# KASUTUS-JUHEND

Koostatud vastavuses EL reeglite ja normidega

HOMOGENISAATOR MUDEL H3037

Seerianumber 2378

# INSTRUCTION MANUAL

Drawn up in compliance with EEC Rules and Standards

HOMOGENIZER MOD. H3037

Serial Number 2378

BERTOLI

## Ettevaatust!

Käesolevat kasutusjuhendit tuleb käsitleda kui osa masina tarnekomplektist ning see tuleb alles hoida kogu masina eluea jooksul kuni masina käibelt kõrvaldamiseni.

Enne mis tahes operatsiooni teostamist veenduge, et hakkate tegutsema õigesti ja vastavuses käesolevas juhendis esitatud juhistega.

Järgige hoolikalt ja täpselt kõiki käesolevas juhendis esitatud juhiseid ja soovitusi.

Käesolevat seadet ei tohi kasutada vastava pädevuse ja oskusteta isikud.

Hoidke käesolevat kasutusjuhendit heas seisukorras, et see oleks alati loetav. Kasutusjuhend peab olema alati kättesaadav masina eest vastutavatele käitajatele.

Andke käesolev kasutusjuhend alati üle masina uuele kasutajale või omanikule.

## Caution!

These instructions are to be held as part of the machine
and must be kept for all the life
of the machine itself until demolition.

Before carrying out any operation,
be sure you are going to act properly and in compliance with
the instructions
included in this manual.

Carefully and utterly follow all instructions and indications as described in this manual.

The machine must not be operated by unauthorized or unskilled personnel.

Keep this manual in good conditions so that they could be always easily readable. It should also be kept within the reach of the operators in charge of the machine.

Hand this manual over to any future user or owner of the machine.

Bertoli Srl ei vastuta ühegi vigastuse, purunemise, õnnetusjuhtumi jne eest, kui see on põhjustatud käesolevas kasutusjuhendis toodud juhiste eiramisest või mittetäitmisest.

Sama tingimus kehtib siis, kui masina juures tehakse mõni muudatus, mida masina tootja ei ole eelnevalt heaks kiitnud.

Tootja jätab endale õiguse muuta mõnda masinat või asendada selle üksikosi masina täiustamise eesmärgil, mis ei anna omanikule õigust seada kahtluse alla kasutusjuhendi teksti kehtivust.

Bertoli S.R.L. will not be responsible for any damages, breakages, accidents, etc.. caused by ignorance or uncompliance with the instructions contained in this manual.

The same criterion is to be held valid for any change or variation not previously authorized by the supplier.

The manufacturer reserves the right to modify or change parts of one machine in view of improving it, which will not give any prejudice nor invalidate the texts herein.

BERTOLI

**HIGH-PRESSURE HOMOGENIZERS AND PISTON PUMPS**
**BERTOLI SRL con socio unico**
**Società appartenente al Gruppo CATELLI HOLDING spa**
**Via Brodolini,1- 43056 S.Polo di Torrile (Parma) - Italia**
**tel. 0521/954711- fax 0521/293704**

**Quality assured firm: UNI EN ISO 9001 certified**

SINCERT

# Sisukord

***Käesolevas sisukorras olevad numbrid viitavad kasutusjuhendi lehekülgedele***



# Summary

***The numbers specified in the summary refer to the pages of this manual.***

BERTOLI

HIGH-PRESSURE HOMOGENIZERS AND PISTON PUMPS

# DECLARATION OF CONFORMITY

Attached IIA - Directive 98/37/CE (Re-codification of Dir. 89/392/CEE and succeeded amendments) for the approaching of the legislations of the relative States members to the making safe of the machine.

| | |
|---|---|
| WORK ORDER NR..... | 07OF00040 |
| TYPE OF MACHINE:..... | HOMOGENIZER |
| MODEL:..... | H3037 |
| SERIAL NUMBER:..... | 2378 |
| YEAR:..... | 2007 |

I, the undersigned
as legal responsible of the company BERTOLI S.r.l.

**DECLARE**

Under my civil and criminal responsibility that the supplied material consists by HOMOGENIZER which is

**FULLY IN COMPLIACE**

with all essential requirement for the safety of the machine that they concern to it; furthermore to the appliance points of the following particular dispositions:

- **DIRECTIVE 98/37/EC** (re-codification of the Dir. 89/392/CEE and succeeded amendments) included in Italy in the Presidential Decree 459/96.
- **LOW TENSION DIRECTIVE 2006/95/CEE** (re-codification of the Dir.73/23/CE included in Italy with law nr. 791/77)
- **ELECTROMAGNETIC COMPATIBILITY DIRECTIVE.2004/108/CE** (dir. 9/336/CEE ) included in Italy in D.L. 476/92).

Moreover it is in compliance with the following harmonized European norms

- UNI EN 1050:1998 - Principles for the risk assessment
- UNI EN ISO 12100-1/2:2005 – Safety of the machinery.

The above-identified machine has successfully passed all Inspections and Tests it has undergone, which can be inferred from the attached documents.

Parma, 2007-12-17

the General Manager
Alessio Lazzari

**BERTOLI** srl con socio unico - Società appartenente al gruppo CATELLI HOLDING spa
Via Brodolini, 1 - 43056 – S.Polo di Torrile - Parma - Italia
Tel. +39 0521 954711 - Fax +39 0521293704 - e-mail: info@bertoli-homogenizers.com

# 0.1 Masina määratlus

*Masina määratluseks on selle andmesilt, mis on kooskõlas EÜ nõudmistega masinate andmete kohta ja direktiiviga 98/37/EÜ.*

# 0.1 Identification of the Machine

*The machine can be identified through the EC identification plate in compliance with EC machine specifications and standards 98/37/EC.*


SELETUS

Andmeplaat.....EÜ

Mudel..... Masina tüüp

S.NR……..……Seerianumber

AASTA: ……..……Valmistamisaasta

V……..……..Toitepinge

HZ ……..……..Võrgusagedus

A ……..…… Tarbitav vool vastavalt andmesildile

kW……..…….. Maks. tarbitav võimsus

P MAX.....Maks. rõhk

Q MAX.....Maks läbilaskevõime

Tootja.....Bertoli Srl

Aadress: .....Via Brodolini, 1
43056 S.Polo di Torrile - Parma – Italy

LEGENDA:

Plate.....EC

Mod. .....Type of machine

S.NR.....Serial number

YEAR .....Year of construction

V.....Primary voltage

Hz.....Network frequency

A.....Ampere consumption as per motor plate

KW.....Installed power

P MAX.....max Pressure

Q MAX.....max Throughput

Manufacturer.....Bertoli Srl

Address: .....Via Brodolini, 1
43056 S.Polo di Torrile - Parma - Italy

*Kui vajate varuosi või tehnilist teavet, viidake andmesildi andmetele. Seejuures näidake alati mudel ja seerianumber:*

*Masinaid võidakse täiustada nii tehniliselt kui ka disaini poolest ning seetõttu on mõned osad erinevad joonistel näidatutest, kuid see ei muuda kehtetuks käesoleva kasutusjuhendi tekstiosa.*

## 0.2 Tootja määratlus

BERTOLI SRL
Via Brodolini, 1
43056 S.Polo di Torrile - Parma - Italy
tel. 0521/95.47.11
faks 0521/29.37.04

## 0.3 Ostja määratlus

Tellimus nr: 07OF00040

Registreeritud nimetus: BPS Partner OU

Aadress:

Laki, 16

10621 Tallinn - ESTONIA

*Refer to the indications on the identification plate whenever spare parts or technical information are needed. Please, indicate always Mod. And Serial number.*

*Machines may undergo up-datings or slight aesthetical changes and therefore show some different details from the ones in the attached drawings, which does not invalidate the text contained in this manual.*

## 0.2 Identification of the Manufacturer

BERTOLI SRL
Via Brodolini, 1
43056 S.Polo di Torrile - Parma - Italy
phone number 0521/95.47.11
telefax 0521/29.37.04

## 0.3 Identification of the Customer

OrderNr: 07OF00040

Societary name: BPS Partner

Address:

Laki, 16

10621 Tallinn - ESTONIA

# 0.4 Kasutusjuhendi määratlus

*Käesoleva kasutusjuhendi on koostanud BERTOLI Srl ja vastavalt kehtivale korrale moodustab see ühe osa masina tarnekomplektist.*

# 0.4 Identification of the: “Instruction Manual”

*This Instruction Manual is issued by BERTOLI S.r.l and forms part of the machine in compliance with the relevant order .*

1. peatükk

# Üldohutus-juhised

*Käesolev peatükk sisaldab mõningaid hoiatusi ja ettepanekuid masina paremaks kasutamiseks. Nende järgimine on oluline masina ohutu kasutamise seisukohast ning inimestega juhtuvate õnnetuste ja materiaalsete kahjude vältimiseks. Lugege neid juhiseid hoolikalt ja püüdke mõista nende mõtet.*

 Käesolev tähis märgib seda, et vastavad operatsioonid võivad olla kasutajale ohtlikud.

*Nad võivad põhjustada kergeid või tõsiseid vigastusi, sealhulgas surmavaid.*

 **Ülaltoodud tähisega märgitud operatsioone tuleb teostada erilise ettevaatusega.**

*Ülaltoodud operatsioonid tuleb teostada õiges järjekorras, et vältida materiaalseid kahjusid ja keskkonnakahjustusi.*

**Hoiatus – Neid operatsioone tohib läbi viia ainult õnnetuste ärahoidmiseks ja eeldusel, et kõik selle tähise juurde kuuluvad ohutusnõuded on täidetud.**

*Vastavalt direktiivile 98/37/EÜ tuleb rõhutada järgmist:*
*KÄITAJA on isik, kes vastutab seadme paigaldamise, toimimise ja seadistamise ning niisuguste tegevuste teostamise eest nagu hooldus, puhastamine, remont ja transport.*

Chapter 1

# General Warnings

*This chapter includes some warnings and suggestions for a better use of the machine. Their respect is essential for safe use of the machine itself and to avoid any possible damage to people and property.*
*These instructions should be read and learnt properly.*

 This symbol indicates that the operation/s under way may cause dangers to operators.

*They can cause either slight or serious physical problems , including death dangers.*

 **All operations which must be carried out with special care, are marked with the symbol indicated above.**

*The above operations must be carried out properly in order to avoid any damages to properties or the surrounding environment.*

**Caution - The operations under way are to be carried out only if accident-prevention and safety regulations emphasized by the above symbol are fulfilled.**

*According to 98/37/EC regulations, we would like to specify that:*
*"OPERATOR" is the person/s who is/are in charge of installing, running, adjusting, and carrying out such operations as maintenance, cleaning, repairs and transport.*

# **1.1** Kasutusjuhend

### 1.1.1 Eesmärk

*Käesoleva kasutusjuhendi eesmärk on anda ostjale ja masina kasutajale kogu teave, mida nad vajavad masina korraliku töö tagamiseks ning selleks, et hoida seda töökorras, täites seejuures ohutusnõudeid ja -eeskirju.*

### 1.1.2 Säilitamine

*Kasutusjuhendi hoidmiseks heas korras soovitame järgmist:*

*- Kasutage seda õigesti, vältides selle rikkumist või hävimist*

*- Ärge võtke välja, lisage, muutke ega kopeerige ühtegi kasutusjuhendi osa; täiendusi võib teha ainult Bertoli Srl.*

*- Hoidke kasutusjuhendit kuivas kohas (et niiskus seda ei rikuks)*

*- Kui masin läheb üle uuele omanikule, andke kaasa ka kasutusjuhend*

### 1.1.3 Kasutamine

*Käesolev kasutusjuhend koosneb 13 peatükist, kusjuures leheküljed on nummerdatud süsteemi [aa.bb] põhjal, kus [aa] kujutab endast peatüki numbrit ja [bb] vastava peatüki leheküljenumbrit.*

*Peatükkide üksikud osad on nummerdatud süsteemi [a.b.c] järgi, kus a on peatüki number, b on osa number ja c alajaotuse number.*

*Kui osades esineb fotosid, tabeleid või jooniseid, on need tavaliselt paigutatud vastava teksti kõrvale.*

# 1.1 Instruction Manual

### 1.1.1 Aim

*This Instruction Manual is aimed at providing the customer and machine operators all information required for correct working of the machine and in order to preserve it in good conditions, always respecting and fulfilling safety standards.*

### 1.1.2 Preservation

*In order to keep the Instruction Manual in good conditions, we recommend:*

*-To use it properly avoiding its deterioration or destruction*

*-Not to take out, add, modify or rewrite any part of it, updatings may be carried out only by Bertoli srl.*

*-To keep it in a dry place (in order not to endanger its life)*

*-To hand it over to new users or owners.*

### 1.1.3 Consultation

*This Instruction Manual is composed of 13 chapters the pages of which are numbered according to the logics [aa.bb] where [aa] stands for the chapter reference number and [bb] stands for the chapter page number.*

*Paragraphs are numbered according to the logics [a.b.c] where [a]stands for the chapter number, [b] stands for the paragraph number and [c] stands for the sub-paragraph number.*

*Photographs, diagrams or drawings, if any, are usually placed at text side.*

*Kasutusjuhendi kasutamise hõlbustamiseks on teksti kohta käivad fotod ja joonised paigutatud võimaluse korral samale leheküljele vastava osa lähedusse.*

### 1.1.4 Värskendamine

*Kui mõnda osa on vaja muuta või täiendada või on vaja lisada uusi osasid, saadetakse Ostjale uus materjal.*
*Kui uued osad asendavad eelmisi, tuleb eelmised osad juhendist eemaldada ja hävitada.*

### 1.1.5 Lisad

*Tarvikuid, elektriskeemi ja suruõhusüsteemi puudutavad juhised on lisatud käesoleva kasutusjuhendi lõppu.*

## 1.2 Ohutusjuhised

### 1.2.1 Ohustatud isik

*Selleks on igaüks, kes asub osaliselt või täielikult ohupiirkonnas.*

### 1.2.2 Ohupiirkonnad

*Mis tahes piirkond masina sees või läheduses, kus võib ohtu sattuda inimese turvalisus või tervis.*

### 1.2.3 Käitaja

*Isik, kes vastutab masina paigaldamise, juhtimise, klappide seadistuse, hoolduse, puhastamise, transpordi jms eest.*

*In order to make the Manual consultation clearer and, wherever possible, photos and drawings a text refers to, are placed in the same page or as close as possible to one text.*

### 1.1.4 Updating

*Whenever modification or installation of new parts became necessary, the Customer will be handed over new instructions.*
*On receiving the new instructions replacing the old ones, the latter should be eliminated and destroyed.*

### 1.1.5 Enclosures

*Instructions concerning accessories, wiring and pneumatic diagrams are included at the end of this Manual.*

## 1.2 Safety Warnings

### 1.2.1 People exposed to risks

*Anyone standing fully or partially in a risky area.*

### 1.2.2 Dangerous or risky areas

*Any area within or near a machine which may endanger both safety and health.*

### 1.2.3 Operator

*Anyone in charge of such operations as installation, operating valves adjusting, maintenance, cleaning and transport of the machine.*

### 1.2.4 Kasutaja

*Ettevõte või isik, kes masina eest ametlikult vastutab.*

## 1.3 Ettevõtte juhi kohustused

*Ettevõtte juht vastutab selle eest, et käesoleva kasutusjuhendi sisu ja mõte jõuaks kõigini, kes vastutavad käesoleva masina eest.*

*Samuti peab ta veenduma selles, et kõik, kes vastutavad käesoleva masina hoolduse, kasutamise jne eest, saavad aru kõigist käesolevas juhendis sisalduvatest juhistest.*

*Kui mõni osa käesolevast kasutusjuhendist läheb kaduma, on ta kohustatud pöörduma Bertoli Srl poole puuduva (või muutunud) osa saamiseks.*

## 1.4 Kohustused rikete või ohu korral

*Masina mis tahes rikke või kahtlase käitumise korral peab masina käitaja sellest viivitamatult teavitama oma ülemusi.*

*.*

*Kui masin töötab valesti või ilmnevad toimimisvead, tuleb kõigepealt hoolikalt uurida kasutusjuhendi vastavaid osasid.*

## 1.5 Ohutusteave

*Masina juhtimise ajal ei tohi käitaja(d) olla medikamentide, narkootikumide või alkoholi mõju all.*

### 1.2.4 User

*A company or a person legally responsible of the machine.*

## 1.3 Employer's obligations

*The employer is responsible of the diffusion and knowledge of the content of this Manual to anyone at his premises who may be in charge of acting on the machine.*

*He should make sure anyone in charge of such operations as maintenance or use of the machine has full knowledge of the instructions contained in this Manual.*

*In the event any part of the manual goes lost or deteriorated, he engages to ask Bertoli S.r.l. the missing or altered part/s.*

## 1.4 Obligations in the event of malfunctioning or possible dangers

*Operators must report any deficiency of the machine or emerging dangers to their superiors.*

*Should the machine work unproperly or show any running defects, check carefully the relating instructions in the different chapters of this Manual.*

## 1.5 Safety Precautions

*When running the machine, Operators must not be under the effects of sedatives, drugs or alcohol.*

*Enne töö alustamist peab käitaja hoolikalt lugema käesolevat juhendit, eriti seoses oma asukohaga masina juures, juhtnuppude paigutuse ja funktsioonidega ning muude juhistega, mis on esitatud osas:„Kasutamine“*

**Masina lähedal viibijatel on keelatud kanda käevõrusid, kaelakeesid, sõrmuseid, kaelasidemeid, pikki juukseid jm objekte, mis võivad sattuda liikuvate osade vahele. Vormi- või töörõivastel peavad olema elastsed kätised.**

*Pöörake tähelepanu masinal olevatele hoiatustähistele, eriti neile, mis viitavad liikuvatele osadele.*

*Ärge asetage liikuvatele osadele mingeid esemeid.*

*Kandke sobivat tööriietust.*

**Masina kasutamine plahvatusohtlikus keskkonnas on keelatud, samuti ei tohi töötava masina läheduses teha keevitustöid.**

*Hoidke masin ja kogu selle ümbrus puhtana (õlilaigud tuleb kohe eemaldada), et käitajad jt seal viibivad isikud ei satuks ohtlikku olukorda.*

*Paigalduskohas ei tohi olla pimedaid alasid, ka ei tohi olemasolev valgustus inimesi pimestada; keelatud on vilkuv või muutuva tugevusega valgustus.*

**Masina elektrisüsteemi muutmine on keelatud.**

 Ärge eemaldage ega liigutage masina kaitsekatteid selle töötamise ajal.

*Kontrollige reeglipäraselt turvalülitite toimimist.*

*Before starting work, Operators shall have studied thouroughly the instructions concerning the standing position they should keep, running controls, and the machine features as described under the item: “Instructions for Use”:*

**It is forbidden to get near the machine wearing bracelets, chains, rings or ties, long hair. Uniform or work clothes should always have elastic wrist-bands.**

*Pay attention to danger signs hanging on the machine, especially those stuck on moving parts.*

*Be careful not to leave anything on moving parts.*

*Wear suitable work clothes.*

**It is forbidden to use the machine in places under explosive atmosphere or carry out welding operations near it.**

*Keep all areas where and around which operators in charge of the machine stand, thouroughly cleaned (any oil stain must always be removed), in order to ensure safe passage.*

*The installation site must have not shadow spots nor be equipped with sight disturbing dazzling lights or be under dangerous stroboscopic effects due to lightening.*

**Do not modify the electric system.**

 Do not remove nor modify the protection panels during operation.

*Check periodically the efficiency of safety microswitches.*

***Mis tahes korralisi või erakorralisi hooldustöid tohivad teha ainult vastavate oskustega ja pädevusega isikud.***

*Enne puhastuse läbiviimist tuleb pealüliti välja lülitada, lukustada see ja panna võti kindlasse kohta.*

***Any ordinary and extraordinary aintenance operations must be carried ut by authorized and skilled personnel.***

*Before starting cleaning operations, disconnect he main switch, padlock it and bring the key ith you.*

*JOONIS 1.1*

*DRAWING 1.1*

*Hoidke oma käed eemal masina liikuvatest osadest.*

*Never touch nor approach your hands to any oving parts.*

*Kontrollige reeglipäraselt toitekaablit ja selle seisukorda.*

*The electric power supply cable should be houroughly checked periodically.*

***Masinat võib juhtida ainult üks käitaja korraga.***

*Masina juhtimise ajal peab käitaja seisma otse juhtpuldi ees (vt joonis 1.1).*

*Hoidke masin puhtana, vajaduse korral puhastage seda põhjalikult: see tagab masina õige ja turvalise toimimise.*

***The machine must always be run by one perator.***

*When operating the machine, the operator hould stand just in front of the control board drawing. 1.1).*

*Clean thouroughly the machine whenever it is necessary: this ensures proper and safe working.*

# 1.6 Hoiatustähised

**Masinale on kinnitatud hoiatustähistega kleebised.**

**Enne mis tahes tegevuse algust vaadake nimetatud tähised üle.**

*Kui mõni neist on kahjustatud, asendage see kohe, kui tekst pole enam loetav.*

*See tähis viitab elektrilöögiohule: ärge puudutage sellise tähisega märgistatud objekte.*

*This sign indicates existence of electric discharges: pay attention to all energized points bearing this sign.*

*See tähis hoiatab kuumade masinaosade eest, millega võib kaasneda põletusoht.*

*This sign indicates that the organs bearing it are subject to high temperatures.*

*See tähis keelab suitsetamise masina läheduses.*

*This sign forbids smoking in the nearby area.*

# 1.6 Warning Signs

**Adhesive CAUTION signs are stuck on the machine.**

**It is strictly necessary to look over them (to take note of them) before starting any operation.**

*Should such signs not be indelible, remember to replace them whenever reading becomes difficult.*

2. peatükk

# Tehnilised andmed

*Käesoleva masina elektrisüsteem vastab:*

***standardi EN 60204 nõudmistele (september 1993).***

*Käesoleva masina mehaaniline osa vastab täielikult*

*masinate direktiivi 98/37/EÜ nõudmistele.*

*Bertoli Srl kinnitab, et käesolev masin vastab täielikult ülalnimetatud normide nõudmistele, millest teavitab ka masinal olev CE-märgis.*

Chapter 2

# Technical Specifications

*Electric equipment in compliance with:*

***CEI EN standards 60204-1 (September 1993).***

*The construction of this machine fully complies with the requirements of:*

*Machine Standards 98/37/EC*

*Bertoli Srl warranties full compliance of this machine with the above mentioned standards and regulations and sticks the EC mark-plate on the machine itself.*

# 2.1 Masina kirjeldus

*Homogenisaator kujutab endast mahulist kolbpumpa, mis surub homogeenitava toote läbi seadistatava avaga spetsiaalse klapi, mida nimetatakse homogeenimisklapiks.*

***Pumba tööks vajalik energia saadakse jõuülekandelt, mis koosneb väntvõllist ja ühendusvarraste süsteemist.***

*Homogeenimisklapi koost koosneb kolmest osast:*
*- Fikseeritud pesa*
*- Surveklapp: liigub pesaga ristisuunas (selle abil saab seadistada nende kahe osa vahemaad, mille tulemusena muutub ka rõhk).*
*- Löökrõngas, mille vastu toode suure kiirusega surutakse.*

*Survepeas olev kolb imeb toote sisse läbi imuklapi.*
*Seejärel suunatakse toode vastuvõtuklappi.*

*Seejärel suunatakse toode järgmisse astmesse, kus toimub lõplik segamine.*

***Homogeenimine ehk ühtlustamine on mehaaniline protsess, mis seisneb aineosakeste purustamises, kuni nad kaotavad sidumisvõime.***

***Osakesed on selle tulemusena umbes poole väiksemad, vastavalt on vähenenud ka nende mass ja suurenenud kogupind, mille tulemusena nad ei tõuse enam pinnale ega setti põhja.***

*Seetõttu ei eraldu enam erinevad komponendid.*

# 2.1 Description of the Machine

*A homogenizer is a volumetric piston pump which pushes the product through a special valve (called "Homogenizing Valve") with an adjustable opening, where homogenization takes place.*

***Its working principle is based on energy transmission by means of a crankshaft and a connecting- rod system to pumping piston.***

*The Homogenizing Valve assembly is composed of three parts:*
*- Fixed seat*
*-Homo valve: it moves perpendicularly to the seat (which allows to adjust the distance between the two parts and, as a result, pressure)*
*-Impact ring, against which the product flow is pushed at high speed .*

*The piston in the compression head intakes the product by means of the "suction valve". The product is subsequently pushed into the delivery valve.*

*It is then sent to another point of the installation overcoming any difference in height it may encounter.*

***Homogenization is a mechanical process which causes the breakdown of particles till they cannot bind any more.***

***The particles obtained, half the original size, are homogeneous (with a mass proportionally reduced and a total surface increased) and they can no more come to the surface nor undergo any settling effect.***

*That is why the separation effect is reduced.*

*Ühtlustamise tulemusena tekkiv toode on täiesti homogeense koostisega.*

## 2.2 Kasutamine

*Käesolev homogenisaator on välja töötatud, silmas pidades selle peamist kasutusotstarvet, milleks on homogeensete ainete tootmine lähteainetest, mis võivad olla vedelikud, poolpaksud või pasta konsistentsiga (eeldusel, et neid saaks pumbata).*

*Igasugune muu kasutusala peale sihtotstarbelise on ebaõige ning võib kahjustada masinat ja põhjustada vigastusi selle käitajale.*

## 2.3 Ohutussüsteemid ja –seadised

*Vältimaks inimeste vigastusi ja materiaalseid kahjusid, mis võivad tekkida töötingimuste sobimatuse või käitaja ebaõige tegevuse tulemusena, on masinal mitmed ohutusseadised, mis on tootmise käigus vastavalt seadistatud.*

*Kui masinal on sundõlitus, lülitab surverelee õlisüsteemi rõhulanguse korral masina välja (Vt ptk 6, lk 6.4-6.5).*

*Pneumosüsteemis olev kaitseklapp laseb osa õhku välja, kui suruõhurõhk ületab maksimaalväärtuse.*

*Elektrimootori kaitseseadis. See on viimane, aga samuti oluline turvaseadis. Tegemist on elektriseadmega, mille ülesanne on masin välja lülitada, kui tarbitava voolu tugevus ületab seadistatud väärtuse – see juhtub surve kasvamisel.*

**Lisaks sellele asub esipaneelil punane nupp. Selle juures on pealkiri *EMERGENCY-STOP* (avarii-väljalülitus).**

*As a result homogenization allows to obtain a fully homogeneous product.*

## 2.2 Use

*This homogenizer has been conceived and protected in view of its main objective, that is, to produce homogenized substances from liquid, demi-liquid products and pastes provided that they can be pumped.*

*Any use other than the one the homogenizer is conceived for, is to be considered improper and can cause damages both to machine and operators.*

## 2.3 Safety Systems and Devices

*In order to avoid damages to persons and property - which can be caused by working defaults or even mistakes made by the operator*
*- the machine is equipped with safety devices duly adjusted during factory tests.*

*If the machine is of the forced lubrication type, the oil circuit pressure switch forces the machine shutdown whenever oil pressure gets too low (See chap. 6, pag. 6.4-6.5).*

*The safety valve in the the pneumatic system lets air out whenever homogenizing pressure exceeds max. values.*

*Electric motor stop device. It is the last but not the least important control. It is an electric protection device whose function is to force the machine shutdown whenever the amperometric consumption exceeds the adjusted value - under the effect of pressure.*

**A red push-button is placed on the front panel. It bears a sign reading EMERGENCY-STOP.**

*Sellele nupule vajutamisel seiskub masin kohe.*


FOTO 2.1

*Pushing this button, the machine stops.*

PHOTO 2.1

Kasutage avarii-väljalülituse nuppu ainult tegeliku avariiohu korral. Näited: äkiline surve kasv – ootamatu seiskumine – ebatavaline müra

**Masina seiskamise kohta tavaolukorras lugege käesolevast juhendist, osast „Kasutamine“.**

# 2.4 Elektrisüsteem

**ÜLDKIRJELDUS**

*Elektrisüsteem asub epoksülakiga kaetud karbis (kaitseklass IP 55).*

**KOMPONENDID**

*Juhtmete ja kuumuskindlate ühenduskaablite isolatsiooni värvus vastab CEI standardi 20-22 nõudmistele; juhtmete ristlõige on vähemalt 1,5 mm², jõukaablite ristlõige vähemalt 2,5 mm².*

*Juhtpaneeli nuppude kaitseklass on vähemalt IP 55.*

***Kogu elektrisüsteem vastab standardi EN 60204-1 nõudmistele.***

The Emergency-Stop button is to be used only in case of actual emergency. For ex.: a sudden pressure increase – unexpected breakdowns – unusual noises.

**To stop the machine in normal conditions, read carefully the instructions under the item “Use of the Machine”**

# 2.4 Electric System

**GENERAL DESCRIPTION**

*Wiring is placed inside a cabinet protected with epoxidic varnish (IP 55 protection).*

**COMPONENTS**

*Wiring cables and fire-protection connecting cables colours are in compliance with CEI standards 20-22 (auxiliary cables min.1,5 mmq, power cables 2,5 mmq).*

*Min. protection level of control board pushbuttons IP 55.*

***All electric equipment fulfills the requirements of CEI EN standards 60204-1.***

## 2.5 Tarvikud

*Masin on varustatud tööriistakomplektiga, kus leiduvad tööriistad on mõeldud peamiselt hüdraulikasüsteemi hooldamiseks: klapitihendite vahetamiseks; pumbakolvi vahetamiseks; samuti on komplektis tihendid (survepea ja homogeenimisklapi jaoks) ning varuvedrude komplekt.*

## 2.5 Accessories

*The machine is always supplied with a tool box including tools necessary for gasket – valve groups - pumping piston replacement, a set of gaskets (to fit in the compression head and in the homogenizing valve unit), and a set of springs.*

## 2.6 Korraliku toimimise tingimused

*Toote rõhk peab olema püsiv, vahemikus u 1,5 kuni 4 bar.*

*Tootes olev õhk peab olema eemaldatud.*

*See on oluline eeltingimus, sest kui toote liikumiskiirus on liiga väike, kuluvad jõuülekande ja survepea detailid (nt kolvirõngad) palju kiiremini.*

*Lähteained ei tohi sisaldada kõvu ega suuri osakesi, mis võivad põhjustada klappide ja pesade ummistumist.*

***Sel juhul võib toode hakata masina sees ringlema, mille tulemusena masina tootlikkus langeb oluliselt.***

*Soovitame paigutada lähteaine sisendisse kahekordse filtri (vt tabel 4.1).*

## 2.6 Good machine working

*Product feeding pressure should be steady, ranging approximately between 1.5 and 4 bar.*

*Air content should be removed.*

*This is a pre-requisite condition since, if the product feeding flow were too low, the drive unit and some components equipping the compression head would suffer quicker wear (e.g., pumping pistons gaskets).*

*The product must not contain hard, big-size particles which could prevent tight closing both of valves and seats.*

***Should this be the case, the product would be forced to recycle thus making it nearly impossible for the machine to reach nominal throughput.***

*It is therefore advisable to place a double filter before the product inlet flange (See Tab. 4.1).*

*Jälgige, et ei toode ega pumbakolbide määrimiseks kasutatav vesi ei sisalda liivaterakesi. Liiv kulutab kolbe ja teisi kõvasulamist valmistaud detaile kiiresti.*

*Samuti võib kahjulikult mõjuda liigne veekaredus (karbonaatide sisaldus).*

**Kui veevärgivesi on väga kare, soovitame kasutada veepehmendit.**

*Järgige hoolikalt käesoleva juhendi muudes osades toodud hooldusjuhiseid (Õlivahetus, ülevaatus jt).*

*Remove any traces of sand both in the product and in the water used to lubricate pumping pistons. Silicates contained in sand have an abrasive effect on pumping pistons and on other hard-alloy parts.*

*Too high a content of carbonates can as well have dangerous effects.*

**If water from the main water supply is too hard, it is advisible to sweeten it.**

*Follow thouroughly preliminary maintenance instructions described under other items elsewhere in this Manual (Oil change, Checkings, etc...).*

## 2.7 Keskkonnatingimused

*Masina normaalseks toimimiseks on vaja järgmisi tingimusi:*

***Keskkonnatemperatuur +5 °C kuni +35 °C;***

***Suhteline õhuniiskus: 40% kuni 75%;***

***TÄHELEPANU:***
***Hoidmistemperatuur masina ladustamisel või pikemal vaheajal töös on:***

***+ 5 °C kuni + 40 °C masinale***
***-5 °C kuni +35 °C juhtpaneelile***

***Pikema vaheaja puhul või hooaja lõpul tühjendage masin korralikult ja eemaldage vesi ning määrdeõli.***

## 2.7 Installation Site Features

*A machine normally works correctly and safely under the following conditions:*

***Temperature ranging between +5°C and +35°C;***

***Humidity: between 40% and 75%;***

***CAUTION: Storage temperature during the machine inactivity or at the end of a campaign ranging from:***

***+ 5°C and + 40°C for the machine***
***- 5°C and + 35°C for the electric board***

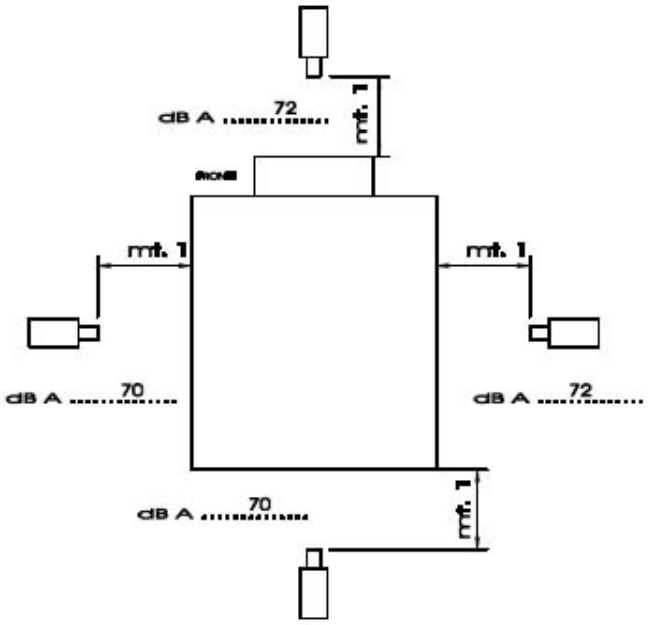
***During the machine inactivity or at the end of a campaign, empty completely the machine and remove water and lubrication oils.***

# 2.8 Müratase

*Müra mõõdeti paigalduskohal ja masina ümbruses kaugusel 1 m ja kõrgusel 1,6 m maapinnast masina tavalise toimimise ajal.*

# 2.8 Acustic Level

*Measurements have been done on the installation site and around the machine at a distance of mt. 1 and a height from ground of mt. 1.6 during normal operation of the machine.*




*TABEL 2.2*
*MÜRATASEME VÄÄRTUSED*

*TABLE. 2.2*
*ACUSTIC LEVEL VALUE*

*Tabelis 2.2 on toodud mürataseme väärtused*

*Table. 2.2 shows the acustic level value.*

# 2.9. Teenindus

*Bertoli Srl klienditeeninduse osakond on alati valmis abistama, kui kliendid vajavad nõu või tehnilist abi masina töös või hooldusel tekkinud probleemide korral.*

*Kui helistate meie klienditeenindusse (tel nr: 0521-29.15.16), võite saada andmed Teie läheduses asuvate volitatud hoolduskeskuste kohta, et Teid kiiremini teenindada.*

# 2.9. After-Sale Service.

*Consulting engineers at Bertoli Srl are always at their customers disposal to offer advice or technical assistance on problems arising during machine operation or maintenace.*

*Getting in touch with our Customer Service (phone: 0521-29.15.16) you will be given names and addresses of authorized Maintenance Engineers around your area, for quicker service.*

## 2.10 Andmesilt

*MASINA MUDEL.....Homogenisaator H3037*

*SEERIA NR .....2378*

*TOOTLIKKUS.....5 m ³/h*

*TÖÖDELDAV TOODE.....cream and yougurt milk*

*TEMPERATUUR .....<90 °C*

*MAKSIMAALNE TÖÖRÕHK.....20 MPa*

*PÖÖRLEMISKIIRUS.....177p/min*

*KOLVI LÄBIMÕÕT.....Ø 55 mm*

*KOLVI KÄIK.....70 mm*

***TARBITAV VÕIMSUS.....37 KW***

## 2.10 Technical Sheet

*MACHINE MOD.....Homogenizer H3037*

*SERIAL NR.....2378*

*THROUGHPUT.....5 m ³/h*

*PRODUCT TO BE PROCESSED....cream and yougurt milk*

*TEMPERATURE.....<90 °C*

*MAX WORKING PRESSURE.....20 MPa*

*REVOLUTIONS.....177g/min*

*PISTONS.....Ø 55 mm*

*PISTON STROKE.....70 mm*

***INSTALLED POWER.....37 KW***

## 2.11 Ühendused (vt tabel 2.3)

*TOOTE SISSELASE.....DN 65*

*TOOTE VÄLJALASE.....Øe40 Øi35mm*

*JAHUTUSVEE SISEND.....G1/2"*

*JAHUTUSVEE VÄLJUND.....G 1¼"*

*SURUÕHU SISEND.....G1/2"*

*VAJALIK RÕHK.....~ 0,7 MPa*

## 2.11 Connections (see table 2.3)

*PRODUCT INLET.....DN 65*

*PRODUCT OUTLET.....Øe40 Øi35mm*

*COOLING WATER INLET.....G1/2"*

*COOLING WATER OUTLET.....G 1¼"*

*AIR INLET.....G1/2"*

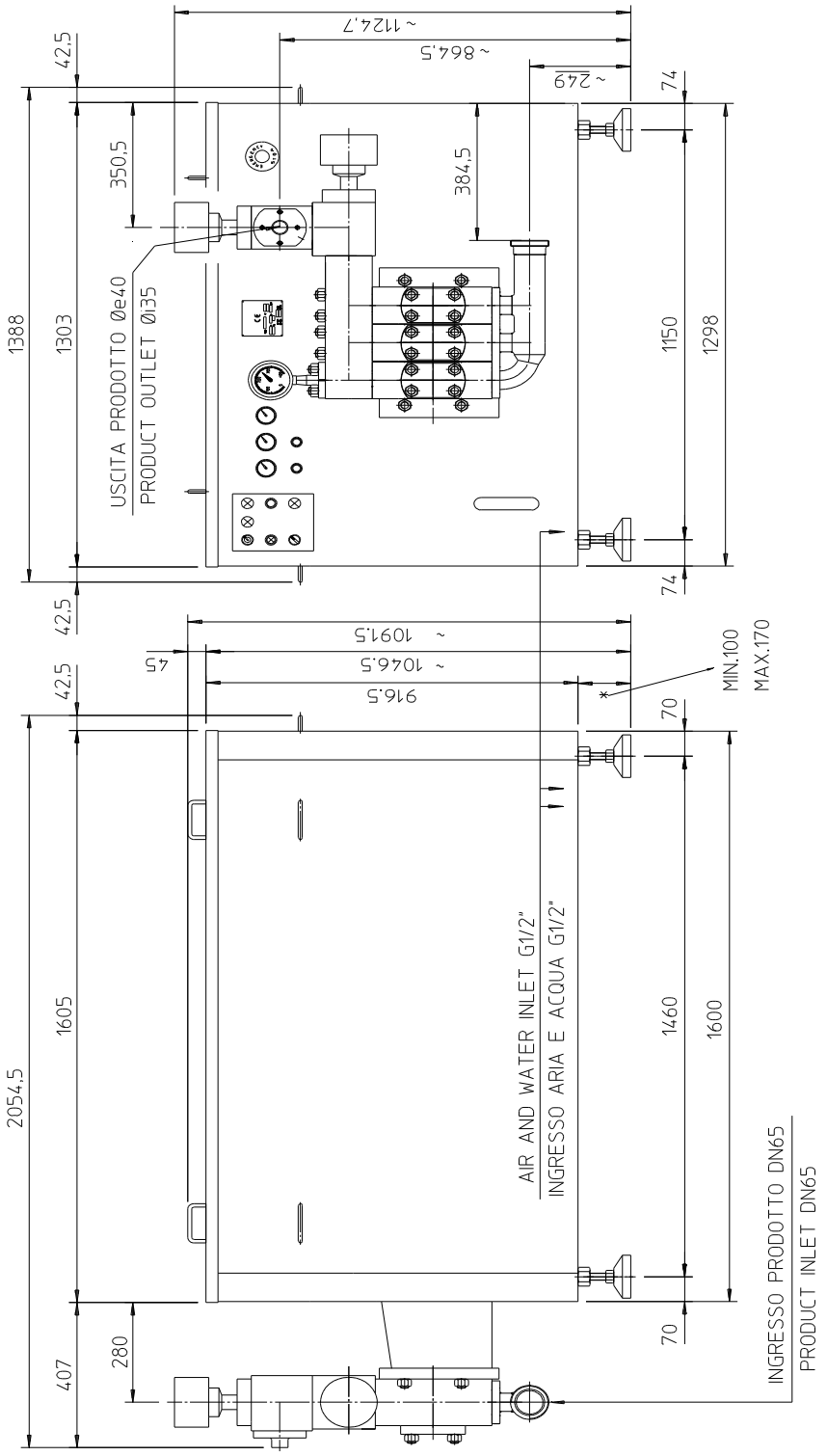
*REQUIRED PRESSURE.....~ 0,7 MPa*

# 2.12 Üldmõõtmed

# 2.12 Overall Dimensions

*TABELLA. 2.3*

*TABLE. 2.3*



# 2.13 Katsetamisprotokoll

*Ostja.....BPS Partner OU*
*Meie tellimus nr……..07OF00040*
*KUUPÄEV……..…….. 29/11/07*

*MASIN……HOMOGENISAATOR TÜÜP…….. H3037 SEERIANUMBER……..2378*
*A) KATSETUSED ON LÄBI VIIDUD MEIE FIRMAS*
*B) KATSETAMISEL KASUTATUD VEDELIK…..……..VESI*
*C) VEDELIKU TEMPERATUUR.....20 °C - 40° C*
*D) KATSETUSAEG, TUNDI.....8h*

*KATSEANDMED*

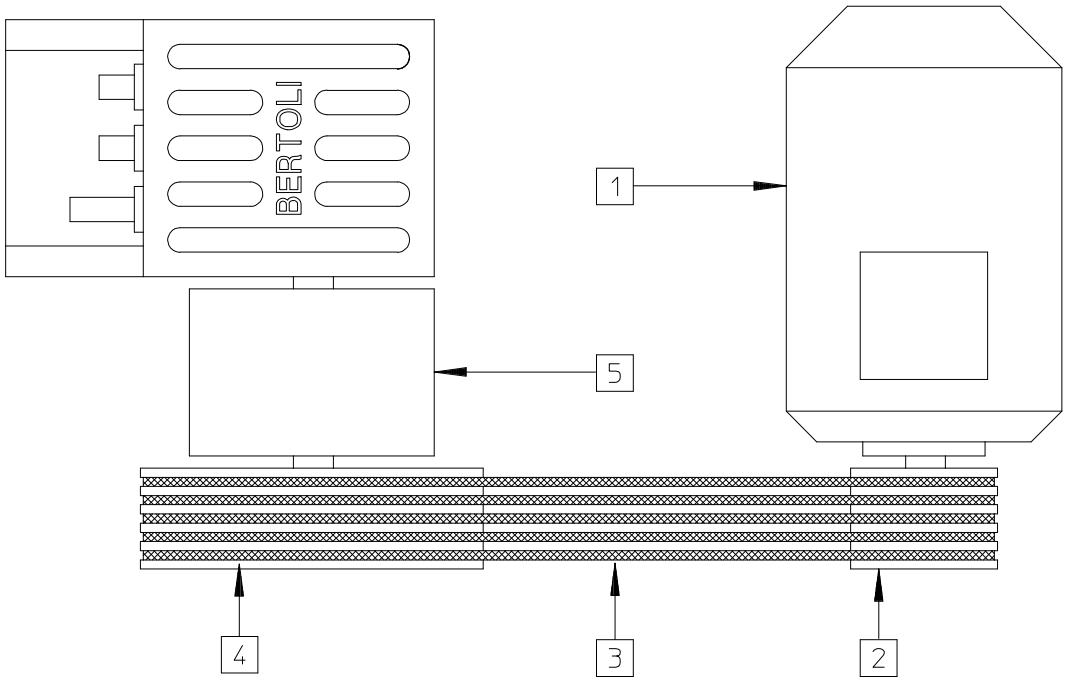
*A) Vedelikuga temperatuuril.....15 °C tootlikkus =....5,16m3/h*
*B) Vedelikuga temperatuuril.....50 °C tootlikkus =..... m3/h*
*C) Töörõhk……..20MPa ( 200bar)*
*D) Mootori tarbitav vool.....57 A*
*E) Suurim katserõhk……..0,35 MPa (3,5bar)*
*G) Toitesüsteem.....Tsentrifugaalpump*
*H) Määrimisrõhk……..0,7 MPa (7bar)*
*I) Pöörlemiskiirus.....Maks.177p/min*
*L) Tarbitav võimsus……..…37 kW*
*L) M) Mootori tüüp…….....…...225S 4p B3 1470 g/1' 400 Volt 50 Hz 37 Kw*
*Seeria NR:BJ3565745*
*N) Elektrimootori tarbitav vool vastavalt andmesildile…….....70A*

*O) 1.°aste:*
*Suruõhutarve rõhul.....20MPa (200bar)*
*=.....0,34MPa (3,4bar)*
*P) 2.°aste:*
*Suruõhutarve rõhul.....5 MPa (50bar)*
*=..... .....0,08MPa (0,8bar)*

*Q) 1.°ja 2.°aste: õhu tagasisurve.....0,05 MPa (0,5bar)*

*Katsetamise tulemus…….....……...positiivne*

*Märkused…….....……..*
*.....*




***MOOTORI ANDMED***

*1 - Mootori tüüp……*225S 4p B3 1470 g/1' 400 Volt 50 Hz 37 Kw

*2 – rihmaratta mudel……Øp 212 5SPB*
*kiirus n.....5*

*3 – Rihmade mudel.....2180 SPB*
*kiirus n……..…5*

*4 - rihmaratta mudel……...Øp 355 5SPB*
*kiirus n.....5*

*5 – Reduktori tüüp…RI 125- UP 2A -4,92- B6*

***MOTORIZATION CHART:***

*1 - Motor type...*225S 4p B3 1470 g/1' 400 Volt 50 Hz 37 Kw

*2 - Pulley model.....Øp 212 5SPB*
*race n.....5*

*3 - Belts model.....2180 SPB*
*belts n.....5*

*4 - Pulley model.....Øp 355 5SPB*
*races n.....5*

*5 - Reducer type.....RI 125- UP 2A -4,92- B6*

3. peatükk

# Transport Käsitsemine Hoidmine

 **Käesolevas peatükis olevad juhised on mõeldud eriti masina transpordi ja paigalduskohale toimetamise eest vastutavatele isikutele.**

 **Kolm siin käsitletavat põhiteemat on koondatud ühte peatükki, et nimetatud isikutel oleks hõlpsam nendega tutvuda.**

 **Turvalisuse huvides on oluline kinnitada enne teisaldamist korralikult kõik masina liikuvad osad.**

Chapter 3

# Transport Earthmoving Storaging

 **The instructions contained in this chapter must be read carefully by authorized personnel in charge of machine transport and handling to and within the installation site.**

 **The three main subjects dealt in here have been included in the same chapter in order to make it easier for authorized personnel to go through them.**

 **For safety reasons, it is prerequisite condition to clamp steadily all moving parts before transportation.**

# 3.1 Transport

Masina mahalaadimise ja käsitsemise juures peab olema vähemalt kolm käitajat, kes peavad kandma kaitsekiivreid, töökindaid ja töörõivaid ning turvajalatseid.
Ülalnimetatud operatsioonide eest vastutavad käitajad peavad suhtuma seadme transportimisse äärmise tähelepanuga.
Tähelepanu: Käitajad peavad alati paiknema masinast turvalisel kaugusel, eriti siis, kui lähedal olemiseks puudub tungiv põhjus.

 Asjasse mittepuutuvad isikud ei tohi teisaldamisoperatsioonide ajal viibida ohustatud piirkonnas.
Nimetatud nõudmiste eiramine võib kaasa tuua tõsiseid vigastusi ja isegi surmajuhtumeid, kui masin peaks juhuslikult kukkuma.

 Masina mahalaadimisel ja teisaldamisel peavad vastutavad isikud hoolikalt jälgima mööduvaid inimesi ja objekte.

# 3.2 Laadimine

Uurige hoolega joonist 3.1 (pakkimata tarnitud masin) ja joonist 3.2 (pakitult tarnitud masin) ning tegutsege vastavalt: .:
1) Kasutage mutrivõtit masina ülakatte eemaldamiseks.
2) Eemaldage ülakate.
3) Keerake masina terasraami külge tõsterõngad.
(Tõsterõngad ja hooldustööriistade komplekt tarnitakse koos masinaga).
4) Kinnitage tõsterõngaste külge tõstetrossid.
5) Haakige tõsteseadme konks tõstetrosside külge nii, et püstjoon läbiks masina raskuskeset G (vt joonist).

**Sel juhul ei ole karta masina kaldumist.**

# 3.1 Transport

Machine unloading and handling requires the presence of three Operators always wearing helmets, working gloves and uniforms, and safety footwear.
The operators in charge of the above operations should always pay the utmost attention during transport.
Caution: Operators should always respect and keep safely distant from the machine mainly whenever there is no need for them to stand near it.

 Unauthorized personnel should never stand around the area within which moving operations are being carried out.
Noncompliance with these requirements may result in serious, even death damages, in the event the machine should accidentelly fall down.

 On unloading and moving the machine personnel in charge of these operations should pay the utmost attention to anybody or anything passing by.

# 3.2 Loading

Study carefully drawing 3.1 (handling a machine supplied unpacked) and drawing. 3.2 (handling a machine supplied with packing) and act accordingly, i.e.:
1) Use a wrench to unscrew the screws which fix the machine top panel.
2)Remove the top panel.
3)Tighten the eye-bolts on the machine iron frame.(The eye-bolts and a set of maintenance tools are supplied with the machine).
4)Anchor the machine to the lifting eyebolts.
5)Hook the crane or the wrecker crane hook to the lifting cable ring (See drawing) so that the vertical passes through the center of gravity (G).

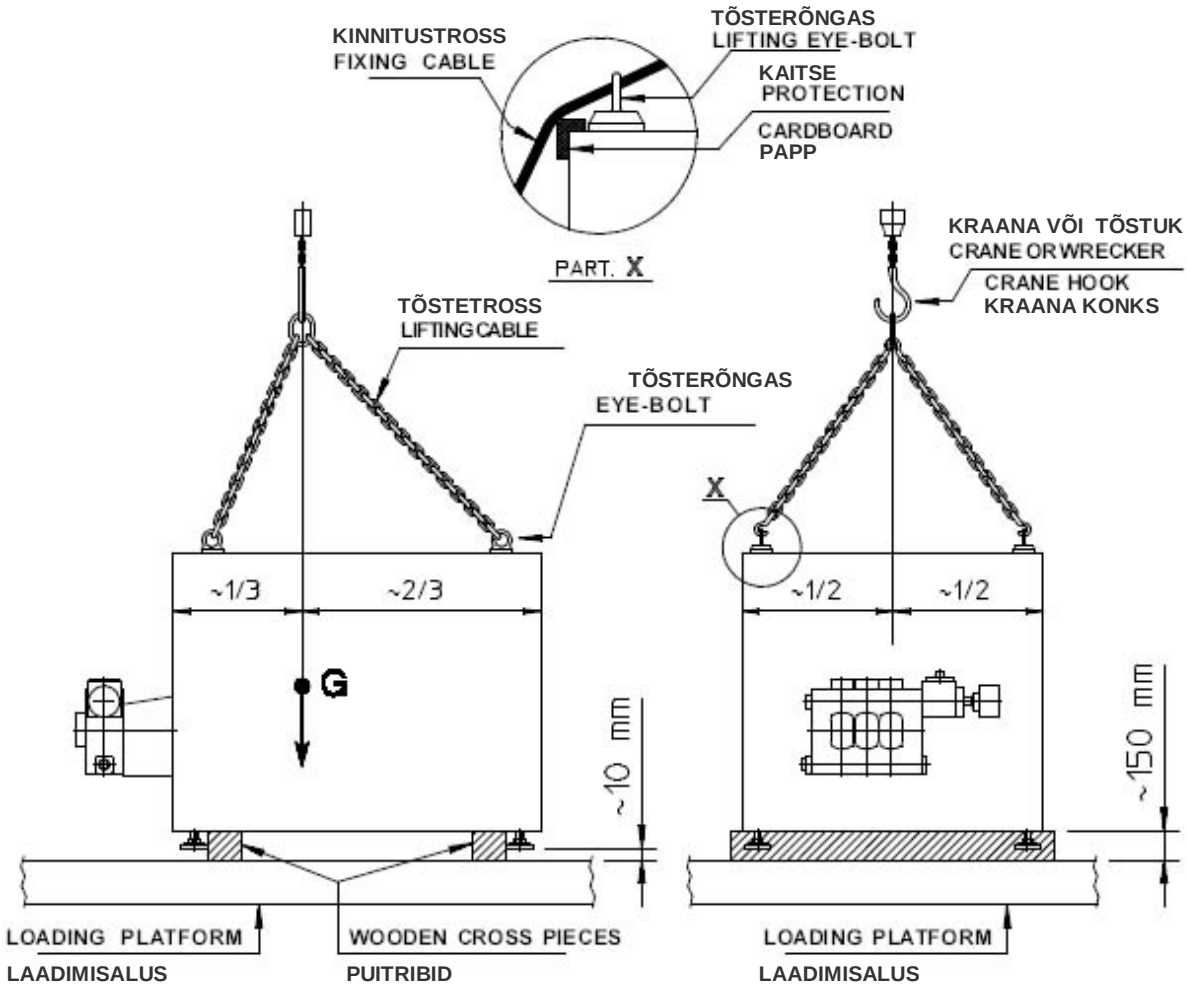
**This way the machine does not suffer any deflection.**

# Masina käsitsemine

(Tarnitud pakkimata kujul)

# Machine handling

(Supplied unpacked)

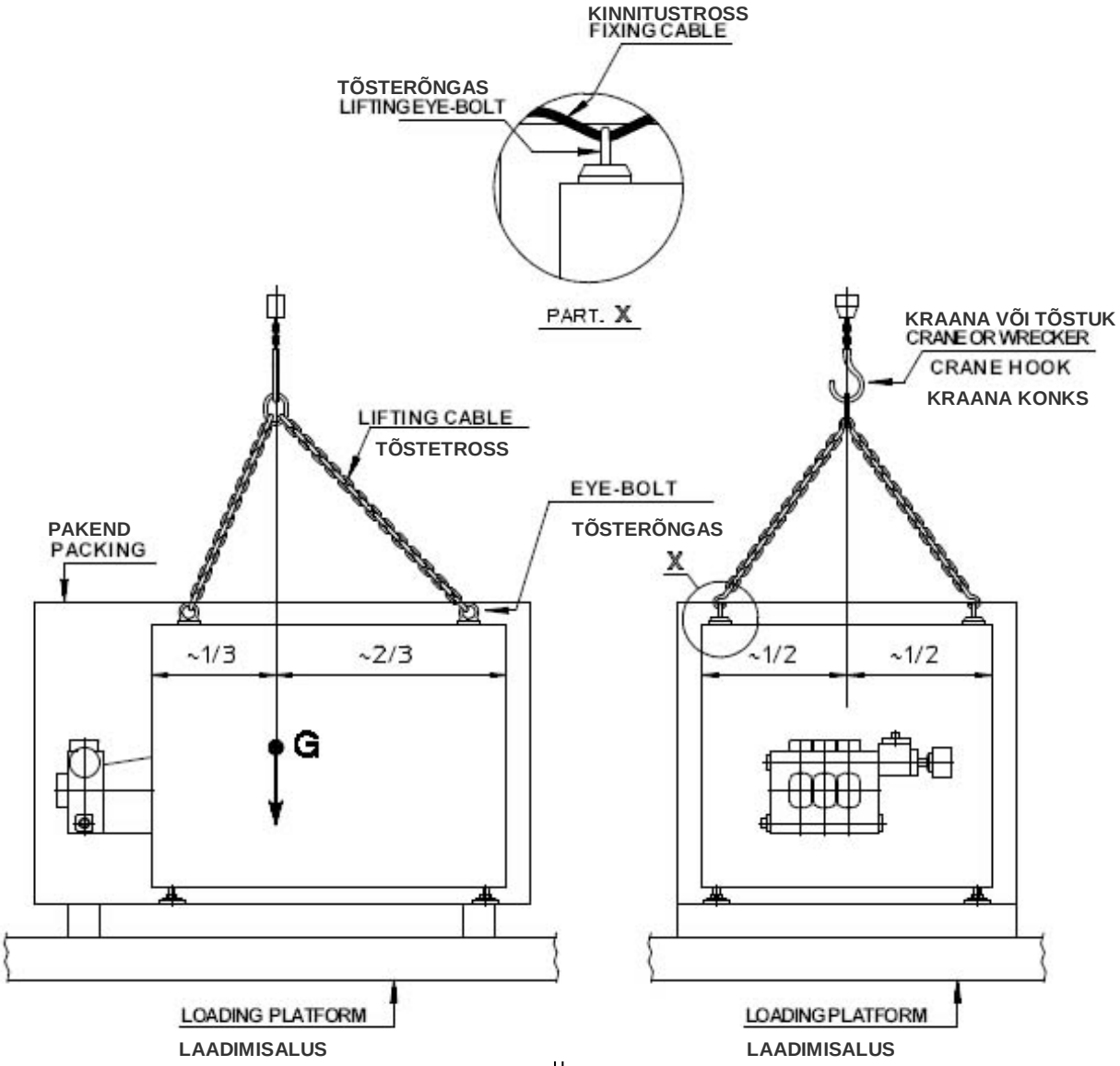



TABEL 3.1 MASINA KÄSITSEMINE
(TARNITUD PAKKIMATA KUJUL)

TABLE 3.1 MACHINE HANDLING
(SUPPLIED UNPACKED)

# Masina käsitsemine
(Tarnitud pakendis)

# Machine handling
(Supplied with packing)




TABEL 3.2 MASINA KÄSITSEMINE
(TARNITUD PAKENDIGA)

TABLE 3.2 MACHINE HANDLING
(SUPPLIED WITH PACKING)

6) Tõstke masin ettevaatlikult üles. Kraana või tõstuk peab liikuma paigalduspiirkonnas äärmise ettevaatusega, et koorem ei hakkaks kõikuma ega ei takerduks millegi taha.

**Masina kogumass on u. 1500 kg.**

7) Paigutage masin transpordivahendil olevale alusele. Kui masin tarnitakse pakkimata kujul, asetage selle alla puitribid. (Vt tabel 3.1).
See tagab masina kaalu ühtlase jaotumise transpordivahendi platvormile.

8) Kinnitage masin transpordivahendi külge tõsterõngaid läbivate trosside abil.

Kui masin tarnitakse pakkimata kujul, asetage trosside ja masina paneelide vahele kaitsekate (tavaliselt papist), et trossid ei vigastaks paneele. Seade on transpordiks valmis.

## 3.3 Mahalaadimine ja käsitsemine

Kui masin on jõudnud paigalduskoha lähedusse, laadige see maha järgmiste juhiste kohaselt:
1) Võtke lahti kinnitustrossid, eemaldage kaitsekate (papist) ja pakend.
2) Kasutage mutrivõtit masina ülakatte poltide eemaldamiseks.
3) Eemaldage ülakate.
4) Keerake masina terasraami külge tõsterõngad. (Tõsterõngad ja hooldustööriistade komplekt tarnitakse koos masinaga).
5) Kinnitage tõsterõngaste külge tõstetrossid.
6) Haakige kraana või tõstuki konks tõstetrosside külge. Et teha seda õigesti, järgige joonistel 3.1 ja 3.2 toodud õigeid mõõtmeid. Asetage masin paigalduskohale. Järgige seejuures peatükis "Üldohutusjuhised" toodud juhiseid.

6) Lift the machine carefully: the crane or wrecker crane used to move it within the installation area should be maneuvered with the utmost care avoiding any oscillation or sudden catch.

**Machine totale weight:Kg ~1500**

7) Position the machine onto the platform of the means of transport. In the event the machine is supplied unpacked, rest it on wooden cross pieces. (See Tab. 3.1).

This way the entire load will be distributed homogeneously on the means of transport platform.

8) Tie the machine to the means of transport passing the cable through the eyebolts.

In the event the machine is supplied unpacked, place a protecting sheet in between the cables and the machine panels (cardboard sheets are normally used), so that they do not suffer any damages. Now the machine is ready for transport.

## 3.3 Discharge and machine handling

Once the machine has reached the factory premises, unload it following the instructions below:
1) Untie the cable, remove the protection (cardboard) sheets and the packing.
2)Use a wrench to unscrew the screws which fix the machine top panel.
3)Remove the top panel.
4)Tighten the eye-bolts on the machine iron frame. (The eye-bolts and a set of maintenance tools are supplied with the machine).
5) Anchor the machine to the lifting eyebolts by menas of cables.
6) Hook the lifting hook of the crane or crane wrecker to the lifting cable rings. To do this in the correctly, refer always to the parameters as shown in drawing. 3.1 and drawing. 3.2.
Lay the machine in the installation site.
Follow the instructions in the chapter titled “General Warnings”.

**Kui masina komplektis puuduvad tõsterõngad või kui paigalduskohas puudub võimalus kraana kasutamiseks, kasutage masina paigaldamiseks autotõstukit.**

Uurige hoolikalt joonist 3.3 (Masina teisaldamine autotõstuki abil) ja tegutsege järgmiselt:

1) Kasutage kahveltõstukit, mis oleks suuteline kandma masina kaalu ja sobiks selle mõõtmetega (kahvlid peavad toetama masina kogu alumist pinda). Paigutage tõstuki kahvlid masina jalgade vahele (olge seejuures ettevaatlik, et mitte vigastada põhja all olevaid voolikuid, torusid ja kaableid).

2) Tõstke tõstuki abil masin 350 mm kõrgusele maapinnast, olge seejuures ettevaatlik.

**Masina paigaldamisel töökohale kehtivad samad reeglid, mis selle paigaldamisel transpordivahendile.**
**(Vaadake selle kohta juhiseid eelmisest osast.)**

**Meenutame seejuures uuesti, et masina kogumass on umbes 1500 kg.**

Masina paigalduskoha ja kogu teisaldamisega seotud piirkonna peavad enne ülalkirjeldatud operatsioone üle vaatama vastavate teadmistega ja pädevusega isikud. Olge selle juures väga tähelepanelik, et veenduda ohtlike kohtade puudumises.

**Kontrollige põranda seiskorda: see peab olema ühtlane ja aukudeta. Ärge sõitke tõstukite ega muude paigaldussõidukitega liiga kiiresti.**

Ärge seiske transpordi ajal seadme peal.

**Should the machine be not provided with any lifting eyebolts, or in the event the installation site does not allow the maneuvering of a crane or a crane wrecker, lift it with a fork lift truck.**

Study carefully drawing. 3.3 (How to move the machine with a fork lift truck) and act as follows:

1) Use a Fork lift truck suitable to bear the weight and dimensions of the machine: (its forks should lean onto the whole lower surface of the machine). Position the lift truck forks in between the machine feet (do this carefully not to damage any part of the machine like sleeves or pipe connections placed under the machine bottom.

2) Lift the machine mm 350 from the ground by maneuvering carefully the fork lift truck.

**Instructions concerning the positioning of the machine inside the installation site are the same as those described for its positioning onto the means of transport.**
**(Refer to the previous paragraph.)**

**We remind, once again, that the overall weight of the machine is Kg~1500**

The whole area involved in the moving operations as well as the installation site are to be inspected by qualified and authorized personnel before the above operations are carried out. Do this with the utmost care to make sure there are no “risky areas”.

**Check carefully the floor conditions:**
**it must be homogenenous and without holes. Do not maneuver lift or other earthmoving equipment at high speeds.**

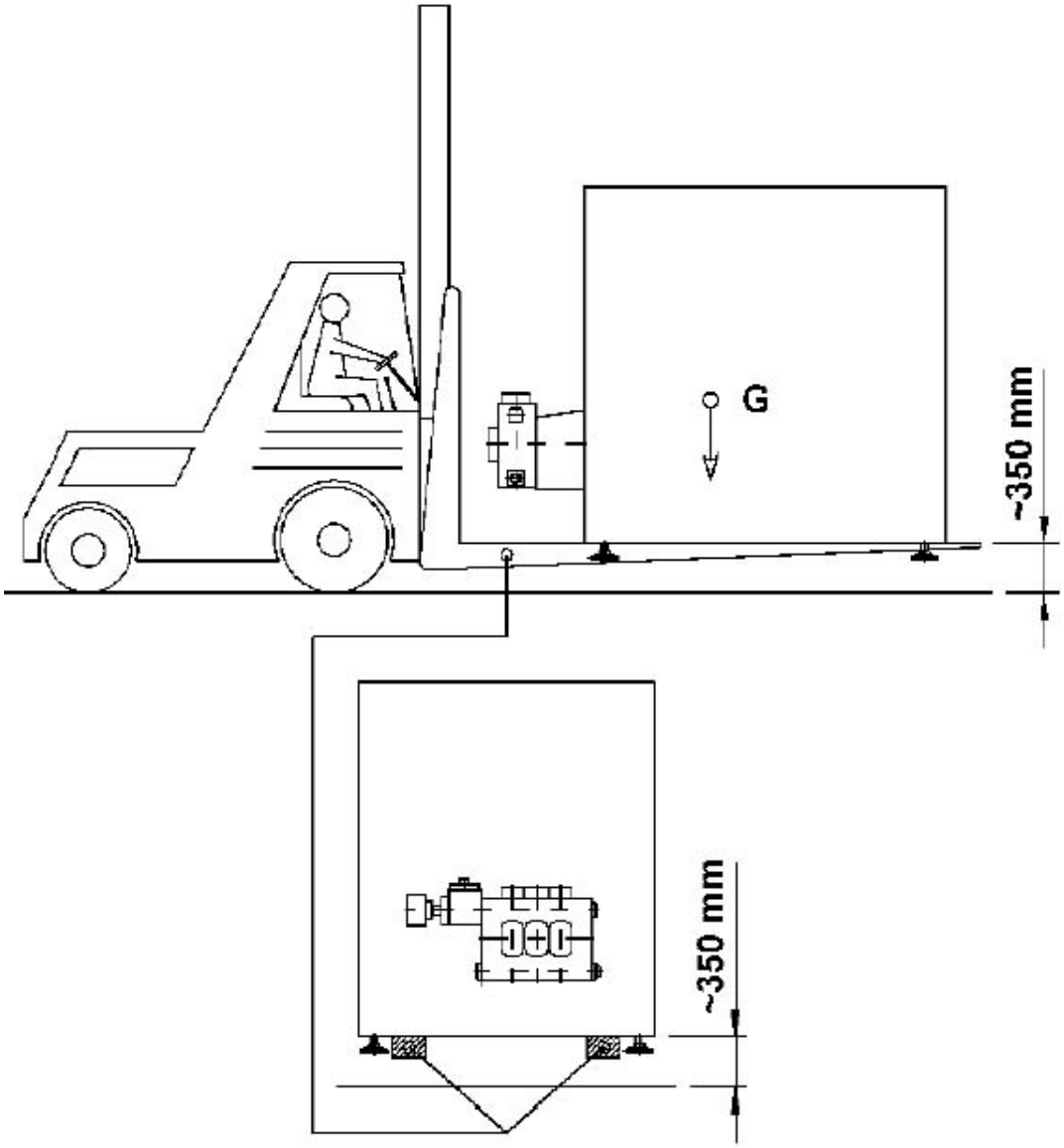
Do not stand on the machine during moving operations.

# Masina käsitsemine

(Kahveltõstuki abil)

# Machine handling

(With a fork lift truck)




TABEL 3.3 MASINA KÄSITSEMINE
(KAHVELTÕSTUKI ABIL)

TABLE 3.3 MACHINE HANDLING
(WITH A FORK LIFT TRUCK)

## 3.4 Vastuvõtt ja ülevaatus

Transpordi ajal võib masin saada vigastusi, kuigi see on korralikult pakitud.

Seepärast tuleb seadme vastuvõtul see hoolikalt üle vaadata, et võimalikud vigastused avastada. Kui avastate vigastuse, ärge masinat kasutage, vaid pildistage vigastatud osi.

Kontrollige saatelehte ja märkige ära kõik kaasasolevad osad, et veenduda nende olemasolus.

Kontrollige hoolikalt ka kõiki masina osi ja detaile, veendumaks, et ükski neist ei ole transpordi ajal kannatada saanud. Kui leiate mõne vigastatud osa, täitke vastava nõude ja saatke see transpordifirmale hiljemalt 3 päeva jooksul masina kättesaamisest. Kasutage saatmiseks tähitud posti ja lisage kirjale fotod vigastatud kohast.

## 3.5 Hoidmine

Kaitseks ilmastikutingimuste vastu tuleb masinat hoida siseruumides.

Katke kõik roostevabast terasest detailid õlikihiga.

**TÄHELEPANU: Hoidmistemperatuur masina ladustamisel või pikemal vaheajal töös on –10 °C kuni +55 °C.**

**Pikema vaheaja puhul või hooaja lõpul tühjendage masin korralikult ja eemaldage vesi ning määrdeõli.**

**Paigutage masin stabiilselt siledale rõhtsale põrandale, mis suudaks kanda kogu masina kaalu.**

## 3.4 Reception and preliminary checking

During transport the machine might suffer some damages even if it has been carefully packed.

Upon receiving it, the machine should be carefully checked in order ascertain any possible damages. In the event any damage is detected, accept the machine upon reserve and take photos of the damaged parts.

Check the packing list and tick each single item in order to verify if all parts are present.

All parts and components must be checked carefully in order to verify if any of them have suffered damages during transport. In the event some parts are found damaged, file a claim and notify it to the forwarder within three days from delivery. Notification should be done by registered mail and should include photographic evidence.

## 3.5 Storage

The machine should be storaged indoor in order not to impair it.

Treat all stainless steel parts with antioxidant oil.

**CAUTION: Storage temperature during the machine inactivity or at the end of a campaign ranging from - 10°C and + 55°C.**

**During the machine inactivity or at the end of a campaign, empty completely the machine and remove water and lubrication oils.**

**The machine should be positioned steadily on a smooth flat floor suitable to bear the weight of the machine.**

# 3.6 Edasilükatud käivitus

Kui masinat pole kavas pikema aja vältel käivitada, tuleb sellega teha järgmised toimingud:

1) Lülitage toide välja masina pealülitist;

2) Puhastage masin põhjalikult (vt „Puhastamine ja hooldus“);

3) Katke määrdega kõik välismõjudele tundlikud osad (vt „Puhastamine ja hooldus“);

4) Kui masina seisuaeg on kestev, tuleb kaitsta kõik lülitid ja juhtpaneelid vastavate katetega:

5) Katke masin kaitsekatetega;

6) Tühjendage masin põhjalikult nii tootest kui ka veest ja määrdeõlist.

# 3.6 Delayed Start-up

In the event the machine should not be installed and work for some time, make sure the following operations are carried out carefully:

1) Disconnect electric power supply by acting on the electric mains switch;

2) Clean the machine (See “Cleaning and Maintenance” chapter);

3) Grease all parts subject to atmospheric agents (See “Cleaning and Maintenance” chapter);

4) If the operation of the machine should be delayed long, key boards and control panels should be thouroughly protected;

5) Cover the machine with protecting sheets.

6)Empty completely the machine and remove water and lubrication oils.

# 4. peatükk

# Paigaldamine

 Masina paigaldamisel tuleb järgida kõiki ohutusnõudeid ja -eeskirju, et vältida inimestega toimuvaid õnnetusi ja materiaalseid kahjusid.

 **Paigaldamist peavad läbi viima Bertoli volitustega pädevad isikud.**

**Kliendi kohuseks jääb masina paigalduskoha ettevalmistamine. Koha valikul arvestage masina üldmõõtmeid; vastav joonis saadetakse kohale tavaliselt juba enne masina tarnimist.**

# Chapter 4

# Installation

 The machine must be installed in full respect of safety regulations and standards to avoid damages either to personnel and/or property.

 **Installation must be carried out by authorized and skilled personnel from Bertoli.**

**It is the customer's duty to organize and prepare the machine installation site. For overall dimensions refer to the overall dimension diagram supplied at an earlier stage (usually before the delivery of the machine).**

# 4.1 Paigaldamine

*Pärast masina paigutamist paigalduskohale (vt osa „Keskkonnatingimused“) on vaja ühendada see kõikide süsteemidega.*

**Torud ei tohi tekitada silindriplokile lisakoormust. Kõik ühendused peavad võimaldama seadme edaspidist hõlpsat montaaži ja demontaaži.**

*Masina (homogenisaatori ja vedelikupumpade) korralikuks toimimiseks soovitame paigaldada toote sisselasketorusse kahekordse filtri (üks filter süsteemi sisendisse ja teine otse masina sisselaskeavasse).*

*Vastava skeemi leiate järgmiselt leheküljelt (vt joonis 4.1).*

*Masina õigeks loodimiseks kasutage selle kruvitavaid seadejalgu (vt joonis 4.2).*

# 4.2 Maandamine

*Masin on juba tarnimisel õigesti ette valmistatud vastavate ühendustega masina juhtpaneelis.*

Kontrollige paigalduspiirkonnas olevat maaühendust ja tehke vajaduse korral vastavad muudatused.

# 4.1 Installation

*After positioning the machine in a suitable place (See recommedations in the paragraph: “Safe operating conditions”), it is necessary to connect it to the installation piping system.*

**Pipes must not produce any strains onto the cylinder block. Connection must be carried out allowing easy successive assembly and disassembly.**

*For best performance of the machine (homogenizers and liquid pumps), we suggest to fit a double filter before the product inlet to the machine (one at the filter inlet, and the other one at the product inlet pipe connection).*

*An installation diagram can be found in the following page (See drawing. 4.1).*

*To obtain correct levelling of the machine act on the adjustable feet the machine is equipped with (See drawing. 4.2).*

# 4.2 Grounding

*The machine is suitably protected through safe grounding with pre-arranged connections ready inside the machine switchboard.*

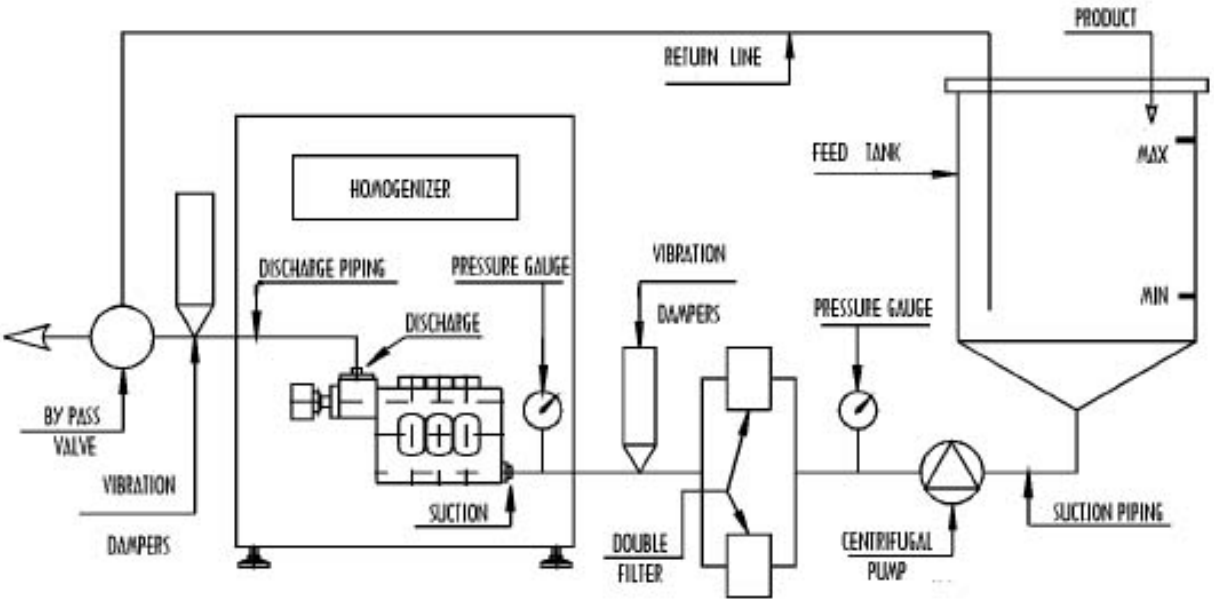
Check and, if necessary, rearrange the grounding system within the installation area.

# Paigaldusmõõtmed

*TABEL 4.1*

# Installation diagram

*TABLE 4.1*



## 4.3 Elektriühendus

*1) Ühendage toitejuhtmed masina pealülitiga (vt tabel 4.2 ja elektriskeemi, mille koopia on olemas ka juhtpaneeli sisetaskus).*

*2) Veenduge, et Teie võrgupinge on sama, mis märgitud masina andmesildile.*

*3) Lülitage pealüliti sisse, keerates selle punase nupu asendisse „1“.*

*4) Kontrollige kindlasti, et nii mootor kui ka õlipump pöörlevad õiges suunas: see suund on nooltega märgitud. (Vt ka elektriskeemi, millest koopia asub juhtpaneelis).*

*Järgides käesoleva juhendi peatükis „Kasutamine" toodud juhiseid, käivitage masin ja seisake see mõne sekundi pärast. Masina seiskumise ajal kontrollige rihmaratta, õlipumba (kui see on olemas) ja mootori ventilaatori pöörlemissuunda.*

***Juhinduge vastavatest nooltest.***

*5) Keerake pealüliti punane nupp asendisse „0“: sellega olete toitepinge välja lülitanud.*

*TABEL 4.2*

## 4.3 Electrical Connection

*1) Connect the electric wires to the switchboard main switch (See Tab. 4.2 and wiring diagram, a copy of which can be found in the inner pocket inside the switchboard).*

*2) Make sure that the socket voltage be the same as the machine’s.*

*3) Supply voltage to the switchboard by turning the red knob marked main switch to “1”.*

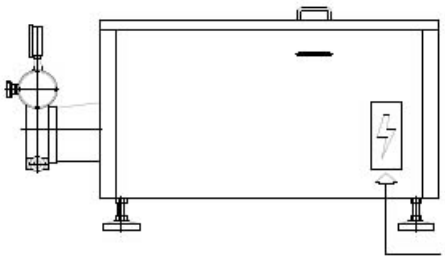
*4) Check carefully the sense of rotation of both the motor and the oil pump: it must be as shown by the arrows. (See wiring diagram a copy of which is inside the switchboard itself).*

*Following the instructions in Chapter titled “Use”, start the machine and stop it again after a few seconds. While the number of revolutions decreases, check the sense of rotation of the pulley and (if provided) of the oil pump as well as the motor's fan.*

***Refer to relevant arrows.***

*5) Turn the red knob on the switchboard to “0”: by doing so the voltage to the switchboard is cut off.*

*TABLE 4.2*



# 4.4 Ühendamine suruõhutorustikuga

*Kõik homogenisaatorid vajavad suruõhku.*

*Ühendage suruõhutorustik masina suruõhuühendusega, vt tabel 2.3.*

***Rõhk süsteemis peab olema umbes:***

*0,7 MPa*
*(= 7 bar).*

*Õhurõhku masina sisendis näitab manomeeter „1“, vasturõhku aga manomeetrid „2“ ja „3“.*

*Suruõhku on vaja ka homogeenklapi pesa avamiseks töörõhu vabastamise eesmärgil.*

# 4.4 Air distribution connection to pneumatic system

*The homogenizers strictly require this connection.*

*Connect the air mains supply to the air inlet pipe connection of the machine positioned as shown in Tab. 2.3*

***The supply air pressure should have approximately the following value:***

*Pressure =0,7 MPa*
*7 Bar*

*Air pressure into the machine can be read on manometer “1”, while air back pressure can be read on manometers “2”and "3".*

*Air supply is also required in the event it were necessary to open the homogenizing valve seat in order to zero-set the working pressure.*

*FOTO 4.3* | *PHOTO 4.3*

**Ärge keerake seadistusnuppe manomeetrite 1 ja 2 juures (vt foto 4.3. Nende nuppude keeramisel muutub esialgselt seadistatud töörõhk, mille tulemusena homogenisaatori töörõhk võib muutuda).**

*Masina pneumosüsteemis on kaitseventiilid „4“ ja „5“ (vt foto 4.3). Need ventiilid on seadistatud kokkulepitud suurimale õhurõhule ja ei luba masina sees olevat õhurõhku seadistaud rõhku ületada. Kaitseventiilid „4“ ja „5“ on individuaalselt seadistatud Bertoli katsekojas.*

Maksimaalse õhurõhu seadistatud väärtust on lubatud muuta ainult Bertoli kirjalikul nõusolekul.
? Kaitseventiilide „4“ ja „5“ ümberseadistamist tohivad teostada ainult Bertoli volitustega pädevad isikud.

*Käesoleva masina puhul ei soovitata kasutada õli sisaldavat ega niiskusest vabastatud suruõhku, sest pneumosüsteemi liikuvad osad on isemäärduvad.*

**Never act on the adjusting knobs placed near the manometers 1 and 2 shown in Photo. 4.3. If this happens, the air pressure value previously set will change thus leading to a variation of the homogenizing pressure.**

*The pneumatic system is equipped with pneumatic safety valves "4" and "5"(photo 4.3)*
*These valves are purposely installed in order to grant that the homogenizer pressure value established by contract is never exceeded. The safety valves "4" and "5" are in effect adjusted and then locked in during test at Bertoli's workshops.*

It is utterly forbidden to try and change the pre-set value without Bertoli's consent and approval.
Any intervention on the valves "4" and "5" must be carried out by authorized and skilled personnel from Bertoli s.r.l.

*We recommend not to use lubricated nor dehumidified air as the pneumatic circuit components are self-lubricating.*

# 4.5 Veetorustiku ühendamine jahutussüsteemiga

*Veetorustiku ühendamiseks jahutussüsteemiga tuleb veetorustik ühendada masina veesisendi otsakuga. Lugege hoolikalt juuresolevas tabelis toodud juhiseid.*

*Veeühendus on vajalik kolvi jahutamiseks ja määrimiseks; masina määrimiseks kasutatakse sundmäärimist, kus õli jahutatakse vesi-õli soojusvahendi abil.*

# 4.5 Water circuit connection to cooling system

*To connect the water supply system to the machine, fit the water pipe to the water inlet pipe connection of the machine. Read carefully the instructions as per the attached table.*

*Water is strictly necessary for piston cooling and lubrication and for lubrication and cooling in machines provided with force lubrication system by means of a water-oil heat exchanger.*

# 4.6 Eelnev pesemine

*Masin vajab eelnevat läbipesemist.*

*Seejuures tuleb silmas pidada, et enne uue masina läbipesemist on vaja veenduda süsteemi läbilaske olemasolus, vastasel juhul võivad masinas olevad mustuseosakesed jääda masinasse ja selle rikkuda.*

 Enne pesemist lülitage pealüliti välja (asendisse „0“) ja lukustage see ning pange võti selle hoiukohta.

***Juhised õigeks pesemiseks on toodud peatüki "Puhastamine ja hooldus" osas „Pesemine“.***

# 4.6 Preliminary Washing

*The machine requires preliminary washing.*

*We would like to underline that before washing a new machine, it is prerequisite condition to see to its bypass, in order to protect the machine from any possible damage caused by impurities fouling inside the piping system.*

 Disconnect electric power to the machine by turning the mains supply switch to “0”, padlock the switch itself and bring the key
with you.

***Refer to the chapter “Cleaning and Maintenance” for correct instructions regarding cleaning operations.***

# 4.7 Kontroll enne käivitamist

*Enne masina käivitamist läbiviidavate katsete eesmärgiks on kontrollida paigalduse õiget teostamist ning võimalike tõrgete esinemist, mis võiksid takistada masina õiget toimimist.*

*Kohe pärast paigaldamist kontrollige järgmisi asjaolusid:*

*1) Võimalikke vigastusi, mis mõjuvad masina toimimisele.*

*2) Kontrollige maaühenduse kvaliteeti, mõõtes maandustakistust oommeetri abil.*

3) Kontrollige, kas ohutusseadiste mikrolülitid, turvaseadised ja avariilülitid toimivad õigesti.

*4) Rihma pinget. Rihm ei tohi rihmaratastel läbi libiseda.*

*Rihma pingutamiseks on jõuülekandesse paigutatud spetsiaalsed tööriistad.*

**Kontrollige rihmapinget reeglipäraselt MITTETÖÖTAVA MASINA PUHUL ja pärast mõnenädalast tööprotsessi.**

# 4.7 Starting checks

*Tests to be carried out before starting-up the machine, allow to verify whether the mechanical installation has been carried out properly and to detect damages or breakages, if any, which could endanger proper machine running and performance.*

*Soon after installation is over, check the following:*

*1) Breakages or other damages affecting the machine structure.*

*2) Check grounding connections by measuring them with an ohmmeter.*

3) If microswitches, safety controls and emergency push-buttons work properly,

*4) Belt tension. It must not cause any skidding onto the pulleys.*

*Belt tensioning should be done by means of the special tools expressely placed inside the driving gear .*

**Belt tension must be checked periodically when the machine IS NOT RUNNING and after the first running weeks.**

5. peatükk

# Kasutamine

**Masina ohutuks juhtimiseks peab masina eest vastutav käitaja asuma tabelis 1.1 näidatud positsioonis, mis lubab tal kasutada kõiki masina juhtnuppe ja ka avariilüliteid ilma ohtu sattumata ja masinat kahjustamata.**

Käitaja peab alati tegutsema kooskõlas kehtivate õnnetuse vältimise eeskirjadega.

Masinat on ohtlik käivitada, kui kõik fikseeritud ja liikuvad kaitsepaneelid ei asu oma kohal, samuti on keelatud deaktiveerida mis tahes kaitseseadist, millega masin on varustatud.

Chapter 5

# Use

**To operate the machine in full safety conditions, the operator in charge of the machine should act from the position indicated in Tab. 1.1, which allows him to run the machine as well as any emergency control avoiding damages to himself and to the machine.**

Operators in charge of the machine shall always act in compliance with all accidentprevention regulations in force.

It is utterly forbidden to operate the machine if fixed and mobile protection panels are not mounted in their place or to inactivate any safety control the machine is equipped with.

# 5.1 Esimene käivitus

*Käikulaskmise puhul on vaja kontrollida mõne sõlme tööd ja teha mõned seadistused, mis tagavad masina edasise optimaalse toimimise.*

*Kui olete ühendanud seadme elektrivõrguga, keerake pealüliti punane nupp asendisse „1“. Selleks on vaja sisestada käivitusvõti pealülitisse ja keerata lüliti asendisse „1“.*

FOTO 5.1

***Pärast seda süttivad kaks märgutuld: märgutuli „Line“ (toide) ja vilkuv märgutuli „Low oil pressure“ (madal õlisurve).***

*Veenduge, et peened veetorud, mis asuvad kolbide kohal, annavad küllaldaselt vett, et kolvid oleksid üleni kaetud. vastasel juhul suurendage veevoolu esipaneelile paigutatud kraani abil, millel on silt „Piston lubrication adjustment“ (kolvi määrimise seadistus).*

*Kontrollige läbi esipaneelil paikneva vaateakna õlitaset.*

*Nupud „Regulation“ (seaded) peavad asuma asendis „0“ ja „Pressure adjusters“ (rõhuseadistid) peavad olema pööratud lõpuni vastupäeva, et õhurõhu manomeetrid näitaksid nulli.*

# 5.1 First start

*Commissioning makes it strictly necessary to carry out some checkings and to adjust some parameters in order to optimize the machine running conditions.*

*Once the switch board has been powersupplied, turn the mains supply switch (red handle) to “1”. To do this, insert the start key into the “Mains supply Switch” and turn it to “1”.*

PHOTO 5.1

***As soon as that is accomplished, two lamps will light up: the “Line” one and the “Low oil pressure” one (the latter is of the flashing type).***

*Make sure that the little water pipes placed above the pistons supply enough water to cover the pistons completely. Otherwise, adjust the water flow by means of the adjusting valve placed on the front panel and bearing the notice “Piston lubrication adjustment”.*

*Check oil level through the oil level sight glass placed on the machine front panel.*

*The "Regulation" selectors must be turned to "0" and the "Pressure adjusters" must be thouroughly turned anticlockwise (the "Air pressure" manometers should point 0 BAR).*

*Käivitage pumbamootor ja kontrollige rõhku: see peab olema piirides 1,5 kuni 4 bar.*

*Start the feed electropump and check the pressure: it should range between 1,5 and 4 bar.*

*Rõhku tuleb kontrollida manomeetrilt, mis asub pumba ja toote sisselaskeotsaku vahel.*

*Pressure check can be done through the manometer placed between the electropump and the product inlet flange to the machine.*

*Vajutage nüüd ererohelisele nupule „Start“: õlisurve hakkab tõusma, mida näitab manomeeter „Oil Pressure“. Selle tulemusena peab vilkuv märgutuli "Low Oil Pressure" kustuma.*

*Now, press the green luminous push button marked “Start”: the oil pressure begins to increase, which can be noted through the “Oil Pressure” manometer. As a result, the “Low Oil Pressure” sight-flow gauge turns off.*

*Sundõlitussüsteemi rõhk peab olema piirides 8 kuni 12 bar. Kui masin on mõnda aega töötanud, õlisurve tavaliselt langeb. Selle põhjuseks on jõuülekande kuumenemine.*

*Lubrication oil pressure should range between 8 and 12 BAR. Nonetheless, when the machine has run for sometime, it may show a decrease. This happens because of oil heating inside the gear system.*

*Homogeenimiseks vajaliku töösurve seadistamise kohta on juhised peatükis 6 „Seadistused“.*

*To reach the required homogenizing pressure see chapter 6 "Adjustings".*

*Ettenähtud homogeenimisrõhu saavutamiseks vajalik õhusurve on toodud osas „Katsetusprotokoll“.*

*Air pressure necessary to reach the required homogenizing pressure is shown in the “Test Sheet”.*

## 5.2 Tavakäivitus

## 5.2 Standard Starting

*Juhinduge masina tavakäivituse puhul samadest juhistest, mis on antud esmakäivituse jaoks, välja arvatud kolvi määrimise ja surve seadistamise juhised, kui just pole vaja teha lisaseadistusi. (Nende kahe parameetri seadistamine toimub ventiili "Piston Lubrication Adjustment" ja lüliti "Pressure adjustment" abil.)*

*For machine standard starting, follow the same instructions as per “Commissioning” except for piston lubrication and pressure, if adjusting is required. (To adjust the two above parameters act on “Piston Lubrication Adjustment” valve and “Pressure adjuster” switch.*

*Kui õhurõhu ventiil on seadistatud, lülitage pärast masina käivitust sisse suruõhk, keerates lüliti „Regulation“ asendisse „1“.*

*Once the air pressure valve is set – after starting the machine - supply the required air pressure by turning the “Regulation” selectors to “1”.*

*Homogeenimisrõhk saavutab seadistatud väärtuse peagi pärast seda.*

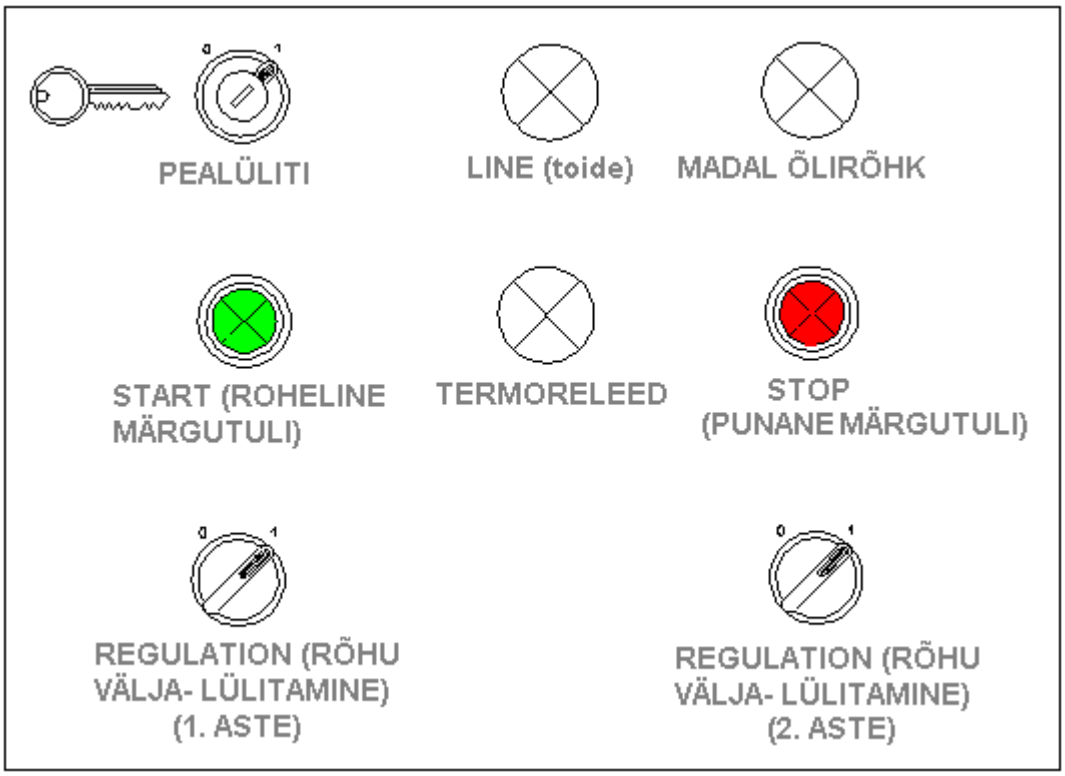
*Homogenizing pressure will reach the previously set soon afterwards.*

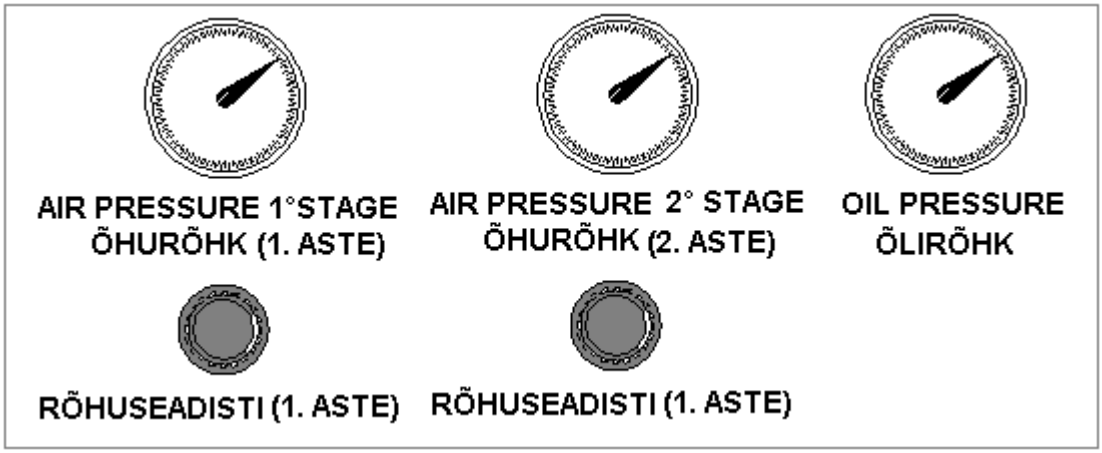
# Juhtpaneel

*TABELLA 5.2*

# Control board

*TABLE 5.2*



## 5.3 Seiskamine

Kui keerate lülitid *Regulation* asendisse „0“ ja vajutate punasele nupule *Stop*, masin seiskub.

Lülitage sisse pumbamootor ja keerake abilüliti *Auxiliary switch* asendisse „0“. Keerake pealüliti punane nupp asendisse „0“.

## 5.4 Läbipesemine

Uue masina puhul ärge laske sinna toodet enne põhjalikku läbipesemisoperatsiooni. See puhastab masina sinna jäänud või kogunenud mustusest, mis vastasel juhul võiks sattuda masina mehaaniliste osade vahele ja neid kahjustada.
Kui läbipesemine on tehtud, ühendage masin tootesüsteemiga, vajaduse korral desinfitseerige masin põhjalikult. Selleks käivitage masin ja seadke rõhk nulli, keerates lüliti *Regulation* asendisse „0“. Kui tegemist on muudetava jõudlusega masinaga, seadistage kiirus maksimumi.

Desinfitseerimine toimub järgmiste juhiste kohaselt, mida tuleb täpselt täita:

1) Loputage toatemperatuuril oleva veega.
2) Töödelge 2-3% soodalahusega temperatuuril 80–90 °C
3) Loputage uuesti toatemperatuuril oleva veega.
4) Töödelge 0,8-0,9% lämmastikhappe lahusega temperatuuril 70–80 °C
5) Loputage toatemperatuuril oleva veega.
Täitke neid juhiseid täpselt:
ärge kasutage teistsuguseid pesemislahuseid!
Need võivad sisaldada keemilisi aineid, mis tekitavad korrosiooni või elektrolüütilisi protsesse. (Tavaliselt riknevad kõige kiiremini just tihendid ja muud osad, mis on kontaktis tootega.)

## 5.3 Stop

On turning “Regulation” selectors to “0” and on pressing the red push button marked “Stop” the machine stops.

Switch off the electropump and turn the “Auxiliary switch” to “0”. Turn to “0” the main switch on the switchboard (red).

## 5.4 Washing

If the machine is new, it should be bypassed before the whole installation is washed. This will prevent any impurities or fouling inside the piping system from getting in contact with machine components damaging them.

Once washing operations are over refit piping connections and if necessary hygienize thouroughly the machine. To do this, start the machine and set pressure to “0” by turning the “Regulation” selector to “0”. If the machine is of the variable throughput type, set it at max.speed.

Read the following instructions carefully and act accordingly:

1) Rinse with water at room temperature
2) Water with 2-3%, soda at 80-90°C
3) Rinse again with water at room temperature
4) Water with 0,8-0,9%, nitric acid at 70-80°C
5) Rinse with water at room temperature.

The above parameters must always be fulfilled: do not use any improper washing solutions! They may contain chemical reagents that could damage some parts under the effects of corrosion or electrolysis. (Gaskets and parts in contact with the product being the most frequentlly subject to the above would-be damages).

6. peatükk

# Seadistused

**Masina seadistusi võib teha ainult vastava pädevusega isik.**

**Kui seadistuste tegemiseks on vaja eemaldada mõni masina kaitsepaneelidest, ärge unustage seda pärast seadistuste tegemist tagasi panna.**

Chapter 6

# Adjustings

**Any intervention on the machine must be carried out by skilled personnel.**

**Whenever to adjusting some parameters it were necessary to remove one of the protection panels, be sure to mount them back properly and to tighten all screws before restarting the machine.**

# 6.1 Töörõhk

Seadme töötamine rõhul, mis ületab maksimaalselt lubatavat, on rangelt keelatud.

*Masin võib töötada kahel erineval viisil:*
Üheastmeline homogeenimine
Kaheastmeline homogeenimine

**ENNE MASINA SURVESTAMIST VEENDUGE, ET SURUÕHU RÕHUSEADISTI ON ASENDIS „0“ (KEERATUD LÕPUNI VASTUPÄEVA). RÕHKU TULEB SUURENDADA AEGLASELT, ALUSTADES NULLIST.**

*Menetlus:*
*Üheastmeline homogeenimine*
*Masina survestamiseks keerake 1. astme lüliti (on-off pressure) asendisse „1“. Töörõhu saavutamiseks tuleb õhurõhu seadistit avada või sulgeda, seejärel seadke õhurõhk, pöörates 1. astme rõhuregulaatorit päripäeva, kuni 1. astme töörõhk on saavutatud. (kontrollige rõhku survepeal oleval manomeetri abil). (Rõhu vähendamiseks tuleb seadistit pöörata vastupäeva.)*

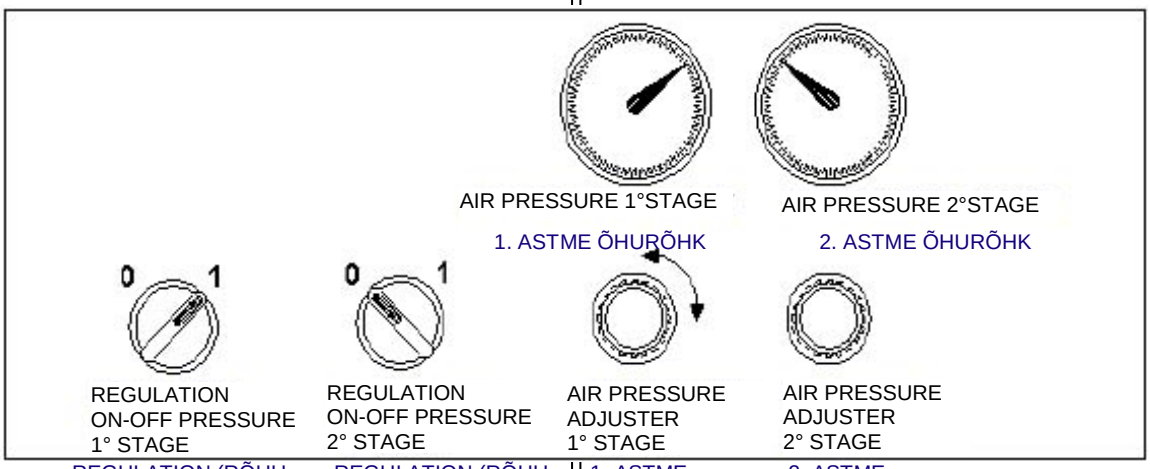
# 6.1 Working Pressure

It is utterly forbidden to operate the machine at a pressure value exceeding the max. value purposely conceived for the machine.

*The machine can works in two different way*
Singol stage Homogenizing Double Stage Homogenizing

**IT IS NECESSARY BEFORE PLUG IN UNDER PRESSURE THE MACHINE TO BE SURE THAT THE AIR PRESSURE ADJUSTER BE COMPLETLY IN ZERO SETTING -COMPLETLY TURNING COUNTERCLOKWISE - IT IS NECESSARY TO GET THE FINALY PRESSURE GRADUALLY, SO THE AIR PRESSURE ADJUSTER MUST BE COMPLETLY IN ZERO SETTING.**

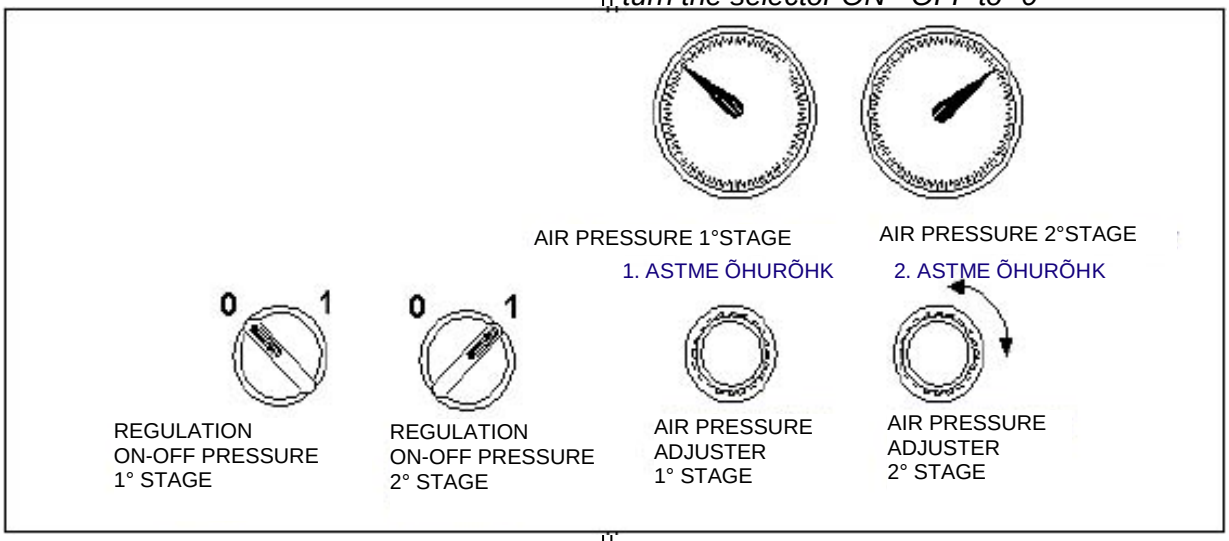
*Procedure:*
*Singol Homogenizing stage In order to insert the pressure for the machine it is necessary turn the 1st stage selector ON - OFF pressure on position "1".*
*The working pressure is reached by opening or closing the air pressure adjuster; then, adjust the air pressure turning clockwise the "1st - pressure adjuster" till the max working pressure for this stage is reached. (pressure can be checked on the pressure gauge placed on the compression head ). (Turn counterclockwise it is it possible to reduce the pressure).*




Joonis 6.1 Figure 6.1

*Rõhu alt vabastamiseks üheastmelise homogeenimise puhul keerake rõhuseadisti vastupäeva lõpuni ja seejärel keerake lüliti ON-OFF asendisse „0“.*

*To release the pressure in Single stage homogenizing way;*
*set to zero the air pressure turning counterclockwise the pressure adjuster; then turn the selector ON - OFF to "0"*




Joonis 6.2

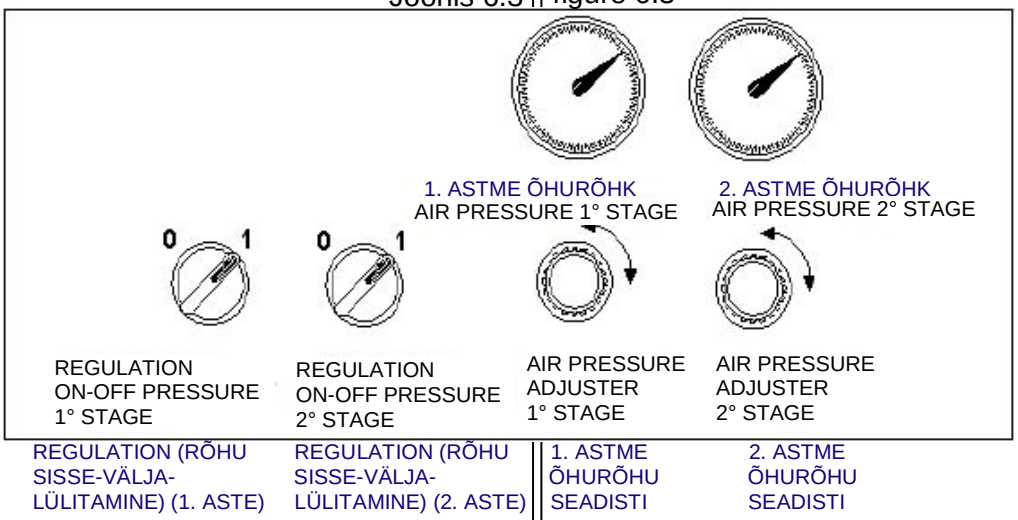
figure 6.2

*Menetlus:*
*Kaheastmeline homogeenimine*
*Masina survestamiseks kaheastmelise homogeenimise režiimis tegutsege järgmiselt:*
*keerake 2. astme rõhulüliti nupp Regulation asendisse „1“. (vt joonis 6.2). Seejärel seadistage õhurõhk, keerates 2. astme seadistinuppu Air pressure adjuster 2 stage päripäeva, kuni 2. astme töörõhk on õige. (kontrollige rõhku survepeal oleva manomeetri abil).*

*Procedure for:*
*Double stage Homogenization*
*In order to insert the pressure for the machine in double stage mode act as below: refering fig. 6.2, turn the 2st stage selector ON - OFF pressure on position 1. Then, adjust the air pressure turning clockwise the "2st - pressure adjuster" till the 2°st working pressure is reached. (pressure can be checked on the pressure gauge placed on the compression head ).*

Joonis 6.3

figure 6.3



*Siis võite keerata esimese astme on-off - rõhulüliti asendisse „1“, seades suruõhu rõhu õigeks ka 1. astmes (joonis 6.3), kuni saavutate soovitud töörõhu ka 1. astmes.*

***Homogeenimisrõhk 2. astmes peab moodustama umbes 20% 1. astme homogeenimisrõhust: (nt kui 1. astme töörõhk on 250 bar, siis 2. astme rõhk peab olema 50 bar).***

*Rõhu alt vabastamiseks kaheastmelise homogeenimise puhul keerake 1. astme rõhuseadisti vastupäeva lõpuni ja seejärel keerake 1. astme lüliti ON-OFF asendisse „0“.*
*Kui olete vabastanud rõhu alt 1. astme, talitage samuti ka 2. astmega (keerake rõhk miinimumi ja lülitage see siis välja).*

*At this time, is it possible to turn the 1°st selector on position 1, so adjust the air pressure in this stage ( fig. 6.3) till reach the desirable pressure value for the 1st stage*

***The 2° stage homogenizing pressure must always be about 1/5 lower than the 1° stage homogenizing pressure (ex.: if the value of the 1° stage pressure is 250 bar, the value of the 2° stage is 50 bar).***

*To release the pressure in double stage homogenizing way; set to zero the air pressure turning counterclockwise the pressure adjuster of the 1st stage;*
*then turn the selector ON - OFF to "0" in order to pressure is release.*
*Once the 1st stage is released act in the same way for the 2nd stage, bringing down the air pressure on 2nd stage and afterwards turn off the selector.*

## 6.2 Kolvi määrimine

*Masina vesiluku sees olevad peened torud peavad tagama küllaldase veekoguse, et kolb oleks üleni veega kaetud. Vastasel juhul tuleb veekogust suurendada, seadistades veekoguse ventiili „Piston Lubrication Adjustment Regulator“. See ventiil asub masina esipaneelil ja seda saab keerata kas päripäeva või vastupäeva. Päripäeva pööramisel veekogus suureneb, vastupäeva keerates väheneb.*

**Veekogus peab olema õigesti seadistatud, et ära hoida vee lekkimist masina malmkeresse. Sel juhul hakkab see vesi ära pesema määrdeõli, mis tekitab masinale tõsiseid vigastusi.**

**Masina katsetamise ajal märgitakse pumbakolvi määrimise seadeklapile positsioonid „min“ ja „max“. „ Seejuures on arvestatud veesurvega 2,5 bar.**

**Kui masina käitaja ei tea veevärgis olevat rõhku, peab ta arvestama tarbitava veehulgaga, tagamaks õiget määrimist:**

**a) u 250 l/h pumbakolbidele**
**b) u 80 l/h hüdraulilisele agregaatpeale (sundmäärimissüsteemiga varustatud masina puhul).**

## 6.2 Piston lubrication

*The little pipes placed inside the machine trap should feed enough water to utterly cover the pistons. If this does not occur, it is necessary to adjust the water flow by acting on the relevant valve "Piston Lubrication Adjustment Regulator". This valve is placed on the machine front panel and can be acted on either clockwise or anticlockwise. If turned clockwise the water flow increases, while turning it anticlockwise it decreases.*

**The water flow must be properly adjusted in order to avoid any water leakage into the cast-iron body of the machine. Otherwise the oil which lubricates the connecting rods would be diluted and would cause serious damages to the drive system.**

**During the machine testing, min and max values are marked in the "Piston lubrication adjustment regulator". Both values result from a water network pressure of 2,5 bar.**

**Should the operator not know the pressure value of the water network system, consider the water consuption per hour in order to get a correct piston lubrication:**

**a)~ 250 l/h for the pumping pistons**
**b)~ 80 l/h for the hydraulic power pack (machine equipped with a forced lubrication system).**

# 6.3 Madal õlisurve

**Kui süttib märgutuli „*Low Oil Pressure*“, tegutsege järgmiselt:**

*- Kontrollige läbi esipaneelil paikneva vaateakna õlitaset.*
*- Kontrollige jõuülekande õlitorusid (vt foto 7.2):*
*- Oodake, kuni masin ja selles olev õli jahtuvad ning käivitage masin uuesti. Kontrollige esipaneelil olevalt rõhureleelt, et õlisurve oleks u 10,5 bar (arvestage, et temperatuuri tõustes väheneb õli töörõhk tasemele u 8–9 bar.*

*Vajaduse korral seadistage ohutusventiili (see asub hüdraulikasüsteemi ülaosas, vt foto 6,1) tegutsedes järgmiselt:*
*- Keerake lahti kontramutter tavalise võtme abil*
*- Keerake väikest kruvi päripäeva õlisurve suurendamiseks (vastupäeva keeramine vähendab õlisurvet). Kui seadekruvi ei ole võimalik käsitsi keerata, kasutage selleks kuuskant-sisevõtit.*
*- Kui õlisurve on seadistatud ettenähtud väärtusele (u 10,5 bar – meenutame, et see kehtib jahtunud õli korral), keerake kontramutter uuesti kinni.*

# 6.3 Low Oil Pressure

**If the “Low Oil pressure” emergency led lights up, act as follows:**

*- Check the oil level by the means of the sight glass placed on the front panel of the machine;*
*- Check the conditions of the oil feed piping to the connecting rods (see photo 7.2);*
*- Wait till the machine and the oil cool down, and then start the machine again. Check, by the means of the pressure gauge situated on the front panel, that the oil pressure value is ~ 10,5 Bar (you will note that on increasing the temperature the working oil pressure sets at ~ 8 ÷ 9 Bar.*

*If necessary, adjust the safety valve (placed on the top of the hydraulic system, see photo 6.1) by acting as follows:*
*- Unscrew the clamping nut by means of a fork wrench*
*- Turn clockwise the little threaded screw to increase the oil working pressure (if necessary, turn the little threaded screw to decrease it). In the event it is still clamped thus making it impossible to turn it manually, use an Allen wrench.*
*- Once the oil pressure is set at the above mentioned value of ~ 10,5 Bar (remember to do this only when it is cold) , tighten the clamping nut.*

FOTO 6.1 | PHOTO 6.1

*Õige seadistamise korral hakkab madala õlisurve avariilüliti õigesti tööle ning võite masina uuesti käivitada.*

*Õlisurve relee rakendusnäidu kontrollimiseks (tavaliselt on see umbes 5 bar), vähendage õlisurvet eelkirjeldatud viisil, kuni masin seiskub.*

*Kui masin seiskub, kuigi õlisurve on normaalne (vahemikus 5 kuni 10 bar), tuleb seadistada ka rõhureleed. Selleks tuleb kruvikeeraja abil pöörata rõhurelee ülaosas asuvat seadenuppu (vt foto 6.2). Tavaliselt näitab rõhurelee punane osuti rõhu seadeväärtust (skaalal 1 kuni 10).*
*Rõhurelee seadistamiseks õlirõhu madalamale väärtusele seadistage punane osuti lähemale väärtusele 1.*


*FOTO 6.2*

***Kui käitaja peab vajalikuks õlirõhu relee seadistamist, tuleb relee rakendusväärtust hoolikalt kontrollida. Selleks vähendage õlirõhku ohutusventiili abil. Oodake õli jahtumist ja seadistage õlirõhk uuesti väärtusele 10,5 bar.***

**Ärge mingil juhul seadistage rõhureleed ega ohutusventiili liiga madalale väärtusele! Kui seadistatud rõhk langeb alla väärtuse 2 bar, võib mittepiisava määrimise tõttu tekkida ajami mehaanilised vigastused (isegi purunemine).**

*Now the low oil pressure shutdown control should work properly and the machine can be started again.*

*To verify the oil pressure gauge operating value, usually set at about 5 Bar, it is necessary to decrease the working oil pressure by means of the safety valve till the machine stops.*

*If the machine stops even being the working oil pressure at the correct value, namely ranging between 5 and 10 Bar, the oil pressure gauge will have to be adjusted as well. To do this, use a screwdriver and turn the ring adjuster placed on the top of the oil pressure gauge (see photo 6.2). As a rule, the red pressure gauge hand (showing the adjusted oil pressure value) points the set value in the 1 to 10 scale.*
*To adjust the oil pressure gauge at lower oil working pressures, the red pressure gauge hand should be positioned close to 1.*

*PHOTO 6.2*

***Whenever the pressure gauge undergoes any intervention by the operator, check carefully the oil pressure gauge operating value. To do this, decrease the oil working pressure by means of the safety valve. Wait till the oil has cooled down and adjust this value back at 10,5 Bar .***

**Do not adjust the oil pressure gauge nor the safety valve at too low a pressure value! A pressure decrease below 2 BAR could cause serious mechanical damages (even cracks) due to insufficient lubrication of the drive unit.**

7. peatükk

# Puhastamine ja hooldus

 **Siinolevad juhised peavad alati olema kättesaadavad personalile, kes tegeleb masina puhastamise ja hooldusega.**

 Enne puhastus- või hooldustegevuse läbiviimist tuleb pealüliti välja lülitada (asendisse „0“), lukustada see ja panna võti kindlasse kohta.

Chapter 7

# Cleaning and Maintenance

 **The following instructions must always be available and easily at hand of personnel in charge of machine cleaning and maintenance.**

 Before starting any cleaning or maintenance operation, disconnect the main switch by turning it to “0” position, padlock it and bring the key along.

# 7.1 Pesemine

*Masina pideva puhtuse eest hoolitsemine on olulise tähtsusega.*
*Iga tootmistsükli lõpul tuleb masin korralikult puhtaks pesta.*
*Selle tulemusena väheneb oht toote kogunemisest tingitud ummistuse või muude setete tekkimiseks ning ühtlasi loote masinasse hügieenilise keskkonna.*
*Pesemisjuhised leiate peatüki 5 „Kasutamine“ osast 5.4..*

*Kui eelmise tsükli lõpus toimus korralik läbipesemine, võib uue tsükli alustamisel piisata loputusest toatemperatuuril oleva puhta veega.*

# 7.2 Puhastamine

 Kui lõpeb ühe toote homogeenimistsükkel, tuleb enne teisele tootele üleminekut masin korralikult puhastada. Enne mis tahes puhastamis- või pesemisoperatsioone tuleb masin pealülitist välja lülitada (punane nupp keerata asendisse „0“).

# 7.3 Kiiresti kuluvad osad

*Masina töö põhineb edasi-tagasi liikumisel, mistõttu mõned osad võivad teistest kiiremini kuluda.*

*Kindlasti kuuluvad vahetamisele survepeas ja homogeenimissõlmes olevad tihendid: iga 1500 töötunni järel või isegi varem, kui ilmnevad toote lekkimise tunnused.*

*Kontrollige liikuvate osade tihendeid reeglipäraselt ja vahetage need kohe, kui avastate lekkeid.*

# 7.1 Washing

*It is of the utmost importance to ensure steady hygiene and sanitary conditions of the machine.*
*A thourough washing cycle is prerequisite condition at the end of each production cycle. This allows to remove any fouling or clogging caused by product stagnation, which inevitably impairs the hygenic and sanitary conditions of the machine itself. For washing instructions refer to the chapter: “Use”.*

*Just a complete rinsing of the machine with water at room temperature may be needed before starting each production cycle if complete washing was carried out at the end of the last production cycle.*

# 7.2 Cleaning

 At the end of each product processing cycle the machine must be submitted to thourough cleaning. Before starting cleaning/ washing operations, disconnect the main switch (red handle turned to “0”).

# 7.3 Parts subject to wear

*The machine running is based on the reciprocating motion, for which some parts are more liable to wear effects.*

*As a rule, the compression head as well as the homogenization unit gaskets should all be replaced every 1500 running hours or whenever product leakages are detected.*

*We suggest to check periodically the drive unit gaskets and to replace them whenever oil leakages are detected.*

*Lisaks sellele soovitame reeglipäraselt kontrollida järgmisi detaile:*

*- pumbakolbe (nende pind peab olema alati sile ja kriimustustevaba).*
*- imu- ja väljalaskeventiili ning ventiilipesi (nende tihenduspinnal ei tohi olla kriimustusi ega kühme);*
*- vedrusid;*
*- homogeenimisklapi pesa ja löökpead.*

**Kui ülalnimetatud detailid ei ole korras, on selle tunnuseks tavaliselt rõhurelee osuti värisemine, mis viitab ebastabiilsele töörõhule.**

*Kui ventiilid, ventiilipesad või vedrud on kulunud, väheneb selle tulemusena masina läbilaskevõime.*

*Kontrollige tihti õlitaset ajamis ja hüdraulikasüsteemis (kui see on olemas), vaadates läbi esipaneelil oleva vaateakna.*

**Järgmistes osades leiate vajalike kontrolloperatsioonide loendi koos üksikasjaliste juhistega kiiresti kuluvate osade väljavahetamiseks: see aitab Teid teha kõike seda õigesti.**

*We recommend moreover to carry out the following periocal checks:*

*- pumping pistons (their surfaces must be always smooth and must not show any scratches).*
*- suction and delivery valves and valve seats (their sealing points must not show any cracks, dinges or riveting).*
*- springs*
*- homogenizing valve seat and impact head .*

**If the above mentioned parts are not in perfect conditions, the pressure gauge hand oscillates, which gives rise to evident pressure unsteadiness.**

*In addition, when valves, valve seats or springs are worn out, the machine throughput decreases.*

*Check steadily the oil level inside the drive unit and inside the hydraulic system (if any), through the oil level sight glass on the machine front panel.*

**In the following chapters you will find a list of checks to be carried out along with information about how to replace the parts and components that are more liable to wear out and all necessary instructions to perform and carry out in the correct way each single operation.**

# 7.4 Kiilrihma pingutamine

*Kiilrihm peab olema õigesti pingutatud, et tagada korralik ülekanne ja vältida rihma läbilibisemist.*

*Kiilrihma pinget tuleb reeglipäraselt kontrollida. Kui soovite seadistada kiilrihma pinget, lülitage välja jõuülekande sidur.*

**Kiilrihma pinget tuleb kindlasti kontrollida pärast esimesi töönädalaid: uute masinate puhul kipuvad kiilrihmad lõtvuma; mis on tingitud jõuülekande sissetöötamisest.**

*Kulunud kiilrihmad tuleb viivitamata välja vahetada, sest kiilrihma purunemise tulemusel masin seiskub ootamatult.*

***Juhised kiilrihma vahetamiseks ja pingutamiseks leiate tabelist 7.1. Enne uue kiilrihma asetamist rihmaratastele tuleb kontrollida järgmist:***

*a) Rihmarataste soonte kulumist. Kui need on ülemäära kulunud, tuleb nad välja vahetada. Kui sellega viivitate, võib ka uus rihm kiiresti läbi kuluda.*

*b) Puhastage korralikult rihmarataste sooned, kõrvaldades õlijäljed ja muu mustuse.*

*c) Rihmarataste joondamine. Rihmarattad peavad olema korralikult joondatud, et vältida rihmade kulumist.*

# 7.4 V-Belt Tensioning

*V-belt tension shall be adjusted to ensure correct driving performance and to prevent their sliding onto the pulleys.*

*V-belt tension should be checked periodically. If V-belt should need tension adjusting, act on the slide in the driving gear.*

**After the machine has run for the first few weeks, check V-belt tension: in new machines V-belts may show a tendency to loosen, this effect being inevitably produced by driving gear natural adaptation.**

*Worn-out V-belts are all to be replaced to avoid breakages, which may cause the sudden shutdown of the machine.*

***Please refer to Table 7.1 for instructions concerning belt replacement and tensioning parameters. Before positionning the belts onto the pulley races, make sure the following checks have been carried out:***

*a)Wear level of pulley races. Should the latter show excessive wear, we suggest to replace them. A delay may impair and rapidly wear out the belts.*

*b)Clean thouroughly the pulley race sides removing oil traces and any other fouling formation.*

*c) Pulley realignment. Pulleys must always be perfectly aligned to ensure the best possible performance and longest working life of V-belts.*

### 7.4.1 Kiilrihma käsitsemine

*Kiilrihmade paigaldamisel kasutage vastavat tööriista, mis väldib rihma liigset deformeerimist selle paigaldamisel.*

*Rima paigalduse lihtsustamiseks ja hõlbustamiseks vähendage rihmarataste vahelist kaugust või lõdvendage pingutit, kui selline võimalus on olemas. Muul juhul tuleb üks rihmaratas maha võtta.*

*Varurihmu tuleb hoida õigetes tingimustes. Ärge hoidke neid deformeeritult ega liiga soojas või liiga külmas kohas. Samuti ei tohi hoiukohas olla liiga suur niiskus.*
*Nende nõudmiste eiramise tõttu võivad rihmad muutuda rabedaks ja nende tööiga lüheneda.*

### 7.4.2 Telgedevaheline kaugus

*Tabelist 7.1 (järgmisel leheküljel) leiate soovitatavad rihmaratta telgede vahekaugused, mis tagab rihma õige alg- ja tööpinge.*

*JOONIS 7.1*

### 7.4.1 V-Belt handling

*On positionning V-belts make sure to act on the required tool without forcing them into the pulley races.*

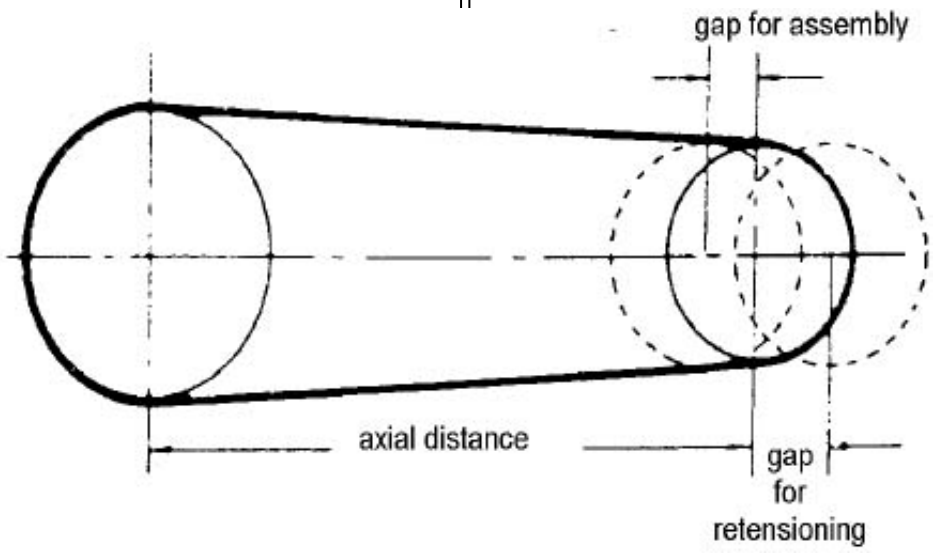
*To make belt installation easier and riskless, just reduce the distance between centres or tightner tension,if any. Otherwise, remove at least one of the pulleys.*

*V-belts must be held stored under proper conditions. Do not stock them with unproper folds and make sure the storage facility tamperature be not too high or low either. It goes without saying that moisture within the storage facility must be not too high either. Disregard of the above mentioned conditions can result in early breakages and mulfunctioning of V-belts.*

### 7.4.2 Axial distance (Recommended distance between centers)

*Table 7.1 in the next page shows the recommended distance between centers which allows to obtain correct initial and subsequent tensioning.*

*DRAWING 7.1*



*TABEL 7.1 TELGEDEVAHELINE KAUGUS*

| Kiilrihma pikkus V-Belt Length (mm) | Ajami tüüp For the assembly | | | | Pingutamiseks For tensioning regulation (mm) |
|---|---|---|---|---|---|
| | SPZ (mm) | SPA (mm) | SPB (mm) | SPC (mm) | |
| < 1200 | 13 | 15 | | | 25 |
| 1201 - 1800 | 21 | 23 | 25 | | 30 |
| 1801 - 2700 | 21 | 23 | 25 | 38 | 40 |
| 2701 - 3175 | 21 | 23 | 25 | 38 | 45 |
| 3176 - 4320 | 21 | 23 | 25 | 38 | 55 |
| 4321 - 5080 | | 23 | 25 | 46 | 65 |
| 5081 - 6000 | | | 31 | 46 | 75 |
| 6001 - 6730 | | | 31 | 46 | 80 |
| 6731 - 7620 | | | 31 | 46 | 90 |
| 7621 - 9020 | | | 31 | 51 | 100 |
| 9021 - 9525 | | | | 51 | 115 |
| 9526 - 12700 | | | | 51 | 140 |

*TABEL 7.1.1 JÄIKUSJÕUD*

| Tüüp Section | Väiksema ratta läbimõõt Smaller pulley diameter (mm) | Jõud P (N) Force P | | |
|---|---|---|---|---|
| | | 0 m/s<br>10 m/s<br>(Newton) | 10 m/s<br>20 m/s<br>(Newton) | 20 m/s<br>30 m/s<br>(Newton) |
| SPZ | 67 - 95<br>> 96 | 12 - 18<br>19 - 26 | 10 - 16<br>17 - 24 | 8 - 14<br>15 - 22 |
| SPA | 100 - 140<br>> 141 | 22 - 32<br>33 - 48 | 18 - 26<br>27 - 40 | 15 - 22<br>23 – 34 |
| SPB | 160 - 265<br>> 266 | 38 - 56<br>57 - 72 | 32 - 50<br>51 - 64 | 28 - 42<br>43 - 58 |
| SPC | 224 - 355<br>> 356 | 72 - 102<br>103 - 132 | 60 - 90<br>91 - 120 | 50 - 80<br>81 - 110 |

## 7.4.3 Jõuülekanne

*a) Madalaim rimapinge, mille puhul rihm suurima deformatsiooni puhul enam läbi ei libise, ongi optimaalne.*

*b) Esimese 24–48 töötunni kestel tuleb rihma pingutust sageli kontrollida.*

*c) Ülepingutamine võib kahjustada nii kiilrihma kui ka kogu rihmülekannet.*

*d) Hoidke rihmad puhtad ja vabad võõrkehadest: vastasel juhul võib rihm läbi libiseda.*
*e) Kontrollige jõuülekannet reeglipäraselt ja kõrvaldage kõik puudused.*

*Kiilrihma pinge mõõtmise juhised on esitatuid järgmises loetelus:*

*- Mõõtke rihma silde pikkus (t)*

*- Rakendage rihmale silde keskpunktis rihmaga ristiolev jõud P, mis on küllaldane, põhjustamaks rihma läbivajumist 1,6 mm 100 mm pikkuse kohta.*
*nt: kui rihma silde pikkus on 1000 mm, on läbivajumine 16 mm.*

*- Mõõtke täpselt rakendatav jõud: selle väärtus peab olema kooskõlas eelmisel lk oleva tabeliga.*
*Pingutamine on õige kui: P< P1<1,5P.*

*Õige rihmapingutuse saamiseks ei tohi silde keskpunktis rakendatud jõud ületada väärtust 60 N.*

## 7.4.3 Driving gear

*a)The lowest tensioning ratio at which a belt does not skid under maximum strain is the most correct.*

*b) V-belt tension needs to be checked frequently during the first 24/48 working hours.*

*c)Overtensioning may endanger both V-belt and bearing working life and reduce it.*

*d)Do not leave any foreign materials on the belts: this may result in skidding effects.*

*e)Check the driving gear periodically and restore the correct parameters if necessary.*

*To check V-belt tension and correct it, read carefully the following instructions:*

*- Measure the free span length (t).*

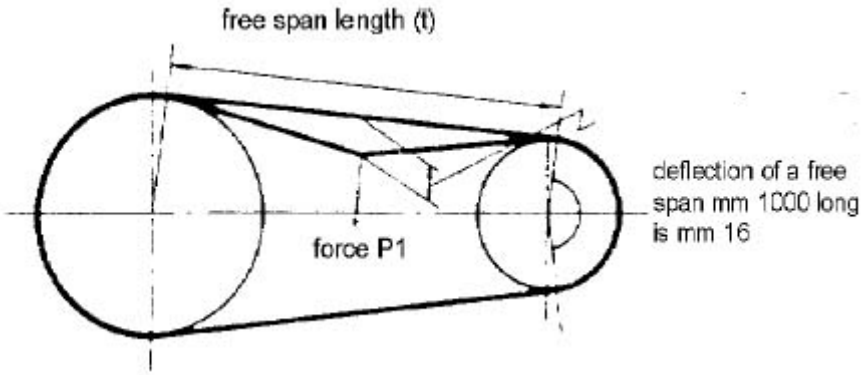
*- Apply a force P1 (it must act at the center of the free span length) perpendicular to the free span length and sufficient to have a belt deflection of 1,6 mm per 100 mm. i.e.:*
*Deflection of a free span mm 1000 long is mm 16.*

*- Check accurately the force applied: values must correspond to the ones shown in the table on the previous page.*
*Tensioning is correct when: P< P1<1,5P.*

*To obtain a correct tensioning value of the belts, apply a max-charge of ~ 60 Newton in the middle of the free span (Re.Tab. 7.1.1).*

*JOONIS 7.1.1*

*DRAWING 7.1.1*



## 7.4.4 Reduktorikruvi reeglipärane ülevaatus

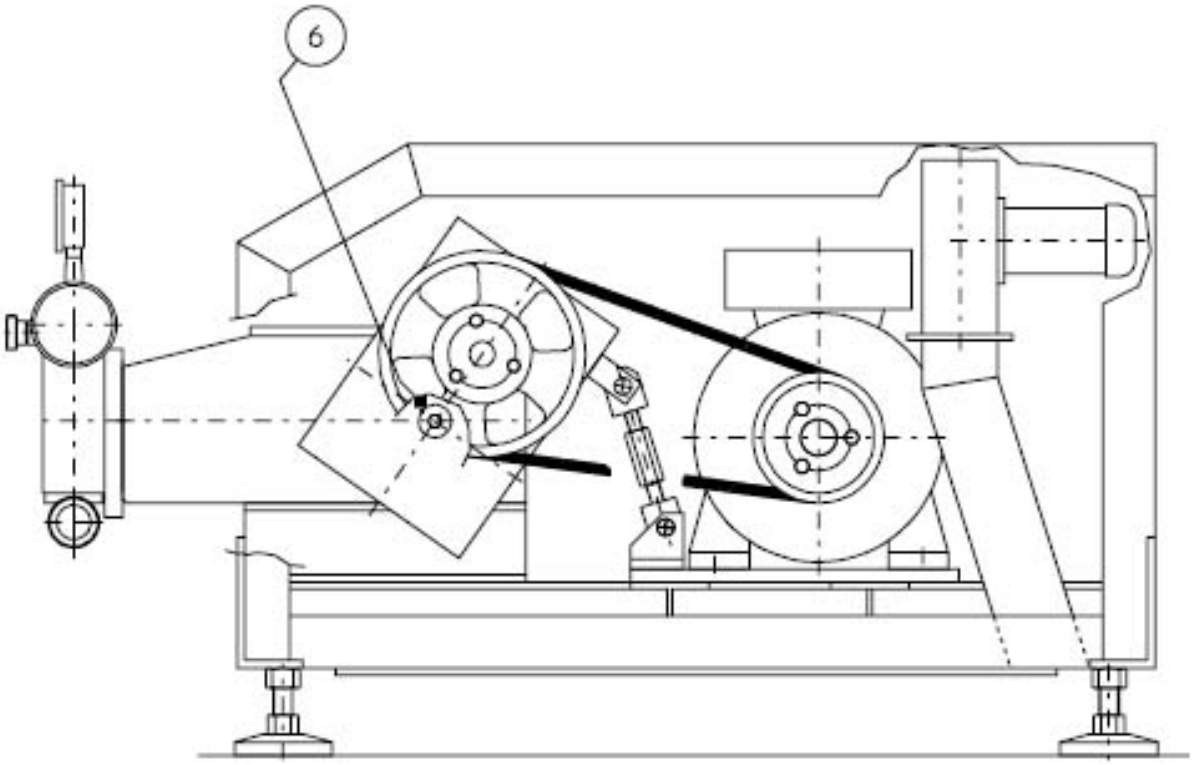
Kontrollige seda iga 1000 töötunni järel.

JOONIS 7.1.2

## 7.4.4 Periodical check on reducer clamping screw

Check must be done every 1000 hours

DRAWING 7.1.2



# 7.5 Õlivahetus

*Masina tarnimisel on nii karter kui hüdraulika õlipaak täidetud õliga (eeldusel, et masinal on sundõlitussüsteem).*

*Kontrollige õlitaset enne iga tootmistsüklit ja ka selle ajal: see kontroll on väga oluline, sest puudulik õlitamine võib ajamit tõsiselt kahjustada.*

*Läbi masina esipaneelil oleva vaateakna võib kontrollida nii õlitaset kui ka õli värvust.*

*Üldiselt muutub töötamise käigus õli värvus ja väheneb selle läbipaistvus. Selle põhjuseks on oksüdeerumine.*

*Kui õli muutub piimjaks, kontrollige kohe jõuülekande esiäärikute tihendeid – vajaduse korral tuleb need välja vahetada. Kui masin on varustatud sundõlitussüsteemiga, kontrollige ka vesi-õli soojusvaheti seisukorda.*

*Muutused õli värvuses tähendavad, et õli on kaotanud oma määrivad omadused ja tuleb täielikult välja vahetada.*

**Tavalises tööolukorras toimub õlivahetus iga 1500 töötunni järel. Uute masinate puhul ja pärast kapitaalremonti peab õlivahetus toimuma pärast 300 töötunni möödumist.**

*Vajalik õlikogus: umbes 25 kg*

**Kui vahetate sundõlitussüsteemiga masinate õli, vahetage ka õlifiltri padrun. (pos. 8, foto 7.3)**

# 7.5 Oil Change

*The crankcase as well as the oil tank in the hydraulic unit (provided that the machine be of the forced lubrication type) are delivered already filled with oil.*

*Oil level must be accurately checked before and during each processing cycle: Such a check is very important since insufficient lubrication can cause serious damages to the drive unit.*

*Oil level as well as its colour can be checked through the sight glass placed on the front side of the machine.*

*Commonly, after a certain running period, oil changes colour getting opaque. This inevitably occurs because of oxidation.*

*When oil colour changes to milky, the gaskets of the drive system front flanges must immediately be checked and replaced if necessary. If a machine is equipped with a force lubrication system, also check the service state of the water-oil heat exchanger.*

*Such changes in oil colour mean that it has lost its prerequisite feautures for optimum lubrication, which calls for a complete oil change.*

**Under normal service conditions, oil should be changed after 1500 running hours. As to new machines and machines that have undergone overhauling, oil changes should be carried out after every 300 running hours.**

*Quantity of oil necessary: Kg ~ 25*

**Whenever oil is changed in machines of the forced lubrication type, the oil filter cartridge should be replaced too.**
**(pos.8,photo 7.3)**

**Iga 1500 töötunni järel kontrollige jõuülekande õlitorusid (vt foto 7.2):**

**Every 1500 running hours replace the oil feed piping to connecting rod bearings (photo 7.2).**

FOTO 7.2

PHOTO 7.2

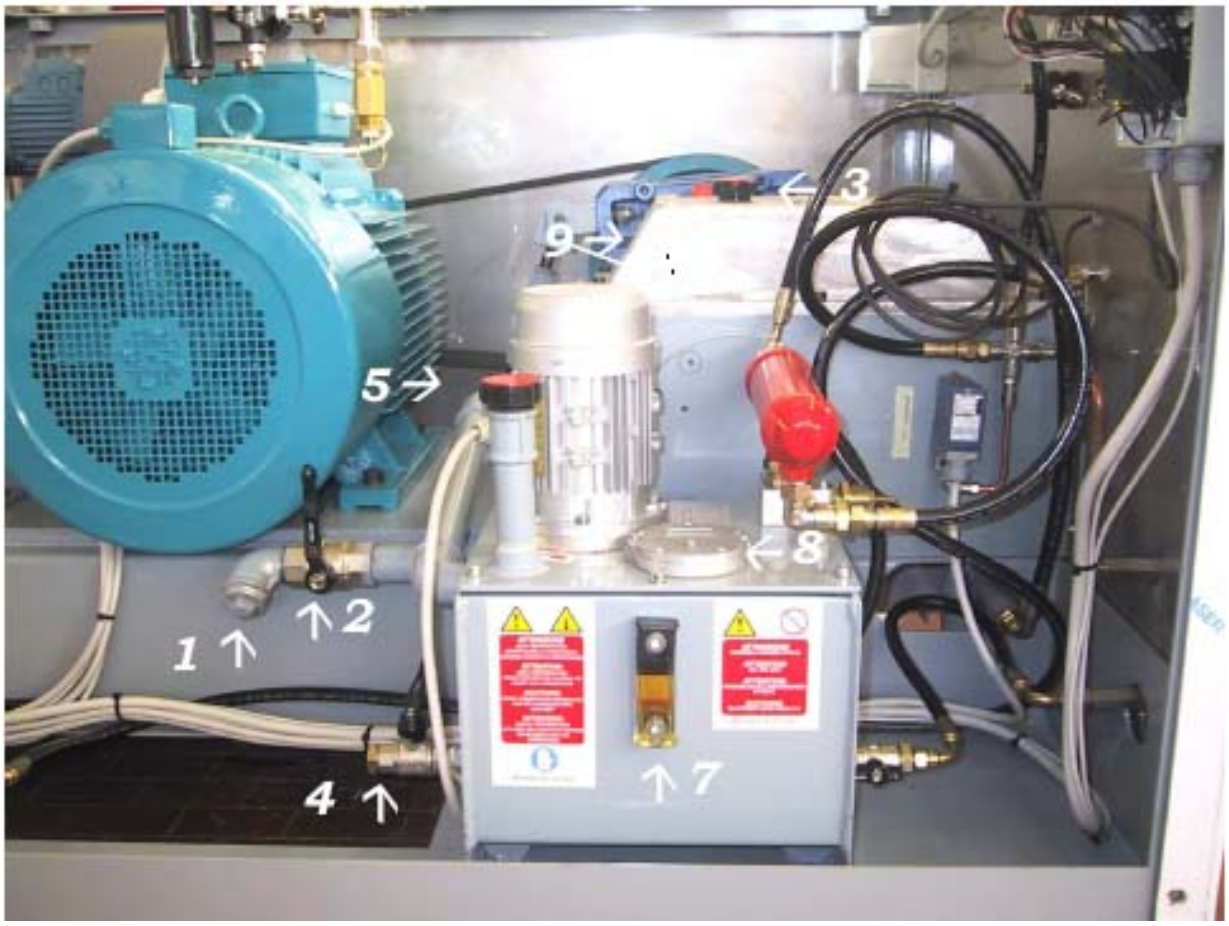



*FOTO 7.3* *PHOTO 7.3*

*Lisaks sellele tuleb iga kolmanda õlivahetuse korral ja pärast karteri tühjendamist eemaldada kate. Selleks keerake lahti kuuskantauguga poldid. Peske karter põhjalikult bensiini ja pintsliga ning eemaldage sealt kogu jääkmustus.*

***Õlivahetuse puhul vaadake fotot 7.3 ja tegutsege järgmiselt:***

*1) Paigaldage masina alla lame nõu, mis mahutab kogu väljalastava õli: vt tabel 7 ja eemaldage õlikork „1“.*

*2) Keerake õlikork „1“ ja õhutuskork „3“ täielikult lahti.*

*3) Avage kuulventiil „2“ ja laske õli välja voolata.*

*4) Kui karter on tühjenenud, nihutage tühjendusnõu korgi „1“ alt korgi „4“ alla.*

*5) Keerake kork „5“ ja kork „4“ täielikult lahti ja laske õli hüdraulika jõupeast välja voolata.*

***Märkus: Pärast kolme õlivahetust tuleb hüdraulikasüsteemi karter puhastada. Toimige järgmiste juhiste kohaselt, mida tuleb täpselt täita:***

*6) Eemaldage kaas „9“. Selleks tuleb lahti keerata kuuskantpesaga kruvid ja sulgeda kuulklapp „2“. Valage karterisse veidi bensiini ja peske karter pintsli abil korralikult puhtaks.*

*7) Pange väljalaskenõu uuesti korgi „1“ alla, avage uuesti kuulventiil „2“ ja tagastage kaas „9“.*

*In addition, after every three oil changes and after having emptied the crankcase, remove the cover. To do this, unscrew the Allen screws (socket head screws). Wash thouroughly with a brush impregnated with gas oil and remove any residual impurities inside the crankcase.*

***For oil changes refer to photo 7.3 and act as follows:***

*1) Position a basin the same capacity as the oil to drain - see Tab. 7 - below the machine bottom (oil drain plug “1”).*

*2) Unscrew thouroughly drain plug “1” and air bleeding plug “3”.*

*3) Open ball valve “2” and let oil drain outside.*

*4) When the crankcase is empty, move the basin previously positioned below drain plug “1” and put it just below drain plug “4”.*

*5) Screw thouroughly drain plug “5” and drain plug “4” and let oil drain from the hydraulic power pack.*

***Note: After every three oil changes, the crankcase should be cleaned. Read the following instructions and act accordingly:***

*6) Remove cap “9”. To do this, unscrew the clamping screws by means of an Allen wrench (setscrew wrench) and close ball valve “2”. Pour some gas oil into the crankcase and clean it thouroughly with a brush.*

*7) Position a drain basin below plug “1”, open again ball valve “2” and reassemble cap “9”.*

*8) Kui ülaltoodud operatsioonid on teostatud, keerake kinni korgid „4“ ja „1“, sulgege kuulklapp „2“ ja valage õli tousse, mis on ühendatud õhutuskorgiga „3“, kuni õlinivoo ulatub vaateakna „7“ keskele.*

*9) Keerake kinni korgid „3“ ja „5“ ning vahetage ära õlifiltri padrun.*

**Ärge valage maha äratöötanud õli ega karteri pesemiseks kasutatud bensiini. Need tuleb koguda spetsiaalsetesse mahutitesse ja käidelda vastavalt masina kasutuskohal kehtivatele jäätme-eeskirjadele.**

***Määrdeõli omadused on esitatud allpooltoodud tabelis:***

*Jõuülekandes kasutatav määrdeõli*

*Q8 FORMULA RALLY SAE 15W-40*

*Füüsikalised ja keemilised omadused*

*Tihedus……20 °C*
*(meetod ASTM D 4052: 880 kg/m3)*

*Viskoossus…… 40 °C*
*meetod ASTM D 445: 110 cSt)*

*Viskoossus……100 °C*
*(meetod ASTM D 445: 15 cSt)*

*Viskoossusindeks……141*
*(meetod ASTM D 2270)*

*Külmumistemperatuur……-30 °C*
*(meetod ASTM D 97)*

*Leektäpp (COC)…… ……220 °C*
*(meetod ASTMD 92)*

*8) Once the above operations have been accomplished, retighten plugs “4” and “1”, shut off ball valve “2” and pour oil into the manifold connected to air bleeding plug “3” to reach the center point of level sight glass “7”.*

*9) Retighten drain plugs “3” and “5” and replace oil filter cartridge.*

**Do not discharge exhaust oil and gas oil used to clean the crankcase into sewerage. They should be collected in special containers which are to be disposed of in full respect of regulations in force in the country the machine is being used.**

***Lubricating oil features are listed in the Tab. below:***

*Oil to be used to lubricate drive unit.*

*Q8 FORMULA RALLY SAE 15W-40*

*Physical and chemical features*

*Density.....20°C*
*(method ASTM D 4052: 880 Kg/m3)*

*Viscosity.....40°C*
*(method ASTM D 445: 110 cSt)*

*Viscosity.....100°C*
*(method ASTM D 445: 15 cSt)*

*Viscosity index.....141*
*(ASTM D 2270 Method)*

*Freezing point.....- 30°C*
*(ASTM D 97 Method)*

*Flammability point (COC).....220°C*
*(ASTMD 92 Method)*

***Kui Teil tekib raskusi sobiva määrdeõli leidmisega, pöörduge Bertoli maaletooja poole, kes soovitab Teile eeltoodud määrdeõli ekvivalendi.***

*Asenduseks sobivad järgmised määrdeõlimargid:*

*TOTAL .....GTS*
*CASTROL .....GTX 2*
*AGIP SUPER .....M.O. 15 W/50*
*ESSO .....EXTRA+MOTOROIL*
*SHELL.....MYRINA X15W40*
*SHELL.....RIMULA X15W40 IP.....SUPER M.O.*
*MOBIL .....MOBIL SUPER*

***Should any difficulty be encountered in finding lubrication oils having the same features as specified above, ask your supplier for a lubrication oil having equivalent features.***

*The following or equivalent lubricants are suitable:*

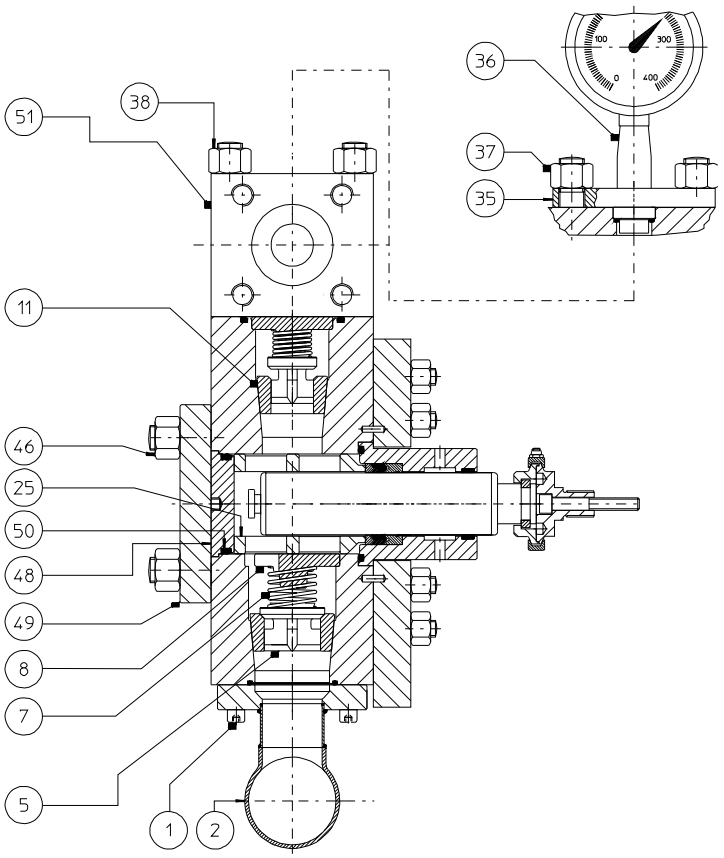
*TOTAL .....GTS*
*CASTROL .....GTX 2*
*AGIP SUPER .....M.O. 15 W/50*
*ESSO .....EXTRA+MOTOROIL*
*SHELL.....MYRINA X15W40*
*SHELL.....RIMULA X15W40 IP.....SUPER M.O.*
*MOBIL .....MOBIL SUPER*

# 7.6 Pumbakolbide koostamine ja lahtivõtmine

*DISEGNO 7.4*

# 7.6 Desassembly and assembly of pumping pistons in a block compression head .

*DRAWING 7.4*




## 7.6.1 Lahtivõtmine

***Järgides joonist 7.4, teostage järgmised operatsioonid:***

*1) Eemaldage äärik (pos. 49), selleks keerake lahti tikkpoltide mutrid (pos. 46) (kasutades eritööriista) ja kork (pos. 48).*

**Olge ettevaatlik äärikute rõngastihendite (50) eemaldamisega.**

## 7.6.1 Desassembly

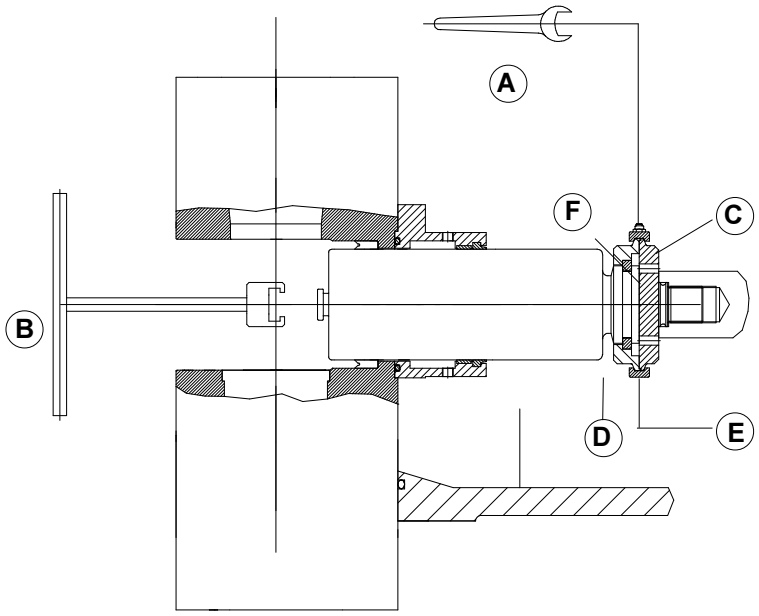
***Refer to drawing 7.4, carry out the following operations***

*1) Remove the flange (pos.49) after loosening bolts (pos.46) by means of the special tool and the plug (pos.48).*

**Pay special attention to O-Rings (50) the flanges are equipped with.**

*2) Keerake veetavat rihmaratast, et tuua kolb alumisse punkti ja eemaldage ventiili tugi (pos. 8), vedru (pos. 7) ja ventiiliketas (pos.5).*

*2) Whirl the driven pulley to bring the pump piston to its bottom dead centre and remove the valve stop (pos.8), the spring (pos.7) and the valve disk (pos.5).*




*DISEGNO 7.5*

*DRAWING 7.5*

***Vt. joonist 7.5***

*3) Keerake võtme (A) abil lahti mutter (C).*

*4) Eemaldage sulgur.*

*5) Kasutage võtit (B) kolvi (D) vabastamiseksja nihutage see umbes 20 kuni 25 mm eemale.*

*6) Nihutage kinnitusrõngast (E). Nüüd on võimalik eemaldada poolrõngad (F).*
*7) Kasutage võtit (B) kolvi (D) haaramiseks ja eemaldage see pea küljest.*

*8) Kasutage kahte konksu vabastamaks eesmise rõngastihendi ja CH-tihendi nende pesast.*

***Refer to drawing 7.5***

*3) By means of the wrench (A) unscrew the nut (C).*

*4) Remove the clamp.*

*5) Use the wrench (B) to loose the piston (D) and move it from its place for about 20/25 mm.*

*6) Move the flange (E). Now it is possible to remove the semi-rings (F).*

*7) Use the wrench (B) to hook the piston (D) and remove it from the head.*

*8) Use two hook tools to extract both the front packing ring and the CH ring from their seat.*

## 7.6.2 Koostamine

*1) Sisestage pumbakolb peasse, püüdes seda mitte kriimustada.*

*2) Koostage kinnitusäärik (Joonis 7.5 pos. E) ja kaks poolrõngast (pos. F), seejärel kinnitage kolb (pos. D) kolvivarre külge (pos C).*

*3) Koostage sõlm ja keerake kinnitusrõngas kinni (Joonis 7.5 pos. A).*

*4) Koostage CH-tihend ja eesmine rõngastihend.*

*5) Sisestage distantsrõngas (joon. 7.4 pos. 25), kuni see ulatub CH-tihendini; kasutage teist distantsrõngast tihendi surumiseks pea vastu.*

*6) Eemaldage nüüd mõlemad distantsrõngad ja keerake veetavat rihmaratast, kuni kolb on alumises seisus ning sisestage järgmised detailid (õiges järjestuses, vt joonis 7.4): ketas (pos. 5), vedru (pos. 7) ja ventiili tugi (pos.8).*

*JOONIS 7.6*

## 7.6.2 Assembly

*1) Insert the pump piston into the head, making sure not to scratch it.*

*2) Assemble the terminal flange (Drwg.7.5, pos. E) and the two half-rings (Drwg.7.5, pos. F) and then, wedge the pump piston (Drwg.7.5, pos.D) against the piston stem fitting (Drwg. 7.5, pos. C).*

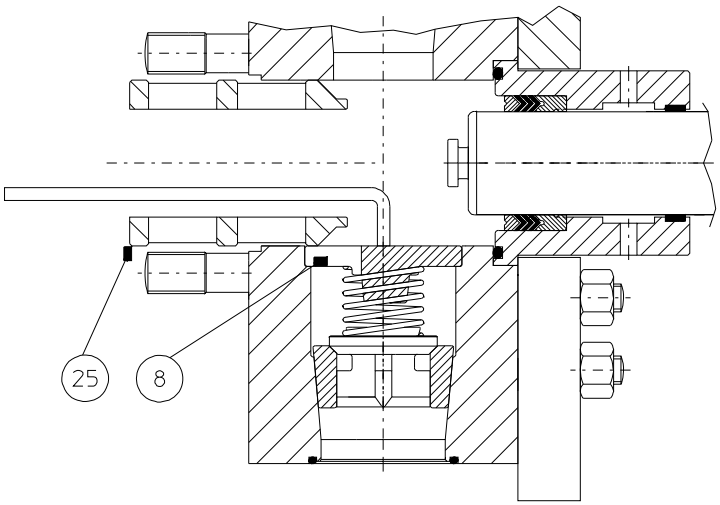
*3) Reassemble the terminal and tighten the screw (Drwg.7.5, pos. A).*

*4) Assemble the CH ring and the front packing ring.*

*5) Introduce the ring spacer (Drwg.7.4, pos. 25) until it reaches the CH front ring and use another spacer to wedge the gasket against the head.*

*6) After having removed both spacers, whirl the driven pulley and bring the piston to its dead centre, introduce as per the following sequence: the disk (Drwg.7.4,pos.5), the spring (Drwg.7.4,pos.7) and the valve stop (Drwg.7.4, pos.8) (Drwg.7.4, pos.5).*

*DRAWING 7.6*



*7) Eritööriista abil (masina komplektis) suruge ventiilikinnis pea vastu ja sisestage distantstükk (joonis 7.6, pos. 2.5). .*

*8) Et eesmise korgi koostamine oleks lihtsam, kasutage õiget võtit, mille abil varem selle lahti võtsite.*

*9) Asetage eesmine äärik (joon 7.4 pos.49) tikkpoltidele (joon 7.4 pos 46) ja keerake mutritega kinni.*

*7) Use the appropriate tool supplied with the homogeniser to wedge the stop valve (pos.8) against the head and introduce the spacer (Drwg. 7.6, pos. 2.5).*

*8) To make reassembling of the front plug easier, use the appropriate wrench previously used for disassembly.*

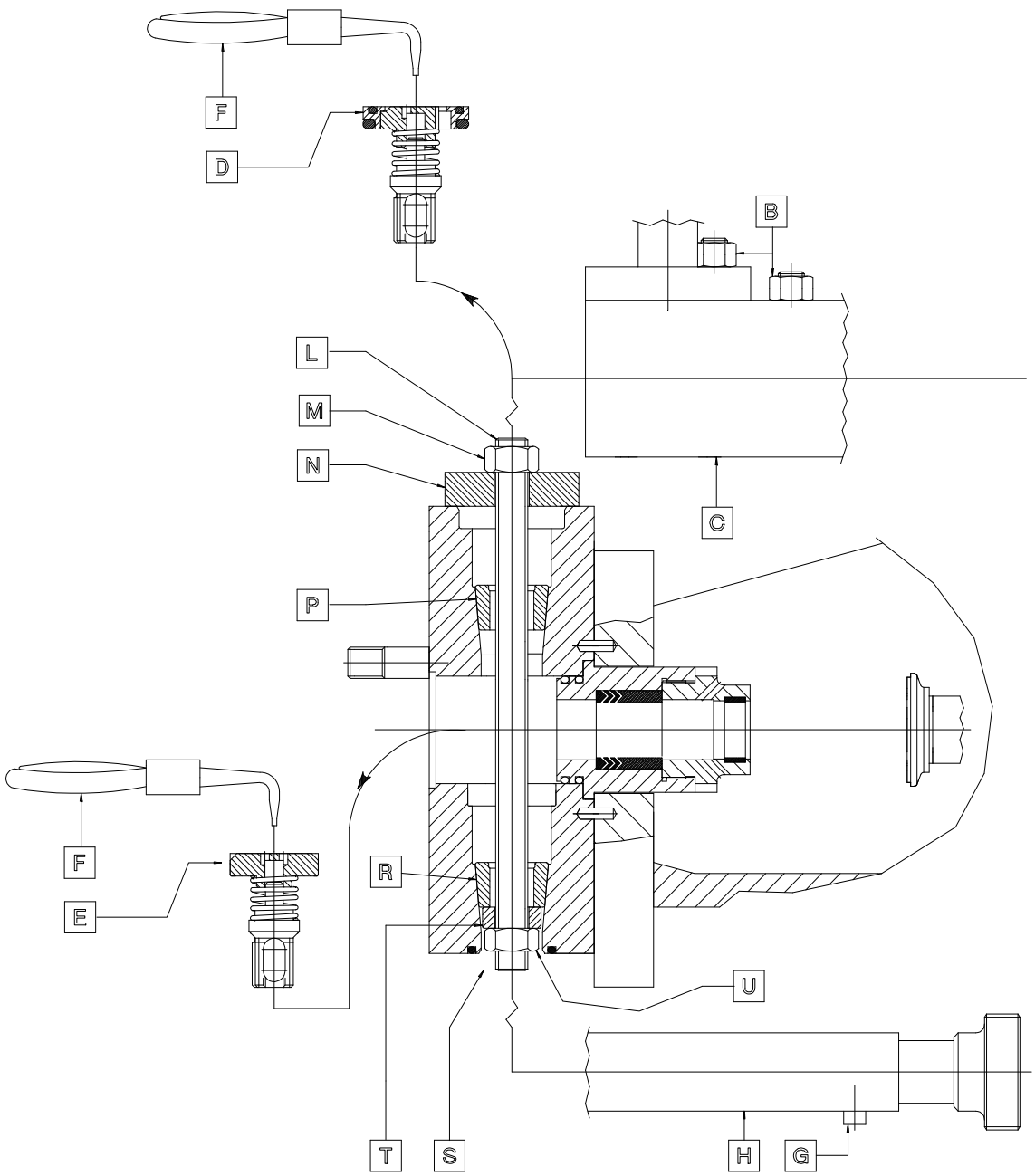
*9) Insert the front flange (Dis. 7.4,pos. 49) into the stud bolts (Dis. 7.4, pos. 46) and tighten the bolts.*

# 7.7 Kooniliste pesade vahetamine

# 7.7 Replacement of conic seats

*JOONIS 7.7*

*DRAWING 7.7*



***Jälgides joonist 7.7, teostage järgmised operatsioonid:***

*1) Ühendage lahti toote torustik sisendotsaku ja väljundotsaku küljest*

*2) Keerake lahti kruvi pos. G ja eemaldage imutoru pos. H.*

*3) Keerake lahti mutter pos. B ja eemaldage väljalasketoru pos. C.*

*4) Keerake lahti mutrid pos. 46, eemaldage äärik pos. 49 ja kork pos. 48, kasutades spetsiaalset võtit (vt joonis 7.4).*

*5) Eemaldage ventiilikoostid pos. D ja pos. E, kasutades näpitstange pos. F.*

*6) Pange paika terasmuhv pos. T keermestatud vardale pos. L ja keerake kinni mutter pos. U.*

*7) Sisestage kogu sõlm kompressioonipea avasse pos. S.*

*8) Asetage paks seib pos. N keermestatud vardale pos. L ja keerake kinni mutter pos. M.*

*9. Mutri pos. M keeramisel vabaneb kooniline pesa pos. R iseenesest.*

*10) Keerake mutter pos. M lahti, keerake lahti ka keermestatud varras pos. L ning eemaldage kooniline pesa pos. R.*

***Väljalaskepoolel oleva koonilise pesa pos. P eemaldamiseks korrake ülalkirjeldatud operatsioone samas järjestuses.***

*11) Paigaldage uued koonilised pesad oma kohtadele.*

***Refer to drawing 7.7, and carry out the following operations:***

*1) Disconnect the installation pipes from the product inlet and outlet flanges*

*2) Unscrew the screw pos. "G" and remove the suction manifold pos. "H"*

*3) Unscrew the nut pos. "B", remove the delivery manifold pos. "C" .*

*4) Untighten the nuts pos. 46, remove the flange pos.49 and the plug pos.48 with the dedicated wrench - Refer to drawing 7.4*

*5) Remove the valve group pos. "D" and "E" by means of the pliers pos "F"*

*6) Place the steel rod pos. "T" on the threaded bar pos. "L" and screw the nut pos. "U"*

*7) Insert the whole group, down from above into the compressione head hole pos. "S"*

*8) Put the flatbar pos. "N" on the threaded bar pos. "L" and screw the nut pos. "M"*

*9) While screwing the nut pos. "M", the conic seat pos. "R" will be released automatically*

*10) Unscrew the nut pos. "M", untighten the threaded bar pos. "L" and remove the conic seat pos. "R"*

***To dismount the delivery conic seat pos. "P", repeat in the same order the above operation.***

*11) Insert the new conic seats inside their place*

*12) Pesade kinnitamiseks on vaja teha samad operatsioonid, mis nende lahtivõtmise puhul. Kasutage vastaspoolel samu tööriistu.* ***Vt. joonis 7.7***

*13) Monteerige ventiilikoostid pos. D ja pos. E survepea sees.*

*14) Paigaldage väljalasketoru pos. C tikkpoltide külge ja keerake kinni mutrid pos. B.*

*15) Paigaldage kork pos. 48, äärik pos. 49 ja keerake kinni mutter pos. 46 –* ***Vt. joonist 7.4***

*16) Monteerige imutoru pos H, keerates võtme abil kinni poldi pos. G.*

*12) Now to block the seats, it's necessary to do the same seats' dismounting operation. Make sure to use the same equipment in the opposite side.*
***Refer to drawing 7.5***

*13) Reassembly the valve groups pos. "D" and "E" inside the compression head*

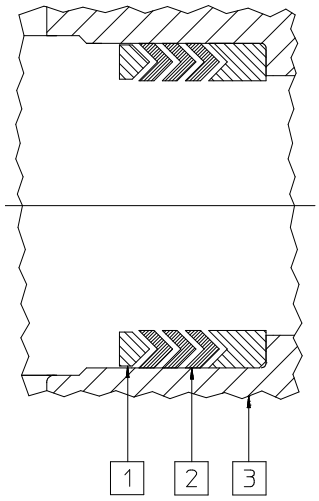
*14) Lean the delivery manifold pos. "C" on the studs and screw the nut pos. "B"*

*15) Insert the plug pos. 48, the flange pos. 49 and screw the nut pos. 46 -* ***Refer to drawing 7.4***

*16) Mount the suction manifold pos. "H", tightening the screw pos. "G" by means of a wrench.*

*DISEGNO 7.8*

*DRAWING 7.8*




# 7.8 Kolvitihendite vahetamine

***Jälgides joonist 7.8, teostage järgmised operatsioonid:***

*1) Võtke lahti pumbakolvid. Selleks järgige osas 7,6 toodud juhiseid.*

*2) Eemaldage roostevaba rõngas (1) ja CH-tihend (2).*

*3) Asetage survepeasse (3) uus CH-tihend (2) ja rõngas (1).*

# 7.8 Replacement of piston gaskets

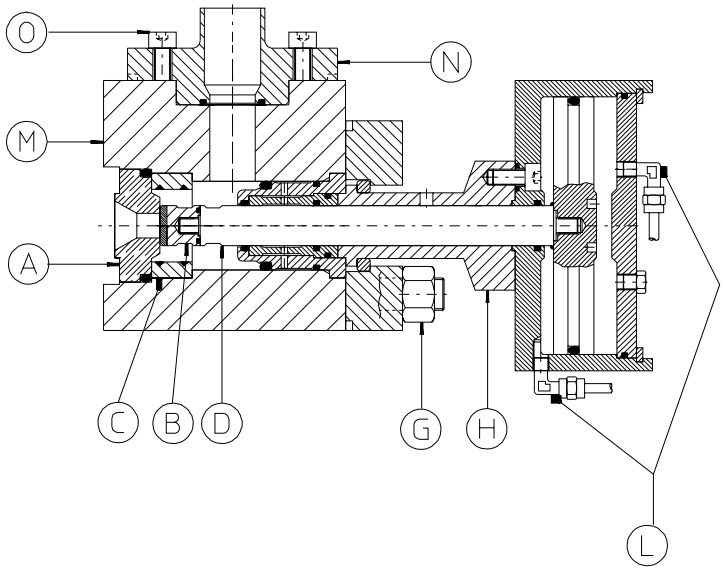
***Refer to drawing 7.8, carry out the following operations:***

*1) Desassembly the pumping pistons. To do that follow the instruction contained in the preceding pages.*

*2) Remove the inox ring (1) and the packing CH (2).*

*3) Mount the new packing (2) and the inox ring inside the compression head (3).*

*DISEGNO 7.9* *DRAWING 7.9*




# 7.9 Homogeenimisklapi pesa ja löökpea vahetus

***Järgides joonist 7.9, teostage järgmised operatsioonid:***

*1) Ühendage lahti suruõhutorud homogeenimissõlme küljest, keerates torud pos. L lahti mutrivõtme abil.*

*2) Keerake lahti kruvid pos. O ja ühendage lahti väljalasketoru pos. N.*

*3) Keerake lahti mutrid pos. G mutrivõtme abil.*

*4) Eemaldage pneumopea pos. H homogeenimiskambri pos. M küljest.*

*5) Pärast homogeenimiskambri pos. M avamist eemaldage homogeenimisklapi pesa pos A ja löökrõngas pos C.*

*6) Homogeenimisklapp pos. B on keeratud homogeenimisklapi vardale pos. D. Homogeenimisklapi avamiseks on vaja kahte mutrivõtit, mis rakendatakse piludesse osadel B ja D.*

***Sõlme koostamiseks korrake ülaltoodud operatsioone vastupidises järjekorras.***

# 7.9 Replacement of homogenizing valve seat and impact head.

***Refer to drawing 7.9, and carry out the following operations:***

*1) Disconnect the air pipes to the homogenizing group by loosening the connection pipes pos. "L" with a fork wrench*

*2) Disconnect the flange product outlet pos.N after having unscrewed the screws pos."O"*

*3) Untighten the nuts pos. "G" with a fork wrench.*

*4) Remove the pneumatic head pos. "H" from the homogenizing chamber, pos."M".*

*5)After having unthreaded the homogenizing chamber (M), extract the homogenizing valve seat pos."A" and the impact ring "C".*

*6) The homogenizing valve pos. "B" is screwed onto the homogenizing valve rod pos. "D". To untighten the homogenizing valve, it is necessary to use two fork wrenches which must be pulled into the splits in parts "B" and "D".*

***To refit the whole group repeat the above operation in the reverse order.***

# 7.10 Survepea poltide pöördemoment

*Kinnikeeramismomendi väärtused on toodud järgmises tabelis. Järgige neid täpselt survepea ja homogeenimisastme kokkumonteerimisel.*

*Kasutage kinnikeeramiseks dünamomeetrilist võtit vältimaks poltide liigset pingutamist.*

*TABEL 7.10*

# 7.10 Head stud torque wrench setting

*Torque data are listed in the table below. They must be referred to whenever compression head and homogenizing unit studs must be torqued.*

*Torque wrench setting should be carried out by means of a dynamometric wrench in order to avoid stresses other than those purposely conceived for the machine.*

*TABLE 7.10*

| KEERE<br>THREADING | DÜNAMOMEETRILISE VÕTME SEADE<br>TORQUE WRENCH SETTING<br>Nm |
|---|---|
| M 8 | 25,07 |
| M 10 | 49,52 |
| M 12 | 84,84 |
| M 14 | 135,13 |
| M 16 | 211,61 |
| M 18 | 290,32 |
| M 20 | 412,78 |
| M 22 | 567,58 |
| M 24 | 713,68 |
| M 27 | 1050,16 |
| M 30 | 1428,97 |
| M 33 | 1940,86 |
| M 45 | 5039,09 |

# 7.11 Reduktori õlivahetus

*Soovitame kasutada järgmisi mineraalõlisid:*

*AGIP.....Blasia*
*ARAL.....Degol BG*
*BP-ENERGOL.....GR-XP*
*ESSO.....Spartan EP*
*IP.....Mellana oil*
*MOBIL.....Mobilgear 600*
*SHELL.....Omala*
*TEXACO.....Meropa*
*TOTAL.....Carter EP*

*Keskmine viskoossus.....150 cSt 40°C puhul*

*Kui soovite pikendada õlivahetusintervalle ja vähendada õli temperatuuri, kasutage sünteetilisi õlisid:*

*KLUBER LUBRICATION.....Syntheso D-EP*
*MOBIL.....Glygoyle*
*SHELL.....Tivela oil*
*MOBIL.....SHC*

*Keskmine viskoossus.....150 cSt 40°C puhul*

*Keskmine õlivahetusintervall on esitatud järgmises tabelis, eelduseks on keskkonnasaastuse puudumine. Kui on tegemist suurte ülekoormustega, tuleb esitatud intervallid jagada kahega.*

*TABEL 7.11*

# 7.11 Oil change into the Gear Reducer

*We suggest to use the following types of mineral oils:*

*AGIP.....Blasia*
*ARAL.....Degol BG*
*BP-ENERGOL..... .....GR-XP*
*ESSO.....Spartan EP*
*IP.....Mellana oil*
*MOBIL.....Mobilgear 600*
*SHELL.....Omala*
*TEXACO.....Meropa*
*TOTAL.....Carter EP*

*Average viscosity.....150 cSt at 40°C*

*When it is required to increase oil change interval and/or reduce oil temperature, use synthetic oil:*

*KLUBER LUBRICATION.....Syntheso D-EP*
*MOBIL.....Glygoyle*
*SHELL.....Tivela oil*
*MOBIL.....SHC*

*Average viscosity.....150 cSt at 40°C*

*An overall guide to oil-change interval, is given in the table, and assumes pollution-free surroundings. Where heavy overloads are present, halve the values.*

*TABLE 7. 11*

| Õli temperatuur<br>Oil Temperature<br>(°C) | Õlivahetusintervall<br>Oil - change interval<br>(h) | |
|---|---|---|
| | Mineraalõli<br>mineral oil | sünteetiline õli<br>synthetic oil |
| < 65<br>65 - 80<br>80 - 95<br>95 - 110 | 8.000<br>4.000<br>2.000<br>- | 25.000<br>18.000<br>12.500<br>9.000 |

***Õli vahetatakse järgmisel viisil:***

*- Keerake lahti õlikork (tähis ?), aga ärge seda eemaldage*

*- Eemaldage õli väljalaske kork ja laske kasutatud õli lõpuni välja voolata*

*- Keerake väljalaskekork uuesti kinni, eemaldage õliava kork ja täitke reduktor õliga (ühega eelpooltoodud õlimarkidest); järgige õlitaset läbi vaateakna.*

 Enne õlivahetust tuleb masin seisata ja välja lülitada. Oodake, kuni reduktoris olev õli jahtub toatemperatuurini, vastasel juhul võib õlikorgi alt pritsida välja kuum õli.

*TIHENDID: Nende eluiga sõltub paljudest asjaoludest, nt roomekiirus, töösurve, keskkonnatingimused jne.*
*Soovitame neid vahetada umbes 20.000 kuni 23.000 töötunni järel.*

***Oil changes should be carried out as follows:***

*- Loosen the oil plug without removing it ( symbol )*

*- Unscrew the drain plug and let lubricant liquid out completely*

*- After tightening the drain plug, unscrew the oil plug and fill with one of the oils suggested till the level point (check through glass sight indicator)*

 Oil changes must be carried out after stopping the machine. Wait until the gear reducer reaches room temperature, otherwise internal pressure could cause hot oil to escape from the oil plug.

*SEAL RINGS: Their life depends on many a different factors such as creeping speed, working pressure, environmental conditions... We, therefore, suggest to replace them after about 20.000/23.000 work hours.*

# 7.12 Tensorbloki kummipuksliigendite koostamine ja lahtivõtmine

**Tensorbloki kummipuksliigendite vahetusintervall on 3000 töötundi.**

*1) Keerake kuuskantplaat lahti tavalise võtme abil. Sel juhul saate rihmad maha võtta.*

*2) Eemaldage rihmad.*

*3) Asetage reduktori alla sobiva paksusega vahetükk ja keerake kuuskantplaat täiesti lahti.*

*4) Jälgige, et plaati seejuures ei vigastataks. Eemaldage sobivate näpitstangide abil nii alumine kui ka ülemine painduv rõngas.*

*5) Eemaldage mõlemad tensorploki tihvtid ja asendage need uutega.*

*6) Võtke maha kummipuksliigendid ja asendage need uutega.*

*7) Pange tensorplokk tagasi oma kohale.*

*8) Asetage kohale tihvtid ja rõngad ning kinnitage need.*

*9) Eemaldage reduktori alt vahetükk.*

*10) Paigaldage rihmad.*

*11) Keerake tagasi kuuskantplaat ja tõmmake rihmad välja vastavalt lk 7.6 toodud juhistele.*

# 7.12 Desassembly and assembly of the silent blocks mounted in the tensor group

**Every 3000 running hours replace the silent blocks mounted in the tensor group.**

*1) Unloosen the exagonal bar by means of a fork wrench. This allows to unclamp the belts.*

*2) Remove the belts*

*3) Put a suitable thickness shim underneath the reducer and keep on unloosen the exagonal bar*

*4) It is important the mentioned bar is not submitted to any stress. Now, remove both the upper and lower flexible rings by means of a pair of pliers of the suitable size.*

*5) Remove both the tensor group's pins anr replace them for the new ones*

*6) Dismount the silent blocks and replace them for the new ones.*

*7) Put back the tensor group into its place.*

*8) Put in the pins and the flexible rings and fix them*

*9) Remove the shim from underneath the reducer.*

*10) Put in the belts.*

*11) Screw back the exagonal bar and stretch the belts as per the values and parameters shown at page 7.6*

8. peatükk

# Rikkepõhjuste leidmine ja kõrvaldamine

**Kui seadme hooldamine on õige ja korrapärane, on tõrgete esinemine ebatõenäone. Järgnev rikkepõhjuste leidmise ja kõrvaldamise skeem võimaldab käitajal avastada rikkeid juba varases staadiumis, vältides hilisemaid tõsisemaid defekte.**

**Kui Teil on rikke tegeliku põhjuse avastamisega raskusi, võtke otsekohe ühendust Bertoli klienditeenindusega.**

Chapter 8

# Trouble Shooting Chart

**If regular and accurate maintenance is carried out no troubles should arise. If needed, the trouble shooting chart that follows will allow the machine operator to detect defects, faults and any, to solve and overcome them on cue avoiding serious or prejudicial damages.**

**Should any difficulty arise making it impossible to establish the actual cause, please contact immediately Bertoli srl.**

1) KOLVITIHENDID KULUVAD LIIGA KIIRESTI, PÕHJUSTADES TOOTE LEKKIMIST

**Kulumine võib olla tingitud pinna kriimustustest või muudest sarnastest põhjustest.**

*Puhastage kolvi pind põhjalikult. Kui kriimud on suured, tuleb vigane kolb asendada uuega. Võib kasutada ka taastatud kolbe.*

**Kolvi taastamine võib toimuda ainult Bertoli töökodades.**

1) PISTON SEAL RINGS WEAR OUT TOO MUCH AND QUICKLY CAUSING PRODUCT LEAKAGES

**Wear may be caused by scratches or similar damages.**

*Clean the piston surface thouroughly. If scratching is excessive, remove the damaged pistons and replace with new ones. Restored pistons can also be used.*

**The treatment to restore the piston surface can be done at Bertoli srl workshop.**

2) PUMBA KOLB KULUB LIIGA KIIRESTI

***2a) Vesi sisaldab liivateri***
*Vees ei tohi olla liiva. Eemaldage liiv filtrite abil või kasutage settepaaki.*

***2b) Vesi on liiga kare***
*Varustage veesüsteem veepehmendajaga.*

2) PUMPING PISTONS WEAR OUT TOO FAST

***2a) Silicates in cooling water***
*Water must be free of silicates. Remove them by means of filters or decantation tanks.*

***2b) Water is too hard***
*Fit the water supply network with a water softner.*

3) RÕHURELEE OSUTI VÕBISEB

***3a) Klappide ja klapipesade vahel on võõrkehad või ummistus***
*Võtke klapid lahti ja eemaldage võõrkehad.*

***3b) Toote voolukiirus on liiga väike***
*Kontrollige toitepumpa: selle voolukiirus peab olema 10–15% kõrgem masina tootlikkusest*

3) PRESSURE GAUGE HAND OSCILLATES

***3a) Some obstruction or clogging between valves and valve seats***
*Remove the valves and clean from foreign matters*

***3b) Insufficient Feeding flow rate***
*Check the feed pump: its flow rate must be 10% to 15% higher than the machine capacity*

*Kontrollige rõhku: see peab olema vahemikus 1,5 kuni 2 bar vedelatele toodetele ja kuni 4 bar pakematele toodetele.*

***Kui olemasoleva pumba jõudlus on liiga väike, asendage see võimsama pumbaga.***

*Kontrollige pumbatihendeid: need peavad olema väga heas korras.*

***3c) Toote leke kolvitihendite vahelt (vt punkt 1)***

***3d) Toode sisaldab õhku.***
*Õhk on tõenäoliselt pärit toitetorustikust.*

*Asendage sisselaskeühenduse tihend.*

*Veenduge, et tootepaagi tasemeandur töötab korralikult. Mittetoimiv andur võib põhjustada probleeme toote pealeandmisel, mis võib vigastada rõhureleed, klappe ja vedrusid.*

*Mõned tooted (nt segud) võivad sisaldada õhku, kui tootmisliin sisaldab segistit.*

*Meie tehnikaosakond on valmis abistama Teid selle probleemi lahendamisel.*

***3e) Rõhurelee on katki.***
*Kontrollige, kas rõhurelee membraan on terve. Kui avastate vigastusi, tuleb membraan asendada.*

***3f) Toote lekked või ummistus toitepoolel***
*Veenduge, et kõik toruühenduste tihendid on korras.*
*Kontrollige kõiki toruühendusi ja otsakuid: vajaduse korral tihendage.*

*Toitetoru võib olla ummistunud. Kontrollige hoolikalt ja eemaldage torust kõik võõrkehad või tootejäägid.*

*Check the pressure: it must range between 1.5 and 2 bar for liquid products and up to 4 bar for thick products.*

***If the existing pump flow rate is insuffcient, replace it with a higher flow rate one.***

*Check the pump sealing system: it must be in perfect and efficient conditions.*

***3c) Product leakage from the piston packing (see item 1)***

***3d) Air into product***
*There must be some air seepage into the pipe system up stream the machine.*

*Replace pipe connection gaskets.*

*Make sure the level probe in the product tank is thouroughly efficient. A defective probe can cause a shortage in product feeding, which can damage the pressure gauge, valves and springs.*

*Some products (e.g., mixes) show a tendency to incorporate air when mixers are installed in the processing line.*

*Our Technical Dept. will be glad to study any possible solution and offer suggestions in order to overcome this trouble.*

***3e) Pressure gauge is damaged***
*Check carefully the pressure gauge diaphgram. If any damages are detected, replace it.*

***3f) Product leakages or clogging in the feeding line***
*Make sure that all pipe connection gaskets are perfectly efficient.*
*Check all pipe connection and flanges: tighten them if necessary.*

*The feed pipe may be clogged. Check carefully and remove any foreign matters or product traces remained inside the pipe.*

4) LÄBILASKEVÕIME LANGUS

***4a) Pesad ja klapid on kulunud***
*Läbilaskevõime langus võib olla tingitud pesade ja klappide kulumisest. Kui klapid ei tööta korralikult, hakkab kolbpump vilistama.*

*Eemaldage vanad pesad ja klapid ning asendage need uutega.*

*Võimalik on ka klapp ja pesa omavahel üle lihvida.*

*Kasutage tööriistaterase (nt 54 HRC) jaoks mõeldud materjale.*

***4b) Toote leke toitetorust (vt punkt 3f)***

***4c) Tihendid on kulunud.***
*Asendage survepea ääriku tihendid ning kolvi rõngastihendid.*

***4d) Sisselasketoru filter on ummistunud***
*Eemaldage filter, puhastage see põhjalikult ja pange tagasi.*

*Kui masin on varustatud kahe paralleelfiltriga – vt tabel 4.1 („Paigaldamine“) – võib filtri puhastada ilma tootmistsüklit katkestamata.*

*Vältimaks suuremaid raskusi toote sisselaskega, soovitame filtri puhastamist mitte edasi lükata.*

***4e) Kiilrihm on lõtv***
*Laske masinal töötada surveta ja kontrollige läbilaset.*

*Rakendage seejärel töösurve ja kontrollige uuesti läbilaset või mootori pöörlemiskiirust.*

*Kui läbilase või pöörlemiskiirus on väiksem, pingutage kiilrihma (juhiseid vt osa 7.4).*

4) THROUGHPUT LOSS OR

***4a) Seats and valves are worn out***
*A decrease in the throughput may be caused by worn out seats and valves. When valves are no more in good working conditions, a howling is heard when the piston pumps.*

*Remove the old seats and valves and replace them with new ones.*

*It is also possible to grind the pieces in contact with each other between the seat and the valve.*
*Use tools normally employed for hard materials (54 HRC aprox.).*

***4b) Product leakage from feed pipe (see item 3f).***

***4c) Gaskets are worn out***
*Replace the flange gaskets of the compression head flange and the piston ring seals.*

***4d) The filter on the intake pipe is clogged***
*Remove the filter, clean it thouroughly and put it back to its place.*

*If the machine is equipped with two parallel filters - as indicated in Tab. 4.1 (“Installation”) - the above operation can be carried out without interrupting the production cycle.*

*In order to avoid feeding unbalance, it is suggestable not to delay the above operation.*

***4e) Loose belts***
*Run the machine without supplying any pressure and check carefully the throughput.*

*Supply working pressure and check again the throughput or motor revolutions.*

*If throughput or revolutions decrease, adjust belt tension (See instructions as per Par. 7.4, pag. 7.4).*

5) MASIN SEISKUB ÕLISURVE LANGEMISE TÕTTU
*(Märkus: see kehtib vaid sundõlitussüsteemiga masinate kohta)*

***5a) Rõhurelee on katki***
*Kontrollige rõhurelee kontakte.*
*Kui need on oksüdeerunud, puhastage neid peene liivapaberiga. Kui see ei aita, siis vahetage rõhurelee.*

***5b) Jõuülekande laagreid määrivate torude vigastused***
*Eemaldage pumbasüsteemi katteplaat, mille taga on võllid ja karter (vt foto 7.2 lk 7.9) ja asendage vigased torud.*

***5c) Õlipump on kulunud**. Vahetage hammasrataspump õlisüsteemi mootori küljes.*

*Võtke maha mootor, selleks keerake kõigepealt lahti õlipaagi kaanekruvid.*

*Seejärel pääsete ligi mootorile ning saate eemaldada vigastatud hammasrataspumba ja asendada selle uuega.*

***5d) Jõuülekande võlli määrivate õlitorude vigastused***
*Kontrollige kõiki toruühendusi ja asendage need.*
*Vajaduse korral vahetage välja ka torud.*

5) MACHINE SHUTDOWN DUE TO LUBRICATION OIL PRESSURE DROP
*(Note: only machines equipped with forced feed pressure lubrication)*

***5a) Pressure gauge is damaged***
*Check carefully the pressure gauge contacts. If they appear oxidized, remove it with sand/ glass paper. Should this attempt fail, replace the pressure gauge.*

***5b) Cracks in oil feed piping to connecting** rod bearings*
*Remove the protection panel of the pumping unit housing the rods and crankshaft group (see photo 7.2 page 7.9) and replace the damaged flexible tube.*

***5c) Lubrication unit pump is worn out***
*Replace the gear pump coupled to the motor of the lubrication system.*

*Disassemble the motor by loosening and removing the clamping screws to the oil tank.*

*This clears the access to the motor and allows to remove the damaged gear pump and to replace it.*

***5d) Cracks in connecting rods' lubrication circuit piping***
*Check all pipe connections and replace them. If necessary, also replace the damaged pipes.*

## 6) MÄÄRDEÕLI SISALDAB VETT

***6a) Vesi-õli soojusvaheti on vigane***
*Vahetage soojusvaheti (pos. 4)*

***6b) Vesi lekib eesmisest otsakust***

*Sel puhul tuleb vahetada veeotsaku tihend.*

*Kontrollige kolvi juhtpindu: kui need on kulunud, asendage kolvijuhid või kroomige uuesti.*

***6c) Kondensniiskus***
*Enne tootmistsükli algust tühjendage masinasse kogunenud vesi klapi kaudu (foto 7.3, ptk 7).*

## 7) LIIGA VÄIKE HOMOGEENIMISRÕHK

***7a) Õhurõhk on ebapiisav***
*Kontrollige rõhku suruõhusüsteemis: see peab olema piirides 0,4 kuni 0,8 MPa.*

***7b) Toode lekib tihendite vahelt***
*Kontrollige survepea ja homogenisaatori tihendeid. Vajaduse korral vahetage nad välja.*

***7c) Homogeenimisklapp ja homogeenimisklapi pesa on kulunud***
*Kontrollige pesa pinda ja klapi löökpead: need peavad olema siledad ja kriimustusteta.*

## 6) WATER INTO LUBRICATION OIL

***6a) Water heat exchanger for oil cooling is damaged***
*Replace the heat exchanger: tab. pos. 4.*

***6b) Water leakage from the front flanges of the machine body***

*If such an event occurs, replace front flange gasket.*

*Check the surface of piston adapter guide: if they are worn out, replace them or repeat the chrome plating treatment.*

***6c) Oil moisture condensation***
*Before starting any processing cycle, drain the water from the drain valve (Photo 7.3, Chap. 7).*

## 7) INSUFFICIENT HOMOGENIZING PRESSURE

***7a) Air supply pressure is insufficient***
*Check the supply air pressure: it must range between 0,4 and 0,8 MPa.*

***7b) Product leakings from gaskets***
*Check the state of the gaskets equipping the compression head and the homogenizing group. Replace them if necessary.*

***7c) Homogenizing valve and homogenizing valve seat worn out***
*Check the seat surface and the valve impact head: this must be well smooth and should not show any scores.*

9. peatükk

# Lahtivõtmine ja lammutamine

 Enne masina lahtivõtmist tuleb lahti ühendada kõik välisühendused: elekter, vesi, suruõhk ja aur. Seejärel keerake lahti ankrupoldid ja muud mehaanilised kinnitused.

 Tühjendage kõik paagid ning võimalikud staatilised laengud.

 **Korduvkasutatavate materjalide käitlemine peab toimuma vastavalt kehtivatele määrustele ja eeskirjadele.**

Chapter 9

# Dismantling and Demolition

 Before the machine is dismantled all energy sources such as those supplying electric power, water, air, and steam must be disconnected. As soon as this has been done, loosen all anchor bolts and/or any other mechanical clamping element.

 Empty all tanks still under pressure and discharge any voltage buildup and electrostatic charges.

 **Disposal of all materials must be carried out in compliance with laws and regulations in force in the country where the machine is kept at the time of its dismantling and demolition.**

# 9.1 Lahtivõtmine

### 9.1.1 Elektrisüsteemi lahtivõtmine

**Olge ettevaatlik kaablite lahtiühendamisel: need võivad olla pinge all ka pärast pealüliti väljalülitamist.**

*Ühendage korralikult lahti kõikide juhtpaneeli kaablite otsad vastavalt neil olevatele tähistele ning juuresolevale elektriskeemile.*

*Ärge eemaldage ega kahjustage kaablitel ja klemmliistudel olevaid tähiseid.*

### 9.1.2 Hüdraulikasüsteemi lahtivõtmine

*Hüdraulikasüsteemi lahtivõtmisel lähtuge kaasasolevatest skeemidest.*

### 9.1.3 Mehaaniliste osade lahtivõtmine

*Enne masina mehaaniliste osade lahtivõtmist peske kõik osad, mis võisid sattuda kontakti tootega masina töötamise ajal. 2) Puhastage põhjalikult ka kõik masina ülejäänud osad (vt ptk 7, „Puhastamine ja hooldus“)*

*Transportimise kohta vt ptk 3.*

### 9.1.4 Pakkimine

*Õige pakkimine peab toimuma nii, et pakendi suurus ja materjal vastab masina kaalule.*

**Tähistage pakend vastavalt selle sisule ja kaalule, lisage ka muu teave, mida vajalikuks peate.**

# 9.1 Dismantling

### 9.1.1 Wiring system dismantling

**Please, pay special attention while disconnecting wire cables: these keep on being live even after the main switch has been turned to “0”.**

*Disconnect all control board wiring harness carefully respecting the indications and references on each cable according to the attached wiring diagrams.*

*Do not remove or erase reference numbers from cables and terminal boards.*

### 9.1.2 Hydraulic system dismantling

*To dismantle the hydraulic system refer to the attached diagrams.*

### 9.1.3 Mechanical parts dismantling

*Before dismantling any mechanical parts the machine is composed of, wash all parts in contact with the raw material treated during routine running of the machine. Clean thouroghly the remaing parts of the machine structure (See “Cleaning and Maintanance” Chapter).*

*For lifting instructions see “Transport” Chapter.*

### 9.1.4 Packing

*Due packing must be chosen so that it could be proportional to the machine weight.*

**Stick a sign outside the packing indicating its content, weight and any additional information required for transportation.**

# 9.2 Lammutamine

**Masina ja selle koostisse kuuluvate materjalide käitlemine peab toimuma kooskõlas eeskirjadega ja määrustega, mis kehtivad vastaval maal.**

*Hõlbustamaks käitlemiseks kõlbulike materjalide määratlemist ning vähendamaks sellega seotud ohte, on masin jaotaud järgmisteks osadeks:*

***1) Survepea***
*Survele vastupidav roostevaba teras*
*Erisulamid*
*Plastmassid*

***2) Ajam***
*Malm*
*Teras*
*Plastmassid*

***3) Määrimissüsteem***
*Raud*
*Alumiinium*
*Vask*
*Roostevaba teras*
*Plastmassid*

***4) Hüdraulikasüsteem***
*Roostevaba teras*
*Valgevask*
*Plastmassid*

***5) Reduktor:***
*Malm*
*Raud*
*Teras*
*Kumm*

***6) Raam ja kere***
*Raud*
*Roostevaba teras*

# 9.2 Demolition

**Demolition and disposal of the different parts the machine is composed of, must be executed in accordance with the regulations and laws in force in the country the machine is kept.**

*In order to make the selection of materials for disposal easier and risk-free, the machine has*
*been subdivided as follows:*

***1) Compression head***
*Stainless steel for high pressures*
*Special alloys*
*Plastic material*

***2) Drive unit***
*Cast iron*
*Steel*
*Plastic material*

***3) Lubrication system***
*Iron*
*Aluminim*
*Copper*
*Stainless steel*
*Plastic material*

***4) Hydraulic system***
*Stainless steel*
*Brass*
*Plastic material*

***5) Driving gear***
*Cast iron*
*Iron*
*Steel*
*Rubber*

***6) Body and frame***
*Iron*
*Stainless steel*

***7) Reduktor:***
*Malm*
*Raud*
*Teras*
*Kumm*

***8) Raam ja kere***
*Raud*
*Roostevaba teras*

***Lisaks**:*

*Elektrimootorid……vask, malm, roostevaba teras määrdeõli*

*Reduktor…….....….hüdraulikaõli määrdeõli*

*Hüdraulikapea…..……hüdraulikaõli*

*Sinine värv…….....……RAL 7035*

**Masina erinevate osade ja komponentide lammutamine ja käitlemine peab toimuma vastavalt kehtivatele määrustele ja eeskirjadele ning arvestades kohalike vastuvõtupunktide ja ladustuskohtade olemasolu.**

***7) Driving gear***
*Cast iron*
*Iron*
*Steel*
*Rubber*

***8) Body and frame***
*Iron*
*Stainless steel*

***In addition:***

*Electric motors.....Copper-cast-iron-stainless steel*

*Lubrication oil*
*Speed reducer.....Hydraulic oil*

*Lubrication oil*
*Hydraulic power pack.....Hydraulic oil*

*Blue varnish.....RAL 7035*

**Disposal and demolition of the various parts and components the machine is composed of should be done in compliance with the regulations and standards establishing permissions and places where the different materials have to be collected**

10. peatükk

# Garantii

*Garantii kaotab kehtivuse, kui masin saab kahjustada ebaõige või vale kasutamise tõttu või hooletu kohtlemise tõttu või mingi õnnetuse tulemusena või ebasobivate või ebakohaste keskkonnatingimuste tõttu, samuti pärast käesoleva garantii ajalist lõppemist.*

Chapter 10

# Warranty

*Should the machine suffer any damage caused by improper or wrong use, or as a result of negligent behaviour or any unwilling act, or due to use in unsuitable and inadequate ambient conditions and well after the normal running period.*

# Homogenisaator mudel H3037

# Seeria nr 2378

***Garantii***

*Käesolev garantii katab kõik materiaalsed kahjud, mis on tingitud sisemistest puudustest, mis on jäänud avastamata seadme tootmise või katsetamise ajal.*

***Garantiitingimused***

*Garantii kehtib siinjuures esitatud piirides ja tingimustel:*

*1) Masin peab töötama kooskõlas käesolevas juhendis toodud juhiste ja soovitustega. Mis tahes erinevat kasutust loetakse mittesihipäraseks ja see tühistab garantiikohustuse.*

*2) Eeltingimuseks on, et masinat kontrollitakse reeglipäraselt ning hooldatakse nii korraliselt kui ka jooksvalt vastavalt käesolevale kasutusjuhendile.*
*Erilist tähelepanu tuleb pöörata määrimisega ning õli ja pumbakolbide jahutamisega seotud juhistele.*

***Garantiiaeg***

*a) Mehaanilised osad 12 kuud*
*b) Elektrilised osad 12 kuud*

***Garantiiaja alguseks loetakse masina tarnekuupäeva.***

***Garantiiga seotud parandused***

*Kui masina parandus või varuosade asendamine toimub kliendi asukohas, tasub klient kõik sellega seotud reisi- ja majutuskulud.*

# Homogenizer Mod. H3037

# Serial Nr.2378

***Warranty***

*The warranty recognized covers all materials showing fast wear and tear due to faults that could not be detected either during assemblying or testing.*

***Terms of warranty***

*The warranty will be worth within the limits and conditions stated hereinafter:*

*1) The machine must work in compliance with the instructions and recommedations stated in this manual. Any different use is to be considered improper and therefore will void the warranty coverage.*

*2) It is prerequisite condition that the machine be submitted to periodical checks and ordinary and extraordinary maintenance as specified in this Instruction Manual.*
*Instructions concerning lubrication and cooling of oil and pumping pistons must be given special attention.*

***Warranty period***

*a) Mechanical parts 12 Months*
*b) Electric parts 12 Months*

***The warranty period starts as from the date of delivery of the machine.***

***Repairs under warranty coverage***

*If the replacement or repair of spare parts under warranty has to be carried out at the customer's premises/factory, the customer will be charged all travelling, board and lodging expenses.*

***Garantii erandid ja piirid***

*Garantii ei kata niisuguste osade vahetamist, mis tuleb vahetada enne garantiiaja lõppu normaalse kulumise tõttu, sh:*

*a) kõik tihendid*
*b) kolvirõngad*
*c) pumbakolvid*
*d) kõik komponendid, mille eluiga ei ole määratud*
*e) garantii ei kata ka elektrikaitsmeid ega märgutulede lampe*

*Tekkinud kahjude kompenseerimist arutatakse koostöös pädeva otsustajaga.*

***Exclusions and limits of the warranty***

*The warranty does not cover all parts that, due to the effect of normal wear, will have to be replaced before the warranty itsels expires, i.e.:*

*a) All gaskets*
*b) CH packings*
*c) Pumping pistons*
*d) All components whose working life cannot be determined*
*e) The warranty does not cover fuses and control board lights equipping electric circuits*

*Any compensation for damages will be dealt with before the competent authority.*

11. peatükk

# Varuosad

*Kui mõnda osa on vaja asendada varuosaga, on eeltingimuseks originaalvaruosade kasutamine.*

***Ärge laske ühtegi osa täiesti lõpuni ära kuluda.***

*Õigeaegne väljavahetamine aitab hoida masinat heas töökorras ning hoiab ära võimalikud vigastused.*

*Kui soovite tellida varuosi, kasutage juuresolevat tellimisvormi ja täitke see hoolikalt.*

**Väga oluline on märkida nii vormi kui ka sõlme joonise number (vt tabel 11.1) et Bertoli Srl saaks eksimatult määratleda varuosad, mida olete tellinud.**

Chapter 11

# Spare Parts

*Whenever a substitution of spare parts is needed, it is prerequisite to replace them with original spares.*

***Do not let any components to wear out completely.***

*Replacing a component on cue means to keep the machine in the best running conditions thus preventing, at the same time, damage worsening*

*Whenever you need to order spare parts, use the attached order form and fill it out thoroughly.*

**It is of the utmost importance to indicate both the form and the assembly drawing numbers (Re. Table 11.1) to enable Messrs Bertoli to identify immediately the spare parts ordered by the customer.**

# 11.1 Kuidas lugeda varuosatabelit ja sellele viidata

*1 - Tabeli vastavusnumber*

*2 – Sõlme joonise number*

*3 – Positsioon tabelis*

*4 - Varuosanumber*

*5 – Nimetus itaalia keeles*

*6 – Nimetus inglise keeles*

*7 – Varuosa mõõtühik*

*8 – Iga varuosa hulk/arv*

*TABEL 11.1*

# 11.1 How to read and refer to spare part tables

*1 - Table re. number*

*2 - Assembly drawing number*

*3 - Re. position in the table*

*4 - Re. spare part number*

*5 - Description in Italian*

*6 - Description in English*

*7 - Unit of measure of the spare part*

*8 - Quantity of each spare in the unit/system*

*TABLE 11.1*

| 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|
| | | | | | |

# VARUOSADE TELLIMISVORM

Tehke käesolevast vormist fotokoopia ja saatke see meile posti teel või faksige:

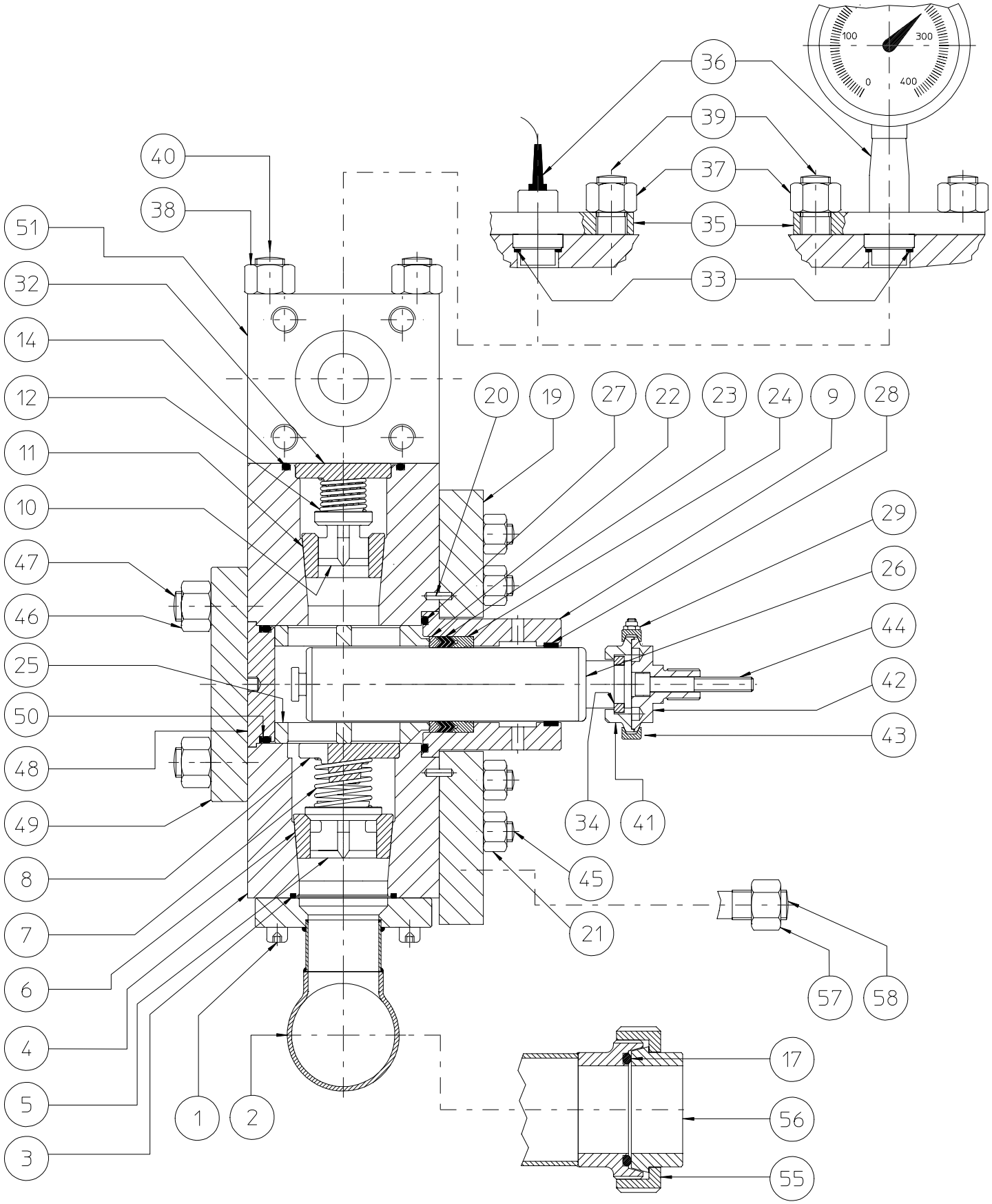
Bertoli Srl.
Via Brodolini,1
43056 S.Polo di Torrile - Parma -
Itaalia
Telefon: +521 - 95.47.11
Faks: +521 - 29.37.04

Klient
VAT Nr.....telefon.....
Aadress
Linn……Sihtnumber……..Riik…….
Masina mudel
Seeria nr (asub masina esiosal)
Tootmisaasta……..
Tabeli vastavusnumber
Sõlme joonise nr

| Positsioon | Kood | Nimetus | Arv |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Lugupidamisega,

Pitsat ja allkiri




| | | | | | |
|---|---|---|---|---|---|
| 1 | ASS.TEST. DI COMPR | | | | |
| POS. | DENOMINAZIONE | PEZZI | CODICE | IALE | DIM.GREZZE-MODELLO |

TRATT. TERM.

SM. GENER.

FINITURA

TOLL.GEN. H ___ | h ___

GRUPPO

MODIFICHE

DATA /03

DISEGN. *Baiocchi L.*

**BERTOLI s.r.l.**
HOMOGENIZER
VIA MARTIRI DELLA LIBERAZIONE 12
43100 PARMA - ITALIA

SCALA 1:1 | FORM B | DIS.N° 105142 | GRUPPO AEA

0 1 2 3 4
5 6 7 8 9

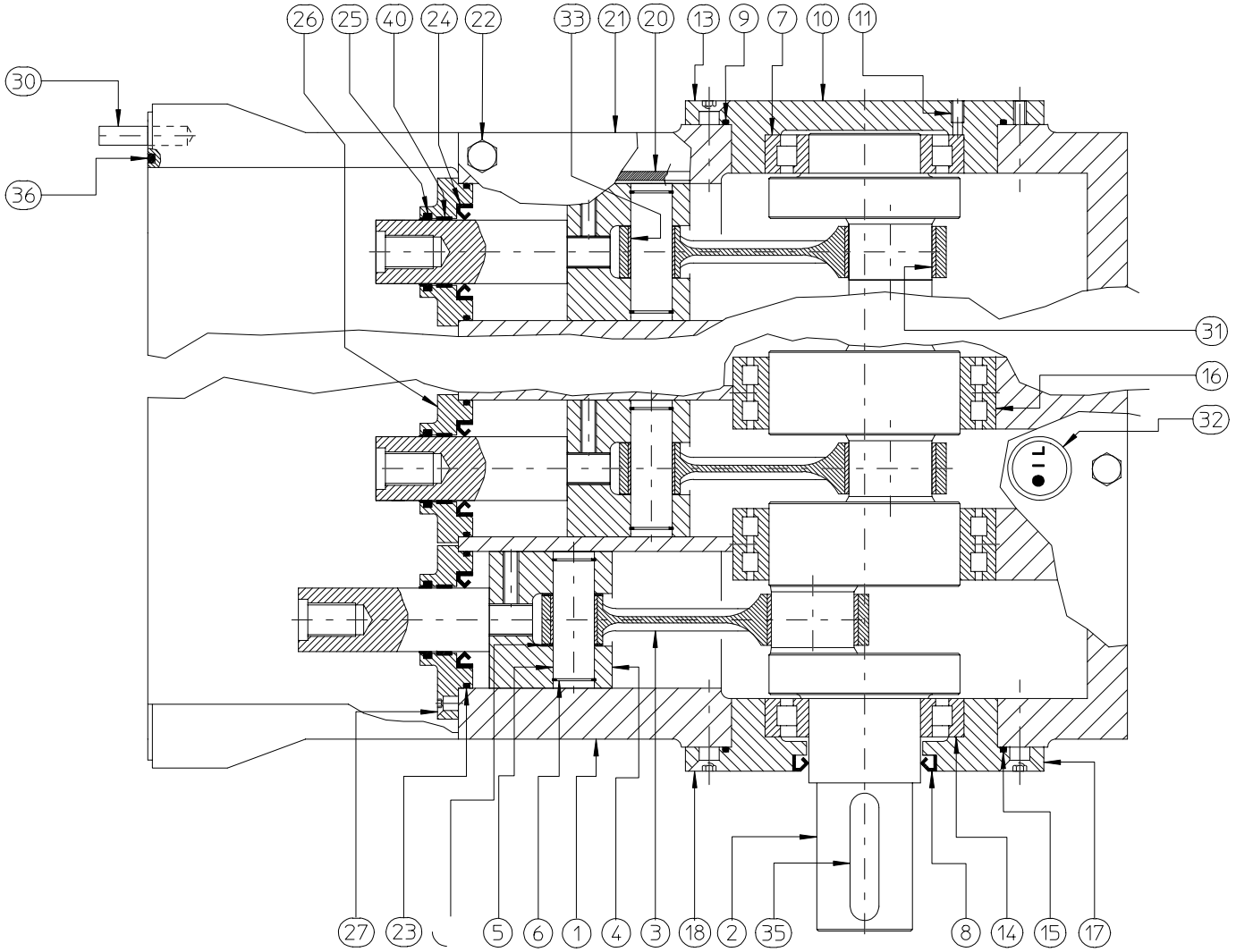
SOSTITUISCE DIS. N° 10.00

RICAVATO DA DIS. N° 10.00

| Pos.<br>Pos. | Nostro codice<br>Our code | Descrizione | Description | u.m<br>m.u | Q.tà<br>Qty |
|---|---|---|---|---|---|
| 2 | 105136/04 | Suction manifold | Suction manifold | Nr. | 1 |
| 4 | 105127/04 | Survepea | Compression head | Nr. | 3 |
| 5 | 105108/17 | Ventiil | Valve | Nr. | 3 |
| 6 | 105424/17 | Klapipesa | Valve seat | Nr. | 3 |
| 7 | 101217/36 | Vedru | Spring | Nr. | 3 |
| 8 | 104215/04 | Klapi juhtpuks | Valve guide | Nr. | 3 |
| 9 | 105132-03/04 | Tagakamber | Piston cylinder | Nr. | 3 |
| 10 | 10502617 | Ventiil | Valve | Nr. | 3 |
| 11 | 105426/17 | Klapipesa | Valve seat | Nr. | 3 |
| 12 | 103053/36 | Vedru | Spring | Nr. | 3 |
| 19 | 105128/07 | Head plate | Head plate | Nr. | 1 |
| 20 | 102215/07 | Cylindrical pin | Cylindrical pin | Nr. | 6 |
| 22 | 101474/04 | Rõngas | Ring | Nr. | 3 |
| 24 | 102943/53 | Rõngas | Ring | Nr. | 3 |
| 25 | 106399-02/04 | Vahetükk | Spacer | Nr. | 3 |
| 26 | 102898-06/40 | Pumbakolb | Pumping piston | Nr. | 3 |
| 28 | 102967/53 | Rõngas | Ring | Nr. | 3 |
| 29 | 103004/07 | Mutter | Nut | Nr. | 3 |
| 32 | 104216/04 | Klapi juhtpuks | Valve guide | Nr. | 3 |
| 34 | 102902/39 | Seib | Washer | Nr. | 3 |
| 35 | 105134/07 | Äärik | Flange | Nr. | 1 |
| 36 | MHF 004 | Rõhunäidik | Pressure gauge | Nr. | 1 |
| 39 | 102333/42 | Tikkpolt | Strud | Nr. | 4 |
| 40 | 105131/42 | Tikkpolt | Stud | Nr. | 8 |
| 41 | 102900/07 | Äärik | Flange | Nr. | 3 |

| Pos.<br>Pos. | Nostro codice<br>Our code | Descrizione | Description | u.m<br>m.u | Q.tà<br>Qty |
|---|---|---|---|---|---|
| 42 | 105058/39 | Kolvivarre seadisti | Piston rod adapter | Nr. | 3 |
| 45 | 103870/42 | Tikkpolt | Stud | Nr. | 24 |
| 47 | 101837/42 | Tikkpolt | Stud | Nr. | 12 |
| 48 | 105130/04 | Kork | Plug | Nr. | 3 |
| 49 | 105129/07 | Äärik | Frange | Nr. | 3 |
| 51 | 105133/04 | Mainfold | Mainfold | Nr. | 1 |
| 58 | 105135/42 | Tikkpolt | Stud | Nr. | 4 |
| 3 | DUC 045 | Tihend | Gasket | Nr. | 3 |
| 14 | DUD 012 | Tihend | Gasket | Nr. | 3 |
| 17 | RII 065 | Tihend | Gasket | Nr. | 1 |
| 23 | GSC 061N | Tihend | Gasket | Nr. | 3 |
| 27 | DUD 017 | Tihend | Gasket | Nr. | 3 |
| 33 | DUC 010 | Tihend | Gasket | Nr. | 1 |
| 50 | DUD 011 | Tihend | Gasket | Nr. | 3 |
| 50 | GVR027 | Tihend | Gasket | Nr. | 3 |

| Pos.<br>Pos. | Nostro codice<br>Our code | Descrizione | Description | u.m<br>m.u | Q.tà<br>Qty |
|---|---|---|---|---|---|
| 1 | VGF035 | Kruvi | Screw | Nr. | 12 |
| 21 | YAA 016 | Kruvi | Screw | Nr. | 24 |
| 29 | YAD 008 | Mutter | Nut | Nr. | 3 |
| 37 | YAA 020 | Mutter | Nut | Nr. | 4 |
| 38 | YAA 020 | Mutter | Nut | Nr. | 8 |
| 43 | MOR 006 | Klamber | Clamp | Nr. | 3 |
| 44 | VFF075 | Kruvi | Screw | Nr. | 3 |
| 46 | YAA 020 | Mutter | Nut | Nr. | 12 |
| 55 | RIJ 065 | Toru | Pipe connection | Nr. | 1 |
| 56 | RIK 065 | Toru | Pipe connection | Nr. | 1 |
| 57 | YAA 020 | Mutter | Nut | Nr. | 4 |




| POS. | DENOMINAZIONE | PEZZI | CODICE | MATERIA | DIM.GREZZE-MODELLO |
|---|---|---|---|---|---|
| 1 | ASSIEME CORPO DI TRASM. | 1 | | | |

TRATT. TERM.

SM. GENER.

FINITURA

TOLL.GEN. H | h

GRUPPO

MODIFICHE

DATA 14/1

DISEGN. Carbognani M.

**BERTOLI s.r.l.**
HOMOGENIZER
VIA MARTIRI DELLA LIBERAZIONE 12
43100 PARMA - ITALIA

SCALA /

FORM B

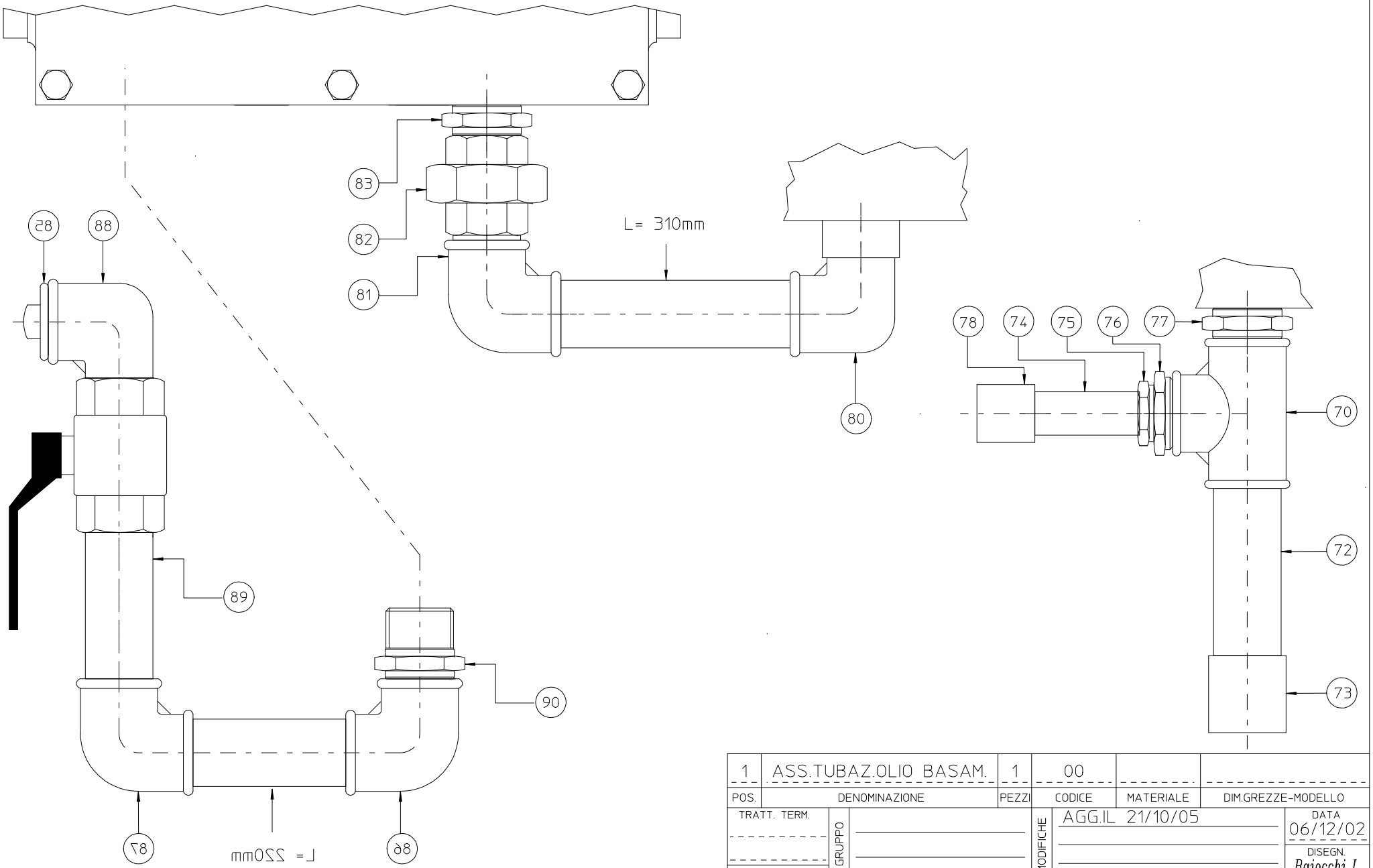
DIS.N° 105143

GRUPPO AED

0 1 2 3 4 5 6 7 8 9

SOSTITUISCE DIS. N° 10.00

RICAVATO DA DIS. N° 10.00




| POS. | DENOMINAZIONE | PEZZI | CODICE | MATERIALE | DIM.GREZZE-MODELLO |
|---|---|---|---|---|---|
| 1 | ASS.TUBAZ.OLIO BASAM. | 1 | 00 | | |

TRATT. TERM.

SM. GENER.

FINITURA

TOLL.GEN. H ___ | h ___

GRUPPO

MODIFICHE: AGG.IL 21/10/05

DATA 06/12/02

DISEGN. Baiocchi L.

**BERTOLI s.r.l.**
HOMOGENIZER
VIA MARTIRI DELLA LIBERAZIONE 12
43100 PARMA - ITALIA

SCALA 1:1 | FORM B | DIS.N° 104923 | GRUPPO AED

0 1 X 3 4 / 5 6 7 8 9

SOSTITUISCE DIS. N° 10.00

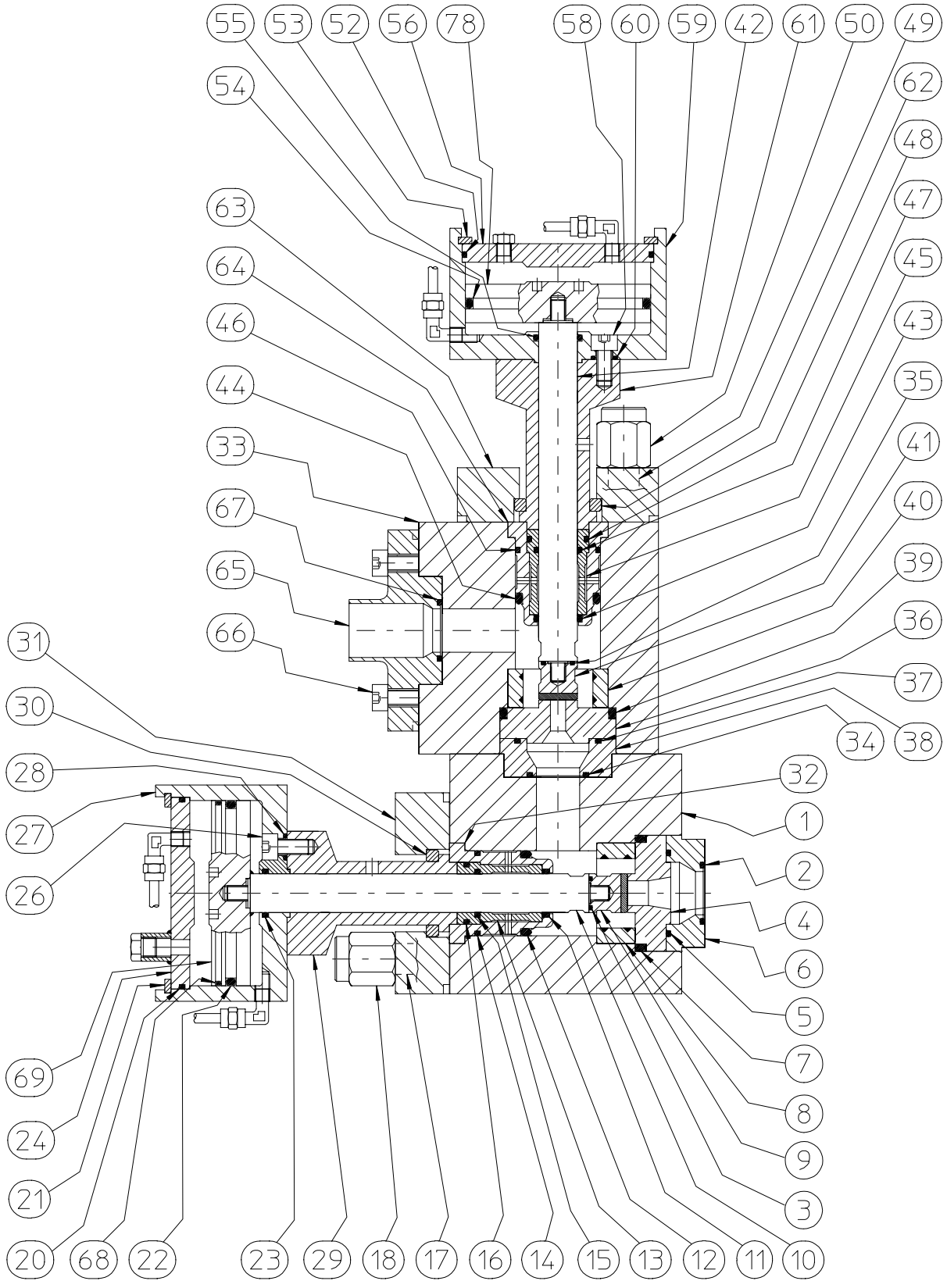
RICAVATO DA DIS. N° 10.00

AJAMIÜKSUS DRIVE UNIT D036201

OSADE NIMEKIRI PART LIST 105143/00

| Pos.<br>Pos. | Nostro codice<br>Our code | Descrizione | Description | u.m<br>m.u | Q.tà<br>Qty |
|---|---|---|---|---|---|
| 1 | 101581/12 | Ajamiüksus | Drive unit | Nr. | 1 |
| 2 | 102847/11 | Väntvõll | Crankshaft | Nr. | 1 |
| 4 | 105060/11 | Kolvivars+ Kolvijuht | Piston rod+Piston guide | Nr. | 3 |
| 5 | 105686/73 | Kepsusilinder | Connecting rod cylinder | Nr. | 3 |
| 10 | 101588/12 | Äärik | Flange | Nr. | 1 |
| 17 | 101587/12 | Äärik | Flange | Nr. | 1 |
| 21 | 101836/14 | Ristpea kate | Crosshead cover | Nr. | 1 |
| 26 | 102857/14 | Äärik | Flange | Nr. | 3 |
| 50 | 104448/16 | Seib | Washer | Nr. | 3 |
| 3 | BIE 020 | Keps | Connecting rod | Nr. | 3 |
| 7 | CUM 017 | Laager | Bearing | Nr. | 1 |
| 14 | CUM 017 | Laager | Bearing | Nr. | 1 |
| 16 | CUN 009 | Laager | Bearing | Nr. | 2 |
| 31 | BRO 020 | Kepsulaager | Connecting rod bearing | Nr. | 3 |
| 33 | BRP 020 | Kepsuaasa laager | Connecting rod eye bearing | Nr. | 3 |
| 35 | LFK 160 | Hammasratta kiil | Gear key | Nr. | 1 |

| Pos. Pos. | Nostro codice Our code | Descrizione | Description | u.m m.u | Q.tà Qty |
|---|---|---|---|---|---|
| 8 | GVG 126 | Rõngas | Ring | Nr. | 1 |
| 9 | DUE 016 | Tihend | Gasket | Nr. | 1 |
| 15 | DUE 016 | Tihend | Gasket | Nr. | 1 |
| 20 | GUX 013 | Tihend | Gasket | Mt. | 1,6500 |
| 23 | DUD 018 | Tihend | Gasket | Nr. | 3 |
| 24 | GVL150 | Rõngas | Ring | Nr. | 3 |
| 25 | GSD 026 | Tihend | Gasket | Nr. | 3 |
| 30 | 101683/07 | Tihvt | Pin | Nr. | 2 |
| 36 | GUX 013 | Tihend | Gasket | Mt. | 0,4400 |
| 40 | GSF 019 | Rõngas | Ring | Nr. | 3 |
| | 102033/50 | Toru | Pipe | Nr. | 3 |
| | | MUTRID JA POLDID | NUTS AND BOLTS | | |
| 6 | AEI 040 | Lukustusrõngas | Seeger snap ring | Nr. | 6 |
| 11 | WCD 010 | Kruvi | Screw | Nr. | 4 |
| 13 | WAG 030 | Kruvi | Screw | Nr. | 6 |
| 18 | WAG 030 | Kruvi | Screw | Nr. | 6 |
| 22 | WGF 030 | Kruvi | Screw | Nr. | 8 |
| 27 | VGF 030 | Kruvi | Screw | Nr. | 12 |
| 32 | TCA 011 | Kork | Plug | Nr. | 1 |




| | | | | | |
|---|---|---|---|---|---|
| 1 | ASSIEME GRUPPO OMOG. | 1 | 00 | | |
| POS. | DENOMINAZIONE | PEZZI | CODICE | MATERIALE | DIM.GREZZE-MODELLO |

| | | | |
|---|---|---|---|
| TRATT. TERM. | GRUPPO: OMOG. DOPPIO STADIO SERIE 1997 | MODIFICHE: AGG.08/02/05 | DATA 24/03/97 |
| SM. GENER. | | | DISEGN. Carbognani M. |
| FINITURA | | | |
| TOLL.GEN. H ___ h ___ | | | |

**BERTOLI s.r.l.**
HOMOGENIZER
VIA MARTIRI DELLA LIBERAZIONE 12
43100 PARMA - ITALIA

| SCALA | FORM | | GRUPPO |
|---|---|---|---|
| / | B | DIS.N° 103202 | AEB |

| | | |
|---|---|---|
| 0 X 2 3 4 / 5 6 7 8 9 | SOSTITUISCE DIS. N° 10.00 | RICAVATO DA DIS. N° 10.00 |

| Pos. Pos. | Nostro codice Our code | Descrizione | Description | u.m m.u | Q.tà Qty |
|---|---|---|---|---|---|
| 1 | 100918/04 | Homogeenimiskamber | Homogenizing Chamber | Nr. | 1 |
| 4 | 100409-05/22 | Homogeenimisklapi pesa | Homogenizing valve seat | Nr. | 1 |
| 6 | 105139/04 | Vahetükk | Spacer | Nr. | 1 |
| 8 | 100411/22 | Löökrõngas | Impact ring | Nr. | 1 |
| 9 | 100420/22 | Löökpea | Impact head | Nr. | 1 |
| 10 | 100476/20 | Löökpea varras | Impact head shaft | Nr. | 1 |
| 13 | 100413/16 | Pronkslaager | Bronze bearing | Nr. | 1 |
| 17 | 101225/42 | Tikkpolt | Stud | Nr. | 4 |
| 24 | 100438/07 | Pneumopea kate | Pneumatic head cover | Nr. | 1 |
| 27 | 100417/07 | Pneumopea | Pneumatic head | Nr. | 1 |
| 29 | 100416/07 | Pneumopea tugi | Pneumatic head support | Nr. | 1 |
| 30 | 100415/07 | Seib | Washer | Nr. | 1 |
| 31 | 100921/07 | Äärik | Flange | Nr. | 1 |
| 32 | 100412/04 | Pronkslaager | Bronze bearing housing | Nr. | 1 |
| 33 | 100918/04 | Homogeenimiskamber | Homogenizing Chamber | Nr. | 1 |
| 36 | 100409-01/22 | Vahetükk | Spacer | Nr. | 1 |
| 38 | 100419/04 | Vahetükk | Spacer | Nr. | 1 |
| 40 | 100411/22 | Löökrõngas | Impact ring | Nr. | 1 |
| 41 | 100420/22 | Löökpea | Impact head | Nr. | 1 |
| 42 | 100476/22 | Löökpea varras | Impact head shaft | Nr. | 1 |
| 45 | 100413/16 | Pronkslaager | Bronze bearing | Nr. | 1 |
| 49 | 101225/42 | Tikkpolt | Stud | Nr. | 4 |
| 56 | 100483/07 | Pneumopea kate | Pneumatic head cover | Nr. | 1 |
| 59 | 100417/07 | Pneumopea | Pneumatic head | Nr. | 1 |
| 61 | 100416/07 | Pneumopea tugi | Pneumatic head support | Nr. | 1 |

| Pos.<br>Pos. | Nostro codice<br>Our code | Descrizione | Description | u.m<br>m.u | Q.tà<br>Qty |
|---|---|---|---|---|---|
| 62 | 100415/07 | Seib | Washer | Nr. | 1 |
| 63 | 100921/07 | Äärik | Flange | Nr. | 1 |
| 64 | 100412/04 | Pronkslaager | Bronze bearing housing | Nr. | 1 |
| 65 | 100422/04 | Äärik | Flange | Nr. | 1 |
| 69 | 100475/14 | Suruõhukolb | Pneumatic piston | Nr. | 1 |
| 78 | 100475/14 | Suruõhukolb | Pneumatic piston | Nr. | 1 |

BERTOLI

GHOMOGEENIMISSÕLM HOMOGENIZING GROUP B036801

TIHENDITE NIMEKIRI GASKET LIST Dis/Drwg. 103202/00

| Pos.<br>Pos. | Nostro codice<br>Our code | Descrizione | Description | u.m<br>m.u | Q.tà<br>Qty |
|---|---|---|---|---|---|
| 2 | DUC 020 | Tihend | Gasket | Nr. | 1 |
| 3 | DUB 014 | Tihend | Gasket | Nr. | 1 |
| 5 | DUC 027 | Tihend | Gasket | Nr. | 1 |
| 7 | DUD 010 | Tihend | Gasket | Nr. | 1 |
| 7 | 104925/31 | Rõngas | Ring | Nr. | 1 |
| 11 | DUC 011 | Tihend | Gasket | Nr. | 1 |
| 11 | 104505/31 | Rõngas | Ring | Nr. | 1 |
| 12 | DUD 003 | Tihend | Gasket | Nr. | 1 |
| 14 | DUC 030 | Tihend | Gasket | Nr. | 1 |
| 15 | DUC 011 | Tihend | Gasket | Nr. | 1 |
| 16 | DUC 017 | Tihend | Gasket | Nr. | 1 |
| 20 | GUH 068 | Tihend | Gasket | Nr. | 1 |
| 22 | GUI 029 | Tihend | Gasket | Nr. | 1 |
| 22 | GVH 050 | Rõngas | Ring | Nr. | 1 |
| 23 | DUC 011 | Tihend | Gasket | Nr. | 1 |
| 28 | DUB 008 | Tihend | Gasket | Nr. | 4 |
| 34 | DUC 017 | Tihend | Gasket | Nr. | 1 |
| 35 | DUB 014 | Tihend | Gasket | Nr. | 1 |
| 37 | DUC 030 | Tihend | Gasket | Nr. | 1 |
| 39 | DUD 010 | Tihend | Gasket | Nr. | 1 |
| 39 | 104925/31 | Anello | Ring | Nr. | 1 |
| 43 | DUC 011 | Tihend | Gasket | Nr. | 1 |
| 43 | 104505/31 | Rõngas | Ring | Nr. | 1 |
| 44 | DUD 003 | Tihend | Gasket | Nr. | 1 |
| 46 | DUC 030 | Tihend | Gasket | Nr. | 1 |

BERTOLI

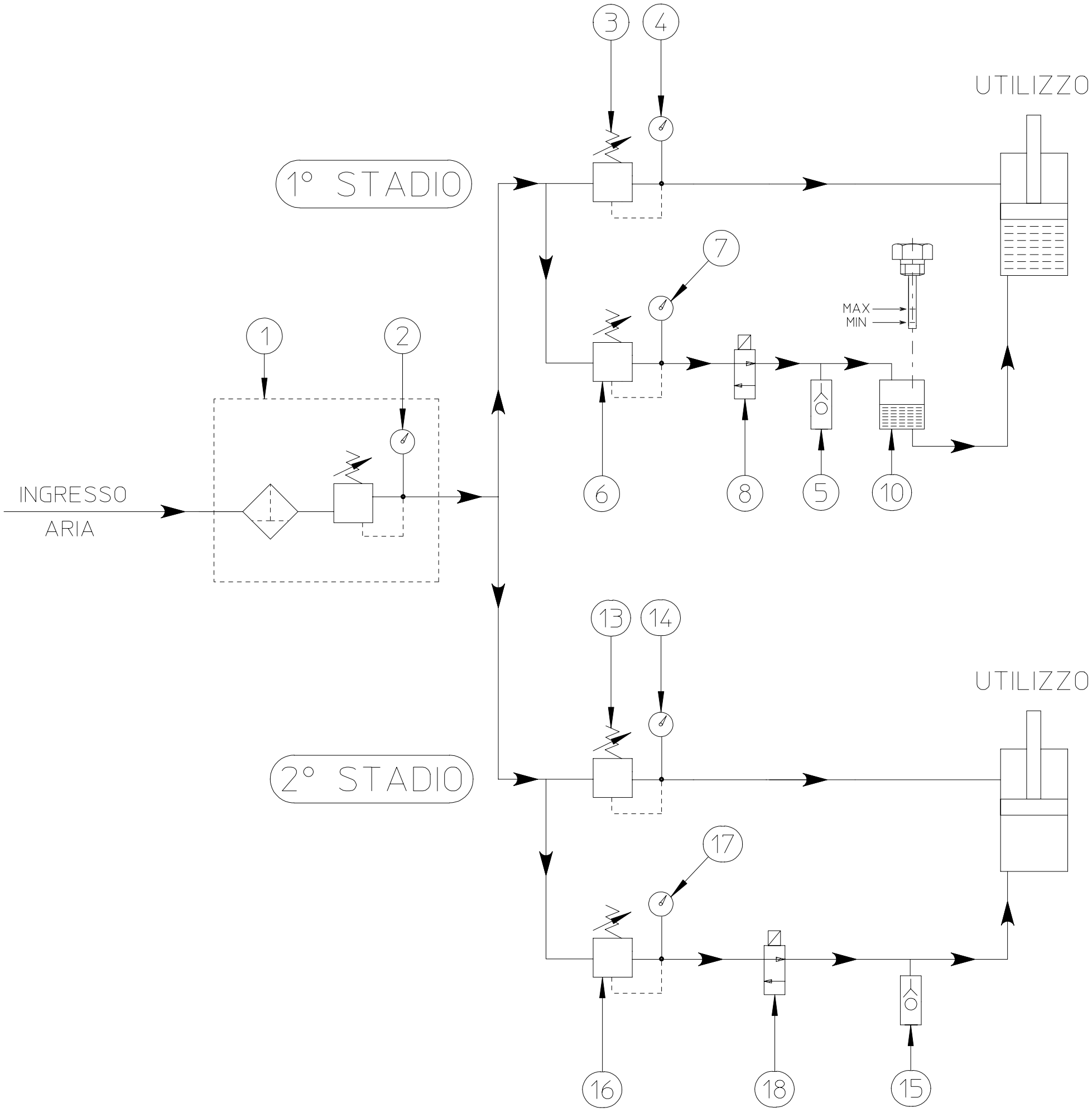
GHOMOGEENIMISSÕLM HOMOGENIZING GROUP B036801

TIHENDITE NIMEKIRI GASKET LIST Dis/Drwg.103202/00

| Pos.<br>Pos. | Nostro codice<br>Our code | Descrizione | Description | u.m<br>m.u | Q.tà<br>Qty |
|---|---|---|---|---|---|
| 47 | DUC 011 | Tihend | Gasket | Nr. | 1 |
| 48 | DUC 017 | Tihend | Gasket | Nr. | 1 |
| 52 | GUH 068 | Tihend | Gasket | Nr. | 1 |
| 54 | GUI 029 | Tihend | Gasket | Nr. | 1 |
| 54 | GVH 050 | Rõngas | Ring | Nr. | 1 |
| 55 | DUC 011 | Tihend | Gasket | Nr. | 1 |
| 60 | DUB 008 | Tihend | Gasket | Nr. | 4 |
| 67 | DUC 017 | Tihend | Gasket | Nr. | 1 |
| 68 | GUH 066 | Tihend | Gasket | Nr. | 1 |

| Pos.<br>Pos. | Nostro codice<br>Our code | Descrizione | Description | u.m<br>m.u | Q.tà<br>Qty |
|---|---|---|---|---|---|
| 18 | YAA 018 | Mutter | Nut | Nr. | 4 |
| 21 | AEI 125 | Lukustusrõngaso | Seeger ring | Nr. | 1 |
| 26 | VGF 020 | Kruvi | Screw | Nr. | 4 |
| 50 | YAA 018 | Mutter | Nut | Nr. | 4 |
| 53 | AEI 125 | Lukustusrõngas | Seeger ring | Nr. | 1 |
| 58 | VGF 020 | Kruvi | Screw | Nr. | 4 |
| 66 | VGF 035 | Kruvi | Screw | Nr. | 4 |

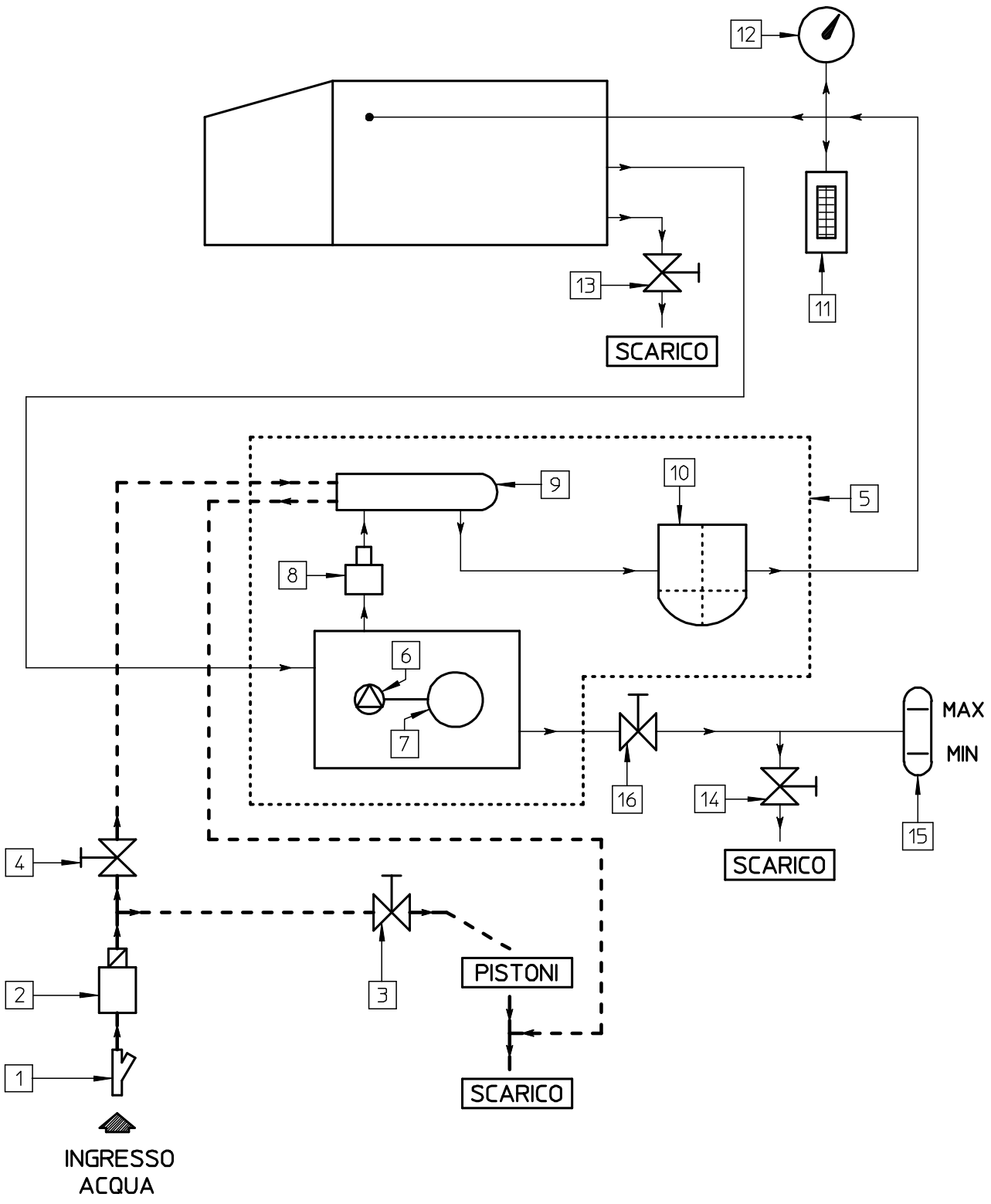
# IMPIANTO CON ELETTROVALVOLE




| | | | | | |
|---|---|---|---|---|---|
| 1 | SCHEMA IMPIANTO PNEUMATICO | 1 | 00 | | |
| POS. | DENOMINAZIONE | PEZZI | CODICE | MATERIALE | DIM.GREZZE-MODELLO |

| | | | |
|---|---|---|---|
| TRATT. TERM. | GRUPPO: OMOG. DOPPIO ST. CON ELETTROV. (STD '98) | MODIFICHE | DATA 06/04/98 |
| SM. GENER. | | | DISEGN. Carbognani M. |
| FINITURA | BERTOLI s.r.l. HOMOGENIZER VIA MARTIRI DELLA LIBERAZIONE 12 43100 PARMA - ITALIA | SCALA / | FORM A — DIS.N° 103577 — GRUPPO AEG |
| TOLL.GEN. H ___ \| h ___ | 0 1 2 3 4 / 5 6 7 8 9 | SOSTITUISCE DIS. N° 10.00 | RICAVATO DA DIS. N° 10.00 |

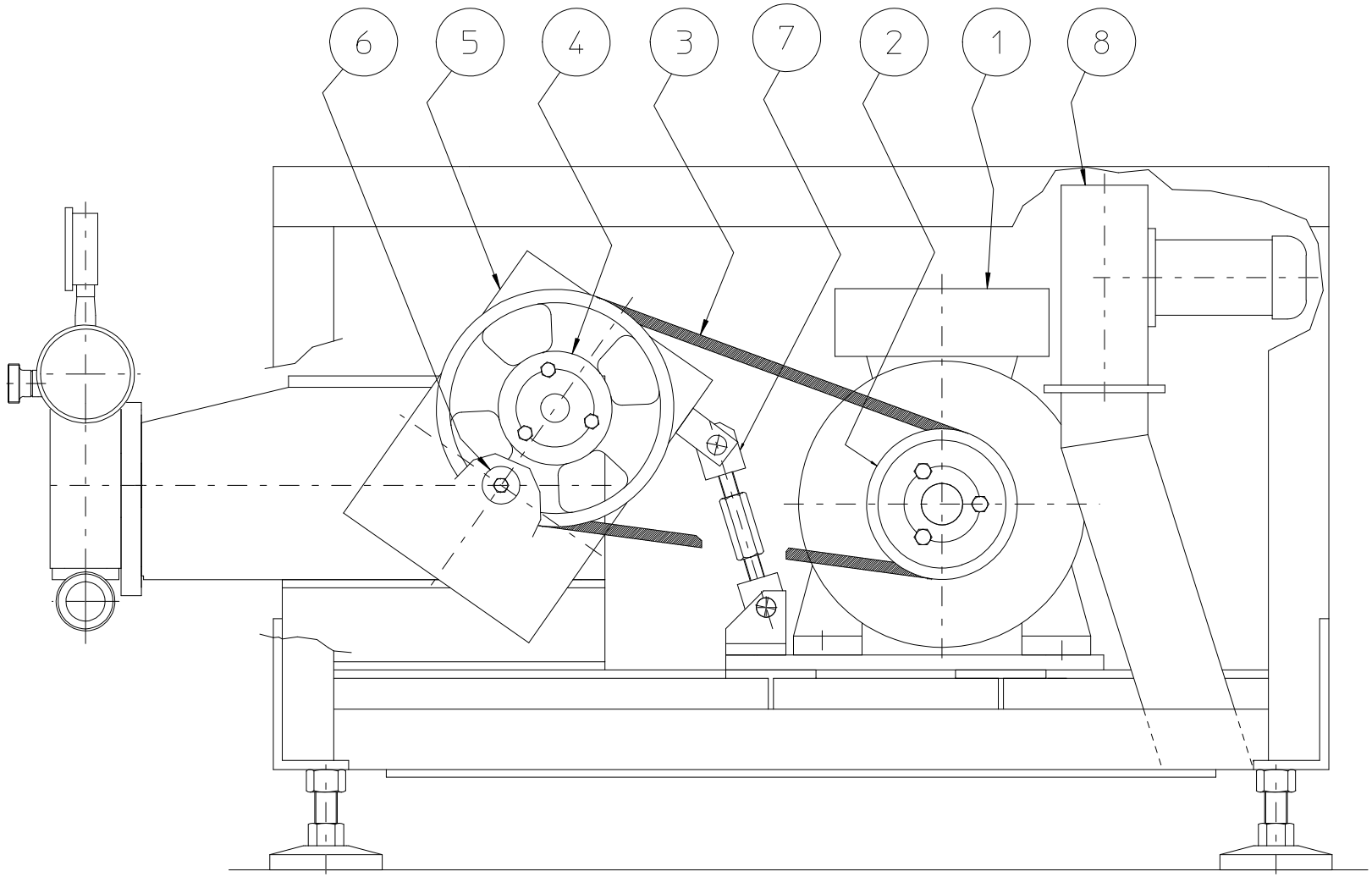
| Pos.<br>Pos. | Nostro codice<br>Our code | Descrizione | Description | u.m<br>m.u | Q.tà<br>Qty |
|---|---|---|---|---|---|
| 1 | EFA 005 | Filter | Filter | Nr. | 1 |
| 2 | MHI 010 | Rõhunäidik | Pressure gauge | Nr. | 1 |
| 3 | EEB 005 | Rõhureduktor | Pressure reducer | Nr. | 1 |
| 4 | MHI 005 | Rõhunäidik | Pressure gauge | Nr. | 1 |
| 5 | VET 005 | Kaitseventiil | Safety valve | Nr. | 1 |
| 6 | EEB 005 | Rõhureduktor | Pressure reducer | Nr. | 1 |
| 7 | MHC 004 | Rõhunäidik | Pressure gauge | Nr. | 1 |
| 8 | EAC 001 | Magnetventiil | Solenoid valve | Nr. | 1 |
| 8 | EBA 005 | Magneetimismähis | Magnetizing coil | Nr. | 1 |
| 10 | 100490/07 | Hydropneumatic shock absorber | Hydropneumatic shock absorber | Nr. | 1 |
| 13 | EEB 005 | Riduttore pressione | Pressure reducer | Nr. | 1 |
| 14 | MHI 005 | Rõhunäidik | Pressure gauge | Nr. | 1 |
| 15 | VET 005 | Kaitseventiil | Safety valve | Nr. | 1 |
| 16 | EEB 005 | Rõhureduktor | Pressure reducer | Nr. | 1 |
| 17 | MHB 004 | Rõhunäidik | Pressure gauge | Nr. | 1 |
| 18 | EAC 001 | Magnetventiil | Solenoid valve | Nr. | 1 |
| 18 | EBA 005 | Magneetimismähis | Magnetizing coil | Nr. | 1 |




| | IMPIANTO IDRAUL.-LUBRIF. | | 00 | | |
|---|---|---|---|---|---|
| POS. | DENOMINAZIONE | PEZZI | CODICE | MATERIALE | DIM.GREZZE-MODELLO |

| | | | | |
|---|---|---|---|---|
| TRATT TERM. | GRUPPO: OMOG. - POMPE SERIE '96 | MODIFICHE | DATA | 22/01/97 |
| SM. GENER. | | | DISEGN. | Carbognani M. |
| FINITURA | BERTOLI s.r.l. HOMOGENIZER VIA MARTIRI DELLA LIBERAZIONE 12 43100 PARMA - ITALIA | SCALA / | FORM A | DIS.N° 103069 — GRUPPO AEA |
| TOLL.GEN. H ... \| h ... | | 0 1 2 3 4 5 6 7 8 9 | SOSTITUISCE DIS. N° | RICAVATO DA DIS. N° |

| Pos.<br>Pos. | Nostro codice<br>Our code | Descrizione | Description | u.m<br>m.u | Q.tà<br>Qty |
|---|---|---|---|---|---|
| 1 | .FIA 005 | Filter | Filter | Nr. | 1 |
| 2 | EAG 009 | Magneetimismähis | Solenoid valve | Nr. | 1 |
| 2 | EBB 011 | Magnetventiil | Magnetizing coil | Nr. | 1 |
| 3 | VES 005 | Ventiil | Valve | Nr. | 1 |
| 4 | VES 013 | Ventiil | Valve | Nr. | 1 |
| 5 | CEA 025 | Hüdraulikapea | Hydraulic power pack | Nr. | 1 |
| 6 | POA 003 | Õlipump | Oil pump | Nr. | 1 |
| 7 | MED 005 | Mootor | Motor | Nr. | 1 |
| 8 | VER 005 | Ventiil | Valve | Nr. | 1 |
| 9 | SCA 004 | Soojusvaheti | Heat exchanger | Nr. | 1 |
| 10 | EFG 005 | Filter | Filter | Nr. | 1 |
| | ECD 005 | Õlifiltri padrun | Oil filter cartridge | Nr. | 1 |
| 11 | PRM 020 | Rõhulüliti | Pressure switch | Nr. | 1 |
| 12 | MHC 004 | Rõhunäidik | Pressure gauge | Nr. | 1 |
| 13 | VEX 010 | Ventiil | Valve | Nr. | 1 |
| 14 | VEX 007 | Ventiil | Valve | Nr. | 1 |
| 15 | SAA 006 | Vaateklaas | Sight glass | Nr. | 1 |
| 15 | 102698/10 | Adapter | Adapter | Nr. | 2 |
| 16 | VES 013 | Ventiil | Valve | Nr. | 1 |
| | KIT 006 | Kit | Set of pipes | Nr. | 1 |




| 1 | ASSIEME MOTORIZZAZIONE | 1 | 00 | | |
|---|---|---|---|---|---|
| POS. | DENOMINAZIONE | PEZZI | CODICE | MATERIALE | DIM.GREZZE-MODELLO |

TRATT. TERM.

SM. GENER.

FINITURA

TOLL.GEN. H ___ | h ___

GRUPPO: OMO - POMPE

MODIFICHE

DATA 20/03/01

DISEGN. *Baiocchi L.*

**BERTOLI s.r.l.**
HOMOGENIZER
VIA MARTIRI DELLA LIBERAZIONE 12
43100 PARMA - ITALIA

SCALA /

FORM B

DIS.N° 104435

GRUPPO AEE

0 1 2 3 4 5 6 7 8 9

SOSTITUISCE DIS. N° 10.00

RICAVATO DA DIS. N° 10.00

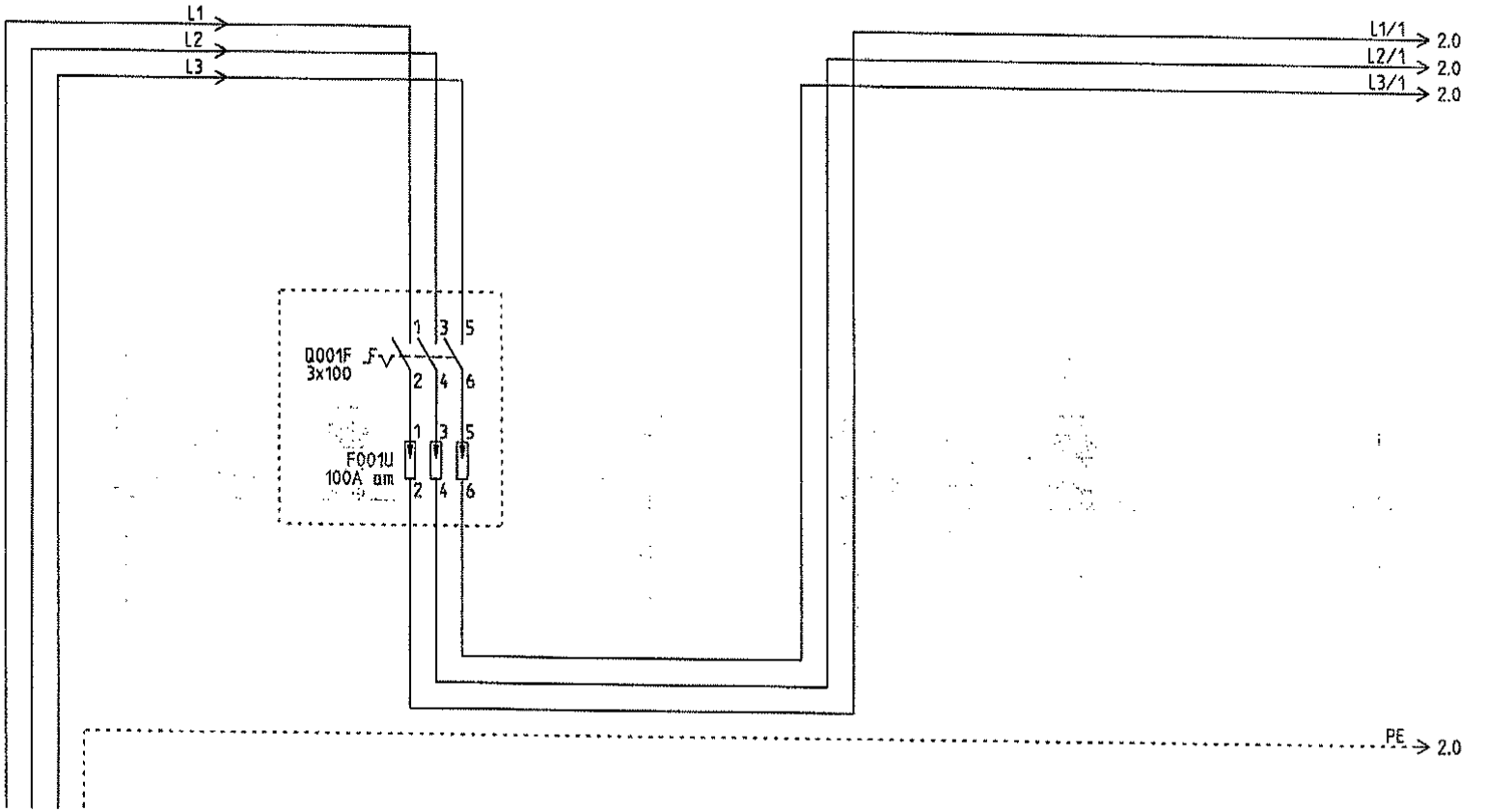
| Pos.<br>Pos. | Nostro codice<br>Our code | Descrizione | Description | u.m<br>m.u | Q.tà<br>Qty |
|---|---|---|---|---|---|
| 1 | MEE 325 | Elektrimootor | Electric motor | Nr. | 1 |
| 2 | PUM 011 | Rihmratas | Pulley | Nr. | 1 |
| 2 | BAF 111 | Kooniline pide | Conical grip | Nr. | 1 |
| 3 | CIG 020 | Rihm | Belt | Nr. | 5 |
| 4 | PUM 020 | Rihmratas | Pulley | Nr. | 1 |
| 4 | BAF 116 | Kooniline pide | Conical grip | Nr. | 1 |
| 5 | RMC 008 | Hammasreduktor | Gear reducer | Nr. | 1 |
| 7 | BOC 003 | Kummipuksliigend | Silent block | Nr. | 2 |
| 8 | MED 005 | Elektrimootor | Electric motor | Nr. | 1 |
| 8 | VEQ 010 | Fan | Fan | Nr. | 1 |

12. peatükk

# Elektriskeemid

Chapter 12

# Wiring Diagrams



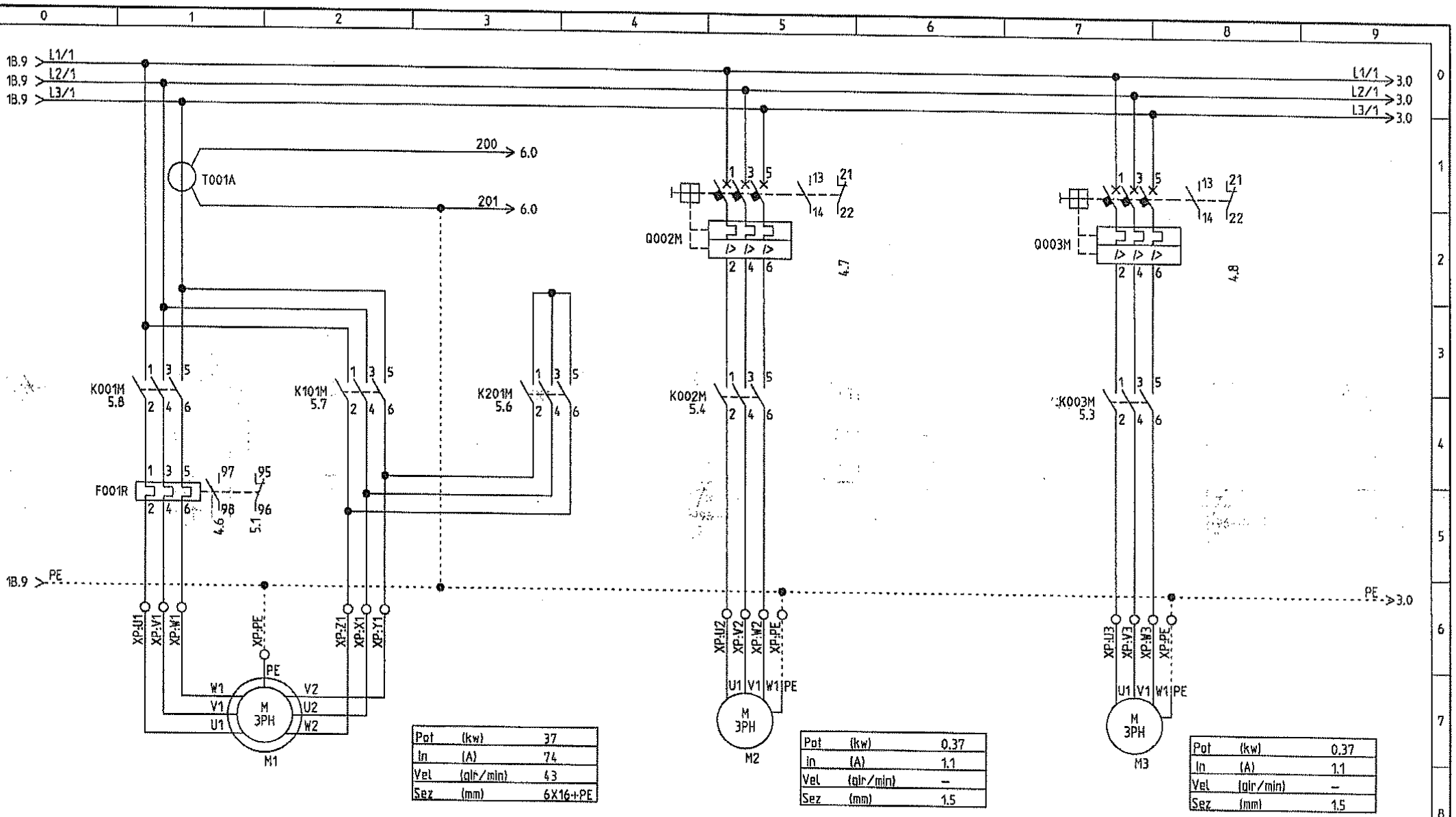

| | | |
|---|---|---|
| Pot | (Kw) | 38 |
| Tens | (V) | 400 |
| Freq | (Hz) | 50/60 |
| In | (A) | 75 |
| F001U | (A) | 100Aam |
| Sez | (mmq) | |

| | |
|---|---|
| ENTRATA LINEA | INTERRUTTORE GENERALE |
| INPUT LINE | MAIN SWITCH |
| LINIENEINTRITT | HAUPTSCHALTER |
| ENTREE LIGNE | INTERRUPTEUR GENERAL |

BERTOLI s.r.l.
via Martiri della Liberazione 12
VICOFERTILE (Parma) – ITALIA

Descrizione: GENERALE BLOCCAPORTA
Impianto:
Cliente:

Progetto: 2244B
Foglio: 1
Data: 22/10/2007
Pagine totali: 13
Pagina prec.: 1A
Pagina succ.: 2




| | | |
|---|---|---|
| Pot | (kw) | 37 |
| In | (A) | 74 |
| Vel | (gir/min) | 43 |
| Sez | (mm) | 6X16+PE |

| | | |
|---|---|---|
| Pot | (kw) | 0.37 |
| In | (A) | 1.1 |
| Vel | (gir/min) | – |
| Sez | (mm) | 1.5 |

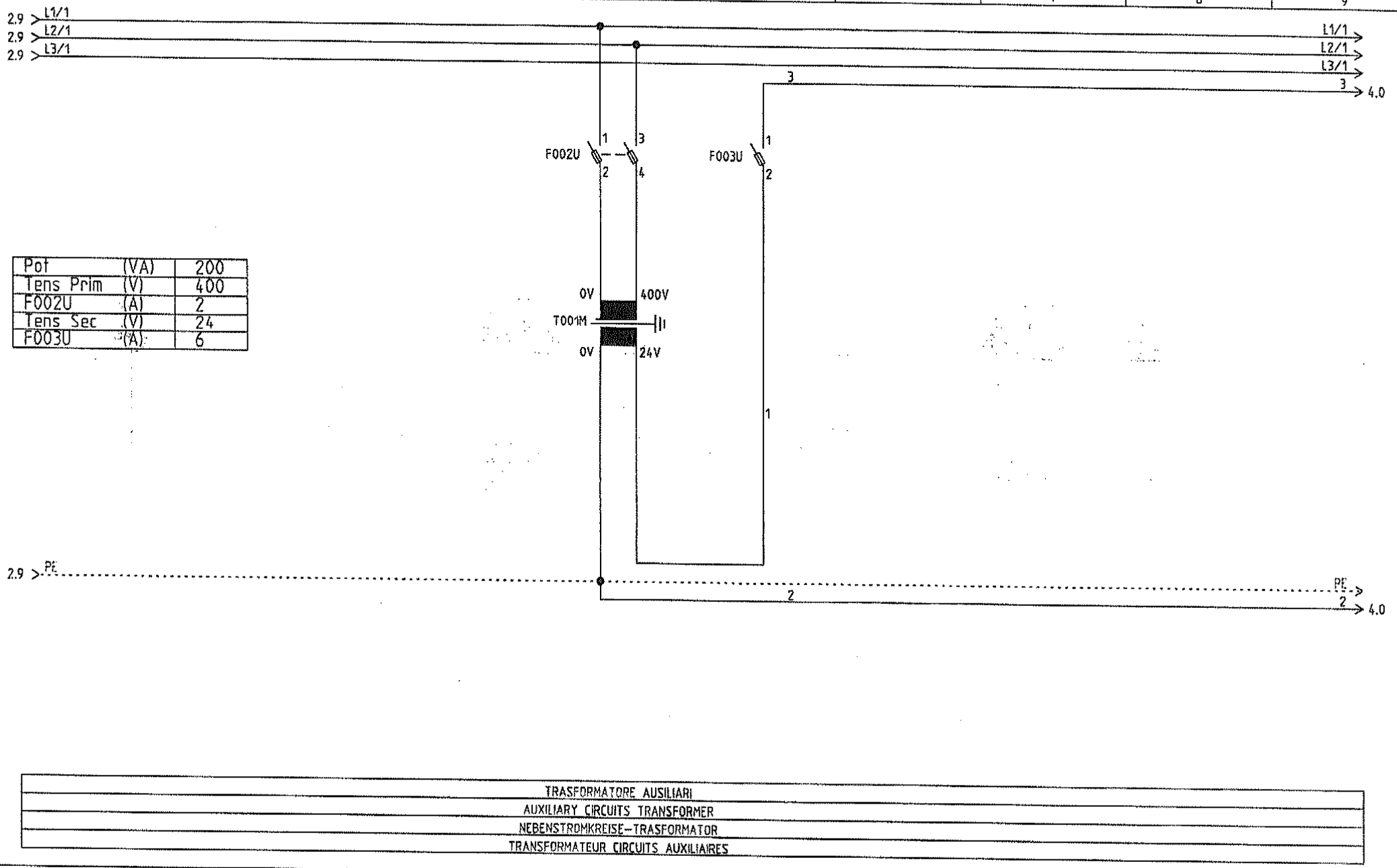
| | | |
|---|---|---|
| Pot | (kw) | 0.37 |
| In | (A) | 1.1 |
| Vel | (gir/min) | – |
| Sez | (mm) | 1.5 |

| | | |
|---|---|---|
| MOTORE PRINCIPALE | VENTILATORE | POMPA OLIO |
| MAIN MOTOR | FAN | OIL PUMP |
| HAUPTMOTOR | VENTILATOR | OIL PUMPE |
| MOTEUR PRINCIPAL | VENTILATEUR | POMPE HUILE |

BERTOLI s.r.l.
via Martiri della Liberazione 12
VICOFERTILE (Parma) – ITALIA

Descrizione: MOTORI
Impianto:
Cliente:

Progetto: 2244B
Foglio: 2
Data: 22/10/2007
Pagine totali: 13
Pagina prec.: 1B
Pagina succ.: 3

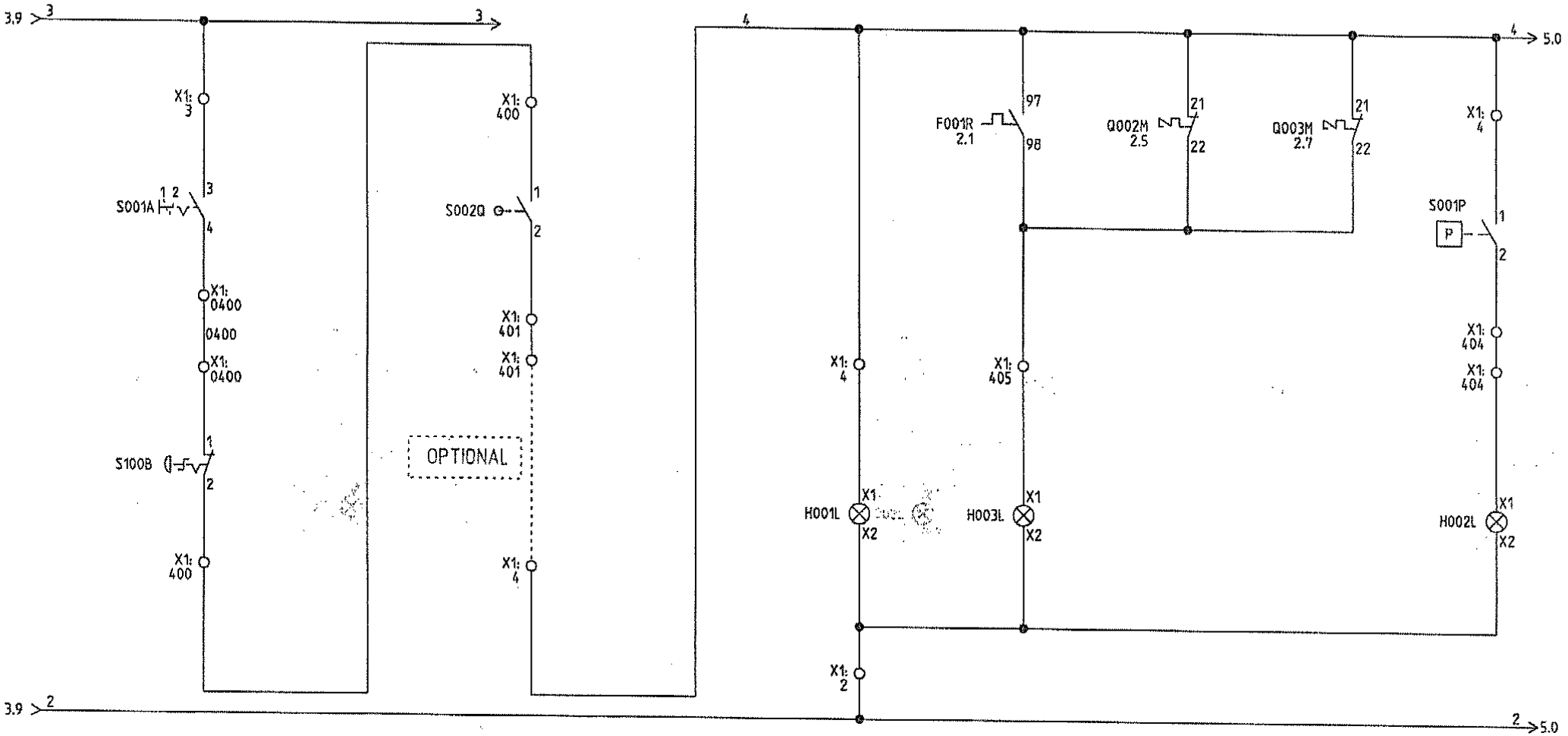



TRASFORMATORE AUSILIARI
AUXILIARY CIRCUITS TRANSFORMER
NEBENSTROMKREISE-TRASFORMATOR
TRANSFORMATEUR CIRCUITS AUXILIAIRES

BERTOLI s.r.l.
via Martiri della Liberazione 12
VICOFERTILE (Parma) – ITALIA

Descrizione: TRASFORMATORE
Impianto:
Cliente:

Progetto: 2244B
Foglio: 3
Data: 19/11/2007
Pagine totali: 13
Pagina prec.: 2
Pagina succ.: 4

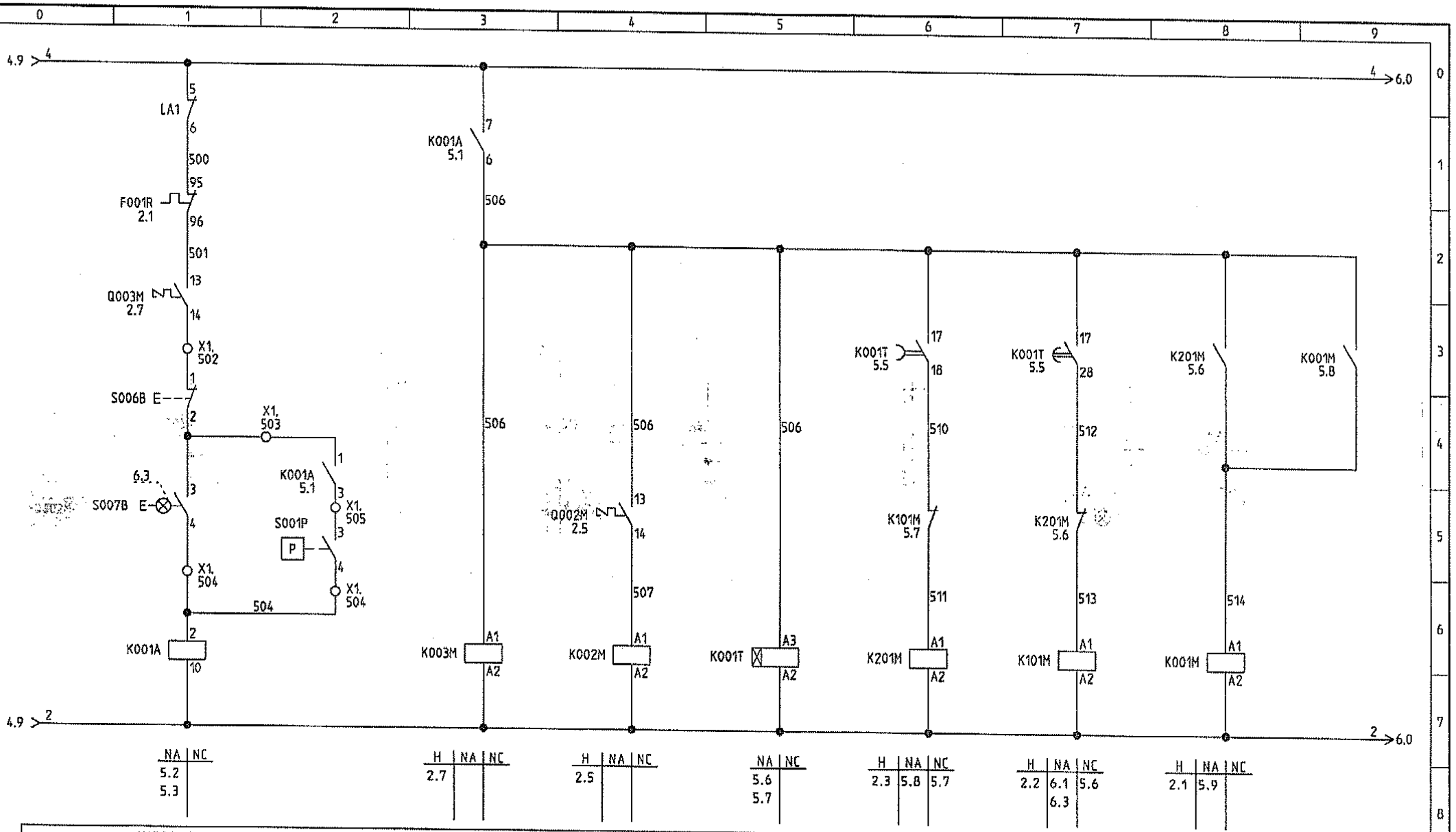



| | | | | |
|---|---|---|---|---|
| GENERALE AUSILIARI | SERIE SICUREZZE | RETE | TERMICI | PRESSOSTATO OLIO CON SEGNALAZIONE |
| AUXILIARY CIRCUITS | SAFETY SET | NETWORK | THERMAL RELAIS | OIL PRESSURE SWITCH WITH SIGNAL |
| NEBENSTROMK.-WAHLSCHAL | SICHERHEITSVOR | NETZ | THERMORELAIS | OELDRUCKWAECHTER UND ALARM |
| GENERALE AUSILIARES | OCCURRENCE HOMO | RESEAU | RELIAS THERMIQUE | PRESSOSTAT HUILE ET SIGNALISATION |

BERTOLI s.r.l.
via Martiri della Liberazione 12
VICOFERTILE (Parma) – ITALIA

Descrizione: AUSILIARI
Impianto:
Cliente:

| | | | |
|---|---|---|---|
| Progetto: 2244B | | | Foglio: 4 |
| Data: 07/11/2007 | Pagine totali: 13 | Pagina prec.: 3 | Pagina succ.: 5 |

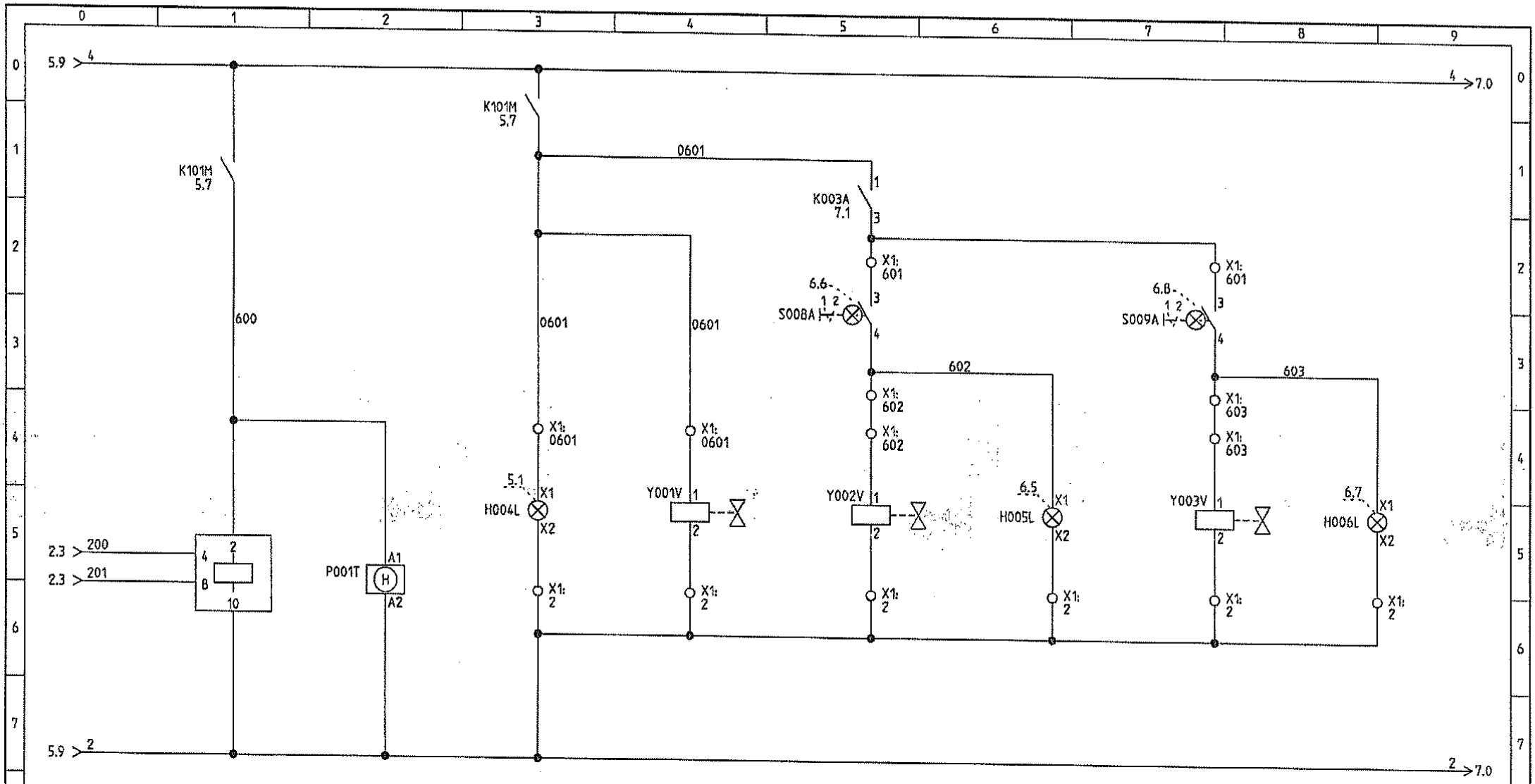



| | | | |
|---|---|---|---|
| MARCIA MACCHINA | POMPA OLIO | VENTILATORE | MOTORE PRINCIPALE |
| MACHINE RUNNING | OIL PUMP | FAN | MAIN MOTOR |
| MACHINE IN BETRIEB | OELPUMPE | VENTILATOR | HAUPTMOTOR |
| MARCHE | POMPE HUILE | VENTILATEUR | MOTEUR PRINCIPAL |

BERTOLI s.r.l.
via Martiri della Liberazione 12
VICOFERTILE (Parma) – ITALIA

Descrizione: AUSILIARI
Impianto:
Cliente:

Progetto: 2244B
Foglio: 5
Data: 07/11/2007
Pagine totali: 13
Pagina prec.: 4
Pagina succ.: 6

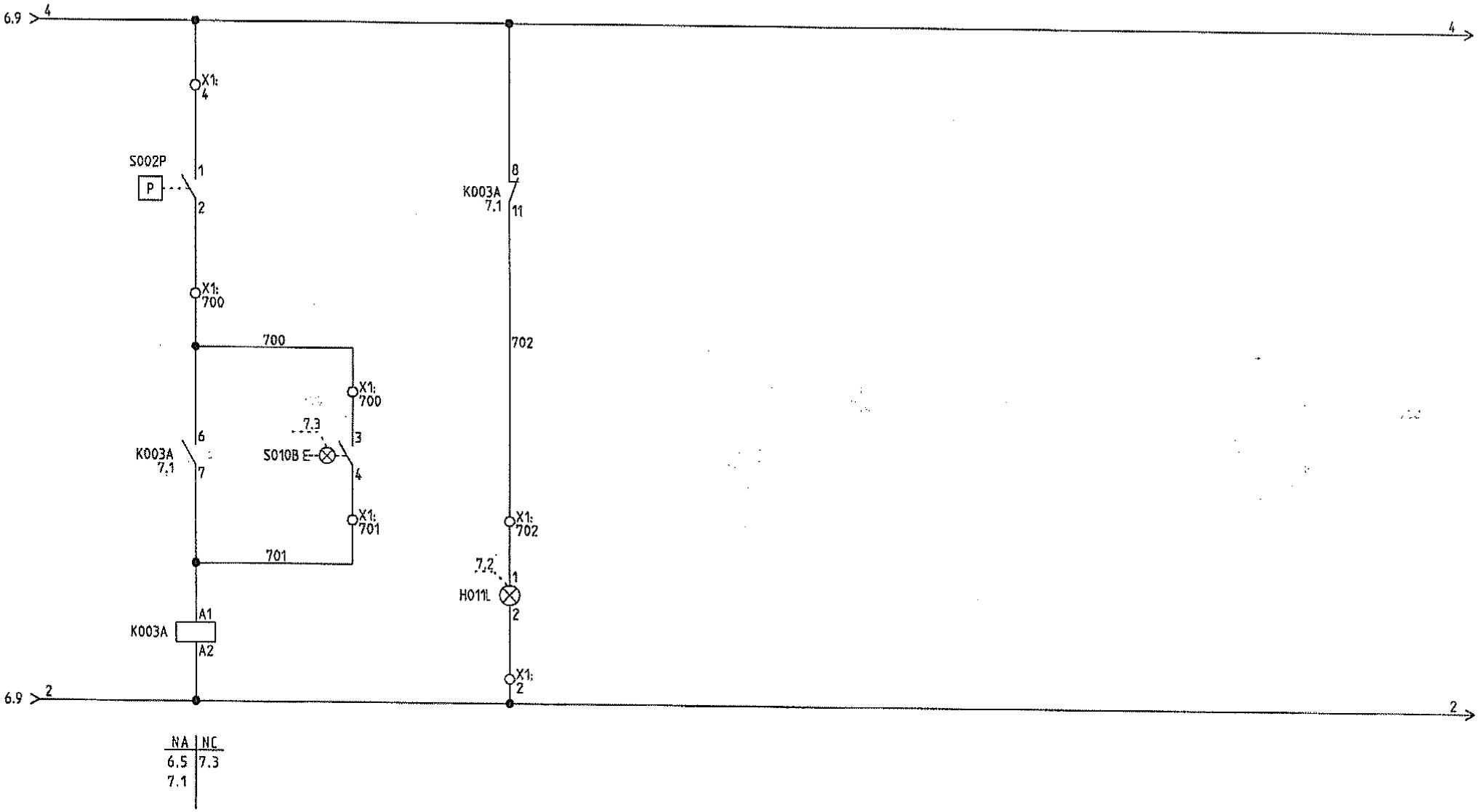



| | | | | | |
|---|---|---|---|---|---|
| RELE DI CORRENTE | CONTAORE | MARCIA MOTORE | ELETTROV. ACQUA | ELETTROV. ARIA 1 STADIO | ELETTROV. ARIA 2 STADIO |
| CURRENT RELAY | HOURS COUNTER | MOTOR RUNNING | WATER ELECTRO-VALVE | AIR ELECTRO VALVE 1 STAGE | AIR ELECTRO VALVE 2 STAGE |
| STROMRELAIS | STUNDENZAEHLER | MOTOR IN BETRIEB | WASSERELEKTROVENTIL | LUFTELEKTROVENTIL 1 STUFE | LUFTELEKTROVENTIL 2 STUFE |
| RELAIS DE COURANT | COMPTE-HEURE | SIGNALISATION MARCHE | ELECTROVANNE EAU | ELECTROVANNE AIR 1 ETAGE | ELECTROVANNE AIR 2 ETAGE |

BERTOLI s.r.l.
via Martiri della Liberazione 12
VICOFERTILE (Parma) - ITALIA

Descrizione: AUSILIARI
Impianto:
Cliente:

Progetto: 2244B
Foglio: 6
Data: 23/10/2007
Pagine totali: 13
Pagina prec.: 5
Pagina succ.: 7




PRESSOSTATO
PRESSURE SWITCH

BERTOLI s.r.l.
via Martiri della Liberazione 12
VICOFERTILE (Parma) – ITALIA

Descrizione: AUSILIARI
Impianto:
Cliente:

| | | | | |
|---|---|---|---|---|
| Progetto: 2244B | | | | Foglio: 7 |
| Data: 07/11/2007 | Pagine totali: 13 | Pagina prec.: 6 | Pagina succ.: 8 | |

## XP

MORSETTIERA POTENZA
MOTOR TERMINAL
SCHALTPLANMOTOR
BARRETTE MOTEUR

| | |
|---|---|
| M1 | PE |
| | U1 |
| | V1 |
| | W1 |
| | Z1 |
| | X1 |
| | Y1 |
| M2 | PE |
| | U2 |
| | V2 |
| | W2 |
| M3 | PE |
| | U3 |
| | V3 |
| | W3 |
| | PE |

## X1

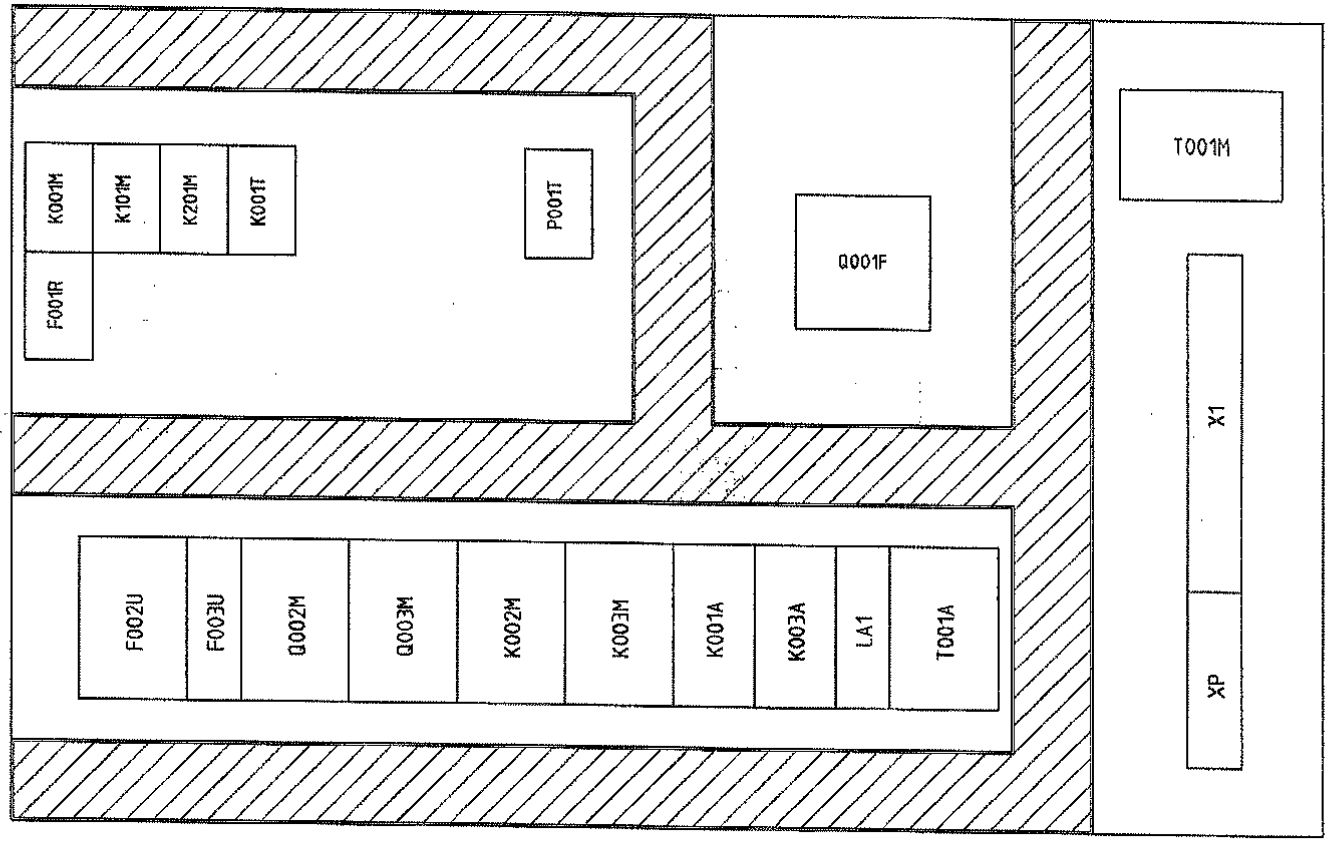
MORSETTIERA AUSILIARI
AUXILIARY TERMINAL
NEBENSTROMKREISEKLEMMKASTEN
BARRETTE CIRCUITS AUXILIAIRES

| | |
|---|---|
| | PE |
| P1 | 2 |
| Y001V | 2 |
| Y002V | 2 |
| Y003V | 2 |
| S001A | 3 |
| S001P | 4 |
| H001L | 4 |
| OPTIONAL-BRIDGE | 4 |
| S002P | 4 |
| S001A | 0400 |
| S100B | 0400 |
| S100B | 400 |
| S002Q | 400 |
| | 401 |
| OPTIONAL-BRIDGE | 401 |
| H002L | 404 |
| S001P | 404 |
| H003L | 405 |
| S006B | 502 |
| S007B | 503 |
| | 504 |
| S001P | 504 |
| | 505 |
| H004L | 0601 |
| Y001V | 0601 |
| S008A | 601 |
| S008A-H005L | 602 |
| Y002V | 602 |
| S009A-H006L | 603 |
| Y003V | 603 |
| S002P | 700 |
| S010B | 700 |
| | 701 |
| H011L | 702 |
| | PE |

BERTOLI s.r.l.
via Martiri della Liberazione 12
VICOFERTILE (Parma) - ITALIA

Descrizione: MORSETTIERE
Impianto:
Cliente:

Progetto: 2244B
Foglio: 8
Data: 22/10/2007
Pagine totali: 13
Pagina prec.: 7
Pagina succ.: 9

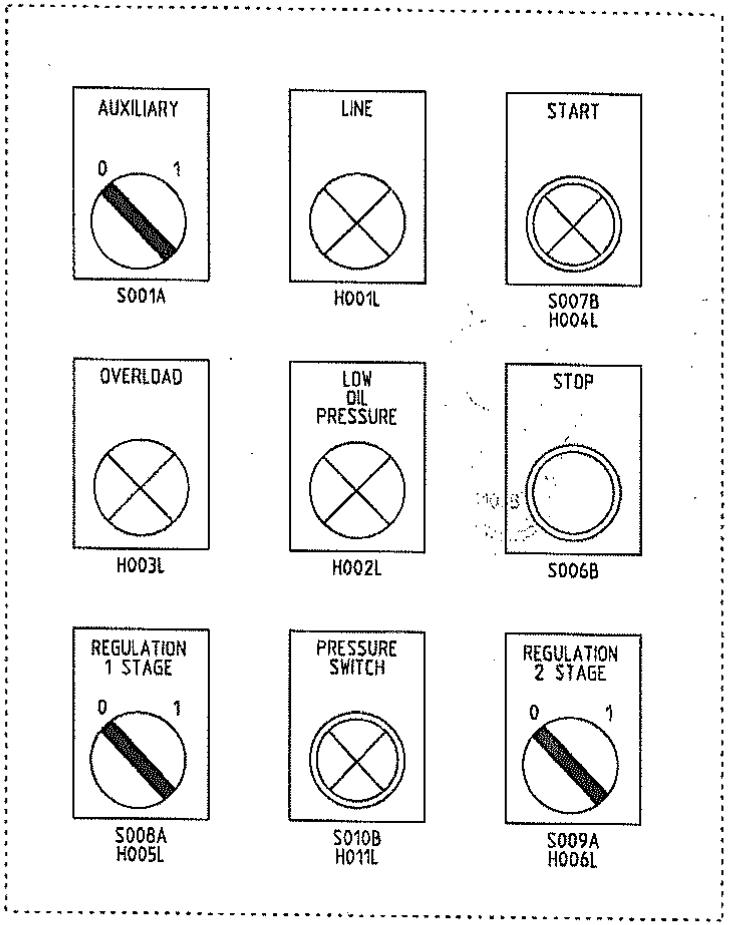



BERTOLI s.r.l.
via Martiri della Liberazione 12
VICOFERTILE (Parma) – ITALIA

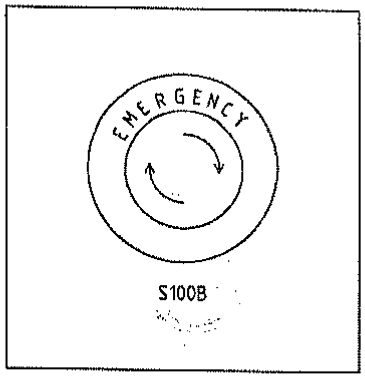
Descrizione: DISPOSIZIONE DI FONDO
Impianto:
Cliente:

Progetto: 2244B
Foglio: 9
Data: 07/11/2007
Pagine totali: 13
Pagina prec.: 8
Pagina succ.: 10

P1




P2




BERTOLI s.r.l.
via Martiri della Liberazione 12
VICOFERTILE (Parma) – ITALIA

Descrizione: DISPOSIZIONE PULSANTIERA
Impianto:
Cliente:

| Progetto: | 2244B | | Foglio: |
|---|---|---|---|
| Data: 19/11/2007 | Pagine totali: 13 | Pagina prec.: 9 | Pagina succ.: 11 |

| LABEL | DESCRIPTION | ARTICLE | BUILDER | Q.TY | NOTE |
|---|---|---|---|---|---|
| Q001F | INTERRUTTORE BLOCCAPORTA 3X100A<br>CON FUSIBILI | 3KL7121-3BA00 | SIEMENS | 1 | |
| T001A | TRASFORMATORE AMPEROMETRICO<br>AMPEROMETRIC TRANSFORMER | AC22 100/5 | CARLO GAVAZZI | 1 | |
| K001M-K101M | TELERUTTORE<br>REMOTE CONTROL SWITCH | 3RT1035-1AC20 | SIEMENS | 2 | |
| K201M | TELERUTTORE<br>REMOTE CONTROL SWITCH | 3RT1026-1AC20 | SIEMENS | 1 | |
| K001T | TEMPORIZZATORE<br>TIMER | 3RP1574-1NQ30 | SIEMENS | 1 | |
| T001M | TRASFORMATORE<br>TRANSFORMER | 200VA 400/24V | ELETRAS | 1 | |
| F002U-F003U | PORTAFUSIBILI<br>FUSEBOX | 3NW7011+3NW7023 | SIEMENS | 2 | |
| S001A | SELETTORE 2 POS A CHIAVE<br>TWO POSITION KEY SELECTOR | 3SB3500-4AD11 | SIEMENS | 1 | |
| S001Q | FINECORSA<br>LIMIT SWITCH | FR501 | PIZZATO | 1 | |
| S100B | PULSANTE DI EMERGENZA<br>EMERGENCY BUTTON | 3SB3603-1HA20 | SIEMENS | 1 | |
| H001L | GEMMA BIANCA<br>WHITE GEM | 3SB3604-6BA60 | SIEMENS | 1 | |
| H003L | GEMMA ARANCIO<br>ORANGE GEM | 3SB3604-6BA30 | SIEMENS | 1 | |
| S006B | PULSANTE ROSSO<br>RED BUTTON | 3SB3500-0AB01 | SIEMENS | 1 | |
| F001R | TERMICO<br>THERMIC | 3RU1136-4HB0 | SIEMENS | 1 | |

BERTOLI s.r.l.
via Martiri della Liberazione 12
VICOFERTILE (Parma) – ITALIA

Descrizione: ELENCO MATERIALE
Impianto:
Cliente:

Progetto: 2244B
Foglio: 11
Data: 07/11/2007
Pagine totali: 13
Pagina prec.: 10
Pagina succ.: 12

| LABEL | DESCRIPTION | ARTICLE | BUILDER | Q.TY | NOTE |
|---|---|---|---|---|---|
| S007B+H004L | PULSANTE LUMINOSO VERDE<br>GREEN LUMINOUS BUTTON | 3SB3606-0AA41 | SIEMENS | 1 | |
| LA1 | RELE AMPEROMETRICO<br>AMPEROMETRIC RELAY | LA3E | LOVATO | 1 | |
| P001T | CONTADRE<br>HOUR COUNTER | 7KT5802 | SIEMENS | 1 | |
| S008A+H005L<br>S009A+H006L | SELETTORE LUMINOSO VERDE<br>GREEN LUMINOUS SELECTOR | 3SB3501-2KA41 | SIEMENS | 2 | |
| Q002M-Q003M | MAGNETOTERMICO<br>MAGNETO THERMIC | 3RV1021-0KA15 | SIEMENS | 2 | |
| K002M-K003M | TELERUTTORE<br>REMOTE CONTROL SWITCH | 3RT1016-1AB01 | SIEMENS | 2 | |
| H002L | GEMMA ROSSA LAMPEGGIANTE<br>RED LUMINOUS GEM | 3SB3604-6BA20+<br>3SB3400-4B | SIEMENS | 1 | |
| | CASSA<br>BOX | GS7520<br>700X500X200 | CEB | 1 | |
| K001A - K003A | RELE<br>RELAY | MK3P5-S+PF113AE | OMRON | 2 | |
| S010B + H011L | PULSANTE LUMINOSO GIALLO<br>YELLOW LUMINOUS BUTTON | 3SB3606-0AA31 | SIEMENS | 1 | |
| | | | | | |
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# 13.1 LISAD

1) Juhised elektrimootorite „Brook Compton“ kohta

2) Juhised reduktorite „Rossi Motoriduttori“ kohta

3) Juhised hüdraulilise agregaatpea „Manfrini“ kohta

# ENCLOSURES

1)"Brook Crompton" electric motors instructions

2)"Rossi Motoriduttori" gear reducers instructions

3)"Manfrini" hydraulic power pack instructions

# 13.1 Juhised elektrimootorite „Brook Compton“ kohta

# 13.1"Brook Crompton" electric motors instructions

# Installation and maintenance of AC electric induction motors

## Introduction

Your Brook Crompton motor is designed for long life, and low running costs. Careful installation and maintenance will ensure that you achieve reliable operation and optimum efficiency.

## Pre-installation requirements

### ⚠ WARNING

Handling and lifting of electric motors must only be undertaken by authorised personnel. Full product documentation and operating instructions must be available together with tools and equipment necessary for safe working practice.

### Receipt

Before any motor is accepted on site it should be inspected carefully for damage or loss incurred during transit.

Packing materials may be damaged including sheeting and crate timbers.

Handling operations may have damaged fan cowls, terminal boxes or auxiliaries.

Where an instance of droppage or loss is evident or suspected, it may be necessary to unpack the goods to establish the full extent of the problem.

Wherever possible, damage should be recorded, photographed and witnessed.

Report any damage to the carriers and Brook Crompton as soon as possible, quoting the motor number and consignment note reference. The insurance company's agents shown on the insurance certificate should also be advised.

### ⚠ Lifting

Eyebolts and/or lifting trunnions supplied with the motor are designed to support only the weight of the motor, not the weight of the motor and any ancillary equipment attached to it. Be absolutely sure that cranes, jacks, slings and lifting beams are capable of carrying the weight of equipment to be lifted.

Where an eyebolt is provided with the motor, this should be screwed down until its shoulder is firmly against the face of the stator frame to be lifted. Eyebolts are normally designed for a vertical lift. For eyebolt/lifting lug torques, see opposite.

### Eyebolt/lifting lug bolt torques

| Type | | Eyebolt dia | Cast iron frames | |
|---|---|---|---|---|
| Metric | NEMA/ CSA | Lifting lug bolt dia* | Torque Nm | Lbf.FT |
| **63** | – | – | – | – |
| **71** | – | – | – | – |
| **80** | 56 | – | – | – |
| **90S/L** | 143/145 | – | – | – |
| **100L** | – | – | – | – |
| **112M** | 182/184 | M12† | – | – |
| **132S/M** | 213/215 | M12† | – | – |
| **160M/L** | 254/256 | M12† | – | – |
| **180M/L** | 284/286 | M16† | – | – |
| **200L** | 324 | M10* | 52 | 38 |
| **225S** | 326 | M10* | 52 | 38 |
| **225M** | 364 | M10* | 52 | 38 |
| **250S** | 365 | M10* | 52 | 38 |
| **250M** | 404 | M16* | 220 | 162 |
| **280S** | 405 | M16* | 220 | 162 |
| **280M** | 444 | M16* | 220 | 162 |
| **315S** | 445 | M16* | 220 | 162 |
| **315M** | 504 | M20* | 400 | 295 |
| **315L** | 505 | M20* | 400 | 295 |
| **355M/L** | 585/6/7 | M20* | 400 | 295 |

* *W-DF design only. Lifting lugs secured with bolts and nuts. High tensile socket headed bolts and special square nuts must be used*

† *The eyebolt should be firmly screwed down (without over tightening), to ensure that the collar is fully seated*

Where two eyebolts/lifting lugs are used with inclined loading, the maximum safe working loads of BS 4278: 1984 should not be exceeded (ISO 3266).

### Tables of approximate weights

**Cast iron construction**
***Frames DF80–DF180L***

| Type | Net weight kg | Gross weight kg | Cubage $m^3$ |
|---|---|---|---|
| **DF80M** | 15 | 16.5 | 0.02 |
| **DF90S** | 19 | 20.5 | 0.03 |
| **DF90L** | 22 | 23.5 | 0.03 |
| **DF100L** | 24 | 26 | 0.03 |
| **DF112M** | 36 | 38 | 0.05 |
| **DF132S** | 65 | 67 | 0.08 |
| **DF132M** | 77 | 88 | 0.08 |
| **DF160M** | 129 | 138 | 0.15 |
| **DF160L** | 149 | 158 | 0.15 |
| **DF180M** | 192 | 203 | 0.21 |
| **DF180L** | 212 | 223 | 0.21 |

**Cast iron construction**
***Frames W-DF100L–W-DF355L***

| Type | Net weight kg | Gross weight kg | Cubage $m^3$ |
|---|---|---|---|
| **W-DF100L** | – | – | – |
| **W-DF112M** | – | – | – |
| **W-DF132S/M** | – | – | – |
| **W-DF160M/L** | – | – | – |
| **W-DF180M/L** | 285 | 300 | 0.30 |
| **W-DF200L** | 285 | 300 | 0.30 |
| **W-DF225S** | 320 | 335 | 0.37 |
| **W-DF225M** | 375 | 390 | 0.37 |
| **W-DF250S** | 420 | 460 | 0.63 |
| **W-DF250M** | 570 | 610 | 0.70 |
| **W-DF280S** | 660 | 721 | 1.2 |
| **W-DF280M** | 800 | 871 | 1.2 |
| **W-DF315S** | 1000 | 1095 | 1.8 |
| **W-DF315M** | 1100 | 1195 | 1.8 |
| **W-DF315L** | 1300 | 1395 | 1.8 |
| **W-DF355S** | 2000 | 2120 | 2.3 |
| **W-DF355M** | 2300 | 2420 | 2.3 |
| **W-DF355L** | 2500 | 2620 | 2.3 |

**Aluminium construction**
***Frames DA63–DA200***

| Type | Net weight kg | Gross weight kg | Cubage $m^3$ |
|---|---|---|---|
| **DA63** | 5 | 5.4 | 0.010 |
| **W-DA71** | 6 | 6.4 | 0.010 |
| **W-DA80** | 9 | 10 | 0.020 |
| **W-DA90S** | 12.5 | 13.5 | 0.030 |
| **W-DA90L** | 14.5 | 15.5 | 0.030 |
| **W-DA100L** | 19 | 21 | 0.038 |
| **W-DA112M** | 27 | 29 | 0.050 |
| **W-DA132S** | 38 | 41 | 0.071 |
| **W-DA132M** | 46 | 49 | 0.076 |
| **W-DA160M** | 80 | 95 | 0.125 |
| **W-DA160L** | 100 | 112 | 0.125 |
| **W-DA180M** | 140 | 165 | 0.253 |
| **W-DA180L** | 148 | 174 | 0.253 |
| **DA200L** | 225 | 240 | 0.370 |

**Drip proof cast iron construction**
***Frames K-CF225M–K-CF315M***

| Type | Net weight kg | Gross weight kg | Cubage $m^3$ |
|---|---|---|---|
| **K-CF225M** | 378 | 411 | 0.37 |
| **K-CF250S** | 391 | 446 | 0.63 |
| **K-CF250M** | 444 | 499 | 0.70 |
| **K-CF280S** | 536 | 602 | 1.2 |
| **K-CF280M** | 633 | 699 | 1.2 |
| **K-CF315S** | 801 | 885 | 1.8 |
| **K-CF315M** | 916 | 1000 | 2.3 |

| Steel construction *Frames 7-DS225S–7-DS355LX* | | | |
|---|---|---|---|
| *Type* | *Net weight kg* | *Net weight kg* | *Cubage m³* |
| **7-DS225S** | 250 | 284 | 0.511 |
| **7-DS225M** | 280 | 314 | 0.511 |
| **7-DS250S** | 370 | 407 | 0.595 |
| **7-DS250M** | 440 | 477 | 0.595 |
| **7-DS280S** | 500 | 542 | 0.786 |
| **7-DS280M** | 565 | 607 | 0.786 |
| **7-DS315S** | 710 | 805 | 1.323 |
| **7-DS315M** | 750 | 845 | 1.323 |
| **7-DS315L** | 920 | 1015 | 1.323 |
| **7-DS355S** | 1225 | 1345 | 2.130 |
| **7-DS355M** | 1530 | 1650 | 2.130 |
| **7-DS355L** | 1710 | 1830 | 2.130 |
| **7-DS355LX** | 2080 | 2200 | 2.500 |

## Storage

If motors have to be stored before installation, precautions should be taken to prevent deterioration.

### *Environment*

Depending on the site conditions it may be necessary to create a suitable stores area to hold the motor prior to installation. Packing cases are not waterproof.

Motors should be stored in a dry, vibration free and clean area at normal ambients (–20°C to 40°C), unless other arrangements have been agreed with Brook Crompton.

Where low temperature ambient storage is anticipated, special precautions should be taken with the type of grease, no plastic parts etc to ensure trouble free start-up.

Motors must be stored away from corrosive or chemically damaging fumes.

Before placing motors into storage, machined components should be carefully inspected. Bearings and shafts are normally covered with a corrosion resistive barrier. If this coating is damaged it should be made good. The component should be cleaned and the protective coating reapplied.

Under no circumstances should rust be merely covered over.

### *Drain holes*

Motors provided with drain holes have drain plugs provided loose in the terminal box up to frame size 180, and fitted on frames size 200 and above. Position the drain holes at the lowest point.

### *Bearings*

To avoid static indentation the storage area should be vibration free. If this is not possible it is strongly recommended that the motors be stood on thick blocks of rubber or other soft material.

Shafts should be rotated by hand one quarter of a revolution weekly.

Where the exposure to some vibration is unavoidable the shaft should be locked in position to avoid static indentation of the bearings.

Roller bearings may be fitted with a shaft locking device. This should be kept in place during storage.

### *Grease*

Factory fitted bearings use a lithium based grease with a recommended shelf life of two years. If stored for a longer period, grease may need to be replaced.* Shielded bearings have a storage life of five years and a further two years operational life following installation.

* *Wash all bearing parts with a non-contaminating solvent. Lightly pack the bearings with grease applying a 33% fill by volume into the bearing and housings*

### *Heaters*

Where space heaters are fitted, and the storage environment has wide humidity and temperature variations, it is strongly recommended they be energised.

Warnings should be placed on the motors to make operatives aware of the live heaters

Supplies are normally 220-240 volt single phase, from a 380-415 volt three phase supply. See terminal box lid for details.

A low voltage DC supply could be used as an alternative (see E:6).

### *Insulation resistance*

During extended storage a three monthly insulation test is recommended to avoid possible lengthy drying out periods when installing. Use a 500 volt DC Megger.

The insulation resistance between phases and between the windings and the frame should be checked.

The insulation resistance should be maintained above 10 megohm.

If a lower reading is measured, use one of the drying out methods recommended on page E:6 until an acceptable reading is obtained. If heaters are fitted but not energised, they should be used in future. See also note on page E:6.

### *Wound rotors*

Ideally, wound rotor motor brushes should not be in contact with the slip-rings during storage as there is a risk of corrosion. Brushes should either be lifted off the slip-rings or stored separately. This may not be possible with small motors (up to frame DWF180).

## Installation

Work on hazardous area motors should only be carried out by Brook Crompton trained personnel or those trained to an equivalent standard

Reference should be made to:

**a** constructional standards EN50014, EN50018 (EEx d), EN50019 (EEx e), BS 5000 Part 16

**b** the approval certificate

**c** codes of practice (BS 5345, IEC 79 Part 14)

All warning instructions and labels must be observed and retained with the motor

**Health & Safety at Work etc Act 1974**

It is essential equipment is installed, earthed and guarded in accordance with current legislation

### *Location*

Motors must be installed with adequate access for routine maintenance. A minimum of 0.75m of working space around the motor is recommended. Adequate space around the motor, particularly at the fan inlet (50mm), is also necessary to facilitate airflow.

Where several motors are installed in close proximity, care must be taken to ensure that there is no recirculation of exhausted warm air. Foundations must be solid, rigid and level.

### *Mechanical*

#### *Drain holes*

Prior to installation remove drain plugs if fitted. If any water has accumulated, the integrity of all gaskets, sealants etc. should be checked. Drain plugs should be put back into place after draining.

#### *Alignment*

When the application calls for direct coupling, the shafts must be correctly aligned in all three planes. Bad alignment can be a major source of noise and vibration.

Allowance must be made for shaft endfloat and thermal expansion in both axial and vertical planes. It is preferable to use flexible drive couplings.

#### *Noise levels*

The noise levels published in current Sales Specifications are equal to or less than the limiting values for rotating machines specified in European and International Standards BS EN 60034 and IEC 34-9.

In most cases noise levels also meet limiting values for exposure to noise in the work place ie Guidance on regulations for Noise at Work issued by HMSO.

It is the responsibility of the purchaser to ensure that other overriding lower noise levels if required, eg Machinery Directive, are specified at the time of order, or that the installation incorporates noise attenuating measures.

#### *Free rotation*

The rotor must be free to rotate within its housing. Where uneven or bumpy rotation occurs the bearings should be inspected to establish that they have not been damaged during transportation or storage.

#### *Slide rails*

Slide rails are available for all motors in the

Brook Crompton product range to provide adjustable mounting. Fabricated steel rails are the standard as they are suitable for all mounting arrangements. Alternative aluminium slide rails are available for floor mounting.

**Installation**

1 slide rails must be installed on a flat surface
2 rails must have a secure location
3 drive and driven shafts must be parallel (see Appendix 1)

### ⚠ *Electrical connection*

The connection diagram is shown on the leaflet enclosed in the motor terminal box or the diagram inside the terminal box lid. The cables used should be capable of carrying the full load current of the motor (see motor nameplate) without overheating or undue voltage drop.

### *Cable terminations*

All cable terminations should be tightly secured. Mains lead terminal lugs should be in face to face contact with the motor lead lugs and securing nuts and lockwashers screwed firmly over the connection. There should be no nuts or lockwashers fitted between the mains and motor lugs.

Wiring should be carried out or checked by a qualified electrician and equipment must be earthed in accordance with current regulations. The equipment must be correctly fused and isolated. All covers must be in position prior to running.

### ⚠ *WARNING*

Isolate power supply to motor before commencing any routine cleaning or maintenance work.

### *Drying out procedures*

It is preferable to dismantle the motor to the point where the rotor is removed. This is not essential but the drying out process will take longer in the assembled state.

The temperature of the windings and the insulation resistance should be monitored at regular intervals. On initial application of heat the insulation resistance will drop quickly and then start to rise slowly until level. On discontinuation of the drying process, a further rise in resistance will occur.

There are several methods which can be used:

1 place the motor in a warm (typically 40°C), dry airstream (fan or convector heater) or in a warm oven with a temperature not exceeding 80°C. This method is preferred if the motor is dismantled
2 connect the motor to a low voltage* three phase supply and inject a current not exceeding 50% of the full load current into the stator winding (**approximately 10% of the line voltage*). If this is carried out on an assembled motor, it is possible though unlikely that the motor will turn. If so the rotor should be locked in position
3 connect two phases in parallel, and the third in series. Apply a low voltage AC or DC supply up to a maximum of 50% of full load current. The stator winding temperature must not be allowed to exceed 80°C. In practice the frame should not be hot to the touch, to guard against internal overheating and consequent damage to the insulation
4 where heaters are fitted these can be energised

### *Supply*

It is important that a motor is operated within the limits of its design voltage and frequency.

It is important that a motor is operated within the limits of its design voltage and frequency. Standard motors for the UK will operate without damage on any voltage in the range 94% to 106% of the nameplate voltage.

The supply cables must be capable of carrying the full load current of the motor (see motor nameplate) without overheating or excessive voltage drop under starting conditions.

### *Earthing*

All motors are fitted with an earthing terminal, in or adjacent to the terminal box, to enable connection to an effective earthing bond. The terminal is designed for connecting the correct size of copper earth connector. If a different material is to be used please refer to Brook Crompton.

The motor must be earthed by connecting the shortest possible length of cable to the earth screws. The cable must have a capacity at least that of the main connections up to 16mm² phase conductors. Between 16 and 35mm² phase conductors, the earth should be a minimum of 16mm². Above 35mm² phase conductors, the earth conductor should be a minimum of half the phase conductor.

| *Phase conductor mm²* | *Earth conductor mm²* |
|---|---|
| up to 16 | at least equal |
| 16-35 | 16 minimum |
| above 35 | at least half |

An earthing bond should not be terminated under the motor fixture bolts or terminal cover screws. The earth lead could be over-looked on reconnection after maintenance

### *Heater continuity*

Heaters should be checked for continuity prior to connection to the control circuitry.

### *Thermistor continuity*

If fitted, it is recommended that thermistors be connected to the control circuit. Thermistors provide good thermal overload protection.

### *Auxiliary electrical items*

Where auxiliaries are fitted, the characteristics should be checked. Example: RTDs (Resistance Temperature Detectors) should have their resistances checked against manufacturer's figures.

Do not megger across the thermistor. Do not apply more than 6V across the thermistor for continuity check.

### *Control gear*

Ensure all control gear and associated metering/protection circuits have been checked fully.

It is imperative that any overload trips and emergency shutdown circuits are working correctly before the motor is energised. All covers must be in position

Where a motor is fitted with a separately driven fan unit, the interlocks and thermal overload protection circuits must be operative.

### *Connection diagrams*

Refer to the connection diagram supplied with the motor for supply details and the required winding connection.

### *Rotation*

Before coupling the motor to the drive, run the motor briefly to check rotation.

All covers must be in place

Motors fitted with angular contact or duplex bearings must be run in the correct mounting position eg vertical.

To reverse rotation interchange any two supply leads.

### *Wound rotors*

The stator of a wound rotor motor is similar to a cage motor but the rotor circuit is connected to a starting resistance. Take care to ensure that the brushes are in contact with the slip rings and that the rotor resistances are connected in the **'start'** position.

### *Starting*

Motors are rated by the output required, the number of starts per hour, the load curve/ inertia, and environmental considerations.

Operating outside the contractual parameters may thermally overload the motor eg too many starts per hour, or mechanically stress components eg overspeeding.

Refer to starter literature for method of start and safety precautions to be taken

### *Running*

After one hour of running, check the general vibration levels. If these are excessive, check alignment (and belt tensioning if belt driven).

Some initial bearing noise may be present during the running in period. This is normal because the grease has to settle down within the bearing. The noise should disappear after a few hours of operation.

Check that the motor runs up smoothly and within the permitted run-up time. Note that repeated starting in quick succession may lead to a thermal overload of the motor.

## *Motor modifications*

W series
Multimount modification
Cast iron motors
*Frames (200-355)*

### ⚠ *SAFETY WARNING*

Do not work under suspended load and use correct lifting equipment.

### Changing terminal box

1 lift motor, using two lifting lugs provided
2 slacken the two vertical foot fixing bolts on one foot
3 remove the two horizontal foot fixing bolts
4 pull the foot away from the frame
5 repeat stages **2** to **4** on the other foot
6 lower the motor onto two pieces of timber
7 remove both lifting lugs
8 rotate the motor until the terminal box is in the correct postion
9 refit the two lugs on the machined pads at the top of the motor on diagonally opposite corners. Ensure that lifting lugs are in contact with all machined faces and that the correct bolts and nuts are used. Tighten the bolts to the torque shown on page E:4
10 remove fan cover
11 remove the endshield bolts at both ends of the motor
12 slacken drive end bearing cap or clamping screws to allow endshield spigot to disengage
13 disengage both endshield spigots and rotate the endshields through 90 degrees until the grease nipples are at the top
14 refit endshield bolts and tighten to torque given on page E:8
15 retighten the bearing cap screws at the drive end, replacing the Nyltite washers under the bolt heads. Tighten screws to the torque given on page E:8
16 lift motor, using hooks in the two lifting lugs
17 strip paint from the pads where the feet are to be fitted and apply a thin film of grease for corrosion protection on bare surfaces
18 slide first foot into position, using vertical nuts and bolts for location purposes. Lightly tighten to prevent foot from falling out of the slots in the frame
19 insert horizontal bolts
20 ensure the feet are fully in contact with the machined faces. Tighten all bolts to the torque given on page E:8
21 repeat stages **18** to **20** on the other foot
22 prime and paint all machined surfaces left exposed by the changes
23 refit fan cover with the greasing hole in the correct position
(if in doubt ask Brook Crompton)

### Bearings, grease, bearing change

*Grease*

Bearings are prepacked with a lithium or lithium complex based grease.

Other lithium based greases of a similar consistency would be compatible. See Table 1 for some alternatives.

**Table 1**
**Alternative lithium complex greases**

| *Grease* | *Reference* | *Manufacturer* |
|---|---|---|
| **Energrease** | LC2 | BP |
| **Castrol** | LMX | Castrol |
| **Luplex** | M2 | Century |
| **Unirex** | N2 | Esso |
| **Sovereign** | LS | Gulf |
| **Mobilgrease** | HP | Mobil |
| **Liplex** | EP2 | Shell |
| **Hytex** | EP2 | Texaco |
| **Retinax** | LX | Shell |
| **LGHT3** | – | SKF |

Where a special grease has been supplied this will be indicated on the motor nameplate.

*Regreasing*

Standard regreasing facilities, where provided, are situated on the periphery of the drive end and non drive endshields.

Grease relief is via a:

**a** diaphragm relief valve
**b** rotating grease relief flinger
**c** plugged grease chute

**Standard regreasing facilities**

| *Type* | *Regreasing facility* |
|---|---|
| **63/180*** | on request |
| **200/355** | standard |

* *Bearings are double shielded and prepacked with grease for life*

Recommended relubrication intervals are shown in Appendix 2. Motors without grease nipples have sealed for life bearings and the intervals in Appendix 2 should be considered as bearing replacement recommendations.

An overgreased bearing will cause overheating of the bearing with the possible escape of the grease, loss of lubrication qualities, leading to ultimate bearing failure.

See Appendix 3 for replacement of a 'W' non-drive end bearing.

*Lubrication procedure*

The following procedure should be adopted.

1 wipe clean the grease gun fitting and the regions around the motor grease fittings
2 remove the grease relief plug if fitted. Some motors will have one way grease valves which should be left in place
3 add a small quantity of grease, approximately 4 to 10 shots depending on frame size
4 allow motor to run for about ten minutes in order that excess grease may be expelled before refitting the relief plug. Bearings fitted with rotating grease relief or through grease valves will relieve automatically
5 on initial start up or after relubrication, 'bearing noise' may result from the new grease moving around the bearing. This noise is normal and will disappear after a few hours of running

*Bearing change*

When fitting new bearings the parts should be lightly lubricated with grease.

The bearing should be driven onto the shaft by pressure on the **inner race only** using a short length of tube placed over the motor shaft.

On larger motors it is easier to raise the temperature of the bearing using an oil bath, oven, or induction heating. The temperature must be controlled to 120°C maximum.

The bearing should then be quickly slipped into place, ensuring that the bearing is in contact with the shaft shoulder.

When cool, ensure that the bearing is clean and charge the bearing with the recommended quantity of grease.

Bearings and housings should be one third full.

### Fitting flange adaptor

1 if required, remove foot as detailed in terminal box position change
2 if required, reposition terminal box and lifting lugs
3 clean paint off the drive end endshield spigot and remove all the plastic bolt-hole cover caps. Apply a film of Hylamar jointing compound on bare machined surfaces for sealing and corrosion protection
4 fit flange ring onto spigot, positioning fixing holes to provide either BS or DIN flange hole positions
5 bolt ring into position, using the same size socket head bolts as used on the feet. These are supplied with the flange ring kit
6 tighten the bolts to torque as given opposite, ensuring a progressive tightening sequence

**Change from ball/ball to roller/ball construction** (refer to Brook Crompton for W-EF)

1. isolate motor before commencing work
2. remove fan cover and fan
3. remove bearing cap screws
4. remove endshield at both ends
5. remove bearing circlips at both ends
6. remove preload washer at non-drive-end
7. replace drive-end ball bearing with new roller bearing and refit circlip
8. remove non-drive-end ball bearing and inner bearing cap
9. fit new non-drive-end inner bearing cap with shallow recess (identical to existing drive-end inner bearing cap)
10. examine existing non-drive-end ball bearing and either refit or replace
11. refit non-drive-end bearing circlip
12. repack bearings with new grease in accordance with recommendations
13. ensure the lip, on both oilseals, is greased
14. refit both endshields and check that:
    - **a** spacer O/D is the same as the bearing O/D
    - **b** bearing spacer supplied is fitted into the non-drive-end endshield bearing recess
    - **c** slots in inner bearing caps are aligned with endshield grease chutes
    - **d** correct location for bearing cap by the use of a stud
    - **e** bolts are torqued up to recommended figures
15. refit bearing cap screws, ensuring correct torque to recommended figures
16. refit fan and fan cover
17. turn shaft by hand to ensure free rotaion

## *Endshield fixing bolt torques*

| *Type* | | *Bolt dia* | *W-DA Aluminium frames Torque* | | *DF & W-DF Cast iron frames Torque* | | *K-CF Torque* | |
|---|---|---|---|---|---|---|---|---|
| *Metric* | *NEMA/CSA* | | *Nm* | *Lbf.FT* | *Nm* | *Lbf.FT* | *Nm* | *Lbf.FT* |
| **63** | – | M4 | 1.5 | 1.1 | – | – | – | – |
| **71** | – | M4 | 1.5 | 1.1 | – | – | – | – |
| **80** | 56 | M5 | 5 | 3.7 | 5 | 3.7 | – | – |
| **90S/L** | 143/145 | M5 | 5 | 3.7 | 5 | 3.7 | – | – |
| **100L** | – | M6 (taptite) | 8-10 | 5.9-7.4 | 20-24 | 14.7-17.7 | – | – |
| **112M** | 182/184 | M6 (taptite) | 8-10 | 5.9-7.4 | 20-24 | 14.7-17.7 | – | – |
| **132S/M** | 213/215 | M6 (taptite) | 8-10 | 5.9-7.4 | 28-32 | 20.5-23.6 | – | – |
| **160M/L** | 254/256 | M8 (taptite) | 29 | 21 | 28-32 | 20.5-23.6 | – | – |
| **180M/L** | 284/286 | M10 (taptite) | 52 | 38 | 38-42 | 27.8-30.7 | – | – |
| **200L** | 324 | M10* | – | – | 52 | 38 | 52 | 38 |
| **225S** | 326 | M10* | – | – | 52 | 38 | 52 | 38 |
| **225M** | 364 | M10* | – | – | 52 | 38 | 52 | 38 |
| **250S** | 365 | M10* | – | – | 52 | 38 | 52 | 38 |
| **250M** | 404 | M16* | – | – | 220 | 162 | 220 | 162 |
| **280M** | 405 | M16* | – | – | 220 | 162 | 220 | 162 |
| **280L** | 444 | M16* | – | – | 220 | 162 | 220 | 162 |
| **315S** | 445 | M16* | – | – | 220 | 162 | 220 | 162 |
| **315M** | 504 | M20* | – | – | 400 | 295 | 400 | 295 |
| **315L** | 505 | M20* | – | – | 400 | 295 | 400 | 295 |
| **355S/M/L** | 585/6/7 | M20* | – | – | 400 | 295 | 400 | 295 |

** High tensile socket headed bolts and square nuts must be used*

## *Foot fixing bolt torques*

| *Type* | | *Bolt dia* | *W-DA Aluminium frames Torque* | | *W-DF Cast iron frames Torque* | |
|---|---|---|---|---|---|---|
| *Metric* | *NEMA/CSA* | | *Nm* | *Lbf.FT* | *Nm* | *Lbf.FT* |
| **63** | – | M5 | 6-7 | 4.5-5.2 | – | – |
| **71** | – | M5 | 6-7 | 4.5-5.2 | – | – |
| **80** | 56 | M8 (taptite) | 24-25 | 17.7-18.4 | – | – |
| **90S/L** | 143/145 | M8 (taptite) | 24-25 | 17.7-18.4 | – | – |
| **100L** | – | M8 (corflex) | 32-35 | 23.6-25.8 | – | – |
| **112M** | 182/184 | M8 (corflex) | 32-35 | 23.6-25.8 | – | – |
| **132S/M** | 213/215 | M8 (corflex) | 32-35 | 23.6-25.8 | – | – |
| **160M/L** | 254/256 | M10 | 68-72 | 50-53 | – | – |
| **180M/L** | 284/286 | M10 | 68-72 | 50-53 | – | – |
| **200L** | 324 | M10* | – | – | 52 | 38 |
| **225S** | 326 | M10* | – | – | 52 | 38 |
| **225M** | 364 | M10* | – | – | 52 | 38 |
| **250S** | 365 | M10* | – | – | 52 | 38 |
| **250M** | 404 | M16* | – | – | 220 | 162 |
| **280M** | 405 | M16* | – | – | 220 | 162 |
| **280L** | 444 | M16* | – | – | 220 | 162 |
| **315S** | 445 | M16* | – | – | 220 | 162 |
| **315M** | 504 | M20* | – | – | 400 | 295 |
| **315L** | 505 | M20* | – | – | 400 | 295 |
| **355S/M/L** | 585/6/7 | M20* | – | – | 400 | 295 |

** High tensile socket headed bolts and square nuts must be used*

## Maintenance

### *On-going maintenance*

Induction motors by their very nature require very little maintenance. However a regular regime of inspection is recommended to ensure minor problems do not escalate to breakdowns. Typical intervals would be 2000 hours of operation or 3 months, whichever is the sooner.

#### Checklist

- no visible damage ie fans cracked, fan cowls bent, foot cracked etc
- no accumulation of dust or fibres on the frame or around the fan inlet
- no significant corrosion of the lifting lugs/ eyebolts
- no excessive vibration
- no loose fasteners
- cables and earths are sound
- sealing of the motor and gland plate in good condition
- insulation resistance adequate, imperative this is checked after a prolonged shut-down
- **Note**
  Fumex smoke extraction motors should be rewound after 5 years of operation. See specification sheet 26E
- regrease required, particularly large output 2 pole motors
- bearing condition

### *Periodic maintenance*

Remove the cover and the fan which is keyed, clamped, pinned or knurl located to the shaft extension. Loosen and remove bearing cover screws and endshield bolts/studs. The endshields should then be eased off their spigots.

The rotor can now be carefully withdrawn from the stator, taking care not to damage the stator bore and both stator and rotor windings.

Having dismantled the motor, maintenance can be carried out to remove all dirt. For this purpose, the use of an air line supplying dry compressed air under comparatively low pressure is best, as a high velocity air-stream can force dirt into the spaces between the windings and insulation, etc. Grease-removing solvents should only be used very sparingly to avoid damage to impregnating varnish or insulation.

Motors should be re-assembled in the reverse order from dismantling, remembering to ease endshields onto bearings and spigots. **Do not use force**.

Before starting, check that the rotor revolves freely. Ensure that the electrical connections are correct and terminal nuts tight (see section – Electrical Connection).

### *Wound rotor*

#### Inspection

Brushes should be inspected every 1000 running hours or at three monthly intervals if this is a shorter period of time. The inspection should include checks for brush wear and tensioning. Build up of carbon dust should be removed using a suitable dust extraction unit.

Replacement of brushes is recommended when the brush is approximately a quarter of the way down the brush holder. On calliper type designs the brushes should be replaced when 1/4" (5mm) of brush remains.

It is important that the correct grade of brush be used as this significantly affects operation. If in doubt please refer to Brook Crompton.

#### Hazardous area motors

In addition to the conditions referred to, special requirements apply to motor types Ex N, Ex nA, EEx e, EEx d, EEx de. Refer to the approval certificate and appropriate codes of practice eg BS 5435.

#### Spares and repairs

When ordering spares it is important to state the motor serial number to ensure that the correct spares will be supplied.

**Notes**

**a** fixing bolts, nuts, studs, screws, spacers or washers are not included with these parts and, if required, should be clearly specified on the order in addition to the part description number. The fixing duty and part description reference number for which they are required should also be clearly stated

**b** bearings ordered direct from bearing manufacturers must be specified as follows:

63-90 CN bearing

100-355 C3 bearing

### *Enquiries*

Please contact Brook Crompton or its Agents for information on any aspects of the motor performance that need clarifying.

**Contact must be made prior to any remedial action being taken under guarantee.**

Please quote the motor number in all such cases with full details of the problem.

### *Policy*

Our policy is one of continuous improvement and we reserve the right to alter any detail of our products at any time without giving notice.

# 1 3 . 13.2 Juhised reduktorite „Rossi Motoriduttori“ kohta

# 1 3 . 2 " R o s s i Motoriduttori" gear reducers instructions

ROSSI MOTORIDUTTORI S.p.A. MODENA - I
VIA EMILIA OVEST 915/A - MODENA - I
C.P. 310 - 41100 MODENA
☎ 059 33 02 88
Fax 059 82 77 74
info@rossimotoriduttori.it
www.rossimotoriduttori.it

**ROSSI GETRIEBEMOTOREN GmbH DÜSSELDORF - D**
Feldheider Strasse 56
40699 ERKRATH
☎ 02104 3 03 30
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info@rossigetriebemotoren.de

**ROSSI GEARMOTORS Ltd. COVENTRY - GB**
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Bayton Road, Exhall
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☎ 02 476 644646
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**ROSSI MOTOREDUCTEURS s.a.r.l. GONESSE - F**
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**ROSSI MOTORREDUCTORES S.L. BARCELONA - E**
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# INSTALLATION AND MAINTENANCE INSTRUCTIONS GEAR REDUCERS AND GEARMOTORS

**UT. D 045 rev. 3**

04-01/2 - 12 500 I GB

## Index



## 1 - General safety instructions

Gear reducers and gearmotors present dangerous parts because they may be:

— live;
— at temperature higher than 50 °C;
— rotating during the operation;
— eventually noisy (sound levels > 85 dB(A)).

An incorrect installation, an improper use, the removing or disconnection of protection devices, the lack of inspections and maintenance, improper connections may cause severe personal injury or property damage. Therefore the component must be moved, installed, commissioned, handled, controlled, serviced and repaired **exclusively by responsible qualified personnel** (definition to IEC 364).

It is recommended to pay attention to all instructions of present handbook, all instructions relevant to the system, all existing safety laws and standards concerning correct installation.

Components in non-standard design or with special executions or with constructive variations may differ in the details from the ones described here following and may require additional information.

For any clarification and/or additional information consult ROSSI MOTORIDUTTORI and specify all name plate data.

Gear reducers and gearmotors of present handbook are normally suitable for installations in industrial areas: **additional protection measures,** if necessary for different employs, must be adopted and assured by the person responsible for the installation.

IMPORTANT: the components supplied by ROSSI MOTORIDUTTORI must be incorporated into machinery and **should not be commissioned before the machinery in which the components have been incorporated conforms to:**

— **Machinery directive 98/37/EEC; in particular, possible safety guards for shaft ends not being used and for eventually accessible fan cover passages (or other) are the Buyer's responsibility;**
— **«Electromagnetic compatibility (EMC)» directive 89/336/EEC and subsequent updatings.**

For the installation, use and maintenance of the electric motor (standard, brake or non-standard motor) or of the possible motor-variator and/or the electric supply device (frequency converter, soft-start, etc.) consult the attached specific documentation. If necessary, require it.

When operating on gear reducer (gearmotor) or on components connected to it **the machine must be at rest:** disconnect motor (including auxiliary equipments) from power supply, gear reducer from load, be sure that safety systems are on against any accidental starting and, if necessary, pre-arrange mechanical locking devices (to be removed before commissioning).

If deviations from normal operation occur (temperature increase, unusual noise, etc.) immediately switch off the machine.

The products relevant to this handbook correspond to the technical level reached at the moment the handbook is printed. ROSSI MOTORIDUTTORI reserves the right to introduce, without notice, the necessary changes for the increase of product performances.

The paragraphs marked with present symbol contain dispositions to be strictly respected in order to assure personal **safety** and to avoid any **heavy damages** to the machine or to the system (e.g.: works on live parts, on lifting machines, etc.) the responsible for the installation or maintenance must scrupulously **follow all instructions contained in present handbook.**

## 2 - Operating conditions

Gear reducers are designed for industrial applications according to name plate data, at ambient temperature 0 ÷ +40 °C (with peaks at -10 °C and +50 °C), maximum altitude 1 000 m.

Not allowed running conditions: application in aggressive environments having explosion danger, etc. Ambient conditions must comply with specifications stated on name plate.

## 3 - How supplied

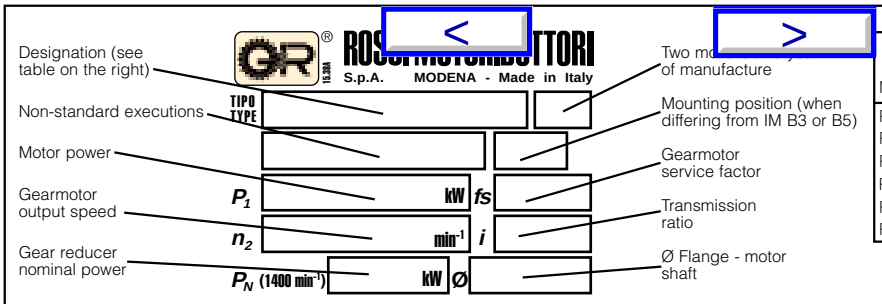
### 3.1 - Receipt

At receipt verify that the unit corresponds to the one ordered and has not been damaged during the transport, in case of damages, report them immediately to the courier.

Avoid commissioning gear reducers and gearmotors, that are even if slightly damaged.

### 3.2 - Name plate

Every gear reducer presents a name plate in anodised aluminium containing main technical information relevant to operating and constructive specifications and defining, according to contractual agreements, the application limits (see fig. 1); the name plate must not be removed and must be kept integral and readable. All name plate data must be specified on eventual spare part orders.




| Designation | | | | Product |
|---|---|---|---|---|
| Machine | Train of gears | Size | Design | |
| R, MR | V, IV, 2IV | 32 ... 250 | UO ... | **Worm** |
| R, MR | 2I, 3I | 32 ... 180 | FC ..., PC ..., UC ... | **Coaxial** |
| R, MR | I, 2I, 3I, 4I | 50 ... 631 | UP ... | **Parallel shafts** |
| R, MR | CI, ICI, C2I, C3I | 50 ... 631 | UO ... | **Right angle shafts** |
| R | C | 80 ... 320 | PO ..., FO ... | **Right angle shafts** |
| R | 2I | 85 ... 250 | OP | **Shaft mounted** |

Fig. 1 (for more information, see ROSSI MOTORIDUTTORI technical catalogues; consult us).

### 3.3 - Painting

Products are painted according to the painting table shown on page 15.

### 3.4 - Protections and packing

Overhanging free shaft ends and hollow shafts are treated with protective anti-rust long life oil and protected with a plastic (polyethylene) cap (only up to D ⩽ 48 mm for overhanging shafts, D ⩽110 mm for hollow shafts). All internal parts are protected with protective anti-rust oil.

Unless otherwise agreed in the order, products are adequately packed: on pallet, protected with a polyethylene film, wound with adhesive tape and strap (bigger sizes); in carton pallet, wound with adhesive tape and strap (smaller sizes); in carton boxes wound with tape (for small dimensions and quantities). If necessary, gear reducers are conveniently separated by means of anti-shock foam cells or of filling cardboard.

Do not stock packed products on top of each other.

## 4 - Storing

Surroundings should be sufficiently clean, dry and free from excessive vibrations ($v_{eff}$ ⩽ 0,2 mm/s) to avoid damage to bearings (excessive vibration should also guarded during transit, even if within wider range) and ambient storage temperature should be 0 ÷ 40 °C: peaks of 10 °C above and below are acceptable.

The gear reducers filled with oil must be positioned according to the mounting position mentioned on the order during transport and storage.

Every six months rotate the shafts (some revolutions are sufficient) to prevent damage to bearings and seal rings.

Assuming normal surroundings and the provision of adequate protection during transit, the unit is protected for storage up to 1 year.

For a 2 year storing period in normal surroundings it is necessary to pay attention also to following instructions:

— generously grease the sealings, the shafts and the unpainted machined surfaces, if any, and periodically control conservation state of the protective anti-rust oil;

— for gear reducers and gearmotors supplied without oil: insert anti-condensation pastilles into the gear reducers to be replaced before due date and remove them before commissioning (as alternative completely fill the gear reducers with lubrication oil and the specified level before commissioning).

For storages longer than 2 years or in aggressive surroundings or outdoors, consult ROSSI MOTORIDUTTORI.

## 5 - Installation

### 5.1 - General

Be sure that the structure on which gear reducer or gearmotor is fitted is plane, levelled and sufficiently dimensioned in order to assure fitting stability and vibration absence (vibration speed $v_{eff}$ ⩽ 3,5 mm/s for $P_N$ ⩽ 15 kW and $v_{eff}$ ⩽ 4,5 mm/s for $P_N$ > 15 kW are acceptable), keeping in mind all transmitted forces due to the masses, to the torque, to the radial and axial loads.

For the dimensions of fixing screws of gear reducer feet and the depth of tapped holes consult the ROSSI MOTORIDUTTORI technical catalogues.

Carefully select the length of fixing screws when using tapped holes for gear reducer fitting, in order to assure a sufficient meshing thread length for the correct gear reducer fitting to the machine without breaking down the threading seat.

Before the installation, verify that:

— there were no damages during the storing or the transport;

— design is suitable to the environment (temperature, atmosphere, etc.);

— electrical connection (power supply, etc.) corresponds to motor name plate data;

— used mounting position corresponds to the one stated in name plate.

**Attention!** When lifting and transporting the gear reducer or gearmotor use through holes or tapped holes of the gear reducer casing; be sure that load is properly balanced and provide lifting systems, and cables of adequate section. If necessary, gear reducer and gearmotor masses are stated in ROSSI MOTORIDUTTORI technical catalogues.

Do not use motor eyebolts when lifting the gearmotors.

Position the gear reducer or gearmotor so as to allow a free passage of air for cooling both gear reducer and motor (especially at their fan side).

Avoid: any obstruction to the air flow; heat sources near the gear reducer that might affect the temperature of cooling air and of gear reducer (for radiation); insufficient air recycle and applications hindering the steady dissipation of heat.

Mount the gear reducer or gearmotor so as not to receive vibrations.

Mating surfaces (of gear reducer and machine) must be clean and sufficiently rough to provide a good friction coefficient: remove by a scraper or solvent the eventual paint of gear reducer coupling surfaces.

When external loads are present use pins or locking blocks, if necessary.

When fitting gear reducer and machine and/or gear reducer and eventual flange **B5** it is recommended to use **locking adhesives** such as LOCTITE on the fastening screws (also on flange mating surfaces).

Before wiring-up the gearmotor make sure that motor voltage corresponds to input voltage. If direction of rotation is not as desired, invert two phases at the terminals.

Star-delta starting should be adopted for no-load starting (or with a very small load) and for smooth starts, low starting current and limited stresses, if requested.

If overloads are imposed for long periods or if shocks or danger of jamming are envisaged, then motor-protection, electronic torque limiters, fluid couplings, safety couplings, control units or other similar devices should be fitted.

Where duty cycles involve a high number of on-load starts, it is advisable to utilise **thermal probes** for motor protection (fitted on the wiring); magnetothermic breaker is unsuitable since its threshold must be set higher than the motor nominal current of rating.

Use varistors to limit voltage peaks due to contactors.

When gear reducer is equipped with a backstop device[1)], provide a protection system where a backstop device breaking could cause personal injury or property damage.

**Attention! Bearing life and good shaft and coupling running depend on alignment precision between the shafts.** Carefully align the gear reducer with the motor and the driven machine (with the aid of shims if need be, for gear reducers size ⩾ 400 use level tapped holes), interposing flexible couplings whenever possible.

Whenever a leakage of lubricant could cause heavy damages, increase the frequency of inspections and/or envisage appropriate control devices (e.g.: remote level gauge, lubricant for food industry, etc.).

In polluting surroundings, take suitable precautions against lubricant contamination through seal rings or other.

For outdoor installation or in a hostile environment, protect the gear reducer or gearmotor with an anticorrosion paint; added protection may be afforded by applying water-proof grease (especially around the rotary seating of seal rings and at shaft end access points).

1) The presence on gear reducer of backstop device is stated by the arrow near the low speed shaft, indicating the free rotation, excluding shaft mounted gear reducers where B or C designs are stated (see ROSSI MOTORIDUTTORI technical catalogues).

Gear reducers and gearmotors [illegible] ected whenever po[illegible] sible and by appropriate mean[illegible] diation and extrem[illegible] of weather; weather protection **becomes essential** when high or low speed shafts are vertically disposed or when the motor is installed vertical with fan uppermost.

For ambient temperature greater than 40 °C or less than 0 °C, consult ROSSI MOTORIDUTTORI.

### 5.2 - Fitting of components to shaft ends

It is recommended that the holes of parts keyed onto shaft ends should be machined to H7 tolerance; for high speed shaft ends having D ⩾ 55 mm, tolerance G7 is permissible provided that the load is uniform and light; for low speed shaft end having D ⩽ 180 mm, tolerance must be **K7** if load is not uniform and light.

Before mounting, thoroughly clean mating surfaces and lubricate against seizure and fretting corrosion.

**Attention!** Installing and removal operations should be carried out with the aid of **jacking screws** and **pullers** using the tapped hole at the shaft butt-end (see table in fig. 2) taking care to avoid impacts and shocks which may **irremediably damage** the **bearings,** the **circlips** or other parts, for H7/m6 and K7/j6 fits it is advisable that the part to be keyed is preheated to a temperature of 80 ÷ 100 °C.

Shaft ends

| D Ø | d Ø |
|---|---|
| 11 | M 5 |
| 14 ÷ 19 | M 6 |
| 24 ÷ 28 | M 8 |
| 30 ÷ 38 | M 10 |
| 42 ÷ 55 | M 12 |
| 60 ÷ 75 | M 16 |
| 80 ÷ 95 | M 20 |
| 100 ÷ 110 | M 24 |
| 125 ÷ 140 | M 30 |
| 160 ÷ 210 | M 36 |
| 240 ÷ 320 | M 45 |

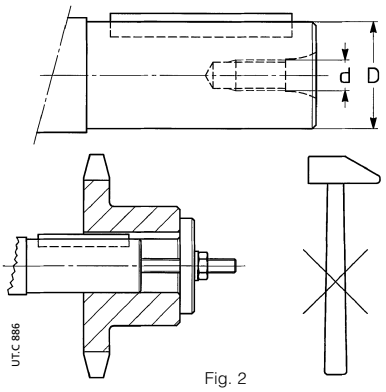


Fig. 2

The couplings having a tip speed on external diameter up to 20 m/s must be statically balanced; for higher tip speeds they must be dynamically balanced.

Where the transmission link between gear reducer and machine or motor generates shaft end loads, (see fig. 3), ensure that:
— loads do not rise above catalogue values;
— transmission overhang is kept to a minimum;
— gear-type transmissions must guarantee a minimum of backlash on all mating flanks;
— drive-chains should not be tensioned (if necessary — alternating loads and/or motion — foresee suitable chain tighteners);
— drive-belts should not be over-tensioned.

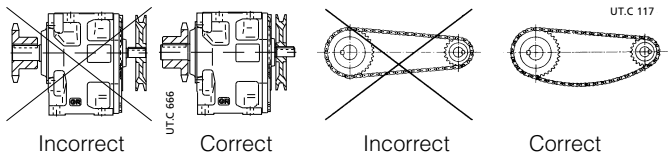


Fig. 3

### 5.3 - Shaft-mounting

When shaft mounted, the gear reducer must be supported both axially and radially (also for mounting positions B3 ... B8) by the machine shaft end, as well as anchored against rotation only, by means of a reaction having **freedom of axial movement** and sufficient **clearance in its couplings** to permit minor oscillations always in evidence without provoking dangerous overloading on the gear reducer.

Lubricate with proper products the hinges and the parts subject to sliding; when mounting the screws it is recommended to apply locking adhesives type LOCTITE 601.

For the mounting of the “kit using reaction disc springs” (sizes ⩽125 parallel shafts) use the tapped butt end hole on the shaft end of the driven machine and the flat machined chamfered surface for compressing and fitting the disc springs into the reaction recess.

Concerning the reaction system, follow the project indications stated in the technical catalogues ROSSI MOTORIDUTTORI. Whenever personal injury or property damage may occur, foresee **adequate supplementary protection devices** against:
— rotation or unthreading of the gear reducer from shaft end of dri-ven machine following to accidental breakage of the reaction arrangement;
— accidental breakage of shaft end of driven machine.

### 5.4 - Hollow low speed shaft

For machine shaft ends onto which the hollow shafts of gear reducers are to be keyed, h6, j6, and k6 tolerances are recommended, according to requirements.

**t!** The shoulder diameter of the shaft end of the driven abutting with the gear reducer must be at least 1,18 ÷ 1,25 times the internal diameter of hollow shaft. For other data on machine shaft end, in case of standard hollow low speed shaft, stepped shaft, with locking rings or bush, with shrink disc see ROSSI MOTORIDUTTORI technical catalogues.

When **installing** and **removing** gear reducers with hollow low speed shaft incorporating a circlip groove — whether with keyway or shrink disc — proceed as per fig. 4a and 4b, respectively, on page 16.

In order to remove the hollow low speed shaft of the parallel and right angle shaft gear reducers (this is the first operation to perform when disassembling the gear reducer) turn the shaft until the keyway is facing the intermediate shaft as indicated in fig. 5 and push the shaft from the reference groove side (circumferencial keyway on shaft shoulder).

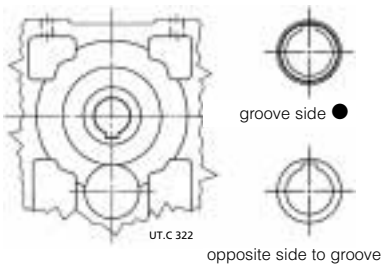


Fig. 5

The system shown in fig. 4c and 4d, page 16, is good for **axial fastening**; when the shaft end of the driven machine has no shoulder (as in the lower half of the drawing) a spacer may be located between the circlip and the shaft end itself. Parts in contact with the circlip must have sharp edges.

The use of **locking rings** (fig. 4e, page 16) or **locking bush** (fig. 4f page 16),will permit easier and more accurate installing and removing and eliminate backlash between the key and keyway.

The locking rings or bush are fitted after mounting and after having carefully degreased the coupling surfaces. Do not use molybdenum bisulphide or equivalent lubricant for the lubrication of the parts in contact. When tightening the bolt, we recommend the use of a locking adhesive LOCTITE 601.

Respect the tightening torques stated in the table on page 16.

In case of axial fastening with locking rings or bush — especially when having heavy duty cycles, with frequent reversals — verify, after some hours of running, the bolt tightening torque and eventually apply the locking adhesive again.

**Attention!** For **vertical ceiling-type** mounting and only for gear reducers equipped with locking rings or bush, gear reducer support is due only to friction, for this reason it is advisable to provide it with a fastening system.

When fitting with **shrink disc** (fig. 4g, page 16) proceed as follows:
— carefully degrease the surfaces of hollow shaft and shaft end of driven machine to be fitted;
— mount the gear reducer onto the shaft end of driven machine following the method indicated in fig. 4a, page 16;
— gradually and uniformly tighten the screws of shrink disc by a continuous sequence (not crossing) and during several phases up to a torque stated in the table on page 16;
— at operation end verify the screw torque by means of a dynamometric key (flat, when it is mounted onto machine end).

### 5.5 - Water cooling by coil

Water fed into the system must:
— be not too hard;
— be at max temperature 20 °C;
— flow at 10 ÷ 20 $dm^3$/min;
— have a pressure 0,2 ÷ 0,4 MPa (2 ÷ 4 bar).

Where ambient temperature may be less than 0 °C, make provision for water drain and compressed air inlet, so as to be able to empty out the coil completely and avoid freezing up.

When risking high input pressure peaks, install a safety valve set to a proper operating threshold.

### 5.6 - Independent cooling unit

See specific documentation supplied together with the unit.

## 6 - Lubrication

### 6.1 - General

Depending on type and size, gear reducers and gearmotors may be grease-lubricated and supplied FILLED WITH GREASE, or (synthetic or mineral) oil-lubricated and supplied FILLED WITH OIL or WITHOUT OIL depending on type and size (see ch. 6.2). When supplying WITHOUT OIL, the filling up to specified level (normally stated by means of transparent level plug) is Buyer’s responsibility.

Every gear reducer has a **lubrication plate.**

Concerning lubricant type and quantity, gear reducer type, how supplied, plugs, filling instructions, oil-change interval, etc. see lubrication table (6.2).

## 6.2 - Lubrication table

< >

<table>
<tr><th>Product</th><th>How supplied* and plugs</th><th>Directions for first filling</th></tr>
<tr><td>Worm<br>sizes 32 ... 81</td><td>FILLED WITH SYNTHETIC OIL<br>AGIP Blasia S 320, KLÜBER Klübersynth GH 6-320, MOBIL Glygoyle HE 320, SHELL Tivela WB/SD<br>Worm speed ⩽ 280 min$^{-1}$<br>KLÜBER Klübersynth GH 6-680, MOBIL Glygoyle HE 680<br>Filler/drain plug<br>2 filler/drain plugs for sizes 80, 81</td><td></td></tr>
<tr><td>Worm<br>sizes 100 ... 250</td><td>WITHOUT OIL<br>(except different statement on lubrication name plate)<br>Filler plug with valve, drain and level plug</td><td>Before putting into service, fill to specified level with synthetic oil (AGIP Blasia S, ARAL Degol GS, BP-Energol SG-XP, MOBIL Glygoyle HE, SHELL Tivela oil ... , KLÜBER Klübersynth GH6 ...) having the ISO viscosity grade given in the table.<br>ISO viscosity grade [cSt]<br>
<table>
<tr><th rowspan="3">Worm speed min$^{-1}$</th><th colspan="5">Ambient temperature 0 ÷ 40 °C[2]<br>Gear reducer size</th></tr>
<tr><th>100</th><th colspan="2">125 ... 161</th><th colspan="2">200, 250</th></tr>
<tr><th></th><th>B3[1], V5, V6</th><th>B6, B7, B8</th><th>B3[1], V5, V6</th><th>B6, B7, B8</th></tr>
<tr><td>2 800 ÷ 1 400 [3]</td><td>320</td><td>320</td><td>220</td><td colspan="2">220</td></tr>
<tr><td>1 400 ÷ 710 [3]</td><td>320</td><td colspan="2">320</td><td>320</td><td>220</td></tr>
<tr><td>710 ÷ 355 [3]</td><td>460</td><td colspan="2">460</td><td>460</td><td>320</td></tr>
<tr><td>355 ÷ 180 [3]</td><td>680</td><td>680</td><td>460</td><td colspan="2">460</td></tr>
<tr><td>< 180</td><td>680</td><td colspan="2">680</td><td colspan="2">680</td></tr>
</table>
1) Not stated on the name plate.<br>2) Peaks of 10 °C above and 10 °C (20 °C for ⩽ 460 cSt) below the ambient temperature range are acceptable.<br>3) For these speeds we advise to replace oil after running-in.</td></tr>
<tr><td>Coaxial<br>sizes 32 ... 41<br>Right angle shaft<br>sizes 80 ... 125</td><td>FILLED WITH SYNTHETIC GREASE<br>SHELL Tivela Compound A<br>IP Telesia Compound A<br>MOBIL Glygoyle Grease 00<br>Filler/drain plug<br>(only for coaxial)</td><td></td></tr>
<tr><td>Coaxial<br>sizes 50 ... 81<br>Parallel and<br>right angle shaft<br>sizes 50 ... 80</td><td>FILLED WITH SYNTHETIC OIL<br>KLÜBER Klübersynth GH 6-220, MOBIL Glygoyle 30<br>Filler/drain plug<br>2 filler/drain plugs for sizes 80, 81</td><td></td></tr>
<tr><td>Coaxial<br>sizes 100 ... 180<br>Parallel and<br>right angle shaft<br>sizes 100 ... 631<br>Right angle shaft<br>sizes 160 ... 320<br>Shaft mounted</td><td>WITHOUT OIL**<br>(except different statement on lubrication name plate)<br>Filler plug with valve<br>(with breathing for shaft mounted gear reducers),<br>drain and level plugs</td><td>Before putting into service, fill to specified level with mineral oil (AGIP Blasia, ARAL Degol BG, BP-Energol GR-XP, ESSO Spartan EP, IP Mellana oil, MOBIL Mobilgear 600, SHELL Omala, TEXACO Meropa, TOTAL Carter EP) or polyglycol** synthetic oil (KLÜBER Klübersynth GH6 ..., MOBIL Glygoyle, SHELL Tivela oil) or polyalphaolefines** synthetic oil (AGIP Blasia SX, CASTROL Tribol 1510, ELF Reductelf SYNTHESE, ESSO Spartan SEP, KLÜBER Klübersynth EG4, MOBIL SHC) having the ISO viscosity grade given in the table.<br>ISO viscosity grade [cSt]<br>
<table>
<tr><th colspan="2">Speed $n_2$ min$^{-1}$</th><th colspan="3">Ambient temperature[1] [°C]</th></tr>
<tr><th>Right angle shaft</th><th>Others</th><th colspan="2">mineral oil</th><th>synthetic oil</th></tr>
<tr><th></th><th></th><th>0 ÷ 20</th><th>10 ÷ 40</th><th>0 ÷ 40</th></tr>
<tr><td>> 710</td><td>> 224</td><td>150</td><td>150</td><td>150</td></tr>
<tr><td>710 ÷ 280</td><td>224 ÷ 22,4</td><td>150</td><td>220</td><td>220</td></tr>
<tr><td>280 ÷ 90</td><td>22,4 ÷ 5,6</td><td>220</td><td>320</td><td>320</td></tr>
<tr><td>< 90</td><td>< 5,6</td><td>320</td><td>460</td><td>460</td></tr>
</table>
1) Peaks of 10 °C (20 °C) below and 10 °C above the ambient temeperature range are acceptable.</td></tr>
</table>

**Independently-lubricated bearings, motor-bearings, backstop device fitted to motor:**
lubrication is «**for life**» (except some cases of motors in which relubrication device is adopted). Should there be either a possibility of the grease becoming contaminated, or a particular type of duty-cycle, it is good policy to check on the state of the grease (between one change and the next, or every year or 2 years) and remove and replace grease in independently-lubricated bearings (every change or every other change, or every 2 or 4 years). Bearings should be filled with ESSO BEACON 3 bearing-grease for ball bearings, KLÜBER STABURAGS NBU 8 EP for roller bearings and ESSO BEACON 2 for backstop device.

## Oil-change interval and lubricant quantity

Oil quantity [l] for **worm** gear reducers sizes **32 ... 81**
For the other sizes the quantity is given by the level stated by the proper plug.

| Size | R V, MR V | | | R IV, MR IV | | | MR 2IV | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **B3**[1], **V5, V6** | **B6, B7** | **B8**[1] | **B3**[1], **V5, V6** | **B6, B7** | **B8**[1] | **B3**[1] | **B6, B7** | **B8**[1] | **V5, V6** |
| **32** | 0,16 | 0,2 | 0,16 | 0,2 | 0,25 | 0,2 | — | — | — | — |
| **40** | 0,26 | 0,35 | 0,26 | 0,32 | 0,4 | 0,32 | 0,42 | 0,5 | 0,42 | 0,42 |
| **50** | 0,4 | 0,6 | 0,4 | 0,5 | 0,7 | 0,5 | 0,6 | 0,8 | 0,6 | 0,6 |
| **63, 64** | 0,8 | 1,15 | 0,8 | 1 | 1,3 | 1 | 1,2 | 1,55 | 1,2 | 1,2 |
| **80, 81** | 1,3 | 2,2 | 1,7 | 1,5 | 2,5 | 2 | 1,7 | 2,8 | 2,3 | 1,8 |

1) Not stated on name plate (B8, only sizes 32 ... 64).
Ambient temperature 0 ÷ +40 °C with peaks up to –20 °C and +50 °C.

An overall guide to **oil-change interval** is given in the table, and assumes pollution-free surroundings. Where heavy overloads are present, halve the values.

Apart from running hours, replace or regenerate the oil each 5 ÷ 8 years according to size, running and environmental conditions.

| Oil temperature [°C] | Oil-change interval [h] |
|---|---|
| **⩽ 65** | 18 000 |
| **65 ÷ 80** | 12 500 |
| **80 ÷ 95** | 9 000 |
| **95 ÷ 110** | 6 300 |

Lubrication «**for life**» (assuming external pollution-free environment).

Grease quantity [kg] for coaxial gear reducers

| Grand. | R 2I MR 2I, 3I | | | |
|---|---|---|---|---|
| | **B3**[1], **B6, B7, B8** | **V5, V6** | **B5**[1] | **V1, V3** |
| **32** | 0,14 | 0,25 | 0,1 | 0,18 |
| **40, 41** | 0,26 | 0,47 | 0,19 | 0,35 |

1) Non stated on name plate
Ambient temperature 0 ÷ +40 °C with peaks up to –20 °C and +50 °C.

Lubrication «**for life**» (assuming external pollution-free environment). Oil quantity [l] for sizes **50 ... 81**

| Coaxial size | R 2I, 3I MR 2I, 3I | | |
|---|---|---|---|
| | **B3**[1] | **B6, B7, B8, V6** | **V5** |
| **50, 51** | 0,8 | 1,1 | 1,4 |
| **63, 64** | 1,6 | 2,2 | 2,8 |
| **80, 81** | 3,1 | 4,3 | 5,5 |

1) Not stated on name plate.
2) Values valid for R 2I; for MR 2I the values are respectively: 0,8; 1,2; 2,3.
3) The first reduction stage (the first two for 4I) is lubricated with grease for life.
Ambient temperature 0 ÷ +40 °C with peaks up to –20 °C and +50 °C.

| Parallel size | R I | | | R 2I, MR 2I | | | R 3I, MR 3I | | | MR 4I | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **B3**[1], **B8** | **B7** | **B6, V5, V6** | **B3**[1], **B8** | **B6**[2] | **B7, V5, V6** | **B3**[1], **B8** | **B6** | **B7, V5**[3], **V6** | **B3**[1], **B8** | **B6** | **B7, V6** | **V5**[3] |
| **50** | — | — | — | 0,6 | 0,9 | 0,8 | 0,7 | 1,05 | 0,9 | — | — | — | — |
| **63, 64** | 0,7 | 0,8 | 1 | 0,9 | 1,4 | 1,2 | 1 | 1,5 | 1,3 | 1,1 | 1,8 | 1,4 | 1,3 |
| **80** | 1,2 | 1,5 | 1,9 | 1,5 | 2,7 | 2,3 | 1,7 | 2,9 | 2,5 | 1,9 | 3,2 | 2,7 | 2,5 |

| Right angle size | R CI, MR CI | | | R ICI, MR ICI | | | | MR C3I | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **B3**[1], **B6, B7** | **B8** | **V5, V6** | **B3**[1], **B7** | **B6** | **B8** | **V5, V6** | **B3**[1], **B7** | **B6** | **B8** | **V5, V6** |
| **50** | 0,4 | 0,6 | 0,45 | 0,45 | 0,8 | 0,65 | 0,5 | 0,5 | 0,9 | 0,7 | 0,55 |
| **63, 64** | 0,8 | 1 | 0,95 | 1 | 1,6 | 1,2 | 1,15 | 1,2 | 1,8 | 1,4 | 1,35 |
| **80** | 1,3 | 2 | 1,8 | 1,6 | 2,7 | 2,2 | 2 | 1,9 | 3 | 2,5 | 2,3 |

An overall guide to **oil-change interval** is given in the table, and assumes pollution-free surroundings. Where heavy overloads are present, halve the values.

Apart from running hours:
— replace mineral oil each 3 years;
— replace or regenerate synthetic oil each 5 ÷ 8 years according to gear reducer size, running and environmental conditions.

The oil quantity is given by the level stated by the proper plug.

| Oil temperature [°C] | Oil-change interval [h] | |
|---|---|---|
| | mineral oil | synthetic oil |
| **⩽ 65** | 8 000 | 25 000 |
| **65 ÷ 80** | 4 000 | 18 000 |
| **80 ÷ 95** | 2 000 | 12 500 |
| **95 ÷ 110** [1] | — | 9 000 |

1) Values admissible only for parallel, right angle shaft gear reducers (cat. G and L) an for non-continuous duties.

* Identification through specific lubrication name plate.
** Lubrication with synthetic oil (polyglycol basis must be with special internal painting; polyalphaolefines basis is advisable for sizes ⩾ 200 and obligatory for sizes ⩾ 400). It is always recommended, particularly for: high speed gear reducers, increase of oil-change interval («long life»), increase of the ambient temperature range, increase of the thermal power or decrease of oil temperature.

Be sure that for gear reducers and gea < 100, the filler plug is provided with a valve (symbo se, replace it with the one normally supplied with.

When gear reducer or gearmotor is provided with a **spilway plug** (red colour) fill after unscrewing a.m. plug in order to check the obtained level by oil outlet.

When gear reducer or gearmotor is provided with a **level plug with rod**, fill with oil up to specified level on rod.

When gear reducer or gearmotor is supplied with a level plug (size ⩾100), necessary lubricant quantity is that which reaches a.m. level (gear reducer at rest) and not the approximate quantity given on the catalogue.

Usually bearings are automatically and continuously lubricated (bathed, splashed, through pipes or by a pump) utilising the main gear reducer lubricant. The same applies for backstop devices, when fitted to gear reducers.

In certain gear reducers in vertical mounting positions V1, V3, V5 and V6, and right-angle shaft gear reducers in horizontal positions B3, B6 and B51 (though not gearmotors in this case, for which the above indications hold good) upper bearings are independently lubricated with a special grease «for life», assuming pollution-free surroundings. The same applies for motor bearings (except some cases in which relubrication device is adopted) and backstop devices when fitted to motors.

Always be sure that the gear reducer is located as per the mounting position ordered, which appears on the name plate. When no indication is given, the gear reducer may be used in horizontal mounting position B3 or B5 (B3, B8, worm gear reducers size ⩽ 64), or vertical position V1 (in the case of right angle shaft gear reducers in the design incorporating flange FO1...).

**Combined gear reducer units.** Lubrication remains independent, thus data relative to each single gear reducer hold good.

## 7 - Commissioning

Carry out an overall check, making particularly sure that the gear reducer is filled with lubricant.

Where star-delta starting is being used, input voltage must match the motor lower voltage (Δ connection).

For asynchronous three-phase motor, if the direction of rotation is not as desired, invert two phases at the terminals.

Before running gear reducers fitted with **backstop device**, make sure that the **direction of rotation in machine, gear reducer and motor all correspond correctly.**

**Attention!** One or more startings in the false direction, even if short, could irremediably damage the backstop device, the coupling seats and/or the electric motor.

A **running-in** period is advisable:

— of approx. 400 ÷ 1 600 h for gear reducers with worm gear pairs in order to reach maximum efficiency;

— of approx. 200 ÷ 400 h for gear reducers with bevel and/or cylindrical gear pairs in order to reach maximum functionality.

The temperature of both gear reducer and lubricant may well rise beyond normal values during running-in. After the running-in period it may be necessary to verify the gear reducer fixing bolt tightness.

Note: worm gear reducer efficiency is lower in the **first running hours** (about 50) and at every cold starting (efficiency will be better with oil temperature increasing). For further information consult ROSSI MOTORIDUTTORI technical catalogues.

## 8 - Maintenance

### 8.1 - General

At machine rest, verify at regular intervals (more or less frequently according to environment and use):

a) all external surfaces are clean and air passages to the gear reducer or gearmotor are free, in order that cooling remains fully effective;

b) normal running conditions
   — oil level and deterioration degree (check with cold gear reducer at rest);
   — noise level;
   — vibrations;
   — sealings;
   — correct fastening screws tightening;
   — etc.

> **on!** After a running period, gear reducer (exclu- shaft mounted gear reducers) is subject to a light internal overpression which may cause burning liquid discharge. Therefore, before loosening whichever plug wait until gear reducer has become cold; if not possible, take the necessary protection measures against burning due to warm oil contact. In all cases, always proceed with great care.
> Maximum oil temperatures indicated in lubrication table (see ch.6.2) do not represent a hindrance to the gear reducer regular running.

During the oil change, after having unscrewed also the filler plug in order to improve the discharge, it is recommended to clean internally the gear reducer casing using the same oil type suitable for the running. For the next filling use a 60 μm oil filter.

When dismounting the cap (whenever gear reducers are provided with), reset the sealing with adhesive on cleaned and degreased mating surfaces.

### 8.2 - Coil

In case of long non-running periods at ambient temperatures lower than 0 °C, the coil should be emptied out using compressed air to blast out all the coolant, so as to avoid freezing-up which would cause the coil to break.

### 8.3 - Seal rings

Duration depends on several factors such as dragging speed, temperature, ambient conditions, etc.; as a rough guide it can vary from 3 150 to 25 000 h.

### 8.4 - Motor replacement

Since gearmotors are realised with **standardised** motor, motor replacement — in case of failure — is extremely easy. Simply observe the following instructions:

— be sure that the mating surfaces are machined under accuracy rating (UNEL 13501-69; DIN 42955);

— clean surfaces to be fitted thoroughly;

— check and, if necessary, lower the parallel key so as to leave a clearance of 0,1 ÷ 0,2 mm between its top and the bottom of the keyway of the hole. If shaft keyway is without shoulder, lock the key with a pin.

When the motor shaft end is keyed direct to worm or to cylindrical or bevel pinion (gearmotors: worm MR V, parallel shaft MR 3I size 140 ... 360 and MR 2I, right angle shaft MR CI and MR C2I);

— check that the fit-tolerance (push-fit) between hole and shaft end is G7/j6 for D ⩽ 28 mm, F7/k6 for D ⩾ 38 mm;

— lubricate surfaces to be fitted against fretting corrosion.

When a cylindrical pinion is keyed onto the motor shaft end (gearmotors: worm MR IV, parallel shaft MR 3I sizes 50...125, 4I, right angle shaft MR ICI, C3I, coaxial):

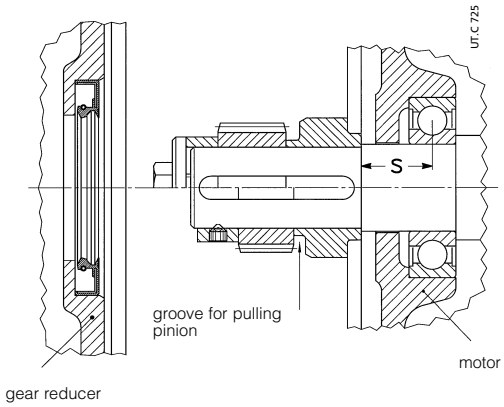
— in case of gear reducer (sizes 40...81), execution «square flange for servomotors», before removing the motor, loose the hub clamp through the proper opening on the top of the square flange;

— check that the fit-tolerance (standard locking) between hole and shaft end is K6/j6 for D ⩽ 28 mm, and J6/k6 for D ⩾ 38 mm; key length should be at least 0,9 pinion width;

— make sure that the motors have bearing location and overhang (distance S) as shown in the table;

| Motor size | Min dynamic load capacity daN | | Max dimension 'S' mm |
|---|---|---|---|
| | Front | Rear | |
| **63** | 450 | 335 | 16 |
| **71** | 630 | 475 | 18 |
| **80** | 900 | 670 | 20 |
| **90** | 1 320 | 1 000 | 22,5 |
| **100** | 2 000 | 1 500 | 25 |
| **112** | 2 500 | 1 900 | 28 |
| **132** | 3 550 | 2 650 | 33,5 |
| **160** | 4 750 | 3 350 | 37,5 |
| **180** | 6 300 | 4 500 | 40 |
| **200** | 8 000 | 5 600 | 45 |
| **225** | 10 000 | 7 100 | 47,5 |
| **250** | 12 500 | 9 000 | 53 |
| **280** | 16 000 | 11 200 | 56 |

— locate the spacer (with adh[illegible]nat between keyw[illegible] and motor shaft shoulder the[illegible]d cylindrical part of least 1,5 mm) and pinion on the motor (pinion pre-heated to 80 ÷ 100 °C) locking the entire assembly by means of a bolt to the butt-end or hub clamp;
— grease the pinion teeth, the sealing ring rotary seating and the ring itself, and assemble carefully.




## 9 - Sound levels

Most of the ROSSI MOTORIDUTTORI product range is characterised by **sound pressure levels $L_{pA}$** (mean value of measurement, assuming nominal load and input speed $n_1$ = 1 400 min$^{-1}$, at 1 m from external profile of gear reducer standing in free field on a reflecting surface, according to draft proposal ISO/CD 8579) **lower or equal to 85 dB(A).**

The table indicates the products which **can exceed** a.m. threshold. For further information about sound levels of every single product see ROSSI MOTORIDUTTORI technical catalogues.

| Machine/Train of gears | | $i_N$ | Size |
|---|---|---|---|
| **Parallel shaft** | **R I** | ⩽ 3,15 | ⩾ 160 |
| | | ⩾ 4 | ⩾ 200 |
| | **R 2I** | all | ⩾ 320 |
| | **R 3I** | all | ⩾ 400 |
| | **R 4I** | ⩽ 160 | ⩾ 500 |
| | | ⩾ 200 | ⩾ 630 |
| **Right angle shaft** | **R CI** | all | ⩾ 320 |
| | **R C2I** | ⩽ 63 | ⩾ 400 |
| | | ⩾ 71 | ⩾ 500 |
| | **R C3I** | all | ⩾ 630 |
| **Right angle shaft** | **R C** | 1 | ⩾ 250 |

## [illegible]ubles: causes and corrective actions

| Trouble | Possible causes | Corrective actions |
|---|---|---|
| Excessive temperature (in continuous duty or of bearings) | Inadequate lubrication:<br>— excessive or insufficient oil quantity;<br>— unsuitable lubricant (different type, too viscous, exhausted, etc.)<br>— too tightened taper roller bearings<br>— worm gear reducer with excessive load during running-in<br>— excessive ambient temperature | Check:<br>— oil level<br>— lubricant type and/or state<br>Consult ROSSI MOTORIDUTTORI<br>Reduce the load<br>Increase the cooling or correct the ambient temperature |
| | Obstructed suction openings of fan cover | Clean the fan cover |
| | Inefficiency of eventual auxiliary bearing lubrication system | Check the pump and the pipes |
| | Bearing failure, defect or bad lubrication | Consult ROSSI MOTORIDUTTORI |
| | Inefficient or out of service oil cooling system: obstructed filter, insufficient oil (exchanger) or water (coil) flow rate, pump out of service, etc. | Check the pump, the pipes, the oil filter and safety devices efficiency (manostats, thermostats, etc.) |
| Anomalous noise | One or more teeth with:<br>— dents or spallings<br>— excessive flanks roughness | Consult ROSSI MOTORIDUTTORI |
| | Bearings failure, defect or bad lubrication | Consult ROSSI MOTORIDUTTORI |
| | Taper roller bearings with excessive clearance | Consult ROSSI MOTORIDUTTORI |
| | Vibrations | Check the fastening |
| Lubricant leaking from seal rings | Seal ring with worn, bakelized, damaged or false mounted seal lip | Replace the seal ring |
| | Damaged rotating seating (scoring, rust, dent, etc.) | Restore the seating |
| | Mounting position differs from the one stated on the name plate | Correctly position the gear reducer |

NOTE
When consulting ROSSI MOTORIDUTTORI state:
— all data on gear reducer or gearmotor name plate;
— failure nature and duration;
— when and under what conditions the failure happened.

## Painting table

| Product | Size | Internal painting | External painting (final colour always blue RAL 5010) | External painting Specifications | Notes |
|---|---|---|---|---|---|
| **Worm**<br>**Parallel and right angle**<br>**Coaxial** | **32 ... 81**<br>**50 ... 100**<br>**32 ... 41** | Epoxy powder (prepainted) | Epoxy powder (prepainted) | Resistant to atmospheric and aggressive agents.<br>Suitable for further painting only after degreasing and sanding. | Machined parts remain unpainted; they are protected with an easily removable anti-rust oil (before painting remove the protective oil). |
| **Worm**<br>**Coaxial** | **100 ... 250**<br>**50 ... 81** | Dual-compound epoxy primer (prepainted) | Dual-compound epoxy primer (prepainted) + Synthetic paint | Good resistance to atmospheric and aggressive agents.<br>Not resistant to solvents.<br>Suitable for further coats of single-compound synthetic paints (normally also dual-compound). | Machined parts are painted with vinyl paint only. |
| **Parallel and right angle**<br>**Coaxial**<br>**Right angle** | **125 ... 631**<br>**100 ... 180**<br>**160 ... 320** | Single-compound zinc primer (prepainted) | Single-compound zinc primer (prepainted) + Synthetic paint | | The internal painting does not resist polyglycol synthetic oils (polyalphaolefines synthetic oils are suitable). |
| **Right angle**<br>**Shaft mounted** | **80 ... 125** | — | Synthetic paint | | — |

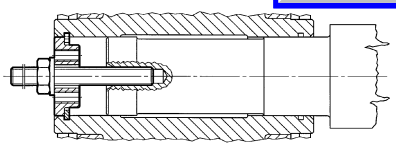


fig. 4a)

Installing fig. 4a) and removing fig. 4b)

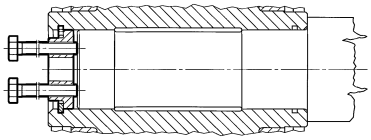
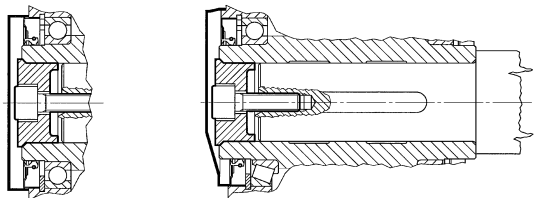


fig. 4b)

Worm sizes 32 ... 50

Parallel and right angle shaft size 50



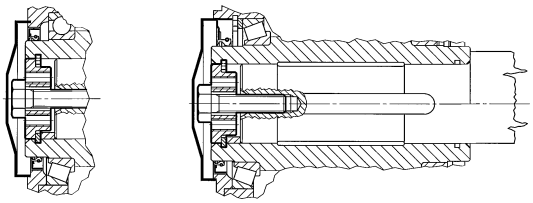
Parallel and right angle shaft size 63

fig. 4c)

Axial fastening

Worm sizes 63 ... 161

Parallel and right angle shaft sizes 64 ... 160



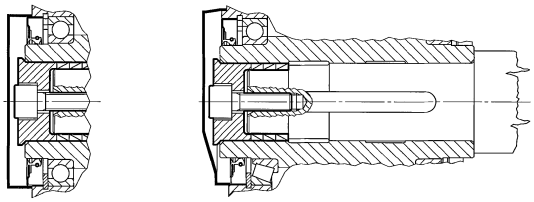
Worm sizes 200, 250

Parallel and right angle shaft sizes 180 ... 360

fig. 4d)

Worm sizes 32 ... 50

Parallel and right angle shaft size 50



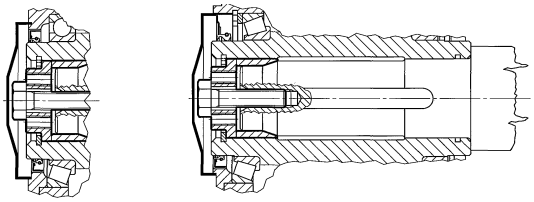
Parallel and right angle shafts size 63

fig. 4e)

Fitting with key and locking rings fig. 4e), with key and locking bush fig. 4f)

Worm sizes 63 ... 161

Parallel and right angle shaft sizes 64 ... 160

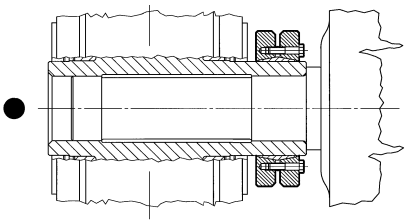


Worm sizes 200, 250

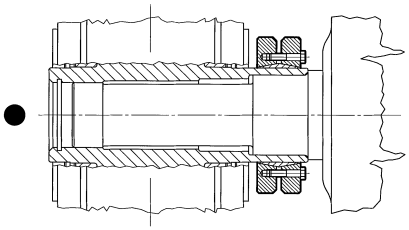
Parallel and right angle shaft sizes 180 ... 360

fig. 4f)

Parallel and right angle shaft sizes 50 ... 125



Parallel and right angle shaft sizes 140 ... 360



Parallel and right angle shaft sizes 400 ... 631

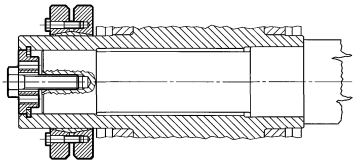


fig. 4g)

Fitting with shrink disk fig. 4g)

UT.C 825

## Table of tightening torques

| Worm gear reducers size | **32** | **40** | **50** | **—** | **63, 64** | **—** | **80, 81** | **100** | **125, 126** | **160** | **161** | **—** | **200** | **—** | **250** | **—** | **—** | **—** | **—** | **—** | **—** | **—** | **—** | **—** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Parallel and right angle shaft sizes | **—** | **50** | **—** | **63** | **64** | **80** | **—** | **100** | **125** | **140** | **—** | **160** | **180** | **200** | **225** | **250** | **280** | **320, 321** | **360** | **400, 401** | **450, 451** | **500, 501** | **560, 561** | **630, 631** |
| *M* [daN m] for rings or bush | 2,9 | 3,5 | 4,3 | 4,3 | 4,3 | 5,1 | 5,3 | 9,2 | 17 | 21 | 21 | 34 | 43 | 66 | 83 | 135 | 166 | 257 | 315 | — | — | — | — | — |
| *M* [daN m] for shrink disk | — | 0,4 | — | 1,2 | 1,2 | 1,2 | — | 3 | 3 | 3 | — | 6 | 6 | 10 | 10 | 25 | 25 | 25 | 25 | 49 | 49 | 49 | 49 | 84 |
| Screws of shrink disk UNI 5737-88 class 10.9 | — | M5 | — | M6 | M6 | M6 | — | M8 | M8 | M8 | — | M10 | M10 | M12 | M12 | M16 | M16 | M16 | M16 | M20 | M20 | M20 | M20 | M24 |

# 13.3 Juhised hüdraulilise agregaatpea „Manfrini“ kohta

# 13.3 "Manfrini" hydraulic power pack instructions

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# USE AND MAINTENANCE INSTRUCTIONS

**SCH. N°.**

**MATR. N°**

This booklet contains useful information to start a hydraulic plant correctly and to perform preventive maintenance.

Complying with such information is extremely important to obtain the best plant performances and to extend its service life.

The following pages provide some general information concerning start-up, maintenance, periodic stoppages and troubleshooting.

## START-UP INSTRUCTIONS

1) PLANT CONSTRUCTIVE CHECK

Check that all parts of the hydraulic circuit (filters, pumps, safety valves, control valves, cylinders, piping, etc.) are in the correct position and ready for use.

2) FILLING THE RESERVOIR

Make sure the reservoir is thoroughly clean.

Fill the reservoir with the prescribed oil or one with the same properties, complying with the maximum and minimum levels.

The reservoir can be filled only through the plug that is equipped with a filter.

3) PLANT START-UP

Start the pump and make sure it turns in the proper direction. Activate all the controls at the minimum pressure level.

This operation is used to fill the piping and the actuators.

4) AIR VENTING

Air in the circuit leads to premature wear and irregular operation. Therefore, immediately after starting the plant, bleed off any air by using the special vents or by loosening the fittings in the highest part of the plant. Localised bleeding will be completed when oil flows in a continuous stream. Instead, all the air has been eliminated when there is no more foam in the reservoir, no abnormal noises and when actuator movements are regular.

5) WORK PRESSURE CALIBRATION (SAFETY VALVE)

Use the register located on the safety valve to calibrate the work pressure. With the pump started and with a pressurised service, observe the value on the pressure gauge. Move the register clockwise to increase this value.

## MAINTENANCE

Plant parts normally do not require any particular maintenance. Therefore, the checks should focus on the fluid and on the filters.

In fact, all the inevitable machining residues and impurities resulting from the erosion of moving parts must be eliminated.

During the first hours of operation the level must be checked very carefully while looking for any possible leaks.

Special attention must be focused on the temperature, that should not exceed 60-70°C. During operation, the oil must be controlled and changed at intervals that will vary according to the type used, the quantity circulating and the machine operating conditions.

Considering a control subjected to regular operating conditions, the following rules apply to oil changes and filtering:

- after the first 100 hours of operation of a new hydraulic control it is recommended to check that the filters are clean and replace them, if necessary;
- Change the oil every 3000-5000 hours of normal operation.

These operations should be carried out as follows:

- When cleaning, never use cotton or fibrous rags;
- Drain the system, clean or change the filters and thoroughly clean the reservoir, if necessary.
- Fill the system with new oil;
- Run the machine, under no-load conditions, for a minimum of 30 minutes, making sure that oil circulates in all parts.

All the checks must be repeated at regular intervals, and especially the temperature check. That’s because a temperature increase leads to a very rapid deterioration of the mechanical parts and gaskets.

The fluid level must be checked more frequently.

Special attention must be focused on noise, since it is the best indicator of imminent or ongoing malfunctions.

## PERIODIC STOPPAGES

BRIEF STOPPAGE

No precautions are required for a brief stoppage of less than two months.

**EXTENDED STOPPAGE**

It may be useful to operate the plant without pressure, for a few seconds, at regular intervals, to guarantee proper lubrication.

The stems of the cylinders must be covered by anti-corrosive products.

CYCLE RESTART

After a brief stoppage, just bleed off the air.

For a more extended stoppage, check that the fluid has not been altered and, if so, replace it with a new one.

In any case, check the level in the reservoir.

## TROUBLESHOOTING GUIDE

**A) Air in the circuit, emulsified oil, foam has formed in the reservoir.**

1 - Oil level too low in the reservoir, for which the suction pipe, which is not adequately immersed, makes the pump suck both air and oil.

2 - Cracks or leaks in the suction pipe or defective pump seal gaskets, that allow air to infiltrate.

**B) The pump does not deliver oil:**

1 - Pump not primed.

2 - Incorrect rotation direction.

3 - Oil level too low.

4 - Oil too viscous.

5 - Broken pump shaft or entrainment couplings.

**C) The pump does not generate pressure:**

1 - The pump does not deliver oil.

2 - Incorrectly adjusted pressure regulator.

3 - Pressure regulator remains open.

4 - Oil leak between circuit and reservoir.

5 - Worn pump.

**D) Noisy pump:**

1 - Air in circuit.

2 - Excessive oil viscosity that creates cavitation during suction.

3 - Pump-motor alignment defect.

4 - Motor -pump entrainment coupling wear.

5 - Worn pump.

**E) Excessive oil temperature:**

1 - Pump operating pressure too high.

2 - The pump is worn and permits internal leakage.

3 - Excessive leakage through the parts.

4 - Insufficient heat dispersion capacity of the system (requires the installation of a coolant).

5 - Oil too viscous.

6 - Continuous overload operation.

**F) Leaking gaskets:**

1 - Abrasive substances in the oil.

2 - Chips or other foreign matter entrained in the oil.

3 - Operating pressure too high.

4 - Alignment defect, defective couplings.

**G) The pump overloads the electric motor:**

1 - Speed higher than rated value.

2 - Pressure value too high.

3 - Clogged delivery ducts.

4 - Motor characteristics inadequate for what is required by the pressure and flow rate.

**H) Noise in valves:**

1 - Worn cursor.

2 - Weak or incorrectly fed electromagnet.

**I) Insufficient speed:**

1 - Insufficient flow rate. (Pump with reduced yield)

2 - No pressure.

3 - Seized pistons.

4 - Excessive demand by other parts of the circuit.

**L) Pressure and flow rate fluctuations:**

1 - Defective or incorrectly calibrated flow rate regulators.

2 - Air in circuit.

3 - Unstable safety valve.