Helical-worm gear units

- Bush with bearings on both ends → (1).

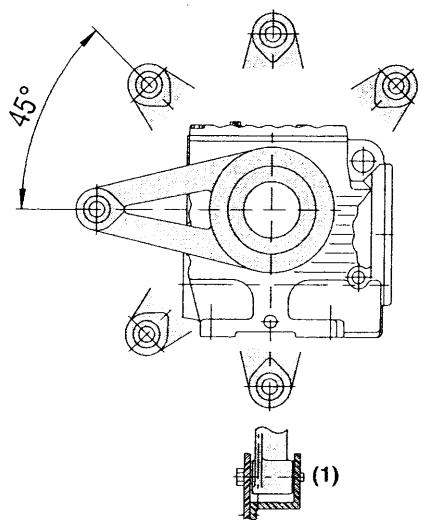


Figure 10: Torque arm for helical-worm gear units

Gear unit	Bolts	Tightening torque
SA37	M6 × 16 – 8.8	11 Nm
SA47	M8 × 20 – 8.8	25 Nm
SA57	M8 × 20 – 8.8	25 Nm
SA67	M12 × 25 – 8.8	86 Nm
SA77	M12 × 35 – 8.8	86 Nm
SA87	M16 × 35 – 8.8	210 Nm
SA97	M16 × 35 – 8.8	210 Nm

SPIROPLAN® W gear units

- Bush with bearings on both ends → (1)

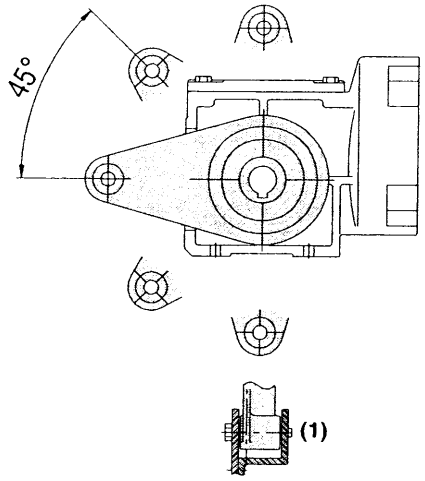


Figure 11: Torque arm for SPIROPLAN® W gear units

Gear unit	Bolts	Tightening torque
WA10	M6 × 16	11 Nm
WA20	M6 × 16	11 Nm
WA30	M6 × 16	11 Nm

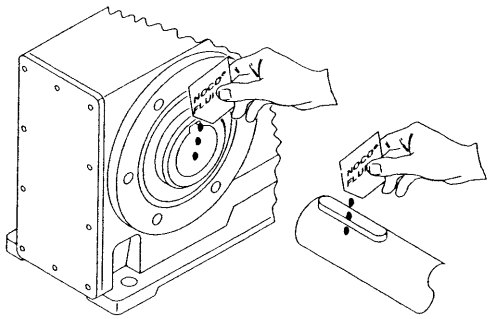
9.2

4.6 *Mounted gear unit with keyway or splined hollow shaft*

For the configuration of customer shafts, please also refer to the design notes in the Gearmotors catalog!

Installation notes

1. Apply NOCO® fluid.



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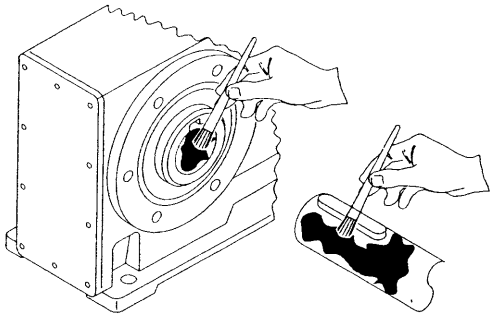
2. Distribute the NOCO® fluid carefully.



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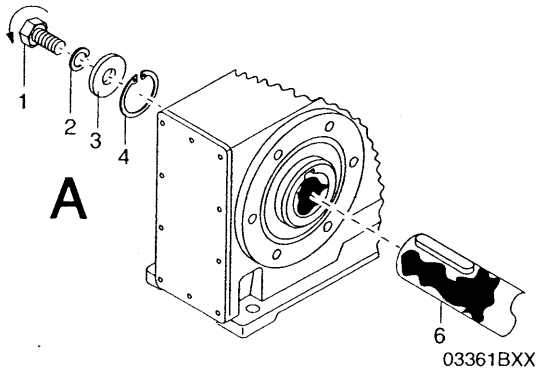
3. Install the shaft and secure it axially
   (mounting is facilitated by using a mounting device)
   3A: Mounting with standard scope of delivery



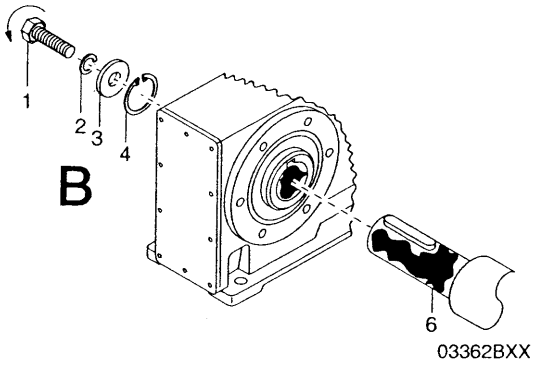
03361BXX

1 Short retaining bolt (standard scope of delivery)
2 Lock washer
3 Washer
4 Circlip
6 Customer shaft

9.2

3B: Assembly with SEW-EURODRIVE assembly/disassembly kit (→ page 26)

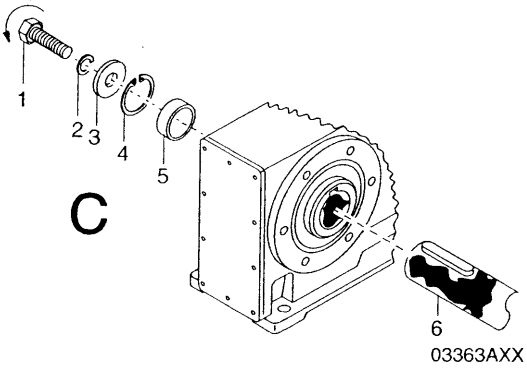
– Customer's shaft **with** contact shoulder



1 Retaining bolt
2 Lock washer
3 Washer
4 Circlip
6 Customer's shaft with contact shoulder

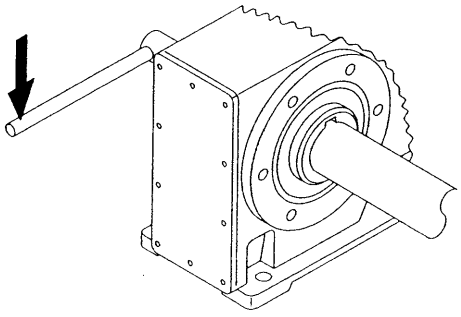
3C: Assembly with SEW-EURODRIVE assembly/disassembly kit (→ page 26)

– Customer's shaft **without** contact shoulder



1 Retaining bolt
2 Lock washer
3 Washer
4 Circlip
5 Spacer
6 Customer's shaft without contact shoulder

4. Tighten the retaining bolt to the appropriate torque (see table).



Bolt	Tightening torque [Nm]
M5	5
M6	8
M10/12	20
M16	40
M20	80
M24	200

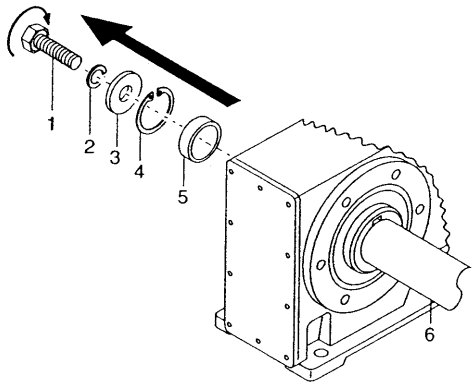
Note:

To avoid contact corrosion, we recommend that the customer's shaft should additionally be recessed between the two contact surfaces!

Removal notes

This description is only applicable when the gear unit was assembled using the installation/removal kit from SEW-EURODRIVE(→ page 26) (see the previous description, point 3B or 3C).

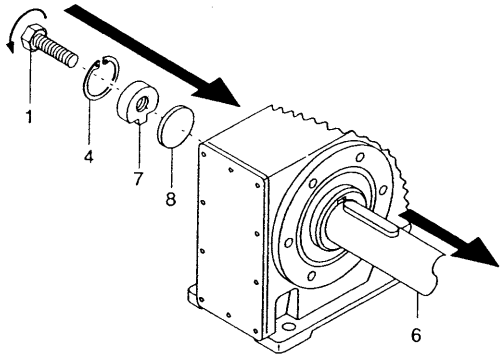
1. Loosen the retaining bolt [1].
2. Remove parts 2 to 4 and, if fitted, spacer 5.



1 Retaining bolt
2 Lock washer
3 Washer
4 Circlip
5 Spacer
6 Customer shaft

03366AXX

3. Insert the forcing washer [8] and the fixed nut [7] from the SEW-EURODRIVE installation/removal kit between the customer's shaft [6] and the circlip [4].
4. Re-insert the circlip [4].
5. Screw the retaining bolt [1] back in. Now you can force the gear unit off the shaft by tightening the bolt.



1 Retaining bolt
4 Circlip
6 Customer shaft
7 Fixed nut
8 Forcing washer

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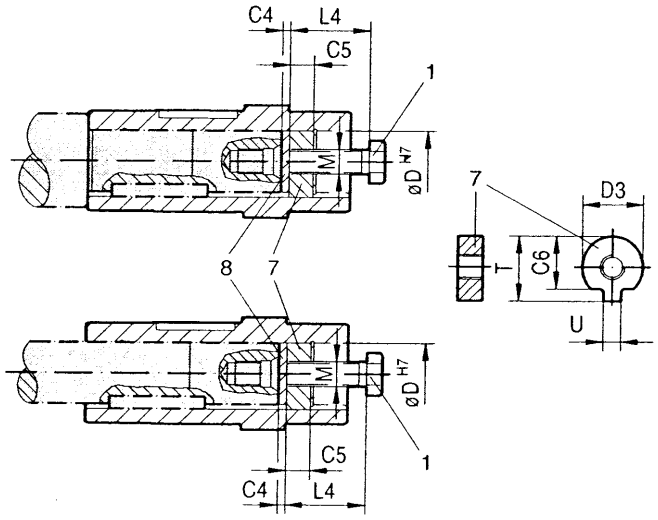
9.2

SEW installation/removal kit

The SEW-EURODRIVE installation/removal kit can be ordered under the following part number.



03394AXX

Figure 12: SEW-EURODRIVE installation/removal kit

1 Retaining bolt
7 Fixed nut for disassembly
8 Forcing washer

Type	D^{H7} [mm]	M[1)]	C4 [mm]	C5 [mm]	C6 [mm]	$U^{-0.5}$ [mm]	$T^{-0.5}$ [mm]	$D3^{-0.5}$ [mm]	L4 [mm]	Part number of installation/removal kit
WA..10	16	M5	5	5	12	4.5	18	15.7	50	643 712 5
WA..20	18	M6	5	6	13.5	5.5	20.5	17.7	25	643,682 X
WA..20, WA..30, SA..37	20	M6	5	6	15.5	5.5	22.5	19.7	25	643 683 8
FA..27, SA..47	25	M10	5	10	20	7.5	28	24.7	35	643 684 6
FA..37, KA..37, SA..47, SA..57	30	M10	5	10	25	7.5	33	29.7	35	643 685 4
FA..47, KA..47, SA..57	35	M12	5	12	29	9.5	38	34.7	45	643 686 2
FA..57, KA..57, FA..67, KA..67, SA..67	40	M16	5	12	34	11.5	41.9	39.7	50	643 687 0
SA..67	45	M16	5	12	38.5	13.5	48.5	44.7	50	643 688 9
FA..77, KA..77, SA..77	50	M16	5	12	43.5	13.5	53.5	49.7	50	643 689 7
FA..87, KA..87, SA..77, SA..87	60	M20	5	16	56	17.5	64	59.7	60	643 690 0
FA..97, KA..97, SA..87, SA..97	70	M20	5	16	65.5	19.5	74.5	69.7	60	643 691 9
FA..107, KA..107, SA..97	90	M24	5	20	80	24.5	95	89.7	70	643 692 7
FA..127, KA..127	100	M24	5	20	89	27.5	106	99.7	70	643 693 5
FA..157, KA..157	120	M24	5	20	107	31	127	119.7	70	643 694 3

1) Retaining bolt

The SEW assembly kit for mounting the customer shaft is a recommendation from SEW-EURODRIVE. You must always check whether this design can compensate the axial loads. In particular applications (e.g. mounting mixer shafts), a different design may have to be used to secure the shaft axially. In these cases, customers can use their own devices. However, you must ensure that these designs do not cause potential sources of combustion according to DIN EN 13463 (for example, impact sparks).

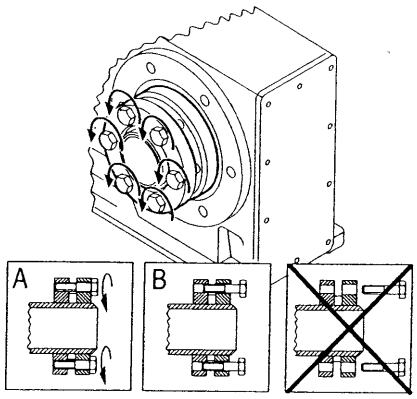
9.2

4.7 *Mounted gear units with shrink disc*

Installation notes

- Do not tighten the locking bolts unless the shaft is installed - the hollow shaft could become deformed!

1. Loosen the locking bolts by a few turns (do not unscrew them completely!).



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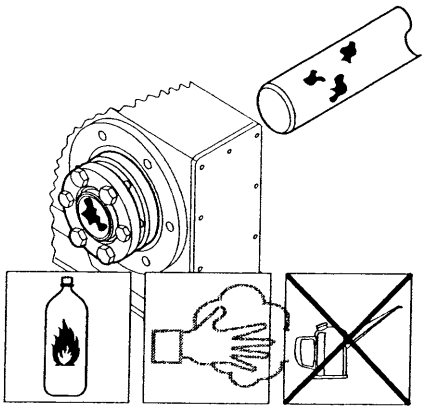
2. Carefully degrease the hollow shaft hole and the input shaft.



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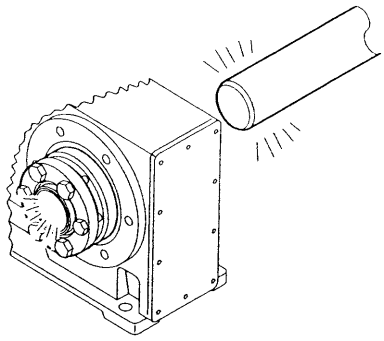
3. Hollow shaft/input shaft after degreasing



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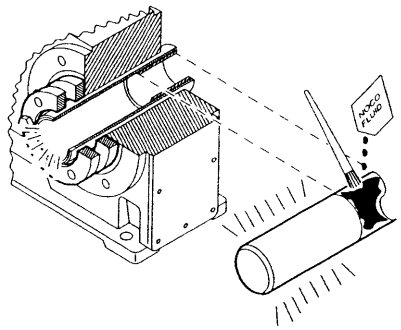
4. Apply NOCO® fluid to the input shaft[1] in the area of the bushing.



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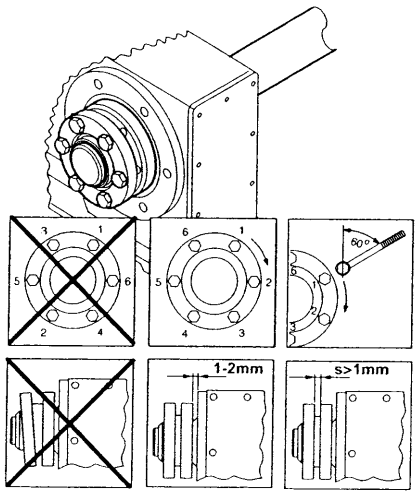
STOP

[1] **It is essential to make sure that the clamping area of the shrink disk is free from grease!**
For this reason, never apply NOCO® fluid directly to the bushing as the paste may be able to get into the clamping area of the shrink disk when the input shaft is put on.

9.2

5. Install the input shaft, making sure that the locking collars of the shrink disk are installed in parallel to each other[2]. For gear unit housing **with a shaft collar**, mount the **shrink disc to the stop on the shaft collar**. For gear unit housing **without a shaft collar**, mount the **shrink disk with a clearance of 1 to 2 mm from the gear unit housing**. Tighten the locking bolts with the torque wrench by working round several times from one bolt to the next (not in diametrically opposite sequence) until the bolts cannot be tightened any more. See the following table for tightening torques.



51096AXX

STOP

[2] **After installation**

- There must be a gap s > 1 mm between the locking collars
- Grease the outside of the hollow shaft in the area of the shrink disk to prevent corrosion.

Gear unit type			Bolt	Nm	◁ max.[1]
		SH37	M5	5	60°
KH37...77	FH37...77	SH47...77	M6	12	
KH87/97	FH87/97	SH87/97	M8	30	
KH107	FH107		M10	59	
KH127/157	FH127		M12	100	
KH167			M16	250	
KH187			M20	470	

1) Maximum tightening angle per cycle

Notes on removing the shrink disk

1. Unscrew the locking bolts evenly one after the other. Each locking bolt may only be unscrewed by about one quarter turn in the initial cycle. This is in order to avoid tilting and jamming the locking collars. Do not fully unscrew the locking bolts!
2. Remove the shaft or pull the hub off the shaft. (You must first remove any rust that may have formed between the hub and the end of the shaft.)
3. Pull the shrink disk off the hub.

Caution!

Risk of injury if the shrink disk is not removed correctly!

Cleaning and lubricating the shrink disk

There is no need to strip down and re-grease disassembled shrink disks before they are screwed back on.

The shrink disk only needs to be cleaned and re-greased if it is contaminated.

Use one of the following solid lubricants for the tapered surfaces.

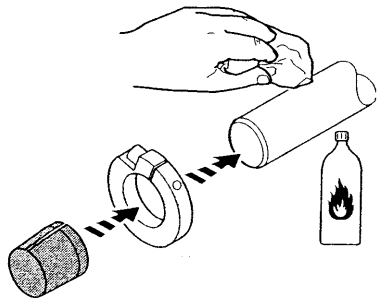
Lubricant (Mo S2)	Sold as
Molykote 321 (lube coat)	Spray
Molykote spray (powder spray)	Spray
Molykote G Rapid	Spray or paste
Aemasol MO 19P	Spray or paste
Aemasol DIO-sétral 57 N (lube coat)	Spray

Grease the locking bolts with a multipurpose grease such as Molykote BR 2 or similar.

9.2

4.8 Mounted gear units with TorqLOC®

1. Clean the inside of the hollow shaft and the customer shaft. Ensure that all traces of grease or oil are removed.
2. Install the split ring and the bushing on the customer shaft.



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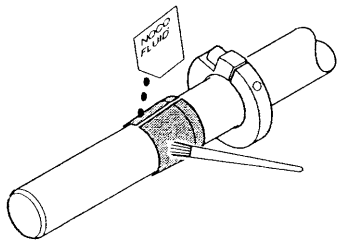
3. Apply NOCO® fluid to the bushing and distribute it carefully.



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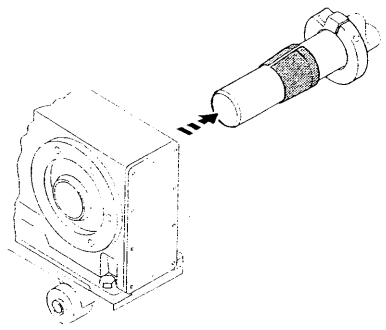
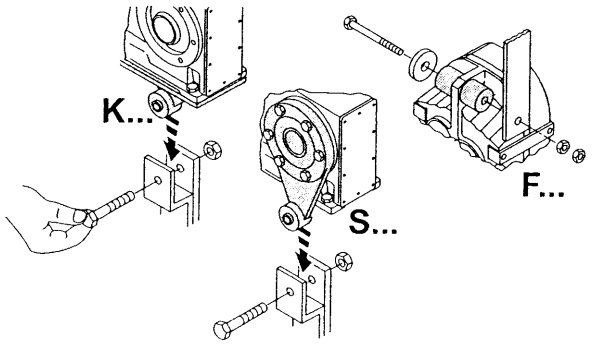
4. Push the gear unit onto the customer shaft.



52091AXX

5. Preassemble the torque arm (do not tighten the bolts).



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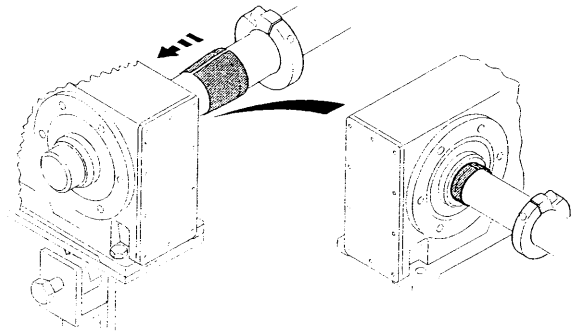
6. Push the busing onto the gear unit up to the stop.



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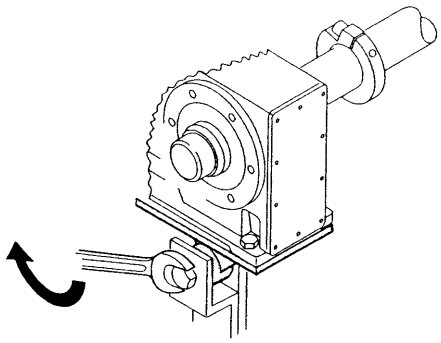
7. Tighten all the retaining bolts for the torque arm.



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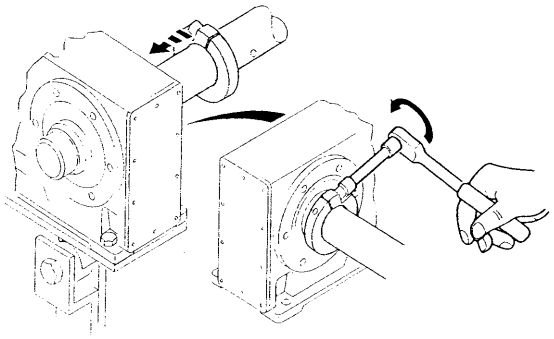
9.2

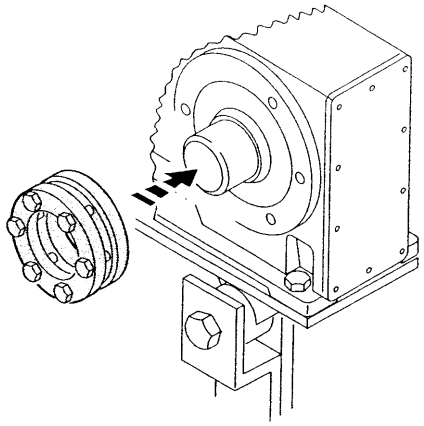
8. Secure the bushing with the split ring. Tighten the split ring on the bushing using the appropriate torque as specified in the following table.



52095AXX

Type		Torque [Nm]	
KT/FT	ST	Nickel plated	Stainless steel
-	37	18	7.5
37	47	18	7.5
47	57	18	7.5
57, 67	67	35	18
77	77	35	18
87	87	35	18
97	97	35	18

9. Slide the shrink disk onto the hollow shaft. Ensure that all bolts have been loosened.



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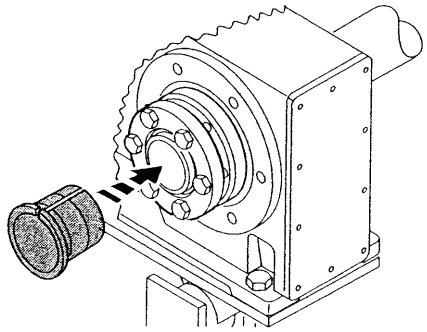
9.2

10. Push the counter bushing onto the customer shaft and into the hollow shaft or shrink disk right into the seat.



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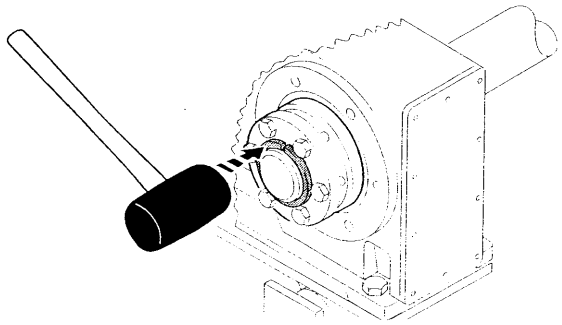
11. Tap lightly on the flange of the counter bushing to ensure that the socket is fitted securely in the hollow shaft.



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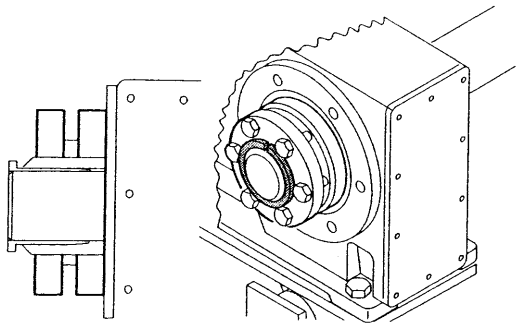
12. Ensure that the customer shaft is fitted in the counter bushing.



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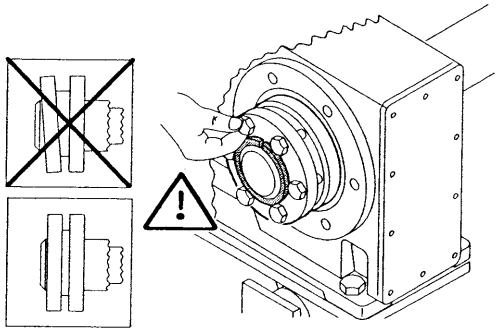
9.2

13. Tighten the bolts of the shrink disk by hand and ensure that the end rings of the shrink disc are parallel.



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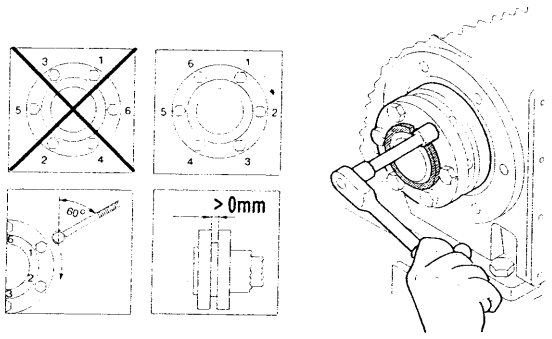
14. Tighten the locking bolts by working round several times from one bolt to the next (not in diametrically opposite sequence). See the table for tightening torques.

After installation, the remaining gap between the outer rings of the shrink discs must be > 0 mm.



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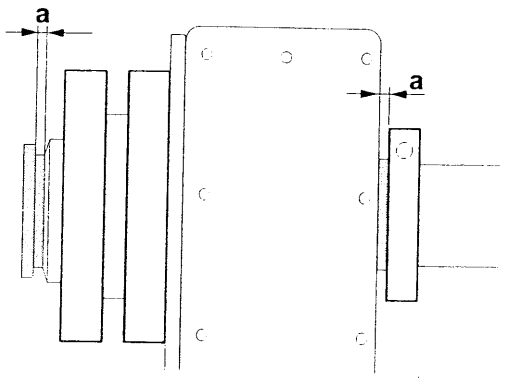
Type		Nickel plated	Stainless steel
KT/FT	ST	Torque [Nm]	
-	37	4.1	6.8
37	47	10	6.8
47	57	12	6.8
57, 67	67	12	15
77	77	30	30
87	87	30	50
97	97	30	50

9.2

15. The distance between the counter bushing and the hollow shaft end and between the split ring and the clamping ring must not exceed the following values. The following table lists the maximum and minimum gap width.



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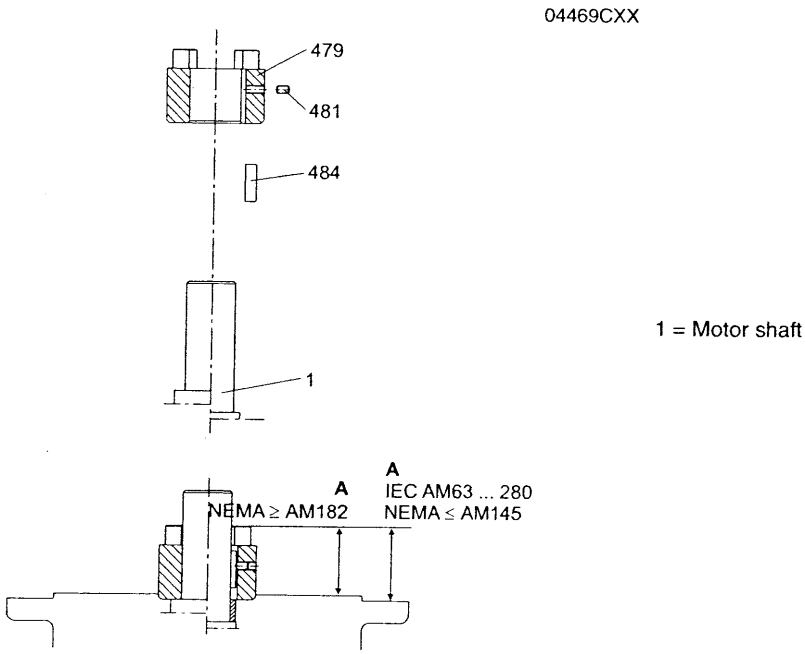
Type		Distance [mm]	
KT/FT	ST	a min.	a max.
-	37	3.3	5.6
37	47	3.3	5.6
47	57	5.0	7.6
57, 67	67	5.0	7.6
77	77	5.0	7.6
87	87	5.8	8.6
97	97	5.8	8.6

9.2

4.9 AM adapter coupling

IEC adapter AM63 225 / NEMA adapter AM56 365



1. Clean the motor shaft and flange surfaces of the motor and adapter.
2. Remove the key from the motor shaft and replace it with the supplied key (484) (not AM63 and AM250).
3. Heat the coupling half (479) to approx. 80 – 100 °C, push the coupling half onto the motor shaft.

   Until stop at motor shaft shoulder (position to point **A** except for AM25 / AM280 and NEMA).
4. Secure key and coupling half using grub screw (481) and tightening torque T_A on motor shaft according to the table.
5. Check point **A**.
6. Seal the contact surfaces between the adapter and motor using a suitable sealing compound.
7. Mount the motor on the adapter. When doing this, make sure the coupling dogs of the adapter shaft engage in the plastic spider.

IEC AM	63 / 71	80 / 90	100 / 112	132	160 / 180	200	225	250 / 280
A	24.5	31.5	41.5	54	76	78.5	93.5	139
T_A	1.5	1.5	4.8	4.8	10	17	17	17
Thread	M4	M4	M6	M6	M8	M10	M10	M10
NEMA AM	56	143 / 145	182 / 184	213 / 215	254 / 256	284 / 286	324 / 326	364 / 365
A	46	43	55	63.5	78.5	85.5	107	107
T_A	1.5	1.5	4.8	4.8	10	17	17	17
Thread	M4	M4	M6	M6	M8	M10	M10	M10

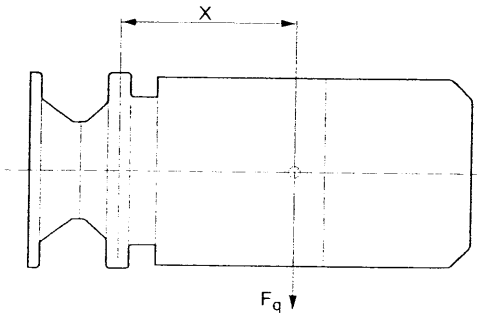
9.2

To avoid contact corrosion, we recommend applying NOCO® fluid to the motor shaft before mounting the coupling half.

When installing a motor onto the adapter, you must use an anaerobic fluid seal to ensure that moisture cannot penetrate the adapter.

Permitted loads

The load data specified in the following table must not be exceeded when a motor is mounted.



51102AXX

Adapter type			F_q [1] [N]	
IEC	NEMA	x [1] [mm]	IEC adapter	NEMA adapter
AM63/71	AM56	77	530	410
AM80/90	AM143/145	113	420	380
AM100/112	AM182/184	144	2000	1760
AM132 [2]	AM213/215 [2]	186	1600	1250
AM132..	AM213/215		4700	3690
AM160/180	AM254/286	251	4600	4340
AM200/225	AM324 - AM365	297	5600	5250
AM250/280	-	390	11200	-

1) The maximum permitted weight of the attached motor F_{qmax} must be reduced proportionally as the distance between the adapter flange and the middle of the motor (x) increases. When this distance is reduced, the maximum permitted weight F_{qmax} cannot be increased.

2) Diameter of the adapter drive flange: 160 mm

9.2

Adapter AM with backstop AM../RS

Check the direction of rotation of the drive before installation and startup. Please inform the SEW-EURODRIVE customer service if the direction of rotation is incorrect.

The backstop is maintenance-free in operation, and does not require any further maintenance work.

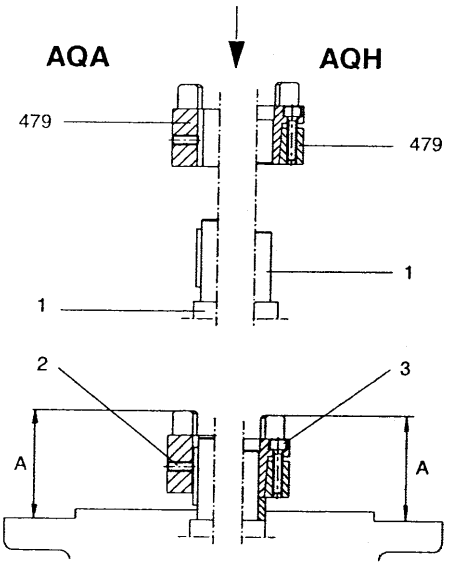
The backstops have a minimum lift-off speed depending on the size (→ following table). If the minimum lift-off speeds are violated, the backstops are subject to wear, and the resulting friction causes the temperature to increase.

Type	Maximum locking torque of backstop [Nm]	Minimum lift-off speed [1/min]
AM80/90/RS, AM143/145/RS	90	640
AM100/112/RS, AM182/184/RS	340	600
AM132/RS, AM213/215/RS	700	550
AM160/180/RS, AM254/286/RS	1200	630
AM200/225/RS, AM324-365/RS	1450	430

STOP

In rated operation, the lift-off speeds must not drop below the minimum values. The lift-off speeds are only permitted to drop below the minimum values during start-up or braking.

4.10 AQ adapter coupling



1 Motor shaft
2 Setscrew
3 Bolt

AQA = With keyway
AQH = Without keyway

53512AXX

1. Clean the motor shaft and flange surfaces of the motor and adapter.
2. **Type AQH:** Unscrew the bolts of the coupling half (479) and loosen the conical connection.
3. Heat the coupling half (80 °C – 100 °C) and push it onto the motor shaft.

   Type AQA / AQH: Up to clearance "A" (see table).
4. **Type AQH:** Tighten the bolts on the coupling half in diametrically opposite sequence

(work round several times tightening the bolts evenly one after the other) until all bolts reach the tightening torque T_A specified in the table.

Type AQA: Use a setscrew to secure the coupling half (see table).

5. Check the position of the coupling half (clearance "A", see table).

   Install motor onto the adapter making sure that the dogs of the two coupling halves engage in each other. The force that must be applied when joining the two coupling halves is dissipated after final assembly, so there is no risk of any axial load being applied to adjacent bearings.

Only for AQA, not permitted for AQH: To avoid contact corrosion, we recommend applying NOCO® fluid to the motor shaft before mounting the coupling half.

When installing a motor onto the adapter, you must use an anaerobic fluid seal to ensure that moisture cannot penetrate the adapter.

Setting dimensions, tightening torques

Type	Coupling size	Clearance "A" [mm]	Bolts DIN 912		Tightening torque T_A [Nm]	
			AQA	AQH	AQA	AQH
AQA /AQH 80 /1/2/3	19/24	44,5	M5	M4	2	3
AQA /AQH 100 /1/2		39				
AQA /AQH 100 /3/4		53				
AQA /AQH 115 /1/2		62				
AQA /AQH 115 /3	24/28	62	M5	M5	2	6
AQA /AQH 140 /1/2		62				
AQA /AQH 140 /3	28/38	74,5	M8	M5	10	6
AQA /AQH 190 /1/2		76,5				
AQA /AQH 190 /3	38/45	100	M8	M6	10	10

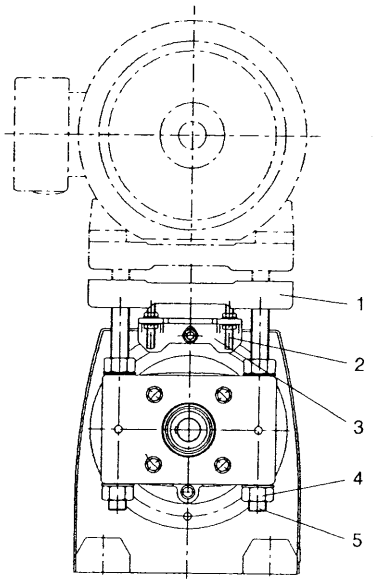
9.2

4.11 AD input shaft assembly

Please refer to Sec. "Installing input and output shafts" for information on mounting of input elements.

Cover with motor mounting platform AD../P

Mounting the motor and adjusting the motor mounting platform.



1 Motor mounting platform
2 Stud bolt (only AD6/P / AD7/P)
3 Support (only AD6/P / AD7/P)
4 Nut
5 Threaded column

03519BXX

1. Set the motor mounting platform to the required mounting position by evenly tightening the adjusting nuts. It may be necessary to remove the lifting eyebolt from helical gear units in order to achieve the lowest adjustment position. Touch up any damage to the paint work.
2. Align the motor on the motor mounting platform (shaft ends must be in alignment) and secure it.
3. Mount the input elements on the input shaft end and the motor shaft. Line them up with one another. Correct the motor position again if necessary.
4. Put on traction elements (V-belt, chain, etc.) and apply a preload by evenly adjusting the motor mounting platform. Do not stress the motor mounting platform and the columns against one another when doing this.
5. Tighten the threaded columns using the nuts which are not used for adjustment.

Only AD6/P and AD7/P:

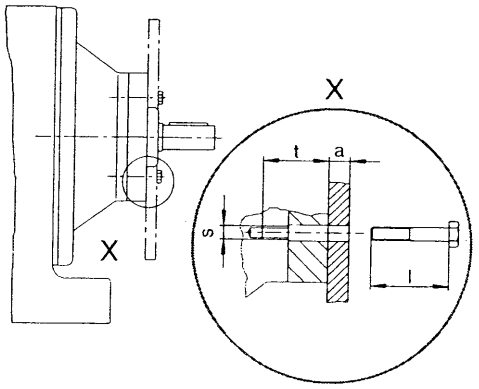
Unscrew the nuts on the stud bolts before adjustment to allow the stud bolts to move axially in the support without restriction. Do not tighten the nuts until the final adjustment position has been achieved. Do not adjust the motor mounting platform using the support.

9.2

Type with centering shoulder AD../ZR

Mounting applications on the input shaft assembly with centering shoulder.

1. Retaining bolts of a suitable length must be used to secure the application. The length l of the new bolts is calculated as follows:



02725CXX

l = t + a
t = Screw-in depth (see table)
a = Thickness of the application
s = Retaining thread (see table)

Round down the calculated bolt length to the next smaller standard length.

2. Remove the retaining bolts from the centering shoulder.
3. Clean the contact surface and the centering shoulder.
4. Clean the threads of the new bolts and apply a bolt locking compound (e.g. Loctite 243) to the first few threads.
5. Position the application against the centering shoulder and tighten the retaining bolts to the specified tightening torque T_A (see table).

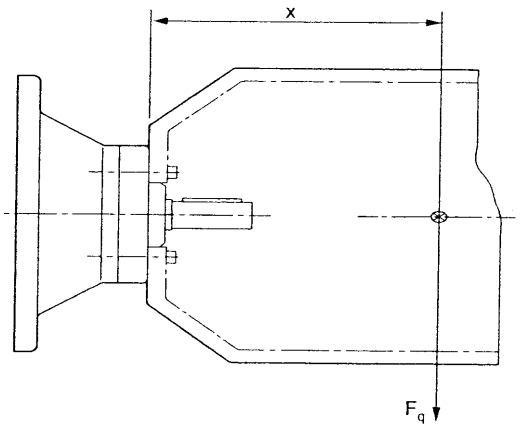
Type	Screw-in depth t [mm]	Retaining thread s	Tightening torque T_A for connection bolts in strength class 8.8 [Nm]
AD2/ZR	25,5	M8	25
AD3/ZR	31,5	M10	48
AD4/ZR	36	M12	86
AD5/ZR	44	M12	86
AD6/ZR	48,5	M16	210
AD7/ZR	49	M20	410
AD8/ZR	42	M12	86

9.2

Permitted loads

STOP

The load values specified in the following table must not be exceeded.



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Type	x[1)] [mm]	F_q[1)] [N]
AD2/ZR	193	330
AD3/ZR	274	1400
AD4/ZR[2)]	361	1120
AD4/ZR		3300
AD5/ZR	487	3200
AD6/ZR	567	3900
AD7/ZR	663	10000
AD8/ZR	516	4300

1) Maximum load values for connection bolts in strength class 8.8. The maximum permitted weight of the attached motor F_{qmax} must be reduced proportionally as the distance between the adapter flange and the middle of the motor (x) increases When this distance is reduced, the F_{qmax} cannot be increased.

2) Diameter of the adapter output flange: 160 mm

9.2

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Cover with backstop AD../RS

Check the direction of rotation of the drive before installation and startup. Please inform the SEW-EURODRIVE customer service if the direction of rotation is incorrect.

The backstop is maintenance-free in operation, and does not require any further maintenance work.

The backstops have a minimum lift-off speed depending on the size (→ following table). If the minimum lift-off speeds are violated, the backstops are subject to wear, and the resulting friction causes the temperature to increase.

Type	Maximum locking torque of backstop [Nm]	Minimum lift-off speed [1/min]
AD2/RS	90	640
AD3/RS	340	600
AD4/RS	700	550
AD5/RS	1200	630
AD6/RS	1450	430
AD7/RS	1450	430
AD8/RS	2860	430

In rated operation, the lift-off speeds must not drop below the minimum values. The lift-off speeds are only permitted to drop below the minimum values during start-up or braking.

9.2

5 Startup

Prior to startup check that the oil level is as specified for the mounting position. The oil checking and drain screws and the breather valves must be freely accessible.

5.1 Startup of helical-worm and SPIROPLAN® W gear units

Note: The direction of rotation of the output shaft in series S..7 helical-worm gear units has been changed from CW to CCW; this is different from the S..2 series. Change direction of rotation: Swap over two motor feeder cables.

Run-in period

SPIROPLAN® and helical-worm gear units require a run-in period of at least 24 hours before reaching their maximum efficiency. A separate run-in period applies for each direction of rotation if the gear unit is operated in both directions of rotation. The table shows the average power reduction during the run-in period.

No. of starts	Worm		Spiroplan®	
	Power reduction	i range	Power reduction	i range
1 start	ca. 12 %	ca. 50...280	ca. 15 %	approx. 40 ... 75
2 start	ca. 6 %	ca. 20...75	ca. 10 %	ca. 20...30
3 start	ca. 3 %	ca. 20...90	ca. 8 %	ca. 15
4 start	-	-	ca. 8 %	ca. 10
5 start	ca. 3 %	ca. 6...25	ca. 5 %	ca. 8
6 start	ca. 2 %	ca. 7...25	-	-

5.2 Startup of helical, parallel shaft helical and helical-bevel gear units

No special startup instructions are required for helical, parallel shaft helical and helical-bevel gear units providing the gear units have been installed in accordance with Sec. "Mechanical Installation".

9.2

HH

6 Inspection and Maintenance

6.1 *Inspection and maintenance intervals*

Frequency	What to do?
• Every 3000 machine hours, at least every 6 months.	• Check oil and oil level. • Check the seals visually for leakage. • For gear units with a torque arm: Check the rubber buffer and change it, if necessary
• Depending on the operating conditions (see chart below), every 3 years at the latest. • According to oil temperature.	• Change mineral oil.
	• Replace anti-friction bearing grease (recommendation). • Replace oil seal (do not install it in the same track).
• Depending on the operating conditions (see chart below), every 5 years at the latest. • According to oil temperature.	• Change synthetic oil
	• Replace anti-friction bearing grease (recommendation). • Replace oil seal (do not install it in the same track).
• Gear unitsR07, R17, R27, F27 and Spiroplan® are have lubrication for life and are therefore maintenance-free	
• Varying (depending on external factors).	• Touch up or renew the surface/anticorrosion coating.

6.2 *Lubricant change intervals*

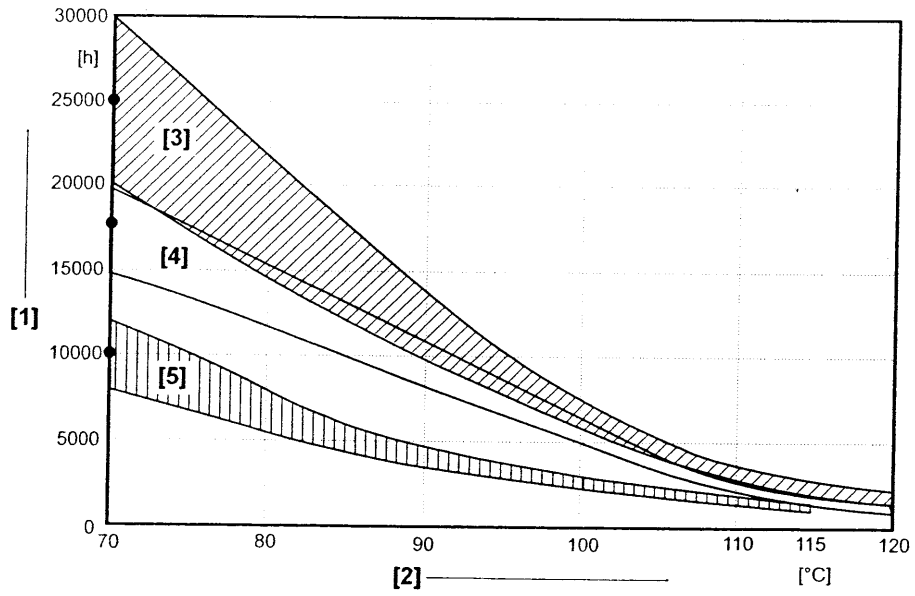

Figure 13: Oil change intervals for standard gear units under normal environmental conditions

[1] Operating hours
[2] Sustained oil bath temperature
• Average value per oil type at 70 °C
[3] CLP PG
[4] CLP HC / HCE
[5] CLP / HLP / E

9.2

6.3 *Inspection and maintenance of the gear unit*

Do not intermix synthetic lubricants and do not mix synthetic and mineral lubricants together!

The standard lubricant is mineral oil (except for Spiroplan® gear units).

The position of the oil level and oil drain plug and the breather valve depends on the mounting position. Refer to the diagrams of the mounting positions.

Checking the oil level

1. **De-energize the gearmotor and secure it to prevent it from being switched on inadvertently!**

   Wait until the gear unit has cooled off – Danger of burns!
2. Refer to Sec. "Installing the gear unit" when changing the mounting position!
3. For gear units with an oil level plug: Remove the oil level plug, check the fill level and correct it if necessary. Screw the oil level plug back in.

Checking the oil

1. **De-energize the gearmotor and secure it to prevent it from being switched on inadvertently!**

   Wait until the gear unit has cooled off – Danger of burns!
2. Remove a little oil from the oil drain plug.
3. Check the oil consistency.
   - Viscosity
   - If you can see that the oil is heavily contaminated, we recommend that you change the oil even if this is outside the service intervals specified in "Inspection and maintenance periods".
4. For gear units with an oil level plug: Remove the oil level plug, check the fill level and correct it if necessary. Screw the oil level plug back in.

Changing the oil

Only change the oil when the gear unit is at operating temperature.

De-energize the gearmotor and secure it to prevent it from being switched back on inadvertently!

Wait until the gear unit cools down - Danger of burns!

Note: The gear unit must still be warm otherwise the high viscosity of excessively cold oil will make it harder to drain the oil correctly.

With oil drain plug / oil level screw

1. Place a container underneath the oil drain plug
2. Remove the oil level plug, breather plug/breather valve and oil drain plug.
3. Drain all the oil.
4. Screw in the oil drain plug.
5. Pour in new oil of the same type through the vent hole (if changing the oil type, please first contact our customer service). Do not mix synthetic lubricants.
   - Pour in the volume of oil in accordance with the mounting position (see Sec. "Lubricant fill quantities") or as specified on the nameplate.
   - Check at the oil level plug.
6. Screw the oil level plug back in
7. Screw in the breather plug/breather valve.

9.2

Without oil drain plug / oil level plug

1. Remove cover plate.
2. Drain the oil through the cover plate opening.
3. Pour in new oil of the same type through the vent hole (if changing the oil type, please first contact our customer service). Do not mix synthetic lubricants.
   - Pour in the volume of oil in accordance with the mounting position (see Sec. "Lubricant fill quantities") or as specified on the nameplate.
4. Check the oil level (→ Sec. "Check oil level for gear units with oil level plug")
5. Attach cover plate (observe the tightening torque and series → Sec. "Check the oil level for gear units without an oil level plug")

Changing the oil seal

1. **De-energize the gearmotor and secure it to prevent it from being switched on inadvertently!**

   Wait until the gear unit has cooled off – Danger of burns!
2. When changing the oil seal, ensure that there is a sufficient grease reservoir between the dust lip and protective lip, depending on the type of gear unit.
3. If you use double oil seals, the space has to be filled one-third with grease.

6.4 Inspection / maintenance of AM / AQA adapters

Frequency	What to do?
• Every 3000 machine hours, at least every 6 months	• Check torsional play • Visually check the elastic annular gear • Check the adapter visually for leakage
• After 25000 - 30000 machine hours	• Renew the anti-friction bearing grease • Replace oil seal (do not install it in the same track) • Change the elastic annular gear.

6.5 Inspection / maintenance of AD adapters

Frequency	What to do?
• Every 3000 machine hours, at least every 6 months	• Check running noise for possible bearing damage • Check the adapter visually for leakage
• After 25000 - 30000 machine hours	• Renew the anti-friction bearing grease
	• Change the oil seal

9.2

7 Malfunctions

Customer service

Please have the following information to hand if you require the assistance of our customer service:
- Data from the nameplate (complete)
- Nature and extent of the fault
- Time and peripheral circumstances of the fault
- Presumed cause

7.1 Gear unit malfunctions

Problem	Possible cause	Remedy
Unusual, regular running noise	A Meshing/grinding noise: Bearing damage. B Knocking noise: Irregularity in the gearing	A Check the oil (see Sec. "Inspection and Maintenance"), change bearings B Contact customer service
Unusual, irregular running noise	Foreign bodies in the oil	• Check the oil (see Sec. "Inspection and Maintenance") • Stop the drive, contact customer service
Oil leaking[1)] • From the gear cover plate • From the motor flange • From the motor oil seal • From the gear unit flange • From the output end oil seal	A Rubber seal on the gear cover plate leaking B Seal defective C Gear unit not vented	A Tighten the bolts on the gear cover plate and observe the gear unit. Oil still leaking: Contact customer service B Contact customer service C Vent the gear unit (see Sec. "Mounting Positions")
Oil leaking from breather valve	A Too much oil B Drive operated in incorrect mounting position C Frequent cold starts (oil foams) and/or high oil level	A Correct the oil level (see Sec. "Inspection and Maintenance") B Mount the breather valve correctly (see Sec. "Mounting Positions") and correct the oil level (see "Lubricants")
Output shaft does not turn although the motor is running or the input shaft is rotated	Connection between shaft and hub in gear unit interrupted	Send in the gear unit/gearmotor for repair

1) Short-term oil/grease leakage at the oil seal is possible in the run-in phase (24 hours running time).

7.2 AM / AQA / AL adapter malfunctions

Problem	Possible cause	Remedy
Unusual, regular running noise	Meshing/grinding noise: Bearing damage	Contact SEW-EURODRIVE customer service
Oil leaking	Seal defective	Contact SEW-EURODRIVE customer service
Output shaft does not turn although the motor is running or the input shaft is rotated	Connection between shaft and hub in gear unit interrupted	Send the gear unit to SEW-EURODRIVE for repair.
Change in running noise and / or vibrations occur	A Annular gear wear, short-term torque transfer through metal contact B Bolts to secure hub axially are loose.	A Change the annular gear B Tighten the bolts
Premature wear in annular gear	A Contact with aggressive fluids / oil; ozone influence; too high ambient temperatures etc, which can cause a change in the physical properties of the annular gear. B Impermissibly high ambient/contact temperature for the annular gear; maximum permitted temperature –20 °C to +80 °C. C Overload	Contact SEW-EURODRIVE customer service

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7.3 AD input shaft assembly malfunctions

Problem	Possible cause	Remedy
Unusual, regular running noise	Meshing/grinding noise: Bearing damage.	Contact SEW-EURODRIVE customer service
Oil leaking	Seal defective	Contact SEW-EURODRIVE customer service
Output shaft does not turn although the input shaft is rotated.	Connection between shaft and hub in gear unit or cover interrupted	Send the gear unit to SEW-EURODRIVE for repair.

9.2

8 Mounting Positions

8.1 General information on mounting positions

Mounting position designation

SEW differentiates between six mounting positions M1 ... M6 for gear units. The following figure shows the spatial orientation of the gearmotor in mounting positions M1 ... M6.

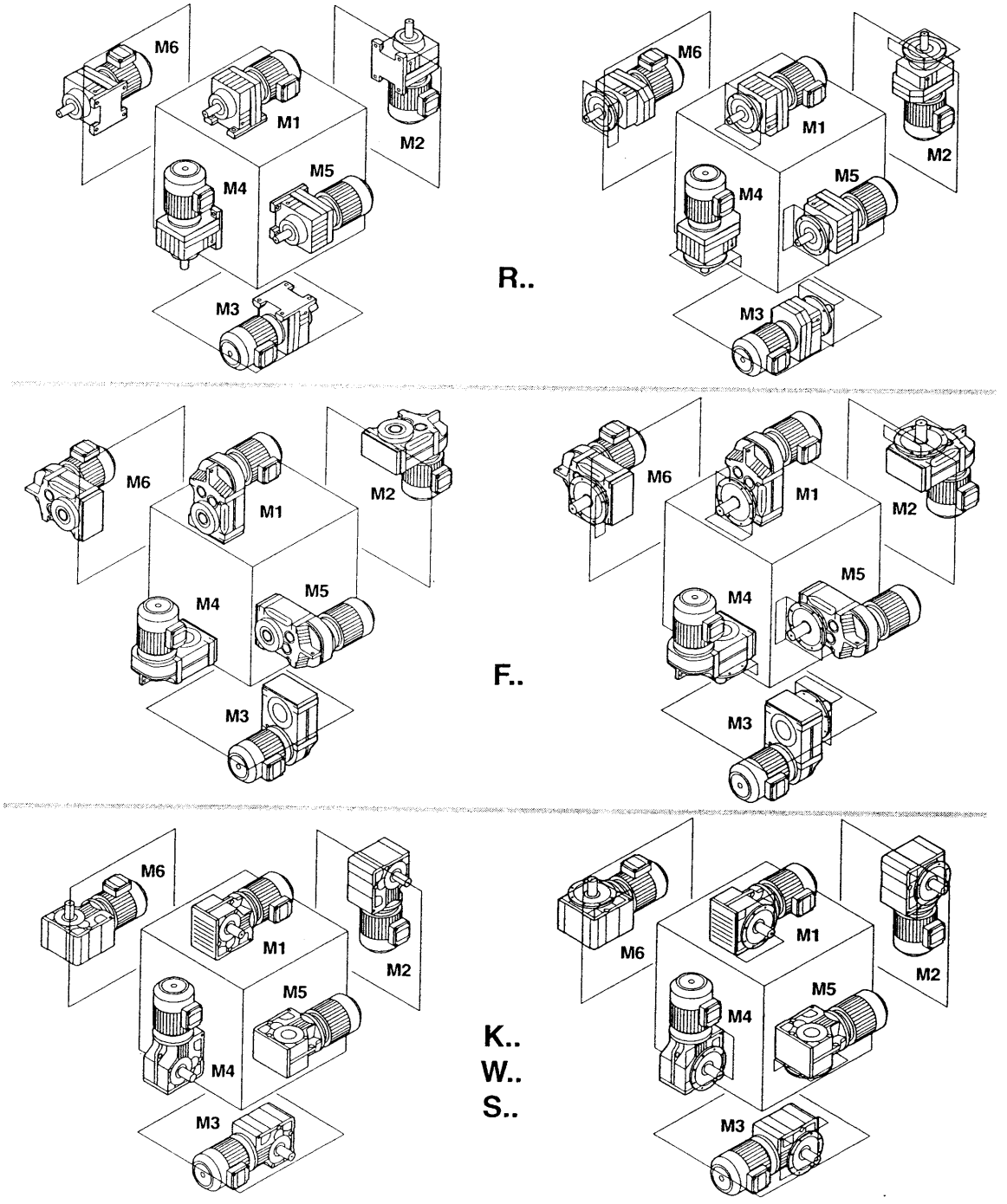

Figure 14: Depiction of mounting positions M1 ... M6

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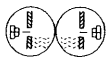
8.2 Key to the mounting position sheets

SPIROPLAN® gearmotors do not depend on any particular mounting position. However, mounting positions M1 to M6 are also shown for SPIROPLAN® gearmotors to assist you in working with this documentation.

Important: SPIROPLAN® gearmotors cannot be equipped with breather valves, oil level plugs or drain plugs.

Symbols used

The following table shows the symbols used in the mounting position sheets and what they mean:

Symbol	Meaning
	Breather valve
	Oil level plug
	Oil drain plug

Churning losses

Increased churning losses may arise in some mounting positions. Contact SEW-EURODRIVE in case of the following combinations:

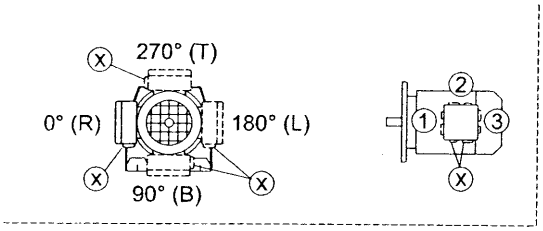
Mounting position	Gear unit type	Gear unit size	Input speed [1/min]
M2, M4	R	97 ... 107	> 2500
		> 107	>1500
M2, M3, M4, M5, M6	F	97 ... 107	> 2500
		> 107	> 1500
	K	77 ... 107	> 2500
		> 107	> 1500
	S	77 ... 97	> 2500

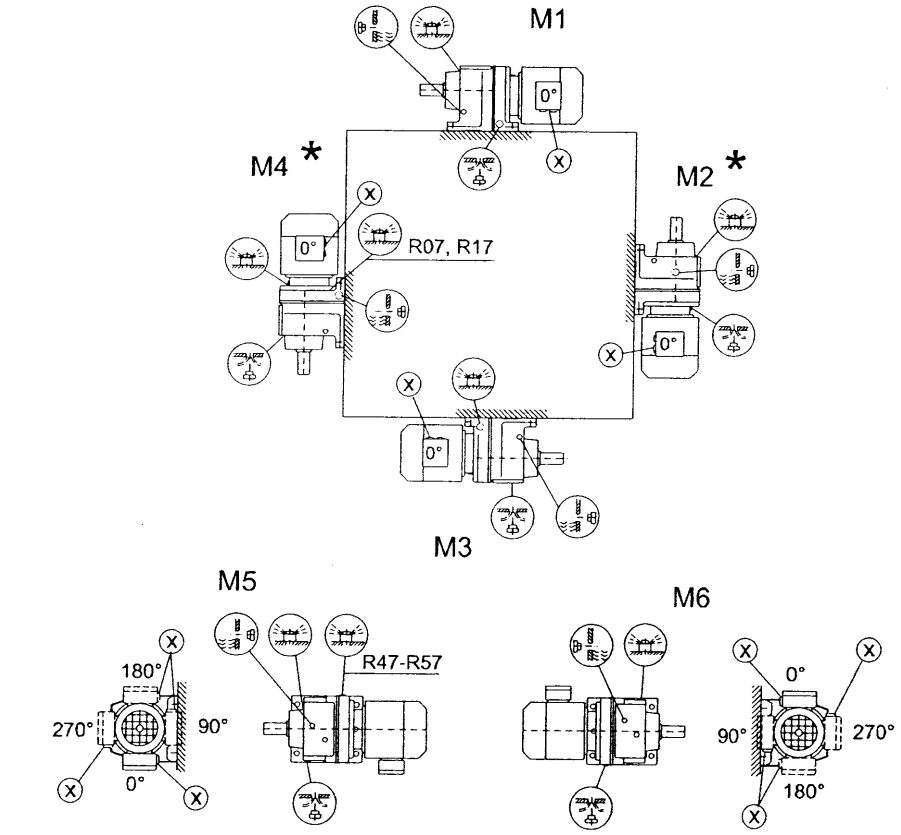
9.2

8.3 Mounting positions for R helical gearmotors

R07-R167

04 040 200





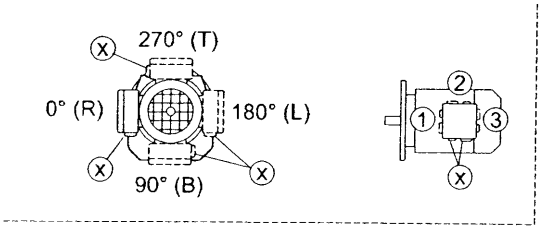
R07		M1, M2 , M3 , M5 , M6
R17, R27		M1, M3 , M5 , M6
R07, R17, R27		
R47, R57		M5

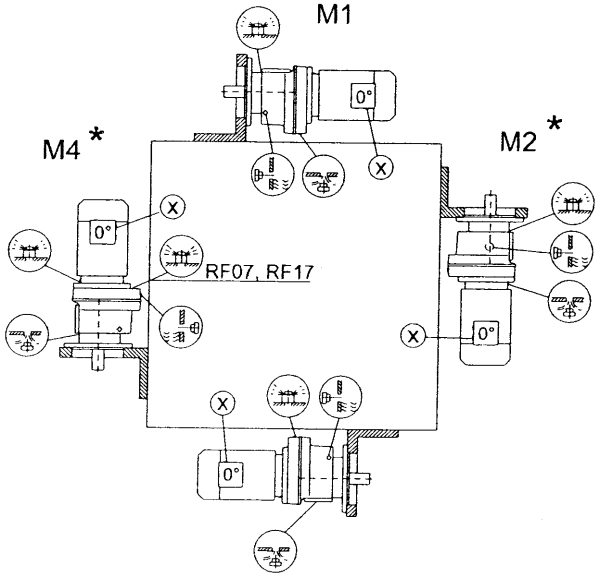
* → page 51

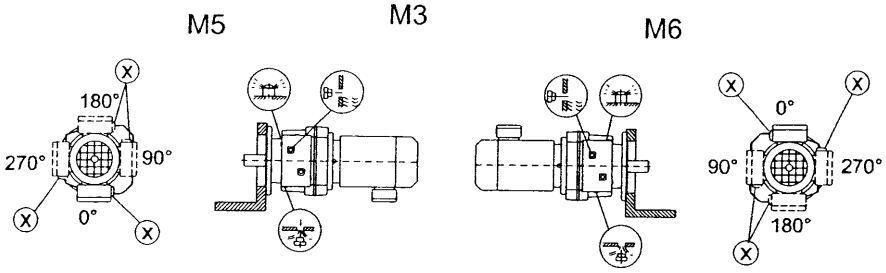
9.2

RF07-RF167

04 041 200







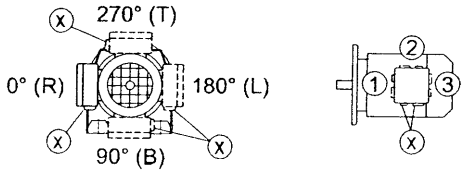
RF07		M1, M2 , M3 , M5 , M6
RF17, RF27		M1, M3 , M5 , M6
RF07, RF17, RF27		
RF47, RF57		M5

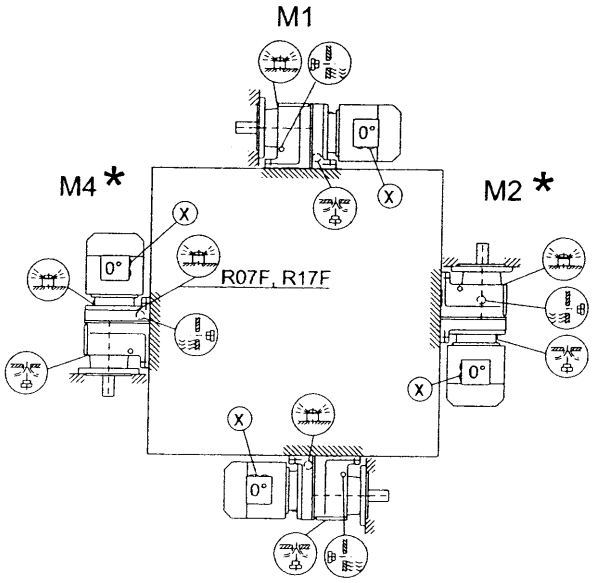
* → page 51

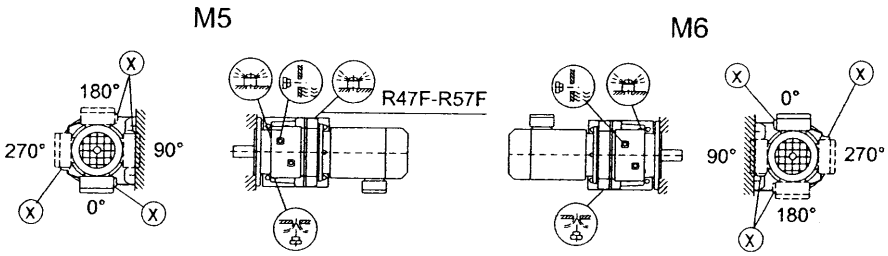
9.2

R07F-R87F

04 042 200







R07F		M1, M2 , M3 , M5 , M6
R17F, R27F		M1, M3 , M5 , M6
R07F, R17F, R27F		
R47F, R57F		M5

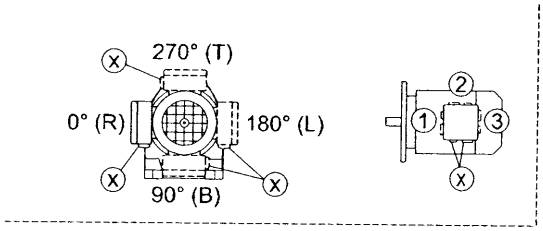
* → page 51

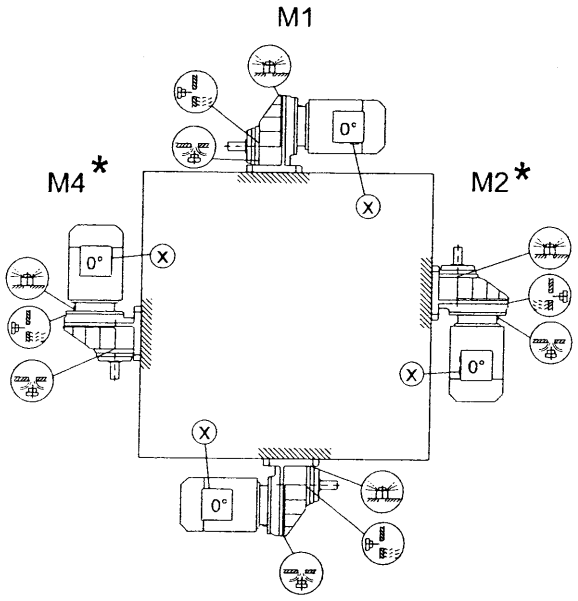
Important: See the (i) information in the "Gearmotors" catalog, section "Project Planning for Gear Units/Overhung and axial loads."

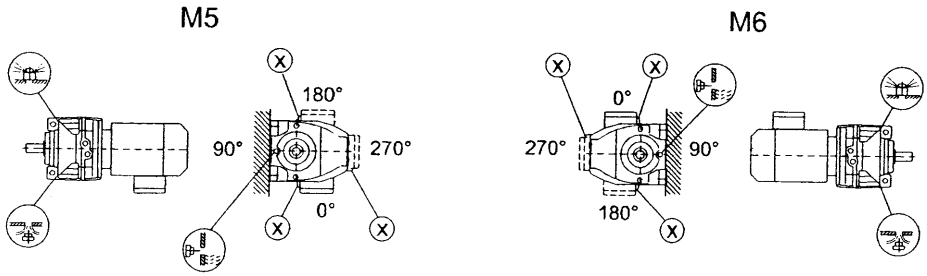
8.4 Mounting positions of RX helical gearmotors

RX57-RX107

04 043 200





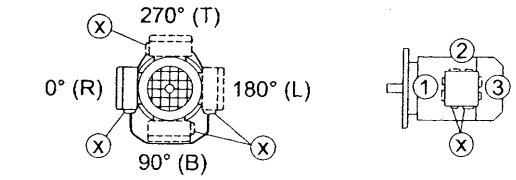


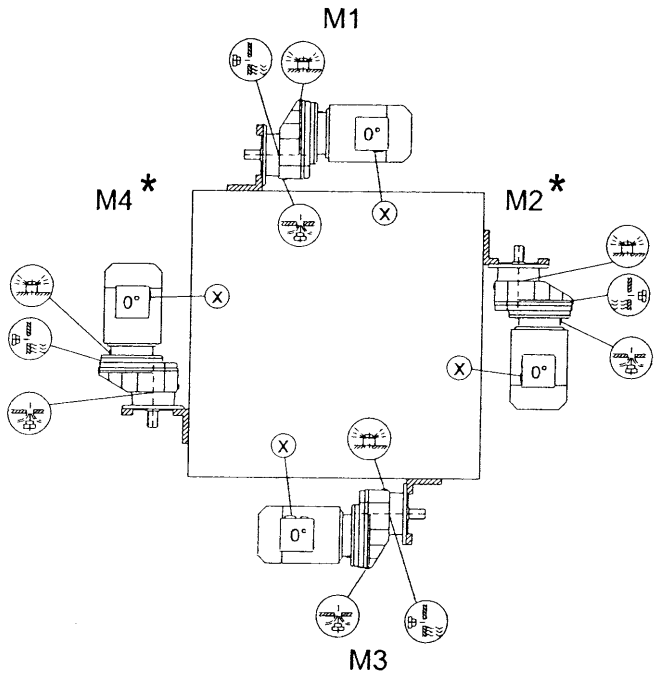
* → page 51

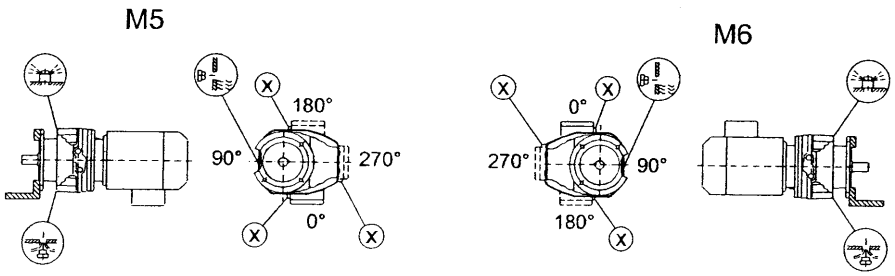
9.2

RXF57 - RXF107

04 044 200







* → page 51

9.2

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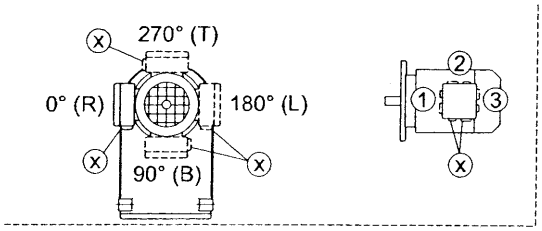
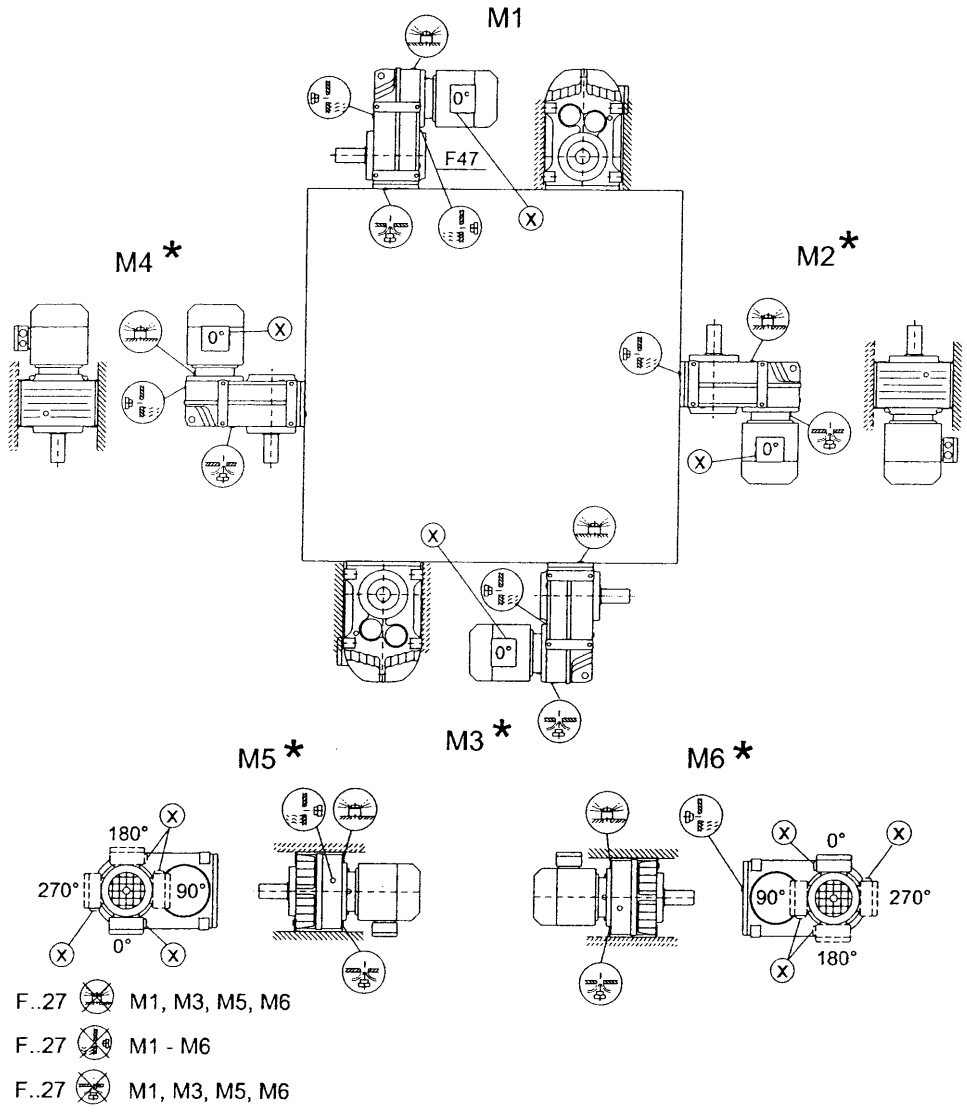
8.5 Mounting positions for parallel shaft helical gearmotors

F/FA..B/FH27B-157B, FV27B-107B

42 042 200





F..27 M1, M3, M5, M6

F..27 M1 - M6

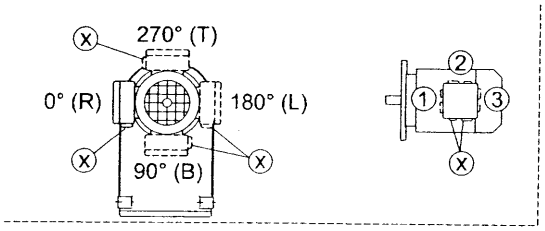
F..27 M1, M3, M5, M6

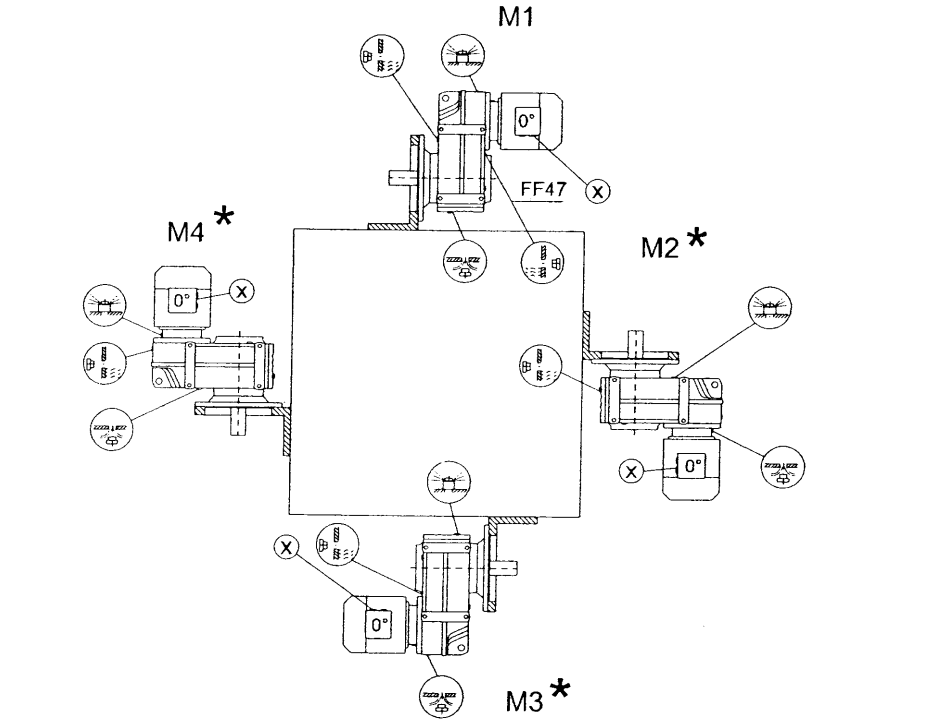
* → page 51

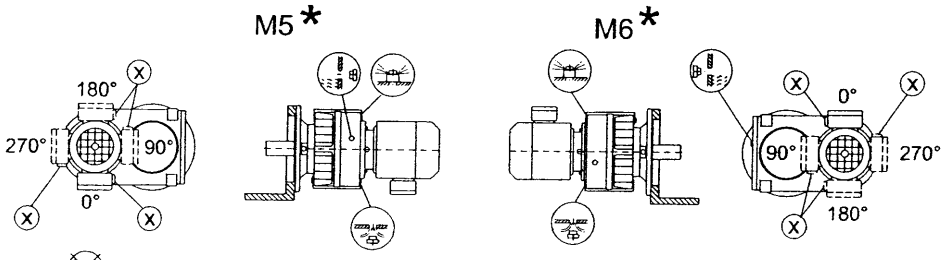
9.2

FF/FAF/FHF/FAZ/FHZ27-157, FVF/FVZ27-107

42 043 200







F..27 M1, M3, M5, M6

F..27 M1 - M6

F..27 M1, M3, M5, M6

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9.2

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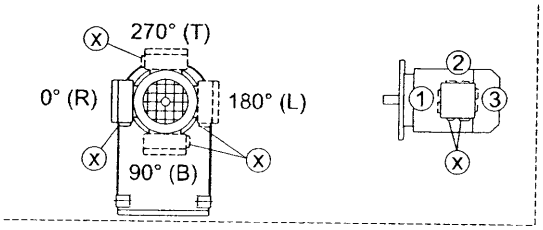
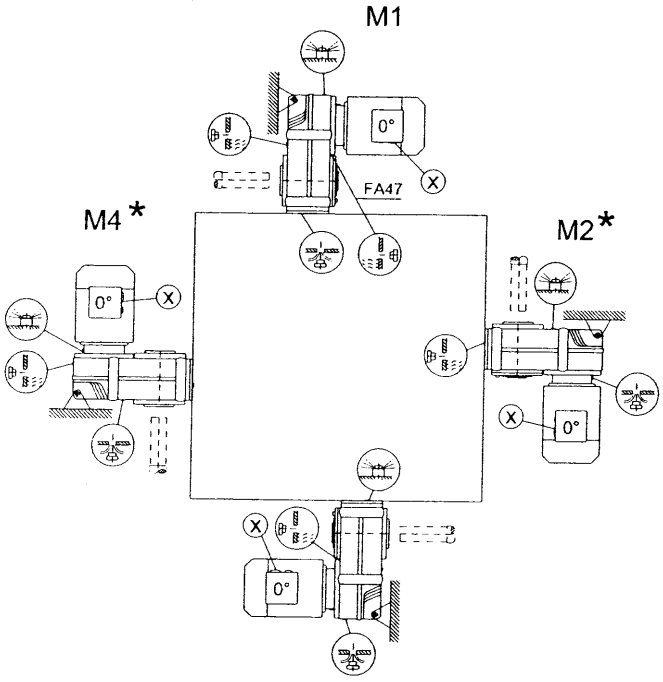
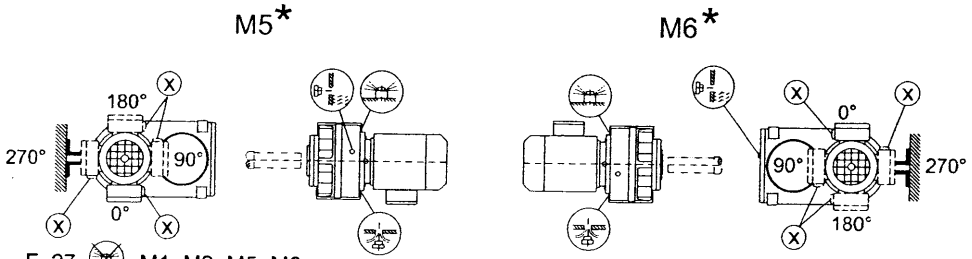
FA/FH27-157, FV27-107, FT37-97



42 044 200





F..27 M1, M3, M5, M6

F..27 M1 - M6

F..27 M1, M3, M5, M6

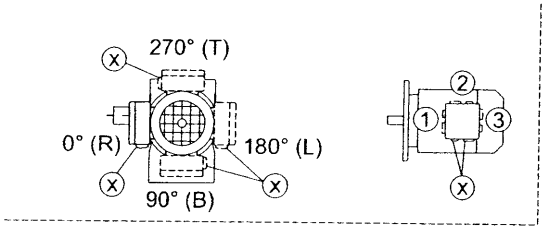
* → page 51

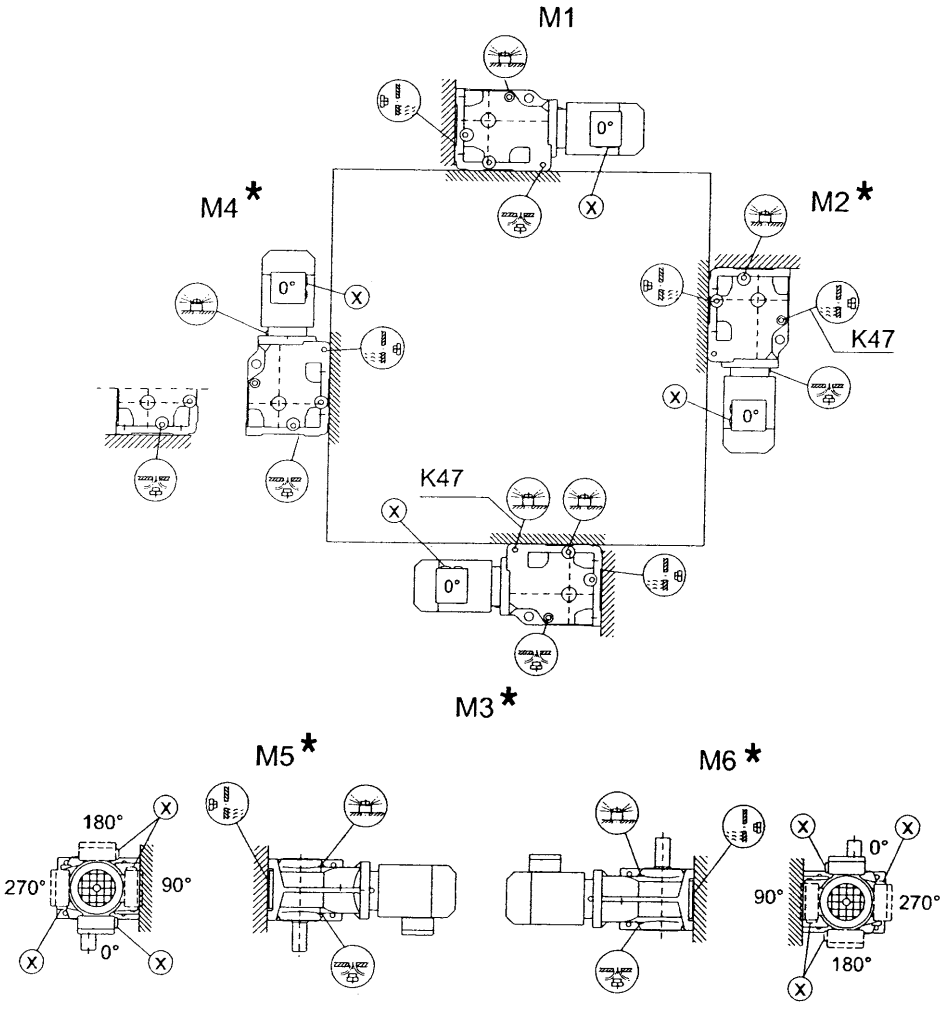
9.2

8.6 Mounting positions for helical-bevel gearmotors

K/KA..B/KH37B-157B, KV37B-107B

34 025 200





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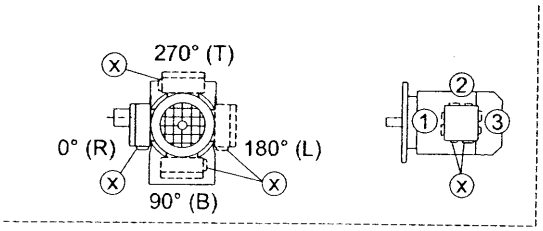
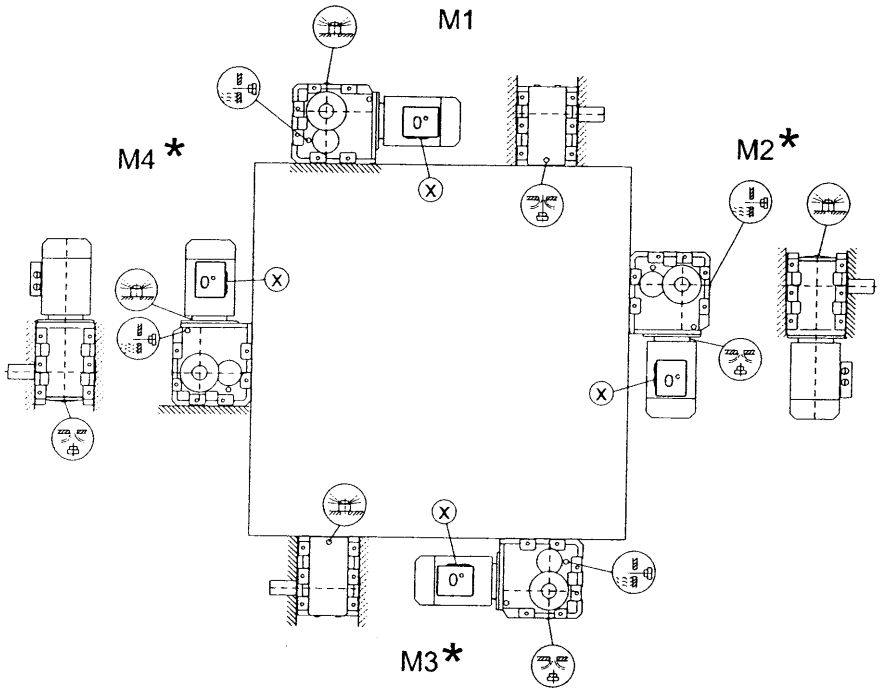
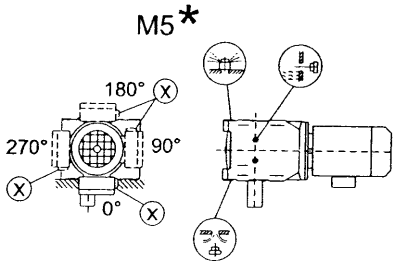
Important: See the (i) information in the "Gearmotors" catalog, section "Project Planning for Gear Units/Overhung and axial loads."

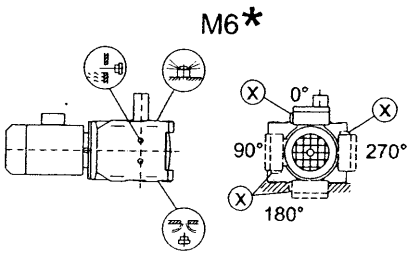
K167-187, KH167B-187B

34 026 200









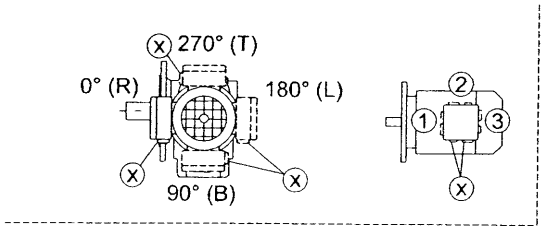
* → page 51

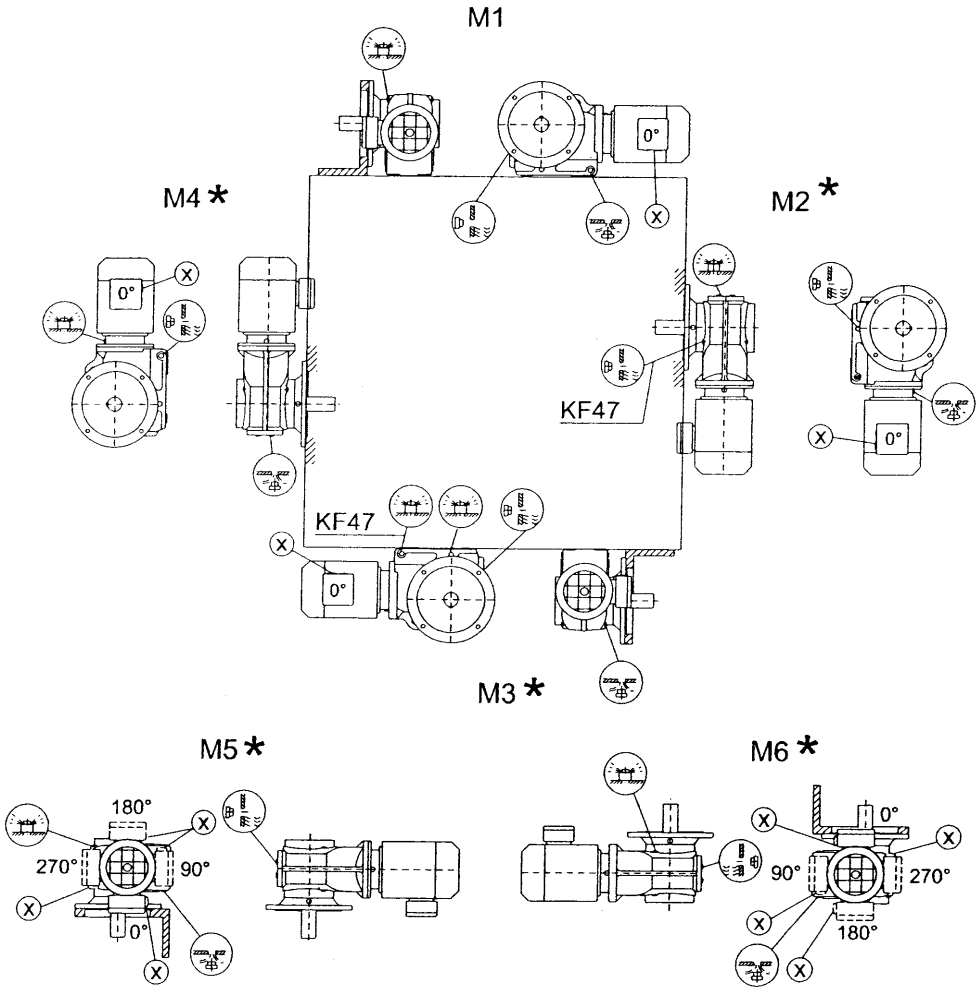
Important: See the (i) information in the "Gearmotors" catalog, section "Project Planning for Gear Units/Overhung and axial loads."

9.1

KF/KAF/KHF/KAZ/KHZ37-157, KVF/KVZ37-107

34 027 200



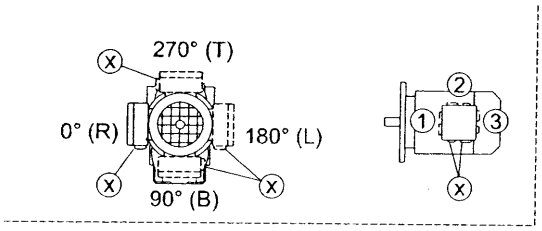


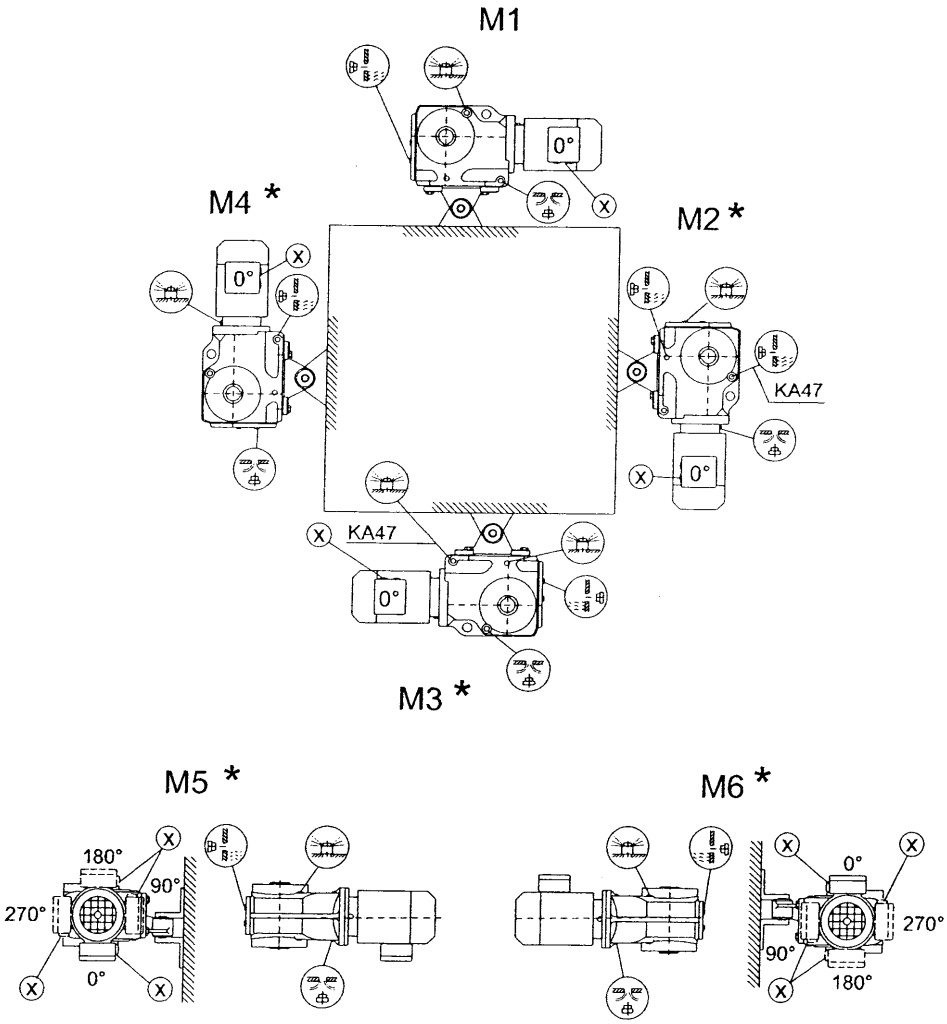
* → page 51

9.2
62

KA/KH37-157, KV37-107, KT37-97

39 025 200





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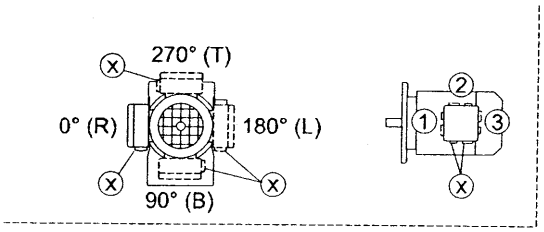
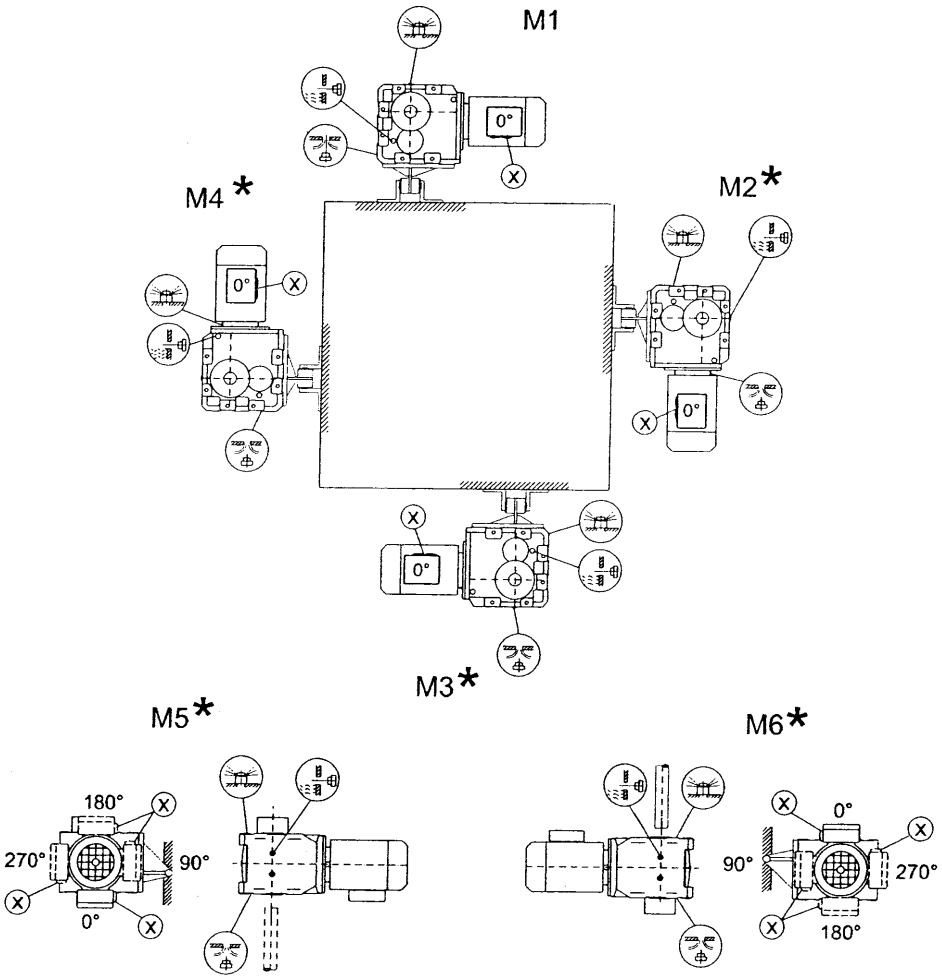
9.2

KH167-187

39 026 200





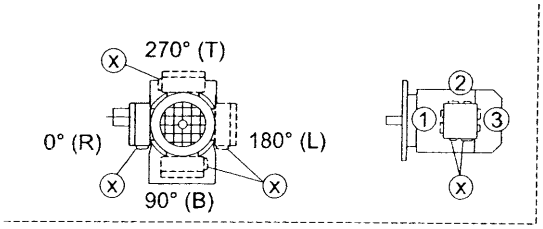
* → page 51

9.2

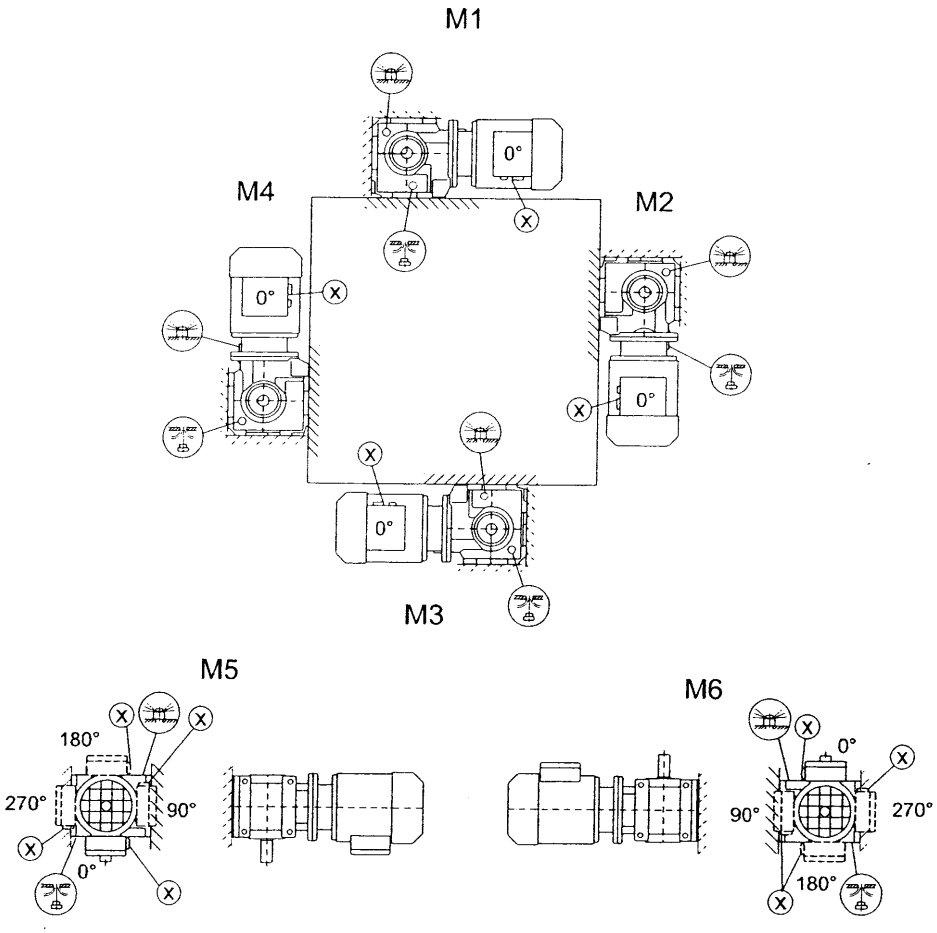
64

8.7 Mounting positions for helical-worm gearmotors

S37



05 025 200

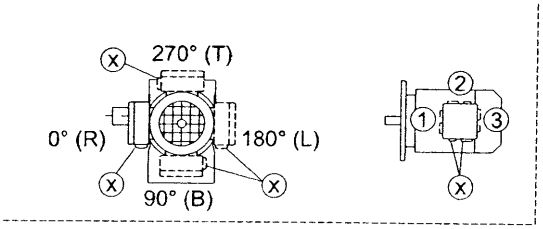


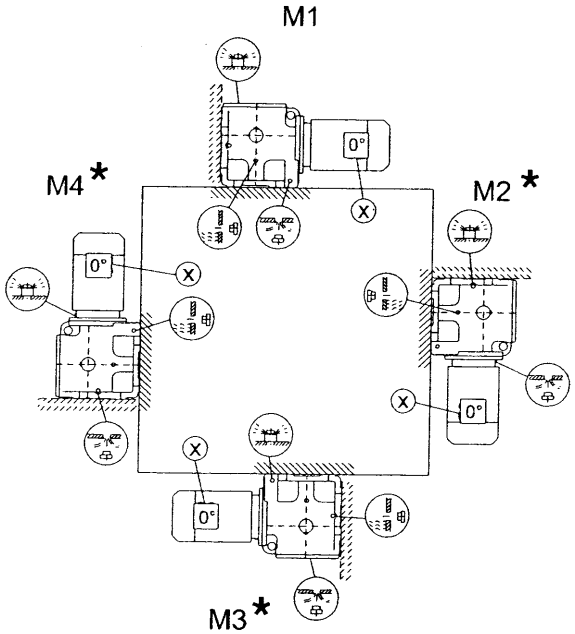
Important: See the (i) information in the "Gearmotors" catalog, section "Project Planning for Gear Units/Overhung and axial loads."

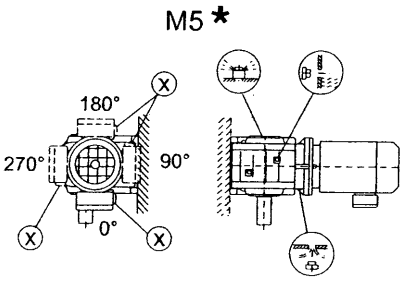
9,2

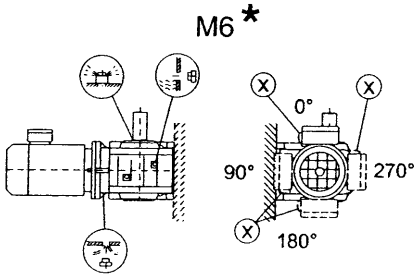
S47 - S97

05 026 200







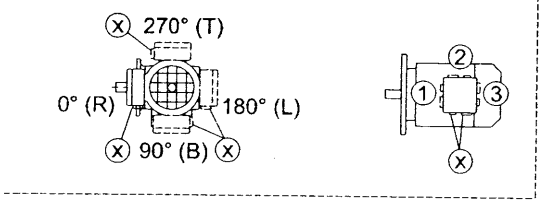


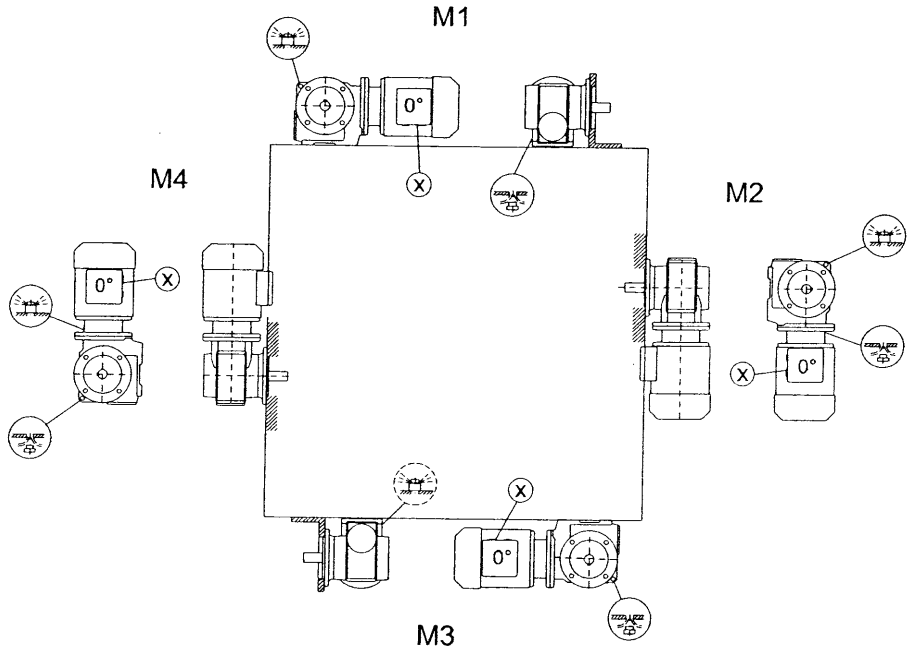
* → page 51

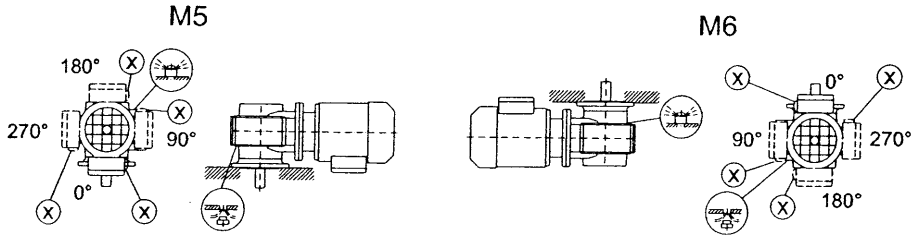
Important: See the (i) information in the "Gearmotors" catalog, section "Project Planning for Gear Units/Overhung and axial loads."

SF/SAF/SHF37

05 027 200



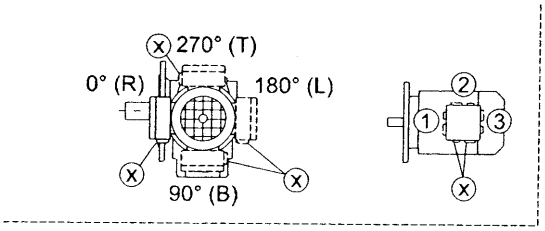


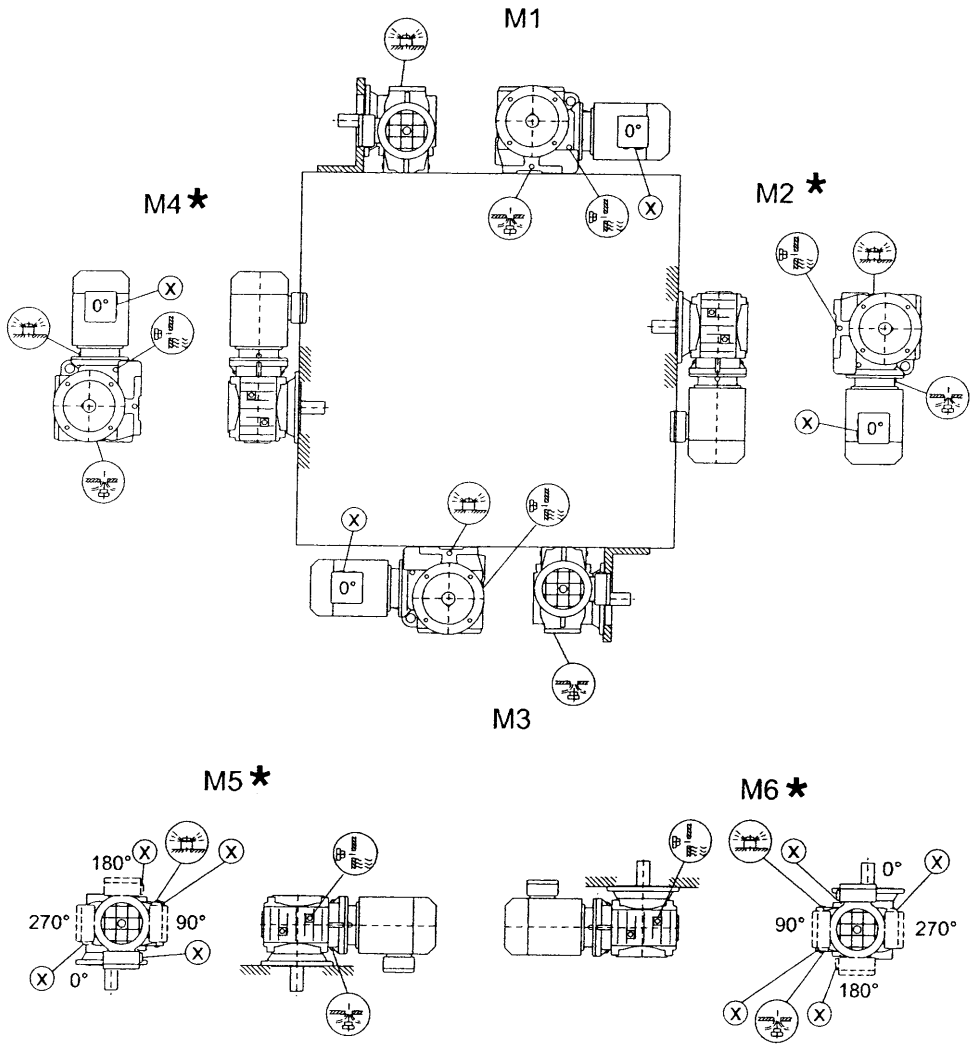


9.2

SF/SAF/SHF/SAZ/SHZ47-97

05 028 200

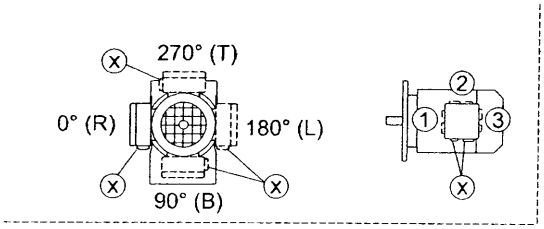


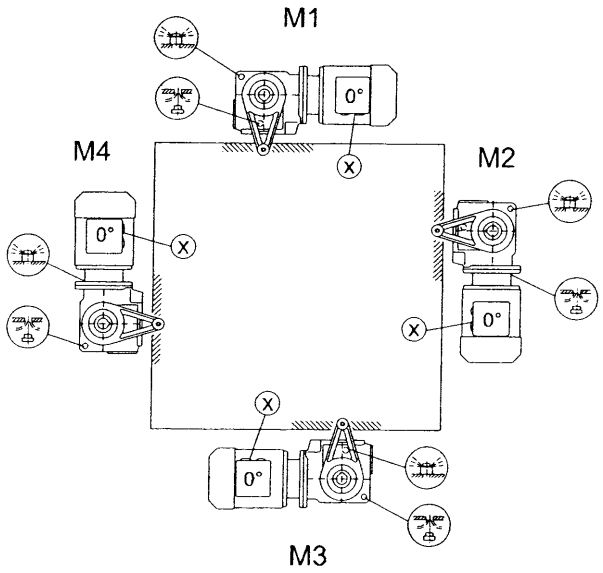


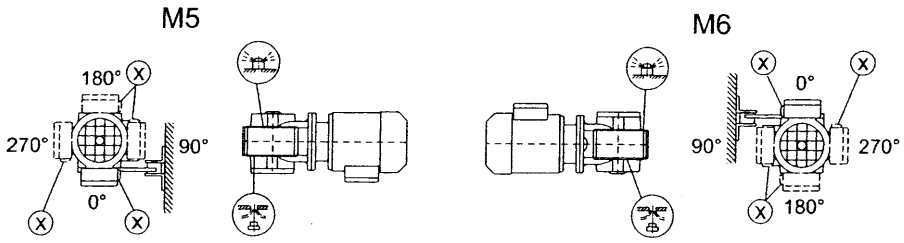
* → page 51

SA/SH/ST37

28 020 200



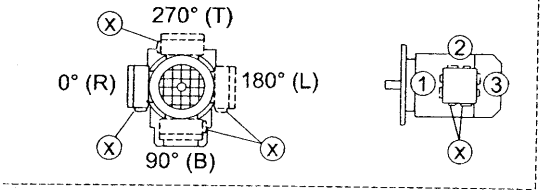


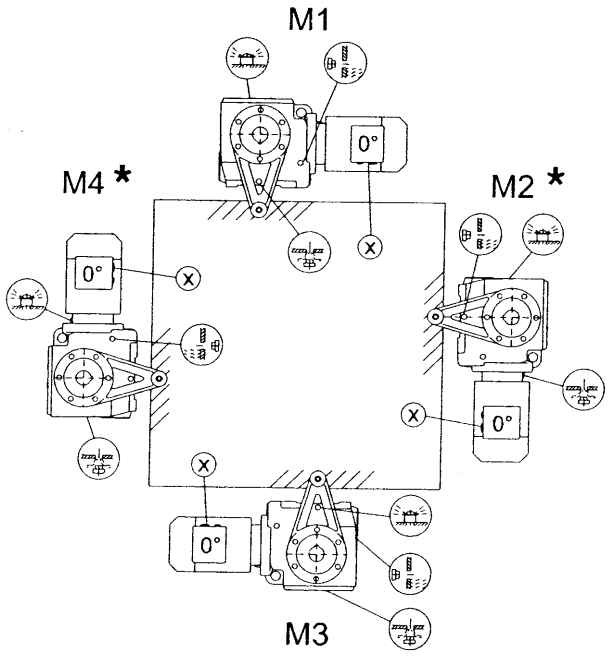


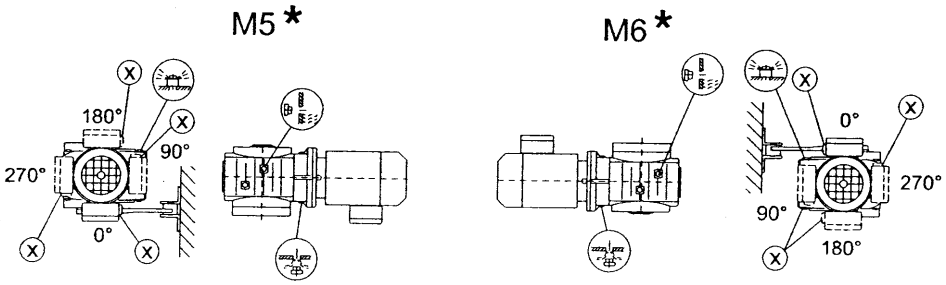
9.2

SA/SH/ST47-97

28 021 200







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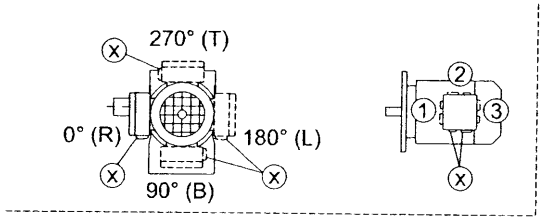
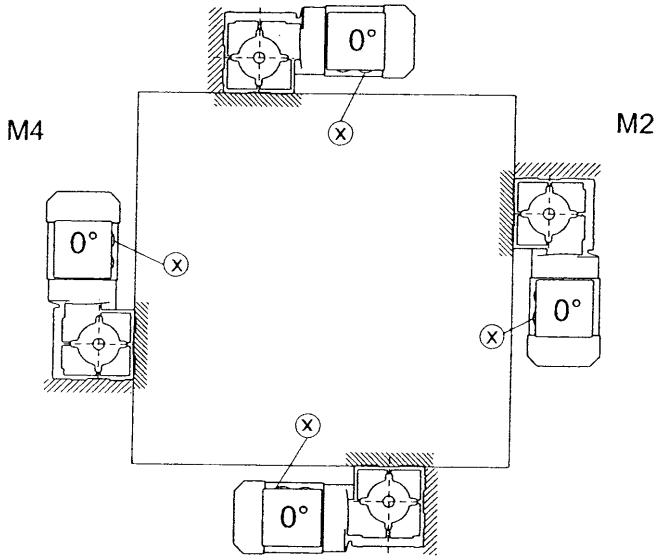
8.8 Mounting positions for SPIROPLAN® W gearmotors

W10-30

20 001 002

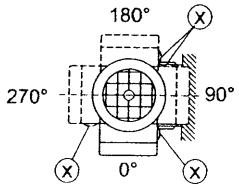


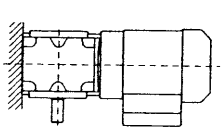
M1



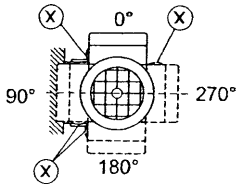
M3

M5





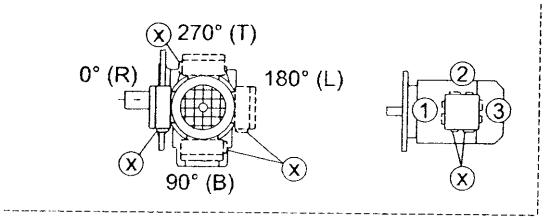
M6

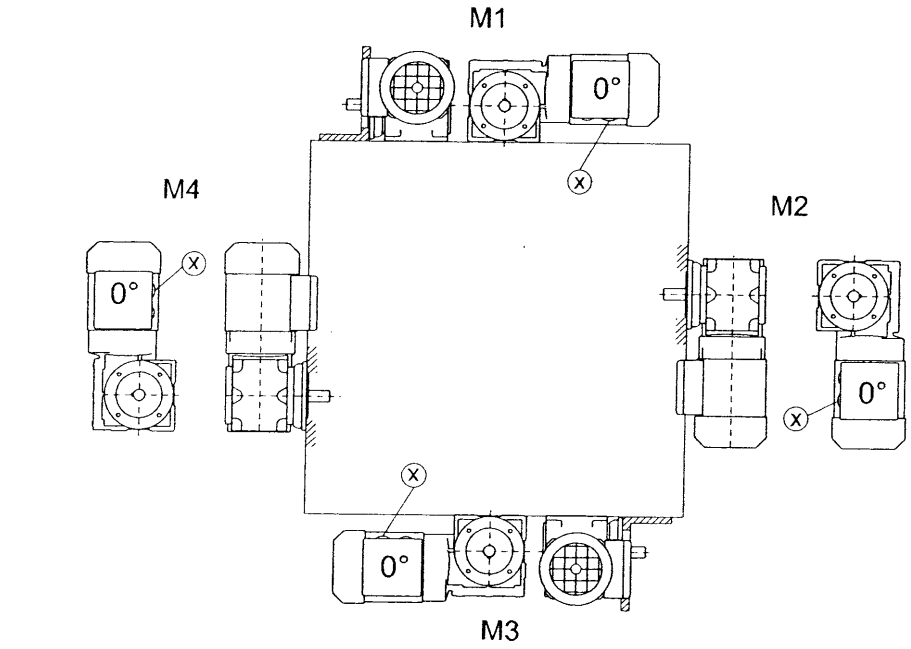


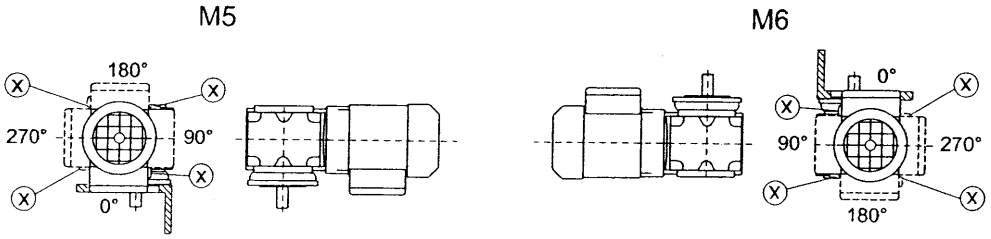
9.2

WF/WAF10-30

20 002 002





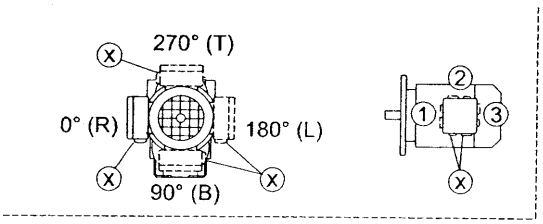


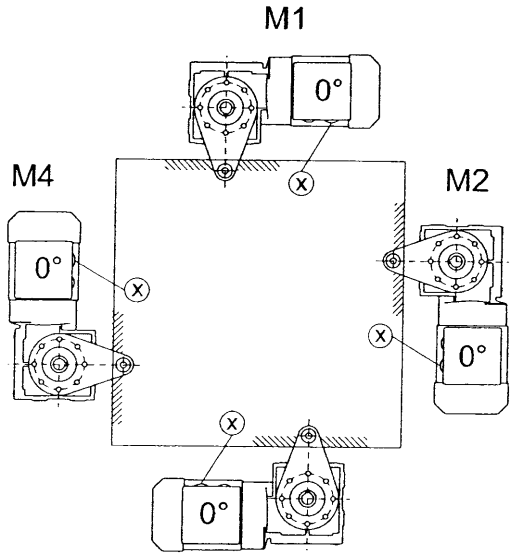
9.2

12

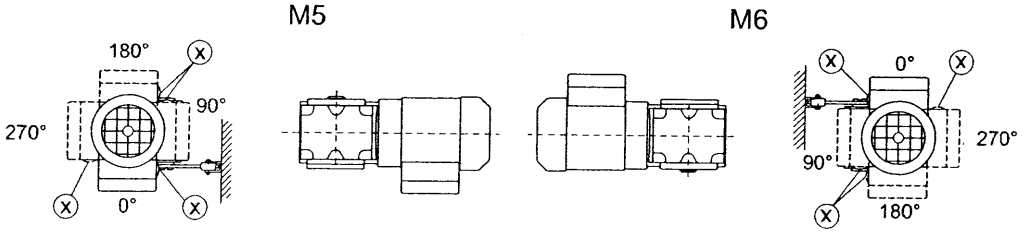
WA10-30

20 003 002





M3



9.2

9 Lubricants

General information

Unless a special arrangement is made, SEW-EURODRIVE supplies the drives with a lubricant fill adapted for the specific gear unit and mounting position. The decisive factor is the mounting position (M1 ... M6, → Sec. "Mounting Positions and Important Order Information") specified when ordering the drive. You must adapt the lubricant fill to any subsequent changes made to the mounting position (→ Lubricant fill quantities).

9.1 Lubricant table

The lubricant table on the following page shows the permitted lubricants for SEW-EURODRIVE gear units. Please note the following key to the lubricant table.

Key to the lubricant table

Abbreviations used, meaning of shading and notes:

CLP	= Mineral oil
CLP PG	= Polyglycol (W gear units, conforms to USDA-H1)
CLP HC	= Synthetic hydrocarbons
E	= Ester oil (water pollution danger category WGK 1)
HCE	= Synthetic hydrocarbons + ester oil (USDA-H1 certification)
HLP	= Hydraulic oil
	= Synthetic lubricant (= synthetic anti-friction bearing grease)
	= Mineral lubricant (= mineral-based anti-friction bearing grease)
1)	Helical-worm gear units with PG oil: Please contact SEW
2)	Special lubricant for Spiroplan® gear units only
3)	Recommendation: Select SEW $f_B \geq 1.2$
4)	Pay attention to critical starting behavior at low temperatures!
5)	Low-viscosity grease
6)	Ambient temperature
	Lubricant for the food industry (food grade oil)
	Biodegradable oil (lubricant for use in agriculture, forestry and water resources)

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Anti-friction bearing greases

The anti-friction bearings in gear units and motors are given a factory-fill with the greases listed below. SEW-EURODRIVE recommends regreasing anti-friction bearings with a grease fill at the same time as changing the oil.

	Ambient temperature	Manufacturer	Type
Anti-friction bearing in gear unit	-20 °C ... +60 °C	Mobil	Mobilux EP 2
	-40 °C ... +80 °C	Mobil	Mobiltemp SHC 100
Anti-friction bearing in motor	-20 °C ... +80 °C	Esso	Unirex EQ3
	-20 °C ... +60 °C	Shell	Alvania RL3
	+80 °C ... +100 °C	Klüber	Barrierta L55/2
	-45 °C ... -25 °C	Shell	Aero Shell Grease 16
Special greases for anti-friction bearings in gear units:			
	-30 °C ... +40 °C	Aral	Eural Grease EP 2
	-20 °C ... +40 °C	Aral	Aralube BAB EP2

The following grease quantities are required:

- For fast-running bearings (motor and gear unit input end): Fill the cavities between the rolling elements one third full with grease.
- For slow-running bearings (in gear units and at gear unit output end): Fill the cavities between the rolling elements two thirds full with grease.

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Lubricant table

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	6) °C	Oil DIN (ISO)	ISO,NLGI	Mobil®								
R...	Standard -10 +40	CLP(CC)	VG 220	Mobilgear 630	Shell Omala 220	Klüberoil GEM 1-220	Aral Degol BG 220	BP Energol GR-XP 220	Tribol 1100/220	Meropa 220	Optigear BM 220	Renolin CLP 220
	-25 +80	CLP PG	VG 220	Mobil Glygoyle 30	Shell Tivela S 220	Klübersynth GH 6-220	Aral Degol GS 220	BP Enersyn SG-XP 220	Tribol 800/220	Synlube CLP 220	Optiflex A 220	
K...(HK...)	4) -40 +80	CLP HC	VG 220	Mobil SHC 630	Shell Omala HD 220	Klübersynth EG 4-220	Aral Degol PAS 220		Tribol 1510/220	Pinnacle EP 220	Optigear Synthetic A 220	Renolin Unisyn CLP 220
	4) -40 +40		VG 150	Mobil SHC 629	Shell Omala HD 150	Klübersynth EG 4-150				Pinnacle EP 150		
	-20 +25	CLP (CC)	VG 150 VG 100	Mobilgear 627	Shell Omala 100	Klüberoil GEM 1-150	Aral Degol BG 100	BP Energol GR-XP 100	Tribol 1100/100	Meropa 150	Optigear BM 100	Renolin CLP 150
F...	-30 +10	HLP (HM)	VG 68-46 VG 32	Mobil D.T.E. 13M	Shell Tellus T 32	Klüberoil GEM 1-68	Aral Degol BG 46		Tribol 1100/68	Rando EP Ashless 46	Optigear 32	Renolin B 46 HVI
	4) -40 +10	CLP HC	VG 32	Mobil SHC 624		Klüber-Summit HySyn FG-32				Cetus PAO 46		
	4) -40 -20	HLP (HM)	VG 22 VG 15	Mobil D.T.E. 11M	Shell Tellus T 15	Isoflex MT 30 ROT		BP Energol HLP-HM 15		Rando HDZ 15		
	Standard 0 +40	CLP (CC)	VG 680	Mobilgear 636	Shell Omala 680	Klüberoil GEM 1-680	Aral Degol BG 680	BP Energol GR-XP 680	Tribol 1100/680	Meropa 680	Optigear BM 680	Renolin CLP 680
	-20 +60	CLP PG	VG 680 1)		Shell Tivela S 680	Klübersynth GH 6-680		BP Enersyn SG-XP 680	Tribol 800/680	Synlube CLP 680		
S...(HS...)	4) -30 +80	CLP HC	VG 460	Mobil SHC 634	Shell Omala HD 460	Klübersynth EG 4-460				Pinnacle EP 460		
	4) -40 +10		VG 150	Mobil SHC 629	Shell Omala HD 150	Klübersynth EG 4-150				Pinnacle EP 150		
	-20 +10	CLP (CC)	VG 150 VG 100	Mobilgear 627	Shell Omala 100	Klüberoil GEM 1-150	Aral Degol BG 100	BP Energol GR-XP 100	Tribol 1100/100	Meropa 100	Optigear BM 100	Renolin CLP 150
	-25 +20	CLP PG	VG 220 1)	Mobil Glygoyle 30	Shell Tivela S 220	Klübersynth GH 6-220			Tribol 800/220	Synlube CLP 220	Optiflex A 220	
	4) -40 0	CLP HC	VG 32	Mobil SHC 624		Klüber-Summit HySyn FG-32				Cetus PAO 46		
R...,K...(HK...), F...,S...(HS...)	4) -30 +40	HCE	VG 460		Shell Cassida Fluid GL 460	Klüberoil 4UH1-460 N	Aral Eural Gear 460				Optileb GT 460	
	-20 +40	E	VG 460			Klüberbio CA2-460	Aral Degol BAB 460				Optisynt BS 460	
W...(HW...)	Standard -20 +40	SEW PG	VG 460 2)			Klüber SEW HT-460-5						
	4) -40 +10	API GL5	SAE 75W90 (~VG 100)	Mobilube SHC 75 W90-LS								
	-20 +40	CLP PG	VG 460 3)			Klübersynth UH1 6-460						
R32 R302	-25 +60		00	Glygoyle Grease 00	Shell Tivela GL 00	Klübersynth GE 46-1200				Multifak 6833 EP 00		
	Standard -15 +40	DIN 51 818 5)	000 - 0	Mobilux EP 004	Shell Alvania GL 00		Aralub MFL 00	BP Energrease LS-EP 00		Multifak EP 000	Longtime PD 00	Renolin SF 7 - 041

9.2 Lubricant fill quantities

The specified fill quantities are **recommended values**. The precise values vary depending on the number of stages and gear ratio. When filling, it is essential to check the **oil level plug since it indicates the precise oil capacity**.

The following tables show guide values for lubricant fill quantities in relation to the mounting position M1 ... M6.

Helical (R) gear units

Gear unit type R.., R..F	Fill quantity in liters					
	M1[1)]	M2[1)]	M3	M4	M5	M6
R07/R07F	0.12	0.20	0.20	0.20	0.20	0.20
R17/R17F	0.25	0.55	0.35	0.55	0.35	0.35
R27/R27F	0.25/0.40	0.70	0.50	0.70	0.50	0.50
R37/R37F	0.30/0.95	0.85	0.95	1.05	0.75	0.95
R47/R47F	0.70/1.50	1.60	1.50	1.65	1.50	1.50
R57/R57F	0.80/1.70	1.90	1.70	2.10	1.70	1.70
R67/R67F	1.10/2.30	2.60/3.50	2.80	3.20	1.80	2.00
R77/R77F	1.20/3.00	3.80/4.10	3.60	4.10	2.50	3.40
R87/R87F	2.30/6.0	6.7/8.2	7.2	7.7	6.3	6.5
R97	4.60/9.8	11.7/14.0	11.7	13.4	11.3	11.7
R107	6.0/13.7	16.3	16.9	19.2	13.2	15.9
R137	10.0/25.0	28.0	29.5	31.5	25.0	25.0
R147	15.4/40.0	46.5	48.0	52.0	39.5	41.0
R167	27.0/70.0	82.0	78.0	88.0	66.0	69.0
Gear unit type RF../RM..	Fill quantity in liters					
	M1[1)]	M2[1)]	M3	M4	M5	M6
RF07	0.12	0.20	0.20	0.20	0.20	0.20
RF17	0.25	0.55	0.35	0.55	0.35	0.35
RF27	0.25/0.40	0.70	0.50	0.70	0.50	0.50
RF37	0.35/0.95	0.90	0.95	1.05	0.75	0.95
RF47	0.65/1.50	1.60	1.50	1.65	1.50	1.50
RF/RM57	0.80/1.70	1.80	1.70	2.00	1.70	1.70
RF/RM67	1.20/2.50	2.70/3.60	2.70	2.60	1.90	2.10
RF/RM77	1.20/2.60	3.80/4.10	3.30	4.10	2.40	3.00
RF/RM87	2.40/6.0	6.8/7.9	7.1	7.7	6.3	6.4
RF/RM97	5.1/10.2	11.9/14.0	11.2	14.0	11.2	11.8
RF/RM107	6.3/14.9	15.9	17.0	19.2	13.1	15.9
RF/RM137	9.5/25.0	27.0	29.0	32.5	25.0	25.0
RF/RM147	16.4/42.0	47.0	48.0	52.0	42.0	42.0
RF/RM167	26.0/70.0	82.0	78.0	88.0	65.0	71.0

1) The output end gear unit of multi-stage gear units must be filled with the larger oil volume.

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Helical (RX) gear units

Gear unit type RX..	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
RX57	0.60	0.80	1.30	1.30	0.90	0.90
RX67	0.80	0.80	1.70	1.90	1.10	1.10
RX77	1.10	1.50	2.60	2.70	1.60	1.60
RX87	1.70	2.50	4.80	4.80	2.90	2.90
RX97	2.10	3.40	7.4	7.0	4.80	4.80
RX107	3.90	5.6	11.6	11.9	7.7	7.7
Gear unit type RXF..	**Fill quantity in liters**					
	M1	**M2**	**M3**	**M4**	**M5**	**M6**
RXF57	0.50	0.80	1.10	1.10	0.70	0.70
RXF67	0.70	0.80	1.50	1.40	1.00	1.00
RXF77	0.90	1.30	2.40	2.00	1.60	1.60
RXF87	1.60	1.95	4.90	3.95	2.90	2.90
RXF97	2.10	3.70	7.1	6.3	4.80	4.80
RXF107	3.10	5.7	11.2	9.3	7.2	7.2

Parallel shaft helical (F) gear units

F.., FA..B, FH..B, FV..B:

Gear unit type	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
F..27	0.60	0.80	0.65	0.70	0.60	0.60
F..37	0.95	1.25	0.70	1.25	1.00	1.10
F..47	1.50	1.80	1.10	1.90	1.50	1.70
F..57	2.60	3.50	2.10	3.50	2.80	2.90
F..67	2.70	3.80	1.90	3.80	2.90	3.20
F..77	5.9	7.3	4.30	8.0	6.0	6.3
F..87	10.8	13.0	7.7	13.8	10.8	11.0
F..97	18.5	22.5	12.6	25.2	18.5	20.0
F..107	24.5	32.0	19.5	37.5	27.0	27.0
F..127	40.5	54.5	34.0	61.0	46.3	47.0
F..157	69.0	104.0	63.0	105.0	86.0	78.0

FF..:

Gear unit type	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
FF27	0.60	0.80	0.65	0.70	0.60	0.60
FF37	1.00	1.25	0.70	1.30	1.00	1.10
FF47	1.60	1.85	1.10	1.90	1.50	1.70
FF57	2.80	3.50	2.10	3.70	2.90	3.00
FF67	2.70	3.80	1.90	3.80	2.90	3.20
FF77	5.9	7.3	4.30	8.1	6.0	6.3
FF87	10.8	13.2	7.8	14.1	11.0	11.2
FF97	19.0	22.5	12.6	25.6	18.9	20.5
FF107	25.5	32.0	19.5	38.5	27.5	28.0
FF127	41.5	55.5	34.0	63.0	46.3	49.0
FF157	72.0	105.0	64.0	106.0	87.0	79.0

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FA.., FH.., FV.., FAF.., FHF.., FVF.., FAZ.., FHZ.., FVZ..:

Gear unit type	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
F..27	0.60	0.80	0.65	0.70	0.60	0.60
F..37	0.95	1.25	0.70	1.25	1.00	1.10
F..47	1.50	1.80	1.10	1.90	1.50	1.70
F..57	2.70	3.50	2.10	3.40	2.90	3.00
F..67	2.70	3.80	1.90	3.80	2.90	3.20
F..77	5.9	7.3	4.30	8.0	6.0	6.3
F..87	10.8	13.0	7.7	13.8	10.8	11.0
F..97	18.5	22.5	12.6	25.2	18.5	20.0
F..107	24.5	32.0	19.5	37.5	27.0	27.0
F..127	39.0	54.5	34.0	61.0	45.0	46.5
F..157	68.0	103.0	62.0	104.0	85.0	77.0

Helical-bevel (K) gear units

K.., KA..B, KH..B, KV..B:

Gear unit type	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
K..37	0.50	1.00	1.00	1.25	0.95	0.95
K..47	0.80	1.30	1.50	2.00	1.60	1.60
K..57	1.20	2.30	2.50	2.80	2.60	2.40
K..67	1.10	2.40	2.60	3.45	2.60	2.60
K..77	2.20	4.10	4.40	5.8	4.20	4.40
K..87	3.70	8.0	8.7	10.9	8.0	8.0
K..97	7.0	14.0	15.7	20.0	15.7	15.5
K..107	10.0	21.0	25.5	33.5	24.0	24.0
K..127	21.0	41.5	44.0	54.0	40.0	41.0
K..157	31.0	62.0	65.0	90.0	58.0	62.0
K..167	33.0	95.0	105.0	123.0	85.0	84.0
K..187	53.0	152.0	167.0	200	143.0	143.0

KF..:

Gear unit type	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
KF37	0.50	1.10	1.10	1.50	1.00	1.00
KF47	0.80	1.30	1.70	2.20	1.60	1.60
KF57	1.30	2.30	2.70	3.15	2.90	2.70
KF67	1.10	2.40	2.80	3.70	2.70	2.70
KF77	2.10	4.10	4.40	5.9	4.50	4.50
KF87	3.70	8.2	9.0	11.9	8.4	8.4
KF97	7.0	14.7	17.3	21.5	15.7	16.5
KF107	10.0	21.8	25.8	35.1	25.2	25.2
KF127	21.0	41.5	46.0	55.0	41.0	41.0
KF157	31.0	66.0	69.0	92.0	62.0	62.0

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KA.., KH.., KV.., KAF.., KHF.., KVF.., KAZ.., KHZ.., KVZ..:

Gear unit type	Fill quantity in liters					
	M1	M2	M3	M4	M5	M6
K..37	0.50	1.00	1.00	1.40	1.00	1.00
K..47	0.80	1.30	1.60	2.15	1.60	1.60
K..57	1.30	2.30	2.70	3.15	2.90	2.70
K..67	1.10	2.40	2.70	3.70	2.60	2.60
K..77	2.10	4.10	4.60	5.9	4.40	4.40
K..87	3.70	8.2	8.8	11.1	8.0	8.0
K..97	7.0	14.7	15.7	20.0	15.7	15.7
K..107	10.0	20.5	24.0	32.4	24.0	24.0
K..127	21.0	41.5	43.0	52.0	40.0	40.0
K..157	31.0	66.0	67.0	87.0	62.0	62.0
KH167	33.0	95.0	105.0	123.0	85.0	84.0
KH187	53.0	152.0	167.0	200	143.0	143.0

Spiroplan® (W) gear units

The fill quantity of Spiroplan® gear units does not vary, irrespective of their mounting position:

Gear unit type	Fill quantity in liters, regardless of mounting position
W..10	0.16
W..20	0.26
W..30	0.50

Helical-worm (S) gear units

S..:

Gear unit type	Fill quantity in liters					
	M1	M2	M3[1)]	M4	M5	M6
S37	0.25	0.40	0.50	0.55	0.40	0.40
S47	0.35	0.80	0.70/0.90	1.00	0.80	0.80
S57	.50	1.20	1.00/1.20	1.45	1.30	1.30
S67	1.00	2.00	2.20/3.10	3.10	2.60	2.60
S77	1.90	4.20	3.70/5.4	5.9	4.40	4.40
S87	3.30	8.1	6.9/10.4	11.3	8.4	8.4
S97	6.8	15.0	13.4/18.0	21.8	17.0	17.0

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.

SF..:

Gear unit type	Fill quantity in liters					
	M1	M2	M3[1)]	M4	M5	M6
SF37	0.25	0.40	0.50	0.55	0.40	0.40
SF47	0.40	0.90	0.90/1.05	1.05	1.00	1.00
SF57	0.50	1.20	1.00/1.50	1.55	1.40	1.40
SF67	1.00	2.20	2.30/3.00	3.20	2.70	2.70
SF77	1.90	4.10	3.90/5.8	6.5	4.90	4.90
SF87	3.80	8.0	7.1/10.1	12.0	9.1	9.1
SF97	7.4	15.0	13.8/18.8	22.6	18.0	18.0

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.

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SA.., SH.., SAF.., SHF.., SAZ.., SHZ..:

Gear unit type	Fill quantity in liters					
	M1	M2	M3[1)]	M4	M5	M6
S..37	0.25	0.40	0.50	0.50	0.40	0.40
S..47	0.40	0.80	0.70/0.90	1.00	0.80	0.80
S..57	0.50	1.10	1.00/1.50	1.50	1.20	1.20
S..67	1.00	2.00	1.80/2.60	2.90	2.50	2.50
S..77	1.80	3.90	3.60/5.0	5.8	4.50	4.50
S..87	3.80	7.4	6.0/8.7	10.8	8.0	8.0
S..97	7.0	14.0	11.4/16.0	20.5	15.7	15.7

1) The larger gear unit of multi-stage gear units must be filled with the larger oil volume.

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10 Appendix

10.1 Index of changes

The following additions and changes have been made compared to the previous edition of the "Explosion-Proof Gear Units R..7, F..7, K..7, S..7, SPIROPLAN® W" (publication number: 1055520x, edition 11/2002) operating instructions:

General additions and corrections.

Mechanical installation

- Installing the gear unit: Data on flatness error
- Installing torque arms for mounted gear units: Data on retaining bolts
- Mounted gear units with shrink disks: Information on assembly / removal has been added
- Mounted gear units with TorqLOC®
- AM adapter coupling: Point A

Inspection and maintenance

- Lubricant change intervals

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Address List

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 · D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Service **Competence Center**	**Central** Gear units / Motors	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte-gm@sew-eurodrive.de
	Central Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-mitte-e@sew-eurodrive.de
	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54, route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62, avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'Affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Paris	SEW-USOCOME Zone industrielle 2, rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Alger**	Réducom 16, rue des Frères Zaghnoun Bellevue El-Harrach 16200 Alger	Tel. +213 21 8222-84 Fax +213 21 8222-84

Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar

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Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://sew-eurodrive.at sew@sew-eurodrive.at

Belgium			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 50 Caixa Postal: 201-07111-970 Guarulhos/SP - Cep.: 07251-250	Tel. +55 11 6489-9133 Fax +55 11 6480-3328 http://www.sew.com.br sew@sew.com.br
	Additional addresses for service in Brazil provided on request!		

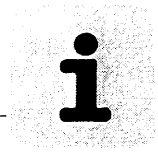
Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GMBH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9532565 Fax +359 2 9549345 bever@mbox.infotel.bg

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 4322-99 Fax +237 4277-03

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, Ontario L6T3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.reynolds@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. 7188 Honeyman Street Delta. B.C. V4G 1 E2	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Street LaSalle, Quebec H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 sewsales@entelchile.net

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25322611 victor.zhang@sew-eurodrive.cn http://www.sew.com.cn



China			
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021 P. R. China	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew.com.cn

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 sewcol@andinet.com

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. PIT Erdödy 4 II HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@net.hr

Czech Republic			
Sales	**Praha**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Luná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 220121234 + 220121236 Fax +420 220121237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Kopenhagen**	SEW-EURODRIVEA/S Geminivej 28-30, P.O. Box 100 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Paldiski mnt.125 EE 0006 Tallin	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 3 589-300 Fax +358 3 7806-211 http://www.sew-eurodrive.fi sew@sew-eurodrive.fi

Gabon			
Sales	**Libreville**	Electro-Services B.P. 1889 Libreville	Tel. +241 7340-11 Fax +241 7340-12

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 GB-Normanton, West- Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk

Greece			
Sales **Service**	**Athen**	Christ. Boznos & Son S.A. 12, Mavromichali Street P.O. Box 80136, GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 2 7960477 + 79604654 Fax +852 2 7959129 sew@sewhk.com

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Hungary			
Sales Service	Budapest	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

India			
Assembly Sales Service	Baroda	SEW-EURODRIVE India Pvt. Ltd. Plot No. 4, Gidc Por Ramangamdi · Baroda - 391 243 Gujarat	Tel. +91 265 2831021 Fax +91 265 2831087 mdoffice@seweurodriveindia.com
Technical Offices	Bangalore	SEW-EURODRIVE India Private Limited 308, Prestige Centre Point 7, Edward Road Bangalore	Tel. +91 80 22266565 Fax +91 80 22266569 sewbangalore@sify.com
	Mumbai	SEW-EURODRIVE India Private Limited 312 A, 3rd Floor, Acme Plaza Andheri Kurla Road, Andheri (E) Mumbai	Tel. +91 22 28348440 Fax +91 22 28217858 sewmumbai@vsnl.net

Ireland			
Sales Service	Dublin	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458

Israel			
Sales	Tel-Aviv	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 lirazhandasa@barak-online.net

Italy			
Assembly Sales Service	Milano	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 2 96 9801 Fax +39 2 96 799781 sewit@sew-eurodrive.it

Ivory Coast			
Sales	Abidjan	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36

Japan			
Assembly Sales Service	Toyoda-cho	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Toyoda-cho, Iwata gun Shizuoka prefecture, 438-0818	Tel. +81 538 373811 Fax +81 538 373814 sewjapan@sew-eurodrive.co.jp

Korea			
Assembly Sales Service	Ansan-City	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate Unit 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 master@sew-korea.co.kr

Latvia			
Sales	Riga	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139386 Fax +371 7139386 info@alas-kuul.ee

Lebanon			
Sales	Beirut	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 gacar@beirut.com

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Lithuania			
Sales	**Alytus**	UAB Irseva Merkines g. 2A LT-4580 Alytus	Tel. +370 315 79204 Fax +370 315 79688 irmantas.irseva@one.lt

Luxembourg			
Assembly **Sales** **Service**	**Brüssel**	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.caron-vector.be info@caron-vector.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 kchtan@pd.jaring.my

Morocco			
Sales	**Casablanca**	S. R. M. Société de Réalisations Mécaniques 5, rue Emir Abdelkader 05 Casablanca	Tel. +212 2 6186-69 + 6186-70 + 6186-71 Fax +212 2 6215-88 srm@marocnet.net.ma

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 241-020 Fax +47 69 241-040 sew@sew-eurodrive.no

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Lodz	Tel. +48 42 67710-90 Fax +48 42 67710-99 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucuresti**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

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Russia			
Sales	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 263 RUS-195220 St. Petersburg	Tel. +7 812 5357142 +812 5350430 Fax +7 812 5352287 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 849 47-70 Fax +221 849 47-71 senemeca@sentoo.sn

Serbia and Montenegro			
Sales	**Beograd**	DIPAR d.o.o. Kajmakcalanska 54 SCG-11000 Beograd	Tel. +381 11 3046677 Fax +381 11 3809380 dipar@yubc.net

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 ... 1705 Fax +65 68612827 sales@sew-eurodrive.com.sg

Slovakia			
Sales	**Sered**	SEW-Eurodrive SK s.r.o. Trnavska 920 SK-926 01 Sered	Tel. +421 31 7891311 Fax +421 31 7891312 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. Ul. XIV. divizije 14 SLO – 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 dross@sew.co.za
	Capetown	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 dswanepoel@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 dtait@sew.co.za

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 9 4431 84-70 Fax +34 9 4431 84-71 sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442-00 Fax +46 36 3442-80 http://www.sew-eurodrive.se info@sew-eurodrive.se

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Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 41717-17 Fax +41 61 41717-00 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chon Buri**	SEW-EURODRIVE (Thailand) Ltd. Bangpakong Industrial Park 2 700/456, Moo.7, Tambol Donhuaroh Muang District Chon Buri 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.co.th

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service 7, rue Ibn El Heithem Z.I. SMMT 2014 Mégrine Erriadh	Tel. +216 1 4340-64 + 1 4320-29 Fax +216 1 4329-76

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri Sirketi Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 + 216 4419164 + 216 3838014 Fax +90 216 3055867 sew@sew-eurodrive.com.tr

USA			
Production **Assembly** **Sales** **Service**	**Greenville**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manuf. +1 864 439-9948 Fax Ass. +1 864 439-0566 Telex 805 550 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**San Francisco**	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, California 94544-7101	Tel. +1 510 487-3560 Fax +1 510 487-6381 cshayward@seweurodrive.com
	Philadelphia/PA	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Dayton	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 440-3799 cstroy@seweurodrive.com
	Dallas	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 sewventas@cantv.net sewfinanzas@cantv.net

9.2

How we're driving the world

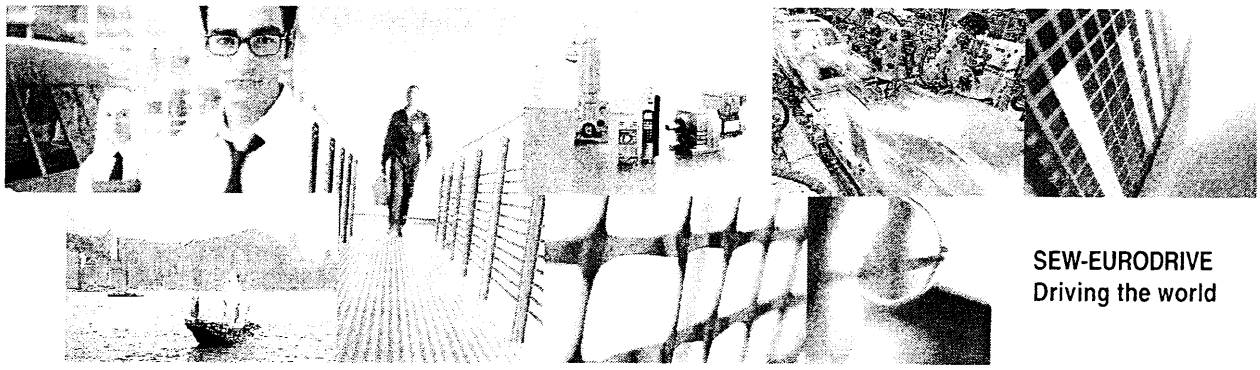
With people who think fast and develop the future with you.

With a worldwide service network that is always close at hand.

With drives and controls that automatically improve your productivity.

With comprehensive knowledge in virtually every branch of industry today.

With uncompromising quality that reduces the cost and complexity of daily operations.

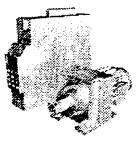


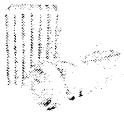
SEW-EURODRIVE
Driving the world

With a global presence that offers responsive and reliable solutions. Anywhere.

With innovative technology that solves tomorrow's problems today.

With online information and software updates, via the Internet, available around the clock.





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→ **www.sew-eurodrive.com**

9,a

Section 3

Electric Motors

Electric Motors

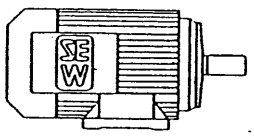
Screw Screen

Quantity:	2
Manufacturer:	SEW Eurodrive
Model:	Class 1, Division II
Rating:	1.5 kW
Power:	575V/3pH/60Hz
Speed:	1800 rpm

AC Motors and Brake Motors

Synchronous Speed 1800 rpm @ 60Hz
NEMA Design B, 40°C Ambient, Continuous Duty,
up to 3300 ft Elevation. Improved Efficiency

SEW EURODRIVE



Frame Size	P_n hp	P_n kW	n_n rpm	I_n Amp 230V	I_n Amp 460V	I_n Amp 575V	I_a/I_n %	T_n lb-in.	T_a/T_n %	T_k/T_n %	Cos φ	η %	Code Letter	J_m lb-ft² *	J_m lb-ft² **	Z_o Starts/hr. BG[2]	Z_o Starts/hr. BGE[3]	T_B lb-in.	Weight lbs. *	Weight lbs. **
DT71K4	0.2	0.15	1700	1.19	0.59	0.48	310	7.45	220	260	0.67	47	J	.00616	.00836	9000	9000	22	13	19
DT71C4	0.33	0.25	1700	1.4	0.7	0.56	400	12.4	230	230	0.70	64	H	.0104	.0125	7800	9000	44	15	22
DT71D4	0.5	0.37	1700	2.15	1.07	0.86	380	18.4	220	230	0.70	62	H	.0104	.0125	5200	9000	44	15	22
DT80K4	0.75	0.55	1700	3.05	1.53	1.22	400	27.4	230	220	0.70	65	H	.0156	.0177	3700	8000	88	22	28
DT80N4	1	0.75	1680	3.45	1.7	1.39	475	37.6	250	260	0.72	76.5	H	.0207	.0228	3300	7500	88	25	32
DT90S4	1.5	1.1	1720	4.4	2.2	1.76	555	54.5	260	290	0.79	79.5	H	.0594	.0722	4200	5000	177	35	57
DT90L4	2	1.5	1720	5.8	2.9	2.3	586	74	280	300	0.81	81	H	.0789	.0936	2000	3800	177	40	62
DT100LS4	3	2.2	1720	8.4	4.2	3.35	595	108	300	330	0.80	83	H	.101	.114	1400	3000	354	51	73
DV112M4	5	3.7	1740	13.2	6.6	5.3	682	180	280	300	0.83	85.5	J	.233	.262	—	1400	487	84	110
DV132S4	7.5	5.5	1730	19.4	9.7	7.8	670	269	280	300	0.83	87	H	.416	.445	—	1000	664	106	139
DV132M4	10	7.5	1745	26.0	13	10.4	730	363	250	330	0.83	88	J	.665	.769	—	1000	885	146	198
DV160M4	15	11	1745	37.5	18.8	15	746	533	280	320	0.83	88.5	J	.945	1.049	—	700	1328	185	240
DV160L4	20	15	1760	51	25.5	20.5	588	720	260	220	0.83	89	G	2.197	2.449	—	560	1770	326	419
DV180M4	25	18.5	1765	67	33.5	27	667	886	350	290	0.77	89	J	2.660	2.912 3.164[1]	—	450	2655 2655[1]	386	476 485[1]
DV180L4	30	22	1770	70	35	28	850	1048	350	270	0.85	90.5	J	3.064	3.316 3.567[1]	—	380	2655 2655[1]	410	503 512[1]
DV200L4	40	30	1770	98	49	39	755	1433	310	250	0.85	90.5	J	5.558	5.809 6.061[1]	—	330	2655 5310[1]	538	650 659[1]
DV225S4	50	37	1770	118	59	47	780	1767	320	250	0.86	91	J	7.149	7.400 7.652[1]	—	250	2655 5310[1]	653	765 774[1]
DV225M4	60	45	1760	142	71	57	600	2160	290	230	0.88	90	G	8.479	8.730 8.982[1]	—	200	2655 5310[1]	717	831 840[1]

* Without Brake
** With Brake
1) Double Disc Brake
2) Values with BG rectifier (standard for frame size 100L and smaller)
3) Values with BGE rectifier (standard for frame size 112M and larger)

Abbreviations

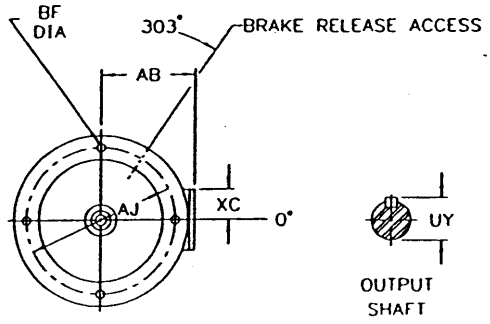
1-3-3

P_n	Rated Power
n_n	Full Load Speed
I_n	Full Load Current
I_a/I_n	Starting Current Ratio (Locked Rotor)
T_n	Full Load Torque
T_a/T_n	Starting Torque Ratio
T_k/T_n	Breakdown Torque Ratio
Cos φ	Power Factor
η	Motor Efficiency
J_m	Motor Inertia
Z_o	Permissible no-load starting frequency at 50% ED
T_B	Maximum Brake Torque

SEW EURODRIVE

AC Motors and Brakemotors
Flange Mounted

FIG. I



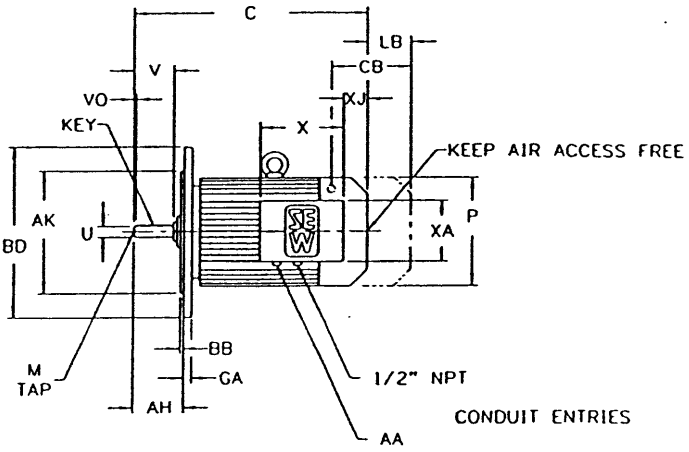
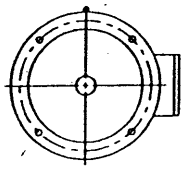
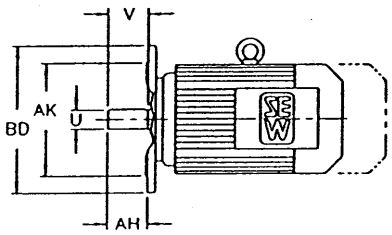


FIG. II





Motor / Output Shaft

Model	C	CB	LB	P	U	UY	V	VO	Key	M
DFT71	9.13	2.32	2.52	5.71	0.551 $^{+.0005}_{-0}$	0.63	1.18	0.16	.20 x .20 x .87	DM5 x .49
	232	59	64	145	14 $^{+.012}_{+.001}$	16	30	4	5 x 5 x 22	DM5 x 12.5
DFT80	11.50	2.32	2.52	5.71	0.748 $^{+.0006}_{+.0001}$	0.85	1.57	0.16	.24 x .24 x 1.26	DM6 x .63
	292	59	64	145	19 $^{+.015}_{+.002}$	21.5	40	4	6 x 6 x 32	DM6 x 16
DFT90	12.72	2.72	3.35	7.76	0.945 $^{+.0006}_{+.0001}$	1.06	1.97	0.20	.31 x .28 x 1.57	DM8 x .75
	323	69	85	197	24 $^{+.015}_{+.002}$	27	50	5	8 x 7 x 40	DM8 x 19

Conduit Box / IEC Flange

Model	AA	AB	X	XA	XC	XJ	FIG.	AH	AJ	AK	BB	BD	BF	GA
DFT71	½ NPT	5.43	5.79	4.53	2.24	0.55	II	1.18	5.12	4.331 $^{+.0005}_{-.0004}$	0.14	6.30	0.35	0.39
	½ NPT	138	147	115	57	14	II	30	130	110 $^{+.013}_{-.009}$	3.5	160	9	10
DFT80	½ NPT	5.43	5.79	4.53	2.24	0.55	II	1.57	6.50	5.118 $^{+.0006}_{-.0004}$	0.14	7.87	0.43	0.47
	½ NPT	138	147	115	57	14	II	40	165	130 $^{+.014}_{-.011}$	3.5	200	11	12
DFT90	½ NPT	6.73	5.79	4.53	2.24	1.10	II	1.97	6.50	5.118 $^{+.0006}_{-.0004}$	0.14	7.87	0.43	0.47
	½ NPT	171	147	115	57	28	II	50	165	130 $^{+.014}_{-.011}$	3.5	200	11	12

Optional Flange

Model	FIG.	AH	AJ	AK	BB	BD	BF	GA
DFT71	II	1.18	6.50	5.118 $^{+.0006}_{-.0004}$	0.14	7.87	0.43	0.47
	II	30	165	130 $^{+.014}_{-.011}$	3.5	200	11	12
DFT80	II	1.57	5.12	4.331 $^{+.0005}_{-.0004}$	0.14	6.30	0.35	0.39
	II	40	130	110 $^{+.013}_{-.009}$	3.5	160	9	10
DFT90	I	2.60	8.46	7.087 $^{+.0006}_{-.0004}$	0.16	9.84	0.55	0.59
	I	66	215	180 $^{+.014}_{-.011}$	4	250	14	15

9-3-14

Dimensions are $\frac{\text{inch}}{\text{mm}}$

Dimension LB is for brake option.
Dimension CB is for Brake Release Access.
Eyebolts are removable.

IQALUIT WATER RECLAMATION FACILITY
IQALUIT, NUNAVUT

OPERATIONS AND MAINTENANCE MANUAL FOR:

ML ENGINEERING SCREW SCREEN

Equipment Supplied By: Pro Aqua Engineering Inc.
2800 John St., Suite 13A
Markham, ON
L3R 0E2

Tel: (416) 513-0222
Fax: (416) 513-6839

Contact: Geoff Coate

Date: June 4, 1999

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SECTION 4

SCREW SCREENS

Screw Screen Technical Data

Manufacturer:	ML Engineering
Model:	SCS 50
Quantity:	2
Screen Perforations:	3mm and 5mm
Washing System:	Transport Dewatering
Motor:	1.5 kW

9.4-2

Table of content:

9.4-3

1 Safety

Remember the Safety! The electrical system should only be installed by authorised personnel. Before any installation or maintenance work on the electrical system, make sure the main fuses are removed and/or the main switch is turned off and locked, so that nobody can switch the power on by mistake! Place a conspicuous notice on the isolation point to warn that plant is under repair.

Warning !
Be careful when starting up! Always check that nobody is close to any unprotected moving parts or is working on the equipment, before starting it!

Warning !
Do not bridge (by-pass) any protection device. Do not remove any protection shields when the equipment is in operation!

Warning !
Before any installation or maintenance work, make sure that the main switch is turned off and locked, and that the key is stored in a safe place, so that nobody can start the equipment by mistake!

Warning !
Remember the accident risk! Use only recommended and approved and certified lifting equipment and slings!

There must always be warning signs at feeder and discharge box openings, and they must be legible! If a sign has been damaged and become illegible, or has fallen off, it must be replaced immediately.

Test safety switches and emergency stops periodically.

Record all maintenance and service activities.

Keep tools in good condition, clean and repair - keep test certificates up to date, report damaged or defective tools - use correct tools for the job - do not improvise.

Clean oil spills and other potentially dangerous litter.

9.4-4

1. General description

For many difficult screening and transportation problems, the Conpura Screw Screen has been designed to incorporate tried and tested technologies into one combined unit for screening, transportation and dewatering.

Usage
Designed for small to medium sized municipal treatment plants and industrial effluent, in a range of screening sizes, the screw screen collects screenings in a perforated basket and conveys along an inclined conveyor fitted with a tough renewable liner and compacts and dewaters in a wedge wire compaction zone.

Installation experience over 25 years has shown that spiral screws without a central shaft are an excellent transport mode not subject to easy blocking. The spiral is fitted with a renewable nylon brush to clean the basket without clogging.

The basket sieve is the most efficient means of screening effluent, trapping stringy as well as rag type materials. The screw screen is fitted with a stainless steel basket which is easily dismantled for replacement of the brush.

The trough in which the screw rotates is U shaped and lined with a durable liner designed to protect the spiral and trough from wear and to be easily replaceable when necessary.

The compaction zone incorporates a replaceable wedge wire basket for dewatering and compaction of screenings, and a rotating blade for removal of screenings into the discharge tube.

Supports
The screw screen is supplied complete with its own mountings base and adjustable leg, details of which are included on installation drawings in appendix.

Optional equipment

- Electronic overload monitor.
- Spray bar system in compaction zone.
- Spray system in conveying.
- Spray bar at inlet basket.
- Guard for basket spiral.
- Stainless containment tank.
- Heating jacket for compaction zone.

9.4-5

3. Installation

Use care when unpacking the equipment to avoid damage on the Screenscrew. Check that goods delivered are in accordance with freight specification sheet. If any damage has occurred or parts are

missing contact the forwarder. Complaints regarding missing or damaged parts should reach Conpura within 7 days after delivery.

Basic rules for installation.

- Unless otherwise indicated, the Conpura screw screen is supplied tested and fully built, only the base plate needs to be installed, and electrical and water connections made to complete.
- Always allow at least 0.7M headroom for removal of gear box and motor. For more extensive maintenance, the machine will rotate around its fixing point into a horizontal position.
- Take care when removing packing in order to avoid damage. Inspect carefully for damage and report damages or shortages immediately to Conpura.
- Carefully check and measure the channel works to ensure it complies with installation drawings.

WARNING!

Before any installation or maintenance work, make sure that the main switch is turned off and locked, and that the key is stored in a safe place, so that nobody can start the equipment by mistake!

Remember the accident risk! Use only recommended and approved and certified lifting equipment and slings!

1. Sling the screen using two flat slings. Lift off the ground and hold on the crane.

2. Lift the support leg under the screen, and bolt onto the body, noting carefully the orientation of holding down bolts.

3. When slinging the screen take care not to damage the cladding on the heating jacket (if fitted).

4. If the screen is tank mounted, the fixings are included on the tank end, so the tank should be mounted and anchored onto the floor, prior to mounting the screen.

5. Fit the flushing water pipes and electrical connections to terminal boxes. Note the overload monitor if supplied will be separately mounted in the control panel and wired in accordance with the instructions as detailed in Appendix. If this wiring is incorrect Conpura disclaims all damages occurring through overloads.

Note: The screen is capable of rotation about its axis for maintenance purposes. Ensure sufficient flexibility is built into cabling and pipe work to allow rotation.

6. With the screen in its final position, fit the anchor bolts and by drilling through the fixing holes and fitting the anchors as supplied - make certain the base plate is level shim as necessary, and that the screw screen is at the angle as specified on the drawing. An incorrect angle will adversely affect the alignment and level of the base of the screen on the channel floor.

9.4-6

7. Bolt on any discharge tubes and bagging equipment as required.

8. Fill the gearbox with oil as required (for oil grade and quantity refer to appendix drive unit). Fit the gear box breather plug.

THE UNIT IS NOW READY FOR START-UP.

4. Start up.

WARNING!

Be careful when starting up! Always check that nobody is close to any unprotected moving parts or is working on the equipment, before starting it!

9.4.7

4.1 Check installation is complete and in accordance with installation drawing.

4.2 Electrical installation should be complete and in particular the following should be checked:

a) Is motor overload connected and set to the correct reading?

b) Is the load monitor in circuit and is it correctly set. Are the correct number of coils set around the C.T?

c) Are the emergency stops positioned, and are they operational?

d) Are motor anti condensation heaters and thermistors connected?

4.3 Examine the screw and make certain there is no construction debris in the channel which may obstruct or damage the screw.

4.4 Place electrical controls into hand operation and start screen.

4.5 Watch screen for normal operation and open water flow. Some noise is normal at first due to dryness, however, will soon disappear after the screen has operated for some time.

4.6 Check screen for correct direction of rotation. If incorrect, reverse the connections of 2 phase wires on the motor.

4.7 After you are satisfied the screen is operating well, set the screen to automatic operation.

The screen should be controlled on upstream level. As the water level reaches a pre-set level, the screen should start and run on for a pre-set time. If the water level has fallen below its start level, it should be allowed to stop. If water remains above start level, the screen should continue to run.

4.8 Start level should be as high as practical, we recommend at least 400 mm.

The screen clears the screening basket very quickly and as such can cause surging downstream. In this case, the upstream start level should be reduced.

Screen run on time should be adjustable between 30 seconds and 5 minutes.

When the screw is at the end of a long channel or outfall, which is free fromturbulence, there is a very real possibility that soft material will not be broken up, and will be drawn into the screen, producing dirty screenings. In such a case, some turbulence should be introduced upstream of the screen. Please consult Conpura ab.

4.9 As screenings are compacted when drawn into the screen, it may be some time before screenings are discharged from the screen. Up to 10 days is possible. This is normal, as compacted screenings are required for proper operation.

4.10If screenings are not compacted on discharge, this is not a screen fault, but is due to the nature of the screenings which are not able to be easily compacted.

9.4.8

The screen can be made to form a "plug" of screenings by introducing a quantity of dry materials (eg. straw) or by fitting the screen with a rubber diaphragm (refer this problem to Conpura).

9.4-9

5 Lubrication and Maintenance

General instructions:
The below schedule is intended as a general model for a minimum of maintenance. Complementary additions, considering special plant and environment characteristic should be made by the maintenance crew on site. To this end, the empty lines may be used!

For more detailed information, also read General Description and Disassembly - Assembly sections as well as descriptions and component lists for ant special components / system in the Appendices section.

Before starting any maintenance work on the equipment, the electrical main switch must be switched OFF and be locked, and key stored in a safe place to prevent any unintentional starting.

Place a warning notice at the isolation point! " Men working, do not touch "

WARNING!
Before any installation or maintenance work, make sure that the main switch is turned off and locked , and that the key is stored in a safe place, so that nobody can start the equipment by mistake!

Note!
The below intervals are valid for service as of second year! During the first operating year, appropriate intervals (months, half year and year) are to be halved!

It is a condition of warranty that log of all service and maintenance be kept available for inspection at any time - failure to produce this log could invalidate warranty!

5.1 Service Intervals.

NOTE! Daily service records shall be kept where all observations are noted. It is a condition of warranty that an up to date service log is available for inspection at any time !

Warning !
Do not bridge (by-pass) any protection device. Do not remove any protection shields when the equipment is in operation!

Warning !
Before any installation or maintenance work, make sure that the main switch is turned off and locked, and that the key is stored in a safe place, so that nobody can start the equipment by mistake!

9.4-10

5.2 As necessary:

- Replace defect parts to avoid more expensive break-downs.
- Repaint and protect shafts etc.
- Clean excess oil and grease

.....

5.3 Daily

- The equipment is operating normally.
- No abnormal noise is heard
- No ice build-up, rags or other contaminants are blocking the function
- The screw drive shaft seals do not leak.
- The grease cartridge (if fitted) is not empty
- .....

5.5 MONTHLY:

- **Lubrication** of driveshaft bearings (two points), overload protector (one point), lower sprockets (two points), upper sprockets (two points), chains and carriage guides.
- Check oil level in the power unit gear box. Top up as necessary.
- **Maintenance**: Remove any condensation moisture from the electrical cabinet.
- .....

5.6 Every 6 months:

- Remove the cover and check screw and lining wear.
- Check all bolted joints for tightness.
- Tighten up the screws of the gland box.
- .....

5.7 YEARLY:

- **Lubrication:** Change oil in the power unit gear box. Oil type, see the App. Section.
- .....
- .....
- **Maintenance:** Check seal wear / leakage. Check the gland seal wear - change gland as necessary.
- Listen for abnormal gearbox noises - sign of wear.
- .....
- .....

5.8 Every 5 years:

- Dismantle, clean and lubricate bearing housing..
- Carefully check all parts of the power unit gear box.
- Replace rubber seals (if fitted).
- .....

6.Components

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WARNING!

Before any installation or maintenance work, make sure that the main switch is turned off and locked, and that the key is stored in a safe place, so that nobody can start the equipment by mistake!

Remember the accident risk! Use only recommended and approved and certified lifting equipment and slings!

Dismantling and re-assembly

6.1 Drive Unit.

- Rotate the screen into its horizontal "maintenance" position and carefully support.
- Support the weight of the drive unit.
- Electrically disconnect, taking careful note of the termination details.
- Remove the plastic shaft end cover, then loosen and remove the cap screw and washer holding the gear box onto the screw shaft.
- Undo the 4 bolts securing the gear box flange to the screw trough end. In some cases, access to these nuts is not possible without removing the screen end cover and gear box support. This is done by loosening and removing the flange bolt. The mounting flange can then be removed with the gear box.
- Pull the gear box off the shaft end, and lower it to the ground.
- 7.Clean inspect and lightly lubricate shafts prior to re-assembly.
- Re-assembly is simply reversal of above.

6.2 Screen Basket.

- Lift the screen into its maintenance position and support carefully.

Note, when the basket is removed, the screen will become top heavy, so ensure it is well supported under the gear box and under the conveyor zone.

- Clean the basket area with high pressure water jet or similar.
- Loosen and remove the bolts securing the basket assembly into the screen body.
- If the screen is fitted with a jacking screw across the upper opening, jack the basket flange apart to facilitate withdrawal of the basket.

If no screw is fitted, it may be necessary to jack the flange apart slightly using a small bottle jack or similar. The flange needs only to be jacked open approximately 5 mm.

9.4-12

- Withdraw the basket taking care not to damage it against the screw.
- Re-assembly is reverse sequence of above.

6.3 Brush.

- Lift the screen into its maintenance position.
- Remove the basket as outlined in 8.2.
- Locate the clamps securing the screw brush. Undo the bolts holding them in position, discard the old clamps.
- If it is not the intention to re-use the old brush, it may be cut out. Otherwise, it should be "unscrewed" away from the spinal after loosening all the bolts.
- Before re assembly, check the spinal for damage and undue wear. Renew the clamps.
- The new brush should be "screwed" onto the spiral until it reaches the tapered section. Secure the clamps starting at the downstream side of the spiral, that is the non drive end, and work progressively towards the drive end, fixing and securing the clamps as you go. Take special care not to have any loose sections of brush not clamped in position.
- Replace the basket as outlined previously. Note the new brush will now protrude further beyond the spiral so the basket opening may have to be "expanded" more to fit over the new brush.

6.4 Screw.

The screw by its very nature is contaminated, so a wise precaution is to clean it using water jets prior to carrying out any work.

In extreme cases, the screw may become damaged or bent, and must be replaced.

- Raise the screen into its horizontal maintenance position, and support as necessary.
- Remove the drive unit as previously advised.
- Remove the covers along the length of the conveying zone.
- Remove the sieve basket as described previously.
- Withdraw the screw from the non drive end taking care not to damage the dewatering cage at the discharge end of the screen.

Once the screw has been withdrawn past the dewatering zone, the screw may be liftedvertically if it is more convenient.

- Take care lifting the screw as it is flexible and may become damaged if not properly supported.
- It is possible to remove the screw without dismantling the gear box or the sieve basket.

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However, it is more convenient to remove both these items even though it is more time consuming.

6.4.1 The screw is supplied as one unit and whilst it is not recommended to weld repair the screw, it is possible. The following welding procedure is to be followed:

- Check that the sections of screw to be welded are straight and undamaged.
- Place the sections of screw in the screen trough, which makes it easier to get the screw straight.
- The edges to be jointed should be prepared for X or K weld jointing and placed facing each other with 2 mm separation.
- The spliced areas are cut at 90 degrees to the diameter of the screw.
- Before welding, make sure the spiral length is correct and that the liner is well protected.
- Carefully weld together the sections.

Alternately spot weld both sides of the screw joint along the edges.
Continuously weld one side of the joint, followed by a continuous weld on the opposite side.

Repeat welding until the joint is completely filled. 3 weld strings along each side is recommended to obtain good strength.

- Check screw for alignment, the maximum allowed curvature is 5mm/m length.

NOTE! Before restarting, ascertain the cause of failure.

6.5 Replacement of Liner.
Under normal circumstances, the screen liner should last up to 3 years, if the liner is damaged before this period has expired, please refer to Conpura who may be able to offer operational advice or alternative materials.

- Remove the motor, gear box, covers, screw as described previously.
- Unbolt the liner bolts and remove.
- Remove the liner, taking care to clean the trough of accumulated deposits and perhaps remains of the glue.
- Place the new liner into the trough and press down carefully such that no air is trapped between the trough and the liner. If there is a space left between the trough and the liner, this will lead to accelerated wear of the liner.

A. Piece of timber placed in the base of the trough can be used to push the liner down into the trough. Alternatively, the screw can be placed into the trough, the weight of which will push the liner into position.

9.4-14

- Drill the liner using the existing holes in the trough as a guide. Bolt the liner into position with the coach bolt head on the inside.

- Trim the liner at the discharge end. Chamfer the liner at the inlet end. If there are any joints, these should be glued using a good quality impact adhesive.

- Re-assemble the screen as described previously and test run, listening for abnormal noises and vibrations. Inspect the liner seams and check for bubbles in the lining.

6.6 Dewatering zone.
The dewatering zone positioned directly adjacent to the discharge section. It is manufactured from wedge wires and designed to compact and de-water screenings prior to discharge.

The dewatering cage can be inspected by lifting the top cover. Normal operations should show the cage packed full, and extruding water and soft materials, which should be flushed away by the "U" shaped spray bar.
The compaction cage is not normally a major wear part, however, in case of damage, it should be replaced or returned to Conpura for repair.

Removal.
1. First, remove covers, basket, screw as described previously, with the screen in its maintenance position. If the screen is fitted with a heating jacket the upper cover of this will also have to be removed.

2.With the cover from the de-watering zone removed, unbolt the cage supports from around the outside of the dewatering zone. Unbolt and remove the wash water pipem work.

3. Lift the cage vertically upwards, taking care not to damage it.

4. Inspect the cage for wear, note the cage can be installed at any one of 4 positions. If any wear occurs, it will be at the lowest side. When re-installing, place this worn side 90 degrees removed from its starting position.

5. Re-install the cage, noting the alignment of the base of the cage with the topside of the liner. If this alignment is incorrect, there is a danger of interference between the screw and the dewatering press.

6. Re-assembly, is simply the reversal of steps 1 to 4.

7. Electrical equipment

WARNING!
An electric chock can hurt or kill! Treat all electric equipment as powered. Avoid contact. Switch of the main power supply before any kind of maintenance or repair work.

7.1 General

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Responsibility and Liability

Components **not supplied** by **Conpura** are outside the supply contract responsibility and liability. In the case of damage to the equipment, function and warranty responsibilities are disclaimed if the electrical wiring is incorrectly connected or designed.

Recommendations

- In case of an overload the control circuit must break the motor current and also interlock the start-up conditions until a manual reset button is pressed (after cause remedy).
- Post signs to indicate automatic start-up.
- Install emergency stops at local operator screen access points.
- Follow the electrical installation instructions as given for each particular unit.

7.2 Drive unit

The bar screen drive is equipped with a motor (named DM) to drive the rake at a speed of approximately 6 m per minute.

The amount of screenings removed will normally be controlled by adjusting the down time at the end of the screen cycle. There is also an opportunity to adjust the head loss through the screen in the channel (optional).

7.3 Control devices and functions

Refer to control schematic drawings supplied by others.

Recommendations The control system, supplied by others, should as a minimum supply incorporate the following:

- Local/Remote operation
- Local forward/reverse jog push-button station complete with emergency lockout feature
- Adjustable cycle timers
- Overload guard manual overload reset
- Local status indicating lights
- High Water level indication and alarm

ATTENTION!

The electrical control system is an important element of the machine and must conform with the European Community directives.

---

8. Trouble shooting

Caution! Operation by unauthorised personnel may endanger personnel and property.

The following table is intended as a general guide for troubleshooting electrical problems. For specific details consult the wiring schematics generated by others.

8.I Electrical

9.4-16

FAULT	CAUSE	REMEDY
No current to the panel	Main switch in "OFF" position.	First make sure nobody is working near the equipment. Then turn on the main switch.
	Fuses burned out.	Replace fuses.
	No main supply voltage.	Arrange for proper voltage supply.
Wrong direction of rotation	Motor incorrectly connected	Reverse phase wires.
Motor will not start	Fuse burned out.	Replace fuse.
	Motor overload protection has tripped.	Determine fault and/or adjust overload to proper setting.
	Motor protection inoperative.	Check operation of motor protection.
Motor will not start or starts with difficulty.	Designed for delta connection but is connected star.	Correct motor connection.
	Main voltage and frequency do not correspond to the rating of the motor.	Change motor or adjust electrical supply.
	Overload tripped.	Check reason for overload Rectify and reset trip.
Fuses blow or motor protection trips.	Short circuit	Trace and correct.
	Short circuit in motor.	Meggar motor.
	Line terminals incorrectly connected.	Correct
	Motor overloaded	Remove overload condition.
Motor over heated.	Motor connected "Delta" instead of "Star" as described.	Correct
	Main voltage differs from rated motor voltage by more than 50%	Apply a main voltage within the rated voltage range of motor.
	Volume of cooling air inadequate.	Clean around motor cooling fan

9.417

	Cooling air ducts clogged up.	And arrange for undisturbed air flow throw the motor.
	Cooling air is pre-heated.	Arrange for cool air supply.
	3-phase motor is running on 2 phase. Connections are lose or on fuse is burned out.	Secure loose contact. Replace fuse. Check reason for blown fuse.
	Motor is overloaded.	Verify screen operation or increase motor size.
Motor trums and takes excessive current.	Windings wet or faulty.	Megger motor. Mechanically check screen for binding.
Motor overload.	Capacity too high.	Lower the load of material.
	The unit is clogged up.	Remove the obstruction.
	The gearbox is damaged.	Replace.
Limit Switch inoperative.	The switch is not mechanically actuated.	Adjust gap setting.
	Oxide on contact surface.	Clean or replace.
	The switch is damaged.	Replace the switch.

Caution! Operation by unauthorised personnel may endanger personnel and property.

8.2 Mechanical

FAULT	CAUSE	REMEDY
The overload guard doesn't break the motors power supply.	The guard is rusty and seizing.	Grease with regular intervals. In extreme cases - replace the switch.
	The switch has been dislocated / located incorrectly.	Contact Conpura or representative.

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	The switch has been disconnected.	Check circuit and correct.
Excessive wear on carriage rollers.	Incorrect alignment of the Carriage, chain sprockets or frame.	Correct the alignment on required parts.
	The rake is overloaded.	Check / adjust springs for rake pressure and overload guard .

9. Spare parts

9.1 Wear Parts

All parts that are subject to wear are "wear parts". The life cycle varies with the wear, maintenance, environment, time of operation, start intensity etc. Spare parts for "wear parts" should be stored in the original manufacturers packing in a clean and dry storage.

When deciding what spares to hold in storage, the following must be considered.

- are the parts subject to heavy wear and must be replaced with even intervals.
- is the costs of parts reasonable?

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- time for delivery is short.
- time for shut down is critical.

It is therefore important that the product user together with the Conpura personnel discusses the above and agrees on a reasonable spare part availability with respect to the type of installation required.
As a minimum we would recommend the following spares be held in store.

1.Set of spinal brushes and clamps.
2.Liner.

Additional spares for 5 years operation.

1. Spare motor.
2. Spare gear box bearings.

For additional information on spares, please refer to Conpura.

9.2 Storage of Spare Parts.

In general holds that more sensitive equipment such as electrical equipment, gear boxes, bearings, seals polished or glossy shaft etc. are kept dry inside. Less sensitive equipment such as steel, metal parts etc. can be kept inside. In both cases, they should be treated to withstand corrosion.

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Appendices A

Contents:

A. Claim Report

9-4-21

Claim Report

Plant:.....

Conpura order number:.....(See name plate)

Type of product:.....

Placed:.....

Duty:.....

When was the trouble
discovered?.....

Who discovered the trouble?.....

How long has the trouble been present before
discovery?.....

What is damaged?.....

What may have caused the problem?.....

Which problems causes the
trouble?.....

Can the product be in operation despite the
problems?.....

Note!
If the defect is great and may cause more damage, the unit shall immediately be taken out of operation.

Can trouble be solved by the customer if Conpura supplies spare parts and garant the job?
.....

In order to simplify handling please give:

Respondent:.....Position:.....

Telephone:..... Fax:.....

Other contact:.....Position:.....

Telephone:.....Fax:.....

9.4-2

Appendix B.

Technical specification

94-23

PLANT: Powell River W.S.T.P. DATE:980226 Order no: 1485-1351

TECHNICAL SPECIFICATION FOR ML SCREENSCREW SCS 50

General:	Type SCS 50 shaftless screwscreen with dewateringpress. Inclined at 35 degrees and designed for installation in a 610 mm wide channel. Discharge height 3322 mm. LOA = 6670.
Duty:	To separate, transport and dewater municipal screenings.
Screw:	Shaftless spiral made of cold rolled flatbars in SB400D. Outer dia. 285. Lower part is provided with an exchangeable brushunit for rinsing of the screenholes.
Trough:	320 mm trough in 3 mm thick stainless steel SS 304. The trough is provided with drilled flanges at each end. Trough section equipped with spray system and solonoid valve.
Press section:	Designed as a special-slotted pipe to the trough. An outer casing with access door and 3" drainage is provided. Equipped with spray system and solonoid valve.
Trough liner:	Trough lined in 8 mm polyurethane.
Screenunit:	920 long x 500 wide, made of a semicircular, diameter 3 mm perforated plate Screen unit is flange connected to the trough.
Supports:	One frame for bolting to foundation. Stainless steel expander bolts are included.
Driveunit:	Spurgear SEW FAF77, DT 90 L4. Speed 8,5 rpm.1690 Nm. In 3,7A/400V Electric motor 1,5 kW, 575 Volts, 60 Hz.
Overload guard:	1 No electronic overload guard is included for installation in a holding circuit in the control panel.
Material:	Trough, press section, flanges and supports SS 304.
Surface treatment:	Steel parts are painted in accordance with Swedish standard RS 8. Driveunit is improved by Conpura. Colour RAL 5017 blue. Trade components according to respective manufacturers standard.

9.4-24

PLANT: Powell River W.S.T.P. DATE:980226 Order no: 1485-1352

TECHNICAL SPECIFICATION FOR ML SCREENSCREW SCS 50

General:	Type SCS 50 shaftless screwscreen with dewateringpress. Inclined at 35 degrees and designed for installation in a 610 mm wide channel. Discharge height 3322 mm. LOA = 6670.
Duty:	To separate, transport and dewater municipal screenings.
Screw:	Shaftless spiral made of cold rolled flatbars in SB400D. Outer dia. 285. Lower part is provided with an exchangeable brushunit for rinsing of the screenholes.
Trough:	320 mm trough in 3 mm thick stainless steel SS 304. The trough is provided with drilled flanges at each end. Trough section equipped with spray system and solonoid valve.
Press section:	Designed as a special-slotted pipe to the trough. An outer casing with access door and 3" drainage is provided. Equipped with spray system and solonoid valve.
Trough liner:	Trough lined in 8 mm polyurethane.
Screenunit:	920 long x 500 wide, made of a semicircular, diameter 5 mm perforated plate Screen unit is flange connected to the trough.
Supports:	One frame for bolting to foundation. Stainless steel expander bolts are included.
Driveunit:	Spurgear SEW FAF77, DT 90 L4. Speed 8,5 rpm.1690 Nm. In 3,7A/400V Electric motor 1,5 kW, 575 Volts, 60 Hz.
Overload guard:	1 No electronic overload guard is included for installation in a holding circuit in the control panel.
Material:	Trough, press section, flanges and supports SS 304.
Surface treatment:	Steel parts are painted in accordance with Swedish standard RS 8. Driveunit is improved by Conpura. Colour RAL 5017 blue. Trade components according to respective manufacturers standard.

9.4-25

Appendix C.

Installation drawings

Drawing
9.4-26

Commissioning and Service

9.5-1

SEW EURODRIVE

Please read this manual carefully before proceeding with the installation of your EURODRIVE product. Warranty claims may be affected if the unit is not installed and maintained in accordance to these instructions. This manual will also enhance your understanding of EURODRIVE products to make their operation extremely dependable and efficient.

One copy of this manual should be included with every, shipment, leaving our Ontario, Quebec or British Columbia assembly centres. Additional copies can be obtained from anyone of our offices in Canada.

INDEX PAGE

This manual may not provide all the information available concerning the installation, operation and maintenance of all EURODRIVE products. References within the text indicate the availability of additional information.

Because of ongoing technical improvements of the EURODRIVE product line, we reserve the right to change the data contained in this manual without notice.

Effective: June 1993

9.5-2

Installation and maintenance of gear reducers

General

Please read and follow these instructions carefully to obtain maximum performance while maintaining warranty rights on the equipment received.

Every EURODRIVE product is factory tested and properly packaged before it leaves our company. Please report any transport damage to the agent of the forwarding carrier.

Storage

If the reducers are to be stored before installation, the storage area should be dry and well ventilated. Prolonged storage and/or storage in areas of high humidity, requires special precautions. Instructions for long term storage can be obtained from EURODRIVE.

If storage is done in an area of extreme and rapid temperature changes, the ventilation plug should be installed for the period of storage (See "Lubrication").

Mounting

The reducers must be mounted on a firm, rigid, plane base, preferably with a machined surface. The support must not flex under load, and the unit has to run vibration free at all times.

Careful alignment with the driven machinery is essential. In applications that exert side loads onto the shaft, mechanical side stops, adjustable if possible, should be installed onto the mounting surface.

To maintain the warranty, the reducer shall not be modified or other equipment attached to it.

Installation of Driven Members

The shafts are protected against corrosion with a vinyl strippable coating, which can be easily removed without using chemicals. If chemicals are used for shaft cleaning, avoid contact with the shaft seals to protect seal and bearing lubrication.

EURODRIVE shafts are machined with tolerances as shown on the dimension sheets in our catalogues.

Driven members, sprockets, pulleys, and sheaves should be heated to 80 degr. C (180 degr. F), and pushed over the slightly greased shaft. Metric shafts are provided with centrebores which can be used for attachment of mounting tools.

Reducers with keyless hollow shafts (Ringfeder or Stuewe taper-locks) require special attention. See instructions on the next page.

Never force driven members with hammer strokes onto the shaft. Doing so will greatly decrease bearing life.

Belts, chains, etc., should be mounted as close as possible to the casting of the reducer to reduce overhung loads on the shaft. Values for maximum permissible overhung loads are published in EURODRIVE catalogues, or can be obtained from our offices.

Lubrication

EURODRIVE reducers are shipped with the proper oil level according to the mounting position specified on the original order.

The reducer is provided with: a red-painted level plug, a drain plug located on its lowest spot, and a blue-painted plug indicating the location for the breather plug. The breather plug is shipped in a plastic bag attached to the reducer. Breather plugs for gearmotors are shipped inside the motor terminal box. Some reducers (i.e., R/RF30 and S/SF30) do not require ventilation.

When the installation of the drive is completed, the blue plug should be located on the highest spot on the reducer. The location of the level plug and the ventilation plug must be checked according to the mounting position data contained in this book, pages 21 to 26.

In certain mounting positions, slight oil loss through the breather plug--due to foaming of oil, or due to internal agitation--might occur. In these cases, the ventilation plug can be substituted with a solid plug, since our reducers are safe to be run sealed.

For washdown applications, specially protected ventilation plugs are available to prevent water from being sucked into the gearcase enclosure.

Some gear reducers, specifically types R/RF30 and S/SF30, do not need any maintenance. They can be mounted in any position and therefore, do not have a level plug. For refills, see page 27 for type and quantity of oil to be used.

Before starting the unit, the proper oil level has to be checked at the red-painted level plug. If lubricant is missing, fill to the proper level with the oil suggested on page 27. Mixing different types of oils should be avoided. Using types of oils other than those shown on page 27 may void the warranty. Oil quantities needed for complete refills are shown on page 28.

After the initial start up, the oil level should be checked periodically, and the area surrounding the reducer should be inspected for evidence of leaking oil.

We suggest changing the reducer oil every 10,000 hours of operation, or every 2 years, whichever is shorter. With the use of synthetic lubricants, 20,000 hours or 4 years of operation can be obtained. Adverse environments, high humidity, aggressive media, and high temperature will shorten the useful life of the lubricant.

CAUTION: Synthetic lubricants must not be mixed with other types, or brands, under any circumstances.

Bearings

Antifriction bearings are either lubricated by the gear oil, or are provided with sealed grease packings. EURODRIVE does not prefer to provide field re-greasable bearings (Zerk fittings) since today's high quality greases will likely outlast the bearing. If downtime, due to bearing failure must be avoided under any circumstances, periodical cleaning, checking and re-greasing with specified grease is recommended. As option, the input covers of helical gear units can be provided with regreasing facilities, or oil bath lubrication on larger units.

9.5-3

Dismantling Reducers

Please refer to page 5 of this manual.

Mounting and Dismounting Hollow Shaft Reducers

Keyed Hollow Shaft Units

EURODRIVE's keyed hollow shaft units are symmetrical. The driven shaft can be inserted from eitehr side.

If the reducer has been delivered with the fasteners on the improper side,bolts,washers, circlip and the safety cover should be removed and mounted opposite of the driven shaft. See Fig.1. Note that some reducer styles have a plastic plug instead of the safety cover.

To avoid fretting corrosion, the inserted mating shaft must be undercut and finished with tolerances shown on page 4. Corrosion retarding greases such as Molykote 321R (or equivalent) must also be applied before slipping the reducer over the driven shaft. See table Fig.5 for other recommended lubricants.

The Removal

Removing hollow shaft reducers can be accomplished with the use of simple tools. One simple method is shown in Fig.2. To make this method practical, we suggest inserting a modified thrust washer into the hollow shaft before mounting the reducer onto the driven shaft. The washer may be inserted afterwards if there is sufficient space between the shaft-end and the circlip.

The modified washer is not included with the unit. It can be easily manufactured on-site with dimensions shown on page 4 of this booklet.

Hollow Shafts Without Keyways

This reducer uses the Stuewe or Ringfeder-shrink fit to hold the reducer onto the driven shaft. These reducers are not symmetrical. The shrink-fit assembly is always located opposite the output shaft. A change of the output side requires disassembly of the reducer. See page 5 of this manual for instructions.

To install these reducers, first remove the protective cover and make sure that the locking screws are loose. Next, clean the hollow shaft bore and the driven shaft, and then slip the reducer over the shaft. See Fig.3. A thin coat of Molykote can be applied to the shaft, at the location indicated in Fig.3.

Slightly tighten any three screws which form the points of an equilateral triangle (screws 1, 5 and 9 in Fig.4), until locking collars lose all their play, but still can be turned.

CAUTION: Heavy tightening of the screws at this time can cause permanent deformation of the inner ring. Measure the gap between both locking collars at various points to ensure equal spacing.

After measuring, tighten all locking screws gradually and in the sequence shown in Fig.4. Several passes are required until all screws are tightened to the specific torque which is embossed on one of the collars. A torque wrench must be used.

Removal

Removal of these units is similar to the installation procedure. Gradually loosen the screws in the order shown in Fig.4.

Do not remove the screws or the locking collars completely. The locking collar assembly should only be removed if the assembly is rusty or dirty. If it is to be removed, it must be cleaned and lubricated on the sliding surfaces with one of the lubricants shown in table Fig.5.

The locking screws should be lubricated with multi-purpose grease.

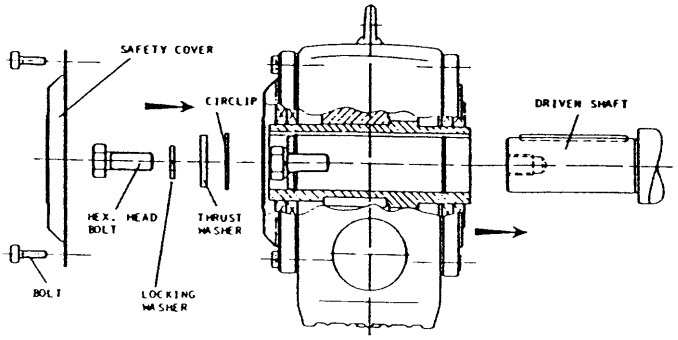


Fig.1: Mounting of Keyed Hollow Shaft Units

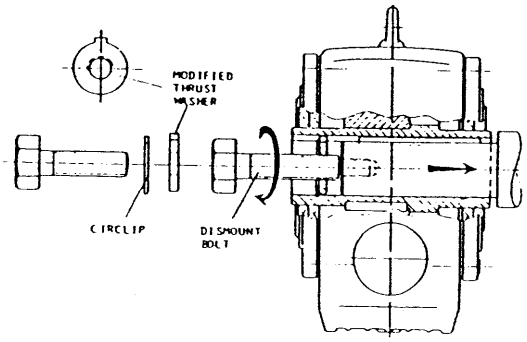


Fig.2: Dismounting of Keyed Hollow Shaft Units

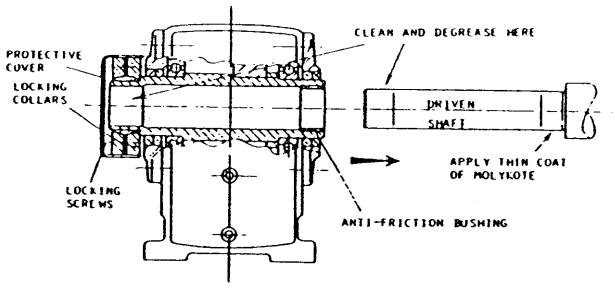


Fig.3: Mounting of Shrink-Fit Hollow Shaft Units

LUBRICANT (Mo S2)	TYPE
MOLYKOTE 321 R (LUBE COAT)	SPRAY
MOLYKOTE SPRAY (POWDER SPRAY)	SPRAY
MOLYKOTE G RAPID (AEMASOL MO 19P)	SPRAY OR PASTE
DIO-SETRAL 57 N (LUBE COAT)	SPRAY OR PASTE

Fig.5: Lubricants for Shrink-Fit Collars

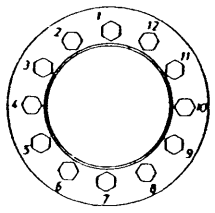
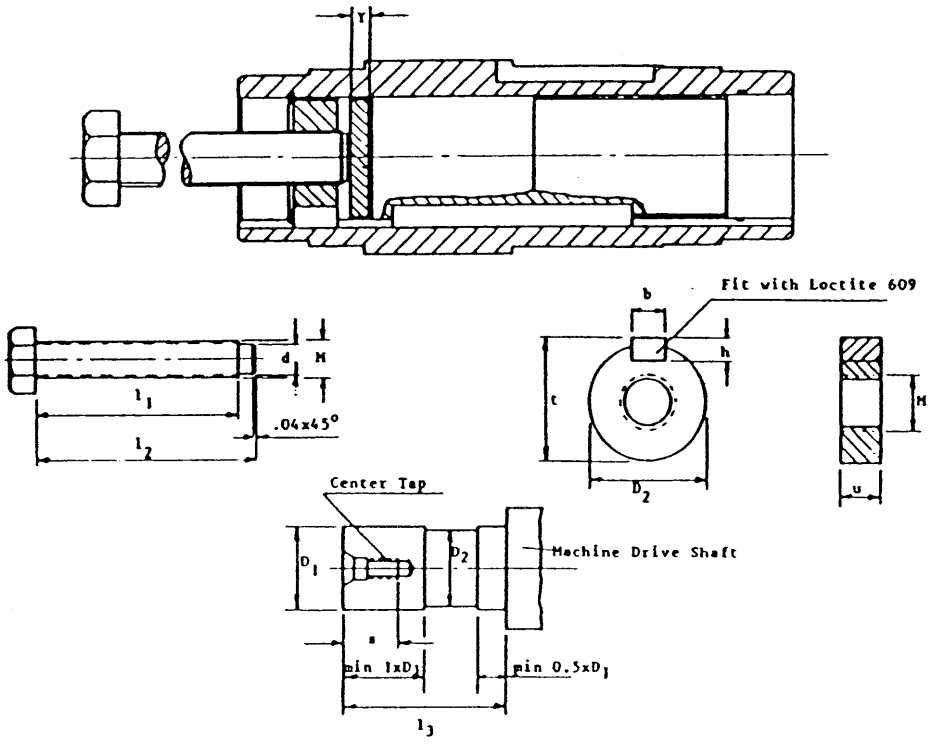


Fig.4: Tightening Sequence

9.5-4

Inserted Shaft Configuration and Hollowshaft Removal Tool



Inch Series Hollowshafts (In)			
Shaft Dia. Key Size	Shockload Factor I	II	III
.750 3/16x3/16	0 -.0005	+.0003 -.0001	+.0006 +.0001
1.250 1/4x1/4	0 -.0006	+.0004 -.0002	+.0007 +.0001
1.375 5/16x5/16			
1.500 3/8x3/8			
2.000 1/2x1/2	0 -.0007	+.0005 -.0003	+.0008 +.0001
2.375 5/8x5/8			
2.438 5/8x7/16			
2.750 5/8x5/8			
2.938 3/4x1/2			
3.250 3/4x3/4	0 -.0009	+.0005 -.0003	+.001 +.0001
3.438 7/8x5/8			
4.000 1x1			

Fig.6: Dimensions for inch series shaft with keyway.

Reducer Size	D_1	D_2 -.008	d_1	y	l_1	l_2	l_3	M	t	b	h	s	u	Center Tap
FA,SA40	1.250	1.245	.500	.20	5.80	6.00	3.90	5/8-18	1.36	.250	.250	1.0	.59	7/16-14
SA 50	1.375	1.370	.500	.20	5.80	6.00	4.09	5/8-18	1.52	.312	.312	1.0	.59	1/2-13
FA60,KA66,SA60	1.500	1.495	.813	.20	6.80	7.00	4.96	1-14	1.65	.375	.375	1.75	.79	5/8-11
FA70,KA76,SA70	2.000	1.995	.813	.20	8.30	8.50	6.02	1-14	2.22	.500	.500	1.75	.79	5/8-11
FA80,KA86,SA80	2.375	2.370	1.000	.30	9.30	9.50	6.81	1 1/4-12	2.65	.625	.625	2.0	.94	3/4-10
FA80,KA86	2.438	2.433	1.000	.30	9.30	9.50	6.81	1 1/4-12	2.60	.625	.438	2.0	.94	3/4-10
FA90,KA96,SA90	2.750	2.745	1.000	.30	12.30	12.50	9.13	1 1/4-12	3.02	.625	.625	2.0	.94	3/4-10
FA90,KA96	2.938	2.933	1.000	.30	12.30	12.50	9.13	1 1/4-12	3.14	.750	.438	2.0	.94	3/4-10
FA100,KA106,SA100	3.250	3.245	1.000	.30	13.80	14.00	10.83	1 1/4-12	3.58	.750	.750	2.0	.94	3/4-10
FA100,KA106	3.438	3.433	1.000	.30	13.80	14.00	10.83	1 1/4-12	3.69	.875	.500	2.0	.94	3/4-10
KA126	4.000	3.995	1.250	.30	16.30	16.50	12.87	1 1/2-12	4.44	1.000	1.000	2.5	1.18	7/8-9

9.5-5

Disassembling Gear Reducers

General

The following information is a general guide-line for the disassembly of a typical EURODRIVE reducer. If additional information is needed, call our office and have the information contained on the reducer's nameplate available.

On the reducer's nameplate, under "Type", a code of several digits will be embossed. The first digit (either an R, S, K, or F) establishes the type of reducer.

Typical cross sections of the four EURODRIVE reducer types are shown on page 20.

Some types and sizes are quite different than the ones shown on page 20. For this reason, a Spare Part List should be obtained for proper identification of parts prior to disassembly.

The Spare Part Lists do not bear any part numbers for the gears, since these will vary for different ratios. EURODRIVE gears have embossed numbers for positive identification. When ordering replacement gears, please have this number ready.

Certain reducer parts will be destroyed during the disassembling process. Replacement parts should be on hand before starting the disassembly. These items generally include: gaskets, seal rings, bearing caps, nilos rings and oil slingers. A set of shims is needed if gears are to be replaced.

Bearings used are standard sizes, their international code is shown on our Spare Parts Lists.

Helical Reducers Type "R....","F...."

Drain oil and remove input and output cover assemblies. "RX.." and "FA.." type reducers do not have any output covers. The "FA.." reducer has a square coverplate instead.

All shafts, gears and bearings can be removed from the main body of the reducer after the circlips are removed.

Some shafts have to be pressed out of the gearhubs. To do so, on some gears supports have to be placed between the gears and the casting, to keep the gears aligned in a horizontal position during the pressing action.

Assemble the reducer in reverse order, placing shims between bearings and circlips to eliminate endplay.

If the input pinion has been removed from its shaft (motor shaft or input shaft) the shaft and the pinion have to be cleaned of any grease. Apply a few drops of "Loctite RC/609" on the shaft before remounting the pre-heated pinion gear.

On the assembled reducer, with the cover(s) removed, the embossed identification numbers should be visible on the gears.

Gaskets should be set in liquid seal (Permatex) to ensure tightness. Reducers of the latest design (R..2,3, K...6) have no gaskets on the output housings or bearing flanges. Loctite 574 has to be applied in all areas.

Worm Gear Reducers Type "S.."

Proceed as with type "R.." and "P.." reducers, with following additional considerations:

On "S.." type reducers, footmounted style, the output shaft must be removed to enable the removal of the remaining gears.

Removal of the output shaft:

After the seals, circlips, shims and bearing caps are removed, the gearbox must be placed under a press, with the output shaft pointing downwards. Place keystock of appropriate dimensions inside the reducer, below the wormwheel, to keep the shaft/wormwheel assembly in the centre of the reducer, while the shaft is being pressed out. Failure to support the worm wheel may damage the worm gear.

On flange-mounted and hollow shaft reducers type "SF.." and "SA..." these procedures are not needed, since the output shaft can be taken out of the housing together with the worm wheel.

Worm gear adjustment:

The worm wheel has to be centred on top of the worm gear, when assembling the drive in order to ensure proper lubrication, and achievement of full nominal service life of the gears.

For this purpose, shims are provided on both sides of the worm wheel bearings.

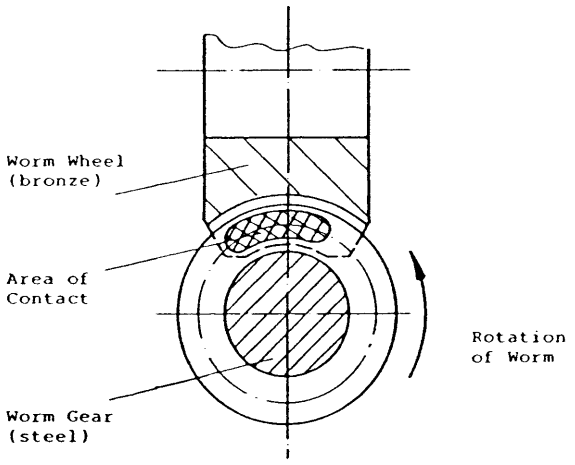


Fig.7: The location of the contact area between worm gear and worm wheel.

Proper shimming can be checked by applying a thin coat of dark grease (Molykote) onto the worm wheel and running the greased portion several times through the gear mesh. The gear contact will leave an imprint on the grease film. This imprint should be centred at the middle of the worm wheel, or slightly offset in the direction of the worm gears rotation. See Fig.7. This offset will ensure better oil penetration into the gear mesh.

Bevel Gear Reducers Type "K..."

There are special instructions available for the disassembly and assembly of these reducers. Please call our office for more information.

9.5-6

Belt Drives "VARIGEAR"

General

EURODRIVE enclosed belt drives do not require any maintenance, with the exception of a periodical check for belt wear.

Every drive is individually tested before it leaves our company. Careful installation and proper operation are essential for its trouble-free performance.

For prolonged storage, varigears may be supplied with the belt removed from belt housing, wrapped in special packing. Install belt according to instructions below.

See page 2 for further mounting and installation instructions.

The drive is designed to operate in temperatures from -30 to +40 degrees C (-22 to +104 degrees F). The speed adjustment mechanism should not be turned on while the drive is at a standstill. We suggest running the drive through the full speed range once a week.

The belt drive air intake and exhaust openings must be kept clear for cool operation. For dust laden environments, special non-ventilated belt drive enclosures (modification "HU") must be used.

In case of free turning speed adjustment wheels, the nut and screw assembly (Fig.8, parts #5 and #6) must be tightened.

Belt Replacement

Due to several design features, the belt life of this drive is exceptionally long under normal operating conditions. Should the belt need to be replaced, proceed as follows (See Figures 8 and 9). Original EURODRIVE belts must be used for replacements.

Adjust the drive to the maximum speed setting and de-energize the motor. Now, turn the speed adjustment wheel to its counter clockwise limit to open the motorized variable pitch pulley.

Remove bearing cover #3, both vent screens, and wheel cover #2. Separate belt housing half A and half B after removing the four bolts #1 (six bolts for drive size 4, 5, and 6).

NOTE: If one of the belt housing halves should need replacement, both halves have to be exchanged, since they come in matched sets only.

Squeeze a wooden wedge into the spring-loaded lower pulley (only on sizes 3, 4, 5, and 6) before removing the worn belt.

Insert the new belt first into the motorized pulley, and pull it over the spring loaded pulley. Remove the wooden wedge, and assemble the components in reverse order.

Lastly, turn the adjustment wheel clockwise until resistance is felt to tension the belt, before operating the unit.

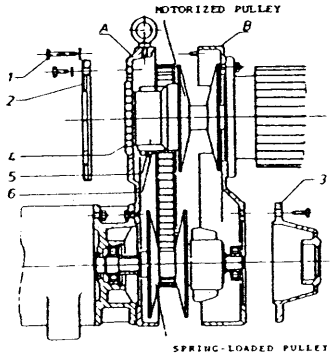


Fig.8: The Basic Beltdrive, Sizes VZ1...VZ4

Repair of Pulleys

EURODRIVE variable pitch pulleys are dynamically balanced for vibration-free operation. Diasassembly of the driven pulley must never be attempted, since this assembly contains a heavily compressed coil spring, which when released could result in serious personal injury. Disassembly may also offset balancing. We recommend installing a matched set of new pulleys in case of wear. Any additional cost will be compensated by longer service life and less downtime.

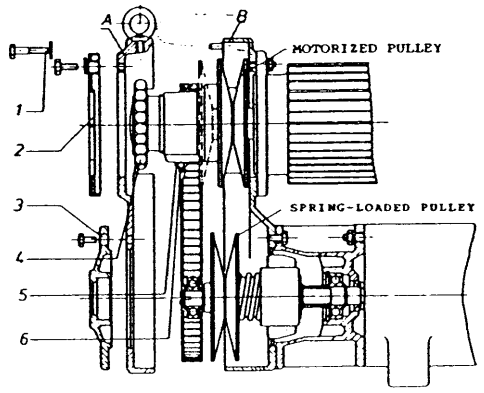


Fig.9: The Basic Beltdrive Sizes VU1...VU5

Speed Range Settings

On our standard drives, the speed range limits are an integral part of the motorized pulley. Contact our office for instructions to reset these limits.

Drives with modification "N","H" and "HS" can be reset in the field (as needed) to compensate for any changes in speed range due to belt wear.

The movement of the motorized pulley is limited by hammer head screws (Fig.10, parts #11 and #12), which become visible after removal of cover #6, on the control head.

The speed range limits for servo-motors (modification "EP") are incorporated in enclosure #8 (Fig.10) in the form of cams and micro switches. For setting procedures see page 9 of this manual.

CAUTION: When changing the speed range on EURODRIVE beltdrives, a replacement belt of different length may be needed. Check with our office.

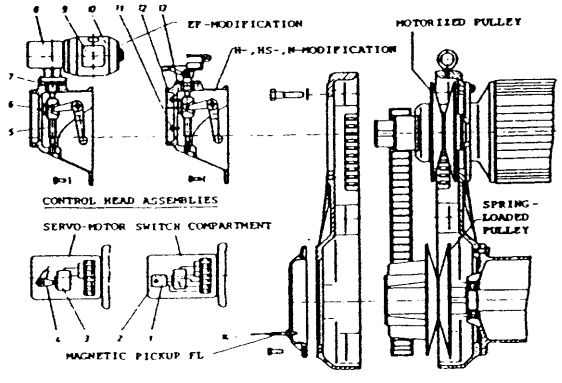


Fig.10: Beltdrive VU6, with std. modifications

9.5-7

Traction Drives "VARIMOT"

General

Every drive is individually tested before it leaves our facility. Careful installation and proper operation are essential for its trouble-free performance. See page 2 for installation recommendations.

Metric output shafts come with tapped centre bores to assist in the mounting of driving members (couplings, sprockets...) with appropriate tooling. Avoid hammering on the shaft. Hammer strokes will cause damage to the friction ring and bearings. If force must be used to mount a driving member, the Varimot drive must be separated as shown in Fig.11. See "Replacing The Friction Ring" below. Hollow shaft #5, has to be removed and the driving member should be pressed onto shaft #1, supporting the opposite end below the press.

Electrical connections must be made in accordance with the drive's nameplate data and local regulations. See the electrical section of this manual for further instruction.

The Varimot, when adjusted through the speed range, moves the motor body vertically. It is therefore necessary to install about 0.5m (20") of flexible conduit at the motor's terminal box.

Varimot drives are typically maintenance-free, except for regular inspections for wear. Speed adjustments should be made only with the drive running. Frequent changes of the speed setting, at a standstill, may cause damage to the friction ring. Should the handwheel turn on its own, causing a shift in its speed setting, tighten locking pin #8.

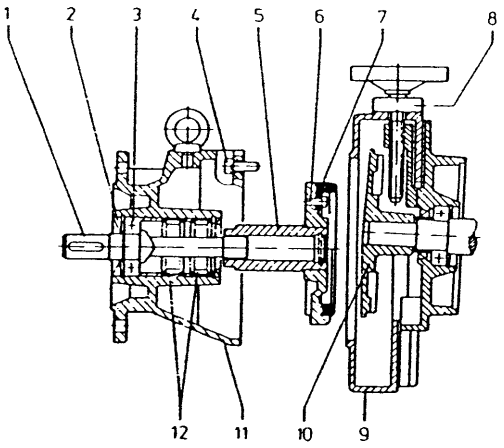


Fig.11: The Varimot Drive

Determining Excessive Wear

As wear on friction ring #7 increases, the backlash of the output shaft, #1, will increase. This backlash therefore, can be used to judge the amount of wear on the friction ring.

The backlash can be gauged directly on the output shaft of footmounted Varimot-drives. When it approaches 45 degrees rotation, the unit should be scheduled for service.

If there is no direct access to the Varimot shaft (as in the case of geared drives for example) the backlash can be also estimated at the motor's fan. To gauge the backlash, the unit then has to be set for 80% speed (pointer should indicate "80" on lateral scale) for this check. Again, if the backlash approaches 45 degrees rotation, schedule the unit for service.

Replacing The Friction Ring

The Varimot's mainbodies, #9 and #11, can be separated by removing the four bolts, #4, to gain access to the friction ring. Friction ring #7, and driving cone #10, have to be checked for wear. If the friction ring shows damage, the whole subassembly #5, #6 and #7 should be replaced.

Inspect the needle bearings, #12, clean and regrease if needed (see lubricants, page 27). If the cam surfaces (#5 end opposite to friction ring) show more wear than 1.0mm (1/25"), the output shaft #1, must be replaced.

Insert the new friction ring sub-assembly into the body. Make sure that the mating cams are lined up properly. Do not use force when tightening the bolts #4, but recheck cam alignment should parts #9 and #11 not seat properly.

CAUTION: Before assembling the drive, make sure that running surfaces of friction ring #7, and driving cone #10, are clean and free of grease. Do not clean with chemicals, but use dry cloth instead.

The assembled unit should have a small amount of backlash at the output shaft.

Energize the drive motor and run the unit slowly through its full speed range. The unit should operate free of noise and vibration.

Drives with Dial Handwheels, Modification "HS"

These speed indication dials work only in the vertical position with the handwheel located on either side of the drive.

This modification, similiar to "K" (sprocket), or "N"(metric stub shaft, with key and circlip), can be easily field installed.

Change of the Handwheel Position

The position of the handwheel can be easily changed to a more convenient location, if needed. After removal of bolts #4, the tail-end portion of the drive can be turned at 90 degree sections.

Proceed as outlined under "Replacing the Friction Ring", when putting the unit back together (cam alignment!).

Wet Ambient Duty Drives, Modification "B"

These are special drives. Among other items, they are provided with drainage holes. Make sure that the hole, which is located at the lowest part of the drive is open.

Speed Ranges

Standard Varimot speed ranges are 5:1 (4:1 on sizes D44 and D45). There are no provisions on the standard drives to change them except on drives equipped with remote-controlled speed options. See the next page for additional information.

Servo-Motor Controlled Drives, Modification "EP", and Speed Indicators "PA", "PL"

Please see the electrical section of this manual for instructions on pages 8, 9, and 10.

9.5-8

Remote Speed Display for Adjustable Speed Drives

Remote Speed Display "PA" for Varimot Drives*

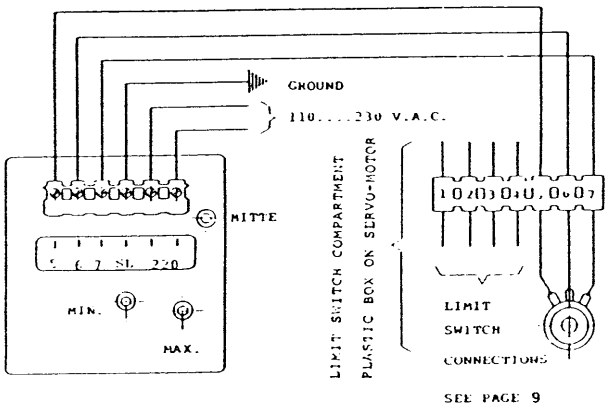
1) The instrument has to be connected to the terminal board of the servo-motor (limit switch compartment) as shown in Fig.12.

   Connect terminals 5, 6, and 7 with the corresponding terminals in the servo-motor's limit switch compartment.

2) Connect the supply voltage to terminals 220. Any voltage from 110 V.A.C. to 230 V.A.C. is acceptable.

3) Adjust the drive to the minimum speed setting, adjust screw "MIN" on back of the instrument so that pointer moves to the 20% mark (25% percent mark on Varimot sizes D42 and D43).

4) Adjust the drive to the maximum speed. Then turn the screw "MAX" on the back of the instrument so the pointer moves to the 100% mark.



SEE PAGE 9

Fig.12.: "PA" Instrumentation

NOTE: Upon energizing the instrument with the specified voltage, it will show the speed (position) at which the drive is set, regardless of whether it is running or not.

*Remote Speed Display "PA" for Varigear Drives

Follow the same basic procedures given for the Varimot above. However, the back of the instrument has a third adjustment screw "MITTE".

Next, adjust the unit to the centre of the speed range (use a tachometer or a stopwatch). Adjust the pointer to the 50% mark on the dial by using the screw "MITTE" on the back of the instrument.

Speed Display "FL", for Varimot Drives

Connect instrument according to Fig.13. Any voltage from 110 V.A.C. to 230 V.A.C. is acceptable.

Adjust the drive to the maximum speed and turn the pointer to the 100% mark with the screw "GROB" (coarse). Make final adjustments with the screw "FEIN" (fine).

In case of a malfunction, remove Varimot driving assembly (see instructions page 7) and check gap between pick-up and monitor screws. The proper gap should be 1.0 mm (0.04"), or one turn on the pick-up thread.

A cable length up to 100 metres (330'), or with a resistance up to 3.0 Ohms is acceptable.

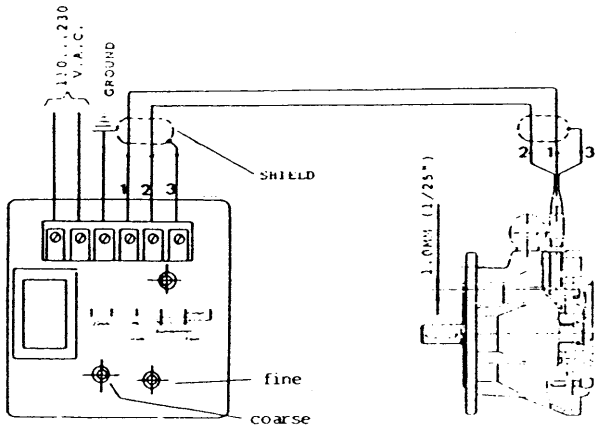


Fig.13: "FL" Instrumentation

NOTE: The "FL" speed display is also available on some Varigear(V-Belt) drives. Proceed as above, or call office for assistance.

Speed Display "FA" Varigear(V-Belt) Drives only

Make electrical connections according to Fig.14. Turn the screw at the back of the instrument so the pointer moves to the 100% mark when unit is adjusted for maximum speed.

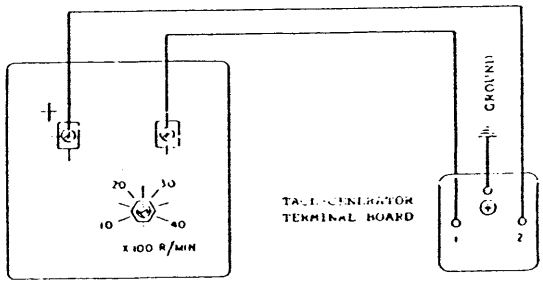


Fig.14: "FA" ("FD") Instrumentation

Speed Display "FD" Varigear Drives only

Follow the same procedures for "FA" speed display. However, since the generator and indicator come as a matched and calibrated set, check the serial numbers of both units before connecting.

Digital Speed Readout "DA"

It can be operated from the magnetic pick-up "FL"-type, or with the tach-generator "FA"("FD")-type.

Call office for instruction sheet 14 765 12E.

9.5-9

Adjustments on Electric Remote Controlled Motors

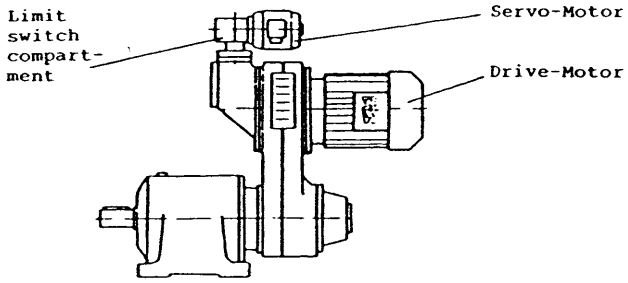


Fig.15: Beltdrive "Varigear" with Servo-Motor

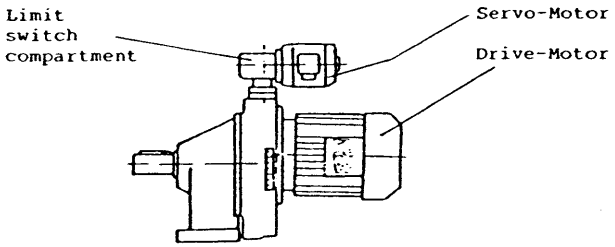


Fig.16: Traction Drive "Varimot" with Servo-Motor

Limit Switch Adjusting Instructions For Varimot Drives For Varigear Drives, use information between brackets

The limit switches - limiting the unit's speed range - are factory set for maximum speed range. Resetting may be necessary after the unit has been dismantled.

The limit switches are located below the plastic cover at gear section of the servo-motor.

1) In case of a new installation, check the wiring of the drive, according to page 10.

2) Remove plastic cover from limit switch compartment.

3) Energize drive motor and adjust the drive to the high speed range limit.

4) Loosen the screws on the cams, and rotate the top cam counterclockwise (clockwise) until it triggers the limit switch contact. Retighten the screw.

5) Adjust the unit to the lowest speed and rotate the bottom cam clockwise (counterclockwise) until it triggers the limit switch. Retighten the screw.

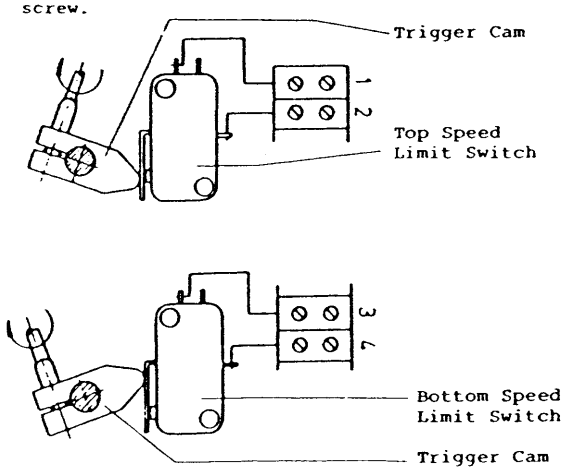


Fig.17.: Limit Switches and Cams

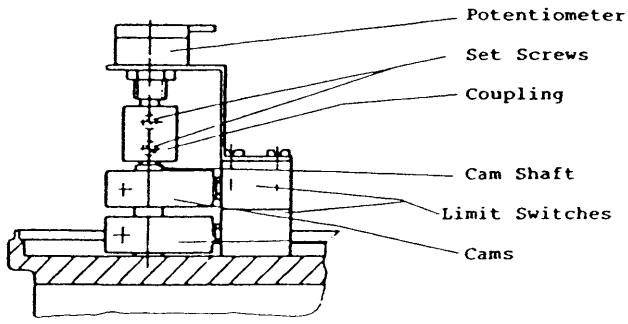


Fig.18.: Camshaft with Cams, Potentiometer

Instrumentation for Remote Speed Display

All instruments for EURODRIVE adjustable speed drives indicate the drive's output speed as a percent of the full speed.

Exceptions are: meters for "FD" types, mechanically coupled tachometers, which indicate RPM, FPM, etc.

Instruments for "PA", and "FL" speed display systems require A.C. input to the terminal marked 220. Any voltage from 110 V.A.C. to 230 V.A.C. will operate the instrument.

The "PA" type speed display requires a potentiometer to be mounted on top of the limit switch cam shaft (see figure 18).

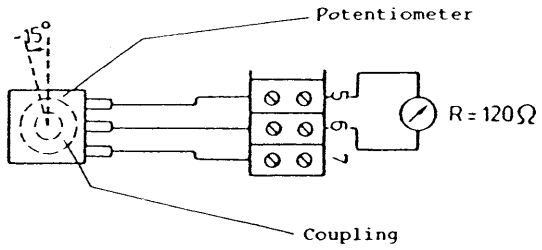


Fig.19: Feedback Potentiometer Setting

Setting of the Feedback Potentiometer

On the cam spindle, a potentiometer will be supplied if a feedback signal - for speed display or closed loop system - is required. The correct setting is accomplished as follows:

1) Make sure the drive is at the minimum speed setting.

2) Loosen one set screw on coupling, and turn potentiometer clockwise (counterclockwise) until it contacts the mechanical stop. Then reverse it 15 degrees counterclockwise.

   Between terminals 5 and 6, a resistance of 120 Ohms can now be measured if set properly.

3) Retighten coupling set screws.

9.5 -10

See page 10 for the electrical wiring of the servo-motor.

Wiring of Electric Remote Controlled Motors

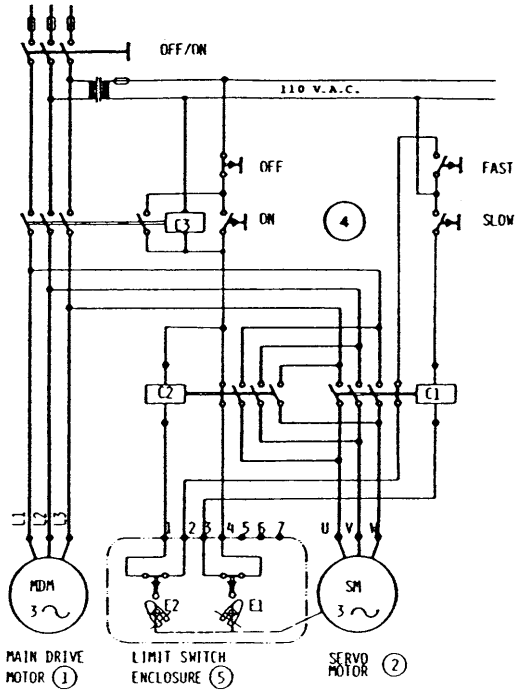


Fig.20: Three-Phase Servo-Motor Push Button Control

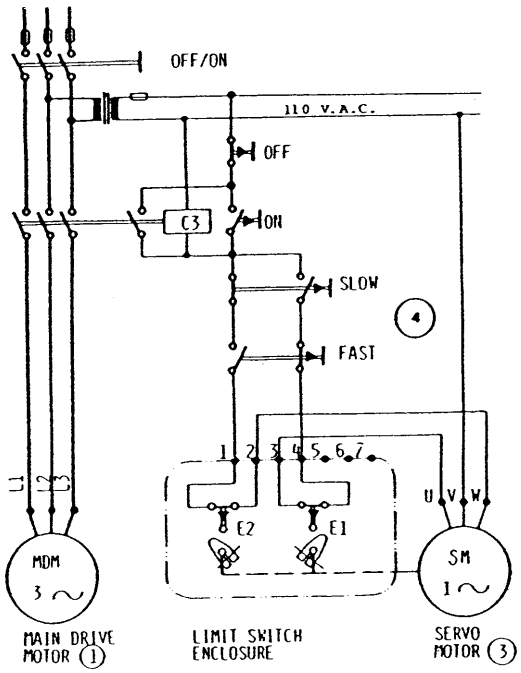


Fig.21: Single-Phase Servo-Motor Push Button Control For Varimot
Reverse leads U-W for Varigear Drive

Variable Speed Drive Type and Size	Mains Voltage for Servo-Motor	
	3/575/60, 3/415/50 3/460/60, 3/380/50	3/230/60 3/208/60 3/220/50
VU/VZ 1, 2, 3 and D12, 22, 23	40.0 Watt 0.054 HP 0.2 A	40.0 Watt 0.054 HP 0.35 A
VZ 4 VU 4, 5, 6, D/DF 32, 42, 43	75.0 Watt 0.10 HP 0.32 A	75.0 Watt 0.10 HP 0.55 A
Terminal Connections for Servo Motor	Z--X--Y U V W | | | L 1 2 3	Z X Y | | | U V W | | | L 1 2 3

Fig.22: Rating and Wiring of Three-Phase Servo Motors.

For rating and connection of single phase servo-motors, see note 3 and diagram 21.

For setting of limit switches see page 9.

For speed display devices see page 8.

EURODRIVE also supplies other remotely-controlled actuators, such as hydraulic controls type "HY" for the Varigear drive, or air cylinders for pneumatically-controlled closed loop systems, type "PP". Call our office for further information.

Notes:

(1) See the motor's nameplate for rating, and inside of the motor terminal box cover for proper terminal connections.

(2) Three-phase servo-motor, see Fig.22 for ratings.

(3) Single-phase servo-motor, one type only for all mechanically adjustable speed drives (not available for the type "VU6"). 115 Volt / 2.1 Ampere rating /120 Watts

(4) This is only a wiring proposal. EURODRIVE usually does not provide any wiring hardware, except for the limit switches, which are part of the servo motor.

(5) Location of limit switch compartment:

Compartment for limit switches and feed back potentiometer

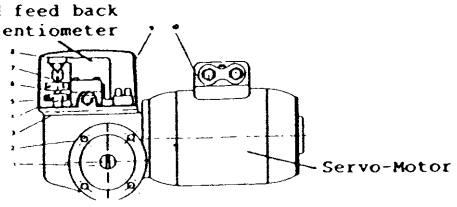


Fig.23: Servo-Motor and Limit Switch Compartment

9.5-11

Three Phase Motors and Brake Motors

In General

Every EURODRIVE motor is fully inspected and dynamically tested prior to delivery. After receiving shipment, inspect for transport damage and report any damage to the forwarding agent of the shipping agency.

For storage, or for mechanical installation, please see page 2.

Electrical Installation

The electrical connections must be made in accordance with local regulations and with the motor's nameplate information.

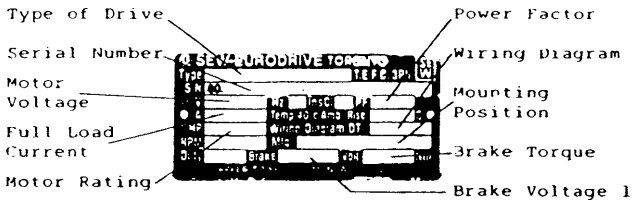
A sample of a nameplate is shown in Fig.24. This nameplate also includes a connection diagram number. A copy of the corresponding diagram is placed inside the motor's terminal box cover. The most frequently encountered connection diagrams are also shown on page 15.

Check with our office if the motor is to run on a voltage or frequency different than specified on the motor's nameplate.

See pages 17 and 18 for typical wiring diagrams for brake motors, dual speed motors, etc.

Any additional questions can be answered by contacting the EURODRIVE office nearest to you. See page 29 for phone numbers.

We recommend that you check the motor's running, idling or starting current after completing the installation. A comparison with nameplate or catalogue data will confirm the proper connection and equipment's sizing.



1 voltage into brake rectifier

Fig.24: Motor Nameplate

The motor should operate successfully on voltages which are within +/-5% of the nameplate specification, however, any deviation may increase the current draw.

Make sure the surrounding area does not restrict the ventilation intake of the motor.

Motor for Washdown Applications

Drainage holes should be installed in motor endbells and the terminal box, if motor is frequently exposed to washdowns.

Motors equipped with drainage holes are shipped from our company with plugs inserted into the holes, for protection. During final installation, these plugs should be removed and the location of the holes should be checked. They have to always be at the lowest points.

Maintenance

Periodically clean the motor's ventilation intake and its cooling fins for best cooling efficiency.

The bearings should be checked, cleaned and regreased every 5000 hours of operation. Regreasing should be done only with specified greases. (see page 27) The bearings should be filled only to one-third of the available space between the races and rolling members to avoid overheating.

When assembling the motor, apply liquid seal around the joints of the end bells, and the stator.

Resetting The Brake

On a properly set brake, the air gap must have the following minimum and maximum values, depending on the brake size:

BM05 - BM4: 0.25 - 0.6 mm (0.010"-0.024")
BM8 - BM31: 0.3 - 1.2 mm (0.012"-0.047")
BM32 - BM62: 0.4 - 1.2 mm (0.016"-0.047")

Prolonged use of the brake will wear the brake lining, which increases the air gap. When the air gap approaches its maximum value, resetting the brake is necessary. To reset the brake proceed as follows:

1. Remove the fan cover (14), rubber seal (19), and all accessories at the fan end.

2) Insert a feeler gauge between the brake coil body (15) and the pressure plate (3), tighten the adjusting nuts (16) until the minimum value for the air gap is reached equally all around. With brakes BM30 to BM62 screw first the threaded bushing into the endshield. After the air gap setting, lock the bushings against the coil body.

3) Ensure a play of 1.5 to 2 mm in the releasing arm. See "The Hand Release Mechanism".

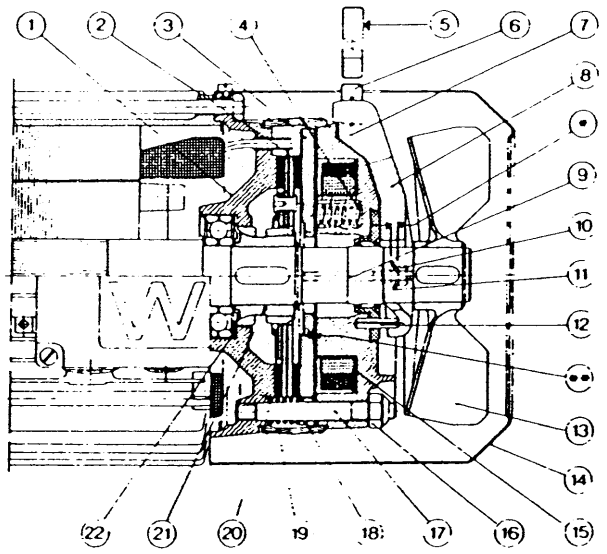


Fig.:25: Setting of Brake

Replacement of the Brake Disc

For motors up to size 100, when the thickness of the brake disc (2) reaches 9 mm, the disc must be replaced. For motors size 112 and up the limit is 10 mm. Contamination of the new brakelining with grease or oil must be avoided.

9.5-12

Changing the Brake Torque

Adjusting or changing the brake's torque is not usually required, since it has been set to the proper value before shipping. Changes in the brakes behaviour generally relate to problems other than the torque. See "Trouble Shooting".

To change the brake torque, remove the fan cover,(14) fan,(13) hand release mechanism,(8) rubber band,(19) and three adjustment nuts(16). Move the coil body(15) about 50mm(2.0") away from the motor. Before doing so, check the terminal box to make sure the brake wires are not jammed below the rectifier block.

Inside the brake coil, a set of up to 6 springs(4) becomes visible at this point. Replace these springs symmetrically with the proper ones to give the brake its desired torque rating. Call our office for information.

When assembling the brake, make sure the brake wire's rubber protection is properly inserted into the end shield(1). Avoid kinking the wire which will weaken the insulation.

Proceed as outlined above under "Resetting The Brake". A new motor nameplate, with the new torque rating should be obtained from our plant.

The Hand Release Mechanism

Most of our brakes are supplied with a hand-operated release mechanism. This allows opening of the brake without energizing the motor to facilitate adjustments on the driven machinery.

There are two types available: The screw-type "BMHF" (6)arrangement which requires an Allen head key, which, when turned clockwise, opens the brake.

The "BMHR"(5) type requires a lever to be inserted into the release arm. A pull away from the motor will open the brake. It will reset automatically, once the lever is released. This arrangement should be applied for hoisting applications. The lever, when not used, is attached to the cooling fins of the motor with clamps.

The hand release mechanism can be easily retrofitted onto the brake. Obtain the kit from our plant and assemble the parts as shown in Fig.25. The studs(9) should be screwed tightly into the stationary disc using Loctite.

Since the stationary disc(3) will move away from the coil body during the brake's operation, it is vital that there is a play(*) on the arm of about 1.5-2.0 mm (0.060"-0.080"). The springs(11) should be placed between the arm(8) and the nuts(10) to eliminate noise.

THE BRAKE RELEASE MECHANISM IS NOT TO BE USED TO CHANGE THE BRAKES TORQUE SETTING. THERE MUST ALWAYS BE CLEARANCE ON THE LEVER, AS OUTLINED ABOVE.

Trouble Shooting Malfunctions

Fault: Motor does not run

1) Check the wiring for damage and proper connection.

2) Measure the values of all three phases
   - resistance
   - voltage
   - current.

3) If, on all three phases a current of similar value is present, either of the following conditions are evident:

   - the motor may be blocked by either excessive external loads, or defects in the reducer or the brake. In this case, the motor should draw locked rotor (in-rush) current. Check our catalogue for values. Release the brake mechanically, reset air gap if needed, or disconnect load for shaft.

   - If the brake is at fault electrically see #4 below.

   - If the current differs essentially from the in-rush current, the motor is either of the wrong voltage, or it is connected for the wrong voltage.

4) Check the brake for electrical problems, if it can be released mechanically, but does not respond to voltage:

   - make sure the wiring is connected according to instructions. Pay special attention to the correct voltages.

   - energize the brake circuit and measure the voltage on rectifier terminals 2 and 3 (BG/BGE rectifiers). The measured voltage should be identical to the nameplate inscription: "brake voltage".

   - measure the voltage on terminals 3 and 5 which should be about 1/2 of the previous measurement.

   - if there is no fault found up to this point measure the current into the rectifier and the resistance of the brake coils. Disconnect it from the rectifier for this purpose. Call our office, forwarding these values together with the drive's serial number and other nameplate information.

   - check with office for proper rectifier selection.

Special instructions for checking the BG/BGE rectifier can be obtained from our office. In case of rectifier failure, the brake coil has to be checked prior to start-up with the new rectifier.

Fault: Brake does not hold load in time

If the brake has been operating well for some time and the change came about in a gradual manner, the release arm has probably run-up against the coil body. Check arm end play, see above.

If the brake has been in operation for some time, and only lately behaves erratically, at irregulaar intervals, dust accumulations at the stationary disc guides may be the cause. Remove the brake's rubber tape and clean away any dust with an air hose. In such cases, it may be advisable to remove the rubber band permanently from the brake.

If the application is new, check the brake's wiring for fast hook-up (see following pages for wiring examples). Generally, all hoisting or vertical motion and indexing applications may require this connection. Increasing the brake's torque will most likely not remedy the situation, but only increase the stress on the transmission.

If the brake is jammed due to rust, call our office for information about our corrosion-proof brake.

On specially hard working brakes, the lining's surface may be glazed due to excessive heat. The application of BGE rectifier will improve this situation dramatically. BGE rectifiers are standard equipment on motors size DV112...DV225, but optional on the smaller sizes DT71...DT100. It also will extend the brake's reset cycle. Call our office for more information.

9.5-13

Direct Current Motors

In General

The basic instructions, as outlined on pages 11 and 12, for three-phase induction-motors apply. The only difference is the nature of the electrical hookup, and the care for the commutator and the brushes.

The same brakes are used for both A.C. and D.C. motors. Therefore, all instructions on brakes, provided on pages 11 and 12, are applicable for D.C. motors.

The EURODRIVE D.C. catalogue contains a detailed description of technical features of the EURODRIVE D.C. motor line. A copy should be obtained for a complete understanding of the equipment. The text below concentrates mainly on the maintenance of the equipment, assuming that the layout of the same has been done according to factory instructions.

The Electrical Hookup

Local electrical regulations, and recommendations contained in this manual, must be followed when making electrical connections.

When working on the motor, special care must be taken to protect the gaskets on the commutator opening, and the terminal box opening.

Most D.C. motors will be driven by a converter. Schematic diagrams of the converter should be obtained, and the electrical wiring designed accordingly.

Since there are a variety of converters, with different features, this manual can not take all of them into consideration. The proper manual should be obtained from the converter manufacturer.

Motor Features

EURODRIVE D.C. motors, sizes GN71 and GN80, are supplied without commutating poles. All larger sizes are equipped with commutation and compensation windings.

The terminal designations on these motors are as follows :

A1 - A2 armature winding
C1 - C2 armature winding with commutating and compensation winding, connected symmetrically
D1 - D2 field winding, if connected in series
F1 - F2 field winding, if shunt wound

A corresponding wiring diagram is located inside the motor's terminal box cover.

If the motor is equipped with a brake, check the motor nameplate inscription for brake voltage.

Auxiliary equipment such as forced cooling fans and tachogenerators, must be connected according to their nameplate data.

Tachogenerators with signal brushes - signalling excessively worn brushes - have additional terminals A5 and A6 in their terminal boxes which provide the corresponding signal.

The Power Rating, Starting and Overload Capacity

The motors are rated according to VDE 0530, at nominal voltage, for a form factor of 1.04.

They provide a constant torque from nominal speed down to standstill. If a motor is run continuously at full torque at speeds below 500 RPM, however, the motor has to be derated, or equipped with a forced cooling fan to compensate for less efficient cooling.

The motors have the capacity to start with 200% of rated current at full field voltage for a limited time. To avoid higher currents, the voltage has to be reduced accordingly during starts. Only motors up to 0.75HP can handle across the line starts. Frequent across the line starts should be avoided to protect the brushes and the commutator.

In compliance with VDE 0530, the motors are designed to run at 150% rated current for 2 minutes at operational temperature. They also can withstand 160% of rated torque for 15 seconds, without suffering permanent damage.

The Field

The field coil must be energized before voltage is applied to the armature.

Voltage peaks, which will be generated by the field inductivity when disconnecting the field coil, have to be discharged over resistors or diodes, in shunt connection.

Use following guideline for resistor values :

Field voltage	factor "X"
110 V	10.0
195 V	7.0
340 V	5.5
440 V	4.0

The size of the necessary shunt is calculated as follows :

$$\frac{\text{Field voltage X Factor "X"}}{\text{Field current}} = \text{Shunt in Ohms}$$

Neutral Zone, how to find it

The brushes are placed into the neutral zone before shipment. The brush holder is marked for this position. After disassembling the motor, the brush holder must be reset, and the old marking should be replaced with the new one.

If the stator is rotated to move the terminal box into a more convenient position, the motor's endshield, with the brush holder has to be rotated at the same rate to maintain the neutral zone setting.

To find the neutral zone, connect the field winding (F1 - F2) to its nominal power source (D.C.), and incorporate a switch into the circuit. Connect a moving coil instrument (50mV to 150mV range) to the armature circuit. The zero-point of this instrument should preferrably be in the centre of the scale. Activation of the switch will generate voltage to the instrument as long as the brushes are outside the neutral zone. Turn the brush holder until no voltage is visible on the instrument, while activating the switch.

To avoid damage to the field winding, the protective resistance, as outlined above, should used in parallel to the switch.

Servicing of the Brushes and Commutator

D.C. motors require constant attention. After the first 1500 hours of operation, a visual inspection of the brushes and the commutator should be performed. A well working commutator is clean and has a purple, satin finish surface.

In normal service, the brushes may have a service life of 4000 hours. However the form factor, pulsating currents, low humidity, frequent

running at low load, corrosive environments.... have a negative influence on brush life. Contact our office if you have questions.

The fan end of the motor is equipped with large covers which allow for inspection and replacement of the brushes. The brushes have to be replaced when their remaining length is 12mm (0.5") or less. Brushes of identical carbon quality must used.

Signal brushes have to be connected to the isolated copper wire of about 1.0mm (0.04") diameter, which runs separated from the brushes power connection. The signal circuit is tied to screws on the brush holder ring.

The contours of new brushes have to be adapted to the commutator's diameter. Wrap Emery-cloth around the commutator, and rock the armature back and forth, until the brushes have full length contact to the commutator surface.

The commutator surface should be refinished only if it has been damaged through overload conditions or corrosion. Use fine grain Emery-cloth to polish the surface.

Spring-loaded brushes should have identical spring tensions on all brushes and the factory-installed value should be maintained. Only for drives subject to high vibrations will an increase of the spring load be beneficial.

After extended service, the commutator may develop uneven (excentrical) wear and the armature must be refinished on a lathe. In order to obtain satisfactory performance, the commutator surface must be finished to a run out accuracy of 0.015mm (0.0006"), and a finish of 5 microns.

The Mica insulation must be cut back at least 1.0mm (0.04") below the commutator's surface, over the full length. The remaining edges have to be deburred. The reduction of the commutator's diameter will increase the gap between it and the brush holders. If the gap is beyond 2mm (0.08"), the holders have to be adjusted accordingly.

Carefully remove the carbon dust and other particles after every service is performed. Also check the neutral zone setting.

Make sure that the access covers to the commutator are tightly closed after every inspection.

Maintenance of the Tachogenerator

The hollow shaft tachogenerator is keyed onto the extended motor shaft and secured with an axial locking screw. Motors with brakes require the removal of the tachogenerator if the brake needs service.

The tachogenerator brushes should be inspected at least every 1500 hours. Remove the accumulated dust with pressurized air, and check the brushes to ensure they do not jam in their holders. If the brushes are worn, replace them with ones of identical quality, and shape them with Emery-cloth to the diameter of the commutator.

Remove all dust before sealing the closing cap.

Bearing Maintenance

Inspect, clean, regrease or replace the anti-friction bearings every 10,000 hours of operation. Regreasing should be done only with specified greases (see page 27). Only one-third of the volume around the rolling members should be filled with grease.

See page 11 for more details.

A cross-section through typical D.C.motors is shown on page 19.

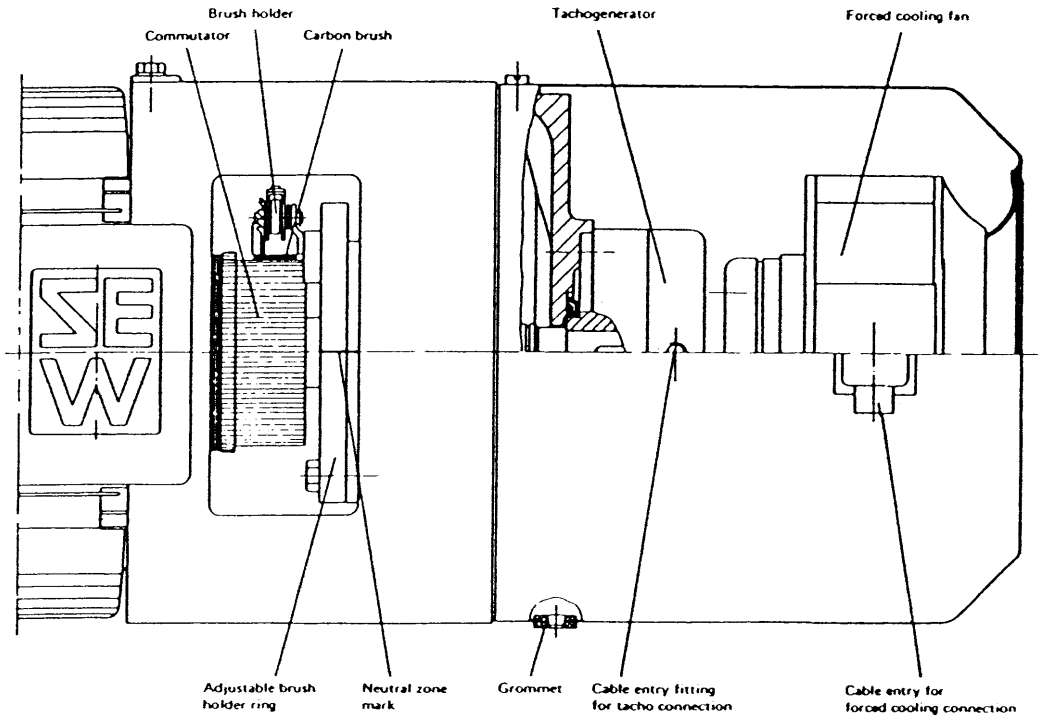


Fig.30: Modifications of D.C. Motors

9.5-15

Three Phase Motor Connection Diagrams and Brake Wirings

All motors manufactured by EURODRIVE COMPANY OF CANADA LTD., bear connection diagram numbers on the nameplate, and on respective factory documents.

These numbers (e.g. DT-79), indicate the specific wiring diagram furnished inside the terminal box cover.

Below is a selection of the most frequently encountered connection diagrams. While the reference numbers are internationally used by EURODRIVE, the actual designations of the terminal pegs may vary, according to the CSA, NEMA or other codes, according to the country of origin of the motor winding.

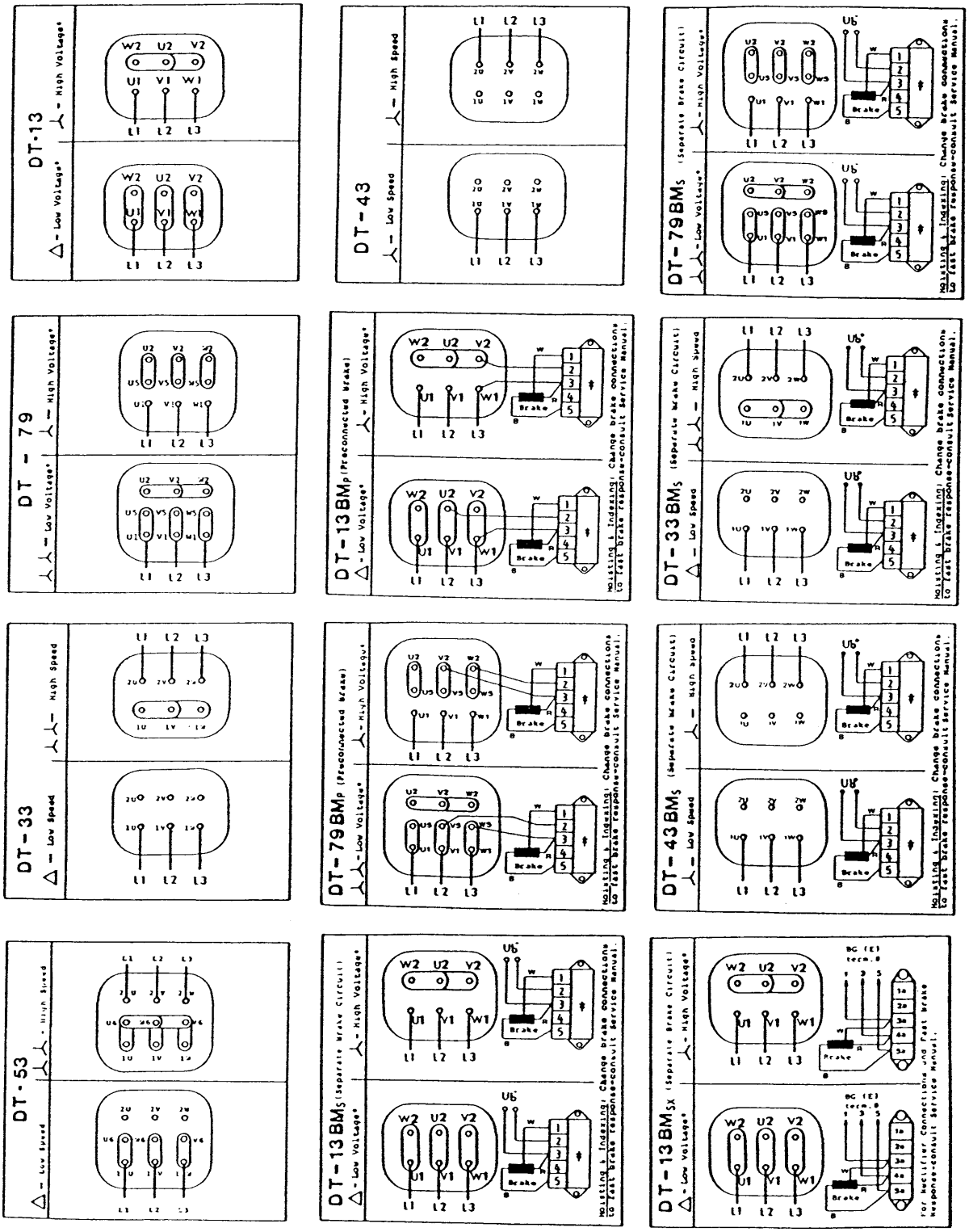
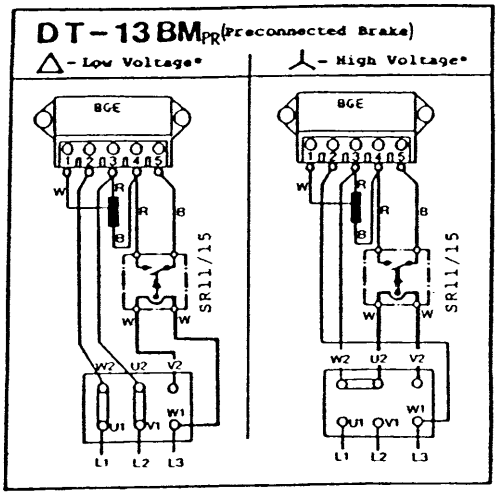


Fig.31: Connection Diagrams for Three-Phase Motors and Brake Wirings

* Check Motor Nametag for Voltage Rating

9.5-14



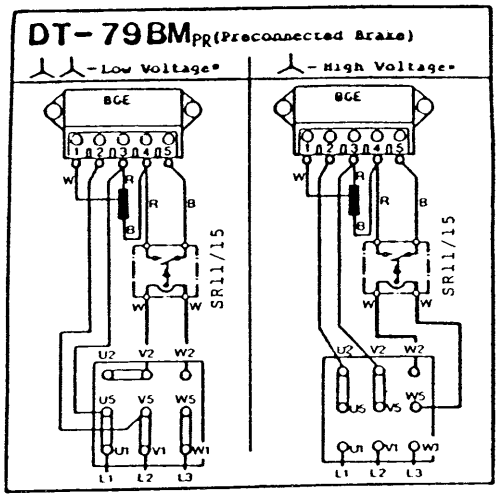


Fig.28: Preconnected brakes for fast response via SR relay.

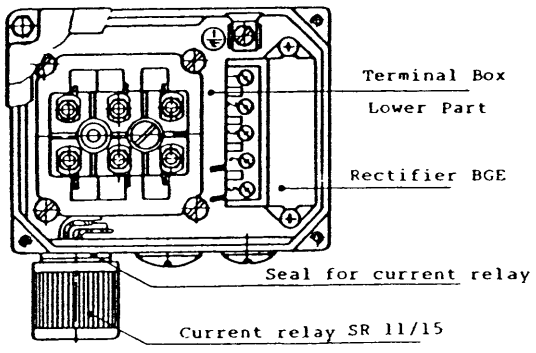


Fig.29: Terminal box with mounted SR relay.

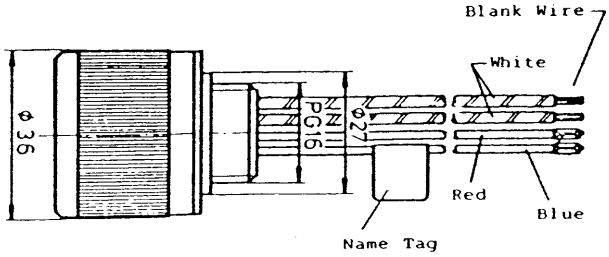


Fig 30 : SR11/15 current relay.

The following wiring samples are valid only for BM-brakes with BG or BGE rectifiers. For instructions relating to preceding brake models, specifically with rectifiers #825 009X and #825 0057, consult the 1986 edition of this Service Manual.

On your brake, the proper selection of the rectifier type and location will have been done already by Eurodrive.

The following general rules for selection apply:

- for motor sizes DV112 and larger, only the BGE type rectifier can be used:

  a) blue version #825 3870 (BGE3) for voltages up to 150 VAC

  b) red version #825 385 4 (BGE1.5) for voltages from 150 VAC to 500 VAC

  c) mount rectifier #825 3870 (BGE3) in control panel for motors DV132M and larger, if brake voltage below 60VAC.

- for motor sizes DT71...DT100, BG type rectifiers are standard:

  d) brown version #825 3862 (BG3) for voltages up to 150 VAC

  e) black version #825 3846 (BG1.5) for voltages from 150 VAC to 500 VAC.

If the motor is submitted to a high start and stop cycle, or to a high ambient temperature, BGE-rectifiers should be used also on the smaller motor sizes DT71...DT100.

In case of a high motor temperature, or a high ambient temperature, specifically in case of insulation class "H" motors, remove the rectifier to the motor control panel. In this case, we suggest a 110 VAC brake circuit, operated from the control voltage, to minimize wiring. An additional terminal block must then be mounted in the terminal box for connection of the brake coils always to pegs 3a, 4a, 5a. See Fig.33.

For rectifiers in the terminal box, the additional terminal lock can be placed on the top of the rectifiers BG, BGE and BSG, for connection of auxilliary functions, like thermistors, thermostats, strip heaters...

For hoisting and indexing, fast brake disconnect should be used. This will require an auxiliary switch in the motor contactor to control the brake. (Fig.35 and Fig.36).

This auxiliary contact can be replaced with brake relais SR 11/15, which is installed at the motor terminal box. (Fig. 28).

SR relais is available in two types; SR11 for motor rated current between 0.6 and 10 A, and SR15 for 10 to 50 A. The primary circuit of the relais is inserted into one phase of the motor. SR relais is only suitable for single speed motors and is not available for insulation class "H". It is mounted in the motor terminal box into one unused PG 16 thread. See Fig29 .and Fig.30.

Two-speed motors have separate brake circuits. (Fig.37 and Fig.38).

In case of D.C. feed brakes, the BG (BGE) rectifiers have to be replaced with the BSG power supplies (#825 4591 - for 24 VDC only) which will be located in the Terminal Box, except for insulation class "H" (not available for motors DV160L and larger).

Ask office for wiring instructions for D.C. power supply "BSG" for 24 VDC operated brakes and brake heater/rectifier "BSH" for brakes in danger of ice freeze up.

9.5-17

BRAKE WIRING EXAMPLES

Note: For connections between rectifier and motor terminal pegs, see diagrams on page 15.

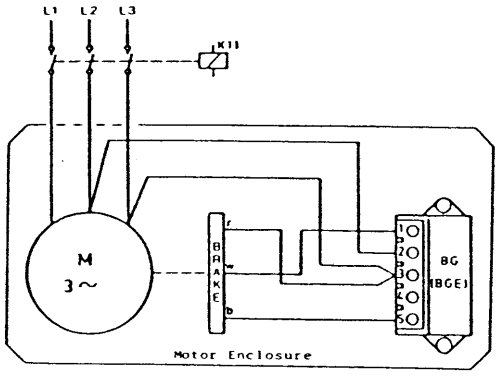


Fig. 31: Preconnected brake. Brake voltage identical to the lower of the two motor voltages. Standard brake response.

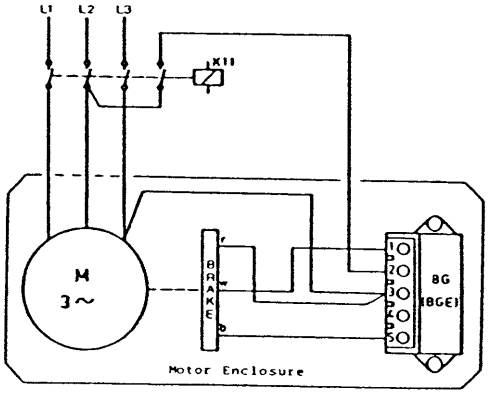


Fig. 34: Brake wiring for standard response. Brake voltage identical to the lower of the two motor voltages.

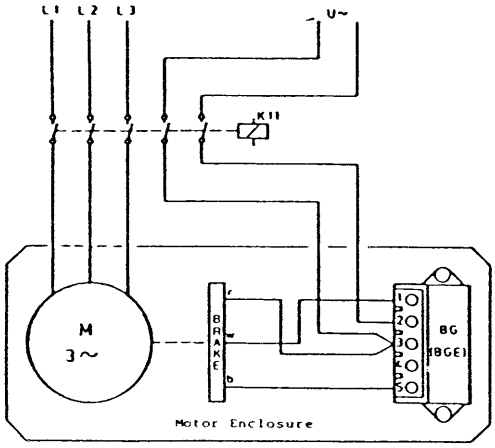


Fig. 32: Separate brake circuit. Standard brake response.

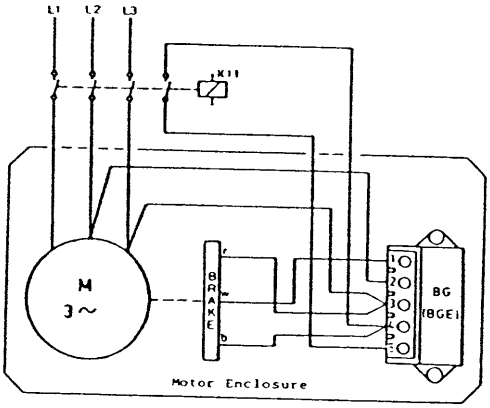


Fig. 35: Preconnected brake for fast response. Brake voltage identical to the lower of the two motor voltages.

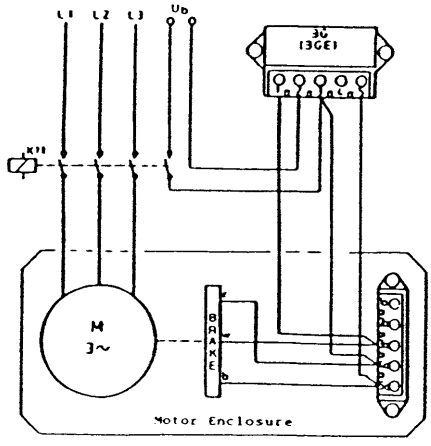


Fig. 33: Brake wiring for insulation class "H" motors, with separate brake circuit and rectifier in control panel. Standard brake response.

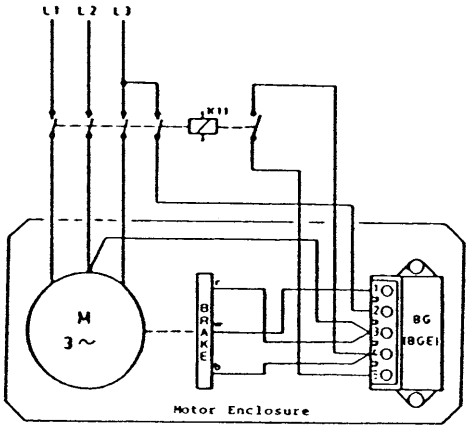


Fig. 36: Brake wiring for fast response. Brake voltage identical to the lower of the two motor voltages.

9.5-18

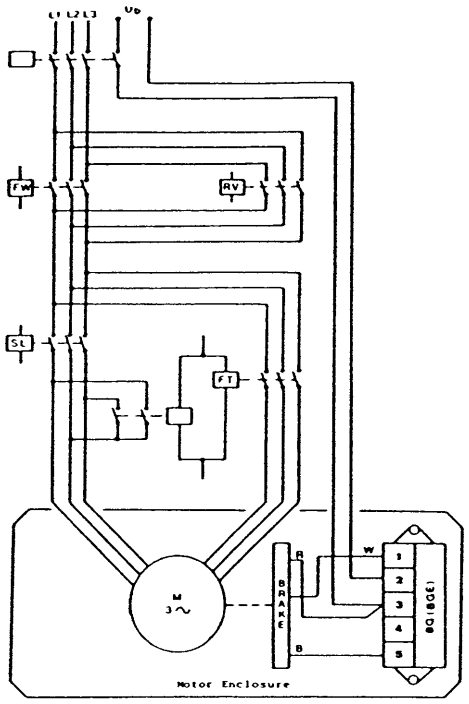


Fig. 37: Two speed motor with single winding. Separate brake circuit. Standard brake response.

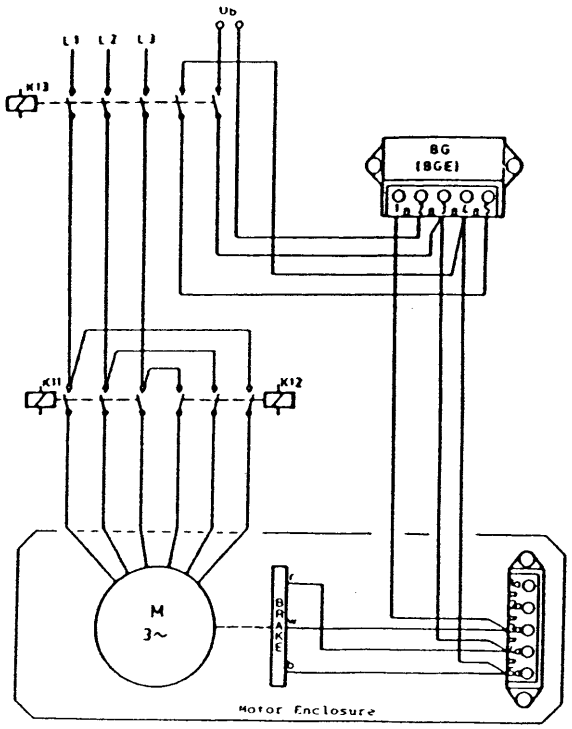


Fig. 38: Two speed motor with dual winding. Separate brake circuit with rectifier in control panel. Fast brake response.

Overload Protection

Thermistor Motor Protection

Thermistors are a very efficient motor protection. They offer fast and accurate response, and an extremely fast resetting time.
They do not have any current setting and therefore are more tamper-proof than conventional motor protection.

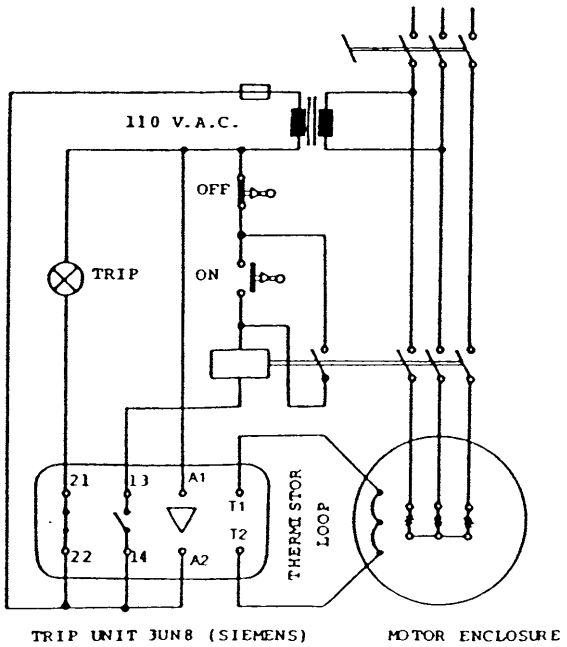


Fig. 39: Wiring of Thermistor Trip Unit 3UN8

Connection diagram Fig. 39 is only to be used for the SIEMENS 3UN8 trip unit, which is available from EURODRIVE stock. For other types, see the corresponding instructions.
The following points should be observed when working with thermistors:

1) Avoid using trip units of US-origin with sensors of European make.
2) One trip unit can accept up to 15 sensors, so several motors can be protected by one relay. One three-phase motor usually has three sensors in its stator. Follow the trip unit's instruction.
3) Measuring the sensor loop should be done with less than 10 Volts. Using more than 10 Volts may damage sensors and motor windings.
4) Other motor overload protection interfering with the thermistors, such as "heaters" (BI-metal switches) have to be removed from the circuit. "Doubling up" will render thermistors useless.

While it is a common practice to install thermistor sensors into an established winding, we do not recommend this procedure. Most of the windings will get damaged during the process.

The sensor's temperature rating will establish the tripping point, without any other current related settings required.

9.5-19

Other Protection Devices

Eurodrive distributes other protection systems for which separate brochures are available upon request.
PCU-System: Electrical overload protection, monitoring the KW-consumption of the drive motor. Also available for vari-speed drives.
Load cell option for PCU systems.

Typical EURODRIVE Product Cross Sections

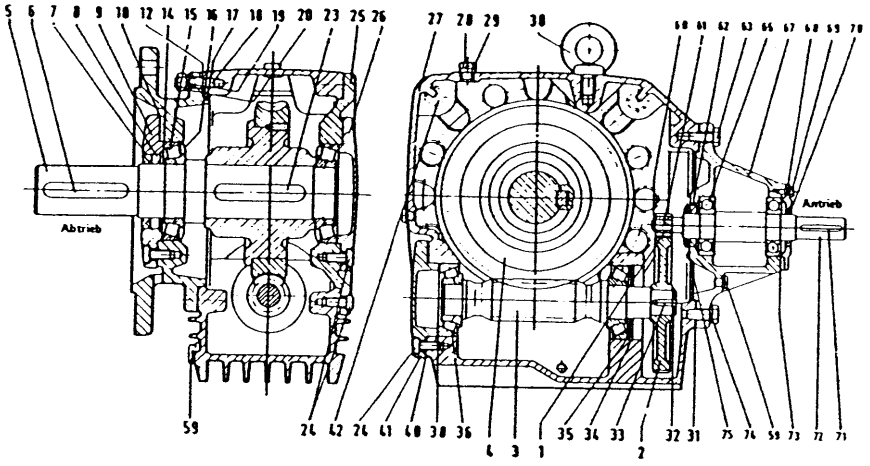


Fig.40: Reducer "SF"

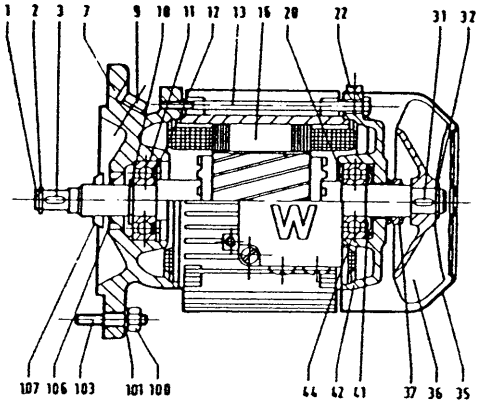


Fig.41: TEFC Motor "DT" ("DFT")

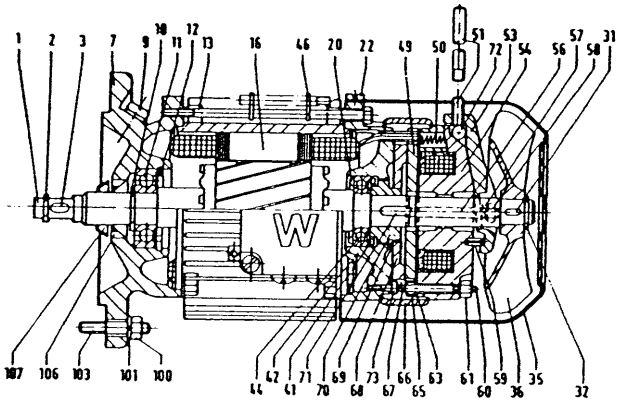


Fig.42: TEFC Motor "DT" ("DFT") with Brake "BHF"

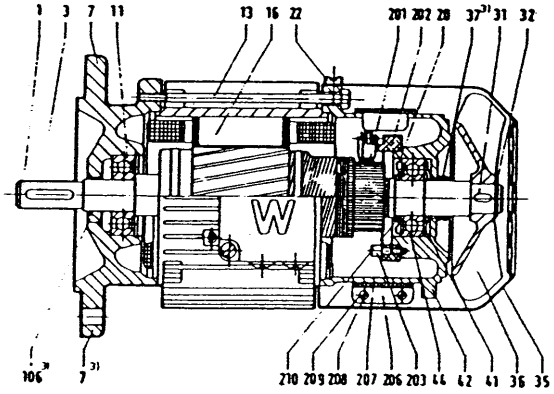


Fig.43: D.C. Motor "GN" ("GFN")

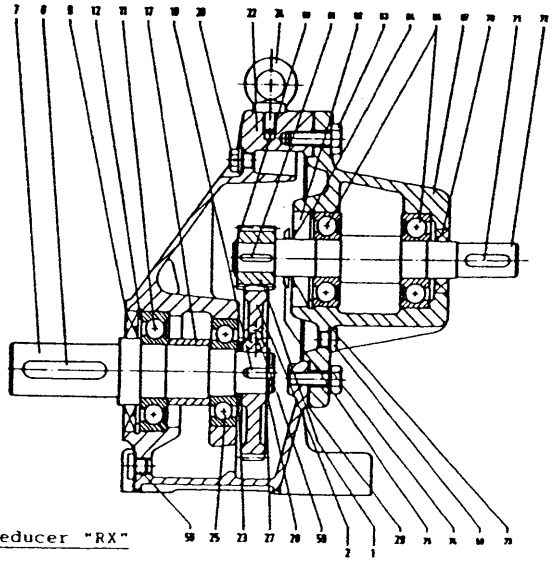


Fig.44: Reducer "RX"

9.5-20

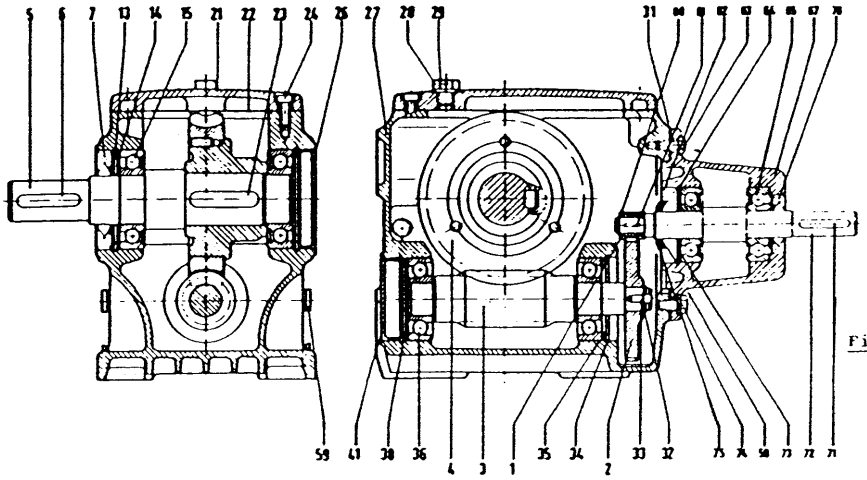


Fig.45: Reducer "S"

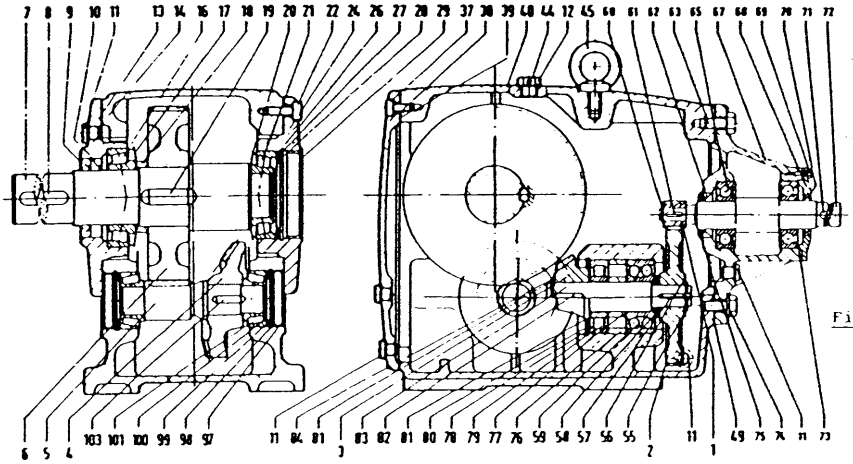


Fig.46: Reducer "K"

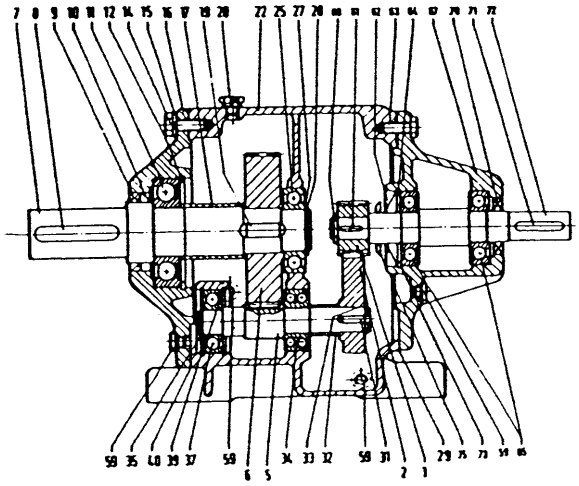


Fig.47: Reducer "R"

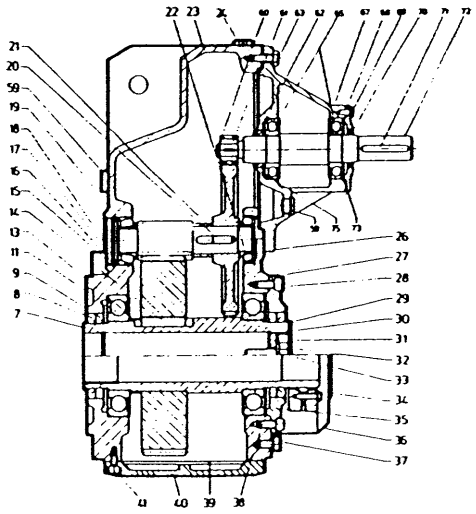


Fig.48: Reducer "FA"

9.5.21

Note : See pages 6 and 7 for cross-sections through mechanical variable speed units !

Mounting Positions for Geared Motors

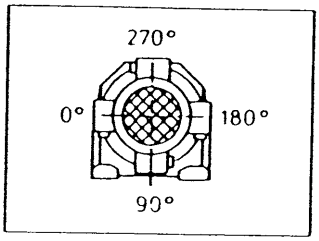
Legend

The various mounting positions in accordance with DIN IEC 34 are shown on the following pages with their designations and positioning, together with the oil plug point symbols, as defined below:

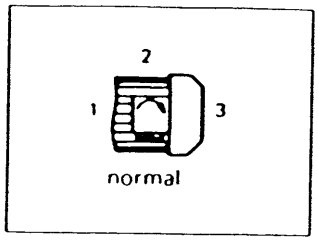
- ○ = breather plug
- ◒ = oil level plug
- ● = oil drain plug

The mounting positions shown apply to the standard gear unit ranges R/F/K/S. Combinations of these gear unit types as well as with variable speed units VARIBLOC® VU/VZ and VARIMOT® D are shown in the respective catalogues.

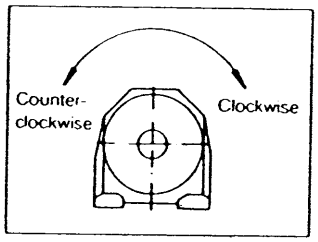
Furthermore, the following definitions apply to the mounting position diagrams:



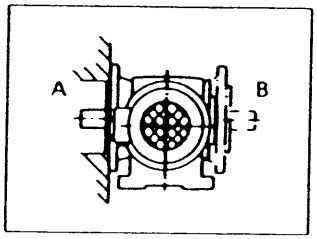
Position of the terminal box: 0°, 90°, 180° or 270°
Position shown on the mounting position sheet corresp. to 0°.
In the absence of details concerning the terminal box position, the drive will be supplied with position 0°.



Position of the cable entry: normal, 1, 2 or 3

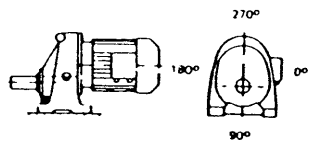
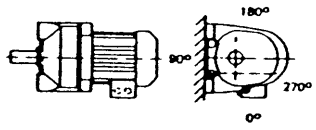
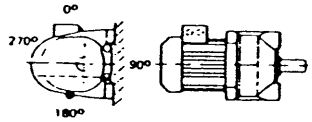
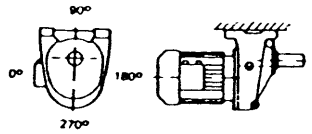
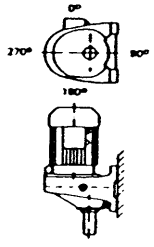
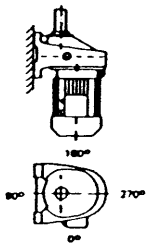
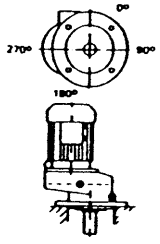
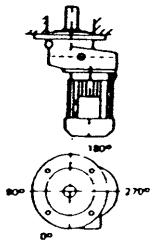
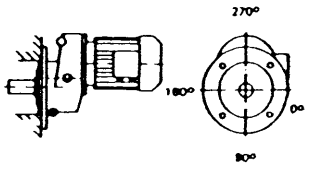
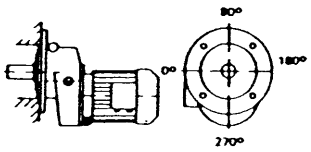


Direction of rotation:
(only for drives with a backstop)
clockwise or counterclockwise
(output shaft viewed end on).



For right angular drives:
output shaft projection: A, B or A + B
Flange projection:
A, B or A + B
Connection side for shaft-mounted unit with shrink disc:
A or B

Helical Geared Motors **RX 61-RX 101 RXF61-RXF101**

B3 	B6 	B7 	B8 
V5 	V6 	V1 	V3 
B5 	B51 		

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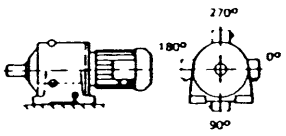
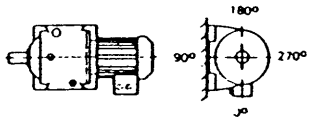
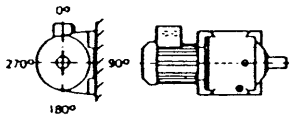
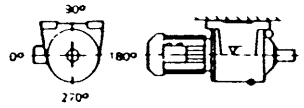
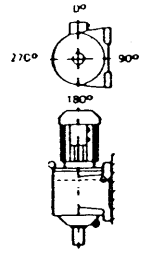
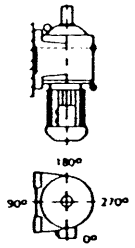
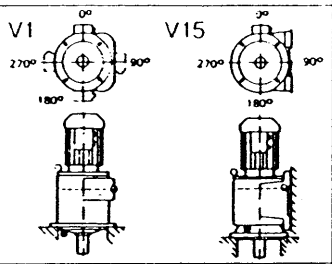
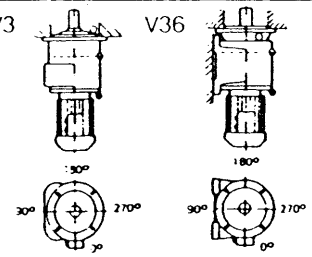
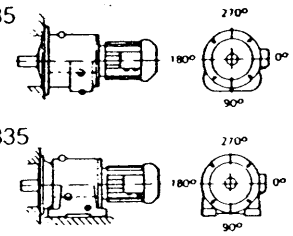
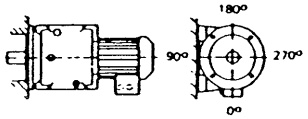
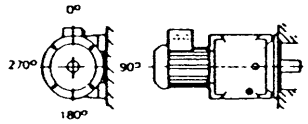
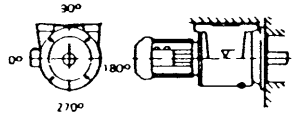
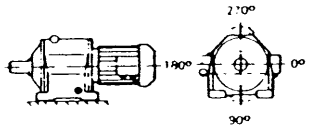
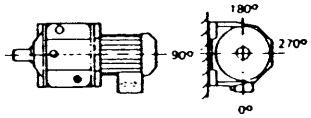
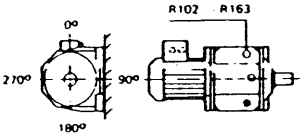
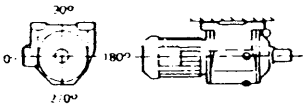
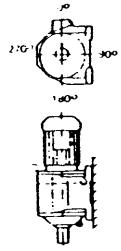
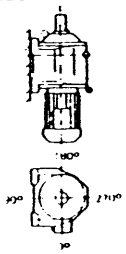
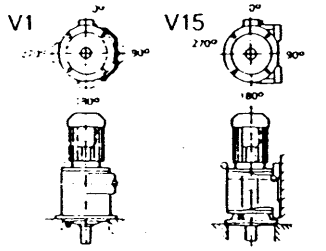
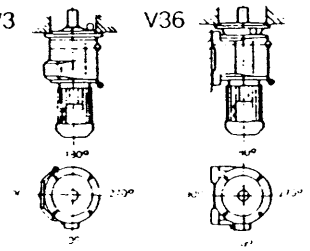
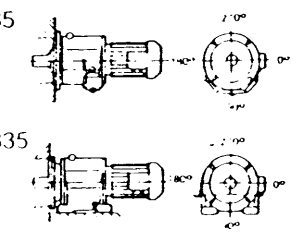
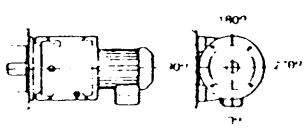
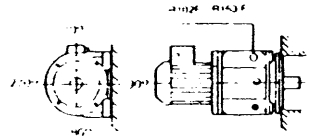
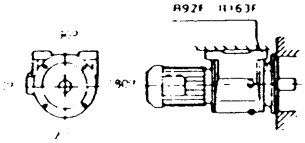
R 30-R 60
RF30-RF60

B3 	B6 	B7 	B8 
V5 	V6 	V1 V15 	V3 V36 
B5 B35 	B65 	B75 	B85 

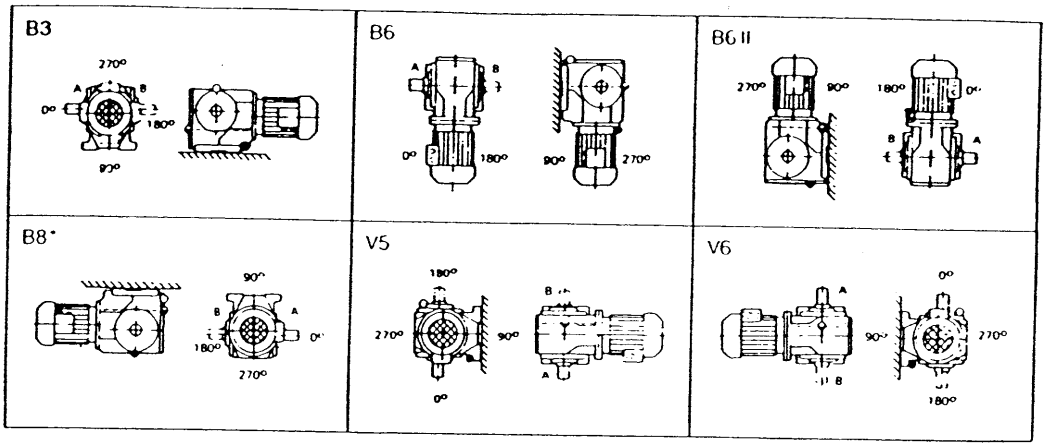
R 32-R 163
RF32-RF163

B3 	B6 	B7 	B8 
V5 	V6 	V1 V15 	V3 V36 
B5 B35 	B65 	B75 	B85 

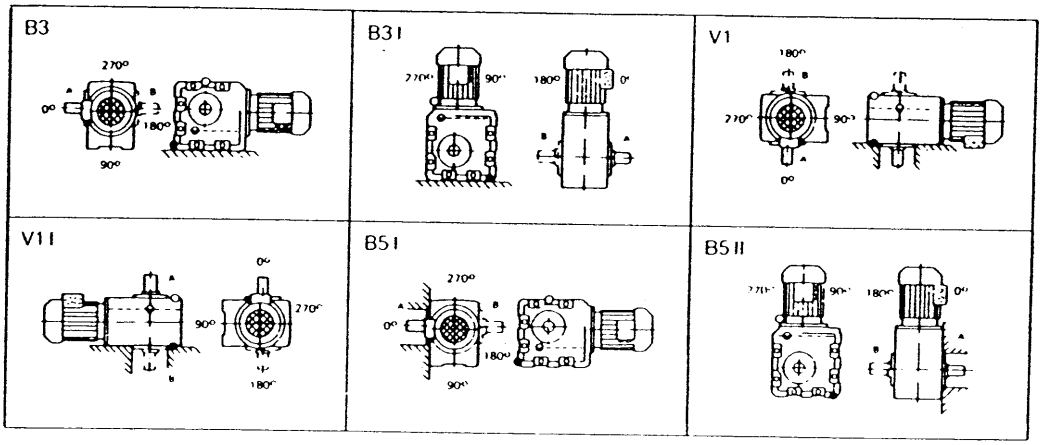
9.5-23

Helical-Bevel Geared Motors

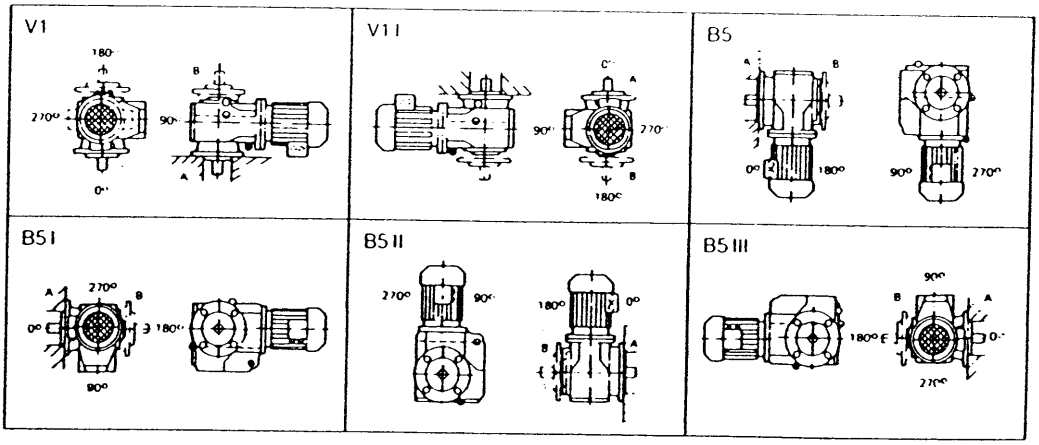
K66-K106



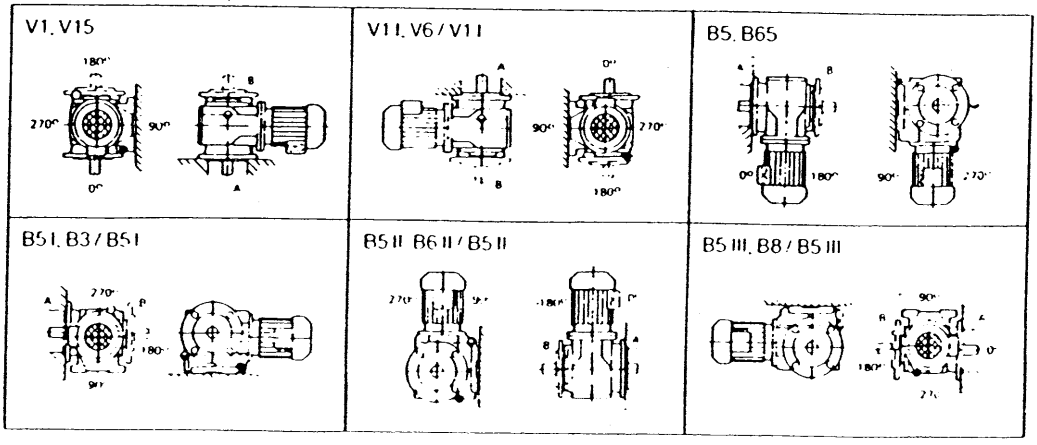
K 160-K 180
KH160-KH180



KF66-KF106

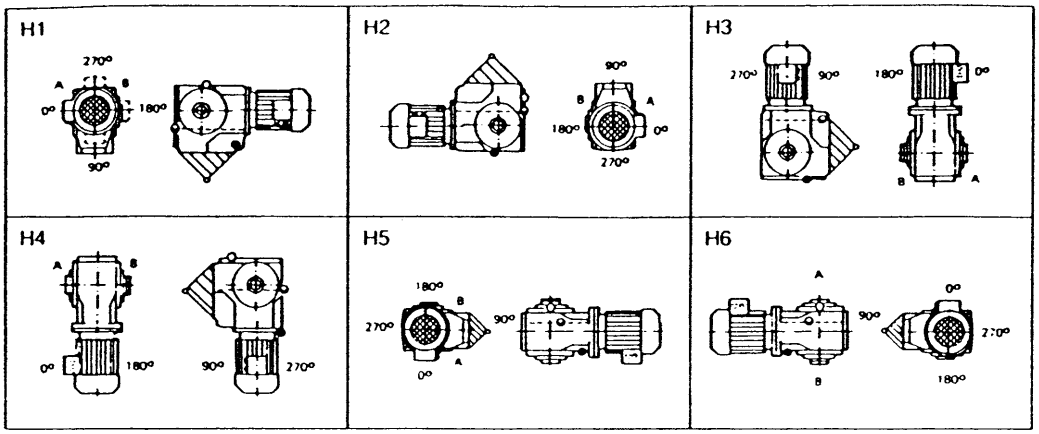


KF126-KF156

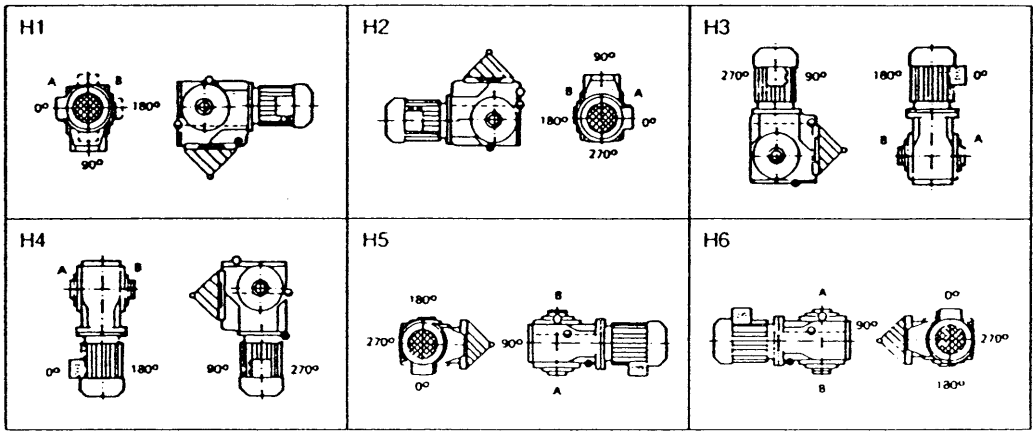


9.5 - 24

KA66-KA106

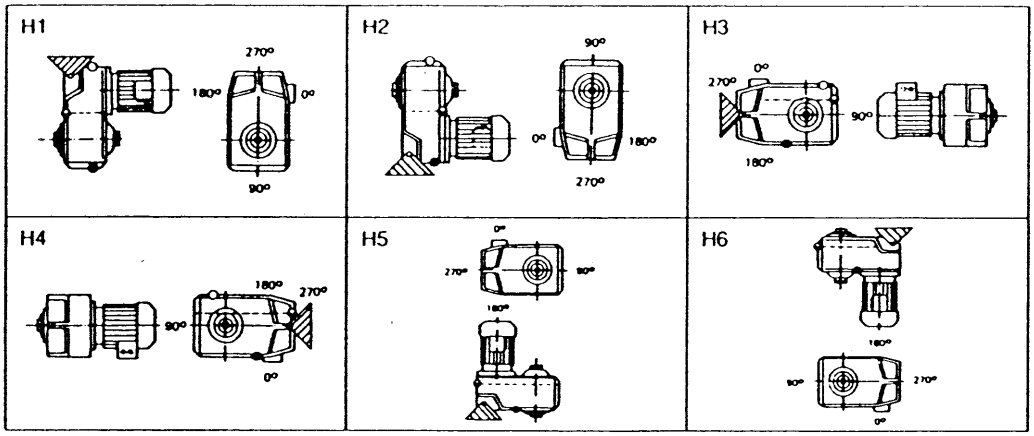


KA126-KA156

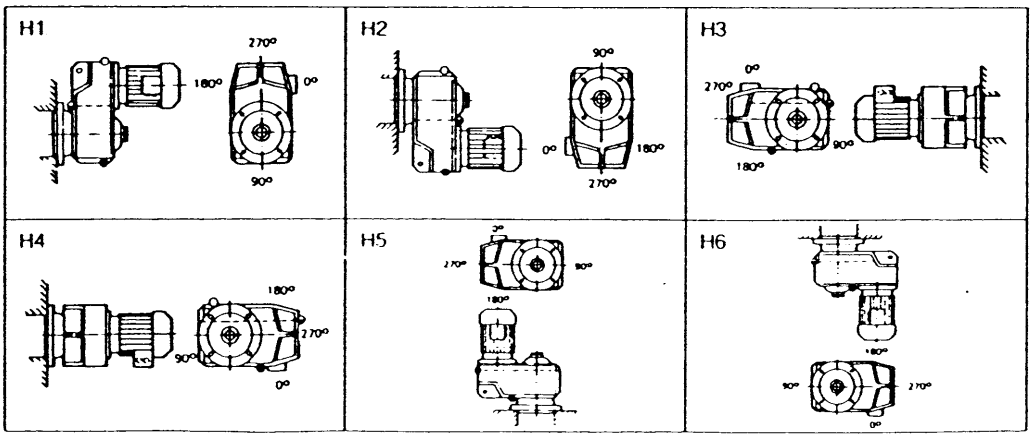


Shaft Mounted Helical Geared Motors

FA40-FA100



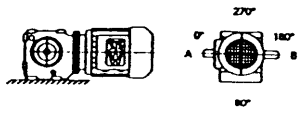
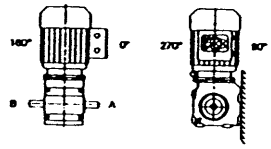
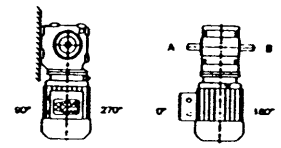
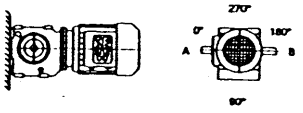
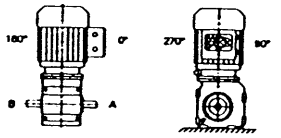
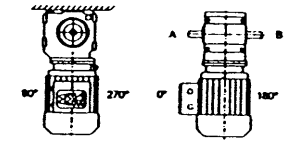
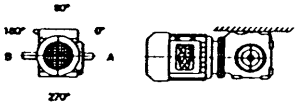
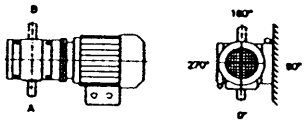
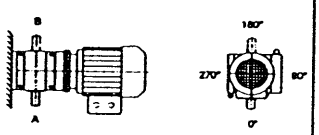
FAF40-FAF100



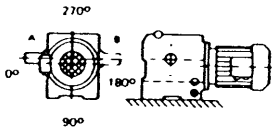
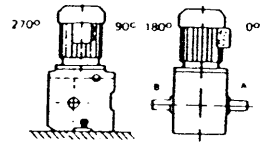
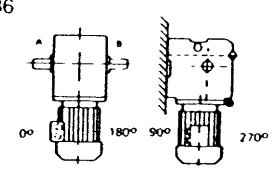
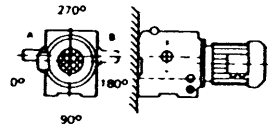
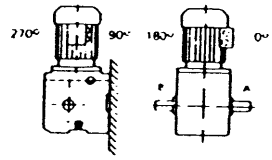
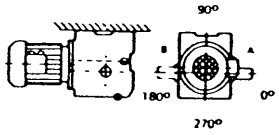
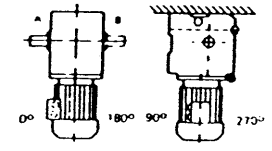
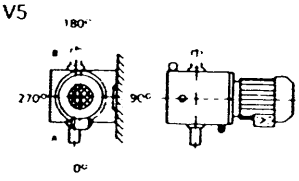
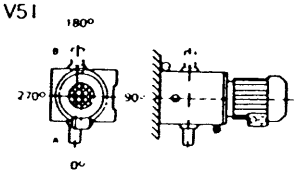
9.5-25

Helical-Worm Geared Motors

S32

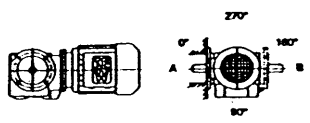
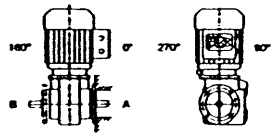
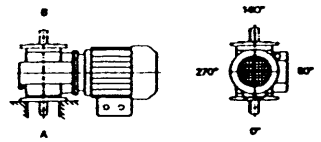
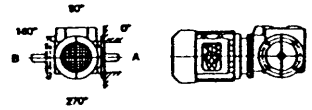
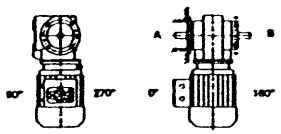
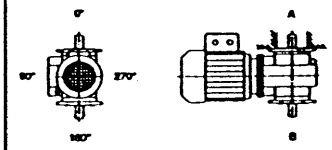
B3	B6II	B6
		
B6I	**B3I**	**B8I**
		
B8	**V5**	**V5I**
		

S42-S100

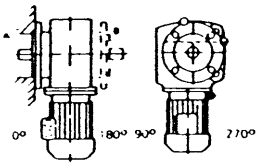
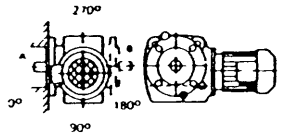
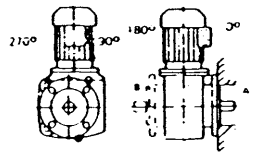
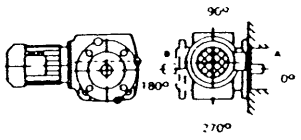
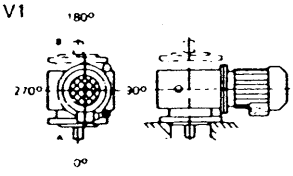
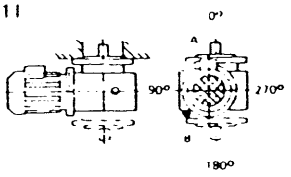
B3	B3I	B6
		
B6I	**B6II**	**B8**
		
B8I	**V5**	**V5I**
		

9.5-26

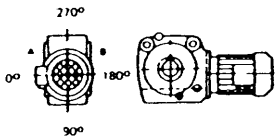
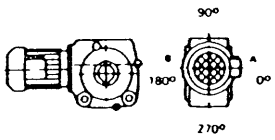
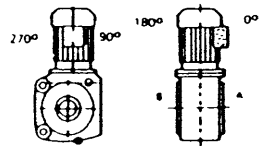
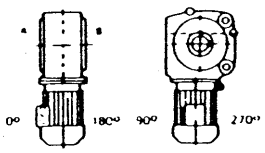
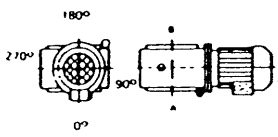
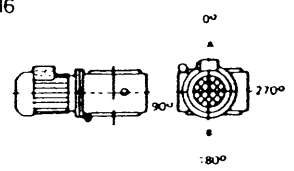
SF32

B5I	B5II	V1
		
B5III	**B5**	**V1I**
		

SF42-SF100

B5	B5 I	B5 II
		
B5 III	**V1**	**V1 I**
		

SA 42-SA 100
SAF42-SAF100

H1	H2	H3
		
H4	**H5**	**H6**
		

9.5-27

Quantities of Lubricants required

Quantities shown below are in litres.

Helical Gear Units [1]

approx. quantity (l) per mounting position

Size	Mounting positions IM..									
	B3/B35 [1]	B5 [1]	B5 II	B6/B65	B7/B75	B8/B85	V1	V3	V5	V6
R, RF302/32	Grease		0,3 kg							
R, RF40	0,3	0,3	–	0,6	0,7	0,6	1	1	1	1
R, RF42/43	0,3	0,3	–	0,6	0,6	0,6	1	0,9	1,1	0,9
R, RF, RÜF62/63	0,6	0,5	–	1,2	1,3	1,1	2	1,8	2,2	1,9
R, RF60	0,6	0,6	–	1,6	1,5	1,1	2	2	2	2,1
RX, RXF61	0,8	0,4	0,7	0,7	0,7	0,7	0,6	0,5	0,9	0,9
R, RF702/703	1,3	1,2	–	2,1	2,3	2	3,6	3,4	3,6	3,5
R, RF, RÜF72/73	1,3	1,2	–	2,1	2,3	2	3,6	3,4	3,6	3,5
RX, RXF71	1,7	1	1,4	1	0,9	1,5	1,3	1,2	2,1	1,3
R, RF802/803	2,6	2,5	–	4	4,8	4	7,5	7	7,3	7,3
R, RF, RÜF82/83	2,6	2,5	–	4	4,8	4	7,5	7	7,3	7,3
RX, RXF81	2,6	1,4	2,7	1,5	1,8	2,9	2,2	1,5	3,7	2,3
R, RF902/903	4,8	4,3	–	7,3	8	7,3	12,3	11,3	12,5	12
R, RF, RÜF92/93	4,8	4,3	–	7,3	8	7,3	12,3	11,3	12,5	12
R, RF, RÜF102/103	6,3	5,8	–	11	12	11,5	19,6	18,3	20,2	19
RX, RXF101	6,1	3,5	6,0	4,2	3,8	7,3	5,2	4,5	9	5,6
R, RF, RÜF132/133	10	9,8	–	18,5	20	19	31,5	32,5	32	32
R, RF, RÜF142/143	15	14	–	27,5	30,5	28,5	50	50	49	49
R, RF, RÜF152	17,5	16	–	38	40	37	60	60	59	61
R, RF, RÜF163	21	18	–	45	44	43	73	71	74	75

Shaft Mounted Helical Gear Units

approx. quantity (l) per mounting position

Size	Mounting positions / Positions de montage					
	H1	H2	H3	H4	H5	H6
FA, FAF40	1,5	1,1	1,7	1,4	1,7	1,7
FA, FAF60	2,8	2,5	3,8	3,4	4,1	4
FA, FAF70	6,5	4,2	6,6	5,7	8,1	7,1
FA, FAF80	10,8	6,8	11,5	9,4	12,7	11,4
FA, FAF90	19,4	11,5	22,3	17,5	24,7	23,2
FA, FAF100	33,6	20	33,5	29,6	45,5	41

Helical-Bevel Gear Units

approx. quantity (l) per mounting position

Size	Mounting positions IM.. / Positions de Montage IM..													
	B3, H1 B5 I	B3 I B6 II	B5	B5 II	B5 III	B6	B8	V1 V1 I	V5	V6	H2	H3	H4	H5, H6
K, KF, KA46	on request													
K, KF, KA66	0,9	3,4	2,4	3,4	3	2,4	3	3,1	3,3	3,3	2,9	3,3	2,3	3,2
K, KF, KA76	1,7	6,2	5	6,4	5,9	4,9	5,7	6,2	6,6	6,6	5,5	6	4,7	6,4
K, KF, KA86	2,5	9,5	8	9,9	9,5	7,8	9,1	10,4	10	10	8,6	9	7,3	9,5
K, KF, KA96	4,8	18	13,8	18,6	16,6	13,5	16	19,6	19	19	15,5	17,5	13	18,5
K, KF, KA106	8	32	24,5	33	29	24	28	33	32	32	27	31	23	31
K, KF, KA126	14	60	45	56	54	44	52	64	62	62	50	58	42	60
K, KF, KA156	27	102	74	106	92	72	88	109	105	105	86	100	70	103
K, KH166	28	120	–	120	–	–	–	95	–	–	–	–	–	–
K, KH186	52	195	–	195	–	–	–	160	–	–	–	–	–	–

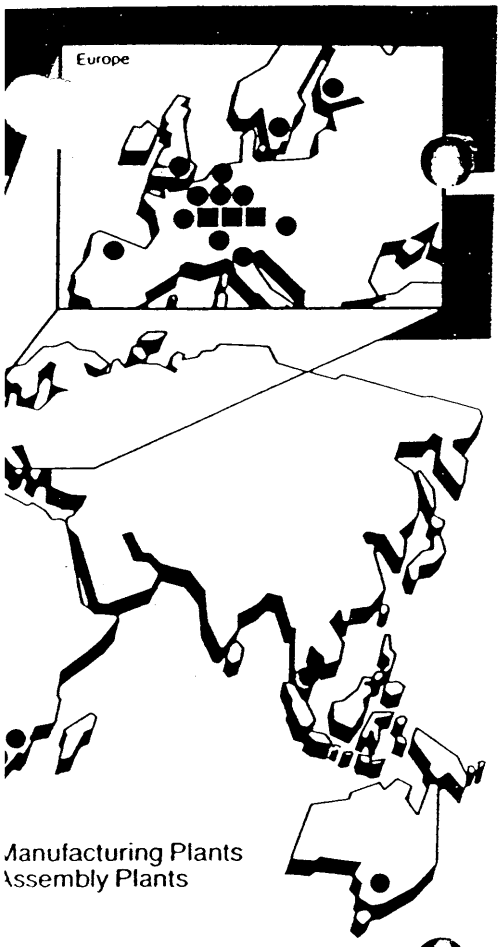
Helical-Worm Gear Units

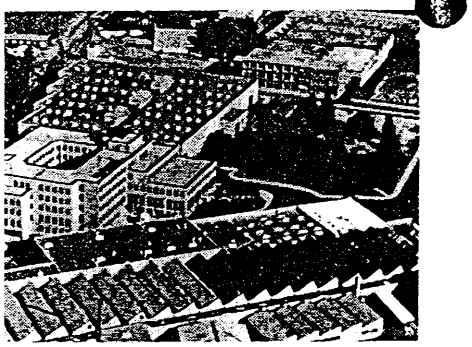
approx. quantity (l) per mounting position

Size	Mounting positions IM..															
	B3 B6 I	B3 I B6 II	B5	B5 I	B5 II	B5 III	B6 B8 I	B8	$V1_A$ $V1I_B$	$V1_B$ $V1I_A$	V5 V5 I	H1	H2	H3	H4	H5 H6
S, SF, SA 31	0,25	0,25	0,35	0,35	0,35	0,35	0,25	0,25	0,35	0,35	0,25	0,25	0,25	0,25	0,25	0,25
S, SF, SA 32	0,25	0,6	0,4	0,25	0,6	0,5	0,4	0,25	0,4	0,4	0,4	0,25	0,5	0,6	0,4	0,4
S, SF, SA 42	0,2	1	0,8	0,4	1,2	0,8	1,1	0,6	0,8	0,6	0,6	0,4	0,8	1,1	0,75	0,7
S, SF, SA 52	0,3	1,5	1	0,45	1,7	1,2	1,6	1,1	1,1	0,8	0,9	0,45	1,1	1,5	1	0,9
S, SF, SA 62	0,6	2,8	2,3	0,9	4	2,3	2,5	1,6	2,3	2,1	1,6	0,9	2,3	3,5	2,1	2
S, SF, SA 72	1,1	5	4	1,5	7,4	4,8	5,3	3,3	4,4	4	3,1	1,5	4	6,1	3,5	3,6
S, SF, SA 82	2,1	10	6,3	3,3	10,8	6	10,8	6	6,8	5,7	5,6	3,3	5,7	10,2	6	6,1
S, SF, SA 92	3,8	19,5	12,5	5,5	22,5	13,6	20,5	11	11,7	10,5	10,5	5,5	12,5	20,3	11,6	12,2

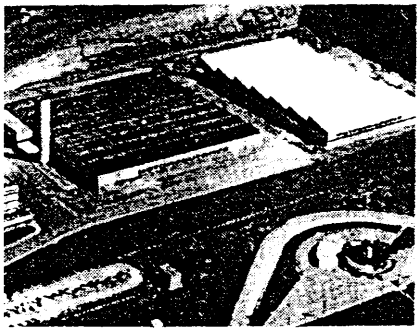
[1] On multi-stage gear units having mounting positions B3, B5 or B35 the larger gear unit is to be provided with the oil filling for B7.

9.5-28





al. West Germany Manufacturing Plant



lo, Brazil Manufacturing Plant

ubricants

SEW EURODRIVE

L	BP	Esso	Mobil	Shell	Texaco	Tribol
20	BP Energol GR-XP 220	SPARTAN EP 220	Mobilgear 630	Shell Omala Oil 220	Meropa 220	Tribol 1100/220
00	BP Energol GR-XP 100	SPARTAN EP 150	Mobilgear 629	Shell Omala Oil 100	Meropa 150	Tribol 1100/150
6	BP Energol GR-XP 68	ESSO AUTOMATIC TRANSMISSION FLUID	Mobil D.T.E. 15	Shell Tellus Oil T 32	Meropa 68	Tribol 1100/680
	BP Bartran HV 15	UNIVIS J 13	Mobil D.T.E. 11	Shell Tellus Oil T 15	Aircraft Hydraulic Oil 15	
	BP Energrease HT - EP 00	FIBRAX EP 370	Mobilplex 44	Shell Grease S 3655	Multifak EP 0	
80	BP Energol GR-XP 680	SPARTAN EP 680	Mobilgear 636	Shell Omala Oil 680	Meropa 680	Tribol 1100/680
20	BP Energol GR-XP 220	SPARTAN EP 200	Mobilgear 630	Shell Omala Oil 220	Meropa 220	Tribol 1100/220
00	BP Energol GR-XP 100	SPARTAN EP 150	Mobil D.T.E. 18	Shell Omala Oil 100	Meropa 100	Tribol 1100/150
	BP Bartran HV 15	UNIVIS J 13	Mobil D.T.E. 11	Shell Tellus Oil T 15	Aircraft Hydraulic Oil 15	
	BP Energrease HT - EP 00	FIBRAX EP 370	Mobilplex 44	Shell Grease S 3655	Multifak EP 0	
20	BP Energol SG - XP 220	-	Mobil Glygoyle 30	Shell Tivela SD 460	-	Tribol 800/220
	BP Energol SG - XP 460	-	Mobil Glygoyle 80		-	Tribol 800/680
	-	GEAR GREASE S 420	Glygoyle Grease 00	Shell Tivela Compound A	-	
32	BP Energol HLP 32	NUTO H 32	Mobil D.T.E. 25	Shell Tellus Oil T 32	Rando Oil 32	Tribol 771
0	BP Energol HLP 15	NUTO H 15	Mobil D.T.E. 21	Shell Tellus Oil T 15	Rando Oil 10	Tribol 770
3	BP Energrease LS 3	ESSO Universal Grease Beacon 2	Mobilux EP 2 (Gear unit)	Shell Cyprina RA/C 3 (Motor)	Glissando FT 3	Tribol 3020-2
			Mobiltemp. SHC 100 (Gear unit)			
		ESSO Unirex N 3 (Motor)				Tribol 4545/220-2
				Aero Shell Grease 16 (Motor)		

9.5-29

nts
tion with SEW
urodrive

WHERE TO CALL FOR HELP

EURODRIVE OFFICE AND FACTORY LOCATIONS

LOCATION	TELEPHONE	TELEFAX
In Canada		
Bramalea, ON	(905) 791-1553	(905) 791-2999
Calgary, AB	(403) 252-5122	(403) 255-9640
Delta, BC	(604) 964-5535	(604) 946-2513
Edmonton, AB	(403) 438-2175	(403) 929-5303
Lower Sackville, NS	(902) 865-7520	(902) 865-7520
Montreal, PQ	(514) 367-1124	(514) 367-3677
Riverview, NB	(506) 387-4058	(506) 387-4058
Winnipeg, MB	(204) 772-9441	(204) 257-2382
In the U.S.A.		
Hayward, CA	(415) 487-3560	(415) 487-6381
Lyman, SC	(803) 439-7537	(803) 439-0566
Troy, OH	(513) 335-0036	(513) 222-4104
Dallas, TX	(214) 330-4824	(214) 330-4724
Bridgeport, NJ	(609) 467-2277	(609) 845-3179

EMERGENCY AFTER HOURS NUMBERS FOR PARTS & SERVICE (CANADA)

Bramalea, ON	1-800-567-8039
Lasalle, PQ	(514) 843-9441
Delta, BC	(604) 946-5535

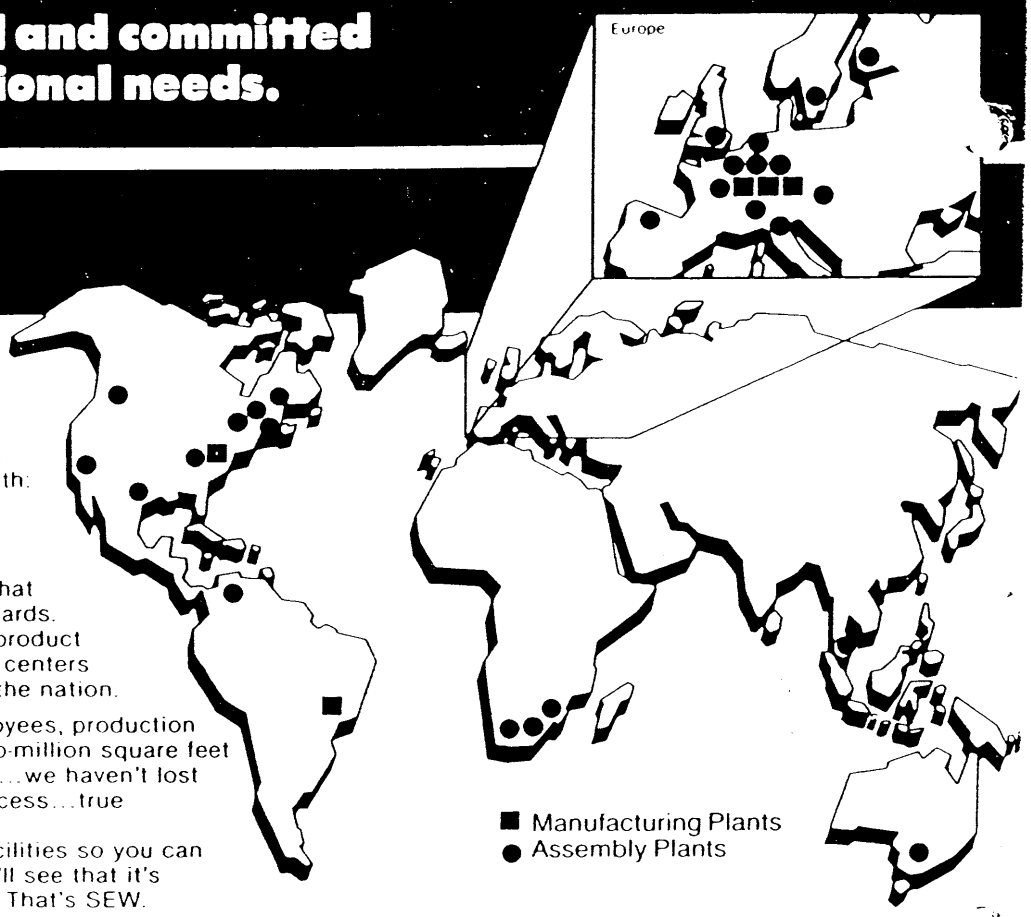
9.5-30

In case of need, call one of the abovementioned numbers to receive a complete listing of all contacts.

Notes:

9.5 - 31

A company structured and committed to meet your international needs.

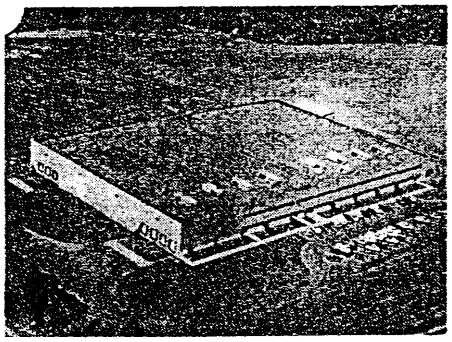


SEW-EURODRIVE has created a worldwide organization, and a product line to meet your needs. No matter if you export, import or domestically use production equipment that requires drives ...SEW-EURODRIVE stands behind you with:

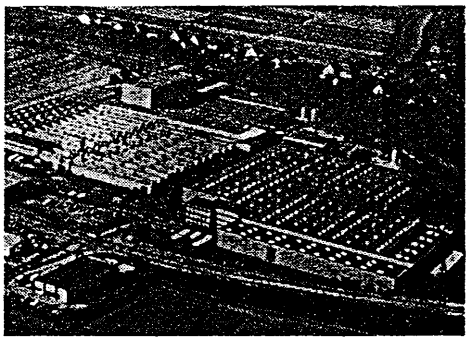
- International availability of *identical* products, parts and service... 30 locations in 19 countries.
- High quality, custom-built products that meet the world's most exacting standards.
- Nearby application engineering and product support...four assembly/engineering centers in the U.S.... sales locations across the nation.

Although we've grown to over 4,000 employees, production facilities which encompass more than two-million square feet and produce over 500,000 units each year...we haven't lost sight of the value that has fueled our success...true customer service.

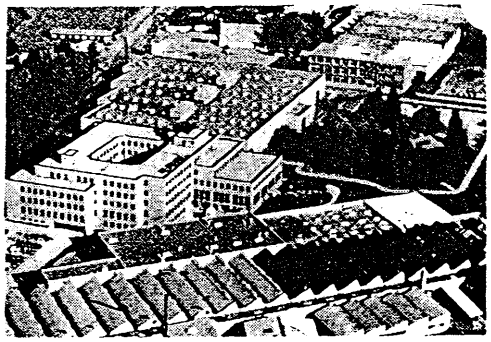
We invite you to tour any one of our facilities so you can see firsthand the true value we offer. You'll see that it's simple, effective and available worldwide. That's SEW.



Lyman, South Carolina, USA Manufacturing Plant



Graben, West Germany Manufacturing Plant



Bruchsal, West Germany Manufacturing Plant

SEW-EURODRIVE
SOCIETE DU CANADA, LTEE
COMPANY OF CANADA, LTD

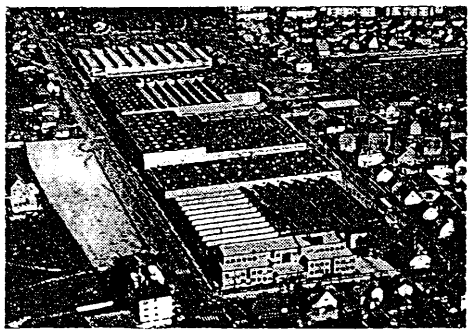
210 Walker Drive
Bramalea, Ontario L6T 3W1
(905) 791-1553

Assembly Centres

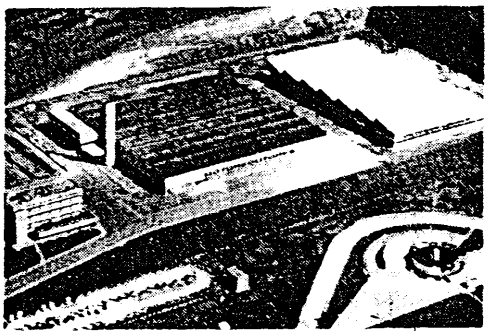
Toronto	(905) 791-1553
Vancouver	1-(800) 972-5481
Montreal	(514) 367-1124

Technical Offices:

dmonton -	(403) 436-2174
Winnipeg -	(204) 772-9441
Moncton -	(800) 361-2928



Haguenau, France Manufacturing Plant



Sao Paulo, Brazil Manufacturing Plant

SEW EURODRIVE

EL-0090

Printed in Canada

487SM

9.5.32 MOTOR

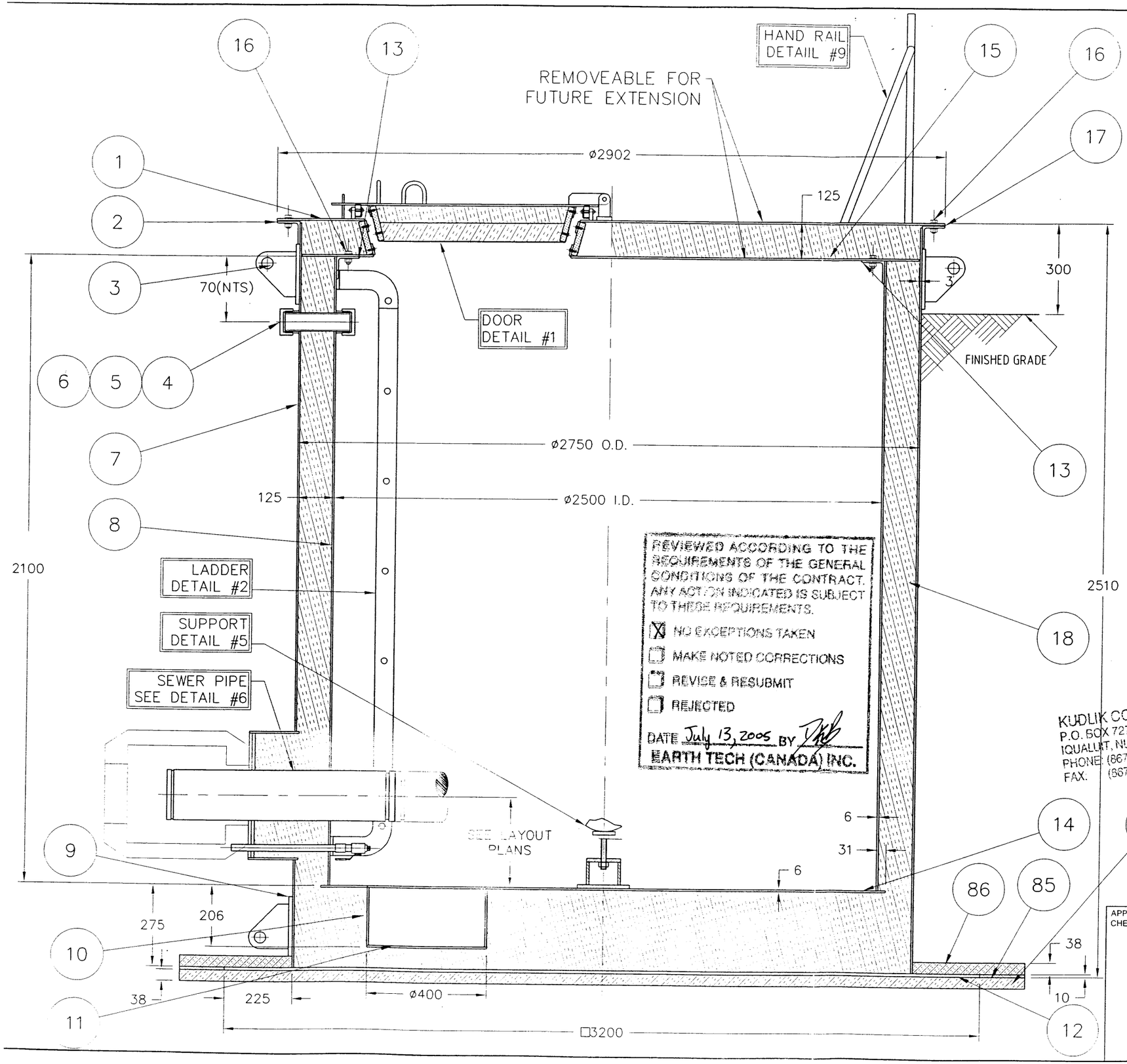
Chapter 10ACCESS VAULT

MANUFACTURER/DISTRIBUTOR:

BERLIE-FALCO
1245 RUE INDUSTRIELLE
LA PRAIRIE (QC.)
J5R-2E4
PHONE: 450-444-0566
FAX: 450-444-2227

10.1 TECHNICAL SPECIFICATION.

END OF CHAPTER 10



KUDLIK CONSTRUCTION LTD
P.O. BOX 727, 1519 FEDERAL ROAD
IQUALUIT, NUNAVUT X0A 0H0
PHONE: (867) 979-1166
FAX. (867) 979-1165

04/07/2005

APPROUVÉ PAR:
CHECK BY:

INGÉNIEUR
JACQUES BOUCHER
38191
QUÉBEC
NUL SANS SIGNATURE

GENERAL NOTE

1) CONSTRUCT ACCESS VAULT FROM 6mm STEEL PLATE WITH CONTINUOUS (FULLY) WELDED CONSTRUCTION .
FABRICATE COMPLETELY PRIOR TO EPOXY COATING.
2) ALL STEEL TO BE CSA G40.21 TYPE 260W, OR ASTM A36
3) ALL PIPING INSIDE THE ACCESS VAULTS TO BE PREFABRICATED TO THE LIMITS SHOWN ON THE TYPICAL SECTION AND AS SHOWN ON THE LAYOUT PLANS.
PROVIDE PIPE ENTRY SPOOL PIECES, LADDER MOUNTING STUDS & ALL OTHER ACCESS VAULT PARTS ,ECT.. AS REQUIRED, PRE WELDED IN PLACE PRIOR TO SANDBLASTING AND EPOXY COATING.
4) ALL PREFABRICATED STEEL PARTS OF ACCESS VAULT (EXCEPT TOP PLATE , HATCH AND LADDER) SHALL BE SANDBLASTED AND EPOXY COATED INSIDE AND OUTSIDE , PER SPECIFICATIONS
5) TOP PLATE, HATCH, HINGES & LADDER , SHALL BE HOT DIP GALVANIZED TO CSA G164
MINIMUM 610g/m2
6) ALL NUTS , BOLTS , WASHERS , SCREWS ETC., ZINC PLATED, OR CADNIUM PLATED
7) PAINT SPECIFICATION
   - SANDBLAST SSPC SP10
   - 2 COATS OF INTERGARD EX HB FROM INTERNATIONAL ,16 MILS TOTAL DRY FILM THICKNESS
   - COLOR: OUTSIDE GREY CODE # 71046
     INSIDE BEIGE CODE # 71020
     HYDRANT RED CODE # 71007
8) STEEL PIPING, INCLUDING CLEANOUT IS SHOWN ON ACCESS VAULT LAYOUT PLANS AND IS HOT DIPPED GALVANIZED
9) SELF ADHESIVE TEFLON TAPE SHOULD BE APPLIED ON THE ACCESS VAULT COVER PERIMETER FACING TO THE RUBBER GASKET
10) HYDRANT, LINK-SEAL JOINT WILL BE SHIPPED SEPARATELY (INSIDE MANHOLE)
11) A "BERLIE-FALCO TECHNOLOGIES INC" FIRM PLATE SHOULD BE FIXED ON THE INSIDE FACE OF ACCESS VAULT COVER
12) PRIOR TO SHIPMENT: ALL FACES OF FLANGE, PROJECTION OUTSIDE OF ACCESS VAULT, SHALL BE PROTECTED BY 5/8" THICK PLYWOOD COVER FIXED BY 4 BOLTS
13) TEST DRAIN VALVE:
ø12mm SCREWED BALL VALVE BRONZE
ø25mm SCREWED BALL VALVE BRONZE
ø50mm SCREWED BALL VALVE BRONZE

REV.	DESCRIPTION	DATE	DESS/DRAWN
2	ISSUED FOR APPROVAL	15/06/05	C.H.
1	ISSUED FOR APPROVAL	14/06/05	C.H.
0	ISSUED FOR APPROVAL	07/06/05	C.H.

BERLIE-FALCO TECHNOLOGIES INC.
1245 rue Industrielle
La Prairie (Quebec)
J5R 2E4
Tel.:(450) 444-0566
Fax.:(450) 444-2227
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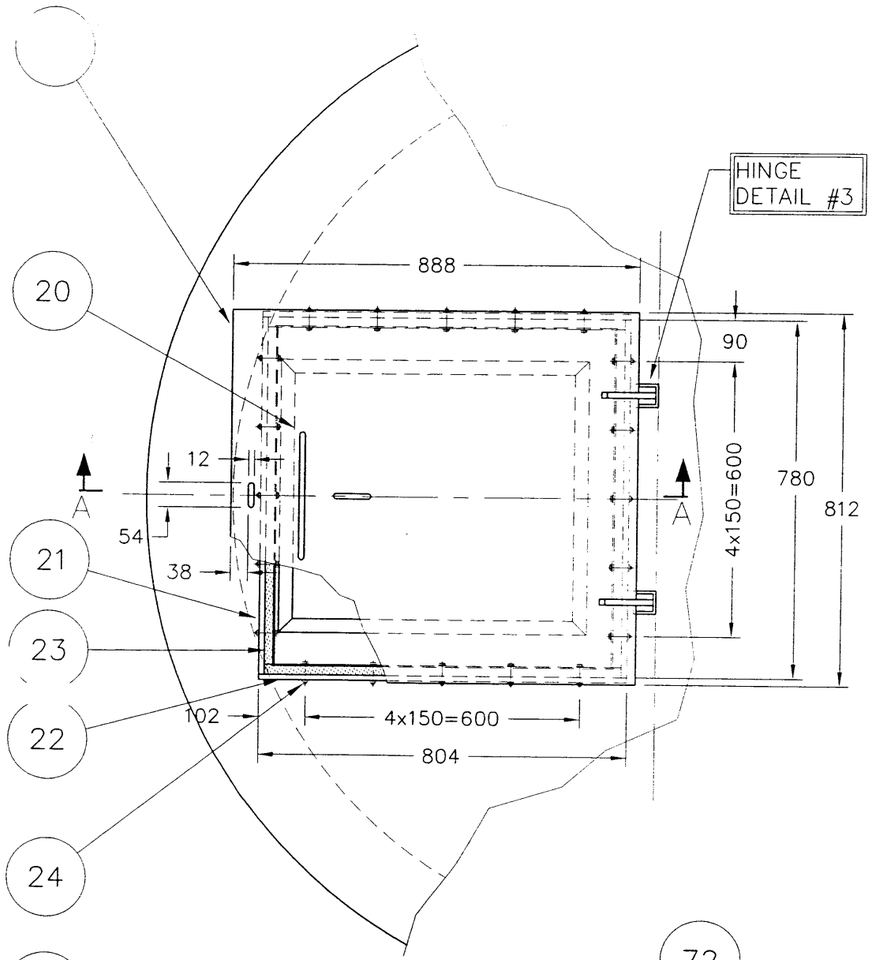
CLIENT:
CUSTOMER: CITY OF IQALUIT

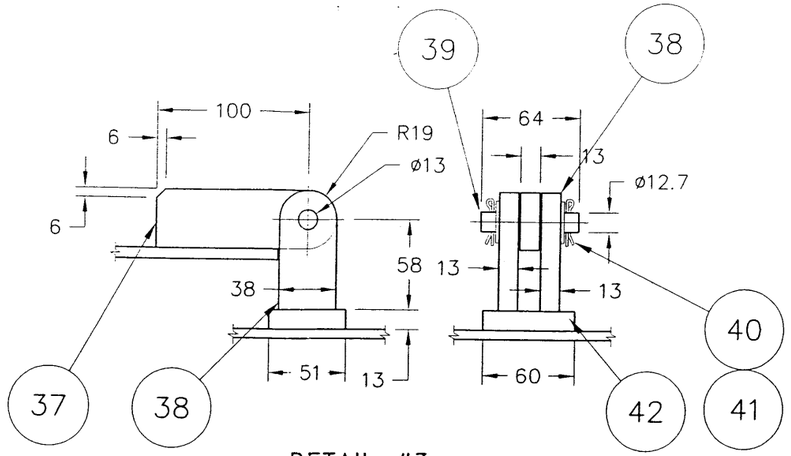
TITRE:
TITLE: WASTEWATER TREATMENT PLANT
ACCESS VAULT

DESSIN No.:
DRAWING No: 4861-F-100

DESS PAR:
DRAW BY: C.H.

ÉCHELLE SCALE:	QTE: QTY:	DATE:	FEUILLE SHEET	REV.
N.T.S.	1	07/06/2005	1 / 7	2





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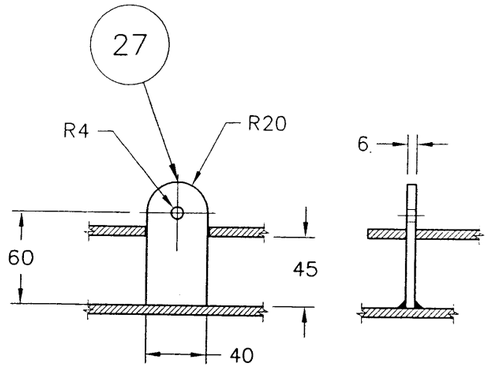

ITEM 27
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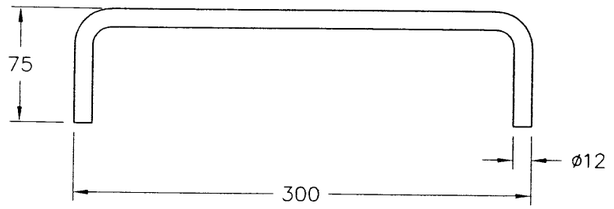

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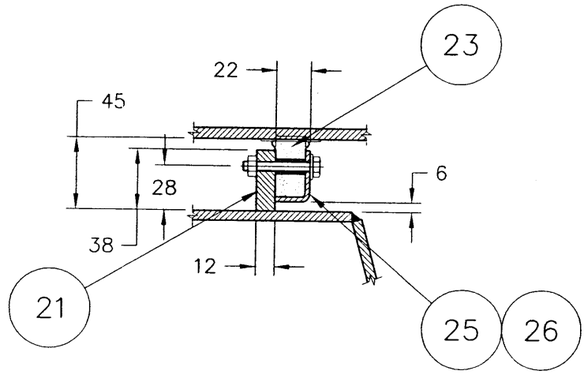

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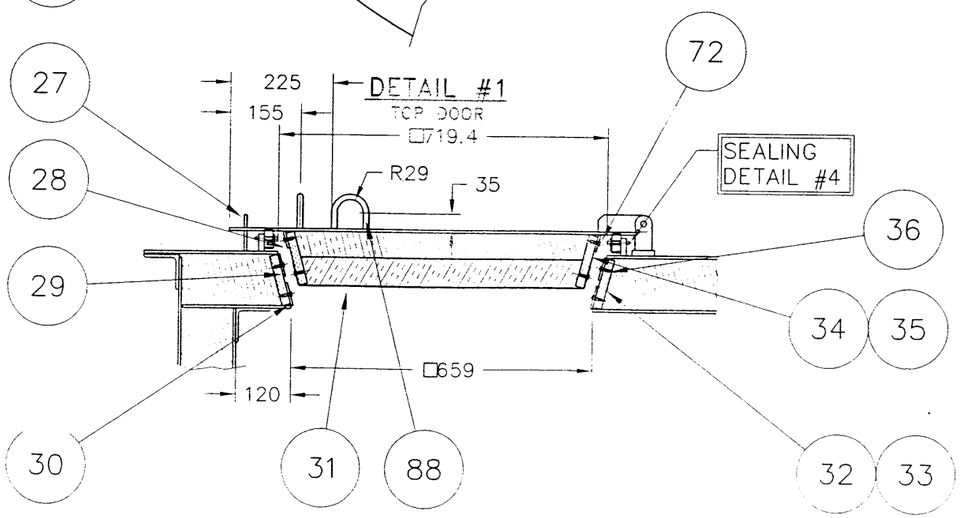

SECTION "A-A"

KUDLIK CONSTRUCTION LTD
P.O. BOX 727, 1519 FEDERAL ROAD
IQUALUIT, NUNAVUT X0A 0H0
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FAX: (867) 979-1195

APPROUVÉ PAR:
CHECK BY:

INGENIEUR
JACQUES BOUCHER
5818
QUÉBEC
NUL SANS SIGNATURE

REV.	DESCRIPTION	DATE	DESS/DRAWN
2	ISSUED FOR APPROVAL	15/06/05	C.H.
1	ISSUED FOR APPROVAL	14/06/05	C.H.
0	ISSUED FOR APPROVAL	07/06/05	C.H.

BERLIE-FALCO TECHNOLOGIES INC.
1245 rue Industrielle
La Prairie (Quebec)
J5R 2E4
Tel.: (450) 444-0566
Fax.: (450) 444-2227
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www.berlie-tech.com

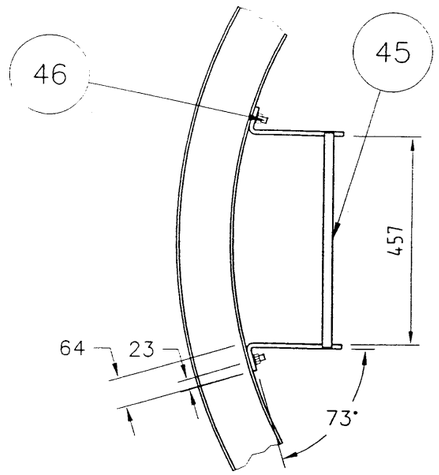
CLIENT:
CUSTOMER: CITY OF IQALUIT

TITRE:
TITLE: ACCESS VAULT DETAILS

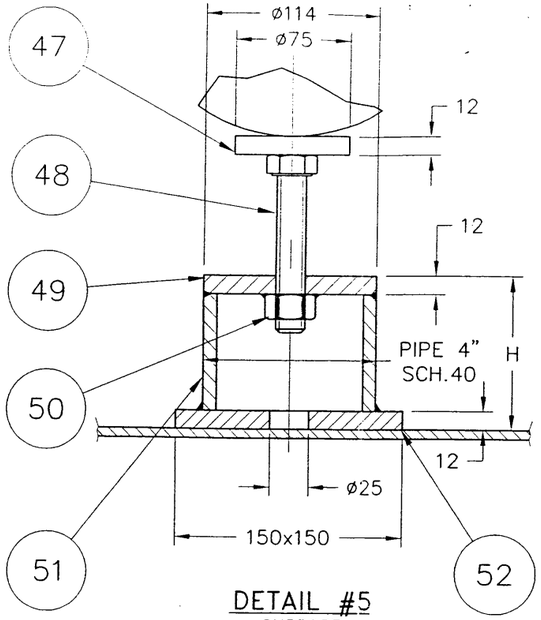
DESSIN No.:
DRAWING No: 4861-F-100

DESS. PAR:
DRAW BY: C.H.

ÉCHELLE / SCALE:	QTÉ: / QTY:	DATE:	FEUILLE: / SHEET:	REV:
N.T.S.	1	07/06/2005	2 / 7	2



DWG	N	L	H
-200	3	900	1450



DETAIL #5
SUPPORT

DWG	QTY.	H
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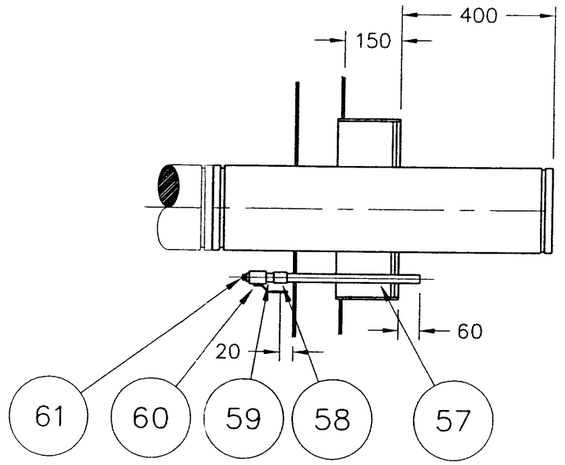
-200	1	230



DETAIL #6
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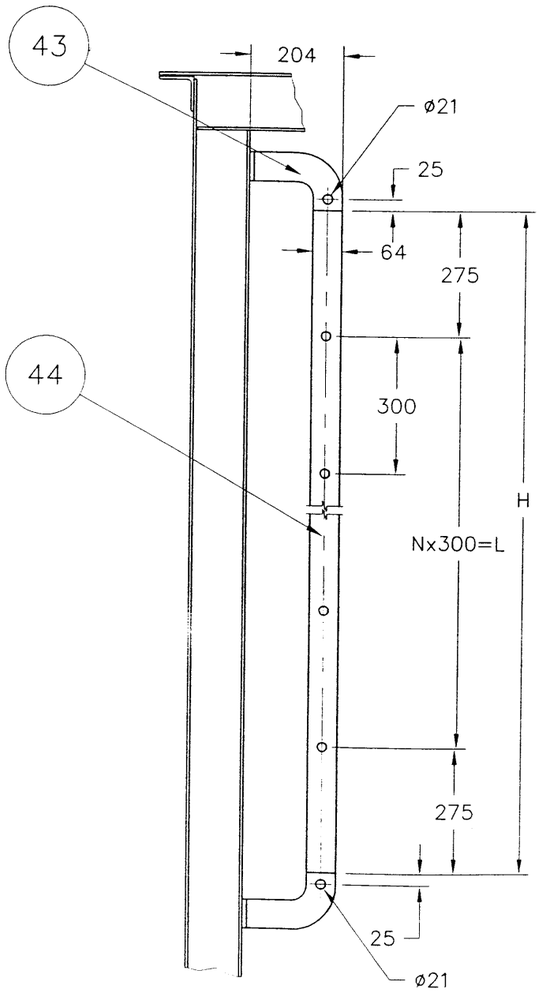
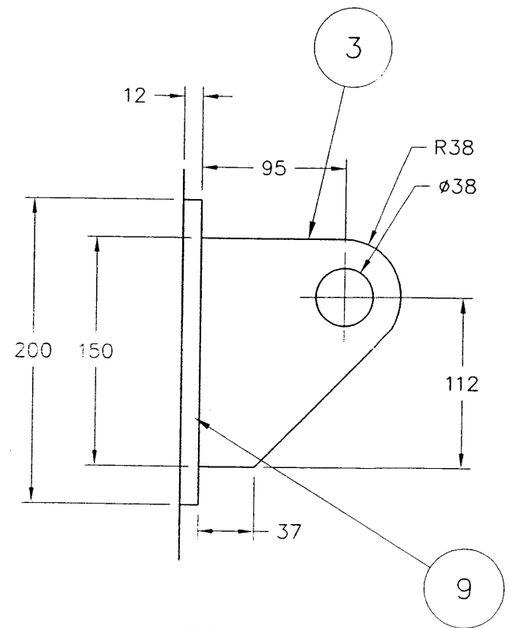


DETAIL #2
LADDER



ITEMS #3 & #9
LIFT LUG

KUDLIK CONSTRUCTION LTD
P.O. BOX 727, 1519 FEDERAL ROAD
IQUALUIT, NUNAVUT X0A 0H0
PHONE: (867) 979-1166
FAX: (867) 979-1159

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38191
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REV.	DESCRIPTION	DATE	DESS/DRAWN
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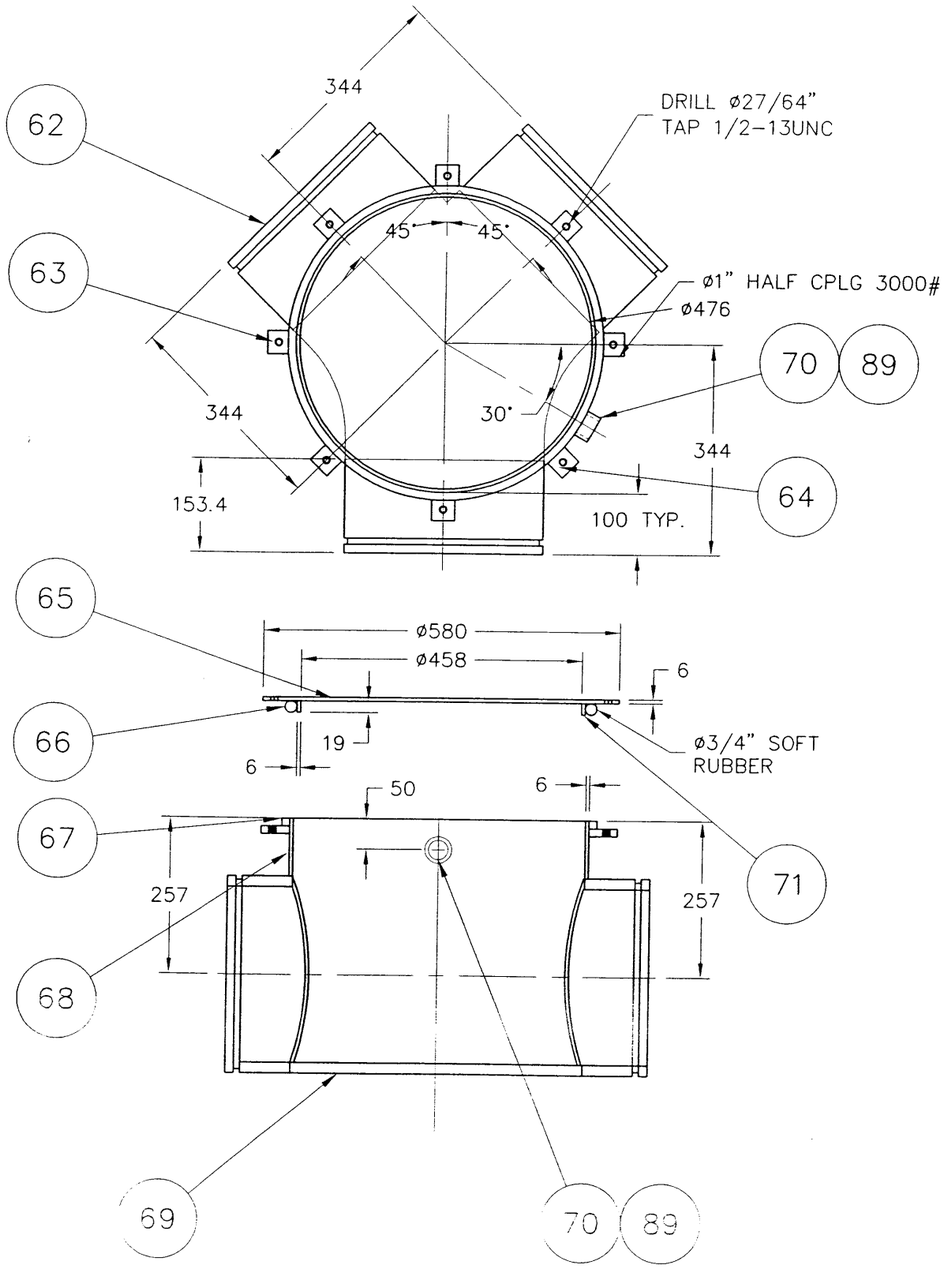
TITRE:
TITLE: ACCESS VAULT DETAILS

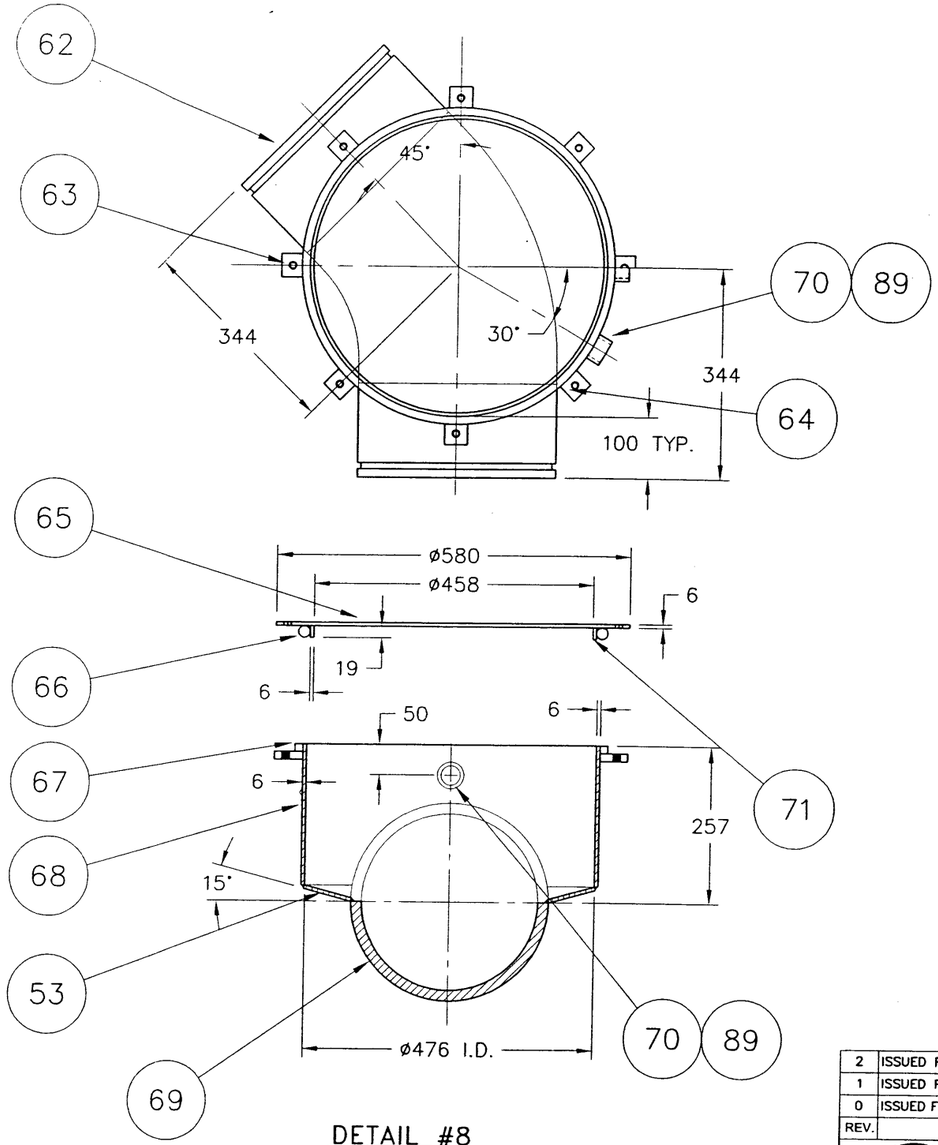
DESSIN No.:
DRAWING No: 4861-F-100

DESS. PAR:
DRAW BY: C.H.

ÉCHELLE SCALE:	QTE: QTY:	DATE:	FEUILLE: SHEET:	REV:
N.T.S.	1	07/06/2005	3 / 7	2



DETAIL #7
CLEANOUT TYPE 1



DETAIL #8
CLEANOUT TYPE 1

KUDLIK CONSTRUCTION LTD
P.O. BOX 727, 1519 FEDERAL ROAD
IQUALUIT, NUNAVUT X0A 0H0
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FAX: (867) 979-1169

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1	ISSUED FOR APPROVAL	14/06/05	C.H.
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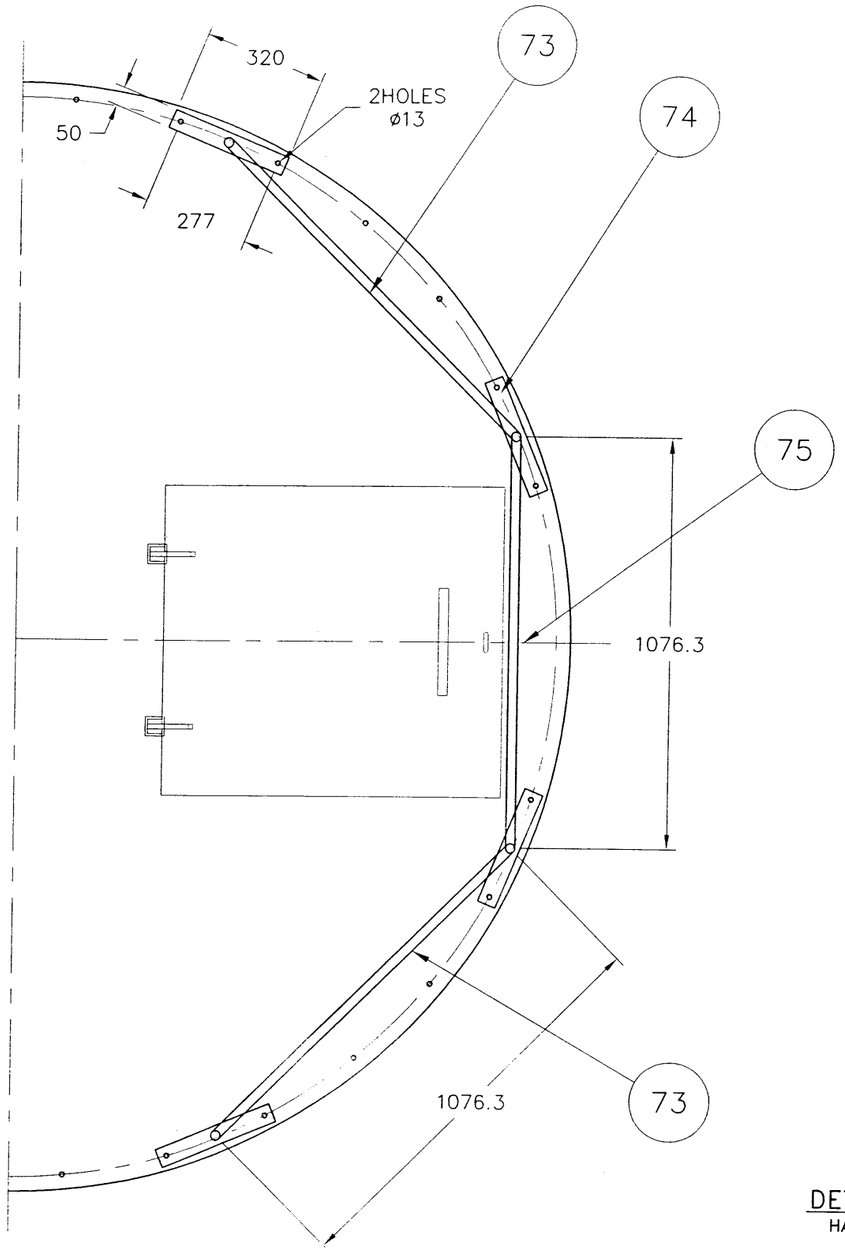
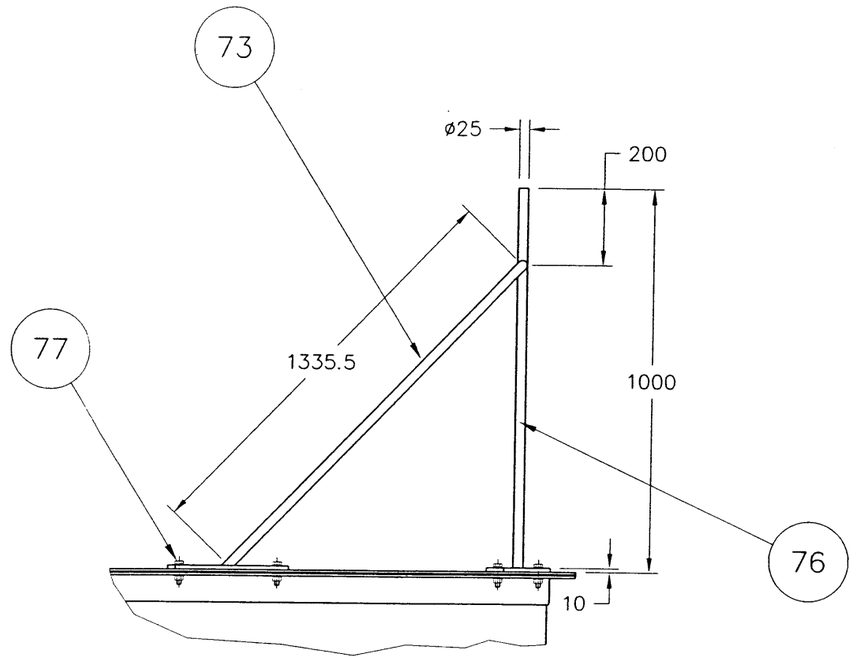
TITRE:
TITLE: ACCESS VAULT DETAILS

DESSIN No.: / DRAWING No:	DESS. PAR: / DRAW BY:
4861-F-100	C.H.

ÉCHELLE / SCALE:	QTE: / QTY:	DATE:	FEUILLE: / SHEET:	REV:
N.T.S.	1	07/06/2005	4 / 7	2





DETAIL #9
HAND RAIL

KUDLIK CONSTRUCTION LTD
P.O. BOX 727, 1519 FEDERAL ROAD
IQUALUIT, NUNAVUT X0A 0H0
PHONE: (867) 979-1166
FAX: (867) 979-1165

REV.	DESCRIPTION	DATE	DESS/DRAWN
2	ISSUED FOR APPROVAL	15/06/05	C.H.
1	ISSUED FOR APPROVAL	14/06/05	C.H.
0	ISSUED FOR APPROVAL	07/06/05	C.H.

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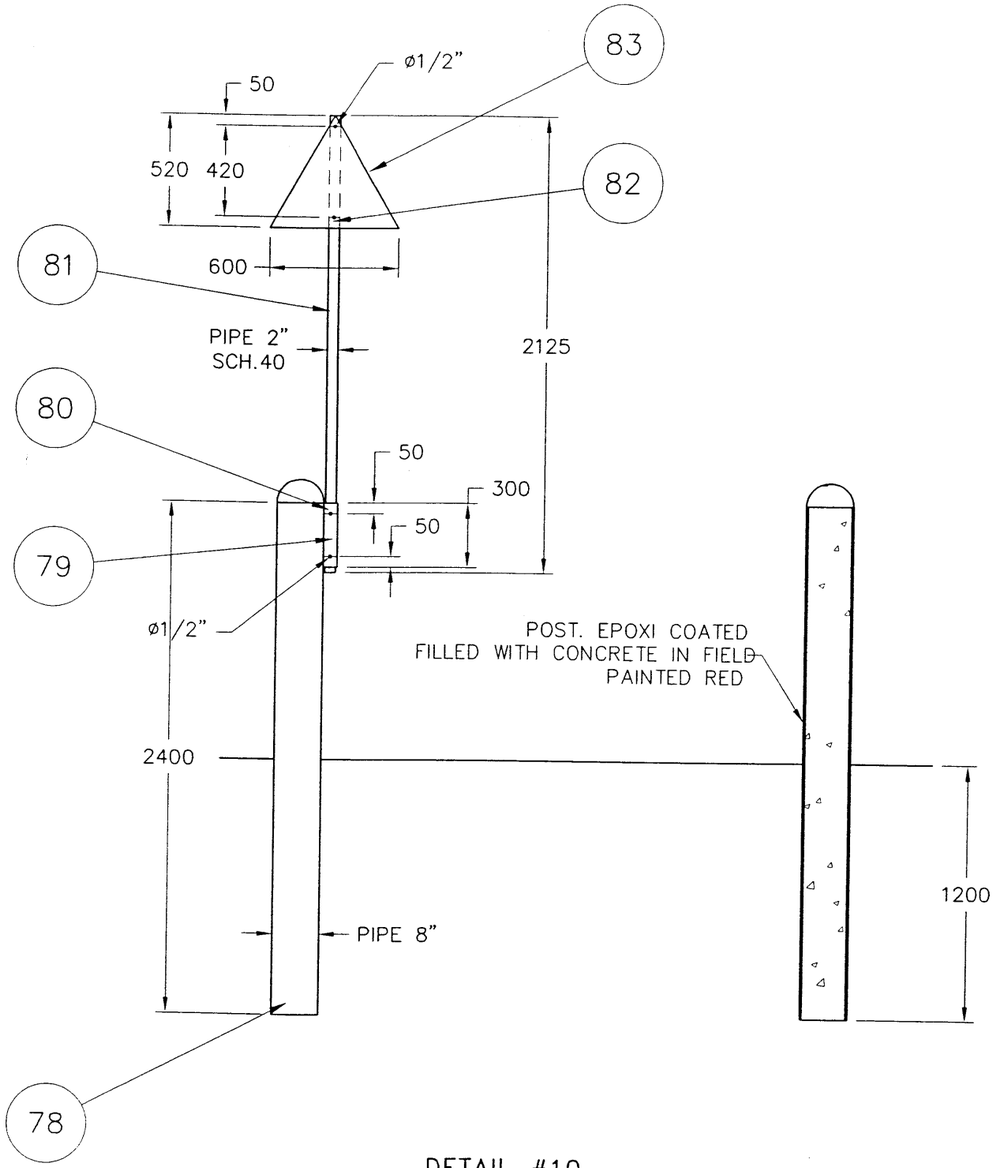
CLIENT:
CUSTOMER: CITY OF IQALUIT

TITRE:
TITLE: ACCESS VAULT DETAILS

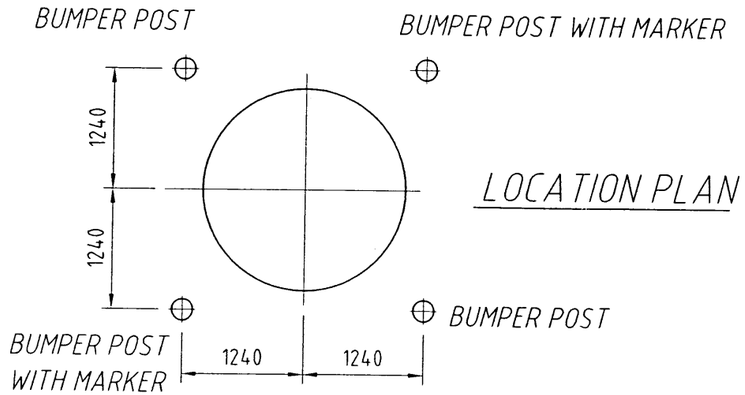
DESSIN No.:
DRAWING No: 4861-F-100

DESS. PAR:
DRAW BY: C.H.

ÉCHELLE / SCALE:	QTE: / QTY:	DATE:	FEUILLE: / SHEET:	REV
N.T.S.	1	07/06/2005	5 / 7	2



DETAIL #10
MARKER & BUMPER POST



LOCATION PLAN

NOTES:

- 2 SIGNS AT EACH ACCESS VAULT.
- POST. SLEEVE & MAST TO BE PAINTED RED AFTER FABRICATION
- 4 POSTS REQUIRED AT EACH ACCESS VAULT

KUDLIK CONSTRUCTION LTD
P.O. BOX 727, 1519 FEDERAL ROAD
IQUALUIT, NUNAVUT X0A 0H0
PHONE: (867) 979-1156
FAX: (867) 979-1157

REV.	DESCRIPTION	DATE	DESS/DRAWN
2	ISSUED FOR APPROVAL	15/06/05	C.H.
1	ISSUED FOR APPROVAL	14/06/05	C.H.
0	ISSUED FOR APPROVAL	07/06/05	C.H.

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Tel.: (450) 444-0566
Fax.: (450) 444-2227
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CHECK BY:

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JACQUES BOUCHER
28191
QUEBEC
NUL SANS SIGNATURE

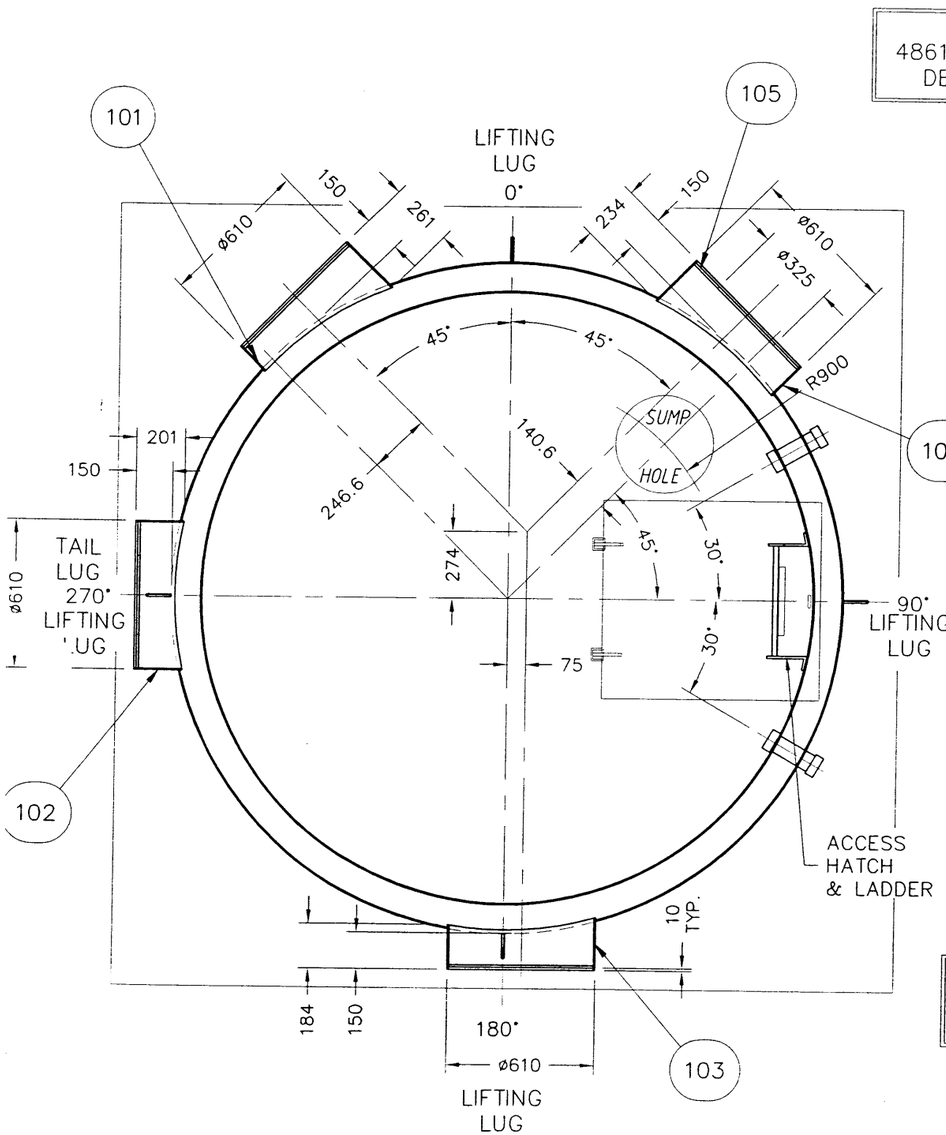
CLIENT:
CUSTOMER: CITY OF IQALUIT

TITRE:
TITLE: ACCESS VAULT DETAILS

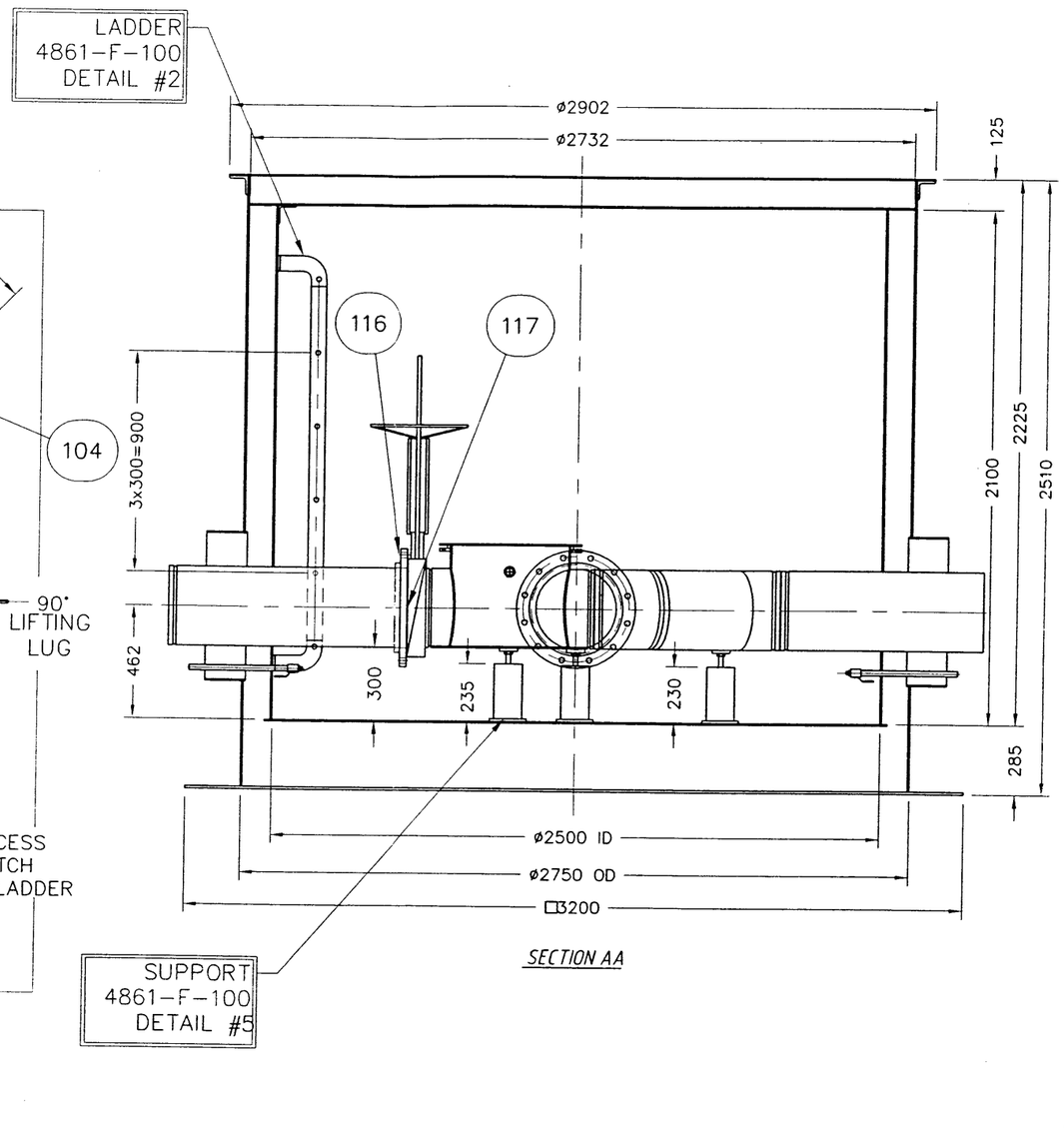
DESSIN No.:
DRAWING No: 4861-F-100

DESS. PAR:
DRAW BY: C.H.

ÉCHELLE / SCALE:	QTE: / QTY:	DATE:	FEUILLE: / SHEET:	REV:
N.T.S.	1	07/06/2005	6 / 7	2



SHELL DETAIL



SECTION AA

GENERAL NOTE

1 – VICTAULIC FITTINGS SHALL BE HOT DIPPED GALVANIZED INSIDE & OUT COUPLINGS SHALL BE STYLE 77 C/W GRADE E GASKETS
2 – ALL NUTS, BOLTS, WASHERS, SCREW, ETC... SHALL BE HOT DIP GALVANIZED OR CADMIUM PLATED
3 – FLANGE ADAPTERS FOR GROOVE JOINT PIPE SHALL BE VICTAULIC STYLE 741
4 – VALVE:
12" KNIFE GATE VALVE – ORBE 10 MODEL (OR EQUIV.), BODY – CAST IRON, DISC– STAINLESS STEEL, SEALS – BUNA–N, SHAFT – STAINLESS STEEL
VALVES SHALL BE INSTALLED WITH CADMIUM PLATED HEXAGONAL HEAD BOLTS

KUDLIK CONSTRUCTION LTD
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FAX: (867) 979-1150

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1	ISSUED FOR APPROVAL	14/06/05	C.H.
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INGÉNIEUR JACQUES BOUCHER 38191 QUÉBEC NUL SANS SIGNATURE

CLIENT:
CUSTOMER: CITY OF IQALUIT

TITRE:
TITLE: WASTEWATER TREATMENT PLANT ACCESS VAULT

DESSIN No.:
DRAWING No: 4861-F-200

DESS. PAR:
DRAW BY: C.H.

ÉCHELLE / SCALE:	QTE: / QTY:	DATE:	FEUILLE: / SHEET:	REV:
N.T.S.	1	07/06/2005	1 / 2	1

Parts List

Item	Qty	Name	Material
74	4	BASE PLATE 3/8" THK.	A-36
75	1	BAR ø1"	GALV. C.S.
76	2	BAR ø1"	GALV. C.S.
77	8	BOLT 1/2-13UNC - 2"LG + NUT 1/2-13UNC + LOCK WASHER 1/2"	PLATED C.S.
78	4	PIPE ø8" SCH.10 , SCH.20	C.S.
79	2	PIPE 2 1/2" SCH.40	C.S.
80	4	BOLT 3/8-16UNC x 3 3/4"LG + NUT 3/8-16UNC	C.S.
81	2	PIPE ø2" SCH.40	C.S.
82	4	BOLT 3/8-16UNC x 3 1/2"LG. + NUT 3/8"-16UNC	C.S.
83	2	PL 1/8"THK.	C.S.
84	1	INSULATION 38mm. THK. CUT TO MATCH EXTERIOR WALL RADIUS	STYROFOAM
85	1	FILLER PIECE, 10mm THK. INSULATION	STYROFOAM
86	1	INSULATION 38" THK.	STYROFOAM
88	1	ROD ø1/2"	GALV. C.S.
89	2	PLUG FOR 1" - 3000# CPLG	GALV. C.S.

Parts List

Item	Qty	Name	Material
26	2	PL 1/8"THK.	GALV. C.S.
27	1	PL 1/4"THK	44W (GALV)
28	4	FLAT BAR 2" x 3/16"	A 36
29	4	FLAT BAR 2" x 3/16"	A 36
30	4	FLAT BAR 2" x 3/16"	A 36
31	5	PL 20 GA. THK.	C.S. GALV
32	2	PL 3/4" THK	POLYETHYLENE
33	2	PL 3/4"THK	POLYETHYLENE
34	2	PL 3/4"THK	POLYETHYLENE
35	2	PL 3/4" THK.	POLYETHYLENE
36	72	PAN HEAD SCREWS #12 x 3/4" LG	GALV
37	2	PL 1/2"THK	44W
38	4	PL 1/2"THK.	44W
39	2	ROUND BAR ø1/2"	SS 304
40	4	COTTER PIN (TYP)	
41	4	FLAT WASHER 1/2"	GALV
42	2	PL 1/2"THK	A 36
43	4	PL. 3/8" (2 R.H.+2 L.H.)	C.S.
44	2	FLAT BAR 3/8"x2 1/2" x H	C.S.
45	6	BOUND BAR ø3/4"	A 36
46	4	THREADED ROD ø1/2" x 1 1/2"LG. + NUT 1/2-13UNC + WASHER 1/2"	C.S.
47	3	PL 1/2" THK.	44W
48	3	BOLT ø3/4" x 4" FULL THREADED	C.S.
49	3	PL 1/2" THK.	44W
50	3	NUT 3/4"-10UNC	C.S.
51	3	PIPE 4" SC.40 (DIFFERENT LENGTH)	A 53-B
52	3	PL 1/2" THK.	44W
53	2	PL 1/4" THK.	44W
57	4	PIPE 1/2" SCH.40 - 450 mm LG.	C.S.
58	4	1/2"ø FULL CPLG 150#	GALV
59	4	1/2"ø CLOSE NIPPLE SERIE 40	GALV
60	4	1/2"ø SCREWED BALL VALVE CRANE F #9102	
61	4	1/2"ø SQ. HD. PLUG 150#	GALV
62	5	PIPE 12" SCH.80	A-53-B
63	16	FLAT BAR 1/2" x 1 1/2"	A-36
64	16	BOLT 1/2-13UNC x 1 1/2"LG	PLATED C.S.
65	2	PL. 1/4" THK.	44W
66	2	GASKET ø3/4"	SOFT RUBBER
67	2	SQ. BAR 1/2" x 1/2"	A 36
68	2	PL. 1/4" THK.	44W
69	3	12" SCH.80 - ELBOW L.R. 45°	GALV. C.S.
70	2	HALF CPLG 1" - 3000#	C.S.
71	2	FLAT BAR 1/4" x 3/4"	A-36
72	24	BOLT 1/4-20UNC x 1 1/2" LG. + NUT	PLATED. C.S.
73	2	BAR ø1"	GALV. C.S.

Parts List

Item	Qty	Name	Material
1	1	PL 6 mm THK.	A 36
2	1	L 3 x 3 x 1/4	G40.21-44W
3	5	LIFT LUG 1/2"THK	A 36
4	2	PIPE ø1 1/2" SCH.40 - 200 mm LG.	PVC
5	2	NIPPLES ø2 SCH.40 - 76 mm LG. (CUT IN TWO PIECES)	C.S.
6	4	THREADED CAP ø2" - 150#	GALV.
7	1	PL 1/4" THK	A 36
8	1	PL 1/4" THK.	A 36
9	5	REINFORCING PLATE 200 x 200 x 12 THK.	A 36
10	1	SHELL SUMP 1/4"THK	A 36
11	1	BOTTOM SUMP 1/4"THK.	A 36
12	1	PL 3/8" THK.	A 36
13	1	L 3" x 3" x 1/4"	G40.21-44W
14	1	INS. BOTTOM 1/4" THK	A 36
15	1	PL 1/4"THK.	A 36
16	56	BOLT 1/2-13UNC - 1 3/4"LG + NUT 1/2-13UNC + LOCK WASHER 1/2"	C.S.
17	1	GASKET 75 mm x 3 mm THK.	NEOPRENE
18	1	INSULATION, FOAM IN PLACE, 240 KPaMIN COMPRESSIVE STRENGHT PER SPECIFICATIONS	POLYURETHANE
19	1	PL. 1/4" THK	44W
20	1	ROUND BAR 1/2" - 410 mm LG.	A 36
21	2	FLAT BAR 1/2"x1 1/2"	A 36
22	2	FLAT BAR 1/2" x 1 1/2"	A 36
23	1	GASKET 19x38 mm ES11-058-N30 ELASTO PROXY	NEOPRENE
24	20	BOLT 1/4-20UNCx1 3/4"LG + NUT 1/4-20UNC + LOCK WASHER 1/4"	C.S. GALV
25	2	PL 1/8"THK.	GALV. C.S.

* QUANTITÉ POUR 1 ACCESS VAULT

KUGLIK CONSTRUCTION LTD
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APPROUVÉ PAR:
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BILL OF MATERIALS

DESSIN No.:
DRAWING No: 4861-F-100

DESS. PAR:
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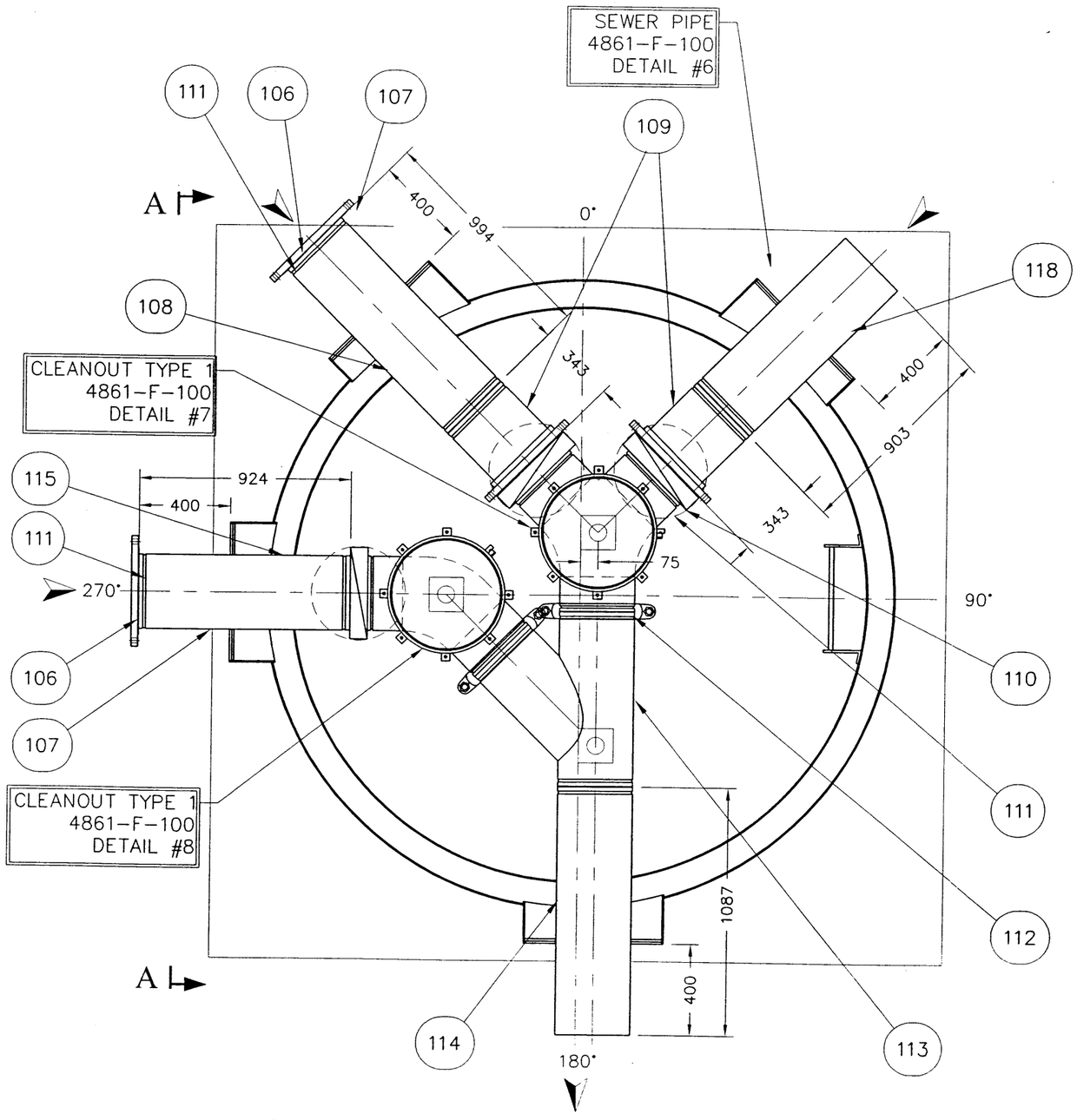
ÉCHELLE SCALE:	QTE: QTY:	DATE:	FEUILLE: SHEET:	REV:
N.T.S.	1	07/06/2005	7 / 7	2



PIPING DETAIL

VALVES, VICTAULIC COUPLING AND VICTAULIC FLANGES NOT SHOWN FOR CLARITY

Parts List

Item	Qty	Name	Material
101	1	PL. 1/4" THK.	44W
102	1	PL. 1/4" THK.	44W
103	1	PL. 1/4" THK.	44W
104	1	PL. 1/4" THK.	44W
105	4	RING 10 mm THK.	44W
106	2	12" BLIND FLANGE	C.S.
107	24	BOLT 7/8-9UNC x 4"LG. + NUT	PLATED. C.S.
108	1	PIPE 12" SCH.80	A-53-B
109	2	PIPE 12" SCH.80	A-53-B
110	3	12" KNIFE GATE VALVE - ORBE 10 (OR EQUIV.), BODY - CAST IRON, DISC - S.S., SEALS - BUNA-N, SHAFT - S.S., WIPER RING - PTFE, LUGGED TYPE.	
111	6	12" VICTAULIC FLANGE STYLE 741	GALV. C.S.
112	5	12" VICTAULIC COUPLING STYLE 77	GALV. C.S.
113	1	12" VICTAULIC 45° LATERAL No.30	GALV. C.S.
114	1	PIPE 12" SCH.80	A-53-B
115	1	PIPE 12" SCH.80	A-53-B
116	72	BOLT 7/8-9UNC x 2 1/2"LT.+ FLAT WASHER	PLATED. C.S.
117	2	GASKET 12 3/4" I.D x 16 1/8" O.D. 1/8" THK.	EPDM
118	1	PIPE 12" SCH.80	A-53-B

KUDLIK CONSTRUCTION LTD
P.O. BOX 727, 1519 FEDERAL ROAD
IQUALUIT, NUNAVUT X0A 0H0
PHONE: (867) 979-1166
FAX: (867) 979-1169

REV.	DESCRIPTION	DATE	DESS/DRAWN
1	ISSUED FOR APPROVAL	14/06/05	C.H.
0	ISSUED FOR APPROVAL	07/06/05	C.H.

BERLIE-FALCO TECHNOLOGIES INC.
1245 rue Industrielle
La Prairie (Quebec)
J5R 2E4
Tel.: (450) 444-0566
Fax.: (450) 444-2227
www.falcotechologies.com
www.berlie-tech.com

APPROUVÉ PAR:
CHECK BY:

INGENIEUR
JACQUES BOUCHER
38191
QUEBEC
NUL SANS SIGNATURE

CLIENT:
CUSTOMER: CITY OF IQALUIT

TITRE:
TITLE: WASTEWATER TREATMENT PLANT
ACCESS VAULT - AV600

DESSIN No.:
DRAWING No: 4861-F-200

DESS. PAR:
DRAW BY: C.H.

ÉCHELLE SCALE:	QTÉ: QTY:	DATE:	FEUILLE: SHEET:	REV:
N.T.S.	1	07/06/2005	2 / 2	1

Chapter 11HOPPER

MANUFACTURER/DISTRIBUTOR:

HTS QUÉBEC
BOISBRIAND
QUÉBEC J7E 1M7
PH:450-434-4949 FAX:4051

11.1 HOPPER COATING TECHNICAL SPECIFICATION.

END OF CHAPTER 11

SECTION 09905

U-3

HTS
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Roofing
Containment Systems
Plural Component Equipment
Plastic Spray Coating and Molding
Polyurethane Foams
Wall and Floor Coating
Mould Releases

Plastic Spray Coating and Molding

Imagine saving time ***and*** improving the finished part of Computer-Aided Design (CAD) expanded polystyrene (EPS) shapes. Unique shaped pieces can now be sprayed with HTS poly urea spray plastic coatings and maintain their intricate shape!

HTS poly urea coatings cure within seconds enabling super fast production schedules.

The process is to start with a cured, dry expanded polystyrene block. Cut and shape the EPS. Apply HTS poly urea hardcoat to the suface of the EPS (thickness will vary depending on where the part). Apply HTS 429 primer at 1-2 dry mils immediately after hardcoat application. Apply your finish. It is that easy and that fast!!!!

HTS also has hand applied systems for small or difficult to get at small parts. Contact your nearest HTS office today to discuss your needs.

Your piece is now ready for sale! For quick, durable, easy and profitable production contact HTS today. Contact HTS to provide the complete package for you including all equipment, plastic coating and primer systems.

IMAGINE

Super fast spray production (dry in 5-10 seconds)

Ideal for use on irregular EPS surfaces

Tough impact resistant spray hard coats

Compatible with many conventional surface finishes

REVIEWED ACCORDING ... REQUIREMENTS OF THE GENERAL CONDITIONS OF THE CONTRACT. ANY ACTION ... TO THE ...

☑ ...
☐ ...
☐ ...
☐ ...

DATE Oct 31/05 BY OKB
EARTH TECH (CANADA) INC.

11-1/5

HOOPER

HTS *TECHNICAL BULLETIN*

HTS 7995

100% SOLIDS PURE POLY UREA COATING

DESCRIPTION

HTS 7995 is a 100% solids "fast set" two-component spray applied 100% poly urea coating system. This coating forms a tough, durable, flexible membrane with outstanding impact resistant properties. This spray applied coating has zero VOC, does not contain any solvents and is supplied in a convenient low viscosity 1:1 mix ratio.

HTS 7995 is used as a direct to metal (dtm) coating system for the exterior of pipe and can also be used for projects over other substrates including: eps, urethane foam, wood or concrete (primers may be required) involving primary or secondary containment. Heated high pressure plural component pumps are required for application of **HTS 7995.** Consult HTS for specific recommendations on surface preparations or primer needs.

RECOMMENDED USES

External Pipe Coating
Waterproofing
Containment
Abrasion Resistant Applications

ORDERING INFORMATION

10 Gallon Kits
110 Gallon Kits
Standard colour is grey

TYPICAL WET PROPERTIES

	ISO	POLYOL
Viscosity at 25 C	500 cps	600 cps
Solids: by weight by volume	100 % 100 %	100 % 100 %
VOC	0	0
Flash Point	>200 C	>200 C
Appearance	Amber	Grey
Weight per US Gallon	9.0 LBS ± .5	8.0 LBS ± .5
Shelf Life - unopened	9 Months	12 Months

FEATURES

COLD TEMPERATURE TOLERANCE: HTS 7995 exhibits flexibility at temperatures to -40C making this an ideal product for high impact applications.

U.V. STABILITY: HTS 7995 is an aromatic 100% poly urea coating. The membrane can be left exposed to UV and maintain its structural integrity although discolouration will occur in colours other than black. Recoat windows will apply.

HIGH TEMPERATURE RESISTANCE: HTS 7995 is a 100% poly urea formulation which provides high heat tolerance compared to conventional urethane chemistries making the HTS 7995 the coating of choice for higher temperature projects. Applications will vary, please consult HTS for specific limits but for dry heat applications a maximum of 300 F can be obtained.

IMPACT RESISTANCE: HTS 7995 has outstanding impact resistance that protects against damage during the backfill process of pipeline construction.

CONVENIENT MIXING RATIO: HTS 7995 is supplied in a convenient 1:1 mixing ratio by volume. This product must be sprayed through heated high pressure plural component spray equipment capable of maintaining 2200 psi output at 160 degees F and 1.5 gallons per minute.

PHYSICAL PROPERTIES OF CURED MATERIALS

PROPERTY	ASTM TEST	VALUE
Tensile Strength	D 412	2550 PSI ± 100
Elongation	D 412	250 %
Hardness	D 2240	95 Shore A
Low Temperature Resistance	D 1737 1/2" Bend	Rated at - 40 C
High Temperature Resistance	Dry Heat	300 F
Moisture Vapour Transmission - Perms	30 mil	0.028 perms
Tear Strength	ASTM D-624 DieC	400 PLI

HESTERMAN TECHNICAL SERVICES, INC

HTS Head Office	190 Hodsman Road, Regina, SK.	Phone 306-721-1339	Fax 306-721-3770
HTS Quebec	Montréal, QC.	Phone 450-434-4949	Fax 450-434-4051
HTS Alberta	Calgary, AB	Phone 403-226-0655	Fax 403-226-6354
HTS Ontario	Oshawa, ON	Phone 905-449-0707	Fax 905-571-1855

WEB SITE: WWW.HTS-Urethanes.com

Email: hts@accesscomm.ca

COATING APPLICATION DETAILS OF HTS 7995

1. Potlife of HTS 7995 is 15 seconds do not pot mix this product. High Pressure plural component spray equipment is required to use this product.
2. "B" component must be mixed for 20 minutes daily using high speed shear mixer prior to use. Be carefull to not cross contaminate the A and B individual components.
3. Do not introduce moisture to either A or B component.
4. Do not thin this product.
5. A & B components must be preheated to 80-90 F prior to use. Do not re-circulate. Use band heaters or "hot box" methods to preheat.

APPLICATION CONDITIONS

	Minimum	Maximum
Ambient Temperature	35 F (2 C)	120 F (49 C)
Relative Humidity	0 %	85 %
Substrate Temperature	45 F (7 C)	100 F (38 C)

EQUIPMENT SETTINGS

Storage - *do not freeze*	70 F (20 C)
Container Pre-Heat	80-90 F
Primary Heater Setting	150 F
Hose Heat Setting	150 F
Output Pressure	2200 psi

COATING CURE SCHEDULE

	70 F - 100 F	45 F - 65 F
Surface Dry (tack free)	<1 minute	10 minutes
Recoat - minimum*	1 minute	10 minutes
- maximum	2 hours	6 hours
Full Cure	24 hours	3 days

*It is critical that the first pass of coating be completely tack free prior to subsequent pass being applied. For applications that are beyond the recoat window consult HTS for details.

HESTERMAN TECHNICAL SERVICES, INC

HTS Head Office	190 Hodsman Road, Regina, SK.	Phone 306-721-1339	Fax 306-721-3770
HTS Quebec	Montreal, QC.	Phone 450-434-4949	Fax 450-434-4051
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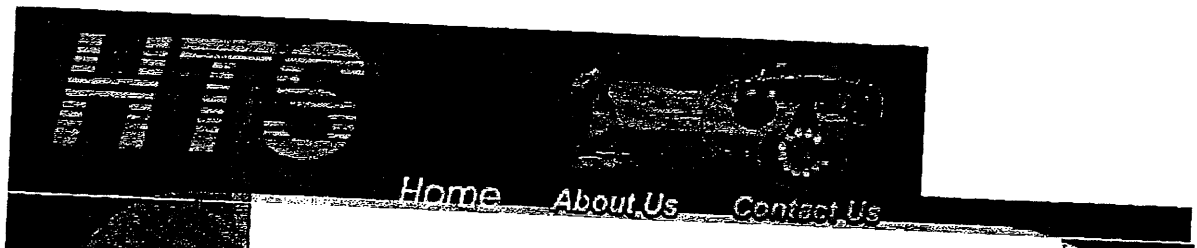
WEB SITE: WWW.HTS-Urethanes.com
Email: hts@accesscomm.ca



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Containment Systems
Plural Component Equipment
Plastic Spray Coating and Molding
Polyurethane Foams
Wall and Floor Coating
Mould Releases

Contact Us

HIGH TECH NEEDS FOR INDUSTRY

HTS

HESTERMAN TECHNICAL SERVICES

Offices:

***HTS* HEAD OFFICE**
190 Hodsman Road
Regina, Sask., Canada
S4N 5X4
Bus (306) 721-1339
Fax (306) 721-3770

***HTS* ALBERTA**
Calgary, Alberta
T3K 4N1
Bus (403) 226-0655
Fax (403) 226-6354

***HTS* ONTARIO**
Oshawa, Ontario
L1J 3K5
Bus (905) 449-0707
Fax (905) 571-1855

***HTS* B.C.**
Kelowna, B.C.
V1W 1J7
Bus (250) 826-0655
Fax (250) 764-2948

***HTS* QUEBEC**
Boisbriand, Quebec
J7E 1M7
Bus (450) 434-4949
Fax (450) 434-4051

Click here to

E-MAIL
us

11 5/5

sur 1

Chapter 12 JIB AND HOIST

MANUFACTURER/DISTRIBUTOR:

KONECRANES Canada INC.
CRANE PRO SERVICES
1875,CHEMIN ST-FRANÇOIS
DORVAL,QUÉBEC
PH:514-421-3030 FAX:1244

12.1 PURCHASE DESCRIPTION.

12.2 HOIST BOOM.

12.3 ELECTRIC HOIST DESCRIPTION.

12.4 MANUAL CHAIN HOIST.

12.5 JIB CERTIFICATION.

12.6 OWNER AND OPERATOR MANUAL FOR TS SERIES TROLLEY

12.7 OWNER AND OPERATOR MANUAL FOR CB CHAIN HOIST.

END OF CHAPTER 12

CRANE PRO SERVICES

Konecranes Canada Inc.
Crane Pro Services
1875 Chemin St. François
Dorval, Québec
H9P 1K3
Tel (514) 421-3030
Fax (514) 421-1244

REVIEWED ACCORDING TO THE REQUIREMENTS OF THE GENERAL CONDITIONS OF THE CONTRACT. ANY ACTION INDICATED DOES NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR DEVIATIONS FROM THE CONTRACT DOCUMENTS.

☑ NO EXCEPTIONS TAKEN

☐ MAKE CORRECTIONS NOTED

☐ REVISE & RESUBMIT

☐ REJECTED

DATE Oct 31/05 BY OKB

EARTH TECH (CANADA) INC.

Le 27 juin 2005
Quote : 05-06-09

050810-003Q

KUDLIK CONSTRUCTION LTD
Mirabel, Qc, Can. J7J 1P4
Tél : (450) 437-4001
Fax : (450) 430-7106

Att. Nikol/Guy,

Tel que demande, voici est notre prix pour fournir une potence et un palan :

POTENCE (Jib Crane)
Modèle; MWS-1100-86 Tie rod braced
Capacité ; 1100 lbs (Capacity)
Portee de la poutre principale: 86 pouces (span) Item A
Rotation : 220 deg
Couleur : Jaune (Color)
Centre-centre des ancrages : 33 pouces (C-C of hinges)
Poids du système : 210 lbs approx. (Weight)
Thrust et pull : 4220 lbs

~~Prix : $1000.00 + taxes~~

Palan type Kito
Capacité: ½ tonne (Capacity)
Vitesse du palan : manuel (Manual hoist + Trolley)
Chariot manuel
Hauteur de levage : 10'-0 (Height of lift).

Client est responsable pour la structure (Client responsable for Structure)
Tous les dimensions doit être approuve par le client avant le commencement de fabrication (Approval necessary)

Livraison 2-3 semaines une fois dessin est approuve Item B

~~[redacted]~~

12.1-1

CRANE PRO SERVICES

Konecranes Canada Inc.
Crane Pro Services
1875 Chemin St. François
Dorval, Québec
H9P 1K3
Tel (514) 421-3030
Fax (514) 421-1244

Tel que demande, voici est notre prix pour fournir une potence et un palan :

POTENCE
Modèle; MWS-2200-96 Tie rod braced
Capacité ; 2200 lbs
Portee de la poutre principale: 96 pouces
Rotation : 220 deg
Couleur : Jaune
Centre-centre des ancrages : 30 pouces
Poids du système : 230 lbs approx.
Thrust et pull : 9120 lbs

Item C
(C-C of anchors)

~~[redacted]~~

Palan type Budgit
Capacité: 1 tonne métrique
Vitesse du palan : 16 ppm (Hoist speed)
Alimentation : 575/3/60
Chariot manuel
Hauteur de levage : 37'-0
Classe1-Division2 Groupe D
Poids approx : 136 lbs

Item D

Client est responsable pour la structure
Tous les dimensions doit être approuve par le client avant le commencement de fabrication

Livraison 8 semaines une fois dessin est approuve
Le panneau NEMA 7 doit pas être installer sur le palan
Boîtier Nema 4 boite de jonction va être installer sur le chariot

~~[redacted]~~

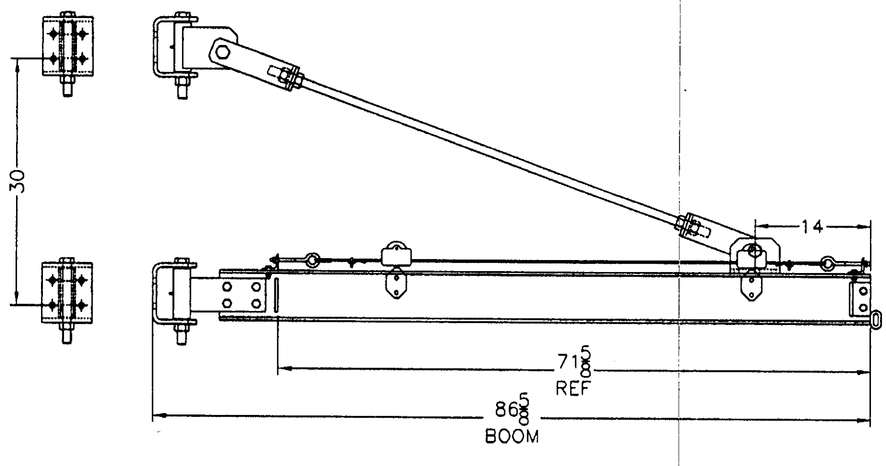
Nema 7 panel & pushbutton station will be shipped loose. Panel to be remote mounted + NOT mounted on hoist. Nema 4 JBox will be trolley mounted for mounting PB to hoist. The paddle type L.S. ~~will~~ be removed & clutch will be used as Limit Switch.

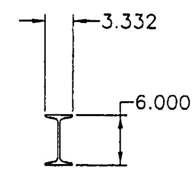
Net: 30 Jours
Cotation valide: 30 Jours
FAB ; Votre Usine

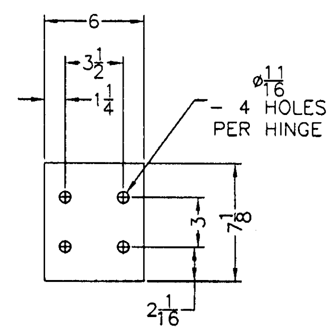
Merci,

Philip Tanious
Directeur de District

12.1-2







HINGE DRILLING DETAIL
SHOWN 2 TIMES SCALE

REV NUM	DATE	REVISION NOTICE	REVISION DESCRIPTION	BY	APPD
1	12AUG05	86-5/8	WAS 96	WJW	

CAPACITY:	BOOM ROTATION:	THRUST & PULL FORCE:
2200 LBS	220 DEG	9120 LBF

NOTE THAT FACTORS, SUCH AS COLUMN CLAMPS, BOOM FLANGE, WALLS OR OTHER OBSTRUCTIONS MAY REDUCE THE BOOM ROTATION. THE ROTATION SPECIFIED ABOVE IS THE MAXIMUM PERMITTED BY THE HINGE DESIGN OF THE JIB CRANE.

APPROVED - PROCEED WITH MANUFACTURING ☐	SIGNATURE:	
APPROVED *AS NOTED* PROCEED WITH MANUFACTURING ☐		
NOT APPROVED- PLEASE CORRECT AND RESUBMIT ☐	DATE:	

ITEM	PART NUMBER	QTY	DESCRIPTION	TOTAL QTY	UOM
	DO NOT SCALE DRAWING	35602-BJ	MOTIVATION INDUSTRIAL EQUIPMENT LTD. STONEY CREEK, ONTARIO. -CANADA- (905) 664-4040		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES. DIMENSIONS IN ( ) ARE MM. -TOLERANCES-

DRAWN BY: BJ
DRAWN DATE: 15JUN05
APPROVAL DWG- MWS-2200-96
DERIVED FROM: MOTIVATION_MWS
UOM: EA
WEIGHT: 212
SCALE: 1/8
SHT: 1 OF 1
SIZE: C
DRAWING NO: A0002463
REV: 1

12.2-1

REV NUM	DATE	REVISION NOTICE	REVISION DESCRIPTION	BY	APRD
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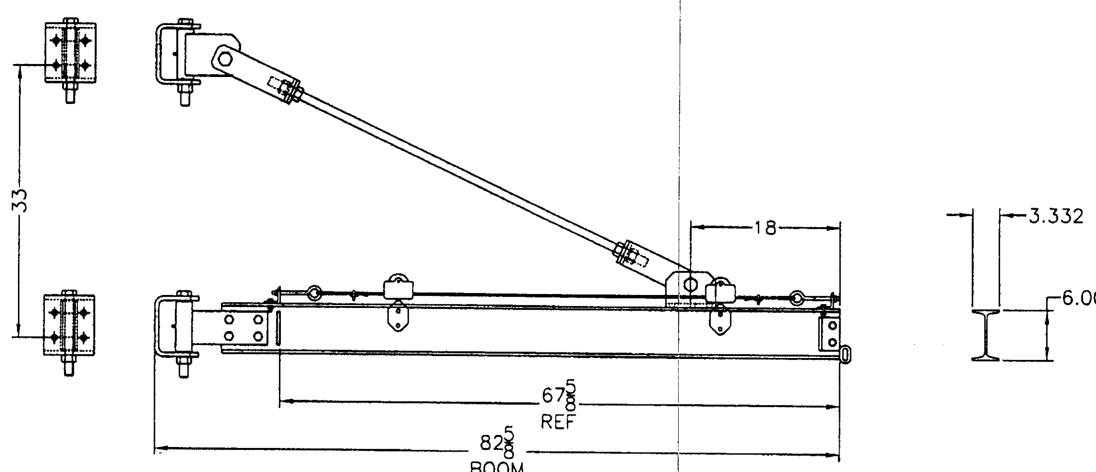
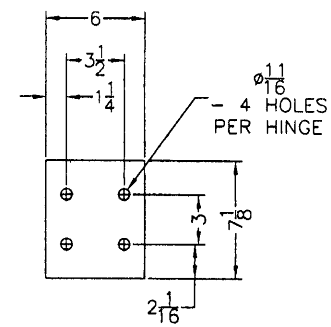




HINGE DRILLING DETAIL
SHOWN 2 TIMES SCALE

CAPACITY:	BOOM ROTATION:	THRUST & PULL FORCE:
1100 LBS	220 DEG	4220 LBF

NOTE THAT FACTORS, SUCH AS COLUMN CLAMPS, BOOM FLANGE, WALLS OR OTHER OBSTRUCTIONS MAY REDUCE THE BOOM ROTATION. THE ROTATION SPECIFIED ABOVE IS THE MAXIMUM PERMITTED BY THE HINGE DESIGN OF THE JIB CRANE.

APPROVED - PROCEED WITH MANUFACTURING ☐	SIGNATURE:
APPROVED *AS NOTED* PROCEED WITH MANUFACTURING ☐	
NOT APPROVED- PLEASE CORRECT AND RESUBMIT ☐	DATE:

ITEM	PART NUMBER	QTY	DESCRIPTION	TOTAL QTY	UOM

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES DIMENSIONS IN [ ] ARE MM

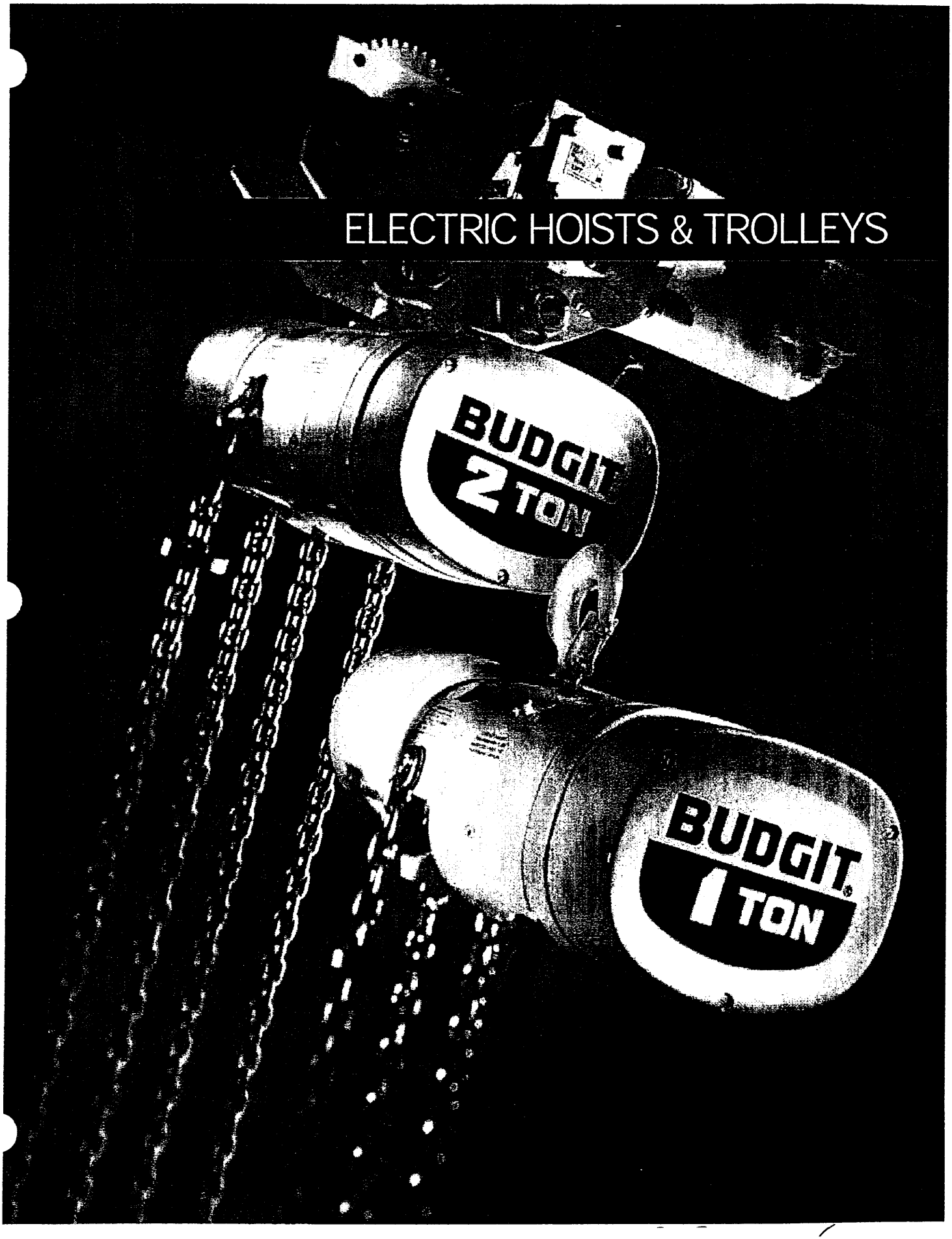
MOTIVATION
INDUSTRIAL EQUIPMENT LTD.,
STONEY CREEK, ONTARIO. -CANADA- (905) 664-4040

APPROVAL DWG- MWS-1100-86

SCALE 1/8 | C | A0002462 | REV 1

12.2-2

Item D+E



There's a for every job.

Electric Chain Hoists

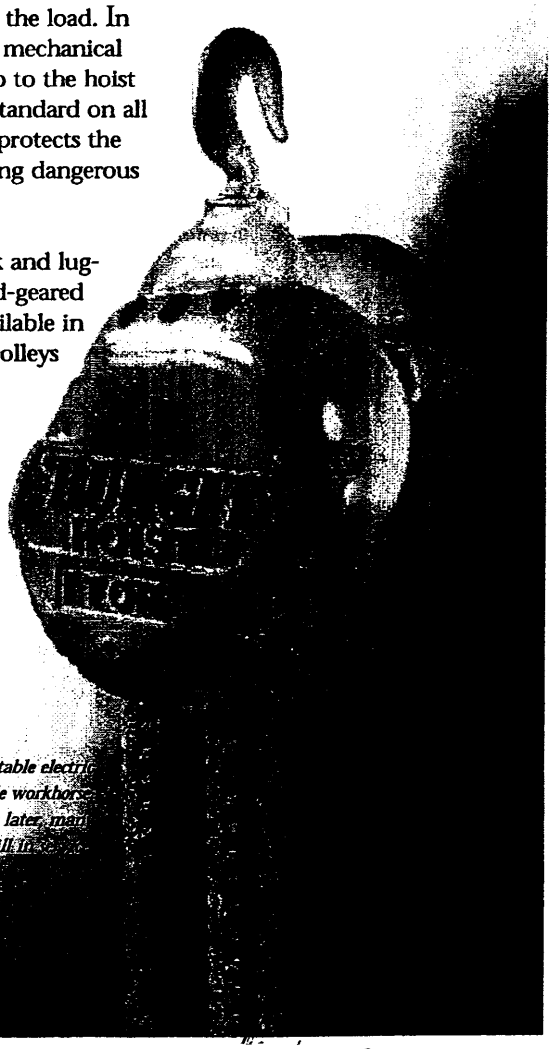
For over 60 years, BUDGIT® Electric Chain Hoists have been designed and manufactured for tough jobs. Since 1935, BUDGIT® has led the industry in innovation, quality, and dependability. These compact, lightweight, economical hoists are built to withstand the rigors of heavy service and repeated lifting cycles. They are easy to service, require minimal maintenance, and offer excellent headroom.

BUDGIT® hoists come with two choices of load chain; roller and link. Roller chain provides smoother, quieter operation for light to medium duty applications. Roller chain models are available only in hook suspension. Link chain hoists are ideal for heavier service applications requiring repeated lifting cycles. All link chain models are available in either hook or lug suspension.

All BUDGIT® electric hoists are equipped with a heavy duty, positive acting, short-stroke DC rectified disc motor brake. The brake is rated at 150% torque to stop and hold the load. In addition, all hoists are provided with a Weston-type mechanical load brake for load lowering control and as a backup to the hoist motor brake. A Manguard™ overload device is also standard on all BUDGIT® Electric Chain Hoists. The Manguard™ protects the hoist, operator and supporting structure by preventing dangerous overloads.

A wide variety of trolleys are provided for both hook and lug-suspended hoists. Trolleys are available in push, hand-geared and motor-driven versions. Hook-on trolleys are available in either push or hand-geared versions. Rigid Mount trolleys are available in push, hand-geared and motor-driven versions.

BUDGIT® hoists are available in a variety of controls to meet the specific need of your application. The standard control is single speed with options available for two speed and variable frequency. All BUDGIT® electric hoists and/or motor-driven trolleys are CSA approved.

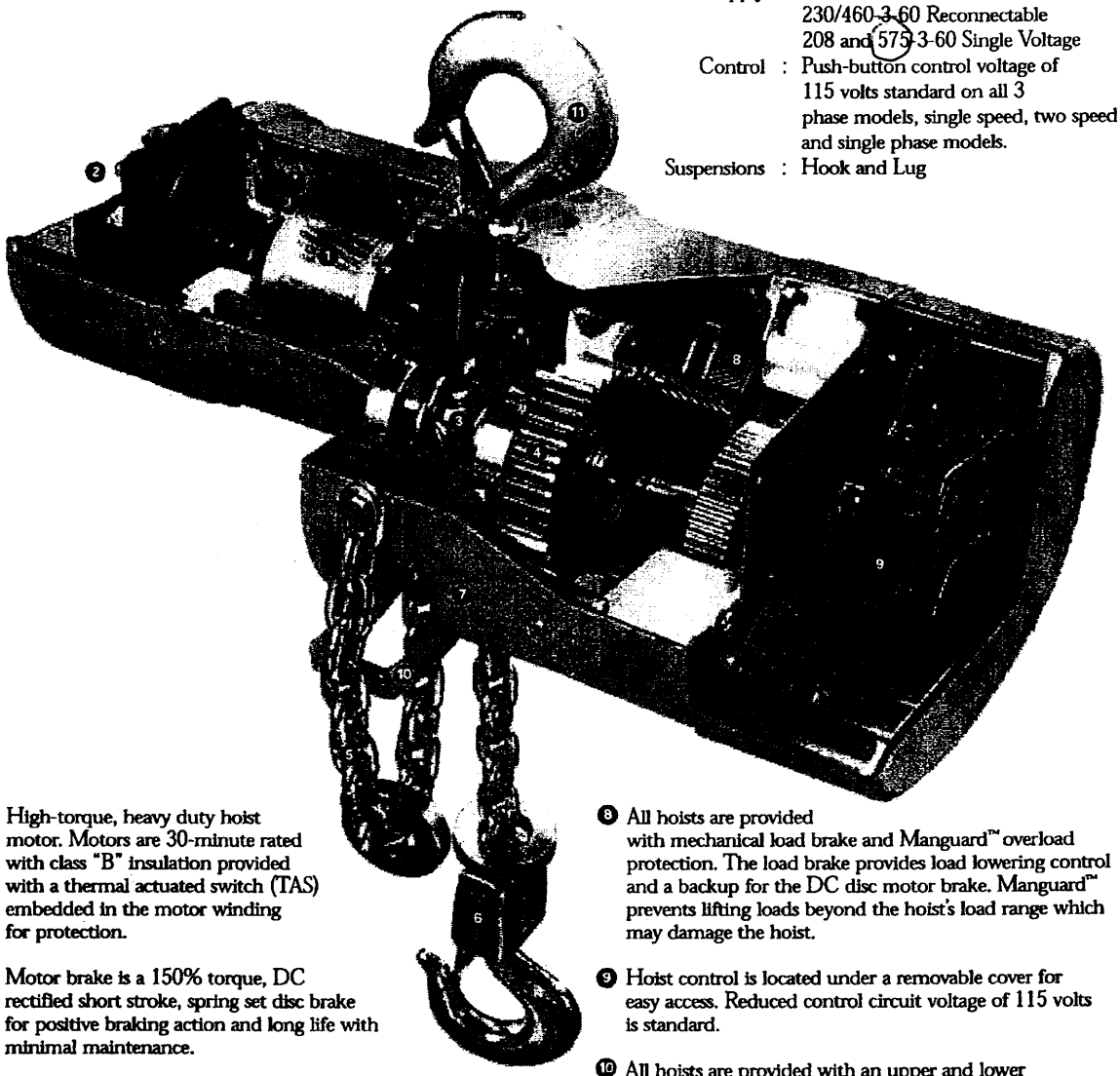


BUDGIT 'S® first portable electri[c]
hoist was a reliable workhor[se].
Today, decades later, man[y]
are still in [use].

12.31

SPECIFICATIONS

Capacity Range	:	1/4 thru 3-tons
Lift	:	10 feet standard additional lifts available
Lifting Speed	:	5 to 64 FPM
AC Power Supply	:	115/230 1-60 HZ Reconnectable 230/460-3-60 Reconnectable 208 and 575-3-60 Single Voltage
Control	:	Push-button control voltage of 115 volts standard on all 3 phase models, single speed, two speed and single phase models.
Suspensions	:	Hook and Lug



❶ High-torque, heavy duty hoist motor. Motors are 30-minute rated with class "B" insulation provided with a thermal actuated switch (TAS) embedded in the motor winding for protection.

❷ Motor brake is a 150% torque, DC rectified short stroke, spring set disc brake for positive braking action and long life with minimal maintenance.

❸ Load sprocket is provided with a full floating chain guide that assures proper engagement of chain on sprocket.

❹ All gearing is totally enclosed, oil-bath lubricated for long life.

❺ Hoists are available in either roller or link chain.

❻ The lower block is provided with a 360° rotating hook riding on thrust bearings. As standard, the hook is provided with a spring loaded latch.

❼ The hoist frame and housing are constructed from light-weight, rugged aluminum alloy. Housing is precision machined for accurate gear and bearing alignment.

❽ All hoists are provided with mechanical load brake and Manguard™ overload protection. The load brake provides load lowering control and a backup for the DC disc motor brake. Manguard™ prevents lifting loads beyond the hoist's load range which may damage the hoist.

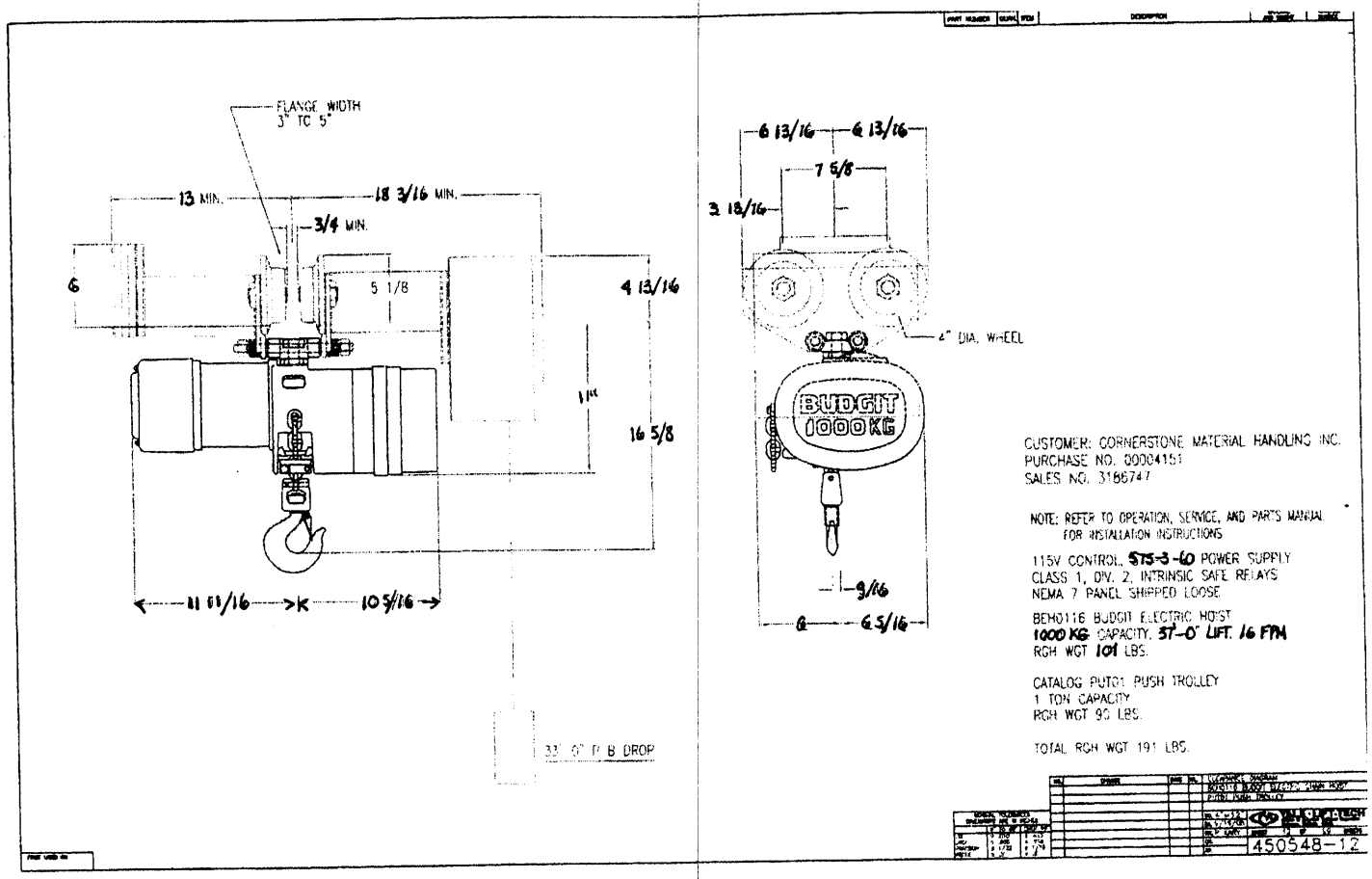
❾ Hoist control is located under a removable cover for easy access. Reduced control circuit voltage of 115 volts is standard.

❿ All hoists are provided with an upper and lower control circuit limit switch.

⓫ Hoists are available in either hook or lug suspension. Hook suspension permits portability of the hoist while lug suspension reduces headroom and can be used with any of our rigid-mount trolleys.

(Not Shown) Standard push-button control station is contoured for operator comfort allowing easy one-handed sure grip control and provided with a weatherproof NEMA-4X enclosure. The push-button cable is provided with built-in strain relief to help prevent cable damage.

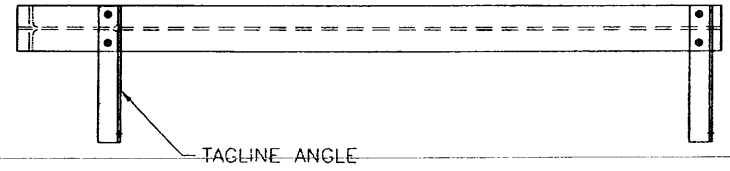
12.3.7

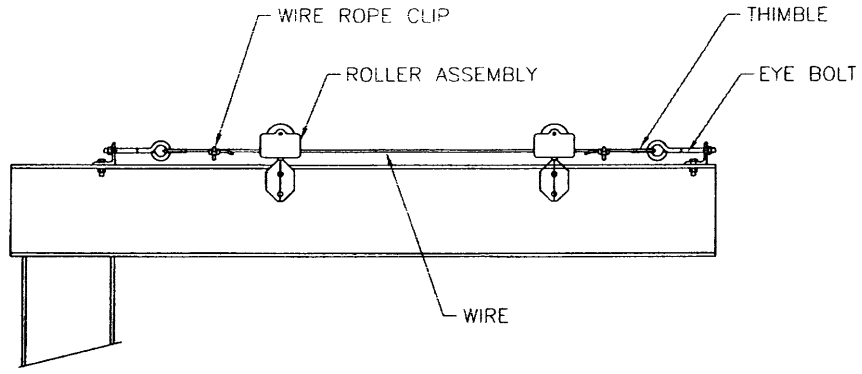

FLANGE WIDTH
3" TO 5"
13 MIN.
18 3/16 MIN.
3/4 MIN.
6
5 1/8
4 13/16
16 5/8
11 11/16
K
10 5/16
33' 0" P/B DROP
6 13/16
6 13/16
7 5/8
3 18/16
4" DIA. WHEEL
BUDGIT
1000 KG
9/16
6 5/16
CUSTOMER: CORNERSTONE MATERIAL HANDLING INC.
PURCHASE NO. 00004151
SALES NO. 3186747
NOTE: REFER TO OPERATION, SERVICE, AND PARTS MANUAL FOR INSTALLATION INSTRUCTIONS
115V CONTROL, STS-3-60 POWER SUPPLY
CLASS 1, DIV. 2, INTRINSIC SAFE RELAYS
NEMA 7 PANEL SHIPPED LOOSE
BEH0116 BUDGIT ELECTRIC HOIST
1000 KG CAPACITY, 57'-0" LIFT, 16 FPM
RGH WGT 101 LBS.
CATALOG PUT01 PUSH TROLLEY
1 TON CAPACITY
RGH WGT 90 LBS.
TOTAL RGH WGT 191 LBS.
450548-12

12.33

REV NUM	DATE	REVISION NOTICE	REVISION DESCRIPTION	BY	APRD

INSTRUCTIONS FOR YOUR TAGLINE KIT





NOTE: The number of rollers supplied may vary for each application due to the boom length.

ITEM	PART NUMBER	DESCRIPTION	QTY	UOM

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE INCHES
DIMENSIONS IN [ ] ARE MM

-TOLERANCES-

ANGULAR ± 0.5°

DECIMAL		FRACTIONAL	
0.0	± .02	GENERAL	± 1/32
0.00	± .01	CUTTING	± 1/16
0.000	± .002	FORMING	± 1/16
0.0000	± .0005	WELDING	± 1/16

QUOTE NUMBER	
ORDER NUMBER	
UNSPECIFIED MACHINING	✓
SHAFT RADII MACHINING	✓
UNSPECIFIED WELDS	
DRAWN BY	WJW
DRAWN DATE	13NOV03
CHECKED	
APPROVED	
UOM	EA
WEIGHT (LBS)	1

MOTIVATION
INDUSTRIAL EQUIPMENT LTD.,
STONEY CREEK, ONTARIO. -CANADA- (905) 664-4040

INSTRUCTIONS- TAGLINE KIT

DERIVED FROM	SHT NO		DRAWING NO	REV NUM
	1	AV	30003896	0
SCALE 1/12	SHT OF 2			

12.3.4

REV NUM	DATE	REVISION NOTICE	REVISION DESCRIPTION	BY	APRD

ASSEMBLY :

1) Position the supplied tagline angles onto beam aligning the holes.

2) Install the supplied bolts, lock washers and nuts. Torque per table below.

3) Install one eye bolt into each angle, as shown, with flat washer and nut.

4) Install one thimble into each eye bolt,

5) Thread the wire around one thimble and form a bight. Fasten the bight formed with one of the wire rope clips supplied and tighten the nuts.

6) Thread the wire through all of the roller assemblies supplied.

7) Thread the wire through the thimble at the opposite end and form a bight. Remove as much slack from the wire as possible. Fasten the bight formed with the other wire rope clip supplied and tighten the nuts.

8) Use the nuts on each eye bolt to make the wire taught.

9) Install electrical wire (or air hose) into the roller assemblies.

Recommended Torque Specifications:

All torque values are in foot-pounds.
Lubrication must be used on threads.

BOLT SIZE	GRADE 2 LUBRICATED
3/8–16 UNC	15
1/2–13 UNC	35
5/8–11 UNC	75
3/4–10 UNC	130

ITEM	PART NUMBER	DESCRIPTION	QTY	UOM

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES
DIMENSIONS IN [ ] ARE MM
-TOLERANCES-
ANGULAR ± 0.5°

DECIMAL		FRACTIONAL	
0.0	± .02	GENERAL	± 1/32
0.00	± .01	CUTTING	± 1/16
0.000	± .002	FORMING	± 1/16
0.0000	± .0005	WELDING	± 1/16

QUOTE NUMBER
ORDER NUMBER
UNSPECIFIED MACHINING ✓
SHAFT RADII MACHINING ✓
UNSPECIFIED WELDS

DRAWN BY: WJW
DRAWN DATE: 13NOV03
CHECKED
APPROVED
UOM: EA
WEIGHT (LBS): N/A

MOTIVATION
INDUSTRIAL EQUIPMENT LTD.,
STONEY CREEK, ONTARIO. –CANADA– (905) 664-4040

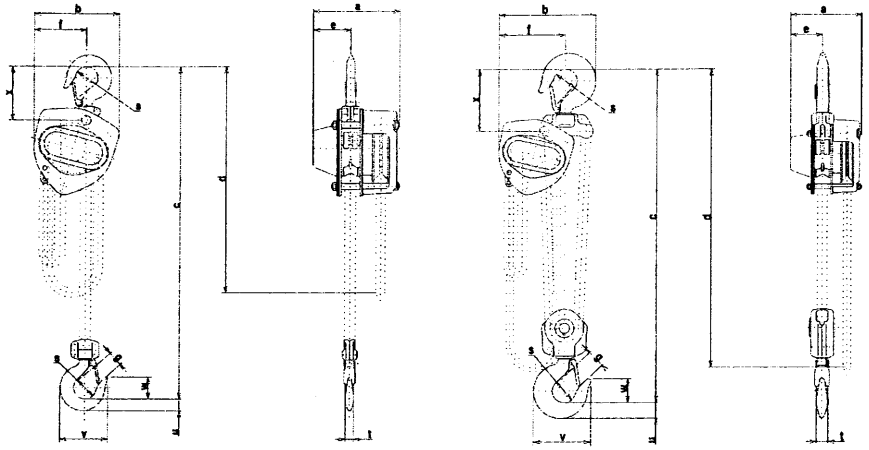
INSTRUCTIONS– TAGLINE KIT

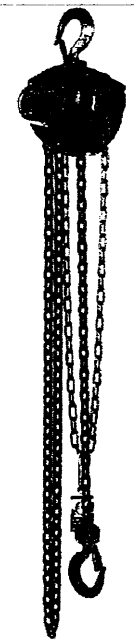
DERIVED FROM
SCALE: 1/1
SHT NO: 2
SHT OF: 2
AV
DRAWING NO: 30003896
REV NUM: 0

12.3.5

KITO M3CB SERIES MANUAL CHAIN HOISTS

Steel Body - Hook Mount





Dimensions (mm)

Model	c	d	b	a	e	f	g	h	i	j	k	w	x
M3CB005	285	158	161	2.5	69	99	27	35.5	12.1	17	77	35	89
M3CB010	295	162	161	2.5	71	99	29	42.5	16	21.8	93	41	101
M3CB015	350	171	182	2.5	78	112	34	47.5	19.5	26.5	106	47	119
M3CB020	375	182	202	3	87	125	36	50	21.8	30	116	49	124
M3CB025	420	192	233	3	91	143	40	53	24.3	33.5	126	53	136
M3CB030	510	171	235	3.1	78	162	42.5	56	27.2	37.5	138	57	148
M3CB050	600	192	282	3.6	91	194	46.5	63	34.5	47.5	161	67.5	172

Specifications

Model	Max. Capacity (tons)	Std. Lift (m)	Hand Pull to Lift Full Load (kg)	Chain Pull to Lift Load One More Unit (kg)	Ship. Weight (kg)	Load Chain Code	Load Chain Falls	Hand Chain Code	Hand Chain Falls	Weight per Additional 3 m of Lift (kg)
M3CB005	0.5	8	24	25	23	KCF050	1	KHCF050	2	5
M3CB010	1	8	29	43	27	KCF063	1	KHCF050	2	6
M3CB015	1.5	8	35	57	33	KCF071	1	KHCF050	2	7
M3CB020	2	10	36	70	47	KCB3080	1	KHCF050	2	8
M3CB025	2.5	10	33	99	60	KCB3090	1	KHCF050	2	9
M3CB030	3	10	36	114	58	KCF071	2	KHCF050	2	11
M3CB050	5	10	34	198	95	KCB3090	2	KHCF050	2	15

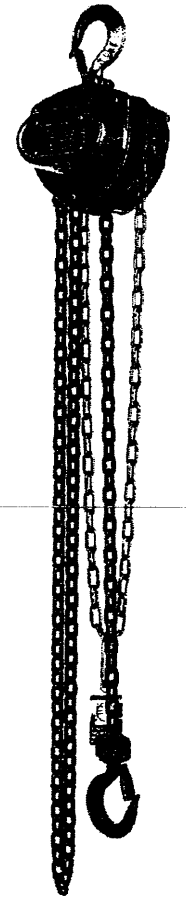
12.4.1

KITO M3CB SERIES MANUAL CHAIN HOISTS

1/2 to 50 metric tonne capacity, high-capacity, lightweight hoists for industrial and contractor use

MAXIMUM STRENGTH

KITO M3 Series Manual Chain Hoists are built with premium-grade components for long life in the toughest industrial and contracting applications. M3 manual chain hoists are small and light, yet extremely durable, with industry-leading quality.



Features

- At rated capacity, load-bearing parts are only stressed to 25% of their limit
- Abrasion resistant load chain is made from heat-treated alloy steel for high, uniform strength
- Forged carbon steel hook design will not fracture under excessive load
- Safe, reliable mechanical brake activates instantly, holds the load securely
- Compact design for lightweight portability
- Articulating top hook allows you to properly centre the load
- Sealed gears and brake protected against damage from dust and water
- Open load sheave allows easy inspection and cleaning without dismantling the unit
- Maintenance-free sealed bearings increase reliability and reduce the pull required to lift loads
- Heat treated load bearing parts are hardened for long, trouble-free life
- High-impact steel housing with similar weight to aluminum due to compact design
- Double reduction gearing requires minimum manual power to operate
- Double-pawl spring system for increased safety and reliability

Options

- Chain bag keeps chain clean and out of the way
- Slip clutch protects hoist from overloading
- Nickel-diffused chain for corrosive environments
- Custom lift lengths to suit your requirements
- Plain or Geared trolley mount for improved load control

Specifications

- Safety Standard: ASME B30.16
- Performance Standard: ASME HST-2
- Test Load: 125% of Rated Capacity
- Chain Type: Grade 100

12.4.2

KITO TS2, TMH, AND MR SERIES TROLLEYS

Industrial quality trolleys built for long life and reliable operation

Whether plain, geared or motorized, there's a trolley to fit every KITO hoist. The reliability, smoothness of operation, and safety of your hoist is dependent on the trolley - be sure to choose KITO quality and safety for both the hoist and trolley.

MAXIMUM QUALITY

Features

- ½ to 20 tonne capacity allows you to choose the capacity that meets your needs
- At rated capacity, load-bearing parts are only stressed to 20% of their limit
- Pivot mounted for smooth operation and load balancing
- Heat treated steel wheels are hardened for long, trouble-free life
- Lifetime lubricated ball bearings increase reliability and reduce maintenance
- Adjustable to fit any beam–tapered or flat flanged, easily adapted for your shop or plant
- Low minimum radius for curved beams for smooth travel around tight curves

Specifications

Model	Max. Capacity (tonne)	Gross Wt. (lbs)	Min. Radius for Curve (mm)	Flange Width Std. (mm)	Flange Width Min. Ext. (mm)	Flange Width Max. Ext. (mm)	Std. Drop (ft)	Travel Speed (ft/min)	Travel Motor H.P.
Plain Trolley - WITH Safety Lugs									
TSP2005	1/2	10	1100	50 - 102	103 - 203	204 - 305	—	—	—
TSP2010	1	18	1300	58 - 127	128 - 203	204 - 305	—	—	—
TSP2020	2	31	1500	82 - 153	—	154 - 305	—	—	—
TSP2030	3	51	1700	82 - 153	—	154 - 305	—	—	—
TSP2050	5	116	2300	100 - 178	—	179 - 305	—	—	—
TSP100	10	220	3000	150 - 220	—	221 - 305	—	—	—
Geared Trolley - WITH Safety Lugs									
TSG2010	1	27	1300	58 - 127	128 - 203	204 - 305	8	—	—
TSG2020	2	42	1500	82 - 153	—	154 - 305	10	—	—
TSG2030	3	60	1700	82 - 153	—	154 - 305	10	—	—
TSG2050	5	174	2300	100 - 178	—	179 - 305	10	—	—
TSG100	10	300	3000	150 - 220	—	221 - 305	12	—	—
TSG200	20	440	—	150 - 220	—	221 - 305	12	—	—
Mini Trolley - Exclusive for ED Series Hoist									
TMH25	0.25	5	600	50 - 100	—	—	—	—	—
Motorized Trolley - Single Speed - 220V, 440V, 575V / Three Phase									
MR010L	1	68	800	58 - 127	—	128 - 305	15	40	0.5
MR010S	1	68	800	58 - 127	—	128 - 305	15	80	0.5
MR020L	2	86	800	82 - 178	—	179 - 305	15	40	0.5
MR020S	2	86	800	82 - 178	—	179 - 305	15	80	0.5
MR030L	3	106	1000	82 - 178	—	179 - 305	15	40	0.5
MR030S	3	106	1000	82 - 178	—	179 - 305	15	80	0.5
MR050L	5	152	1800	82 - 178	—	179 - 305	15	40	1
MR050S	5	152	1800	82 - 178	—	179 - 305	15	80	1
MR100L	10	238	2500	150 - 220	—	221 - 305	15	40	1
MR200L	20	499	—	150 - 220	—	221 - 305	15	40	1 x 2
Motorized Trolley - Dual Speed - 220V, 440V, 575V / Three Phase									
MR010SD	1	77	800	58 - 127	—	128 - 305	15	20/80	0.4/0.1
MR020SD	2	95	800	82 - 178	—	179 - 305	15	20/80	0.4/0.1
MR030SD	3	112	1000	82 - 178	—	179 - 305	15	20/80	0.8/0.2
MR050SD	5	161	1800	82 - 178	—	179 - 305	15	20/80	0.8/0.2

12.43

TRACON Services Inc.
15 Belfield Road, Unit 8, Etobicoke, Ontario M9W 1E8 Telephone 416 243 5238 TeleFax 519 743 3598

Your White Knights

05th December 2002

Capacity Certification

MOTIVATION Customer

Reference: **Jib Certification**

In our capacity of a Professional Engineer licenced to practise in the Province of Ontario, we have checked the design calculation procedures of **MOTIVATION** Industrial Equipment Ltd and carried out independent design verifications of several random selections of the Company's Models MJP, MWS, MWQ, MPS, MPQ Jib Cranes. Based on our findings and in conformance with the Ontario Health and Safety Act, Regulation 213/91, **Cranes Hoisting and Rigging**, Section 151 (2), and the CSA B167-96 Safety Standard for Maintenance and Inspection of Overhead Cranes, Gantry Cranes, Monorails, Hoists and Trolleys we certify that the aforementioned Jib Crane models are certified to safely perform lifts at their rated capacity, subject of course to the proviso that the Jibs are operated in conformance with **MOTIVATION**'s published operation and maintenance procedures.

Should you have any questions or comments, please contact the writer.

Yours truly
TRACON Services Inc

Roland Tracy

Roland Tracy, H.B.A. P.Eng.

REGISTERED PROFESSIONAL ENGINEER
K. R. TRACY
05 Dec 02
PROVINCE OF ONTARIO

KRT/jac

12.5

OWNER'S (OPERATOR'S) MANUAL AND SAFETY INSTRUCTIONS FOR TS SERIES (MODEL TS2) PLAIN AND GEARED TROLLEY

BEFORE USING THIS PRODUCT :

ALWAYS SAVE THIS BOOK FOR FUTURE REFERENCE

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

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

: NEVER transport loads over or near people.

: NEVER work under or near lifted loads.

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

: ALWAYS follow the installation procedure on this manual when using the hoist with this TS2 trolley.

These safety instructions contain important information to help you use the TS2 Trolley in a safe manner. Please refer to this Owner's (Operator's) Manual for additional safety information.

KITO CORPORATION

YAMANASHI HEAD OFFICE : Tsuijiarai 2000, Showa-cho, Nakakoma-gun, Yamanashi-ken, 409-38 Japan.
Phone:0552-75-7736 Fax:0552-75-6165

TOKYO OFFICE : 3-37-4, Yoyogi, Shibuya-ku, Tokyo, 151 Japan.
Phone:03-5371-7341 Fax:03-5371-7349

12.6 -1

CONTENTS

12.6-2

DEFINITIONS

⚠ WARNING : Death or serious injury could result in potentially hazardous situation.

1. SAFETY

1-1 Safety summary

Danger exists when heavy loads are transported, particularly if 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 trolleys.
Following these simple rules can help to avoid transporting accidents;

⚠ WARNING : Death or serious injury could result in improper trolley use. To avoid these hazards :

NEVER use a trolley for transporting people.

NEVER lift or transport loads over or near people.

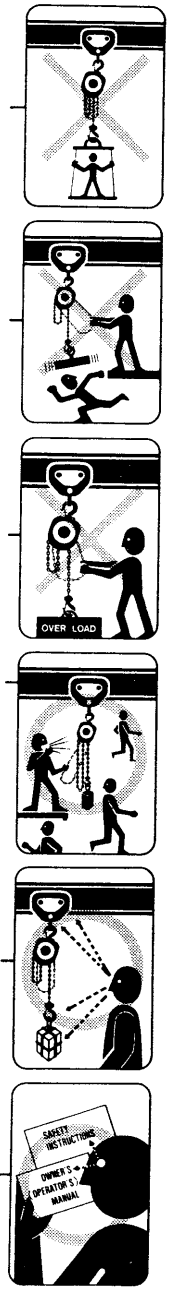
NEVER work near or under suspended loads.

NEVER transport more than the trolley's rated capacity.

ALWAYS notify others when a transport is about to begin.

ALWAYS make sure that the supporting structures are strong enough to support the weight of the load and hoist.

ALWAYS read owner's (operator's) manual and safety instructions before operating.



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

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

12.6-3

1-2 Safety instructions

Serious injury could result if the following safety instructions are not followed.
(If this trolley is used in conjunction with a hoist, also refer to the hoist manual for additional precautions and instructions.)

⚠ WARNING : Death or serious injury could result in improper trolley use. To avoid these hazards :

NEVER allow an unqualified (not trained in safety and operation) person to operate the trolley.

NEVER apply loads which exceed the rated capacity of the trolley.

NEVER attach the hoist that has a rated capacity which exceeds the rated capacity of the trolley.

NEVER operate the trolley when a "DO NOT OPERATE" sign is placed on the trolley.

NEVER use a trolley if the width does not fit the rail.

NEVER use the hand chain to support a load.

NEVER transport a load over people.

NEVER use the trolley for transporting people.

NEVER allow anyone to stand on a suspended load.

NEVER swing a suspended load.

NEVER leave a suspended load unattended.

NEVER weld or cut a load suspended by the trolley.

NEVER connect the hoist to the trolley with improper fittings.

NEVER operate the trolley hand chain if excessive noise, jamming, overloading or binding occurs.

NEVER work near or under suspended loads.

NEVER operate a trolley if damaged or malfunctioning.

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

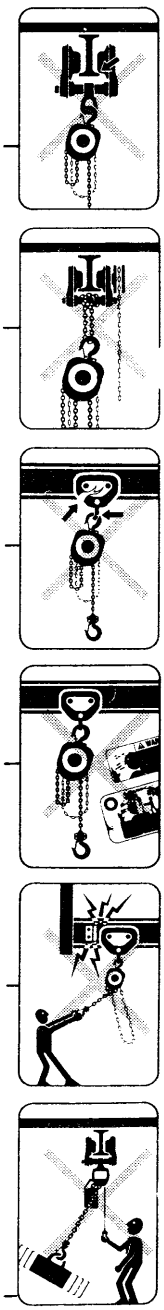
NEVER use a trolley without a nameplate or warning labels or with illegible nameplate or labels.

NEVER remove or obscure the warning tags.

NEVER operate a trolley unless you are physically capable of doing so.

NEVER allow a trolley to collide with another trolley or stopper on the beam.

NEVER operate trolley unless load is centered under trolley.



12.6.4

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

ALWAYS make sure that you and others are clear of the load path.

ALWAYS inspect the trolley for wear or damage before each shift.

ALWAYS inspect the trolley thoroughly and replace worn or damaged parts.

ALWAYS lubricate the trolley regularly.

ALWAYS pay attention to the load at all times when operating the trolley.

ALWAYS rig the load properly and carefully.

ALWAYS check the trolley before daily use according to the Recommended Daily Inspection.

ALWAYS let the authorized personnel inspect the trolley periodically.

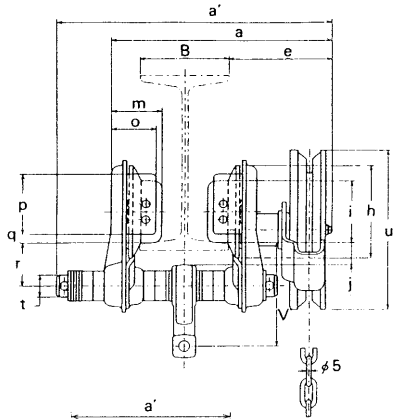
ALWAYS consult the manufacturer or your dealer if you plan to use a trolley in an excessively corrosive environment.

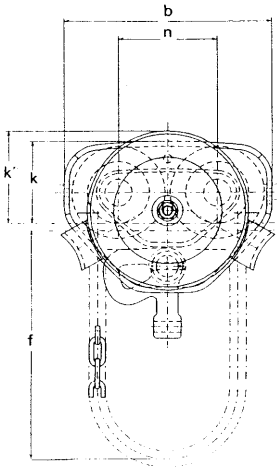
ALWAYS use the trolley within rail slope of 1/50.

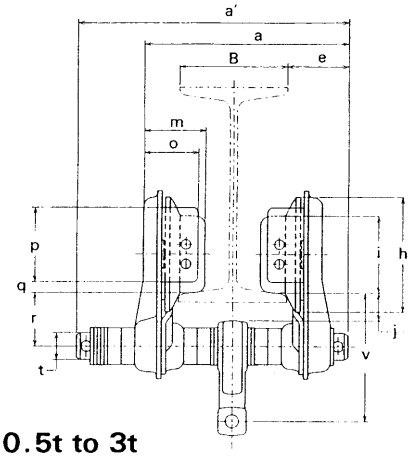
12.6-5

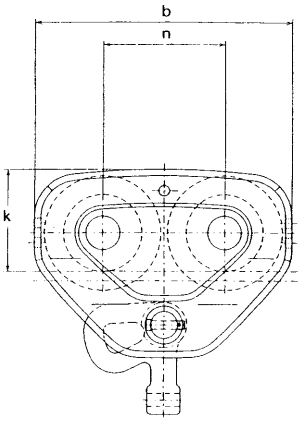
2. TROLLEY SPECIFICATIONS

2-1 For manual chain hoist









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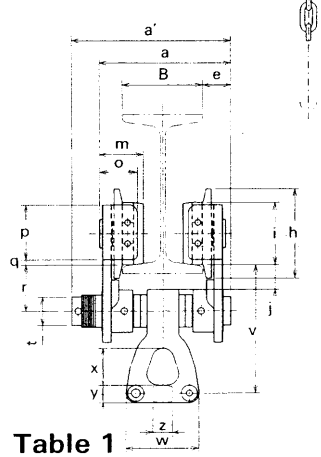
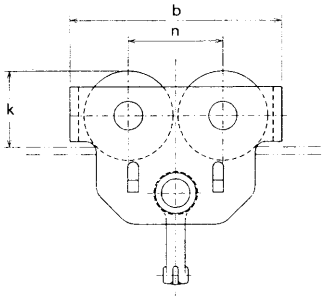
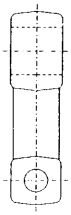
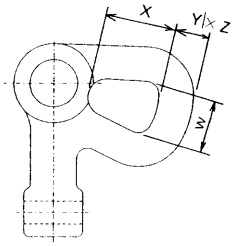


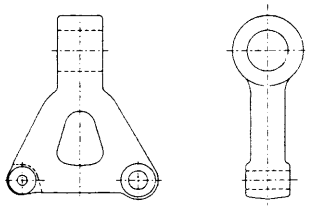


5t





Suspender C



Suspender C(3t,5t)

Table 1

Model	Code		Capacity	Rail Width Adjustability			Min. Radius for Curve	Net Weight (kg)		Hand Chain Folded Length	V	W	X	Y	Z	a [Max.]	a'	b
	Plain Trolley	Geared Trolley	(t)	Standard	Option		(mm)	TSP	TSG	(m)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
					W20	W30												
TS2	TSP005C	–	0.5	50 to 102	103 to 203	204 to 305	1100*	4.5	–	–	93	26	33	14	14	173	204	182
TS2	TSP010C	TSG010C	1	58 to 127	128 to 203	204 to 305	1300*	8.0	12	2.5	106	28	37	18	18	275 (215)	309 (249)	236
TS2	TSP015C	TSG015C	1.5	82 to 153	–	154 to 305	1500	14	18	2.5	129	32	40	22	22	349 (264)	385 (300)	280
TS2	TSP020C	TSG020C	2	82 to 153	–	154 to 305	1500	14	19	3.0	129	32	40	22	22	349 (264)	385 (300)	280
TS2	TSP025C	TSG025C	2.5	82 to 153	–	154 to 305	1700	23	27	3.0	144	36	44	27	25	359 (280)	398 (320)	324
TS2	TSP030C	TSG030C	3	82 to 153	–	154 to 305	1700	23	27	3.0	169	40	48	24	30	359 (280)	398 (320)	324
TS2	TSP050C	TSG050C	5	100 to 178	–	179 to 305	2300	50	56	3.5	228	60	70	33	36	376 (273)	400 (297)	400

Capacity (t)	e (mm)	f (m)	h (mm)	i (mm)	j (mm)	k (mm)	k' (mm)	m (mm)	n (mm)	o (mm)	p (mm)	q (mm)	r (mm)	t (mm)	u (mm)
0.5	46	–	82	60	19	76	–	45	84	42	54	10	38	22	–
1	116 (56)	2.2	106	71	28	95	106	56	112	50	69	10	50	25	183
1.5	154 (69)	2.2	127	85	34	112	109	71	131	63	83	10	62	32	183
2	154 (69)	2.7	127	85	34	112	109	71	131	63	83	10	62	32	183
2.5	157 (79)	2.7	148	100	36	134	114	80	152	74	102	10	68	36	183
3	157 (79)	2.7	148	100	36	134	114	80	152	74	102	10	68	36	183
5	156 (53)	3.2	169	118	47	144	131	81	178	70	104	10	88	54	183

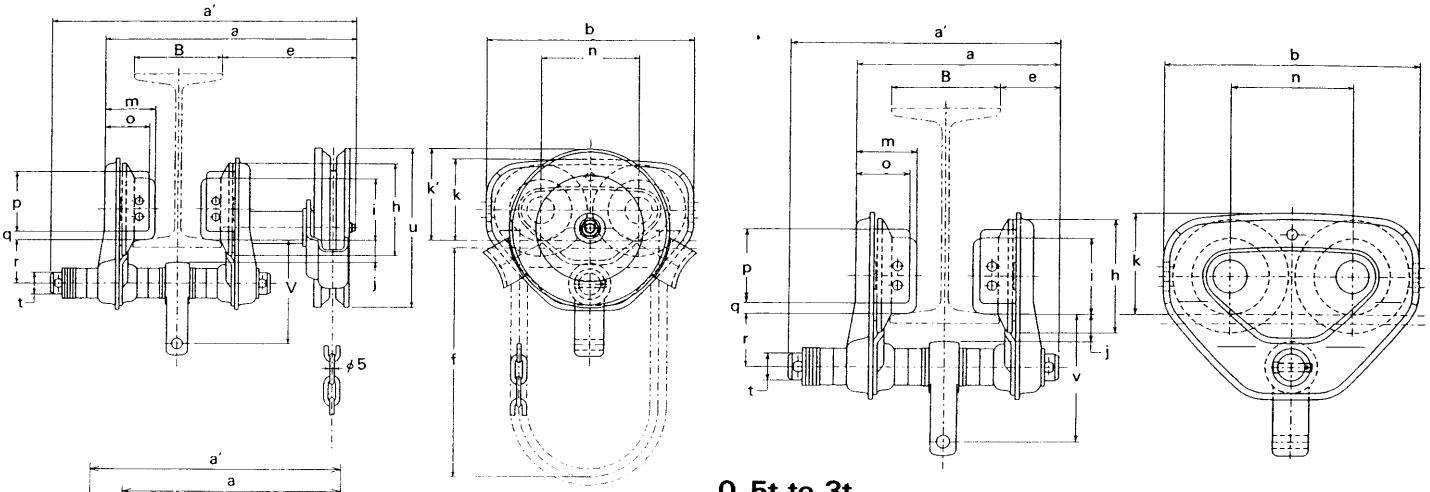
- Figures in parentheses show the data for plain trolley type.
- The maximum 200mm and 300mm rail width are available as option.

※Minimum flange width for curved rail : 0.5 ton trolley ····· 57mm.
: 1 ton trolley ····· 73mm.
: 2.5 and 3ton trolley ····· 89mm.

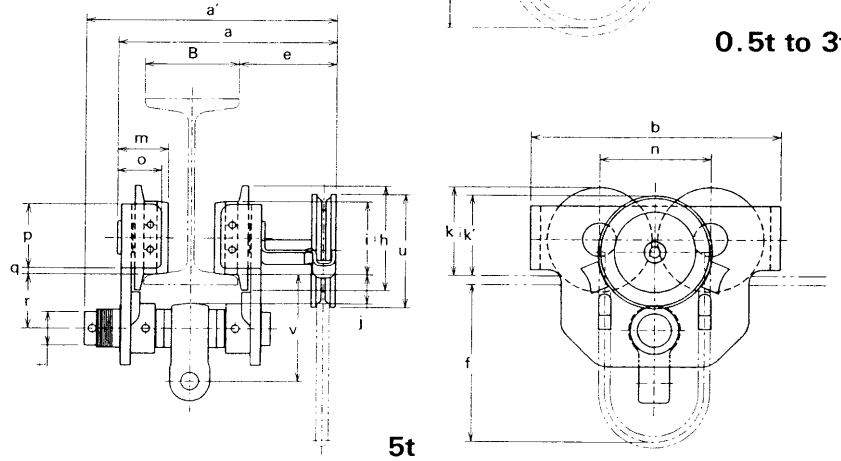
- Net weight is when flange width is in standard range.
- Dimension"a"is when flange width is in standard range.
- Dimension"a"is when flange width is adjusted to the maximum of the standard range.

12.6-6

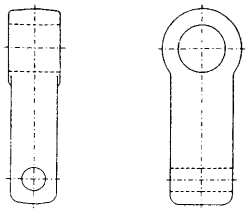
2-2 For electric chain hoist



0.5t to 3t



5t



Suspender E

Table 2

Model	Code		Capacity (t)	Rail Width Adjustability			Min. Radius for Curve (mm)	Net Weight (kg)		Hand Chain Folded Length (m)	V (mm)	a [Max.] (mm)	a' (mm)	b (mm)
	Plain Trolley	Geared Trolley		Standard	Option			TSP	TSG					
					W20	W30								
TS2	TSP005E	–	0.5	50 to 102	103 to 203	204 to 305	1100*	4.5	–		98	173	204	182
TS2	TSP010E	TSG010E	1	58 to 127	128 to 203	204 to 305	1300*	8.0	12	3.0	119	311 (215)	345 (249)	236
TS2	TSP020E	TSG020E	2	82 to 127		204 to 305	1500	14	19	3.0	138	349 (264)	385 (300)	280
TS2	TSP025E	TSG025E	2.5	82 to 153		154 to 305	1700	23	27	3.0	153	359 (280)	398 (320)	324
TS2	TSP030E	TSG030E	3	82 to 153		154 to 305	1700	23	27	3.0	153	359 (280)	398 (320)	324
TS2	TSP050E	TSG050E	5	100 to 178		179 to 305	2300	50	56	3.5	171	376 (273)	400 (297)	400

Capacity (t)	e (mm)	f (m)	h (mm)	i (mm)	j (mm)	k (mm)	k' (mm)	m (mm)	n (mm)	o (mm)	p (mm)	q (mm)	r (mm)	t (mm)	u (mm)
0.5	46	–	82	60	19	76	–	45	84	42	54	10	38	22	–
1	152 (56)	2.7	106	71	28	95	106	56	112	50	69	10	50	25	183
2	154 (69)	2.7	127	85	34	112	109	71	131	63	83	10	62	32	183
2.5	157 (79)	2.7	148	100	36	134	114	80	152	74	102	10	68	36	183
3	157 (79)	2.7	148	100	36	134	114	80	152	74	102	10	68	36	183
5	156 (53)	3.2	169	118	46.5	144	131	81	178	70	104	10	88	54	183

- Figures in parentheses show the data for plain trolley type.
- Minimum flange width for curved rail : 0.5 ton trolley ····· 57mm.
  : 1 ton trolley ····· 73mm.
  : 3ton trolley ····· 89mm.
- The maximum 200mm and 300mm rail width are available as option.
- Net weight is when flange width is in standard range.
- Dimension"a"is when flange width is in standard range.
- Dimension"a"is when flange width is adjusted to the maximum of the standard range.

12.6-7

3. TROLLEY INSTALLATION

3-1 Coupling with manual chain hoists.

(1) The CB series hoists can be suspended either in the hook suspension method (the top hook is hung from the suspender C as shown in Fig.A), or in the direct-coupling method (the hoist body, with the top hook removed, is directly coupled to the suspender C as shown in Fig.B). However, the 7.5 ton and larger capacity CB series hoist can only be suspended by the hook suspension method and the top hook must be hung directly from the suspension shaft of the trolley.

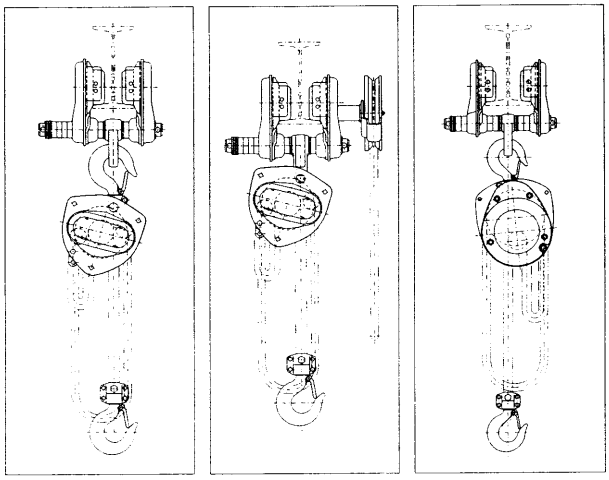


Fig. A Fig. B Fig. C

The CF and CL series hoists can be suspended by suspender C like Fig. A and C.

(2) The direct-coupling method is best for circumstances which require as much effective hoisting length as possible, but where the height of the ceiling is low.
The hook suspension method type is best for circumstances when the chain hoist is transferred frequently.

(3) Direct Coupling method of CB series chain hoist.
   1) For 0.5 to 2.5 ton capacity (Refer to Fig.1)
      a) Remove the wheel cover nuts and spring washers, then remove the wheel cover itself.
      b) Straighten and remove the bent split pin in the top pin, pull out the top pin and remove the top hook.
      c) Mount the suspender to the hoist body using the top pin and the split pin which have been removed as above.
      d) Firmly bend the pointed end of the split pin as shown in Fig. 2.
      e) Install the wheel cover, as it was before, with the nuts and spring washers.

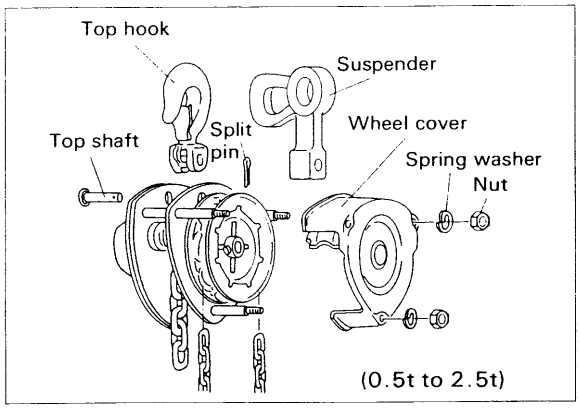


Fig. 1

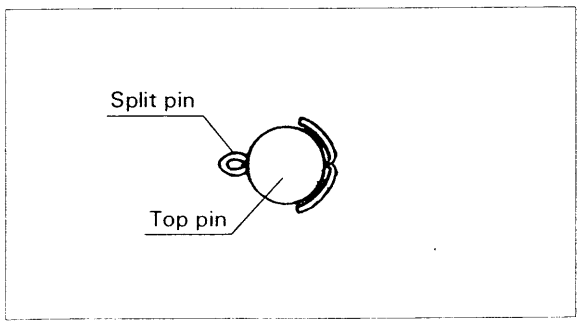


Fig. 2

12.6-8

2) For 3 or 5 ton capacity. (Refer to Fig. 3.)

In addition to the procedure stated above, the following steps are also required.

a) Straighten the bent split pin, remove the slotted nuts, pull out the chain pins, and then remove the load chain from the top hook, in Fig. 3.

b) Connect the end of load chain and the suspender with chain pins, slotted nuts and the split pin.

c) Firmly bend the pointed end of the split pin.

d) Make sure that no twisting and no capsizing of load chain occurs.

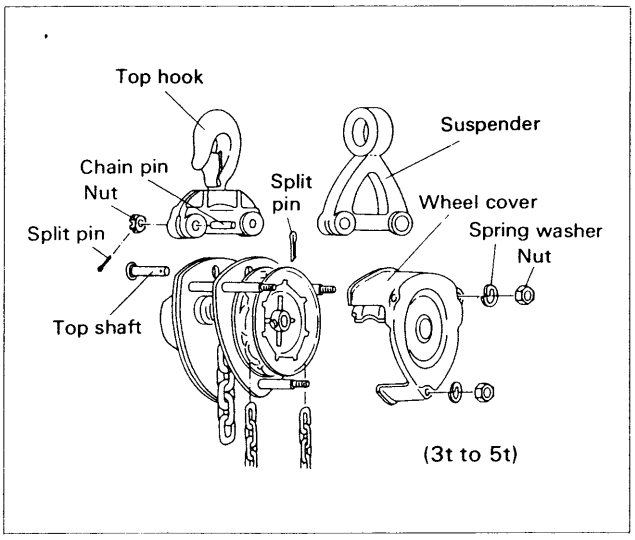


Fig. 3

3-2 Coupling with electric chain hoists · ES, EF series

The direct coupling method shown in Fig.D should be applied.

(1) Remove the top hook from the hoist body. (Refer to Fig. 4-1)
Straighten the bent split pin, remove the slotted nut, and the top pin (in the case of double falls of chain, the top bolt), and then remove the top hook.

(2) Installation of suspender
Mount the suspender E to the hoist body using the top pin (or top bolt), and a nut which has been removed as above, and a new split pin. Firmly bend the pointed end of the split pin as shown in Fig. 2.

(3) The EF series electric chain hoist can be suspended by the suspender E like Fig. E.

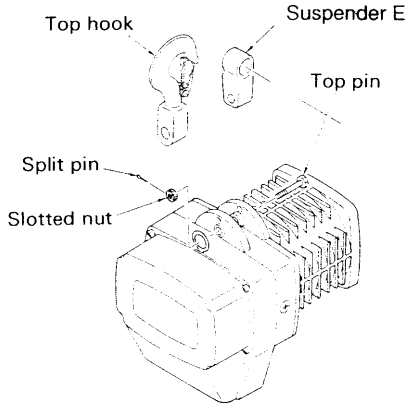
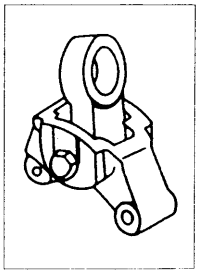


Fig. 4-1

Fig. 5



Suspender E for double falls of chain

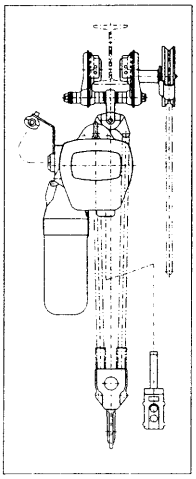


Fig. D

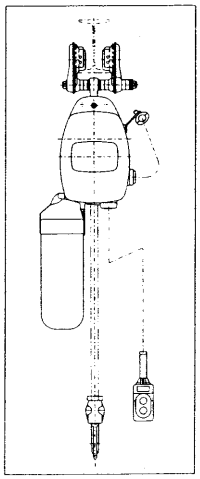


Fig. E

12.6-9

· ER series

The direct coupling method is shown in Fig. F.

Installation of suspender (Refer to Fig. 4-2)

Mount the suspender G to the connection yoke with the connection yoke rubber, the yoke bolt and the slotted nut. Then insert a new split pin and bend it securely as shown in Fig. 2.

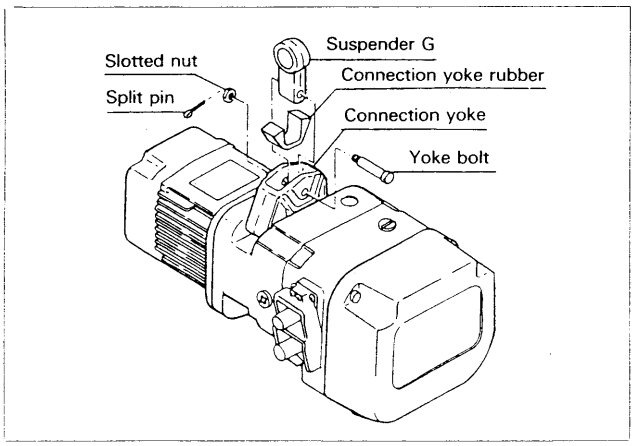


Fig. 4-2

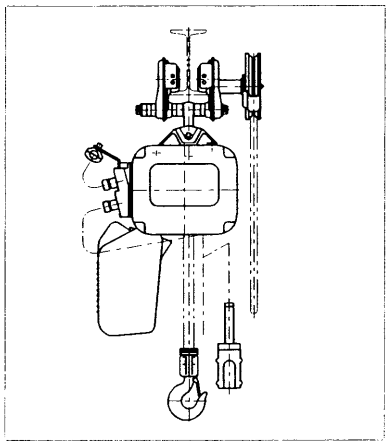


Fig. F

3-3 Adjusting trolley width before installation

When the trolley and the chain hoist are combined, the following procedures must be followed to adjust the trolley width by using the inner and outer adjusting spacers (Refer to Table 3 on page 9).

(1) Make sure that the direction is as shown in Fig. A to E.

(2) The right and left side plates should be as far apart as possible, and the difference between A and B should be approximately 4mm (Refer to Fig. 6).

(3) Bend the split pin of the shaft stopper pin as shown in Fig. 7.

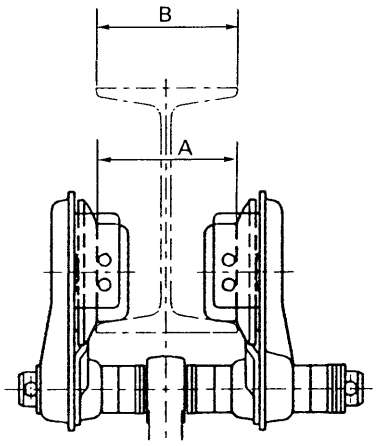


Fig. 6

3-4 Installation of trolley onto beam

(a) It is preferable to install the trolley from the end of the beam, with the chain hoist and the trolley coupled. After installation, make sure to re-install the stopper as it was.

(b) When there is no space between the end of beam and building, first remove the side plate S from the suspension shaft. After placing the side plate G on the other side of the flange, reassemble and re-install side plate S as it was before. Also, bend the split pin of shaft stopper pin correctly as shown in Fig. 7.

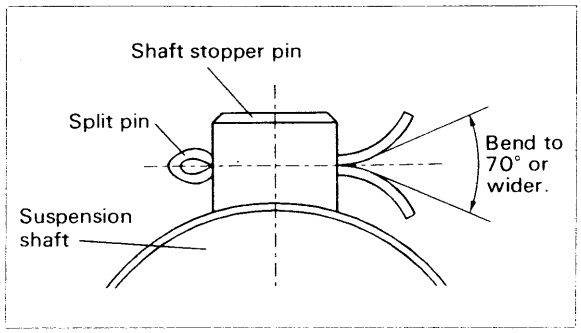


Fig. 7

12.6 -10

Table 3

Number of Adjusting Spacers

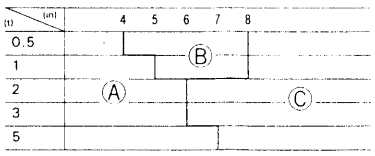
Capacity	Parts	Beam flange width (in)	2	2 5/16	2 1/2 – 2 5/8	2 7/8 – 2 15/16	3	3 1/4	3 9/16	3 7/8	3 15/16	4	4 3/16	4 5/16	4 7/16	4 11/16 – 4 3/4	4 15/16	5	5 3/16	5 5/16	5 3/8	5 5/8	5 7/8 – 5 15/16	6	6 1/8	6 5/16	6 7/16	6 11/16	6 7/8	7	7 1/16 – 7 1/8	7 1/4 – 7 5/16	7 7/8	8	8 7/16	8 11/16	9	9 1/8	9 7/8	10	10 1/8	10 1/4	10 3/8	10 1/2	11	11 1/8	11 1/4	11 3/8	11 5/8	11 3/4	11 13/16	11 7/8	12
		(mm)	50	58	64 – 66	73 – 74	75 – 76	82	90 – 91	98	100	102	106	110	113	119 – 120	125	127	131	135	137	143	149 – 150	153	155	160	163	170	175	178	180 – 181	184 – 185	200	203	215	220	229	232	250	254	257	260	264	267	279	283	286	289	295	298	300	302	305
0.5	Thin spacer	Inner	2+3	3+4	0+1	1+2	2+2	3+3	0+1	1+2	2+2	2+3	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	4+4	4+5	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer	4	2	8	6	5	3	8	6	5	4	7	6	5	3	9	8	7	6	5	3	9	8	7	6	5	3	9	8	7	6	1	0	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	0+0	0+0	0+0	1+1	2+2	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	3+3	4+3
		Outer	4	4	2	2	2	2	0	0	0	0	7	7	7	7	5	5	5	5	5	5	3	3	3	3	3	3	1	1	1	1	1	1	7	7	7	5	3	3	3	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
1	Thin spacer	Inner		3+3	0+0	1+1	1+2	2+3	0+0	1+1	1+2	2+2	2+3	3+3	3+4	0+1	1+2	2+2	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	4+4	4+5	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer		2	8	6	5	3	8	6	5	4	3	2	1	7	5	4	7	6	5	3	9	8	7	6	5	3	9	8	7	6	1	0	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner		0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	0+0	0+0	0+0	1+1	2+2	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	3+3	4+3
		Outer		6	4	4	4	4	2	2	2	2	2	2	2	0	0	0	5	5	5	5	3	3	3	3	3	3	1	1	1	1	1	1	7	7	7	5	3	3	3	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
2	Thin spacer	Inner						2+2	3+4	0+1	1+1	1+2	2+2	2+3	3+3	0+0	1+1	1+2	2+2	2+3	3+3	0+0	1+1	1+2	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	0+0	0+1	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer						3	0	6	5	4	3	2	1	7	5	4	3	2	1	7	5	4	7	6	5	3	9	8	7	6	9	8	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner						0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	0+0	0+0	0+0	0+0	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+5	5+5	5+5	5+5	5+5	5+5	5+5	6+5
		Outer						6	6	4	4	4	4	4	4	2	2	2	2	2	2	0	0	0	11	11	11	11	9	9	9	9	7	7	7	7	7	5	3	3	3	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner						–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
3	Thin spacer	Inner						1+2	3+3	0+0	0+1	1+1	1+2	2+2	2+3	3+4	0+1	1+1	1+2	2+2	2+3	3+4	1+4	1+5	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	0+0	0+1	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer						7	4	10	9	8	7	6	5	3	9	8	7	6	5	3	5	4	7	6	5	3	9	8	7	6	9	8	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner						2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+4	5+4	0+0	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+5	5+5	5+5	5+5	5+5	5+5	5+5	6+5
		Outer						5	5	3	3	3	3	3	3	1	1	1	1	1	1	1	0	0	11	11	11	11	9	9	9	9	7	7	7	7	7	5	3	3	3	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner						–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
5	Thin spacer	Inner								0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	0+0	0+1	2+3	3+3	0+1	1+1	0+0	0+1	1+1	1+2	2+2	2+3	0+1	1+1	1+2	2+2	3+3	3+4	4+4	4+4	1+5
		Outer								8	7	6	5	4	2	8	7	6	5	4	2	8	7	6	5	4	2	4	3	6	5	8	7	3	2	7	6	8	7	6	5	4	3	7	6	5	4	2	1	0	3	2
	Thick spacer	Inner								0+0	0+0	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	3+2	3+2	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+4	5+4
		Outer								5	5	5	5	5	3	3	3	3	3	3	1	1	1	1	1	1	0	0	9	9	7	7	7	7	5	5	3	3	3	3	3	3	1	1	1	1	1	1	1	0	0
	Fixing spacer	Inner								–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1

Note : 1) Take note the numbers on spacers of inner side as follows.

Example 0 + 1
- 1 — Number on side plate S
- 0 — Number on side plate G

2) Adjustment of trolley width
See clause 3−3.
Adjust the dimensions by appropriately increasing or decreasing the number of inner or outer adjusting spacers, without strictly adhering to the number in the above table.

3) Ⓐ indicates standard range.
Ⓑ indicates W20 range, as option
Ⓒ indicates W30 range, as option



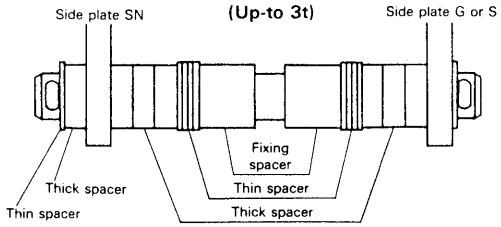


Table 3

Number of Adjusting Spacers

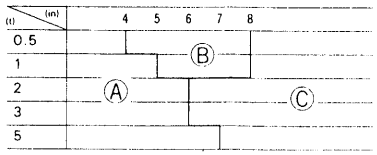
Capacity (t)	Parts	Beam flange width (in)	2	2 5/16	2 1/2 – 2 5/8	2 7/8 – 2 15/16	3	3 1/4	3 9/16	3 7/8	3 15/16	4	4 3/16	4 5/16	4 7/16	4 11/16 – 4 3/4	4 15/16	5	5 3/16	5 5/16	5 3/8	5 5/8	5 7/8 – 5 15/16	6	6 1/8	6 5/16	6 7/16	6 11/16	6 7/8	7	7 1/16 – 7 1/8	7 1/4 – 7 5/16	7 7/8	8	8 7/16	8 11/16	9	9 1/8	9 7/8	10	10 1/8	10 1/4	10 3/8	10 1/2	11	11 1/8	11 1/4	11 3/8	11 5/8	11 3/4	11 13/16	11 7/8	12
		(mm)	50	58	64 – 66	73 – 74	75 – 76	82	90 – 91	98	100	102	106	110	113	119 – 120	125	127	131	135	137	143	149 – 150	153	155	160	163	170	175	178	180 – 181	184 – 185	200	203	215	220	229	232	250	254	257	260	264	267	279	283	286	289	295	298	300	302	305
0.5	Thin spacer	Inner	2+3	3+4	0+1	1+2	2+2	3+3	0+1	1+2	2+2	2+3	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	4+4	4+5	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer	4	2	8	6	5	3	8	6	5	4	7	6	5	3	9	8	7	6	5	3	9	8	7	6	5	3	9	8	7	6	1	0	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	0+0	0+0	0+0	1+1	2+2	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	3+3	4+3
		Outer	4	4	2	2	2	2	0	0	0	0	7	7	7	7	5	5	5	5	5	5	3	3	3	3	3	3	1	1	1	1	1	1	7	7	7	5	3	3	3	3	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
1	Thin spacer	Inner		3+3	0+0	1+1	1+2	2+3	0+0	1+1	1+2	2+2	2+3	3+3	3+4	0+1	1+2	2+2	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	4+4	4+5	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer		2	8	6	5	3	8	6	5	4	3	2	1	7	5	4	7	6	5	3	9	8	7	6	5	3	9	8	7	6	1	0	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner		0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	0+0	0+0	0+0	1+1	2+2	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	3+3	4+3
		Outer		6	4	4	4	4	2	2	2	2	2	2	2	0	0	0	5	5	5	5	3	3	3	3	3	3	1	1	1	1	1	1	7	7	7	5	3	3	3	3	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
2	Thin spacer	Inner						2+2	3+4	0+1	1+1	1+2	2+2	2+3	3+3	0+0	1+1	1+2	2+2	2+3	3+3	0+0	1+1	1+2	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	0+0	0+1	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer						3	0	6	5	4	3	2	1	7	5	4	3	2	1	7	5	4	7	6	5	3	9	8	7	6	9	8	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner						0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+5	5+5	5+5	5+5	5+5	5+5	5+5	6+5
		Outer						6	6	4	4	4	4	4	4	2	2	2	2	2	2	0	0	0	11	11	11	11	9	9	9	9	7	7	7	7	7	5	3	3	3	3	3	3	1	1	1	1	1	1	1	1	0
	Fixing spacer	Inner						–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
3	Thin spacer	Inner						1+2	3+3	0+0	0+1	1+1	1+2	2+2	2+3	3+4	0+1	1+1	1+2	2+2	2+3	3+4	1+4	1+5	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	0+0	0+1	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer						7	4	10	9	8	7	6	5	3	9	8	7	6	5	3	5	4	7	6	5	3	9	8	7	6	9	8	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner						2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+4	5+4	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+5	5+5	5+5	5+5	5+5	5+5	5+5	6+5
		Outer						5	5	3	3	3	3	3	3	3	1	1	1	1	1	1	0	0	11	11	11	11	9	9	9	9	7	7	7	7	7	5	3	3	3	3	3	3	1	1	1	1	1	1	1	1	0
	Fixing spacer	Inner						–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
5	Thin spacer	Inner									0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+4	1+4	1+1	1+2	0+0	0+1	2+3	3+3	0+1	1+1	0+0	0+1	1+1	1+2	2+2	2+3	0+1	1+1	1+2	2+2	3+3	3+4	4+4	1+4	1+5
		Outer									8	7	6	5	4	2	8	7	6	5	4	2	8	7	6	5	4	2	4	3	6	5	8	7	3	2	7	6	8	7	6	5	4	3	7	6	5	4	2	1	0	3	2
	Thick spacer	Inner									0+0	0+0	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	3+2	3+2	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+4	5+4
		Outer									5	5	5	5	5	5	3	3	3	3	3	3	1	1	1	1	1	1	0	0	9	9	7	7	7	7	5	5	3	3	3	3	3	3	1	1	1	1	1	1	1	0	0
	Fixing spacer	Inner									–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1

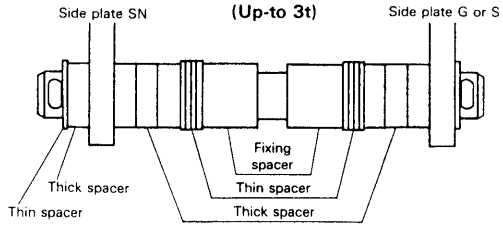
Note : 1) Take note the numbers on spacers of inner side as follows.

Example 0 + 1
- 1 — Number on side plate S
- 0 — Number on side plate G

2) Adjustment of trolley width
See clause 3−3.
Adjust the dimensions by appropriately increasing or decreasing the number of inner or outer adjusting spacers, without strictly adhering to the number in the above table.

3) Ⓐ indicates standard range.
Ⓑ indicates W20 range, as option
Ⓒ indicates W30 range, as option





3-5 Installation of stopper onto traversing beam

Make sure to install the stopper at both ends of the beam. Also, refer to Table 4, Fig. 8 and Fig. 9 below when installing the stopper.

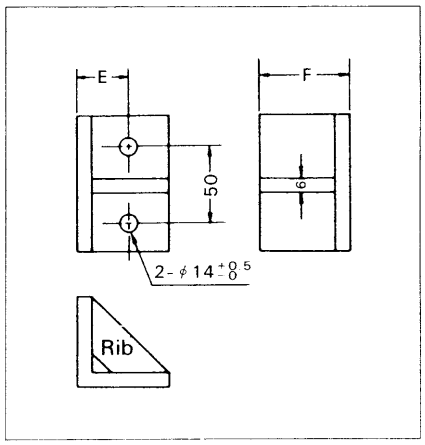


Fig. 8

Stopper size

*Only for reference

Beam Width B (mm)	Stopper Material (mm)	E (mm)	F (mm)	Quantity	Bolt	Nut
75	L-50×50×6	30	30	4	M12×55×55 (Four bolts)	M12 (Eight nuts)
100	L-50×50×6	30	40	4		
125	L-50×50×6	30	50	4		
150	L-65×65×8	35	65	4		
175	L-75×75×9	40	75	4		

Teble 4

Stopper installation

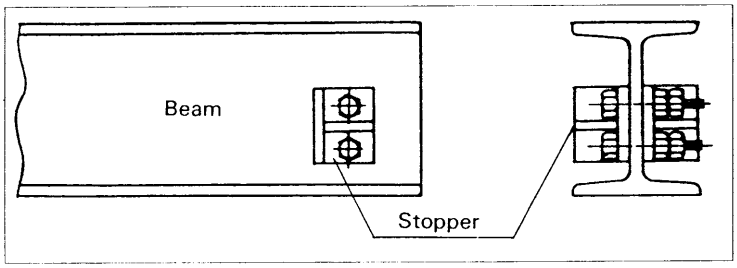


Fig. 9

3-6 Installation of power supply cable

Install it as the following procedure.

(1) Provide messenger wire (3 to 6mm dia. steel cable) along the beam, and make the power supply cable run with the cable hangers through the messenger wire so that it would not be twisted.

(2) In case hoist is connected with plain trolley or geared trolley, provide messenger wire slightly outside the cable receiver of the hoist (See Fig. 10).

* When the curved beam is used, the messenger wire can not be attached to the beam. For this case, a special T type cable hanger for the curved beam is available as option (See page 21, Fig. 22).
* Consult your authorized Kito dealer in case the electrical power supply is by means of any other method.

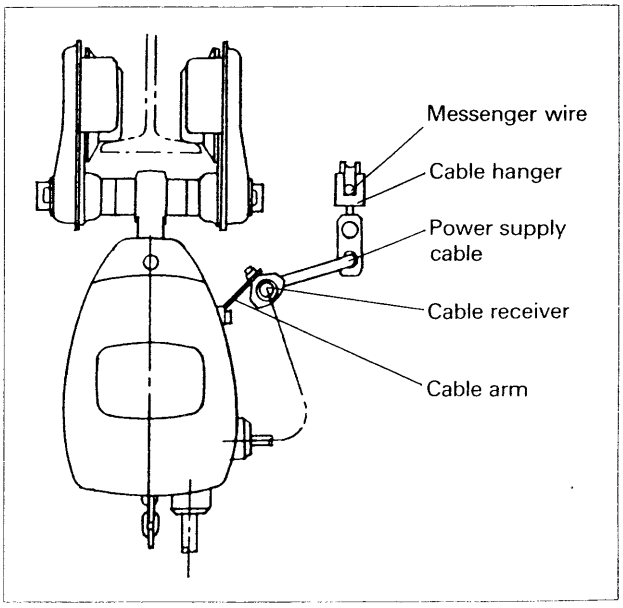


Fig. 10

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3-7 Check points after installation

When the entire installation is completed, check the followings.

(1) Check wheter the relative position of the trolley and the chain hoist is correct (See Fig. A to E).

(2) Check that the beam stoppers are securely fastened on the rail to prevent trolley run away.

(3) Make sure that no bolt, nut, split pin or snap pin are missing, and that those are all adequately fastened.

4. OPERATION

4-1 Safety considerations

The three most important aspects of trolley operation are:

(1) Follow all safety instructions when operating trolley,

(2) Allow only qualified people to operate a trolley and

(3) Subject each trolley to a regular inspection and a maintenance procedure.

4-2 Operation

(1) Plain trolley

For plain trolley, movement is controlled by pushing on the load or the hook of the attached hoist.

(2) Geared trolley

For geared trolley, when facing the trolley hand wheel :

Pull down on right side of hand chain (Clockwise rotation) to move left.

Pull down on left side of hand chain (Counterclockwise rotation) to move right.

4-3 Trolley storage

NEVER expose the trolley to rain or dew.

NEVER leave the trolley in a damp place.

ALWAYS be sure to house the trolley under the eaves or under some cover after use, in the case of outdoor installation.

ALWAYS wipe off all dirt and water.

ALWAYS install in a dry place.

ALWAYS lubricate gear side of the pinion and track wheel G.

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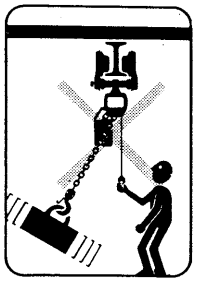
4-4 Precaution in handling

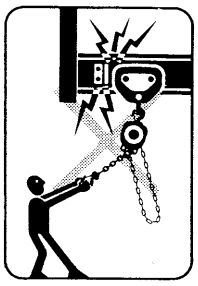


(1) Avoid slant loading

It is dangerous to pull the load slant, with the trolley connected to the hoist, as the trolley is inclined and gives too much strain to the trolley.

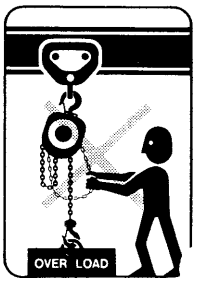
(2) Avoid collision

The trolley will be damaged if it is bumped against stopper or against another trolley.



(3) Never allow articles to become caught or hooked onto the hand chain.

When articles are hooked or caught on the hand chain and the hand chain is strongly pulled, severe damage will be caused not only to the hand chain but also to the trolley itself.



(4) Never overload

The nameplate on the trolley shows the maximum lifting capacity. If the capacity of the trolley is different from the capacity of the chain hoist with which it is combined, operates them within the capacity of whichever smaller.

(5) Never throw

Never throw or drag the trolley.

Always handle trolleys with care.

5. INSPECTION

5-1 Outline

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

5-2 Daily inspection

ALWAYS check the following points before each work shift.

(1) Check for visual signs or abnormal noises which could indicate a potential malfunction.

(2) Check hand chain movement around the hand wheel.

(3) Clean the chain, if chain binds, jumps, "clicks" or is excessively noisy.

(4) Replace the chain, if problem persists.

(5) Check for smooth operation.

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5-3 Periodic inspection

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

NORMAL (Normal use) : Semiannual inspection
HEAVY (Frequent use) : Quarterly inspeciton
SEVERE (Excessively frequent use) : Monthly inspection

Inspect all the items in "Periodic Inspection". Also inspect the following.

(1) Check rivets, split pins, cap screws and nuts. Replace if missing and tighten if loose.

(2) Inspect for wear, damage, distortion, deformation and cleanliness. If external evidence indicates the need, disassemble.

(3) Check gears, shafts, bearings and chain guides. Replace worn or damaged parts. Clean, lubricate and reassemble.

(4) Check for damage or excessive wear. Replace if necessary.

(5) Check for distortion, wear and continued ability to support load.

(6) Check that the trolley wheels track the beam properly and total clearance between wheels and flange equals to approximately 4mm. (Refer to 3-3 on page 8.) Adjust the clearance if necessary.

(7) Check side plates for spreading due to bending. Repair as necessary.

(8) Check name plates for presence and legibility. Replace if necessary.

5-4 Inspection method and judgment criteria

5-4-1 Daily inspection procedure

Inspection Item	Inspection Method	Discard Limits / Judgment Criteria	Countermeasures/ Others
1. Function	• Run under no load condition.	• Trolley should run smoothly and is not tilt when a light load is applied.	• If the movement is not smooth, try to determine its cause and replace the trolley with a new one if necessary.
2. Deformations and damages of each part	• Check visually.	• There should be no deformation or damage.	• Replace the part with new one if deformed or damaged.
3. Part loosening	• Check visually.	• Parts should not be loosened.	• Fasten tightly.
4. Name plate	• Check visually.	• Every description should be clear and visible.	• Replace the name plate with new one.

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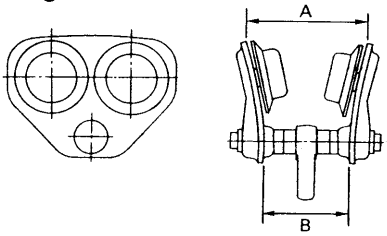
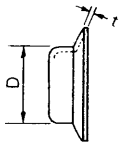
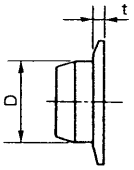
5-4-2 Periodic inspection procedure

Inspection Item	Inspection Method	Discard Limits / Judgment Criteria	Countermeasures/ Others
1. Traversing function	• Move trolley with light load suspended.	• Trolley should run smoothly, and not tilt when a light load is applied. Overall movement should be smooth.	• If not smooth, adjust beam, readjust balance or lubricate pinion holder, pinion and gear of track wheel G.
2. Side plate deformation	• Check with calipers.	• Dimension A and B should not exceed 2mm. **Fig. 11** 	• If the difference exceeds 2mm, replace it with a new one.
3. Track wheel abrasion	• Check visually or with calipers as needed. **Fig. 12** 0.5 to 3t  **Fig. 13** 5t 	• Abrasion of tread or flange should not exceed the limits on the table below. **Table 5** Capacity (t) / Tread outside diameter : D (Standard / Limit) / Flange thickness : t (Standard / Limit) 0.5 — 60 / 58.5 / 3.2 / 2.5 1 — 71 / 69.5 / 4 / 3.3 2 — 85 / 83.5 / 4.5 / 3.8 3 — 100 / 98.5 / 5 / 4.3 5 — 118 / 112 / 9.6 / 6.7	• Replace it with a new one if it exceeds the limit.
4. Missing or damaged nameplate	• Check visually.	• Never use the one which is not legible.	• Replace it with new one.
5. Damage of hand wheel	• Check visually.	• Never use the damaged one.	• Replace it with new one.
6. Deformation and abrasion of gear (track wheel G, pinion)	• Check visually or use calipers as needed.	• Never use the deformed or abraded one.	• Replace it with new one.
7. Deformation and abrasion of suspension shaft	• Check visually or use calipers as needed.	• Never use the suspension shaft if its diameter is worn by 10% or more.	• Replace it with new one.

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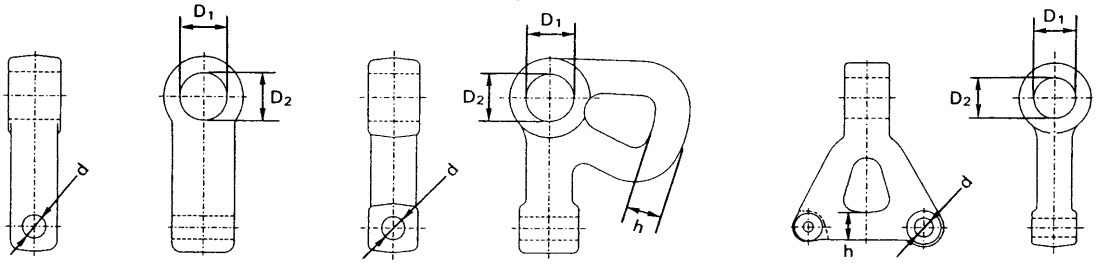
Inspection Item	Inspection Method	Discard Limits / Judgment Criteria	Countermeasures/ Others
8. Deformation and abrasion of suspender	• Check visually or use calipers as needed.	• Never use the suspender if its dimensions of D_2-D_1, d or h exceed the limit in the Table 6 below.	• Replace if it exceeds the limit below.

Fig. 14



Suspender E. G　　Suspender C　　Suspender C

Table 6

(mm)

Hoist Type	Trolley capacity (t)	Hoist applied capacity (t)	D_2-D_1 limit	d		h	
				Standard	Limit	Standard	Limit
CB (Susp.C)	0.5	0.5	1	12.2	13	14	12.5
	1	0.5・1	1	12.2	13	18	16
	2	1.5・1	1	16.2	17	22	20
	3	2.5	1.5	16.2	17	27	24
		3	1.5	16.4	17	24	21.5
	5	5	1.5	16.4	17	33	30
ES or EF (Susp. E) ER (Susp. G)	0.5	0.25・0.5-S, 0.5-L	1	12.2	13	—	—
	1	1-S・1-L	1	12.2	13	—	—
	2	1.5・2-S・2-L	1	20.2	21	—	—
	3	2.5・3	1.5	20.2	21	—	—
	5	5	1.5	28.2	30	—	—

9. Rail deformation	• Check visually or use a calipers as needed.	• The flange should not be deformed.	• Replace or repair.
10. Condition of welded part	• Check visually.	• There should be no crack. • There should be no rust.	• Repair or strengthen.
11. Rail abrasion	• Check visually or use a calipers as needed.	• The tread should not be abraded. • Replace it if the dimension B becomes 95% t becomes 90% of new one.	• Replace.
12. Loosening of fixing bolt	• Try to turn it with a spanner.	• The bolt should be tightened firmly.	• Tighten the bolt.

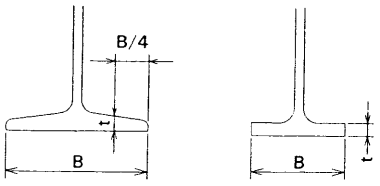


Fig. 15

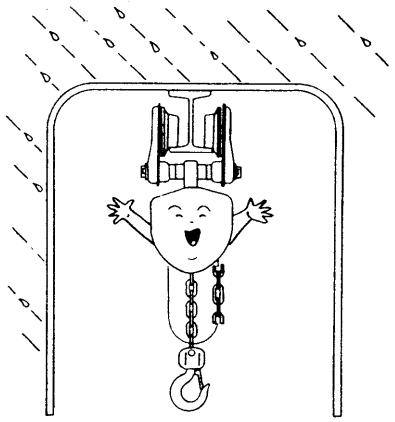
6. MAINTENANCE

ALWAYS maintain, inspect and test the trolley in accordance with applicable safety codes and regulations.
Safety regulations for hoists and cranes regulates implementations and maintenances of daily inspection, monthly inspection, annual inspection and testings. All inspection and maintenance records should be kept for at least 3 years.

⚠ WARNING : IMPROPER trolley use could result serious injury or death.
To avoid these hazards :
: NEVER perform maintenance on the trolley while it is suspending a load.
: Before performing maintenace, attach the tag :
["DANGER": DO NOT OPERATE EQUIPMENT BEING REPAIRED.]
: Only allow qualified service personnel to perfrom mainterance.
: After performing maintenance, test trolley to 100% of its rated capacity before returning to service.

6-1 Conditioning

6-1-1 Storing



(1) In the event that the trolley or hoist becomes wet, dry the trolley or hoist with a dry cloth.

(2) In the case of outdoor installation, make sure to house a trolley or hoist under the eaves or under some cover after operation.

6-2 Lubrication

6-2-1 Geared wheels (geared trolley only)

Lubricate exposed trolley drive pinion and wheel teeth. Brush with grease as often as necessary to keep teeth liberally covered. If the grease becomes contaminated with sand, dirt or other abrasive materials, remove old grease and replace with new grease (standard grease*) during monthly or annual inspection.
Temperature range of standard grease is −20℃ (−4°F) to +60℃ (140°F). If the hoist is used at temperatures below −20℃ (−4°F) or above + 60℃ (+ 140°F), consult the manufacturer or dealer since some parts should be changed.

* Calcium soap grease equivalent of NLGI (National Lubricating Grease Institute) / 2, or EP 2.

6-2-2 Trolley wheels and hand chain

Trolley wheel bearings do not need to be lubricated and must be replaced if worn or damaged. Hand chain, used on geared trolley, does not normally require lubrication.

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6-3 Overhaul and assembly

Overhaul and assemble should be performed with reference to the following figures.

Fig. 23 : for 0.5t to 3t plain trolley
Fig. 24 : for 5t plain trolley
Fig. 25 : for 0.5t to 3t geared trolley
Fig. 26 : for 5t geared trolley

6-3-1 Precaution in overhaul and assembly

(1) Parts names are described in parts list on page 23 to 28.
(2) For overhauling a geared trolley, remove the track wheel first, then take off the pinion.
(3) Adjusting spacers and fixing spacers can be classified by colour.
Adjusting spacers : yellow Fixing spacers : white
(4) When connecting with geared trolley, install it as the trolley's hand chain should be on right side from the hoist's name plate side.
(5) Bend the split pin firmly as shown in Fig. 16-1 or 16-2. When removing the frame for installing the trolley onto rail, tighten the split pin firmly after the installation is completed.
(6) Place the shaft stopper pin as shown in Fig. 16-1 or 16-2 and the flat surface should be touched on adjusting spacers.

Fig. 16-1

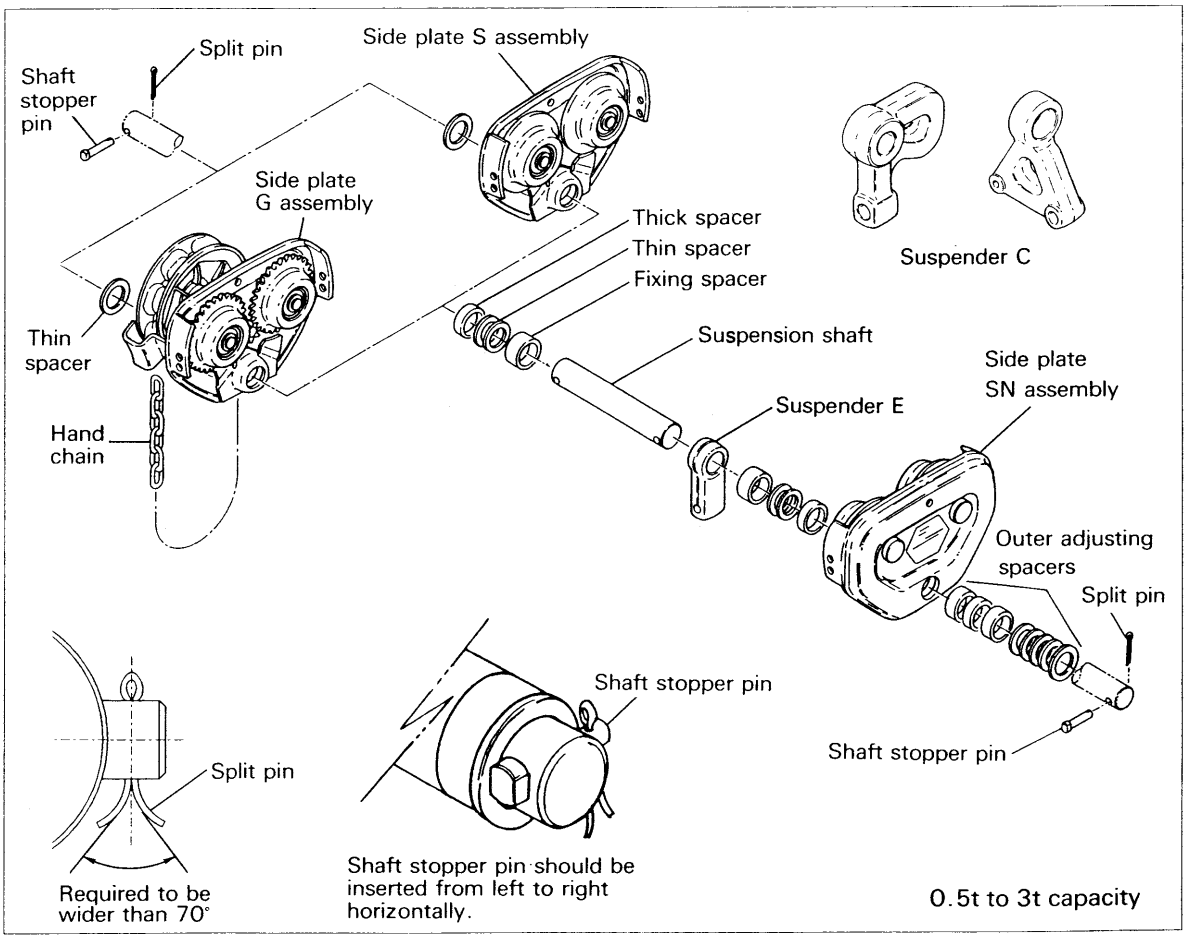
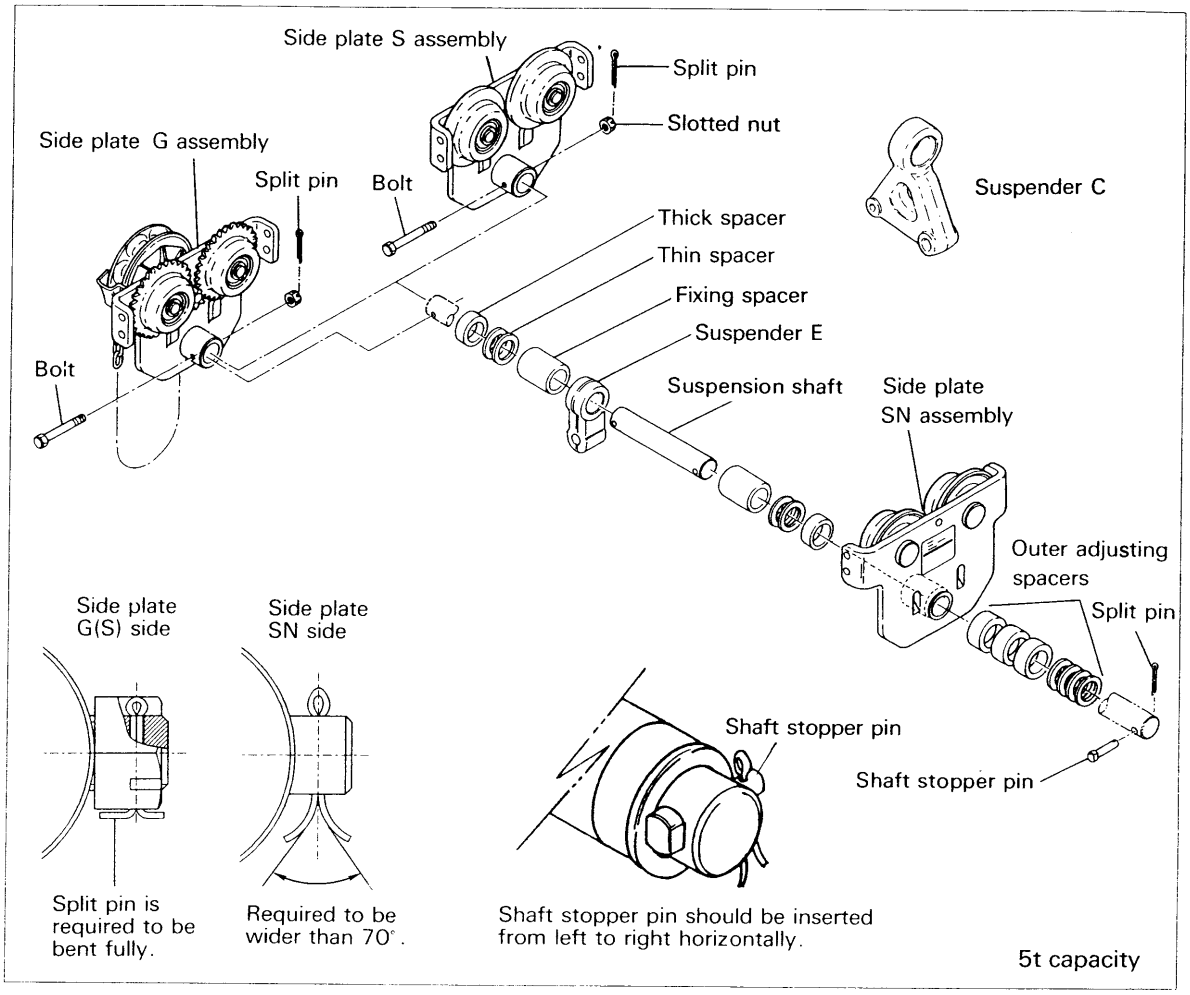


Fig. 16-2



12.6-21

7. BUFFER AND T-TYPE HANGER

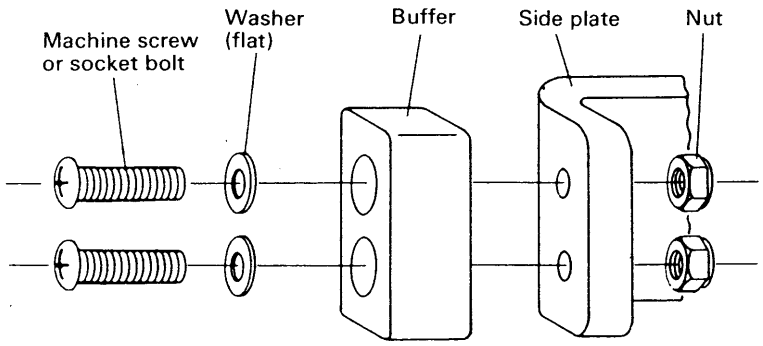
7-1 Buffer

The side plates "S" and "G" have bumpers (lug) which prevent damage to the wheel and to the trolley. Buffers are available as option.

7-1-1 Installation of buffer

Assemble as described below. Tighten the screw tightly, so the buffer can not be moved by hand.

Fig. 17



7-2 T-type hanger

A T-type hanger is used for moving the power supply cable while running together with the trolley on the same rail. When employing a T-type hanger, an additional fitting (cable pusher) is needed.

7-2-1 Installation of cable pusher

(1) Up to 3 t capacity

Fix the cable pusher by the M5 socket bolt with a spring washer from outside the side plate. When the power supply is on right as shown in Fig. 18, place the cable pusher on right side of the side plate.

When the power supply is on left, turn the cable arm fitting 180° (upside down direction) and re-install it. Then re-install the cable pusher on the left side of the side plate.

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(2) 5 t capacity

Fix the cable arm by the bolt and spring washer into the ϕ8mm hole of the side plate from inside. The method of installation depends on the direction of the power supply cable.

* When there is no taps or holes for installtion of the cable pusher on the side plate, make them referring to Fig. 20 and Table 7.

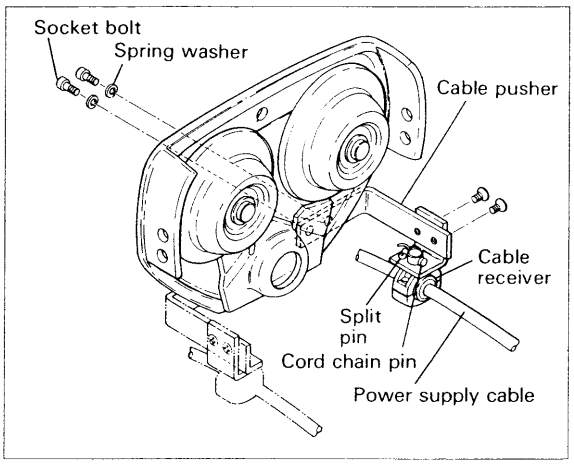

Fig. 18

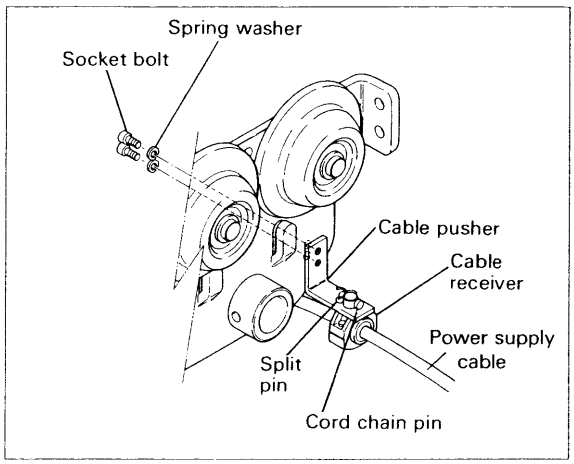

Fig. 19

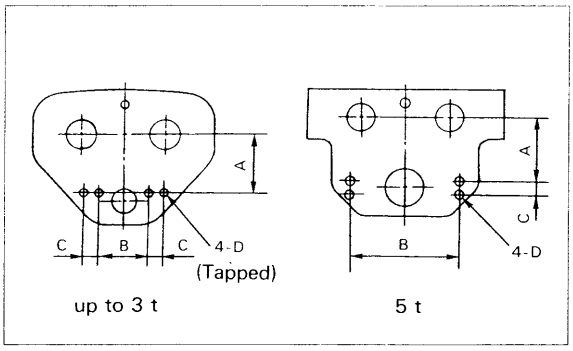

Fig. 20

	A	B	C	D
1/2t	62	50	15	M5
1t	75	80	15	M5
2t	86	80	22	M5
3t	93.5	124	22	M5
5t	142	242	19	ϕ8.5

Table 7

7-2-2 Installation of cable receiver

Install the cable receiver onto the hole (ϕ14mm) from the bottom side of the cable pusher (cable arm) with a cord chain pin and a split pin. (Bend the split pin firmly). (Refer to Fig. 18 or 19.)

7-2-3 Installation of T-type hanger

(1) Type

There are 3 types. After adjusting the rail width as refer to the table below, install the T-type hanger from the rail end. (See Fig. 21)

12.6 -23

(2) Installation of T-type hanger

After adjusting beam width as refer to the table 8, install the required number of the T-type hanger as shown in Fig. 22.

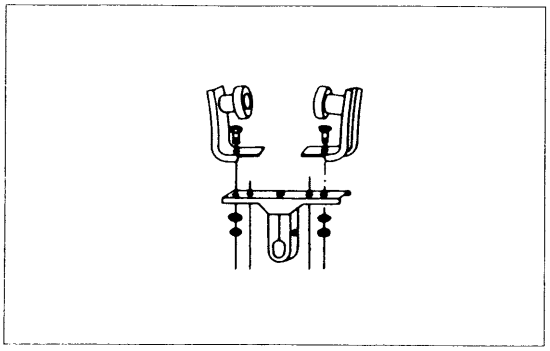

Fig. 21

Type	Beam Width (mm)
T-type hanger 200	76 to 102 (3" to 4")
T-type hanger 250	102 to 152 (4" to 6")
T-type hanger 275	127 to 178 (5" to 7")

Table 8

Note : Ask your authorized Kito dealer if the beam width exceeds 178mm.

*The intervals between adjacent hangers.

In case of the straight beam or the larger radius curved beam, 2m interval between hangers is adequate. In case of smaller radius curved beam, closer interval gives smooth operation. For example, if the curve radius is about 1.5m, about 1m interval is adequate.

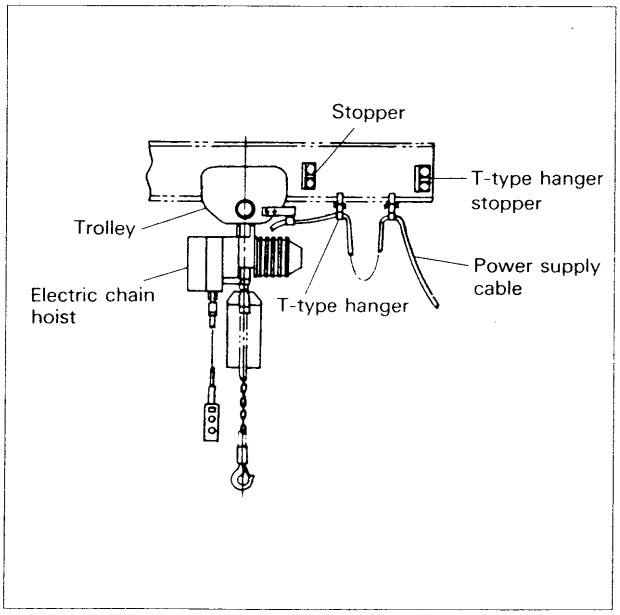

Fig. 22

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8. 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.

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9. PARTS LIST

*When ordering replacement parts, please specify the following points.

1. Part name and trolley capacity.
2. Correct figure number.

Plain trolley (Rail width-standard)

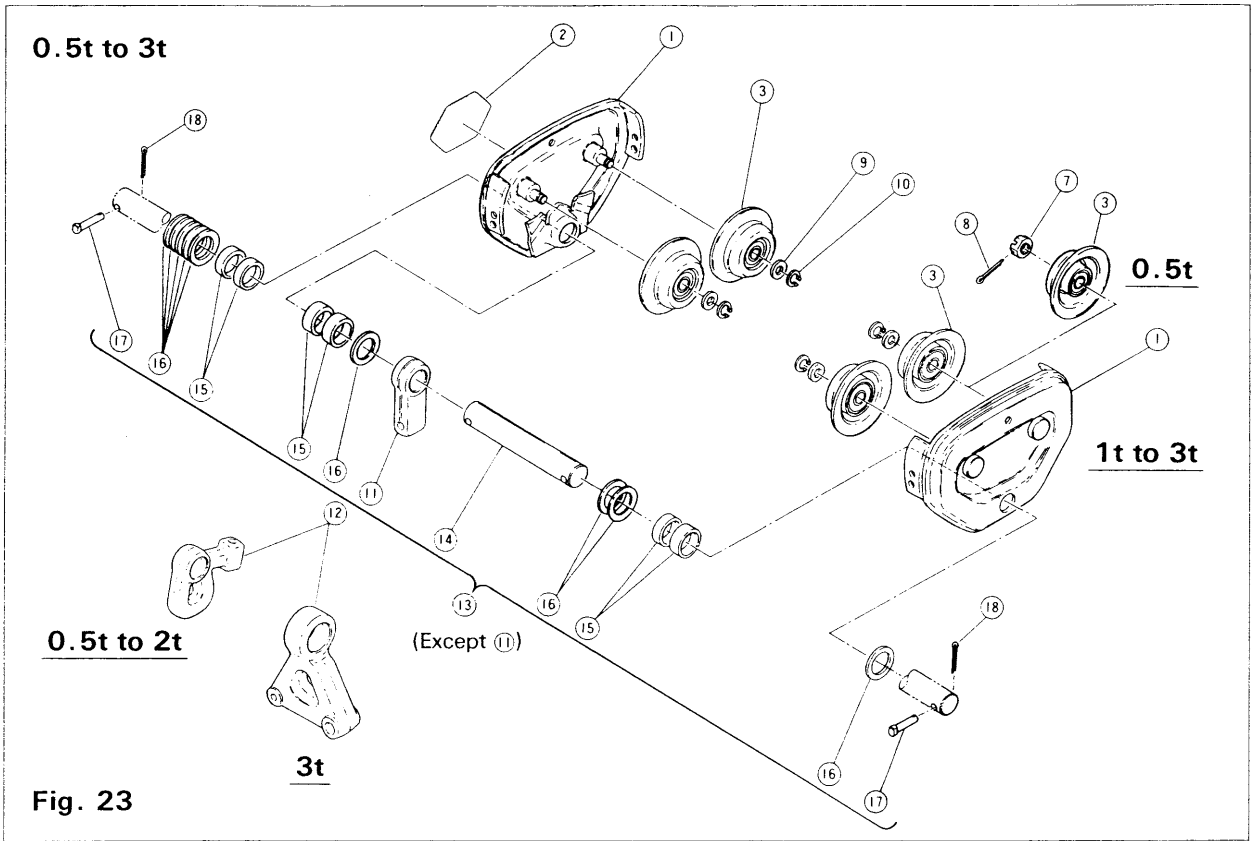


Fig. 23

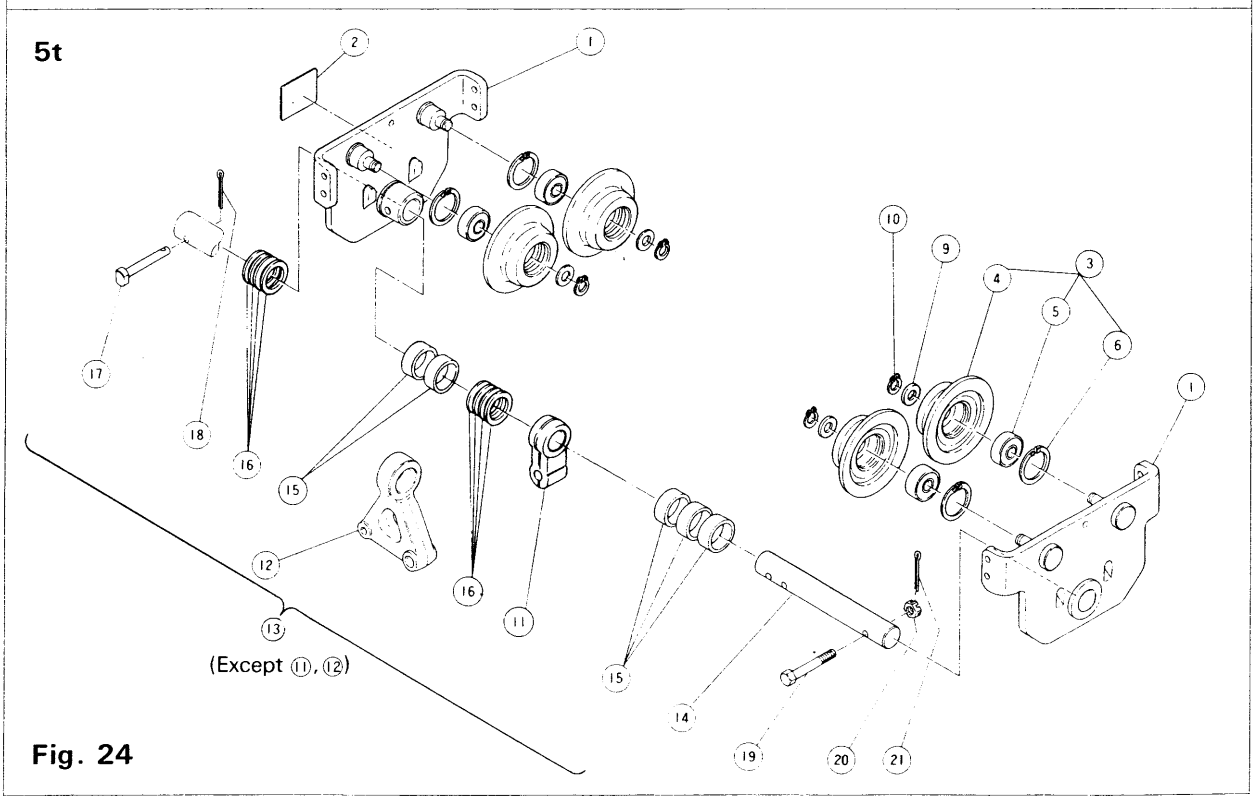


Fig. 24

Fig. No.	Part No.	Part Name	Nos. per Trolley	Capacity					Remarks
				0.5t	1t	2t	3t	5t	
1		Side plate S Assembly	2					——	
		Side plate S Assembly	2	——	——	——	——		
2	T7G-800	Name plate B	1						
3	T6G-5102	Track wheel S Assembly	4					——	
	T3G-1102	Track wheel S Assembly	4	——	——	——	——		
4		Track wheel S	4	——	——	——	——		
5		Ball bearing	4	——	——	——	——	(6307ZZ)	
6		Snap ring	4	——	——	——	——	(R-80)	
7	T6P-158	Slotted nut	4	(L-M10)	——	——	——	——	
8	T6P-159	Split pin	4	(2×16)	——	——	——	——	
9	T6-104	Track wheel washer	4	——		(T1G-2')	(T1G-3')	(MS3-5')	
10	T6G-106	Snap ring	4	——	(S-15)	(S-20)	(S-25)	(S-35)	
11	T7GB-004	Suspender E	1					(MS3-5')	for Electric chain hoist
12	T7GC-004	Suspender C	1					(T5G-5')	for Manual chain hoist
13	T7G-1115	Suspension shaft (standard) Assembly	1						
14	T7G-115	Suspension shaft (standard)	1						
15	T7G-116	Thick spacer	*					(T1G-5')	
16	T6G-117	Thin spacer	**					——	
	T7G-120		8	——	——	——	——		
17	T6G-156	Shaft stopper pin	2 (1)					(MS3-5')	(1) for 5t
18	T6G-157	Split pin	2 (1)	(3.2×20)		(4×20)		(4×22)	(1) for 5t
19	T4G-154	Suspension shaft bolt	1	——	——	——	——	(MS3-5')	
20	T4G-155	Slotted nut	1	——	——	——	——	(L-M12)	
21	T4G-156	Split pin	1	——	——	——	——	(3×22)	

Note : * 4p'cs for 0.5t, 6p'cs for 1t·2t, 9p'cs for 3t, 5p'cs for 5t.
** 10p'cs for 0.5t, 9p'cs for 1t, 8p'cs for 2t, 11p'cs for 3t.

12.6.27

Geared trolley (Rail width-standard)

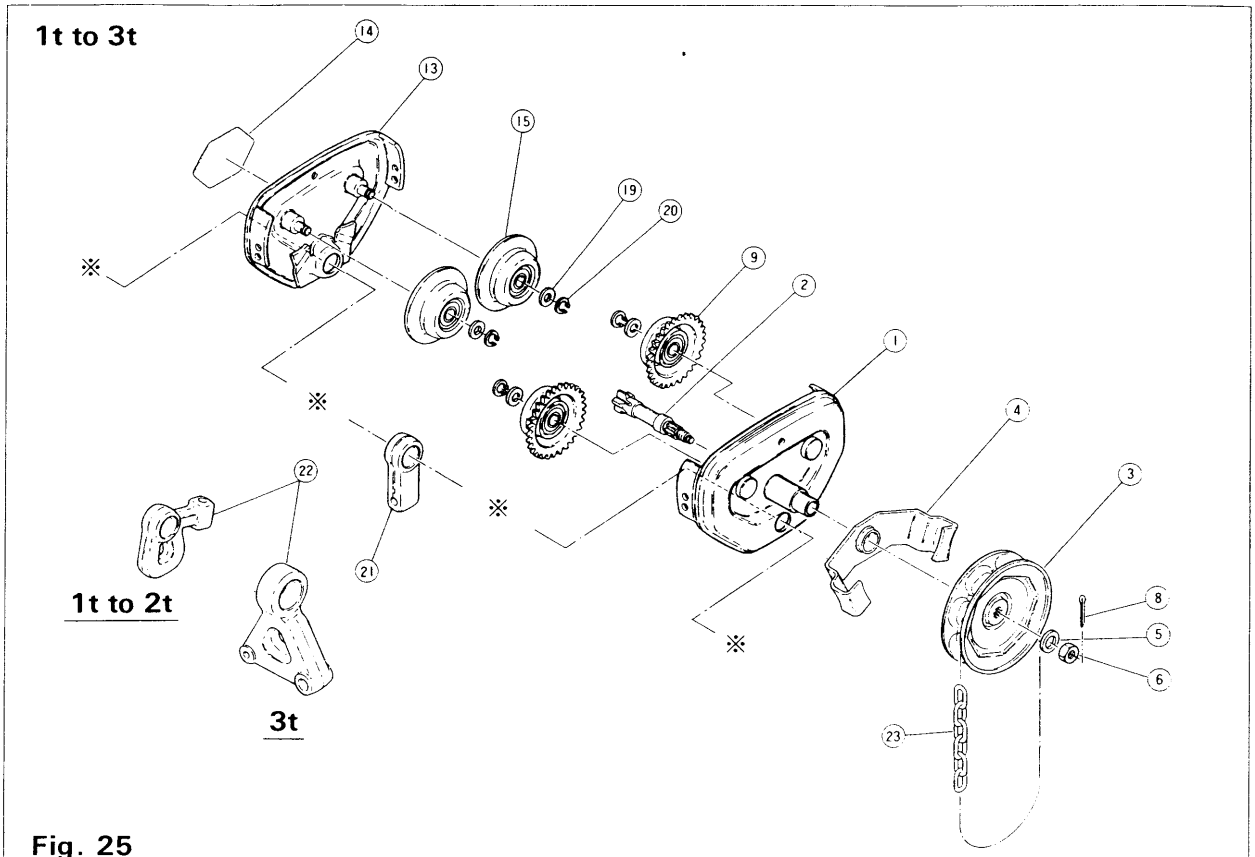


Fig. 25

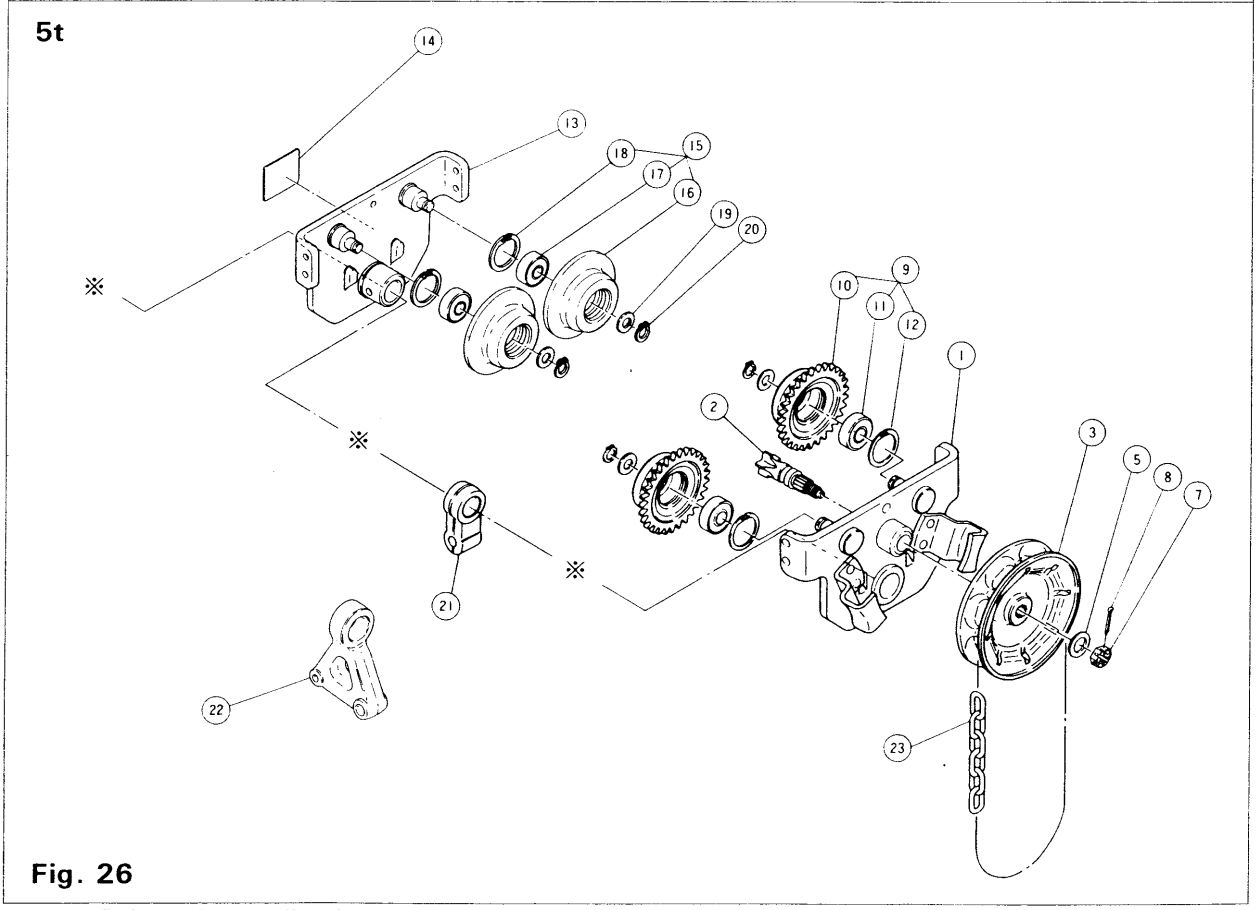


Fig. 26

Note : ※ Refer to the parts list of plain trolley for suspender assembly.

Fig. No.	Part No.	Part Name	Nos. per Trolley	Capacity				Remarks
				1t	2t	3t	5t	
1		Side plate G Assembly	1	.			——	
		Side plate G Assembly	1	——	——	——		
2	T7GB-121	Pinion	1	——			(T4GB-1ᵗ)	
			1		——	——	——	for Electric chain hoist
	T7GC-127	Pinion	1		——	——	——	for Manual chain hoist
3	T6G-123	Hand wheel	1				——	
	T7G-123			——	——	——		
4	T6G-5125	Hand chain guide Assembly	1				——	
5	T7G-152	Washer	1	(L-M12)				
6	T7G-151	Lever nut	1	(M2-40ᵗ)			——	
7	T4G-151	Slotted nut	1	——	——	——	(L-M12)	
8	T7G-160	Split pin	1	(3×18)			(3×22)	
9	T6G-5101	Track wheel G Assembly	2				——	
	T3G-1102	Track wheel G Assembly	2	——	——	——		
10		Track wheel G	2	——	——	——		
11		Ball beaning	2	——	——	——	(6307ZZ)	
12		Snap ring	2	——	——	——	(R-80)	
13		Side plate S Assembly	1				——	
		Side plate S Assembly	1	——	——	——		
14	T7G-800	Name plate B	1					
15	T6G-5102	Track wheel Assembly	2				——	
	T3G-1102	Track wheel S Assembly	2	——	——	——		
16		Track wheel S	2	——	——	——		
17		Ball bearing	2	——	——	——	(6307ZZ)	
18		Snap ring	2	——	——	——	(R-80)	
19	T6G-104	Track wheel washer	4		(T1G-2ᵗ)	(T1G-3ᵗ)	(MS3-5ᵗ)	
20	T6G-106	Snap ring	4	(S-15)	(S-20)	(S-25)	(S-35)	
21	T7GB-004	Suspender E	1				(MS3-5ᵗ)	for Electric chain hoist
22	T7GC-004	Suspender C	1				(TS1-5ᵗ)	for Manual chain hoist
23	T7G-842	Hand chain	1	(2.5m)	*2.5m for 1.5t. (3m)		(3.5m)	for Manual chain hoist

12.6-29

Rail width-option

Suspension shaft W20 Assembly. (0.5t, 1t)

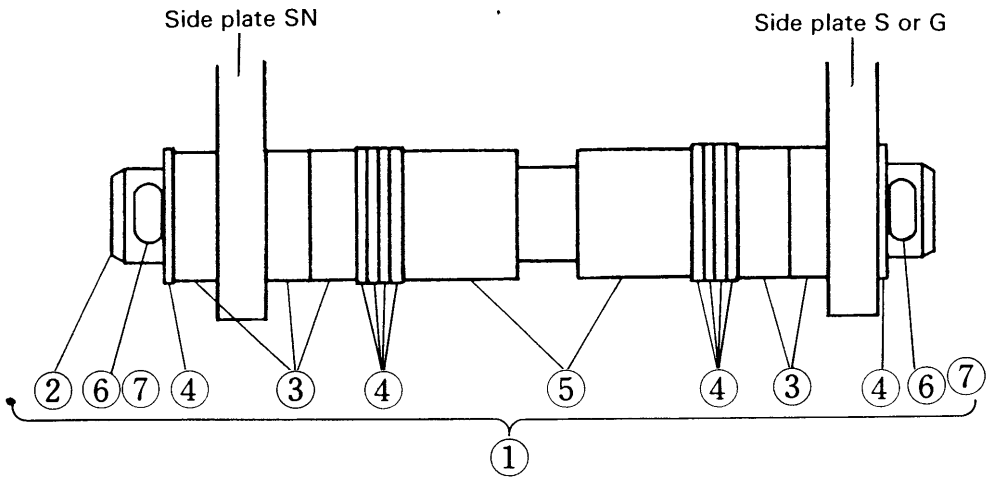


Fig. 27

Suspension shaft W30 Assembly. (0.5t to 3t)

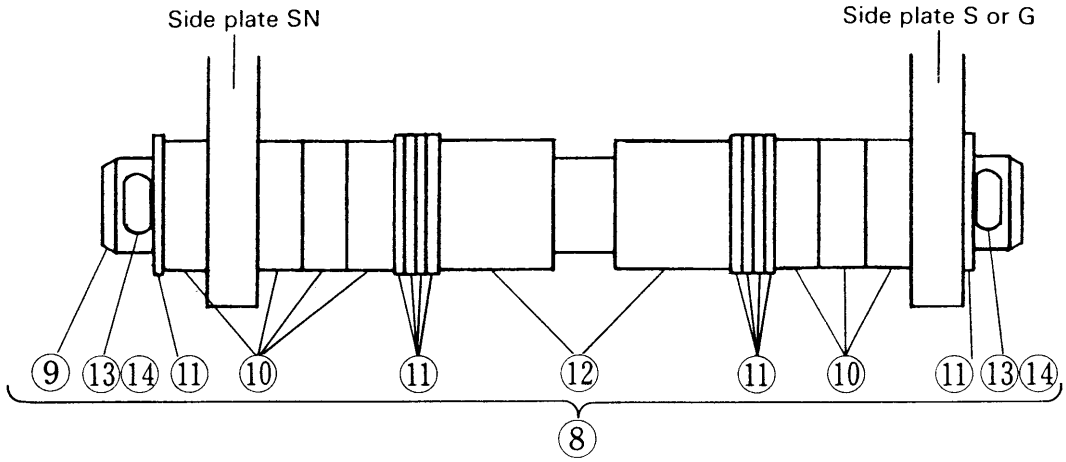


Fig. 28

Suspension shaft W30 Assembly. (5t)

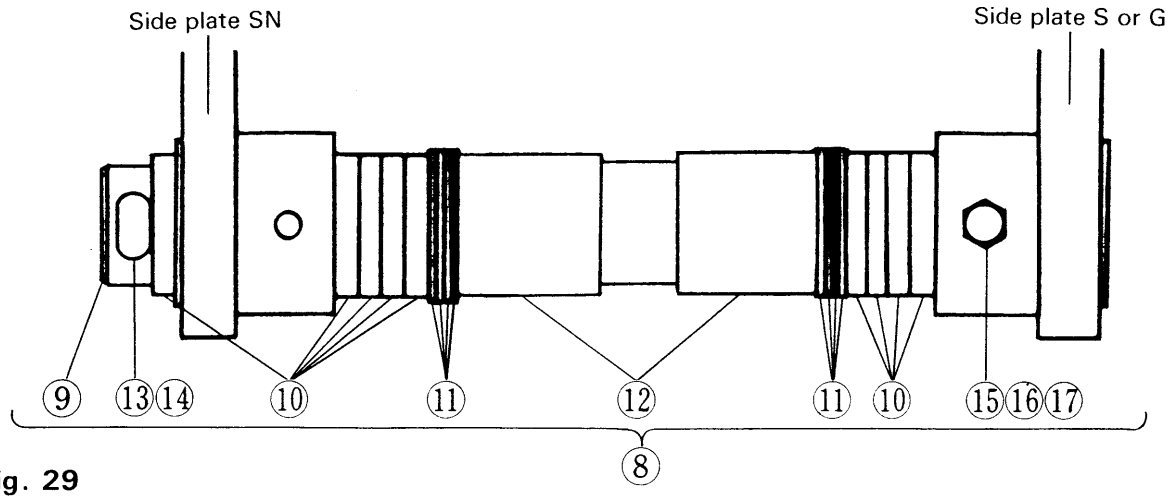
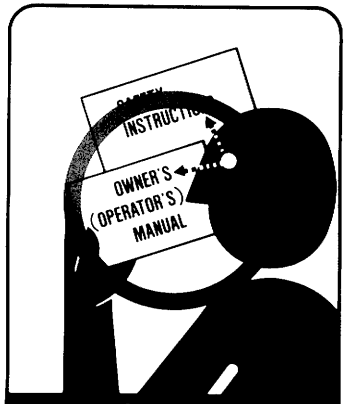
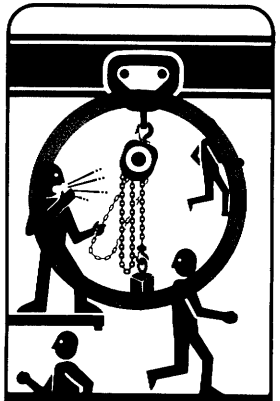


Fig. 29

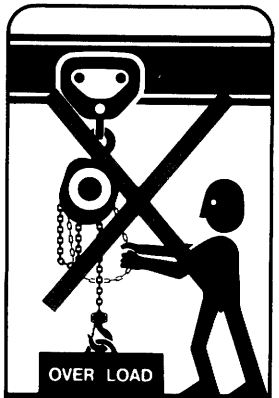
IMPROPER trolley and chain hoist use could result in death or serious injury. To avoid these hazards:



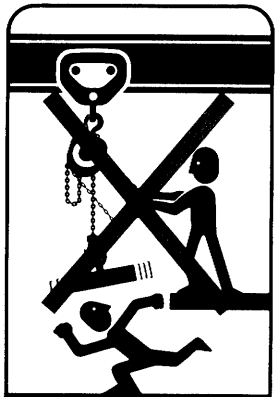
ALWAYS read owner's (operator's) manual and safety instructions before operating.



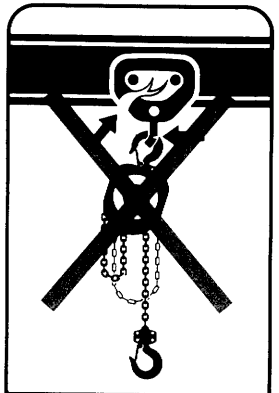
ALWAYS notify others when a transport is about to begin.



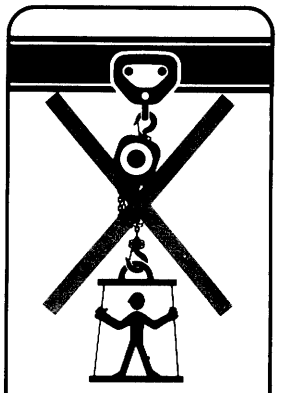
NEVER transport more than the trolley's rated capacity.



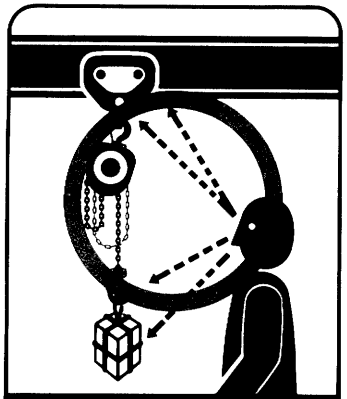
NEVER lift or transport loads over or near people.



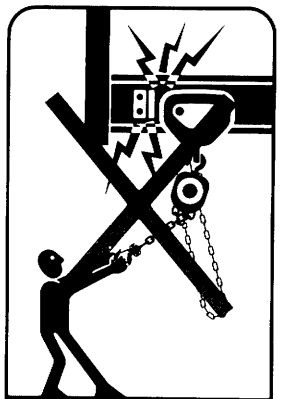
NEVER operate a trolley if damaged or mulfunctioning.



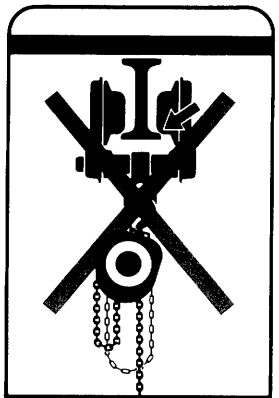
NEVER use a trolley for supporting, or transporting people.



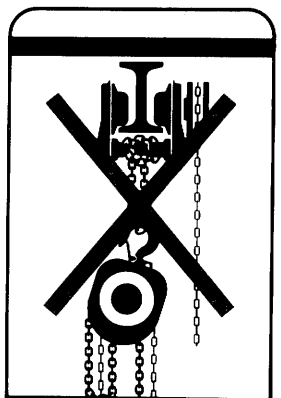
ALWAYS make sure that the supporting structures are strong enough to support the weight of the load and hoist.



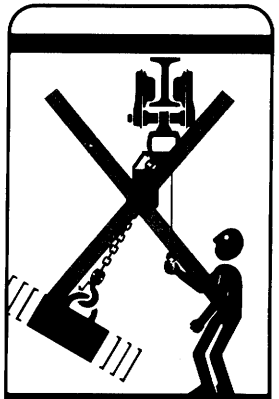
NEVER allow trolley to collide with stopper on the beam.



NEVER use a trolley if the width does not fit the rail.



NEVER connect the hoist to the trolley with improper fittings.



NEVER operate unless load is centered under hoist.

NEVER remove or obscure the warning tags and labels.

Fig. No.	Part No.	Part Name	Nos. per Trolley	Capacity					Remarks
				0.5t	1t	2t	3t	5t	
1	T7G-136	Suspension shaft W20 Assembly	1			—	—	—	
2	T7G-136	Suspension shaft W20	1			—	—	—	
3	T7G-116	Thick spacer	*			—	—	—	
4	T6G-117	Thin spacer	10			—	—	—	
5	T7G-137	Fixing spacer W20	2			—	—	—	
6	T6G-156	shaft stopper pin	2			—	—	—	
7	T6G-157	Split pin	2	(3.2×20)					
8	T7G-1181	Suspension shaft W30 Assembly	1						
9	T7G-181	Suspension shaft W30	1						
10	T7G-116	Thick spacer	**					(T1G5t)	
11	T6G-117	Thin spacer	10					—	
	T7G-120		8	—	—	—	—		
12	T7G-182	Fixing spacer W30	2						
13	T6G-156	Shaft stopper pin	2 (1)				(MF2-2t)	(MS3-5t)	(1) for 5t
14	T6G-157	Split pin	2 (1)	(3.2×20)		(4×20)		(4×22)	(1) for 5t
15	T4G-154	Shaft stopper pin	1	—	—	—	—	(MS3-5t)	
16	T4G-155	Slotted nut	1	—	—	—	—	(L-M12)	
17	T4G-156	Split pin	1	—	—	—	—	(3×22)	

Note : * 7p'cs for 0.5t, 5p'cs for 1t.
** 7p'cs for 0.5t•1t, 11p'cs for 2t•3t, 9p'cs for 5t.

12.6-32

12-46

Table 3

Number of Adjusting Spacers

Capacity	Parts	Beam flange width (in)	2	2 5/16	2 1/2 2 5/8	2 7/8 2 15/16	3	3 1/4	3 9/16	3 7/8	3 15/16	4	4 3/16	4 15/16	4 7/16	4 11/16 4 3/4	4 15/16	5	5 3/16	5 5/16	5 3/8	5 5/8	5 7/8 5 15/16	6	6 1/8	6 5/16	6 7/16	6 11/16	6 7/8	7	7 1/16 7 1/8	7 1/4 7 5/16	7 7/8	8	8 7/16	8 11/16	9	9 1/8	9 7/8	10	10 1/8	10 1/4	10 3/8	10 1/2	11	11 1/8	11 1/4	11 3/8	11 5/8	11 3/4	11 13/16	11 7/8	12
		(mm)	50	58	64 66	73 74	75 76	82	90 91	98	100	102	106	110	113	119 120	125	127	131	135	137	143	149 150	153	155	160	163	170	175	178	180 181	184 185	200	203	215	220	229	232	250	254	257	260	264	267	279	283	286	289	295	298	300	302	305
0.5	Thin spacer	Inner	2+3	3+4	0+1	1+2	2+2	3+3	0+1	1+2	2+2	2+3	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	4+4	4+5	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer	4	2	8	6	5	3	8	6	5	4	7	6	5	3	9	8	7	6	5	3	9	8	7	6	5	3	9	8	7	6	1	0	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	0+0	0+0	0+0	1+1	2+2	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	3+3	4+3
		Outer	4	4	2	2	2	2	0	0	0	0	7	7	7	7	5	5	5	5	5	5	3	3	3	3	3	3	1	1	1	1	1	1	7	7	7	5	3	3	3	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
1	Thin spacer	Inner		3+3	0+0	1+1	1+2	2+3	0+0	1+1	1+2	2+2	2+3	3+3	3+4	0+1	1+2	2+2	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	4+4	4+5	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer		2	8	6	5	3	8	6	5	4	3	2	1	7	5	4	7	6	5	3	9	8	7	6	5	3	9	8	7	6	1	0	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner		0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	0+0	0+0	0+0	1+1	2+2	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	3+3	4+3
		Outer		6	4	4	4	4	2	2	2	2	2	2	2	0	0	0	5	5	5	5	3	3	3	3	3	3	1	1	1	1	1	1	7	7	7	5	3	3	3	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
2	Thin spacer	Inner						2+2	3+4	0+1	1+1	1+2	2+2	2+3	3+3	0+0	1+1	1+2	2+2	2+3	3+3	0+0	1+1	1+2	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	0+0	0+1	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer						3	0	6	5	4	3	2	1	7	5	4	3	2	1	7	5	4	7	6	5	3	9	8	7	6	9	8	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner						0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	3+3	3+3	3+3	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+5	5+5	5+5	5+5	5+5	5+5	5+5	6+5
		Outer						6	6	4	4	4	4	4	4	2	2	2	2	2	2	0	0	0	11	11	11	11	9	9	9	9	7	7	7	7	7	5	3	3	3	3	3	3	1	1	1	1	1	1	1	1	0
	Fixing spacer	Inner						–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
3	Thin spacer	Inner						1+2	3+3	0+0	0+1	1+1	1+2	2+2	2+3	3+4	0+1	1+1	1+2	2+2	2+3	3+4	1+4	1+5	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	0+0	0+1	2+3	3+3	4+5	1+1	0+0	0+1	1+1	1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer						7	4	10	9	8	7	6	5	3	9	8	7	6	5	3	5	4	7	6	5	3	9	8	7	6	9	8	4	3	0	7	9	8	7	6	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner						2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+4	5+4	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+5	5+5	5+5	5+5	5+5	5+5	5+5	6+5
		Outer						5	5	3	3	3	3	3	3	1	1	1	1	1	1	0	0	0	11	11	11	11	9	9	9	9	7	7	7	7	7	5	3	3	3	3	3	3	1	1	1	1	1	1	1	1	0
	Fixing spacer	Inner						–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
5	Thin spacer	Inner								0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+0	0+1	1+1	1+2	2+2	3+3	0+4	1+4	1+1	1+2	0+0	0+1	2+3	3+3	0+1	1+1	0+0	0+1	1+1	1+2	2+2	2+3	0+1	1+1	1+2	2+2	3+3	3+4	4+4	1+4	1+5
		Outer								8	7	6	5	4	2	8	7	6	5	4	2	8	7	6	5	4	2	4	3	6	5	8	7	3	2	7	6	8	7	6	5	4	3	7	6	5	4	2	1	0	3	2			
	Thick spacer	Inner								0+0	0+0	0+0	0+0	0+0	0+0	1+1	1+1	1+1	1+1	1+1	1+1	2+2	2+2	2+2	2+2	2+2	2+2	3+2	3+2	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+4	5+4			
		Outer								5	5	5	5	5	5	3	3	3	3	3	3	1	1	1	1	1	1	0	0	9	9	7	7	7	7	5	5	3	3	3	3	3	3	1	1	1	1	1	1	1	0	0			
	Fixing spacer	Inner								–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1

Note : 1) Take note the numbers on spacers of inner side as follows.

Example 0 + 1

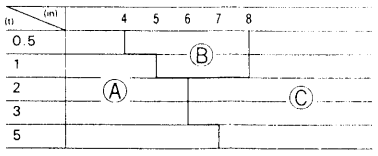
- 1 — Number on side plate S
- 0 — Number on side plate G

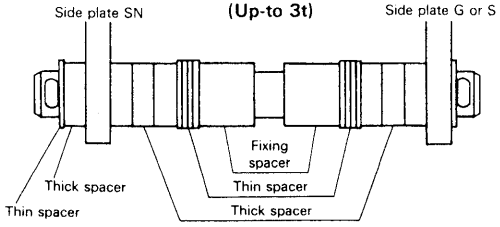
2) Adjustment of trolley width

See clause 3−3.

Adjust the dimensions by appropriately increasing or decreasing the number of inner or outer adjusting spacers, without strictly adhering to the number in the above table.

3) Ⓐ indicates standard range.
Ⓑ indicates W20 range, as option
Ⓒ indicates W30 range, as option





12.4.33

Table 3

Capacity	Parts	Beam flange width (in)	2	2 5/16	2 1/2 2 5/8	2 7/8 2 15/16	3	3 1/4	10 3/8	10 1/2	11	11 1/8	11 1/4	11 3/8	11 5/8	11 3/4	11 13/16	11 7/8	12
		(mm)	50	58	64 66	73 74	75 76	82	264	267	279	283	286	289	295	298	300	302	305
0.5	Thin spacer	Inner	2+3	3+4	0+1	1+2	2+2	3+3	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer	4	2	8	6	5	3	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner	0+0	0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	3+3	4+3
		Outer	4	4	2	2	2	2	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner	–	–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
1	Thin spacer	Inner		3+3	0+0	1+1	1+2	2+3	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer		2	8	6	5	3	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner		0+0	1+1	1+1	1+1	1+1	2+2	2+2	2+2	3+3	3+3	3+3	3+3	3+3	3+3	3+3	4+3
		Outer		6	4	4	4	4	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner		–	–	–	–	–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
2	Thin spacer	Inner						2+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer						3	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner						0+0	4+4	4+4	4+4	5+5	5+5	5+5	5+5	5+5	5+5	5+5	6+5
		Outer						6	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner						–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
3	Thin spacer	Inner						1+2	2+2	2+3	4+5	1+1	1+2	2+2	3+3	3+4	4+4	4+5	1+5
		Outer						7	5	4	0	7	6	5	3	2	1	0	3
	Thick spacer	Inner						2+2	4+4	4+4	4+4	5+5	5+5	5+5	5+5	5+5	5+5	5+5	6+5
		Outer						5	3	3	3	1	1	1	1	1	1	1	0
	Fixing spacer	Inner						–	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
5	Thin spacer	Inner							2+2	2+3	0+1	1+1	1+2	2+2	3+3	3+4	4+4	1+4	1+5
		Outer							4	3	7	6	5	4	2	1	0	3	2
	Thick spacer	Inner							3+3	3+3	4+4	4+4	4+4	4+4	4+4	4+4	4+4	5+4	5+4
		Outer							3	3	1	1	1	1	1	1	1	0	0
	Fixing spacer	Inner							1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1

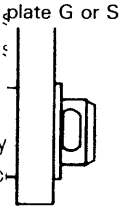
Note : 1) Take note the numbers on spacers of in

Example 0 + 1

Number on plate G or S

Number on

2) Adjustment of trolley width
See clause 3−3.
Adjust the dimensions by appropriately number of inner or outer adjusting spac the number in the above table.



13.6.34