa maszyny: EXPERT 4000	Nazwa zespolu: Elem instal. elektrycznej		Nazwa detalu: Zasilanie glowne		
ICE system Ice - cream machines	Podzialka	Il. szt.	Material	Nr rysunku: DZ-E-426-1	



Konstruował				Masa [kg]	Nr zlecenia
Sprawdził					426
Emitował					
Nazwa maszyny: EXPERT 4000	Nazwa zespołu: Elem instal. elektrycznej		Nazwa detalu: Schemat sterowania		
ICE system ice - cream machines	Podziałka	Il. szt.	Materiał	Nr rysunku: DZ-E-426-2	

Symbols at electrical diagram

Aw – emergency switch

CC – pressure pick-up

EZ1÷13 – electrovalves

FK1, 2 – photocells

G – heater

K1 – contactor

K11 – heater relay

Lc – red control lamp

Lz – green control lamp

M – motor

P1 – START switch

P2 – STOP switch

PSE3 – stabilizing feeder cable

PT-100 – temperature gauge

Q1 – thermic protection of the motor

S1 – selector of heater switching on

S2 – switch of working mode

S-193 – magnetoelectrical protection - triphase

THR – temperature control

WD1, 2 – gate switches

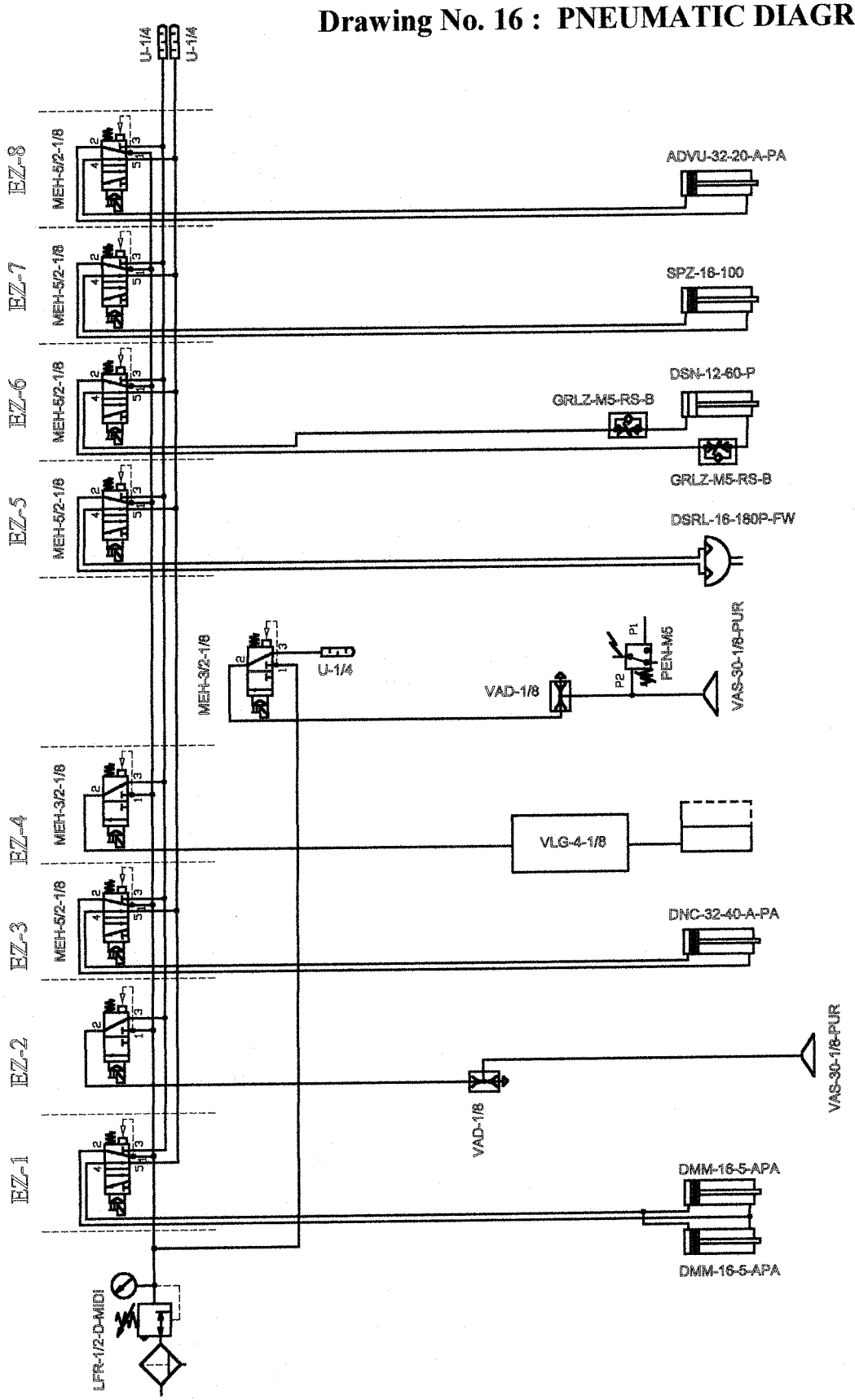
WG – main switch

ZR – differential and current protection

Electrovalves functions

electrovalves	**"cup"**	**"horn"**	**"calippo"**
EZ-1	unclamping of cups	unclamping of horns	-
EZ-2	-	feeding of horns	unclamping of calippo
EZ-3	cups suction nozzle	needles	-
EZ-4	-	chocolate sprayer	-
EZ-5	proportioner (doser)	proportioner (doser)	proportioner (doser)
EZ-6	rose decoring	rose decoring	proportioner (opener)
EZ-7	glaze decoring	glaze decoring	-
EZ-8	vibrator	vibrator	-
EZ-9	lids suction nozzle	lids suction nozzle	lids suction nozzle
EZ -10	lids feeding	lids feeding	lids feeding
EZ -11	dater	dater	dater
EZ -12	cup receipt	"pencil-filler" pump	syrup pump
EZ -13	"by-pass" valve	"by-pass" valve	-

Drawing No. 16 : PNEUMATIC DIAGRAM.



Zespol: *Schemat pneumatyczny*			Czas	Urzadzenie: *EXPERT 4000*	Masa: *kg*
Szkicował: *Agnieszka Godziek*				Data: *15.10.01*	Nazwa: *Schemat pneumatyczny*
Toczenie					
Frezowanie					
Montaz					
Podzialka /	Material			ICEsystem ice – cream machines	Nr rysunku *RK–P.426*

Symbols at pneumatic diagram

ADV-...-...	- servo-motor of double-sided operation
ADVU-...-...	- servo-motor of double-sided operation
DMM-...-...	- servo-motor of double-sided operation
DNC-...-...-...	- servo-motor of double-sided operation
DSN-...-...-...	- servo-motor of double-sided operation
DSRL-...-...-...	- oscillatory drive of double-sided operation
EG-...-...-...	- single acting cylinder
EV-20-4	- round mounting module
EZ-...	- electrovalve
GRLA-1/8-...	- throttle and non-return valve
GRLZ-1/8-...	- throttle and non-return valve
HE-3-1/8-...	- shut-off valve
LFR-1/2-...	- air preparation unit
MEH-...-...	- electromagnetic valve
PEN-M5	- pressure pick-up
PM	- air motor
SPZ-...-...-...	- line unit
U-...	- silencer
VAD-1/8	- vaccum suction nozzle
VAS-...-...-...-PUR	- suction cup
VLG-4-1/8	- multivibrator

C. WARRANTY

I. WARRANTY CONDITIONS.

Producer warrants that machine is free of material and execution defects within the limits mentioned above.

Producer does not take responsibility for defects and faults of components delivered by third parties, however ensures suitable service.

Producer reserves the right to modifications of machine without prior notice and without necessity of modernization.

1. Warranty period.

Warranty period is 12 months from the date of start-up, which shall take place with the presence of user's staff not later then 14 days from the date of machine delivery.

2. Warranty conditions.

Warranty is granted under condition of signing of technical acceptance report.

Warranty covers cost of replacement of defective parts or their repair, when producer is responsible for defect.

Warranty does not cover costs of service staff travel, unless otherwise agreed.

Warranty does not cover defects resulting from transport, defective or incorrect operating, using not original parts, overload.

Warranty does not cover following parts and operating materials: seals, ink, letters, springs, elements of electric and pneumatic system, etc. Used elements bought from the third parties are subject to warranty conditions established by their producers.

The Seller is not responsible for losses of production, losses of markets, etc.

The Seller takes the obligation to perform services within 5 years from the date of warranty expiration, on following conditions:
The Seller must deliver on condition of payment all spare parts, necessary for continuation of machine work on the cost of the user, within 7 days from the date of notice about such defect, the Seller will repair machine on condition of payment.

II. TECHNICAL ACCEPTANCE REPORT.

Board consisting of above mentioned made on ..... technical acceptance of machine:

- machine for ice-cream packing EXPERT 4000 (serial No 376) - 1 pce.

The Board ascertained as follows:

1. Machine is complete (according to the order), it has the set of additional equipment (according to the Chapter II, of the instruction manual "Complete delivery"), it correctly works, and it achieves technical parameters and safety norms provided in instruction manual.
2. Client's staff has been trained regarding machine service and rules of safety work. Service manual has been given.
3. Device has been admitted to operation.

Notes:

1. Reached working capacity is ..... pcs/ h

.....

.....

.....

Report has been made in two copies, one for each Party.

Members of the Board:

From the Seller's side (.....):

1.	.....	.....	
	Name and surname	Post	Signature
2.	.....	.....	

From the Buyer's side (.....):

1.	.....	.....	
2.	.....	.....	
3.	.....	.....	
4.	.....	.....	

TECHNICAL ACCEPTANCE REPORT (copy for the Seller)

Board consisting of above mentioned made on ..... technical acceptance of machine:

- machine for ice-cream packing EXPERT 4000 (serial No 376) - 1 pce.

The Board ascertained as follows:

1. Machine is complete (according to the order), it has the set of additional equipment (according to the Chapter II, of the instruction manual "Complete delivery"), it correctly works, and it achieves technical parameters and safety norms provided in instruction manual.
2. Client's staff has been trained regarding machine service and rules of safety work. Service manual has been given.
3. Device has been admitted to operation.

Notes:

1. Reached working capacity is ..... pcs/ h

.....

.....

.....

Report has been made in two copies, one for each Party.

Members of the Board:

From the Seller's side (.....):

1.	..... Name and surname	..... Post	..... Signature
2.	.....	.....	.....

From the Buyer's side (.....):

1.	.....	.....	.....
2.	.....	.....	.....
3.	.....	.....	.....
4.	.....	.....	.....

.... , date .....

Company's name (customer) Place

III. STAFF TRAINING PROTOCOL

The selling party representative (serviceperson) has carried out on the day ..... the training on the rules of operation safety of the following devices:

.....

.....

.....

.....

.....

The training referred to the knowledge of construction, principles of safe operation, ways of adjusting the machine, cleaning and servicing of the machine.

The training involved the following persons from the customer's personnel. Hereby, these pe-rsons are authorised to operate the above mentioned machines.

No.	Name	Designation	Trainee signature

.....

Serviceperson signature

.... , date .....

Company's name (customer) Place

STAFF TRAINING PROTOCOL (copy for the Seller)

The selling party representative (serviceperson) has carried out on the day ..... the training on the rules of operation safety of the following devices:

.....

.....

.....

.....

.....

The training referred to the knowledge of construction, principles of safe operation, ways of adjusting the machine, cleaning and servicing of the machine.

The training involved the following persons from the customer's personnel. Hereby, these pe-rsons are authorised to operate the above mentioned machines.

No.	Name	Designation	Trainee signature

.....

Serviceperson signature

IV. WARRANTY CARD.

Warranty period

12 months

MACHINE: Dozing and packing automatic machine EXPERT 4000

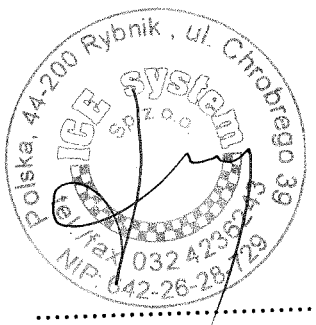
TYPE: CUP / HORN / CALIPPO*

INDUSTRIAL NUMBER: 426

DATE OF SALE: .....

DATE OF START-UP: .....

*) cross out unnecessary



.....
(Seller's seal and signature)

.....
(Signature of the person performing start-up)

Service : ICE system sp. z o.o., 44-200 Rybnik ul.Chrobrego 39, Poland
tel. + 48-32/ 423-62-43,422-97-08

V. CARD OF INSPECTIONS AND WARRANTY REPAIRS.

Pos.	Date	Description of inspection or repair	Technician's signature

D. ENCLOSURES

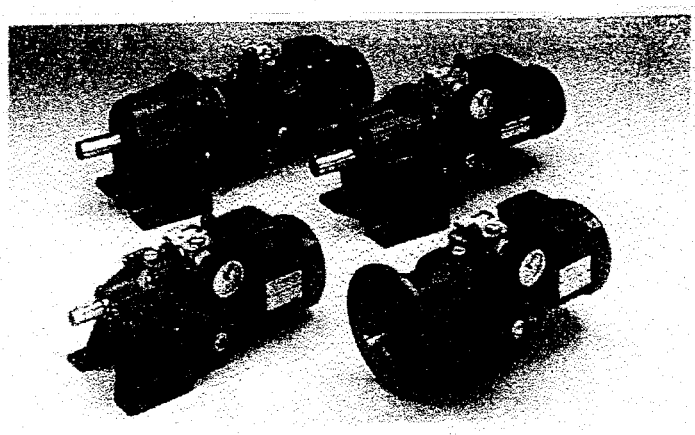
MOTOVARIO

TECHNICAL – TUBULAR

DOCUMENTATION

of variable speed transmission unit

Made by Motovario (Italy)



TRANSMISSIONS – MOTOREDUCERS

IMPORT · EXPORT · SERVICE

EQNet

THE EUROPEAN NETWORK FOR QUALITY SYSTEM ASSESSMENT AND CERTIFICATION

This is to state that

MOTOVARIO S.p.A.

Via Giardini, 45 - 41040 Spezzano di Fiorano Modenese (MO)
Italia

holds the Quality System Certificate

CISQ-ICIM n°: 0129/0

for the standard from the
ISO 9000 / EN 29000
series, and the scope as specified therein

Signed for and on behalf of EQNet member

DATE

08-11-1993

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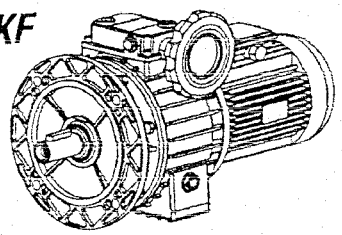
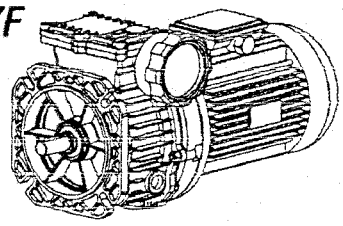
The issuing member holds all other EQNet members harmless for any claims arising from the existence of this document

MOTORVARIATORS

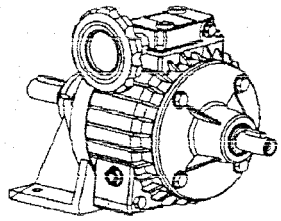
TKF



TXF

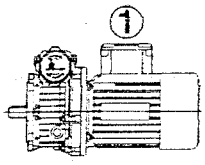
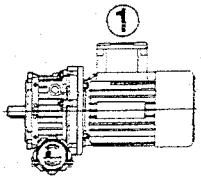
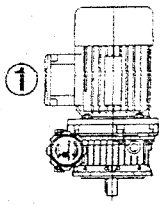
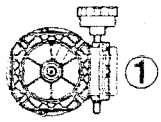
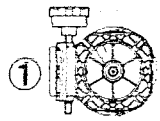


VK

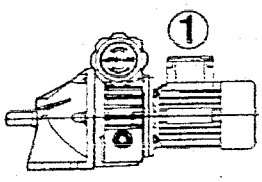
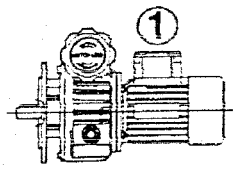
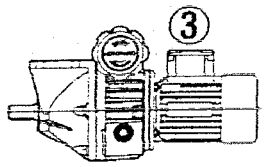
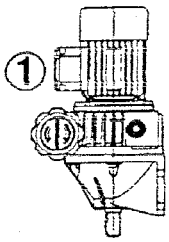
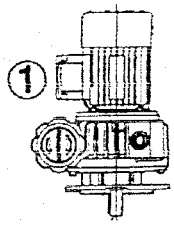
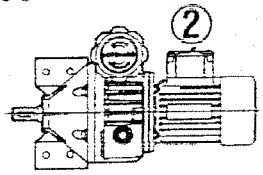
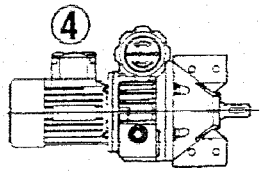


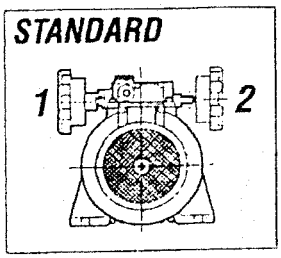
MOUNTING POSITION

TX

B5	B8	V1	B6	B7
				

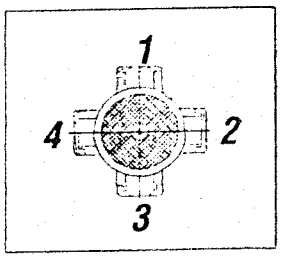
TK

B3	B5	B8
		
V5	**V1**	
		
B6S	**B6D**	
		



MOUNTING POSITION OF HANDWHEEL CONTROL

Variators are supplied as standard with a handwheel for manual speed control. An optional gravitational indicator can be fitted to the standard handwheel. Unless otherwise specified, the handwheel is fitted to the variator in position 1 (to the right, looking at the output shaft).



MOUNTING POSITION OF TERMINAL BOX

For special requirements, orders must specify the position of the terminal box with reference to the diagram. Unless otherwise specified the terminal box will be mounted as shown in the diagram for the mounting position.

1. DESIGNATION.

TKF	variator with output flange
TXF	motorvariators
VK	variator with input shaft
D	differential
002, 005, 010	size
170-1000	output speed
B3, B5, B8	mounting position
0,75 kW	motor power
4p	number of motor poles
V220/380	motor voltage
Hz50	motor frequency

2. DESIGN FEATURES.

- 7 sizes for power ratings from 0,15 kW to 9,2 kW.
- Variation range: i=3,5 (5/080 ÷ 10/090); i=6 (sizes 5 ÷ 10); i=5 (all others).
- Variation range with differential: i=∞.
- Silent, vibration-free running.
- High efficiency.
- Bidirectional rotation.
- Control handwheel positionable on either side.
- Speed repeatability at max. speed: ± 0,5 %.
- Speed repeatability at min. speed: ± 1 %.
- Regulation sensitivity: 0,5 RPM.

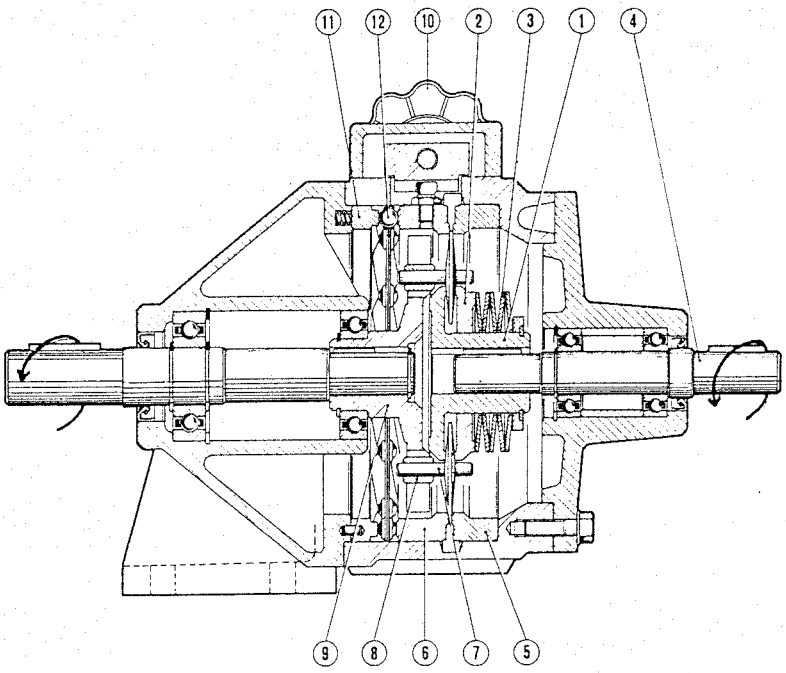
3. MATERIALS.

- Casings (TK-VK): G200 grey cast iron (ISO 185).
- Casings (TX): diecast aluminium alloy.

4. ELECTRIC MOTORS.

- All versions: IP55 protection.
- TK versions: flange type B14.
- TX versions: flange type B5.

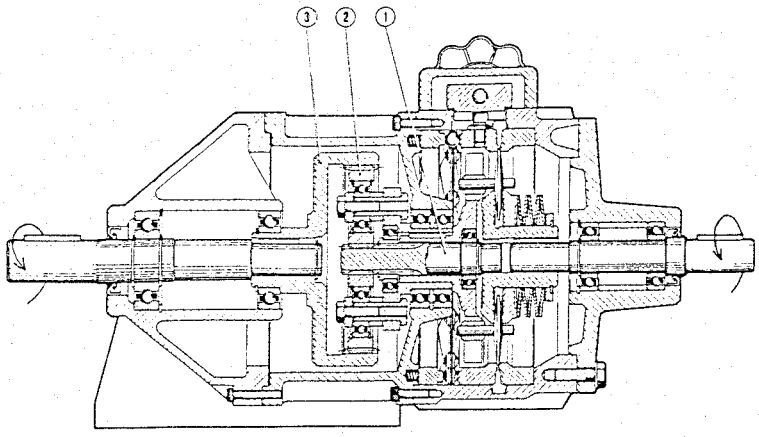
5. RUNNING.



MOTOVARIO variators basically consist of the following components. Two sun races (1, 2) are pushed together by a set of Belleville springs (3) and are keyed to the input shaft (4). Two annulus races (5, 6) are fixed to the variator casing and therefore remain stationary. Planet discs (7) rotate in friction bearings (8) and are capable of sliding radially in planet carrier (9) which is keyed to the output shaft.
Planet discs (7) are held between the driving sun races (1, 2) on the inside and the stationary annulus races (5, 6) on the outside. This imparts a double rotation to the planet discs which rotate individually about their own axes and collectively around the annulus races. Since the friction bearings which hold the planet discs are fixed to the planet carrier, the collective motion of the planet discs rotates the planet carrier and the output shaft to which it is keyed. Continous speed variation is achieved by turning handwheel (10). This moves annulus race (6) against pressure from ball ring (12) and cam race ring (11). As annulus ring (6) moves, the gap between it and annulus ring (5) widens or narrows, causing the planet discs to slide out wards and inwards. This radial sliding movement of the planet discs varies the ratio of the drive transmitted to the planet carrier and output shaft.

N. B. The motorvariator must be running before the adjustment can be made.

6. DIFFERENTIAL.



MOTOVARIO variators can be equipped with epicyclic differential units to vary output speed over the range between 0 RPM and maximum RPM. This transmission ratio is defined as ∞.
Zero RPM output speed is achieved by transmitting the constant speed of the input shaft not only to the variator's sun races but also to the sun gear (1) which drives the additional epicyclic gear train. Input speed as varied by the variator is relayed to the planet gears (2) of the epicyclic differential. This causes planet gears (2) to rotate at the same speed as the driving sun gear (1). Under these conditions the annulus gear (3) of the epicyclic differential remains stationary, and there is no rotation of the output shaft.

7. LUBRICATION.

TK versions are supplied without bleed valves.
TXF versions are supplied without oil caps and are permanently lubricated; they are therefore maintenance free and there is no need for oil changes.
All variators, if not otherwise specified in the order, are intended to be operated in positions B3-B5.
For oil changes refer to the recommended lubricant table.

Quantity of oil in litres		
TKF	B3, B5, B6, B8	V1, V5
002	0,12	0,26
005	0,15	0,75
010	0,42	1,70

Quantity of oil in litres		
TXF	B5, B6, B7	V1, B8
002	0,10	0,25
005	0,13	0,40
010	0,33	0,75

Recommended oil	
IP	TRANSMISSION V.E.
IP	A.T.F. DEXRON FLUID
AGIP	A.T.F. DEXRON
BP	AUTRAN DX
CHEVRON	A.T.F. DEXRON
ESSO	A.T.F. DEXRON
FINA	A.T.F. DEXRON
MOBIL	A.T.F. 220
SHELL	A.T.F. DEXRON
CASTROL	TQ DEXRON II

8. ASSEMBLY.

In order to ensure suitable assembly of motovariators in the device, follow below mentioned instructions:

- Secure stable fixing to the construction in order to eliminate vibrations.
- Maintain coaxiality shafts because unsuitable position of shaft axles may cause overload and heating of rolling bearings and vibrations of the whole system, what causes loss of drive life.
- If during device operation there are overloads, it is necessary to install the coupling between motovariator and drive receipt.
- After variator mounting on the device, screw the suitable standard plug in place of venting plug.

9. RUNNING-IN.

In order to ensure the prolonged operation, the full motovariator load may take place after 100 working hours.

10. START-UP.

Before motovariator start, it is necessary to check if the direction of rotations is suitable. The first start of motovariator shall be realized by gradually increasing of load in order to eliminate mistakes in connecting the motor with the electrical installation.

11. MAINTENANCE.

MOTOVARIO motovariators, due to used construction, materials and quality, do not need any maintenance, except inspection of leak tightness and periodical cleaning of the body from dust and other contaminations. In case of properly selected drive at the stage of designing and proper operation, i.e. prevention of overloading MOTOVARIO motovariators ensure long operation.

12. INSTRUCTIONS REGARDING SAFETY OF WORK.

a) all rotating parts as couplings, transmissions etc. should have guards,
b) during operation of drive do not loosen any screws
c) all works connecting with disassembly and maintenance should be realized only at switched off motor.

13. GENERAL NOTES.

- During start-up of motovariators every time pay attention to any loosened and damaged an-choring elements.
- Motovariators shall be assemblied acc. to assembly position given in the order, what ensures adequate amount of oil for given position and suitable lubrication.

- Motovariators shall be mounted in such way, in order to:
  - ensure suitable cooling and regular heat abstraction (periodical cleaning from dust and other contaminations - on the variator finning);
  - protect against vibration (use nuts with washers in order to eliminate loosening of screws).
- In order to protect against activity of atmospheric factors and in difficult working conditions it is recommended to use guards and periodical painting of motovariator bodies.
- In case of ambient temperatures $t < -20°C$ and $t > +50°C$ it is necessary to use special guards protecting motovariator against low and high temperatures.

CAUTION !
Changes of rotational and motovariator regulation may be carried only during operation.

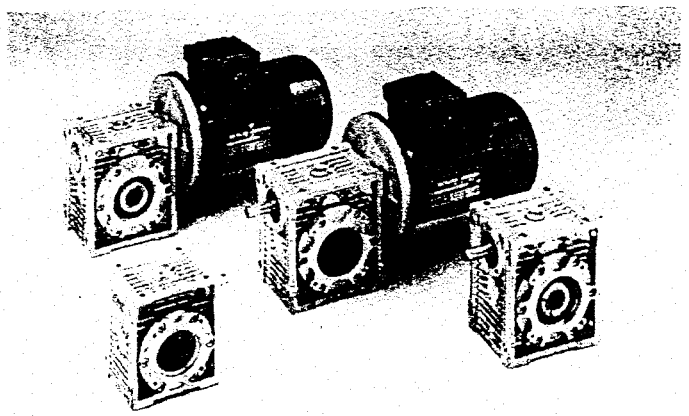
MOTOVARIO

TECHNICAL – TUBULAR

DOCUMENTATION

of worm gear

Made by Motovario (Italy)



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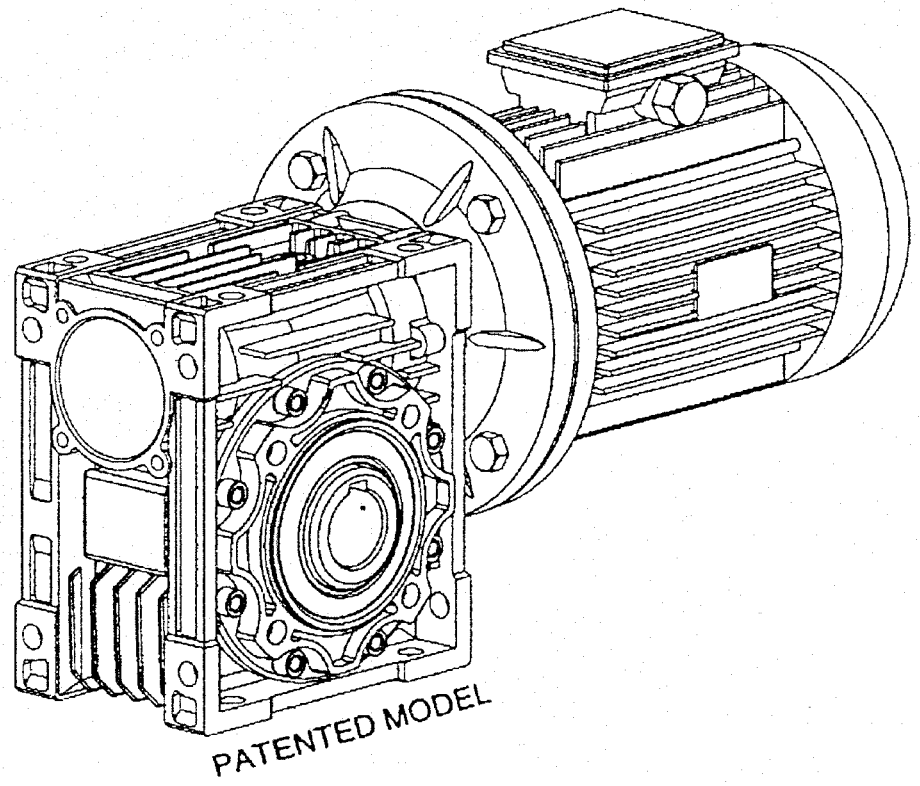
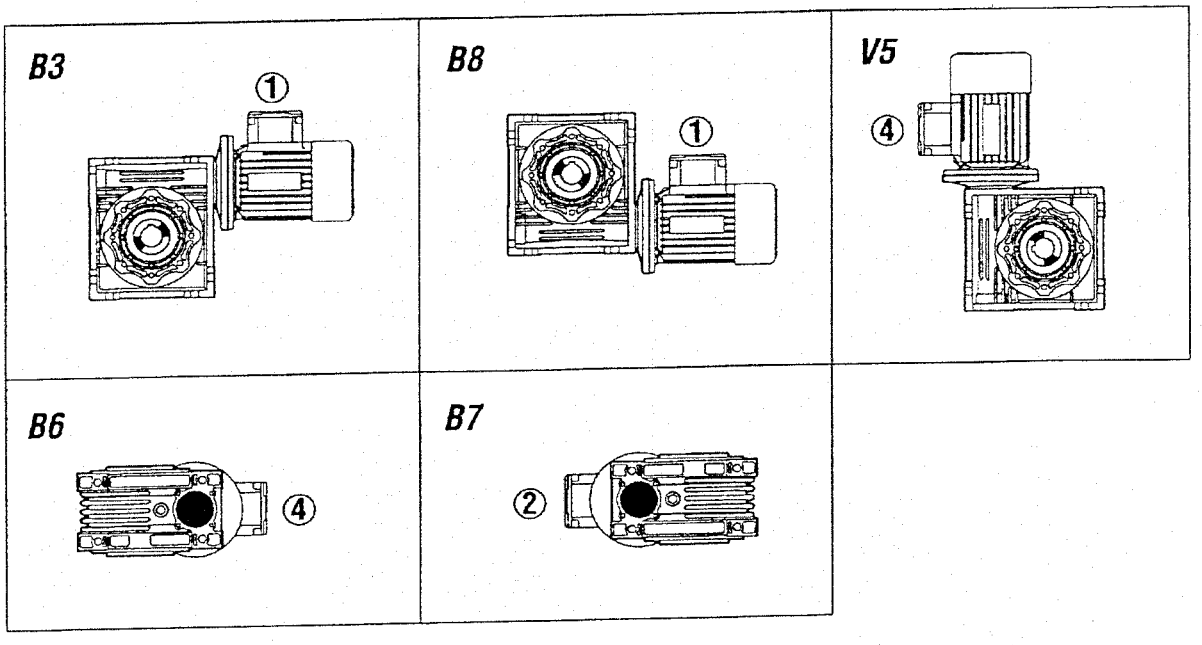
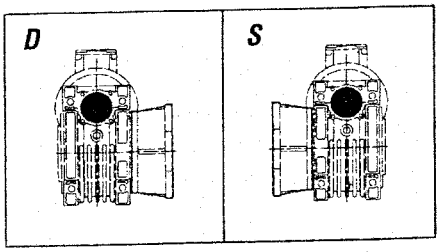
WORM GEARMOTORS

NMRV



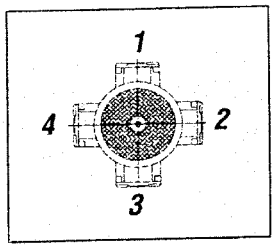
MOUNTING POSITIONS





FLANGE „F-FL" MOUNTING

Unless otherwise specified, gear reducers are supplied with the flange in position D referred to mounting position B3.



MOUNTING POSITION OF TERMINAL BOX

For special requirements, orders must specify the position of the terminal box with reference to the diagram. Unless otherwise specified the terminal box will be mounted as shown in the diagram for the mounting position.

1. DESIGNATION.

NMRV	geared motor
NRV	gear reducer
025 ÷ 090	size
F - FL	output flange
030	ratio
PAM	motor mounting facility
200	flange diameter
19	shaft diameter
VS	double extension worm shaft
AS	single extension output shaft
AB	double extension output shaft
B3	mounting position
0,75 kW	motor power
4p	number of motor poles
V220/380	motor voltage
Hz50	motor frequency

2. DESIGN FEATURES.

- Universal mounting.
- Patented modern design casing.
- Ample cooling fins.
- Excellent thermal conduction and heat dispersion.
- Zl tooth contour (UNI 4760), with ground screw tooth form.
- 9 sizes for power ratings from 0,06 to 9,2 kW.
- Transmission ratios from 5:1 to 100:1.
- High efficiency.
- Excellent mechanical strength with very light weight.
- Self-draining casing design.

3. MATERIALS.

- Casing: aluminium alloy.
- Worm: case hardened and tempered 20MnCr5 steel (UNI 8550).
- Helicoid worm wheel: G-CuSn12 bronze (UNI 7013-72).

4. PERFORMANCE.

Load capacity and efficiency calculated to BS 721-83 and checked to Niemann standards.

5. LUBRICATION.

Size 025, 030, 040, 050, 063, 090 gear reducers come pre-filled with IP TELIUM VSF, a synthetic gear oil suitable for permanent lubrication. They can be mounted in any position.
The synthetic oil used by MOTOVARIO can operate in all ambient temperatures between -25°C and +50°C.

Quantity of oil, l						
NRV	025	030	040	050	063	090
B3	0,02	0,04	0,08	0,15	0,30	1
B8						
B6, B7						
V5						

Type	Mineral	Synthetic
IP	MELLANA OIL 320	TELIUM VSF
SHELL	OMALA OIL 320	TIVELA OIL SC320
AGIP	BLASIA 320	BLASIA S320
MOBIL	MOBILGEAR 320	GLYGOYLE 30
CASTROL	ALPHA MAX 220	ALPHASYN PG 320

6. TOOTH CONTOUR OF WORM.

The performance of a worm gear pair dependson a number of factors including the materials used, lubrication, and the design and construction of the unit. One of the most fundamental factors affecting performance is the design of the gear pair in terms of the area of contact between the tooth surfaces. This turn depends on the contour of the tooth and on the gear cutter used to cut the worm wheel.
MOTOVARIO has adopted a ZI tooth contour (UNI 4760/4) for its worm gear reducers. The high performance of MOTOVARIO gear reducers (in terms of torque transmission, efficie-

ncy, and reliability) is the result of careful tooth contour design and accurate gear cutter manufacturing, ensuring an optimal area of contact.

7. ASSEMBLY.

In order to ensure suitable assembly of reducers and motoreducers in the device follow below mentioned instructions:

- Secure stable fixing to the construction in order to eliminate vibrations.
- Maintain coaxiality of shafts, because unsuitable position of shaft axles may cause overload and heating of rolling bearings and vibrations of the whole system, what causes loss of drive life.
- If during device operation there are overloads, it is necessary to install the coupling between reducer and drive receipt.

8. RUNNING-IN.

In order to ensure the prolonged operation, the full reducer load may take place after 100 working hours.

9. START-UP.

Before motoreducer start, it is necessary to check if the direction of rotations is suitable. The first start of motoreducer shall be realized by gradually increasing of load in order to eliminate mistakes in connecting the motor with the electrical installation.

10. MAINTENANCE.

MOTOVARIO reducers and motoreducers, due to used construction, materials and quality, do not need any maintenance, except inspection of leak tightness and periodical cleaning of the body from dust and other contaminations. In case of properly selected drive at the stage of designing and proper operation, i.e. prevention of overloading MOTOVARIO reducers and motoreducers ensure long operation.

11. INSTRUCTIONS REGARDING SAFETY OF WORK.

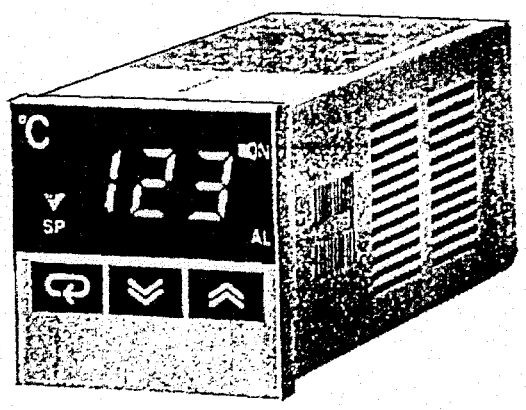
a) all rotating parts as couplings, transmissions etc. should have guards,
b) during operation of drive do not loosen any screws,
c) all works connecting with disassembly and maintenance of reducers and motoreducers should be realized only at switched off motor.

12. GENERAL NOTES.

- During start-up of reducers every time pay attention to any loosened and damaged anchoring elements.

- Reducers shall be assemblied acc. to assembly position given in the order, what ensures adequate amount of oil for given position and suitable lubrication.
- Reducers and motoreducers shall be mounted in such way, in order to:
  - ensure suitable cooling and regular heat abstraction (periodical cleaning from dust and other contaminations - on the variator finning);
  - protect against vibration (use nuts with washers in order to eliminate loosening of screws).
- In case of ambient temperatures $t < -20°C$ and $t > +50°C$ it is necessary to use special guards protecting motoreducer against low and high temperatures.

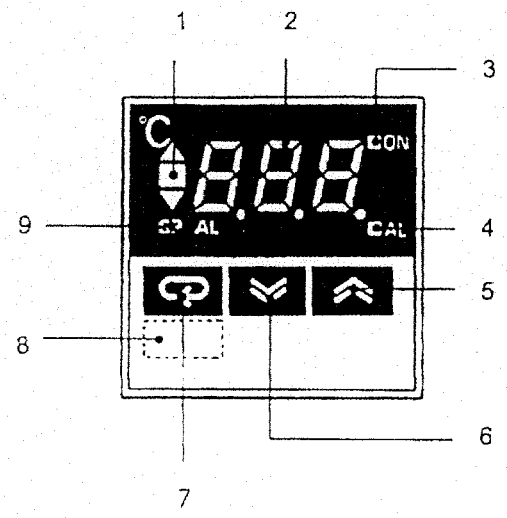
SERVICE MANUAL OF TEMPERATURE CONTROL



Technical characteristic.

Supply	100-240 AC, 50/ 60 Hz or 24 DC/ AC
Allowable voltage tolerance	85 ÷ 110 % voltage rating
Power consumption	About 7 VA
Control output	3A, 250 AC (resistancial load)
Voltage output	20mA, 12 DC, with antishorting system
Accuracy of setting	0,5 % full scale, 1 digit max.
Accuracy of indication	Sigualling of temperature is bigger, smaller or level 1 % given temperature
Time of sampling - output	2/ 20 second
Time of sampling - input	500 ms (output period: 2 second indication period: 2 second)
Resistancial of isolation	20 MΩ min. on 500 DC
Dielectrical strength	2000 AC, 50/ 60 Hz for 1 minute (between clamps of opposite polarization)
Ambient temperature	During work: -10°C to +55°C
Humidity	35 ÷ 85 % of relative humidity
Protection degree – IEC 144	
	Cap plate: IEC IP50
	Housing: IEC IP30
	Terminals: IEC IP00

Cap panel.



1. LED deviation indicators.
   Shines on green when present temperature is level to given temperature. Above and underneath indicators are two triongular diodes, which shine on red when given temperature is different than actual. When actual temperature is higher than given shines upper diode. In different case shines lower diode.

2. Temperature indicators.
   It displays in order: present, set temperature and alarm set temperature, each time the button is pressed.

3. Output operation indicator.
   It displays when output signal is active.

4. Alarm output operation indicator.
   Not active.

5. Up key.
   Pushing gives increase of set temperature. Prolonged pushing gives further increase of temperature value.

6. Down key.
   Pushing gives decrease of set temperature. Prolonged pushing gives further decrease of temperature value.

7. Temperature indication switching key.
   Pressure causes projection of parameters, like: present temperature, setting temperature.

8. Hidden protection key.
   If the programm will be protective by internal switches DIP, that up/down keys are blocked. However warrante person can changes the value.

9. Mode indicators.
   SP shines when setting temperature is on main display.
   AL is not active.

C E R T I F I C A T E

DQS Deutsche Gesellschaft zur Zertifizierung von Managementsystemen mbH

Qualitäts- und Umweltgutachter

hereby certifies that the company

FESTO KG

Ruiter Straße 82, D - 73734 Esslingen
Development, production and distribution of pneumatic components,fittings and adjoining technologies at the plants Esslingen-Berkheim and Rohrbach (BC Pneumatic)
Development and distribution of components and systems for factory and process automation and electronics at the plant Denkendorf (BC Cybernetic)

FESTO Didactic KG

Rechbergstraße 3, D - 73770 Denkendorf
Development, production and distribution of didactic systems for automatisation and communication technology; realization of training courses

FESTO Tooltechnic KG

Ulmer Straße 48, D - 73728 Esslingen
Development, production and distribution of high value electrical and pneumatic tools at the plants Esslingen and Neidlingen

has implemented and maintains a

quality system.

A quality audit has verified that
this quality system fulfills the requirements
of the following standard:

DIN EN ISO 9001
issue August 1994

This certificate is valid until	January 16, 2000
Certificate Registration No.:	23 099 - 04
Frankfurt am Main, Berlin	January 17, 1997
First issue (DIN ISO 9001)	December 1990

PRESIDENT
Dr.-Ing. W. Hansen

MANAGING DIRECTOR
Dipl.-Ing. J. Pärsch

Member of: EQNet THE INTERNATIONAL CERTIFICATION NETWORK

Offices: D-60433 Frankfurt am Main, August-Schanz-Straße 21
D-10787 Berlin, Burggrafenstraße 6

Deutscher Akkreditierungs Rat
DAR
TGA-ZQ-91003-01
TGA-ZM-53-95-60-0

1. Notes for the user

In this catalogue we have included more technical data than in previous catalogues (e.g. materials for all products, sectional views of products) and have introduced a system for locating and selecting the required products.

We would suggest that you use the following methods when making your selections:

Method I

If you know the type designation of the Festo product you wish to order, you can look it up in the index of headings where you will find the catalogue sheet number; the same applies if you know the general technical designation (e.g. check valve).

Method II

If you are looking for a Festo product with specific technical data, e.g. a mechanically actuated 3/2-way valve with G $^1/_8$ connections, a glance at the index 4 "Valves" will lead you to the table of contents of this group, including the sub-section "Manually-operated and mechanically-actuated valves", from which you can then make a selection. The valves are grouped according to series and connection sizes.

When ordering, please give the part number and type.

In the above-mentioned example for the mechanically actuated 3/2-way valve, directly actuated, G $^1/_8$ with short swivel lever and actuating force 7 N (0.7 kp), the order code for a valve with actuator would be as follows:

4937 RW/0-3-$^1/_8$ Valve
5835 ASK-02 Swivel lever

For cylinders you will find a sample order (catalogue sheet 3.1/1) and the appropriate order code on the catalogue sheet for cylinders.
Example:
Double acting standard cylinder as per ISO 6431 and VDMA 24562, piston diameter 50 mm, stroke 500 mm and with adjustable end-position cushioning 150038 DNGU-50-500-PPV-A, catalogue sheet 3.1/30-1, or 36 356 DNG-50-500-PPV-A, catalogue sheet 3.1/40-1.

For lengths of stroke not given (differing from standard lengths) the desired length of stroke should be added to the order code, as should the figure for the special design.

For solenoid valves, several ordering methods are possible:
In the case of solenoid valves with only one type of power supply, e.g. V solenoids, the solenoid coil is supplied with the valve.
E.g. 19701 MVH-5-$^1/_4$-B, catalogue sheet 4.2-121-1

If there is a choice of several voltages, the valves and solenoid coils should be ordered separately.
E.g. 15901 MFH-5-$^1/_4$-B, catalogue sheet 4.2/122-1
34111 MSFG-24-OD, catalogue sheet 4.2/351-1

What are the points to bear in mind when using Festo components?

1. This equipment should only be used within the limits detailed in the technical specification. Strict observation of the technical specification should be ensured at all times.
2. Correctly prepared compressed air should be used at all times. When installing the equipment and thereafter the customer shall ensure that the environmental conditions at the place of use are taken into consideration.
3. If components are incorporated in a system or used within safety devices or circuits, the customer shall ensure that national and local safety laws and regulations are observed.
4. Should you require further information please contact your local Festo office.

2. Characteristics, data, product range

On the catalogue sheets you will find characteristics and technical data. The technical data are mean values of seriesproduced devices and deviations within certain limits are therefore possible. If the components are to be used in marginal areas, please consult us.

The most important data are explained below:

2.1 Medium

For many Festo pneumatic components with an operating pressure of 6 bar you will find on the catalogue sheets the words: "Filtered, lubricated, or filtered, non-lubricated compressed air."

These components are given a basic lubrication whilst being assembled at Festo. They can normally be used without employing a lubricator. It is, however, necessary to use a filter unit which is fine enough to extract impurities down to 40 µm (standard design of filter cartridge). If you require more finely filtered compressed air for specific applications, we recommend that you use a filter cartridge with a pore width of 5 to 8 µm and, if necessary, a downstream extra-fine filter of type LFM. Components for which the medium "filtered, lubricated, or filtered, non-lubricated compressed air" is given are subjected to random tests at Festo in dry operation with non-lubricated air (cold drier).

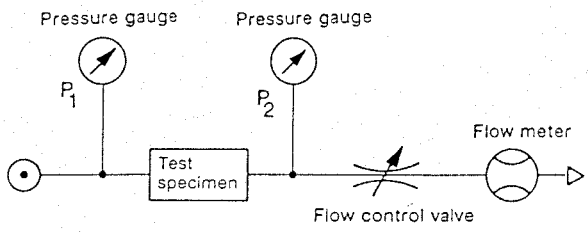
For automatic draining of the condensate which collects in the filter bowl we recommend our automatic water drain.

We would advise operation with filtered, lubricated compressed air where the components are used under extreme environmental and application conditions, e.g. with very slow cylinder movements, for exact feeds and if the piston rod is subjected to a high lateral stress.

Festo can supply special designs for different media. Please consult us if necessary.

2.2 Standard nominal flow rate

The *standard nominal flow rate* q_{nN} is the value used by FESTO for the flow characteristic of a product. We have selected l/mm as the unit. The follwing diagram shows the circuit used by FESTO to measure flow rates.



The *standard nominal flow rate* is the nominal flow rate under standard conditions. In accordance with DIN 1314, these condition are t_n = °C, p_n = 1.013 bar (p_n is an absolute pressure.

The nominal flow rate q_n is the flow rate measured under typical nominal conditions. Festo uses the following nominal conditions:

- Test medium air, temperature (20 ± 3) °C = medium temperature
- Test specimen at room temperature
- Pressures to be set as follows:

for components with a constant cross-section:
(e.g. directional control valves)
Upstream pressure p_1 = 6 bar,
downstream pressure p_2 = 5 bar

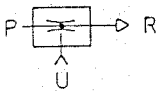
Exception 1: Silencers
Upstream pressure p_1 = 6 bar,
downstream pressure $p_2 = p_{amb}$
p_{amb} = atmospheric pressure

Exception 2: Low-pressure components
Upstream pressure p_1 = 0.1 bar,
downstream pressure $p_2 = p_{amb}$

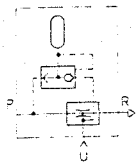
for pressure regulators:
Upstream pressure p_1 = 10 bar (constant)
downstream pressure p_2 = 6 bar with q = 0 l/min. These values are set set on the test specimen. The flow rate is then increased slowly and at a constant rate until the downstream pressure reaches the value p_2 = 5 bar. The resulting flow rate is measured.

A further note on absolute pressure. The pressure in a completely evacuated chamber (100% vacuum) is 0. Pressures calculated with this zero point as a reference are absolute pressures.

Vacuum generator Type VAD-...

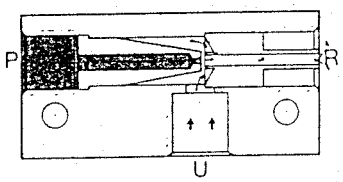


Vacuum generator with ejector Type VAK-1/4

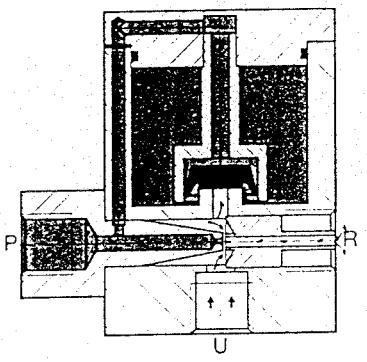


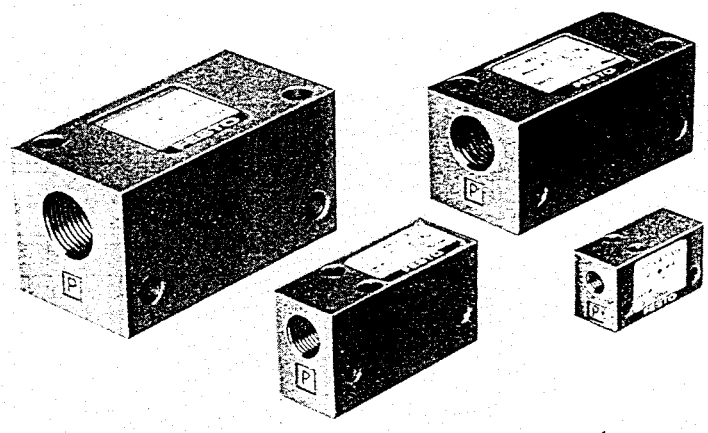
Accessories:
Suction cups type VAS,
see page 6.1/20-1

Type VAD-1/4

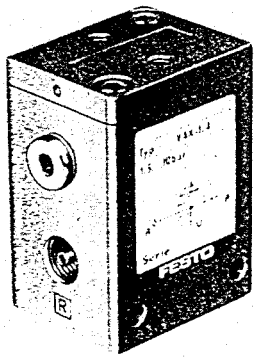


Type VAK-1/4





VAK-1/4



Workpieces with smooth and impervious surfaces can be picked up and held, e.g. for transporting and assembly, by using a vacuum generator/generator with ejector and the appropriate VAS suction cups without any additional vacuum equipment being required. Workpieces can be picked up in any position.

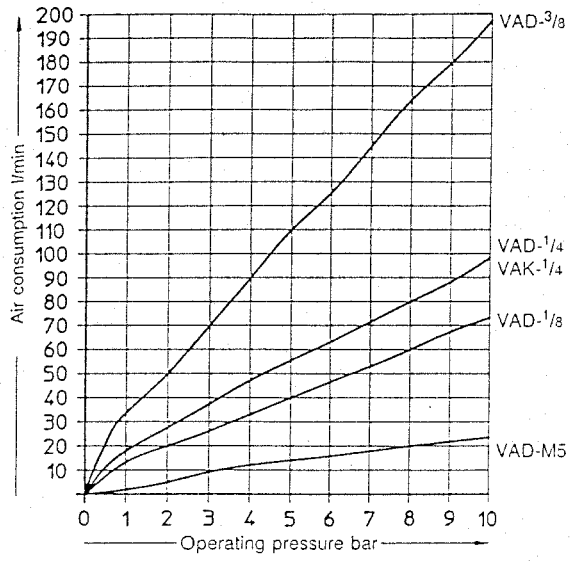
The generator produce the vacuum in accordance with the ejector principle, using the compressed air flowing from P to R. The suction cups are connected to the vacuum port U. The suction procedure stops when the compressed air is switched off at P.

The vacuum generator with ejector produces a vacuum in the same way as does the basic generator. However, while the suction procedure is taking place, a built-in reservoir is filled with compressed air. When the inlet pressure (P) is switched off, the compressed air stored is released rapidly via port U (quick exhaust principle), thereby ejecting the workpiece from the suction cup. An additional port is provided to allow the volume of the reservoir to be increased.

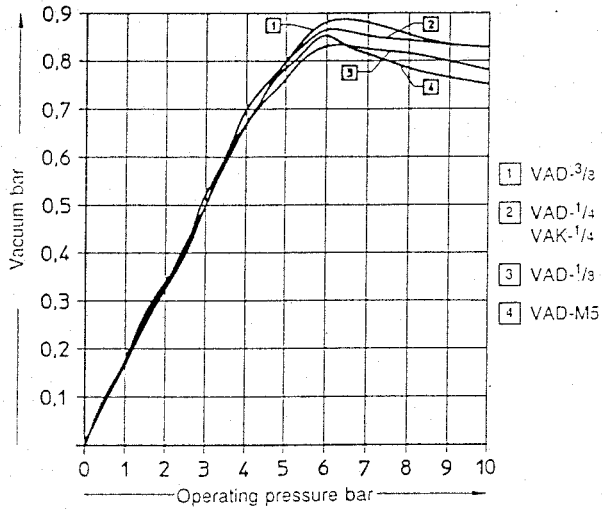
The low level of exhaust air noise which is produced during the blow-off procedure can be reduced still further by attaching a silencer to port R. The compressed air can be supplied via a 2/2 or 3/2-way valve, thus saving air.

Order code Part No./Type	19 293 VDA-M5	14 015 VAD-1/8	9394 VAD-1/4	19 294 VAD-3/8	6890 VAK-1/4
Medium	Atmospheric air				
Design	Ejector principle				
Mounting	Through-holes in housing				Thread M6
Connection	M5	G 1/8	G 1/4	G 3/8	G 1/4
Nozzle dia. Blast nozzle/injector nozzle	0.5/1.3 mm	0.8/2.1 mm	1.1/2.8 mm	1.5/4.0 mm	1.1/2.8 mm
Pressure range	1.5 to 10 bar				
Air consumption	See diagram on page 6.1/15-3				
Vacuum					
Suction characteristics					
Sound pressure level					
Volume					32 cm³
Temperature range	−20 to +80 °C				
Material	Housing: anodized aluminium				
Weight	0.014 kg	0.039 kg	0.091 kg	0.154 kg	0.263 kg

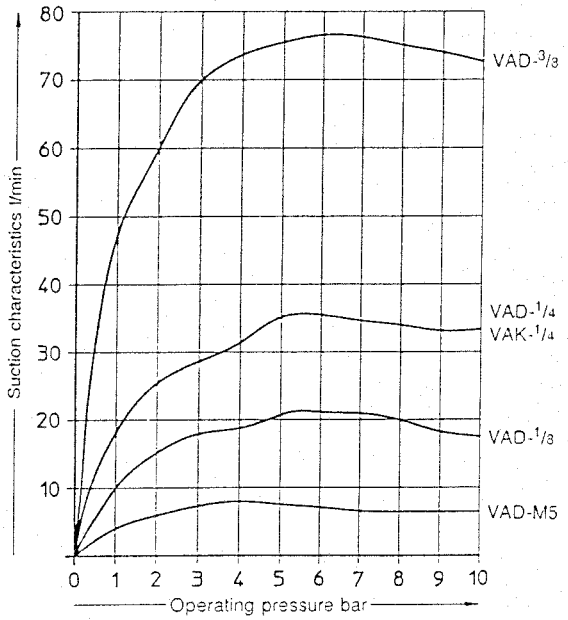
Air consumption in relation to operating pressure



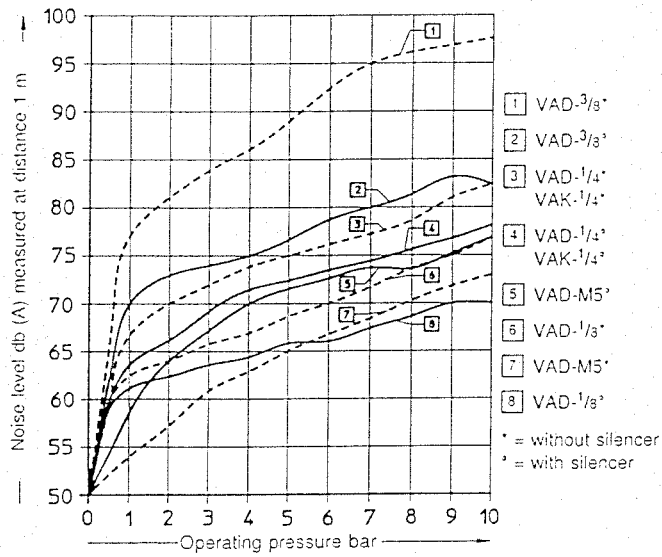
Vacuum in relation to operating pressure



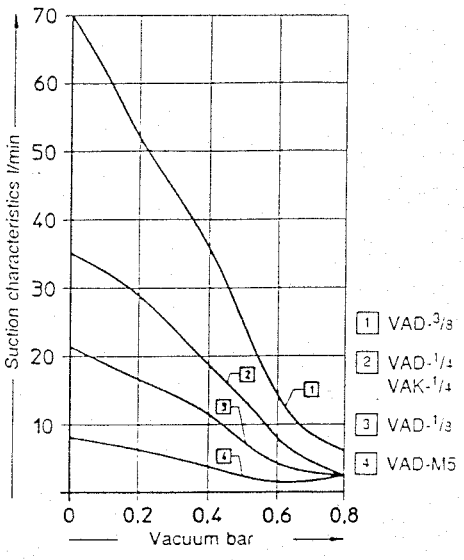
Suction characteristics in relation to operating pressure



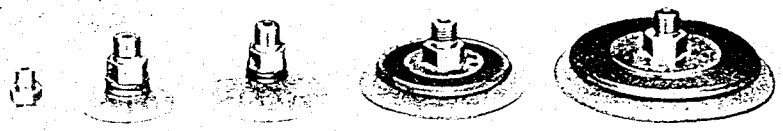
Noise level in relation to operating pressure



Suction characteristics in relation to vacuum



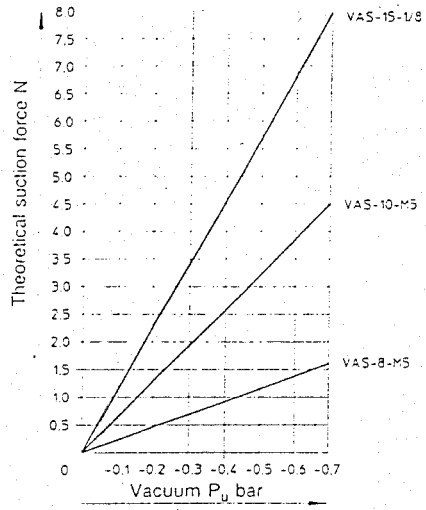
Suction cup
Type VAS-...-PUR (polyurethan)
with sealing ring type OL-...

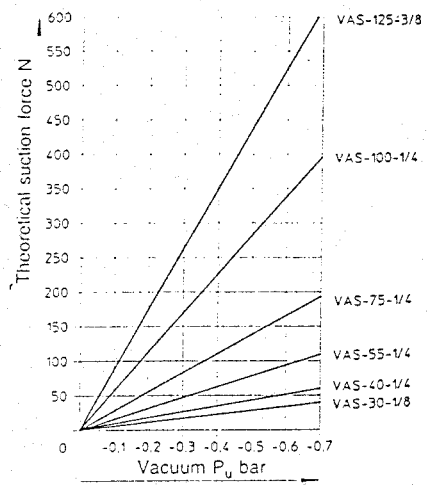


The suction cups VAS-... can be used to pick up and hold workpieces with smooth and impervious surfaces by vacuum. The soft suction cups ensure that the surface of the workpieces are not damaged.

Accessories:
For adapter type AD-... for cylinders with hollow piston rods, see sheets 6.1/30-1 and 6.1/31-1.

Theoretical suction force as a function vacuum





Order code Part No./Type						
	dia. 8 to 30 mm	36 135 VAS-8-M5-PUR	12 612 VAS-8-M5-PUR-S	173 441 VAS-10-M5-PUR	36 136 VAS-15-1/8-PUR	36 137 VAS-30-1/8-PUR
	dia. 40 to 125 mm	36 138 VAS-40-1/4-PUR	36 139 VAS-55-1/4-PUR	36 140 VAS-75-1/4-PUR	36 141 VAS-100-1/4-PUR	152 606 VAS-125-3/8-PUR
Medium		Atmospheric air				
Mounting		Screw-in thread				
Connection	dia. 8 to 30 mm	M5	M5	M5	G 1/8	G 1/8
	dia. 40 to 125 mm	G 1/4	G 1/4	G 1/4	G 1/4	G 3/8
Nominal size	dia. 8 to 30 mm	2 mm	2 mm	2 mm	3 mm	3 mm
	dia. 40 to 125 mm	4 mm	4 mm	4 mm	4 mm	7 mm
Effective suction dia.	dia. 8 to 30 mm	5.5 mm	5.5 mm	8 mm	12 mm	25 mm
	dia. 40 to 125 mm	32 mm	44 mm	60 mm	85 mm	105 mm
Theoretical suction force at −0.7 bar vacuum	dia. 8 to 30 mm	1.6 N	1.6 N	4.5 N	7.9 N	34 N
	dia. 40 to 125 mm	56 N	106 N	197 N	397 N	606 N
Temperature range		−20 to +60 °C				
Material		Die-cast Zn, polyurethane; VAS-10: Al, polyurethane				
Weight	dia. 8 to 30 mm	0.004 kg	0.004 kg	0.003 kg	0.011 kg	0.013 kg
	dia. 40 to 125 mm	0.027 kg	0.032 kg	0.078 kg	0.142 kg	0.148 kg

Service manual of SIEMENS S7 controller with OP7 display.

I. Main screen.

When power is turn on display shows main screen with informations as below:

EXPERT 4000			[time]
	Choice of option		
Cone	Calippo	Cup	

(1)

Main screen is redy to introduce choices after appearing actual time in the right upper corner.

II. Choice of particular options.

To choice one of three machine options (work with package type: cone, calippo or cup) needs pressing function button (F1, F2 or F3) which are under name of package. After pressing F1 appears screen on the display with following informations:

EXPERT 4000		[time]
Capacity		xxx l/h
Choiced cone option		
<<	>>	

(2)

Field "capacity xxx l/h" informs about current capacity of machine.

Field " Choiced cone option" informs about choice of option with package cone type

Field "<<"- pressing F1 causes return to main screen

Field ">>" pressing F2 causes transition to the next screen:

Feeder jaws		OFF	
Ang. of turn on		50	
Ang. of turn off		150	
<<	>>	ON	OFF

(3)

Field " Feeder jaws OFF" informs about function name which parameters we can change and about condition of function, i.e. is it turn on or off

Field " Angle of turn on 50" informs about value of angle where starts execution of function

Field "Angle of turn off	150"	informs about value of angle where ends execution of function
Field	"<<"	pressing F1 causes return to main screen
Field	">>"	pressing F2 causes transition to the next screen

III. Parameters of function set up.

Feeder jaws		OFF	
Angle of turn on		50	
Angle of turn off		150	
<<	>>	ON	OFF

(4)

1. Change condition of function:

Field	"ON"	pressing F3 causes activation of function
Field	"OFF"	pressing F4 causes deactivation of function

2. Change angle of turn on:

Readiness to change of value is signals by the last pulsating digit. To chnage angle need to enter required value from numerical keyboard and confirm by pressing „ENTER". In case of mistaken information needs to cancel operation by pressing „ESC".

3. Change angle of turn off:

Readiness to change of value is signals by the last pulsating digit. To chnage angle need to enter required value from numerical keyboard and confirm by pressing „ENTER". In case of mistaken information needs to cancel operation by pressing „ESC".

ATTENTION !
During attempt at enter value apears password enquiry. Then enter on numerical keyboard: "222" and confirm by pressing „ENTER". Password is active for 3 min. from the last proofs.

4. Transmission between printing angles:

△ - Transmission to angle of turn on

▽ - Transmission to angle of turn off