## INDEX

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. General</td>
<td>2</td>
</tr>
<tr>
<td>2. Safety</td>
<td>2 – 4</td>
</tr>
<tr>
<td>A Aggregate type</td>
<td>5</td>
</tr>
<tr>
<td>B Number of outlets</td>
<td>5</td>
</tr>
<tr>
<td>C Inspection</td>
<td>5</td>
</tr>
<tr>
<td>D Kinds of drive</td>
<td>5</td>
</tr>
<tr>
<td>E Position of drive: at the top / Block valve</td>
<td>5</td>
</tr>
<tr>
<td>F Reservoir</td>
<td>5</td>
</tr>
<tr>
<td>G Accessories</td>
<td>5</td>
</tr>
<tr>
<td>3. Application</td>
<td>6</td>
</tr>
<tr>
<td>4. Design</td>
<td>6</td>
</tr>
<tr>
<td>5. Function</td>
<td>6</td>
</tr>
<tr>
<td>6. Specification</td>
<td>7</td>
</tr>
<tr>
<td>7. Installation</td>
<td>8</td>
</tr>
<tr>
<td>8. Start-up</td>
<td>8 – 9</td>
</tr>
<tr>
<td>9. Lubricants</td>
<td>9</td>
</tr>
<tr>
<td>10. Fault finding</td>
<td>10 – 11</td>
</tr>
<tr>
<td>11. Plates</td>
<td>11</td>
</tr>
</tbody>
</table>
1. General

Prior to start up, we recommend to read these operating instructions carefully as we do not assume any liability for damages and operating troubles which result from the nonobservance of these operating instructions!

Any use beyond the applications described in these operating instructions is considered to be not in accordance with the product’s intended purposes. The manufacturer is not to be held responsible for any damages resulting from this: the user alone bears the corresponding risk.

As to figures and indications in these operating instructions we reserve the right to make technical changes which might become necessary for improvements.

The copyright on these operating instructions is kept reserved to the company DELIMON. These operating instructions are intended for the erecting, the operating and supervising personnel. They contain regulations and drawings of technical nature which must not – completely or partially - be distributed nor used nor communicated to others without authorization for competition purposes.

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2. Safety

These operating instructions contain fundamental instructions which are to be observed during erection, operation and maintenance. Therefore it is absolutely necessary for the fitter and the competent qualified staff/user to read these operating instructions before installation and start-up. The operating instructions must be available at all times at the place of use of the machine/system.

Not only the general safety instructions stated under this main point “safety” are to be observed, but also the other specific safety instructions stated under the other main points.

2.1 Identification of safety warnings in the operating instructions

The safety warnings contained in these operating instructions which, if not observed, may cause dangers to people, are specially marked with general danger symbols

⚠️ safety sign according to DIN 4844, warning about a danger spot,
in case of warning about electric voltage with

⚠️ safety sign according to DIN 4844, warning about dangerous electric voltage.

In case of safety instructions which, if not observed, may cause damage to the machine and its function, the word

ATTENTION

is inserted.

Instructions that are directly attached to the machine, as for example
• rotational direction arrow
• identifications for fluid connections
must be observed at all events and maintained in a fully legible condition.
• Note: There is an increased skid risk in case of spilled/leaked out lubricants. They are to be removed at once properly.

⚠️ Safety sign according to DIN 4844, warning about skid risk.
2. Safety (continuation)

2.2 Personnel qualification and training
The operating, maintaining, inspecting and erecting personnel must have the appropriate qualification for such work. Area of responsibility, competence and supervision of the personnel have to be regulated by the user. If the personnel do not have the necessary knowledge, they have to be trained and given instructions. This can be effected, if necessary, by the manufacturer/supplier on behalf of the user of the machine. Furthermore, the user has to make sure that the contents of the operating instructions are fully understood by the personnel.

2.3 Dangers in case of nonobservance of the safety instructions
The nonobservance of the safety instructions may result in hazards to persons, to the environment and to the machine. The nonobservance of the safety instructions may lead to the loss of any claims for damages.
In detail, the nonobservance may for instance lead to the following hazards:
- Failure of important functions of the machine/system
- Failure of prescribed methods for maintenance and repair
- Hazard to persons by electrical, mechanical and chemical influences
- Hazard to the environment by the leakage of dangerous substances

2.4 Safety conscious working
The safety instructions stated in these operating instructions, the existing national regulations as to the accident prevention as well as possible internal working, operating and safety rules of the user are to be observed.

2.5 Safety instructions for the user/operator
- If hot or cold machine parts lead to dangers, these parts have to be protected against touch.
- Protection against touch for moving parts (e. g. coupling) must not be removed when the machine is in operation.
- Leakages (e. g. from the shaft seal) of hazardous goods to be delivered (e. g. explosive, toxic, hot) are to be removed in such a way that there is no danger to persons and environment. Legal rules are to be observed.
- Hazards caused by electrical power are to be excluded (for details please refer for instance to the rules of the VDE and the local power supply companies).

2.6 Safety instructions for maintenance, inspection and installation work
The user has to take care that all the maintenance, inspection and installation work is executed by authorized and qualified skilled personnel who have informed themselves adequately by thoroughly studying the operating instructions.
Basically, work on the machine is only to be carried out during shut-down. It is obligatory to observe the shut-down procedure described in the operating instructions.
Pumps or pump aggregates that deliver media being hazardous to health have to be decontaminated. Immediately after completion of the work, all safety and protective equipments have to be reinstalled and/or reactivated.
- Advice: When working with compressed air, do wear glasses.
  (DIN 4844 – Use breathing mask)
- Advice: Observe EC-Safety Data Sheet for materials of consumption and additives used and use personal protective equipment.
  (DIN 4844 – Use breathing mask)
Before recommissioning, observe the points stated in section “initial start-up”.

2.7 Unauthorized conversion and manufacture of spare parts
Conversion or modifications to the machine are only permitted when agreed with the manufacturer. Original spare parts and accessories authorized by the manufacturer serve to ensure safety. The use of other parts may render the liability for consequential losses null and void.
2. **Safety** (continuation)

2.8 **Unacceptable modes of operation**
   The operational reliability of the machine supplied is only guaranteed if the machine is used in accordance with its intended purposes as per section 1 - General - of the operating instructions. The limiting values specified in the data sheet must on no account be exceeded.

2.9 **Guidelines & standards**
   1., 2. and 3. guideline (see data sheet: R&N_2009_1_GB)

3.0 **Notes on environmental protection and waste disposal**
   In correct operation with lubricants, the components are subject to the special requirements set by environmental legislation. The general requirements for lubricants are specified in the respective safety data sheets. Used lubricants are hazardous forms of waste and therefore require special supervision in the sense of § 41 paragraph 1 sentence 1 and paragraph 3 no. 1 of KrW-/AbfG (Closed-Loop Waste Management Act). Used oils must be handled in compliance with AltölV (Waste Oil Ordinance). The devices or components contaminated with lubricant must be disposed of by a certified waste management company. Records of proper waste management must be filed in conformance to NachwV (Ordinance on Waste Recovery and Disposal Records).
GENERAL PRODUCT CHARACTERISTICS

- Chain lubrication with oil
- Pump with a delivery rate of 1.2 litres
- Surface signal grey RAL 7004

A. AGGREGAT TYPE WSE

B. NUMBER OF OUTLETS

1 outlet

C. INSPECTION

Stage A

D. KINDS OF DRIVE

A. C. motor 0.18 kW, 230V, 50Hz
Three-phase A.C. motor 0.18 kW, 50Hz, 230/400V, 60Hz, 260/460V
A. C. motor UL, 0.18 kW, 115V, 60Hz
Three-phase A.C. motor UL, 0.18 kW, 60Hz, 115V

E. POSITION OF DRIVE: at the top / CLOCK VALVE

3/2-way solenoid valve DC 24V
3/2-way solenoid valve AC 230V

F. RESERVOIR

4 litres, metal
12 litres, aluminium

G. ACCESSORIES

without
Float-type switch for 4 litres, 2x min, 12 – 48V
Float-type switch for 4 litres, 2x min, 250V
Float-type switch for 12 litres, 1x min, 250V
Terminal box

(separate data sheets will be included to the consignment).
3. **Application**

The chain lubrication aggregate WSE is used for automatic and metered lubrication of chains, articulations, rolls, hinges etc. This system is also suitable for application with oil wetting of integral parts (engine crankshaft).

4. **Design**

The chain lubrication aggregate WSE consists of:
1. Electrical switching device
2. Opto-electronical proximity switch *
3. Reflector (deleted with inductive proximity switch)
4. Gear pump aggregate with mounted solenoid valve and integrated throttle.
5. Pipe 6 x 0.7
6. Spray nozzle
7. Metering element ZEE
8. Manifold VZE
* The optoelectronic proximity switch with reflector may optionally be replaced by an inductive proximity switch.

5. **Function**

After switching on the system, the chain lubrication aggregate starts and circulates oil without pressure via the opened solenoid valve and the opened restrictor. As soon as an impulse is initiated via the existing proximity switch (optoelectronic or inductive) by the chain, the solenoid valve closes and the oil circulation is interrupted. The main line leaving the pump and the following metering elements ZE-E are admitted rapidly with pressure. The metering elements release the stored lubricant quantity with speed to the friction points via spray nozzles (in form of a directed drop). When the chain leaves the switching range of the proximity switch, the solenoid valve opens, the pressure in the main line decreases and oil is stored in metering element ZE-E for the next lubrication cycle. The above circulation recommences.
6. Specification

Ambient temperature: ................................................................. 0 °C to 40 °C

a) Gear pump aggregate
   Flow rating: ........................................................................... 1200 cm³/min
   Delivery pressure, firmly adjusted ........................................... 30 bars
   Reservoir capacity: ............................................................... 4 or 12 litres

b) Metering element ZE-E
   Metering volume .................................................................. 10 mm³
   Number of metering elements per system ............................ max. 12 pieces

c) Spray nozzle
   Length 150 mm for horizontal and vertical installation.
   Length 250 mm for vertical installation only
   Spray distance ..................................................................... 20 - 50 mm

d) Optoelectronic proximity switch

   Voltage .................................................................................. 220V; 50 - 60 Hz
   Residual voltage ..................................................................... 1.8 V
   Continuous load (internal consumption) .............................. 200 mA
   Idle current ........................................................................... < 20 mA

e) Inductive proximity switch

   Voltage range ................................................................. 20 - 250V AC; 50 - 60 Hz
   Contact distance ................................................................. 10 mm
   Condition ................................................................................ N/O
   Max. load current ................................................................. 500 mA
   Min. load current ................................................................. 2 mA
   Temperature range ............................................................... -25 °C to +70 °C
   Protective system ............................................................... IP 67
   Connection ............................................................................. 2 m cable; 3 x 0.5 mm²

f) Inductive proximity switch

   Voltage range ................................................................. 10 - 30V DC
   Contact distance ................................................................. 10 mm
   Switching characteristic .................................................. pnp N/O
   Max. load current ................................................................. 80 mA
   Temperature range ............................................................... -25 °C to +70 °C
   Protective system ............................................................... IP 67
   Connection ............................................................................. 2 m cable; 3 x 0.25 mm²

g) Level control (min)
   Switching voltage .............................................................. max. 250V ~
   Contact voltage ................................................................. max. 1A
   Switching capacity .......................................................... max. 60 VA
   Contact type ........................................................................... change-over contact
7. Installation

1. The maximal pipe length (pipe 6 x 0.7) between gear lubrication aggregate and the most remote metering element ZE-E (7) must not exceed 5 m.
2. The distributor outlets should preferably always show upward.
3. The routing of the pipes should enable a later ventilation.
4. The proximity switch (5) should be located visible and easily accessible. The desired triggering must only be performed by the provided machine component, e.g. certain chain section.
5. The nozzles (10) should be aligned in such a way that the nozzle orifice shows in direction of the friction point in the moment of pulse triggered.
6. The electric connection should be performed within the terminal box according to the illustrated wiring diagram.

**ATTENTION**

During the connection of the motor, the correct direction of rotation must be observed, which is indicated by an arrow at the motor.

8. Start-up

1. Fill oil reservoir (1).
2. Switch on pump aggregate (2).
   The filled-in oil is circulated now without pressure through the opened solenoid valve (3) and the throttle (4). Attenuate the electro-magnetic field of the proximity switch (5) and/or interrupt the light beam of the optoelectronic proximity switch (6).
8. **Start-up** (continuation)

3. Ventilate the pipes carefully by loosening the plug screw (8) on the metering element ZE-E (7). It is recommended to place a receptacle below the elements to prevent environmental contamination by emerging oil.

4. As soon as bubble-free oil is visible, fasten screw plugs (8) tightly.

5. Recreate impulse-free condition on proximity switch (5). Close throttle screw (9) on the solenoid valve (3) by slowly turning it clockwise until all metering elements ZE-E release oil in a continuous fine spray by pressure build-up in the main line. Repeat this procedure several times, if necessary, after turning throttle screw (9) anti-clockwise.

6. When pipes, elements and nozzles are ventilated correctly, open throttle screw (9) anti-clockwise.

7. Release several lubrication cycles. For this purpose release several consecutive pulses on proximity switch (5) by repeated attenuation of the electronic field and/or by interruption of the light ray.

8. The system is now ready for operation.

9. With running system adjust position of nozzles (10) and response point of proximity switch (5) until the released oil drops hit the desired lubrication points exactly.

9. **Lubricants**

Mineral oils with operating viscosity between 40 and 900 mm²/s⁻¹ attain proper spraying results (refer to diagram). Synthetic oils or solid additives, solvents, higher or lower operating viscosity affect the function of the system, i.e. the maximum possible pulse sequence, the metering accuracy and the spraying result. In case of queries, please contact us.

Max. spray-impulse of metering element with 10 mm³-metering volume as a function of the operating-viscosity.
## 10. Fault finding

<table>
<thead>
<tr>
<th>Kind of failure</th>
<th>Possible failure</th>
<th>Fault clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some of the metering elements do not deliver lubricant, or their drop acceleration is insufficient.</td>
<td><strong>Air has got into the system</strong>&lt;br&gt;Oil refilled and not waited with commissioning until there were no air bubbles to be seen in the oil. Fallen below min. filling level.</td>
<td>Deaerate system</td>
</tr>
<tr>
<td></td>
<td><strong>Distributor contaminated.</strong>&lt;br&gt;Filled-in oil was not clean.</td>
<td>Exchange distributor. Clean reservoir and flush feed lines, if necessary.</td>
</tr>
<tr>
<td></td>
<td><strong>Spray nozzle clogged</strong>&lt;br&gt;Spray nozzle point has clogged as a result of external contaminations. Spray nozzle tube deformed and buckled as a result of external influence of violence.</td>
<td>Dismantle spray nozzle, clean and blow compressed air through it.</td>
</tr>
<tr>
<td>All metering elements deliver lubricant, but their drop acceleration is insufficient.</td>
<td><strong>Oil sort used does not correspond to Synthesco</strong>&lt;br&gt;Oil viscosity is too high</td>
<td>Make oil change, wash feed lines. If the allowed min. pressure of $\leq 4.5$ bar is exceeded, oil viscosity is too high.</td>
</tr>
<tr>
<td></td>
<td><strong>Spray nozzle is deformed or adjusted wrongly</strong></td>
<td>Readjust spray nozzle</td>
</tr>
<tr>
<td>Some of the lubrication points are not hit precisely.</td>
<td><strong>Initiator of the chain sampling has been adjusted wrongly</strong></td>
<td>Adjust correct lubrication moment by displacing the initiator</td>
</tr>
<tr>
<td>Lubrication points are not hit precisely.</td>
<td><strong>Distributor valve plugs mixed up</strong></td>
<td>Correct allocation of distributor valve plugs.</td>
</tr>
<tr>
<td>No delivery by metering elements</td>
<td><strong>Wrong electric connection of pump motor</strong>&lt;br&gt;Target: Rotational direction = clockwise with view on fan blade&lt;br&gt;Fallen below min. filling level&lt;br&gt;Oil tank was or is empty&lt;br&gt;Main solenoid valve does not clock</td>
<td>Change connections of motor</td>
</tr>
<tr>
<td></td>
<td>No electric contact making</td>
<td>Refill oil, deaerate system.</td>
</tr>
<tr>
<td></td>
<td>Valve armature is blocked (contaminated). Existence of undervoltage</td>
<td>Remove plug screw from one injector manifold and install pressure gauge ($0 – 40$ bar). Observe required pressure gauge change while conveyor is running. Target: $\leq 4.5$ bars to approx. $30$ bar.</td>
</tr>
<tr>
<td></td>
<td><strong>Coil defective (burnt out).</strong>&lt;br&gt;<strong>Advice:</strong> It is not allowed to change the voltage from direct current to alternating current or vice versa by exchanging the coils.</td>
<td>Loosen and pull off solenoid valve plug. Check contact making at plug by means of a measuring instrument while conveyor is running. Dismantle solenoid valve and clean it. Measure existing voltage at main solenoid valve plug. Allowed = minus $10%$ of the rated voltage.</td>
</tr>
</tbody>
</table>
10. Fault finding (continuation)

<table>
<thead>
<tr>
<th>Kind of failure</th>
<th>Possible failure</th>
<th>Fault clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>No delivery by metering elements</td>
<td>Delivery pressure within the system is insufficient&lt;br&gt;Pressure relief valve is leaky</td>
<td>Exchange complete solenoid valve</td>
</tr>
<tr>
<td></td>
<td>Gear pump defective</td>
<td>Remove plug screw from one injector manifold and install pressure gauge (0 – 40 bar). Entire screw in throttle screw at solenoid valve. Check max. pressure (target: approx. 30 bar) at pressure gauge while pump is running. A too low pressure may result from a contamination of the pressure relief valve or a damaged sealing lip of the pertaining Usit ring. Important: Entirely screw out throttle screw. If things are not better after having removed, cleaned and renewed the Usit ring, exchange gear pump. Process as described “main solenoid valve does not clock” If the max. pressure of approx. 30 bars is not obtained, dismantle solenoid valve and clean it.</td>
</tr>
<tr>
<td></td>
<td>Solenoid valve does not close (contamination).</td>
<td>Use oil type of a higher viscosity. Shorten operating time.</td>
</tr>
<tr>
<td>Metering element tend to once-through running (excessive metered quantity)</td>
<td>Ball in the metering element is in a float position&lt;br&gt;Lower deviation from the allowed min. service viscosity of the oil of 40 mm²/s in the tank after a long operating time (heating-up) or a too high ambient temperature</td>
<td></td>
</tr>
</tbody>
</table>

11. Plates (Examples)

<table>
<thead>
<tr>
<th>Name plate</th>
<th>Type plate</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Name plate" /></td>
<td><img src="image2.png" alt="Type plate" /></td>
</tr>
</tbody>
</table>

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