RAW WASTE
WATER PUMP
P-104

SALSNES
FILTER

12.7

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OWNER'S (OPERATOR'S) MANUAL AND SAFETY INSTRUCTIONS FOR CB SERIES CHAIN HOIST (MODEL M3)

BEFORE USING THIS PRODUCT :

ALWAYS SAVE THIS BOOK FOR FUTURE REFERENCE

ALWAYS READ OWNER'S (OPERATOR'S) MANUAL AND SAFETY INSTRUCTIONS

⚠ WARNING : IMPROPER chain hoist use could result in death or serious injury. To avoid these hazards:

: NEVER hoist loads over or near people.
: NEVER work under or near hoisted loads.

: ALWAYS operate, inspect, and maintain this hoist in accordance with applicable safety codes and regulations.

These safety instructions contain important information to help you use the chain hoist in a safe manner. Please refer to this Owner's (Operator's) Manual for additional safety information.

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DEFINITION

⚠ WARNING : indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

1. BEFORE USE

1.1 Safety Summary

Danger exists when heavy loads are transported, particularly when the equipment is not being used properly or is poorly maintained. Because accidents and serious injury could result, special safety precautions apply to the operation, maintenance and inspection of the Manual Chain Hoist.

Following these simple rules can help to avoid hoisting accidents;

⚠ WARNING : IMPROPER chain hoist use could result in death or serious injury. To avoid these hazards:

NEVER use a hoist for lifting, supporting or transporting people.

NEVER lift or transport loads over or near people.

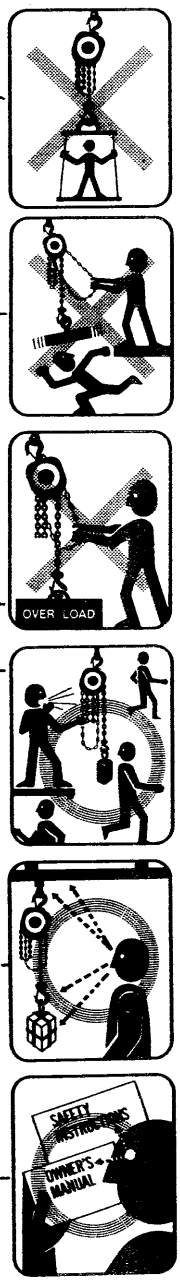
NEVER work near or under hoisted loads.

NEVER lift more than rated load.

ALWAYS let people around you know when a lift is about to begin.

ALWAYS make sure that the supporting structures and load-attaching device are strong enough to hold the weight of the load and hoist.

ALWAYS read Owner's (Operator's) manual and safety instructions.



Remember, proper rigging and lifting techniques are the responsibility of the operator. Be sure to read and understand the instructions contained in this manual before using your hoist. Check all applicable safety codes, regulations and other applicable laws for further information about the safe use of your hoist.

More detailed safety information is contained in the following pages. For additional information, please contact Kito Corporation or your authorized Kito dealer.

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1.2 Safety Instructions

Serious injury could result if the following safety instructions are not followed.

⚠ WARNING : IMPROPER chain hoist use could result in death or serious injury. To avoid these hazards:

"ALWAYSs"

ALWAYS make sure that you and others are clear of the load before lifting begins.

ALWAYS allow only qualified (trained in safety and operation) people to operate the hoist.

ALWAYS operate a hoist only if you are physically fit.

ALWAYS check the hoist before daily use according to the Recommended Daily Inspection (Refer to Sec. **4.2**).

ALWAYS let the authorized personnel inspect the hoist periodically (Refer to Sec. **4.3**).

ALWAYS make sure that the chain length is long enough for the intended job.

ALWAYS check that the hook latches are in proper working order before use (Refer to Sec. **4.3**).

ALWAYS replace all missing or broken hook latches.

ALWAYS be sure that the hoist's rated capacity, which is found on the hoist's label, is well in excess of the weight of the load.

ALWAYS be sure that the load is properly seated in the saddle of the hook.

ALWAYS keep the load from hitting the chain.

ALWAYS use two hoists which have rated capacities equal to or more than the load to be lifted whenever you must use two hoists to lift a load. This will provide adequate protection in the event that a sudden load shift or failure of one hoist occurs.

ALWAYS check the brake before use (Refer to Sec. **4.3**).

ALWAYS check for loose or missing parts before use.

ALWAYS lubricate the hoist regularly (Refer to Sec. **5.1**).

ALWAYS pay attention to the load at all times when operationg the hoist.

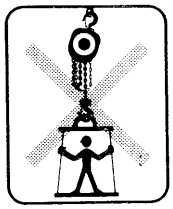
ALWAYS ease the slack out of the chain and sling when starting a lift to prevent a sudden loading.

ALWAYS secure a hoist and loads properly after use.

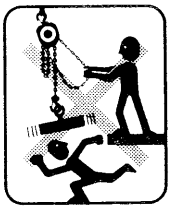
ALWAYS consult the manufacturer or your dealer if you plan to use a hoist in a dusty, moist or greasy environment.

ALWAYS consult the manufacturer or your dealer if you plan to use a hoist in an excessively corrosive environment.

ALWAYS operate the hoist with manual power.



⚠ WARNING : IMPROPER chain hoist use could result in death or serious injury. To avoid these hazards:

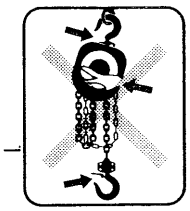


"NEVERs"

NEVER use the hoist to transport people.

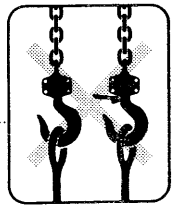
NEVER lift a load over people.

NEVER work near or under hoisted loads.



NEVER operate a hoist if damaged or malfunctioning.

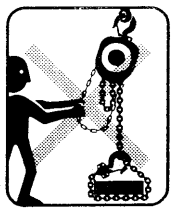
NEVER use a hoist which has been taken out of service until the hoist has been properly repaired or replaced.



NEVER use a hoist if the hook latch is missing or broken.

NEVER lift a load unless it is directly under the hook.

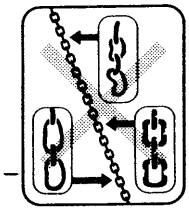
NEVER splice a hoist chain.



NEVER use non-authentic KITO chains on the hoist.

NEVER use the hoist chain as sling.

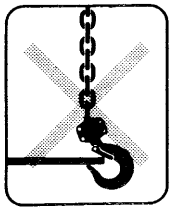
NEVER force a chain or hook into place by hammering.



NEVER jerk a load to prevent a sudden loading.

NEVER use a twisted, kinked, damaged or stretched load chain.

NEVER swing a suspended load.



NEVER support a load on the tip of the hook.

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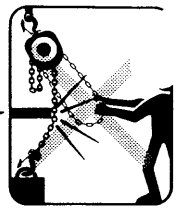
NEVER suspend a load for an extended period of time.

NEVER leave a suspended load unattended.

NEVER run the load chain over a sharp edge.

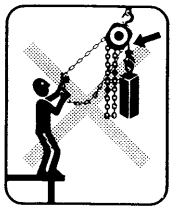


NEVER weld or cut a load suspended by a hoist.

NEVER use the hoist chain as a welding electrode.

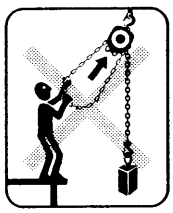
NEVER use the hoist with rusty chain.

NEVER wind so far that the hook touches the block.



NEVER unwind so far that no unloaded chain is left.

NEVER operate a hoist if chain jumping, excessive noise, jamming, overloading or binding occurs.

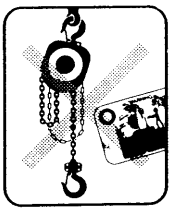


NEVER use a hoist without chain stopper (or tail pin) at the end of no load side chain.

NEVER throw a hoist.

NEVER use a hoist without a name plate or warning tag and label or with illegible name plate, warning tag and label.

NEVER remove or obscure the warning tag.



NEVER use modified or deformed hooks.

NEVER use a motor to operate a manual hoist.

NEVER use a hoist near fire or where hot objects may touch it.

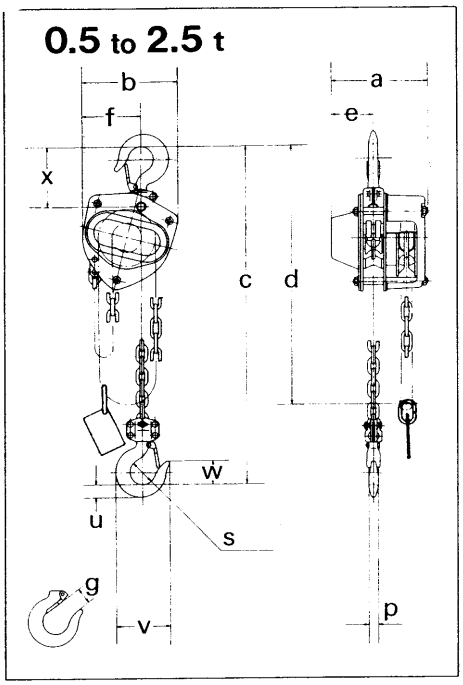
NEVER use the hoist in temperatures below −40°C(−40°F) or above +60°C(+140°F).

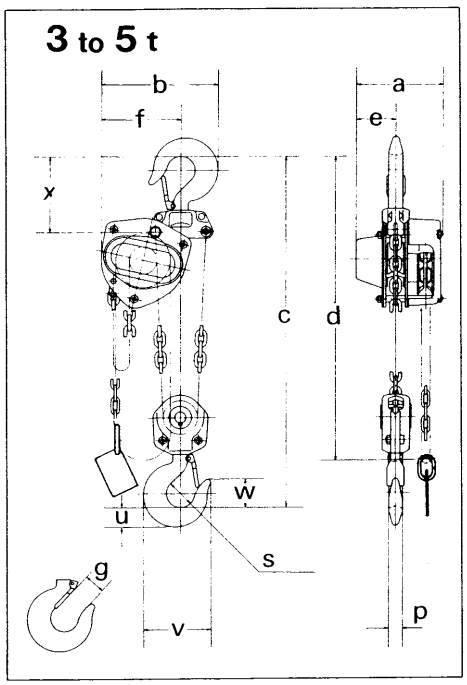
NEVER lift the bottom hook closer to the top hook than the minimum distance. (Refer to Sec. 2 : Dimensions table)

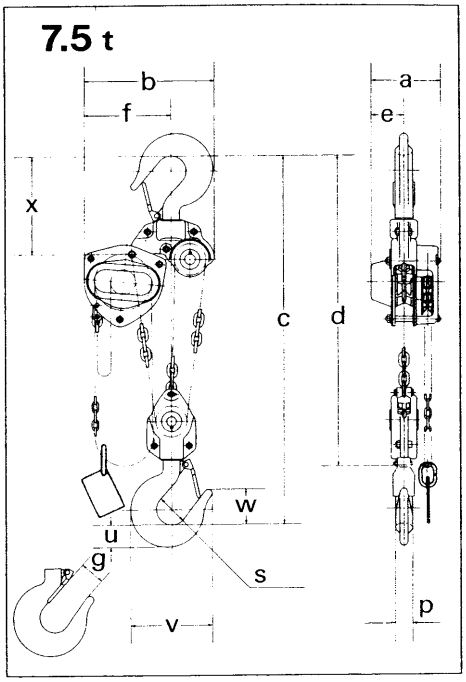
WARNING TAG is installed on a hand chain.

2. MAIN SPECIFICATIONS

Unit system is the metric one (SI unit system) in the following table.







Specifications

Model	Code	Nominal Capacity (t)	Std. Lift (m)	Chain Pull to Lift Full Load (kg)	Chain O'hauled to Lift Load One Meter (m)	Test Load (t)	Net Weight (kg)	Shipping Weight (Approx) (kg)	Load Chain Dia.(mm)× Fall(lines)	Weight in kg for Additional One Meter of Lift (kg)
M3	CB005	0.5	2.5	24	25	0.75	10	10.5	5.0×1	1.5
M3	CB010	1	2.5	29	43	1.5	11.5	12	6.3×1	1.8
M3	CB015	1.5	2.5	35	57	2.36	14.5	15	7.1×1	2.1
M3	CB020	2	3.0	36	70	3	20	21	8.0×1	2.3
M3	CB025	2.5	3.0	33	99	3.75	27	28	9.0×1	2.7
M3	CB030	3	3.0	36	114	4.75	24	26	7.1×2	3.2
M3	CB050	5	3.0	34	198	6.3	41	43	9.0×2	4.4
M3	CB075	7.5	3.5	35	297	9.5	63	66	9.0×3	6.2

- Any lift of chain is available on request. Because KITO chains are specially heat-treated, only authentic KITO chains should be used on your hoist. **Never** attempt to lengthen your chain by attaching additional chain links with any other means. KITO can supply almost any length of chain desired. Simply specify the length of chain desired when ordering.

Dimensions

Model	Nominal Capacity (t)	Min. Distance between Hooks :C (mm)	a (mm)	b (mm)	d (m)	e (mm)	f (mm)	g (mm)	s (mm)	p (mm)	u (mm)	v (mm)	w (mm)	x (mm)
M3	0.5	285	158	161	2.5	69	99	27	35.5	12.1	17	77	35	89
M3	1	295	162	161	2.5	71	99	29	42.5	16	21.8	93	41	101
M3	1.5	350	171	182	2.5	78	112	34	47.5	19.5	26.5	106	47	119
M3	2	375	182	202	3	87	125	36	50	21.8	30	116	49	124
M3	2.5	420	192	233	3	91	143	40	53	24.3	33.5	127	53	136
M3	3	510	171	235	3.1	78	162	42.5	56	27.2	37.5	138	57	148
M3	5	600	192	282	3.6	91	194	46.5	63	34.5	47.5	161	67.5	172
M3	7.5	770	192	373	4.2	91	253	72.5	85	47.5	63	231	97.5	275

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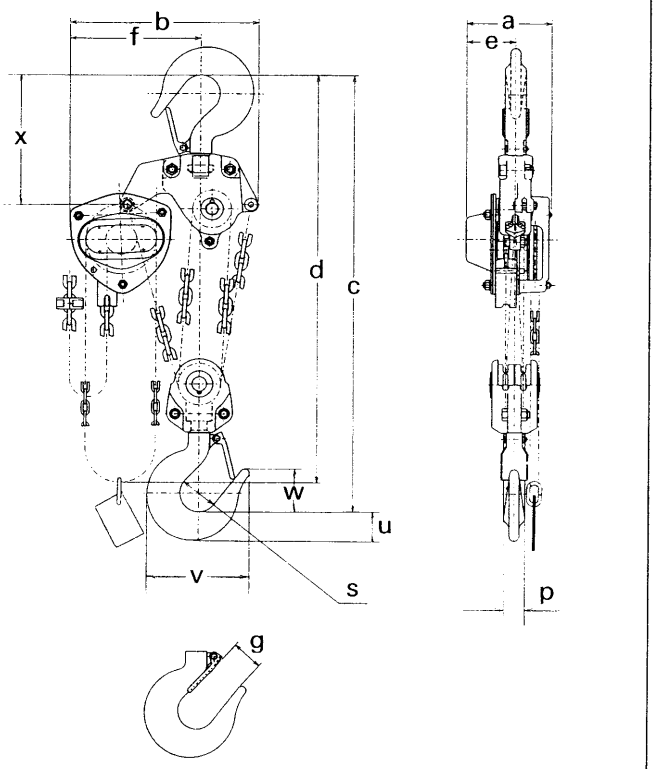

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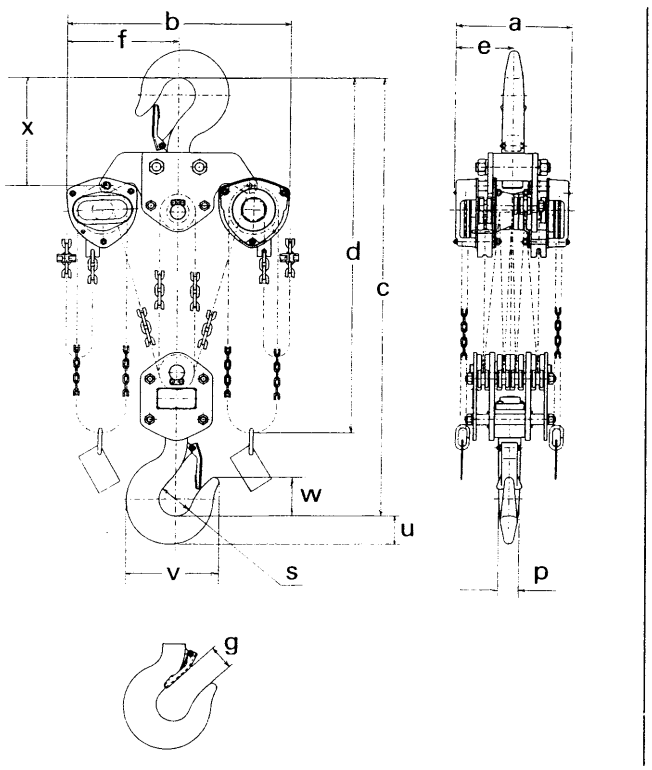

Specifications

Model	Code	Nominal Capacity (t)	Std. Lift (m)	Chain Pull to Lift Full Load (kg)	Chain O'hauled to Lift Load One Meter (m)	Test Load (t)	Net Weight (kg)	Shipping Weight (Approx) (kg)	Load Chain Dia.(mm) × Fall(lines)	Weight in kg for Additional One Meter of Lift (kg)
M3	CB100	10	3.5	36	396	12.5	83	91	9.0×4	7.9
M3	CB150	15	3.5	37	594	20	155	165	9.0×6	11.4
M3	CB200	20	3.5	36×2	396×2	25	235	305	9.0×8	15.8

- Any lift of chain is available on request. Because KITO chains are specially heat-treated, only authentic KITO chains should be used on your hoist. **Never** attempt to lengthen your chain by attaching additional chain links with any other means. KITO can supply almost any length of chain desired. Simply specify the length of chain desired when ordering.

Dimensions

Model	Nominal Capacity (t)	Min. Distance between Hooks : C (mm)	a (mm)	b (mm)	d (m)	e (mm)	f (mm)	g (mm)	s (mm)	p (mm)	u (mm)	v (mm)	w (mm)	x (mm)
M3	10	760	192	438	4.2	111	308	72.5	85	47.5	63	231	97.5	295
M3	15	1020	268	492	4.7	119	337	80	100	60	80	275	110	320
M3	20	1180	374	746	4.8	187	373	81	110	67	90	301	125	351

3. OPERATION

3.1 Safety Consideration

⚠ WARNING : Improper operation could result in death or serious injury. To avoid these hazards, only operate the chain hoist by hand. Power operation may result in structural damage or premature wear. This damage or wear may cause a part to break and cause the load to fall.

3.2 Operation

1. Face the hand chain wheel side of the hoist.
2. To raise the load, pull hand chain clockwise.
3. To lower the load, pull hand chain counterclockwise.

NOTE: The clicking sound of the pawl when a load is being raised indicates normal operation.

3.3 Hoist Storage

⚠ WARNING : IMPROPER chain hoist use could result in death or serious injury. To avoid these hazards:

ALWAYS store the hoist in no load condition.

ALWAYS wipe off all dirt and water.

ALWAYS oil the chain, top pin, chain pin and hook latches.

ALWAYS hang in a dry place.

ALWAYS check the hoist for abnormalities when using the hoist after a period of non-use according to the regular inspection procedures (Refer to Sec. **4.3**).

3.4 Principle and Operation of the Overload Limiter (OPTIONAL)

⚠ WARNING : IMPROPER chain hoist use could result in death or serious injury. To avoid these hazards:

⚠ WARNING : NEVER disassemble or attempt to adjust the overload limiter assembly. Any attempt to do so will void the warranty. Contact your closest KITO Dealer, if service is required.

The overload limiter device has been developed to avoid overloading. When an applied load exceeds the preset value, the hand chain wheel rotates idly. The device is friction clutch mechanism which is concentrically equipped on pinion shaft between hand chain wheel and mechanical brake.

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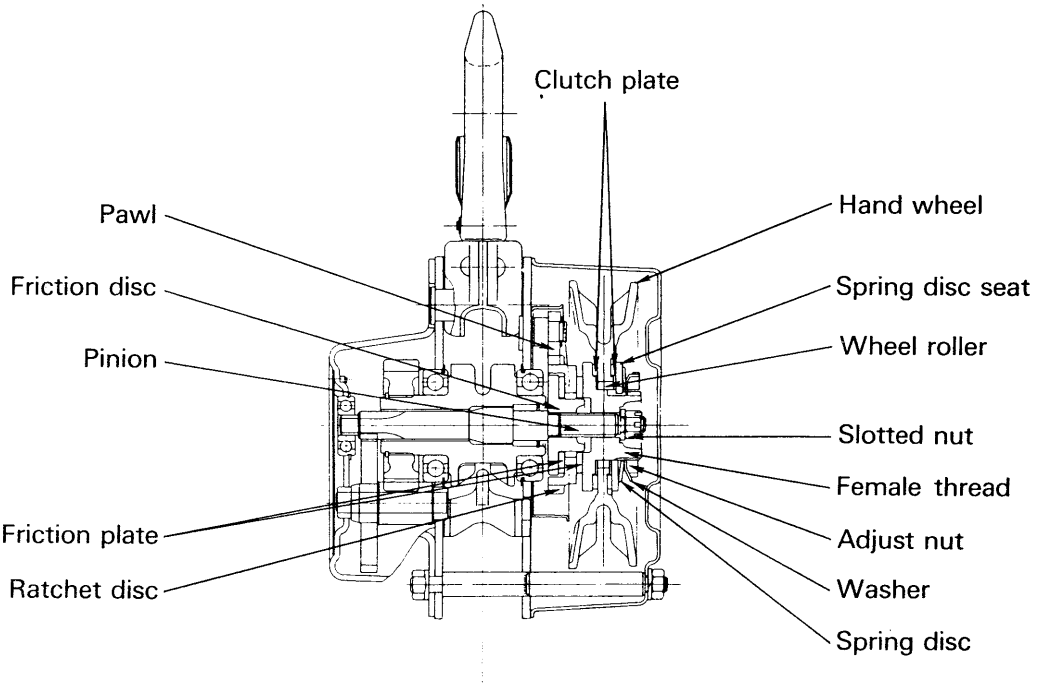


4. INSPECTION

4.1 Outline

There are two types of inspection, the daily inspecton performed by the operator while using the hoist, and the more thorough periodic inspections performed by qualified personnel who have the authority to remove the unit from service.

4.2 Daily Inspection

Before each work shift, check the following points:

(1) Check that the name plate showing the hoist capacity is attached and clearly legible.

(2) Check that the warning tag and label are attached and clearly legible.

(3) Check for visual defects or abnormal noises which could indicate a defect.

(4) Check that the top and bottom hook latches are in place and in proper condition.

(5) Make sure the openings of the top and bottom hooks are not too wide, that the swivel rotates freely and that the hook latch is in position and works normally.

(6) Check for wear or damage, increased throat width, bent shank or bending of hook.

(7) Check that the chain does not have excessive rust or corrosion and that it is not dry due to lack of lubricant.

(8) When facing the hand chain side of the hoist with no load:
The brake is operating normally if the pawl "clicks" when the hand chain is wound in a clockwise direction and does not "click" when operated in the counter-clockwise direction.

(9) Check lubrication and lubricate if necessary. (Refer to Sec. 5.1)

(10) Check that the chain is assembled normally and that there is no twisting.

(11) Check for loose or missing nuts and for missing split pins.

4.3 Periodic Inspection

Periodic inspections should be made at the interval shown below and should follow the given procedures.

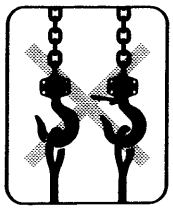
NORMAL (Normal use): Semiannual inspection

HEAVY (Frequent use): Quarterly inspection

SEVERE (Excessively frequent use): Monthly inspection

<Periodic Inspection Procedure>

Figures in parentheses are Figure Nos. in Parts List.

Item	Inspection Method	Discard Limit/Criteria	Measures
Indications	Check visually.	○Capacity indication is clear.	Attach the name plate.
HOOK [1, 6, 55, 78] (Top and Bottom) 1. Deformation/ twist of hook opening 	Measure dimension "e" between two embossed marks at time of purchase with calipers.	○No deformation from original shape (at time of purchase).	Replace the hook.
	Check visually.	○Twist shall not be large enough to detect visually.	Replace the hook.
2. Wear	Measure "c" and "d" with slide calipers.	○Never use the hook if dimension "c" or "d" becomes less than 90 % of normal.	Replace the hook.

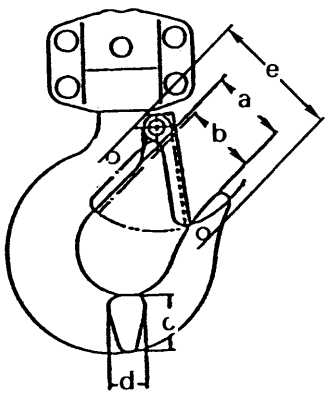


Table 1 (Reference dimensions)

Type (t)	a (mm)	b (mm)	c (mm)		d (mm)	
	Normal	Normal	Normal	Discard	Normal	Discard
1/2	31.0	27.0	17.0	15.3	12.1	10.9
1	34.0	29.0	21.8	19.6	16.0	14.4
1 1/2	37.5	34.0	26.5	23.9	19.5	17.6
2	40.0	36.0	30.0	27.0	21.8	19.6
2 1/2	42.5	40.0	33.5	30.2	24.3	21.9
3	46.0	42.5	37.5	33.8	27.2	24.5
5	50.0	46.5	47.5	42.8	34.5	31.1
7 1/2	79.5	72.5	63.0	56.7	47.5	42.8
10	79.5	72.5	63.0	56.7	47.5	42.8
15	95.0	80.0	80.0	72.0	50.0	45.0
20	95.0	81.0	90.0	81.0	56.0	50.4

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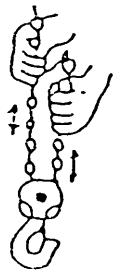
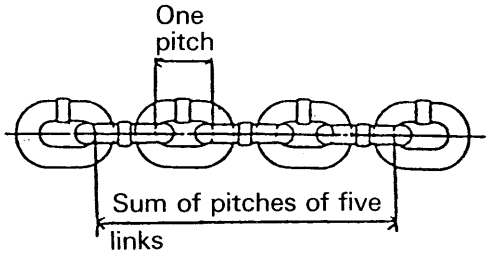
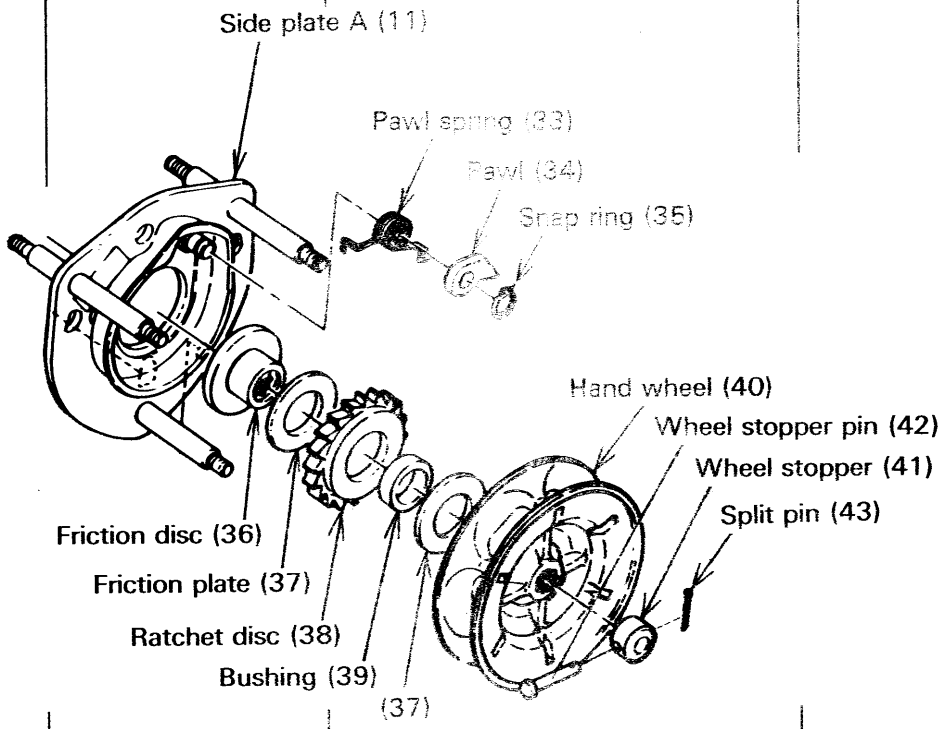
Item	Inspection Method	Discard Limit/Criteria	Measures
3. Hook flaws	Check visually.	○ No great damage permitted.	Replace the hook.
4. Hook movement	Turn hook.	○ Shall turn smoothly.	Replace the hook.
5. Top/bottom fixture damage [Fittings of 1,6,55, 78]	Check visually.	○ No slack or missing rivets, nuts or bolts.	Replace the hook.
6. Idle sheave rotation [57, 81]	Hold the load chain with both hands and turn the idle sheave by moving the chain up and down.	○ Smooth rotation. 	Overhaul.
7. Hook latch [2, 7, 56, 80]	Check visually.	○ Proper positioning and smooth working.	Replace the latch or hook.
LOAD CHAIN [47, 110] 1. Wear	Measure with slide calipers.	○ Measure the sum of pitches of five chain links and check that the maximum length does not exceed value shown in table 2.	Replace the chain.
		**Table 2**	
		Type (t) / Sum of pitches of five links (mm) / Discard limit (mm)	
		$\frac{1}{2}$ / 75.5 / 77.7	
		1 / 95.5 / 98.3	
		$1\frac{1}{2}$, 3 / 106.0 / 109.1	
		2 / 121.0 / 124.6	
		$2\frac{1}{2}$, 5, $7\frac{1}{2}$ 10, 15, 20 / 136.0 / 140.0	
2. Rust, flaws, deformation	Check visually.	○ No obvious rust (Apply oil as necessary.) ○ No twists or harmful flaws.	Remove rust. Replace the load chain.
HOOK YOKE (Top set [1, 54] / Bottom set [6, 77]) Joint of Top/ bottom fixtures with top pin [4] and chain pin [8, 106]	Measure hole diameter of joint area in two directions at right angle.	○ Deformation not permitted (if each measured value differs more than 0.5mm, it is not a circle).	Replace the part.

Item	Inspection Method	Discard Limit/Criteria	Measures
FUNCTION 1. Lifting and lowering	Lift and lower a light load.	○ No abnormal difficult in lifting or lowering.	Overhaul and service.
2. Brake		○ Confirm that none of the problems listed below occur during lifting and lowering: • Lifting impossible. • Load falls when the operator removes his hands. • Load fall during unwinding. • Load slips down slowly.	Overhaul and service.
BRAKE (Inside mechanism)	Overhaul and check.		



1. Flaws on brake surface [37,38,39]	Check visually.	○ No flaws due to scratching or gouging by foreign matter.	Replace the part.
2. Flaws on friction disc [36]	Check visually.	○ No flaws due to scratching or gouging by foreign matter.	Replace the part.
3. Wear on friction plate [37]	Measure with slide calipers.	○ Retain uniform thickness and friction plate shall not be worn more than 0.5 mm. For all types: Normal thickness: 3 mm Discard limit: 2.5 mm	Replace the part.

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Item	Inspection Method	Discard Limit/Criteria	Measures
4. Flatness of friction plate [37]	Check clearance with straight gauge.	○ Clearance shall be uniform. Internal part shall not be thicker than external part.	Replace the part.
5. Bushing [39]; wear and oil	Check radial thickness (t) with calipers and oil existence.	○ Radial thickness (t) shall be uniform. Oil shall be contained. Refer to table 3.	Replace the part.
6. Ratchet disc [38]; wear and rust	Check visually.	○ The tooth wear shall not be more than 1.5 mm. ○ No rust	Replace the part.
LIFTING SYSTEM 1. Load sheave [14]; wear and deformation	Check visually.	○ No large wear or no deformation or no burr due to load chain contact is permitted on the surface of load chain pocket.	Replace the part.
2. Gears [25,27]; wear and flaw	Check visually.	○ Teeth shall be free from large wear or flaws.	Replace the part.

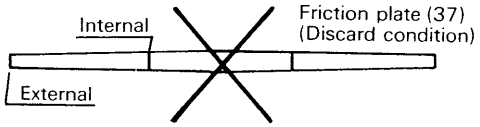
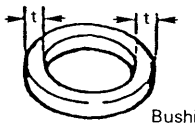
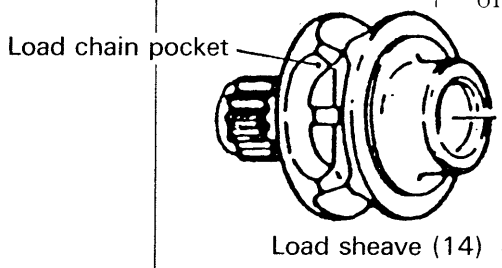


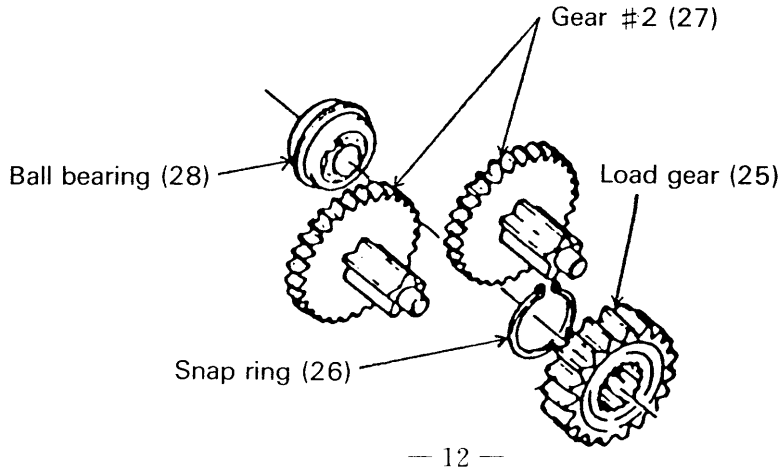
Table 3

Type (t)	Normal thickness: t (mm)	Discard limit (mm)
1/2, 1, 1 1/2, 3	3	2
2, 2 1/2, 5, 7 1/2 10, 15, 20	4	3

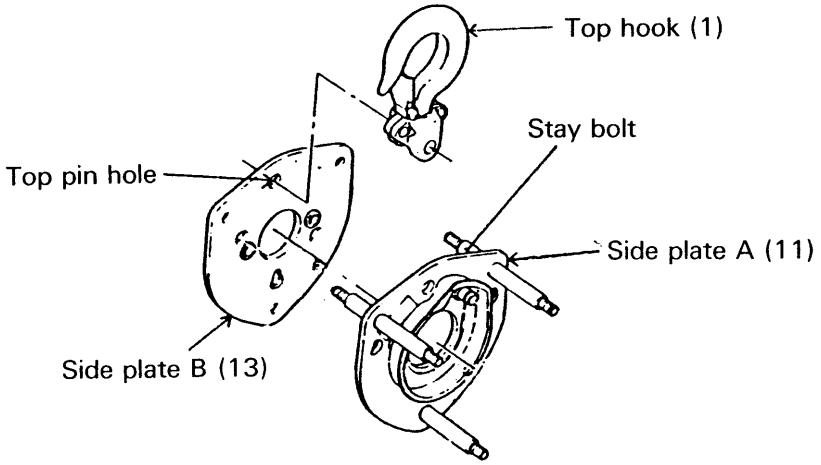


t:Radial thickness





Item	Inspection Method	Discard Limit/Criteria	Measures
3. Hand wheel [40]; wear and deformation	Check visually.	○ No large wear or no deformation on the surface of hand chain pocket. ○ Turn and check if it touches the cover.	Replace the part. Replace the part.
SIDE PLATES [11,13] 1. Deformation of top pin hole	Check visually.	○ Hole shall not be oval.	Replace the part.
2. Slack stay bolt restraint	Tap.	○ No slack is permitted.	Replace the frame.
MISCELLANEOUS 1. Deformation of stripper [21]	Check visually.	○ No large crush or damage on stripper tip is permitted.	Replace the part.
2. Flaw on guide roller [20]	Check visually.	○ Shall turn lightly. ○ No large deformation.	Replace the part.



12.7

5. MAINTENANCE

⚠ WARNING : IMPROPER chain hoist use could result in death or serious injury.
To avoid these hazards:
: NEVER perform maintenance on the hoist while it is supporting a load.
: Before performing maintenance, attach the tag:
["DANGER": DO NOT OPERATE EQUIPMENT BEING REPAIRED.]
: Only allow qualified service personnel to perform maintenance.
: After performing any maintenance on the hoist, always test to its rated capacity before returning to service.

5.1 Lubrication

5.1.1 Applying Grease to Gears

Unscrew nuts (31), on the opposite side of hand chain wheel, and remove spring washers (32) and gear case (29). Remove old grease and replace with new grease (standard grease*), at annual inspection.

Temperature range of standard grease is −40°C (−40°F) to +60°C(140°F).

If the hoist is used at temperature below −40°C (−40°F) or above +60°C(140°F), consult the manufacturer or dealer since some parts shall be changed.

* Recommended brand : Shell Albania #3 or calcium soap grease equivalent of NLGI(National Lubricating Grease Institute)/#3

5.1.2 Load Chain

⚠ WARNING : IMPROPER chain hoist use could result in death or serious injury.
To avoid these hazards:
: Failure to maintain clean and well lubricated load chain will void the manufacturer's warranty.

ALWAYS lubricate load chain weekly, or more frequently, depending on severity of service.

ALWAYS lubricate more frequently than normal in a corrosive environment.*

ALWAYS use machine oil equivalent to ISO VG46 or 68.

ALWAYS clean chain with an acid free solvent only to remove rust or abrasive dust build-up. After cleaning, lubricate the chain.

ALWAYS lubricate each link of the chain and apply new lubricant over existing layer.

*A corrosion-resistant chain is available as option. For information on the capabilities and limitations of KITO's regular and corrosion-resistant chain, please ask your dealer.

5.2 Overhaul, Assembly and Adjustment

5.2.1 Overhaul

Figures in parentheses are Figure Nos. in Parts List.

Overhaul Procedures	Remarks
1. Put a hoist with wheel cover side up.	
2. Unscrew three nuts [45] (with the spring washers [46]) fixing the wheel cover [44] and remove the wheel cover from the side plate A [11].	
3. Remove the hand chain [48] from the hand wheel [40].	
4. Pull out the split pin [43] from the wheel stopper pin [42] and remove the wheel stopper pin and the wheel stopper [41] from the pinion [17].	
5. Remove the hand wheel [40] from the pinion [17] by turning the hand wheel counterclockwise.	If the hand wheel is too tight to turn by hand, put the hand chain on the hand wheel back again and pull it down hard. It will release the brake.
6. Remove two friction plates [37], the ratchet disc [38] and the bushing [39] from the friction disc [36].	
7. Unscrew the friction disc [36] from the pinion [17] by turning counterclockwise holding the end of the pinion with fingers.	
8. Remove the snap ring [35] from the pawl pin (on the side plate A) and then remove the pawl [34] and pawl spring A and B [33].	
9. <For 7½ t and smaller types> Pull the split pin [24] out from the stopper pin [23] and remove the load chain [47] and the stopper pin from the anchorage [22]. <For 10 t and larger types> Pull the split pin [52] out from the end pin [51] and remove the load chain [47] and the end pin. Unscrew two socket bolts (with the spring washers) fixing the stoppers [114] and remove the stoppers.	
10. Remove the load chain [47] from the load sheave [14] by pulling the load chain toward the bottom hook.	
11. Remove the split pin [5] from the top pin [4], then remove the top pin and the top hook [1] from the side plate A [11] and B [13].	
12. Put a hoist with gear case side (or name plate side) up.	

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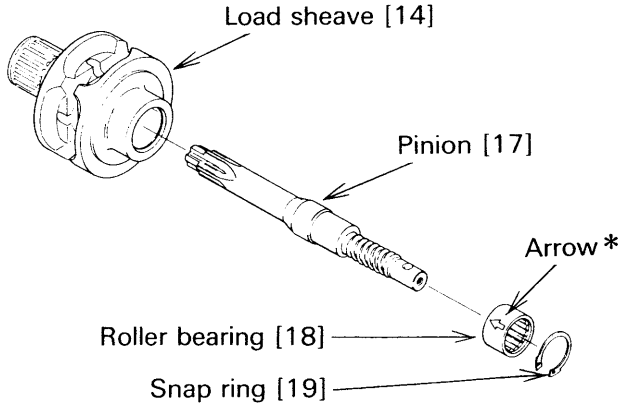
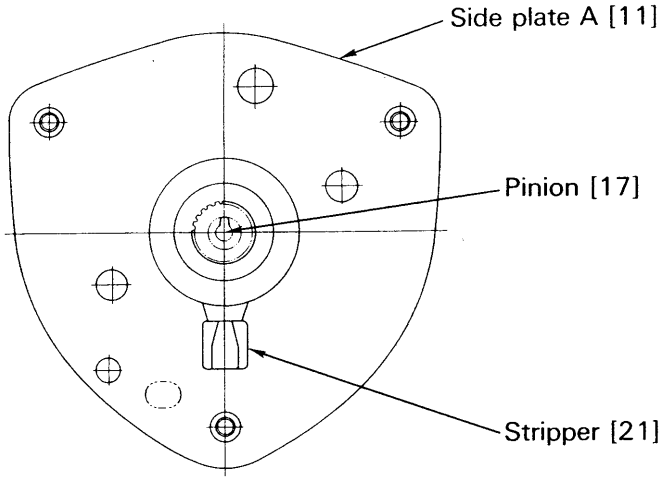
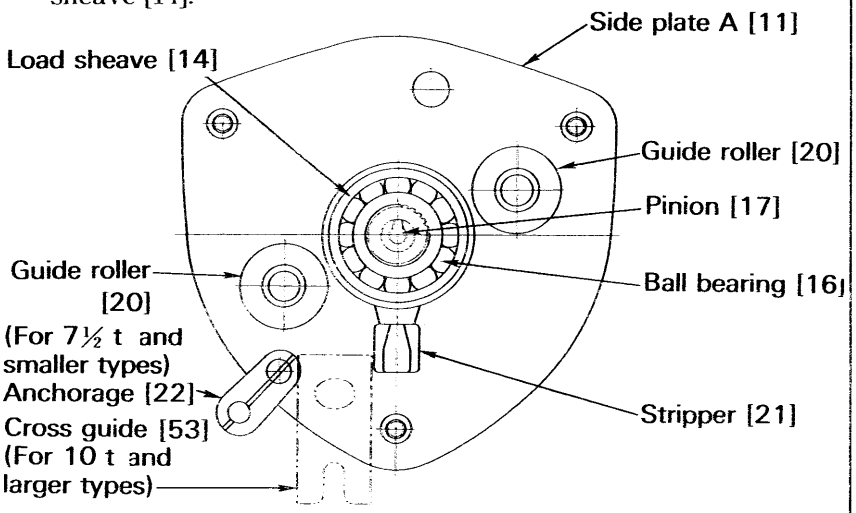
Overhaul Procedures	Remarks
13. Unscrew three nuts [31] (with the spring washers [32]) fixing the gear case [29], remove the gear case from the side plate B [13], and take the ball bearings [28] out from the gear case.	
14. Remove two pairs of the gear # 2 [27] (1/2 t has one pair) from the side plate B [13].	
15. Remove the snap ring [26] from the load sheave [14], then the load gear [25] from the load sheave.	
16. Remove the side plate B [13] from the side plate A [11] and then take the ball bearing [16] out from the side plate B.	
17. Remove the guide rollers [20], load sheave (attached to the pinion [17]), stripper [21] and anchorage [22] (For 10 t larger types: cross guide [53]) from the side plate A [11], then remove the ball bearing [15] from the side plate A.	
18. Remove the snap ring [19] in the load sheave [14].	
19. Remove the pinion [17] and the roller bearing [18] from the load sheave [14].	Hold the load sheave with a hand and remove the bearing by tapping the pinion with a wooden hammer.
20. Pull the split pin [10] out from the slotted nut [9] and remove the slotted nut and chain pin from the bottom hook [6].	

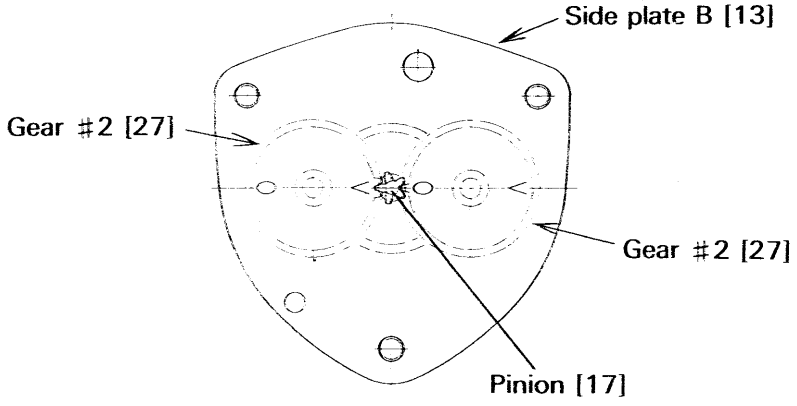
5.2.2 Assembly and Adjustment

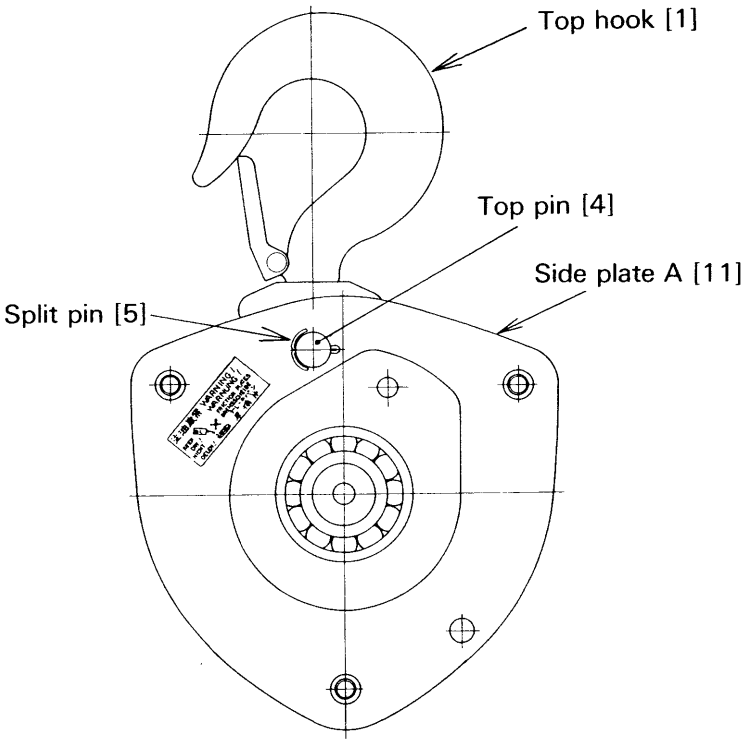
Assembly Procedures	Remarks
1. Apply grease to the rollers of the roller bearing [18] and insert the pinion [17] (from the side of the brake screw) into the roller bearing and insert them together into the load sheave [14]. Fix them with a snap ring [19].	The arrow * direction on the outer side of the roller bearing shall be faced to pinion gear side. When inserting, use a screwdriver on the bearing and tap it with a wooden hammer.
	**⚠ WARNING** Always make sure that the snap ring is correctly seated.
2. Put the side plate A [11] with a brake cover side down and insert the ball bearing [15] (with a snap ring side up) into the side plate A. Grease the balls of ball bearing shown in the side plate A.	
3. Insert the load sheave [14] with a part of involute serration side (pinion gear side) up into the ball bearing [15]. The stripper [21] must be put as well.	
	
4. <For 7½ t and smaller types> Put the guide rollers [20] and the anchorage [22] in the side plate A [11]. <For 10 t and larger types> Put the guide rollers [20] and the cross guide [53] in the side plate A [11].	Put the cross guide so that the longer arm fits to the side plate A.

12.7

Assembly Procedures	Remarks
5. Grease the balls of the ball bearing [16]. Insert it with the snap ring side down to the shaft of the load sheave [14].	As for the ball bearing of the load sheave, make sure that the snap ring is placed on the side of the load sheave where the load chain reeves.
6. Join the side plate B [13] to the side plate A [11].	In case it is difficult to join the two, tap it with a wooden hammer. Be careful not to let the stripper, guide roller, and anchorage fall down.
7. Mesh the load gear [25] with the involute serration of the load sheave [14] and fix it with a snap ring [26].	**⚠ WARNING** Always make sure the snap ring is completely set at the bottom of the ditch.
8. Grease the two pairs of the gear # 2 [27], the load gear [25] and the gear of the pinion [17]. Put them in the gear plain bearing (bearing A) of the side plate B [13]. Letters O and V on the gears must face to each other as shown in the below picture. Do not forget to apply grease to the boss on the both sides of the gear #2.	It is not necessary to adjust the letters in case of the 1/2 t model, for it has only one pair of the gear #2.





Assembly Procedures	Remarks
9. Grease the balls of the ball bearing [28] and insert it with the snap ring down into the end of the pinion [17] shaft. 10. Join the gear case [29] to the side plate A [11] and fix them with the three spring washers [32] and nuts [31]. 11. Place the top hook [1] between the side plate A [11] and B [13]. Then insert top pin [4], and fix it with the split pin [5].  12. Place the hand wheel [40] side upward.	**⚠ WARNING** Always bend the split pin firmly after inserting it into the top pin.

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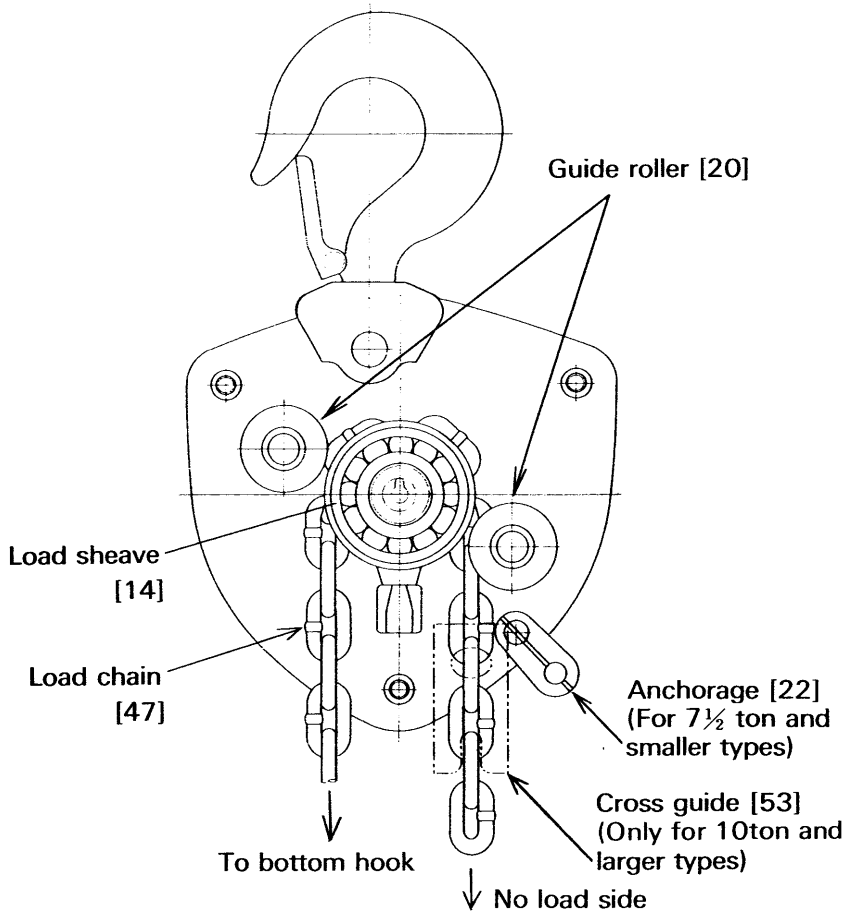
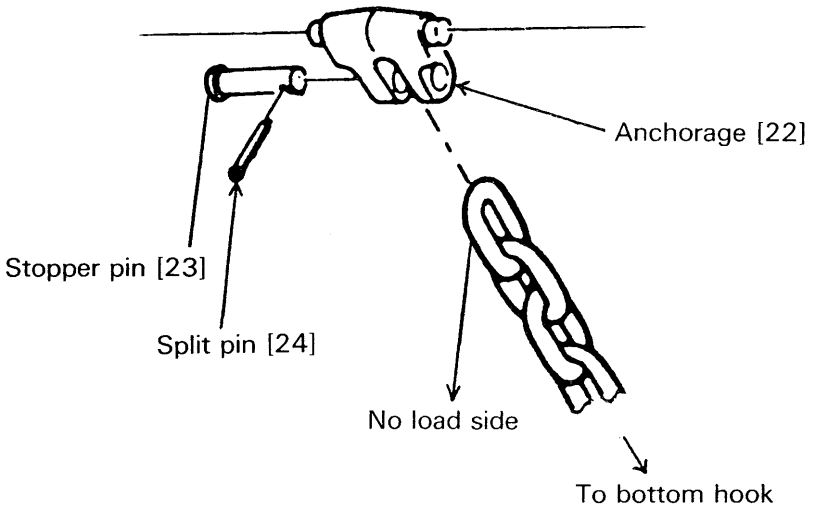
Assembly Procedures	Remarks
13. Reeve the load chain [47] turning the pinion [17] shaft clockwise through the space between the left (bottom hook side) guide roller [20] and the load sheave [14].	**⚠ WARNING** Put the welded part of the vertical chain link outward and reeve it through the load sheave. Pull it out between the right guide roller (no load side) and the load sheave.
For 10 t or larger hoists, pass the no load end of the chain through the cross guide [53].	It is recommended for this process to position the unit so that the side plate A [11] faces left and the side plate B [13] faces right.

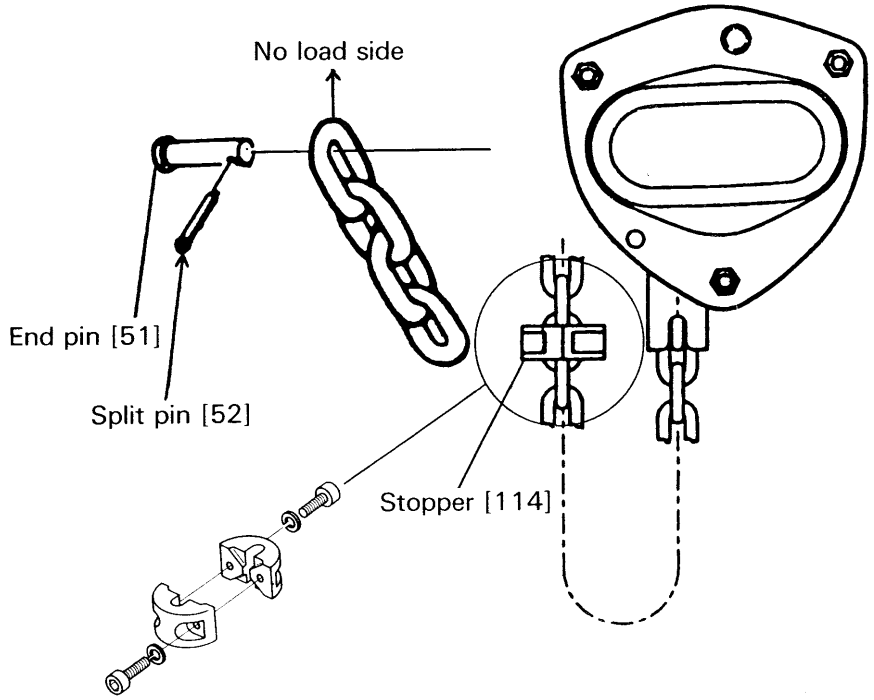


Assembly Procedures	Remarks
14. <For 7½ t and smaller types> Pull the end of the load chain [47] out between the right guide roller [20] and the load sheave [14] (no load side) and insert it to the anchorage [22]. Insert the stopper pin [23] and fix it with a split pin [24].	**⚠ WARNING** Make sure the load chain is not twisted and the split pin in the stopper pin is bent thoroughly.



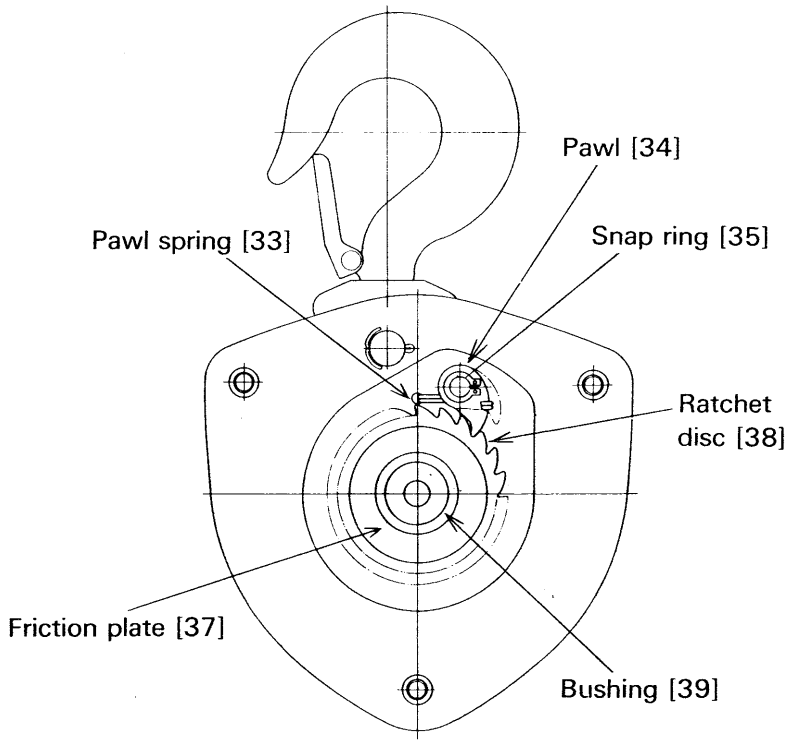
<For 10 t and larger types>
Connect the no load end of the load chain [47] to end pin [51] which is to be inserted from gear case [29] side.
Use a split pin [52] to secure the end pin.
Fix stoppers [114] to the ninth link from the no load end of the load chain by assembling with socket bolts and spring washers.

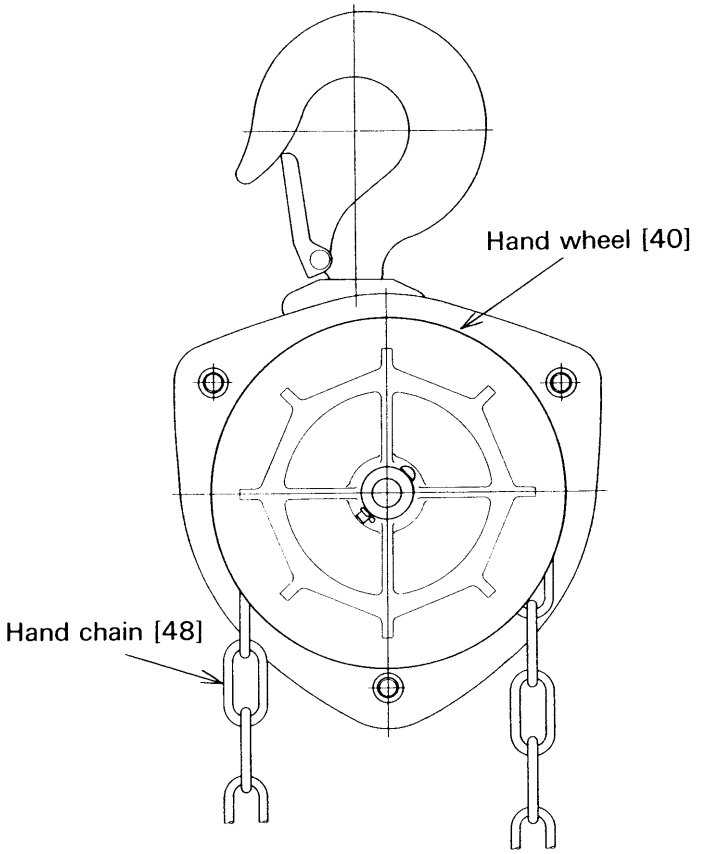
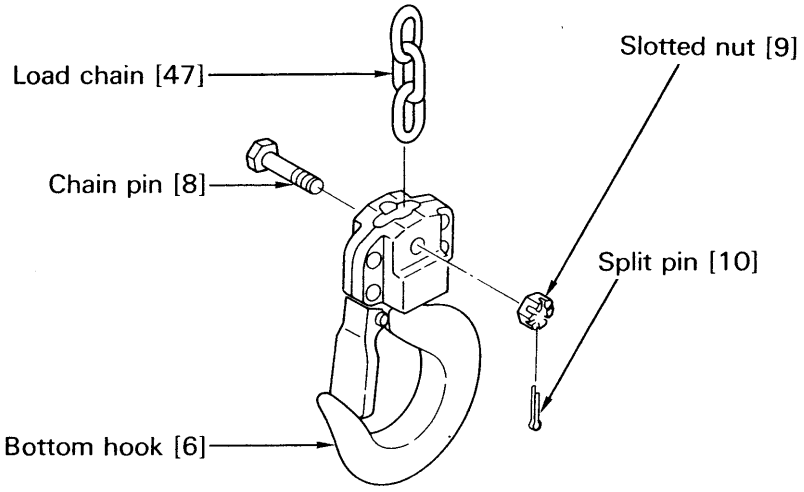
Screwed hole side of one stopper shall face to non-screwed hole side of the other stopper. Socket bolt shall be inserted from the non-screwed side.



12.7

Assembly Procedures	Remarks
15. Apply machine oil to the pawl pin (in side plate A [11]) and join the pawl spring A, B [33] and the pawl [34] respectively to it. Fix them with a snap ring [35].	**⚠ WARNING** Make sure the pawl spring is touching to the pawl and the snap ring is completely set at the bottom of the groove.
16. Put the friction disc [36] to the pinion [17] shaft (while turning the pawl [34] counterclockwise).	
17. Wipe out any dirt on the friction disc [36], friction plates [37] and both sides of the ratchet disc [38] and check if the oil of the bushing [39] (bushing with containing oil) is applied enough. Then place the friction plate, bushing, ratchet disc and friction plate respectively on the friction disc. (Make sure that the pawl meshes with the ratchet disc properly)	**⚠ WARNING** **Never** apply oil since the brake is 'dry system'. Wipe out thoroughly any oil and dirt on the brake. The gear of the ratchet disc should point at the pawl. Otherwise, the hand wheel cannot be assembled later. In case the bushing does not have oil inside, soak it in turbin oil for a day. Install it in without wiping the oil. Make sure that the pawl meshes with the ratchet disc properly.
18. Wipe out the dirt of the hand wheel [40] and apply machine oil to the threaded part of it. Screw it in the pinion [17] shaft all the way down.	
19. Place the wheel stopper [41] on the head of the pinion [17], insert the wheel stopper pin [42] and fix it with a split pin [43].	**⚠ WARNING** **Never** forget to bend the split pin after inserting into the wheel stopper pin.



Assembly Procedures	Remarks
20. Put the hand chain [48] around the hand wheel [40].  	
21. Join the wheel cover [44] to the side plate A [11] and fix them with the spring washer [45] and the nut [46].	
22. Insert the other end of the load chain [47] to the bottom hook [6] and fix them with the chain pin [8], slotted nut [9] and split pin [10].  	**⚠ WARNING** Always bend surely the split pin.

12 7

6. WARRANTY

Kito Corporation ("Kito") extends the following warranty to the original purchaser ("Purchaser") of new products manufactured by "Kito"(Kito's Products).

(1) "Kito" warrants that Kito's Products, when shipped, shall be free from defects in workmanship and/or materials under normal use and service and "Kito" shall, at the election of "Kito", repair or replace free of charge any parts or items which are proven to have said defects, provided that all claims for defects under this warranty shall be made in writing immediately upon discovery and, in any event, within one (1) year from the date of purchase of Kito's Products by "Purchaser" and provided, further, that defective parts or items shall be kept for examination by "Kito" or its authorized agents or returned to Kito's factory or authorized service center upon request by "Kito".

(2) "Kito" does not warrant components of products provided by other manufacturers. However to the extent possible, "Kito" will assign to "Purchaser" applicable warranties of such other manufacturers.

(3) Except for the repair or replacement mentioned in (1) above which is "Kito"'s sole liability and purchaser's exclusive remedy under this warranty, "Kito" shall not be responsible for any other claims arising out of the purchase and use of Kito's Products, regardless of whether "Purchaser"'s claims are based on breach of contract, tort or other theories, including claims for any damages whether direct, indirect, incidental or consequential.

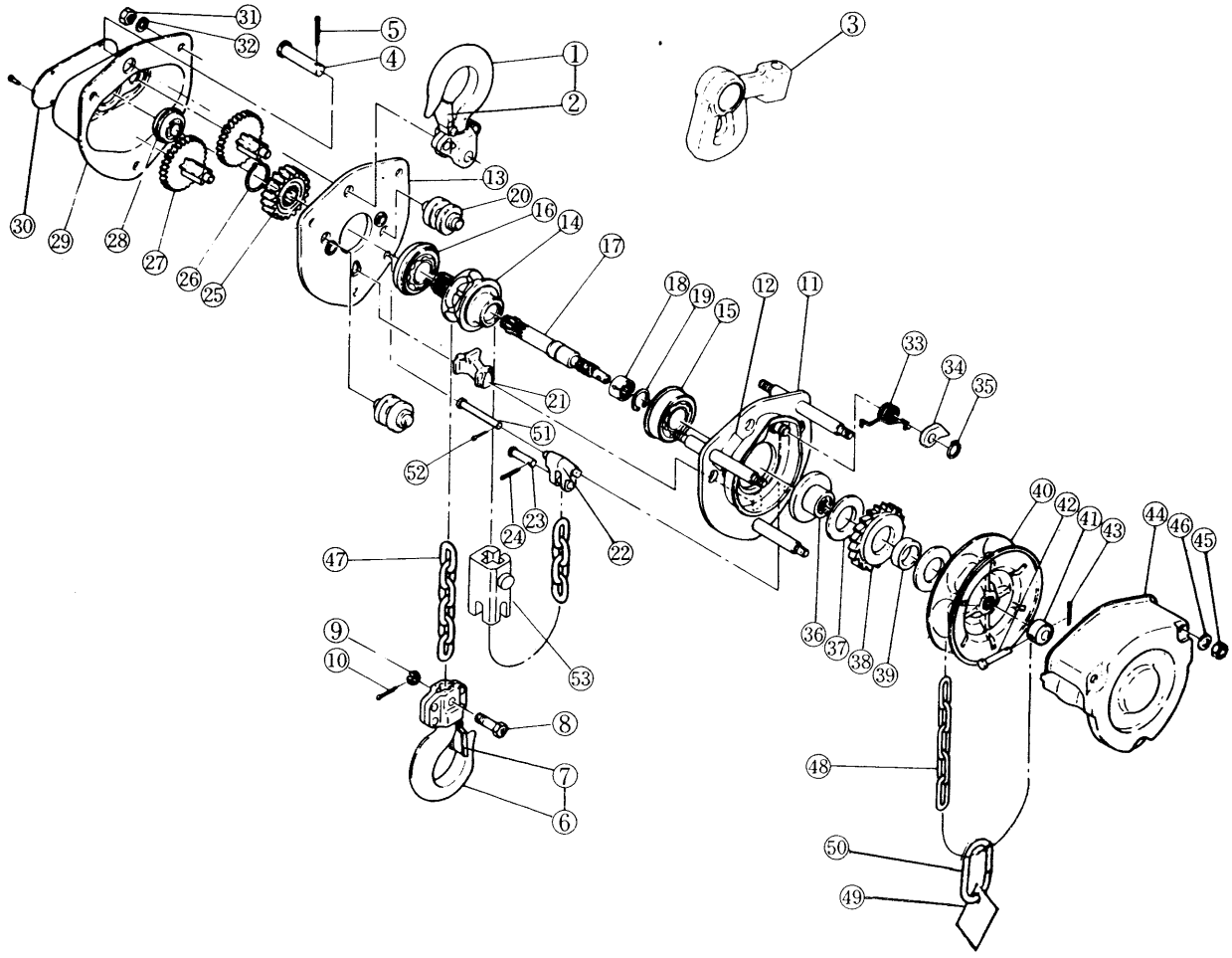
(4) This warranty is conditional upon the installation, maintenance and use of Kito's Products pursuant to the product manuals prepared in accordance with content instructions by "Kito". This warranty shall not apply to Kito's Products which have been subject to negligence, misuse, abuse, misapplication or any improper use or combination or improper fittings, alignment or maintenance.

(5) "Kito" shall not be responsible for any loss or damage caused by transportation, prolonged or improper storage or normal wear and tear of Kito's Products or for loss of operating time.

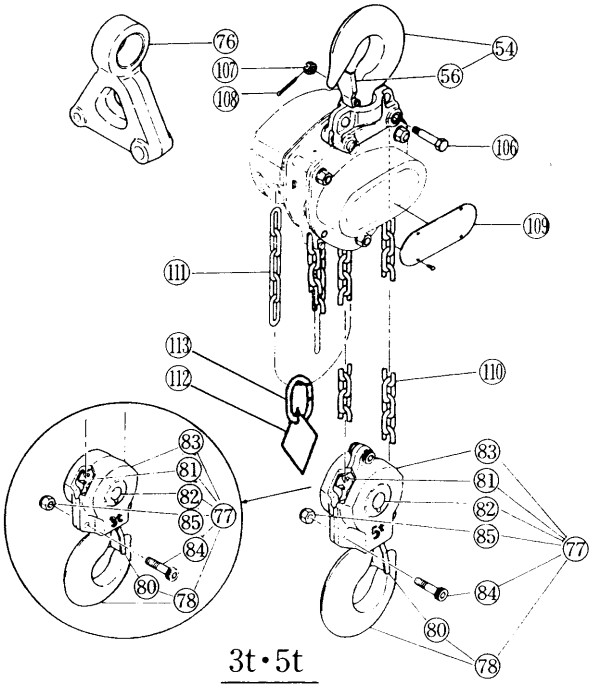
(6) This warranty shall not apply to Kito's Products which have been fitted with or repaired with parts, components or items not supplied or approved by "Kito" or which have been modified or altered.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

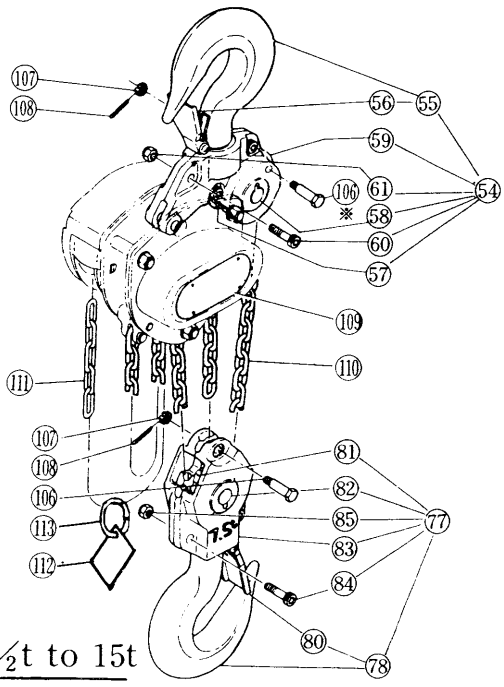
7. PARTS LIST



ADDITIONAL PARTS FOR 3 t AND LARGER TYPES



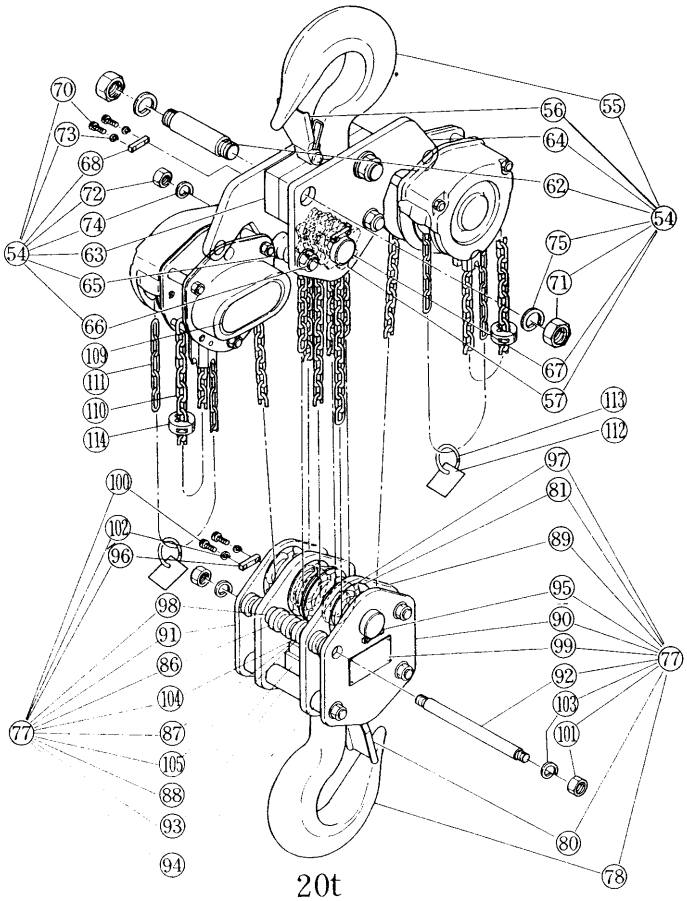
3t・5t



7½t to 15t

※ The Chain pin of 10t model is located on top yoke to connect the Load chain.

12.7



20t

Fig. No.	Part No.	Part Name	Parts per Hoist	Capacity Code										
				005	010	015	030	020	025	050	075	100	150	200
①	M3-001A	Top hook set	1				—			—				
2	M3-071A	Hook latch assembly	1				—			—				
③	*	Suspender for TSP005	1		—									
	*	Suspender for TSG010	1			—								
	*	Suspender	1	—			—			—				
④	M3-163	Top pin	1											
⑤	M3-198	Split pin	1											
⑥	M3-021A	Bottom hook set	1				—			—				
7	M3-071A	Hook latch assembly	1				—			—				
⑧	M3-041	Chain pin	1				—			—				
⑨	M3-049	Slotted nut	1				—			—				
⑩	M3-096	Split pin	1				—			—				
⑪	M3-101[1]	Side plate A assembly	1											
12	M3-806	Name plate F	1											
⑬	M3-102[1]	Side plate B assembly	1											
⑭	M3-116	Load sheave	1											
⑮	M3-140	Ball bearing	1											
⑯	M3-145	Ball bearing	1											
⑰	M3-111[1]	Pinion	1											

*see trolly parts lists.

Fig. No.	Part No.	Part Name	Parts per Hoist	Capacity Code										
				005	010	015	030	020	025	050	075	100	150	200
	M3-130	Roller bearing	1											
⑲	M3-118	Snap ring	1											
⑳	M3-161	Guide roller	2											
㉑	M3-162	Stripper	1											
㉒	M3-176	Anchorage	1									—	—	—
㉓	M3-177	Stopper pin	1									—	—	—
㉔	M3-196	Split pin	1									—	—	—
㉕	M3-114	Load gear	1											
㉖	M3-117	Snap ring	1											
㉗	M3-112 (1)	Gear #2 assembly	(3)	1	2	2		2	2					
㉘	M3-135	Ball bearing	1											
㉙	M3-103	Gear case assembly	1											
㉚	M3-800 (1)	Name plate B with rivets	1				—			—	—	—	—	—
㉛	M3-181	Nut	3											
㉜	M3-186	Spring washer	3											
㉝	M3-179	Pawl spring A (2)	1											
	M3-180	Pawl spring B (2)	1											
㉞	M3-155	Pawl	1											
㉟	M3-157	Snap ring	1											
㊱	M3-153 (1)	Friction disc	1											
	M3-151 (1)	Friction plate	2											
	M3-152 (1)	Ratchet disc	1											
㊴	M3-154 (1)	Bushing	1											
㊵	M3-115 (1)	Hand wheel	1											
㊶	M3-159	Wheel stopper	1											
㊷	M3-167	Wheel stopper pin	1											
㊸	M3-199	Split pin	1											
㊹	M3-171	Wheel cover assembly	1											
㊺	M3-182	Nut	3											
㊻	M3-187	Spring washer	3											
㊼	M3-841	Load chain	1							—	—	—	—	—
㊽	M3-842	Hand chain	1				—			—	—	—	—	—
㊾	M3-931	Warning tag	1							—	—	—	—	—
㊿	M3-045	Chain stopper link	1							—	—	—	—	—
(51)	M3-164	End pin	1	—	—	—	—	—	—	—	—			
(52)	M3-197	Split pin	1	—	—	—	—	—	—	—	—			
(53)	M3-176	Cross guide	1	—	—	—	—	—	—	—	—			

Note : (1) When ordering replacement part, use the symbol M3B in place of M3 for 2.5t, 5t and larger types, because there are no interchangeability.

(2) Pawl spring A and B must be used as a set.

(3) Each number in "Capacity Code" columns is parts per hoist.

Remark : Every part quantity becomes twice of the number in the column "Parts per hoist" for 20t hoist.

12.7

ASSEMBLY FOR OVERLOAD LIMITER

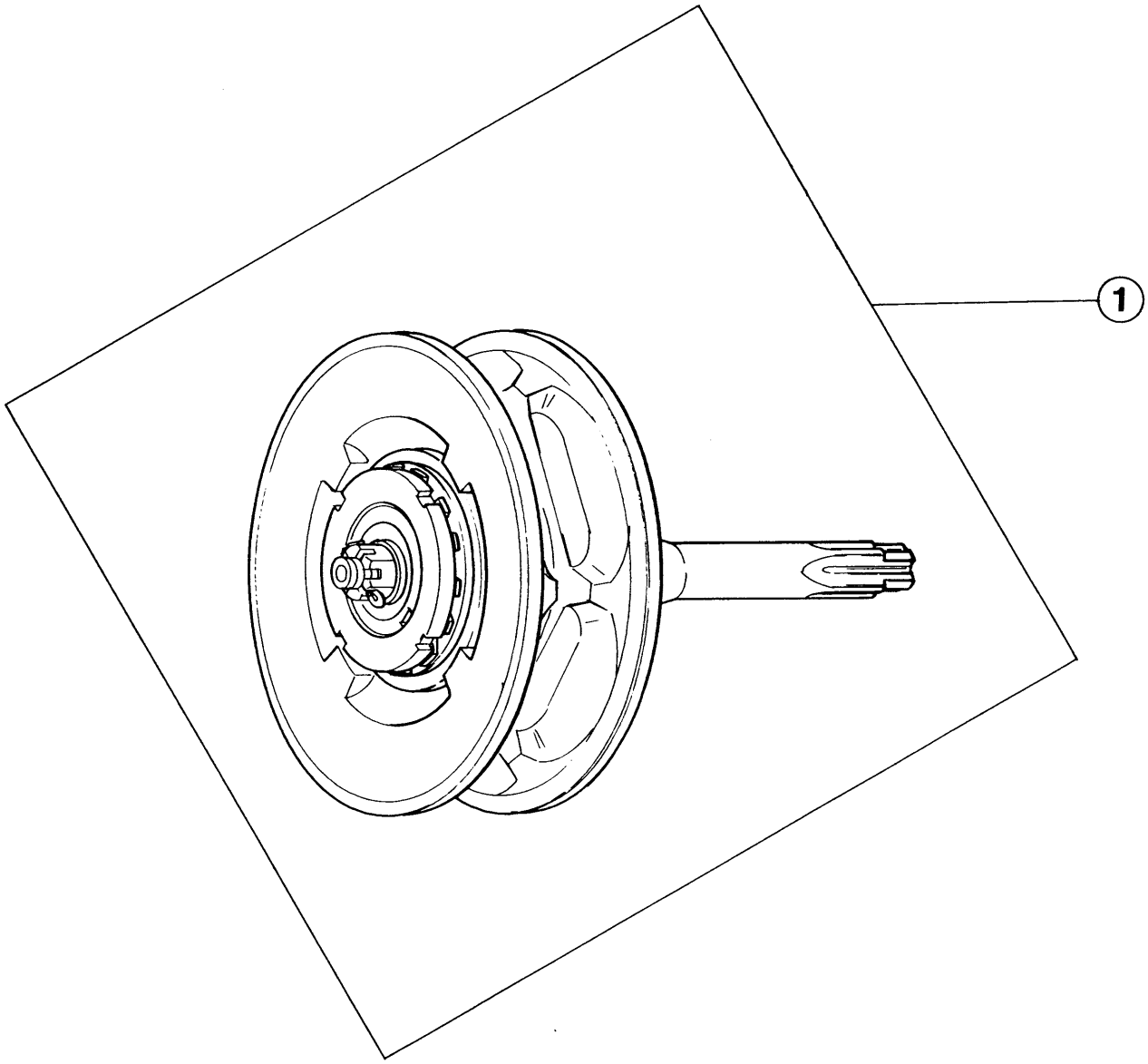


Fig. No.	Part No.	Part Name	Parts per Hoist	Capacity Code				
				005	010	015 030	020	025 100 050 150 075 200
①	M3-111A[1]	OLL Kit	1					

Note : (1) When ordering replacement part, use the symbol M3B in place of M3 for 2.5t, 5t and larger types, because there are no interchangeability.

Remark : Every part quantity becomes twice of the number in the column Parts per hoist" for 20t hoist.

KITO CORP.
Tokyo Opera City Tower 16F,
3-20-2 Nishi-Shinjuku, Shinjuku-ku,
Tokyo 163-1416, Japan
Tel. : 03-5371-7341
Fax. : 03-5371-7349
E-mail : overseas@kito.co.jp
URL : http: //www.kito.co.jp

Printed in Japan 2005.10—5(N)

Chapter 13SUBMERSIBLE PUMPS

MANUFACTURER/DISTRIBUTOR:

FLYGT IIT INDUSTRIES
300,LABROSSE AVE
POINTE-CLAIRE,QUEBEC
H9R 4V5
PH:514-695-0100 FAX:7990

13.1 PERFORMANCES CURVES AND ELECTRIC DATA

13.2 NP3153 MT ON 8" DISCHARGE

13.3 FLYGT LIFTING DEVICE

13.4 PARTS LIST & INSTALLATION, CARE AND MAINTENANCE MANUAL

END OF CHAPTER 13

FLYGT

Courbes de performances

PRODUIT	TYPE
NP3153.181	MT

DATE	PROJET	# COURBE	VERS.
2005-08-17		63-436-00-4530	1

	1/1-CHARGE	3/4-CHARGE	1/2-CHARGE
COS phi DU MOTEUR	0.80	0.74	0.61
RENDEM. DU MOTEUR	87.5 %	88.0 %	87.5 %
RENDEMENT REDUCT.	---	---	---

ARBRE MOTEUR		
PUISSANCE...	11.2	kW
DEMARRAGE COURANT...	95	A
NOMINAL COURANT...	15	A
NOMINAL VITESSE...	1760	rpm
MOMENT TOTAL D'INERTIE	0.066	kgm2
# DE CANAUX	2	

DIAMETRE ROUE: 204 mm

MOTEUR	STATOR	REV.
21-15-4AA	08D	11

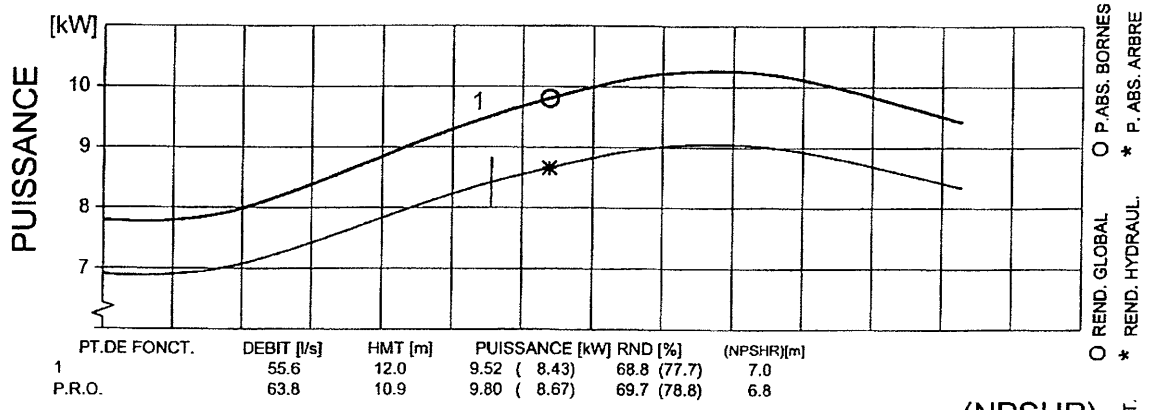
FREQ.	PHASES	TENSION	POLES
60 Hz	3	600 V	4

REDUCTEUR	RAPPORT
---	---

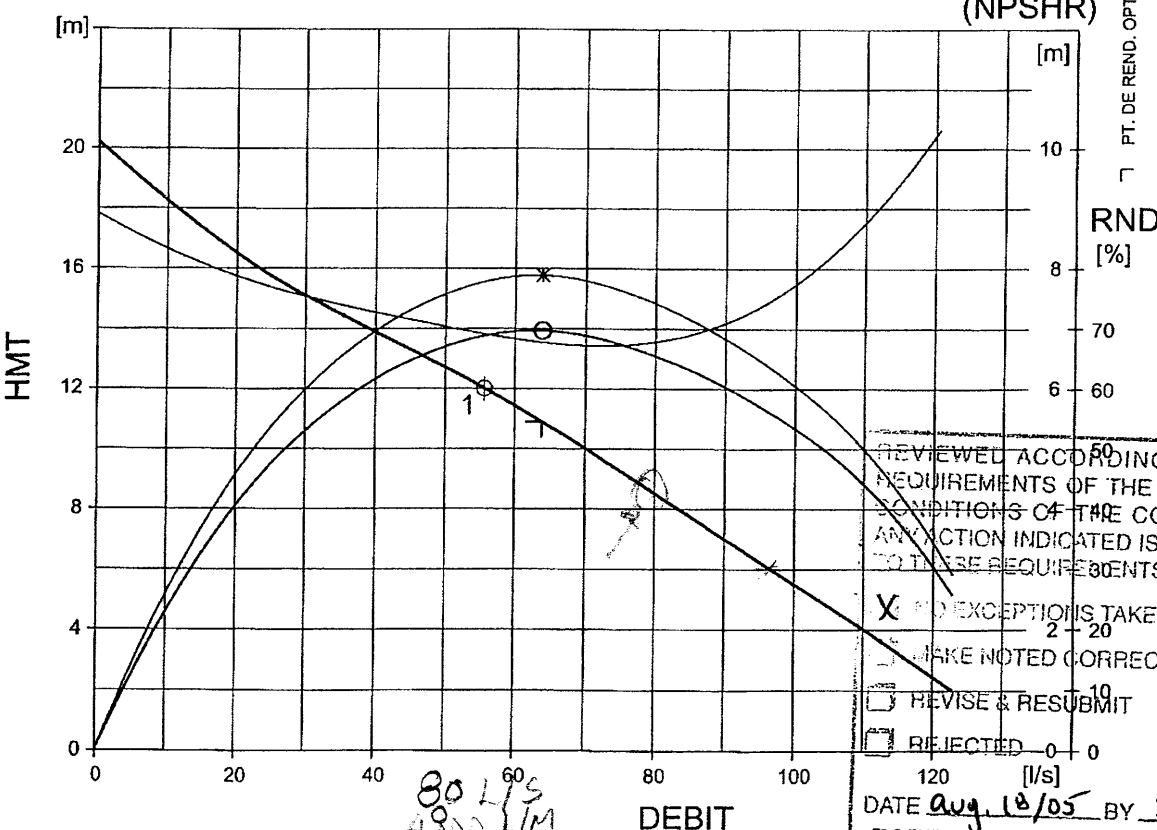
COMMENTAIRES -

ENTREE/SORTIE: -/150 mm

PASSAGE LIBRE: ---



PT.DE FONCT.	DEBIT [l/s]	HMT [m]	PUISSANCE [kW]	RND [%]	(NPSHR)[m]
1	55.6	12.0	9.52 (8.43)	68.8 (77.7)	7.0
P.R.O.	63.8	10.9	9.80 (8.67)	69.7 (78.8)	6.8



REVIEWED ACCORDING TO THE REQUIREMENTS OF THE GENERAL CONDITIONS OF THE CONTRACT. ANY ACTION INDICATED IS SUBJECT TO THESE REQUIREMENTS.

X NO EXCEPTION IS TAKEN

MAKE NOTED CORRECTIONS

REVISE & RESUBMIT

REJECTED

DATE Aug. 18/05 BY S.Sync

EARTH TECH (CANADA) INC.

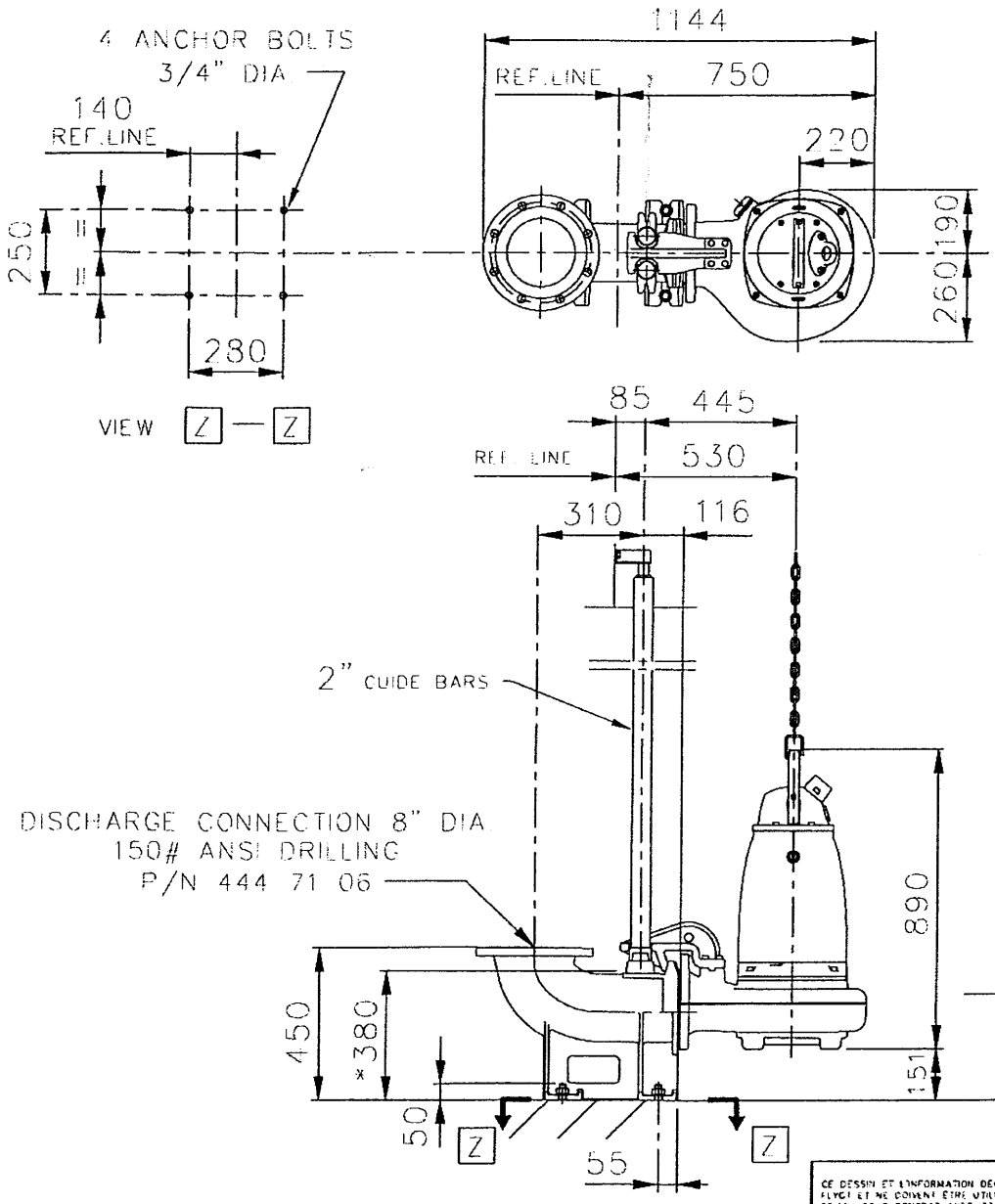
(NPSHR) = (NPSH3) + marges

Performance en eau claire, données de performance 40 °C

FLYPS3.1.0.0 (20050224)

FLYGT COURBE

13.1



* DIMENSION TO ENDS OF GUIDE BARS

Flygt
ITT Industries

TITLE
NP 3153 MT ON 8" DISCHARGE 444 71 06

IQALUIT

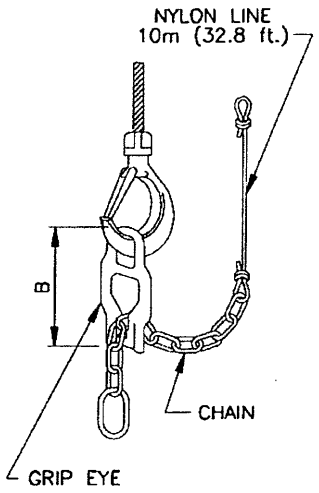
LOCATION
~~SAMNING~~ - ~~INLET~~ WATER PUMPING STATION NO. 1

CUSTOMER

DRAWN BY	DATE	SCALE	FORMAT
Michael Cater	2002-11-13	1 : 20	A
APPROVED BY	DATE	PROJECT No	
Michael Cater	2002-11-13	02-63-2875	
DRG. NO		M-64717	REVISION 0

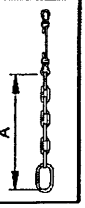
ISSUED FOR ☐ PURCHASING ☐ FABRICATION ☐ INSPECTION ☐ APPROVAL ■ INFORMATION ☐ PLANNING ☐ QUOTATION

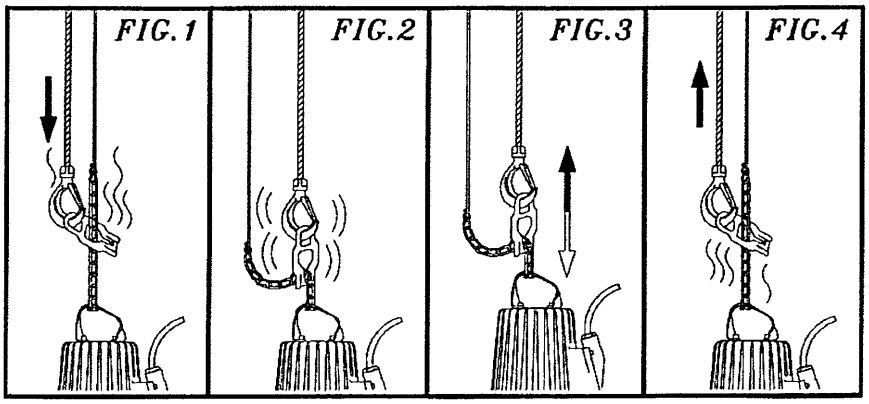
FLYGT	Station Equipment	DOCUMENT NO. ES22	
	FLYGT Lifting Device	SUPERSEDES 01/97	ISSUED 12/2000



"FLYGT" LIFT

THE FOLLOWING METHOD OF RAISING A **Flygt** 3000 SERIES PUMPS HAS BEEN DEVELOPED TO MAKE LIFTING EASIER AND STILL KEEP THE OVERALL COSTS FOR LIFTING EQUIPMENT LOW. IT CONSISTS OF A SHORT LENGTH OF CHAIN ATTACHED TO THE PUMP HANDLE, A LENGTH OF NYLON ROPE ATTACHED TO THE CHAIN, AND A GRIP EYE (WHICH IS PUT ONTO THE LIFTING EQUIPMENT HOOK) WHICH THEN SLIDES DOWN THE ROPE AND AUTOMATICALLY CONNECTS TO THE CHAIN.

RATING	CHAIN SLING UNIT P/N	A	GRIP EYE P/N	B	STYLE	USED ON PUMPS	STYLE 1
1200 Kg. (2600 lb.)	442 18 00 STEEL	345 (13 9/16")	620 09 00 STEEL	200 (7 7/8")	1	SEE DOCUMENT ES25	
540 Kg. (1200 lb.)	442 18 06 STAINLESS STEEL	404 (15 7/8")	620 09 00 STEEL	200 (7 7/8")	1		
2000 Kg. (4400 lb.)	442 18 05 STAINLESS STEEL	698 (27 1/2")	620 09 01 STEEL	353 (13 7/8")	1		



NOTES:

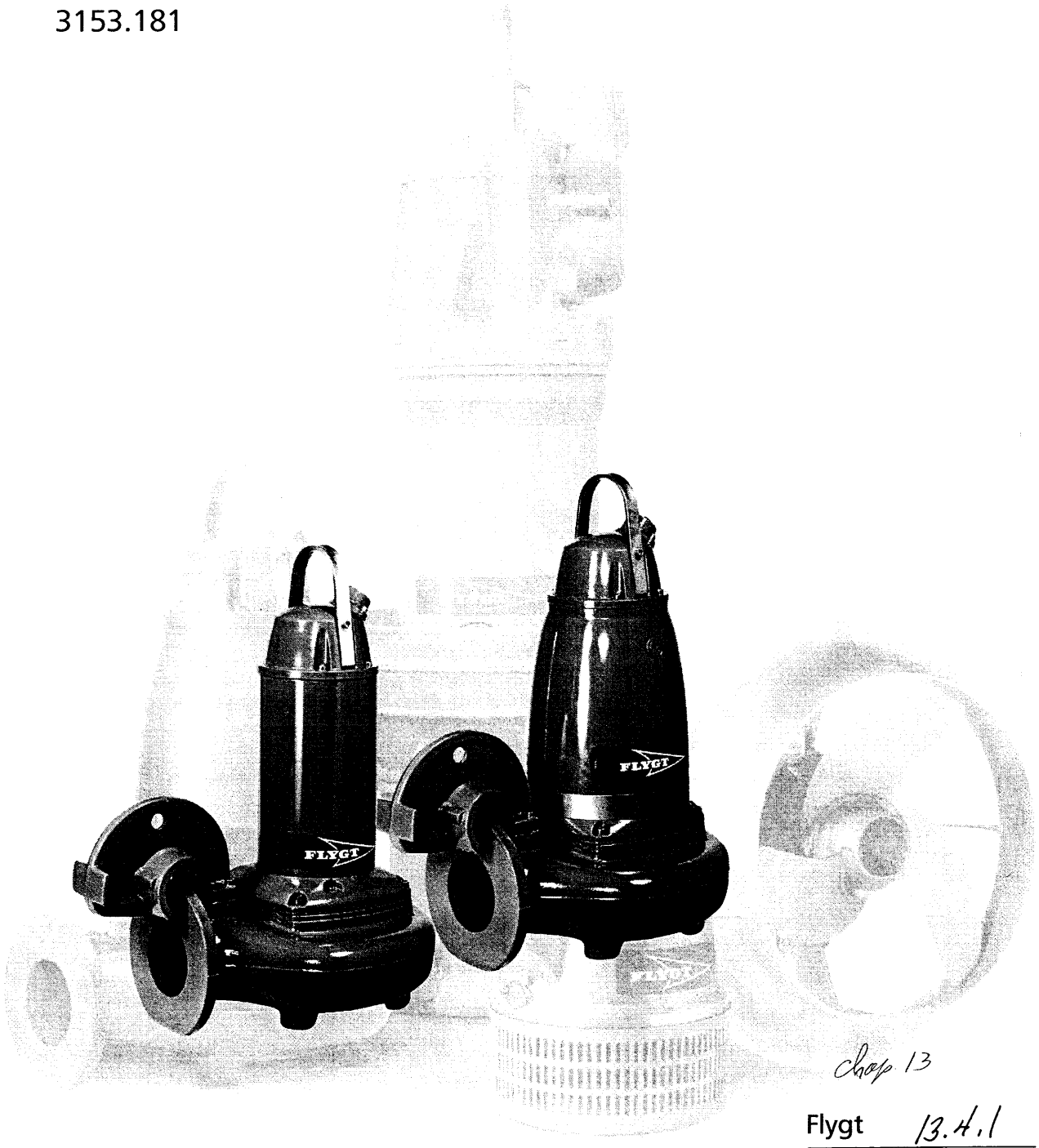
1) GRIP EYE NOT WARRANTEED IF OTHER CHAINS ARE USED.
2) LIFTING DEVICE IS RATED IN ACCORDANCE WITH ISO 4301-1980.

DIMENSIONS ARE IN mm (INCHES)

FLYGT

Installation, Care and Maintenance

3153.181



chap 13

Flygt 13.4.1

895381/02

ITT Industries

CONTENTS

SAFETY

This manual contains basic information on the installation, operating and maintenance and should be followed carefully. It is essential that these instructions are carefully read before installation or commissioning by both the installation crew as well as those responsible for operation or maintenance. The operating instructions should always be readily available at the location of the unit.

Identification of safety and warning symbols

General Danger:

Non-observance given to safety instructions in this manual, which could cause danger to life have been specifically highlighted with this general danger symbol.

High Voltage:

The presence of a dangerous voltage is identified with this safety symbol.

WARNING! Non-observance to this warning could damage the unit or affect its function

Qualifications of personnel

An authorized (certified) electrician and mechanic shall carry out all work.

Safety regulations for the owner/operator

All government regulations, local health and safety codes shall be complied with.

All dangers due to electricity must be avoided (for details consult the regulations of your local electricity supply company).

Unilateral modification and spare parts manufacturing

Modifications or changes to the unit/installation should only be carried out after consulting with Flygt.

Original spare parts and accessories authorized by the manufacturer are essential for compliance. The use of other parts can invalidate any claims for warranty or compensation.

Dismantling and re-assembly

If the pump has been used to pump hazardous media, care must be taken that, when draining the leakage, personnel and environment are not endangered.

All waste and emissions such as used coolant must be appropriately disposed of. Coolant spills must be cleaned up and emissions to the environment must be reported.

The pumping station must be kept in good order at all times.

All government regulations shall be observed.

FLYGT

FLYGT SUBMERSIBLE PUMP

PARTS LIST NP 3153 MT

SERIAL NO 3153.181 0560259

ITT FLYGT
A DIV. OF ITT IND. OF CANADA LTD
300 LABROSSE AVENUE

POINTE CLAIRE, QUEBEC H9R 4V5
CANADA
TELEPHONE NO: 5146-950100

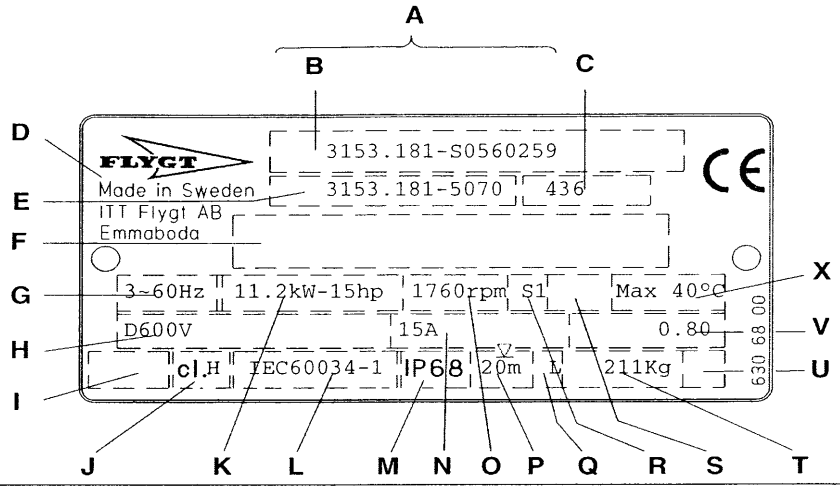
13.4.3

DATAPLATE

FLYGT NP 3153 MT

DATE: 2005-09-23

SERIAL NO: 3153.181 0560259



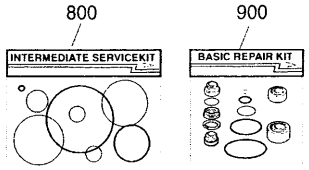
Dataplate Interpretation:

A Serial number
B Product code + Number
C Curve code/Propeller code
D Country of origin
E Product number
F Additional information
G Phase; Type of current; Frequency
H Rated voltage
I Thermal protection
J Themal class
K Rated shaft power
L International standard
M Degree of protection
N Rated current
O Rated speed
P Max. submergence
Q Direction of rotation: L=left, R=right
R Duty class
S Duty factor
T Product weight
U Locked rotor code letter
V Power factor
X Max. ambient temperature

(1 kg = 2.2 pound, 1 lit = 0.26 US gallon, 1 lit = 0,22 UK gallon)

Recommended spare parts:
See Rec. column: I = Intermediate Service Kit; parts for inspection and maintenance.
B = Basic Repair Kit; parts for major overhaul.

For service:
Pos number 800; O-rings kit intended for Intermediate Service.
Pos number 900; contains of a shaft seal unit, bearings and O-rings.



A complete set of tools can be ordered for repair and maintenance work; i. e. standard hand tools and special tools for seal change and hydraulic-end use.

Order:
This partlist can be used as an order form by marking out the number of parts in the Qty/Order column.
Please send or fax the form to your Flygt representative.

PARTS LIST

FLYGT NP 3153 MT

SERIAL NO 3153.181 0560259

Item no	Partno	Rec	Denomination	Qty/ord.
1	642 15 00		Lifting handle	1
2	83 04 56		Hex.socket hd screw M10X35-A4-80	2
7	83 45 59		Cable tie 200X2,4 PA 6/6 -55+105	1
8	630 68 00		Data plate USE 6306801 AS SPARE PART	2
9	83 93 50		Marking strip 5-GW(T1;T2;T15;T16)	1
9	83 93 51		Marking strip W2;V2;U2;W5;W1;V5;V1U5;U1	1
9	650 09 00		Connection plate	1
9	650 22 00		Connection plate	1
10	82 20 88		Drive screw 4X5	4
14	94 20 41	(s)	Motor cable SUBC 4G 1.5 MM2	16.6 m
15	397 81 00		Gland screw	1
21.1	82 40 61		Plain washer 24.5X35X2 (22)-24	2
21.2	84 17 90		Seal sleeve (10)-12 MM	1
21.3	398 98 00		Cable clamp PA 12, 10-12MM	1
23	94 21 03	(s)	Motor cable SUBC 12 AWG/4	16.6 m
24	642 17 00		Entrance flange	1
25	84 41 09		Plate	1
26	83 04 53		Hex.socket hd screw M12X45-A4-80	2
31	82 74 63		O-ring 49,5X3,0 NBR	1
32	642 14 04		Entrance cover	1
33	82 78 35		O-ring 175,0X3,0 NBR	1
35	83 04 56		Hex.socket hd screw M10X35-A4-80	4
45	82 00 11		Hex.socket hd screw M6X12	2
53	82 00 11		Hex.socket hd screw M6X12	2
53	82 00 11		Hex.socket hd screw M6X12	2
54	642 08 00		Rail	1
56	642 16 00		Earthing plate	2
60	82 56 25		Spring washer 71,5X59,0X6,5	1
61	83 30 16		Ball bearing 3306A-2Z/C3WT	1
69	642 09 00		Stator housing	1
72	82 74 94		O-ring 209,3X5,7 NBR	1
73	641 98 05		Shaft unit	1
79	641 94 08		Stator 21-15-4a	1
79.1	84 50 50		Thermal detectors	1
82	608 12 01		Cooling jacket OUTER	1

Ordered by:

Company:.....Ref:.....Tel:.....Date:.....

13.4.5

PARTS LIST

Item no	Partno	Rec	Denomination	Qty/ord.
83	82 78 49		O-ring 221,84X3,53 NBR	1
84	82 75 01		O-ring 279,3X5,7 NBR	1
88	649 38 01		Cable entry unit (17)-20MM	1
88.18	82 40 81		Plain washer (14)-20 MM	4
88.19	84 18 01		Seal sleeve (17)-20 MM	2
88.20	597 98 02		Ring	1
101	650 51 00		Cable unit FLS10	1
103	663 04 00		Level sensor FLS10	1
105	642 10 00		Bearing holder	1
107	82 59 06		Retaining ring SGA 40	1
108	82 44 15		Supporting washer	1
109	83 30 18		Ball bearing 3308A-2Z/C3WT	1
110	83 07 62		Retaining ring JB 90	1
120	642 13 00		Inspection screw	1
122	82 76 85		O-ring 17,0X3,0 NBR	1
122	82 76 85		O-ring 17,0X3,0 NBR	3
129	642 12 00		Seal housing cover	1
130	82 78 39		O-ring 230,0X3,0 NBR	1
131	82 75 01		O-ring 279,3X5,7 NBR	1
133	83 04 56		Hex.socket hd screw M10X35-A4-80	6
141	641 50 00		Mechanical seal DIAM.35	1
145	83 04 53		Hex.socket hd screw M12X45-A4-80	4
158	642 34 65		Impeller	1
162	82 37 05		Plain washer	1
169	83 04 55		Hex.socket hd screw M12X110-A4 80	1
200	643 63 00		Pump housing	1
202	83 04 56		Hex.socket hd screw M10X35-A4-80	2
203	648 00 00		Cover	1
204	82 81 93		O-ring 44,2X5,7 FPM	1
209	651 07 00		Sliding bracket	1
210	83 04 53		Hex.socket hd screw M12X45-A4-80	4
229	667 40 01		Sticker	2
232	83 53 58		Terminal clamp WEIDMüLLER WDU6/10	3
233	83 53 61		Terminal clamp WDU16,1000 V	6
234	83 53 67		Cross connection WQV 16/2	3
234	650 20 02		Cross connection	1
235	83 53 54		End support WEW 35/2	2
236	83 53 50		Partition	1
239	443 69 00		El-lead through	1
240	607 48 00		Spring	1
241	82 78 35		O-ring 175,0X3,0 NBR	1

Ordered by:

Company:.....Ref:.....Tel:.....Date:.....

PARTS LIST

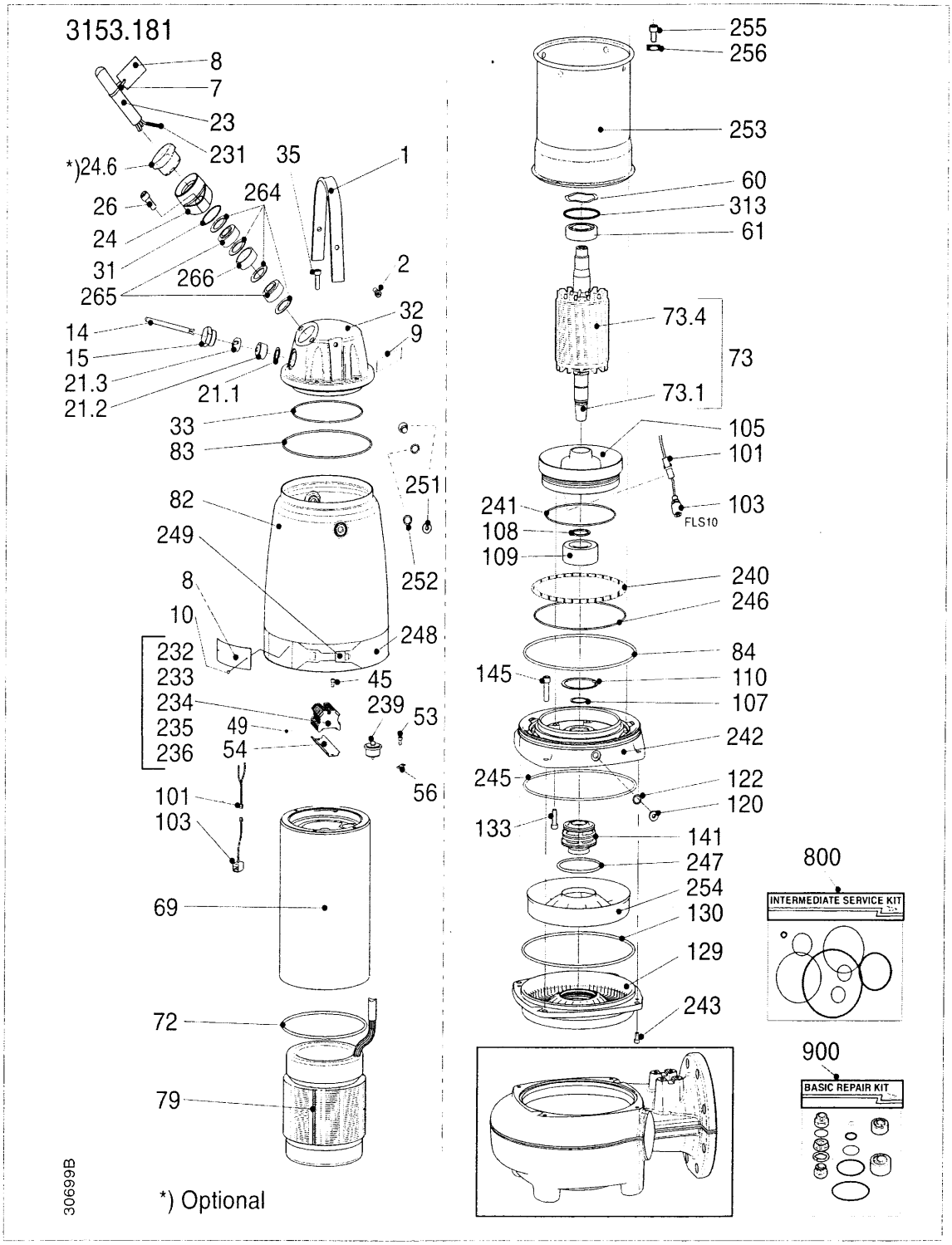
Item no	Partno	Rec	Denomination	Qty/ord.
242	608 22 00		adapter	1
243	83 04 57		Hex.socket hd screw M8X16-A4-80	2
245	82 75 01		O-ring 279,3X5,7 NBR	1
246	82 78 39		O-ring 230,0X3,0 NBR	1
247	82 95 69		O-ring 84,4X4,0 FPM	1
248	608 27 00		Strip	1
249	82 32 50		Clip	1
251	642 13 00		Inspection screw	2
252	82 76 85		O-ring 17,0X3,0 NBR	2
253	608 13 00		Cooling jacket INNER	1
254	608 14 00		Flow diffuser	1
255	82 00 11		Hex.socket hd screw M6X12	4
256	608 24 00		Square washer	4
258	643 65 01		Sleeve	1
259	643 66 00		Gland screw	1
313	82 71 72		O-ring 71,2X3,0 FPM	1
800	84 15 47		Is kit INTERMEDIATE SERVICE KIT	1
800	84 15 48		Is kit INTERMEDIATE S.KIT HOT W	1
900	657 17 08		Basic repair kit	1
900	657 17 09		Basic repair kit	1
	90 37 08		Monopropylene glycol 'DOWCAL N'	3.15 l
...	.....		.....	....
...	.....		.....	....
...	.....		.....	....
...	.....		.....	....

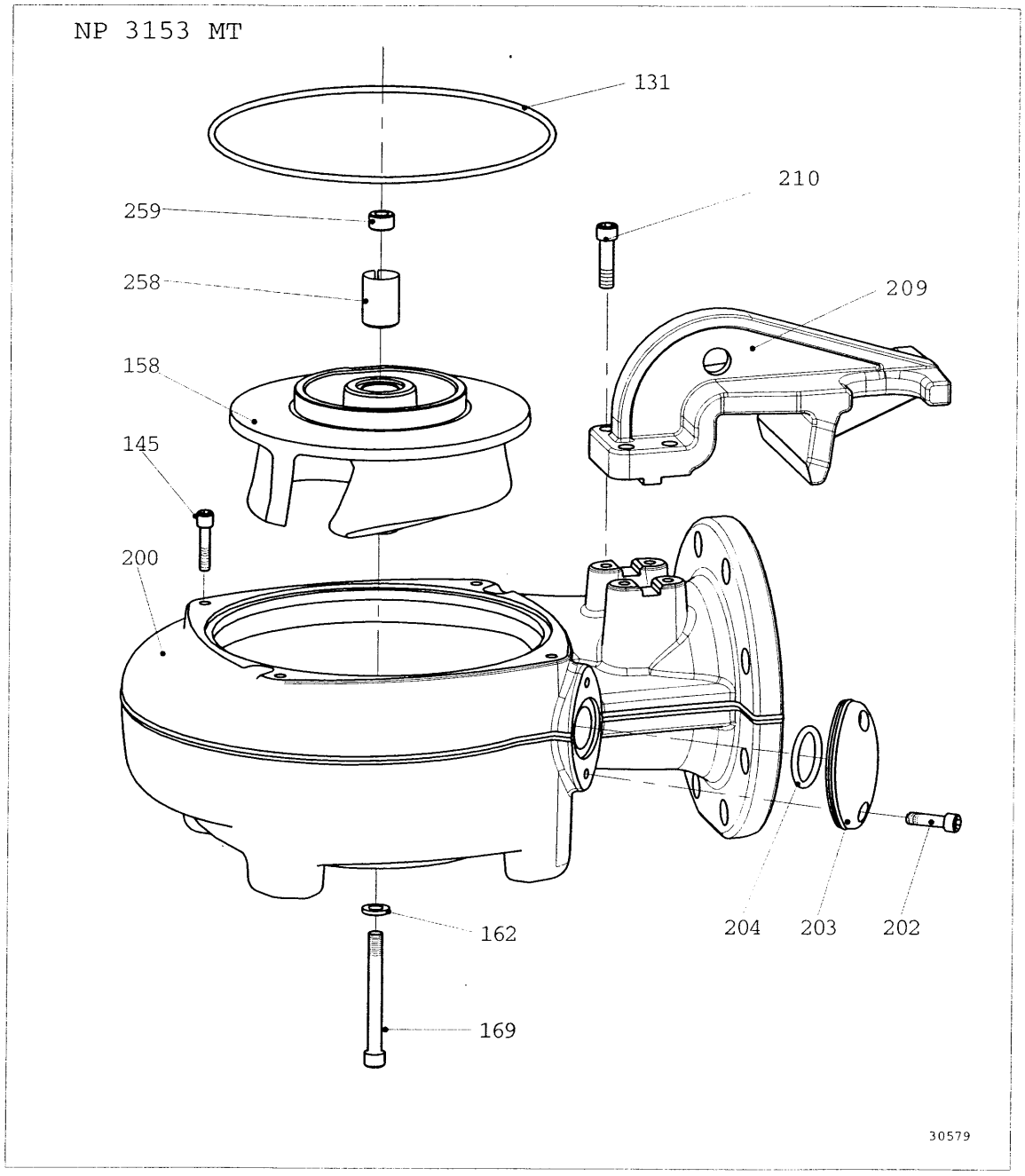
Ordered by:

Company:.....Ref:.....Tel:.....Date:.....

13.4.7

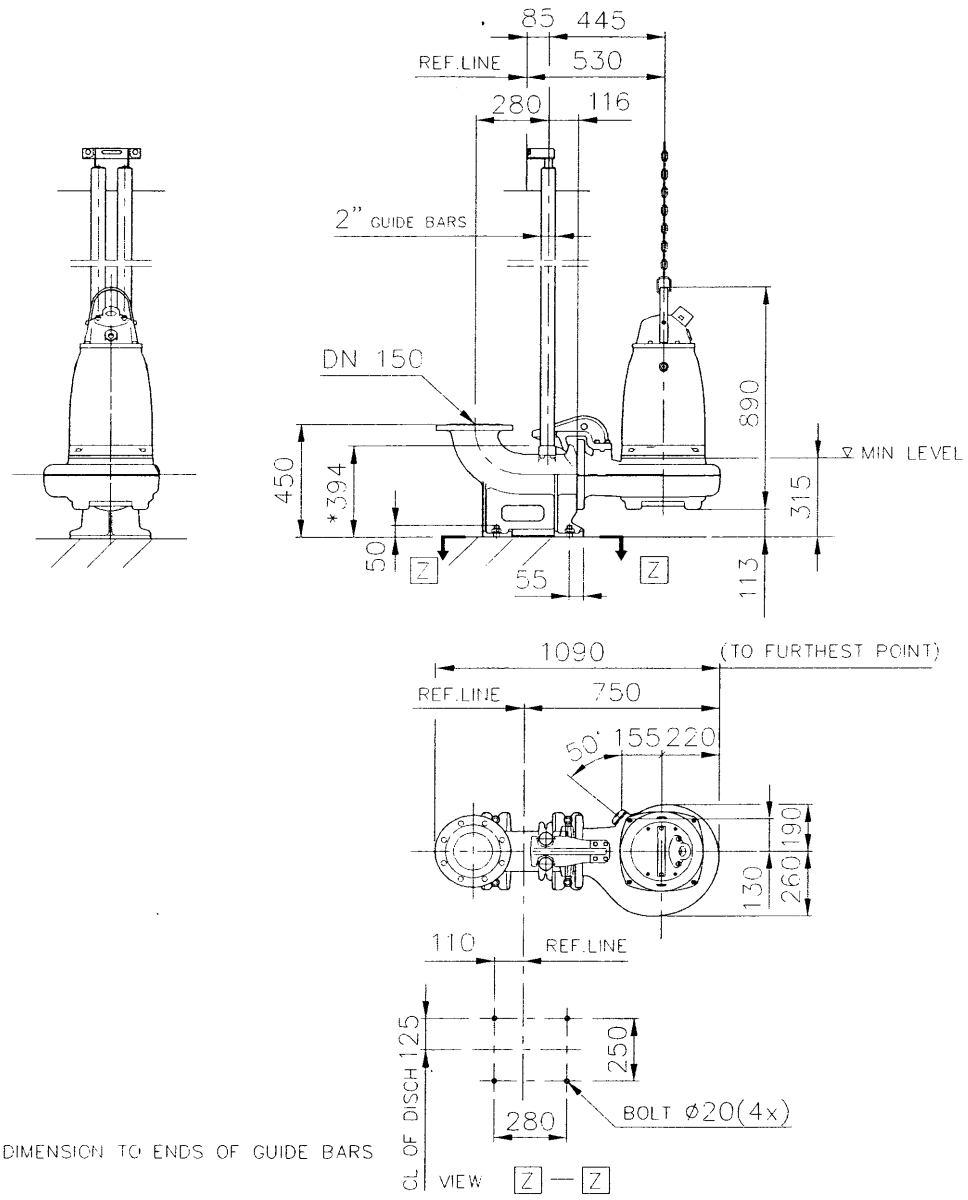
EXPLODED VIEW




NP 3153 MT
131
210
259
258
209
158
145
200
162
204
203
202
169
30579

13.4.9

DIMENSIONAL DRAWING



* DIMENSION TO ENDS OF GUIDE BARS

Weight (kg)	
Pump	Stand
211	79

AUTOCAD DRAWING	Denomination: Dimensional drwg NP 3153 MT DN 150/DN 150	Drawn by: JoS	Checked by: JK	Date: 990610
		Scale: 1:20		Reg no: 5399
		650 43 00		G

GUARANTEE

ITT Flygt undertakes to remedy faults in products sold by Flygt provided:

— that the fault is due to defects in design, materials or workmanship;

— that the faults are reported to Flygt or Flygt's representative during the guarantee period;

— that the product is used only under condition described in the Installation, Care and Maintenance manual and in applications for which it is intended;

— that the monitoring equipment incorporated in the product is correctly **connected** and **in use**;

— that all service and repair work is done by a work shop authorized by Flygt;

— that genuine Flygt parts are used.

Hence, the guarantee does not cover faults caused by deficient maintenance, improper installation, incorrectly executed repair work or nomal wear and tear.

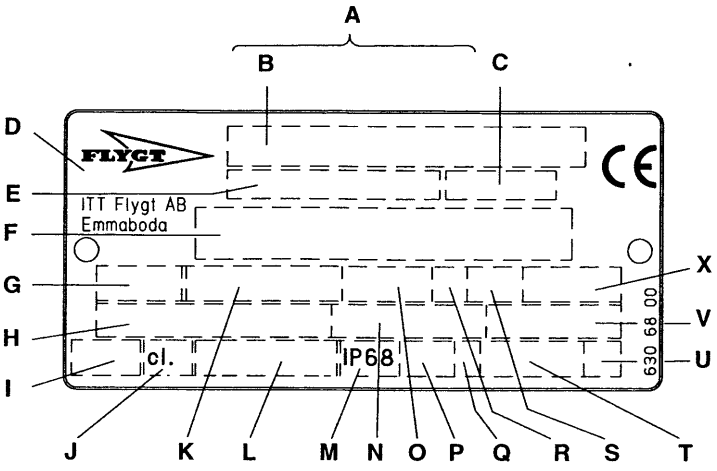
Flygt assumes no liability for either bodily injuries, material damages or economic losses beyond what is stated above.

Flygt guarantees that spare parts will be kept for 15 years after that the manufacture of this product has been discontinued.

12 4.11

DATA PLATE INTERPRETATION

General data plate



A Serial number
B Product code + Number
C Curve code / Propeller code
D Country of origin
E Product number
F Additional information
G Phase; Type of current; Frequency
H Rated voltage
I Thermal protection
J Thermal class
K Rated shaft power
L International standard
M Degree of protection
N Rated current
O Rated speed
P Max. submergence
Q Direction of rotation: L=left, R=right
R Duty class
S Duty factor
T Product weight
U Locked rotor code letter
V Power factor
X Max. ambient temperature

Approval plates

These approval plates apply to an explosion-proof submersible ITT Flygt pump.
The plates are used together with the general data plate on the pump.

Introduction

Thank you for buying a submersible ITT Flygt pump. In this Installation, Care and Maintenance manual you will find general information on how to install and service the 3153 pump to give it a long and reliable life.

Application

This Installation, Care and Maintenance manual applies to a submersible ITT Flygt pump.

If you have bought an Ex-approved pump (please see approval plate on your pump or Parts List) special handling instructions apply as described in this document.

The pump is intended to be used for;

— pumping of waste water

— pumping of raw or clean water

— pumping of sludge

Installation alternatives

P = semi permanent wet well arrangement with pump installed by means of twin guide bars with automatic connection to discharge.

S = transportable version with hose connection or flange for connection to discharge pipeline.

T = permanent dry well or in-line arrangement with flange connection to suction and discharge pipework; vertical mounting.

Z = permanent dry well or in-line arrangement with flange connection to suction and discharge pipework; horizontal mounting.

In **T-, Z-** and **S**-installations the pump must be equipped with cooling jacket.

For further information on applications, contact your nearest Flygt representative.

Pump versions

LT = low head execution
MT = medium head execution
HT = high head execution
SH = super high head execution

Liquid temperature: max. 40°C (104°F)
Also available in an execution for liquid temperature up to 70°C (158°F) only with cooling jacket.

Higher temperatures than 40° C (104° F) are not permitted for the Ex-approved pumps.

Liquid density: max. 1100 kg/m³ (9.2 lb per US gal.)

The pH of the pumped liquid: 5.5 —14.

Lowest liquid level: See illustration on page 8.

Depth of immersion: max. 20 m (65 ft).

Weights

Weight including connections, but without motor cable in kg (lb).

Pump type	With cooling jacket	Without cooling jacket	Discharge connection
NP 3153 LT	320 (705)	307 (677)	78 (172)
NP 3153 MT	206 (454)	193 (425)	54 (119)
NP 3153 HT	192 (423)	179 (395)	42 (93)
NP 3153 SH	215 (474)	202 (445)	35 (77)
NS 3153 LT	379 (836)	—	
NS 3153 MT	240 (529)	—	
NS 3153 HT	214 (472)	—	
NS 3153 SH	237 (522)	—	
NT 3153 LT	437 (963)	—	
NT 3153 MT	284 (626)	—	
NT 3153 HT	235 (518)	—	
NT 3153 SH	258 (569)	—	
NZ 3153 LT	310 (683)	—	
NZ 3153 MT	196 (432)	—	
NZ 3153 HT	182 (401)	—	
NZ 3153 SH	205 (452)	—	

13.4.13

Motor data

50 Hz, 7.5 kW, 1460 r/min, 3- phase, 4-pole

Voltage V	Rated current A	Starting current A
230 D	29	168
380 D	17	96
400 D	16	91
400 Y	17	98
415 D	15	86
440 D	16	88
500 D	13	70
660 Y	9.9	56
690 Y	9.3	52

50 Hz, 9.0 kW, 1460 r/min, 3-phase, 4-pole

Voltage V	Rated current A	Starting current A
230 D	32	181
380 D	20	114
400 D	19	107
400 Y	19	105
415 D	18	105
440 D	19	107
500 D	15	86
660 Y	11	66
690 Y	11	62

50 Hz, 13.5 kW, 1455 r/min, 3-phase, 4-pole

Voltage V	Rated current A	Starting current A
230 D	47	250
380 D	28	150
400 D	28	150
400 Y	27	145
415 D	26	133
440 D	26	143
500 D	21	112
660 Y	16	87
690 Y	16	86

50 Hz, 9.0 kW, 955 r/min, 3-phase, 6-pole

Voltage V	Rated current A	Starting current A
230 D	36	151
380 D	22	95
400 D	21	90
400 Y	21	88
415 D	20	81
440 D	20	87
500 D	17	73
660 Y	13	55
690 Y	12	52

50 Hz, 15.0 kW, 2925 r/min, 3-phase, 2-pole

Voltage V	Rated current A	Starting current A
230 D	47	370
380 D	29	239
400 D	27	213
400 Y	27	216
415 D	27	222
440 D	28	238
500 D	22	187
660 Y	17	138
690 Y	16	123

Motor data

60 Hz, 12 hp, (8.9 kW) 1755 r/min, 3-phase, 4-pole

Voltage V	Rated current A	Starting current A
200 D	36	216
208 D	36	227
230 Y//	32	204
380 D	19	115
380 Y	20	124
440 D	17	101
460 D	16	95
460 Y ser	16	102
575 D	13	73
600 D	12	78

60 Hz, 15 hp, (11.2 kW) 1755 r/min, 3-phase, 4-pole

Voltage V	Rated current A	Starting current A
200 D	44	246
208 D	43	259
230 Y//	39	228
380 D	23	133
380 Y	23	139
440 D	20	121
460 D	19	112
460 Y ser	19	114
575 D	15	90
600 D	15	95

60 Hz, 20 hp, (14.9 kW) 1755 r/min, 3-phase, 4-pole

Voltage V	Rated current A	Starting current A
200 D	59	330
208 D	58	345
230 Y//	52	296
380 D	31	186
380 Y	31	180
440 D	26	158
460 D	26	157
460 Y ser	26	148
575 D	21	116
600 D	21	123

60 Hz, 15 hp, (11.2 kW) 1150 r/min, 3-phase, 6-pole

Voltage V	Rated current A	Starting current A
200 D	49	214
208 D	49	225
230 Y//	46	212
380 D	26	114
380 Y	26	109
440 D	23	100
460 D	21	95
460 Y ser	22	101
575 D	17	76
600 D	17	81

60 Hz, 23 hp, (17.2 kW) 3525 r/min, 3-phase, 2-pole

Voltage V	Rated current A	Starting current A
200 D	59	460
208 D	58	480
230 Y//	52	415
440 D	28	243
460 D	26	215
460 Y ser	26	207
575 D	21	189
600 D	21	198

13.4.15

DESIGN OF THE PUMP

Motor
Squirrel-cage 3-phase induction motor for 50 Hz or 60 Hz.
The motor is started by means of direct on-line or star delta start.
The motor can be run continuously or intermittently with a maximum of 30 evenly spaced starts per hour.
Flygt motors are tested in accordance with IEC 34-1.

The stator is insulated in accordance with class H (180°C, 360 F). The motor is designed to supply its rated output at ± 10% variation of the rated voltage. Without overheating the motor, ± 10% variation of the rated voltage can be accepted provided that the motor does not run continuously at full load.

Monitoring equipment
The stator incorporates three thermal contacts connected in series that activate an alarm at overtemperature.
The thermal contacts: open at 140°C (285°F). The sensors shall be connected to Flygt's monitoring unit MiniCAS II or equivalent unit.
The monitoring equipment shall be of a design that makes automatic restart impossible.
The 3153 is supplied with inspection sensor FLS10 for sensing the presence of any liquid in the inspection chamber.

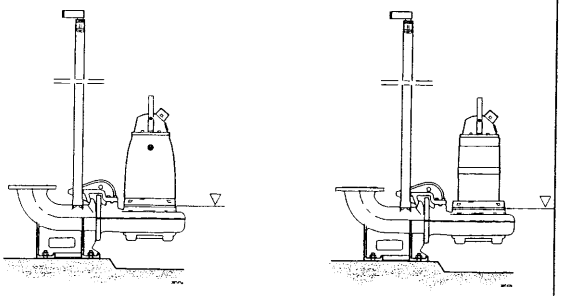
Cooling
The pump is cooled by the ambient liquid.
For lowest liquid level, see illlustration below.

Bearings
The support bearing of the shaft is a double row ball bearing. The main bearing of the shaft is a double row angular contact ball bearing.

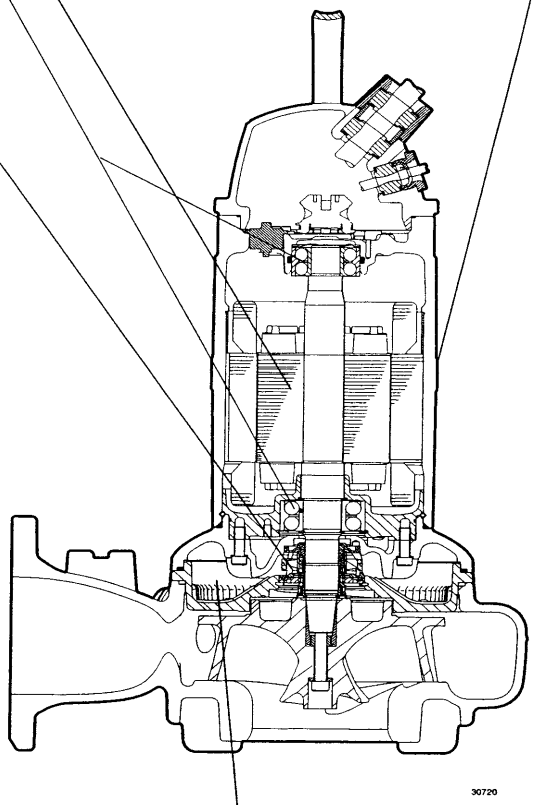
Mechanical seal unit
The pump has one shaft mechanical seal unit consisting of two independently operating seals:

Alt I	Inner seal:	Corrosion resistant cemented carbide WCCR/WCCR
	Outer seal:	Corrosion resistant cemented carbide WCCR/WCCR
Alt II	Inner seal:	Corrosion resistant cemented carbide/Aluminum Oxide WCCR/Al_2O_3
	Outer seal:	Silicon Carbide RSiC/RSiC

Lowest liquid level

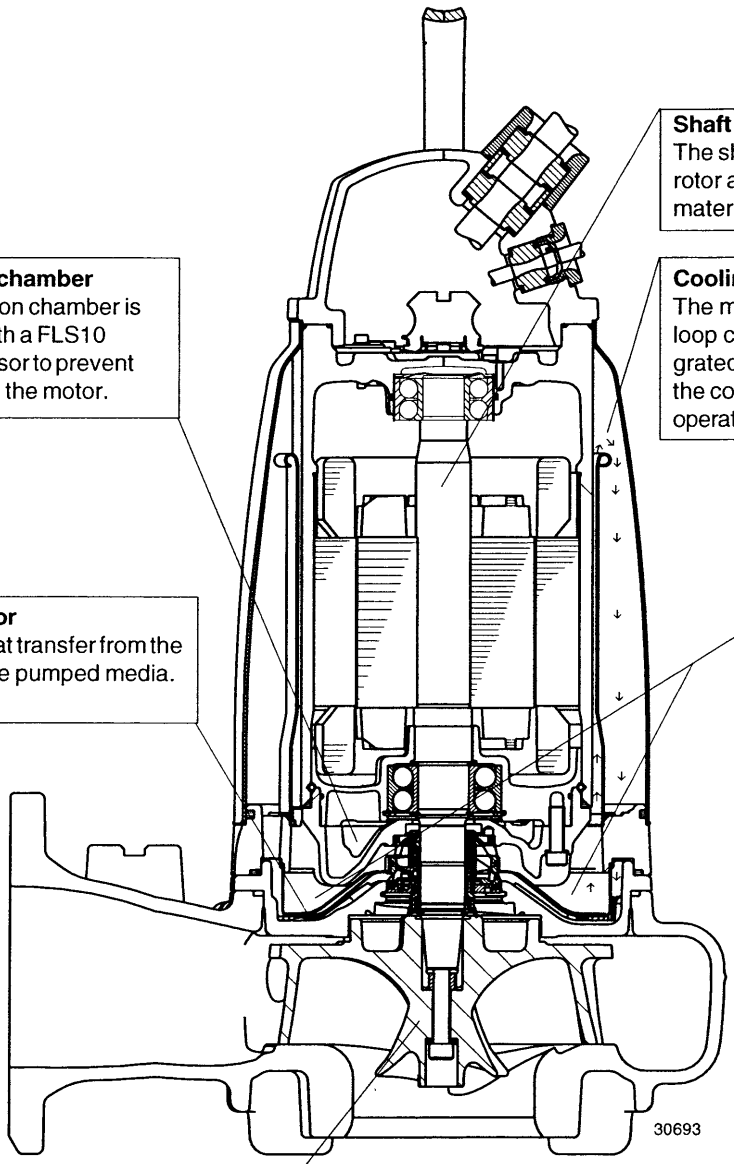


Without cooling jacket



Seal housing
A coolant fluid lubricates and cools the mechanical seal unit and acts as a buffer between the pumped media and the electric motor.

With cooling jacket



Shaft
The shaft is delivered with the rotor as an integral part. Shaft material; stainless steel.

Cooling
The motor is cooled by a closed loop cooling system. An integrated coolant pump circulates the coolant whenever the pump is operated.

Inspection chamber
The inspection chamber is equipped with a FLS10 leakage sensor to prevent damages on the motor.

Flow diffusor
Provides heat transfer from the coolant to the pumped media.

Seal housing
The coolant lubricates and cools the mechanical seal unit and acts as a buffer between the pumped media and the electric motor.

Impeller
The pump is equipped with a N-impeller, a semiopen two-vane impeller.

13.4.17

TRANSPORTATION AND STORAGE

The pump may be transported and stored in a vertical or horizontal position. Make sure that the pump cannot roll or fall over.

WARNING!

Always lift the pump by its lifting handle.
Never by the motor cable or the hose.

The pump is frostproof as long as it is operating or is immersed. If the pump is hoisted from the sump when the temperature is below the freezing point, the impeller and shaft seal may freeze.

A frozen impeller and shaft seal can be thawed by allowing the pump to stand immersed in the liquid for a short period before it is started. Never use a naked flame to thaw the pump. The pump should run for a few seconds after being taken up in order to expel all remaining water from the hydraulic end.

For longer periods of storage, the pump must be protected against moisture and heat. The impeller should be rotated by hand occasionally (for example every other month) to prevent the seal rings from sticking together. If the pump is stored for more than 6 months, this rotation is mandatory.

After a long period of storage, the pump should be inspected before it is put into operation. Pay special attention to the shaft seal and the cable entry.

Follow the instructions under the heading "Before starting".

INSTALLATION

Handling equipment

Always pay extra attention to safety aspects when working with lifting equipment.

Lifting equipment is required for handling the pump. The lifting chain and the shackle should be in stainless steel and inspected every year.

— **Stay clear of suspended loads.**

— **Always lift the pump by its lifting handle – never by the motor cable or the hose.**

The minimum height between the lifting hook and the floor shall be sufficient to lift the pump out of the sump.

The lifting equipment shall be able to hoist the pump straight up and down in the sump, preferably without the need for resetting the lifting hook.

Oversized lifting equipment could cause damage if the pump should stick when being lifted.

Make sure that the lifting equipment is securely anchored and in good condition.

Check that the lifting handle and chain are in good condition.

To ensure proper installation, please see the dimensions on the dimensional drawing.
WARNING! The end of the cable must not be submerged. It must be above flood level, as water could penetrate through the cable into the junction box or the motor.

For automatic operation of the pump (level control), it is recommended that the level regulators should be used at low voltage. The data sheet delivered with the regulators gives the permissible voltage. Local rules may specify otherwise.

Clean out all debris from the sump before the pump is lowered down and the station is started.

— **Minimum stop level should be according to the dimensional drawing.**

— **The pump must never run dry.**

Safety precautions

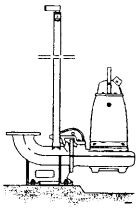
In order to minimize the risk of accidents in connection with service and installation work, the following rules should be followed:

1. Never work alone. Use a lifting harness, safety line and a respirator as required. Do not ignore the risk of drowning.
2. Make sure there are no dangerous gases within the work area.
3. Check the explosion risk before welding or using electric hand tools.
4. Before the pump is installed check that the cable and cable entry have not been damaged during the transportation.
5. Observe strict cleanliness. Do not ignore health hazards.
6. Bear in mind the risk of electrical accidents.
7. Make sure that the lifting equipment is in good condition and comply to local ordinances.
8. Provide a suitable barrier around the work area, e.g. a guard rail.
9. Make sure you have a clear path of retreat.
10. Use safety helmet, safety goggles and protective shoes.
11. All personnel who work with sewage systems must be vaccinated against diseases to which they may be exposed.
12. A first-aid kit must be close at hand.
13. Note that special rules apply to installation in explosive atmosphere.

Follow all health and safety rules and local codes and ordinances.

Installation alternatives

P- installation



In the P- installation, the pump is installed on a stationary discharge connection and operates completely or partially submerged in the pumped liquid.

In addition to the pump the following items are required:

Guide bars consisting of two hot dip galvanized or stainless steel pipes.

Guide bar bracket for attaching the guide bars to the access frame or the upper part of the sump.

Level regulators or other control equipment for start, stop and alarm.

Cable holder for holding the cable and regulating the height of the level regulators.

Access frame (with covers) to which the upper guide bar bracket and cable holder can be attached.

Discharge connection for connecting the pump to the discharge line. The discharge connection has a flange which fits the pump casing flange and a bracket for attaching the guide equipment.

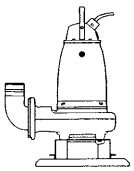
Bushings for vibration damping between the guide bars and the discharge connection.

Instructions

- Provide a barrier around the pump pit, for example a guardrail.
- Arrange for a cable between the sump and the electric control box. Make sure that the cables are not sharply bent or pinched.
- Place the access frame in position.
- Align the frame so that it is horizontal and then grout it in place.
- Grout the anchor bolts in place. Be careful when aligning and positioning the discharge connection in relation to the access frame.
- Place the discharge connection in position and tighten the nuts.
- Secure the guide bars in the bracket.
- Check that the guide bars are placed vertically by using a level or a plumb line.
- Connect the discharge pipe to the discharge connection.
- Bolt the cable holder to the access frame. Thread the level regulator cables through the holes in the cable holder and adjust the height of the level regulators.
- Protect bolts and nuts with corrosion preventive compound.
- Lower the pump along the guide bars.
- Fasten the lifting chain (stainless steel) on the access frame and the cables on the cable holder. Make sure that the cables cannot be sucked into the inlet of the pump. Support straps are required for deep installations.
- Run the cables up to the electric control box.
- Clean out debris from the sump before starting up the station.
- The pump can be hoisted up along the guide bars for inspection without any connections having to be undone.

13.4.19

S- installation

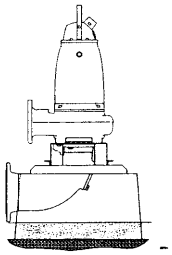


In the S- installation, the pump is transportable and intended to operate completely or partially submerged in the pumped liquid. The pump is equipped with a connection for hose or pipe, see "Parts list".

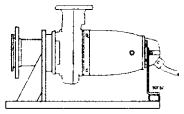
The pump stands on a base stand.

WARNING! Watch for the starting jerk which can be powerful.

T/Z- installation



T



Z

In the T- installation, the pump is installed in a stationary position in a dry well next to the wet sump.

In the Z- installation the pump is installed in a horizontal position on a support stand and a bell-mouth is connected to the inlet pipe.

The pump has a watertight motor and will therefore not be damaged in the event of flooding.

The pump is equipped with a cooling jacket.

In addition to the pump the following items are required:

Support stand for anchoring the pump to a base.

Shut-off valves to permit the pump to be removed for service.

Level regulators or other control equipment for start, stop and alarm.

WARNING! The risk of freezing is particularly great at certain T or Z installations.

Instruction

Bolt the base stand to the concrete base by means of the anchor bolts. Bolt the pump to the base stand and the suction connection.

Connect the motor cable, suction line and discharge line.

Make sure that the weight of the pump does not bear on the system piping.

ELECTRICAL CONNECTIONS

- **Before starting work on the pump, make sure that the pump and the control panel are isolated from the power supply and cannot be energized. This applies to the control circuit as well.**
- **If the pump is equipped with automatic level control, there is a risk of sudden restart.**
- **If persons are likely to come into physical contact with the pump or pumped media (liquid), e.g on con-struction sites and farms, the earthed (grounded) socket must have an additional earth-(ground-) fault protection device (GFI) connected.**

All electrical work shall be carried out under the supervision of an authorized electrician. Local codes and regulations shall be complied with.

- **All electrical equipment must be earthed (grounded). This applies to both pump equipment and any monitoring equipment. Failure to heed this warning may cause a lethal accident. Make sure that the earth (ground) lead is correctly connected by testing it.**

Check the data plate to deterimine which voltage supply is valid for your pump.

Check that the main voltage and frequency agree with the specifications on the pump data plate.

If the pump can be connected to different voltages, the connected voltage is specified by a yellow sticker.

Connect the motor cable to the starter equipment as illustrated in the wiring diagrams.

When the pump is connected to the public mains it may cause flicker of incandescent lamps when starting. In this case the supply authority should be notified before installing the pump.

Leads that are not in use must be isolated.

The cable should be replaced if the outer sheath is damaged. Contact a Flygt service shop.
Make sure that the cable does not have any sharp bends and is not pinched.

Under no circumstances may the starter equipment be installed in the sump.

WARNING! For safety reasons, the earth (ground) lead should be approx. 100 mm (4.0") longer than the phase lead. If the motor cable is jerked loose by mistake, the earth (ground) lead should be the last lead to come loose from its terminal. This applies to both ends of the cable.

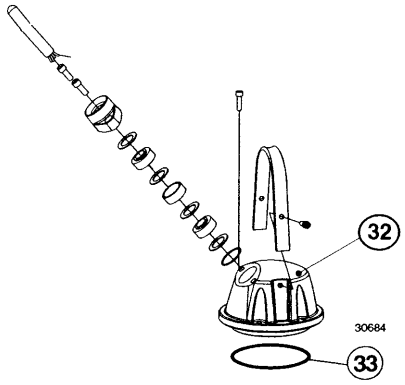
The motor is convertible between different voltages as stated on the data plate. This conversion is done on the terminal board or the contactor.

— **Bear in mind the risk of electrical shock and the risk of explosion if the electrical connections are not correctly carried out.**

When using a variable-frequency-drive (VFD) the shielded cable (type NSSHÖU.../3E+St) should be used in order to fulfil European CE requirements. Contact your Flygt representative and ask your VFD-supplier for electrical limitations. Also please see VFD-recommendation Flygt article no. 893472.

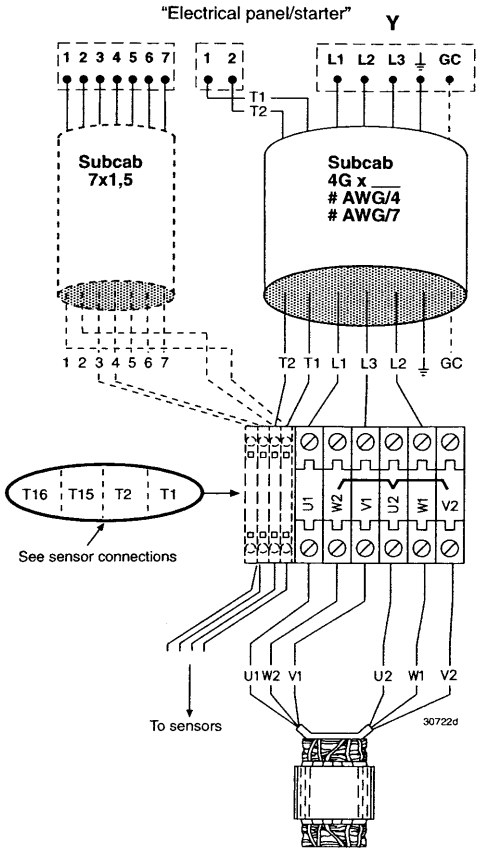
Connection of stator and motor leads

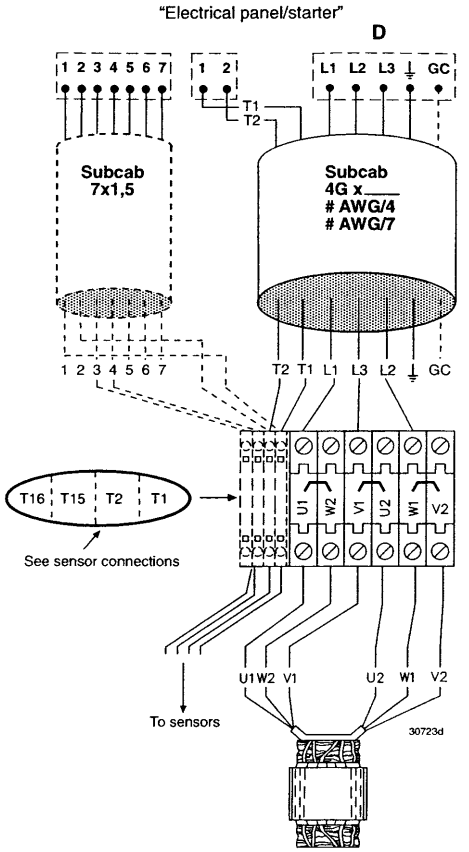
- Check on the data plate which connection, Y, D or YD, is valid for the voltage supply. Then, depending on voltage, arrange the connection on the terminal board in accordance with Y, D or YD. See figure.
- Connect the motor cable to the connection block, U1, V1, W1 and earth (ground). Connect the leads from the motor control circuit.
- If star-delta start is used, motor cables are connected as shown in the figure. Links (jumper strips) are not used with star-delta start.
- Make sure that the pump is correctly earthed (grounded).
- Install the O-ring (33) and connection cover (32).
- Tighten the screws and the gland nut so that the cable entry unit bottoms out.
- Connect the motor cable to the starter equipment.
- Check the direction of rotation, see "Before starting".
- If the direction of rotation is wrong, transpose two of the phase leads.
- Remember that the starting surge with the direct-on line start can be up to six times higher than the rated current. Make sure that the fuses and circuit breakers are of the proper amperage.
- The incorporated thermal contacts must be connected and in use. The pump must be connected to an overload protection which must be set to rated power.



13.4.21

SUBCAB 4G/SUBCAB AWG





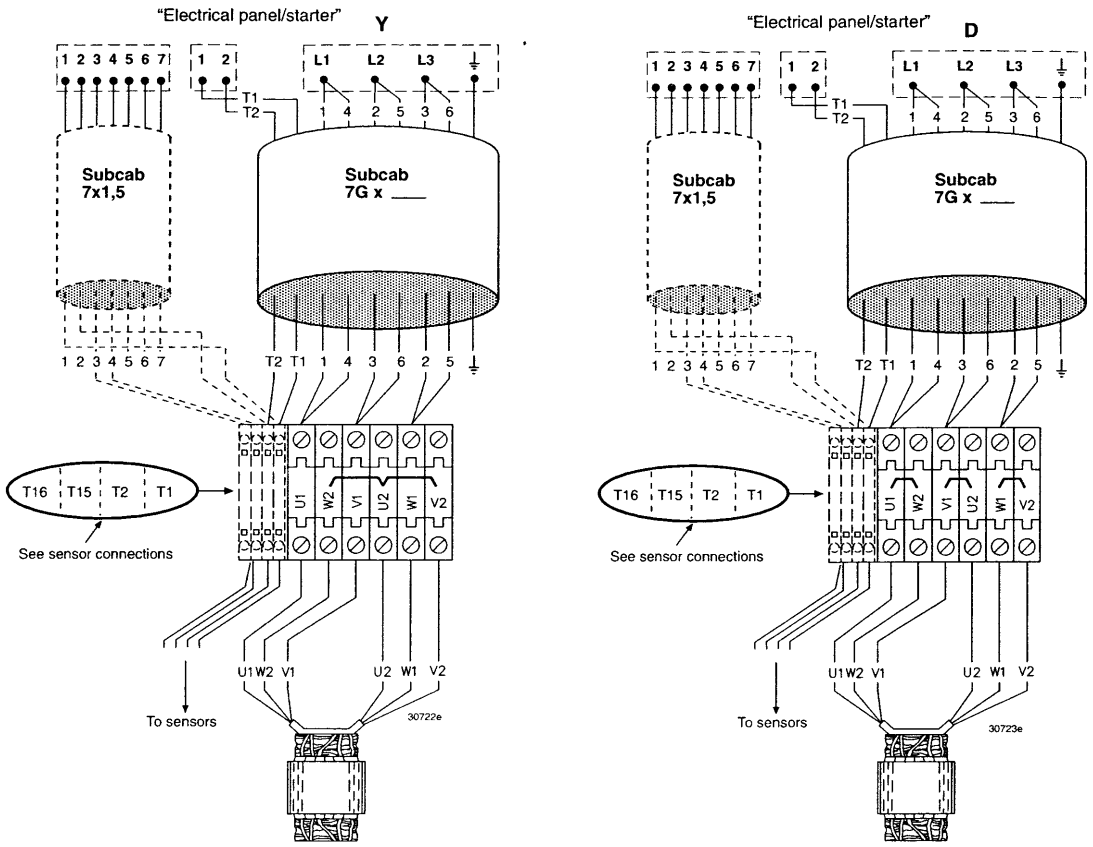
Mains	Lead	Pump terminal board
L1	brown/(red*)	U1
L2	blue/alt. grey (white*)	W1
L3	black (black*)	V1
Earth (Ground)	yellow/green	⏚
Groundcheck (GC)	yellow*)	

Stator leads connection: Stator lead	Pump terminal board
U1, red	U1
W2, black	W2
V1, brown	V1
U2, green	U2
W1, yellow	W1
V2, blue	V2

Control	Cable lead
T1	T1 black/orange*
T2	T2 black/blue*

* SUBCAB AWG

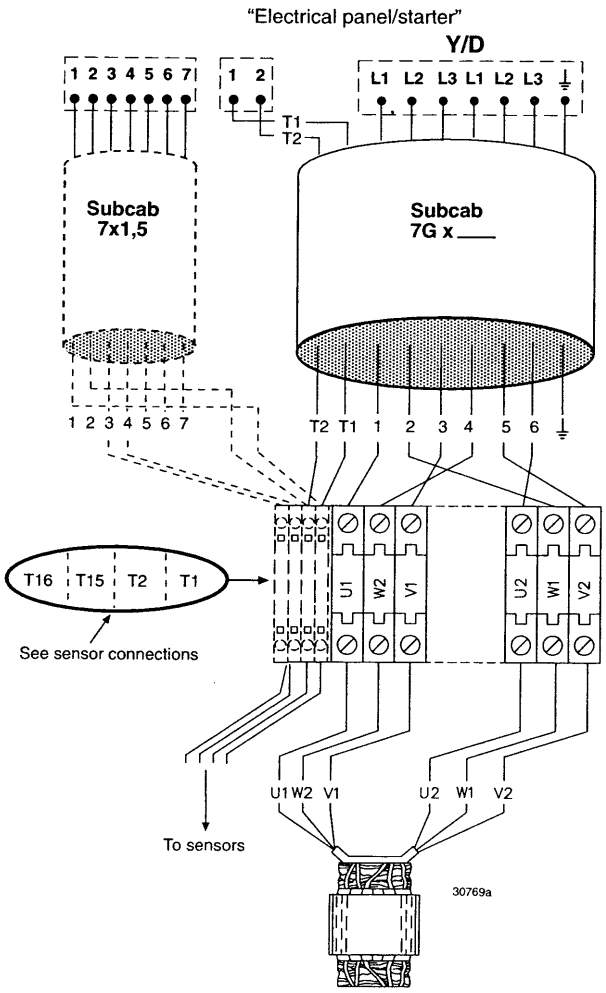
SUBCAB 7G



Mains	Lead	Pump terminal board	Stator leads connection: Stator lead	Pump terminal board
L1	1 black	U1	U1, red	U1
L2	2 black	W1	W2, black	W2
L3	3 black	V1	V1, brown	V1
L1	4 black	U1	U2, green	U2
L2	5 black	W1	W1, yellow	W1
L3	6 black	V1	V2, blue	V2
Earth (Ground)	yellow/green	⏚		
Control	Cable lead			
T1	T1/black			
T2	T2/black			

12 d 93

SUBCAB7G

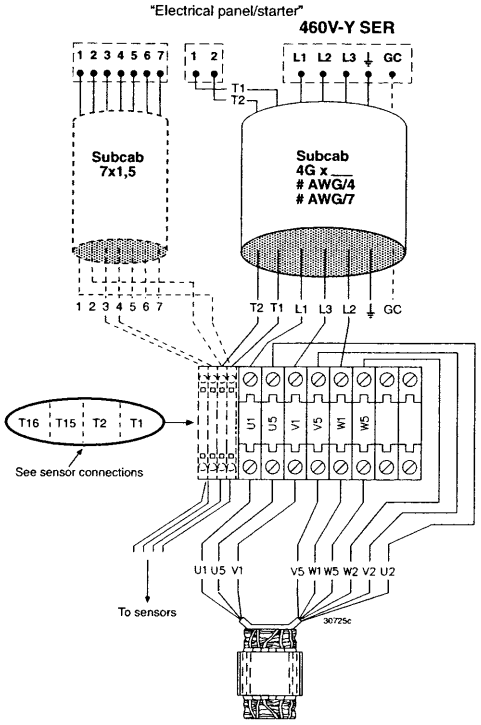


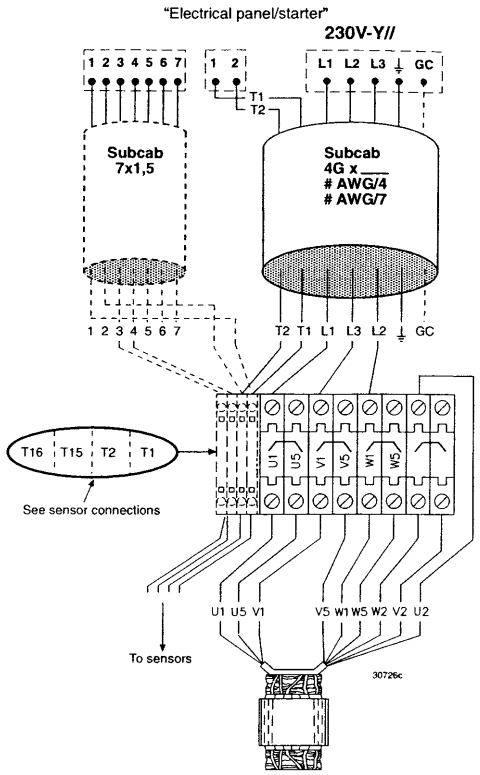
Main	Lead	Pump terminal board
L1	1 black	U1
L2	2 black	W1
L3	3 black	V1
L1	4 black	W2
L2	5 black	V2
L3	6 black	U2
Earth (Ground)	yellow/green	⏚

Control	Cable lead
T1	T1/black
T2	T2/black

Stator leads connection: Stator lead	Pump terminal board
U1, red	U1
W2, black	W2
V1, brown	V1
U2, green	U2
W1, yellow	W1
V2, blue	V2

SUBCAB 4G/SUBCAB AWG





Mains	Lead	Pump terminal board
L1	brown/(red*)	U1
L2	blue/alt. grey (white*)	W1
L3	black (black*)	V1
Earth (Ground)	yellow/green	⏚
Groundcheck (GC)	yellow*)	

Stator leads **460V-Y SER** connection:	
Stator lead	Pump terminal board
U1, red	U1
W2, black	W2
V1, brown	V1
U2, green	U2
W1, yellow	W1
V2, blue	V2
V5, brown	
W5, yellow	
U5, red	

Control	Cable lead
T1	T1 black/orange*
T2	T2 black /blue*

Mains	Lead	Pump terminal board
L1	brown/(red*)	U1
L2	blue/alt. grey (white*)	W1
L3	black (black*)	V1
Earth (Ground)	yellow/green	⏚
Groundcheck (GC)	yellow*)	

Stator leads **230V-Y//** connection:	
Stator lead	Pump terminal board
U1, red	U1
U5, red	U5
V1, brown	V1
V5, brown	V5
W1, yellow	W1
W5, yellow	W5
U2, green	
V2, blue	
W2, black	

Control	Cable lead
T1	T1 black/orange*
T2	T2 black/blue*

* SUBCAB AWG

13.4.25

Sensor connections

Monitoring equipment

FLS10 is a small float switch and it is installed in the inspection chamber. FLS is connected to max 12 V.

Thermal switches are incorporated into the stator and are rated 250 V, 5 A (cos φ =1) / 1,6 A (cos φ =0,6).

The sensors are connected as standard to the Flygt monitoring relay MiniCAS II (see diagrams below).

In case optional sensors are used the more advanced monitoring relay MAS 711 can be used.

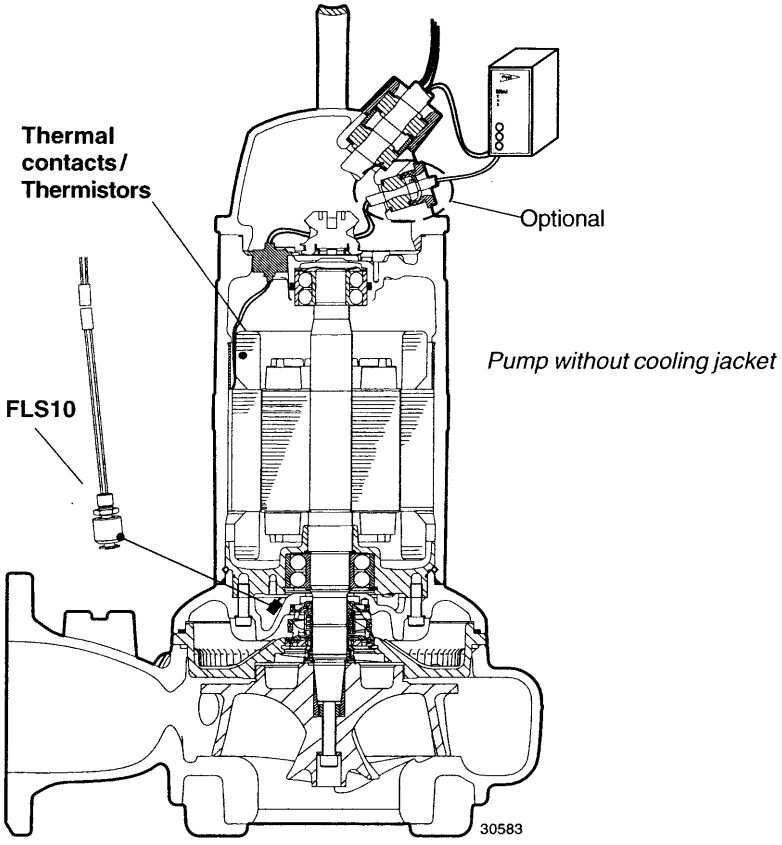
For a **PTC-thermistor** (PTC = Positive Temperature Coefficient), there is a significant increase in resistance at a certain temperature that can be utilized for monitoring the temperature.

PTC-thermistor

T= 25 °C	R ≤ 100 Ohm
T=135 °C (T_{REF} - 5 °C)	R ≤ 550 Ohm
T=145 °C (T_{REF} + 5 °C)	R ≥ 1330 Ohm

Three thermistors are connected in series and have a resistance of approx. 150-300 ohms at room temperature.

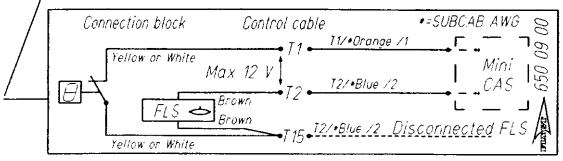
The label in the junction box shows if the pump is equipped with optional sensors.



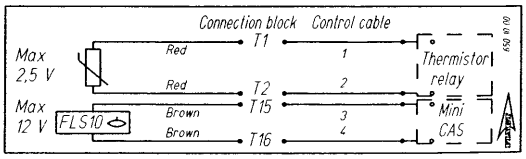
Sensor connection for standard configuration

In standard execution the pump is equipped with either thermal contacts or thermistors.

A) Thermal contacts



B) Thermistors



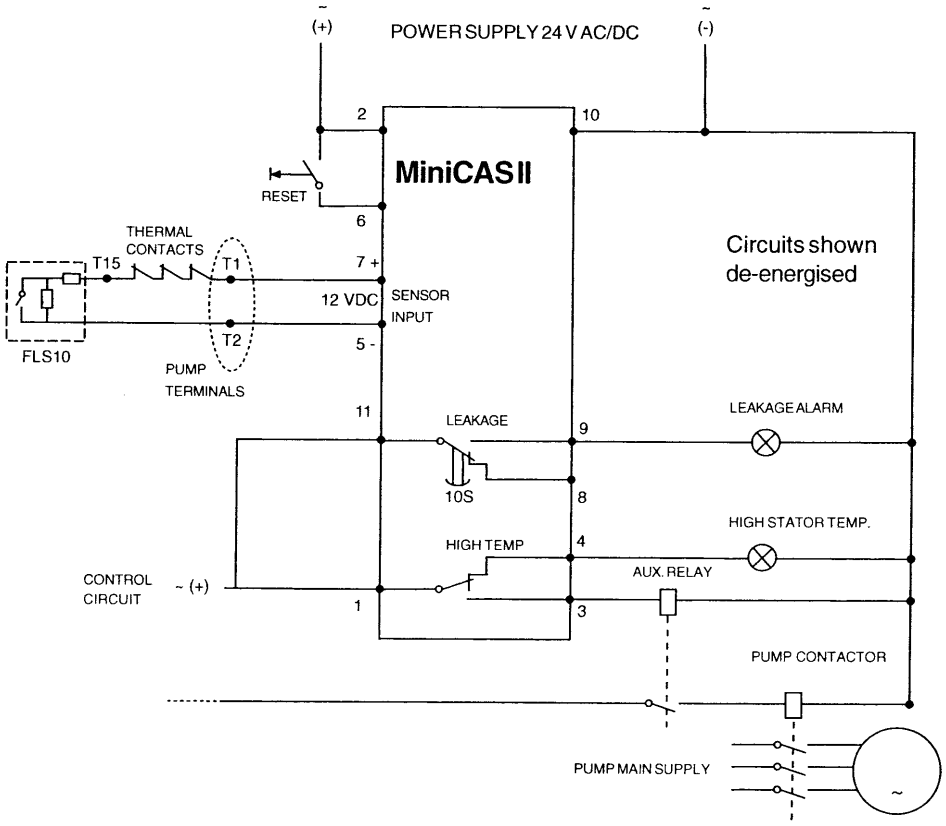
FLS10 + thermal contacts

0 mA = *Overtemperature*

10 mA = *OK*

28 mA = *Leakage*

Tolerance 10%



Sensor Connection Table

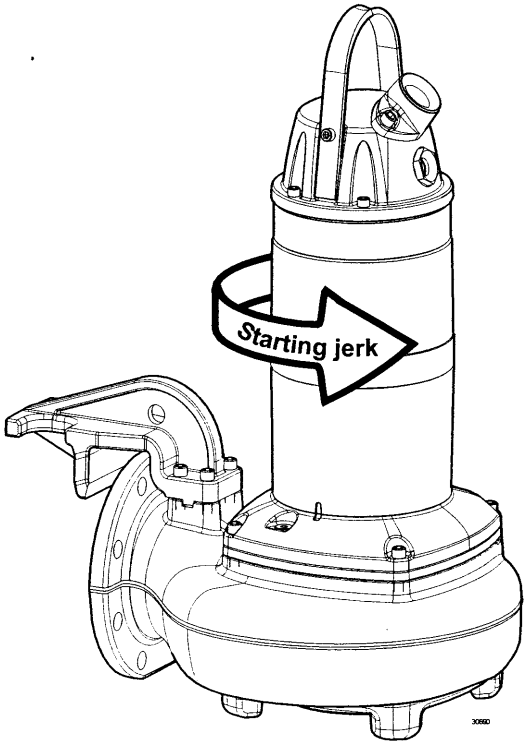
(For further information please contact Flygt representative.)

Sensor	Sensor lead	Thermal connection	Control cable	Connected to
Thermal contacts + FLS10	White Brown White+Brown	T1 T2 T15	T1/*Orange T2/*Blue = SubCab /* SubCabAWG	Mini CAS II Mini CAS II
Thermistors + FLS10	Red Red Brown Brown	T1 T2 T15 T16	1 2 3 4	Thermistor relay Thermistor relay Mini CAS II Mini CAS II

13 4. 27

Before starting

- Check that the visible parts of the pump and installation are undamaged and in good condition.
- Remove the fuses or open the circuit breaker and check that the impeller can be rotated freely.
- Verify that the supply voltage matches the pump data plate voltage rating.
- Conduct insulation integrity check.
- Conduct phase to phase resistance check.
- Check that the monitoring equipment works.
- Check the direction of rotation. The impeller shall rotate clockwise, as viewed from above. When started, the pump will jerk in the opposite direction to the direction in which the impeller rotates. See figure.
- In case of dry installation, check the direction of rotation through the inlet elbow access cover.
- Transpose two phase leads if the impeller rotates in the wrong direction (3-phase).



Watch the starting jerk which can be powerful.

— **Before starting work on the pump, make sure that the pump and the control panel are isolated from the power supply and can not be energized. This applies to the control circuit as well.**

— **Make sure that the pump cannot roll or fall over and injure people or damage property.**

— **In some installations the pump surface and the surrounding liquid may be hot. Bear in mind the risk of burn injuries.**

— **In some installations and at certain operating points on the performance curve, the noise level of 70 dB or the noise level specified for the actual pump may be exceeded.**

Service/Inspection

ITT Flygt recommends a preventive maintenance program based on Intermediate and Major Services at regular intervals. For standard sewage applications where FLS 10 is correctly connected and in use and the temperature of the pumped liquid is 40°C (104°F) or less an *Intermediate Service* should be performed every 8000 hours or every 2 years, whichever occurs first.

The time between *Major Service* could vary considerably depending on operating conditions and the need for a Major Service will be determined during the regular Intermediate Services.
However, a minimum of 20 000 hours of operation could be anticipated.

For applications other than sewage water or for specific operating conditions, other service intervals may be recommended.

Pump	**Intermediate Service running 8 000 h or 2 years**
Junction box	Check that it is clean and dry.
Terminal board	Check that the connections are properly tightened.
Insulation check	Check that the resistance between earth and phase lead is more than 5 M Ω Conduct phase to phase resistance check.
Cable	Check that the rubber sheating (jacket) is undamaged.
Seal housing	Fill up with new coolant if necessary. Check freezing point (lower than –13°C, 9°F).
Inspection chamber	Drain all liquid if any. Check the resistance. Normal value approx. 1200 Ω, alarm approx. 430 Ω
O-rings	Always replace the O-rings of the filling plugs and at the junction cover. Always grease new O-rings.
Thermal contacts	Check the resistance. Normally closed circuit; interval 0 – 1 Ω
Thermistor	Check the resistance 20 – 250 Ω, (measuring voltage max 2 V DC).
Impeller	Check impeller clearance and adjust if necessary.
Lifting handle	Check the screws and the status of the lifting handle.
Rotation direction	Check the rotation of the impeller.
Lifting device	Check that local safety regulations are followed.
Voltage and amperage	Check running values.
Pump station	**Intermediate Service running 8 000 h or 2 years**
Electrical cabinets/ panels	Check that they are clean and dry.
Connection to power	Check that the connections are properly tightened.
Overload and other protections	Check correct settings.
Personnel safety	Check guard rails, covers and other protections.
Level regulators	Check condition and function.
Pump	**Major Service**
Support and main bearing.	Replace with new bearings.
Mechanical seal unit.	Replace with new seal units.
Pumpstations same as Intermediate Service	

12 4 99

If any indication of alarm between inspections, please see instructions below.	Actions
FLS10	Drain the fluid in the inspection chamber. Fill with new coolant if necessary. Check freezing point (lower than –13°C, 9°F). Check the inspection chamber again after one week of operation. If leakage has occured, drain the fluid and change the mechanical seal unit and replace with new coolant.
Thermistor/Thermal-contact	Check coolant level. (pump with cooling jacket) Check start and stop levels.
Overload protection	Check that the impeller can rotate freely.

The following points are important in connection with work on the pump:

— Make sure that the pump cannot roll or fall over and injure people or damage property.

— Check every year that the lifting equipment is in good condition.

The pump is designed for use in liquids which can be a health risk. In order to prevent injury to the eyes and skin, observe the following points when working on the pump:

— Make sure that the pump has been thoroughly cleaned.

— Beware of the risk of infection.

— Follow local safety regulations.

— Always wear goggles and rubber gloves.

— Rinse the pump thoroughly with clean water before starting work.

— Rinse the components in water after dismantling.

— The coolant chamber may be under pressure. Hold a rag over the filling plug to prevent splatter.

Proceed as follows if fluids have splashed into your eyes:

— Rinse your eyes immediately in running water for 15 minutes. Hold your eyelids apart with your fingers.

— Contact an eye specialist.

On your skin:

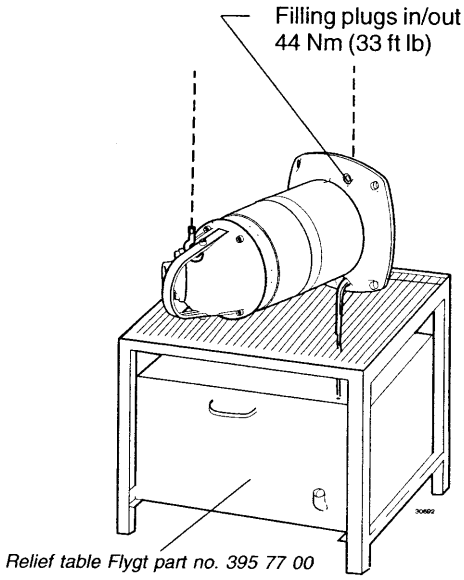
— Remove contaminated clothes.

— Wash your skin with soap and water.

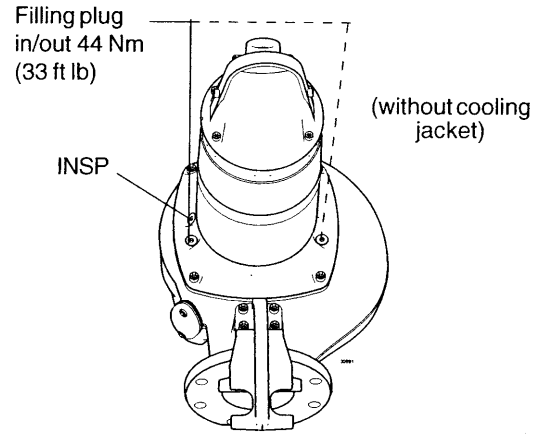
— Seek medical attention, if required.

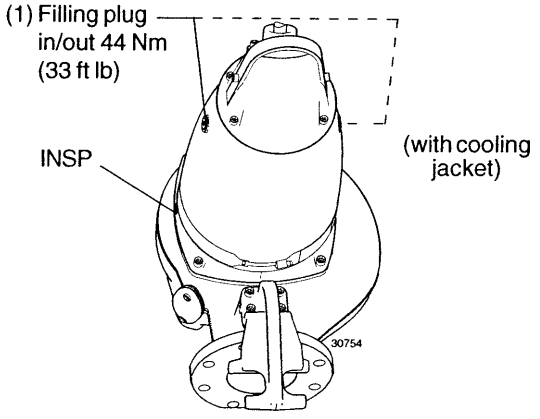
Changing the coolant

Emptying coolant
(without cooling jacket)

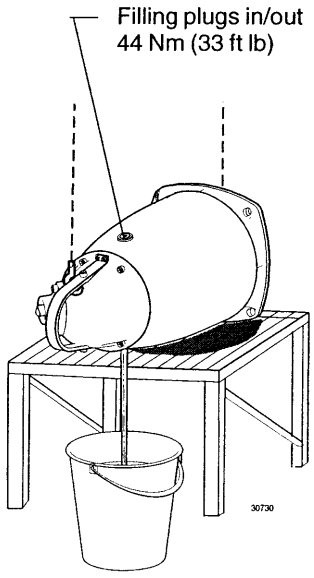


Filling coolant





Emptying coolant
(with cooling jacket)



1. Lift the pump horizontally with an overhead crane and place on relief table.

2. Turn the pump so that one of the filling plugs holes faces downwards.
   WARNING! If the mechanical seal unit leaks, the seal housing may be under pressure. Hold a rag over the filling plug to prevent splatter.

3. Unscrew the filling plug. It is easier to drain the water-glycol if the other filling plug is also removed.

4. Pump **without** cooling jacket. Raise the pump to an upright position. Fill with coolant to the same level as the filling plugs; approx. 2,2 litres (2.3 US quarts).
   Pump **with** cooling jacket; approx. 10,5 litres (11.2 US quarts)
   Coolant: a mix of water and stabilized monopropy-leneglycol in a mixture ratio of 70/30 % volume part.

   Known trade marks of monopropyleneglycol are: Dowcal N (individual components are approved by FDA), Dowcal 20. These are non-poisonous, heat-and-cold resistant and inhibiting of corrosion.

   Use of other type of glycol jeopardize the function of the pump.

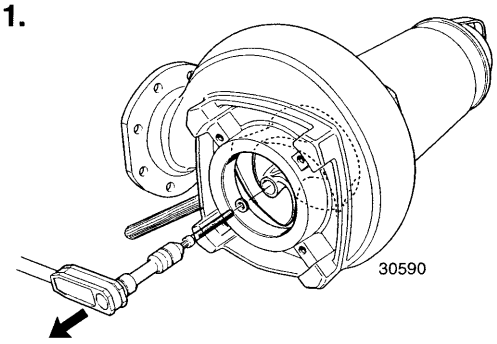
   If there is no risk of freeezing even clean water with anti-corrosive is acceptable as coolant.

5. Always replace the O-rings of the filling plugs. Put the plugs back and tighten them.

12 4 31

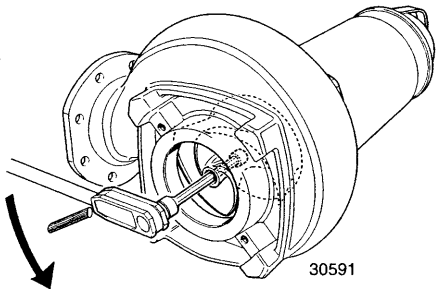
Removing the impeller

1.



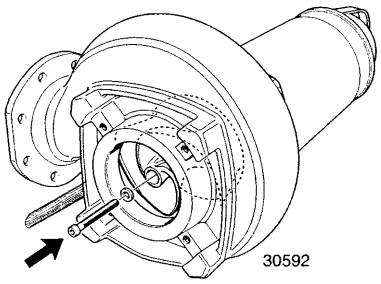
Place the pump horizontally. Remove the guide pin (if mounted). Remove the flush valve cover and it's O-ring. Insert a rod (wood or plastic) through the hole and lock the impeller in place. Remove the impeller screw.

2.



Using a 12 mm hexagon bit adaptor (allen socket) with a 100 mm (4″) extension (minimum length) turn the gland screw counter clockwise until the impeller breaks free from the shaft.

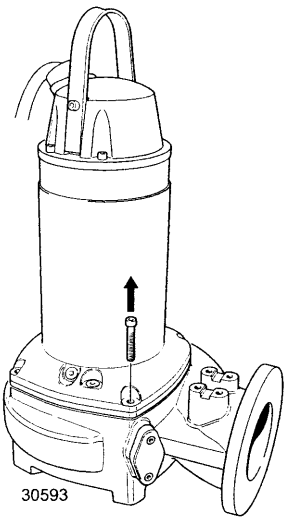
3.



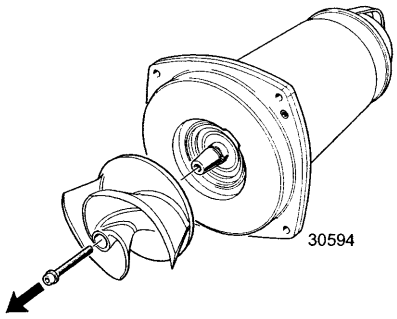
Install the impeller screw. Tighten lightly by hand, just to prevent the impeller from falling off.

4.

Remove the rod and raise the pump. Remove the pump housing screws. Using a crane, lift the drive unit off the pump housing.



5.



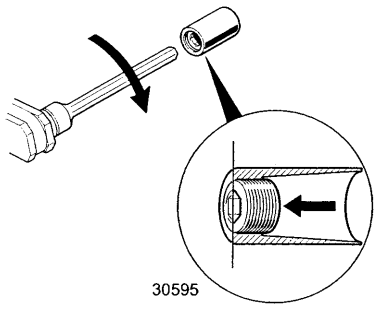
Place the drive unit horizontally.
Remove the impeller screw.

Worn impellers can have very sharp edges. Use protective gloves!

WARNING! When laying the pump on its side do not allow the weight of the pump to rest on any portion of the impeller. The impeller must not be allowed to make contact with the concrete floor or other hard and rough surfaces.

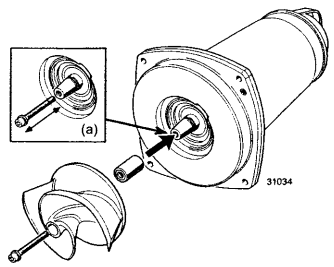
Installing and setting clearance

1.



Make sure that the end of the shaft is clean and free from burrs. Polish off any flaws with fine emery cloth. Grease end of shaft, conical sleeve and the threads of the gland screw and the impeller screw. Align the edge of the gland screw with the edge of the conical sleeve so that they are flush.

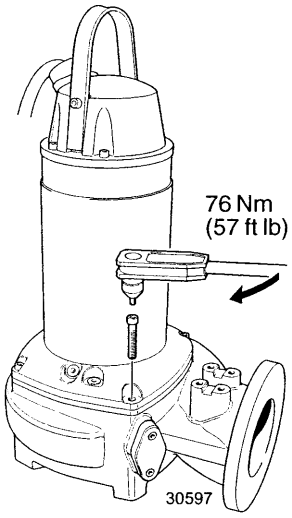
2.



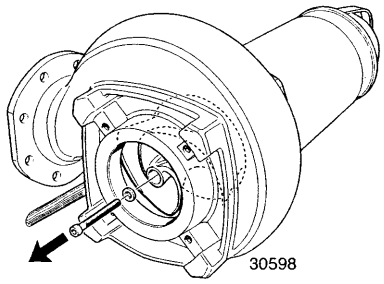
Before assembling, check that the impeller screw is clean and easy to screw into the shaft end (a). This to prevent the shaft to rotate with the impeller screw. Assemble the conical sleeve and the impeller onto the shaft. Fit the impeller screw onto the shaft. Tighten the impeller screw lightly by hand, just to prevent the impeller from falling off.

3.

Fit the drive unit to the pump housing. Adjust its position so that the inspection hole is on the same side as the hole for the flush valve. Tighten the screws in diagonally opposite pairs.

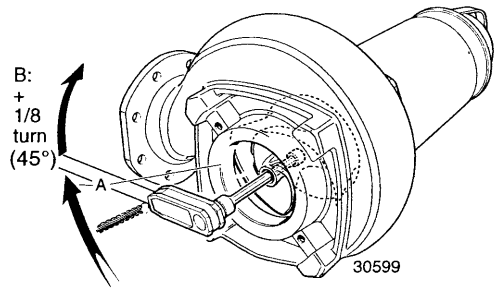


4.



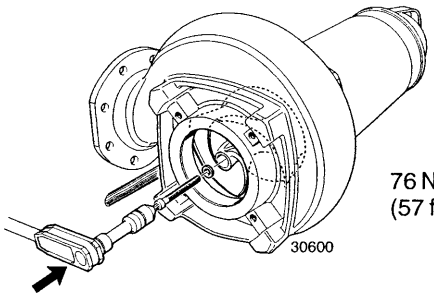
Place the pump horizontally.
Remove the flush valve cover and it's O-ring. Insert a rod (wood or plastic) through the hole and lock the impeller in place. Remove the impeller screw.

5.



Turn the gland screw clockwise until the impeller makes contact with the pump housing. Tighten it a further 1/8 turn, 45°. This will insure the correct clearance between the impeller and the bottom of the pump housing in the next step.

6.

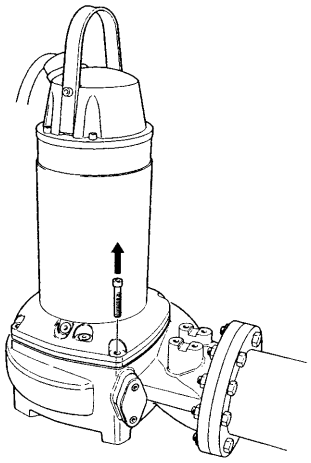


Fit the washer and the greased impeller screw and tighten, torque to 76 Nm (57 ft lb). Remove the rod used to lock the impeller. Fit the O-ring, flush valve cover and secure with screws, torque to 44 Nm (33 ft lb).
SH-version - if applicable: Fit the guide pin and adjust the clearance to 0,2 - 0,8 mm (0,008-0,032") between the guide pin and the impeller.

13.4.33

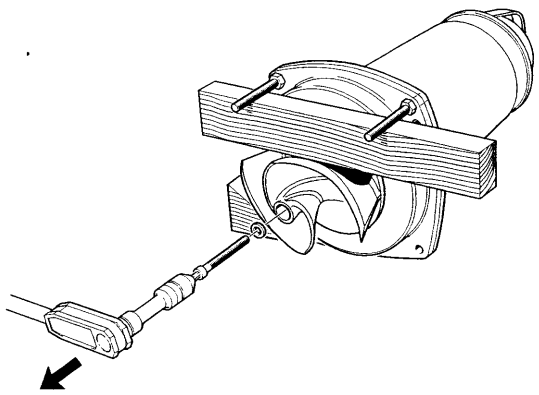
Removing the impeller - dry installation version, NT

1.



Remove the drive unit from the pump housing.

2.

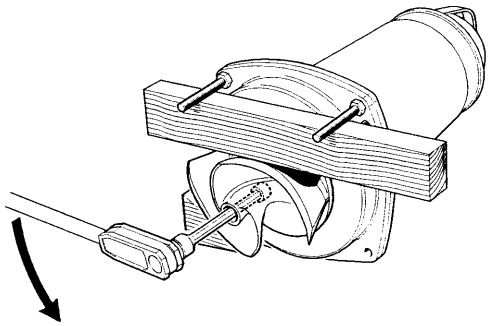


Place the drive unit horizontally. Lock the impeller in place and remove the impeller screw.

WARNING! When laying the pump on its side do not allow the weight of the pump to rest on any portion of the impeller. The impeller must not be allowed to make contact with the concrete floor or other hard and rough surfaces.

Worn impellers can have very sharp edges. Use protective gloves!

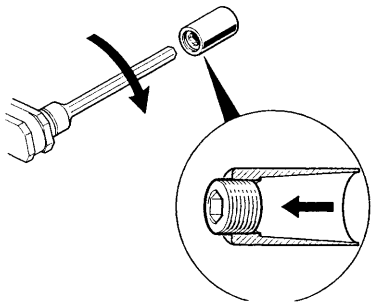
3.



Using a 12 mm hexagon bit adaptor (allen socket) with a 100 mm (4″) extension (minimum length) turn the gland screw counter clockwise until the impeller breaks free from the shaft. Remove the impeller.

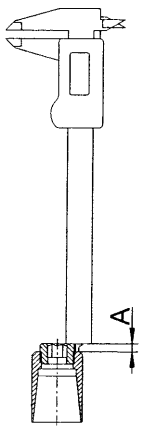
Installing and setting clearance

1.



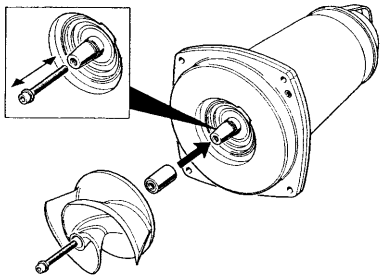
Make sure that the end of the shaft is clean and free from burrs. Polish off any flaws with fine emery cloth. Grease end of shaft, conical sleeve and the threads of the gland screw and the impeller screw. Unscrew the gland screw approximately 5 mm.

2.



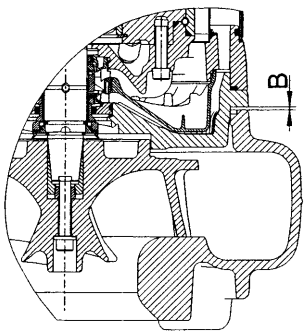
Measure and note the distance A.

3.



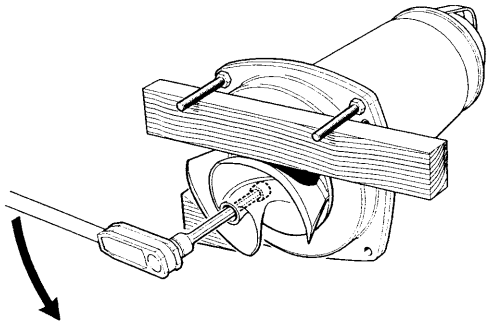
Before assembling, check that the impeller screw is clean and easy to screw into the shaft end (a). This to prevent the shaft to rotate with the impeller screw. Assemble the conical sleeve and the impeller onto the shaft. Fit the impeller screw with washer onto the shaft and tighten to 76 Nm (57 ft lb).

4.



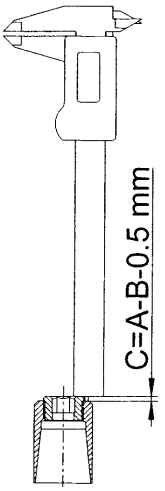
Make sure that the O-ring is removed from the seal housing cover. Place the drive unit in the pump housing. Check the distance between the seal housing cover and the pump housing with a feeler gauge. Check diametrically at four points.
Note the largest measured distance, B. See fig.

5.



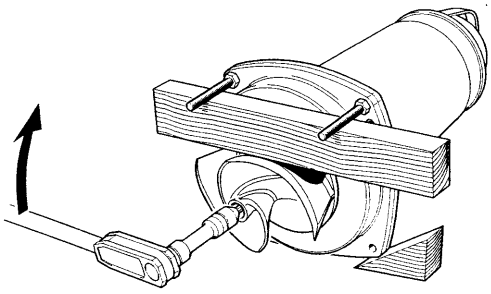
Lift the drive unit out of the pump housing and remove the impeller and conical sleeve.

6.



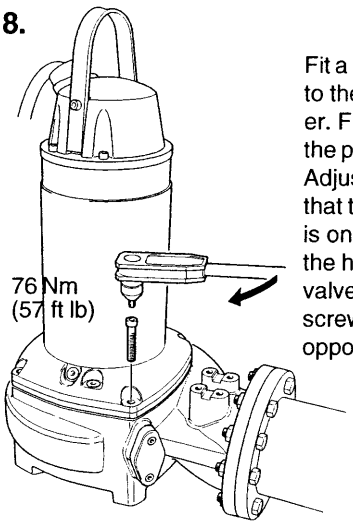
Calculate the measure C according to formula:
C = A - B - 0,5mm
Unscrew the gland screw until C is reached.

7.



Fit the conical sleeve, impeller and impeller screw with washer and tighten to 76 Nm (57 ft lb).

8.



Fit a new greased O-ring to the seal housing cover. Fit the drive unit to the pump housing. Adjust its position so that the inspection hole is on the same side as the hole for the flush valve. Tighten the screws in diagonally opposite pairs.

13.4.35

FAULT TRACING (TROUBLESHOOTING)

A universal instrument multimeter (VOM), a test lamp (continuity tester) and wiring diagram are required in order to carry out fault tracing on the electrical equipment.

Fault tracing shall be done with the power supply disconnected and locked off, except for those checks which cannot be performed without voltage.

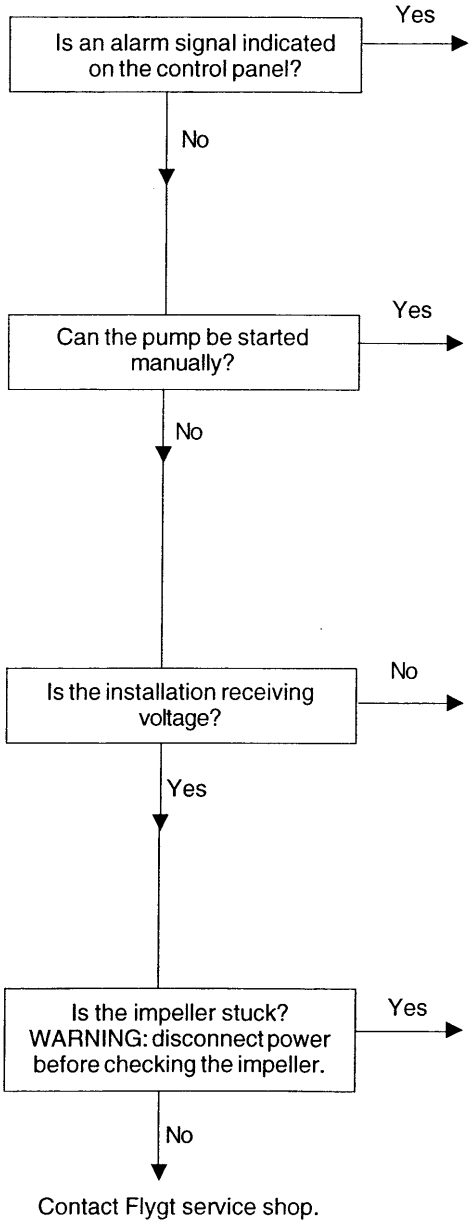
Always make sure that there is no one near the pump when the power supply is turned on.

Use the following checklist as an aid to fault tracing. It is assumed that the pump and installation have formerly functioned satisfactorily.

Electrical work shall be performed by an authorized electrician.

Follow local safety regulations and observe recommended safety precautions.

1. Pump fails to start



Check the cause:

— If the stator temperature is high, check that the impeller rotates freely.

— If there is a fault in the thermistors/thermal contacts, contact a Flygt service shop.

— If the FLS10 indicates an alarm.

— Check that the overload protection is reset.

a) Fault in level equipment (start level regulator). Clean or replace.

b) Fault in control equipment.

Check:

— that the thermal contacts have not opened.

— that all connections are intact.

— relay and contactor coils.

— that the control switch "Man/Auto" makes contact in both positions.

Check:

— that the main power switch is on.

— that there is control voltage to the starter equipment and its fuses are intact.

— that there is voltage in each phase of the supply line.

— that all fuses have continuity and are tight.

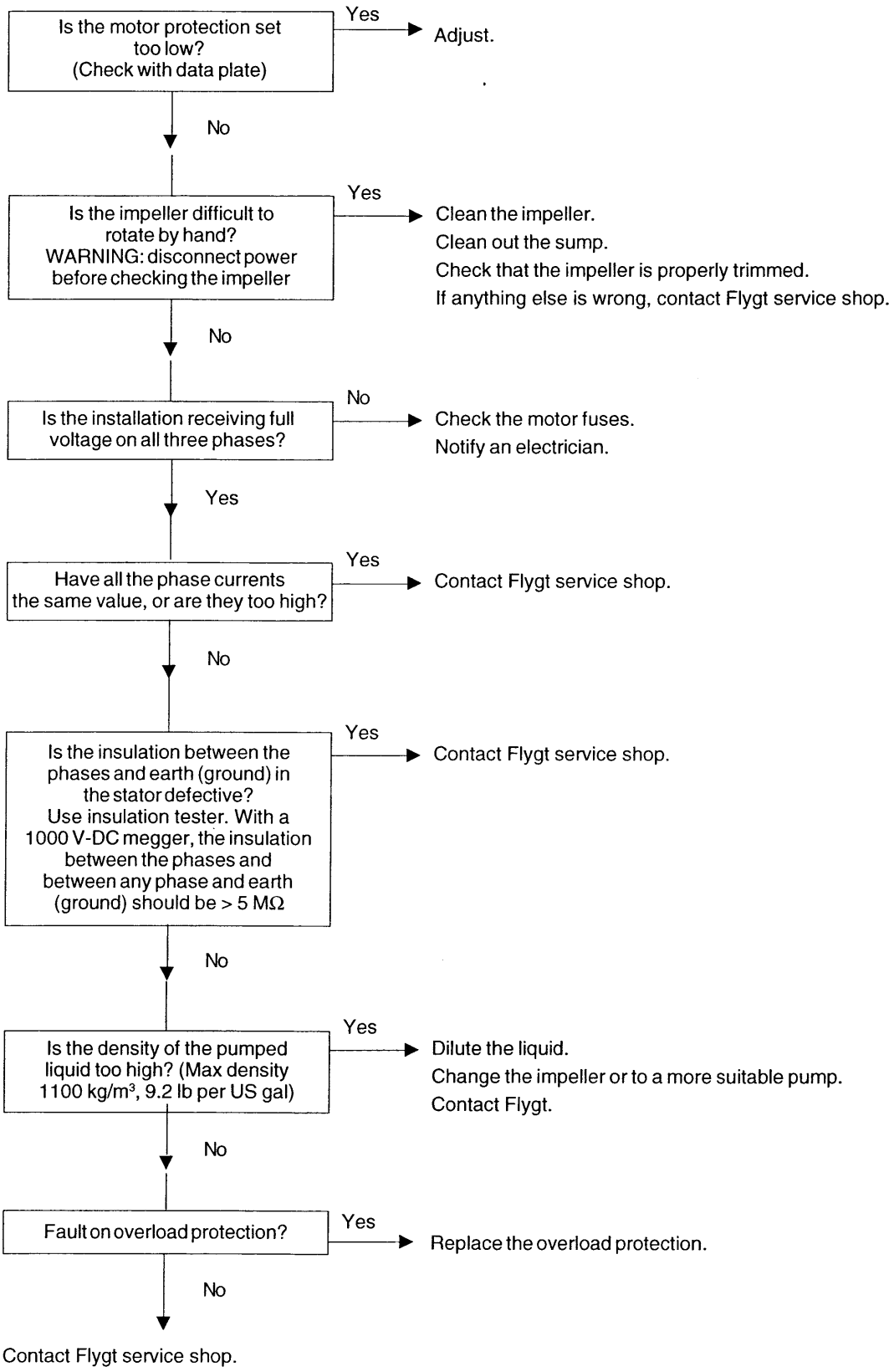
— that the overload protection is reset.

— that there is no break in the motor cable.

Clean.

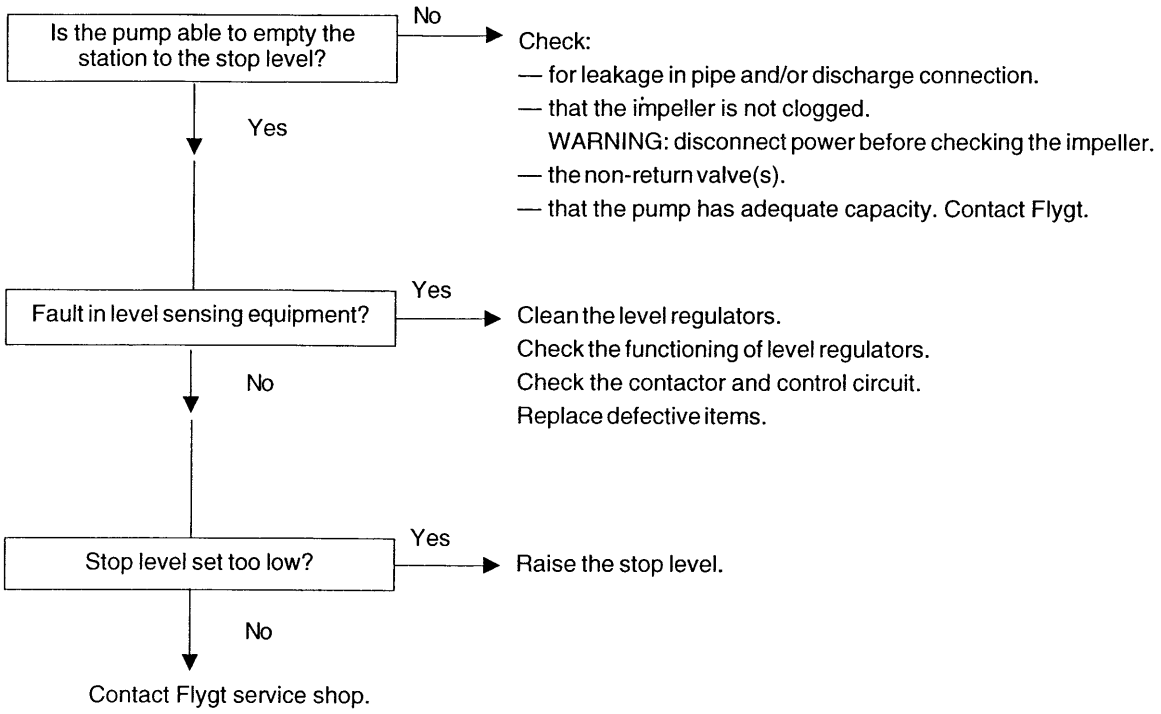
Clean the sump.

2. Pump starts but motor protection trips

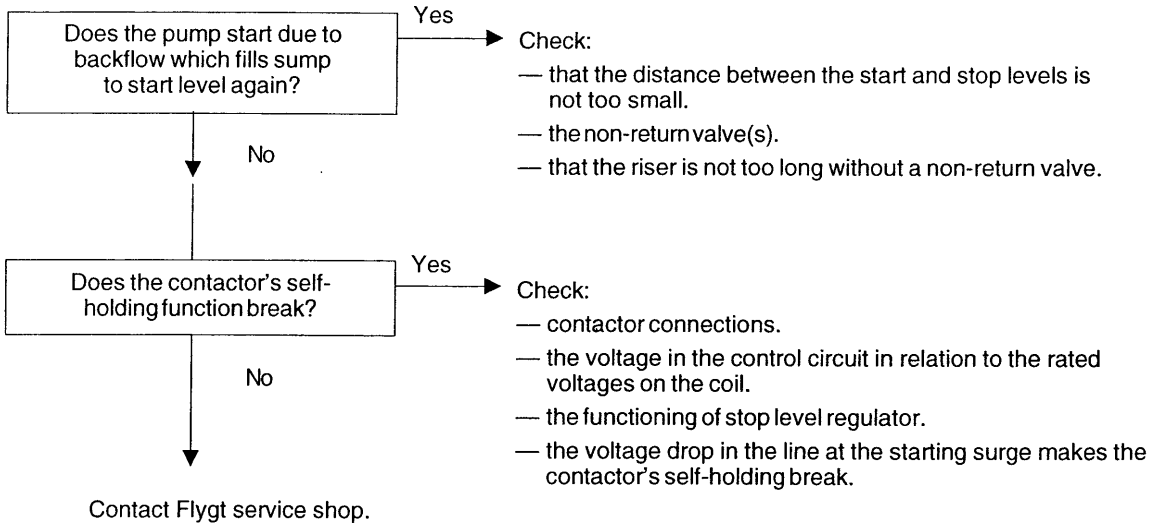


13.4.37

3. The pump does not stop (when level control is used)



4. The pump starts-stops-starts in rapid sequence



5. Pump runs but delivers too little or no water

Check:

— direction of rotation of pump, see "Before starting".

— that valves are open and intact.

— that pipes and impeller are not clogged.

— that the impeller rotates freely.

— that the suction lift has not been altered.

— for leakage in the pump installation.

— for wear on the impeller, pump and casing/flange.

See also under "Inspection".

Do not override the motor protection repeatedly if it has tripped.

CITY OF IQUALUIT
C/O WASTE WATER TREAT.PLANT
C/O POTABLE WATER PLANT
P.O.BOX 460, IQUALUIT,
NUNAVUT, XOA OHO

SERVICE LOG

Most recent service date	Pump No.	Hours of operation	Remarks	Sign.

13.4.39

FLYGT

www.flygt.com

3153.181.02. En. 07. ITT FLYGT AB 895381

Chapter 14SALSNES FILTER

MANUFACTURER/DISTRIBUTOR:

SALSNES FILTER
#101,16 COMMERCIAL DRIVE
CALGARY,ALBERTA T3Z 2A7
PH:403-301-4123 FAX:4126

MANUFACTURER/DISTRIBUTOR:

KAESER
3760 La Vérendrye Boisbriand,
QC J7H 1R5 Canada
Phone: (450) 971-1414
Fax: (450) 971-1415.
Email: info.canada@kaeser.com

14.1 ELECTRICAL POWER SINGLE LINE DIAGRAM .(ORIGINAL)

14.2 CONTROL PANEL WIRING DIAGRAM.

14.3 PHYSICAL VIEW OF CONTROL PANEL.

14.4 TECHNICAL INSTALLATION DATA.

14.5 PICTURE OF SF 6000.

14.6 TECHNICAL DATA.

14.7 PHOTO AND EXTERNAL VIEW (TYPICAL INSTALLATION).

14.8 SALSNES FILTER SYSTEM MODEL SF6000, USER MANUAL.

14.9 SALSNES FILTER SYSTEM MODEL SF6000, OPERATOR MANUAL.

14.10 ROTARY BLOWER SERVICE MANUAL.

14.11 ROTARY BLOWER INSTALLATION INSTRUCTION.

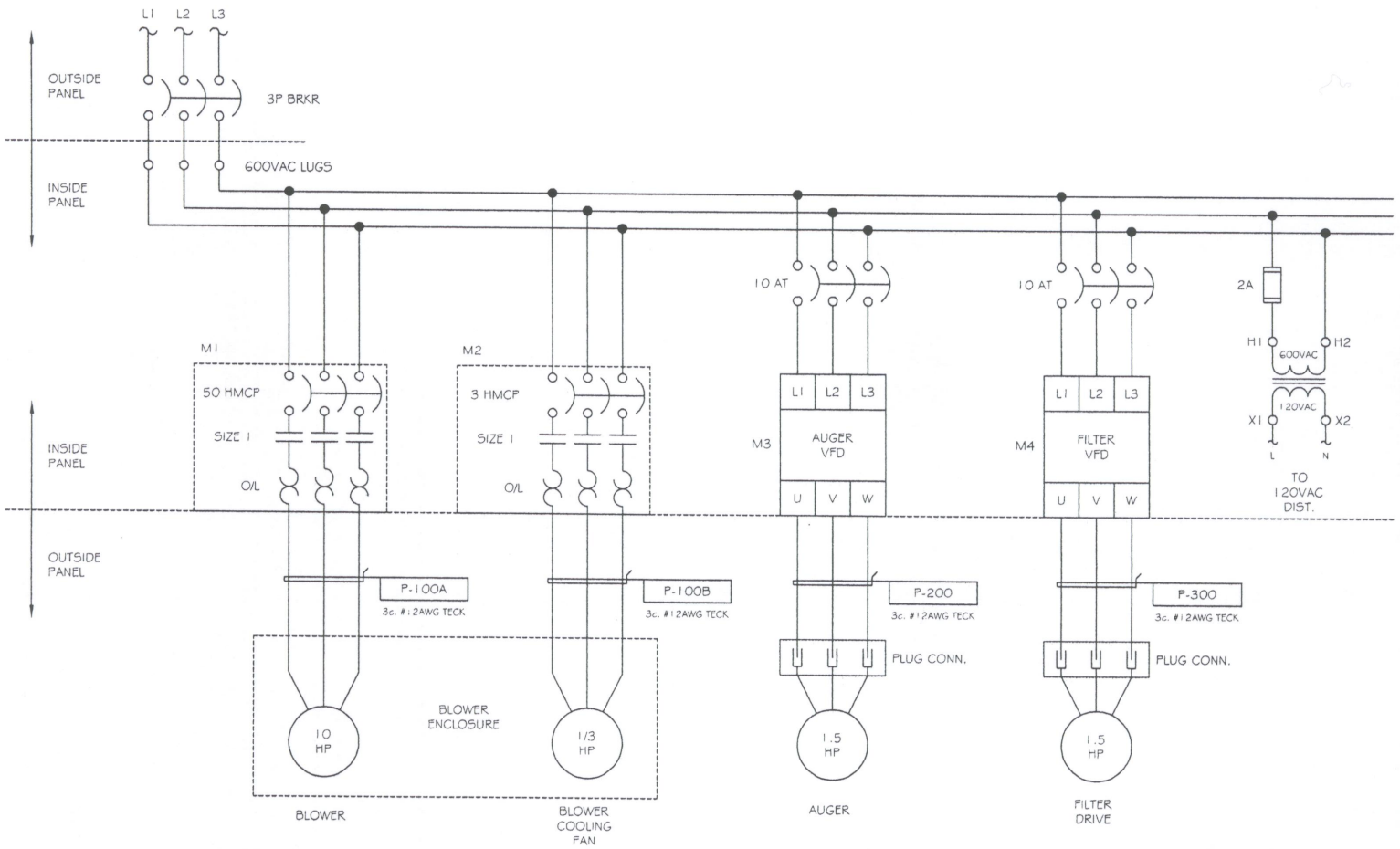
14.12 SALSNES FILTER INSPECTION AND MAINTENANCE.

14.13 SALSNES FILTER SYSTEM MODEL SF6000, PARTS MANUAL.

14.14 MOTOVARIO WORM GEAR REDUCERS SERVICE MANUAL .

14.15 LAFERT MOTOR OPERATING INSTRUCTION .

END OF CHAPTER 14



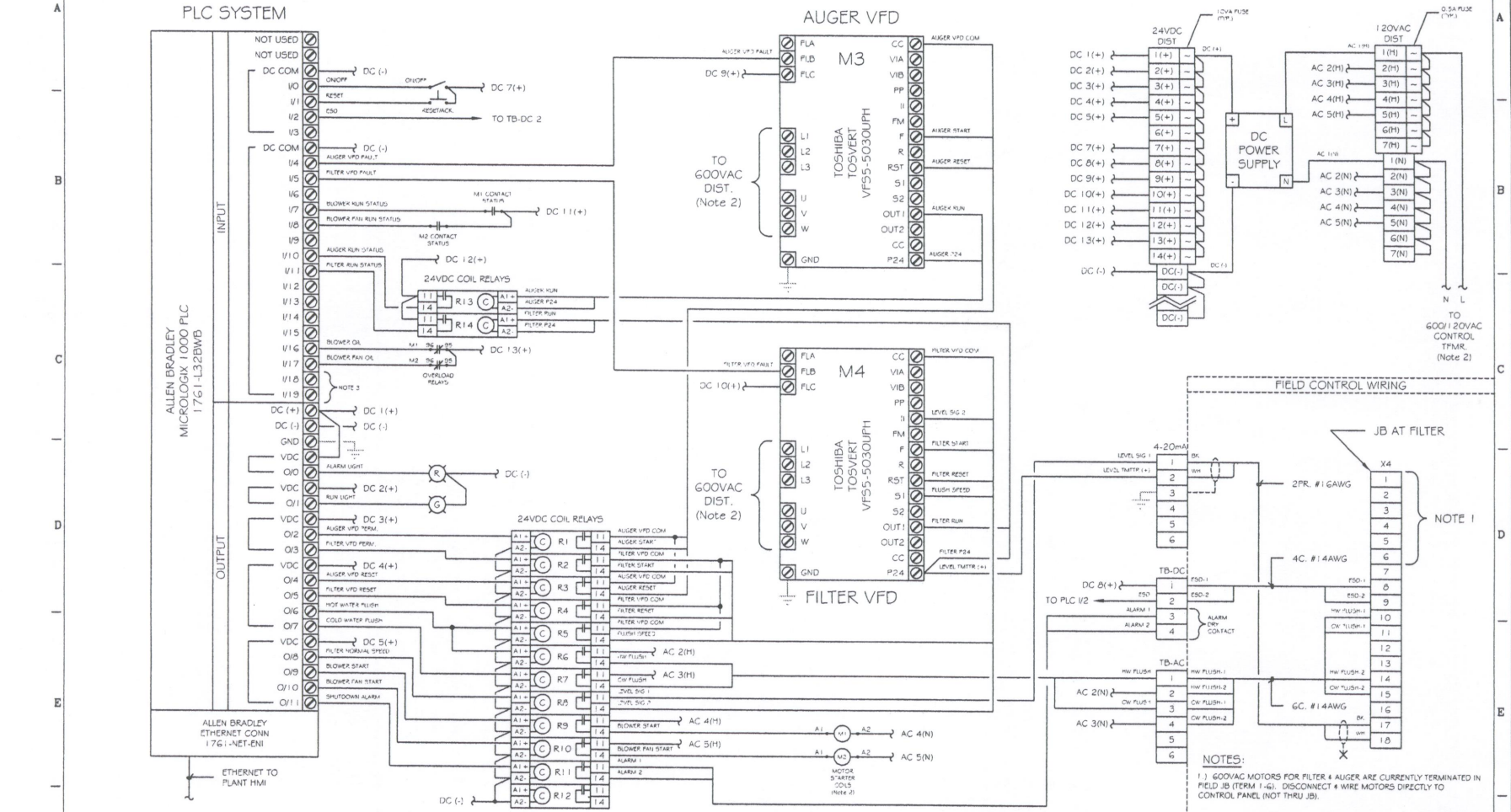
ORIGINAL CONTROL REMOVED.
SEE REVISED DRAWINGS
VOL. 2 SECTION 12 ..

DRAWING ISSUE RECORD									
ISSUE	1	2	3	4	5	6		BY	DATE
REVIEW AND COMMENTS							DESIGNED	SH	MAR 22/04
APPROVAL							DRAWN	SH	MAR 22/04
TENDER							CHECKED		
CONSTRUCTION							PROCESS CK.		
REFERENCE							MECH. CK.		
							STRUCT. CK.		
							ELECT. CK.		
							CLT APP.		
							CLIENT APP.		
							CLIENT APP.		

SALSNES FILTER NORTH AMERICA
#101-16 Commercial Dr.
Calgary, AB T3Z 2A7
Tel 403 301 4123
Fax 403 301 4126
www.salsnes.com

CLIENT IQALUIT
PROJECT WWTP UPGRADE
TITLE SALSNES FILTER SINGLE LINE DIAGRAM
JOB NO. | SCALE N/A | DWG. NO. SF-W002 | A

9/1 - 11
1/21



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ORIGINAL CONTROL REMOVED
SEE REVISED SALSNES DRAWINGS
VOL. 2 SECTION 12

14.3

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2.2.5. Technical installation data SF6000

Item	Value
General	
Material	Stainless steel AISI 304
Performance values	
Capacity (waste water, SS 250 mg/l)	160 liters pr. sec.
Separation efficiency SS (suspended solids)	40 –70 % (80–190 g/PE/day)
Dry substance, (DS)	25 - 35 %
Dimensions complete unit	
Length	2782 mm
Width (full with open dewatering lid)	2362 mm
Height	1790 mm
Weight incl. blower / incl. water	1120 kg / 1720 kg
Fastening bolts floor	Ø 12mm
Inlet, outlet and connections dimensions	
Inlet diameter pumped/gravity inlet flow	Ø ~~250/400~~ mm flange (Specified when ordering) 350mm
Outlet, diameter	Ø ~~400~~ mm flange 350mm
Overflow diameter	Ø ~~400~~ mm flange 350mm
Air Hose	Ø 50 mm with hose coupling
Ventilation flange	Ø150mm with hose coupling
Hot water connection	Ø 1/2" BSP.
Cold water connection	Ø 1/2" BSP.
Drain cock bottom flush	Ø 2" BSP.
Sludge dewatering cylinder diameter	Ø 175 mm
Dewatering reject water	Ø 100 mm with hose coupling
Sampling tap (optional)	Ø 1/2" BSP.
Wire cloth	
Wire cloth speed	1,5 – 12 mtr / min
Wire cloth area. (dived)	2,2 m^2
Wire cloth porosity # (Mesh opening)	0,1 – 1,0 mm
Electrical and air compressor data	
Rated power for of wire cloth motor	1,1 kW 1500 RPM and Gear 1:30
Rated power for of dewatering conveyor motor	1,1 kW 1500 RPM and Gear 1:30
Dimensioning power demand	12 kW
Normal power consumption total system with 0,3 bar air pressure	5,5 kW
Air compressor capacity at 0,6 bar	335 m3/h
Rated power of air compressor motor	7,5 kW

1.5hp
1.5hp.
~16hp CONNECTED
7.4hp AVG. CONSUMPTION

Table 1: Technical installation data SF6000

Project/delivery specific deviations of the technical data are found in chapter 6 Technical Specifications in the User Manual.

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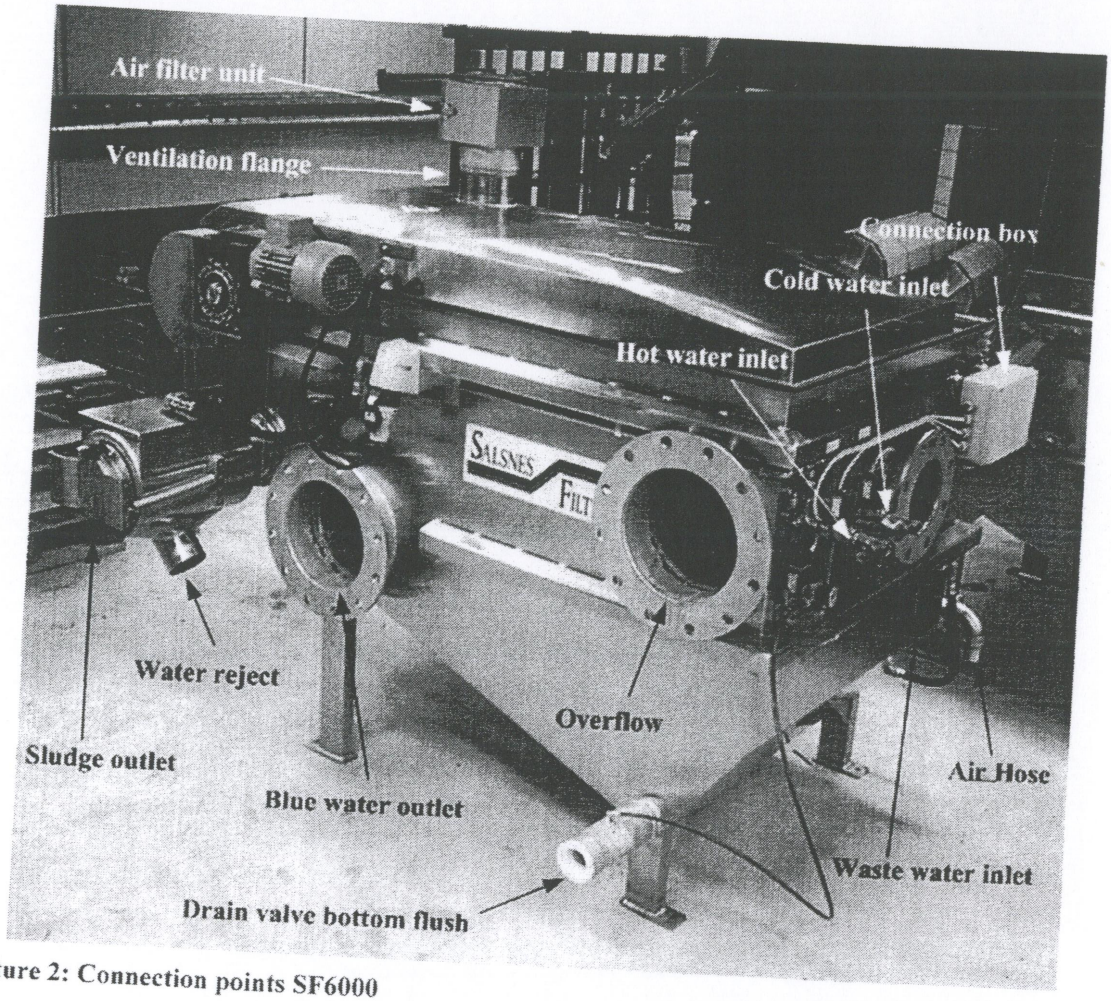

Picture 2: Connection points SF6000

14.5

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SALSNES FILTER

Product catalogue

TECHNICAL DATA, SALSNES FILTERS	Page 1 of 1	Date: 24.05.04

DATA	Mod. 1000	Mod. 2000	Mod. 4000	Mod. 6000
Capacity (Municipal waste water, 350 micron	--- 15 l/sek	------- 40 liters pr sec.	-- -- 80 liters pr. sec.	– 160 liters pr. sec.
Capacity (Fish farming, 350 micron. 25 mg SS /l)	--- 30- 40 l/sek	------100 liters pr sec.	----- 200 liters pr. sec.	- 400 liters pr. sec.
Separation efficiency SS (suspended solids)	40-70 %	40 –70 % (80–190 gr/P/dg)	40 –70 %	40 –70 %
Dry substance, (DS)	25.35 %	25 - 35 %	25 - 35 %	25 - 35 %
Length	1280mm	1800 mm	2300 mm	2580 mm
Width (Main housing/total)	750/1300mm	1350 mm	2150 mm	2720 mm
Height (Base/total/ with vent pipe)	650/1300/1330mm	950 mm	1300 mm	1630 mm
Weigth incl. blower	350 kg	475 kg	575 kg	725 kg
Weigth incl.water	475 kg	775 kg	975 kg	1325 kg
Inlet diameter	Ø 200	Ø 150 mm	Ø 200 – 250 mm	~~Ø 250 – 350 mm~~ 350 mm
Outlet, diameter	Ø 200	Ø 250 mm	Ø 250 – 350 mm	~~Ø 350 – 400 mm~~ 350 mm
Overflow diameter	Ø 200	Ø 250 mm	Ø 250 – 350 mm	~~Ø 350 – 400 mm~~ 350 mm
Wire cloth speed	1,5 – 12 m / min	1,5 – 12 m / min	1,5 – 12 m / min	1,5 – 12 m / min
Wire cloth area. (max under water/ separation area)	0,25 m2	0,5 m2	1 m2	2,2 m2
Effective width wire cloth	400m/m	600m/m	900m/m	1400m/m
Wire cloth porosity # (Mesh opening)	0,1 – 1,0 mm	0,1 – 0,85 mm	0,1 – 0,85 mm	0,2 – 0,85 mm
Press cylinder diameter	Ø 75 mm	Ø 125 mm	Ø 175 mm	Ø 175 mm
Dimensioning power demand	5,8kW	7,8 kW	8,1 kW	10,1 kW
Normal power consumption at 0,3 bar	2,1 kW	3,6 kW	3,7 kW	4,6 kW
Blower capacity at 0,3 bar	65 m3/h	110 m3 / h	165 m3/h	250 m3/h

17.7.1

1/8

DATE 29.11.2000	DRAWN H. Hofstad	SCALE 1:1	SALSNES FILTER
DATE	CHECKED		
DATE	APPROVED		
TITLE SF 6000			DRAWING NO 26000000
CAD REF 26000000		PLOT DATE 29.11.2000	ASSEMBLY

14.7.2

14-

User Manual

Salsnes Filter System©

Model

SF6000

S/N:

SALSNES FILTER AS
7817 SALSNES
NORWAY

Telephone: +47 74 27 48 60
Fax: +47 74 27 48 59
Email: firmapost@salsnes-filter.no

14.8

14 A

20 Pages

SALSNES FILTER

7800 NAMSOS

Tel.: + 47 74 27 48 60
Fax.: + 47 74 27 48 59

CE

2002-10-24

Type: SF 6000

Serial no.: 2035

NS-EN 45014

EC declaration of conformity for machinery

We, **Salsnes Filter AS**
(name of manufacturer)

7800 NAMSOS
(address)

declare that the product as specified:

Salsnes Filter, SF 6000, 2035
(type, model, serial number)

is in accordance with the requirements in the directive 98/37/EC of the European Parliament and of the Council, of 22. June 1998 and later,

and with reference to and in accordance with the following national technical standards and specifications

NS-EN 292-1, NS-ISO 251, NS 5639, NS-EN 418
(title and number of publications for standards and norms)

Salsnes/Namsos,

(date and year) Venche Lunnan (sign)

14.8

SALSNES FILTER WARRANTY

Salsnes Filter AS (manufacturer) warrants that the product (Salsnes Filter unit) shall be free from defects in material and workmanship under normal use and service conform to Salsnes Filter AS 's published specifications for a period of 18 months from the date of shipment from manufacturer or 12 months from the date of installation at customer's site, whichever expires first.

This warranty applies only to the Salsnes Filter unit and equipment supplied with and included in the purchase agreement/contract (blower, control board, conveyor system when appropriate), and under the following conditions:

1. Salsnes Filter AS shall receive the installation report signed by customer and representative within 30 days of installation at customer's site.
2. Any part of the SF unit that fails or is damaged under normal use within the warranty period will be replaced or, at Salsnes Filter AS's option repaired.
3. Any defective items shall be promptly returned to Salsnes Filter.

Exception of liability

For the following kinds of failure or damage, the repair costs are **not** covered under this Salsnes Filter AS warranty:

4. Failure or damage caused by improper or incorrect use or handling, or unauthorized repair or modification of the SF unit.
5. Failure or damage caused by any accident etc after the purchase.
6. Failure or damage caused by fire, earthquake, storm or flood, lightening, abnormal voltage supply, or other natural disasters.
7. Failure or damage caused by the use of the SF unit for any purposes or application other than the intended.

Technical performance

The Salsnes Filter technical reliability and performance guarantee applies only under the following conditions:

1. The application is according to Salsnes Filter AS recommendations, and designed in a manner that not allows large or heavy particles, stones, etc. to reach the SF unit and cause damages on the filter mesh, conveyors, etc.
2. Installation, operation, inspections and maintenance are carried out according to the instructions and written manuals.
3. Necessary actions are taken regarding certain influents, ex. containing large amounts of fat (above 80 mg/l) that may require manual cleaning.
4. All major deviations from expected operation and performance that may cause serious malfunction and/or breakdown are immediately and within no more than 7 days, notified to Salsnes Filter AS. Based only on such notification, Salsnes Filter AS will and can prescribe the preventive action(s) to avoid serious damages and/or breakdown.

Installation guide

for

Salsnes Filter System©

Model

6000

76004100_001

27.09.2004

SALSNES FILTER AS
7817 SALSNES

Telephone: +47 74 27 48 60
Fax: +47 74 27 48 59
Email: firmapost@salsnes-filter.no

14.8

Revisions:

Revision	Changes	Author
001	First version	Svein Storø

Table of content:

1. General

This manual describes the basic requirements for the installation of the Salsnes Filter System© Model 6000. There may be project specific adaptations that differ from the content in this manual, and this information must be covered in separate project specific documentation.

2. The Salsnes Filter System©

The Salsnes Filter System© Model 6000 consists of three separate components. These are: The Salsnes Filter component (1), the air compressor (2) and the control panel (3). The wastewater is first filtered through an endless filter cloth. The sludge that accumulates on the filter cloth is automatically blown down into the sludge compartment by compressed air and water flush. The sludge is then pressed through a dewatering unit to increase the dry solids concentration in the sludge.

The air compressor consists of an electrical compressor that produces compressed air for cleaning of the cloth.

A more detailed process description are found in the Operator's Manual for the SF6000

In the basic Salsnes Filter System© are all controls and start/stop mechanisms centralized in the Control Panel. For certain installations may the functionality of Control Panel be an integrated part of the main control system for the whole plant. In such a case is the documentation of the control system covered in the plant specific documentation.

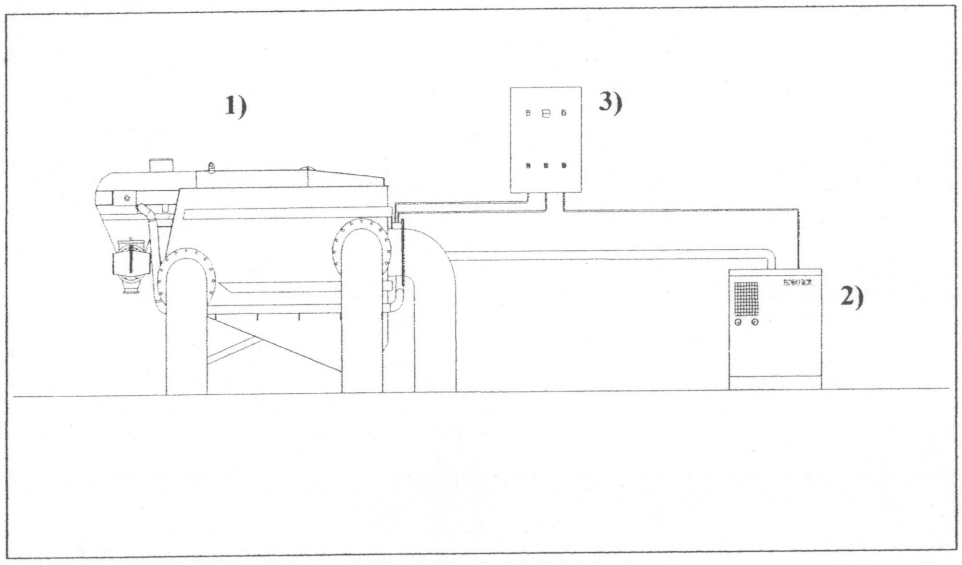

Figure 1: Salsnes Filter main components in principle

14.8

Picture 1: The Salsnes Filter SF6000

14.8

2.1. The purpose and design of the Salsnes Filter System

The Salsnes Filter System is designed and produced to treat wastewater.

Any other use of the system not specified is not allowed. If the system is damaged during operation for a purpose other than treating wastewater, the manufacturer is not responsible for damages incurred during operation.

The filter system shall be utilized for the purpose it was constructed and under no circumstances will it be utilized for any other purpose. If the machine is utilized for a purpose other than wastewater treatment, the customer takes responsibility for the damages incurred upon the filter system during operation.

The manufacturer must approve any modification of the system done by the customer. If the manufacturer does not approve the modifications, and damage occurs to the unapproved modified Salsnes Filter system the manufacturer is not responsible for damages incurred during operation.

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2.2. Installation

Installation must be carried out in accordance with the installation procedures in this document and the distributor shall make sure that the installation procedures are closely followed. The installation report (section 3) shall be completed and returned to the manufacturer within 30 days after installation.

2.2.1. Content of Delivery

The following accessories are included in the standard delivery of a SF 6000:

1 pcs	Spreader for support of the frame removal/mounting
1 pcs	Scraper for cleaning of sludge compartment
1 pcs	Bottom valve Ø 2" BSP for the bottom flush
1,5 m	Flexible tube for reject water outlet Ø100
2 pcs	Hose clamps Ø110 AISI304
0,5 m	Tube for air compressor Ø50
0,5 m	Tube for bottom flush connection Ø65
2 pcs	Hose clamps Ø75 AISI304
2 pcs	Hose clamps Ø60 AISI304 air compressor
1 pcs	90° elbow tube, bottom flush
1 pcs	Hexagon nipple 2" AISI304, bottom flush
1 pcs	2" tube w/ welded and threaded joint, bottom flush
15-16 cm	Shims for exact levelling of the machine unit
1 pcs	Rubber sealing for sludge outlet
1 pcs	User manual SF6000 (provided during delivery or start-up)

Contains:

0. Declaration of Conformity (General)
1. Manufacturer Warranty (General)
2. Control System/PLC programming (General)
3. Installation Guide (General)
4. Operator's Manual (General)
5. Completion Test Form (Delivery/project specific)
6. Technical Specification (Delivery/project specific)
7. Air compressor (Delivery/project specific)
8. Installation report (Delivery/project specific)
9. Inspection and Maintenance (Delivery/project specific)
10. Operation Journal (Delivery/project specific)
11. Spare Parts (Delivery/project specific)
12. Training (General)

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2.2.2. Working Area space and mounting requirements

The Salsnes Filter system requires a Working Area for proper operation. It is important that there is enough space so the sludge compartment can be taken out during routine maintenance and servicing.

During routine maintenance and servicing, a recommended minimum floor/space area of as shown in figure 2 is required. If space constraints do not permit this, adaptations of the system are possible on request.

It's recommended to have a minimum height of 1250 mm between the top of the machine and the winch above the machine.

The machine shall be placed upon a foundation (preferably concrete, steel or aluminium) with a minimum load-bearing capacity of 2000 kg.

The foundation must be firm and level.

The filter system must be fastened to the foundation with bolts.

Please see chapter 2.2.7 for dimension drawings.

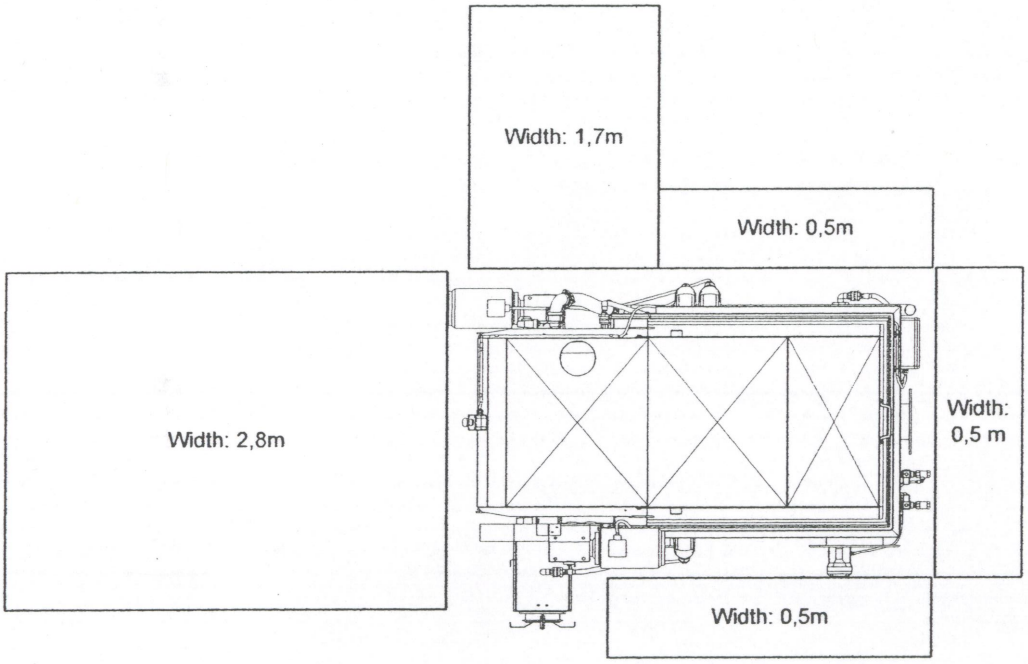

Figure 2: Floor space requirements SF6000

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Width: 1,7m
Width: 0,5m
Width: 0,5 m
Width: 2,6m
Width: 0,5m

2.2.3. Air compressor unit

The standard air compressor unit delivered with the SF6000 is the Kaeser BB68C.
The air compressor(s) may be placed at any free space, or a separate room if that is preferred.

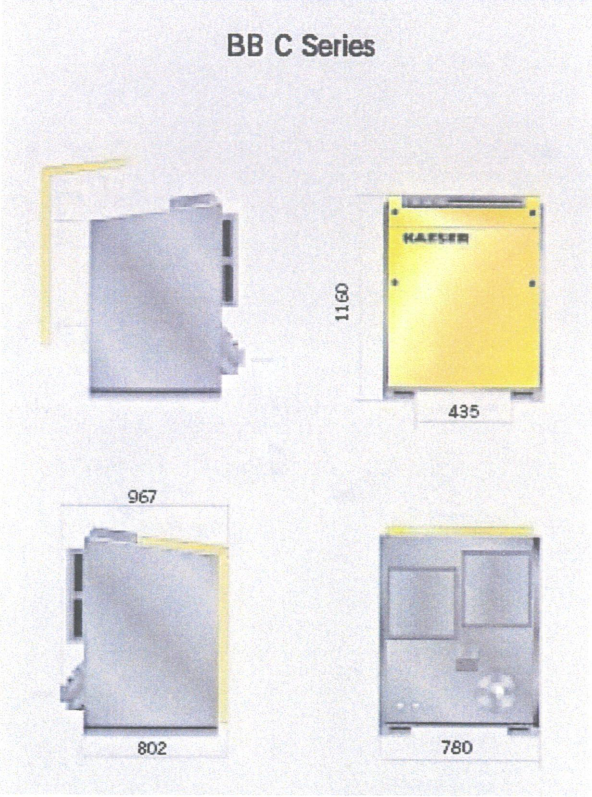

Figure 3: Dimensions Kaeser BBC series

The space requirement for each air compressor is showed in the figure above.
In addition is approximately 1 m of free distance required in front of the unit of for service and maintenance. For further instructions for service and maintenance please refer to section 4. Operator's Manual.

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2.2.4. Safe area requirements

The Salsnes Filter SF 6000 is designed according to Directive 98/37/EC and relevant international standards. See section 0. Declaration of Conformity in the User Manual.
However if specific requirements for safe area operations are required, adaptations may be provided on request. This must be specified when ordering.
The following main regulations applies in the different regions:

1. EU: ATEX (ATmosphere Explosible)
   EU Directive 94/9/EC
2. International: IECEx (International Electric Committee Explosives)
3. North America: NEC (National Electrical Code)

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2.2.5. Technical installation data SF6000

Item	Value
General	
Material	Stainless steel AISI 304
Performance values	
Capacity (waste water, SS 250 mg/l)	160 liters pr. sec.
Separation efficiency SS (suspended solids)	40 –70 % (80–190 g/PE/day)
Dry substance, (DS)	25 - 35 %
Dimensions complete unit	
Length	2782 mm
Width (full with open dewatering lid)	2362 mm
Height	1790 mm
Weight incl. blower / incl. water	1120 kg / 1720 kg
Fastening bolts floor	Ø 12mm
Inlet, outlet and connections dimensions	
Inlet diameter pumped/gravity inlet flow	Ø 250/400 mm flange (Specified when ordering)
Outlet, diameter	Ø 400 mm flange
Overflow diameter	Ø 400 mm flange
Air Hose	Ø 50 mm with hose coupling
Ventilation flange	Ø150mm with hose coupling
Hot water connection	Ø 1/2" BSP.
Cold water connection	Ø 1/2" BSP.
Drain cock bottom flush	Ø 2" BSP.
Sludge dewatering cylinder diameter	Ø 175 mm
Dewatering reject water	Ø 100 mm with hose coupling
Sampling tap (optional)	Ø 1/2" BSP.
Wire cloth	
Wire cloth speed	1,5 – 12 mtr / min
Wire cloth area. (dived)	2,2 m^2
Wire cloth porosity # (Mesh opening)	0,1 – 1,0 mm
Electrical and air compressor data	
Rated power for of wire cloth motor	1,1 kW 1500 RPM and Gear 1:30
Rated power for of dewatering conveyor motor	1,1 kW 1500 RPM and Gear 1:30
Dimensioning power demand	12 kW
Normal power consumption total system with 0,3 bar air pressure	5,5 kW
Air compressor capacity at 0,6 bar	335 m3/h
Rated power of air compressor motor	7,5 kW

Table 1: Technical installation data SF6000

Project/delivery specific deviations of the technical data are found in chapter 6 Technical Specifications in the User Manual.

14.8

2.2.6. Connections and installation responsibilities

With reference to Picture 2 and Table 2 the following items and connections are required to complete the installation of the SF 6000.
The tables also include the responsibilities for delivery.

2.2.6.1. Water and air connections

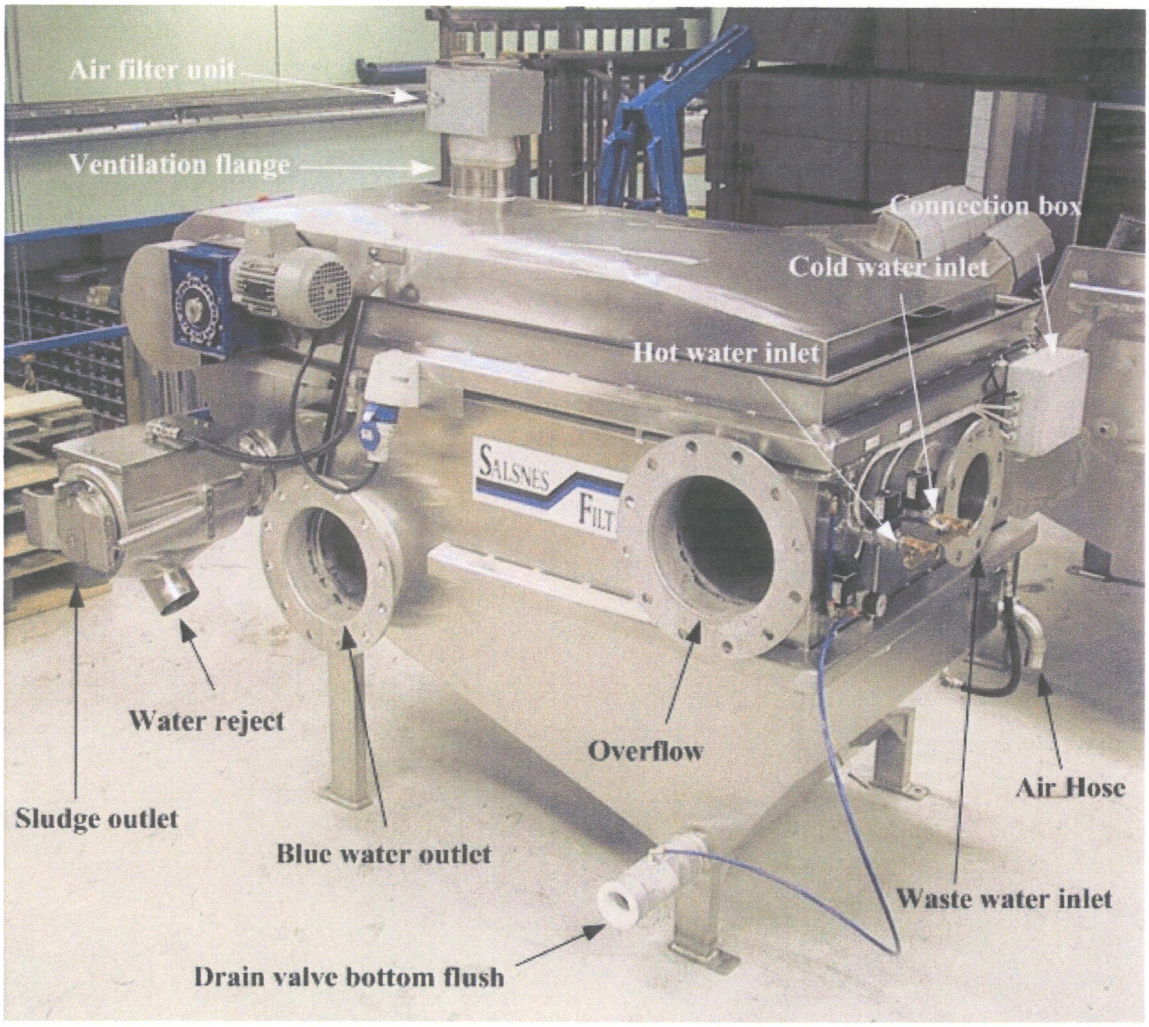
Responsible:
SF = Salsnes Filter sends as an attachment to the machine, but the customer has to carry out a complete connection on site.
D = Distributor

Item	Value/Comment	Responsibility
AIR COMPRESSOR		
Recommended air compressor pressure on air knife	0,3 – 0,6 bar. May be delivered with upright or downward connection. To be specified when ordering.	SF
WATER CONNECTION TO MACHINE:		
Hot water for flushing	Default every 6-hour for 3 minutes (intervals) on filter cloth and dewatering wedge wire. 20-30 liter/flushing. Temperature: 70-90 °C. Pressure: 4-6 bar.	D
Cold water for flushing	Default every 24-hour for 3 minutes (intervals) at the bottom of the filter housing. 20-30 liter/flushing. Pressure: 4-6 bar.	D
WASTE WATER CONNECTIONS:		
Wastewater inlet	Dimension to be specified when ordering.	D
Blue water outlet	Left or right side mounting to be specified when ordering	D
Overflow outlet	Left or right side mounting to be specified when ordering	D
Water reject	Left or right side mounting to be specified when ordering [1)]	D
SLUDGE OUTLET:		
Outlet sludge screw - dry solid	Must be arranged so that it drops down into a container, conveyor belt etc. (if not it will drop down to the floor). This must be arranged by customer/-distributor. Left or right side mounting to be specified when ordering [1)]	D

1) Parts of the same unit. Must be specified for the same side.

Table 2: Wastewater, potable water and air connections

14.8



Picture 2: Connection points SF6000

14.8

2.2.6.2. Electrical connections

ELECTRICAL CONNECTIONS CONNECTION BOX		
Cables from control system to Connection Box mounted on machine. – M4 Filter cloth – M2 Sludge screw – S5 Emergency stop – Y1 Flush valve hot water – Y2 Flush valve cold water – Y3 Bottom valve control – PT Pressure transmitter	1x PFSP 3x1,5mm^2 + E 1x PFSP 3x1,5mm^2 + E 1x 6x 0,75 mm2+ E	D

Table 3 Electrical cabling SF6000

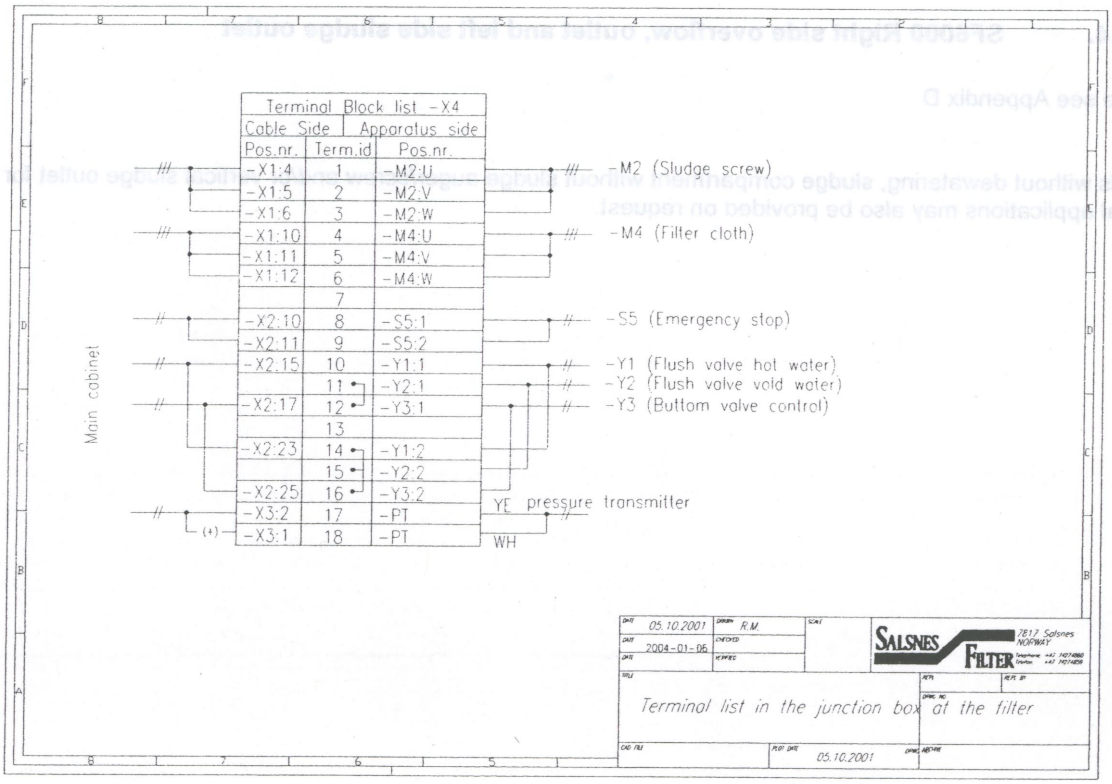


Figure 4: Electrical connections SF6000

14.8

2.2.7. Dimensions and tube connections SF6000

The following drawings are showing the dimensions and tube connections for the SF6000.
Four different basic versions are available:

2.2.7.1. SF6000 Left side overflow, outlet and sludge outlet

Please see Appendix A

2.2.7.2. SF6000 Left side overflow, outlet and right side sludge outlet

Please see Appendix B

2.2.7.3. SF6000 Right side overflow, outlet and sludge outlet

Please see Appendix C

2.2.7.4. SF6000 Right side overflow, outlet and left side sludge outlet

Please see Appendix D

Models without dewatering, sludge compartment without sludge auger/screw and/or vertical sludge outlet for special applications may also be provided on request.

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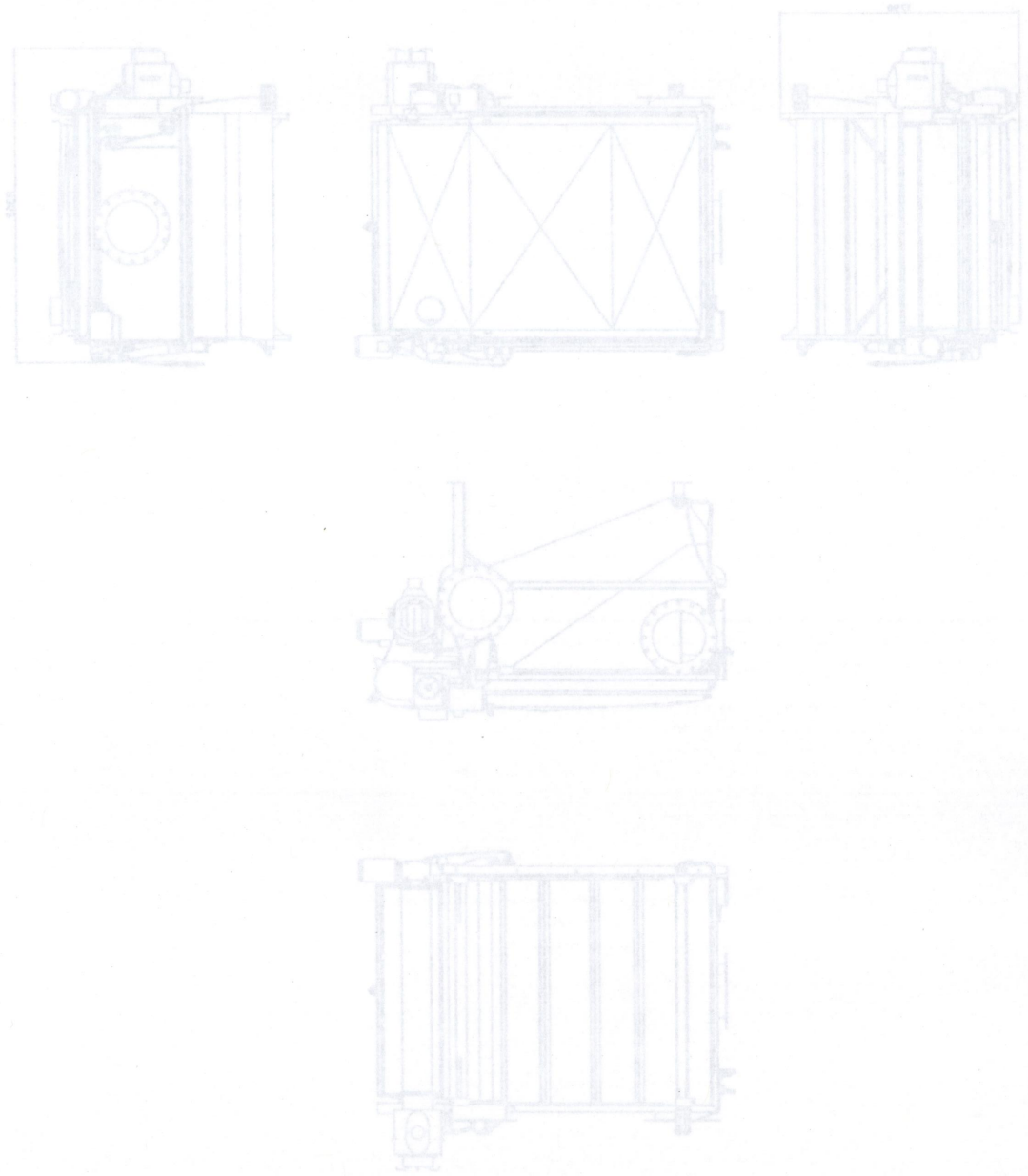
3. Installation report

After the installation is finished and approved an installation report must be signed and copies handed over to the following:

1. Customer
2. Salsnes Filter AS representative/distributor (Original)
3. Salsnes Filter AS (manufacturer)

Template for the Installation Report is found in section 9 in the User Manual.



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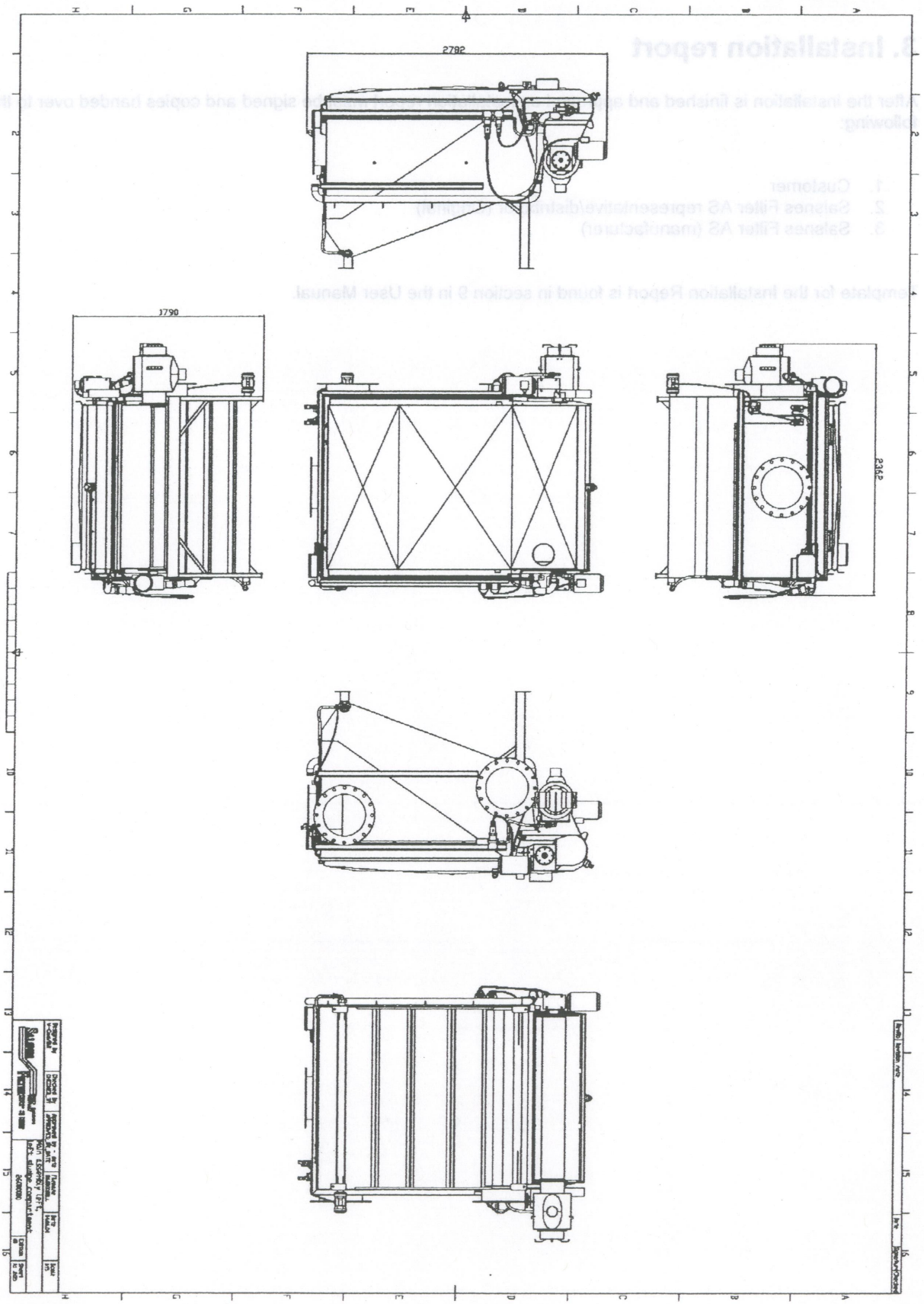

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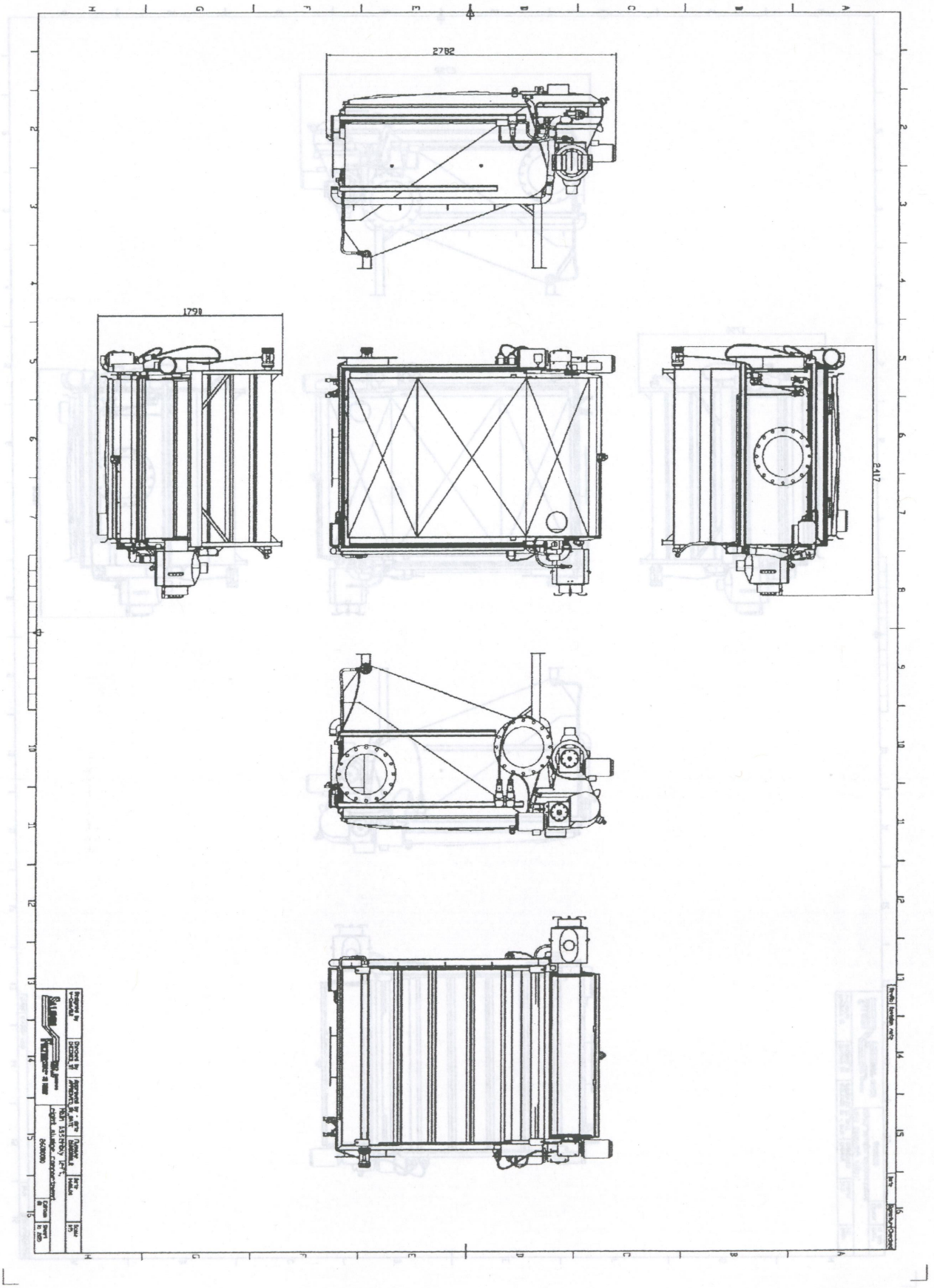

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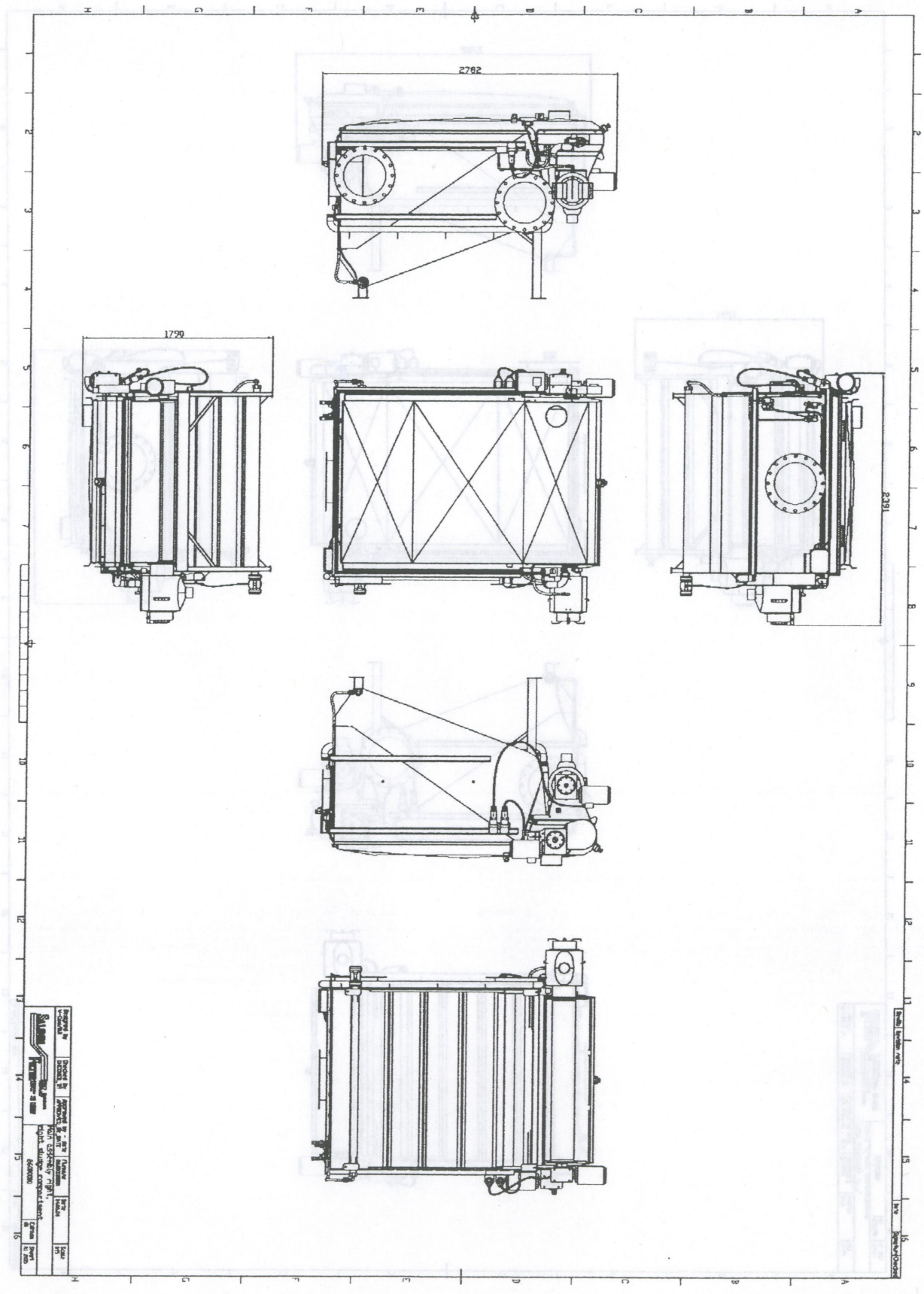

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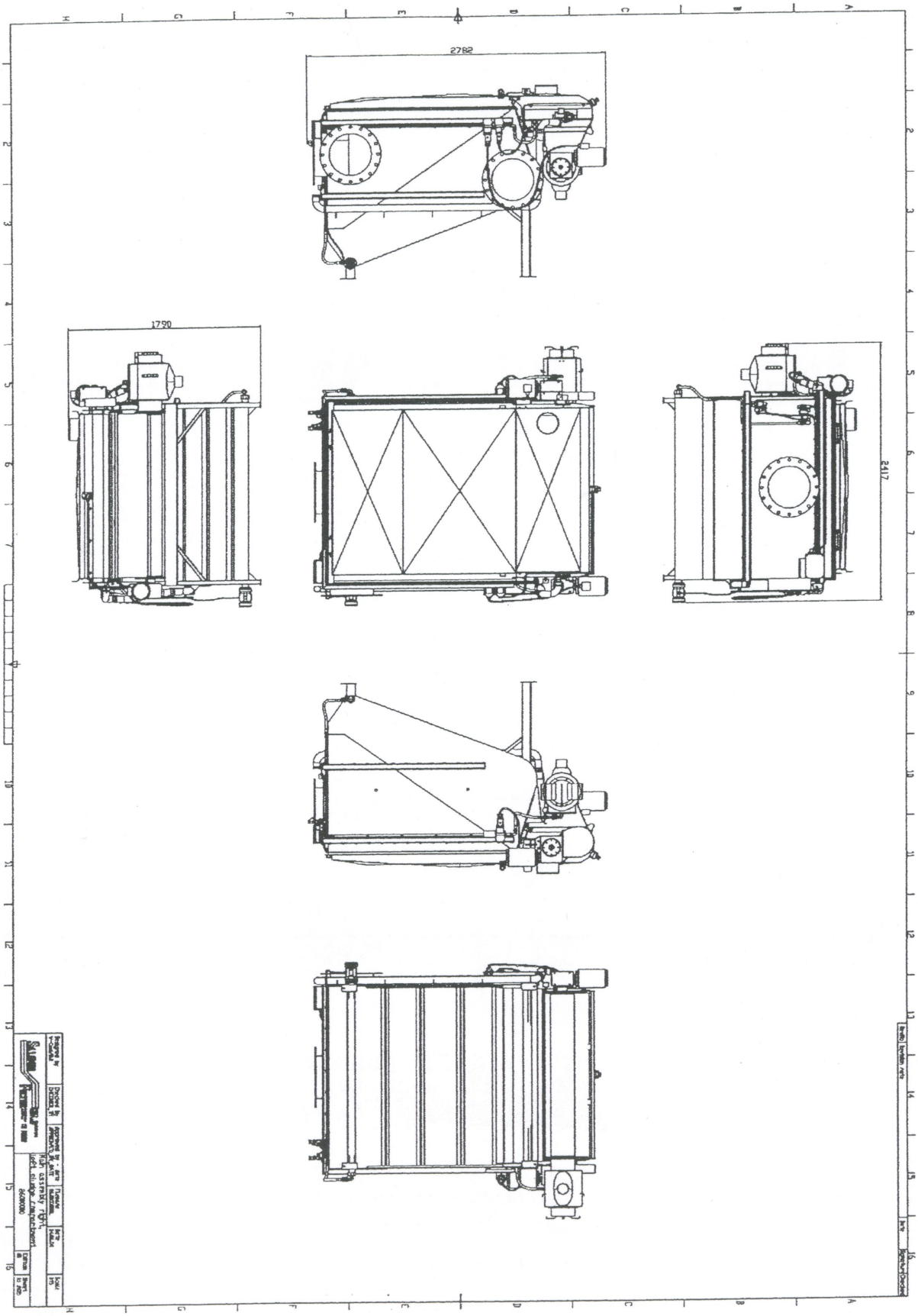

14.8

Operator's Manual

for

Salsnes Filter System©

Model

SF6000

76005100_001

07.06.2004

SALSNES FILTER AS
7817 SALSNES

Telephone: +47 74 27 48 60
Fax: +47 74 27 48 59
Email: firmapost@salsnes-filter.no

19.9

19.13

Operator's Manual

for

Salsnes Filter System®

Model

SF6000

78005130_001

07.06.2004

SALSNES FILTER AS
7217 SALSNES

Telephone +47 74 27 48 00
Fax +47 74 27 48 50
Email firmapost@salsnes-filter.no

Revisions:

Revision	Changes	Author
001	First version	Svein Storø

14.9

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1. General

This document describes the operation and maintenance of the Salsnes Filter System© Model SF6000. For technical data of the SF6000, please see the Installation Guide.

2. The Salsnes Filter System©

The Salsnes Filter System© Model/type 6000 is approved within the general provisions within the European Economic Area (EEA) agreement on equipment, 89/392/EEA, 91/368/EEA, 93/44/EEA.

The assigned operator is required to thoroughly read the operating instructions before taking responsibility of the system. This requirement of the operator is necessary to ensure that the operator follows safety procedures and also that the unit is operated in accordance with the manufacturers specifications.

3. Components of the Salsnes Filter

The Salsnes Filter System© Model 6000 consists of three separate components. These are: The Salsnes Filter component (1), the air compressor (2) and the control panel (3). The wastewater is first filtered through an endless filter cloth. The sludge that accumulates on the filter cloth is automatically blown down into the sludge compartment by compressed air and water flush. The sludge is then pressed through a dewatering unit to increase the dry solids concentration in the sludge.

The air compressor consists of an electrical compressor that produces compressed air for cleaning of the cloth.

A more detailed process description is found in chapter 7.1.4

For the basic Salsnes Filter System© all controls and start/stop mechanisms are centralized in the Control Panel.
For certain installations the functionality of Control Panel may be an integrated part of the main control system for the whole plant. In such a case the documentation of the control system is covered in the plant specific documentation.

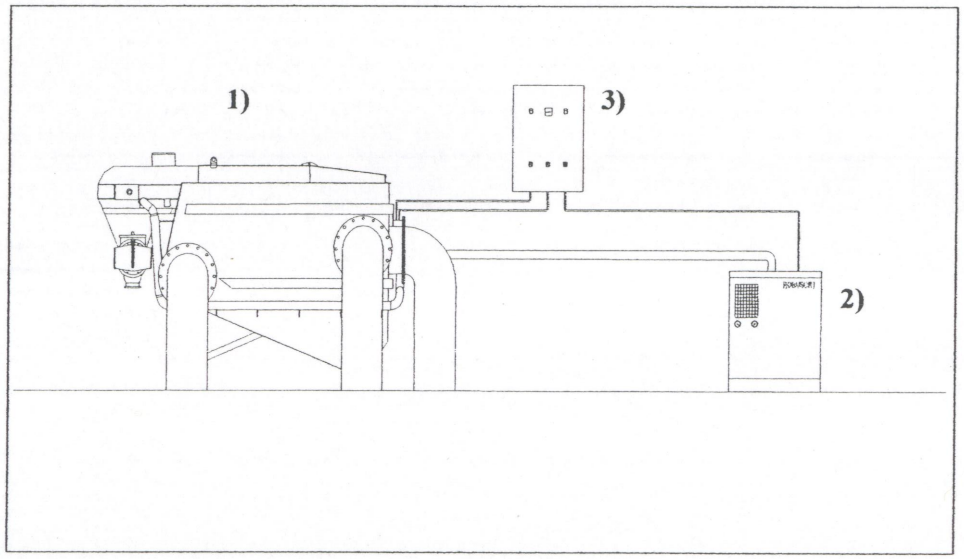

Figure 1: Salsnes Filter main components in principle

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Picture 1: The Salsnes Filter SF6000

4. The purpose and design of the Salsnes Filter System

The Salsnes Filter System is designed and produced to treat wastewater.

- Any other use of the system not specified is not allowed. If the system is damaged during operation for a purpose other than treating wastewater, the manufacturer is not responsible for damages incurred during operation.
- The filter system shall be utilized for the purpose it was constructed and under no circumstances will be utilized for any other purpose. If the machine is utilized for a purpose other than wastewater treatment, the customer takes responsibility for the damages incurred upon the filter system during operation.
- The manufacturer must approve any modification of the system by the customer. If the manufacturer does not approve the modifications, and damage occurs to the unapproved modified Salsnes filter system the manufacturer is not responsible for damages incurred during operation.

5. Deed of Conveyance for Salsnes Filter system.

When the Salsnes Filter systems operations (scheduling for training, service, maintenance etc.) are agreed and documented, the responsibility for the system is the owners. These entail:

- Daily servicing and maintenance.
- That supplier's recommendations for routine maintenance are adhered to.
- That training of the personnel shall adhere to the supplier's guidelines for training.
- That the filter system shall be utilized for the purpose it was constructed and under no circumstances will it be utilized for any other purpose.

6. Installation

Installation must be carried out in accordance with the installation procedures described in the Installation Guide, and the distributor shall make sure that the installation procedures are closely followed. The installation report (section 5 in the User Manual) shall be completed and returned to the manufacturer within 30 days after installation.

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7. Operation of the SF6000

7.1. Initial start-up/operation

7.1.1. Basic setup data for operation

For all electrical data see specific information following each unit. The following setup parameters are valid for all units with a Salsnes Filter specified control system

Maximum frequency filter cloth	80 Hz. [1) 2)]
Minimum frequency filter cloth	0 Hz.
Initial frequency	10 Hz
Frequency during manual operation controlled by the frequency inverter	80 Hz [1)]
Hysteresis	10 Hz.
Acceleration time	5 sek.
Retardation time	10 sek.
Hot water flush time	1-60 min. (3 min default)
Interval between hot water flushing	1-24 hrs (6 hrs default)
Start-up level	Default 165 mm above outlet threshold (Level ruler mounted inside machine)
Sample taking	To be determined by the operator (if installed)
Bottom flush time	1-60 min. (3 min default)
Bottom flush interval	1-24 hrs (24 hrs default)
Maximum frequency dewatering conveyor	80Hz
Minimum frequency dewatering conveyor	30Hz
Level of pressure transmitter	145 mm below outlet threshold.
Time delay dewatering conveyor	0-999 sec (10 sec default)
Air pressure	0,3 – 0,6 bar

1) 60Hz to comply with Urban Waste Water Treatment Directive 98/15/EEC.
2) Maximum frequency 80 Hz is reached when inlet water level is 30 mm below overflow level

Table 1: Basic setup data

7.1.2. Before start-up.

Before start up of the Filter system, it is required that all checkpoints from the installation report form (section 5 in the User Manual)) are verified and signed by the operator in charge.

7.1.3. Installation Test Routines (Trial run).

It is required that the filter system go through a 3 hour trial run and the operator and a skilled observer must monitor the system during the whole period.

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7.1.4. Construction and Operation principles

This chapter describes the construction and operational principles for the Salsnes Filter System©.

The Salsnes Filter system is fully automatic and is operated from the control panel/central control system with the support of the signal components.

Wastewater enters the machine through the inlet flange (1). The raw wastewater flow is first filtered through the mesh filter cloth (7), and the filtered water from the back of the filter cloth flows out through the outlet flange (3).
The surface of the cloth transports the separated sludge to the air-cleaning device (9) where compressed air blows the sludge down into the sludge compartment (8).

A pressure transmitter (4) measures the level of the incoming water. This information is used to vary the speed of the filter cloth to achieve optimum performance at variable flow rates and variable influent SS concentrations. As long as the water level in the inlet chamber is low, the mesh filter cloth is immobile. Eventually particles will accumulate on the cloth surface, the water level will increase and the pressure transmitter (4) will forward signals to the control system that automatically start the motors that moves the filter cloth, blower and the dewatering conveyor.

If the water level keeps increasing while the cloth is moving, the speed will automatically increase. If the water level drops below the preset limit, the motor will stop until the level increases again.

The filter cloth (5) and the sludge-dewatering cylinder (20) are flushed with hot water 3 times a day. (11 and 19). Recommended flushing time is 3 min, with 6 hours intervals. This is controlled by the PLC, and can be adjusted. The bottom flush (15) at the lowest point of the filter compartment is set to flush for 3 min at 24 hrs intervals, which can be adjusted by changing the settings in the PLC. The bottom faucet opens automatically and allows the sediment to be rinsed out.

The first stage of dewatering is done by gravity and pressured air through the air doctor, while the sludge drops down into the sludge compartment. The dewatering screw presses the sludge forward to the dewatering cylinder (20) where further dewatering is done. The dry solids content of the sludge can be regulated by adjusting the tension on the spring-loaded lid (22).

The reject – blue water – from the dewatering unit (21) is normally connected to the water outlet system, but if there are special requirements the reject water may also be connected to the inlet.

On the side of the filter compartment there is a valve for sample taking. (Not included in all Models)

1	Inlet.	9	Blowpipe nozzle unit.	17	Motor, sludge screw.
2	Overflow.	10	Rubber scraper/rake.	18	Motor, filter cloth
3	Outlet.	11	Flushing nozzle.	19	Flushing nozzles for the dewatering cylinder.
4	Level indicator.	12	Sludge overflow box	20	Dewatering cylinder
5	Filter cloth.	13	Double Bottom.	21	Outlet, dewatering cylinder wastewater
6	Untreated wastewater	14	Sludge screw	22	Dewatering cylinder lid/cover
7	Treated wastewater	15	Bottom flush (cold water) for removal of sediment	23	Ventilation.
8	Sludge box.	16	Drainage faucet for sediments		

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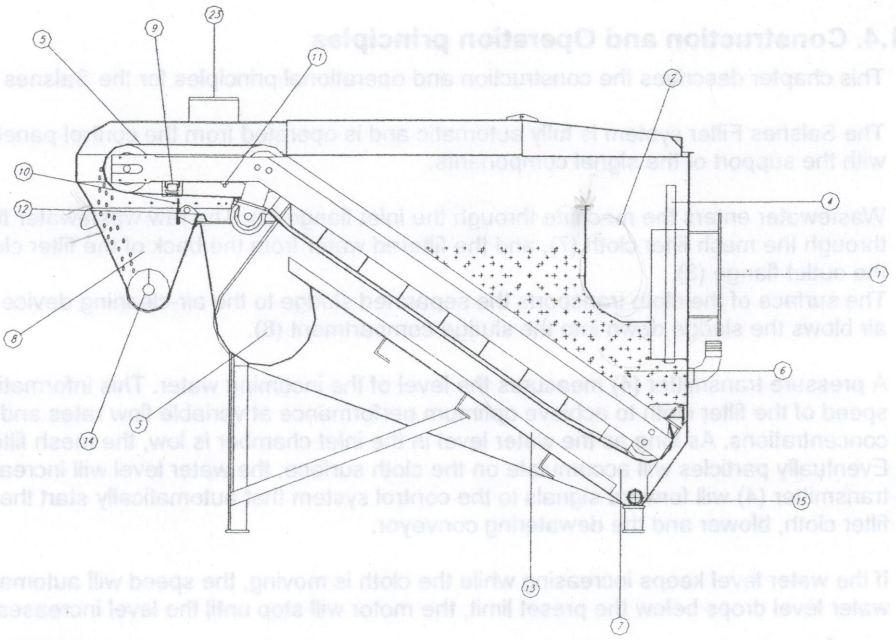

Figure 2: Details SF6000

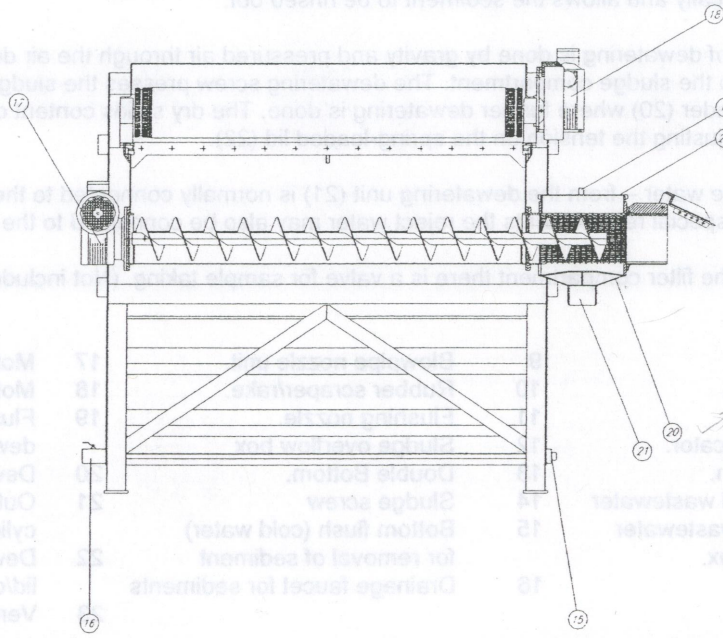

Figure 3: Details SF6000

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7.2. Operational recommendations.

The Salsnes Filter unit may either be controlled by a separate control unit (PLC based), or be controlled by a central PLC system.
The full description of the control system is found in section 2 Control System/PLC programming in the User Manual.
Basic operational aspects will be described in this manual, but plant/installation specific adaptations may occur and this will be a part of the plant specific documentation.

7.2.5. Switches and indicators

The following control switches and indicators are needed in the control system for operation:

Switch/Indicator	Functions	Description
Main switch	Auto/Off/Manual	Sets the running mode for the control of the filter cloth and dewatering conveyor.
Start switch	On (Push switch)	Starts the unit after a power down
Flush switch cloth	Auto/Off/Manual	Sets the running mode for the control of the hot water flushing.
Bottom flush switch	Auto/Off/Manual	Sets the running mode for the control of the cold water flushing.
In Operation	Indicator	Lit when unit runs in manual or auto modes
Failure	Indicator	Lit when an error occurs and a security mechanism is engaged.

7.2.6. Operational modes

The Salsnes Filter unit may be run in two basic operational modes.

1. Automatic control

This mode may be set for the running of the filter cloth/dewatering conveyor and the cold and hot water flushing independently, and is the mode used for normal operation.

In this mode the speed, running period and running time of the filter cloth, dewatering conveyor, hot water and cold water flushing are fully controlled by the PLC/frequency inverter system responding on the input from the water level sensor.

The ranges of regulation for the different parameters are adjusted during the trial-run period for optimal performance. See 7.1.1 Basic setup data for operation for initial settings.

2. Manual control

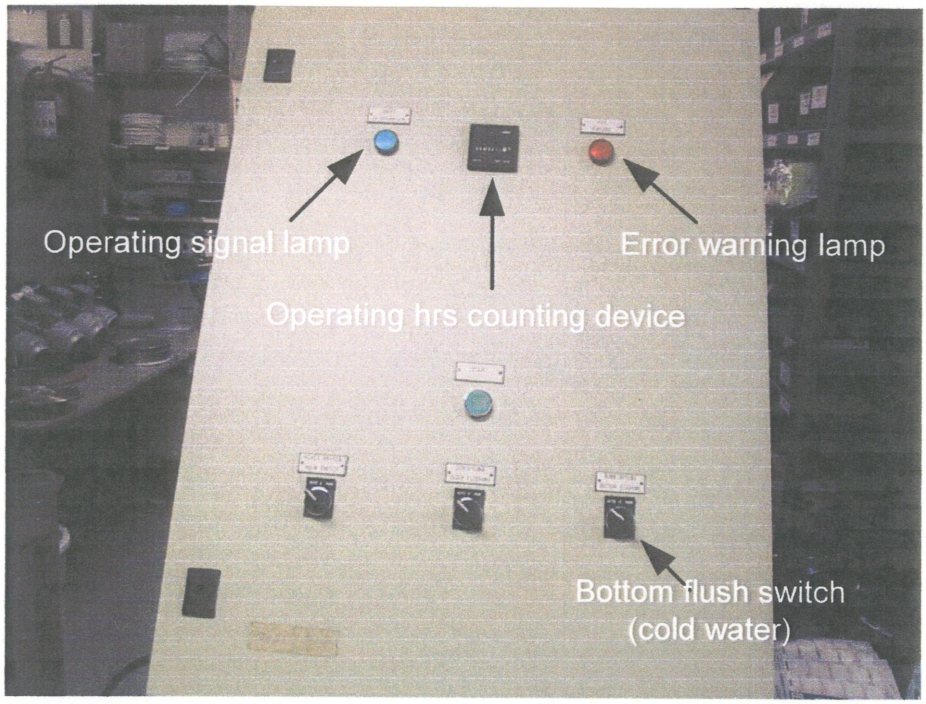
The following functions may be overridden for maintenance, test and service purposes:

- Manual control of filter cloth and dewatering conveyor (Main switch)
- Manual bottom flushing (Bottom flush switch)
- Manual flushing cloth and dewatering unit (Flush switch cloth)

Parameter values for manual operation are found in Table.1 Basic setup data

7.2.7. Example of control panel layout

Below is an example of a control panel layout. The layout may differ for different projects, so the as–built descriptions are found in the project specific documentation.



Picture 2: Overview control panel layout

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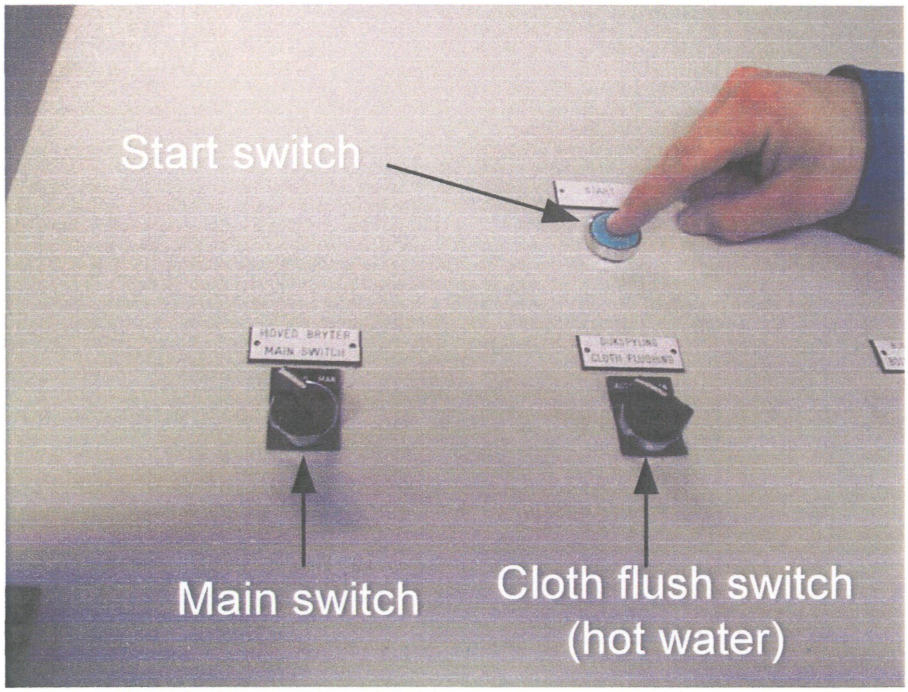

Picture 3: Close-up control panel layout

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7.2.8. Start up procedures first time or after shut down

The procedure below describes the process for starting the filter for the first time or after shutdown.

1) Apply some water to the belts and sealings if the unit has been out of operation for a longer period.

2) Main switch and flush switches must be set in AUTO position. (Ensure that taps for hot and cold water are open.)

3) Press the Start switch.

4) Start the inlet flow and open the inlet valve to approximately half capacity (if possible). This is in order to avoid large quantities of sludge entering the machine from sedimentation in tanks or other parts of the external system.

5) Ensure that the dewatering conveyor in the sludge compartment manages to press out the sludge, while a plug of sludge is building up in the dewatering cylinder. A plug can be created by restraining the lid at the end of the dewatering cylinder from opening.

6) Check that the air pressure is at the level recommended in the manual. (If the pressure is too low, check the connections)

7) Check that the screw conveyor manages to carry away the compressed sludge mass.

8) When a normal sludge mass appears, the filter and the screw conveyor are functioning properly.

9) The inlet valve can be increased to full capacity. The following points must be checked regularly:
   - The dewatering conveyor in the sludge compartment manages to move the sludge mass.
   - The conveyor carries away the sludge mass and that the pressure is in accordance with the instruction manual.
   - The sludge compression is normal
   - The flushing is normal

10) When the Salsnes Filter unit including the sludge conveyor and the air compressor are functioning normally, the initial start up procedures are complete.

7.2.9. Safety details

Note!
All switches including the Main Switch at the control panel must always be set to the Off position, and the electric connection disconnected during all service and/or maintenance work at the machine.

Always use hearing protection when performing work in the vicinity of the machine when it is in operation.

The following must always be performed whenever the machine has been stopped:

1. Switch off the machine by setting all switches at the control panel to Off position at the control panel. This is also relevant after activating the emergency stop button.

2. Disconnect the power supply by disconnecting the electric power plug

3. Under NO circumstances should a person use their limbs (hands, arms etc.) to clean the conveyer screw before the points 1 and 2 of the safety details above are completed.

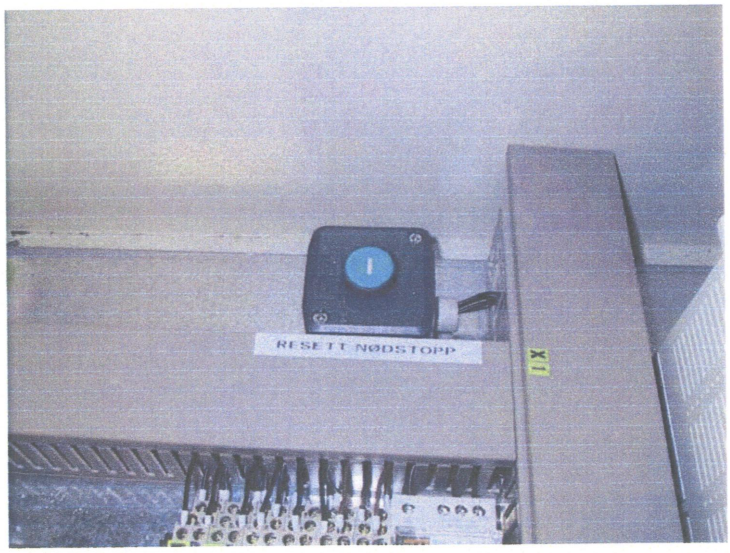
4. During initial start-up of the machine, the operator shall ensure that no persons are within operating area of the machine or exposed to any moving parts etc, so that injury can occur.

Danger!
Be aware that if the machine is turned-off, but not unplugged from the power supply, the machine can still automatically start-up by the automatic water level indicator!

7.2.10. Emergency stop

When the emergency stop button at the front of the Salsnes Filter has been activated, press the reset button inside the control panel/cabinet before the control panel switches are set to auto/manual for a restart. Then press the start button at the front of the panel.
The location of the reset button may differ between the installations, so please check the plant/installation specific documentation for details.

Picture 4: Location emergency stop button



Picture 5: Reset Emergency stop

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7.3. Operation adjustment.

The filter system runs effectively and at full capacity (according to the cloth filter dimension) when the wastewater during operation is at its highest level, and no water is being discharged through the overflow.

The parameter values of the control system are set from the manufacturer. These values may be modified according to the current plant conditions in order to achieve optimized operations. See Table 1 Basic setup data.
The parameters are either adjusted from the PLC system or the frequency inverters controlling the cloth and the conveyor motors. For full details see the section 2 Control System/PLC programming and plant/installation specific implementation.
There are a few points that need specific attention at start-up and during operation:

- If overflow occurs when the cloth starts moving, it is advisable to reduce the acceleration time of the cloth.
- If the filter system runs longer than expected after that the water level has sunk under the minimum level, then reduce the retardation time of the cloth.
- To avoid untimely starts and stops, adjust and regulate the retardation time and the hysteresis.
- If an unstable timing occurs, also adjust the hysteresis.

The hot water flush is set to operate in intervals and for a preset time as shown in Table 1 Basic setup data.
Dependent upon the fat/grease content in the wastewater, which tends to clog the cloth filter, adjust the flush interval. See table below.

The dewatering sludge conveyor is controlled by the second frequency inverter, and set to run at the correct speed according to the filter cloth speed. It is important that the conveyor screw runs for a certain time after that the filter cloth has stopped.
If the sludge-dewatering conveyor stops too soon or too late, this can be adjusted (default 10 sec).

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8. Instruction for the air compressor

For instructions about the air compressor, please refer to section 7 of the manual.

9. Maintenance and Inspection routines

Please also refer to the Inspections and maintenance guide (section 10).

9.1. Weekly Inspection

1. Visual function inspection of the system should be carried out weekly.
2. Remove the lid at the dewatering unit and check that the wedge wire screen is not clogged or damaged. Flush manually if necessary.
3. Inspect the air pressure gauge from the air compressor. Normal pressure is 0.30-0.60 bar, max. 0.6 bar. (If a variation is observed, see chapter 10: Trouble shooting checklist)
4. Check the filter mesh/cloth for damage such as tears, holes etc. and that the air doctor cleans the whole width of the filter mesh/cloth.
5. Check the oil level in the air compressor by controlling the oil level gauge at the back of the air compressor. (See section 6)
6. Inspect that grease or other sediments do not clog the sludge conveyor. (Clean the sludge conveyor manually when necessary)
7. Inspect the compartment and clean manually if necessary.

Danger!
The main electric switch must be turned of and/or electric connection disconnected during work or maintenance in the sludge compartment.

9.2. Monthly Inspection

1) Check the driving belts between the conveyor belt motor and the drive roller, in particular it's condition and tension. Control that the drive roller motor or its gears are not abnormally hot.
2) Inspect and eventually rinse/change the compressor air filter. (If specific conditions appear, and dust is created in the air compressor area or at the air intake, the air filter must be rinsed/replaced each day)
3) Rinse the strainer attached to the water inlet, and inspect the hot water nozzles.
4) Check that the pressure transmitter pipe and the pressure transmitter level indicator are not clogged by fat and grease. Clean carefully if necessary.

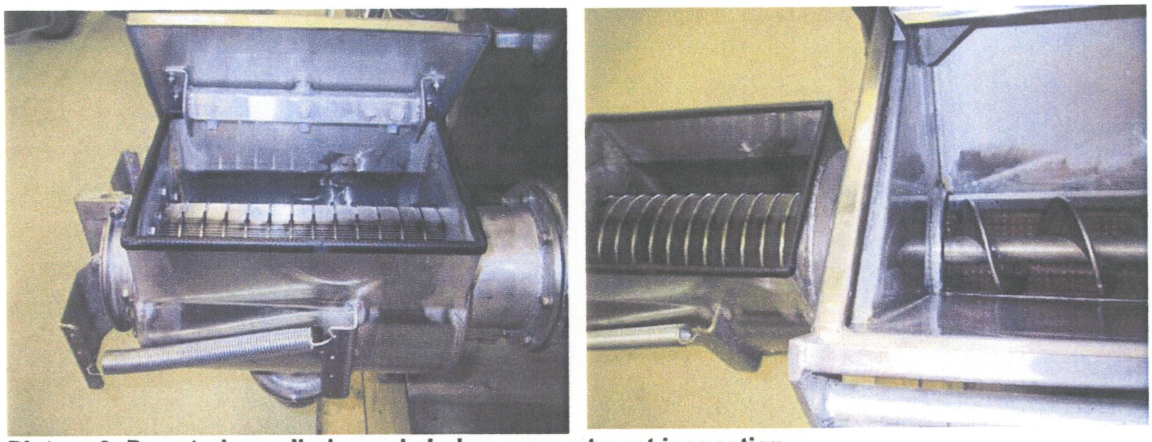
9.3. After approx. 300 hours in operation

1) Lubricate bearings in the drive roller and the flange sealing for the gear on the sludge conveyor (dewatering screw in the sludge compartment).

2) Change the oil in the air compressor. (See section 8 in the User Manual)

9.4. After approx. 3000 hours in operation.

Inspect the wedge wire screen in the dewatering cylinder and the sludge conveyor in the compartment for wear and tear. If holes are found in the plastic coating of the sludge compartment, the complete coating must be changed. With moderate wear and tear the wedge wire screen can be turned/rotated. This is done by removing the end piece of the discharge pipe, lift out the wedge wire screen and turn it. The screen must be turned in such a way that the locking pin (which initially pointed straight up) will fit into the next notch.



Picture 6: Dewatering cylinder and sludge compartment inspection

9.5. Lubrication

Subsequent lubrication intervals:

Approx. 3000 hours running time.

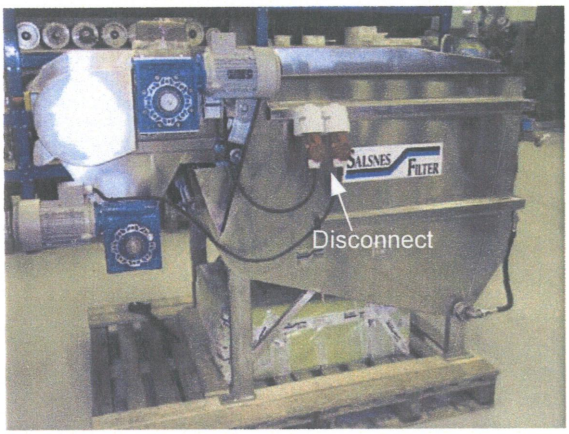
Lubricants for compressor and filter machine:

Oil:	Statoil HMA 100/150	or equivalent.
Grease:	Statoil Uniway EP2N	or equivalent.

See also the additional lubrication chart for the compressor.
The worm gears are permanently filled with grease that needs no replacement.

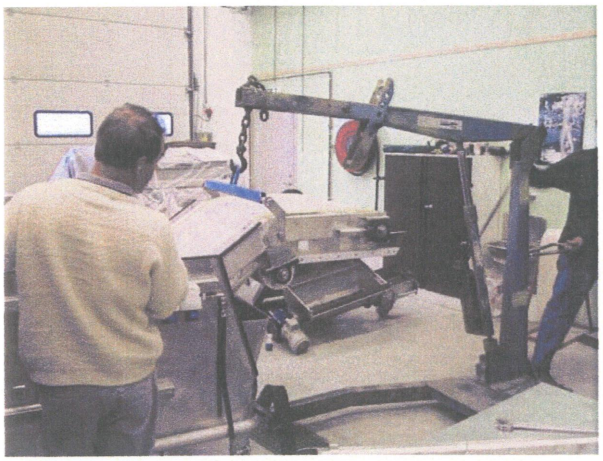
9.6. Guidelines for changing the filter cloth

- Close all taps, valves and stop all pumps connected to the inlet of the filter machine.
- Switch off the electricity and unplug the electric connections to the belt drive and the dewatering screw motor that are placed on the side of the machine unit.



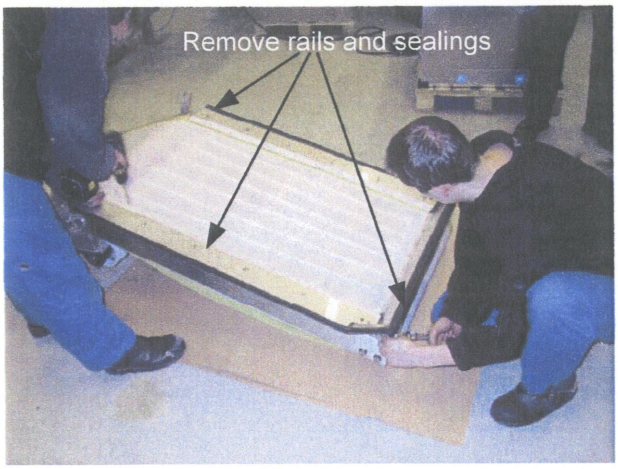
Picture 7: Electrical connection motors

- Remove the top lid and the sludge compartment.
- Disconnect the hot water for the filter cloth hot water flush, the hot water hose for the dewatering wedge wire flush, and the and the air hose connected to the air doctor inside the filter box.
- Remove the cover of the driving belt of the cloth motor and dismantle the motor and brackets.
- Lift the frame up slightly, and rinse most of the sludge from it.
- Lift the frame out of its casing and clean it. Open the bottom faucet while at the same time set the bottom flush is manually to "on". Clean the frame casing.



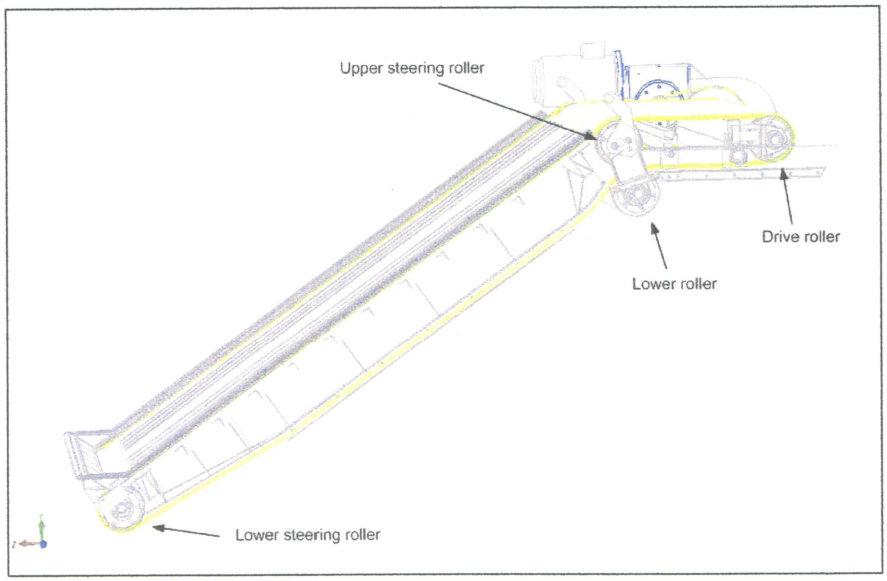
Picture 8: Removal of frame

– Place a piece of cardboard on the floor and lower the frame carefully to the floor and remove the rails and sealings at both sides, and at the lower end of the frame.



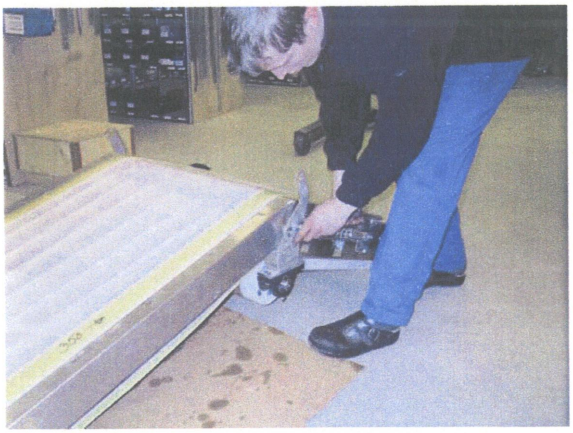
Picture 9: Removal of rails and sealings

– Frame and rollers:



Picture 10: Frame and rollers

- Loosen the upward pointing lifting pad and adjust it so it does not protrude from the frame.



Picture 11: Adjustment of lifting pad

- Set the frame on its side so that the compressor air snap-lock points upwards
- Release all 4 screws of the lower roller, and remove the roller completely.

Picture 12 Release of cloth

- Release the tension screws on the drive roller and the screws on the bearing blocks of the drive roller.
- Remove the cloth by pulling it sideways from the rollers and clean the frame on the inside.
- Check that the rollers move freely.
- Unscrew the air doctor from the hose and check that it is free of debris. This is done by flushing water into the pipe.
- If the air doctor is functioning, a continuous jet of water will emanate from the air gun nozzle.
- If the air doctor is still clogged, rinse the unit with soapy water then clean water. Then flush it with clean water.
  The procedure with soapy water should be repeated if necessary.
- If the air gun is still clogged, use a nozzle cleaner to clean out the nozzle gap.

- Also inspect the nozzles of the hot water flush pipe. Remove and clean if necessary.
- Gently replace the filter cloth by pulling it sideways on the rollers. Observe that the arrow point to the moving direction. Let the splice/joint of the cloth be visible on the drive roller to control the angle of the cloth.

Picture 13: Control of cloth position

1) Remount the lower roller to its original position.
2) Lower the frame flat to the floor again.
3) Fasten the lower sealing and the two steering rails to both sides of the frame and add silicon between the rails and the sealing beam.
4) Check to ensure that the conveyor belt on the cloth is correctly placed in the steering rail of the drive roller.
5) Tighten the filter cloth. The conveyor belts (at both sides of the cloth) must be tightened so a slack of 10 - 20 mm appears when a light push is applied to the belts between the upper steering roller and the drive roller. If the belts are not properly tightened, they may derail from the track or be overloaded.
6) Check that the cloth is positioned correctly. (This is done by lining up the splice with the frame. Ensure that the splices on the roller belts are aligned). Fasten down the locking nuts after positioning the cloth.
7) Check that the filter cloth can be pulled around the drive roller. Also ensure that the conveyor belt glides under the steering rail after it has been refastened. (This task is accomplished by pulling the conveyor belt back and forth). If the cloth doesn't move, correct (loosen) the steering rails until the cloth can be pulled around from the drive roller.
8) Remount the lifting pad.
9) Place the frame into its position in the filter box, and remount the hot and cold water pipes, and the air hose back in their original positions.
10) Remount the top lid to its original position and push the sludge compartment in place again.
11) Remount the motors and the drive belt cover.

12) Check that all connections are properly fastened.

13) Follow the Initial start up procedures from chapter 7.2.8.

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10. Trouble shooting checklist.

Failure point	Possible cause	Solution
	The emergency switch is enabled	Release the switch and reset the control panel.
The machine does not start	The ON/OFF switch is not in ON.	Press the ON switch.
	No electricity is being supplied	Check the electrical plug is connected and the fuse box.
	Fuse box is off.	Check the fuse box and turn on the power.
	Failure in the frequency converter.	Change the frequency converter, and/or repair it.
The machine does not start Automatically, only Manually.	The transmitter pipe is clogged	Clean
The machine does not stop when on "AUTO"	The transmitter pipe is clogged	Rinse out the pipe and make sure that the pipe is not pinched or crushed.
	Failure in the air pressure transmitter	Adjust (see the manual), change
	Minimum frequency is higher than the Start frequency, or too high hysteresis	Reprogram the control system/frequency converter
The machine is running erratically, unstable.	Too low hysteresis	Reprogram the control system /frequency converter
Too high air pressure	The air pressure pipe is clogged	Rinse, or change if necessary.
	Clogged air filter in the compressor	Rinse, or change if necessary.
	Defective air compressor	Repair, or change if necessary
Filter cloth is askew, not running properly on the conveyor belt	Foreign objects, and soil deposits are behind the conveyor/driving belt.	Rinse the filter cloth and belt, place bake the belt and tighten.
	The conveyor/driving belt is too loose.	Reposition the belt and tighten the belt.
Whistling noise occurs	Filter cloth is clogged with grease/fat.	Run the rinse manually, also rinsing can be accomplished using and external hose.

Table 2: Trouble shooting checklist

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11. Form overview

Below is a brief description of the forms that is a part of the complete manual:

Declaration of conformity:	The document declares the system is in accordance with the requirements in the directive 98/37/EC of the European Parliament and of the Council, of 22.June 1998 and later.
Manufacturer warranty:	The document describes the warranty regulation that applies to Salsnes Filter products.
Completion Test form:	Factory quality control of produced filter system. This form documents that the Salsnes filter system has been produced, inspected, and follows specifications set forth by Salsnes Filter AS. The customer accepts the completed form.
Technical specifications:	Technical details of the specific system delivery
Air compressor:	Technical details of the specific air compressor delivery
Installation report:	This form document that the dimension of the filter systems, sludge transport screw, and internal area dimensions are delivered and installed in accordance with sale contract agreements between supplier and customer. Three examples of this form will be completed; one for the client/customer, one for the manufacturer, and one to the distributor/Salsnes representative.
Inspection and maintenance:	Form showing the basic maintenance routines for display at the site.
Operation journal:	Form for registration of performed maintenance
Training:	This form document that the training program for the service operators and personnel that is essential to maintain the standards for service and maintenance, are performed. Furthermore, it is required that the customer/owner provides and document training programs to new personnel that will be servicing and providing maintenance.

14.9

SALSNES FILTER

SALSNES FILTER COMPLETION TEST FORM

Distributor	
Customer	
Form completed by	

Type	
Serial no.	
Date	

	Control point	Specified value	Measured value	Deviation	Approved (Sign.)	Action if not approved
1	Chest watertight - tested					
2	Sludge compartment - tested					
3	All bolts and nuts					
4	Air doctor and connected items					
5	Bottom flush function					
6	Drive belt correctly tightened					
7	Filter mesh (cloth) correctly on rollers					
8	Filter mesh (cloth) slides free					
9	Filter mesh (cloth) tightened					
10	Rollers function (easy rotate)					
11	Sludge conveyor compartment slides easily					
12	Compartment scraper touching the cloth					
13	Electricity voltage					
14	Connection frame and chest watertight					
15	Water flush function and connections					
16	Blower function to air doctor (pressure)					
17	Test operation of machine					
18	Programming of frequency inverter					
19	Programming of time relay					
20	Emergency stop switch function					
21	Time delay of dewatering conveyor					
22	Over current protection device setup					

	Control point	Specified value	Measured value	Deviation	Approved (Sign.)	Action if not approved
	Blower					
23	Electric motor: Kilowatts					
24	Electric motor: rpm (revolutions per minute)					
25	Driving belt pulley electric Motor					
26	Boss motor					
27	Driving belt pulley blower					
28	Boss blower					
29	Driving belt					
30	Safety air valve					
31	Silencer adjusted (Y/N)					
32	Pressure inverter connected? (Y/N)					
33	Blower cleared for operation (Y/N)					
34	Measured working air pressure (bar)					

The following items inclusive by shipment (marked by tick):			
35	Frame lifting device	1 pcs	
36	Scraper	1 pcs	
37	Bottom valve	1 pcs	
38	Hose for reject water	1,5 m	
39	Hose clamps stainless Ø100 mm	2 pcs	
40	Hose for blower Ø50 mm	0,5 m	
41	Hose for bottom flush Ø65mm	0,5 m	
42	Hose clamps stainless Ø75mm	2 pcs	
43	Hose clamps stainless Ø60mm	2 pcs	
44	90 ^{0} Hose bend	1 pcs	
45	Nipple 2" stainless	1 pcs	
46	Tube 2" /welded threaded joint	1 pcs	
47	Shims for exact leveling of machine unit	15-16 cm	
48	Rubber sealing sludge outlet	1 pcs	
49	Installation and operator's manual	1 pcs	

SALSNES FILTER

SALSNES FILTER TECHNICAL SPECIFICATIONS

Distributor	
Customer	
Date of shipment	
Form completed by	

Model/type	
Serial no.	
Date	
Year of manufacture	

Supply voltage	
Noise level	70dB

Current load	

Section	Component	Specification	Comment
Blower	Blower		
	Motor		
	Driving belt pulley motor		
	Boss pulley motor		
	Driving belt pulley blower		
	Boss pulley blower		
	Driving belt		
	Air pressure valve		
	High pressure air hose		
Chest	Inlet		
	Outlet		
	Overflow		
	Bottom tap/faucet		
	Control valve		
	Filter mesh flush valve		
	Bottom flush valve		
	Snap lock flush connection		

Chapter 14.9

Section	Component	Specification	Comment
Compartment	Motor		
	Gear		
	Dewatering conveyor		
	Dewatering unit		
	Outlet dewatering unit		
	Sludge outlet right/left		
	Snap lock flush connection		
Lid	Ventilation pipe		
Frame	Motor		
	Gear		
	Driving belt pulley gear		
	Boss pulley gear		
	Driving belt pulley roller		
	Boss pulley roller		
	Driving belt (on cogwheel)		
	Filter mesh		
	Snap lock high pressure air		
	Air hose		
	Air pressure gauge		
	Snap lock flush (filter mesh)		
Control board	Design		
	Overcurrent prot. blower		
	Overcurrent prot. conveyor		
	Fuse blower		
	Fuse conveyor (sludge)		
	Fuse frequency inverter		
	Fuse control function		
	Frequency inverter		
	Pressure transmitter		

MANUFACTURER'S DECLARATION

within the meaning of Machinery Directive 98/37/EC, Annex II B

KAESER KOMPRESSOREN

We hereby declare that the machine:

Type designation: BB 68 C pr

Material No.: 882271.02160 Serial No.: 1001

in the specification supplied by us is intended for incorporation into or assembly with other machines and may not be put into service until it has been determined that the machine into which it is to be incorporated into or assembled with conforms to the provisions of the EC machinery directive. In particular:

98/37/EC	**Machinery Directive**
73/23/EEC	**Low Voltage Directive**
89/336/EWG	**Electromagnetic Compatibility directive**

The following harmonized standards are applied:

- **DIN EN 1012-1: 1996-07** **EN 1012-1: 1996**
- **DIN EN 292-1: 1991-11** **EN 292-1: 1991**
- **DIN EN 292-2/A1: 1995-06** **EN 292-2: 1991/A1:1995**
- **DIN EN 294: 1992-08** **EN 294: 1992**
- **DIN EN 60204-1: 1998-11** **EN 60204-1: 1997**

The following standards are applied for evaluation of electromagnetic compatibility:

- **DIN EN 55014: 1993 - 12** **EN 55014-1: 1993**
- **DIN EN 55014-1/A1: 1997 - 09** **EN 55014-1: 1993/A1: 1997**
- **DIN EN 50082-2: 1996 - 02** **EN 50082-2: 1995**

The following national standards, directives and specifications are applied:

- **German National Equipment Safety Act**
- **German National Equipment Safety Act Regulation**

Coburg — Location

05.11.2001 — Date

Signature

14.9

KAESER KOMPRESSOREN GmbH
Carl-Kaeser-Str. 26, 96450 Coburg
Germany

Tel.: (0 95 61) 640-0
Fax: (0 95 61) 640-130
Tlx: 663 264

Executives: Dipl.-Ing. Carl Kaeser, Dipl.-Wi.-Ing. Thomas Kaeser
Court of Jurisdiction: Coburg B 292
VAT No.: DE 132460321

KAESER COMPRESSORS

OMEGA/OMEGA PLUS ROTARY BLOWERS - PACKAGE RECOMMENDATIONS -

Project: Salsnes - Aqua Pure **User:** Aanerod

INPUT DATA:

Operating mode:	Gauge pressure		Flow medium :	dry air	
Kind of package:	Compact-Package		Specific heat constant κ:	1,40	
Inlet temperature :	20	°C	Specific weight at standard conditions :	1,293	kg/m³
Inlet pressure :	1013	mbar	Pressure difference :	520	mbar
	760,0	Torr	Discharge pressure :	1533	mbar
				1150,1	Torr

Technical data:

Package: **BB 68C**
Motor power: 7,5 kW
Operating voltage: ~~400V/60Hz~~ 600 Δ

Blower speed (60Hz): 5820 1/min
Connection DN: 65

Operation data:	**max. load**		**design point**		
Pressure difference Δp:	520	mbar	520	mbar	
Inlet flow Q1*:	5,69	m³/min	5,69	m³/min	341 m³/h
Inlet flow Q1 Standard : RELATED TO 0°C AND 1013 mbar			5,30	Nm³/min	318 Nm³/h
Discharge temperature*:	70	°C	70	°C	
Required motor power*:	7,4	kW	7,4	kW	
Motor shaft power*:			7,0	kW	
Blower shaft power*:			6,8	kW	

	without sound enclosure	with sound enclosure
Sound pressure level** :	88 dB(A)	70 dB(A)
Sound power level** :	103 dB(A)	85 dB(A)
Dimension (depends on motor supplier!) (L x W x H)	725x 648 x 1024 mm	967x 780 x 1160 mm
Weight	ca. 175 kg	ca. 295 kg

** Measured to PN 8 NTC 2.3, 1 m distance, free field measurement with sound isolated pipework.
* Performance data to DIN ISO 1217, part 1, annex C

The pressure difference at max. load corresponds to valve set pressure!

14.4

Project: Salsnes - Aqua Pure

User: Aanerod

Kind of package: Compact-Package

Operating mode: Gauge pressure

Inlet temperature : 20 °C

Valve set pressure: 520 mbar

Inlet pressure : 1013 mbar/ 760,0 Torr

Input inlet flow: 5,7 m³/min

Package: **BB 68C**

Blower speed (60Hz) : 5820 1/min

Motor power: 7,5 kW

Connection DN: 65

Operating voltage: ~~400V/60Hz~~ 575V A

Nameplate data: **max. load** related to 1013 mbar and 20°C

Pressure difference Δp: 520 mbar

Discharge pressure p2* : 1,53 bar

*Discharge pressure related to max. pressure difference

Inlet flow Q1 Standard : 5,69 m³/min
RELATED TO 20°C AND max Δp:

NOTE: ACCESSORIES SHOWN ARE INTENDED FOR AIR USE ONLY.

Accessories:

	yes	no
Unloaded start up valve: AFE15	☐	☒
Check plate: DN 65-SB	☒	☐

Optional for package with sound enclosure

	yes	no
Sound enclosure with super- silencing:	☐	☒
Sound enclosure for outdor installation:	☐	☒

Instruments

	yes	no
Temperature gauge:	☐	☒
Temperature gauge with switch point:	☐	☒
Pressure gauge:	☒	☐
Filter differential pressure switch:	☐	☒

	yes	no
Sound enclosure:	☒	☐
Suction from ambient:	☒	☐
Suction from pipe:	☐	☒

Standard equipment with s. encl.: 1x 337-H Blowoff valve, pressure gauge, filter with maintenance indicator

Standard equipment without s. encl.: 1x 337-H Blowoff valve, filter with maintenance indicator

Remarks for project:

Achtung: - Sonderfarbe Schalldämmhaube in RAL 5002 ! - graue
Teile sollen grau bleiben !!

SERVICE MANUAL

Rotary Blowers

Model: BB C pr

No.: 9_5757_00USE

USE OIL SB-220

KAESER

3760 LA VERENDRIE

BOIS BRIAN

450-971-1414

14.10

SERVICE MANUAL

Rotary Blowers

Model: BG C pr

No.: 9_8757_00US

SERVICE MANUAL E

Rotary Blower Package

Model: BB 68 C pr

Part No.: 882271.01220 – V02

Serial No.: .....

CITY OF IQUALUIT
C/O WASTE WATER TREAT.PLANT
C/O POTABLE WATER PLANT
P.O.BOX 460, IQUALUIT,
NUNAVUT, XOA OHO

Manufacturer:

KAESER KOMPRESSOREN GmbH

96410 Coburg • PO Box 2143 • GERMANY • Tel. +49–9561–6400 • Fax +49–9561–640130

http:// www.kaeser.com

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KAESER KOMPRESSOREN

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V-belt set:

Description ..... XPZ 1060

Article No.: 893360.0

Sound enclosure fan motor :

See the fan electrical diagram in the attachment under "Installation Instructions".

1.4 Lubricant Capacities

Drive end ..... 0.15 ± 15 % l

Gear end ..... 0.13 ± 15 % l

1.5 Lubricant Oil Filling

Attention! **The rotary blower package is delivered with a full charge of lubricating oil.**

Type of oil used: KAESER OMEGA FLUID-M 220

1.6 Recommended Lubricants

The use of mineral oils with high ageing resistance, high viscosity index, good oxidation stability and good demulsifying properties are recommended. They should comply with the minimum requirements placed on mineral oil type C by DIN 51517, Part 1.

The following oils should be used taking ambient temperatures and the resulting oil temperatures into account:

- Ambient temperature -15 °C to 40°C - normal oil temperature -5 °C to 80 °C
  Lube oil type C, CL, CLP 100 to DIN 51517
  Viscosity at 40 °C 100 ± 10 mm^2/s (CSA)
  ISO – VG 100

Recommended sort:	KAESER OMEGA FLUID - M 100	part no.: 892475.0
	in 1 litre bottle	part no.: 885891.00010
	in 5 litre canister	part no.: 885891.0

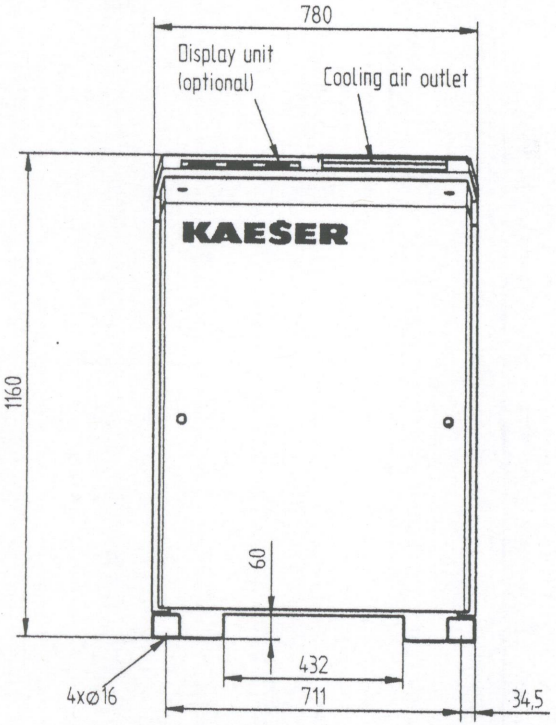
- Ambient temperature –5 °C to 60 °C - higher oil temperature 2 °C to 110 °C
  Lube oil type C, CL, CLP 220 to DIN 51517
  Viscosity at 40 °C 220 ± 22 mm^2/s (CSA)
  ISO – VG 220

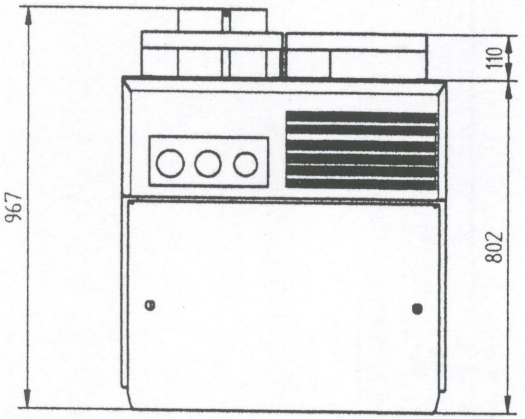
Recommended sort:	KAESER OMEGA FLUID - M 220	part no.: 892338.0
	in 1 litre bottle	part no.: 883816.00010
	in 5 litre canister	part no.: 883816.0

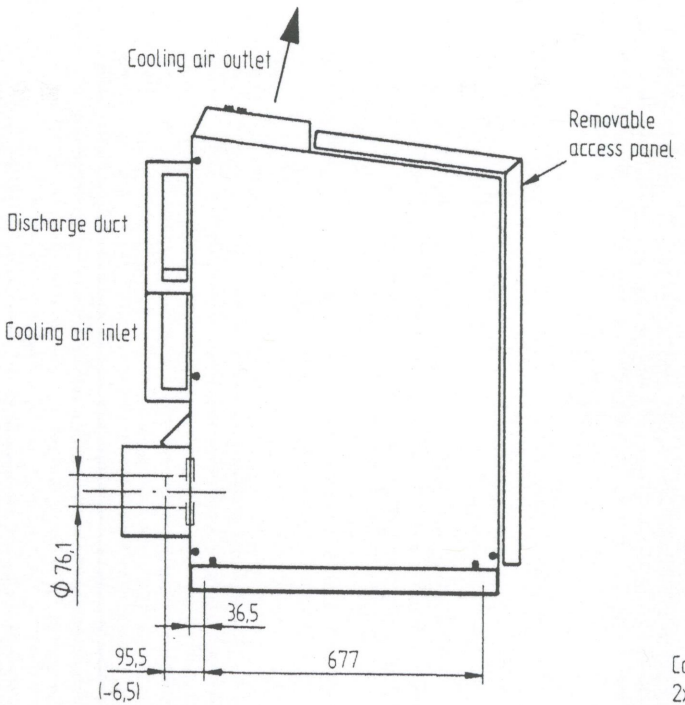
For extreme operational conditions

- Ambient temperature –25 °C to 40 °C – oil temperature –25 °C to 110 °C
  Lube oil type PG 150 DIN 51502
  Viscosity at 40 °C 138 mm^2/s (CSA)

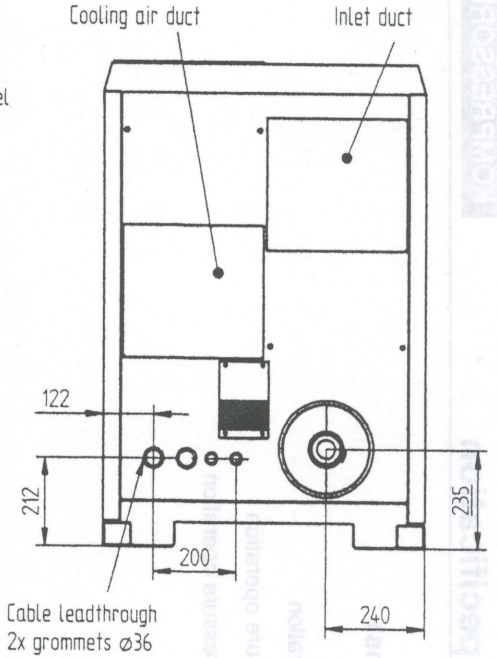
Recommended sort:	KAESER OMEGA FLUID - S 150	part no.: 892193.0
	in 1 litre bottle	part no.: 863289.00010
	in 5 litre canister	part no.: 863289.0







Blower discharge port end
with check flap
( ) = dimension excluding check flap



Cable leadthrough
2x grommets ø36
2x grommets ø21

BB 68/88 C pr			
Stand: 24.06.02	Datum: 1.12.00	Name: Schultz	CAD-Datei: MB001112.dft

KAESER KOMPRESSOREN
– Werk Gera –

1.10 Design Data (Diagrams)

Air delivery in pressure operation

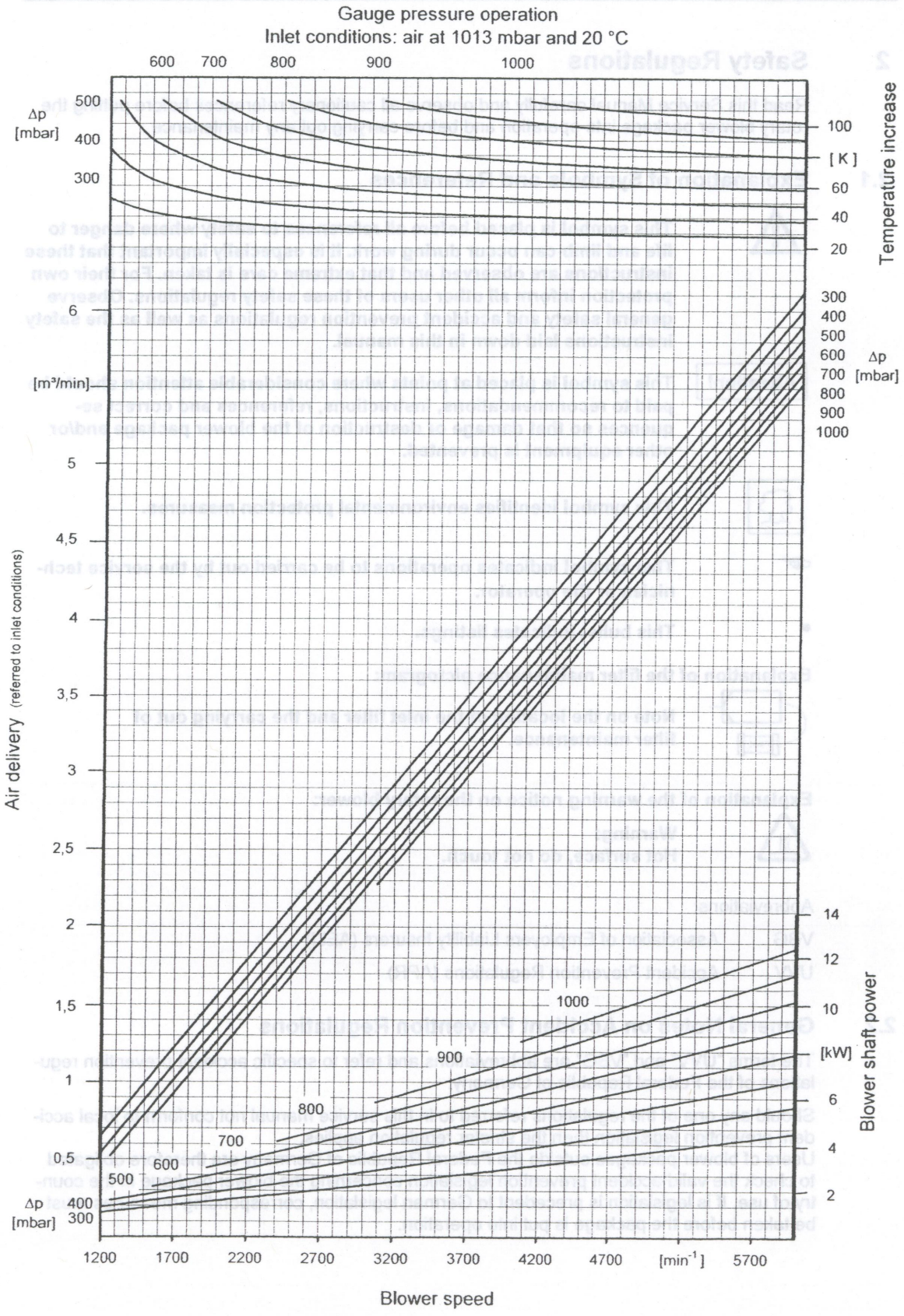
Blower shaft power in pressure operation

Temperature in crease in pressure operation

14.10

OMEGA 22 PLUS

KAESER KOMPRESSOREN



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2 Safety Regulations

Read this Service Manual carefully and observe all cautionary references before putting the rotary blower package into operation and before carrying out any maintenance.

2.1 Explanation of Symbols and References

This symbol is placed before all references to safety where danger to life and limb can occur during work. It is especially important that these instructions are observed and that extreme care is taken. For their own protection inform all other users of these safety regulations. Observe general safety and accident prevention regulations as well as the safety instructions laid down in this manual.

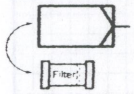
Attention! **This symbol is placed at points where considerable attention should be paid to recommendations, instructions, references and correct sequences so that damage or destruction of the blower package and/or other equipment is prevented.**

This symbol identifies environmental protection measures.

☞ **This symbol indicates operations to be carried out by the service technician or the operator.**

- **This bullet indicates listings.**

Explanation of the filter maintenance pictogram:



Note on the location of the inlet filter and the carrying out of filter maintenance.

Explanation of the warning notice on the rotary blower:

Warning:
Hot surface, do not touch.

Abbreviations:

VBG	Association of Employers Liability Insurers (AELI)
UVV	Accident Prevention Regulations (APR)

2.2 General Notes on Accident Prevention Regulations

The terms "UVV" and "VBG" are abbreviations and refer to specific accident prevention regulations of the Federal Republic of Germany.

Should any one of the regulations referred to in this service manual not conform to local accident prevention legislation then the stricter regulation applies.
Users of blower packages outside the Federal Republic of Germany are therefore obligated to check the valid accident prevention legislation concerning the blower package in the country of use. If is legislation is precedent to German legislation, corresponding measures must be taken before the package is put into operation.

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2.3 Accident Prevention Regulations

Accident prevention regulation 10.0 "Power Driven Work Units" (VBG 5)

Attention! **According to Accident Prevention Regulation VBG 5, Par. 12, the user of a rotary blower package is obligated to carry out the following measures (DIN VDE 0113 Part 1 and European Standards ES 60204-1 serve as appropriate instructions):**

Rotary Blower Packages fitted with a drive motor of power exceeding 2 kW and drawing currents of more than 16 amps must be fitted with a lockable isolating switch (DIN VDE 0660, DIN VDE 0100) and fuses in the power supply to the blower package.

Details concerning the size of the isolating switch and the fuses are given in chapter 1.3.

Accident prevention regulation 13.4 "Compressors" (VBG 16)

Attention! **We refer especially to paragraph 12: General Installation and Condition of the Installation Space.**

Accident prevention regulation 1.2 "Noise" (VBG 121)

Attention! **We refer especially to paragraph 10: Noise Protection for Personnel.**

We also recommend observation of the following recommendations:

- No open flames and flying sparks at the place of installation.
- Ensure that sparks or high temperatures cannot cause fire or explosion during any necessary welding work on the package.
- Operating personnel must be instructed on the necessity of wearing ear muffs during operation of the package, especially during operation without the sound enclosure.
- Personnel should not linger for long periods in the direct vicinity of packages with damaging sound levels.
- Rotary blower packages may not be used for explosive, toxic, corrosive or damaging gases.
- Because of the high temperatures (up to 150 °C) do not touch the air pipes during blower package operation. Wait until the blower has cooled down and pressure has vented before attempting any repairs to the pipework.
- Use only the lubricants recommended by the manufacturer.

2.4 General References

Only trained or specialised personnel may work on power driven systems (see UVV 10.0).

Before work is carried out on electrical systems, carry out the following precautions in the sequence shown:

1. Switch off all phases
2. Ensure that the blower package is isolated and locked out
3. Check that no voltages are present

Vent or shut off the pipework if not otherwise stated in the service manual.

14.10

Attention! **The warranty is invalidated if any modifications are carried out without previous consultation and the consent of KAESER COMPRESSORS.**

2.5 Spare Parts

Safe and reliable operation of the package is only guaranteed with the use of KAESER original spare parts.

14.10

Attention! **The warranty is invalidated if any modifications are carried out without previous consultation and the consent of KAESER COMPRESSORS.**

2.5 Spare Parts

Safe and reliable operation of the package is only guaranteed with the use of KAESER original spare parts.

14.10

3 General

Attention! **This Service Manual must always be available at the place of installation of package.**

3.1 Correct Use

The package is intended solely for the transport of oil-free air under pressure and in conformity with the technical specification (see chapter 1.1).
Any other use is considered incorrect. The manufacturer cannot accept liability for any damage caused by incorrect use. The user alone is liable for any risks incurred. Correct use also means compliance with installation, removal, commissioning, operational and maintenance instructions laid down by the manufacturer.

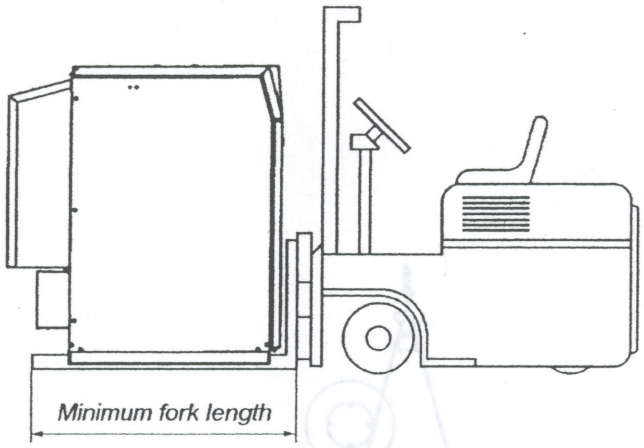
3.2 Copyright

14.10

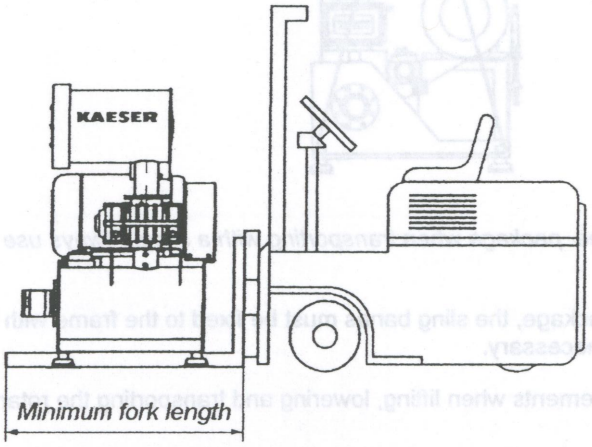
4 Transport

4.1 Transport Instructions

Attention! **To avoid damage to components of the package, we recommend the use of a fork lift truck, lift truck or a sling for transport.**



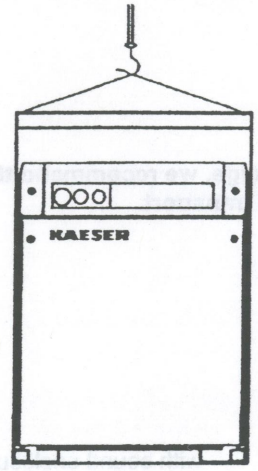
with sound enclosure

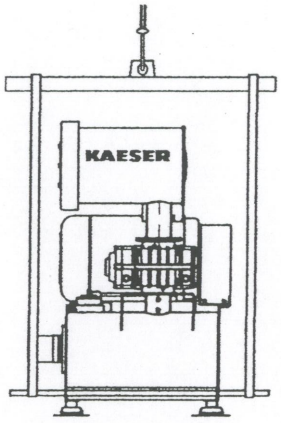


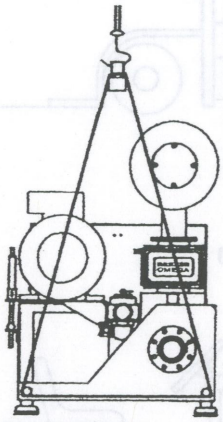
without sound enclosure

Attention! **When transporting using a crane hook, a suitable sisal or steel sling must be used (VBG 9a).**

14.10







No side forces should act upon the package when transporting with a sling. Always use a spreader !

☞ To hang the rotary blower package, the sling bands must be fixed to the frame with a round bar of and padded, if necessary.

Avoid sudden, sharp vertical movements when lifting, lowering and transporting the rotary blower package.

4.2 Packaging

A decisive factor concerning the type of packaging is the transport route.

The packaging conforms to the packaging regulations laid down by the German Federal Association of Wood, Pallet and Export Packaging (HPE) and by the Association of German Mechanical Engineering Institutes (VDMA), if not otherwise contractually agreed.

Packaging should be recycled if possible or disposed of in an environmentally acceptable way.

4.3 Temporary Storage

Attention! **The package must be stored in a dry room at a constant temperature over 0°. Air inlet and air outlet openings should be closed off to prevent ingress of dirt.**

When storage is to be longer than a year the block should be treated with a preserving oil.

- ☞ Spray preserving oil onto the flanged ports, drive shaft and air chamber to protect against corrosion.
- ☞ Carry out an oil change annually (see chapter 9.6).

Recommended preserving oil:

External:

ESSO RUST BAN 324
MOBIL OIL TECREX 39
SHELL V-Product 9703

Internal:

AVIA Avilub MK 2000
ESSO LUB MZ 20 W/20
MOBIL Mobilarma 523 or 524
SHELL Ensis Motor Oil 20

or similar makes.

Putting into operation after a long period of temporary storage:

- ☞ Remove the preserving material from the air chamber with a suitable solvent.
- ☞ Carry out the measures detailed for installation and putting into operation.
- ☞ Carry out an oil change (see chapter 9.6).

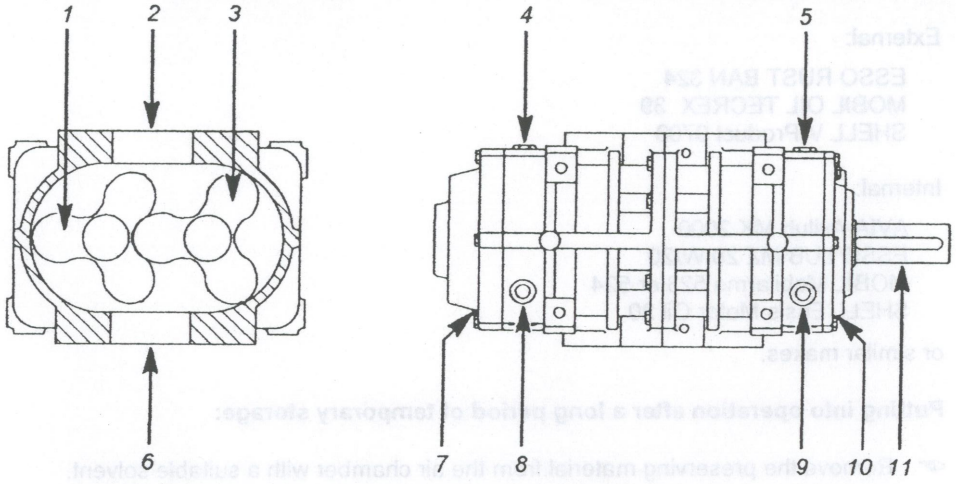
14.10

5 Construction and Principles

5.1 Compression

The package is fitted with a KAESER blower block with OMEGA profiled rotors.
Two rotors, synchronised by a pair of timing gears, rotate in opposite directions in two cylindrical bores within a casing. A defined quantity of air entering the inlet port is trapped between the lobes of the rotors and the casing and carried round to the discharge port.
Because there is no contact between the rotors and the housing there is no wear and no lubrication is required.

KAESER rotary blowers consume only as much power as is demanded by the back pressure existing at the discharge port.



1 Male rotor
2 Inlet port
3 Female rotor
4 Oil filler plug, gear end
5 Oil filler plug, drive end
6 Discharge port
7 Oil drain, gear end
8 Oil level sight glass, gear end
9 Oil level sight glass, drive end
10 Oil drain, drive end
11 Drive shaft

5.2 Short Description

The rotary blower block is belt driven from an electric motor.

The electric motor and the blower are mounted on a common base frame.

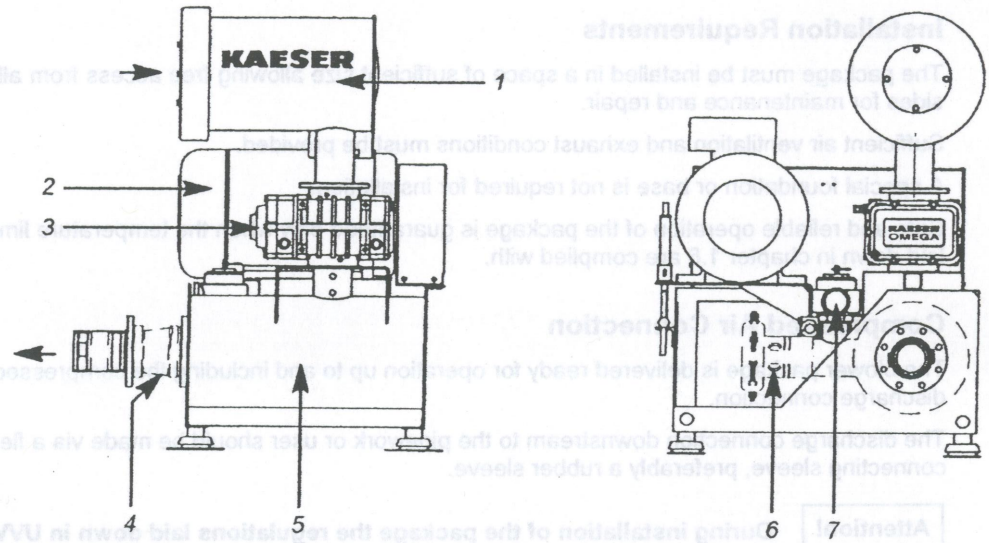
The flow medium is drawn into the block via an inlet silencer in which an inlet filter is integrated.

The air flows in a vertical direction in the discharge silencer.

The compressed air is discharged at the connecting flange of the discharge silencer.

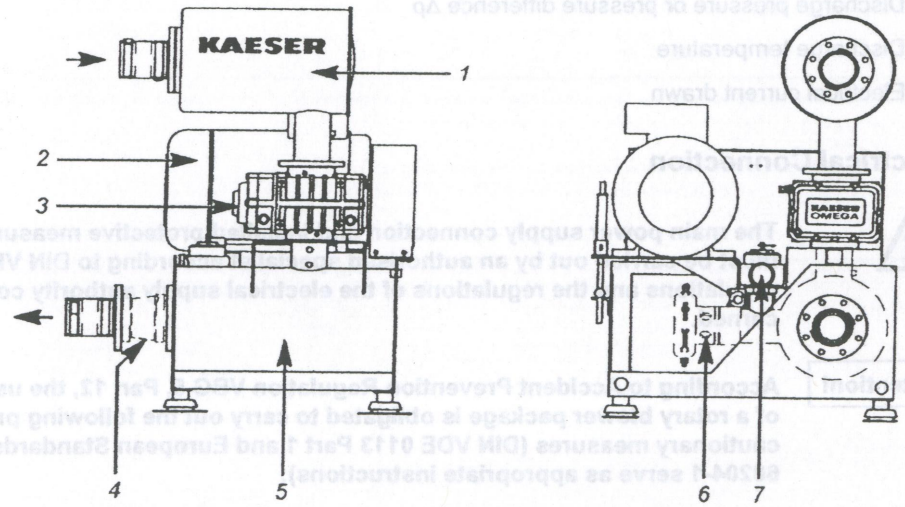
14.10

Ambient air inlet



1 *Inlet filter*
2 *Motor*
3 *Blower*
4 *Check plate (Option)*
5 *Discharge silencer*
6 *Unloaded-start valve (Option)*
7 *Safety valve*

Piped inlet



1 *Inlet filter*
2 *Motor*
3 *Blower*
4 *Check plate (Option)*
5 *Discharge silencer*
6 *Unloaded-start valve (Option)*
7 *Safety valve*

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6 Installation

6.1 Installation Requirements

The package must be installed in a space of sufficient size allowing free access from all sides for maintenance and repair.

Sufficient air ventilation and exhaust conditions must be provided.

A special foundation or base is not required for installation.

Safe and reliable operation of the package is guaranteed only when the temperature limits laid down in chapter 1.8 are complied with.

6.2 Compressed Air Connection

The blower package is delivered ready for operation up to and including the compressed air discharge connection.

The discharge connection downstream to the pipework or user should be made via a flexible connecting sleeve, preferably a rubber sleeve.

Attention! **During installation of the package the regulations laid down in UVV 13.4 must be observed.**

It is especially important that necessary safety devices, a check plate and operational measuring and control devices are provided.

If the air flows into a system which remains pressurised after switching off the blower package, an off-load starting valve or similar device must be fitted.

To ensure safe and reliable operation of the blower package it is recommended that at least the following parameters are monitored and interlocked with the drive:

- Discharge pressure or pressure difference Δp
- Discharge temperature
- Electrical current drawn

6.3 Electrical Connection

The main power supply connection and installed protective measures must be carried out by an authorised specialist according to DIN VDE regulations and the regulations of the electrical supply authority concerned.

Attention! **According to Accident Prevention Regulation VBG 5, Par. 12, the user of a rotary blower package is obligated to carry out the following precautionary measures (DIN VDE 0113 Part 1 and European Standards ES 60204-1 serve as appropriate instructions):**

Rotary Blower Packages fitted with a drive motor of power exceeding 2 kW and drawing currents of more than 16 Amps must be fitted with a lockable isolating switch (DIN VDE 0660, DIN VDE 0100) and fuses in the power supply to the blower package.

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Attention!

The size of the main isolating switch (to AC 23, category of use) is dependent on the maximum rated current I_N (see chapter 1.3).

Recommendations for the size of the cable core cross-sections and the fuses are detailed in chapter 1.3.

The cross-sections of the supply cable and the fuses are installed to DIN VDE 0100, Part 430 and 523 for an ambient temperature of 30 °C. Under other operational conditions, e.g. higher ambient temperatures or longer power supply cables (over 50 metres) the supply cable cross-sections and fuses must be checked according to DIN VDE regulations and the regulations of the electrical supply authority concerned.

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7 Putting into Operation

7.1 Points to be Observed

Every rotary blower package is given a test run in the factory and carefully checked before shipment. The test run confirms that the package conforms to the specification data and runs perfectly. However, it is recommended that it is inspected for damage that could have occurred during transport. The package should be carefully observed during the first hours of operation to determine any malfunction that could occur.

The user is responsible for the installation of the complete package.

- Before putting into operation check the correct sequence of the compulsory safety and monitoring devices and the necessary operational measuring and control devices for the processing technology used.
- Check the installation of check plate, valves and controls for correct direction.
- Remove the blanking caps fitted during installation.

7.2 Starting Precautions

ANY NON-OBSERVANCE OF THESE OR OTHER PRECAUTIONARY REFERENCES (WARNING, ATTENTION) COULD LEAD TO AN ACCIDENT CAUSING INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

☞ Remove all packaging materials, tools and transport safety devices.

- It is expected that the user employs safe working methods and complies with all valid local operating and safety regulations when operating the package.
- It is the responsibility of the user to ensure that the package is constantly kept in a state of operational safety.
- Do not operate the package in spaces in which high dust pollution, toxic or inflammable vapours and gases can form.
- Do not connect the package to a different power supply than that stated on the motor nameplate.
- Install the package in a frost-free space and where the ambient temperature conditions (see chapter 1.8) are met.

☞ Check the drive shaft for ease of rotation by turning with the hand.

☞ Check the tension of the belt drive (see chapter 9.3).

☞ Check the oil level and top up if necessary (see chapter 9.5).

Remove all electrical power from the blower package before carrying out this work.

Lock out the supplies to the blower package to prevent accidental switch-on.

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7.3 Direction of Rotation Check

Danger from rotating parts

- The rotors **must** rotate in the correct direction.
- The correct direction of rotation is counter-clockwise when looking at the end of the shaft. An arrow indicating the direction of rotation is located on the belt guard and on the blower block.

☞ Remove the inlet filter inspection cover (also if the filter is integrated in the inlet silencer) or remove the check plate (non-return valve) complete.
Open all shut-off devices.

☞ Check the direction by turning the control switch to "I" and then immediately back to "O" again and observing the direction of rotation.

☞ If the direction is incorrect, the phase sequence in the power supply must be changed.

Attention!

The rotation check must be made every time the machine or motor is disconnected and re-connected to the mains supply.

If the blower block rotates in the wrong direction a reversal of the direction of flow and an evacuation of the discharge pipework occurs.

Always check the direction of rotation with the discharge line disconnected because the blower block could be damaged or destroyed should if foreign bodies are sucked in or a high vacuum is generated.

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8 Operation

8.1 Starting and Stopping the Blower Package

Observe the safety regulations when putting the package into operation.

The starting and stopping procedure depends largely on the application at hand together with the control devices fitted.

Always start with the blower stationary. If back pressure is apparent in the pipework system then suitable measures ensuring off-load starting must be taken.

If the blower package is operated via a two-speed motor the changeover from high to low speed must be delayed, i.e. the speed must have reduced to the lower speed or the blower must have stopped rotating before the motor is started again at the lower speed.
The motor can be switched directly to the higher speed.

Do not exceed the speed limits when operating the blower package with a frequency converter! At low rotational speeds and high pressure differentials the maximum permissible temperature could be exceeded. (see chapter 1.10).

Attention! **Do not switch the package on and off with the mains isolating switch. Always use the control switch.**

8.2 Action to be taken during a Fault

The general safety regulations (see chapter 2) and the corresponding local safety regulations must be observed during fault-finding.

Re-starting after rectification of a fault:

See chapter 7 "Putting into Operation"

Explanation of the symbols used in the following fault diagnosis:

⊗1 - Have checked by a specialist.
⊗2 - Refer to KAESER customer service.

8.2.1 Abnormal running noises

Possible fault:	Rectification:
Backlash of the gears too large.	Check the backlash. If it is > 0.1 mm replace the timing gears; ⊗1 or ⊗2.
Bearing clearance is too large.	Measure the clearance. Replace the bearing if necessary; ⊗1 or ⊗2.
Rotors out of time.	Compare the conditions under use concerning pressure difference and speed with the conditions at delivery. Check the rotor chamber for contamination and clean if necessary.

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8.2.2 Excessive blower temperature

Possible fault:	Rectification:
Operation with excessive pressure difference.	Check the pressure difference and correct if necessary.
Contamination of the inlet filter causing degradation of volumetric efficiency.	Clean inlet filter.
Rotor clearance too large.	Measure the clearance between the rotors and check with the manufacturer. Rotor replacement could be necessary, ⊗1 or ⊗2.

8.2.3 Oil leaking into the air chamber

Possible fault:	Rectification:
Oil level too high.	Drain the oil until the level is in the middle of the oil level sight glass. Clean out the air chamber with cleanser.

8.2.4 Low inlet volume flow

Possible fault:	Rectification:
Excessive rotor clearance caused by wear, especially by heavily contaminated flow medium.	Measure the clearance between the rotors and check with the manufacturer. Rotor replacement could be necessary; ⊗1 or ⊗2.
Inlet flow resistance too high.	Clean the inlet filter.

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9 Maintenance

9.1 Precautions to be Observed during all Maintenance and Servicing

Work on power driven equipment may only be carried out by trained or specialised personnel, see UVV 10.0 (VBG 5).

Before carrying out any maintenance, switch off and lock out the mains isolating switch.

Ensure that no personnel are working on the package before restoring power.

Care must be taken to see that operating materials and used parts are disposed of in a manner conducive to environmental protection.

9.2 Regular Maintenance

Service interval	Work to be done	See chapter
24 hours after first putting into operation	Check drive belts tension and adjust if necessary	9.3
50 hours after first putting into operation	Check all electrical connections for tightness and tighten, if necessary	
500 hours after first putting into operation	Change the lubricating oil	9.6
500 hours or monthly	Check lubricating oil level	9.6
	Check drive belts tension and adjust if necessary	9.3
On series BB: 4000 hours or annually On series DB, EB, FB, HB: 6000 hours or annually	Change the lubricating oil *	9.6
Annually	Check all electrical connections for tightness and tighten if necessary	
	Check pressure relief valve	
	Check condition of drive belts	
10 000 hours or after 4 years.	Grease motor bearings or replace	9.9
12 000 hours or after 2 years	Change drive belts	9.4
See motor nameplate	Grease motor bearings	9.9

* The maintenance period can vary depending on the cut-in frequency and environmental conditions.

We urgently recommend that a record is kept of maintenance work done (see chapter 11.2)

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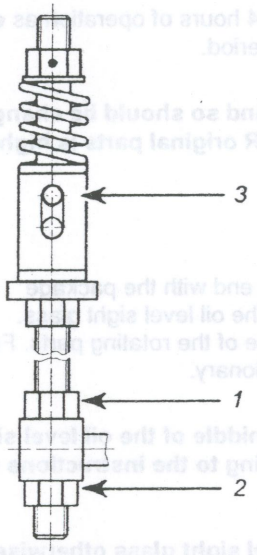
9.3 Checking Drive Belt Tension

☞ Switch off the package (see chapter 8.1)

Switch off and lock out the mains isolating switch to prevent accidental or unauthorised switch-on.

Check the tension of the drive belts after the first 24 hours and then every 500 hours of operation.



1 & 2 *Adjusting nuts*
3 *Indicator pin*

The tensioning device automatically adjusts the belt tension over a certain range with the aid of a compression spring.

If the drive belts have stretched to the extent that the indicator pin (3) is located at the top end of its slot, the belt tension must be re-adjusted.

Proceed as follows:

☞ Loosen nut (1).

☞ Tighten the belts with nut (2) until the indicator pin (3) is located at the lower end of the slot.

☞ Tighten nut (1) again.

9.4 Changing the Drive Belts

☞ Switch off the package (see chapter 8.1)

Switch off and lock out the mains isolating switch to prevent accidental or unauthorised switch-on.

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- ☞ Release nut (2, see chapter 9.3) of the tensioning device.
- ☞ Turn the hexagon nut (1, in section 9.3) so that it moves downwards until belt tension is released.
- ☞ Remove the belts.
- ☞ Lay the new belts over the motor and block pulleys without straining them.
- ☞ Reset the belt tension (see chapter 9.3).
- ☞ Refit the belt guard.
- ☞ Check belt tension after two hours and then again after 24 hours of operation as experience shows that the belts stretch mostly during this period.

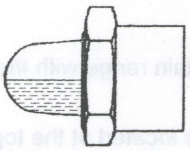
Attention! **V-belts must be of exactly the same length and so should be changed as a set, not individually. The use of KAESER original parts is highly recommended.**

9.5 Lubricating Oil Level Check and Top-Up

Check the lubricating oil level monthly at the gear end and drive end with the package switched off. The oil level should never fall below the middle of the oil level sight glass. The oil level at the sight glass changes during operation because of the rotating parts. For this reason the check the oil level only when the package is stationary.

Attention! **If the oil level has fallen to 3 mm below the middle of the oil level sight glass, the blower must be topped up according to the instructions in the oil recommendations.**

Never top up above the middle of the oil level sight glass otherwise oil could be forced into the air chamber.



Lubricating oil level at middle of oil level sight glass

- ☞ Top up with lubricating oil via "red" oil filter plugs on the gear and drive ends of the block until the middle of the oil level sight glass is reached (see chapter 1.5).
- ☞ Top up only with oil of the same sort that is already in the machine (see label on the block)

Attention! **The oil chambers of the gear and drive ends are not connected to each other.**

9.6 Lubricating Oil Change

Attention! **Carry out the first lubricating oil change after the first 500 hours of service.**
Carry out the oil change with the blower block at operational temperature.

See chapter 9.2. for further lubricating oil change intervals.

- ☞ Prepare an oil catchment container

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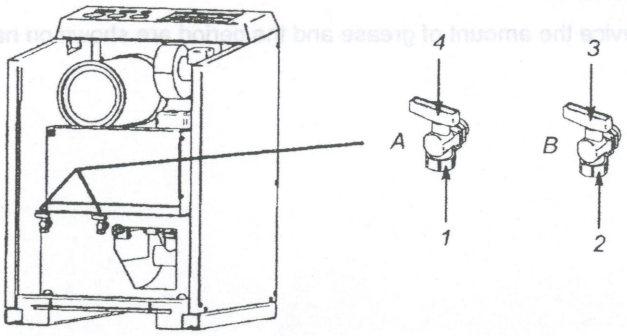
- ☞ Remove the oil filler plugs to facilitate drainage (see chapter 5.1).
- ☞ Remove the caps (1 and 2) and open the drain taps (3 and 4) and drain the oil.



1 Cap
2 Cap
3 Oil drain tap
4 Oil drain tap

A Drive-end
B Gear-end

Collect the used oil in a suitable container and dispose of according to environmental regulations!

- ☞ Fill up with new lubricating oil to the middle of the oil level sight glass (see chapter 9.5). Use only the lubricating oil detailed in the oil recommendations (see chapter 1.6).
- ☞ Allow the drain taps to remain open until oil flow out (drain line vented).
- ☞ Check the oil level and top up as necessary.
- ☞ Close the drain taps and replace the caps.
- ☞ Replace the filler plugs.
- ☞ Check for leaks.

9.7 Cleaning the Blower Package

- ☞ Regularly clean the surfaces of the blower and drive motor and keep free of dirt and contamination.

Attention! **Layers of dirt inhibit heat dissipation and damage may occur through overheating.**

9.8 Air filter changing

The air filter should be changed every 2500 operating hours or when indicated by the filter monitor.

Switch off and lock out the mains isolating switch to prevent accidental or unauthorised switch-on.

- ☞ Remove the inlet silencer cover
- ☞ Remove the Velcro securing band and take out the old air filter
- ☞ Place the new filter on the perforated inlet port and secure with Velcro band
- ☞ Replace and secure the inlet silencer cover.

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9.9 Greasing the Electric Motor

The maximum maintenance-free period of permanently greased motors is at least 10 000 service hours but 4 years maximum.

On motors with a greasing device the amount of grease and the period are shown on name-plate on the motor.

11.2 Maintenance Schedule

Rotary blower package, Modell:

Part No: **Serial No:**

Date	Description of work	Service hours	Signature

11.3 Safety information concerning contamination of compressors, blowers, vacuum pumps and components

Application and purpose

Every company is responsible for the health and safety of its employees. This extends to personnel who carry out servicing work at the company's premises or at the site of the user.

The attached declaration is intended to inform the service contractor of any possible contamination to be found in compressors, blowers, vacuum pumps or components sent to him for servicing. Based on this information, the service contractor can instigate the necessary protective measures when carrying out the service work.

Preparation for shipment

Before shipping the item(s), the sender should fill out and sign the attached Declaration of Contamination form (one for each item) and attach a copy to the shipping documents and a copy on the outside of the packaging.

Please note the following shipping regulations:

- drain all operating fluids
- remove filter elements
- make all openings airtight
- pack correctly
- ship in suitable container
- fix a copy of the Declaration of Contamination to the **outside** of the packaging

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KAESER KOMPRESSOREN

Installation instructions

Transportable sound enclosure for rotary blower packages

BB 68 C pr
BB 88 C pr

Part no.: 882263.00030

Manufacturer:

KAESER KOMPRESSOREN GmbH

96410 Coburg • PO Box 2143 • GERMANY • Tel. +49–9561–6400 • Fax +49–9561–640130

http:// www.kaeser.com

14.11.1

Edition: 02/01

Contents

1 Scope of Delivery

The sound enclosure is supplied already fitted to the blower.

2 Technical Specification

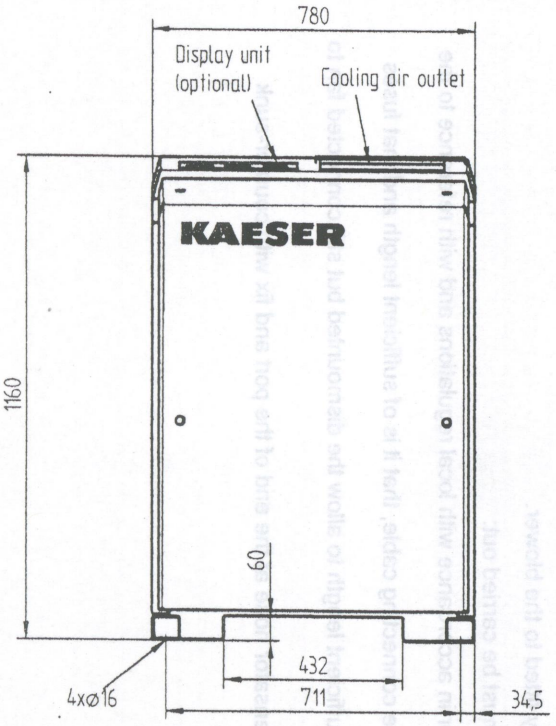
Dimensions:	L x W x H 1325 x 1130 x 1450
Weight:	~ 120 kg
Sound reduction:	~ 18 - 20 dB
Fan power supply:	see 7

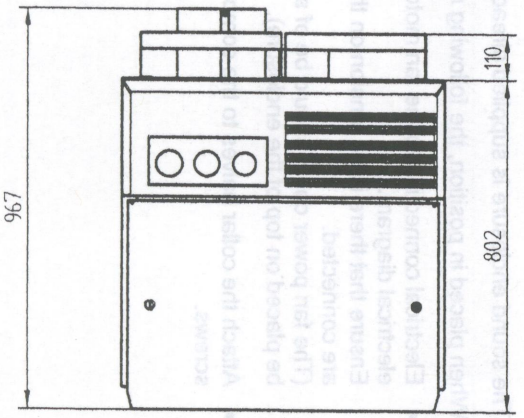
2.1 Dimensional drawing

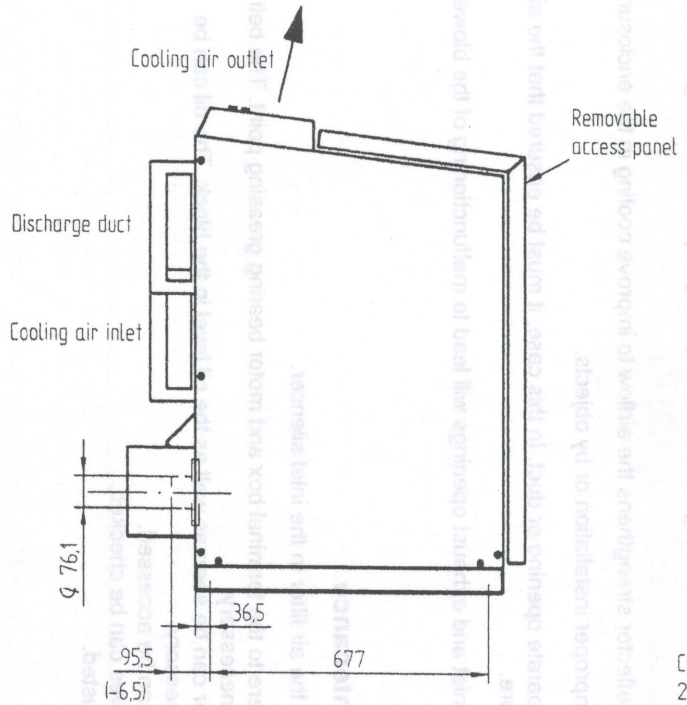
(see following page)

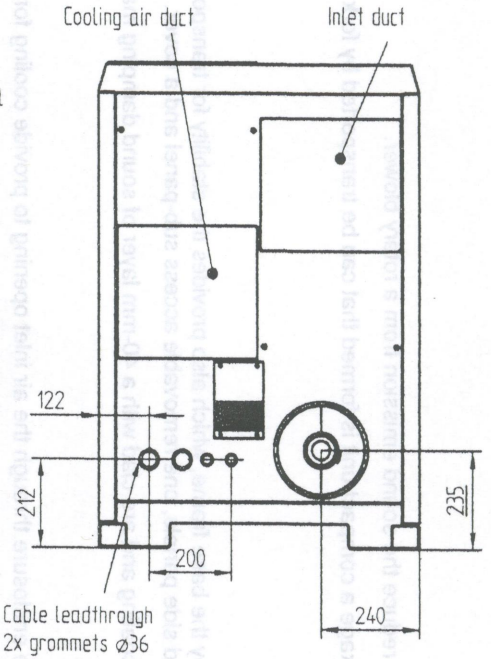
14.11.2

Entwicklungsbedingte Änderungen vorbehalten. Zeichnung darf nur über CAD geändert werden.









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