

# Functional description for GQ-Blower unit

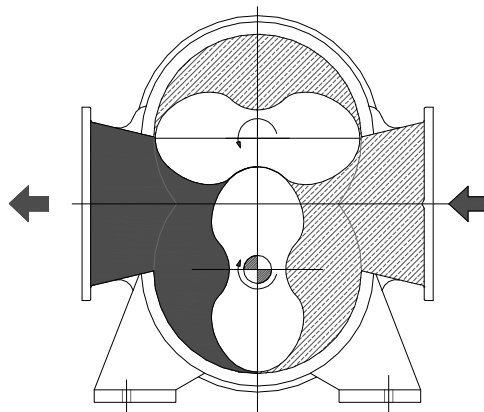
(type of construction: Roots-compressor)

The used abbreviations on the name plate have the following meaning:

P (KW)	=	power of compressor
$Q_1$ (m <sup>3</sup> /min)	=	volume flow
n (1/min)	=	operating speed of rotors
$p_1$ (bar)	=	intake pressure as absolute pressure
$p_{2e}$ (bar)	=	compressed discharge pressure (overpressure)
$\Delta p$ (mbar or bar)	=	differential pressure

Customer	:	ASCOTEC
Project	:	Gole Gohar
Order no.	:	-
Blower Type	:	GQa22.23xz / GQb22.23xz
Job no.	:	1. stage: (GQa..) 61-343334/00-02 & 61-345986/00
		2. stage: (GQa..) 61-343334/03/04 & 61-345986/00
		Cooling gas: (GQb..) 61-343334/05 & 61-345986/00

Issued:	Quast	Date:	06.11.12					
Revision	01	02	03	04	05	06	07	08
Date	12.12.2012							
Name	quast							



Adherence to all recommendations and instructions contained in this manual is a prerequisite to the safe and trouble-free operation of the blower. Consequently, it is of the utmost importance that this manual be made available to operating and maintenance personnel on time and in its entirety.

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### 1. General

1.1 Site conditions	
Country:	Iran
Ambient temperatures (min/max) :	-10°/ +40°C
Indoor, Outdoor installation:	Outdoor
Earthquake, acceleration:	0,3 x g
Installation high / atmospheric pressure:	1720 m / 0,831 bar a
Ex-Zone:	-
Ex-protection class:	-
Type of protection:	-

1.2 Gas analysis process gas							
Case			1	2	3	4	6
			1 <sup>st</sup> stage	2 <sup>nd</sup> stage	Cooling gas		
Nitrogen	N2	Vol. %	0,41	0,39	2,57	-	-
carbon monoxide	CO	Vol. %	21,27	20,12	1,82	-	-
carbon dioxide	CO2	Vol. %	19,43	18,38	1,96	-	-
Methan	CH4	Vol. %	4,23	4,00	41,20	-	-
Hydrogen	H2	Vol. %	41,97	39,69	49,15	-	-
Water	H2O	Vol. %	12,69	17,43	3,30	-	-
						-	-
Hydrogen sulfide	H2S	ppm	6	6	2	-	-
						-	-
						-	-
						-	-
				-	-	-	-
Total		%	100	100	100	-	-
Average Mol-weight		kg/kmol	-	-	-	-	-
Gaskonstante / Gas constant ®	R	J/(kg*K)	451	452	808	-	-
Isentropenexponent / Isentropic exponent (κ)	κ	-	1,368	1,365	1,360	-	-
Normdichte / Density Norm	ρN	kg/Nm³	-	-	-	-	-

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1.2.1 Auslegung / Design								
Fall / Case			1 Note 1	2	3	-	-	-
Ansaugtemperatur / suction temperature	t1	°C	51	74	40	-	-	-
Endtemperatur (trocken) / discharge temperature (dry)	t2	°C	-	-	-	-	-	-
Ansaugdruck / suction pressure	p1	bar a	1,081	2,106	2,131	-	-	-
Enddruck / discharge pressure	p2	bar a	2,12	3,264	2,999 <sup>3)</sup>	-	-	-
Ansaugvolumenstrom / Intake volume flow	Q1_ist	m³/h	81780	71100	103740	-	-	-
Normvolumenstrom / Norm volume flow (0°C; 1,013 bar a) Note 2)	QN	m³N/h	232584 /3	240246 /2	190300	-	-	-
Massenstrom / Mass flow	m	kg/h	-	-	-	-	-	-
Gebläsedrehzahl / blower speed	n_G	1/min	524	448	636	-	-	-
Antriebsdrehzahl Motor / driving speed motor	n_Mot	1/min	1500	1500	1500	-	-	-
Kupplungsleistung Gebläse/ power consumption	Pk	kW	2905	2723	3012	-	-	-
Endtemperatur (bis zur Sättigung) / discharge temperature (saturated)	t_2S	°C	74	88	54	-	-	-
Einspritzmenge / injection flow (approx.)	Q_WS	m³/h	3,21	3,08	2,601	-	-	-
Motorleistung (installiert) / motor rating	P_Mot	kW	3400	3000	3400	-	-	-
Toleranzen / tolerances								
Leistung / power		%	+5	+5	+5	-	-	-
Ansaugvolumenstrom / Intake volume flow		%	+5	+5	+5	-	-	-
Garantiepunkt / Guaranteed point		-	-	-	-	-	-	-
Note 1) 2 x 1 <sup>st</sup> stage								
Note 2) downstream discharge silencer incl. water injection								
Note 3) downstream blower; corresponding to 2,0 bar g downstream discharge silencer								

1.2.2 Cooling water			
	Medium	Cooling water	
	Pressure_p	bar g	2 - 3
	Temperature inlet t E min/norm/max	°C	28
	Outlet temperatur_t A	°C	33
	Fouling factor	m²K/kW	-
	Consumption	m³/h	10,0
	Analyse	Is not available	
1.2.3 Sealing water			
	Medium	-	
	Pressure p min/norm/max	bar g	2,8/-/3,8
	Temperature inlet t min/norm/max	°C	-
	Temperature outlet tmin/max	°C	-
	Consumption Vmax	m³/h	-
	Analyse	Is not available	

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1.2.4 Injection water			
	Medium	Injection water	
	Pressure p min/norm/max	bar g	4,3/-/4,9
	Temperature inlet t min/norm/max	℃	-
	Consumption V	m^3/h	2,6
	Analyse	Is not available	
1.2.5 Seal air Not required!			
	Medium	-	
	Pressure p min/norm/max	mbar g	-
	Temperature t min/norm/max	℃	-
	Pressure dew point	℃	-
	Consumption V	Nm^3/h	-
1.2.6 Seal gas Not required!			
	Medium	-	
	Pressure p min/norm/max	bar g	-
	Temperature t min/norm/max	℃	-
	Pressure dew point	℃	-
	Consumption V min/norm/max	Nm^3/h	-
1.2.7 Instrument air Not required!			
	Medium		-
	Pressure p min/norm/max	bar g	-
	Temperature t min/norm/max	℃	-
	Pressure dew point	℃	-
	Consumption V	Nm^3/h	-
1.2.8 Auxiliary Power			
High voltage	Voltage	kV AC	6,6
	Frequency	Hz	50
Low voltage	Voltage	V AC	400
	Frequency	Hz	50
Control voltage	Voltage	V AC / V DC	110 / 24
	-	-	-
1.2.9 Lube oil, seal oil See operating instruction blower and gear box.			
	-	-	-
	-	-	-

## Functional description for GQ Blower unit

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### 2. Unit components

The blower unit consists of the following main components:

Blower, gearbox, driving motor, one discharge silencer, sliding sleeves with pipe connections, one oil supply unit for the blower and one oil supply unit for the gearbox.

#### 2.1 Installation

Blower, gearbox, driving motor and silencer are mounted on the concrete foundation by means of base plates and anchor bars. The oil units for blower and gearbox are mounted separately on the foundation.

#### 2.2 Blower

The positive displacement blower of this series is a two-lobe blower (Type GQ).

Upon rotation of the pistons the gas is transported via the forming chamber between piston and cylinder wall from intake- to discharge side and leaks against the discharge pressure.

Due to synchronizing gear wheels on the gear case side a trouble-free run of the pistons without contacting each other is achieved. The radial forces resulting from the gas power are picked up by cylindrical roller bearings on the drive side and the wheel side. Axial fixing as well as adjustment of clearances are effected on the wheel side by means of QJ-bearings. The separation of the conveying room from the oil chambers is done by a labyrinth and an oil-purged single-acting mechanical seal. Bearings, gear wheels and mechanical seal are supplied with oil by a circulation pressure lubrication. At drive shaft seal rings with grease trap serve as sealing to atmosphere.

Prior to delivery the positive displacement blowers are subject to a detailed test run with connecting performance measurement.

The blower units are provided with a name plate indicating the exact designation, serial number and all essential performance data.

Direction of flow: horizontal from right to left (looking onto driving journal).

Direction of rotation: clockwise (looking onto driving journal)

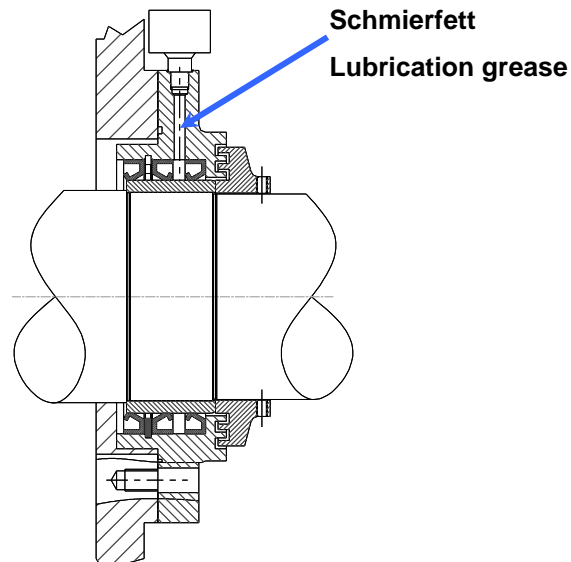
Materials	GQa22.23xz	GQb22.23xz
Cylinder and side plates:	EN-GJS-400-18-LT	EN-GJS-400-18-LT
Pistons:	EN-GJL-200	1.4317
Shaft:	42CrMo4	42CrMo4
Gear case / housing cover:	EN-GJS-400-15	EN-GJS-400-15

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### 2.2.1 Sealing to atmosphere (driving shaft)

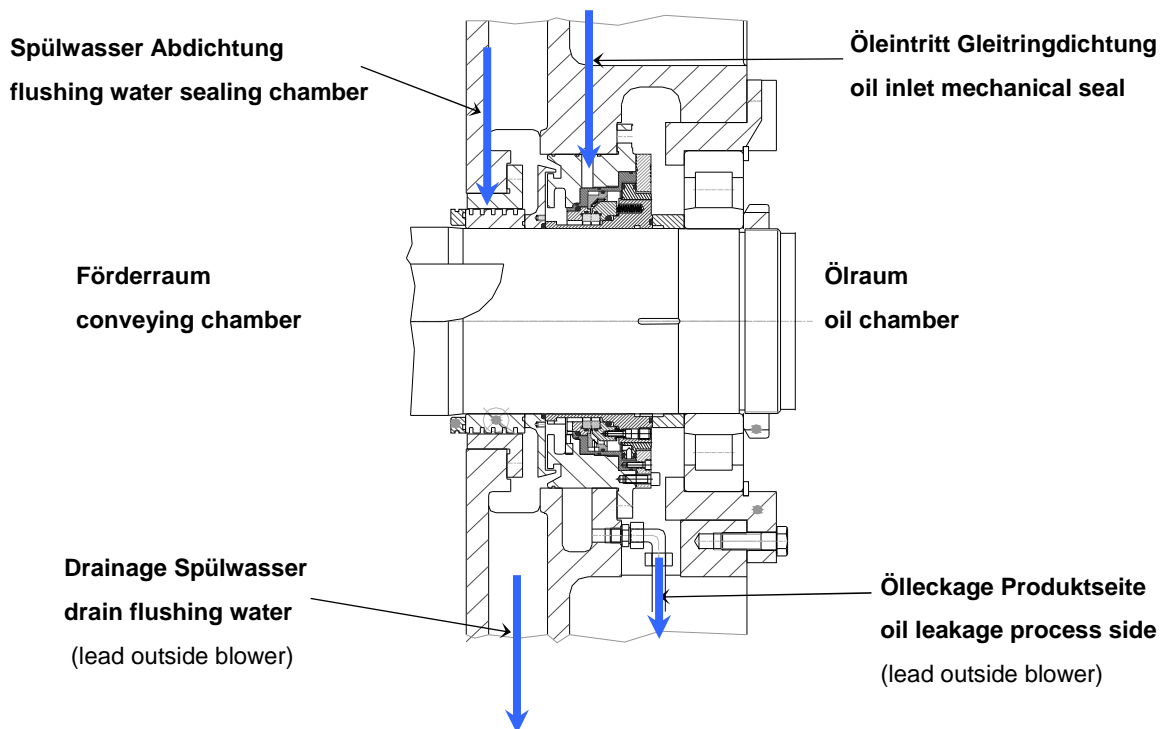
The sealing to atmosphere at drive shaft is effected by shaft seal rings with grease trap.

(Regreasing intervals see operating manual)



### 2.2.2 Sealing at conveying chamber (mechanical seal)

The sealing between conveying chamber and oil chambers is effected by labyrinths and oil-purged single acting mechanical seals.



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## Functional description for GQ Blower unit

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### 2.2.3 Contact protection

The blower is equipped with thermal contact protections (passive resistances).

Axial: one in the side plate / driving side; one in the side plate / wheel side.

Radial: one in cylinder / discharge side for driving rotor; one in cylinder / discharge side for female rotor.

In case of a faulty axial as well as radial displacement of the pistons it comes to a contact between pistons and feeler peak and consequently to an increase of the pipe resistance.

After a contact the corresponding feeler unit must be exchanged.

Each the two electrical cables are wired in series in a junction box.

Via suitable evaluation units these must be processed electrically at site.

## 2.3 Pipes and corresponding installations (P&I: PG-00766, PG-00767)

### 2.3.1 Process gas pipes (S1, S2)

The suction-sided process gas pipe provided by the customer is connected to the suction socket of the blower via pipe connections and sliding sleeve. Between suction flange and pipe connection a starting strainer is installed.

The discharge side of the blower is connected to the discharge-sided silencer also via pipe connections and sliding sleeve.

This silencer is installed horizontally. The inlet and outlet are horizontally. The connection to the piping provided by the customer is also effected via pipe connections and sliding sleeve.

The inlet of the silencer is equipped with a diffuser insert.

**The piping provided by the customer must be connected in such a way, that the max. admissible forces and movements (caused e.g. by heat expansion) are not exceeded.**

#### Pressure protection conveying pipe:

On the **discharge side** safety facilities (e.g. safety relief valve) are to be provided at site, opening and relieving upon exceeding the max. admissible operating pressure. These serve for pressure protection of blower, pipes and reservoir.

#### 2.3.1.1 Suction strainer

The starting strainer / suction strainer is **not** monitored by a differential pressure measurement. After commissioning, if it is sure, that no coarse contamination (welding beads etc.) can penetrate into the blower via the suction pipe, the gaze wire **must** be removed.

#### 2.3.1.2 Sliding sleeves

The sliding sleeves do not transmit any forces and torques. Only axial movements can be recorded, i.e. the pipes provided by the customer must be fixed accordingly.

#### 2.3.1.3 Silencer discharge side

On the silencer a drain is provided by means of which the accumulating water / condensate must be drained.

**At site the customer has to provide a suitable constantly drain (preferably: dipping basin), by means of which the accumulating liquid is drained without gas leakage!**



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### 2.3.2 Injection water pipe (S4)

Water is injected into the suction socket of the blower via 2 injection facilities. This injection serves for keeping the discharge temperature at saturation temperature and for washing away contamination deposits in the conveying chamber and on the rotors.

Injection water pressure:	1 <sup>st</sup> stage:	approx.	3,9- 4,6 kg/cm <sup>2</sup> (g)	
	2nd stage:	approx.	4,6- 5,4 kg/cm <sup>2</sup> (g)	
	Cooling gas:	approx.	3,6- 3,8 kg/cm <sup>2</sup> (g)	
Injection water quantity:	1 <sup>st</sup> stage:	approx.	53 - 56	l/min
	2nd stage:	approx.	51 - 54	l/min
	Cooling gas:	approx.	41 - 43	l/min

#### 2.3.2.1 Solenoid valve (at site)

The water injection is activated via the solenoid valve.

- closed at zero current

#### 2.3.2.2 Strainer

In the injection water supply line a strainer, keeping back coarse particles, is to be provided. A corresponding water quality must be available.

### 2.3.3 Flushing water (S3)

Between conveying chamber and mechanical seal a labyrinth seal is available.

**This seal must be flushed at regular intervals (once per shift for 15 min) with water.**

#### Flushing water pressure (middle pressure + (1,0 to 2,0) kg/cm<sup>2</sup>)

1 <sup>st</sup> stage:	approx.	1,8-2,8 kg/cm <sup>2</sup> (g)
2nd stage:	approx.	2,8-3,8 kg/cm <sup>2</sup> (g)
Cooling gas:	approx.	2,7-3,7 kg/cm <sup>2</sup> (g)

#### 2.3.3.1 Solenoid valve

The flushing water supply is activated via the solenoid valve (see above).

- closed at zero current

#### 2.3.3.2 Double filter

In the common supply pipe, upstream of the distribution onto the four labyrinth seals, a double filter is to be provided. One filter is continuously in operation, the other one standby.

### 2.3.4 Drainage conveying chamber (S5)

Via the drainage pipe the excessive water with the washed out contamination is drained off. This water/condensate must drain off freely. **There must be no backpressure into the blower.**

The existing pressure approx. corresponds to the medium pressure ( $p_m = (\text{discharge pressure} + \text{intake pressure}) / 2$ ).

**At site the customer has to provide a suitable constantly drain (preferably: dipping basin), by means of which the accumulating liquid is drained without gas leakage!**

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### 2.3.5 Drainage conveying chamber / Aersil chamber (S9)

Via the drainage pipe water is also drained off. This water must drain off freely. **There must be no backpressure into the blower.**

The existing pressure corresponds to the discharge pressure.

**At site the customer has to provide a suitable constantly drain (preferably: dipping basin), by means of which the accumulating liquid is drained without gas leakage!**

### 2.3.6 Drainage sealing (S28)

Via the drainage pipe the flushing water of the labyrinth seal is drained off. This water must drain off freely. **There must be no backpressure into the blower.**

The existing pressure approx. corresponds to the medium pressure ( $p_m = (\text{discharge pressure} + \text{intake pressure}) / 2$ ).

### 2.3.7 Oil leakage mechanical seal (S12)

The oil leakage of the four mechanical seals to the process side is collected within the blower and led to the outside via four internal pipes. Outside the blower these pipes are combined and led into a drain reservoir.

#### 2.3.7.1 Oil leakage drain reservoir

The oil drain reservoir is designed with integrated float. In case of increasing oil level the internal admission valve opens and in case of decreasing oil level the admission valve closes to the pipe provided by the customer.

The existing pressure approx. corresponds to the medium pressure ( $p_m = (\text{discharge pressure} + \text{intake pressure}) / 2$ ).

### 2.3.8 Flushing gas connections (S8, S11)

At the blower connections for flushing pipes (provided by customer) are provided.

Via these pipes the conveying chamber (S11) and the oil chambers on the driving and wheel side (S8) can be flushed at standstill with inert gas.

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## Functional description for GQ Blower unit

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### 2.4 Oil supply

#### 2.4.1 Oil unit blower

This includes the following items:

- Oil tank which even serves for receiving all the components.
- two electrical oil pumps, one in operation the other one as standby.
- each an oil pressure regulating valve on the discharge side of the oil pumps to guarantee a constant lube- and seal oil pressure of approx. 1,5-2,5 kg/cm<sup>2</sup> above the **max. middle pressure** of the blower. (values see **Instrument List**)
- Each a non-return valve downstream of the oil pressure regulating valve preventing a return flow into the oil reservoir via the standby-pump.
- A double oil filter with change-over fitting making a filter change during operation possible.
- Oil heater
- Oil temperature control valve (automatic)
- an expansion valve in cooling water feed
- a flow measuring unit in cooling water return
- cooling water feed (S6)
- cooling water return (S7)
- filling connection (S23)
- Deaeration pipe connection (S24): at the deaeration connection a riser must be installed, through which in case of damage of the mechanical seal process gas flowing into the oil system can escape.

The oil temperature downstream of the cooler is regulated by the oil temperature control valve (approx. 45 - 55 °C).

#### 2.4.2 Oil unit gearbox

This includes the following items:

- Base frame which serves for receiving all the components.
- two electrical oil pumps, one in operation the other one as standby.
- each an oil pressure regulating valve, on the discharge side of the oil pumps to guarantee a constant lube oil pressure of approx. 0,5-0,8 kg/cm<sup>2</sup>.
- Each a non-return valve downstream of the oil pressure regulating valve preventing a return flow via the standby-pump.
- A double oil filter, with change-over fitting making a filter change during operation possible.
- Oil temperature control valve (automatic)
- one expansion valve, in cooling water feed.
- one flow measurement in cooling water return.
- cooling water feed (S26)
- cooling water return (S27)

The oil temperature downstream of the cooler is regulated by the oil temperature control valve (approx. 45 - 55 °C).

## Functional description for GQ Blower unit

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Upon filling of the oil unit/pipes care has to be taken, that the complete system is deaerated (**see operating manual**).

### 2.5 Drive

#### 2.5.1 Driving motor (supplied by customer)

Direction of rotation when looking on drive journal motor: **clockwise**

The electric motor is fixed directly on the foundation by means of base plates and anchor bars.

##### 1<sup>st</sup> stage:

Manufacturer	:Helmke
Type	:DKK630-04 01
Rated Power	:3400 kW
Input speed	:1495 1/min

##### 2nd stage:

Manufacturer	:Helmke
Type	:DKK560-04 01
Nominal Power	:3000 kW
Input speed	:1494 1/min

##### Cooling gas:

Manufacturer	:Helmke
Type	:DKK630-04 01
Nominal Power	:3400 kW
Input speed	:1495 1/min

#### 2.5.2 Gearbox motor – blower

The gearbox is fixed directly on the foundation by means of base plates and anchor bars.

- Cooling by separate oil unit with pressure oil circulating lubrication.
- Oil heater in oilsump gearbox

Direction of rotation when looking on drive journal gearbox: **counter clockwise**

##### 1<sup>st</sup> stage:

Manufacturer	:HANSEN
Type	:QHPJ1S-RLN-2,85
Nominal Power	:3400 kW
Input speed	:1495 1/min
Output speed	:524,56 1/min
Ratio	:1 : 2,85

## Functional description for GQ Blower unit

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### 2nd stage:

Manufacturer	:HANSEN
Type	:QHPJ1S-RLN-3,409
Nominal Power	:3000 kW
Input speed	:1494 1/min
Output speed	:438,25 1/min
Ratio	:1 : 3,409

### Cooling gas:

Manufacturer	:HANSEN
Type	:QHPJ1S-RLN-2,348
Nominal Power	:3400 kW
Input speed	:1495 1/min
Output speed	:636,77 1/min
Ratio	:1 : 2,348

### 2.5.3 Couplings

It is mandatory to check the exact alignment of the components prior to commissioning!

The coupling guard is stipulated in the "UVV "(regulations for prevention of accidents issued by German employer's liability insurance association) as contact protection and needs to be mounted prior to commissioning.

#### 2.5.3.1 Gearbox - blower:

##### 1<sup>st</sup> stage:

Manufacturer	:KTR
Technical design	:Flexible bolt coupling
Type	:REVOLUX KX 265

##### 2nd stage:

Manufacturer	:KTR
Technical design	:Flexible bolt coupling
Type	:REVOLUX KX 265

### Cooling gas:

Manufacturer	:KTR
Technical design	:Flexible bolt coupling
Type	:REVOLUX KX 265

## Functional description for GQ Blower unit

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### 2.5.3.2 Main motor – gear box:

#### 1<sup>st</sup> stage:

Manufacturer	:KTR
Technical design	:all -steel coupling
Type	:RADEX N 208-NANA1

#### 2nd stage:

Manufacturer	:KTR
Technical design	:all -steel coupling
Type	:RADEX N 208-NANA1

#### Cooling gas:

Manufacturer	:KTR
Technical design	:all -steel coupling
Type	:RADEX N 208-NANA1

## Functional description for GQ Blower unit

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### 3. Instrumentation

- See Instrument List: 61-343334\_00\_il, 61-343334\_03\_il, 61-343334\_05\_il

**Note:**

All shutdowns function without delay. During each shutdown, oil pressure must exist at the mechanical seal.

All shutdowns must be self-holding, i.e. a system that has shut down due to a fault can only be restarted after the fault message has been erased and the fault has been rectified by the operating personnel.

## Functional description for GQ Blower unit

### 4. Functional course

#### General:

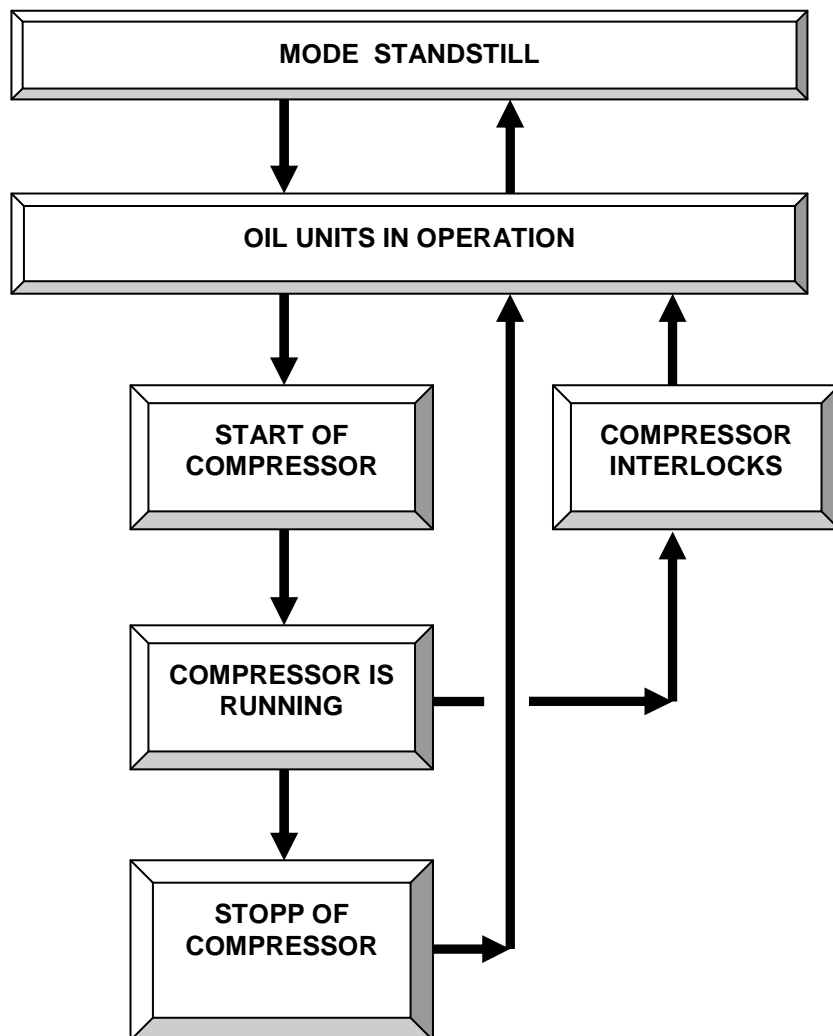
In the suction-sided process gas pipe upstream of each stage from the side of the customer a deaeration connection must be provided. (see P&I PG-00766, PG-00767)

**Furthermore the blower must be run dry or inerted (N<sub>2</sub>) prior to each standstill!**

#### Process gas pipes:

Filling of the pipes with process gas must only be effected if the seal- and lube oil supply for the blower is activated!!

Filling of the pipes must be effected slowly, there must be no pressure difference between intake- and discharge side!





## Functional description for GQ Blower unit

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### STANDSTILL – MODE (Process pipes are depressurized and either inertized or filled with air)

#### PRE-START-UP CONDITION FOR OIL UNITS

1. → Main motor (-) is switched off.
  2. → Solenoid valves (injection water) and (flushing water) are closed.
  3. → Lube & seal oil pumps blower (2.11.1 or 2.11.2) are switched off
  4. → Lube oil pumps gear box (2.11.51 or 2.11.52) are switched off
  5. → Oil level in oil reservoir blower (LS 2.13.6) O.K. (>LAL)
  6. → Filling level box gear (LG 2.13.7) O.K. (visual check at local)
  7. → Oil level in oil gear box (LG 7.13.62) O.K. (visual check at local)
- Lube & seal oil pump blower and lube oil pump gear box can now be switched on.

#### START-UP OF OIL UNITS

Start lube & seal oil pump blower (2.11.1 or 2.11.2) &

Start lube oil pump gear box (2.11.51 or 2.11.52).

→ Select the non running pumps as the "STAND BY" Pump.

Oil pumps (blower and gear box) are running (by means of pressure regulating valve PSV 2.9.4, PSV 2.9.5, PSV 2.9.54, PSV 2.9.55 the necessary oil pressure is regulated)

#### STOP-UP OF OIL UNITS

The oil units shall only be stopped by the operator when the compressor is depressurized.

#### PRE-START-UP CONDITION FOR COMPRESSOR

Oil Pumps (blower and gear box) have to be in operation for at least 3 minutes to make sure that all oil pipes are filled.

To pressurize the compressor, the lube & seal oil supply compressor must be activated (oil pump has to be in operation for at least 3 minutes to make sure that all oil pipes are filled).

1. → Hand valves at compressor gas suction side shall be open (in the field).
2. → Bypass Valve (-) shall be open
3. → Cooling water shut off valves for oil cooler blower and gearbox oil cooler shall be opened (necessary cooling water quantities shall be manually adjusted by means of regulating valves).
4. → Lube & seal oil pump blower (2.11.1 or 2.11.2) must run.
5. → Lube oil pump gear box (2.11.51 or 2.11.52) must run.
6. → Solenoid valves (injection water) and (flushing water) have to be closed.
7. → Oil heater oil unit blower is switched on.
8. → Oil heater gearbox is switched on.
9. The operator shall check that all drain line isolation valves are open (in the field).

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The following conditions shall be considered by the DCS

10. → Oil pumps blower (2.11.1 or 2.11.2) and gear box (2.11.51 or 2.11.52) running time > 3 minutes &
11. → Oil feed temperature blower > TAL 2.13.4 &
12. → Oil feed temperature gear > TAL 2.13.54 &
13. → Bypass Valve (-) must be open &
14. → Lube & seal oil pressure blower > PAL 2.13.14 &
15. → Lube oil pressure gear box > PAL 2.13.64 &
16. → Solenoid valve injection water (XV 5.10.5) is closed &
17. → Solenoid valve flushing water (XV 5.10.3) is closed &
18. → Main motor release for starting &
19. → Spin down time of compressor is over (5 minutes) &
20. → No alarm conditions &

The compressor is now ready to be started

### 1. Step: starting main motor

#### START-OF COMPRESSOR

1. → Start main motor (by operator)
2. → Open Solenoid valve injection water (XV 5.10.5)

#### COMPRESSOR IS RUNNING

##### Operation of Flushing water valve XV 5.10.3

→ Solenoid valve flushing water (XV 5.10.3) shall be opened once per shift (by operator). The valve will be closed automatically by the DCS after 15 minutes.

The operator shall take care that the drainage system is in a condition to securely drain the additional water during flushing.

##### Operation of compressor- and gear-box oil system

###### a) Transfer to the Stand-By oil pump by operator

During operation of the compressor the stand by pumps (Blower 2.11.1 or 2.11.2 and gear box 2.11.51 or 2.11.52) must be brought into OPERATOR-Mode to allow the operator to start this pump. The start of this pump will put both pumps to run in parallel.

The operator has now the possibility to stop any of the two pumps as long as the oil pressure is above the according low alarm. Before stopping a pump the operator shall make sure that the other pump is operating normally (check of local pressure gauges, etc.).

The operator shall stop one of the oil pumps and put the stopped pump back into Stand-By-mode.

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## Functional description for GQ Blower unit

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### **b) Automatic Start of Stand-By oil pump**

Under the following conditions the Stand-By pump will start:

- Trip of the running pump or
- Oil pressure low alarm (for blower oil unit: PAL 2.13.14 / for gear box oil unit: PAL 2.13.64)

When the Stand-By pump is started, the DCS will change the mode for this pump to OPERATOR.

### **Stopping of the oil pumps**

The DCS system will not allow the operator to stop a single running oil pump unless:

- The compressor is stopped &
- The compressor run down time has expired

The operator shall keep the compressor oil systems in operation until (process pipes are depressurized) and (Process pipes either inertized or filled with air)

-Cooling water for compressor and gear box can be switched off. (Attention: Drain cooling water!!)

### **TRIP condition of the Compressor**

#### **TRIP OF THE COMPRESSOR**

##### **1. Step: forced switching off of blower or via trip signal**

- switch off main motor &
- injection water valve will be closed (XV 5.10.5) &
- flushing water valve will be closed (XV 5.10.3)

Spin down time of compressor will be initiated (5 minutes)

#### **COMPRESSOR IS STOPPED**

The operator shall keep the compressor oil systems in operation until (process pipes are depressurized) and (Process pipes either inertized or filled with air)

#### **STOP OF THE COMPRESSOR BY OPERATOR**

switch off main motor (by operator)

injection water valve will be closed (XV 5.10.5) &

flushing water valve will be closed (XV 5.10.3)

Spin down time of compressor will be initiated (5 minutes)

The operator shall keep the compressor oil systems in operation until (process pipes are depressurized) and (process pipes either inertized or filled with air)

## Functional description for GQ Blower unit

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### 5. Commissioning

#### 5.1 Test run driving motor

Separate motor from gearbox and check direction of rotation of motor according to arrow placed at blower.

**The check of direction of rotation of the motor must not be effected with coupled machine as a return stop is installed at the gearbox or the blower must not run in reverse!**

Pay attention to smooth running of motor. Afterwards reconnect motor and gearbox.

**The alignment of all the coupling halves (motor – gearbox, gearbox – blower) must be checked  
→ see operating manual**

#### 5.2 Test run unit

The blower must only be started at standstill. The corresponding oil pressures (oil unit blower: medium pressure + 1,5 to 2,5 kg/cm<sup>2</sup> oil unit gearbox: **(see operating manual manufacturer gearbox)** must be observed.

Furthermore please pay attention, that the maximum data indicated on the name plate are not exceeded.

### 6. Shutdown

Switch off driving motor.

If switching-off is carried out during conveyance against counter-pressure, the blower is slowed down by the counter-pressure and stops relatively quickly. The non-return flap installed at the gearbox prevents a running in reverse of the blower, caused by the gas differential pressure (between suction- and discharge socket).

At longer standstill periods, the fuses of the driving motor are to be removed, in order to prevent an unintentional starting of the blower.

### 7. Appendix

Further information concerning the components used, such as gearbox, coupling, measuring units etc. can be taken from the operating manuals of the manufacturers.

### After-Sales service / address

Hotline: phone 8-16 h: 05154/81-529

16-24 h: 0171/3511834

Fax: 05154/81-191

Shipping address: Aerzener Maschinenfabrik GmbH

Dept.: AS

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