



## CHAPTER OVERVIEW

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**Operating Instructions** .....

.....

.....

.....

**Attachment** .....

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B

C

D

E

### Manufacturer in terms of 2014/68/EU

The full name and address of the manufacturer is:

Lenhardt & Wagner GmbH

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68623 Hüttenfeld / Germany

Phone: +49 (0) 62 56 - 85 88 0 - 0

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Internet: [www.lw-compressors.com](http://www.lw-compressors.com)



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## SERVICE INFORMATION / WARRANTY

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### Compressor information

\_\_\_\_\_

Type designation

\_\_\_\_\_

Serial number

\_\_\_\_\_

Date of construction

### Purchase information

\_\_\_\_\_

Purchase date

\_\_\_\_\_

First commissioned on

\_\_\_\_\_

Warranty period

\_\_\_\_\_

Dealer's stamp

### Warranty

L&W will uphold warranty claims made during a period of 12 months from the invoice date.

If the compressor was purchased from an official L&W dealer, the date on the dealer's invoice is valid. Warranty claims can only be made on presentation of the original invoice.

Should verifiably defective parts have been delivered, we will decide to either replace the parts or repair them. The resulting transport and assembly costs will be invoiced.

No reduction of the purchase price or changes to the contract can be made. The parts for which a claim is being made should be kept safe by the purchaser and, when requested, sent to us at their cost. Replaced parts become the property of L&W. If maintenance work is carried out without our knowledge or permission by the purchaser or a third party, we are absolved from any liability for warranty claims. As a matter of principle, warranty claims can only be made by the initial purchaser.

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# Operating Instructions

Breathing Air Compressor

**LW SC-400 ES / LW SC-480 ES / LW SC-550 ES**





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## GENERAL INFORMATION

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### General Information

We strongly recommend reading this manual thoroughly prior to operation and follow all the safety precautions precisely. Damage resulting from any deviation from these instructions is excluded from warranty and liability for this product. Carry out other commissioning steps only if you have fully understood the following contents.

Before commissioning and using the unit, carry out all the essential preliminary work and measures concerning legal regulations and safety. These are described on the following pages of this operation manual.

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### Description of marks and warning signs

The following warning signs are used in this document to identify the corresponding warning notes which require particular attention by the user. The warning signs are defined as follows:



#### Caution

Indicates an imminently hazardous situation which, if not avoided, could result in serious injury, physical injury or death.



#### Warning

Indicates a potentially hazardous situation which, if not avoided, could result in physical injury or damage to the product or environment.



#### Note

Indicates additional information on how to use the unit.



## DESCRIPTION

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### Scope of Delivery

Compressors are provided in different equipped versions.

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### Versions

#### Filling pressure versions:

- PN 225 bar
- PN 330 bar
- PN 225 / 330 bar

### Specifications

- Sound insulated housing
- Automatic dump system
- Automatic stop at final pressure
- Hour counter
- Start/Stop and emergency stop switch, condensate test buttons
- Motor protection switch, emergency stop switch
- Pressure maintaining and non-return valve
- All pistons c/w steel piston rings
- Low pressure oil pump and filter
- Oil / water separators after each stage
- Safety valves after each stage
- 3 concentric suction/pressure valves
- HP outlet

### Options

- Auto start system
- Up to 6 additional hoses available (front door mounting)
- 4- fold filling panel installed at front door
- 200 and 300 bar parallel filling operation
- Oil pressure display
- Inter stage pressure monitoring
- Oil pressure monitoring c/w auto shut down
- Cylinder head temperature monitoring with auto shut down
- Oil temperature display with auto shut down
- 2,3l filter housing
- Puracon filter monitoring
- ECC control in remote control box
- Direction of rotation monitoring
- Power cable and plug

## DESCRIPTION

### Technical Data



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Technical Data	LW SC-400 ES	LW SC-480 ES	LW SC-550 ES
Capacity [l/min]:	400	480	550
Max. Operating Pressure [bar]:	350	350	350
RPM [min <sup>-1</sup> ]:	900	1,015	1250
Number of Pressure Stages:	3	3	3
Cylinder Bore 1st Stage [mm]:	Ø 95	Ø 95	Ø 95
Cylinder Bore 2nd Stage [mm]:	Ø 42	Ø 42	Ø 42
Cylinder Bore 3rd Stage [mm]:	Ø 18	Ø 18	Ø 18
Medium:	Compressed Air / Breathing Air	Compressed Air / Breathing Air	Compressed Air / Breathing Air
Intake Pressure:	atmospheric	atmospheric	atmospheric
Oil Pressure (at operating temperature) [bar]:	+1.5 (-0,2)	+1,5 (-0,2)	+1,5 (-0,2)
Oil Capacity [l]:	2,2	2,2	2,2
Intake Temperature [°C]:	0 < +45	0 < +45	0 < +45
Ambient Temperature [°C]:	+5 < +45	+5 < +45	+5 < +45
Cooling Air Volume [m <sup>3</sup> /h]:	> 3.300	> 3.300	> 3.300
Voltage:	400 V / 3-phase / 50 Hz	400 V / 3-phase / 50 Hz	400 V / 3-phase / 50 Hz
Protection Class Drive Motor:	IP 54	IP 54	IP 54
Drive Power [kW]:	11	11	11
RPM Motor [min <sup>-1</sup> ]:	2.890	2.890	2.890
Start:	Star/Delta	Star/Delta	Star/Delta
Dimensions W x D x H [mm]:	880 x 1260 x 1800	880 x 1260 x 1800	880 x 1260 x 1800
Weight [kg]:	ca. 454	ca. 454	ca. 454
Content Volume Filter housing [l]:	0,98	0,98	0,98



## DESCRIPTION

### Unit Assembly

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No.	Designation
1	Filling pressure gauge
2	Switchboard
3	Filter Housing

## DESCRIPTION

### Switchboard

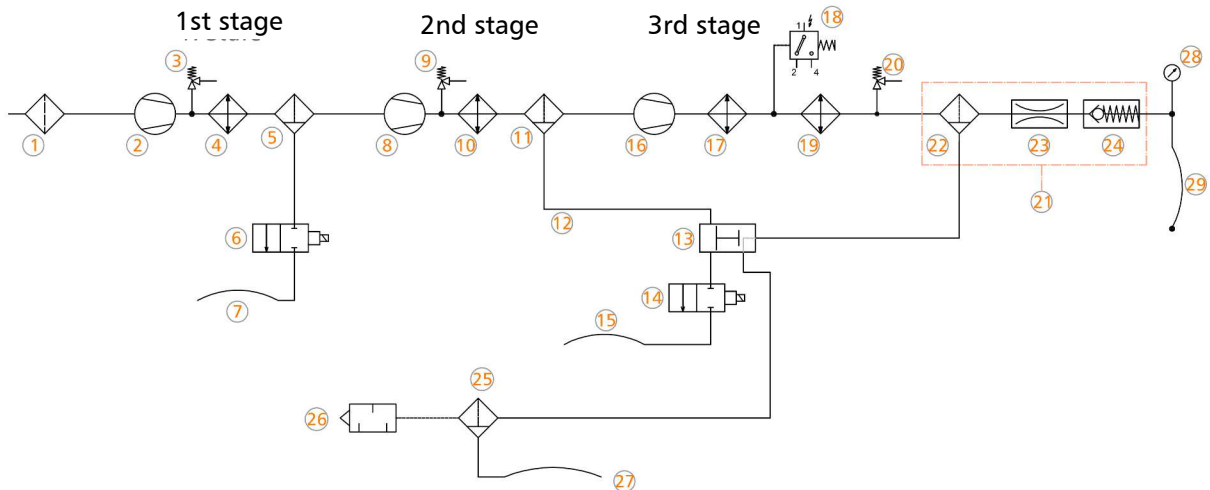
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No.	Designation
1	Emergency shut-off switch
2	Hour counter
3	ON button
4	OFF button
5	Drain test button

## BESCHREIBUNG

### Fließdiagramm



- |   |  |
|---|--|
| 1. Ansaugfilter / Air Intake Filter                     | 16. 3. Verdichterstufe / 3rd Pressure Stage                  |
| 2. 1. Verdichterstufe / 1st Pressure Stage              | 17. Wärmetauscher / Heat Exchanger                           |
| 3. Sicherheitsventil 1.Stufe / Safety Valve 1st Stage   | 18. Druckschalter (Auto-Stopp) / Pressure Switch (Auto Stop) |
| 4. Wärmetauscher / Heat Exchanger                       | 19. Zusatz-Wärmetauscher / Additional Heat Exchanger         |
| 5. Öl-/Wasserabscheider / Oil Water Separator           | 20. Sicherheitsventil 3.Stufe / Safety Valve 3rd Stage       |
| 6. Kondensatventil / Condensate Valve                   | 21. ZB Filtergehäuse / Ass. Filter Housing                   |
| 7. Kondensatablassschlauch / Condensate Release Hose    | 22. Öl-/Wasserabscheider / Oil-/Water Separator              |
| 8. 2. Verdichterstufe / 2nd Pressure Stage              | 23. Druckhalteventil / Pressure Maintaining Valve            |
| 9. Sicherheitsventil 2.Stufe / Safety Valve 2nd Stage   | 24. Rückschlagventil / Non-Return Valve                      |
| 10. Wärmetauscher / Heat Exchanger                      | 25. Kondensatabscheider Endstufe / Condensate Separator      |
| 11. Öl-/Wasserabscheider / Oil-/Water Separator         | 26. Schalldämpfer / Silencer                                 |
| 12. Steuerleitung 2.Stufe / Control Cable 2nd Stage     | 27. Kondensatablassschlauch / Condensate Release Hose        |
| 13. Pneum. Kondensatventil / Pneumatic Condensate Valve | 28. Manometer / Pressure Gauge                               |
| 14. Kondensatventil / Condensate Valve                  | 29. Hochdruckschlauch / HP Hose                              |
| 15. Kondensatablassschlauch / Condensate Release Hose   |  |



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# SAFETY PRECAUTIONS



## **SAFETY PRECAUTIONS**

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**A**

### **Intended Use**

Only use the unit in perfect condition for its intended purpose, safety and intended use and observe the operating instructions! In particular disorders that may affect safety have to be eliminated immediately!

Use the unit exclusively for the determined medium (see "Technical Data"). Any other use that is not specified is not authorized. The manufacturer/supplier shall not be liable for any damages resulting from such use. Such risk lies entirely with the user. Authorization for use is also under the condition that the instruction manual is complied with and inspection and maintenance requirements are enforced.

No change and modification to the unit can be made without the written agreement of the manufacturer. The manufacturer is not liable for damage to persons or property resulting from unauthorised modifications.

### **Operators**

Target groups in these instructions;

#### **Operators**

Operators are persons who are authorized and briefed for the use of the compressor.

#### **Qualified personnel**

Qualified personnel are persons who are entitled to repair, service, modify and maintain the system.



#### **Warning**

Only trained personnel are permitted to work on the unit!



#### **Warning**

Work on the electrical equipment on / with the machine / unit may only be carried out by qualified electricians.

## **SAFETY PRECAUTIONS**

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### **Safety instructions on the unit**

Importance of notes and warning signs that are affixed to the compressor according to the application or its equipment.

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**Warning**  
High voltage!



**Note**  
Ensure correct direction of rotation!



## **SAFETY PRECAUTIONS**

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### **General Safety Precautions**

- Read the Operating Instructions of this product carefully prior to use.
- Strictly follow the instructions. The user must fully understand and strictly observe the instructions. Use the product only for the purposes specified in the intended use section of this document.
- Do not dispose the operating instructions. Ensure that they are retained and appropriately used by the product user.
- Only trained and competent personnel are permitted to use this product.
- Comply with all local and national rules and regulations associated with this product.
- Only trained and competent personnel are permitted to inspect, repair and service the product.
- Only authentic L&W parts and accessories may be used for maintenance work. Otherwise, the proper functioning of the product may be impaired.
- Do not use faulty or incomplete products. Do not modify the product.
- Inform L&W in the event of any product or component fault or failure.
- The quality of the air supply must meet EN 12021 specifications for breathing air.
- Do not use the product in areas prone to explosion or in the presence of flammable gases. The product is not designed for these applications. An explosion might be the result if certain conditions apply.

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## **SAFETY PRECAUTIONS**

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### **Unit customised safety notices**

#### **Organisational measures**

- In addition to the instruction manual, observe and comply with universally valid legal and other obligatory regulations regarding accident prevention and environment protection.
- In addition to the instruction manual, provide supplementary instructions for supervision and monitoring duties taking into consideration exceptional factors e.g. with regard to organisation of work, production, personnel employed.
- Supervise personnel's work in accordance with the instruction manual, taking into account safety and danger factors.
- Observe all safety and danger notices on the compressor and check readability and completeness.

#### **Safety instructions operation**

- Take measures to ensure that the machine is only taken into operation under safe and functional conditions. Only operate the compressor if all protective and safety equipment, e.g. detachable protective equipment, are provided and in good working order.
- Check the compressor at least once per day for obvious damage and defects. Inform the responsible department / person immediately if anything is not as is should be (including operation performance). Shut down the machine immediately if necessary and lock it.
- In case of malfunction, stop the compressor immediately and lock it. Repair malfunctions immediately.
- If there is a failure in the electric energy supply, shut the machine / unit down immediately.
- Ensure safe and environmentally friendly disposal of consumables and old parts.
- The stipulated hearing protectors must be worn.
- Soundproofing equipment on the compressor has to be activated in safety function during operation.
- When handling with fats, oils and other chemical agents, observe the note for the product-related safety.

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## SAFETY PRECAUTIONS

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### Maintenance instructions

- Hoses have to be checked by the operator (pressure and visual inspection) at reasonable intervals, even if no safety-related defects have been detected.
- Immediately repair any damage. Escaping compressed air can cause injury.
- Depressurise system and pressure lines before beginning repair work.
- Pressurised air lines must be laid and mounted by qualified personnel. Connections must not be mixed up. Fittings, length and quality of the piping must correspond to requirements.
- Adjustment, maintenance and inspection activities and keep appointments, including information on replacement parts / equipment, prescribed in the operating instructions have to be respected.
- If the machine / equipment is completely off during maintenance and repair work, it must be protected against unexpected restart. Turn off main control device and remove the key and/or display a warning sign on the main switch.
- The machine and especially the connections and fittings should be cleaned from oil, fuel and maintenance products at the beginning of the maintenance / repair. Do not use aggressive cleaning agents. Use fibre-free cleaning cloths.
- Switch off compressor and clean with a slightly damp cloth. Remove dirt from cooling pipes by using a brush.
- After cleaning, examine all pipes for leaks, loose connections, chafing and damage. Immediately eliminate any faults.
- Always retighten any screw connections loosened for maintenance or repair work.
- If it is necessary to remove safety devices for maintenance and repair work, these must be replaced and checked immediately after completion of the maintenance or repair work.
- The electrical equipment of the compressor must be regularly checked. Defects, such as loose screw connections or burnt wires, must be immediately rectified by electrically skilled personnel.
- Only personnel with particular knowledge and experience with pneumatics may carry out work on pneumatic equipment.
- Only personnel with particular knowledge and experience in gas equipment may carry out work on gas equipment.

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## **SAFETY PRECAUTIONS**

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### **Transportation instructions**

- Parts which need to be dismantled for transport purposes must be carefully replaced and secured before taking into operation.
- The transport may only be carried out by trained personnel.
- For transportation, only use lifting devices and equipment with sufficient lifting power.
- Do not stand or work under suspended loads.
- Also separate from minor relocation machinery / system of any external energy supply. Before recommissioning, reconnect the machine to the mains according to regulations.
- When recommissioning, proceed according to the operating instructions..

### **Safety regulations**

- Inspections according to legal and local obligatory regulations regarding accident prevention are carried out by the manufacturer or by authorised expert personnel. No guarantees whatsoever are valid for damage caused or favoured by the non-consideration of these directions for use.

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# INSTALLATION

## INSTALLATION

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### Installation in closed rooms



#### **Danger**

No operation in explosion-hazard areas.

The unit is not approved for operation in areas prone to explosion.

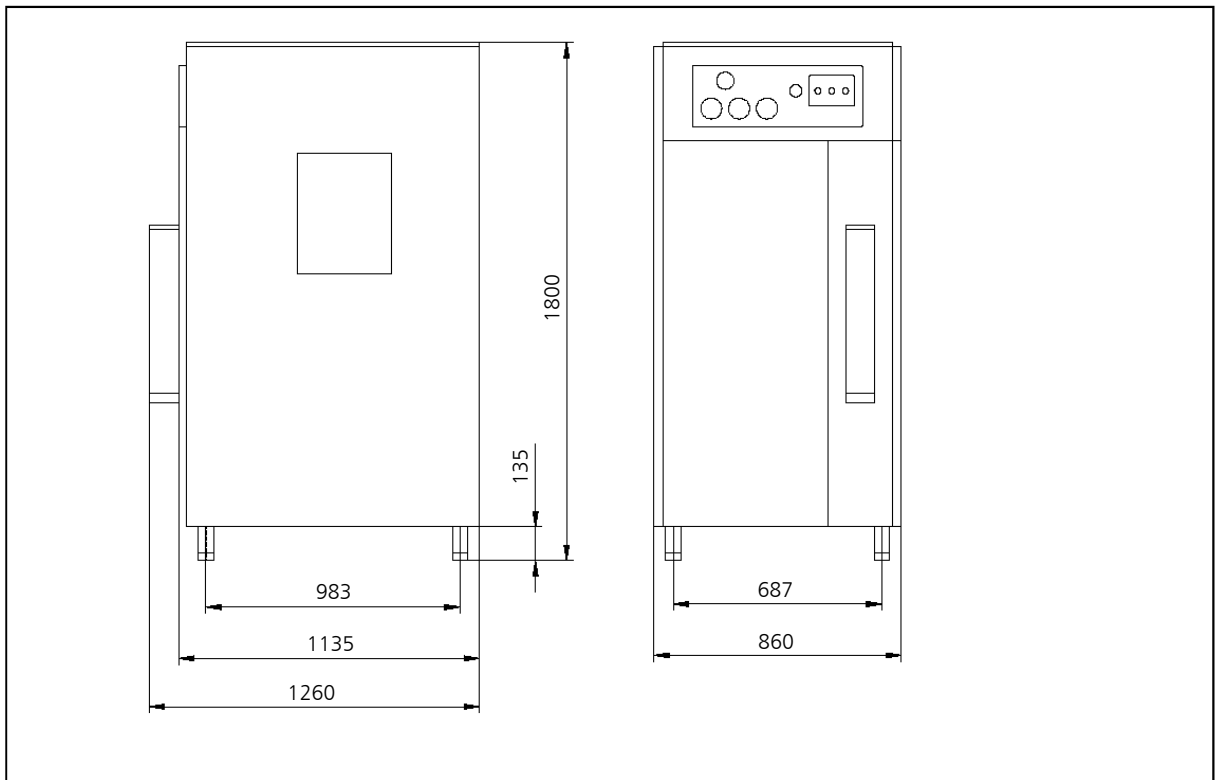
#### **For installation in closed rooms, observe the following:**

- Install the unit horizontally and level. The floor must be vibration-free and capable of taking the load of the system weight.
- The compressor room must be clean, dry, dust free and as cool as possible. Avoid direct exposure to sunlight. If possible, install unit in such a manner that the compressor fan can intake fresh air from outside. Ensure adequate ventilation and exhaust air opening.
- When locating the compressor in rooms of less than 30 m<sup>3</sup> space where natural ventilation is not ensured or other systems having high radiation are operating in the same room, measures must be taken to provide artificial ventilation.
- Intake air must be free from noxious gas e.g. smoke, solvent vapours, exhaust fumes etc.
- Observe the specified operating temperature (see "Technical Data")!

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# INSTALLATION

## Dimensions



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Fig. Dimensions

## INSTALLATION

### Minimum distances



#### Note

Minimum distances must be adhered!

- Make sure that the compressor always has a sufficient amount of fresh air available.
- To prevent serious damage, ensure that the cooling air flow can flow freely.
- The following minimum distances must be adhered:  
Front side min. 1500 mm, sides and rear side min. 500 mm, distance to the ceiling min. 500 mm.  
Avoid anything in this area which can restrict the cooling air flow.

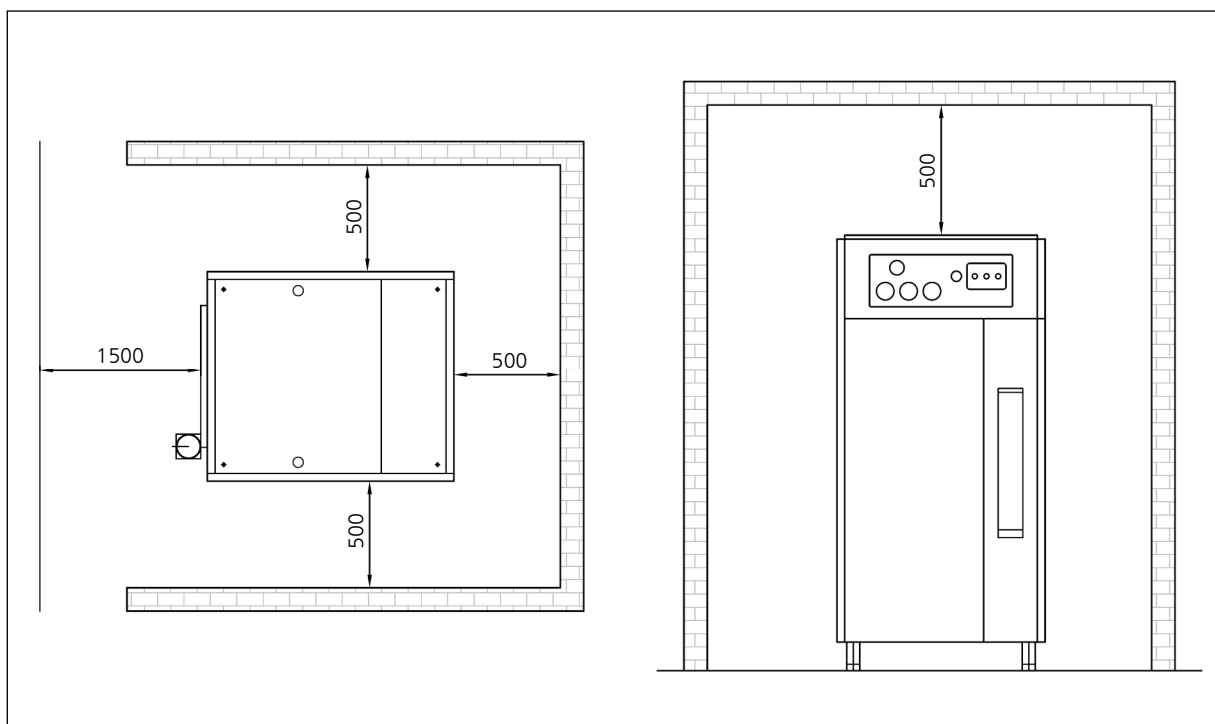


Fig. Minimum distances

## INSTALLATION

### Ventilation

- Make sure that the compressor always has a sufficient amount of fresh air available for cooling.
- To prevent serious damage, ensure that the cooling air flow can flow freely.
- The necessary cooling air flow can be calculated by using the following formula:  
 $300 \times \text{drive power [kW]} = \text{required cooling air flow [m}^3/\text{h]}$   
 Example 11kW motor:  $300 \times 11\text{kW} = 3300 \text{ m}^3/\text{h} = \text{required cooling air flow.}$
- The fan capacity for fresh air and warm air must meet at least the required cooling air flow.  
 The fans must have the same capacity.

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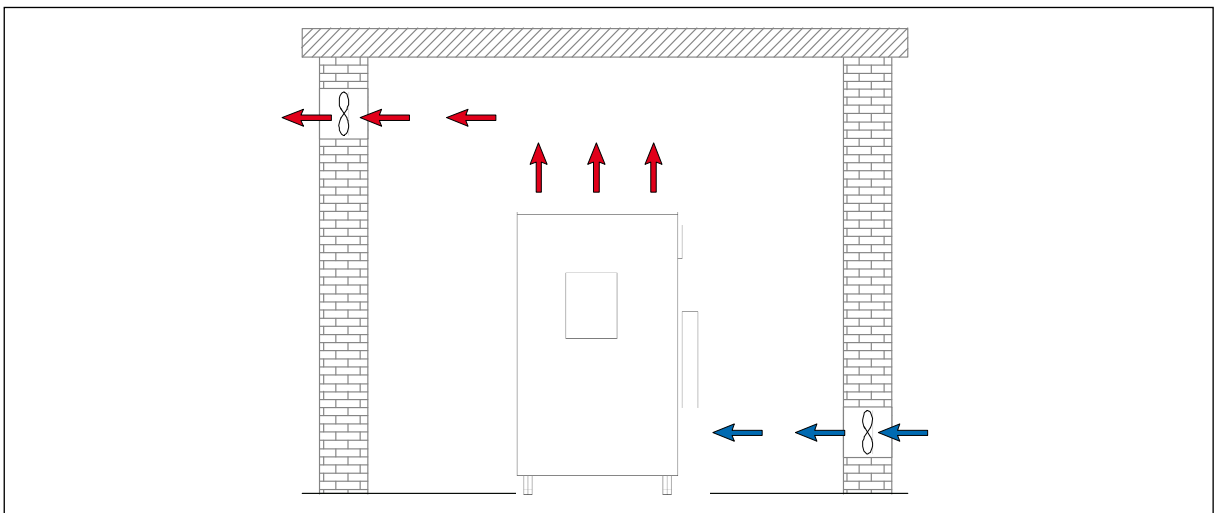


Fig. Ventilation through facade

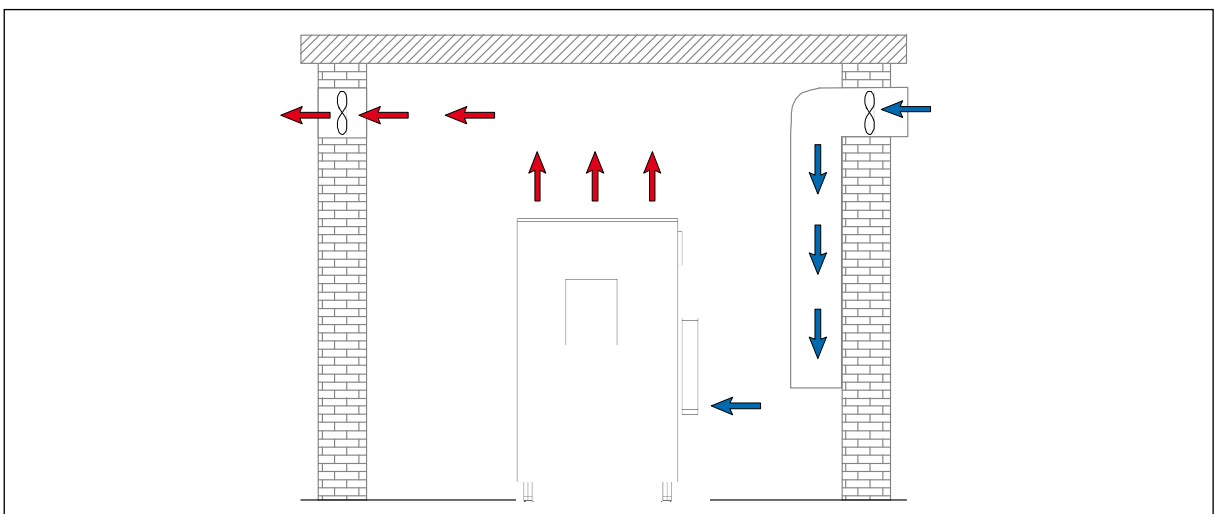


Fig. Ventilation via ventilation stack

## INSTALLATION

### Electrical Installation



#### Warning

Work on the electrical equipment on / with the machine / unit may only be carried out by qualified electricians.

For installation of electrical equipment, observe the following:

- If control devices are delivered by the factory, refer to the appropriate wiring diagram.
- Ensure correct installation of protective conductors.
- Check conformity of motor and control device tension and frequency with those of the electric network (see name plate on the compressor).
- The fusing should be done in accordance with the valid regulations of the responsible electricity supply company.
- When connecting the unit to the electrical supply, check the compressor direction of rotation (see chapter "Maintenance" -> Check turning direction).
- Fuse the motor correctly (see table; use slow-blow fuses).

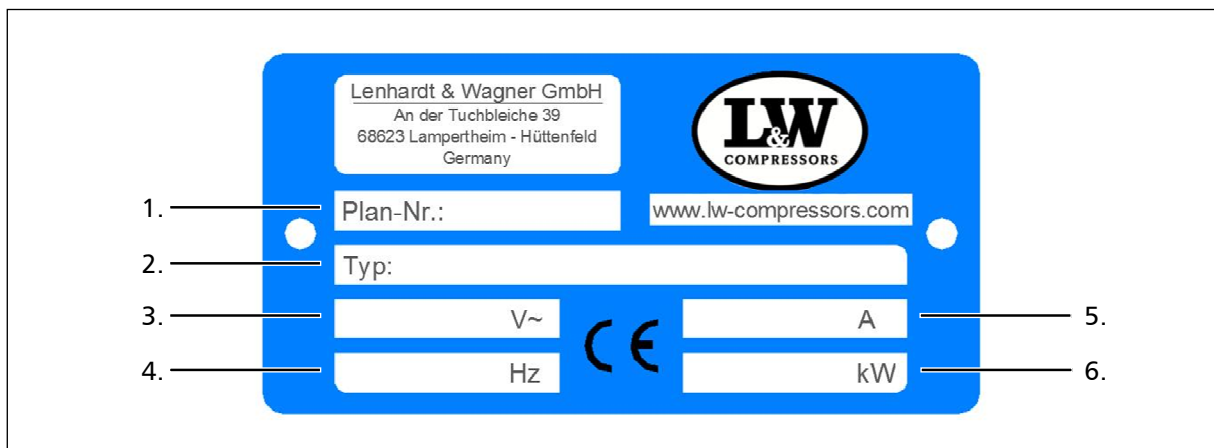


Fig. Compressor name plate

No.	Designation
1.	Circuit diagram number
2.	Compressor type
3.	Power supply
4.	Frequency
5.	Motor current consumption
6.	Nominal motor power

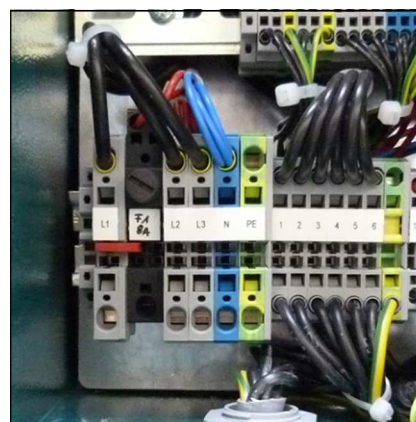


## INSTALLATION

### Electrical Installation

The standard compressor version is prepared for the connection to three phases (brown, black, grey), neutral conductor (blue) and protective earth conductor (green/yellow).

Fig. - Connection to the switch box



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### Recommended fuses for 360 - 500 V operating voltage

Nominal motor power		Fusing start A		Connection in mm <sup>2</sup>	
[kw]	[A]	Direct	Star/Delta	Contactor supply	Motor S/D
2.2	5	10	-	1.5	1.5
4	8.5	20	-	2.5	1.5
5.5	11.3	25	20	2.5	1.5
7.5	15.2	30	25	2.5	1.5
11	21.7	-	35	4	2.5
15	29.9	-	35	6	4
18.5	36	-	50	6	4
22	41	-	50	10	4
30	55	-	63	10	6

### Recommended fuses for 220 - 240 V operating voltage

Nominal motor power		Fusing start A		Connection in mm <sup>2</sup>	
[kw]	[A]	Direct	Star/Delta	Contactor supply	Motor S/D
2.2	8.7	20	-	1.5	1.5
4	14.8	25	-	2.5	1.5
5.5	19.6	35	25	4	2.5
7.5	26.4	50	35	6	4
11	38	-	50	6	4
15	51	-	63	10	4
18.5	63	-	80	16	6
22	71	-	80	16	6
30	96	-	125	25	10



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# OPERATION



## OPERATION

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### Important operation instructions



#### Note

Ensure that all persons handling the compressor are familiar with function and operation of the unit.



#### Wear hearing protection

When working on a running machine, always wear hearing protection.

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## FIRST COMMISSIONING

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### Prior to first commissioning, observe the following:

Necessary steps are described on the next page.

- Ensure that cooling air can flow freely.
- Check compressor oil level by the oil sight glass (see next page).
- Check all connections and retighten if necessary.
- Check if the filter cartridge is in place (see "Service and Maintenance").
- Check the V-belt tension (see next page).
- The compressor is delivered as standard with HP outlet!

Caution: When optionally equipped with filling hoses, ensure that all lever filling valves are closed. Hold tight one filling valve manually and open the corresponding lever filling valve!

### Start the compressor

1. Start the compressor by pushing the ON button.
2. Check turning direction - see the rotary direction arrow on the housing of the electric motor (see next pages). If the turning direction is wrong, immediately stop the compressor by pushing the OFF button and contact an authorised electrician.



#### Warning

Wrong impeller rotation direction!

Immediately after switching the compressor on, check the rotation direction. Depending on the place of installation, the phase sequence can influence the rotation direction.

3. Check oil pressure (if oil pressure gauge is installed).
4. Run the compressor for about 2 minutes.
5. Caution: When optionally equipped with filling hoses, close the opened lever filling valve carefully!
6. Run the compressor up to maximum pressure and check if the final pressure switch shuts off the compressor. If the final pressure switch does not shut off, switch off the compressor with the OFF button (see chapter "REMEDYING FAULTS").
7. Check the compressor unit for leaks (see "SERVICE AND MAINTENANCE")
8. Now check the condensate drain valves:
  - Fix the black condensate hoses
  - Drain test - press the test button
  - If correct, air escapes
9. Stop the compressor by pushing the OFF button.
10. Open all filling valves carefully so that they are vented.

## FIRST COMMISSIONING

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### Check oil level



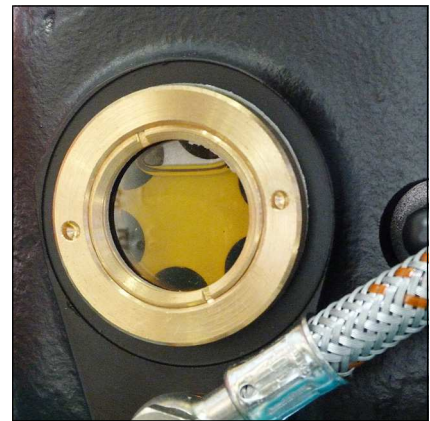
#### Warning

Check oil level daily. Never start the compressor with a too low oil level. Risk of accidental loss, destruction or deterioration.

Check oil before each operation of the system!

The oil level should be between the middle and upper end of the oil sight glass. Never start the compressor with a too low oil level.

Refill new compressor oil at least when the oil level reached the middle of the indicated area.



Oil sight glass

### Check V-belt tension

The V-belt could lose tension during transportation. Please check the V-belt tension before starting the compressor.

### Tension V-belt / Correct V-belt tension

See chapter "Service and Maintenance" -> "Tension V-belts"

## FIRST COMMISSIONING

### Check turning direction



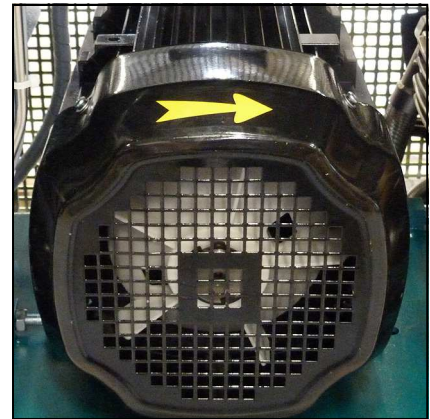
#### Warning

Wrong impeller rotation direction!

Immediately after switching the compressor on, check rotation direction. Depending on the place of installation, the phase sequence can influence the rotation direction.

Before starting the compressor for the first time, check rotation direction (see the rotary direction arrow on the housing of the electric motor).

If the direction of rotation is wrong, the guide pistons of the 2nd and 3rd stages can not be sufficiently lubricated, with the consequence that the pistons will be damaged. Furthermore, cooling air flow will not be sufficient.



Rotation direction arrow

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## DAILY COMMISSIONING

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### **Prior to daily operation observe the following:**

- Ensure cooling air can flow freely.
- Check compressor oil level by the oil sight glass.
- Check if filter cartridge is in place / observe filter cartridge life!
- Ensure toxic-free, pure intake air.

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## OPERATION

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### Filling procedure



**Caution! Fill only cylinders which:**

- are marked with the test mark and the test stamp of the expert.
- have been hydrostatic tested (check last test date).
- are rated for the final pressure.
- are free from humidity.



**Note**

The unit shuts down when final pressure is reached. Thus, the unit always has to be restarted manually.

1. Close all filling valves.
2. Connect the closed compressed air cylinders.
3. Open cylinder valves.
4. Start compressor by pushing the ON button.
5. When the filling pressure gauge increases, open the filling valves slowly.
6. Fill compressed air cylinders to the desired pressure, subsequently close the filling valves slowly.
7. Close and vent all filling valves.
8. Disconnect all compressed air cylinders from filling valves.

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## OPERATION

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### Switch off the compressor

The compressor unit is equipped as standard with a pressure switch which automatically shuts down the system when the corresponding final pressure is reached.

During filling process, you can shut down the system at any time by pushing the red button (OFF) or the emergency stop (only in case of emergency!).



#### Note

After automatic or manual switching off, all pressure vessels and filter housings of the compressor will be automatically vented.

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# REMEDYING FAULTS

## REMEDYING FAULTS

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### Final pressure can not be reached

Cause of fault	Remedy
Connections leaky	Retighten or clean/replace if necessary
Final pressure safety valve leaky	Replace
Pipes / heat exchanger broken	Replace
Condensate drain valves leaky	Unscrew valves, check sealing surfaces, clean, replace if necessary
Final pressure switch stop unit	Verify settings, replace if necessary
Piston of pneumatic condensate valve sticks	Clean pneumatic condensate valve and restore function, check/replace o-rings, replace valve completely if necessary

### Strong compressor vibration

Cause of fault	Remedy
V-belt tension too loose	Tension V-belt
Drive motor / Compressor unit loosely	Retighten mounting screws
Anti vibration mounts used up	Replace
Ground not levelled	Ensure a solid and level ground

### Air supply too low

Cause of fault	Remedy
Inlet and outlet valves contaminated / defective	Clean, replace if necessary
Cylinder(s), piston(s) or piston ring(s) used up	Replace
V-belt slips	Tension V-belt
See chapter "Final pressure can not be reached"	See chapter "Final pressure can not be reached"

## REMEDYING FAULTS

### Compressor overheated

Cause of fault	Remedy
Inlet filter cartridge contaminated	Replace
Ambient temperature too high	Improve room ventilation / Reduce operation times
Cooling air inlet and outlet insufficient	Observe minimum distances (see Installation Instructions)
Air intake hose too long	Reduce length of the air intake hose
Air intake hose diameter too small	Use a larger diameter
Wrong compressor rotation direction	Ensure correct phase rotation, observe rotation direction arrow!
Inlet and outlet valves contaminated / defective	Clean, replace if necessary

### Safety valve leaks

Cause of fault	Remedy
Inlet and outlet valves of the following pressure stage defective	Clean, replace if necessary
Sinter filter of the following water separator blocked	Replace
Safety valve leaky	Replace

### Oil taste in the air

Cause of fault	Remedy
Mole carbon filter cartridge saturated	Replace
Compressor oil unsuitable	Use prescribed oil quality
Filter cartridge unsuitable	Use prescribed filter type
Cylinder(s), piston(s) or piston ring(s) defective	Replace

## REMEDYING FAULTS

### Automatic condensate drain defective

Cause of fault	Remedy
Solenoid coils defective	Replace
Cable / supply cable defective	Repair, replace if necessary
Timer / relais defective	Replace
Sinter filter of pneumatic condensate valve blocked	Replace
Piston of pneumatic condensate valve sticks	Clean pneumatic condensate valve and restore function, check/replace o-rings, replace valve complete if necessary

### Condensate drain starts before reaching final pressure

Cause of fault	Remedy
Pressure stages are not as prescribed, control pressure of pneumatic condensate valve too low	Check corresponding inlet and outlet valve, replace if necessary.
Piston sealing of pneumatic condensate valve contaminated / used up	Clean, replace if necessary
Timer / relais settings not correct	Adjust as prescribed
Timer / relais defective	Replace

### Compressor stops before final pressure

Cause of fault	Remedy
Final pressure switch settings not correct	Correct settings
Opening pressure of the pressure maintaining valve too high	Correct settings
Fuse / circuit breaker has tripped Valid only for E models	Check fusing of the power supply / observe regulations
Emergency stop switch has tripped	Unlock emergency stop switch, close compressor housing door correctly



## REMEDYING FAULTS

### Filter life not sufficient

Cause of fault	Remedy
Pressure maintaining valve settings not correct	Adjust as prescribed
Filter cartridge unsuitable	Replace by a prescribed filter cartridge type
Filter cartridge too old	Observe expiration date
Filter cartridge packaging incorrect / damaged / already opened. Filter cartridge already partly saturated before change	Store filter cartridges properly, dispose defective cartridges
Operating temperature too high	Ensure sufficient ventilation
Cylinder(s), piston(s) or piston ring(s) defective	Replace

### Oil consumption too high

Cause of fault	Remedy
Cylinder(s), piston(s) or piston ring(s) defective	Replace
Compressor oil unsuitable	Use prescribed oil quality
Operating temperature too high	Observe prescribed operating temperatures
Oil leak at the compressor block	Tighten corresponding mounting screws, if necessary replace corresponding paper sealing / o-ring / shaft seal

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# MAINTENANCE AND SERVICE

### Service, Repair and Maintenance

Carry out service and maintenance work exclusively when the compressor is stopped and depressurised. The unit should be leak-checked regularly. Leaks can be preferably localised by using a leak detector spray (if necessary, brush pipes with soapy water).

We recommend that only authorised L&W service technicians carry out service work on the bearing of the compressor (crankshaft and connecting rods).

We urgently recommend that all maintenance, repair and installation work must only be carried out by trained personnel. This is necessary because all maintenance work can not be explained exactly and detailed in this manual.

Only use authentic spare parts for service work.

**Danger**

Components under pressure, such as hose ends, can quickly come loose when manipulated and can cause potentially fatal injuries due to the pressure surge. Any work on system parts may only be performed in a pressure-compensated state.

**Warning**

The use of accessories that have not been tested can lead to death or serious injury or damage to the unit. Only use authentic spare parts for service work.

**Warning**

Carry out maintenance or service work when the unit is switched off and protected against unexpected restart.

**Warning**

Risk of burns!

Carry out maintenance or service work when the unit has cooled down.





## MAINTENANCE AND SERVICE

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### Daily before taking unit into operation

Maintenance work	Type	Quantity	Order No.
Check oil level	-	-	000001
Check condition of all filling hoses	-	-	-
Check filter cartridge lifetime	-	-	-
Operate unit to final pressure and check function of final pressure switch	-	-	-

### At 25 operation hours

Maintenance work	Type	Quantity	Order No.
Oil change	-	2,2	000001

### Every 3 months or as required

Maintenance work	Type	Quantity	Order No.
Check/Retorque all connections and bolts	-	-	-



## MAINTENANCE AND SERVICE

### Annually

Maintenance work	Type	Quantity	Order No.
Oil change, if less than 1000 operating hours	-	2,2	000001
Check V-belt tension and condition	LW SC-400 ES (50Hz)	-	-
	LW SC-480 ES (50Hz)	-	-
	LW SC-550 ES (50Hz)	1	011247
Check opening pressure of final safety valve	-	-	-
Clean coolers	-	-	-
Clean all oil/water separators, if less than 500 operating hours	-	-	-
Service intake filter (depends on condition - if less than 500 operating hours)	-	-	-
Check all connections for leakage	-	-	-

### Every 500 operating hours

Maintenance work	Type	Quantity	Order No.
Change intake filter *	-	1	000170
Check pressure maintaining/non-return valve	-	-	-
Check V-belt tension and condition	see above	see above	see above



**\* Note**

Article is part of our 1000h and 2000h service kits.

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## MAINTENANCE AND SERVICE

### Every 1000 operating hours

Maintenance work	Type	Quantity	Order No.
Replace sintered metal filter element of water separators	1st stage	1	000184
	1st stage	1	002914
	2nd stage	1	000173
	2nd stage	1	002914
Replace o-rings of water separators	1st stage	1	001294
	1st stage	2	001272
	2nd stage	3	001272
Replace sintered metal filter of oil separators	-	1	000184
Replace o-ring of oil separator	-	1	001294
Replace silencer	-	1	000178
Replace sintered metal filter of pneumatic condensate valve	-	1	000188
Replace oil sieve / oil pump cover gasket	-	1	002569
Oil change	-	2,2	000001
Replace o-rings of the final filter housing	-	2	001769

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## MAINTENANCE AND SERVICE

### Every 4000 operating hours (Latest in 10 years)

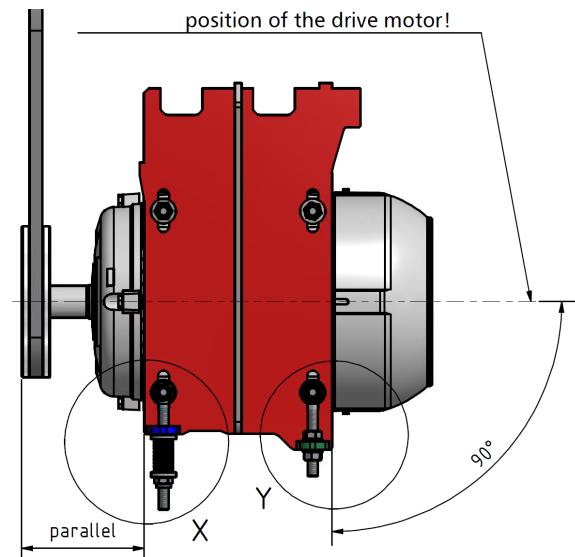
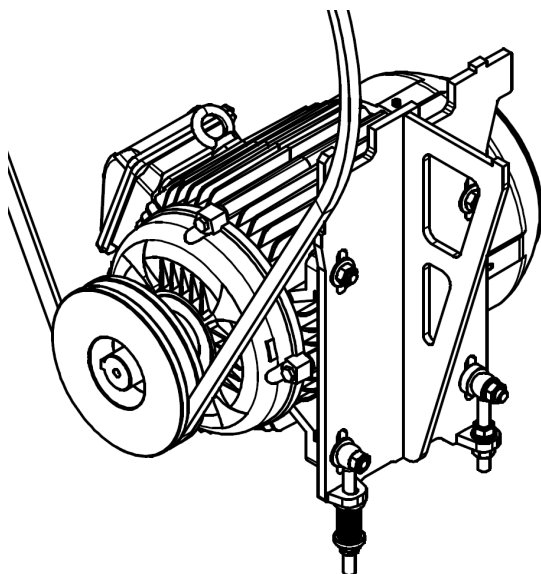
Maintenance work	Type	Quantity	Order No.
Replace all o-rings and gaskets of 1st, 2nd and 3rd stage	gasket	3	000240
	o-ring	1	001274
Replace all inlet and outlet valves incl. gaskets	1. Stage	1	000259
	2. Stage	1	000256
	3. Stage	1	010337
	Upper gasket 1st	1	000257
	Upper gasket 2nd	1	000254
	Lower gasket 1st	1	000258
	Lower gasket 2nd	1	000253
Replace needle bearings for conrod 2nd stage	-	1	003836
Replace needle bearings for conrod	-	1	003281
O-Ring Cylinder change	3. Stufe	1	001274
CU-Ring (Ø10 x 16 x 2mm)	-	12	001323
Paper gasket cylinder flange	-	3	000240

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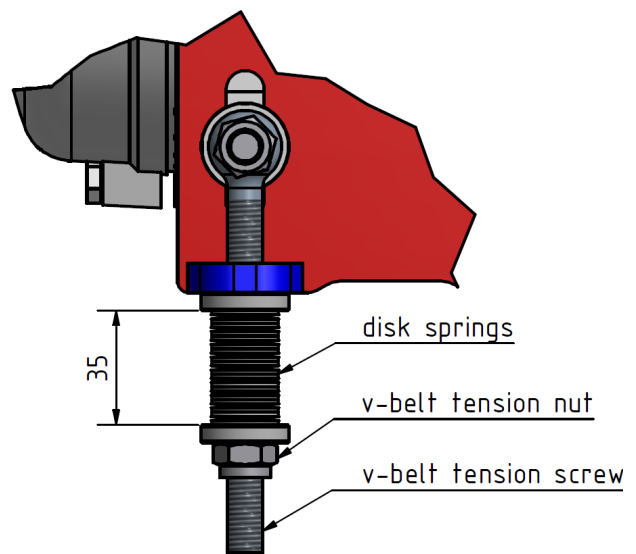
### Tension V-belt

Tension V-belt as follows:

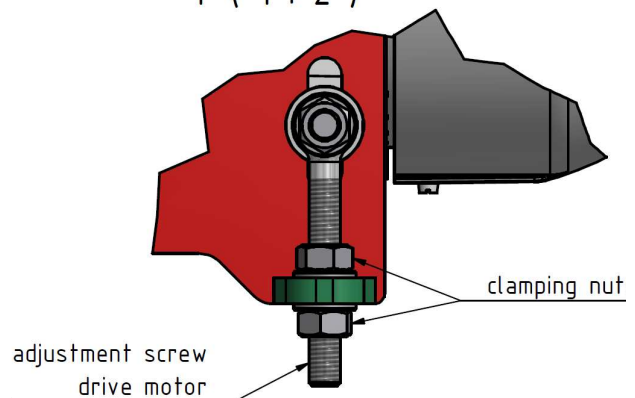
- Press the emergency stop button
- Remove front door and side, lower maintenance cover
- Loosen the clamping screws of the fan sheet metal (additional fan)
- Loosen the hexagon nuts of the engine mounting flange
- Loosen the clamping nuts of the "adjustment screw drive motor"
- Preload V-belt with "V-belt tension nut" until correct spring preload is reached (35mm)
- Bring the motor into the horizontal position with the drive motor adjustment screw
- Tighten the fastening nuts on the motor flange
- Tighten the clamping nuts "adjustment screw drive motor"
- Align fan plate (additional fan) and tighten clamping screws
- Check the free movement of the additional fan



X ( 1 : 2 )



Y ( 1 : 2 )

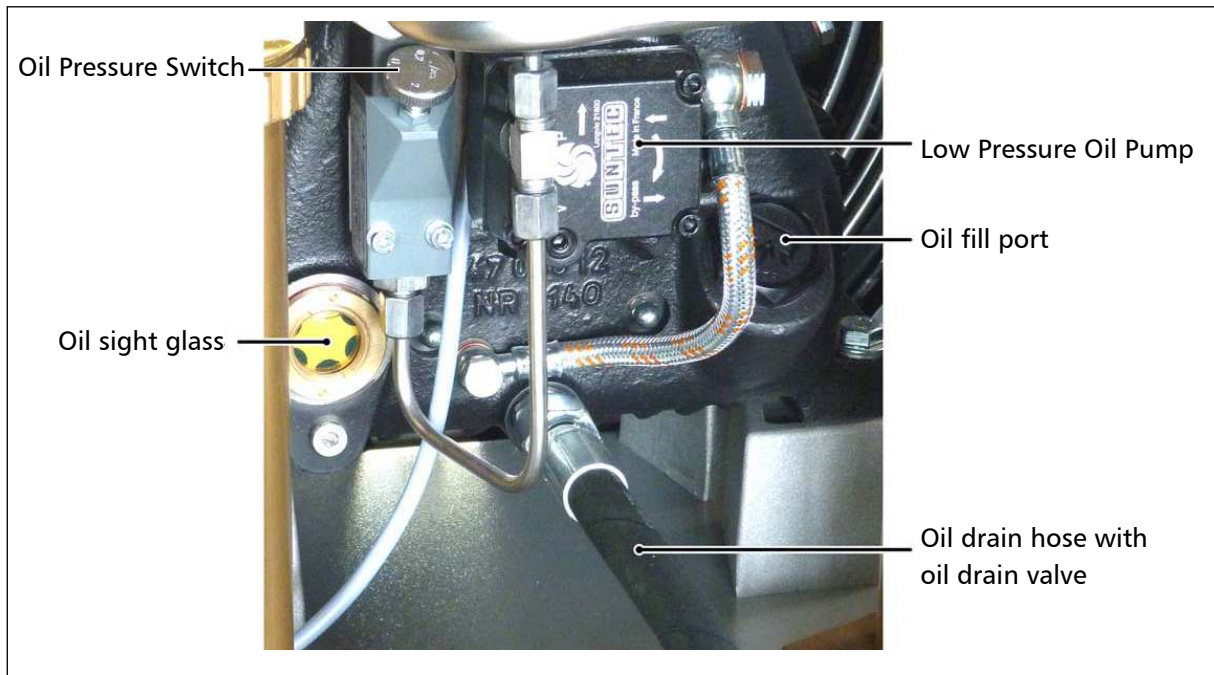


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### Compressor lubrication

Crankshaft bearings of the 1st and 2nd stage get lubrication by an oil slinger. In addition, 1st and 2nd stage are lubricated by spray oil. The guide cylinder of the 3rd stage is lubricated by a mechanical oil pump.

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Lubricating System

### Check oil level



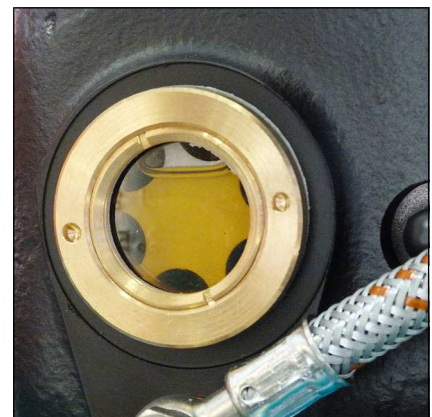
#### Warning

Check oil level daily. Never start the compressor with a too low oil level. Risk of accidental loss, destruction or deterioration.

Check oil before each operation of the system!

The oil level should be between the middle and upper end of the oil sight glass. Never start the compressor with a too low oil level.

Refill new compressor oil at least when the oil level reached the middle of the indicated area.



Oil sight glass

### Oil change



#### Note

We recommend oil change at least once a year - depending on total operating hours.

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#### Oil change as follows:

- Run compressor warm for approx. 2 min.
- Switch off and vent compressor.
- Place a suitable oil drain tray under the drain hose.
- Open carefully oil drain valve and drain oil completely.
- Close oil drain valve.
- Loosen oil fill port with an appropriate adjustable wrench (AF 0-40 mm) and unscrew manually.
- Fill oil by using a funnel.
- Check oil level. The oil level should be between the middle and upper end of the oil sight glass.
- Screw oil fill port manually in and tighten with the adjustable wrench.

The oil change is now completed.

#### Maintenance intervals

- First oil change after 25 operating hours (total hours).
- All further changes after each 1,000 operating hours.

#### Oil and oil capacity

Approx. 2,200 ml synthetic compressor oil is necessary for one oil change. Only use synthetic compressor oil which is recommended as suitable from L&W.

## MAINTENANCE AND SERVICE

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### Oil sieve change

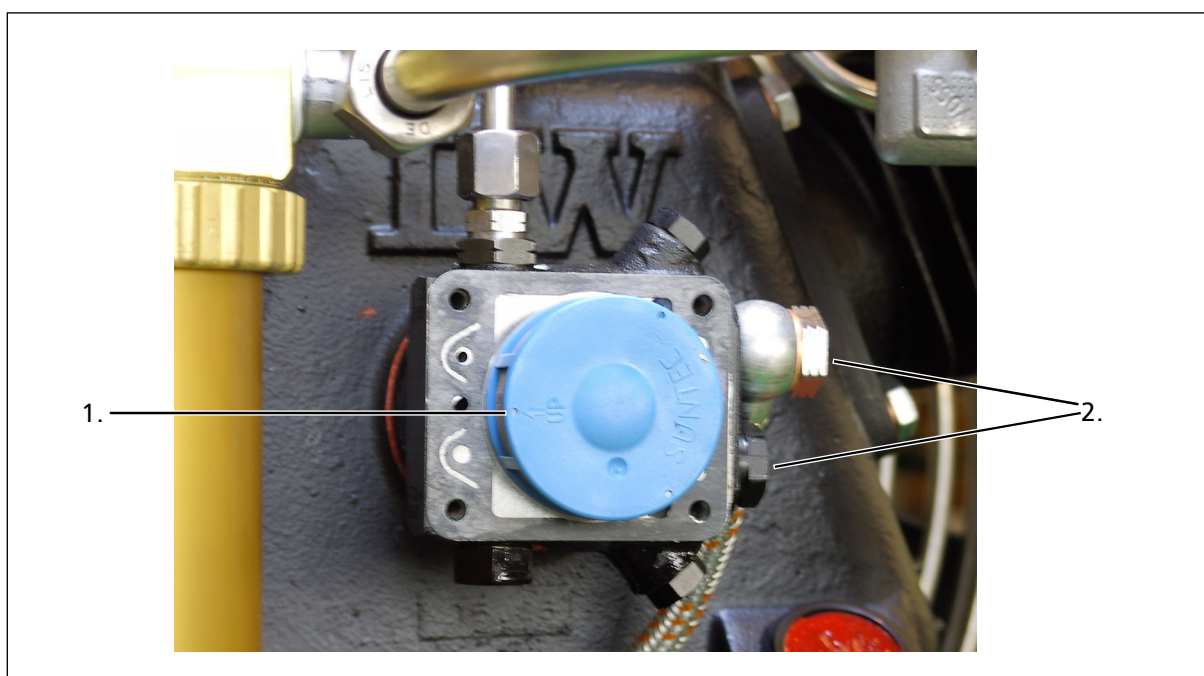
Oil sieve change as follows:

- Loosen cover screws (4 pcs).
- Remove the cover, the cover gasket and the oil sieve.
- Clean the oil sieve with petroleum-ether or replace the defective oil sieve.
- Replace the gaskets.
- Soak the gaskets with oil before placing (respect mounting direction).
- Be sure to position the arrow (see Fig., Pos. 1) from the new oil sieve opposite to inlet and return ports of the pump (see Fig., Pos. 2).
- Remount the cover with the 4 cover screws. Tightening torque: 4.5 - 8 N.

The oil sieve change is now completed.

### Maintenance intervals

- We recommend cleaning or replacing the oil sieve every 1,000 working hours.
- Service Kit oil pump (002569). Consists of: 000798—Oil sieve + 000672—oil pump cover gasket



Correct oil sieve mounting direction



### Final pressure switch



**Note**

Do not adjust the final pressure switch to the safety valve pressure. The final pressure switch has to be adjusted to min. 10 bar below the safety valve pressure. Otherwise, the safety valve can open during operation. This considerably reduces the life of the safety valve.

The pressure switch shuts off the compressor automatically when the selected final pressure is reached. The final pressure switch is already adjusted to the corresponding cut-out pressure.

The pressure can be adjusted with the upper adjusting screw as follows:

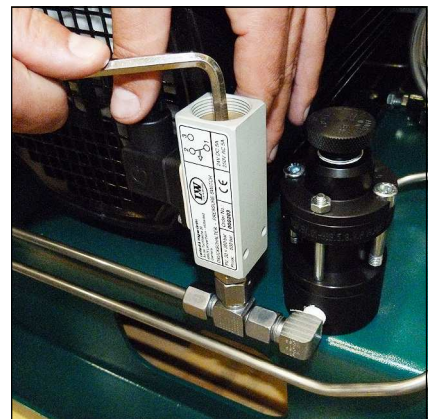
**Increasing cut-out pressure:**

Turn the adjusting screw clockwise

**Reducing cut-out pressure:**

Turn the adjusting screw anti-clockwise

Adjust the pressure switch in steps of a quarter turn. Restart the compressor after every adjustment step to verify the actual cut-out pressure.



Final pressure switch

**Example settings:**

Safety valve	Max. Operating Pressure
225 bar	215 bar
250 bar	240 bar
330 bar	320 bar

## MAINTENANCE AND SERVICE

### Automatic condensation dump system



#### Note

The collected condensate can contain oil and has to be disposed according to regulations.

The LW 450 ES comes as standard with an automatic condensation dump system. Solenoids drain all condensate separators every 15 minutes.

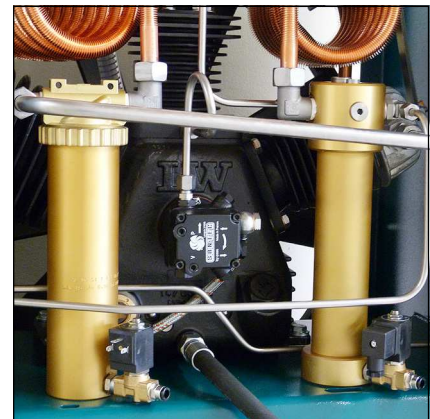
To test the system, press the blue condensate test drain button on the operating panel.

### Oil / water separators

Condensate is separated after every stage of compression. All three oil / water separators are equipped with electronic timer controlled solenoids. The timer is located in the switch box and activates the dump valves about every 15 minutes.

To release the complete condensate through the black plastic hoses, we recommend using an 20 l container at least.

The drain noise can be kept to a minimum by using a silencer.



Oil / water separators 1st and 2nd stage

### Maintenance intervals

We recommend to clean oil and water separators every 500 operating hours or at least once a year, to check for corrosion damage and to replace o-rings if necessary.

All oil / water separators have an integrated sinter filter which has to be replaced every 1,000 operating hours.



Oil / water separators final stage

## MAINTENANCE AND SERVICE

### Oil / water separator 1st stage - maintenance



#### Note

Clean all parts thoroughly before assembly.

#### Change / clean oil / water separators 1st stage as follows:

- Loosen pipe connections and mounting screws.
- Remove oil / water separators.
- Open ring nut and remove separator top (Fig. 1).
- Open nut and remove separator top (Fig. 2).
- Change sinter filter (Fig. 3).
- Reassemble all parts and tighten nut.
- Change o-ring, previously grease new o-ring (Fig. 4).
- Place separator top and tighten ring nut manually.
- Mount oil / water separators.
- Tighten pipe connections and mounting screws.

Oil / water separator maintenance is now completed.



Fig. 1 - Open ring nut and remove separator top



Fig. 2 - Loosen nut at the separator top



Fig. 3 - Change sinter filter



Fig. 4 - Change o-ring

## MAINTENANCE AND SERVICE

### Oil / water separators 2nd stage - maintenance



#### Note

Clean all parts thoroughly before assembly.

**Maintenance / cleaning of oil / water separators 2nd stage as follows:**

- Loosen pipe connections and mounting screws.
- Remove oil / water separators.
- Unscrew and remove filter top (Fig. 1).
- Open nut and remove separator top (Fig. 2).
- Change sinter filter (Fig. 3).
- Reassemble all parts and tighten nut.
- Change o-ring, previously grease new o-ring (Fig. 4).
- Place separator top and tighten manually.
- Remove bottom part (Fig. 5)
- Change o-ring, previously grease new o-ring
- Press in bottom part
- Mount oil / water separators.
- Tighten pipe connections and mounting screws.

**The oil / water separator maintenance is now completed.**



Fig. 1 - Unscrew and remove filter top

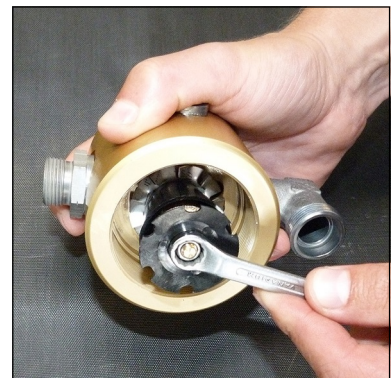


Fig. 2 - Loosen nut at the separator top

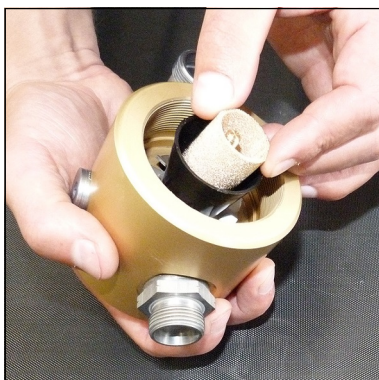


Fig. 3 - Change sinter filter

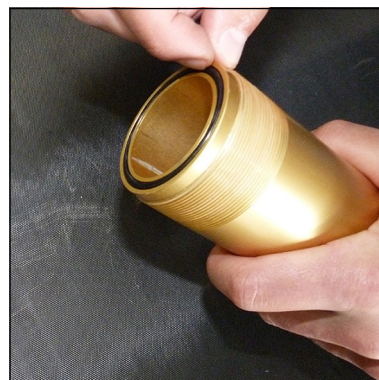


Fig. 4 - Change o-ring



Fig. 5 - Bottom part

## MAINTENANCE AND SERVICE

### Oil / water separators final stage - maintenance



#### Note

Clean all parts thoroughly before assembly.

#### Change/clean oil / water separators final stage as follows:

- Loosen pipe connections and mounting screws.
- Remove oil / water separators.
- Open ring nut and remove separator top (Fig. 1).
- Loosen nut at the separator top.
- Change sinter filter (Fig. 2).
- Reassemble all parts and tighten nut.
- Change o-ring, previously grease new o-ring (Fig. 3).
- Place separator top and tighten ring nut manually.
- Replace silencer.
- Mount oil / water separators.
- Tighten pipe connections and mounting screws.

The oil / water separator maintenance is now completed.



Oil / water separators final stage



Fig. 1 - Loosen ring nut

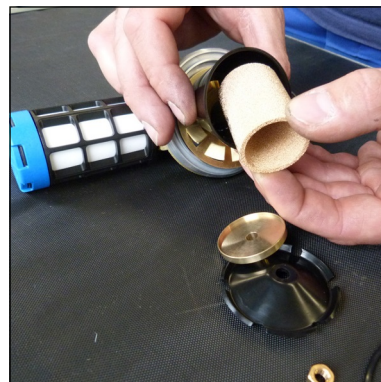


Fig. 2 - Change sinter filter



Fig. 3 - Change o-ring

### Pneumatic condensate valve - maintenance



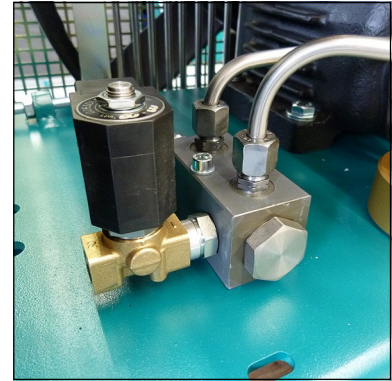
#### Note

Clean all parts thoroughly before assembly.

#### Pneumatic condensate valve change as follows:

- Loosen pipe connections and mounting screws.
- Remove pneumatic condensate valve.
- Loosen connection (Fig. 2).
- Change sinter filter (Fig. 3).
- Tighten horizontal screw.
- Mount pneumatic condensate valve.
- Tighten pipe connections and mounting screws.

**Pneumatic condensate valve maintenance is now completed.**



Pneumatic Condensate Valve

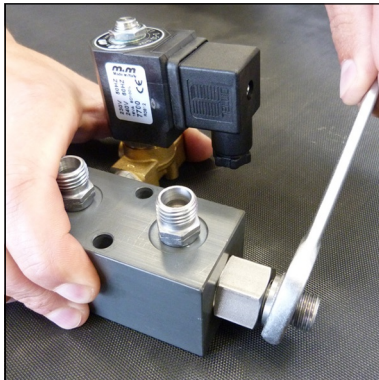


Fig. 2 - Loosen connection

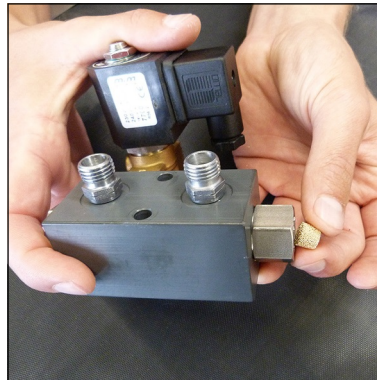


Fig. 3 - Change sinter filter

## MAINTENANCE AND SERVICE

### Filter housing

The black mole carbon filter housing is installed on the right hand side of the motor.

Inside the filter housing a jet blows air on to the housing wall. Condensation water and oil are led by centrifugal force to the bottom of the housing. Air flows through the mole carbon filter cartridge, which purifies the air from residual moisture and odours.



Fig - Filter housing

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#### Caution

Do not run the compressor with empty unfilled cartridges.  
Only use genuine L&W cartridges.

P/N	Model	Filtering	Filter Volume
000002	LW SC-400 ES	DIN EN 12021 (Breathing Air)	0,98 ltr
000002	LW SC-480 ES	DIN EN 12021 (Breathing Air)	0,98 ltr
000002	LW SC-550 ES	DIN EN 12021 (Breathing Air)	0,98 ltr

The high-pressure compressor is equipped with an integrated breathing air purification system. Air is compressed up to 350 bar, dried and odour- and tasteless purified. Oil residues are bounded.

The breathing air filter cartridge consists of a molecular sieve and activated-carbon filter.

All breathing air filter cartridges are factory vacuum sealed.

We recommend unpacking the filter cartridges just before installation. Filter cartridges which are exposed too long could be saturated with moisture and become unusable.

### Maintenance intervals

Filter cartridges should be changed at the following intervals, at +20°C or more often, depending on humidity and ambient temperature:

Standard life time at 20°C:

- 37,5 hours for LW SC-400 ES
- 31,25 hours for LW SC-480 ES
- 27,0 hours for LW SC-550 ES

## MAINTENANCE AND SERVICE



### Caution

Do not run the compressor with empty unfilled cartridges.  
Only use genuine L&W cartridges.

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### Filter cartridge change

Change filter cartridge as follows:

- Stop the compressor and check the air is completely drained. Wait till the filter housing is completely vented; this procedure takes approx. 1 - 2 minutes
- When no air discharges from the condensate release hoses, the pressure vessels are depressurized.
- Remove the end filter topcap (Fig. 1). Remove the filter cover by using the filter tool. The housing can not be opened if still under pressure.

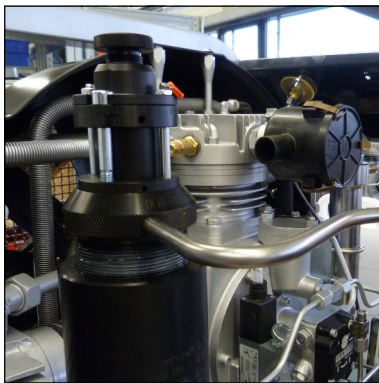


Fig. 1 - Loosen filter housing topcap by using the filter tool

- After opening the housing, pull out the filter cartridge by using the filter tool (Fig. 2).
- Remove adapter from used cartridge.
- Open the vacuum sealed packet of the new filter cartridge and carefully place it into the filter housing (press slightly).
- Put on filter adapter (Fig. 3) on new cartridge. Use spanner to make sure adapter is sealing to cartridge bottom. Insert filter cartridge (incl. installed filler adapter).
- Fully turn in filter housing topcap in by using the filter tool and turn it back 1/4 turn. This avoids tightening of the topcap due to vibration.
- **The filter cartridge change is now completed.**



Fig. 2 - Pull out the filter cartridge by the catch and insert a new cartridge



Fig. 3 - Filter adapter

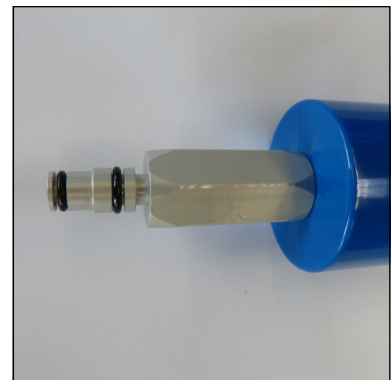


Fig. 4 - Installed filler adapter



### Note

Ensure that the old filter cartridge is disposed correctly at an approved waste point.



### Filter housing - maintenance



#### Note

Clean all parts thoroughly before assembly.

#### Filter housing maintenance as follows:

- Unscrew filter housing cover by using the filter tool (Fig. 1).
- Change o-ring, previously grease new o-ring (Fig. 2)
- Screw the filter housing cover in by using the filter tool (Fig. 1).
- Screw in the filter cover with the help of the filter wrench and loosen again about a  $\frac{1}{4}$  turn. This prevents the lid from shaking (Fig. 1).
- Dismantle the mounting bracket (Fig. 3).
- Unscrew the filter housing. Change the lower O-ring, first grease the new O-ring (as in Fig. 2).
- Mount filter housing. Mount the mounting bracket (Fig. 3).

The filter housing maintenance is now completed.



Fig. 1 - Remove/screw in filter cover



Fig. 2 - Change o-ring



Abb. 3 - Befestigungsbügel

### Inlet Filters



#### Note

Dirty filters make intaking air difficult and reduce delivery capacity. Risk of compressor overheating.

A micro filter cartridge is used as an air inlet filter. Check air inlet filter regularly or replace if necessary. Defective air inlet filters should be immediately replaced.

### Maintenance Intervals

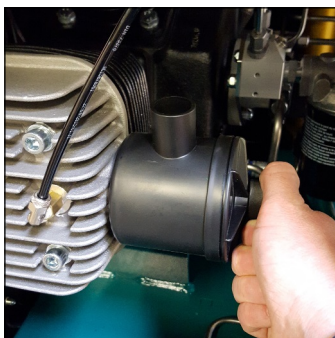
We recommend that the filter cartridge should be replaced every 1,000 working hours (depending on pollution grade).

### Inlet Filter Cartridge Change

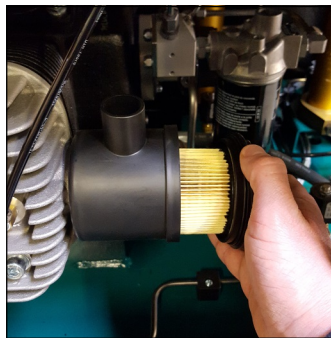
Inlet filter cartridge change as follows:

- Loose nut (Fig.1)
- Remove cover and replace filter cartridge by a new one (Fig.2)
- Assemble intake filter
- Tighten nut

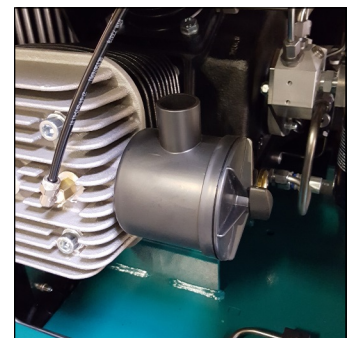
The inlet filter cartridge change is now completed.



(Fig.1) Loose nut



(Fig.2) Remove cover and replace filter cartridge



(Fig.3) Mount the intake filter

## MAINTENANCE AND SERVICE

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### Cylinder heads and valves

Inlet and outlet valves of the specific compressor stages are located between valve head and cylinder. Outlet valves open while piston downstroke, inlet valves open while upstroke or compression stroke.

Valves are subject to normal wear and tear and have to be replaced at certain intervals (depending on specific operating conditions). Dismount valve heads to change valves. The three valves are combined inlet and outlet valves. The first and second stage valves are plate valves. The third stage contains a spring operated piston which acts inside a bronze cylinder.



Valve head 3rd stage

### Maintenance intervals

All valves should be replaced after 4,000 working hours due to normal wear and tear. To replace valves the cylinder heads have to be removed. There are no special tools required to replace these valves.

### Available special tools

Special tools are not necessary for dismounting inlet and outlet valves but make work easier.

Order number: 006847



Special tool

### Replace inlet and outlet valves 1st and 2nd stage



#### Note

The figures of the parts can differ due to the different stages.

Change inlet and outlet valves 1st and 2nd stage as follows:

#### Remove Inlet / Outlet Valve

- Loosen pipe connections
- Loosen valve head screws (Fig. 1)
- Remove valve head
- Pull out inlet and outlet valve (Fig. 2). CAUTION: Observe that the lower copper valve ring is also pulled out. (It can still stick inside the cylinder)
- Check valve head if defective

Install Inlet / Outlet Valve - see following page

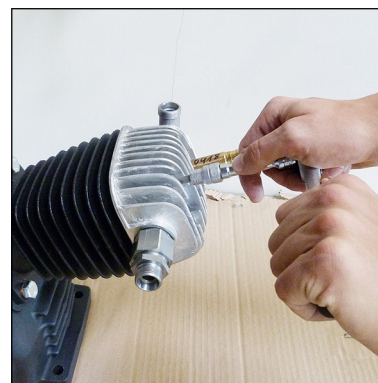


Fig. 1 - Loosen valve head screws



Fig. 2 - Pull out inlet and outlet valve

### Replace inlet and outlet valves 1st and 2nd stage - continued from previous page

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#### Caution

The exact alignment of upper and lower valve gasket is very important. Inlet and outlet channels have to be exactly centred. Do not turn inlet and outlet valve after insertion. The copper valve ring could cover outlet channels.

#### Install Inlet / Outlet Valve

- Grease the lower valve gasket slightly and place on the new inlet and outlet valve.  
CAUTION: Observe correct copper valve ring position (centre inlet and outlet channels).
- Place the new inlet and outlet valve straightly into the cylinder (Fig. 3).  
CAUTION: Do not turn the inlet and outlet valve inside the cylinder! The copper valve ring could cover outlet channels!
- Place the upper valve gasket on the inlet and outlet valve.  
CAUTION: Observe the correct paper gasket position (centre inlet and outlet channels). (Fig. 4)  
Note: Valve head screws can be inserted into the valve head to secure the upper valve gasket.
- Refit the valve head and tighten the valve head screws crosswise.

#### Starting torques:

1. nd Stage 45 Nm
2. nd Stage 30 Nm

The replacement inlet and outlet valves 1st and 2nd stage is now completed.

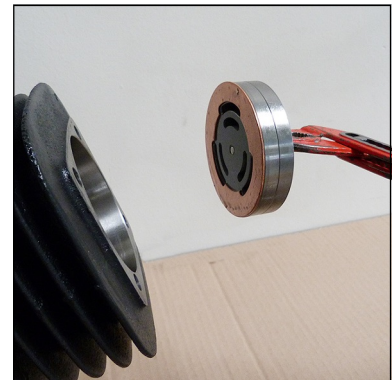


Fig. 3 - Place new inlet and outlet valve straightly into cylinder

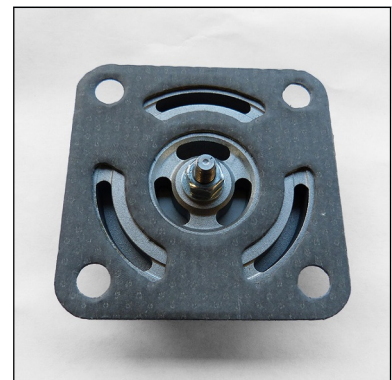


Fig. 4 - Ensure the correct mounting position of the paper gasket

## MAINTENANCE AND SERVICE

### Replacement inlet and outlet valves 3rd stage

Replacement inlet and outlet valves 3rd stage as follows:

- Loosen pipe connections
- Loosen valve head screws (Fig. 1)
- Remove lower valve gasket (Fig. 2)
- Dismount inlet and outlet valve (Fig. 3). Observe that the upper valve gasket is also pulled out. (It can still stick inside the cylinder head)
- Check valve head if defective (check centre pin)
- Mount valve gasket on inlet and outlet valve.  
CAUTION: Ensure correct mounting position of the upper valve gasket (Fig. 4).
- Insert new inlet and outlet valve into valve head.  
CAUTION: Observe correct position between valve centre hole and valve head centre pin.
- Place bottom valve gasket
- Place valve head with the new inlet and outlet valve. Tighten valve head screws crosswise (tightening torque 30 Nm).

Replacement inlet and outlet valves 3rd stage complete.



Fig. 1 - Loosen valve head screws

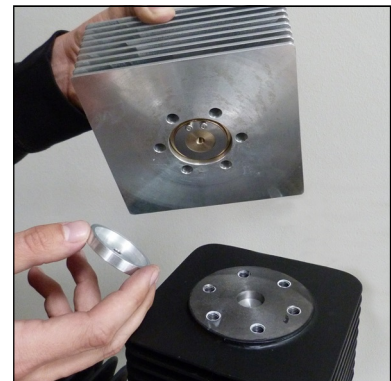


Fig. 2 - Remove lower valve gasket

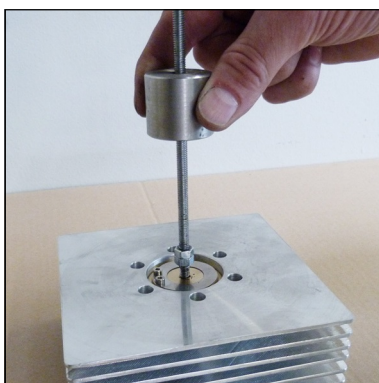


Fig. 3 - Remove inlet and outlet valve

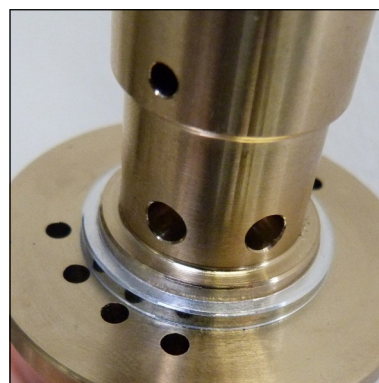


Fig. 4 - Ensure correct mounting position of the upper valve gasket

A

## MAINTENANCE AND SERVICE

### Safety valves

Every pressure stage is equipped with a separate over pressure safety valve. Safety Valves avoid a non permissible high pressure at the specific pressure stages and limit maximum operation pressure of the compressor.

#### Safety valves are adjusted to:

- 1st Stage: 8 bar
- 2nd Stage: 50 bar
- 3rd Stage: max. final pressure

The adjusted blow-off pressure [bar] of the safety valves is indicated on their housings.

All safety valves are factory sealed with special L&W safety seals to avoid manipulation of the limit value settings.

Safety valves with removed seals have to be immediately checked for the prescribed settings and replaced if necessary.

The safety valve of the final stage is furthermore equipped with a knurled screw to be activated once.

Turning the knurled screw clockwise could vent the valve completely and therefore the final filter housing.

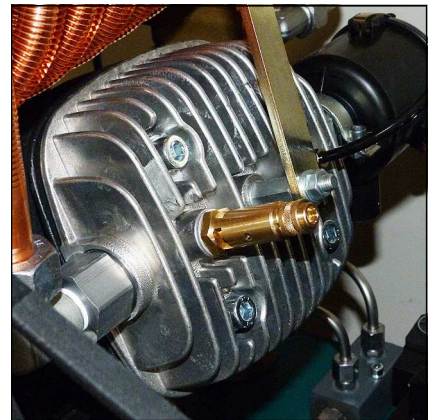
During normal operation conditions, the knurled screw has to be turned anti-clockwise up to the upper stop. An integrated circlip avoids complete unscrewing.

If a safety valve blows off, it indicates problems with either inlet or outlet valve of the following stage.

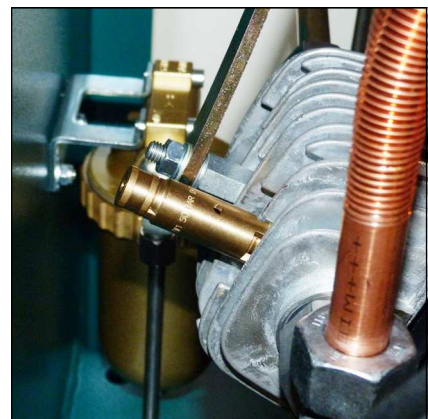


#### Note

Replace defective safety valves immediately!



Safety valve 1st stage



Safety valve 2nd stage



Safety valve 3rd stage

A

### **Pressure maintaining / non return valve**

The pressure maintaining / non return valve combination is placed in the flow direction after the final filter housing.

#### **Pressure maintaining valve**

The pressure maintaining valve drains a large part of the water content of the compressed air mechanically by ensuring the minimum outlet pressure. This guarantees optimal drying and purification of the breathing air.

After starting the compressor, the pressure inside the final filter housing constantly increases. The pressure maintaining valve prevents the compressed air from blowing off (final pressure gauge = 0 bar).

When the adjusted opening pressure is reached (160 bar), the purified compressed air flows via pressure maintaining and non return valve to the filling valves.

The value of the opening pressure of the pressure maintaining valve can be read at the final pressure gauge. When opening pressure is reached, the pressure gauge value increases within a few seconds.

**Adjust pressure maintaining valve see next page.**

#### **Non return valve**

The non return valve which is placed after the pressure maintaining valve, prevents the purified breathing air from flowing back into the filter housing / condensate drain valves.

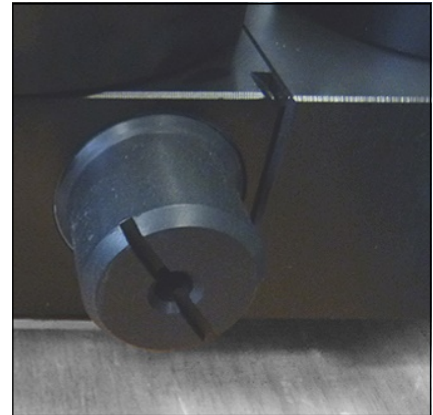


Fig. - Pressure maintaining / non return valve



### Adjust pressure maintaining valve

- Vent filling valve and close afterwards (filling pressure gauge 0 bar)
- Start the compressor
- Observe filling pressure gauge
- When the opening pressure of the pressure maintaining valve is reached, the indicated filling pressure increases within some seconds from 0 bar up to the adjusted opening pressure.

If the opening pressure does not reach a value at 160 bar, adjust the pressure maintaining valve as follows:

#### Increase opening pressure:

- Vent filling valve (filling pressure 0 bar)
- Loosen clamp screw on the side
- Turn adjusting screw clockwise by using a suitable slotted screwdriver
- Start compressor and check opening pressure, adjust if necessary
- Tighten clamp screw on the side
- Check opening pressure again

#### Reduce opening pressure:

- Vent filling valve (filling pressure 0 bar)
- Loosen clamp screw on the side
- Turn adjusting screw anti-clockwise by using a suitable slotted screwdriver
- Start compressor and check opening pressure, adjust if necessary
- Tighten clamp screw on the side
- Check opening pressure again



#### Note

If the adjusted opening pressure of the pressure maintaining valve is higher than the final pressure of the compressor, the final pressure safety valve blows off before pressure maintaining valve opens (final pressure = 0 bar). When valve settings are not clear (e.g. after disassembly / repair), start the adjustment with a low basic setting (turn adjusting bolt 3 full turns in).

### Safety valve test



#### Note

Do not fill any tank during test phase!

#### Safety valve test as follows:

- Depressurise the system.
- Turn the adjusting screw of the final pressure switch one turn clockwise (please see chapter "Final pressure switch", page A-47).
- Start the compressor.
- Watch the final pressure gauge. The safety valve should open when reaching working pressure of the compressor. If not, switch off the unit and take out of service until the safety valve has been replaced.
- Switch off the compressor.
- Turn the adjusting screw of the final pressure switch back (one turn counterclockwise).
- Check the cut-out pressure. Adjust if necessary!

The safety valve test is now completed.



Pressure switch

### Leak test

**Note**

Do not fill any tank during test phase!

**Note**

Two person are recommended for the test!

#### Leak test as follows:

- Close filling valves.
- Start the compressor.
- Press the OFF-switch and hold on the button.
- Verify the compressor for release noises. (A slight hiss of the air inlet filter nozzle can be ignored). If release noises occur, localise blow off position(s).
- Release the OFF-switch.

The leak test is now completed.



OFF-switch



## MAINTENANCE AND SERVICE

A

### Test of Pressure Equipment

According to the Pressure Equipment Directive 2014/68/EU and TÜV Darmstadt (German supervising authorities).

Subject: pressure equipment with a product permissible operating pressure [bar] x content volume [litres] from 200 up to 1000.

**Example: LW SC-400 E / LW SC-480 E / LW SC-550 E : Filter housing 0.54 l**

Maximum operating pressure: 350 bar

Content volume: 0.98 litres

350 bar x 0.98 litres = 343

343 is more than the minimum of 200 -> therefore must test by a licensed expert is required.

**1. Examination after 5 years by a qualified person or authorized organisations.**

Visual inspection, inside and outside.

**2. Examination after 10 years by a qualified person or authorized organisations.**

Visual inspection, inside and outside.

In addition, a water pressure test is carried out at 1.5 times of the permissible vessel operating pressure.

The test methods described in point 1 and 2 must be repeated periodically - as described above.

**Max. numbers of load cycles for operation with max. allowable pressure variation**

Final pressure [bar]	Load cycles	Operating hours [h]
350	35.000	8.750



**Caution**

The filter container (P/N: 010706) has to be replaced after 15 years!



A

# MAINTENANCE RECORDS



## MAINTENANCE RECORDS

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### Introduction form for the Operator

A

No.	Surname, Name	Date	Place	Signature	Instructor

By adding themselves to this list, the person that signs it confirms having been given a yearly introduction/instruction about the function and operation of the compressor unit. Furthermore, they have be informed about the relevant safety rules and regualtions (TRG, DGRL, BetrSichV, GSG, GSGV).





# MAINTENANCE RECORDS

## Cartridge change

A

Date	Operating hours	Difference	Name









## STORAGE

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### Conservation / storage of the compressor

If the compressor unit is not to be used for an extended period of time, we recommend to carry out the following work before storage time:

- Run the compressor at 200 bar filling pressure for approximately ten minutes (control the flow with the filling valve to maintain constant pressure).
- Replace compressor oil, open filling valve(s) and run compressor for a few minutes.
- Stop compressor and open drain valves (depending on the compressor type, this may happen automatically). Remove top cap of final filter housing: clean throat, grease o-ring and throat with a food grade grease or silicone grease. Close filter housing.
- Remove intake filter cartridge and undo intake pipes on all valve heads.
- Start compressor unit. Spray a few drops of compressor oil into intake connectors.
- Stop compressor unit and insert intake filter cartridge. Bring intake pipes back in position and fix connections and nuts. Close filling- and drain valves.
- Store the compressor in a cool dry place free from dust and contamination. A dust cover is recommended as long as condensation can be avoided.
- If compressor unit should be stored for a period of more than one year, an oil change is strongly recommended before it's been re-used.
- Fuel driven units only: fill up fuel tank to top level to avoid corrosion.

### De-conservation, commissioning

After the compressor has been stored, the following steps are to be taken:

- If compressor hasn't been used for longer than 12 months, we strongly recommend an oil change before any use.
- Replace intake filter cartridge and check oil level.
- Clean compressor unit, check for foreign objects. Check condition and tension of V-belts, replace if necessary. Check condition of filling hoses, replace if necessary.
- Secure hoses against whipping and open filling valves and run compressor for approximately 10 minutes.
- Check condition of final filter cartridge, replace if necessary.
- Close filling valves and run compressor up to final pressure.
- Check safety valve relief pressure of final stage and/or pressure switch setting.
- Check all connections and pipe work for leaks.

Once all above steps are completed, compressor unit is now ready for use.

## STORAGE

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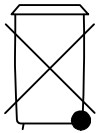
### Transportation instructions

- Parts which need to be dismantled for transport purposes must be carefully replaced and secured before taking into operation.
- The transport may only be carried out by trained personnel.
- For transportation, only use lifting devices and equipment with sufficient lifting power.
- Do not stand or work under suspended loads.
- Also separate from minor relocation machinery / system of any external energy supply. Before recommissioning, reconnect the machine to the mains according to regulations.
- When recommissioning, proceed according to the operating instructions..

### Disposal

The product must be disposed in accordance with national waste disposal regulations and by an appropriate waste disposal company.

### Electric and electronic components



EU-wide regulations for the disposal of electric and electronic appliances which have been defined in the EU Directive 2002/96/EC and in national laws are effective from August 2005 and apply to this device.

Common household appliances can be disposed by using special collecting and recycling facilities. However, as this device has not been registered for household usage, it must not be disposed of through these means.

The device can be returned to L&W. Please do not hesitate to contact us if you have any further questions on this issue.



# ATTACHMENT

E

**Lenhardt & Wagner GmbH**

**An der Tuchbleiche 39  
D-68623 Lampertheim – Hüttenfeld**

www.lw-compressors.com



## Operating Instruction

### Safety valve

Typ:

**SiV2 BKZ TÜV.SV.19-1140.5.G.V.P CE 0091 AlMgSi1 F31 1100\* Lenhardt & Wagner**

<b>Set pressure:</b>	see mark (hand wheel on top of valve)
<b>Maximum outflow:</b>	Set pressure 100-159 bar: 750 l / min Set pressure 160-350 bar: 1.100 l / min
<b>Suitable media:</b>	Media-resistant, non-corrosive gases

The safety valve is used for protection of pressurized components, eg pipelines, pressure vessels, or the compressor itself.

The hand wheel on the top of the safety valve is marked with the adjusted set pressure.



- 1) Identification of set pressure
- 2) Seal
- 3) Fixing screws<sup>1</sup>
- 4) Venting screw (hand wheel)
- 5) Identification serial number
- 6) Socket for safety valve

Safety valve with socket

<sup>1</sup> The fixing screws M8 must be strength class 8.8 and meet the requirements of Merkblatt AD 2000 leaflet W7. Shaft length 70mm.

In order to prevent manipulation of the set pressure, all safety valves are factory fitted with a seal.

A safety valve on which the seal has been removed, must be returned to the manufacturer for repair / adjustment before further use.

In addition, the safety valve has a venting device (hand wheel).

When rotated clockwise, the safety valve and the filter housing of the final stage are completely vented.

During normal operation, the screw is unscrewed to the upper stop anticlockwise; an integrated safety ring prevents the screw from being removed.

---

If a safety valve blows off, the system must be switched off immediately and the cause of the error, investigated.

There are two possible reasons:

1. The safety valve is defective and blows off before the set pressure.

In this case the safety valve should be submitted immediately to the manufacturer for repair or replaced with a new one.

2. The safety valve opens properly, the problem is on the system.

A constant blowing of the safety valve is not permitted, the sealing seat of the valve can be damaged. The error on the system must be detected and repaired before further filling operations.

The safety valve may only be used if it is ensured that the maximum flowrate of the system does not exceed the blow-off rate of the safety valve.

The safety valve may only be used with the approved media.

Repair work on compressors must only be performed by trained personnel.

### **Dismantling of the safety valve**

Ensure that on the safety valve is no pressure.

Loosen and remove the two M8 fixing bolts with a 6 mm Allen key.

The safety valve can now be removed by turning and simultaneously pulling out of the socket.

### **Mounting**

1. Clean the safety valve socket.

2. Oil the insert pin of the safety valve including the O-ring with 1 to 2 drops of oil.

3. Press the safety valve pin complete into the socket.

4. Fasten the safety valve with the two 8 mm allen screws into the socket  
(Tightening torque: 10 Nm)

5. Screw the venting screw (hand wheel) anticlockwise to its upper limit.

6. Start the System (Compressor), check installation for leaks and proper function.

**Manufacturer:** Lenhardt & Wagner GmbH  
An der Tuchbleiche 39  
D-68623 Lampertheim – Hüttenfeld

**Contact:** E-Mail: [service@lw-compressors.com](mailto:service@lw-compressors.com)  
Web: [www.lw-compressors.com](http://www.lw-compressors.com)  
Tel.: +49 (0) 6256 – 85880 0  
Fax: +49 (0) 6256 – 85880 14

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**Note:**

*Only use safety valves which are in a technically perfect condition, for its intended purpose, safety and danger awareness, in compliance with the operating instructions!*  
*Faults which could affect safety must be rectified immediately!*

**Notes:**

- The safety valve must be installed directly on the protected pressure vessel and / or the plant.
  - The safety valve must be installed in an upright position.
  - The flow area of the port must be greater than the valve opening.
  - Protect valve against splashes
- 

**Maintenance:**

- In accordance with current Pressure Equipment Directives, the safety valve must be periodically checked for operation and reliability.
- Refill annually lubricating oil:  
Oil filling position:  
Hole on the spacer (see arrow, Figure 1)
- Oil level: Fill oil into the hole until oil comes out of the hole.

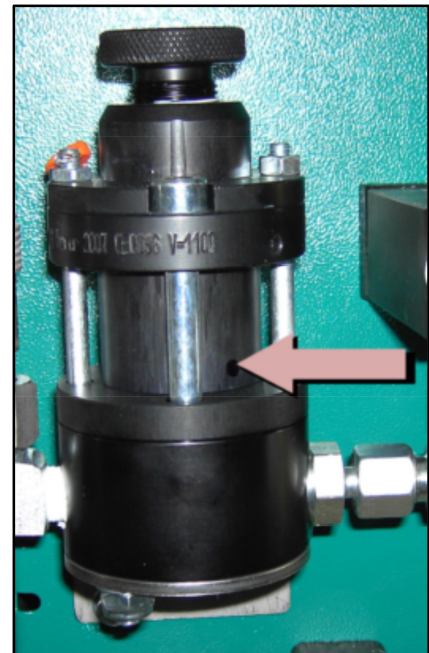


Figure 1: Position for oil refill

*To be used lubricating oil for the safety valve: L&W Article N°.: 008500 (content: 30 ml)*


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Read this document carefully before using this device. The guarantee will be expired by damaging of the device if you don't attend to the directions in the user manual. Also we don't accept any compensations for personal injury, material damage or capital disadvantages.

## PID TEMPERATURE CONTROLLER

- \* 77 x 35mm sized.
- \* Selectable dual-set value.
- \* Selectable thermocouple types or Pt100 input.(Selection must be specified in order).
- \* Automatic calculation of PID parameters.(SELF TUNE).  
 Enter PID parameters of the system if they are known at the beginning. Otherwise, Self-Tune should be activated.
- \* Soft-Start feature.
- \* Input offset feature.
- \* C/A2 Relay output can be programmable as alarm or control output.
- \* Selectable SSR control output.
- \* Selectable heating/cooling control.
- \* In the case of sensor failure periodical running or relay state can be selected.
- \* CE marked according to European Norms.



**RoHS**  
Compliant

### TECHNICAL SPECIFICATIONS

Input type	Temperature range		Accuracy
	°C	°F	
Pt 100 Resistance thermometer EN 60751	-99.9...300.0 °C	-99.9...543.0 °F	± 0,5% (of full scale) ± 1 digit
Pt 100 Resistance thermometer EN 60751	-200...600 °C	-328...1112 °F	± 0,5% (of full scale) ± 1 digit
J (Fe-CuNi) Thermocouple EN 60584	0... 600°C	+32... +1112°F	± 0,5% (of full scale) ± 1 digit
K (NiCr-Ni) Thermocouple EN 60584	0...1300°C	+32... +2372°F	± 0,5% (of full scale) ± 1 digit
T (Cu-CuNi) Thermocouple EN 60584	0... 400°C	+32... +752°F	± 0,5% (of full scale) ± 1 digit
S (Pt10Rh-Pt) Thermocouple EN 60584	0...1700°C	+32... +3092°F	± 0,5% (of full scale) ± 1 digit
R (Pt13Rh-Pt) Thermocouple EN 60584	0...1700°C	+32... +3092°F	± 0,5% (of full scale) ± 1 digit

#### ENVIRONMENTAL CONDITIONS

Ambient/storage temperature	0 ... +50°C/-25... +70°C (with no icing)	
Max. Relative humidity	80% up to 31°C decreasing linearly 50% at 40.	
Rated pollution degree	According to EN 60529	Front panel : IP65 Rear panel : IP20
Height	Max. 2000m	



Do not use the device in locations subject to corrosive and flammable gases.

#### ELECTRICAL CHARACTERISTICS

Supply	230V AC +%10 -%20, 50/60Hz or 24V AC %±10, 50/60Hz
Power consumption	Max. 5VA
Wiring	Power connector: 2.5mm <sup>2</sup> screw-terminal, Signal connector: 1,5mm <sup>2</sup> screw-terminal connection.
Line resistance	Max. 100ohm
Data retention	EEPROM (minimum 10 years)
EMC	EN 61326-1: 2006
Safety requirements	EN 61010-1: 2010 (Pollution degree 2, overvoltage category II)

#### OUTPUTS

C/A2 output	Rôle : 250V AC, 8A (for resistive load), Selectable as NO+NC Control or Alarm2 output. Rôle : 250V AC, 16A (for resistive load), Selectable as NO Control or Alarm2 output.
SSR output	Max 20mA 12Volt (as control output)
Life expectancy for relay	Withot load 30.000.000 mechanical operation; 250V AC, on the 8A resistive load 100.000 electrical switching

#### CONTROL

Control type	Single set-point and alarm control
Control algorithm	On-Off / P, PI, PD, PID (selectable)
A/D converter	12 bit
Sampling time	100ms
Proportional band	Adjustable between 0% and 100%. If Pb=0%, On-Off control is selected.
Control period	Adjustable between 1 and 250 seconds
Hysteresis	Adjustable between 1 and 50°C/F
Output power	The ratio of power at a set point can be adjusted between 0% and 100%

#### HOUSING

Housing type	Suitable for flush-panel mounting according to DIN 43 700.
Dimensions	W77xH35xD71mm
Weight	Approx. 200g (after packing)
Enclosure material	Self extinguishing plastics.



While cleaning the device, solvents (thinner, benzine, acid etc.) or corrosive materials must not be used.

Entering from the programming mode to the run mode:  
 If no key is pressed within 20 seconds during programming mode, the data is stored automatically and the run mode is entered.  
 Alternatively, the same function occurs first pressing **▲** key and **▼** key is pressing programming mode is entered. Then together, data is recorded and running mode is entered.

### Programming mode



**Con.a.** = Control set point lower limit, (for selected output)  
 Adjustable between 0 and C5H1

**C5Lo** = Control setpoint upper limit, (for selected output)  
 Adjustable between C5Lo and Upper scale value.

**C5H1** = Proportional band, (for selected output)  
 Adjustable between %0.0 and %100.0.  
 C.Pb = %0.0, On-Off control is selected.

**CPb** = Proportional band, (for selected output)  
 Adjustable between 1 and 50 °C.  
 C.Pb = 0, this parameter is active.

**CHy5** = Hysteresis of the output, (for selected output)  
 Adjustable between 1 and 50 °C.  
 C.Pb = 0, this parameter is active.

**C.ti** = Integral time, (for selected output)  
 Adjustable between 0.0 and 100.0 minutes.  
 C.ti = 0.0, integral impact is disable.

**C.td** = Derivative time, (for selected output)  
 Adjustable between 0.0 and 25.00 minutes.  
 C.td = 0.0, derivative time is disable.

**C.ct** = Period time, (for selected output)  
 Adjustable between 1 and 250 second.  
 C.Pb = 0, this parameter is different from "0", this parameter appears.

**CP5t** = The ratio of output power at the setpoint, Adjustable between %0 and %100.

**CEP5** = The percentage of faulty sensor selected output power, Adjustable between %0 and %100.

**55t5** = Soft start timer set value  
 This parameter indicates the time to reach set point value when the device is first energised.  
 Adjustable between 0 and 250 minutes.  
 If 0 is selected, soft start feature will be enable and the device reaches set point value quickly.  
 ⚠ Setting Pb = 0, soft start feature will be disable.

**CTYP** = Control output type  
 CTYP = HEAT means heating control.  
 CTYP = COOL means cooling control.

**AL2a** = Alarm2 set value lower limit.  
 Adjustable between 0 and R25H parameter value.  
 ⚠ If C55E parameter is different from C-A2, this parameter is seen.

**R25L** = Alarm2 set value upper limit.  
 Adjustable between R25L parameter value and upper scale value.

**R25H** = Hysteresis of the Alarm2 output.  
 Adjustable between 1 and 50 °C.

**R2HY** = Function of Alarm2 type.  
 Four kinds of functions can be selected:  
 nA2E = Independent alarm (Inversely)  
 dE = Deviation  
 bAn = Band alarm (Band)  
 bAn = Band with inhibition

**R25E** = The state of Alarm2 output.  
 H = If A2 output is above the set value, (on)  
 L = If A2 output is above the set value, (off)

**R2Er** = State of Alarm2 output in the case of sensor failure.  
 on = A2 output is probe failure (on).  
 off = A2 output is probe failure (off).

**inPE** = Input type selection.  
 FEn = J type nOn = K type c.c.n = T type P10r = S type, P13r = R type thermocouple selection.  
 ⚠ This parameter varies when changing some parameters.

**UnIE** = The temperature unit.  
 OF = °C, OF = °F  
 ⚠ (This parameter varies when changing some parameters.)

**FLtE** = Coefficient of digital filter.  
 Filter for display value.  
 Adjustable between 1 and 200. If this parameter is 1, digital filter runs is quick. If this parameter is 200, digital filter runs is slow, the value of parameter should be increased in interference.

**C05E** = Control output selection  
 C-A2 = CA2 (Relay) output selection  
 SSR = SSR output selection

**off5** = Offset value.  
 Offset value is added to the measurement value.  
 Adjusted between -100 and +100 °C. The normal value is 0.

**FtEE** = Function key setting parameter  
 nA2E = Function key is off.  
 C25A = The function key with 2.set value is used.  
 nAn = Manual mode can be achieved with the function key.  
 d5Po = Only the temperature display mode is entered with function key.

**n5Et** = The percentage of manual output parameter.  
 Adjustable between %0 and %100.  
 This parameter allows manual adjustment of the output power.  
 n5Et = 0, this parameter is not seen.

**5tCu** = Self tune control parameter.  
 If both **▲** and **▼** keys are pressed, 5tCu message is displayed on the screen and self tune process is started automatically.

If both **▲** and **▼** keys are pressed, no message is displayed on the screen and self tune process is stopped.

Self tune begins when the measurement, P10r message and measurement value are shown alternately. Self tune process completed automatically after the 5tCu parameter is done no and is entered to the working mode. Self tune process begin when the measured temperature is expected fall below 90% of the set value the display shows **LEH** message alternately. Expected to fall below the temperature set point 60% evolved and then self tune process starts automatically. If asked to abort the self tune process, 5tCu parameter is done no and **▼** key is pressed.

**5tCo** = Security menu access code. It should be 2011.

**C05c** = Parameters of Con.a menu security access level code. none = Invisible. P4E5 = Modification can be done. Pno = Only visible.

**R25c** = Parameters of R25C menu security access level code. none = Invisible. P4E5 = Modification can be done. Pno = Only visible.

**C05c** = Parameters of Con.f menu security access level code. none = Invisible. P4E5 = Modification can be done. Pno = Only visible.

**5t5c** = Parameters of 5tCu menu security access level code. none = Invisible. P4E5 = Modification can be done.

**CEFP** = Parameters of Con.f menu security access level code. none = Parameter settings are not change. P4E5 = Parameter setting will be restored.



When holding **▲** key, the value of parameter flashes and using **▼** and **▲** keys the requested value can be adjusted.

If **▲** key is pressed and held 0.6 seconds, the value of the selected parameter changes rapidly. If waited enough, the value increases 100 at each step. After following the release of the key, initial condition is returned. The same procedure is valid for the decrement key.

### DEFAULT PARAMETERS

TC Input	Pr100 Input
AL2a	0
R25L	600
R25H	2
R2HY	none
R25E	H
R2Er	on
C5Lo	0
C5H1	600
CPb	0
CHy5	2
C.ti	4.0
C.td	1.00
C.ct	20
CP5t	0
CEP5	0
55t5	0
CTYP	HEAT

TC Input	Pr100 Input
nA2E	FLC
UnIE	°C
FLtE	25
C05E	C-A2
off5	0
FtEE	none
n5Et	50

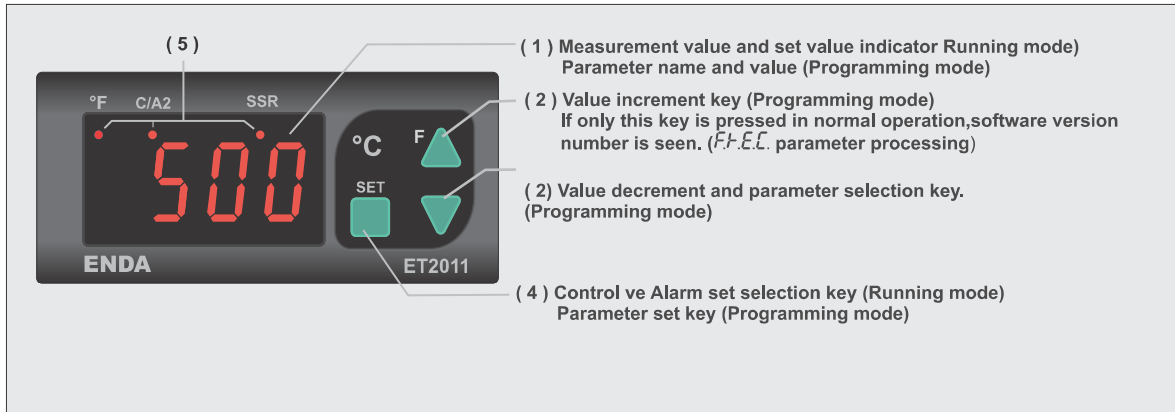
TC Input	Pr100 Input
inPE	FEn
UnIE	°C
FLtE	25
C05E	C-A2
off5	0
FtEE	none
n5Et	50

TC Input	Pr100 Input
Con.a	P4E5
R25C	P4E5
C05c	P4E5
5t5c	P4E5
CEFP	no

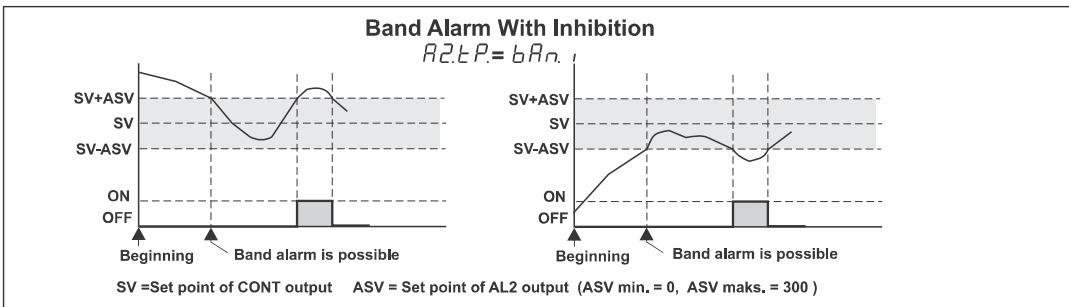
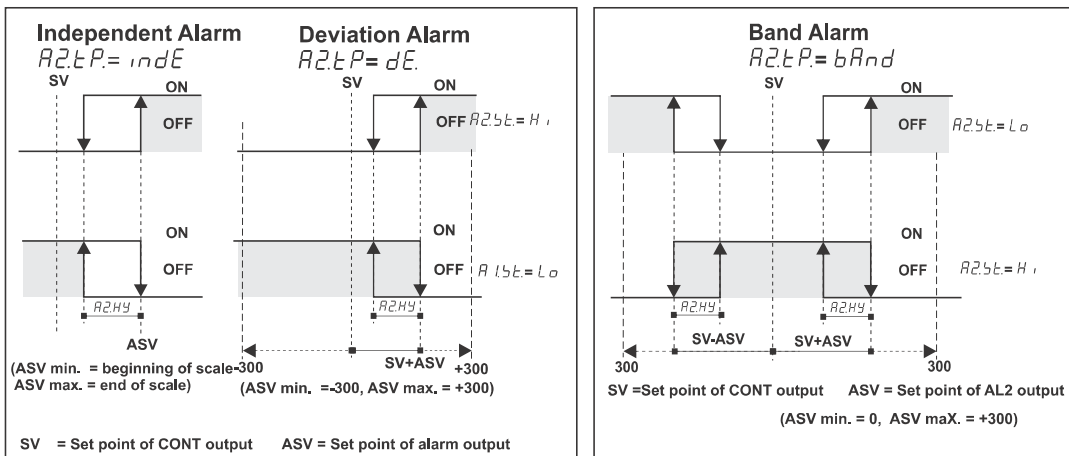
While the parameter names appear, if **▲** and **▼** keys are pressed together, returns to the program mode.

# TERMS

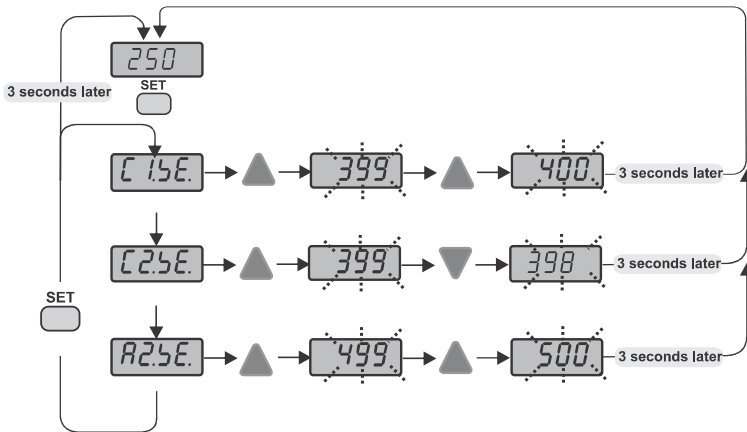


(1) PV and SV display	7 segment, 4 digits red LED display
Character heights	12 mm
(2),(3),(4) Keypad	Mikro switch
(5) State indicator	For control, Alarm1 and SSR outputs 3 digits red LED

## ALARM2 OUTPUT TYPES



## MODIFICATION OF CONTROL AND ALARM SET POINTS



**ERROR MESSAGES**

- PFR Sensor is broken
- Temperature value is higher than the value
- Temperature value is lower than the scale
- P5C Pt100 sensor is short circuit

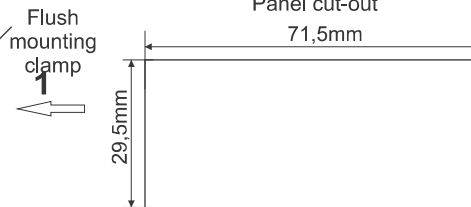
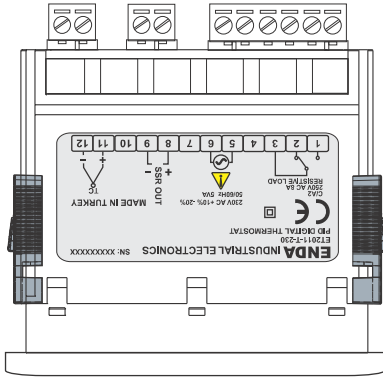
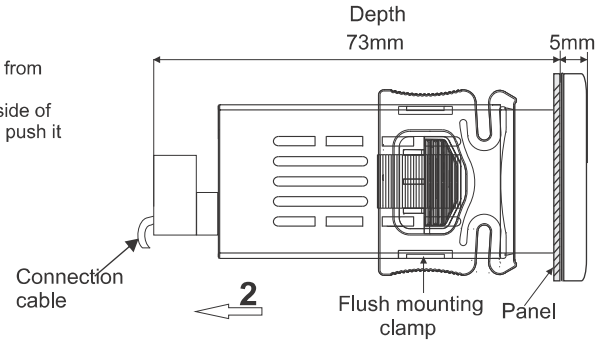
FF.EC parameter, is set to the C25R parameter, this parameter is displayed.

C05E parameter is set to the output of SSR, this parameter is seen.

## DIMENSIONS



For removing the device from the panel:  
- While pressing both side of the device in direction 1, push it in direction 2.



Note

- 1) Panel thickness should be maximum 7mm.
- 2) If there is no 60mm free space at back side of the device, it would be difficult to remove it from the panel.

Order Code: ET2011-X- XXX- X

**Input selection**  
RT....PT100 input  
T....TC input

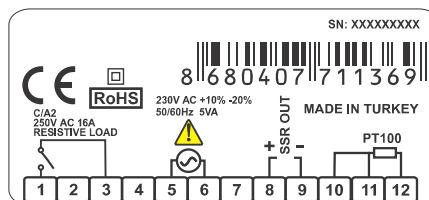
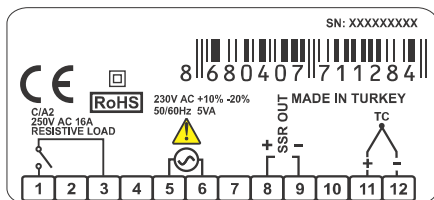
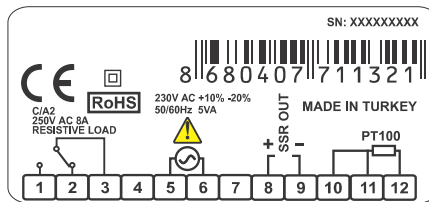
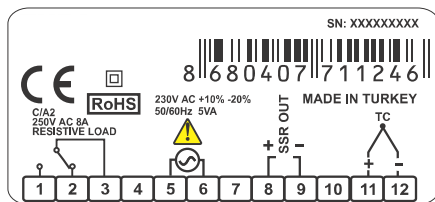
**Supply voltage**  
230VAC.....230V AC  
110VAC.....110V AC  
024VAC.....24V AC  
SM.....9-30VDC/7-24V AC

**Contact current selection**  
None.....8A contact output  
P....16A contact output

## CONNECTION DIAGRAM



ENDA ET2011 is intended for installation in control panels. Make sure that the device is used only for intended purpose. The shielding must be grounded on the instrument side. During an installation, all of the cables that are connected to the device must be free of energy. The device must be protected against inadmissible humidity, vibrations, severe soiling. Make sure that the operation temperature is not exceeded. All input and output lines that are not connected to the supply network must be laid out as shielded and twisted cables. These cables should not be close to the power cables or components. The installation and electrical connections must be carried on by a qualified staff and must be according to the relevant locally applicable regulations.

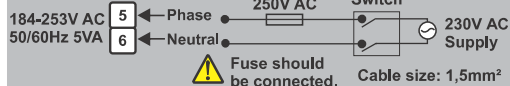


Holding screw  
0,4-0,5Nm

Equipment is protected throughout  
by DOUBLE INSULATION.

### NOTE :

SUPPLY:



Note 1) Mains supply cords shall meet the requirements of IEC 60227 or IEC 60245.  
2) In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument and it should be easily accessible by the operator.