AS 30/35
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AS 30/35
428.590

AS 30
AS 35

KAESER-CONTROL

KAESER COMPRESSORS, INC.

511 Sigma Drive • P.O Box 946 • Fredericksburg, Virginia 22404
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I M P O R T A N T

Read entire service manual before operating unit or performing any maintenance.

Always shut off power to unit at main disconnect switch before attempting any maintenance. All system pressure should be discharged unless manual instructs otherwise.

Use only "Kaeser Compressors" approved replacement parts.

Compressed air from any oil lubricated Kaeser compressor is not suitable for use in any breathing apparatus or food related process.

A T T E N T I O N

Kaeser Compressors declines responsibility for any modifications made to any Kaeser compressor other than those made at the Kaeser factory or those made with prior written permission from Kaeser Compressors.

SAFETY PRECAUTIONS

Every Screw Compressor is operated and thoroughly tested at the factory before shipment to make sure the compressors delivers its rated capacity and is in good working order. However, all the care given at the factory will not prevent possible damage during transit. We recommend the unit be carefully inspected for evidence of possible damage in shipment. During the first few hours of operation, the machine should be watched for any possible malfunction.

Comply with the following before start-up

- Remove all packing, tools and debris from in and around unit before operating.
- Do not operate in the presence of toxic or flammable vapor.
- Work on current-carrying parts may only be carried out by an appropriate personnel.
- Do not operate the compressor at a voltage other than the one specified on the compressor nameplate.
- Do not operate the compressor at pressures exceeding the maximum pressures indicated on nameplate.
- Install the compressor in an area where the air inlet temperature is at least 40° F but no higher than 100° F.
- If an air outlet duct is provided, it should be at least the size of the cooler outlet cross-section and the pressure loss in it should not exceed the maximum limit stated by the compressor manufacturer.
- Install the compressor to maintain a distance of 3 ft. between the cooling air inlet of the unit and the wall.
- Do not shut off the compressor operating with load at the main disconnect switch Use start/stop switch (4, Figure 4)
- Check for proper direction of rotation.
  DO NOT OPERATE UNIT IF ROTATION IS INCORRECT.
- Make sure the shutoff valve (4, Figure 21) is closed.
- Make sure the shutoff valve (3, Figure 22) at the discharge line is open.
- Shut off the unit, tighten up all the screws in the control box (repeat this after 50 operations hours).
- Make sure the maintenance doors are closed.

FAILURE TO HEED THIS OR ANY OTHER WARNING MAY RESULT IN AN ACCIDENT CAUSING PERSONAL INJURY OR PROPERTY DAMAGE.

Table of Contents Page

1. Dimensions and specifications

Model	Maximum pressure psig	Free air delivery unit cfm	Motor kW	Motor hp	Motor rpm
AS 30	110 145 190	115 100 85	18.5	25	3600
AS 35	110 145 190	135 120 105	22	30	3600

2. Description of the SIGMA screw compressor

The main components of the Sigma Screw Compressor are a housing and two rotors. The compressor operates according to the rotary piston principle and is driven by an electric-motor through V-belts.

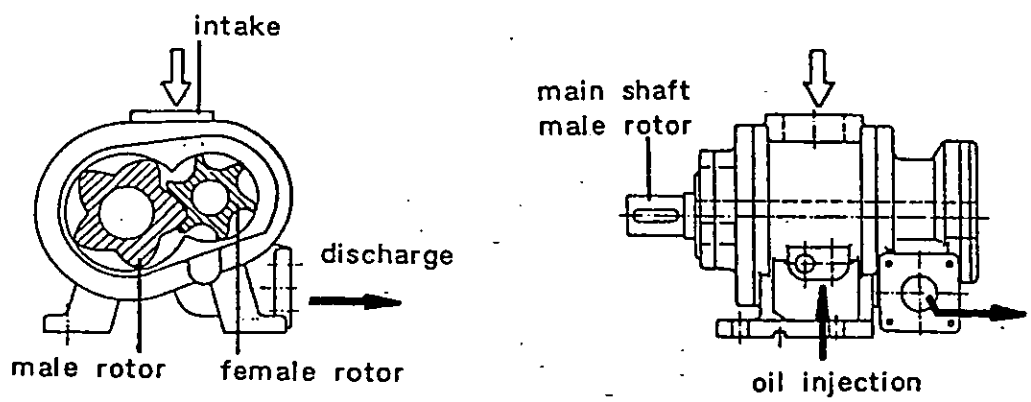
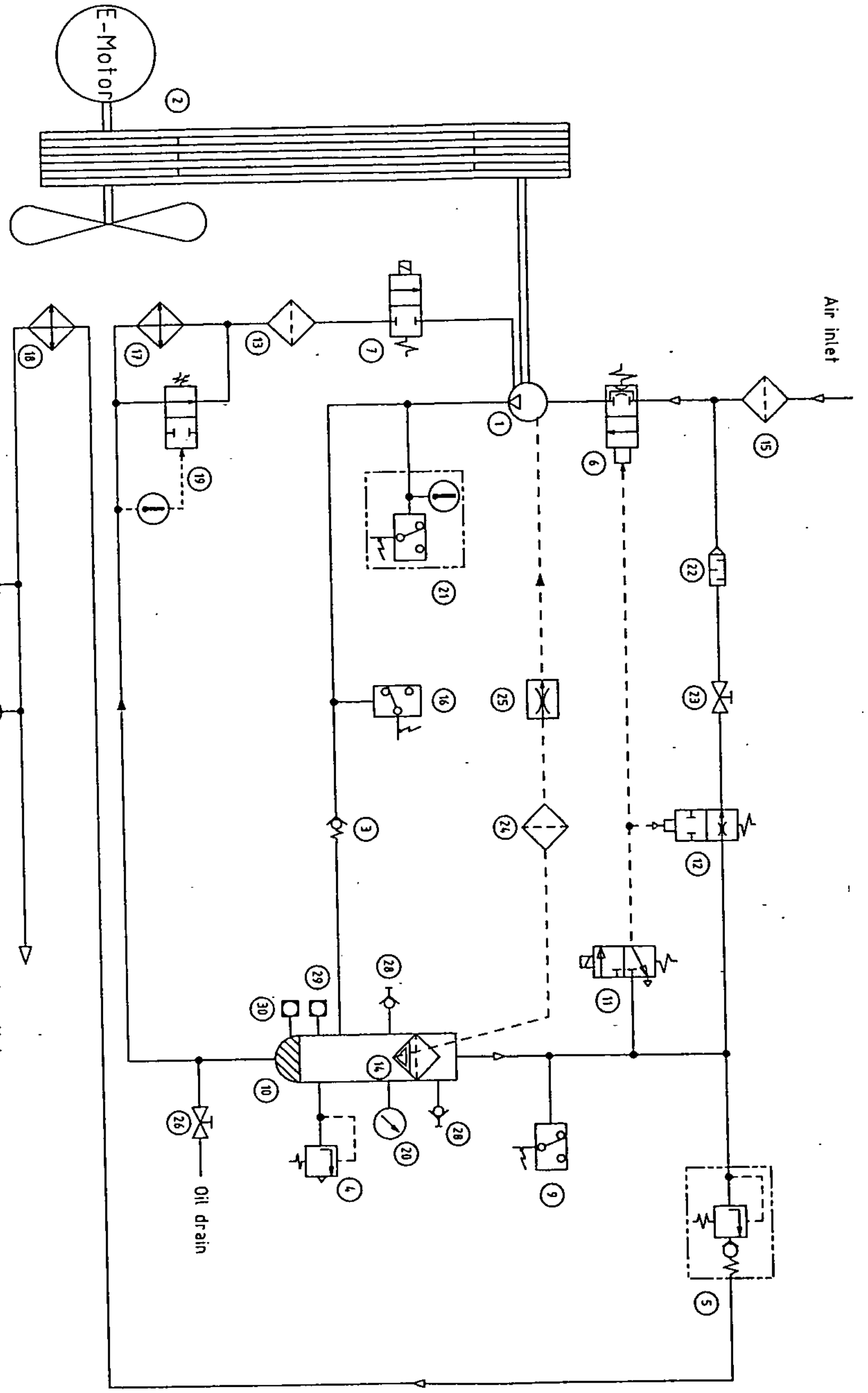


Figure 1

There are two rotors with antifriction bearings in the housing: a male rotor with 5 lobes driven by the motor and a female rotor with 6 voids. While the rotors are turning, air is drawn in through the inlet port at the upper side of the housing and the trapped air is compressed at the lower side.
The oil injected into the housing at the lower side picks up the heat resulting from the compression process, prevents the rotors from contacting each other and lubricates the antifriction bearings at the same time.
As there are no unbalanced forces, inlet or outlet valves, smooth running of the unit is ensured.

3. CONSTRUCTION AND FUNKTION OF SCREW COMPRESSOR MODEL AS T 8046



3. CONSTRUCTION AND FUNKTION OF SCREW COMPRESSOR MODEL AS T 8046

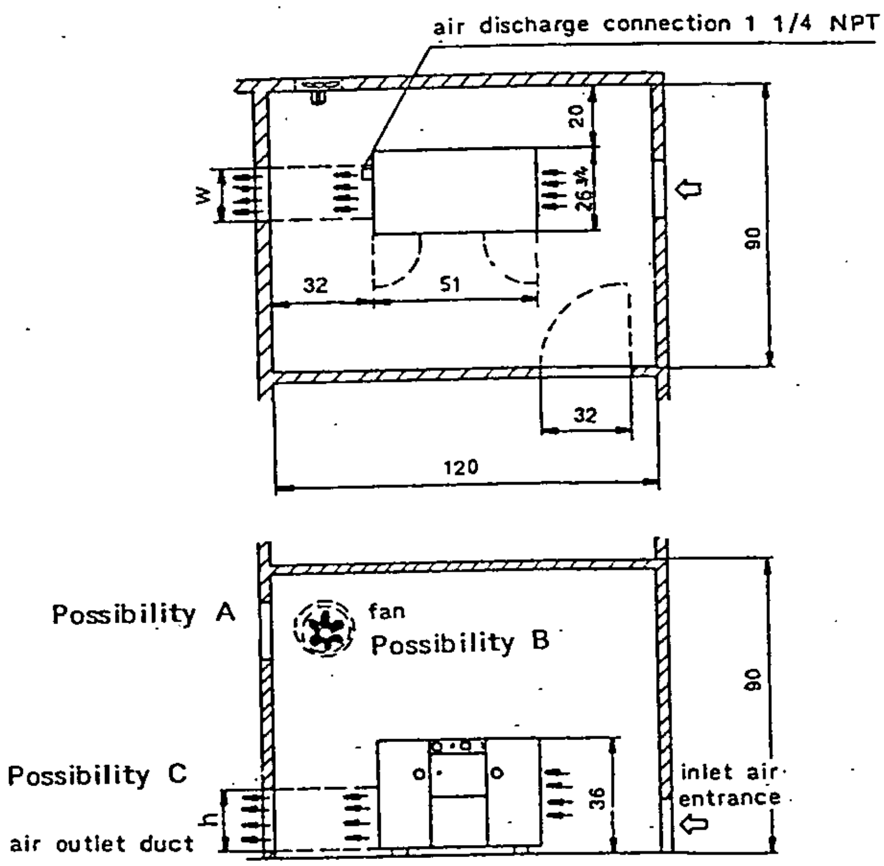
1	Air end
2	Driving motor
3	Check valve
4	Safety valve
5	Minimum pressure check valve (min. pressure 65 psig)
6	Inlet valve
7	Oil stop valve
8	Pressure switch (full load-idling; Δp min 10 psig)
9	Pressure switch prevents start-up of compressor against load (switching point 18.5 psig)
10	Oil separator tank
11	Control valve
12	Vent valve
13	Oil filter 10 µm
14	Oil separating cartridge
15	Air filter 4 µm (not required; if bag-type filter is used)
16	Pressure switch (faulty direction of rotation; switching point 5 / 15 psig)
17	Oil cooler (air-cooled)
18	Air after cooler (air-cooled)
19	Oil temperature controller (opening temp. approx. 160 °F)
20	Pressure gauge
21	Contact thermometer + indication (switching point 230 °F)
22	Silencer
23	Ball valve
24	Dirt trap
25	Nozzle (dia. 5/128)
26	Oil drain cock
27	
28	Hose coupling
29	Oil sight glass: oil level maximum
30	Oil sight glass: oil level minimum

KAESER COMPRESSORS

4. INSTALLATION

4.1 Ventilation for air-cooled units

Installation of the screw compressor should take place according to the following schedule. For easy access and service, respect the minimum distances indicated below.



Dimensions in inches

Figure 3

The compressor room should provide adequate ventilation.

Model	Possibility A Ventilation: natural draft air outlet duct inlet air entrance sq.ft.	Possibility B Ventilation: fan cfm at a static pressure of 0.4 inches WC	Possibility C Exhaust air is used for heating w x h inches	Required size at air inlet entrance, for B or C sq.ft.
AS 30	20	3000	18 x 20	3.75
AS 35	25	3500	18 x 20	4.3

On water cooled units values indicated on the above chart for inlet air duct and forced ventilation are reduced approx. 25 %. Possibility B does not apply.

Possibility A:

For ventilation through natural draft the air outlet duct must be the same size as the inlet air entrance (see chart on page 7).

Possibility B:

Air delivery of the exhaust fan must be adequate for the size of the unit (see chart on page 7).

Possibility C:

Warm exhaust air is forced through a duct into the room to be heated. Consult KAESER COMPRESSORS for maximum allowable pressure drop in exhaust ducts.

To ensure trouble-free operation of the unit, cooling air temperature should not drop below 40°F and not exceed 100°F.

4.2 Air discharge connection

The unit is piped ready for operation. It must be connected to the air line with a flexible connecting hose. A check valve is not required in the discharge line as one is built into the unit.

4.3 Electrical connection

The unit is wired ready for operation and it needs only be connected to the supply line. Pull the cable with conductors L1, L2, L3 and earth E through the openings of the base frame into the controller and connect them to the terminals marked L1, L2, L3 and earth E. The main disconnect switch and main fuses must be supplied by the purchaser. This main disconnect switch must have a minimum switching capacity which is 1.1 times the indicated rated power of motor.

The required fuses and cross sections of cables are shown in the following chart.

Model	Motor		Direct on-line start 230 V, 3-phase, 60 cycles		Direct on-line start 460 V, 3-phase, 60 cycles	
			Fuse dual element	Conductor wire size	Fuse dual element	Conductor wire size
	kW	hp	Amps	AWG	Amps	AWG
AS 30	18,5	25	100	4	60	8
AS 35	22	30	110	3	60	8

4.4 Overload relay adjustment

Direct on-line start 230 V, windings in delta-connection

Only the phase current of a winding is led through the overload relay. This phase current is only 0.58 time the motor rated current I_N, accordingly the relay has to be ajdusted for I_N x 0.58.

Adjustment:

The overload relay should be adjusted approx. 10 % higher than phase current of a winding. This will prevent it from acting at voltage fluctuations.

Direct on-line start 460 V, windings in WYE-connection.

Adjustment:

The overload relay should be adjusted approx. 10 % higher than rated current. This will prevent it from acting a voltage fluctuations.

SHUT OFF POWER TO UNIT AT MAIN
DISCONNECT SWITCH BEFORE ATTEMPTING
ANY ADJUSTMENTS TO COMPRESSOR.

KAESER COMPRESSORS

5. PREPARATION FOR INITIAL START-UP

see 'SAFETY PRECAUTIONS' on Page 2

5.1 Start-up after oil change and/or long standstill

The following procedure must be observed when starting the unit after an oil change and/or a standstill period of three (3) months and over.

To add oil in the airend intake port:

Before starting the unit, pour approx 1 pint oil in the airend intake port and rotate the airend by hand before starting the unit.

> **Important:**
>
> Use the same brand and quality of oil as the one being used to operate the compressor unit only (refer to the specs label on the oil separator tank), or drain oil from the oil separator tank and use for that purpose.

> **Caution:**
>
> Discharge pressure in unit before draining any oil.

To add oil, unscrew the inlet valve of the airend and pour recommended amount oil into the airend. Screw inlet valve back on.

To increase wye time respectively time of released start, at the initial start-up

For initial start-up, increase wye time relay respectively released start time relay to 20 seconds to prevent compression of inlet air during start-up. Stop unit by start/stop switch. JUST BEFORE REACHING THE 20 SECOND LIMIT.

Once this is done, wye time relay respectively released start time relay must be set back its normal operating point of approx. 6 seconds.

These two preventive measures will ensure that the airend is getting sufficient oil when starting up the unit and will provide sufficient time for filling the oil cooler and all oil lines.

> **Attention:**
>
> After a standstill of more than 12 month further special procedures are required before the initial start-up. For that consult KAESER COMPRESSORS, INC.

5.2 Checking the direction of rotation:

- Switch on the unit (4, Figure 4) and check the direction of rotation of the compressor pulley or motor pulley. Arrows on motor and airend housing indicate direction of rotation.
- Should direction of rotation be incorrect, conductors L1 and L2 must be interchanged.
- If the direction is correct the built in ventilator blows through the cooler to the outside.

WARNING

If the compressor is wrong, the unit is automatically shut down by the safety pressure switch (16, Figure 2).

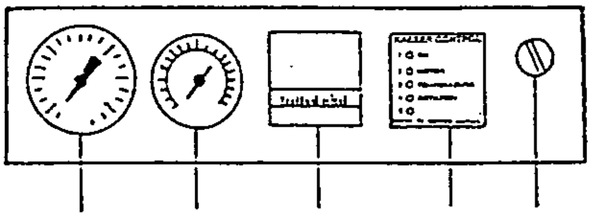
5.3 Instrument Panel

Compressor start-up

- Switch on the customer supplied main switch
- Turn the start/stop-switch (4, Figure 4) to the start position

Compressor stop

- Turn the start/stop-switch (4, Figure 4) to the stop postion
- Switch off the customer supplied main switch.



1 2 3 5 4

1 Pressure gauge for outlet pressure of unit
2 Temperature gauge for airend discharge temperature
3 Hourmeter
4 Start/stop switch
5 KAESER CONTROL

Figure 4

Important:

Do not shut off the compressor operating with load at the main diaconnect switch. Use the start/stop-switch on the unit first.

KAESER COMPRESSORS

5.4 Safety system: KAESER-CONTROL

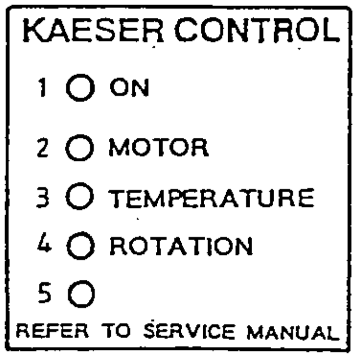


Figure 4a

1. Comes on when the unit is in operation or ready for operation.
   Goes out in case of malfunction.

In case of malfunction (lights 2, 3, 4 and 5) the respective light comes on and the compressor is immediately shut down.

2. Overload relay of the compressor motor
   After having eliminated the trouble, push the reset button on the overload.

3. Contact thermometer for excessive final compression temperature
   When the temperature reaches 212 degrees F., the unit is shut down (21, Figure 2).

4. Pressure switch (16, Figure 2)
   The unit is shut down if the direction of rotation is incorrect or the V-belts are broken or have slipped.

5. Provided for additional arrangements.

After the trouble has been eliminated, the unit must be reset. For that reset the switch (4, Figure 4) from START to STOP.
Now the compressor is ready for operation.

5.5 Idle time adjustment

The time delay relay for idling time is located in the control box (time 3-30 minutes). The idling phase should be set in such a way that the maximum number of times the motor cuts in is less than 15 times an hour.

5.6 Pressure switch adjustment

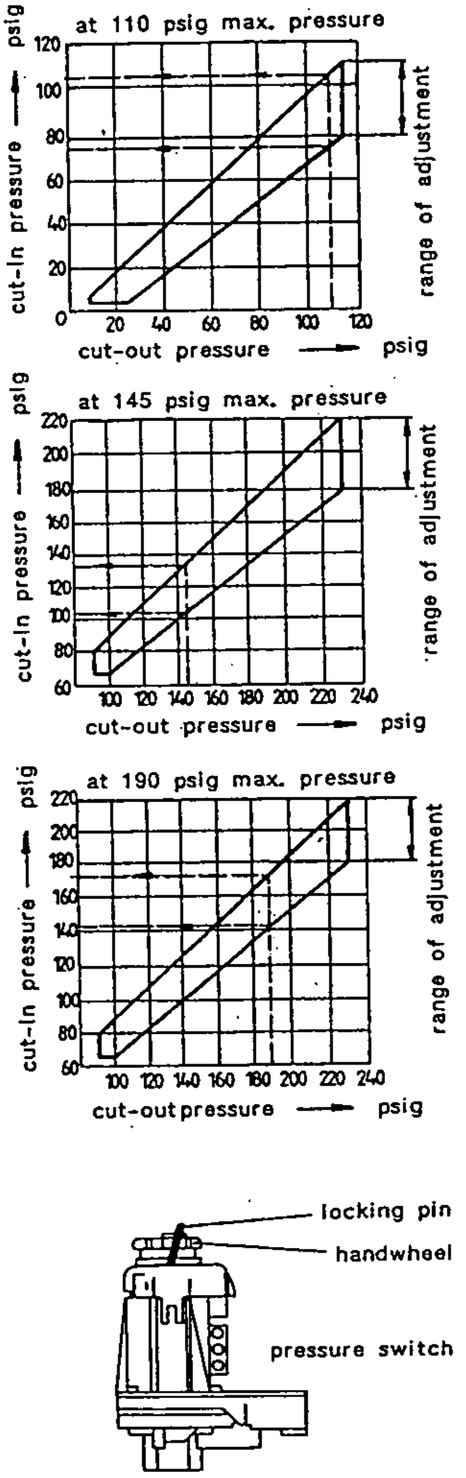


Figure 5-8

Adjustment of the switch differential at the pressure switch for limiting the switching frequency.

Maximum frequency of idling operation:

twice a minute

By increasing the switch differential between cut-out and cut-in the switching frequency can be reduced to a limited extent. If this is not sufficient a larger air tank is required.

The pressure switch has been pre-set at the factory as follows:

110 psig units: 100 to 110 psig (Δp = 10 psi)
145 psig units: 135 to 145 psig (Δp = 10 psi)
190 psig units: 180 to 190 psig (Δp = 10 psi)

Pressure adjustment can only be carried out at the mounted pressure switch when the compressed air line is under pressure.

Cut-out pressure:

For higher pressure: turn handwheel to the right
for lower presssure: turn handwheel to the left

Cut-in pressure/switch differential:

To increase the difference between cut-in and cut-out pressure:

- remove locking pin
- press handwheel so that the cross pin at the top of the handwheel comes out, then turn handwheel to the left
- place in locking pin.

To decrease the difference between cut-in and cut-out pressure:

- remove locking pin
- proceed as indicated above but turn hand-wheel to the right
- place in locking pin

> **Caution**
>
> Before removing the pressure switch cover, shut off the compressor (stop button and main disconnect switch). After each read adjustment at pressure switch, place cover on pressure switch before switching on the compressor.

5.7 Control systems

5.7.1 DUAL-Control (standard)

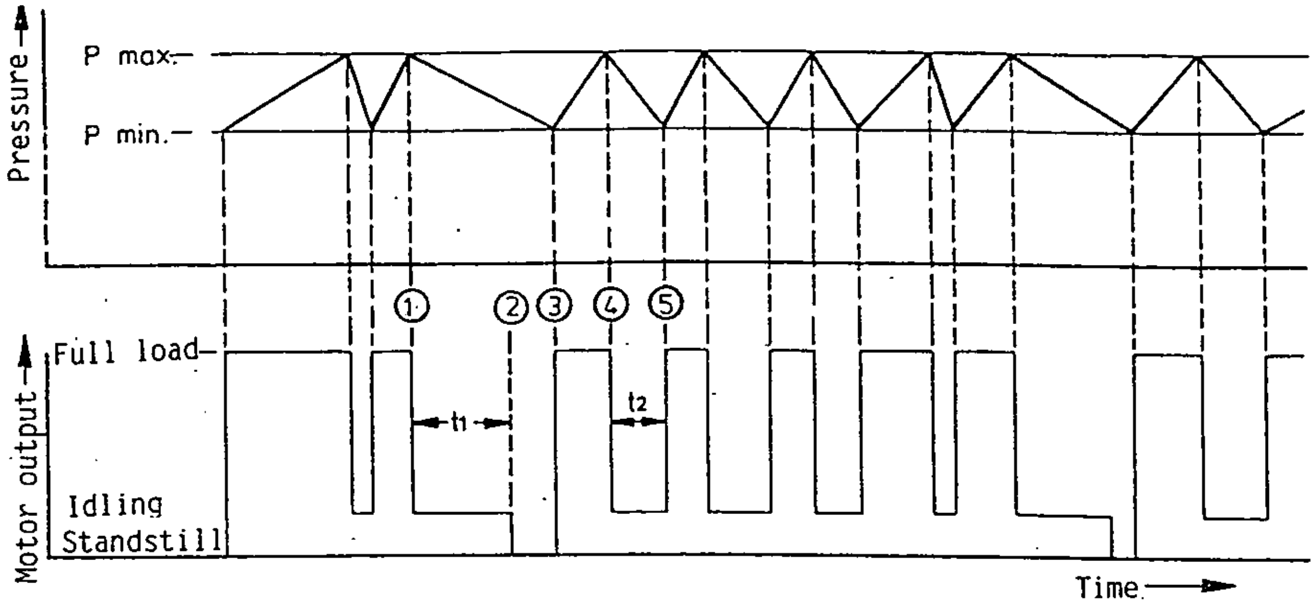


Figure 9

With the DUAL-Control (combined idling/ intermittent operation control system) the compressor operates only at the following two points:

full load and idling

The compressor pressure is regulated by a pressure switch within the pressure limits, e.g. between 100 - 110 psig. This results in an extremely low switching differential of only 10 psig between full load and idling.

If the compressor continues to idle longer than for a pre-set adjustable period (1) to (2) e.g. t_1 = 6 min, then the electric motor will be switched off completely at (2).

Upon reaching the lower switching point at p_{min} (3) e.g. 100 psig, the unit is switched on again automatically. If, however, the pressure drops again to p_{min} (5) within a shorter period (4) to (5) e.g. t_2 = 3 min. then, automatic switching over to full load will take place.

5.7.2 QUADRO-Control (optional)

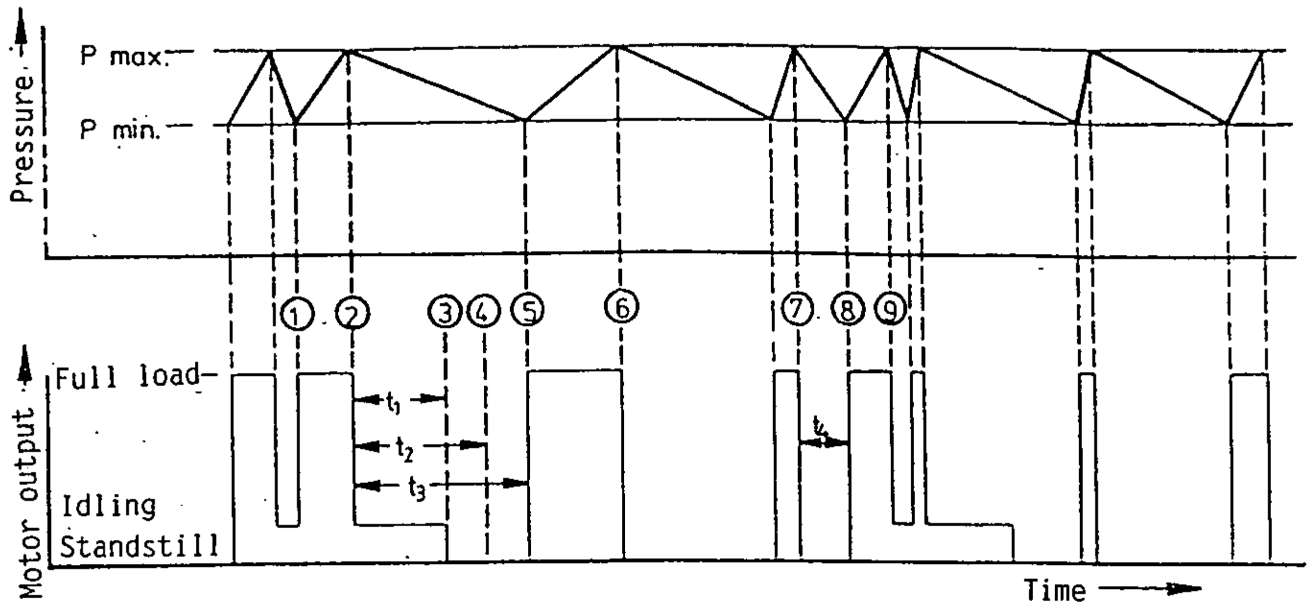


Figure 10

The Quadro-Control provides even greater savings in the case of widely varying air demand.

The following controls and operating modes are possible:

- Upon reaching the lower pressure limit of the pressure switch p_{min} (1), the control automatically selects **full load**.
- When the upper pressure limit p_{max}(2) is reached, the control automatically selects **idling.**
- At the end of the pre-set idling period (2) to (3) e.g. t_1 = 4 min, the compressor is switched to **standstill.**
- If the time is dropping from p_{max} (2) to p_{min} (5) e.g. t_3 = 6 min is longer than the comparison period (2) to (4) e.g. t_2 = 5 min, the **intermittent operation** mode is selected automatically and the compressor drops to standstill rather than to idle for the subsequent cycle (6). If the time from (7) to (8) is shorter e.g. t_4 = 2 min, the idling mode is selected again for the following cycle (9). This comparison with the fixed time "t_2" is repeated for each pressure drop.

The QUADRO-Control also replaces the commonly used selector switch for idling/intermittent operation in selecting the optimum operating mode automatically.

6. MAINTENANCE SCHEDULE

Always follow maintenance instructions:

- Before performing any maintenance on the unit, push stop button and cut off main disconnect switch to make sure the power is off.
- Before restarting, make sure no one is working on the unit and covering plates are back on, as well all doors are closed
- After switching on main disconnect switch, start unit by start-stop switch (4, Figure 4).
- In case of power failure or cutoff at main disconnect switch, restart unit manually by pushing the start button.
- The socket to vent the tank is attached to the hose coupling (4, Figure 22). It is used for maintenance work, such as oil refill, oil and filter change.
- Work on current-carrying parts may be carried out by an appropriate personnel.

6.1 Air inlet filter

Cleaning of the air inlet filter should take place at least every 500 operating hours.

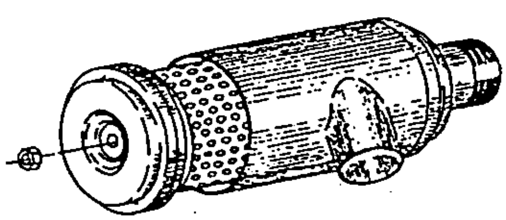


Figure 11

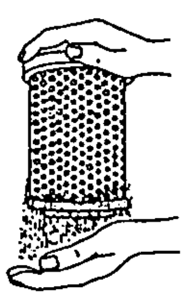


Figure12

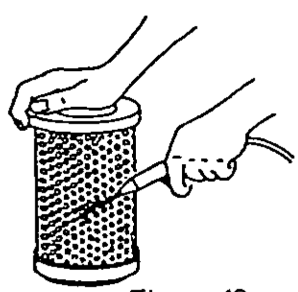


Figure13

- Shut off the compressor (start-stop switch and main disconnect switch).
- Opening the filter housing (Figure 11):
- Dismount the hexagon nut on the cover of the filter housing and pull out the cartridge. By cleaning the filter housing extra attention should be paid to the contact surfaces of the gasket.
- Cleaning by tapping off the dust (Figure 12)

  Tap the front side of the cartridge against your palm until all the dust has fallen out. Avoid damaging the cartridge. Clean the contact surfaces of the gaskets.
- Blow clean with compressed air (Figure 13):

  Blow dry compressed air (no higher than 70 psig) slanted against the paper pleats. Then blow clean the inside of the cartridge thoroughly.

Caution:

Do not use fluids to clean air filter. Replace cartridge after several cleanings (max. 5 cleanings) or if cartridge is overly contaminated.

6.2 Filter mat

Clean filter mat every 100 to 300 operating hours depending on amount of dust.

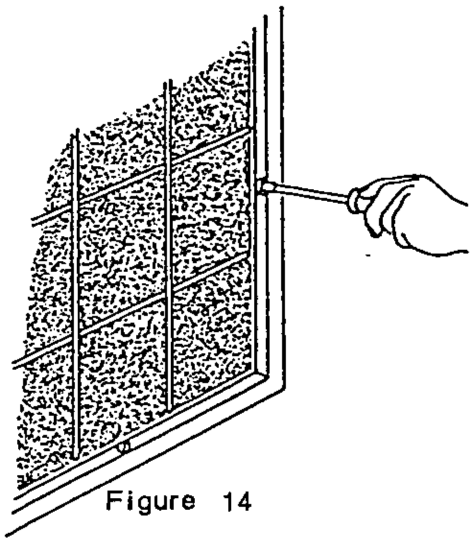


Figure 14

- Shut off the compressor (start-stop switch and main disconnect switch).
- Remove cover frame with a screwdriver. To mount, turn screws 90° (Figure 14).
- Cleaning:
  Rinse the mat in water of approx. 100°F with some mild detergent. Cleaning can also be done by tapping, vacuuming, or blowing the dust off with compressed air. With oily dust, rinse the mat in mild solvent or warm water.
- If mat is excessively soiled, replace.

6.3 Oil filter

Replace the oil filter cartridge after the first 50 hours, afterwards every 1000 to 2000 service hours.

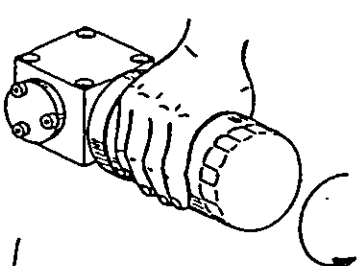


Figure 15

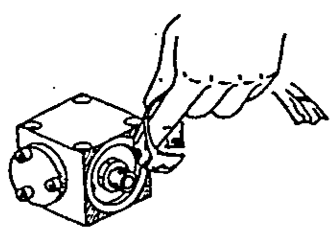


Figure 16

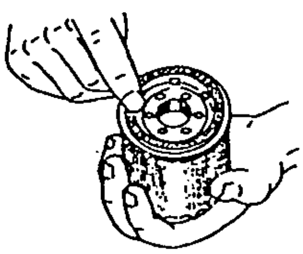


Figure 17

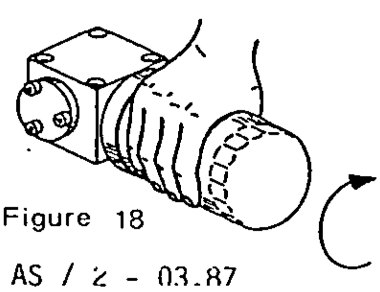


Figure 18

- Shut off the compressor (start-stop switch and main disconnect switch).
- Place vent socket (1, Figure 22) into hose coupling (4, Figure 22) at the tank (the tank loses its pressure).
  Then wait about 1 minute until the oil settles.
- Unscrew clogged filter by turning the filter counterclockwise and discard. (Figure 15)
- Clean sealing surface at the filter head thoroughly with lint-free cloth. (Figure 16)
- Lubricate the new oil filter at gasket lightly with oil. (Figure 17)
- Screw in the new filter manually until the cartridge gasket fits tightly. (Figure 18) Hand-tighten only!

  Pour oil into the tank to normal level. See section 6.6.

Important:

Remove vent socket from hose coupling. Start up the compressor and check for leakage.

Caution:

Oil may be very hot. Allow unit to cool before working with oil system.

6.4 Oil separator

6.4.1 Checking the pressure differential

- Insert the pressure gauge in socket with 1/4" female thread.
- Turn compressor on and keep the operating pressure as constant as possible.
- Insert pressure gauge into the hose couplings at the tank (4 and 5, Figure 22) and take pressure readings.
- The difference of these readings indicates the pressure differential at the oil separating cartridge.
- We recommend replacing the cartridge at a pressure differential of approx. 12 psig.
- The life of the oil separating cartridge depends to a high degree on the contamination of the inlet air and the maintenance of the air and oil filters.
- For this reason the pressure differential should be checked every 500 operating hours.

6.4.2 Filter replacement

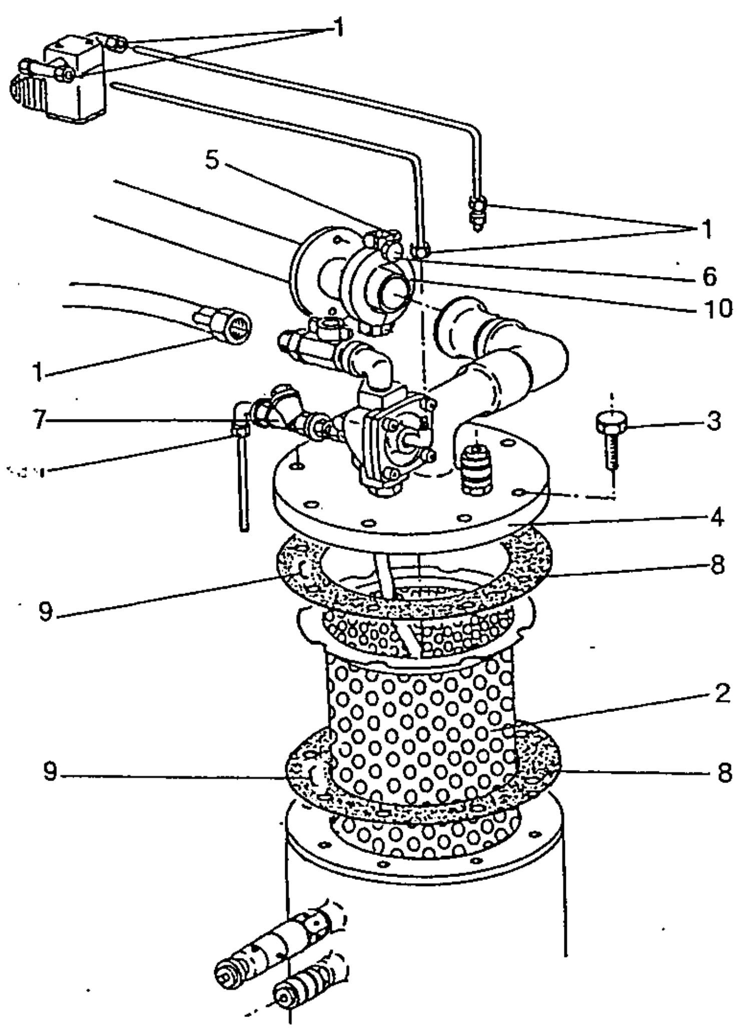


Figure 19

- Shut off the compressor (start-stop switch and main disconnect switch).
- Place vent socket (1, Figure 22) into hose coupling (4, Figure 22) at the tank (the tank loses its pressure). See section 6.6.
- Loosen self-locking nuts (5) and (6) of the elastic pipe connection and remove bracket halves (10).
- Loosen pipe fittings (1), remove screws (3) and tank head (4).
- Remove the old oil separating cartridge (2) with gaskets (8) and clean gasket surfaces.
- Place in a new cartridge (2) with new gaskets (8) and fasten tank head (4) with screws (3).
- When changing the cartridge (2), unscrew and replace screen filter and o-ring from the dirt trap (7). Also replace the diaphragm, part no. 5.0999.0 on the vent valve. See section 11.7.
- Assemble parts in reverse order.
- To install elastic pipe connection. See section 6.4.3.
- Remove the vent socket (1, Figure 22).

Attention

In order that static electricity can flow through the electrically conductive oil separator cartridge to the separator tank and grounded compressor frame, the gaskets (8) of the oil separator tank cover have been provided with a metal clip (9).

Do not remove the clip!

6.4.3. Mounting of the elastic pipe connection

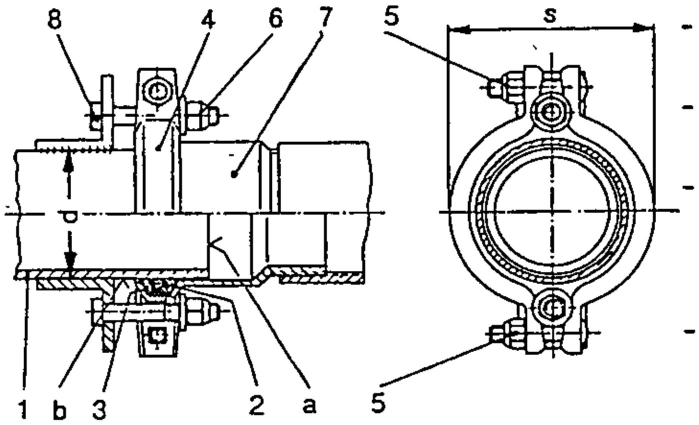


Figure 20

d	s	Cone ring Order No.
1 3/8 (1.38)	2 21/32 (2.66)	5.1390.0

Dimensions in inches

- Cutting edge "a" of pipe (1) has to be burr-free and surface "b" clean.
- Place cone ring holder (3) and cone ring (2) on pipe (1).
- Place pipe (1) into sleeve (7) without preliminary stress; push cone ring (2) with cone ring holder up to the cone end of sleeve (7) (realign the pipe, if necessary).
- Place the bracket halves (4) on the cone ring holder and sleeve and tighten nuts (5) according to measurement "s". Measurement "s" is a recommended value and can fluctuate by approx. 2 %.
- Tighten locking screws (8) and nuts (6) so as to allow adjusting by hand when the unit is off. When the unit is operating at full load, all screws must be under equal load.

After the self-locking nuts (5) and (6) have been tightened and loosened several times they have to be replaced.

6.5 Compressor Oil Specifications

6.5.1 Mineral oils

BP	ENERGOL THB 46
	ENERGOL HLP 46
Castrol	HYSPIN AWS 46
Chevron	GST 46
	CALTEX REGAL OIL R+O
EXXON	NUTO H 46
Mobil	D.T.E OIL MEDIUM
Shell	ROTELLA 10 W*
	X 100 Motoroil 10 W
TEXACO	RANDO OIL HD 46

02.25.85

The oil used for cooling the screw compressor during operation must have the following properties:

- high ageing resistance
- high dispersive power
- low emulsifiability
- minimum capacity for forming foam

Basic oil:	solvent raffinate
Hydraulic or turbine oil:	viscosity class VG 46
Viscosity at 104°F:	approx. 42-50 cSt (200-230 SU sec)
Flash point, surface temperature:	above 392°F
Pour point:	at least 18°F below lowest ambient temperature

To ensure trouble-free operation, use only one of the oil types listed on the left. These oil types are of comparable quality and can be purchased from the listed oil companies or service stations.

The order in which the oils are listed is not indicative of or related to the quality of the oils.

The oil companies reserve the right to change the names of the oil designations!

*Oil type "ROTELLA 10 W" is mixable with oil type "SHELL COMPTELLA OIL 46" (old name "Shell Oil S.9159") which is already in the unit.

6.5.2 Synthetic Oils

The following synthetic oils are recommended for use in KAESER screw compressors:

	Ambient Temperature
Kaeser Synthetic 466R	40° F to 100° F
Kaeser Synthetic 687R	Consistantly above 70° F

Consult KAESER COMPRESSORS, INC. for other brands.

Extra care must be taken when changing from mineral oil use to synthetic oil or when changing oil brands. Make sure that all oil in the separator tank, oil lines, oil cooler and airend has been drained.

Kaeser Compressors recommends that the initial fill of synthetic oil be changed no later than 6000 service hours. Thereafter, the oil must be changed no later than 8000 service hours. The first oil filter must be replaced after 100 - 200 servoce hours and every 2000 - 3000 hours thereafter. The oil and oil filter change intervals may vary dependin on ambient conditions.

Also, when switching from mineral oil to a synthetic oil, the plant system materials must be re-evaluated. Certain plastics are not compatible with synthetic oils. The following is a partial list of acceptable and not recommended materials:

Acceptable	**Not Recommended**
Viton	Neoprene
High Nitrile Buna N	SBR Rubber
Teflon	Low Nitrile Buna N
Epoxy Paint	Acrylic Paint
Oil-resistant Alkyd	Lacquer
Nylon	Polystyrene
Delrin	PVC
Celcon	ABS

Consult KAESER COMPRESSORS, INC. for details or materials not listed.

Caution:
Synthetic oils are not compatible with polycarbonate bowls. Any such bowls in the compressed air system should be covered with metal bowl guards or replaced with metal bowls.

6.6 Adding oil

Check oil level daily at the oil sight glass. Always shut off the compressor when checking the oil level. Oil must be added when the minimum oil level, which is the middle of the lower oil sight glass, has been reached. Fill to the middle of the upper oil sight glass, no higher.

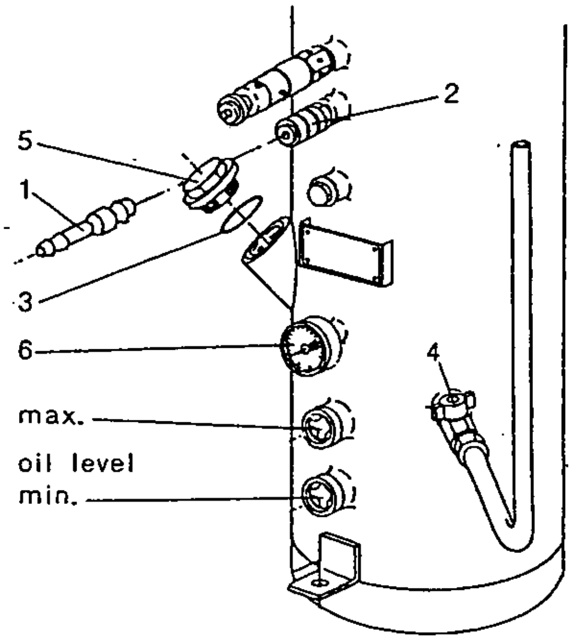


Figure 21

DO NOT OVERFILL.

- Shut off the compressor (start-stop switch and main disconnect switch).
- Open maintenance doors.
- Place vent socket (1) into coupling (2) at the tank (the tank loses its pressure).
- Loosen locking screw (5) at the filling vent.
- Pour oil in to the max. level.
- Check gasket (3) and tighten locking screw (5).
- Remove vent socket (1) from coupling.

Important:

Always use the same make and type of oil (indicated on the oil-separator tank).

Different oil than that already in the unit may be used if it meets the oil specifications. See section 6.5. Whenever changing oil types, always drain all of old oil completely and change oil filter before adding new oil type.

Never mix oil types, other than approved by KAESER COMPRESSORS, INC.

6.7 Oil change

The oil must be changed approx. every 2000 to 3000 service hours depending on contamination of inlet air.
If the unit operates at or close to ambient temperature of 100°F (for example in boiler rooms etc.) the oil must be changed more frequently, i.e. every 1000 - 1500 hours.

> **Important:**
>
> Drain all oil from, the oil separator tank, cooler and lines.
>
> For restart procedure sse section 5.1

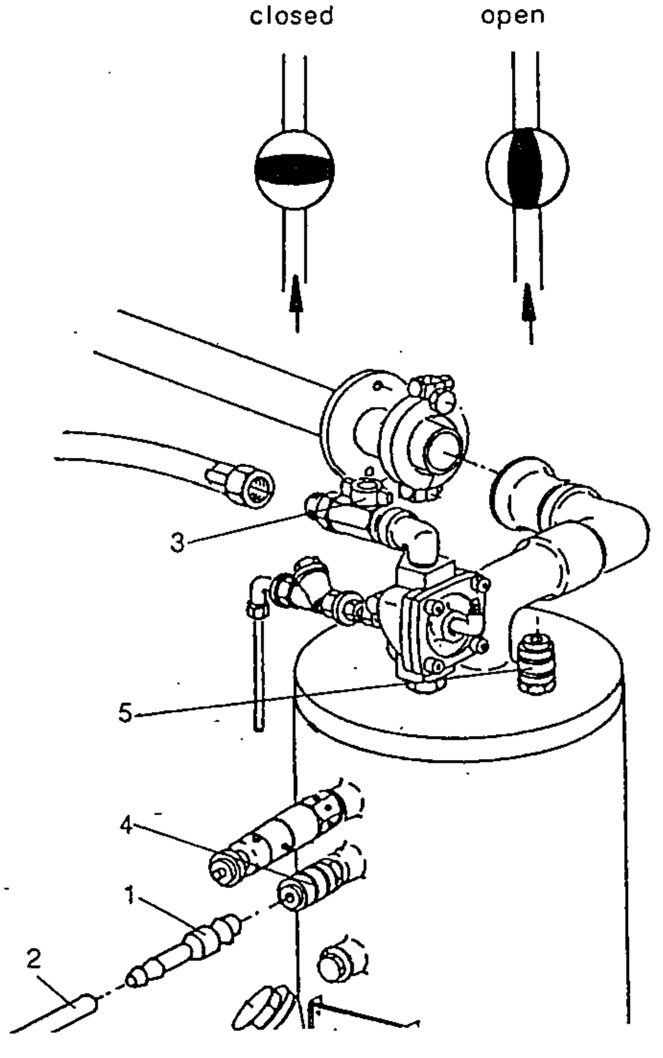


Figure 22

Model	Oil charge
AS 30	approx 4 3/4 US Gal
AS 35	approx 4 3/4 US Gal

Oil change with pressure produced by another source.

- Shut off the compressor (start-stop switch and main disconnect switch).
- Close shutoff valve (3).
- Hook hose (2) of other pressure source to socket (1) onto tank and pressure feed (the tank should have a pressure of approx. 30 psig).
- Remove hose with socket.
- Slowly open drain valve (4, Figure 21) (the pressure remaining in the tank will cause the oil to flow).
- After discharging the tank, slowly open the cooler drain plug (1, Figure 25) (the oil will drain without pressure).
- Close drain valve (4, Figure 21) and cooler drain plug (1, Figure 25).
- Open shutoff valve (3).
- Oil adding see section 6.6.

Oil change with pressure produced by the compressor:

- Shut off the compressor (start-stop switch and main disconnect switch).
- Close shutoff valve (3).
- Let compressor run for about half a minute (the tank should have a pressure of approx. 30 psig).
- Shut off the compressor (start-stop switch and main disconnect switch).
- Slowly open drain valve (4, Figure 21) (the pressure remaining in the tank will cause the oil to flow).
- After discharging the tank, slowly open the cooler drain plug (1, Figure 25) (the oil will drain without pressure).
- Close drain valve (4, Figure 21) and cooler drain plug (1, Figure 25).
- Open shutoff valve (3) at the tank cover.
- Oil adding see section 6.6.

> **Caution**
>
> Oil may be very hot.
> Allow unit to cool before draining oil.

6.8 Temperature gauge and high temperature switch

When final compression temperature reaches 230° F, the compressor shuts off. At the same time the light No. 3 of KAESER CONTROL (Figure 4a) comes on.

Troubleshoot and repair.

Probable causes:
- malfunction in the cooling system, e.g.:
- low oil level
- extreme ambient temperature (too low or too high)
- clooged oil filter
- clooged oil cooler
- clooged air inlet filter mat

After the trouble has been eliminated the compressor can be restarted at start-stop switch (4,Figure 4).

6.9 Motor lubrication

The standard motors have life-time grease lubrication.
Under normal working conditions (ambient temperature 80° F), carry out maintenance of the motor according to the following chart.
After the indicated working hours, demout motor bearings, rinse them and fill the void spaces with new grease.

Model	Lubrication interval operating hours	
	Motor 50 Hz	Motor 60 Hz
AS 30 / 35	11 000	10 000

We recommend the following brands of lithium base grease:

- BP Energrease LS 3
- Calypsol H 443
- Exxon Beacon 3
- Mobilux Grease 3
- Shell Alvania 3
- SKF Waelzerol FL

Under harder working conditions, i.e. strongly polluted intake air and ambient temperature of the unit, approx. 105° F, lubrication interval is half as long.

For special motors, other protective systems etc., follow manufacturer's instructions (on motor name plate).

6.10 V-belt tension

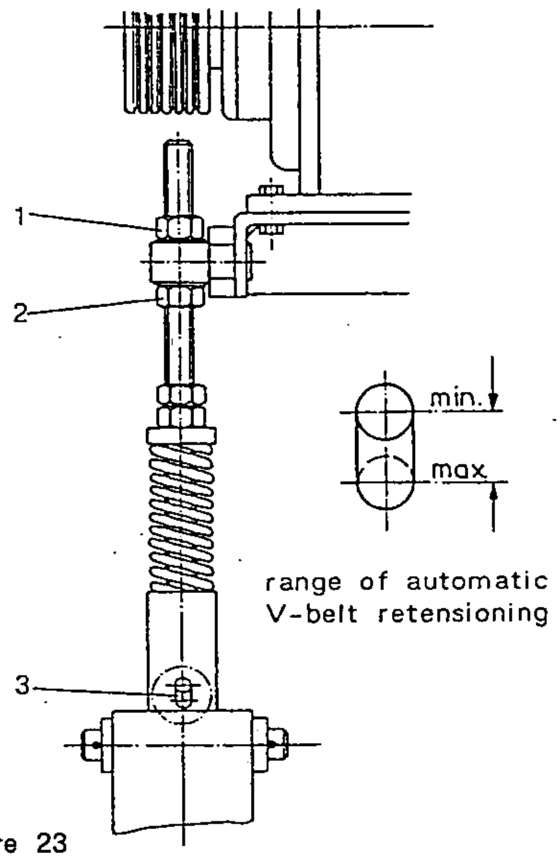


Figure 23

Belt tension must be checked every 500 operating hours.

The V-belt span is adjusted automatically within a limited range by the pressure spring. See figure at left.

An indicator pin (3) in the oblong hole indicates the V-belt span. When the pin (3) reaches the top of the hole, retensioning is required.

- Shut off the compressor (start-stop switch and main disconnect switch).
- Loosen hex nut (1).
- Retension the V-belt by turning the hex nut (2) until the pin (3) is all the way down.
- Retighten hex nut (1).

6.10.1 V-belt changing

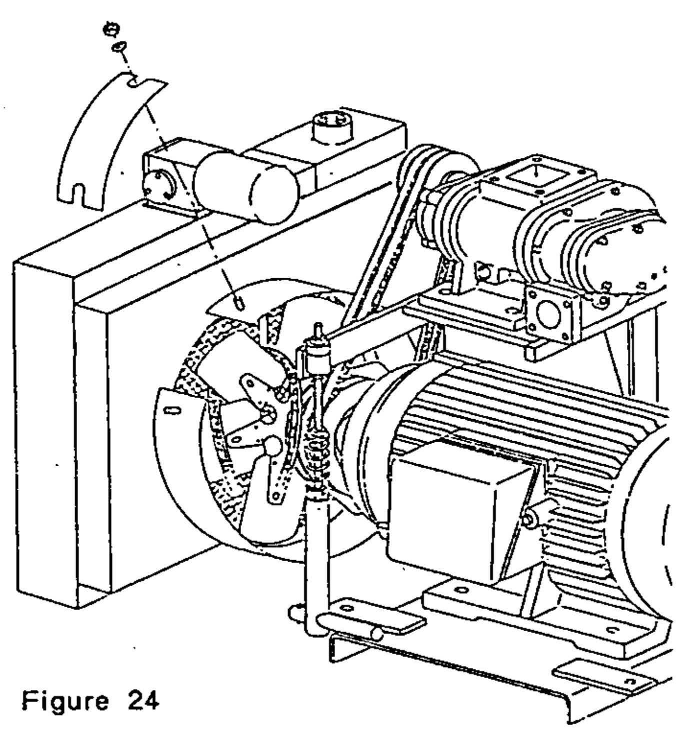


Figure 24

- Shut off the compressor (start-stop switch and main disconnect switch).
- Open left maintenance door.
- Unscrew and remove covering plate from fan frame.
- Turn adjusting hex nut (2, Figure 23) downwards.
- Place V-belt first over the free-standing fan blade, then turn fan and move belt over the other blades
- Slip V-belt over motor and compressor pulleys.
- Tension V-belt see section 6.10.
- Fasten covering plate on the frame.
- Close maintenance door.
- Check V-belt tension after approx. 2 and 24 operating hours. (See section 6.10).

Important:

Spare V-belts must absolutely have the same length and must be 100 % oil resistance. We, therefore, recommended the genuine Kaeser V-belts be used.

6.11 Cleaning the cooler

Check cooler at least every 1000 operating hours for contamination. Strong contamination can result in excessive temperature in oil circulation.

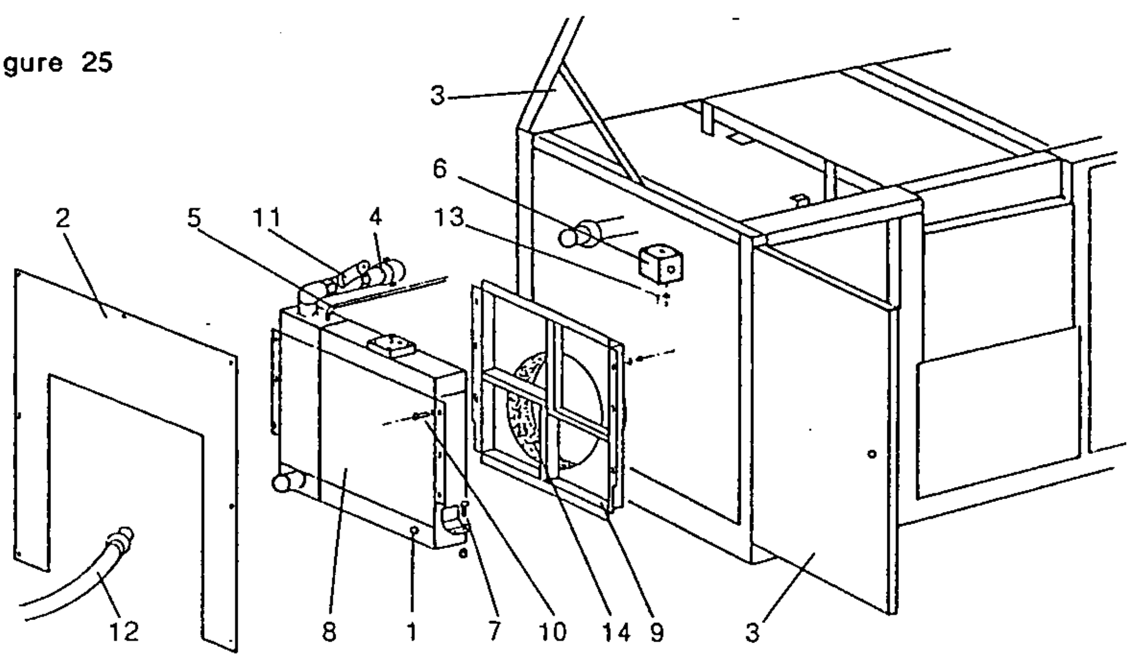
Disassembling and cleaning the cooler:

- Shut off the compressor (start-stop switch and main disconnect switch).
- Vent the unit (see section 6.4.2).
- Remove covering wall (2) and open maintenance doors (3).
- Discharge compressed air line.

> **Attention:**
> When the unit has been vented, pressure is provided from the air lines up to the minimum pressure check valve (11). Therefore, disconnect the unit from the air mains (shut-off valve). After that vent the air aftercooler by demounting the compressed air line (12) carefully. If no shut-off valve is provided, the complete air lines must be vented.

- Demounted elastic pipe connection (4) and control line (5).
- Screw off combination valve (6) from cooler (8), left it slightly and wipe off the oil flowing out with a piece of cloth. Remove o-rings (13) and check them.
- Close the openings of the oil lines at the cooler (8).
- Undo attachment screws (7) and lift off the cooler (8) with fan housing (9).
- Undo attachment screws (10) and demount fan housing (9).
- Blow cooling fins clean with compressed air or spray with water.
- Check foam kit (14) of fan housing (9).
- Assemble part in reverse order.
- While mounting combination valve (6), make sure o-rings (13) are seated properly.
- For mounting elastic pipe connection see section 6.4.3.

Figure 25



6.12 Checking the safety valve on the oil separator tank

To check the set maximum operating limit the unit must be operated at a final pressure higher than maximum setting of the pressure switch.

Maximum pressure of the unit	Set maximum operating pressure of the safety valve
110 psig	130 psig
145 psig	165 psig
190 psig	210 psig

In order to avoid readjustment of the pressure switch, carry out checking in the following way:

- Shut off the compressor (start-stop switch and main disconnect switch).
- Close the shutoff valve (3, Figure 22) at the discharge line.
- Close the shutoff valve downstream of the unit.
- Start the compressor and let it switch over from full load to idling.
- While the discharge line is being closed the pressure can easily be checked at the pressure gauge (6, Figure 21) on the seperater tank as it is increased slowly up to the limit where the safety valve will react.
- Shut off the compressor.
- Open the shutoff valve downstream of the unit.
- Open the shutoff valve (3, Figure 22) at the discharge line.

6.13 Maintenance parts list

Model	Maximum pressure psig	V-belt pcs.	V-belt compl.set Order No.	Oil filter cartridge Order No.	Oil separation cartridge compl.set Order No.	Air inlet filter cartridge Order No.	Filter mat Order No.
AS 30	110 145 190	3 3 3	6.2506.0 6.2507.0 6.1445.0	6.1985.0	6.2011.0	6.2000.0	6.1943.0
AS 35	110 145 190	4 4 4	6.2509.0 6.2501.0 6.1447.0	6.1985.0	6.2011.0	6.2000.0	6.1943.0

The oil separating cartridge set (Order No. 6.2011.0) consists of:

pcs.	Order No.	Name
1	6.1963.0	Separating cartridge
2	5.0556.0	Gasket
1	8.0394.0	Dirt-trap strainer
1	5.1443.0	O-ring

When ordering spare parts always state compressor type, serial number and year of manufacture which are stamped on the name plate.

Important:

Order KAESER genuine factory-tested replacement parts only !!

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6.14 Recommended maintenance schedule for model AS

Interval	Maintenance	Refer to section
50 hrs after initial start up	Tighten all wiring connections in the control panel	
50 hrs after initial start up	Replace oil filter	6.3 Oil filter
Weekly	Check oil level	6.6 Adding oil
100 to 300 hrs	Clean filter mat	6.2 Filter mat
Every 500 hrs	Check V-belt tension	6.10 V-belt tension
	Clean or replace air inlet filter	6.1 Air inlet filter
	Check pressure differential of separator cartridge and replace if necessary.*	6.4 Oil separator
Every 1000 hrs	Check cooler for surface dirt*	6.11 Checking the cooler
Every 1000 hrs to 2000 hrs	Change oil filter*	6.3 Oil filter
Every 2000 hrs to 3000 hrs	Change oil (if mineral oil is used)*	6.7 Oil change
Every 6000 to 8000 hrs	Change synthetic oil (if used in place of mineral oil)*	6.7 Oil change
Every 10000 or 11000 hrs	Lubricate motor bearings*	6.9 Motor lubrication
Yearly	Clean cooler surfaces*	6.11 Checking the cooler
	Tighten all wiring connections in the control panel	
	Check safety valve	6.12 Checking the safety valve

* Note:

Time interval may vary depending on type of unit, installation (e.g. boiler room), frequency of use, and ambient conditions (e.g. ambient temperature other than 32 - 105° F), please consult KAESER COMPRESSORS, INC.

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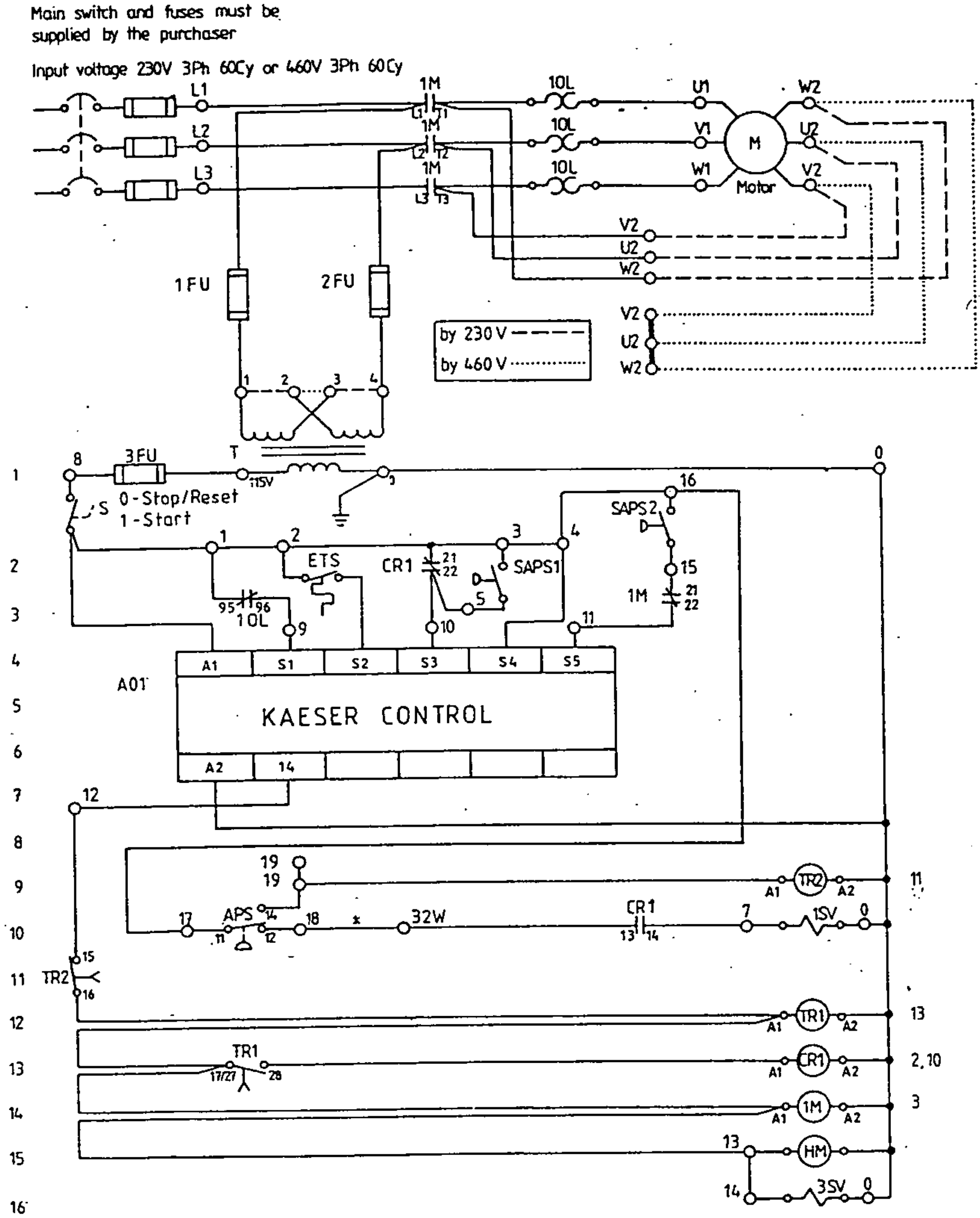
6.15 Maintenance check list

Record hours of operation and check maintenance work performend.
Record values where indicated.

Hours of operation	Filter mat		Air filter cartridge		Oil filter cartridge	Oil separating cartridge		Oil fill			V-belts			Date	Signature
	cleaned	replaced	cleaned	replaced	replaced	diff. pressure	replaced	checked	refilled	replaced	checked	retensioned	replaced		

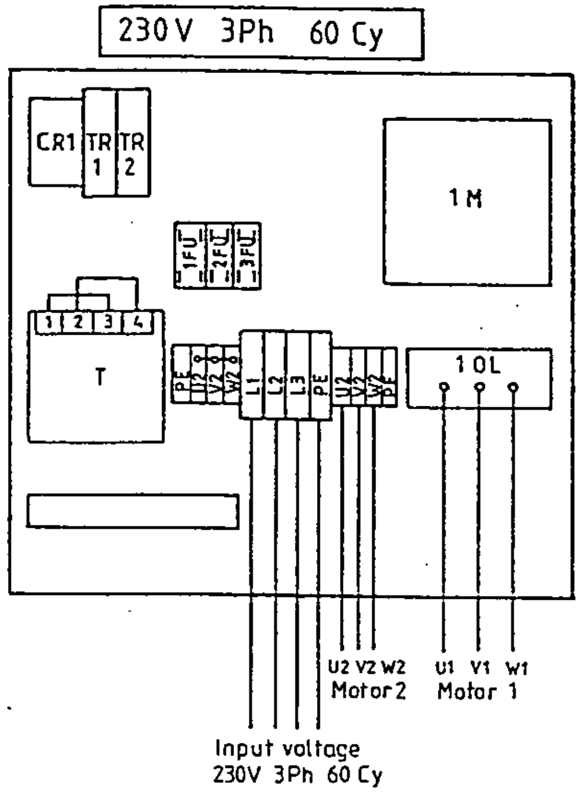
7. Wiring diagram for AS Page 1
St 428.590

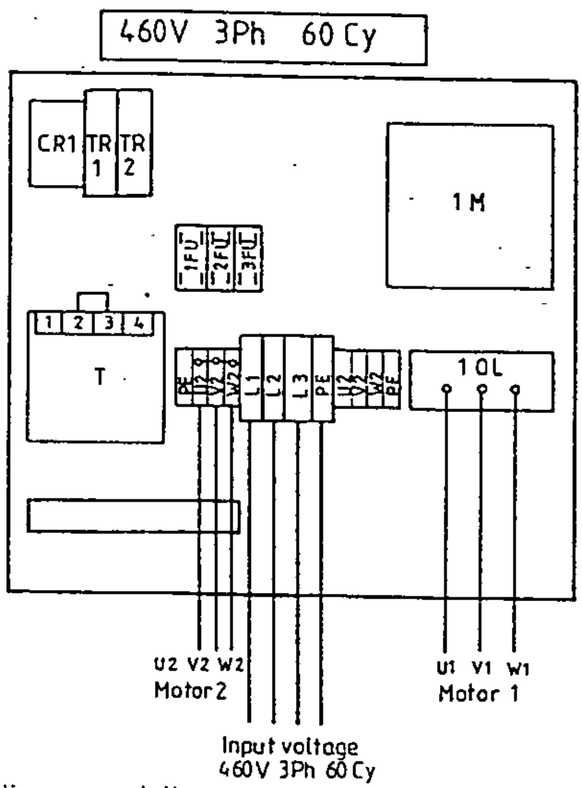


* For connection of automatic changeover remove the bridge !

7. Wiring diagram   Page 2
St 428.590

- S Switch 0-Stop/Reset, 1-Start
- 1M Motor starter
- 1FU, 2FU, 3FU Fuse
- T Transformer
- ETS Excessive temperature switch
- APS Air pressure switch
- SAPS 1,2 Safety air pressure switch
- CR1 Control realy
- 1SV Solenoid value (controls inlet valve/discharge valve)
- 3SV Solenoid valve (oil stopp)
- TR2 Time delay realy (delay-off)
- TR1 Time delay realy (released start)
- HM Hour meter





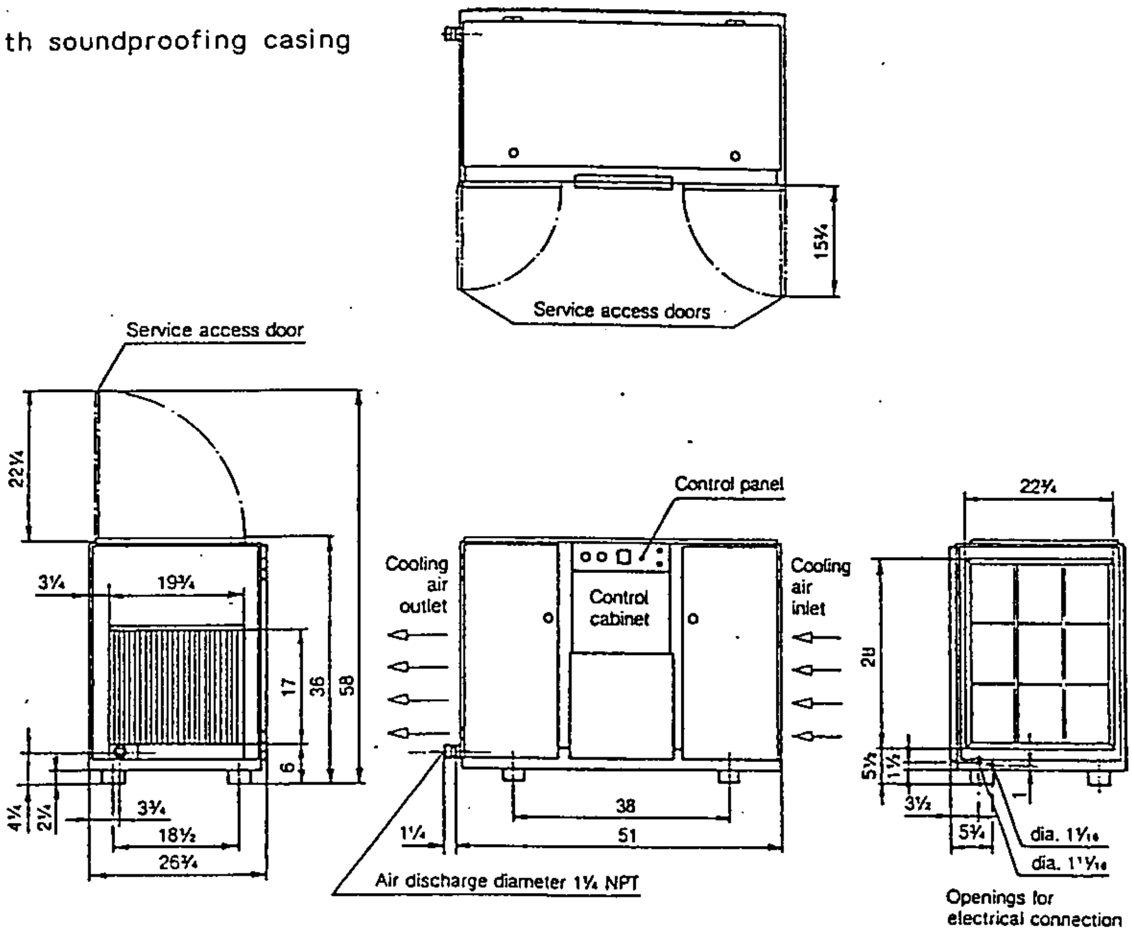
Attention!

Before taking into operation connect the motor and transformer for the corresponding voltage!

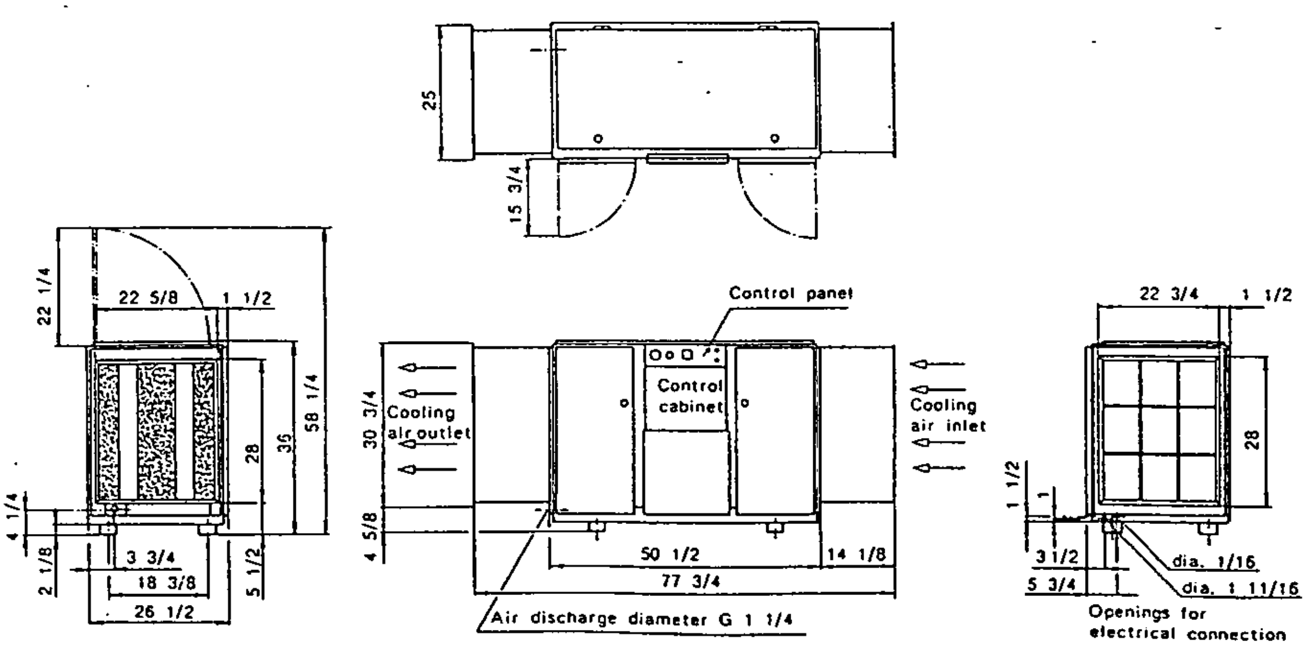
8. DIMENSIONAL DRAWING

Dimensions in inches

air cooled with soundproofing casing



air cooled with super soundproofing casing



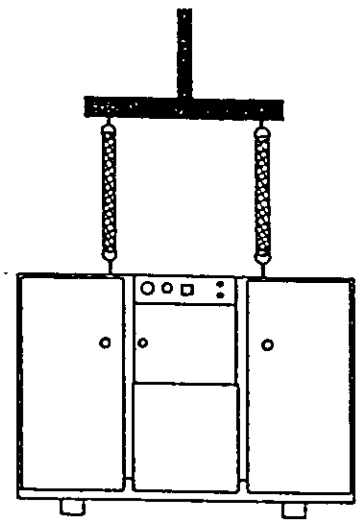
KAESER COMPRESSORS

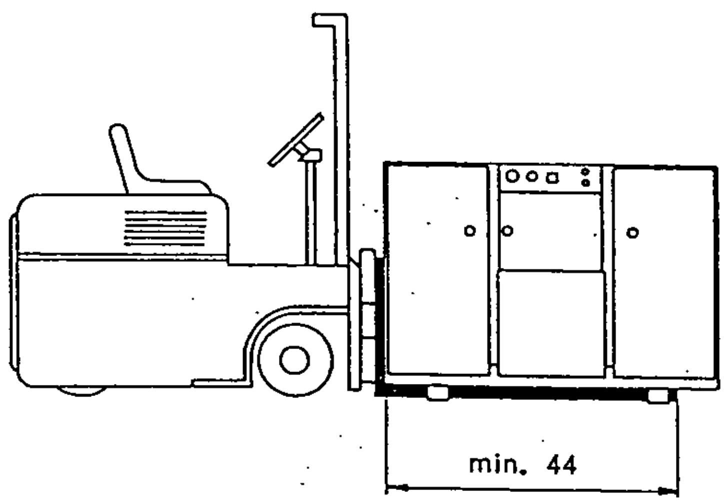
9. TRANSPORT INSTRUCTIONS

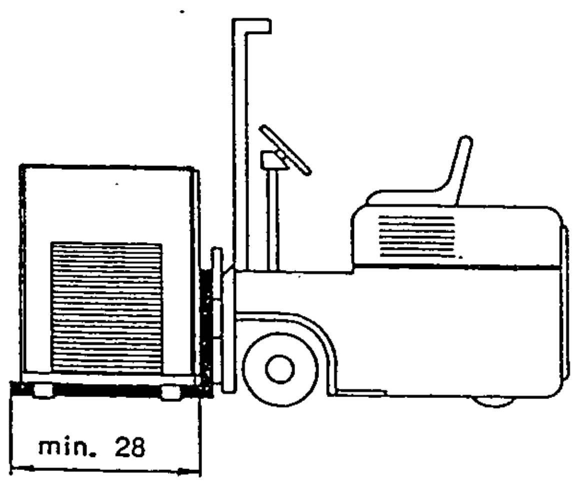
To avoid damage of the casing of the unit, it is recommended a fork lift or an adjustable spreader beam be used for transportation.

> **Attention:**
>
> For transportation with spreader beam remove top cover before screwing in the eye bolts (M 16).

Typ	Weight
AS 30	approx. 950 lbs
AS 35	approx. 1010 lbs







Dimensions in inches

10. TROUBLE SHOOTING

10.1 Airend temperature is too high (greater than 155 - 180°F)

Possible Cause		Remedy
Cooling air inlet or outlet is too close to wall or other blockage.	YES →	Situate unit for adequate air flow (see section 4.1)
↓ NO		
Air intake filter mats are clogged.	YES →	Clean the mats or replace if necessary (see section 6.2).
↓ NO		
Ambient temperature is too high, i.e. greater than 104°F.	YES →	Provide cooler air from other source or move compressor to a cooler location.
↓ NO		
Cooling air supply is inadequate.	YES →	Provide required amount of ventilation (see section 4.1).
↓ NO		
If cooling air outlet duct is used it may be too narrow or too long.	YES →	Consult KAESER COMPRESSORS engineering department for duct requirements.
↓ NO		
The ribs of the coolers (air and oil coolers) are clogged	YES →	Clean with compressed air/water or steam injector. (see section 6.11).
↓ NO		
Oil level is low.	YES →	Check oil level and add necessary amount of recommended oil (see section 6.5). Check dirt trap filter in oil return line for possible contamination.
↓ NO		
Thermostatic valve is not functioning correctly.	YES →	Check the valve spring and actuating piston. Replace defective parts (see section 11.2).
↓ NO		
Oil stop valve is not functioning correctly.	YES →	Check the valve and replace any defective parts (see section 11.6).
↓ NO		

Idle pressure is too low for proper oil circulation.	YES	Check idle pressure at the separator tank. If the pressure is low check the inlet valve. Adjust inlet valve to maintain adequate idle pressure (see section 11.4).
NO		
Wrong oil is used.	YES	Drain old oil completely and replace with recommended type (see section 6.5). Consult KAESER COMPRESSORS engineering department for other oil types not listed.
NO		
Oil filter is clogged.	YES	Replace filter (see section 6.3).
NO		
On units equipped with a separate fan motor(s), the motor(s) may not be operating.	YES	Check wiring. Replace motor(s) if defective.
NO		
On water cooled units the heat exchanger element may be clogged.	YES	Inspect heat exchanger element. Clean or replace as necessary.

10.2 Motor overload relay switches the unit off

Possible Cause		Remedy
Overload relay is set wrong or is defective.	YES	Check line current and adjust overload relay as necessary (see section 4.4). Replace relay if defective.
NO		
Motor is running two phase: defective motor or blown fuse.	YES	Check wiring, tighten any loose connections. Replace fuse(s) or motor if necessary.
NO		
Motor stop/start cycle is too frequent.	YES	See section 10.5
NO		
Operating pressure is too high.	YES	Adjust pressure switch to proper operationg pressure (see section 5.6). Replace pressure switch if defective.
NO		
Oil separator cartridge is contaminated.	YES	Check pressure differential across cartridge. Replace cartridge and dirt-trap filter if necessary (see section 6.4).
NO		
Motor starts against pressure because system does not get vented.	YES	- Check ballcock and open it if it is closed. - Check the diaphragm in the vent valve and replace if defective (see section 11.7). - Check the minimum pressure check valve. Adjust minimum pressure function or replace defective parts as necessary. (see section 11.5). - Check silencer in vent line. Clean or replace as needed.
NO		

Airend is flooded with oil.	YES →	Check the oil stop valve and replace defective parts (see section 11.6).
↓ NO		
Airend is defective.	YES →	Check airend and replace if defective.
↓ NO		
Ambient temperature is above 104° F.	YES →	Provide adequate ventilation (see section 4.1).
↓ NO		
Defective motor: bad bearings or short circuit in windings.	YES →	Replace motor.

10.3 Compressor is running but produces no pressure

Possible		Remedy
Airend rotates in wrong direction.	YES	Reverse motor polarity (see section 5.2 and 7).
NO		
Inlet valve does not open or opens only partially.	YES	Check the inlet valve, control valve and lines. Replace defective parts as needed (see section 11.4).
NO		
Discharge valve does not close at full load.	YES	Check the control valve, control lines and discharge valve. Replace defective parts as needed (see section 11.3 and 11.7).
NO		
Minimum pressure check valve is defective.	YES	Check the valve and replace defective parts (see section 11.5)
NO		
Leaks in plant system.	YES	Check for open valves, loose connections, defective tools, etc.
NO		
Plant system air demand exceeds capacity of compressor.	YES	Reduce system demand or install additional compressor(s).
NO		
Starting timer for WYE switch over or released start up does not work.	YES	Check timer and replace if necessary. (Supplement - Electrical System).
NO		
Air leak in unit.	YES	Tighten loose connections, repair or replace defective parts as necessary.
NO		
Socket is still in the hose coupling at the oil separator tank.	YES	Remove socket from coupling (see section 6.6).
NO		
Safety valve has blown off.	YES	See section 10.6.
NO		
Airend is defective.	YES	With unit running, place hand over air inlet filter casing. Should feel considerable suction. If not, airend is producing no pressure.

10.4 Oil flows out of air filter

Possible Cause		Remedy
Oil stop valve does not close when unit shuts off.	YES	Check the valve and its wiring. Replace defective parts (see section 11.6).
NO ↓ Oil level in separator tank is too high.	YES	Drain oil to correct level (see section 6.5).
NO ↓ The check valve at the airend outlet malfunctions.	YES	Inspect the valve (see section 11.1).

10.5 Full-load/Idle sequence occurs too frequently

Possible Cause		Remedy
Air receiver (tank) size is too small or there is no tank	YES	Consult KAESER COMPRESSORS engineering department for recommended tank size.
NO ↓ Diameter of hose connecting the unit to the air receiver is too small.	YES	Connecting hose diameter should not be less than the air discharge pipe diameter. Install larger hose if necessary.
NO ↓ Minimum pressure check valve leaks.	YES	Check the valve and replace defective parts (see section 11.5).
NO ↓ Pressure switch is incorrectly adjusted or defective.	YES	Check adjustment of pressure switch; replace switch if defective (see section 5.6).
NO ↓ Idle time is too short.	YES	Set idle timer for longer interval (see section 5.5).

10.6 Safety-valve blows off

Possible Cause		Remedy
System does not discharge at idle.	YES →	Make sure ball cock valve in vent line is open. Check the control lines, control valve, inlet valve and discharge valve. Replace defective parts as needed. (see section 11.3, 11.4 and 11.7).
↓ NO		
Separator cartridge is contaminated.	YES →	Check the cartridge pressure differential and replace cartridge if necessary (see section 6.4).
↓ NO		
Pressure switch is set too high.	YES →	Check pressure switch adjustment and replace if defective (see section 5.6).
↓ NO		
Minimum pressure check valve does not open.	YES →	Check the valve for blockage and replace defective parts as necessary (see section 11.5).

10.7 Oil in the unit enclosure

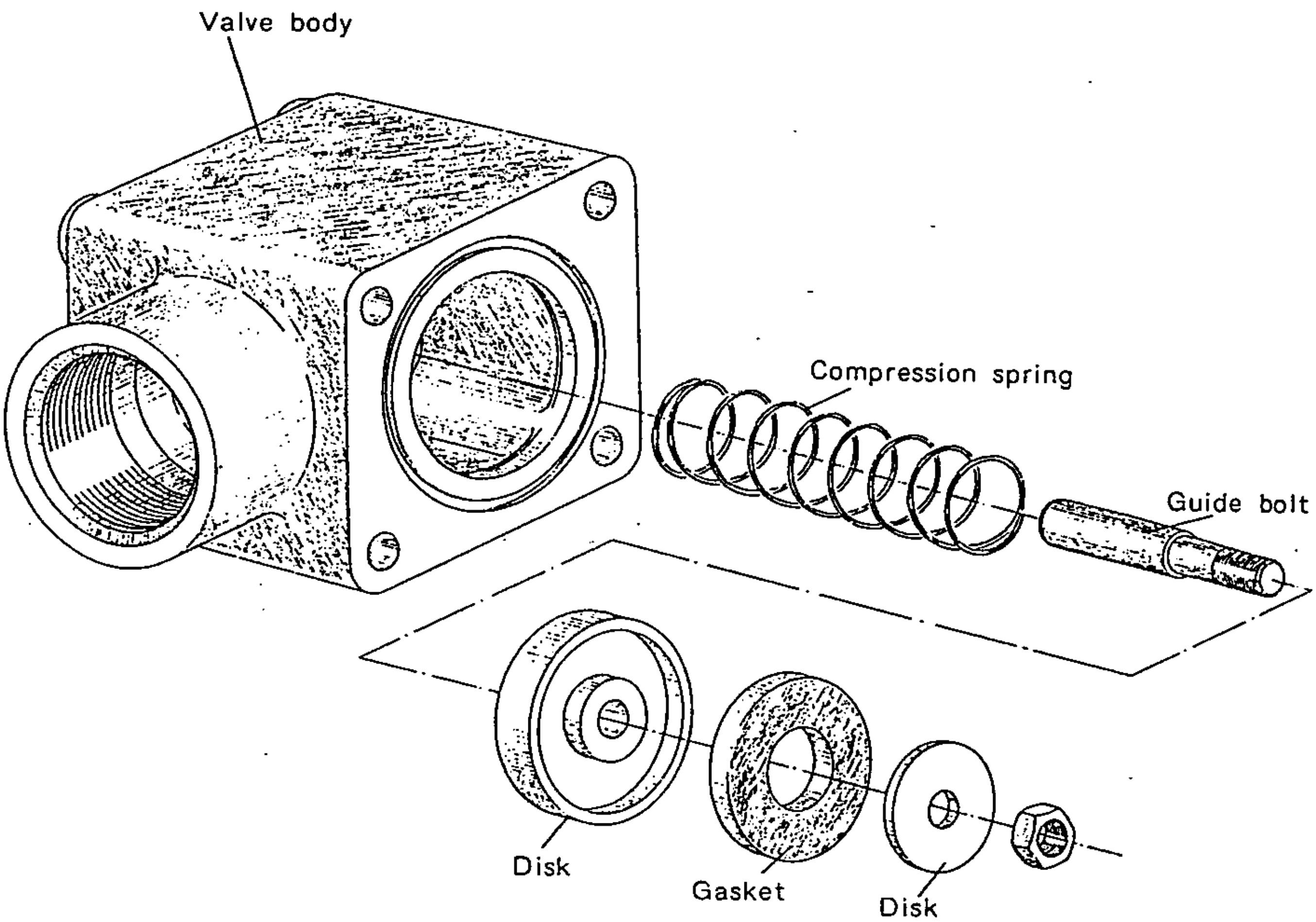
Possible Cause		Remedy
Socket is still in the hose coupling at the separator tank.	YES →	Remove the socket from the coupling (see section 6.6).
NO ↓		
Safety valve has blown off.	YES →	See section 10.6.
NO ↓		
Oil is coming out of air filter.	YES →	See section 10.4.
NO ↓		
Hose coupling on separator tank is loose.	YES →	Tighten coupling or replace if defective (see section 6.6).
NO ↓		
Oil sight glass is loose or broken.	YES →	Tighten (carefully!) or replace as needed.
NO ↓		
Oil cooler leaks.	YES →	Replace oil cooler.

10.8 Excessive oil consumption

Possible Cause		Remedy
Wrong oil is being used in the unit.	YES →	Replace with correct oil type (see section 6.5). Consult KAESER COMPRESSORS engineering department for allowable oil types not listed.
↓ NO		
Separator cartridge has ruptured.	YES →	Check pressure differential and replace separator cartridge if necessary (see section 6.4).
↓ NO		
Separator cartridge mountings are loose.	YES →	Tighten mounting bolts (see section 6.4).
↓ NO		
Oil level in separator tank is too high	YES →	Drain oil to correct level (see section 6.6).
↓ NO		
Oil scavenger line is clogged.	YES →	Inspect dirt trap filter and scavenger line. Clean or replace clogged parts as necessary.

11. VALVE SERVICE SUPPLEMENT

11.1 Check Valve



Function

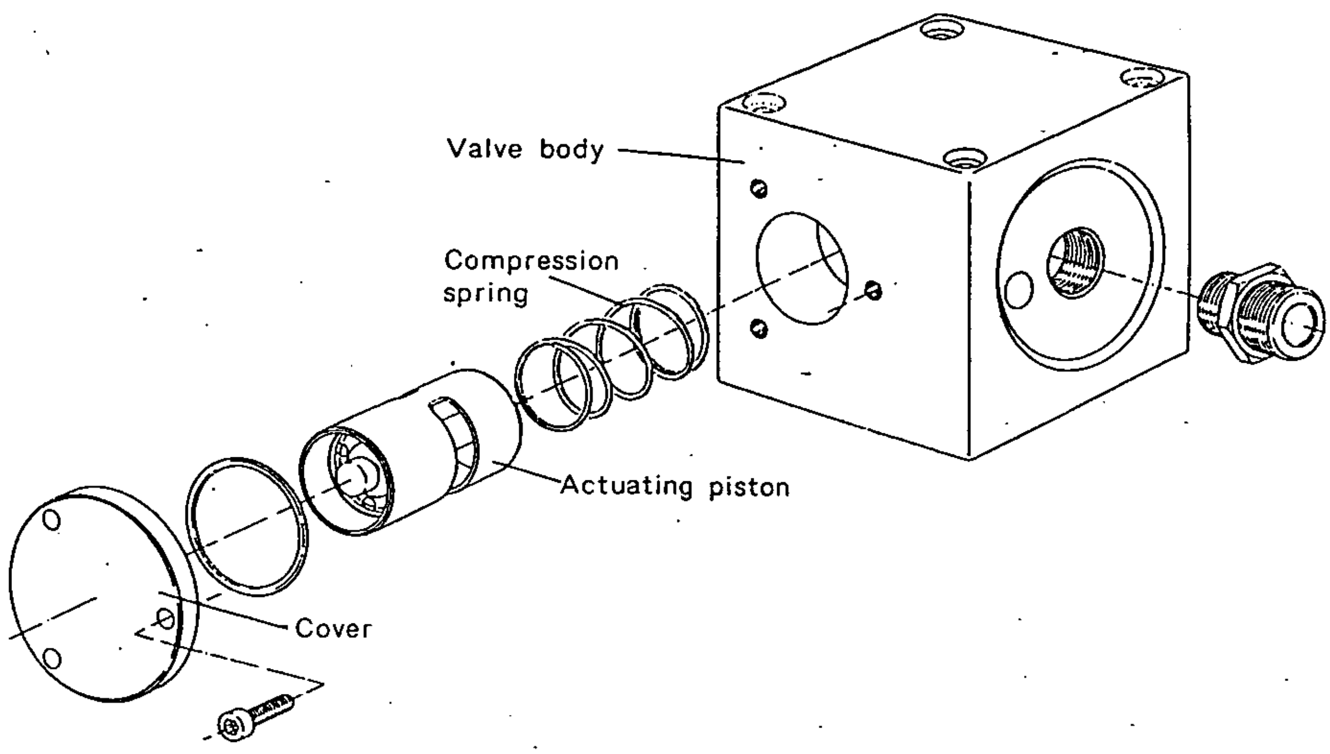
To prevent the backflow of oil-air mixture into airend during cut-off.

Compressor Mode	Valve Condition
Full-load	Open
Idle	Open
Cut-off	Closed

Checking

Remove bolts and pull away from airend. Do not attempt to remove the air-oil pipe. Manually operate check plate. Condensation, a broken spring or oil deposits may cause it to stick open or shut.

11.2 Combination (Thermostatic) Valve

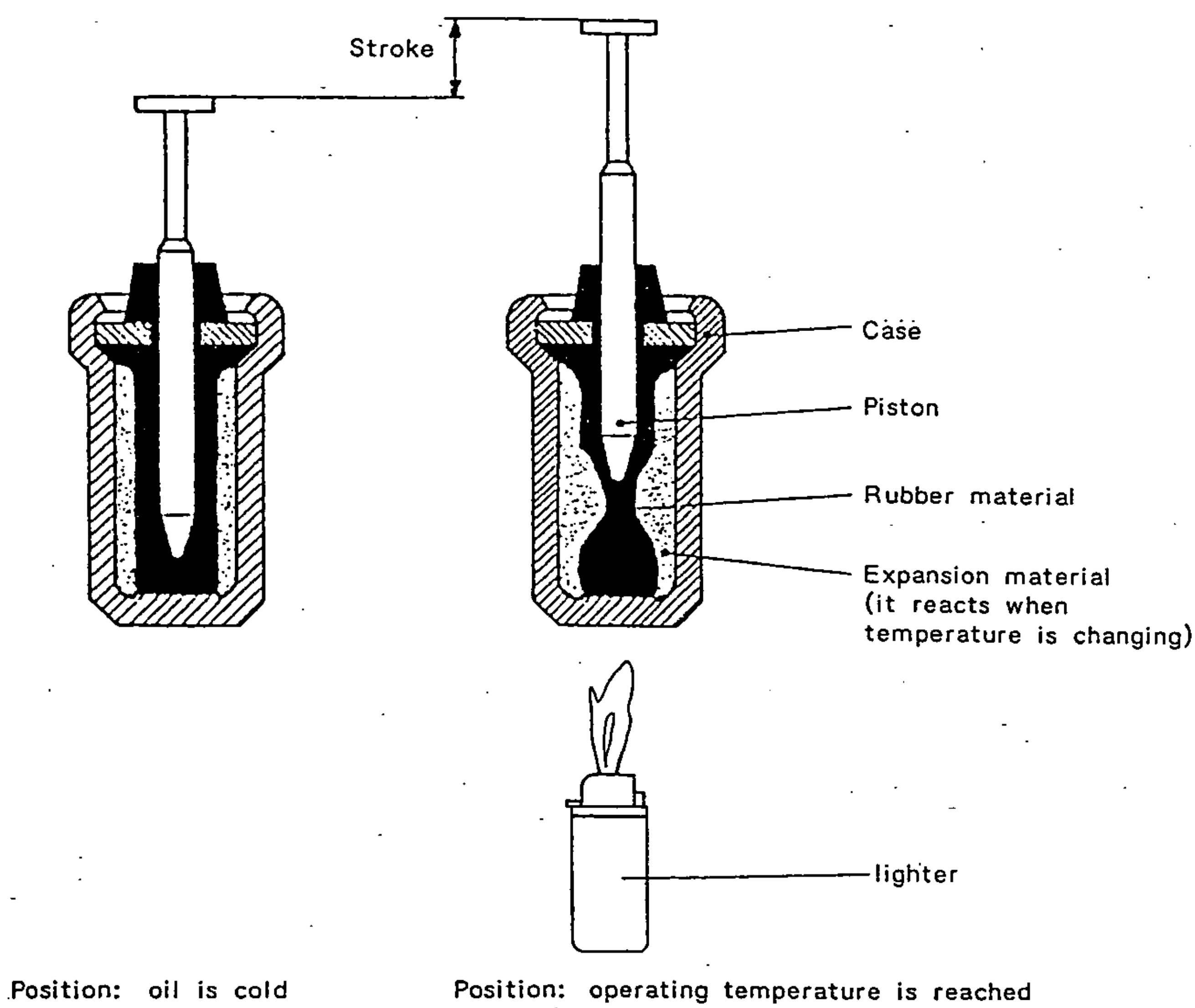


Function

To regulate flow of oil into oil cooler, thus maintaining proper oil temperature. This valve directs oil into the cooler, or by-passes the cooler to send oil directly back to the airend, as necessary.

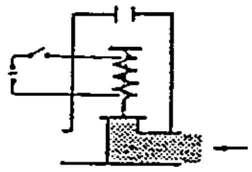
Checking thermostatic operating features of the working element

Start compressor after allowing it to cool. If thermostatic valve is operating correctly, there should be a sharp increase in the temperature of the cooling exhaust air when the unit reaches operating temperature as the valve directs warm oil through the cooler. If no such increase occurs, or machine runs hotter than normal (greater than 180° F), then remove the actuating piston from the valve assembly. Apply heat to the end of the working element as shown:



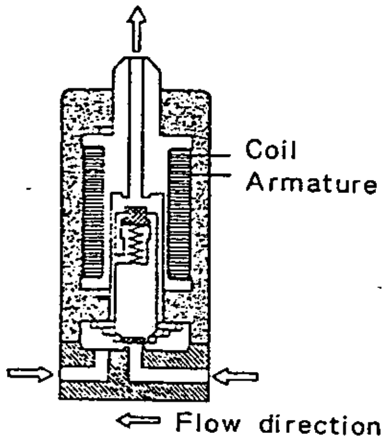
The working element should move outward in the direction indicated. Replace the actuating piston if the element does not move.

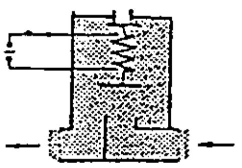
11.3 Control Valve



Deenergized closed:

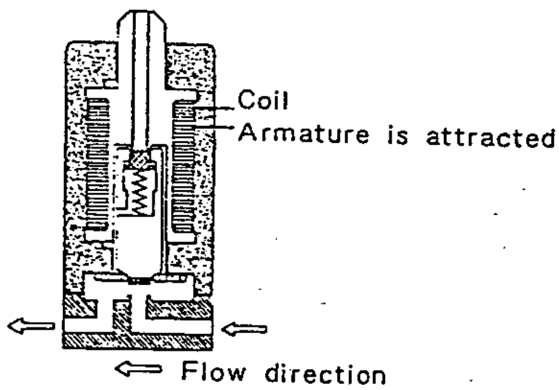
(currentless)
when compressor is running off-load or is cut-off (WYE-time)





Energized opened:

when compressor is running on-load (Delta-time)



Function

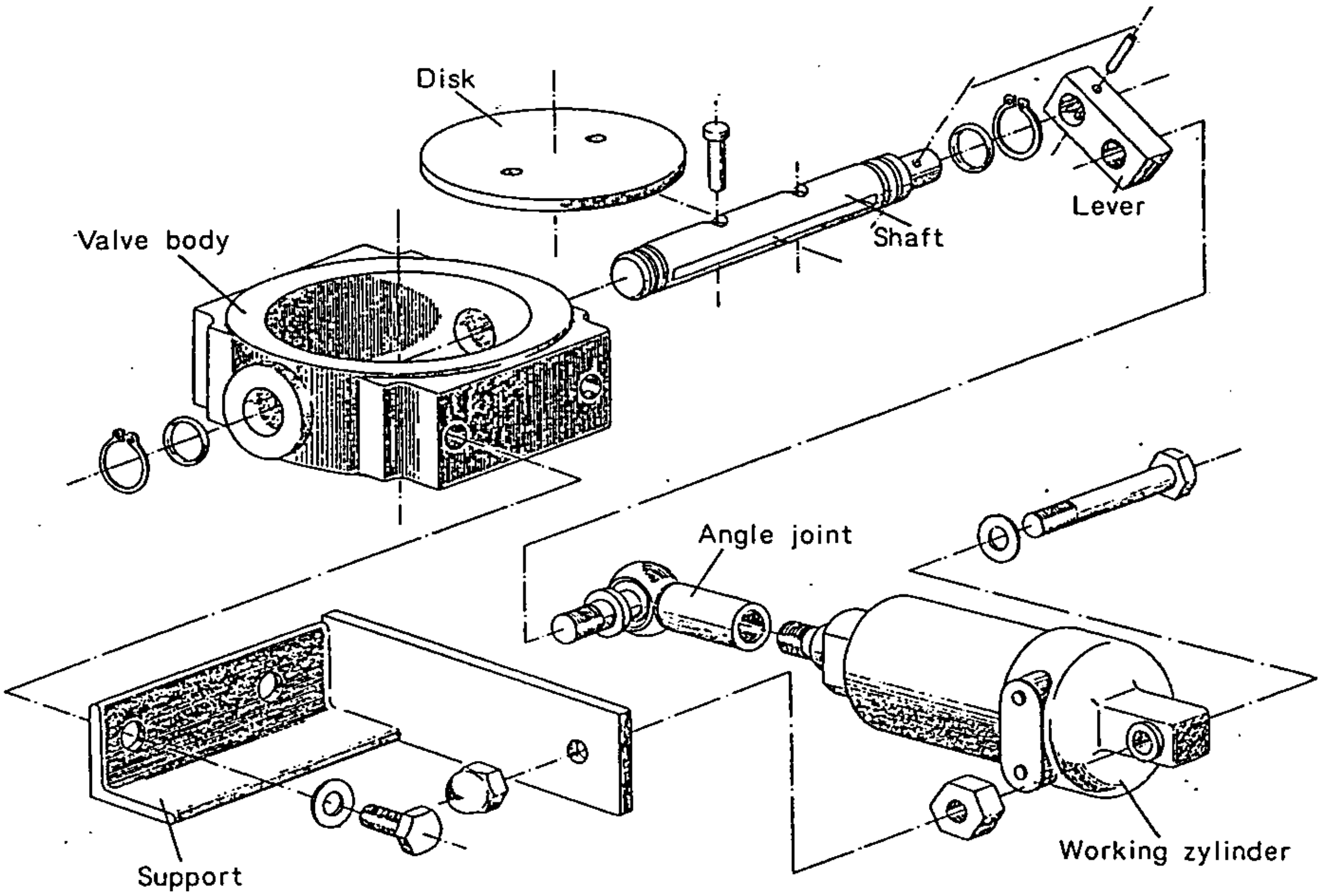
This valve is activated by a solenoid coil. It controls the operation of the vent valve and the inlet valve. When the control valve is open, the vent valve is closed and the inlet valve is open. When the control valve is closed, the vent valve is open and the inlet valve is closed.

Compressore Mode	Valve Condition
Full-load	Open
Idle (WYE-time, or released start up time)	Closed
Cut-off	Closed

Checking

The coil operates on 110 V AC, so it may be checked with power from any standard outlet. Disconnect leads to the control box and connect outside power. Coil should energize and operate with an audible click. If coil operates with external power, but valve does not operate when machine runs, then check for power in leads from pressure switch. Make sure that the machine is running at full-load when checking for power from pressure switch. If coil operates, and is receiving power from the pressure switch at full-load, but valve still does not function properly, then check control lines for blockage.

11.4 Inlet Valve



Function

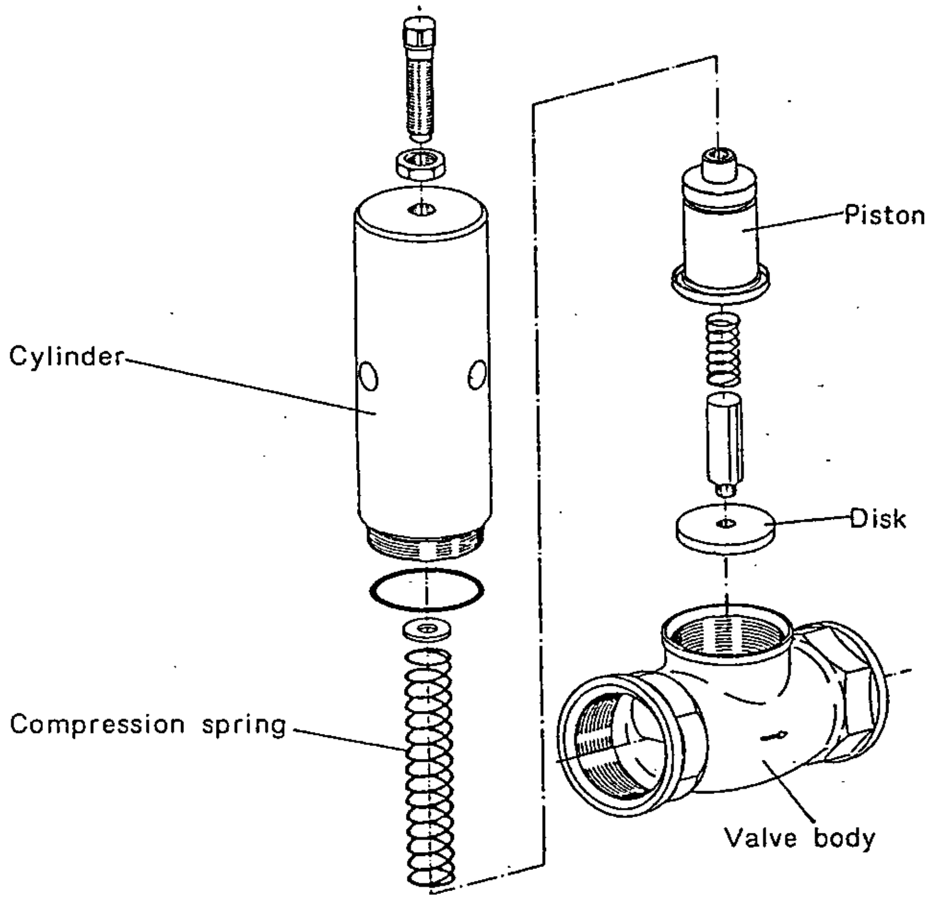
To control the flow of air into the airend. There is a hole in the valve plate to allow some air to enter the airend when the inlet valve is closed. This hole is just big enough to allow adequate idle pressure for proper oil circulation.

Compressor Mode	Valve Condition
Full-load	Open
Idle (WYE-time, or released start up time)	Closed (but idling hole open)
Cut-off	Closed

Checking

- Pull on the lever that connects the working cylinder to the valve plate, i.e. manually open the inlet valve. It should close when released. If it does not close, or there is no resistance, then the working element spring is defective.
- Run the machine at full load to build up system pressure. Pour soapy water on working cylinder. Bubbles indicate an air leak. Replace entire working cylinder if any leakage is indicated.
- Disconnect valve plate linkage and manually rotate valve plate. It should rotate 360° freely. If it does not then the valve plate is defective.

11.5 Minimum pressure check valve



Function

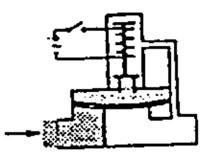
- Minimum Pressure:
  Allows compressor to build up sufficient pressure for adequate oil circulation before releasing air to the receiver.
- Check Funktion:
  Prevents backflow of air through the unit.

Compressor Mode	Valve Condition
Full-load	Open
Idle (WYE-time, or released start up time)	Closed
Cut-off	Closed

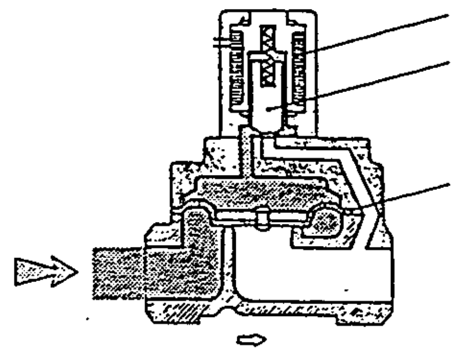
Checking

- Minimum Pressure:
  Start the unit and watch the separator tank pressure and the instrument panel readings. The separator tank pressure should go to about 60 psi before any pressure is indicated on the instrument panel. Be sure that the panel gauge shows no pressure before attempting this test.
- Check Funktion:
  Isolate machine and shut it off at maximum pressure. If the valve is not operating then the instrument panel gauge will show a rapid loss of pressure.

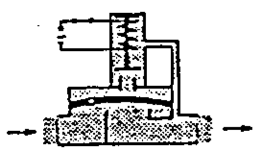
11.6 Oil stop valve



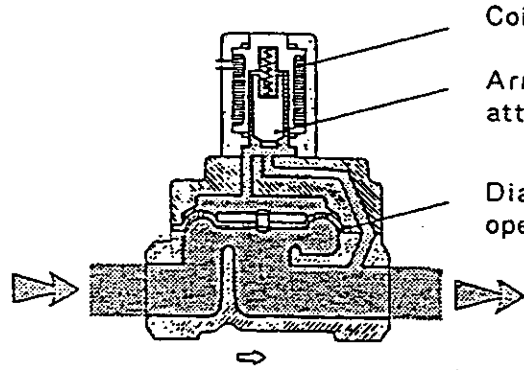
Deenergized closed:
(currentless)
when compressor is switched off.



Flow direction



Energized opened:
when compressor is running off load or on load.



Flow direction

Function

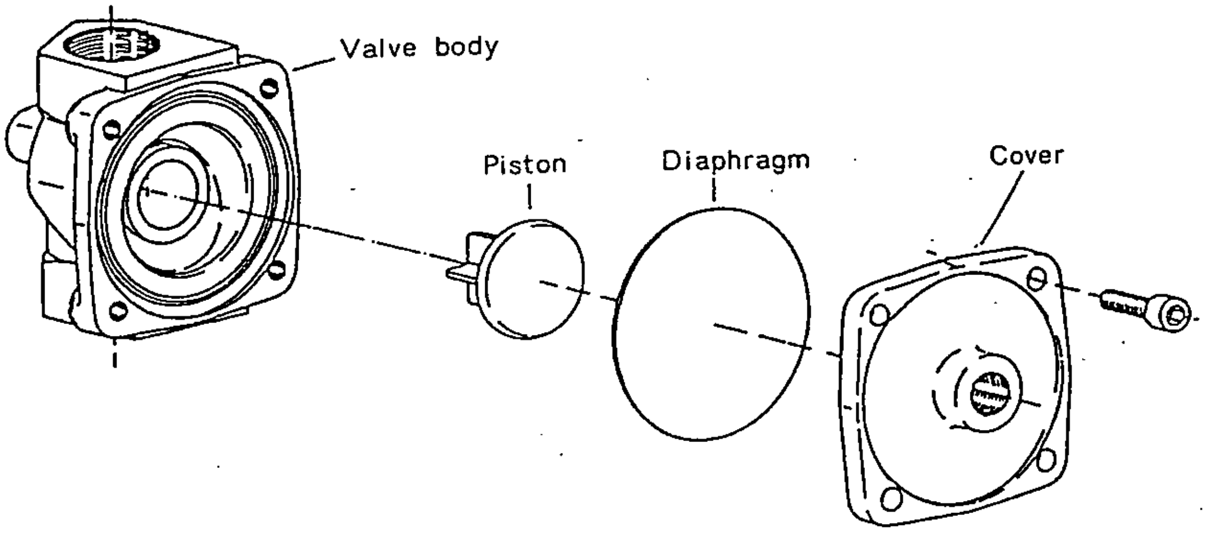
Controls flow of oil to the airend. This valve is activated by a solenoid coil and should always be open when the motor is running. It closes only when the unit shuts off to prevent oil from flooding the airend.

Compressor Mode	Valve Condition
Full-load	Open
Idle (WYE-time, or released start up time)	Open
Cut-off	Closed

Checking

- Be sure to always allow unit to complete one full-load/idle sequence before shutting the machine off. Avoid shutting off unit under full load. Allow unit to idle first if possible.
- Coil activates on 110 V AC. It may be tested with power from any standard outlet. To test coil disconnect leads from the No. 1 Motor Starter and apply power from external source. Coil should activate with an audible click.
- Check for power from No. 1 Motor Starter leads with motor running. If there is no power when motor is running then the starter may be defective.
- If coil activates, and there is power in the leads from the motor starter with the motor running, but the valve still does not operate, then check the diaphragm for rupture or blockage.

11.7 Vent valve (Discharge valve)



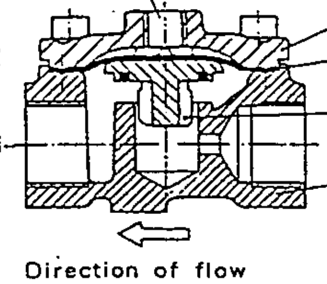
Function

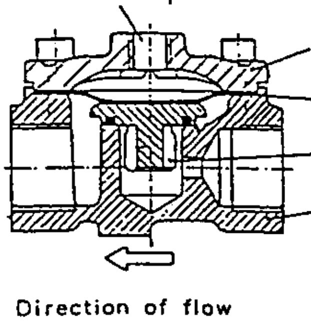
To discharge the system pressure during idle and cut-off. It is necessary to discharge pressure during idle to reduce motor load, thus saving energy. The system must be discharged when shut off because starting the compressor against pressure will damage the motor.

Compressor Mode	Valve Condition
Full-load	Closed
Idle (WYE-time, or released start up time)	Open
Cut-off	Open

Checking

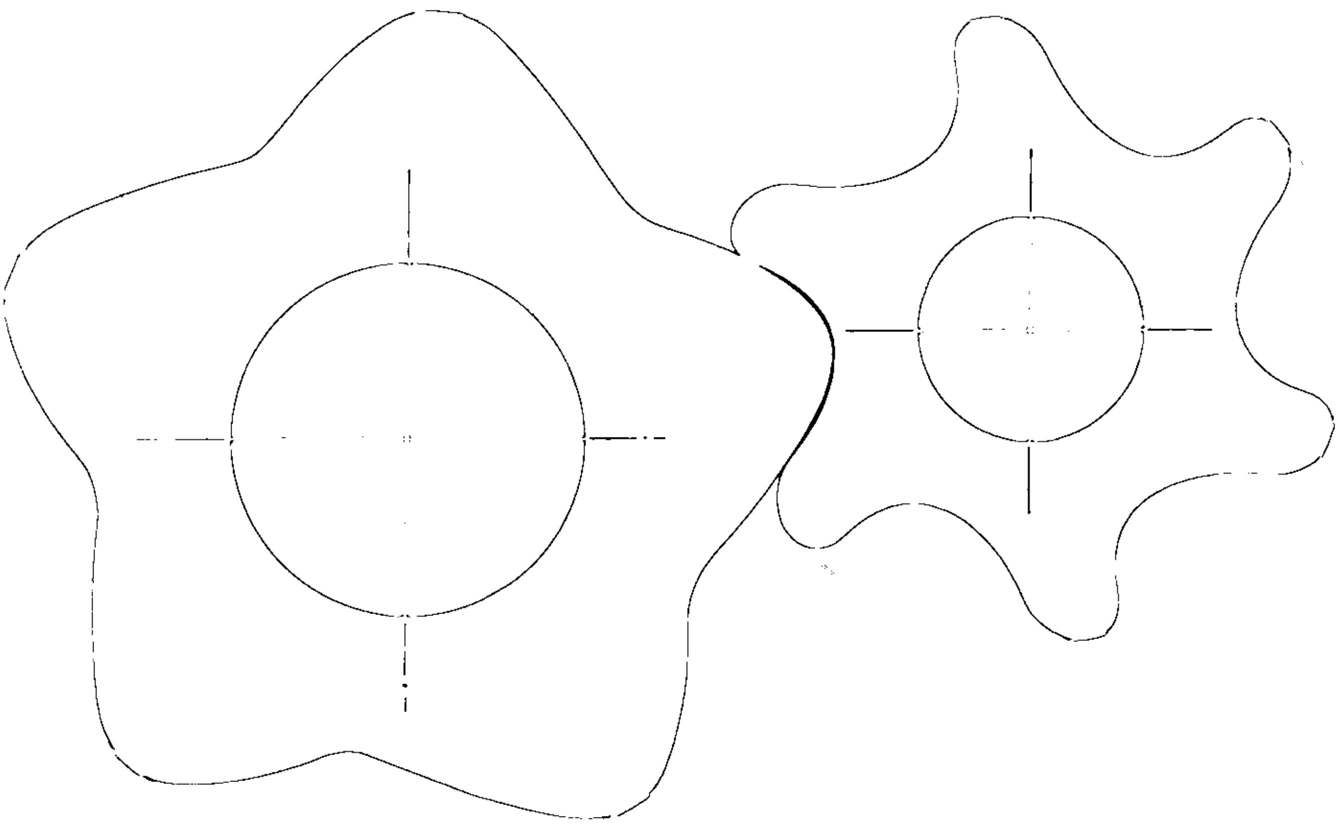
- Close ball cock valve in the discharge line.
- Start unit, allow to idle, and shut off immediately.
- If the vent valve diaphragm is defective the inlet valve will operate. Replace the diaphragm if it is defective.





KAESER
KOMPRESSOREN

Ersatzteilliste
Parts manual
Notice pièces de rechange



SIGMA-PROFIL

AS 30

AS 35

KAESER - Control

A 31

B 30

C 30

D 33

KAESER COMPRESSORS, INC.
511 Sigma Drive • P.O Box 946 • Fredericksburg, Virginia 22404
Tel. (540) 898-5500 • Fax. (540) 898-5520

KAESER COMPRESSORS

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KAESER COMPRESSORS

SECTION 1 INTRODUCTION

1. FOREWORD

This manual is provided for the operator's use and reference when ordering parts. An illustrated parts breakdown is included for identification. All compressor parts meet the manufacturer's highest quality used in the manufacture of the original equipment.

2. DESCRIPTION

The parts breakdown lists every part, assembly and sub-assembly of the compressor unit. Each part is idendified with a number. The location of and relationship between parts are clearly illustrated. Questions pertaining to the number, description and quantities needed for each assembly are dealt with in the following pages.

3. TO ORDER PARTS

When ordering parts, furnish the following information to prevent any error:

- Model designation and serial number of the unit as shown on compressor nameplate.
- Reference number, part number, description and quantity required as listed.

4. RECOMMENDED SPARE PARTS LIST

A recommended spare parts list is provided at the end of this manual. The list indicates the description, part number, the quantity used in the compressor, and minimum quantities which should be carried to ensure maximum protection of the compressor. The recommended spare parts inventory to be kept on hand varies according to the location of the nearest distributor, and is broken down as follows:

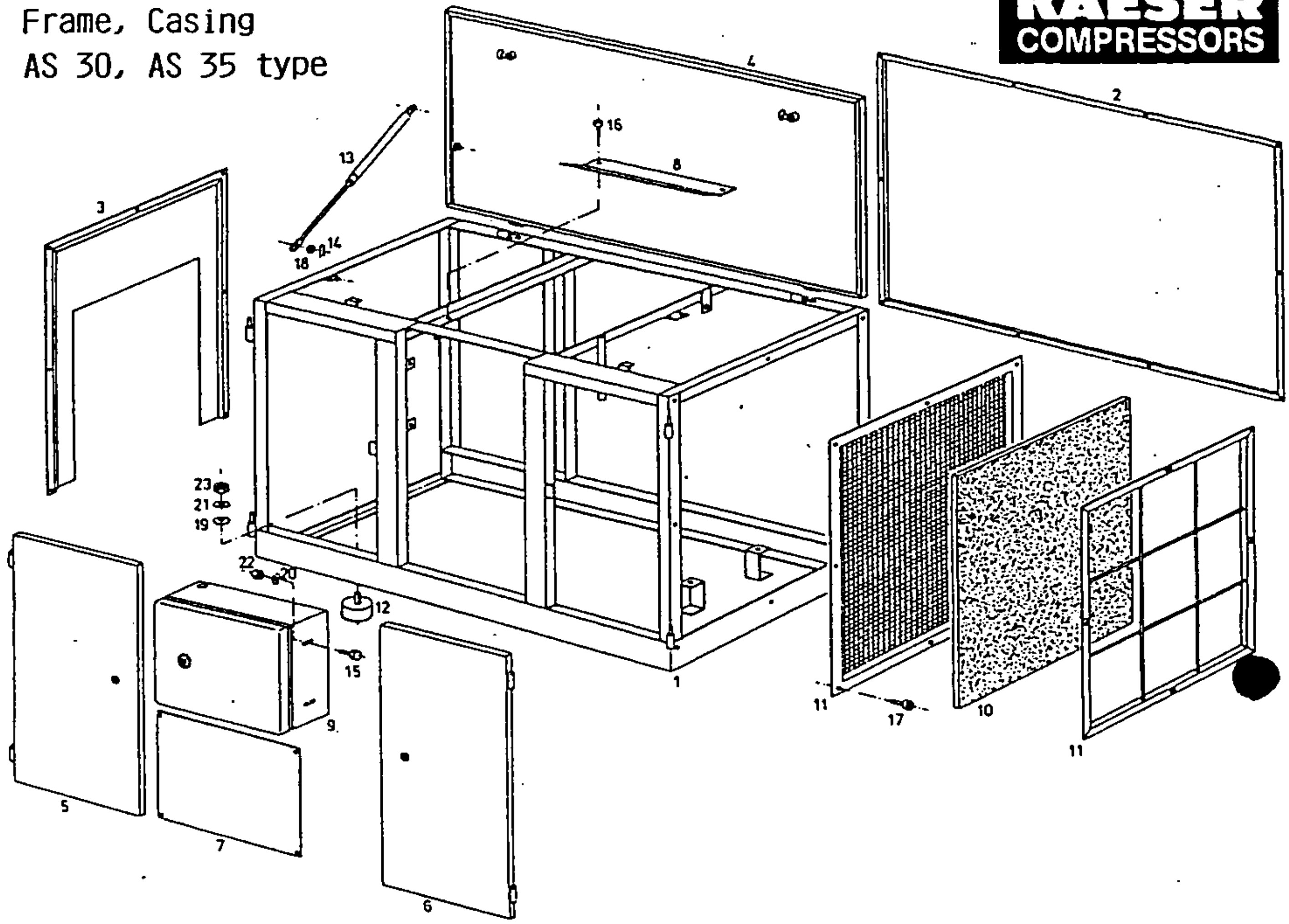
A. Local distributor
B. Nearby distributor
C. Remote distributor.

5. CAUTION

NEVER use parts other than the ones appreoved by the manufacturer and listed in this parts manual. The use of parts not appreoved by the manufacturer may result in hazardous conditions, over which the manufacturer has no control, bodily injury, and damage to the compressor unit. Such action would invalidate the manufacturer's warranty of the compressor unit.

Frame, Casing
AS 30, AS 35 type

KAESER COMPRESSORS

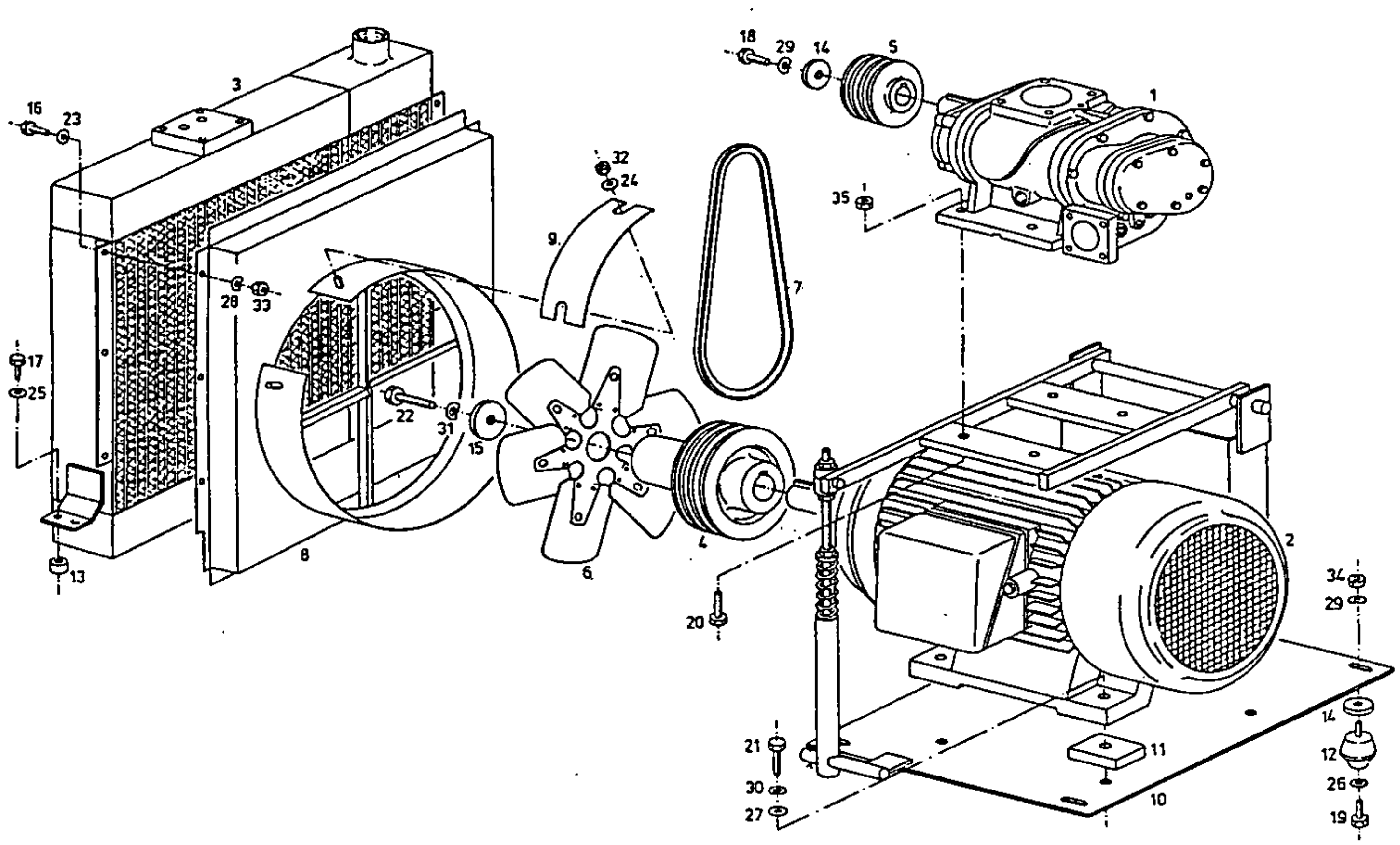


	Ref.	Qty	Part No.	Description
	1	1	4.9313.0	Frame
	2	1	4.8203.0	Casing
	3	1	4.7034.1	Casing
	4	1	4.8202.0	Door
	5	1	4.7036.1	Door
	6	1	4.7037.1	Door
	7	1	4.8204.0	Cover plate
	8	1	4.8201.0	Cover plate
1)	9	1	7.2303.2	Controller
2)	9	1	7.2304.2	Controller
	10	1	6.1943.0	Filter mat
	11	1	4.9259.0	Quick-change frame
	12	4	6.1343.0	Anti-vibration pads dia. 15/16 x 2 3/16"
	13	1	5.1331.0	Gas spring
	14	2	5.1330.0	Split pin
	15	4	6.0800.0	Hec.-hd. screw M 5 x 15
	16	2	6.0897.0	Philips head screw M 4 x 10
	17	29	6.0916.0	Philips head screw M 5 x 10
	18	2	6.0623.0	Washer
	19	4	6.0625.0	Washer
	20	4	6.0651.0	Spring washer
	21	4	6.0655.0	Spring washer
	22	4	6.0681.0	Hex. nut M 5
	23	4	6.0686.0	Hex. nut M 12
				1) Compressor Unit AS 30
				2) Compressor Unit AS 35

A31

Driving system
AS 30, AS 35 type

KAESER COMPRESSORS



Ref.	Qty	Part No.	Description
1	1	1.3849.2	Screw compressor Sigma 1a
1-3) 2	1	7.0028.0	Motor, 3-phase 18,5 kW, 230/460 V
4-6) 2	1	7.0030.0	Motor, 3-phase 22 kW, 230/460 V
1-3) 3	1	5.1071.20010	Cooler
4-6) 4	1	4.7711.0	Motor pulley dia. 8 1/4
4	1	4.7712.0	Motor pulley dia. 8 1/4
1) 5	1	4.9867.0	Compressor pulley dia. 6 3/16
2) 5	1	4.9869.0	Compressor pulley dia. 6 7/8
3) 5	1	4.9870.0	Compressor pulley dia. 7 15/16
4) 5	1	4.7297.0	Compressor pulley dia. 5 5/16
5) 5	1	4.9871.0	Compressor pulley dia. 6 1/32
6) 5	1	4.9872.0	Compressor pulley dia. 6 7/8
6	1	4.9190.0	Fan wheel
1) 7	1	6.2506.0	Set of v-belts
2) 7	1	6.2506.0	set of v-belts
3) 7	1	6.2507.0	Set of v-belts
4) 7	1	6.2509.0	Set of v-belts
5) 7	1	6.2501.0	Set of v-belts
6) 7	1	6.2501.0	Set of v-belts
8	1	4.7144.2	Fan case
9	1		Cover plate
10	1	4.7079.1	Swing frame
1-3) 11	4	4.7593.0	Steel plate
12	4	6.1328.0	Base of the machine
13	4	4.1287.0	Distance sleeve
14	5	5.0427.0	Disk
15	1	4.7592.0	Disk
16	6	6.0721.0	Hex. hd. screw M 6 x 20
17	4	6.0727.0	Hex. hd. screw M 8 x 25
18	1	6.0762.0	Hex. hd. screw M 10 x 25
19	4	6.0763.0	Hex. hd. screw M 10 x 30
20	4	6.0768.0	Hex. hd. screw M 12 x 40

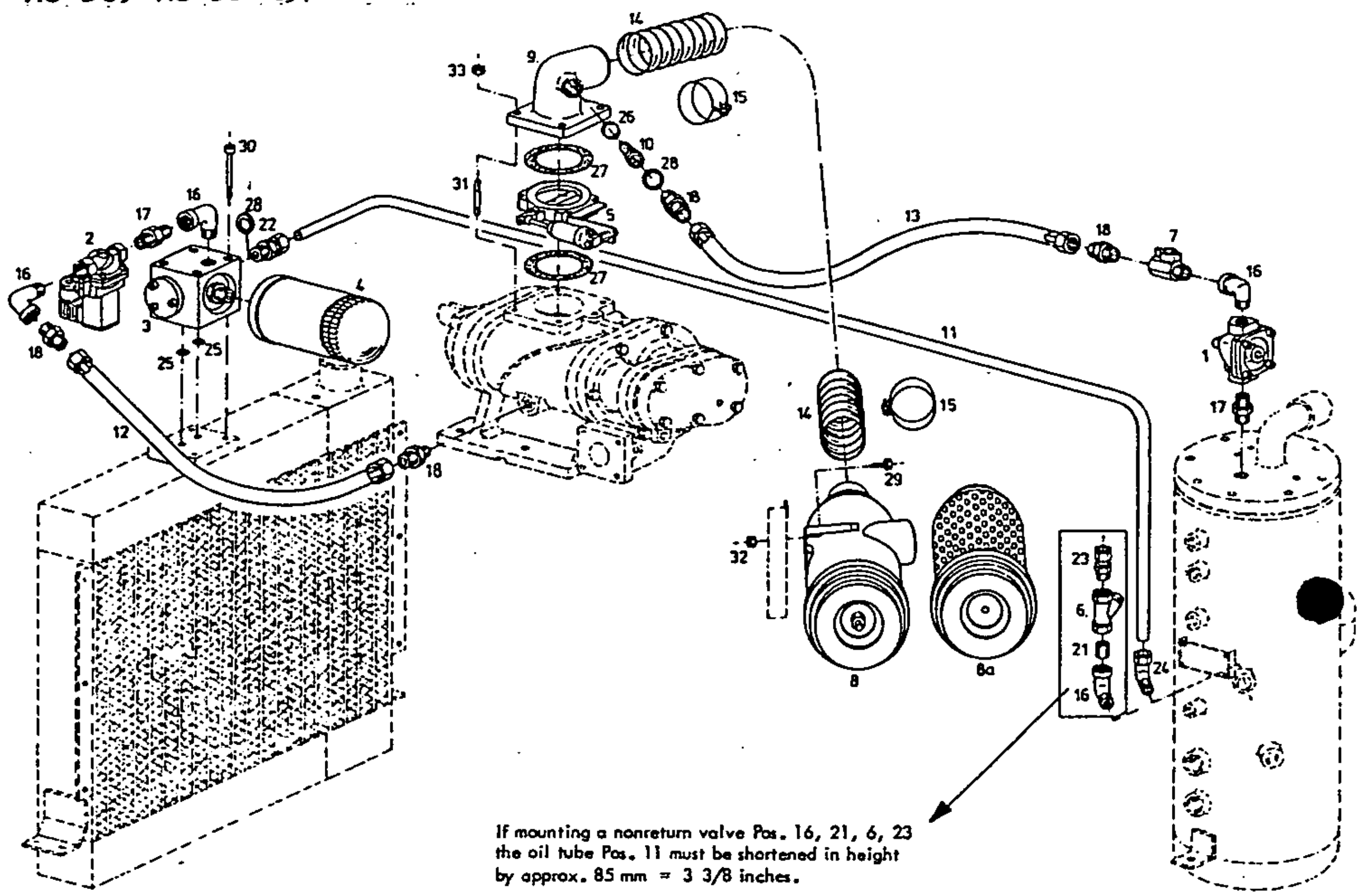
Ref.	Qty	Part No.	Description
1-3) 21	4	6.0783.0	Hex. hd. screw M 12 x 70
4-6) 21	4	6.0794.0	Hex. hd. screw M 12 x 50
1-3) 22	1	6.0783.0	Hex. hd. screw M 12 x 70
4-6) 22	1	6.0781.0	Hex. hd. screw M 16 x 70
23	6	6.0622.0	Washer
24	2	6.0630.0	Washer
25	4	6.0631.0	Washer
26	4	6.0624.0	Washer
27	4	6.0633.0	Washer
28	6	6.0652.0	Spring washer
29	5	6.0654.0	Spring washer
30	4	6.0655.0	Spring washer
1-3) 31	1	6.0655.0	Spring washer
4-6) 31	1	6.0657.0	Spring washer
32	2	6.0681.0	Hex. nut M 5
33	6	6.0682.0	Hex. nut M 6
34	4	6.0685.0	Hex. nut M 10
35	4	6.0686.0	Hex. nut M 12

1) Unit AS 30; 110 psig
2) Unit AS 30; 145 psig
3) Unit AS 30; 190 psig
4) Unit AS 35; 110 psig
5) Unit AS 35; 145 psig
6) Unit AS 35; 190 psig

B30

Oil tubes, Vent lines
AS 30, AS 35 type

KAESER COMPRESSORS



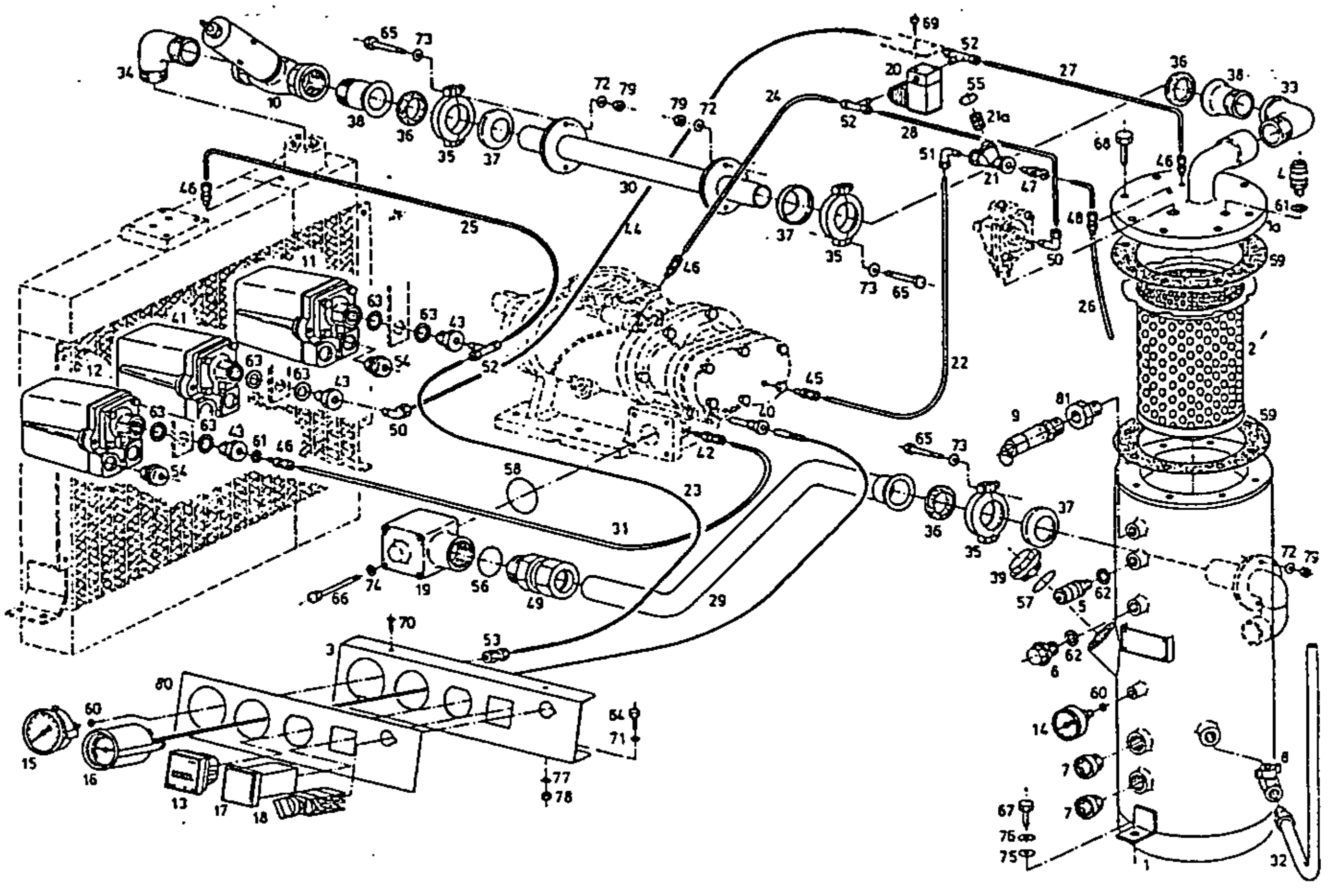
Ref.	Qty	Part No.	Description
1	1	4.7340.0	Vent valve G 1/2"
2	1	2.0701.0	Oil stop valve G 1/2 compl. pasted with pos. 17/16 and 18
3	1	4.8865.1	Combination valve
4	1	6.1985.0	Filter cartridge
5	1	4.7386.1	Inlet valve
1) 6	1	8.0283.0	Check valve G 1/2"
7	1	8.0259.0	Ball cock G 1/2"
8	1	6.1909.0	Air filter complete
8a	1	6.2000.0	Filter cartridge
9	1	4.7304.2	Air intake filter support
10	1	6.1972.0	Sinter filter
11	1	4.8198.1	Tube
12	1	8.0864.0	Hose line G 1/2" x 19 11/16"
13	1	8.0806.1	Hose line G 1/2" x 16 8/16"
14	1	9.1079.0	Hose G 2 1/2" x 16 8/16"
15	2	9.0656.0	Wide-band clamp
1) 16	4	6.1112.0	Angle G 1/2"
17	2	6.1030.1	Fitting G 1/2"
18	4	5.0784.0	Double nipple G 1/2"
19			
20			
1) 21	1	5.0811.0	Thread nipple G 1/2"
22	1	6.0269.0	Pipe fitting G 1/2"
1) 23	1	6.0237.0	Pipe fitting G 1/2"
24	1	6.0257.0	Angle fitting G 1/2"
25	2	5.1474.0	O-ring dia. 16 x 3
26	1	5.1448.0	O-ring dia. 15 x 2
27	2	5.0555.1	Gasket for inlet valve
28	1	6.1524.0	Gasket G 1/2"
29	2	6.0720.0	Hex.hd. screw M 6 x 15
30	4	6.2407.0	Cylinder screw with inside hex. M 6 x 85
31	4	5.0497.0	Stud M 8 x 55

Ref.	Qty	Part No.	Description
32	2	6.0682.0	Hex. nut M 6
33	4	6.0684.0	Hex. nut M 8
			1) Compressor Unit AS 30, 190 psig AS 35, 190 psig (and Quadro)

C30

KAESER COMPRESSORS

Control tubes
Compressed air tubes
AS 30, AS 35 type



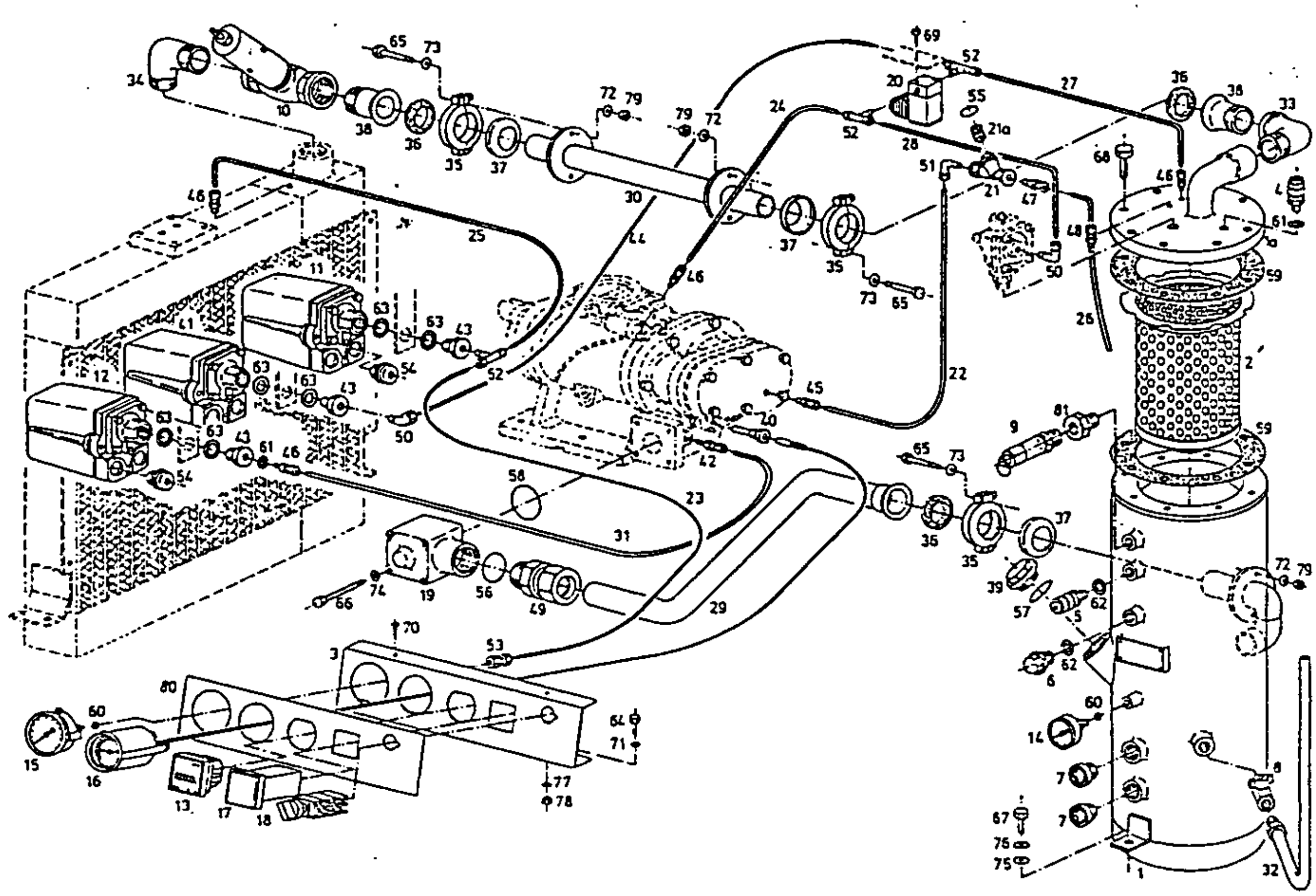
Ref.	Qty.	Part No.	Description
1	1	3.6113.0	Tank 8 gal. 220 psig compl. with 1a
1a	1	4.7234.2	Cover
2	1	6.1963.0	Oil separator cartridge
3	1	4.7453.2	Instrument panel
4	1	9.0843.0	Hose coupling G 1/4
5	1	9.0844.0	Hose coupling G 3/8
6	1	6.0501.0	Locking screw G 3/8
7	2	6.0105.0	Oil sight gaiss G 3/4
8	1	8.0259.0	Ball cock G 1/2
9	1	8.2002.0	Safety valve G 1/2, 130 psig
9	1	8.2008.0	Safety valve G 3/8, 165 psig
9	1	8.2009.0	Safety valve G 1/2, 165 psig
9	1	8.2014.0	Safety valve G 3/8, 230 psig
10	1	4.7333.0	Minimum pressure check valve G 1 1/4
11	1	7.0220.0	Pressure switch 115 psig
11	1	7.0221.0	Pressure switch 230 psig
12	1	7.0219.0	Pressure switch
13	1	7.0784.0	Hour meter
14	1	8.0018.0	Pressure gauge 0-360/220 psig
15	1	8.0137.0	Pressure gauge 0-145/110 psig
15	1	8.0136.0	Pressure gauge 0-230/145 psig
15	1	8.0138.0	Pressure gauge 0-230/190 psig
16	1	8.0197.0	Distance thermometer
17	1	7.1092.00020	Malfunction relay
18	1	7.0426.0	Switch
19	1	4.7392.0	Check valve
20	1	2.0711.0	Solenoid valve compl. pasted with Pos. 50 and 52
21	1	8.0381.0	Dirt trap G 1/4
21a	1	8.0394.0	Dirt trap strainer
22	1	9.0616.0	Control tube dia. 1/4"x13 1/2"
23	1	9.0616.0	Control tube dia. 1/4"x15 3/8"

Ref.	Qty.	Part No.	Description
24	1	9.0616.0	Control tube dia. 1/4"x15 3/8"
25	0,74	9.0616.0	Control tube dia. 1/4"x 29 1/8"
26	1	4.8195.0	Suction tube dia. 1/4"
27	0,235	9.0616.0	Control tube dia. 1/4" x 9 1/4"
28	0,260	9.0616.0	Control tube dia. 1/4"x 10 1/4"
29	1	4.4340.0	Air tube
30	1	4.8194.0	Air tube
31	0,55	9.0616.0	Control tube dia. 1/4"x 21 5/8"
32	1	8.0890.0	Hose line DN 1/2"x 29 1/2"
33	1	5.8085.0	Angle G 1 1/4
34	1	6.1097.0	Angle G 1 1/4
35	3	5.1124.0	Tension clamp complete
36	3	5.1390.0	Gasket ring
37	3	5.1120.0	Support for gasket ring
38	2	4.8192.0	Sleeve
39	1	6.0519.0	Locking screw G 1 1/4
40	1	5.0929.0	Protection sleeve G 3/8
41	1	7.0218.0	Pressure switch
42	1	6.1716.0	Pipe fitting M 12 x 1.5
43	3	5.0846.0	Reducing socket G 1/2 x G 1/8
44	0,56	9.0616.0	Control tube 1/4" x 22 1/8"
45	1	6.0231.0	Pipe fitting R 1/8
46	4	6.0246.0	Pipe fitting R 1/8
47	1	6.0234.0	Pipe fitting R 1/4
48	1	4.8199.0	Pipe fitting R 1/4
49	1	6.0241.0	Pipe fitting G 1 1/4
50	2	6.0266.0	Angle fitting R 1/8
51	1	4.7937.0	Angle fitting R 1/4
52	3	6.0344.0	T Pipe fitting R 1/8
53	1	6.0390.0	Pipe fitting G 1/4
54	3	7.0673.0	Plug PG 16
55	1	5.1443.0	O-ring dia. 20 x 2.5
56	1	5.1468.0	O-ring dia: 38 x 2.5
57	1	5.1455.0	O-ring dia. 47 x 2

EL - 4/1

Control tubes
Compressed air tubes
AS 30, AS 35 type

KAESER COMPRESSORS

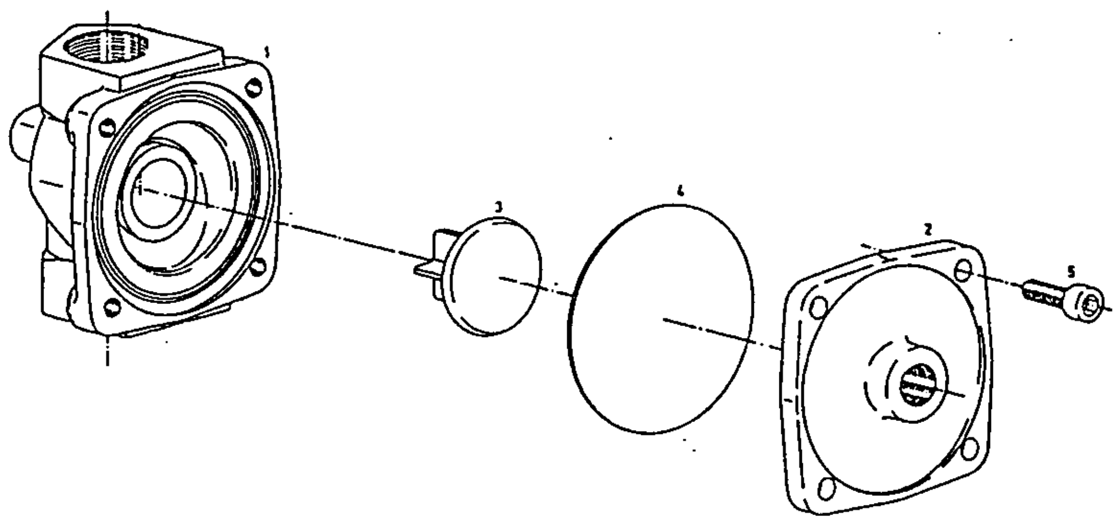


Ref.	Qty.	Part No.	Description
58	1	5.1459.0	O-ring dia. 55 x 2
59	2	5.0556.0	Gasket for tank
60	2	6.0470.0	Gasket for pressure gauge G 1/4
61	2	6.0432.0	Gasket G 1/4
62	3	6.1521.0	Gasket G 3/8
63	6	6.0438.0	Gasket G 1/2
64	2	6.0800.0	Hex.-head screw M 5 x 15
65	6	6.2218.0	Hex.-head screw M 6 x 65
66	4	6.0735.0	Hex.-head screw M 8 x 70
67	2	6.0806.0	Hex.-head screw M 10 x 25
68	8	6.0759.0	Hex.-head screw M 16 x 45
69	2	6.0890.0	Fillister head screw M 4 x 8
70	2	6.0861.0	Countersunk screw M 5 x 10
71	2	6.0621.0	Washer
72	6	6.0622.0	Washer
73	6	6.0630.0	Washer
74	4	6.0623.0	Washer
75	2	6.0624.0	Washer
76	2	6.0654.0	Spring washer
77	2	6.0660.0	Toothed lock washer
78	2	6.0681.0	Hex. nut M 5
79	6	6.2430.0	Hex. nut M 6
80	1	5.2270.0	Foil label
81	1	6.3207.0	Reducing socket G 1/2 x G 3/8
			1) Compressor Unit AS 30/35 110 psig
			2) Compressor Unit AS 30/35 145 psig
			3) Compressor Unit AS 30/35 190 psig
			4) Compressor Unit AS 30 145 psig

Ref.	Qty.	Part No.	Description
			5) Compressor Unit AS 35 145 psig
			Part 21a includet in the complete oil separating cartridge set No. 6.2011.0

Vent valve
4.7340.0

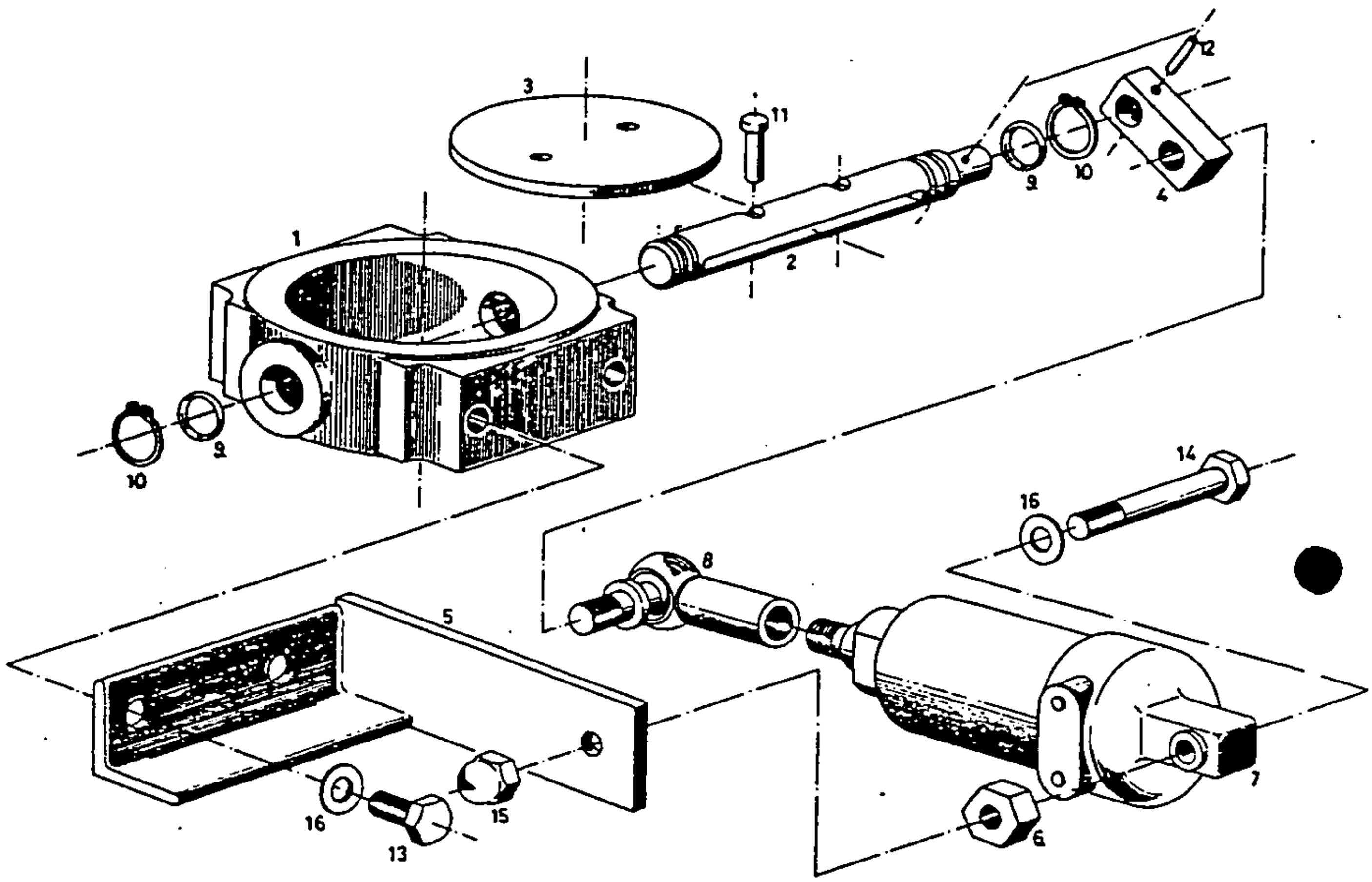
KAESER COMPRESSORS



Ref.	Qty	Part No.	Description
1	1	5.0996.0	Valve body
2	1	5.0997.0	Cover
3	1	4.9026.0	Piston complete
4	1	5.0999.0	Diaphragm
5	4	6.2408.0	Cylinder screw with inside hex. M 5 x 12

Inlet valve
4.7386.1

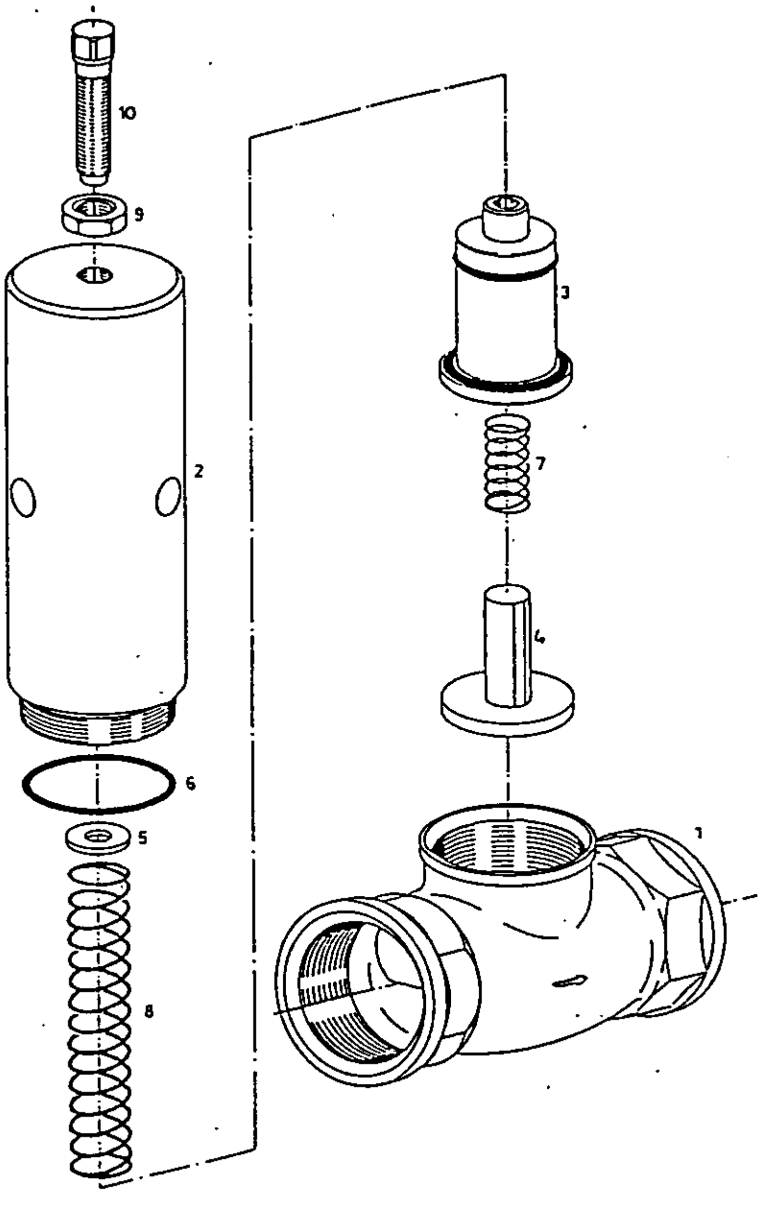
KAESER COMPRESSORS



Ref.	Qty	Part No.	Discription
1	1	4.8920.3	Valve body
2	1	4.8962.1	Shaft
3	1	5.0392.1	Disk
4	1	4.8964.0	Lever
5	1	4.8960.0	Support
6	1	4.8965.0	Hex. nut
7	1	7.0486.0	Working cylinder
8	1	7.0489.0	Angle joint
9	2	5.1465.0	O-ring dia 10x1
10	2	6.0541.0	Guard ring
11	2	4.7563.0	Rivet with button head
12	1	6.0609.0	Clamping sleeve
13	2	6.0720.0	Hex. hd. screw M 6 x 15
14	1	6.0723.0	Hex. hd. screw M 6 x 45
15	1	6.0701.0	Cap nut M 6
16	3	6.0622.0	Washer

Minimum pressure
check valve
4.7333.0

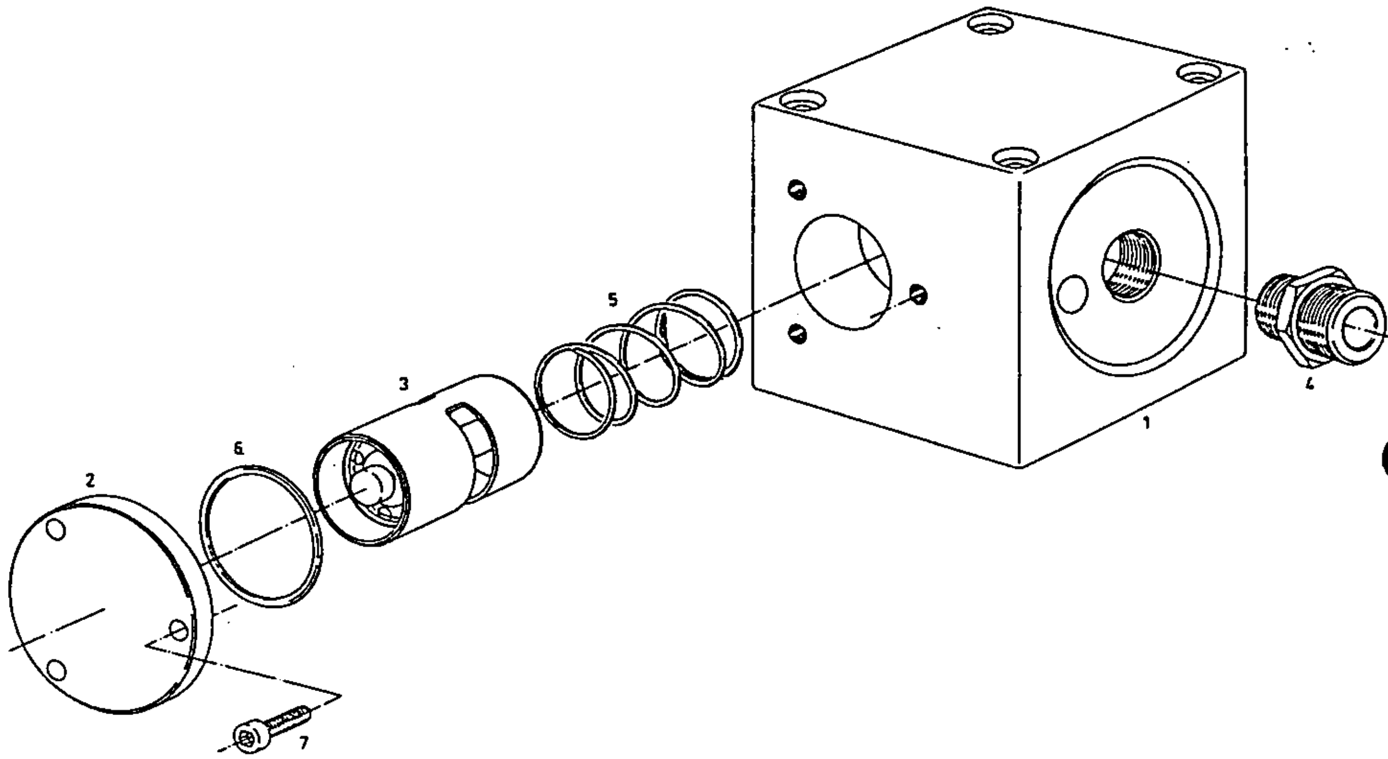
KAESER COMPRESSORS



Ref.	Qty	Part No.	Description
1	1	4.8579.0	Valve body G 1 1/4
2	1	4.8580.0	Cylinder
3	1	4.9025.0	Piston complete
3a	1	4.8534.0	Piston
4	1	4.9016.0	Valve disk complete
5	1	6.2372.0	Disk
6	1	5.1468.0	O-Ring dia 38 x 2,5
7	1	5.0643.0	Compression spring
8	1	5.0646.0	Compression spring
9	1	6.0685.0	Hex. nut M 10
10	1	6.0946.0	Square-head bolt M 10 x 35

Combination valve
4.8865.1

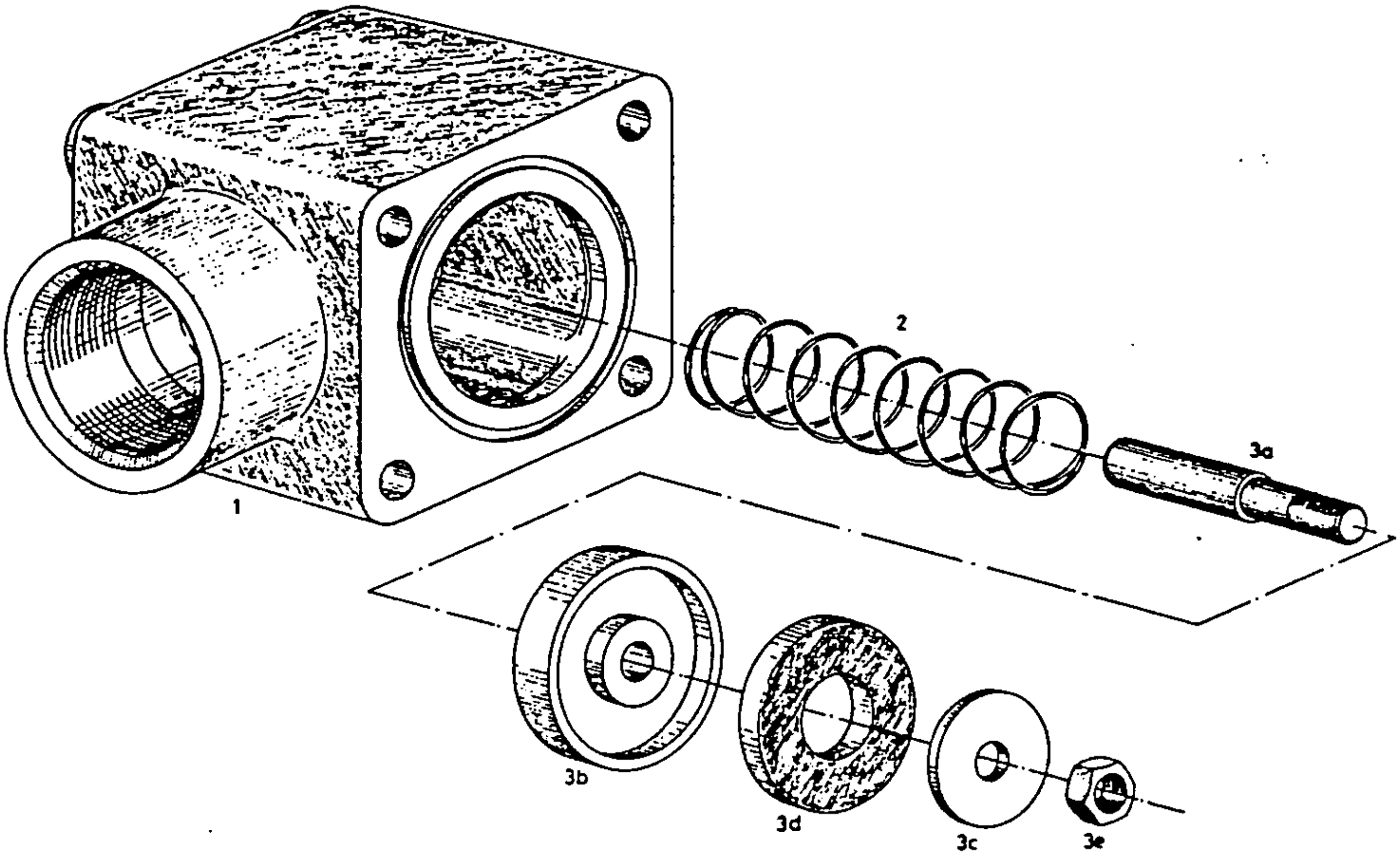
KAESER
COMPRESSORS



Ref.	Qty	Part No.	Discription
1	1	4.8862.0	Valve body
2	1	4.8875.0	Cover
3	1	7.0399.0	Actuating piston with working element
4	1	5.0775.0	Double nipple
5	1	5.0636.0	Compression spring
6	1	5.1445.0	O - ring dia. 35x2
7	3	6.2406.0	Cylinder screw with inside hex. M 5 x 16

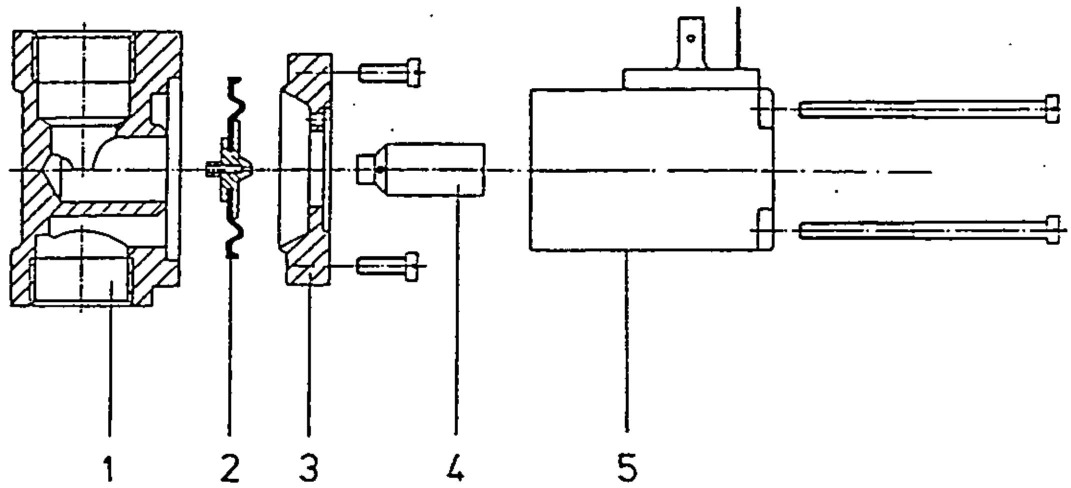
Check valve
4.7392.0

KAESER COMPRESSORS



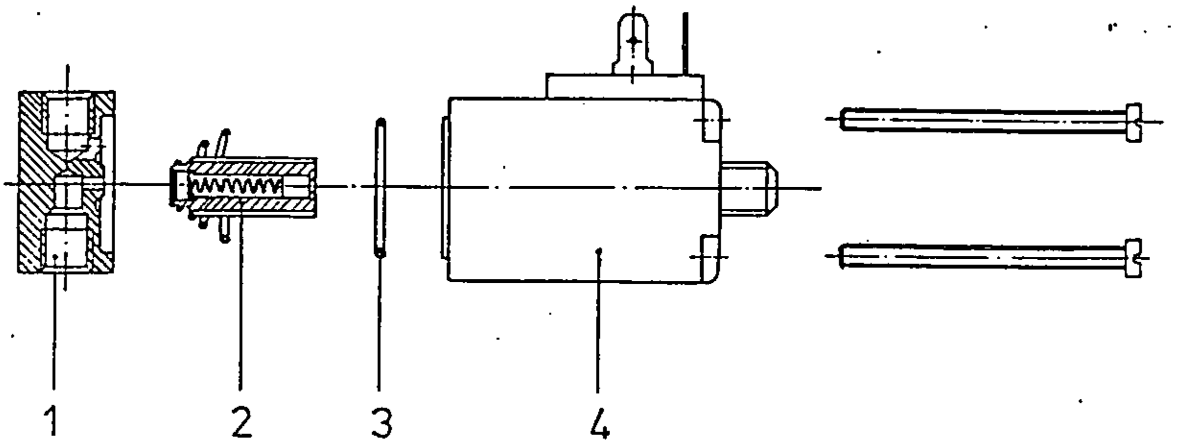
Ref.	Qty	Part No.	Discription
1	1	4.8903.0	Valve body
2	1	5.0616.0	Compression spring
3	1	4.9010.0	Valve disk complete ,
3a	1	4.8904.1	Guide bolt
3b	1	4.8905.2	Disk
3c	1	4.8907.1	Disk
3d	1	5.0563.1	Gasket
3e	1	6.0684.0	Hex. nut M 8

Oil stop valve
2.0701.0



Ref.	Qty.	Part No.	Description
1			Bottom of casing compl. pasted with fitting
2		7.1340.0	Diaphragm complete
3			Flange
4		7.0343.0	Core complete
5		7.1958.0	Coil complete

Control valve
2.0711.0



Ref.	Qty	Part No.	Description
1			Casing
2		7.0387.0	Armature
3		7.0344.0	O-Ring 25 x 1,5 Viton
4		7.1372.0	Coil

RECOMMENDED SPARE PARTS LIST

Model AS 30/35

DESCRIPTION	Part No.	Qty per unit	LOCATION Section	Ref.	Recommended Quantities A	B	C
Oil filter cartridge	6.1985.0	1	Oil tubes, vent lines	3	1	2	3
Oil separating cartridge	6.2011.0	1			1	1	2
Complete Set consists of							
- Oil separator cartridge	6.1963.0	1	Control tubes compressed air tubes	2			
- Gasket for tank	5.0556.0	2	Control tubes compressed air tubes	59			
- O-Ring dia. 20x2,5	5.1443.0	1	Control tubes Compressed air tubes	55			
- Dirt trap strainer	8.0394.0	1	Control tubes compressed air tubes	21a			
Air inlet filter cartridge	6.2000.0	1	Oil tubes, vent lines	8a	2	3	4
Filter mat	6.1943.0	1	Frame, casing	10	2	3	4
V-belt set AS 30/110 psig	6.2506.0	1	Driving system	7	1	1	2
V-belt set AS 30/145 psig	6.2506.0	1	Driving system	7	1	1	2
V-belt set AS 30/190 psig	6.2507.0	1	Driving system	7	1	1	2
V-belt set AS 35/110 psig	6.2509.0	1	Driving system	7	1	1	2
V-belt set AS 35/145 psig	6.2501.0	1	Driving system	7	1	1	2
V-belt set AS 35/190 psig	6.2501.0	1	Driving system	7	1	1	2
O-Ring dia. 16 x 3	5.1474.0	2	Oil tubes, vent lines	25	1	1	2
O-Ring dia. 15 x 2	5.1448.0	1	Oil tubes, vent lines	26	1	1	2
O-Ring dia. 38 x 2,5	5.1468.0	1	Control tubes, Compressed air tubes	56	1	1	2
O-Ring dia. 47 x 2	5.1455.0	1	Control tubes Compressed air tubes	57	1	1	2
O-Ring dia.55 x 2	5.1459.0	1	Control tubes, compressed air tubes	58	1	1	2
O-Ring dia. 10 x 1	5.1465.0	2	Inlet valve	9	1	1	2
O-Ring dia. 38 x 2,5	5.1468.0	1	Minimum pressure check valve	6	1	1	2
O-Ring dia. 35 x 2	5.1445.0	1	Combination valve	6	1	1	2
Gasket for inlet valve	5.0555.1	2	Oil tubes, vent lines	27	1	1	2

SECTION 3 RECOMMENDED SPARE PARTS LIST

Model AS 30/35

DESCRIPTION	Part No.	Qty per unit	LOCATION Section	Ref.	Recommended Quantities A	B	C
Gasket G 1/2	6.1524.0	1	Oil tubes, vent lines	28	1	1	2
Gasket ring	5.1390.0	3	Control tubes compressed air tubes	36	1	1	2
Gasket for tank	5.0556.0	2	Control tubes compressed air tubes	59	1	1	2
Gasket for pressure gauge G 1/4	6.0470.0	2	Control tubes compressed air tubes	60	1	1	2
Gasket G 1/4	6.0432.0	2	Control tubes, Control air tubes	61	1	1	2
Gasket G 3/8	6.1521.0	3	Control tubes Control air tubes	62	1	1	2
Gasket G 1/2	6.0438.0	6	Control tubes Control air tubes	63	1	1	2
Diaphragm	5.0999.0	1	Vent valve	4	1	1	2
Diaphragm	7.1340.0	1	Oil stop valve	2	1	1	2
Safety pressure switch	7.0219.0	1	Control tubes, Compressed air tubes	12	0	1	1
Pressure switch 115 psig	7.0220.0	1	Control tubes Compressed air tubes	11	0	1	1
Pressure switch 230 psig	7.0221.0	1	Control tubes Compressed air lines	11	0	1	1
Piston complete	4.9026.0	1	Vent valve	3	1	1	2
Piston complete	4.9025.0	1	Minimum pressure check valve	3	1	1	2
Valve disk complete	4.9016.0	1	Minimum pressure check valve	1	1	1	2
Valve disk complete	4.9010.0	1	Check valve	3	1	1	2
Compression spring	5.0616.0	1	Check valve	2	0	1	2
Compression spring	5.0643.0	1	Minimum pressure check valve	7	0	1	1
Compression spring	5.0646.0	1	Minimum pressure check valve	8	0	1	1

RECOMMENDED SPARE PARTS LIST

Model AS 30/35

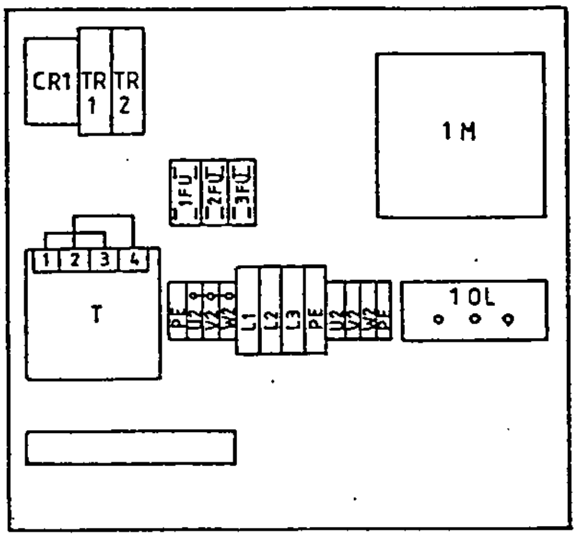
DESCRIPTION	Part No.	Qty per unit	LOCATION		Recommended Quantities		
			Section	Ref.	A	B	C
Compression spring	5.0636.0	1	Combination valve	5	0	1	1
Working element	7.0399.0	1	Combination valve	3	1	1	2
Vent valve complete	4.7340.0	1	Oil tubes, vent lines	1	0	0	1
Inlet valve	4.7386.0	1	Oil tubes, vent lines	5	0	0	1
Minimum pressure check valve	4.7333.0	1	Control tubes Compressed air tubes	10	0	0	1
Check valve	4.7392.0	1	Control tubes compressed air tubes	19	0	0	1
Combination valve	4.8865.1	1	Oil tubes, vent lines	3	0	0	1
Oil stop valve	2.0701.0	1	Oil tubes, vent lines	2	0	0	1
Control valve	2.0711.0	1	Control tubes, compressed air tubes	20	0	0	1

RECOMMENDED SPARE PARTS LIST

FOR ELECTRICAL EQUIPMENT

Model AS 30

Direct on-line start 230 V or 460 V



DESCRIPTION		Part No.	Qty-per unit	LOCATION USE	Recommended Quanties		
					A	B	C
1M	Motor starter with	7.3409.0	1	Control box	0	1	1
	Auxiliary switch			Control box	0	1	1
10L	Overload relay motor	7.3458.0	1	Control box	0	1	1
1	Base	7.3466.0	1	Control box	0	1	1
1,2,3FU	Fuse	7.3300.0	3	Control box	0	1	1
T	Transformer	7.2220.0	1	Control box	0	1	1
CR1	Control relay	7.2066.0	1	Control box	0	1	1
TR2	Time delay relay (delay off)	7.0467.0	1	Control box	0	1	1
TR1	Time delay relay (released start)	7.0466.0	1	Control box	0	1	1.

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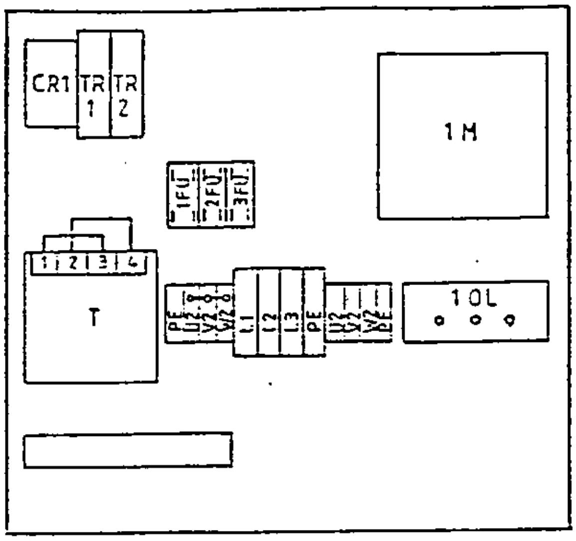
RECOMMENDED SPARE PARTS LIST
FOR ELECTRICAL EQUIPMENT
Model AS 35
Direct on-line start 230 V or 460 V



DESCRIPTION		Part No.	Qty-per unit	LOCATION USE	Recommended Quanties A	B	C
1M	Motor	7.2063.0	1	Control box	0	1	1
1OL	Overload relay motor	7.3459.0	1	Control box	0	1	1
1	Base	7.3466.0	1	Control box	0	1	1
1,2,3FU	Fuse	7.3300.0	3	Control box	0	1	1
T	Transformer	7.2220.0	1	Control box	0	1	1
CR1	Control relay	7.2066.0	1	Control box	0	1	1
TR2	Time delay relay (delay of)	7.0467.0	1	Control box	0	1	1
TR1	Time delay relay (released start)	7.0455.0	1	Control box	0	1	1

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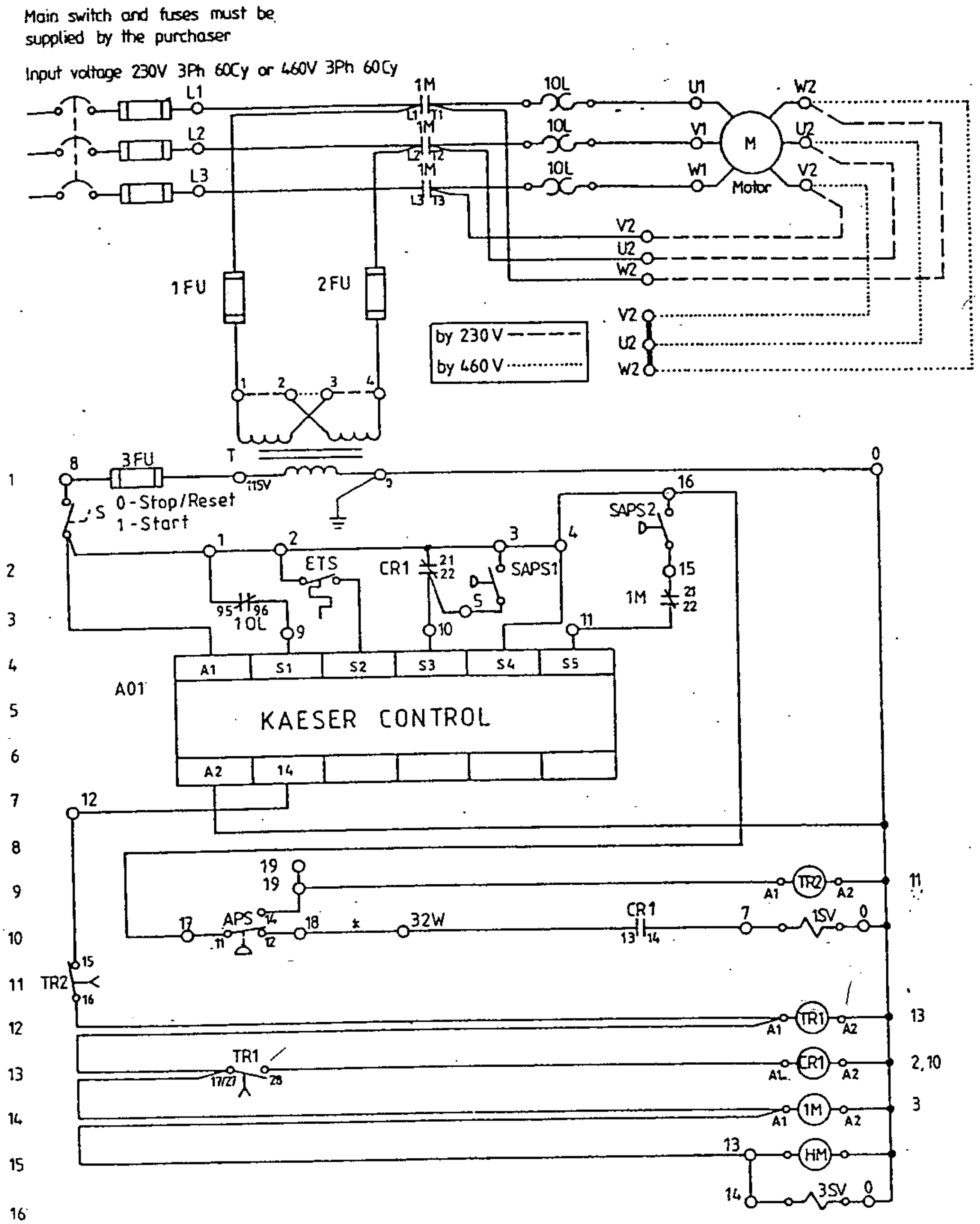
7. Wiring diagram for AS   Page 1
St 428.590



* For connection of automatic changeover remove the bridge !

2.0711.0