

Fastening technology / Automation

TIOS H350N, TIOS H35:2

Instruction manual for 99-0128_BKA, 99-0135:2



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1. INTRODUCTION

We present you an operating manual, in which the data and instructions for unit commissioning are stated, as well as the instructions for its operation and maintenance. This documentation is designed for all employees, who come into contact with the unit and riveting tool. It is necessary to pay proper attention to the entire contents because possible lack of knowledge of operation and maintenance may lead to unit failures.

All data stated in this manual and in the documentation handed over together with the unit is the intellectual property of the manufacturer and may be used only for purposes of unit operation. Their abuse for other purposes creates liability according to legal regulations.

The operator is obliged to thoroughly familiarise himself with this operating manual and adhere to the requirements for operation and maintenance.

Unit type: Riveting unit TIOS H350N
Riveting head type:
Riveting head production number:
Drive unit type:
Drive unit production number:
Production year:
Manufacturer's address:

TTA, s r.o.
U Vodárny 1506
397 01 Písek

Tel.: +420 732 657 298

Czech Republic

www.titgemeyer.com

E-mail: tta-sales@titgemeyer.com

Further information:

Warning safety symbol:



This warning safety symbol informs about important safety communications in this operating manual.

Whenever you see this symbol, read the following communication and information carefully. Inform other operators.

2. UNIT USE

2.1 Regular Scope and Manner of Use

The riveting unit is designed for riveting of ripping rivets, both single-side and multi-part (SRB), namely up to the max. stud dimension – diameter 6.8 mm and the max. force needed for breaking 30 kN. The unit is designed for use in production halls with a temperature range of 15 to 28 °C. The unit allows for checking and evaluating the riveting process. The unit can be operated separately or connected with another unit using a connector.

2.2 Expected Operation Level

Work with the unit may only be performed by persons meeting the legally determined age and health competence. Only demonstrably trained, informed, and operator authorised persons may work with the unit. Upon agreement, the manufacturer may perform training of the persons. The operator must clearly determine the scope of work for persons performing the operation, preparation works, maintenance, and repairs.

Maintenance works and repairs of the unit may be performed only by employees, who meet:

Expert education with experience in the field

Perfect knowledge of all safety regulations related to the performance of the requested work

3. TECHNICAL CHARACTERISTICS

3.1 Description

The unit consists of the drive unit (1), the riveting gun (4), riveting nozzle (3) and connecting hoses (2).

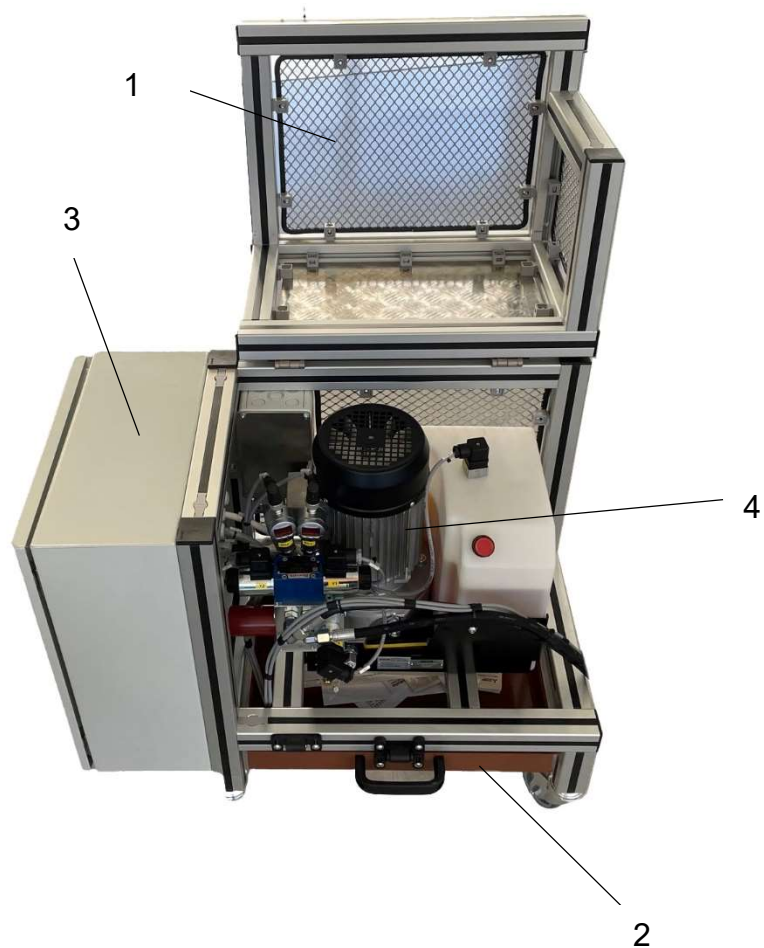




The riveting nozzle that is fastened to the riveting head, they must correspond to the rivet to be riveted. The connecting hose serves for connecting the riveting head with the drive unit and at the same time allow for increasing the action radius of the operator. The drive unit serves as a source of pressure oil for riveting head drive and at the same time it secures control, checking, and evaluation of the entire riveting process.

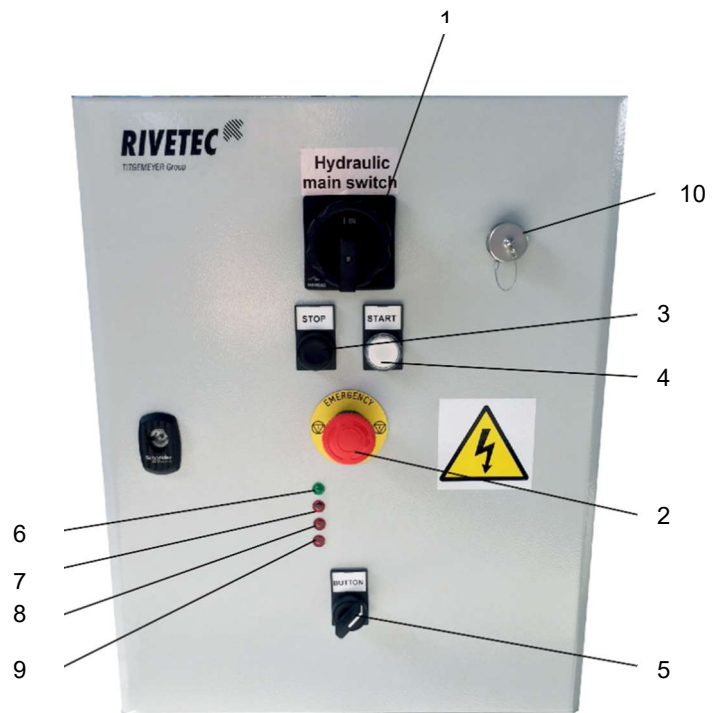
3.2 Drive Unit Description

The drive unit consists of the base frame (1), the catch bath (2), the electric switchboard (3), and the hydraulic aggregate (4).



3.2.1. Electric Switchboard Description

Power control light (6), main switch (1), Emergency STOP (2), aggregate start (4), aggregate stop (3), button switch (5) – serves for activation of the corresponding button at the riveting gun, oil overheating control lamp (7), low oil level control lamp (8), filter fouling control lamp (9), LAN (10).



3.2.2. Hydraulic Aggregate Description

BKA unit

The compact BKA unit is a tank, motor, pump and base unit assembly placed on a common frame. A safety valve is mounted in the base block.

Control block

The control block it contains is mounted on the output pattern of the basic block following elements:

Filter

With filter insert (0040) and electrical clogging signal (0050) for oil filtration security.

Safety valve

Which sets the maximum value of the operating pressure.

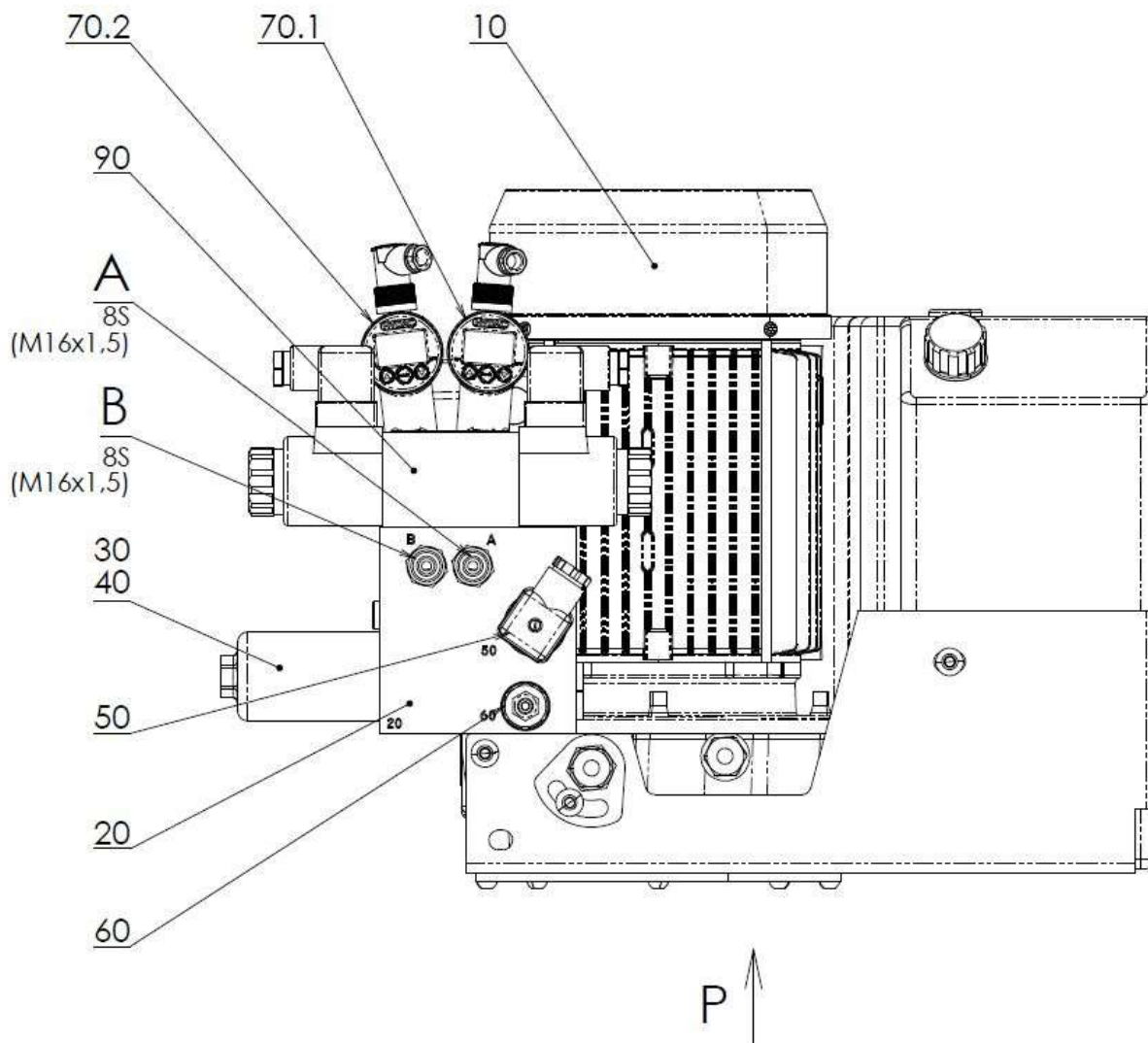
Slide valve

Four-way, closed at rest, outlet connected to the tank, under pressure connected to the output. If all valves are de-energized, the unit runs in relief mode.

If we want to have pressure at output A (or B), we must bring one or the other magnet voltage switchboards, the pressure oil then does not flow back into the tank, but just into the selected one output A (resp. B).

Electronic pressure switches

Included in the outputs. Their task is to signal the course of pressure.



The aggregates may only be operated in a short-term operation S2 or an interrupted operation S3 (according to VDE 0530). They are not suitable for permanent loading with the working pressure. Overheating may cause motor burning or plastic part melting. Besides that, there is also the danger of injury! The aggregate contains thermal protection of the motor.

3.2.3. Riveting Gun H35:2 Description

The riveting head is a hand instrument, whose piston is driven in both directions by hydraulic oil. The riveting head is connected with the pressure oil source by hydraulic hoses (3) ended with quick couplers (1). The riveting head is equipped with force and distance sensors for evaluating the course of the riveting process. A part of the riveting head is the Calchip (2) that serves for storing the sensors parameters and their use for connection to the amplifying and evaluating module. The riveting gun is equipped with two starting buttons, which allows the operator to hold the head ergonomically in all positions. The riveting head may be suspended on a balancer. The head is standard equipped with a rubber extension for catching torn off studs, it is also possible to equip it with different unit for discharge and catching of torn off studs, see Optional accessories.



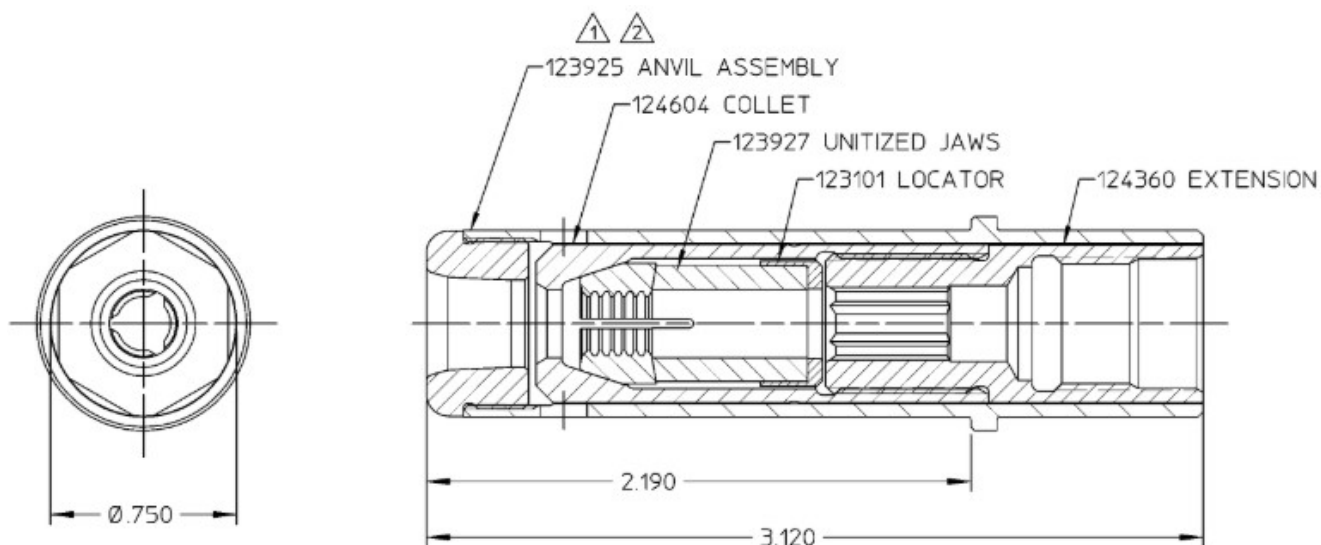
To the riveting gun, it is possible to mount various types of riveting nozzles for various types of rivets. The limiting factor when choosing is the opening diameter in the hydraulic piston of the riveting head, the dimension of the connecting threads and openings, and the force needed for rivet tearing off. In case of any doubt, it is necessary to address the authorised service or the manufacturer. See on point 6.2.

3.2.4. Connecting Hose Description

The connecting hoses are designed as a complete set. They are fitted at both ends with hydraulic quick couplers and the set contains also an electric cable fitted from both sides with connectors. The connecting hoses have a length of 2.5 m. (87-0341)

3.2.5. Riveting Nozzle Description

The riveting nozzle consists of at least the following parts: jaws, clamping head, front nozzle. There may be more parts – depending on the rivet type to be used with the nozzle and the nozzle manufacturer. Example of using riveting head Huck 99-3006 for 6,5 mm lock bolts.



3.3 Technical Parameters

PARAMETER	UNIT	VALUE
Working fluid	Mineral hydraulic oil of class VG 32 according to ISO TC 28/SC4 (DIN 51524) with viscosity 32 mm ² /s at 40 °C	
Tank volume	dm ³	6
Working fluid purity according to	ISO 4406 NAS 1638	18/16/13 7
Max. securing pressure	MPa	40
Pump flow rate	l/min	1,7
Working fluid temperature range	°C	40-55
Motor output	kW	2,2
Connecting voltage – different voltage?? Tolerances	V/Hz	400/50
Control voltage	V	24
Pulling force of the riveting head	kN	26,5
Riveting head piston stroke (max.)	mm	30
Riveting head weight	kg	2.5
Drive unit weight	kg	85

Drive unit dimensions	mm	780x400x660
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4. WORK SAFETY AND HYGIENE

4.1 Introduction

These safety instructions were prepared in accordance with the governmental directives:

No. 24/2003 Coll. (Technical requirements for machinery)

No. 17/2003 Coll. (Technical requirements for electric low voltage unit)

No. 18/2003 Coll. (Technical requirements for products from the standpoint of their electromagnetic compatibility)

4.2 Definitions of Terms

Machine user (machine operator)	- It is a physical or legal entity responsible for the machine operation and its technical condition, adherence to the work safety standards and corresponding national standards for machine operation.
Responsible person	- It is a person authorised by the user to check the machine operation and its technical condition, adherence to work safety standards and corresponding national standards for machine operation.
Maintenance	- A person or persons, whose task is transport, installation, repairs, and maintenance or cleaning of the machine.
Adjuster	- A person or persons, whose task is machine or tool adjustment.
Operator	- A person or persons, whose task is regular operation of the machine.
Dangerous space	- Any space inside or outside the machine, in which the person is exposed to danger, injury or health harm.
Dangerous points	- These are points on the machine with danger of injury or health harm.

Unit repair	- This means a product repair with a minor or even significant wear, where the nature of the repair does not change the original parameters and safety of the unit.
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4.3 Other Safety Statements

All defects and failures that occurred must be reported to the shift leader and recorded into the Operating book of the unit including the manner of repair securing.

Machine user is obliged to train the employees for operation, adjustment, and maintenance of the unit, he is obliged to periodically train and check. He must record every instruction into the journal with signatures of interested persons.

Operation and maintenance must be performed according to the manufacturer's regulations.

The space, in which the unit is installed, must be equipped with anti-fire unit and the operator must be perfectly familiar with it. It is necessary to adhere to the safety regulations for flammable and oil substances valid for the country, where the unit is operated.

4.4 Conditions for Unit Use

4.4.1. Technical Condition

- The unit may only be used in a perfect technical condition.
- The operator is obliged to continuously ascertain this condition.
- The found failures, especially such that can adversely affect safety, must be removed immediately.
- Protective devices must be always functional and in a perfect technical condition – see chapter □
Protective devices
- Protective Devices
 - Securing valve as protection against overload
 - Current securing of the electromotor
 - Central STOP

4.5 Organisation Measures

4.5.1. Obligations of the Machine Operator

- The operator of the unit must prepare an Unit Record with the dates of checks, the list of checked unit parts, and the list of persons to perform the checks are determined, with regard to the operating manual.
- The operator of the unit must maintain the unit in a perfect condition and order at the workplace.
- Works on the unit may be allowed by the operator to be performed only by competent persons, who were properly trained and instructed.
- The operator must adhere to the legally determined minimum age of the operator, maintenance, and adjusters.
- The operator of the unit must secure expert checking (review) of the production unit, especially its safety devices, namely:
 - Before commissioning into regular operation
 - At least once a year - after changes or repairs

4.5.2. Adherence to Regulations

The operator of the unit must take care about adherence to the corresponding safety regulations in order to secure safety of persons, who have the task of operating, maintaining, and repairing. The operator must check the persons coming into contact with the unit for adherence with safety regulations.

4.5.3. Personal Protective Unit, Tools

If a regulation or necessity requires, the employees must use personal protective unit and tools. The operator must check this adherence to regulations.

4.5.4. Failures

Should failures occur in the unit that would endanger the safety of operation or if there is doubt about the perfect condition of the unit during operation, it is necessary to stop the unit immediately and remove the failure. The failures must be removed only by trained and authorised employees by the unit operator.

4.5.5. Machine Modifications

Without the supplier's consent, no modifications of the design nature that would affect safety worsening may be performed on the unit. This measure applies also for welding works on bearing parts.

4.5.6. Spare Parts

It is necessary to use only such spare parts that meet the determined requirements of the manufacturer. Inexpertly performed repairs as well as use of incorrect spare parts results in voiding the product warranty. Use of an incorrect spare part is considered to be an intervention into the machine structure. The manufacturer therefore does not accept liability for such modified structure.

4.5.7. During Long-Term Unit Shutdown:

- Turn off the control voltage.
- Turn off the main voltage supply.



4.6 Instructions for Safety during Unit Operation

4.6.1. Obligations of the Operator during Regular Operation

The operator must observe the operating conditions. Adhere to all safety regulations and standards. Familiarise with the operating manual.

Before every commencing of work with the unit, make sure and continuously check, that no unauthorised person is present near dangerous points. During failures of function of the unit, immediately stop and prevent its starting, until the failure is removed. During work with the unit, use protective tools, e.g. protective gloves, hearing protectors, possibly other PE with regard to the performed operation.

4.6.2. Regular Operation of the Unit

- Avoid all manners of work that are in conflict with safe operation.
- Report changes during operation immediately to corresponding persons, possibly immediately stop and secure the unit.
- Start the unit only after removing the failure cause.

4.6.3. Preparation, Adjustment

- Perform preparation works and function verification only by a qualified person only in the ADJUSTMENT mode.
- During preparation and adjustment, take increased care because the interlocking and protective devices securing protection of the unit and the operator are inactive in the ADJUSTMENT mode.

4.7 Warning about Extraordinary Types of Danger

4.7.1. Electricity

The description is in this entire operating manual.

4.7.2. Dangerous Points



Dangerous points are the places, where upon non-adherence to the safety regulations, damage of the property or danger to personal health may occur.

Dangerous points are especially:

- Moving parts of the unit
- The working space of the unit
- Moving supplies
- Hose connections

Other dangerous places may arise according to the type of the operated technology at the unit. These dangers must be stated in the manual supplied by the technology operator.

4.7.3. Danger during Handling of Fire

The working fluid – hydraulic oil is a flammable liquid with the flashpoint of about 200 °C. Works on the unit, such as welding, burning or grinding, may only be performed by an authorised person.

4.7.4. Noise

It is necessary to use the prescribed protective tools against noise.

4.8 Safety during Maintenance

Screw connections, flanges or valves may be tightened only when the pipelines are not pressurised. Repairs and failures must not be removed at the unit under voltage and under oil pressure. It is necessary to turn off the unit and depressurise hydraulic circuits. During all maintenance or repair works, adhere to valid regulations for environmental protection.

4.9 Banned Activities



To perform any repairs under voltage and pressure of oil.

To remove and disable the safety devices and devices for signalling of failures and interlocking the machine operation or disconnect them electrically.

To operate the unit by persons younger than permitted by legal regulations for operation of this unit in the operator's country. The record of their training must be in writing.

To fill the unit with other than recommended operating substances with worse than prescribed purity.

To perform any welding works on the drive tank and the hydraulic pipeline.

To perform any repairs on the unit with non-depressurised hydraulic circuits and under voltage.

To handle open fire near hydraulic unit.

It is forbidden to perform any such design modifications and interventions that have not been recommended and approved by the unit manufacturer. The same applies to replacement of spare parts for another type or kind.

To perform any repairs without the supervision of a trained maintenance employee and consent of the responsible manager.

Only a person trained for this activity may remove failures on the electrical installation and electrical unit.

4.10 Environmental Protection

- During all works on the unit, it is necessary to adhere to the valid regulations about environmental protection.
- During the replacement of hydraulic oil and filtering elements, it is necessary to adhere to the regulations concerning their disposal with regard to local conditions.
- During disposal of waste, it is necessary to consider the possible health risks and compatibility with the environment.
- Upon a hydraulic oil leak, it is necessary to stop the operation immediately and proceed in accordance with the regulations for removal of effects of the emergency with oil products. New starting and performance of the instructions for operation are to be implemented only after removing the emergency causes!

4.11 Documentation

- The accompanying documentation complies in its design with corresponding standards and regulations valid at the time of the commissioning.
- The documentation contains all documents for operation and maintenance of the unit.
- The operator must ensure that there is at least one printout of the documentation accessible to the group of employees securing operation, adjustment, and maintenance of the machine.

Every person that is authorised to perform an activity on the machine is obliged to familiarise itself with the contents of the technical documentation (the operating manual) before commencing work.

4.12 Warranty

The manufacturer guarantees for supply defects according to the conditions agreed in the contract. The warranty period applies according to the contractual provisions. The warranty does not apply to damages caused by inexperienced handling of the unit, use of unoriginal spare parts or upon non-adherence to the instructions stated in the operating manual. Non-adherence to safety instructions, especially ignoring forbidden activities prevent the manufacturer's liability.

5. STORAGE AND TRANSPORT

5.1 Storage

The storage premises must be dry and dust-free with low air humidity.

Acid or other chemical vapours must not be present. For storage longer than 6 months, it is necessary to properly conserve using conserving oil.

Store rubber parts in polythene bags and conserve with glycerine. Prevent access of ultraviolet radiation and humidity.

Spare parts (if the products contains them) are packaged according to the belonging to functional subgroups. Clear arrangement of spare parts and their storage is a prerequisite of well working maintenance.

Lightly coat the riveting head and the riveting nozzle with conserving oil during long-term storage (e.g. ELFOLNA 46).

5.2 Transport Instructions

The unit is supplied completely assembled. There should be some regulations about the transportation. After delivery the unit please check the oil if you have to fill whole fluid or check the oil level.

The unit must be unpacked from the transport material and established in place, where it will be operated. The hydraulic aggregate must be filled with the operating fluid. Fill with a fluid prescribed by the unit manufacturer, namely in a volume of 4 litres. For filling, use the filling opening located at the top side of the aggregate.

The maximum of the oil fill may be checked using the checking probe located on the closure – see the figure. The

PARAMETER	UNIT	VALUE
Unit weight	kg	90
Max. dimensions - plan - height	mm	780 x 400 660

quality and cleanliness of the oil fill must correspond to the requirements of the regulations stated in Chapter Technical Parameters.

5.3 Instructions for De-conserving

Conserved parts must be rid of conserving and all pollutants.

All inhibitors of rust, if they were used during transport and storage, must be removed. The inhibitors, if washed out with warm oil, cling and accumulate on the polished areas of the unit (pumps and hydro motors).

5.4 Dimensions and Weights of the Unit

6. COMMISSIONING

6.1 Installation

Connect the unit to the power supply with a 5-pin plug 16A / 400V. The supply conductor is 3 m long. Connect the riveting gun to the unit. It is provided with connection hoses. These hoses connected the hydraulic and electric form the unit to the riveting gun.

6.1.1. Replacing H350 to H350N

Changing updated unit H350N by H350 is it possible.

Customer take care of:

Connecting 3 red jumpers between clamps in new version of unit. (Function is describe above)

Added signals of emergency stop on pins 7 and 8 in HARTING connection plug B, to replace original signal oil temperature.

6.1.2. Conversion Table for Hydraulic Mineral Oils

Performance class according to ISO-TC 28-SC4, CETOP RP91H HM according to DIN 51 524 part 2. HLP

VISC. GRADE (ISO)	VG 32	
ADDINOL	Hydraulikol HLP 32	
AGIP	OSO 32	
ARAL	VITAM GF 32	
Benzina	OH-HM 32	
BP	ENERGOL HLP 32	
CASTROL	HYSPIN AWS 32	
DEA	ASTRON HLP 32	
ELF	ELFOLNA DS 32	
ESSO	NUTO H 32	
FINA	HYDRAN C 32	
FUCHS	RENOLIN B 10 RENOLIN VG 32	
KORAMO	MOGUL HM 32	
MOBIL	DTE 24 Hydr.oil. Light	
MOL-LUB	MADIT OH-HM 32	SUPPLIED FOR THE UNIT BY THE MANUFACTURER
OMV	HLP 32, hyd HLP 32	
PARAMO	PARAMOL HM 32	
SHELL	TELLUS OIL 32	
TEXACO	RANDO OIL HDA-32	
TOTAL	AZOLLA ZS 32	
VALVOLINE	ULTRAMAX HLP 32	

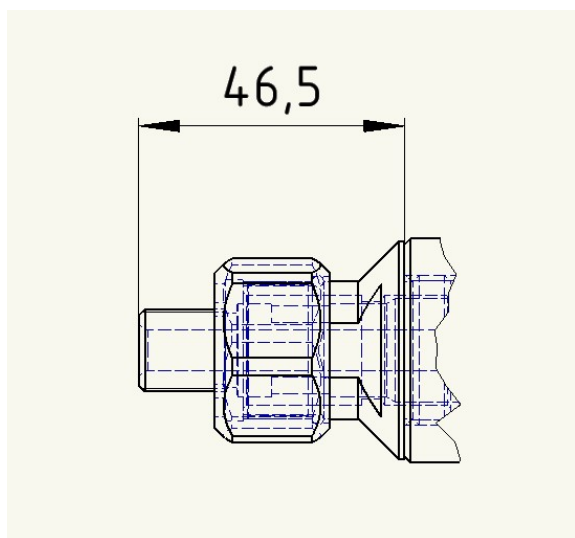
This table is compiled based on the documents and catalogue sheets of oils and does not guarantee the quality or miscibility of oils from individual producers. The use of oils must be consulted with the unit manufacturer.

As standard, oil MADIT OH-HM 32, whose **technical sheet** and **safety sheet** forms an appendix of this manual, is supplied with the unit.

6.2 Assembly

6.2.1. Mount the riveting nozzle on the riveting head:

- First check, whether the hydraulic piston is in the front initial position (see the figure).



Into the clamping head insert the jaws, then turn the clamping head on the thread of the hydraulic piston. Then secure the clamping head and tighten.

Use the wrench A – 13 mm for tightening and wrench B – according to the clamping head.

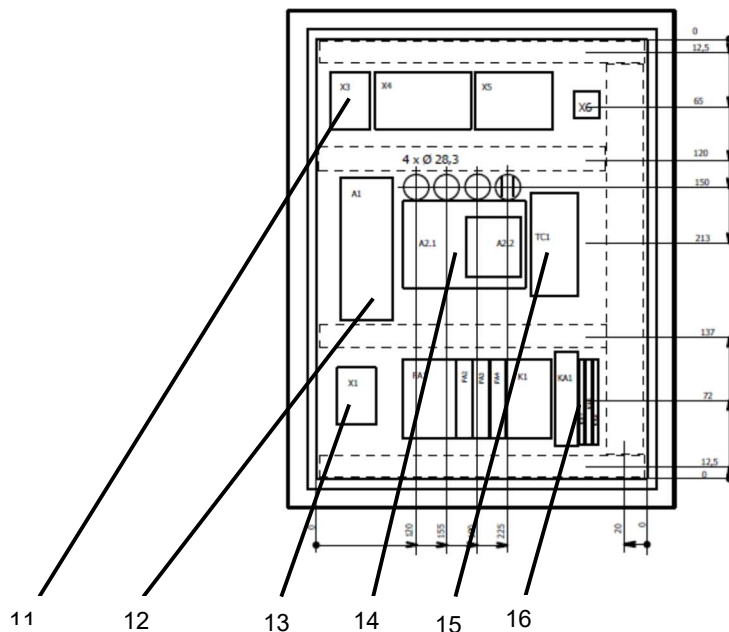
- Screw the nozzle on and tighten using wrench 22.
- Into the nozzle insert the front nozzle and tighten the sleeve nut.

6.2.2. Connecting the Riveting Gun and the Drive Unit

- Connect the hydraulic quick couplers of the riveting gun into the hydraulic hoses of the drive unit, in case of using connecting hoses, connect the quick couplers of the riveting gun and the connecting hoses first and then the quick couplers of the hydraulic hoses and the drive unit.
- In perform the connection of the connectors (calchip) of signal transfer, for connecting the connectors, perform their securing.
- Connecting hoses are in chapter 3.1.

6.2.3. Connecting an External SPS

- The TIOS H350N can be pursued as Standalone as well as part of a higher control. The interface for connection with a superior control is a cable with Hartingplug. In the delivery state the machine is configured for Standalone using, the cable with Hartingstecker must not be connected for Standalone usage.
- Using the connector, connect with an external SPS.
- For the type of the connector and individual signals see Appendices – “Electric wiring diagram”
- Electrical socket with 3 red cables. Whit red cables can unit work aloun. If the red cables will customer take out and connect with superior system.The unit will be work under superior system (11) – controls the entire process of riveting, amplifying and evaluation unit MP85 (12) Power supply connection (13) – control programmable unit (14) supply unit 24 V (15), two-channel security circuits (16)



- The jumpers between clamps are described in the diagram
- The device is delivered with 3 red cables in the terminal block – the differences are that device can work independently (stand-alone system) or is embedded in the machine and subject to the upper control system (build in). Device is controlled by – riveting pistol, unit H350N, or control via external plc.
- The unit contains 3 red jumpers between clamps in the terminal box. Two shorts are used to interconnect safety circuits. When using both of these times, the unit can be used as a separate unit for the riveting pistol. It can be operated by means of buttons on the gun or on the cabinet. By removing these keys and connecting an external PLC, the control system can be controlled by a superior system (in this case it is not possible to control the unit by means of buttons on the gun or on the switchboard).
- Third jumper between clamps is there because of the function - enabling riveting. When is connected to the machine external PLC systems can be connected instead of this.

The riveting unit is ready for connection to an external control unit. After connecting, signal exchange is made possible, which will secure control of the riveting process. Individual inputs and outputs are described Electric Wiring Diagram.

The actual connection is prepared using a connector HARTING – the type is described in the electric wiring diagram.

6.2.4. Outputs and inputs in Hartingplug

Usage with superior control the following functions are given in the Hartingplug and has to be given by or send to the superior control.:

Contact in Harting Plug	Function	Description	Jumpers for Stand alone Modus
Outputs from to unit to external PLC			
XC2:1A and XC2:A2	External Emergency Stop	Contacts must be closed to enable internal safety Circuit*	X3:1 and X3:2
XC2:A3 and XC2:A4	Quit	Contacts may be opened, if starting of Riveting Process shall be prevented (Rivet enable)	XL:1L+ and X4:5
XC2:A5 and XC2:A6	ON	After release and close safety curcuits has to be start up (same like switch on button	
XC2:A7 and XC2:A8	Reset	Close and release Contacts to reset Sensor Values **	
XC2:A9 and XC2:A10	External Emergency Stop	Contacts must be closed to enable internal safety Circuit*	X3:9 and X3:10
XC2:A11 and XC2:A12	Reserve	Not in use	

Inputs from external PLC			
XC2:1B and XC2: B2	ON	Potential free Contact opens if Emergency Stop is released	
XC2:B3 and XC2: B4	NOK Signal	Potential free Contact closes in case of NOK Process evaluation 300ms	
XC2:B5 and XC2: B6	OK Signal	Potential free Contact closes in case of OK Process evaluation 300ms	
XC2:B7 and XC2: B8	Internal Emergency Stop	Potential free Contact opens if Emergency Stop is released	
XC2:B9	Warning Oil	24 V Contact closes in Case of Oil warning	
XC2:B10	Reserve	Not in use	
XC2:B11 and XC2: B12	Internal Emergency Stop	Potential free Contact opens if Emergency Stop is released	
PE	PE	Must be connected	

* To enable Functions after Emergency Stop both External Emergency Stops has to be opened before

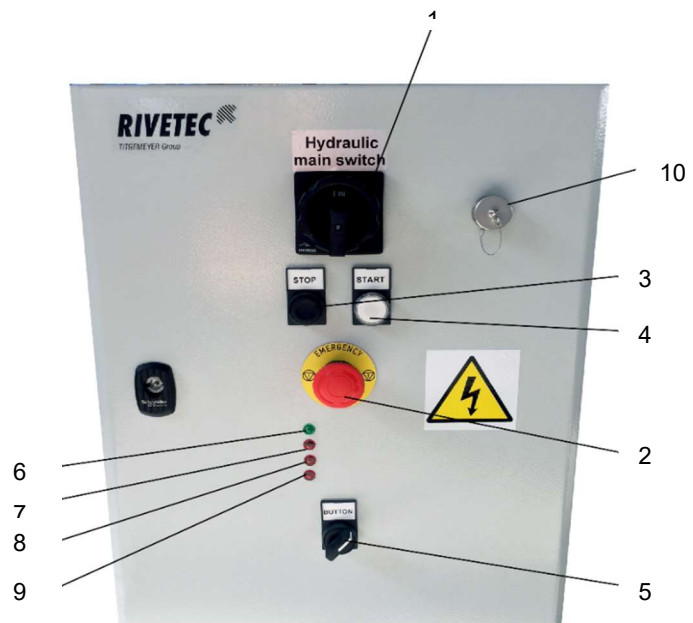
** may be closed only if machine don` t work and Contacts 3-4 are opened

6.2.5. Connecting the Unit to the Electricity Source

- The unit is equipped with a 5-pin plug 16A / 400V.
- The supply conductor is 3 m long.

6.3 Unit Starting

- By pulling and turning, unblock the Emergency STOP (2).
- Turn on the main switch (1) – the power control light is lit (6).
- After 10 s, turn on the START button (4).
- Perform the starting button selection using the selector switch (5).
- Different uses are possible with remove 3 red wires in the electric cabinet. See in chapter 6.2.3.



6.4 Adjustment and Setting

6.4.1. Adjustment of the Riveting gun

There is no adjustment on the riveting gun what customer will make by himself.

Any adjustment and setting may only be performed by a competent person – authorised service.

6.4.2. Setting the Working Values of the Hydraulic Aggregate

All settings at the hydraulic aggregate are performed in the production plant. The procedure and manner of adjustment corresponds to the procedures of the supplier of the hydraulic unit and the setting values are governed by the internal regulations of the TTA Company so that the required and declared output parameter of the unit are achieved. See Chap. 3.3. Technical Parameters.

Any adjustment and setting may only be performed by a competent person – authorised service.

6.4.3. Program and its Setting in the Control Programmable Unit

The control programmable unit is equipped with a program already in the production plant. The program is built so that the unit allows for using all functions described in Chapter 7. Unit Functions. The program is password protected so that its breach cannot occur. The safety password is stored at the manufacturer.

Any program changes and program settings may only be performed by a competent person – authorised service.

6.4.4. Setting the Basic Data in the Program of Unit MP85

In the program of the amplifying and evaluating unit MP85, there are all basic settings already performed in the production plant. The basic settings of the program are performed so that the unit allows for using all functions in Chapter 7. Unit Functions.

Only a competent person should enter the program a trained employee, authorised service. The basic settings may be changed only upon agreement with the riveting unit manufacturer.

6.4.5. Setting the Evaluating Criteria of the Riveting Process MP85 -



These are criterion settings, according to which the riveting process is evaluated and finally marked as good or bad. This setting can only be performed based on the knowledge of connected parts, used rivets, and the technological procedure that will be used during the process. This setting must be specified after the performed tests during regular operation. The process values that are decisive for its quality performance, must be determined by the customer (user). These values may be e.g. the value of the force upon rivet stud tearing off and its tolerance, the value of the rivet stud movement length, for which the rivet body deformation takes place, etc.

With regular supply of the unit, the evaluating criteria are not set. It is possible to agree a general preset already in the production plant.

The setting can be performed after connecting the MP85 with a PC. For this action, it is necessary to have the corresponding connecting cable and a control program installed in the PC. The connecting cable and the control program see Chap. 10 Optional Accessories.

The setting of the evaluating criteria may be performed only by a competent person – trained employee, authorised service.

The procedure of setting the evaluating criteria is not the subject of this manual. It requires a separate training and knowledge of the product MP85 by HBM.

6.4.6. Setting the Riveting Process Data Saving

The basic setting during selling from the TTA Company is without data saving. It is possible to preset the data storage already in the production plant upon agreement with the unit manufacturer.

For the possibilities of data storage, see Chap. 7.3. Riveting Process Data Saving.

The setting may be performed after connecting the MP85 with a PC. For this action, it is necessary to have the corresponding connecting cable and the control program installed in the PC. For the connecting cable and the control program see Chap. 10 Optional Accessories.

The data storage setting may only be performed by a competent person – a trained employee, authorised service.

The procedure of data saving setting is not a subject of this manual. It requires a separate training and knowledge of the MP85 product by HBM.

7. UNIT FUNCTIONS

The riveting unit TIOS H35:2 is equipped with the following main functions:

7.1 Riveting

The riveting function is described in Chapter 8. Operation and control.

7.2 Riveting Process Evaluation

The riveting process is evaluated based on physical quantities (dependence of force on distance) sensed by sensors located in the riveting gun. For the actual evaluation, it is necessary to determine the checking windows, through which the curve sensed during the riveting process must pass.

If the curve passes the correct windows, in the correct direction, and in the correct order, the process is evaluated as good (OK). If the curve does not pass some window or not in the correct direction or order, the process is evaluated as bad (NOK).

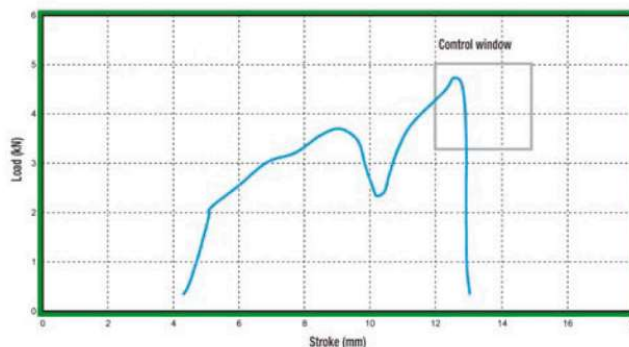
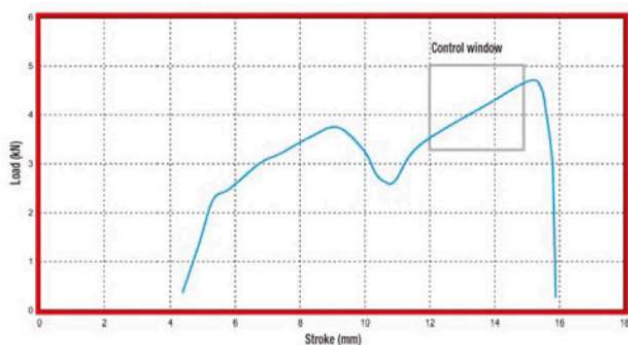
By the combination of the amount of check windows, their size and location, it is possible to check during the process and evaluate more facts. E.g. the rivet quality – whether it corresponds to the etalon, presence of riveted materials, adherence to basic dimensions of riveted materials and the opening for the rivet, etc.

Process evaluation – visualisation using a diode at the riveting head:

red NOK



green OK



NOK curve: The curve does not pass the window on the correct direction or order.

OK curve: The curve pass the window on the correct direction or order.

7.3 Riveting Process Data Saving

The data of the riveting processes may be stored in these manners:
See in manual of MP85A

A/ Medium type:

- MMC card (about 100000 riveting processes on a 2GB card) see Optional Accessories
- Into the PC memory

B/ Types of processes to save:

- Only OK processes
- Only NOK processes
- OK and NOK processes

C/ Setting the amount of stored data:

- Without data loss
- With data loss

D/ Manner of saving:

- Only curves
- Result saving (also the check window setting is saved)

E/ Saving format:

- ASCII
- QDAS

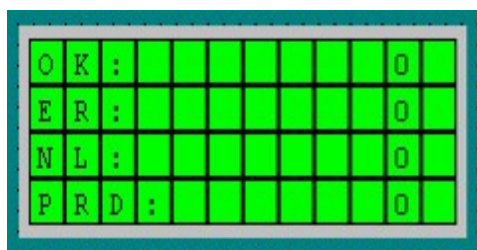
7.4 Check and Securing Some Technical Parameters of the Unit

The unit is equipped with further auxiliary functions that serve for facilitating maintenance and checking:

Quantity function: the number of OK, the number of NOK, the number of reset impulses, the number of idle cycles

This screen is on PLC in the Switch.

Everything that is displayed on the control unit panel and individual counters can be reset (see Chap. Operation and Control)



OK riveting counter
NOK riveting counter
Reset impulses counter
Idle cycles counter

- Checking the hydraulic unit temperature: upon exceeding the permitted temperature, the hydraulic unit is turned off – information is displayed on the control unit panel, after temperature drop to the working temperature, it is possible to resume working.
- Check of the hydraulic oil level (two-stage):
 - First stage: the operator is informed at the control unit panel
 - Second stage: until the hydraulic oil is refilled, the hydraulic aggregate is turned off (the information is at the control unit panel)

- Hydraulic oil purity check: in case of filter clogging, the operator is warned by information on the control unit panel, if the filter is not cleaned within 6 hours of operation, the hydraulic aggregate is turned off, namely until the filter is replaced. Maintenance have to change the filter.



Warning - high temperature

Warning - dearth of oil (1st stage)

Warning - replace the filter necessary or refill the hydraulic oil

8. OPERATION AND CONTROL

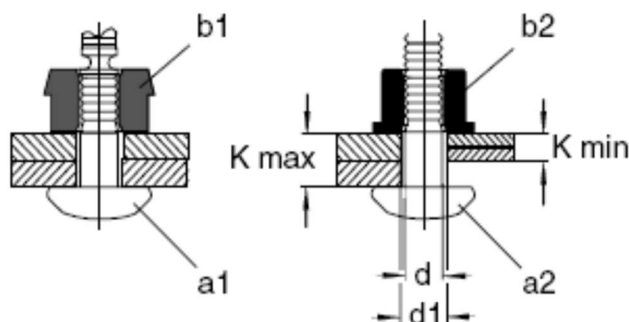
8.1 Warning:

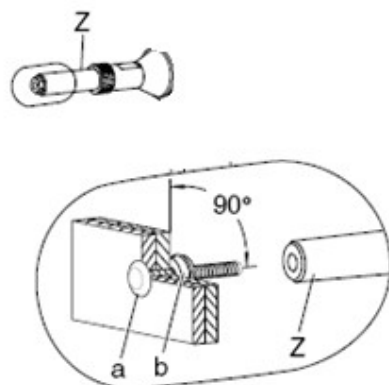
- The riveting head used by you and the rivet may look differently from the used figures.
- When riveting, the tool must be held perpendicular to the riveted material.
- The values of the opening size (D1) and the clamping area (K) must be obtained from the used rivet manufacturer.

8.2 Two-Part Rivet Riveting Procedure

- Put the riveting stud (a) into an opening in the material
- Put the clamping ring (b) on the riveting stud
- Hold the riveting pivot head (a) and pull on the riveting nozzle (Z). Insert the nozzle so that it pushes the clamping ring (b) to the material.
- Press the start button on the riveting head – the riveting operation is performed (the riveting nozzle is pulled on the clamping ring, which pushes it to the material and also deforms it). After tearing off the rivet stud, the hydraulic piston returns into the original position.
- The torn off rivet stud is discharged during the next riveting rearwards from the riveting head.

Attention – it is necessary to use a torn stud catcher.

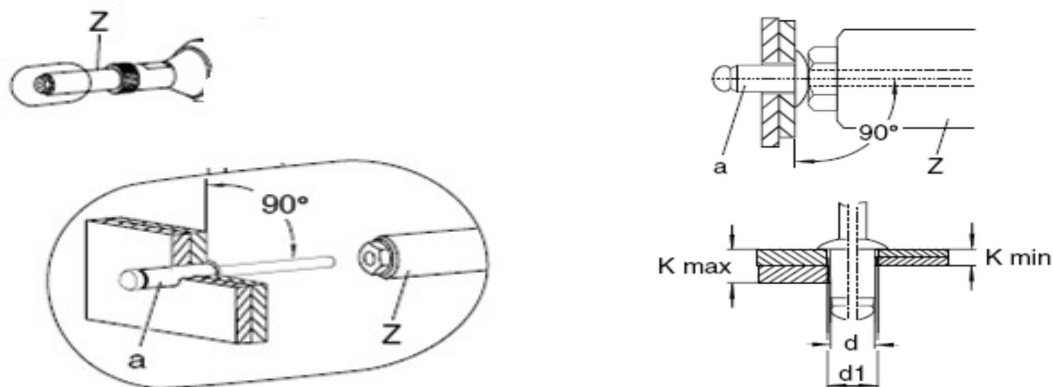




8.3 Procedure of Riveting a Single-Side Ripping Rivet

- Put the ripping rivet (a) into an opening in the material
- Pull on the riveting nozzle on the rivet stud (Z). Insert the nozzle so that it pushes the rivet (a) to the material.
- Push the start button at the riveting head – the riveting operation is performed (the jaws grip the rivet stud and pull it inside the nozzle, which deforms the rivet body and the material is clamped). After breaking the rivet stud, the hydraulic piston returns into the original position.
- The torn off rivet stud falls in the direction of the riveting head tilt.

Attention – it is necessary to use a torn stud catcher.

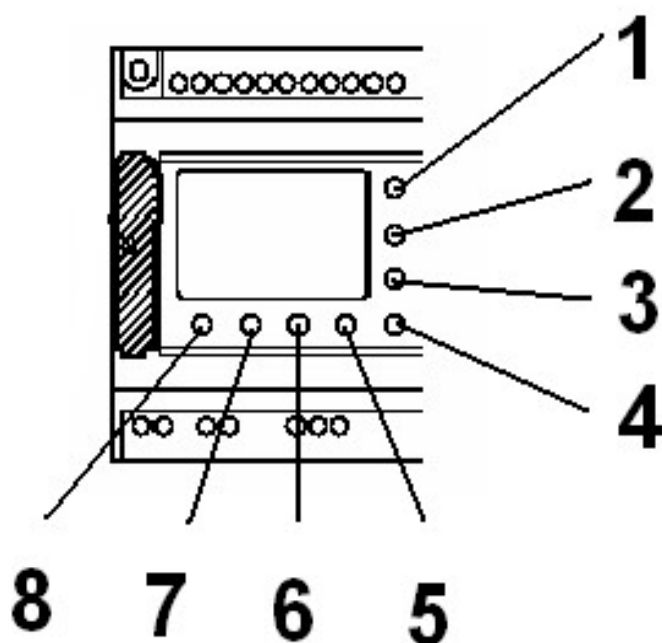


8.4 Process Evaluation

- If the process is evaluated as good, the green diode is lit on the riveting gun and 1 pc is added in the control unit into the counter of good processes (OK). In case that the unit is connected with an external control unit, an OK signal is sent to it.
- If the process is evaluated as bad (NOK), the red diode is lit at the riveting gun and 1 pc is added to the counter of bad processes (NOK). The riveting head is blocked for further use (unless the control unit program is changed upon the customer's wish). In case that the unit is connected with an external control unit, a NOK signal is sent to it.

8.5 Internal Control System Panel Button Control

The internal unit of the control system is fitted with 8 pcs of buttons that are programmable for the following use:



Button 1 - Resetting the amplifying and evaluation unit MP85

Button 2 - Resetting the good cycle counter - OK, the counter of signals for the MP85 used for setting a zero for sensors, the counter of riveting cycles – without rivets

Button 3 - Resetting the counter of bad cycles – NOK

Button 4 - Setting the zero of sensors in the riveting head.

Button 6 and 7 simultaneously – turning on the hydraulics and the command for return of the hydraulic piston in the riveting head into the start position.

ATTENTION – danger of injury by the riveting head (the riveting nozzle must not be dismantled)!

Buttons 5, 6, 7, and 8 - cause the displaying of the software version.

9. MAINTENANCE



The activities described in this chapter must be performed after turning off the riveting unit and disconnecting the electricity source. In the opposite case, there is a danger of injury.

9.1 Maintenance of the Riveting Gun and the Riveting Nozzle

- The riveting gun and the riveting nozzle must be kept clean and perform cleaning of the clamping head (4), jaws (3), and the front nozzle (6) every day.
- Every day, before commencing work, it is necessary to check the condition of the front nozzle (6), whether it is not deformed or whether cracks are created. In case that there is a deformation or cracks, it is necessary to replace the nozzle - see 6.2 Assembly
- Every day before commencing work, it is necessary to check the tightening of the clamping head (4) and the sleeve nut (7). In case of tightening the clamping head.
- Once a week, check the jaw condition (3), in case of their wear, replace them. See Chap. 6.2.
- Every day, check the nozzle tightening (5).
- Regularly check a possible oil leak at the riveting head
- Twice a year, it is necessary to perform setting of the values in the calchip see chap. 6.4.1.
- In high volumes shorts maintenance check to suitable maner

9.2 Drive Unit Maintenance

The drive unit is maintenance free, but it is necessary to regularly perform the following checking tasks:

Checking whole day of reporting on the display of the internal control system:



Warning - high temperature
Warning - dearth of oil (1st stage)
Warning - replace the filter
necessary

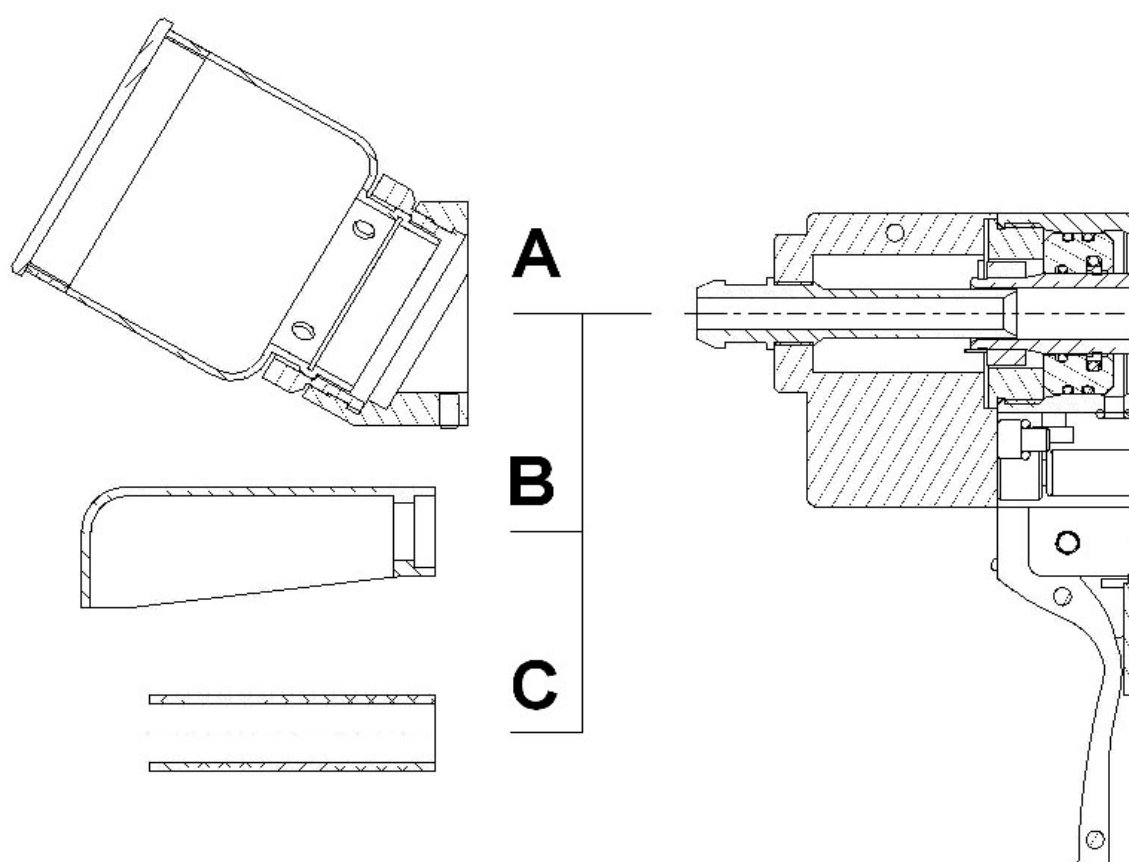
- Message "high temperature of the hydraulic unit" – upon exceeding the permitted temperature, the hydraulic unit is turned off (information is displayed on the control unit panel), upon a temperature drop to the operating temperature, it is possible to resume working.
- Message "lack of oil – first level" – during the nearest shutdown of the unit, it is necessary to refill the hydraulic oil, see 6.1 Installation.
- Message "necessary filter replacement or lack of oil" – it is necessary to check the oil level and refill it (see Chap. 6.1 Installation), if the message lasts, it is necessary to replace or clean the filter of the hydraulic aggregate (this activity may only be performed by trained personnel or an authorised service).
- Once a week, perform a visual check of the entire hydraulic system, especially secure tightness of individual elements, pipelines, hoses, valves, and the tank.

The optional accessories must be ordered separately.

9.3 Torn Stud Discharge

With the unit, it is possible to use 3 options for discharge or catching of torn studs:

- A1 Catching vessel direct including a connecting adapter (87-0272 + 87-0061)
- A2 Catching vessel angular including an adapter for connection (87-0440 + 87-0061)
- B Catching rubber – it is supplied with the riveting gun as standard. (87-0062)
- C Discharge hose (87-S521:1)



9.4 Set for Connection of a PC with the MP85

- The set serves for the possibility of setting the basic data in the program of the amplifying and evaluating unit MP85A, setting the evaluating criterions of the riveting process, setting the riveting process data saving, allows also for direct data saving.
- The set can only be used by a trained person, knowledgeable about the product of the HBM Company, the measuring and amplifying module MP85A.
- Set parts: connecting cable, USB adapter, setting SW, SW – USB driver

9.5 MMC Memory Card

The MMC card serves for data storage of the riveting process. See in manual of MP85A, the MMC card can be bought in the regular business network.

10. FAILURES AND THEIR REMOVAL

When identifying the failure causes, it is always first necessary to determine, whether the unit function loss is caused by a failure of the electric or hydraulic unit part.

For repairs of failures on hydraulic systems, it is impossible to prepare a unified procedure. However, it is necessary to adhere to all general rules and work procedures:

Before disassembly of any parts of the hydraulic system, it is necessary to make sure that:



- Switch off the unit and disconnect from the power supply
- Do not operate with the tool if you are ill, under the influence of drugs, alcohol or narcotics.
- Do not use the tool when it is incomplete and when it has visible mechanical defects.
- The mechanism, whose hydraulic control will be dismantled, is in a stable position that allows for disconnecting the hydraulics (autonomous unit movement must not occur).
- The hydraulic circuit is disconnected from the pressure source (turned off and depressurised hydraulic drive).
- The hydraulic circuit is disconnected from the electricity source (it is disconnected at the central electric switchboard, the control voltage is turned off at the panel, and the connectors of electric switchboards are dismantled).
- Individual branches of the hydraulic circuit are without pressure (check at the measuring points using a manometer, possibly depressurise).
- During all disassembly works, thoroughly take care about maximum possible cleanliness of the workplace in order to prevent damage of the dismantled parts and introduction of pollutants into the system.
- Replace individual parts only with original spare parts. Use of other parts than original may lead to the unit function loss.
- After completing the assembly, carefully check the setting of the hydraulic elements according to the diagram.
- Before operation, clean individual parts of the hydraulic unit from oil.

Actions that the unit operator may perform – designed using the letter **B**

Other actions may only be performed by a trained qualified person – designated using letter **F**.

FAILURE	POSSIBLE CAUSE	FAILURE REMOVAL
The rivet cannot be torn off, but the hydraulic system works.	Clogged jaws Worn jaws Loose riveting nozzle	(B) Clean the riveting nozzle. (B) Replace the jaws. (B) Perform tightening.
The rivet stud cannot be inserted into the nozzle.	Incorrect riveting nozzle Loose riveting nozzle Clogged opening for stud discharge	(B) Replace the nozzle. (B) Perform tightening. (B) Empty the device for stud discharge.
Hydraulic system leak	Loose connections Damaged packing	(B) Perform tightening (F) Replace – authorised service
Hydraulic piston has not returned into the original position.	Electric failure Low working temperature	(B) Return the piston using buttons to the SPS.
Aggregate does not work.	High working temperature Lack of oil Oil filter clogged	(B) Let the unit cool down. (F) Refill oil. (F) Replace or clean the filter.

11. WEARABLE PARTS

The wearable parts are contained in the riveting nozzle set. These parts must be regularly checked and based on a test and long-term monitoring, determine the rules and dates for their regular replacement. Appearance of parts and ordering numbers depend on the type of the riveting nozzle and manufacturer.

12. SPARE PARTS

12.1 Spare Parts Storage

- The storage premises must be dry and dust-free with low air humidity.
- - Acid or other chemical vapours must not be present. For storage longer than 6 months, it is necessary to proper conserve using conserving oil.
- Spare parts are packaged according to the belonging to functional subgroups.
- Rubber parts must be conserved with glycerine and stored in black polythene bags.

12.2 Exchangeability of Spare Parts

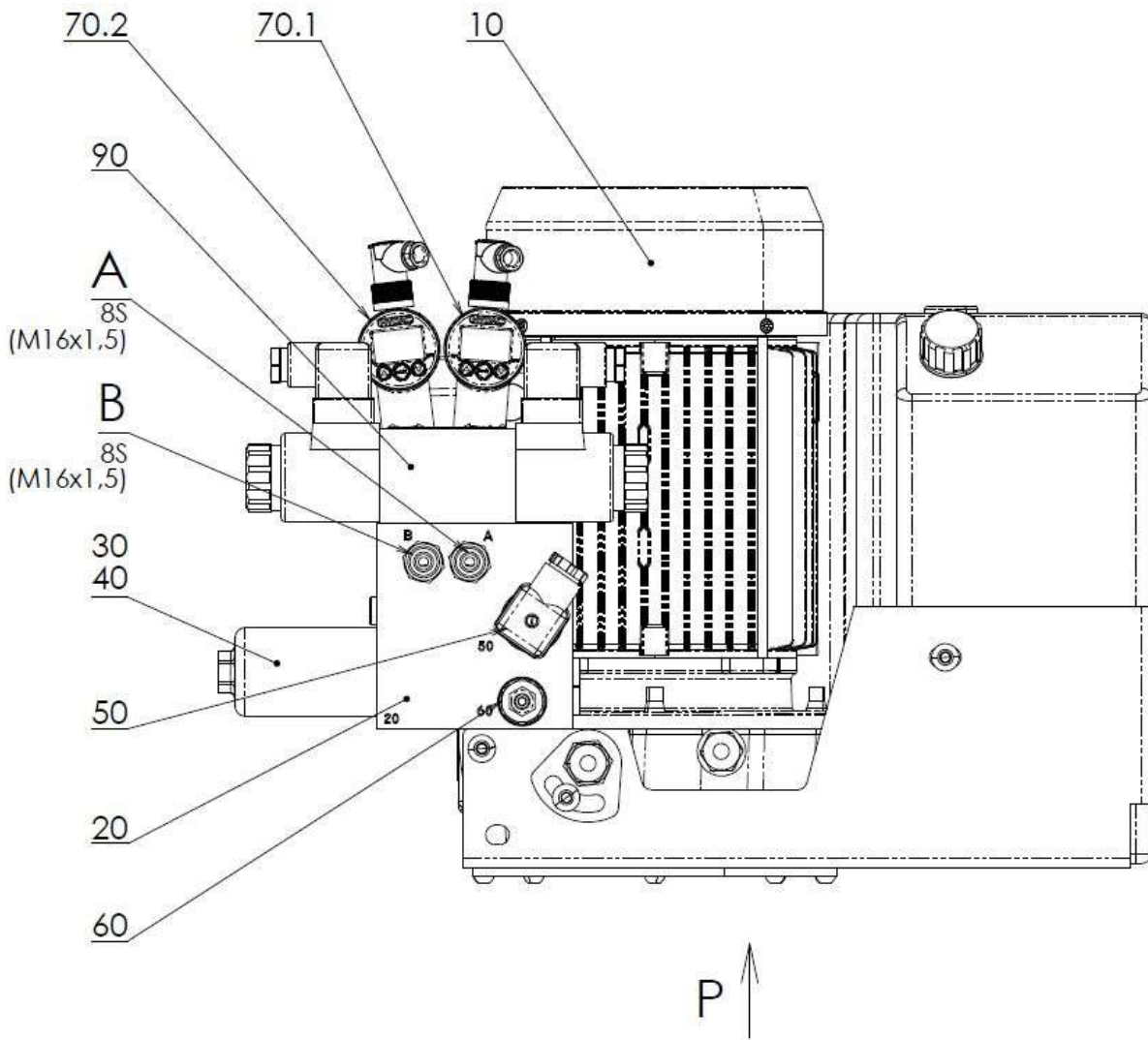
During production, assembly, commissioning, and work of the machine, there is constant modernisation of elements. For these reasons, it is necessary to write the order exactly according to the documentation and check with the actual condition mounted at the unit. Most new elements is exchangeable without modifications, but it is better to have the order assessed by an expert workplace of TTA, spol. s r.o., that is capable of deciding about exchangeability, possibly about necessary modifications to perform.

12.3 Ordering Manner:

According to the information on the type plate on the unite

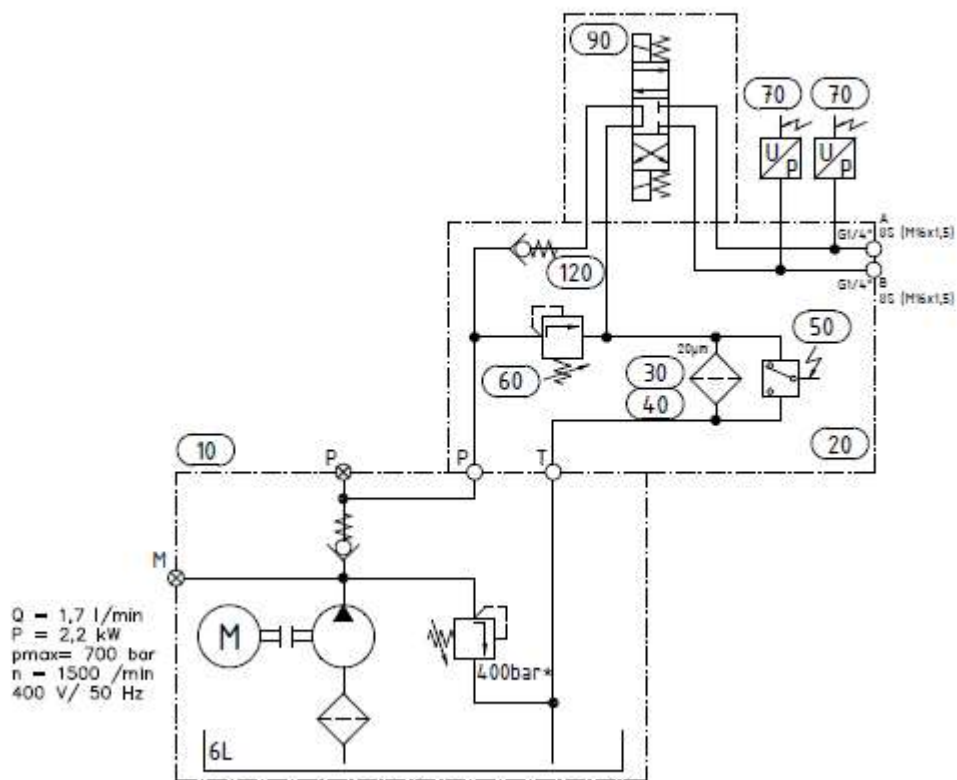
Hydraulic Aggregate

POS.	QUANTITY	UNIT	ORDERING CODE	DESCRIPTION	SUPPLIER
0010	1.00	pcs	4575032	BKA-E-415-2,2-1,22/400-6-X-00	BIERI
0020	1.00	pcs	4581043	BLOCK RIVETEC BKA (Bieri)	HYDAC
0030	1.00	pcs	1250583	MDF 30 SET XX W 1,0	HYDAC
0040	1.00	pcs	1260880	0030 D020 BN3HC	HYDAC
0050	1.00	pcs	311645	VM 2 C.0	HYDAC
0060	1.00	pcs	716024	DB4E-01X630P	HYDAC
0070	2.00	pcs	908167	EDS 3446-10400-000	HYDAC
0080	2.00	pcs	6006788	ZBE 06 M12x1 4 polig, abgew	HYDAC
0090	1.00	pcs	6007617	4WE 6 G6X/EG24N9K4	BOSCH REXROTH
0100	1.00	pcs	7400001526	Conector A GDM 2009 (931965-106)	BELTES
0110	1.00	pcs	7400001525	Conector B GDM 2009 (931965-100)	BELTES
0120	1.00	pcs	710151	RVE-R1/4-X-0,5	HYDAC
	1.00	pcs	87-0361	Hydraulic quick coupler Kit	TTA



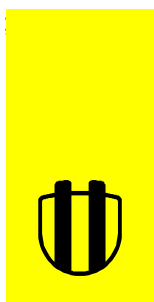
13. APPENDICES

13.1 Hydraulic Diagram



13.2 Oil Technical Sheet

INDUSTRIAL OILS



Madit OH-HM 32

HYDRAULIC OIL

Technical Information Bill

Slovnaft

Description:

Hydraulic oil **Madit OH - HM 32** is solvent-refined and hydrotreated mineral oil with additives for improving oxidation stability, anticorrosion and antiwear properties, and antifoaming additives.

Use:

The oil **Madit OH - HM 32** is designed for hydrostatic mechanisms with high mechanical and thermal load; for stationary and mobile machines, working in the unprotected environment. They are all-season oils and are compatible with most oils of other producers. Approved by ZŤS, Dubnica nad Váhom, Slovakia.

Specifications:

Viscosity class:	ISO VG 32
Performance profile:	ISO-L-HM ISO 11158 HM HLP (DIN 51 524-2) HM (AFNOR NF E 48-603) Cincinnati Lamb P-68 Bosch Rexroth RE 90220

Physical & Chemical Properties:

Density at 15°C, kg/ m ³	informative	872
Kinematic viscosity at 40°C, mm ² /s		28,8 - 35,2
Kinematic viscosity at 100°C, mm ² /s	minimum	5
Dynamic viscosity at -20°C (CCS), Pa.s	maximum	2,5
Viscosity index	minimum	95
Open cup flash point according to Cleveland, °C	minimum	180
Pour point, °C	maximum	-33
Deemulsification characteristic at 54°C, min.	maximum	40

Packaging:

Madit OH-HM 32 is supplied in 60 and 200 litres metal painted barrels, for wholesale in returnable containers, in tank cars and in railway tank cars.

Storage Conditions:

Madit OH-HM 32 should be stored in closed original containers on the places protected against weather effect, strong sunlight and heating surfaces at the temperature to +40°C. Storage time at meeting above mentioned conditions is 3 years.

Manipulation:

Respect the safety principles at work with oil products.
 For more information ask for the product's Safety Data Sheet.

Contact place for marketing information:

Slovnaft a.s., Technický servis mazív, Vlčie hrdlo, 824 12 Bratislava 23, Slovakia
 Tel.: +421/2/5859 7646; 5859 7263; 5859 7647; 5859 7264; 5859 7399
 Fax: +421/2/4524 6829
madit@slovnaft.sk, www.madit.sk

The data conform with the present technical state, we reserve the right of changes.

January 2006

13.3 Oil Safety Sheet

MATERIAL SAFETY DATA SHEET MOL-LUB Ltd. (91/155 EC)

Trade name: **Madit OH-HM 32 hydraulic oil**

Version: 3

Latest revision: 12. 09. 2006

Date of issue: 04. 12. 2003

Page: 1/(7)

1.

Identification of the substance / preparation and company

Product name:

Madit OH-HM 32

Product type / recommended uses:

preparation / hydraulic oil

Manufacturer / Supplier identification:

MOL-LUB Lubricant Production Trade and Service Limited Liability Company

H-2931 Almásfüzitő, Fő u. 21., Hungary

Phone / Fax: (+36-34) 526-330 / (+36-34) 526-391

For more information contact:

MSDS:

MOL-LUB Lubricant Production Trade and Service Limited Liability Company

Customer Service Center

H-2931 Almásfüzitő, Fő u. 21., Hungary

Phone / Fax: (+36-80) 201-296 / (+36-34) 348-010

Technical information:

MOL-LUB Ltd. Product Development and Technical Service

H-1117 Budapest, Október huszonharmadika u. 18., Hungary

Phone/Fax: (+36 - 80) 201-296 or (+36 - 1) 464-0236 / (+36 - 1) 464-0304

Emergency phone number: (+36) 34 526-210 or (+36) 34 526-144

Health Toxicological Information Service (ETTSZ 1096 Budapest, Nagyváradi tér 2.)

Tel.: (+36 - 1) 476-6464, or (+36 - 80) 201-199

2. Composition / information on ingredients

Chemical description: Refined mineral oil containing additives (antioxidant, corrosion-inhibitor, antiwear, viscosity modifier and pour point depressant).

Ingredients / Hazardous components:

Name	CAS/EINECS number	Hazard symbol	Risk phrase	Conc. %(m/m)
Base oil	101316-70-5/309-875-6	-	-	} 98 – 99.5
	101316-72-7/309-877-7	-	-	
Zinc alkyl dithiophosphate	confidential	Xi	R 36/38	max. 0.5

The full text of each relevant R phrase see in Section 16.

3. Hazards identification

Human health hazards: -

Note: Prolonged and/or repeated contact may cause irritation depending on individual sensitivity (see also Protective unit).

Safety hazards: -

Environmental hazards: -

4. First aid measures

General information: Never give anything by mouth to an unconscious person, or never induce vomiting.

Inhalation: Remove the affected person to fresh air. If rapid recovery does not occur, obtain medical attention.

Skin contact: Wash skin with large amounts of water, use soap. If irritation persists, obtain medical attention.

Eye contact: Flush eyes with plenty of water for 10-15 minutes. Obtain medical attention.

Ingestion: If swallowed, give water, **do not** induce vomiting. Get medical attention.

5. Fire-fighting measures

Fire hazards:

Moderately hazardous (see also Section 9 - flash point).

Suitable extinguishing media:

Foam, carbon dioxide, dry chemical powder.

Unsuitable extinguishing media:

Water jet.

Hazardous decomposition products:

On burning, phosphor oxides, sulphur oxides, at elevated temperature hydrogen sulphide can be formed.

In case of incomplete combustion, carbon monoxide, various hydrocarbons and soot can be formed.

Special protective unit:

-

Further information:

-

6. Accidental release measures

Personal precautions:

See Section 8.

Environmental precautions:

Prevent spills from entering into natural water, soil and drains by containing the liquid.

Notify relevant authority.

Clean-up procedures / recovery

On soil: Contain spilled liquid with sand, earth or other suitable absorbents. Recover free liquid by pumping. Dispose of according to local regulations.

On water: Confine the spillage. Remove from surface by skimming or suitable absorbents. Notify local authorities according to regulations.

7. Handling and storage

Handling:

Keep away from radiant heat and open flame.

Keep general measures applied for normal operations with lubricants. No special requirements.

When using do not eat, drink or smoke. Avoid splashing the product.

Storage:

Store in dry, well ventilated place in tightly closed containers.

Keep away from radiant heat, open flame and strong oxidizing agents.

Storage temperature: max. 40°C.

8. Exposure controls / personal protection

Engineering control measures:

Not required.

Exposure limits:

Mineral oil mist: TWA: **5 mg/m³**; STEL: 10 mg/m³, for oil mist, vapour excluded (ACGIH).

Personal protection:

Respiratory protection: Breathing apparatus not required.

Hand protection: Oil-proof gloves (e.g. – PVC, nitrile).

Eye protection: Protective goggles not required.

Skin protection: Protective clothing.

Other special:

General protective measures / hygiene:

Avoid contact with skin and eyes. Avoid prolonged breathing of oil vapours or mists.

Ensure washing facilities after working hours and before breaks. Take off contaminated or oil-soaked clothing, wash with warm water and soap.

9. Physical and chemical properties

Appearance:	
Physical state:	liquid, viscous
Colour:	yellow to brownish red
Odour:	characteristic
Change in physical state:	
Pour point (ISO 3016):	typ. -36°C
Boiling point:	
Flash point (COC) (EN ISO 2592):	typ. 210°C
Ignition point (EN ISO 2592):	
Autoignition temperature:	not available
Explosive properties:	not explosive
Oxidizing properties:	
Vapour pressure at 20°C:	negligible
Density at 20°C (EN ISO 12185):	typ. 0.876 g/cm ³
Solubility in water:	practically insoluble in water
Solubility in other solvents:	gasoline, kerosene, toluene, etc.
n-Octanol/water partition coefficient:	not available
Others:	
Heating value:	inf. 42 000 kJ/kg
Kinematic viscosity (EN ISO 3104)	
at 40°C, mm ² /s:	typ. 32.4 mm ² /s
at 100 °C, mm ² /s:	typ. 5.5 mm ² /s
pH:	not applicable

10. Stability and reactivity

Stability:	No decomposition if stored and handled properly.
Conditions to avoid:	Direct heat or ignition sources.
Materials to avoid:	Strong oxidizing agents.
Hazardous decomposition products:	On burning, phosphor oxides, sulphur oxides, at elevated temperature hydrogen sulphide can be formed. In case of incomplete combustion, carbon monoxide, various hydrocarbons and soot can be formed. Under normal conditions no dangerous decomposition products are formed.
Notes:	

11. Toxicological information

Acute toxicity:

Oral (OECD 401):	LD ₅₀ (rat)	> 2000	mg/kg	(based on components)
Dermal (OECD 402):	LD ₅₀ (rabbit)	> 2000	mg/kg	(based on components)

Irritation, skin sensitization:

Skin:	not irritant (based on components)
Eye:	not irritant (based on components).
Note:	Prolonged and/or repeated contact may cause irritation depending on individual sensitivity.
Sensitization:	not sensitising (based on components)

Chronic toxicity: not known

Other information, specific effects:

The product does not contain PCBs, PCTs, and other chlorine compounds, and heavy metals, barium compounds.

The base oil(s) contain(s) less than 3% DMSO extract (IP 346), therefore not classified as carcinogenic material according to 67/548/EEC NOTE L.

Carcinogen effect:	not known
Mutagen effect:	not known
Reproduction-damaging effect:	not known

12. Ecological information

Mobility:	Floats on water. Absorbs on soil.
Degradability / persistence:	Biodegradability:
Bioaccumulative potential:	
Ecotoxicity:	Not available.
Aquatic organisms:	
Soil organisms:	
Plants:	
Biological oxygen demand:	
Chemical oxygen demand:	
Heavy metal content:	None.
PCT, PCB and other chlorinated hydrocarbons:	None.
Environmental effects:	Spills may form a film on water surfaces causing impaired oxygen transfer.

13. Disposal considerations

Product disposal:

Wastes of the product or used oil should be treated as hazardous waste.

EWC cod: 13 01 10* or 13 02 05*

Mineral-based non-chlorinated hydraulic oils. or

Mineral-based non-chlorinated engine, gear and lubricating oils.

Disposal must be in compliance with national and local regulations.

Packaging disposal:

Containers with product residue should also be treated as hazardous waste according to national and local disposal regulations.

EWC cod: 15 01 10*

Packaging containing residues of or contaminated by dangerous substances.

Disposal must be in compliance with national and local regulations.

Wastewater:

Quality of wastewater emitted to natural water must comply with national and local regulations.

Care should be taken in any case to ensure compliance with EC, national and local regulations. It is the responsibility of the user to know all relevant national and local regulations.

14. Transport information

Land transport:

Road/ Railway	ADR/RID:	Not classified.
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Waterways:

Inland waterways/ Sea transport	ADN/IMDG:	Not classified.
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Air transport: ICAO / IATA:	Not classified.
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15. Regulatory information

Hazard symbol according to EU directives (67/548/EEC, 2001/59/EC, 2004/73/EC and 88/379/EEC, 1999/45/EC, 2001/60/EC) and to Hungarian regulation [44/2000. (XII. 27.) EüM rendelet (existing version)] for hazardous substances and hazardous preparations: **Not required.**

Hazardous component(s): -

The packaging must bear the inscription: -

R-phrases: Not required.

S-phrases: S 60: This material and its container must be disposed of as hazardous waste.
S 61: Avoid release to the environment. Refer to special instructions/Safety data sheets.

16. Other information

Recommended application / restrictions:
See product sheets.

Information given is based on our best knowledge and is intended to describe the product for the purposes of safety of transporting and handling only. It should not be therefore construed as guaranteeing any specific property of the product.
This safety data sheet has been made according to 88/379/EEC, 91/155/EEC, 93/112/EEC and 2001/58/EC directives.

Source of data presented in this material safety data sheet:
Test results of this product
Material safety data sheets of product's components
Hungarian and EU lists of dangerous substances
Relevant Hungarian regulation and EU directives
CONCAWE database

The full text of each relevant R phrase in Section 2.:

R 36/38: Irritating to eyes and skin.

Revision Indicators:

Section	Subject of change	Date	Version
1.	Modification of the name	27.02.2004	1
1. 15.	For more information contact Regulatory information Other corrections	30.11.2004	2
1 2 9 11, 14, 15, 16	<i>For more information contact</i> Composition / information on ingredients Physical and chemical properties <i>Regulatory information and other corrections</i>	12.09.2006	3

