ROUNDO

Bockningsmaskiner
Bending Machines
Biegemaschinen
Rouleuses-Cintreuses
Máquinas Dobladoras

IMPORTANT!
This is the operators manual for your ROUNDO Bending Machine. Please be sure to read and follow all instructions before using the machine!

WARNING!
Always disconnect the power supply before servicing or repairing the machine!
Always make sure that the hydraulic pressure is turned off before making any repairs and maintenance!

ROUNDO

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Mach. type PASS 310

Capacity 4500 x 5

Mach. no. 027613

Delivered 2002/09

VÆGT INCL. Ø340 VALSE 18800 kg

Ø220 VALSE ALENE 1700 kg

Date/Datum

Our ref./Vår ref.

Your date/Ert datum

Your ref./Er ref.

ROUNDO
www.roundo.com

OVERENSSTEMMELSESERKLÆRING

Vi Roundo AB
Box 171
SE-281 22 HÄSSLEHOLM

erklærer på eget ansvar, at produkten ROUNDO Pladevalse

Typ: PASS 310 **Maskin nummer: 027613**

som er omfattet af denne erklæring, er i overensstemmelse med følgende standarder eller andre normative dokumenter:

SS-EN 292-1, SS-EN 292-2, SS-EN 418, SS-EN-953, SS-EN 954-1, SS-EN 982, SS-EN 1037, SS-EN 1050, SS-EN 60204-1

i henhold til bestemmelserne i Direktiv EG:s Maskindirektiv 89/392/EEC,

Bilaga 2A og Rådets direktiv 91/368/EEC.

Hässleholm 2002-09-06

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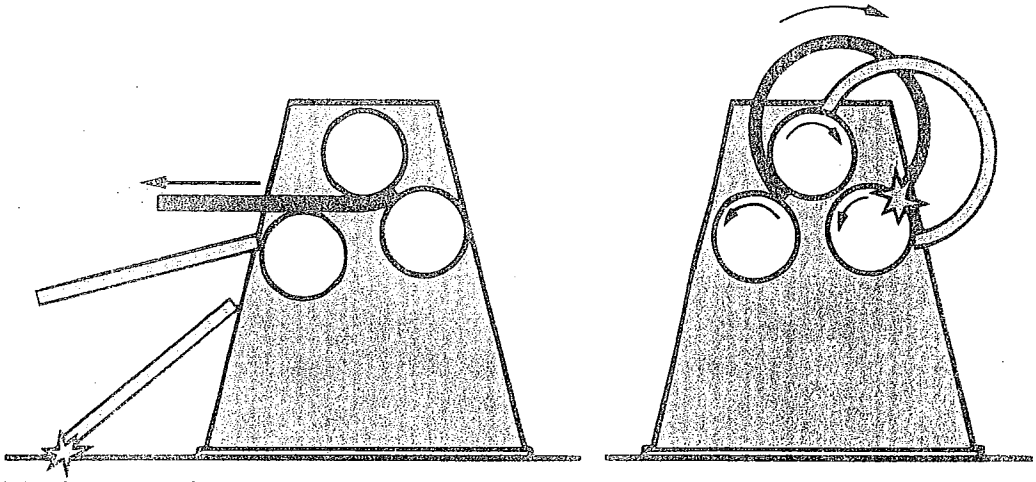
CAUTION VORSICHT ATTENTION



IMPORTANT! Never operate the machine in such a way that there is a risk for the plate or the section to slip out of the rolls!
Keep hands off and out of the rolls, the plate section and all moving. parts. Never climb on the machine for any reason when it is running.

WICHTIG! Die Maschine niemals so bedienen, dass die Gefahr besteht, dass das Blech oder das Profil aus den Rollen gleitet. Rollen, Blech oder Profil und alle anderen beweglichen Teile nicht anfassen.
Niemals, egal aus welchem Grund, auf die Maschine klettern, während sie in Betrieb ist.

IMPORTANT! Utiliser toujours la machine en veillant à ce que le profilé ou la section ne risquent pas de glisser des galets.
Ne pas poser les mains sur ou entre les galets, sur le profilé ou sur toutes autres parties mécaniques. Ne jamais monter sur la machine quand elle fonctionne.

OM MASKINEN INTE STARTAR,
SE INSTR. LINMANÖVRERAT NÖDSTOPP.

IF THE MACHINE WILL NOT START, SEE
INSTR. WIRE OPERATED EMERGENCY STOP.

WENN DIE MASCHINE NICHT STARTET,
SIEHE INSTRUKTION KABELBETÄTIGTE
NOTABSCHALTUNG.

SI LA MACHINE NE DEMARRE PAS, VOIR
L'INSTRUCTION DU FIL D'ARRÊT D'URGENCE.

VARNING! WARNING! ACHTUNG!

VID SVETSNING MÅSTE JORDNING SKE
I ARBETSSTYCKET.

ALWAYS CONNECT GROUND CABLE
TO THE WORKPIECE WHEN WELDING.

SCHWEISSEN NUR MIT ERDUNG
AM ARBEITSSTÜCK ERLAUBT.

TOUJOURS CONNECTER LA CABLE DE
LA PRISE DE TERRE A LA PIECE A
TRAVAILLER LORS DU SOUDAGE.

TABLE OF CONTENTS

* Only if the machine is equipped with this optional device.

Continued ⇒

Spare parts information of standard components

Description	Make	Part No.	Sheet
Check valve	Hawe	RH-2	143
Shuttle valve	Hawe	WV8-S	429
Directional valve	Atos	DHI	444
Filter	Parker	12PS	452
Counter balance valve	SUN	CBCG	473
Relief valve	Hawe	MVR-28C	502
Dir. proportional valve	Atos	DHZO	510
Oil cooler	Oiltech	TBI04	513
Filter	Parker	18P	516
Hydraulic pump/motor	Oiltech	QPM20	517
Hydraulic pump	Atos	PVPC-L-3029	525
Hydraulic motor	SAI	GM05	530
Joystick	Binder	33 250	990
Planetary gearbox	Trasmital	306L2	999
Machine PASS 310	Roundo		1.3287
Machine PASS 310	Roundo		1.3075
Machine PASS 310	Roundo		1.3076
Machine PASS 310	Roundo		1.3151
Motorized support rolls	Roundo		2.4465

* Only if the machine is equipped with this optional device.

INSTRUCTION MANUAL

ROUNDO PASS 310 x 4500

(Please see enclosed pictures pages elsewhere in this manual)

TRANSPORTATION AND INSTALLATION

The machine is delivered fully assembled, except for some of the optional equipment such as Top support, Side support, etc. if any.

When transporting the machine, the control unit, etc. it is very important that they are carefully anchored. The machine has a rather low center of gravity and normally there is no risk of capsizing. The control unit and electronic equipment must be handled with care!

Lifting of the machine is done by an overhead crane, using soft loops around the Top roll. Please note that the manner of lifting a machine with particularly short rolls (working length) will be different, see the enclosed Lifting Instruction. Lifting of the control unit is done by using soft loops.

IMPORTANT! DURING LIFTING, THE DROP END (END YOKE) MUST BE SECURED WITH THE SAFETY LOCKING DEVICE (BOLT AND FLAT BAR)!

This is supplied with the machine and attached at the factory before delivery.

Make sure the machine is well balanced during lifting. See figure 1 showing the lifting principle.

The machine must be placed on an even/leveled concrete floor, on a foundation or into a foundation pit. See the valid Foundation drawing.

Level the machine in both directions using a water level. See figure 2 showing the leveling principle.

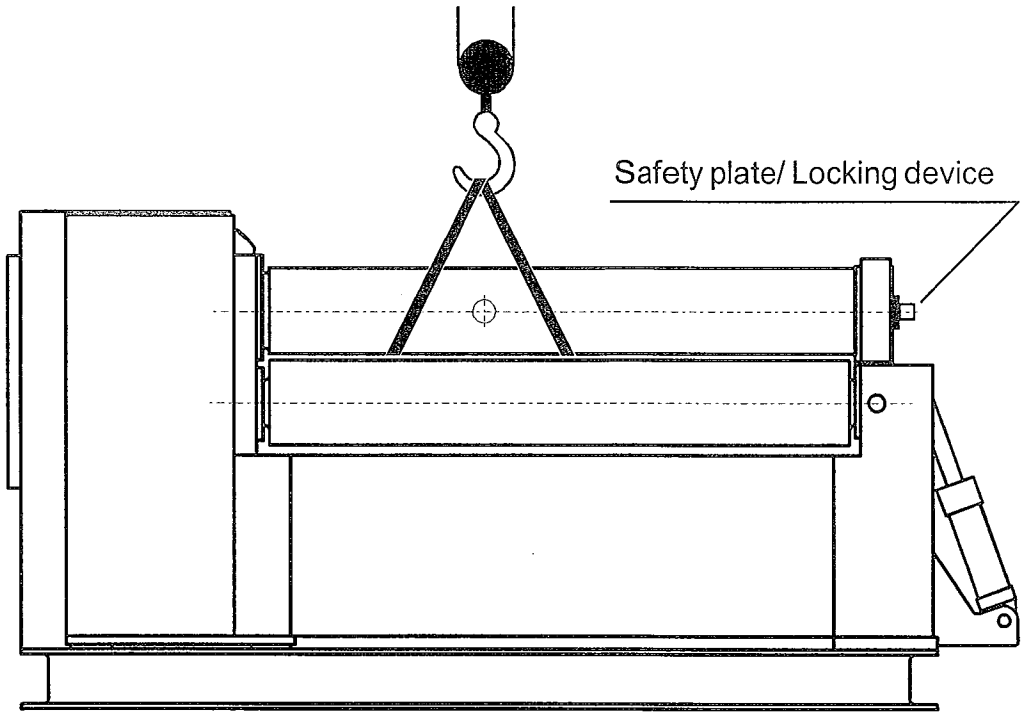
It is very important that the machine is installed and leveled without any wryness. It should rest evenly under its whole beam foundation. Use shims if necessary. It is of less importance if the whole machine leans somewhat as long as it is resting evenly on an even surface.

Bolt the machine to the concrete floor, using bolts and clamps (not supplied with the machine), according to the Foundation drawing. Make sure that the concrete foundation, bolts and clamps will be able to withstand the pulling forces indicated by the Foundation drawing.

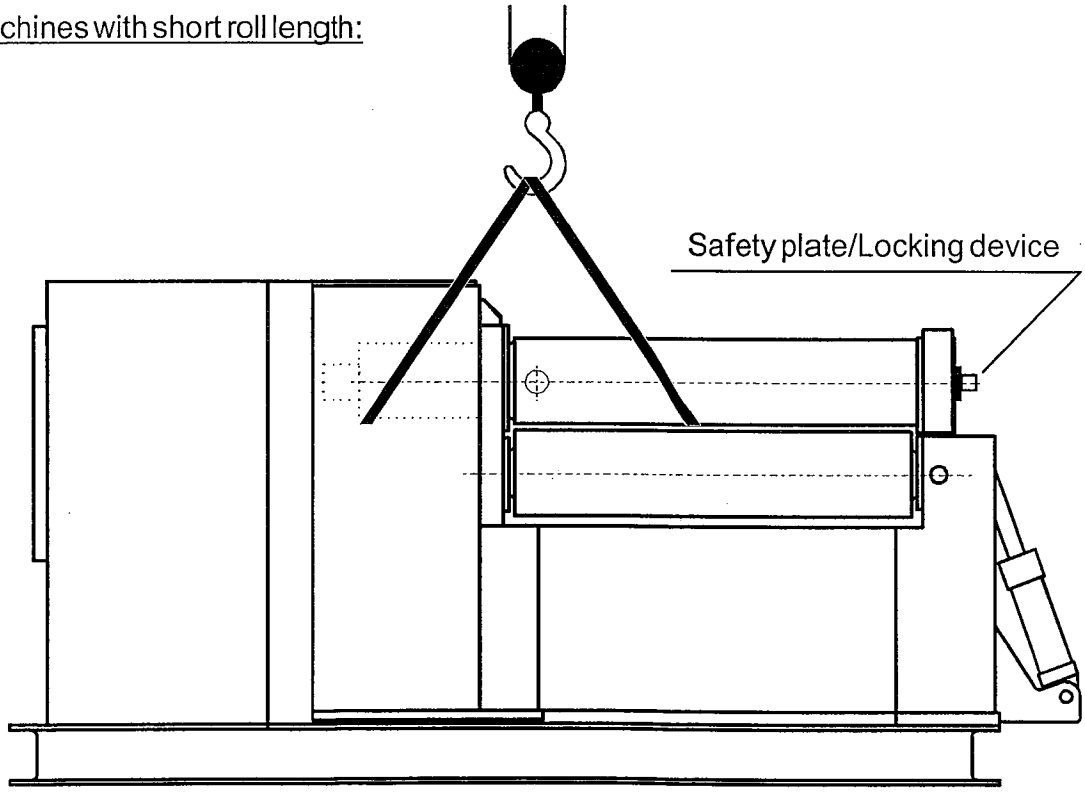
If the machine is lowered under the floor level into a pit, the gap between the walls and the machine must be covered with checkered plate and grate plate. The size of the grate plate must be sufficient to allow good ventilation of the hydraulic system. Please see the Foundation drawing.

LIFTING PRINCIPLES

Normal:



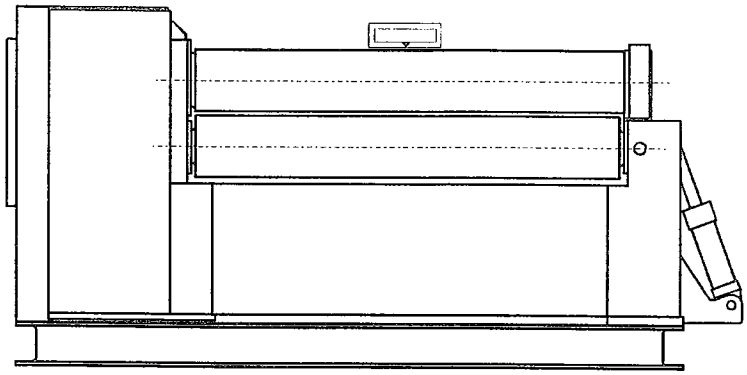
Machines with short roll length:



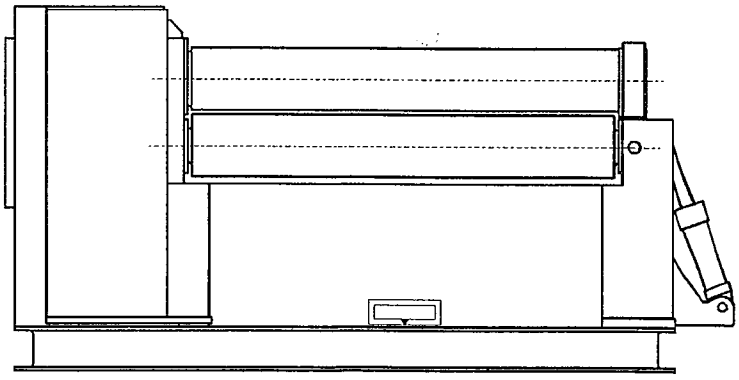
PAS/PASS MACHINES FIGURE 2 04/-92

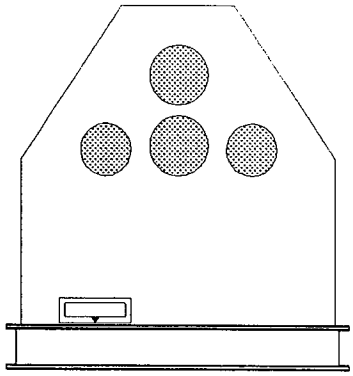
LEVELING PRINCIPLES

I TOP ROLL: Longitudal



II FRAME: Longitudal and Lateral (across)





A.7 DRIFT/VEDLIGEHOLDELSE

- Afbryd altid strømmen til maskine, inden der åbnes for relæskabet!
- Afbryd altid strømmen til maskinen, inden der foretages nogen form for vedligeholdelse!
- Vær omhyggelig med at få lukket døren til relæskabet, inden strømmen atter tilsluttes.
- Alle skærme og lemme, som er blevet fjernet i forbindelse med vedligeholdelsen etc., skal atter monteres på maskinen, inden denne sættes i drift igen!

A.8 RISIKOOMRÅDE

Operatøren skal have fuldt kendskab til maskinens risikoområde. Maskinens risikoområde er vist på tegning I-4.9418, som derfor skal studeres.

A.9 STØJMÅLING

Maskintype: PASS 310 **Maskinnummer :** 027613

Testresultat

☐ Det målte støjniveau er lavere end 70 dB (A).

☒ Det målte støjniveau er 73 dB (A).

Testbetingelser

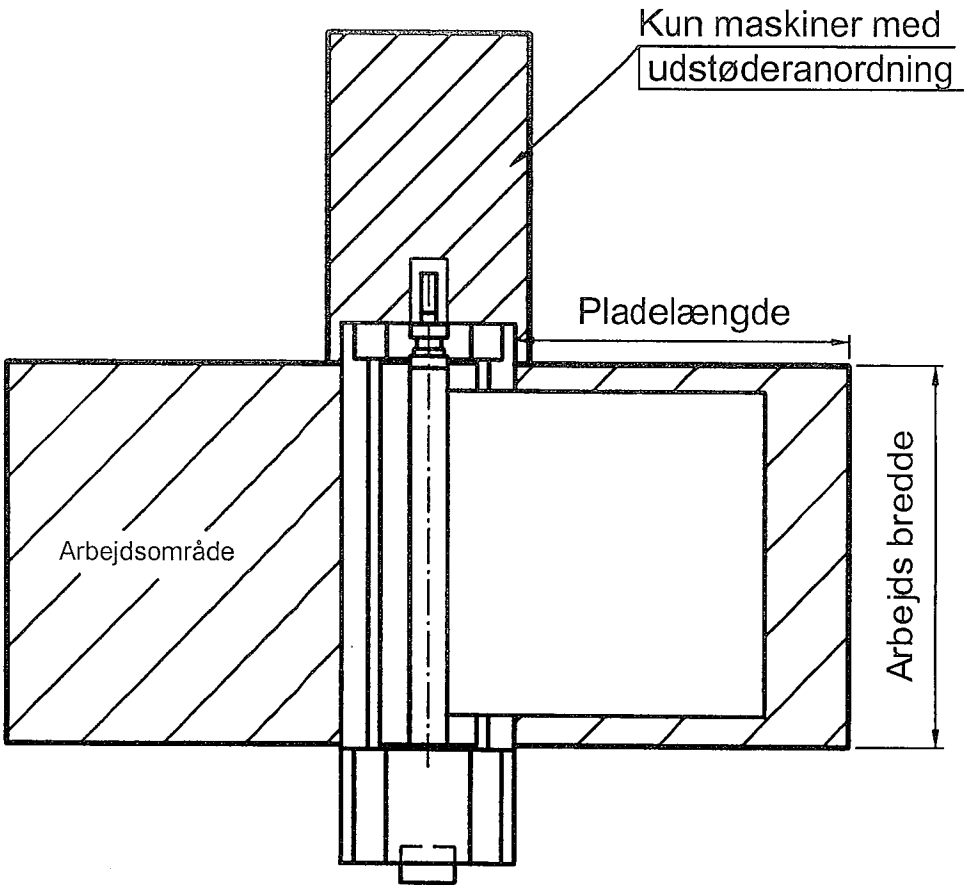
Støjniveauet er testet både ved tomgangskørsel og ved fuld rotationshastighed.

Anvendt metode

Støjniveauerne er målt fra de forskellige manøvrestationer under ens betingelser og i dB(A).

Anvendt instrument

Det anvendte instrument er af fabrikat Brüel & Kjær, type 2225.



ADVARSEL !

Der må ikke befinde sig nogen personer i det viste arbejdsområde.

Der må ikke befinde sig nogen fremmede genstande, arealadskillelser, stativer etc. idet viste arbejdsområde.

ROUNDO	Arbejdsområde PS/PAS/PASS	I-4.9418

ELECTRICAL INSTALLATION

Electrical installation should only be done by authorized personnel !

The machine is delivered with complete electric equipment. Machines delivered to certain markets such as the USA and EU are equipped with a disconnect switch (main power switch) for the incoming power.

1. Check carefully that the power supply is of the correct voltage and frequency, according to the labels on the electrical cubicle and the electrical diagram. Keep the voltage free from disturbances.

2. Connect the proper incoming 3-phase voltage to the power lines L1, L2, L3 and ground to the main electric cubicle or, if the machine is so equipped, the disconnect switch in accordance with the valid electrical diagram found elsewhere in this manual. Please also see enclosed picture pages.

CAUTION ! IF THE WRONG VOLTAGE IS CONNECTED, THE MACHINE WILL BE DAMAGED!

PNEUMATICAL INSTALLATION

(Only valid for machines equipped with optional lifting roll /ejection device)

The purpose of the lifting roll is to lift the plate to prevent overlap (double plate) during rolling when the cylinder is almost finished. See instruction drawing "Lifting roll principle" No. I-4.10545 elsewhere in this manual. The ejection device is designed to eject the finished cylinders from the machine after the drop end is opened. The lifting roll/ejection device is operated by switches in the control panel, or it may be programmed to operate automatically in CNC mode (optional).

The pneumatic ejection device is designed for a pressure of 6-8 kp/cm^2 (85-115 PSI). Connect compressed air from a suitable source to the filter regulator. The filter regulator is located on the side of the machine; see picture pages and the pneumatic diagram. The compressed air should be clean, 5 micron or less and dry. Mist lubrication is *not* necessary.

CAUTION ! WHEN THE LIFTING ROLL/EJECTION DEVICE IS OPERATED, NO PERSONS MUST BE WITHIN THE WORKING AREA! See instruction drawing "Working area" elsewhere in this manual.

STARTING UP

This section explains the *first* starting up of the machine after installation.

1. Check that the machine is properly leveled and anchored to the foundation according to the instruction above.

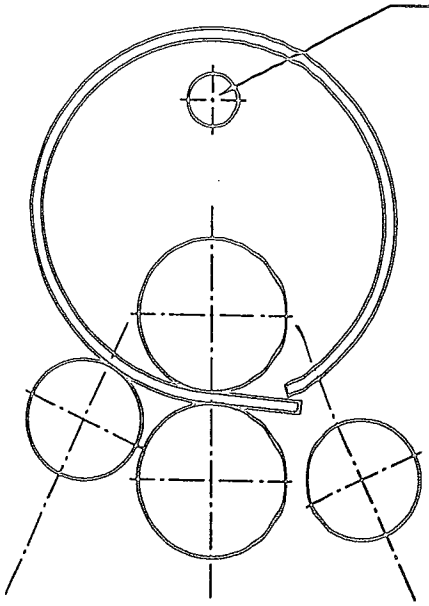
2. Clean the machine from the anti-corrosion medium (rust protective).

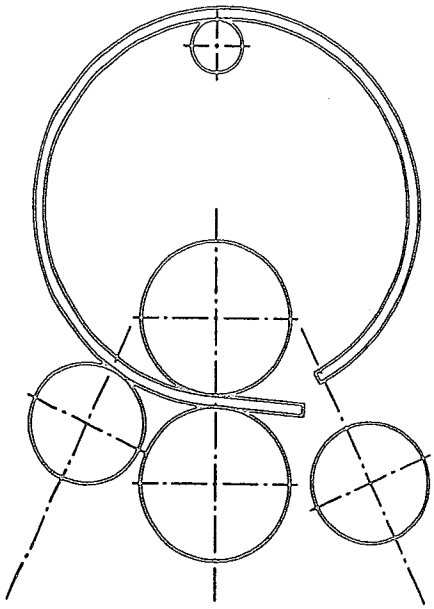
3. Make sure there are no obstacles or other foreign objects in the machine or between the rolls.

I

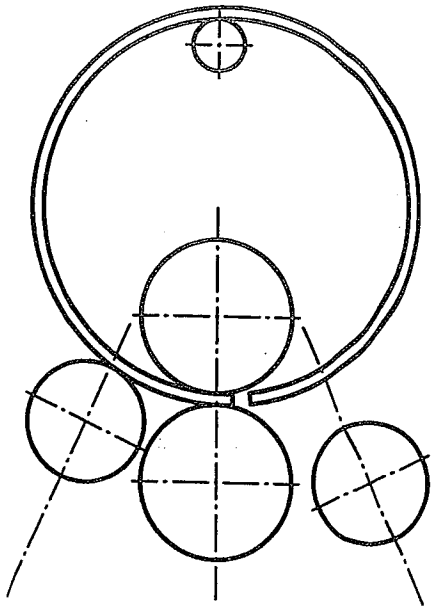
II

Lifting roll





III



ROUNDO	Lifting roll principle PAS/PASS machines	I-4.10545

4. Check the oil level in the hydraulic oil tank through the level glasses. Some machines are delivered with the oil tank partly empty for transportation reasons. If the level is too low, fill up the tank with oil. The oil level should be between the upper and lower inspection glass. Oil type: BP Energol HLP 46 or Shell Tellus 46 or equivalent.

5. Check that all closing valves for suction and return lines to the hydraulic tank are open.

6. Switch on the disconnect switch (main power switch).

7. Turn on the key switch on the electric cubicle. (Only valid for machines delivered to the USA)

8. Push the start button in the control panel to start the electric pump motor/s. Check immediately that the electric motors are rotating in the proper direction (indicated by arrow on the motors). In order to do this, the covers may have to be removed first. If the direction of rotation is wrong, then two of the incoming phases of the power lines shall be switched.

CAUTION ! RUNNING THE PUMPS IN THE WRONG DIRECTION FOR ANY LENGTH OF TIME WILL DAMAGE THE PUMPS !

If the machine should not start when the start button is pressed, then:

Any of the emergency stop buttons or wire may be activated. (release it)
Any of the fuses may be cleared. (reset or change it)
Any of the overload relays on the contactors may be cleared. (reset it)
The disconnect switch (main power switch) may be turned off. (turn it on)
The key switch on the electric cubicle may be turned off (USA machines only). (turn it on)
Oil level in the hydraulic oil tank is too low. Indicated on the screen. (check and refill)
Hydraulic pressure filters are too dirty. Indicated on the screen. (change filter cartridges)

A good rule is that the main power switch is always turned off when the machine is not in use, as well as during service etc. on the machine.

9. When the machine has been started, let the motors/pumps run for 5-10 minutes without operating the machine. Check that there is no leakage in the hydraulic system.

10. Lubricate the machine according to the lubricating instruction.

11. Remove the locking device for the Drop end (End yoke).

Please proceed to the section "Starting up the machine-Manual control". Read this carefully before continuing below!

12. Start the roll rotation forward and reverse with the push button (machine with portable control box, standard) or use the joy stick (machine with control box with joy sticks). Regulate the Lower roll and Side rolls up and down. Check the rolls' parallelism against the top roll. If necessary, adjust. (see instruction "PARALLELADJUSTMENT OF THE LOWER ROLL" and "PARALLELADJUSTMENT OF THE SIDE ROLLS" elsewhere in this manual).

13. Check the balance of the Top roll as follows:

Note ! **The following procedure has to be done after every time the machine has been relocated!**

- Regulate the Lower roll and the side rolls down in order not to transmit any forces to the top roll.

- Open the Drop end (End yoke) (press the corresponding push button located on the Drop end frame or on the main control panel). The top roll should remain leveled when the Drop end is opened. If the end of the Top roll either drops down or moves up, the leveling of the foundation has to be checked/adjusted.

- Open the Drop end all the way down until the Top roll is erected. Then close it again by pressing the proper push button. Before the Drop end closes, carefully check that the tapered end of the top roll meets the inside taper of the Drop end housing properly. If not (the end of the Top roll is too high or too low), then it will be necessary to adjust* the stop positions in the CNC control system for the balancing cylinder, until the Top roll is properly balanced/leveled when the Drop end is closed. The balancing cylinder with limit switch and linear transducer is located at the rear of the Motor frame. (Please see picture elsewhere in this manual.) Please note that if the Top roll is significantly out of level when the Drop end is closing, it is an indication that the machine is not leveled properly on the foundation. Then it will be necessary to readjust the leveling of the machine, before doing any changes to the settings in the CNC control system.

- Keep pressing the button during 1-2 seconds after the Drop end is closed to make sure the pressure is built up in the hydraulic cylinder.

Please note that when the Drop end is closed, the balancing cylinder is in it's top position and there will be a gap between the piston and the surface of the Top roll. This is set from the factory and usually no further adjustment is necessary. However if necessary the balancing cylinder may be adjusted up or down by means of the set screws. (please see pictures)

*NOTE ! THE STOP POSITIONS FOR THE BALANCING CYLINDER ARE SET FROM THE FACTORY FOR ALL FOUR TOP ROLLS (Ø205, Ø240, Ø277 AND Ø300). **THIS IS SET IN THE CNC CONTROL SYSTEM, AND ANY CHANGES IN THESE SETTINGS SHOULD ONLY BE DONE BY AUTHORIZED ROUNDO PERSONNEL!**

Note ! The tapered end of the Top roll and the inside taper of the Drop end housing shall normally be kept dry. However sometimes a little grease is required to reduce friction.

For further information, see the section "BALANCING OF THE TOP ROLL / DROP END OPERATION" elsewhere in this manual.

AIR BLEEDING OF THE HYDRAULIC CYLINDERS

The cylinders of the Side rolls and Lower roll are equipped with air bleeders. Under normal circumstances, no air will enter the hydraulic system. However it can occur after transportation from the factory, after filling up the tank with oil, or if there is an oil leakage.
To air bleed the cylinders, regulate the rolls down to the bottom position. Open the air bleeding nipples at the top and bottom of the cylinder at the motor side for one of the rolls. These air bleeders are located on each side of the machine frame.
Regulate the roll up and down 5-10 mm until the oil coming out from the nipples is completely free from air. Then close the nipples firmly. Then do the same at the end yoke side. Proceed in the same way with the other rolls until all cylinders for the Side rolls and Lower roll are air bled.

BLEEDING OF THE END YOKE CYLINDER

Run the piston to the bottom position. Open the air bleeding nipples. Regulate the piston up and down 5-10 mm until the oil coming out from the nipples is completely free from air. Then close the nipples firmly. If the balancing cylinder for the Top roll needs to be air bled, it is done in the same manner.

PARALLEL ADJUSTMENT OF THE SIDE ROLLS PASS 110-310

Both side rolls have been calibrated parallel against the top roll before delivery, but may have changed somewhat during transportation and installation of the machine. Due to a certain inevitable internal leakage in the hydraulic cylinders, parallelism of the side rolls will have to be adjusted frequently. The intervals between adjustments depends on the load etc put on the machine during operation.

The Drop end (End yoke) side of each side roll can be fine adjusted up or down in relation to the motor side by means of a separate valve and hydraulic circuit. Before adjusting the parallelism, regulate the side rolls upwards until there is small gap between the top roll and the side roll. Since the rolls are crowned, parallelism is checked by means of spacer plates at each end of the rolls.

Do NOT calibrate the rolls against the bottom position of the hydraulic cylinders, as this is not necessarily parallel to the top roll. Also for this reason always try to avoid regulating the side rolls all the way down to the bottom position.

Parallel adjustment of the side rolls is done as follows:

Standard machines and machines equipped with PSR/wCNC:
Use push buttons located on the Drop end (end yoke) frame (2 on each side).

-Due to a small amount of deflection in the Drop end frame during bending and prebending, for best results, it is recommended to keep the side rolls a little higher at this side than the Motor side of the machine.

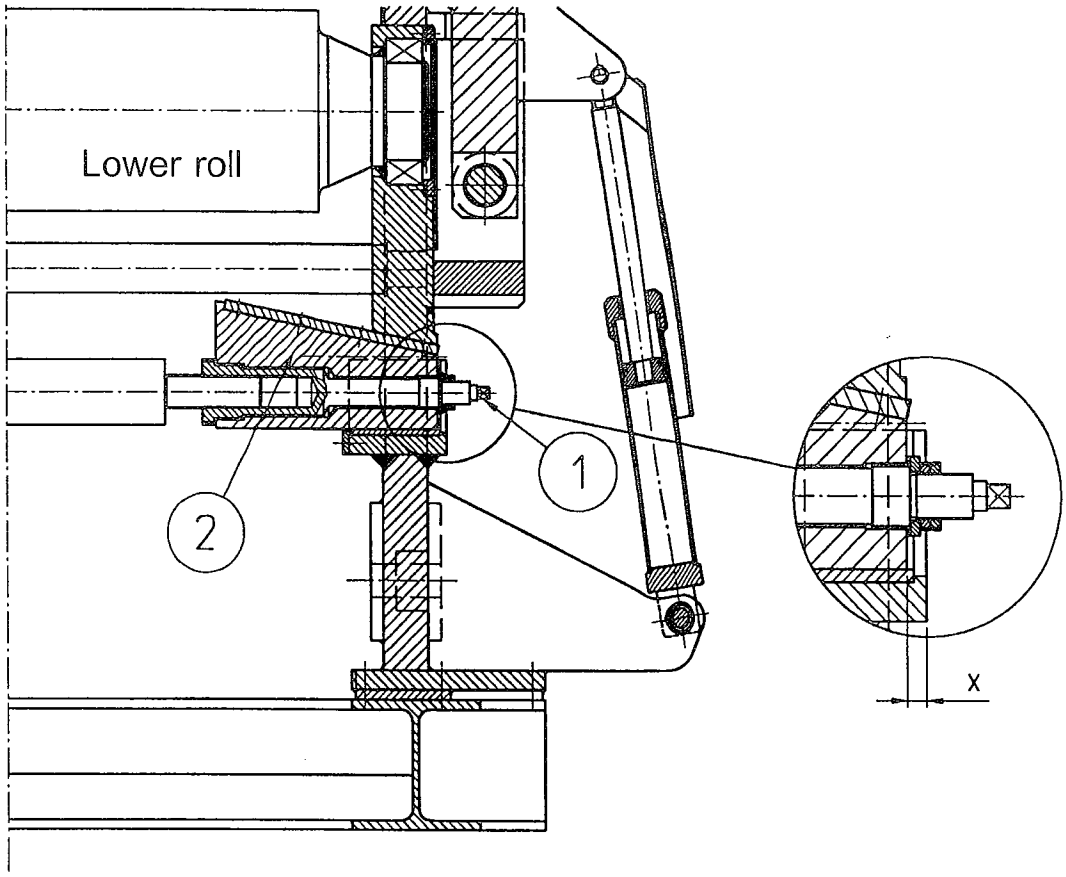
-If necessary, the parallelism of the side rolls may be adjusted during bending/rolling, even under load.

-During cone bending, the side rolls should be tilted and this is done in the same way . Please study the instruction "CONE BENDING IN PASS MACHINES".

ROUNDO

PARALLEL ADJUSTMENT OF THE LOWER ROLL PASS 280 - 310

and PASS 255 with separate hydraulic motors for Top and Lower roll



The parallelism between the Top and Lower roll, has been adjusted at the factory before delivery. It should not have changed if the machine is placed on an even, concrete foundation.

However, when bending for instance cones, the parallelism has to be adjusted:

When rolling normal cylinders, the results will sometimes be better if the Lower roll is a little higher in the Drop end side than the Motor side to compensate for deflection in the Drop end frame.

By turning adjustment nut (No. 1) with the special key delivered with the machine, key block (No. 2) will move forwards or backwards. This will cause a seperate adjustment of the Lower roll, up or down, at the drop end side. Check the parallelism with a thickness (feeler) gauge against the Top roll. If the machine is equipped with digital scales for the Lower roll (optional), check the adjustment by using those.
Key block angle is 11,31 degrees, which gives a 5:1 relation between x- and y-adjustment of the Lower roll´s Drop end side. The pitch of the thread is for 3mm/r.

ALWAYS KEEP RECORDS OF MEASUREMENT "x" OR THE NUMBER OF REVOLUTIONS, IN ORDER TO BE ABLE TO RESET QUICKLY AGAIN!

Note! **Measurement "x" should only be taken when the Lower roll is in its bottom position**

BALANCING OF THE TOP ROLL / DROP END OPERATION
PASS 310 x 4500 interchangeable Top rolls.

The drop end operation and balancing/erection of the Top roll are performed by hydraulic cylinders

These cylinders are operated by two (2) push buttons, on the control panel, which are controlling the hydraulics.

The position of the Drop end and the movement of the balancing cylinder are controlled by a limit switches (inductive switches) and a linear transducer, which give their status to the control system. (Please see the hydraulic- and electric diagrams).

The functions are as follows:

When the Drop end is closed (normal operating condition), the balancing cylinder is in it's top position, leaving a small gap to the Top roll.

- When the push button ("Drop end down") on the control panel, is pressed, the balancing cylinder piston starts pressing at the Top roll and stops when the Top roll is balanced. This stop position is set individually for each top roll from the factory in the CNC control system. When the Top roll is balanced and leveled the Drop end is opened and regulated all the way out/down by continuing pressing the push button.

The balancing cylinder at the rear of the Motor frame is balancing the Top roll to a horizontal level. (Be careful when opening the Drop end the first time and check that the Top roll will be balanced horizontally, see "STARTING UP" section.)

As soon as the Drop end opens, a limit switch at the Drop end will open and inform the control system.

- When the Drop end is open all the way, it is possible to erect the Top roll at the Drop end side by pressing the balancing cylinder further down. This is accomplished by pressing the push button ("Drop end down") again. (When opening the Drop end, keep pressing the button until the Top roll is erected)

When the Top roll has been erected to its maximum position, it will automatically stop and the push button can be released. This movement is stopped by the lower limit switch at the balancing cylinder (near the linear transducer).

The top roll will remain in erected position, which will make it easy to remove the rolled plate cylinder.

- Level the top roll again by pressing the corresponding push button ("Drop end up"). The top roll will go down, be leveled and stopped automatically by the CNC system controlling the balancing cylinder.

The speed of the Top roll movement down/up can be set by carefully adjusting the flow control valve, located below the directional valve. The speed is correctly adjusted from the factory.

- Close the Drop end again by continuing to press the push button ("Drop end up") after the Top roll is leveled. Before the Drop end closes, carefully check that the end of the Top roll meets the Drop end correctly. If not, the stop position for the balancing cylinder has to be adjusted in the CNC control system by authorized ROUNDO personnel only. (See above for information). (Also see section "STARTING UP").

Note! **Each Top roll has been leveled at the factory, but during transportation and installation this might have changed.**
It is important that the Top roll is properly balanced, and if not, this could cause damage to the machine !

When closing the Drop end, the push button shall be pressed 1-2 seconds extra after the Drop end is closed, in order to close the Drop end firmly and ensure that the hydraulic pressure has been built up in the cylinder.

It is recommended to press the button to close the Drop end every morning or at start up in order to secure the Drop end.

When opening the Drop end it is very important that the Lower roll and the two Side rolls are not pressing against the Top roll! They should be regulated down prior to this operation!

The Drop end is equipped with a limit switch, which will prevent operating any of the rolls and the rotation when the Drop end is opened.

The limit switch shall be adjusted to have its break point very close to the normal (closed) working position. This is adjusted from the factory.

Note ! When the machine is not in operation, always leave the machine with the Drop end closed !

WORKING PRINCIPLE IN 4-ROLL PASS MACHINES (PASS 110-310), SEE FIGURE 1-9

- Put the plate in between the Lower roll and the Top roll.

- Align the plate. This is most conveniently done by gently pushing (driving) the leading edge of the plate against the rear Side roll B (1).

- Regulate the Lower roll D upwards until the plate is pinched with correct pressure between the Lower- and Top roll (2). If the machine is equipped with PAS/wCNC control system, the distance between the Lower roll and the Top roll can be easily read on the screen on the control unit. The correct pinching pressure depends on the plate thickness, plate width, bending radius and Material quality as well as the crowning of the rolls. This has to be determined after testing for each product type.

Due to the crowning of the Top- and Lower roll, the pressure must be higher on thin plate on order to avoid getting "hour glass" shape of the cylinder. Too high pressure will flatten out the plate and/or the cylinder will not be straight over the length. Normal pinching pressure is approx. 25-100 bar.

If the machine is equipped with PAS/wCNC control system, this pressure will be set by turning the potentiometer located on the control panel, and it can be read on the screen (P_D). Furthermore P_D can be entered into a program. See separate section "PAS/wCNC Manual".

- Lower Side roll B (3).

- Reverse the roll rotation C until the leading edge of the plate is just ahead of the vertical center line of the Top- and Lower roll (4).

- Regulate Side roll A to the desired position (5) and prebend the plate by feeding the plate by rotating the rolls forward far enough to e able to check the radius (6). Then continue feeding the plate until it can be reached by Side roll B.

Note ! If the radius has not been reached and the plate is reversed to initial position, Side roll A must be regulated upwards considerably more to obtain further bending.

If the already bent zone of the plate is passed and the bending is continued on the unbent zone with rolls in the same position, the radius on that part will be much smaller.

- Change bending rolls by lowering Side roll A and moving Side roll B up to the desired/correct position (7). (It should press against the plate, rather that barely touch it).

- Roll/feed the plate until the trailing edge is just above the center of Side roll A. In this position Side roll B must be regulated upwards and Side roll A lowered (8). This is to compensate when the trailing end of the plate is no longer in contact with Side roll A.

- Continue rolling until the cylinder is complete. Be careful if there is an overlap of the plate ends (9).

If the cylinder has not been closed, it can be finished and rolled/calibrated by rolling the plate cylinder in reversed direction.

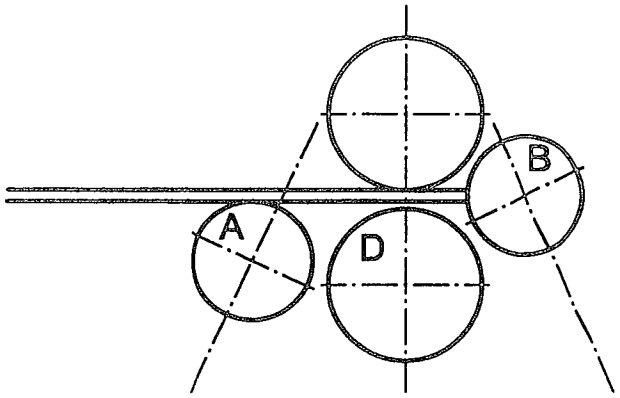
The above description of the working cycle is the general one for cylinder rolling at prebending (CNC) capacity (One Side roll at the time) in 4-roll PASS machines.

Regarding the capacities of the machine, please see valid Bending diagrams/capacity graphs.

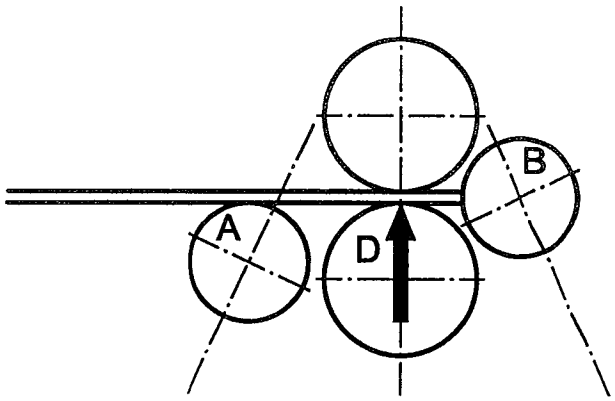
The rated circular capacity is valid when prebending is not in demand. In this case, the bending is done by the two Side rolls and the Lower roll is acting as a driving roll only.

Working principle in PAS/PASS machines (Figures 1 - 3)

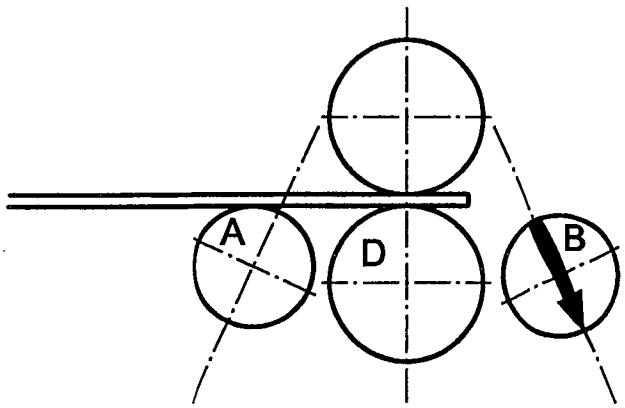
1. Plate infeed.



2. Pinch with lower roll D.



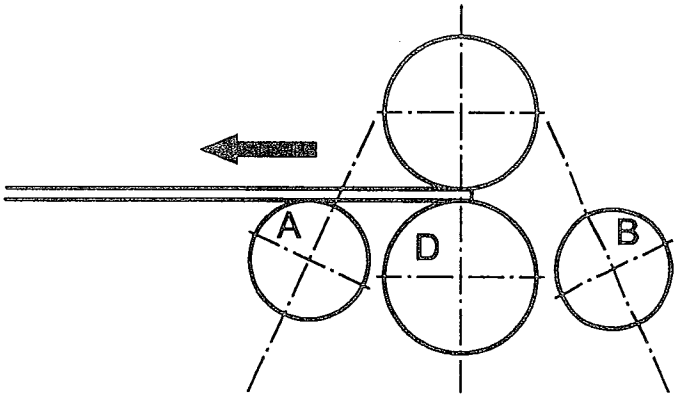
3. Lower sideroll B.



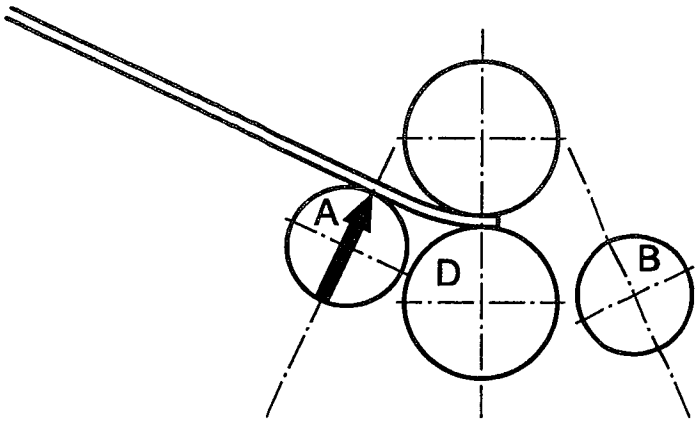
Continued ⇒

Working principle in PAS/PASS machines (Figures 4 - 6)

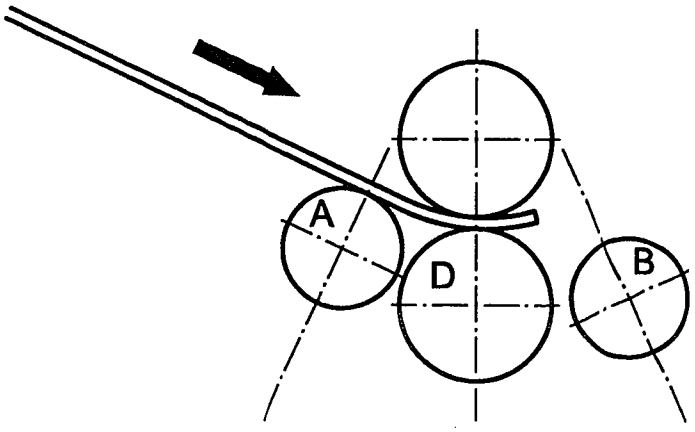
4. Rotate back almost to beginning of plate.



5. Move roll A up for prebending.



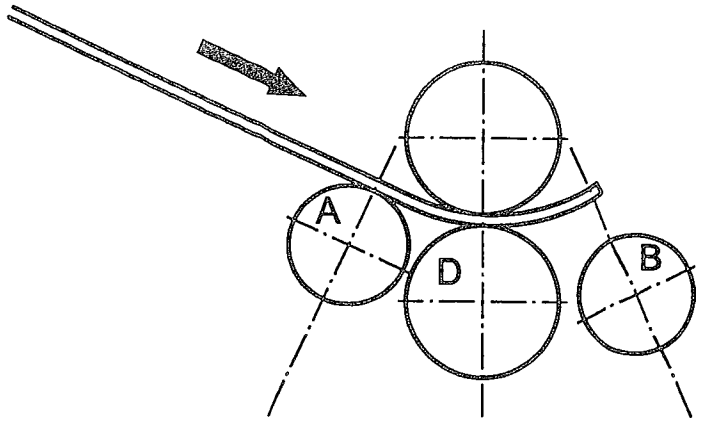
6. Roll first radius.



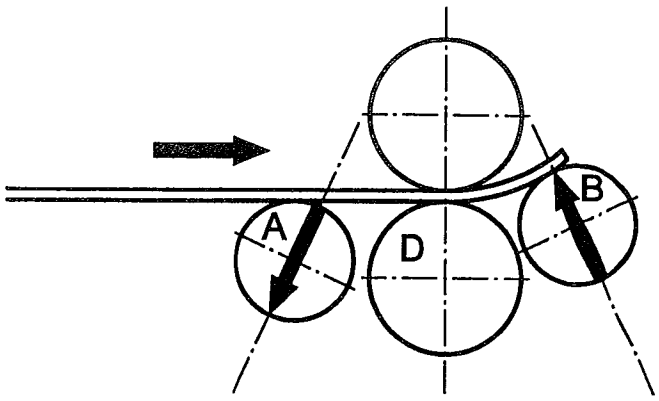
Continued ⇒

Working principle in PAS/PASS machines (Figures 7A - 8A)

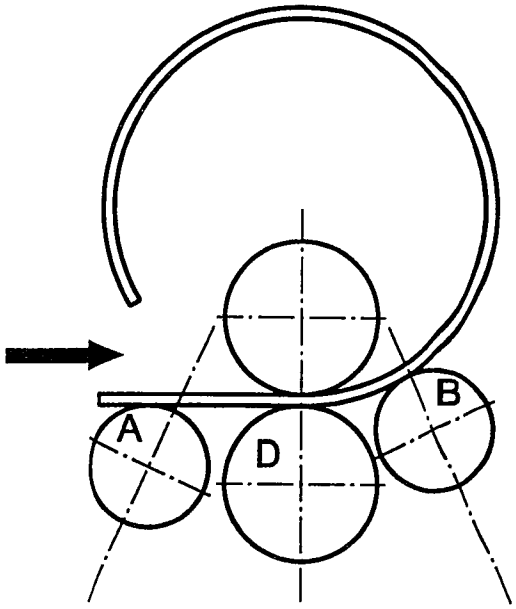
7A. Continue rolling until the leading edge is just above side roll B.



7B. Change bending roll (A-B).



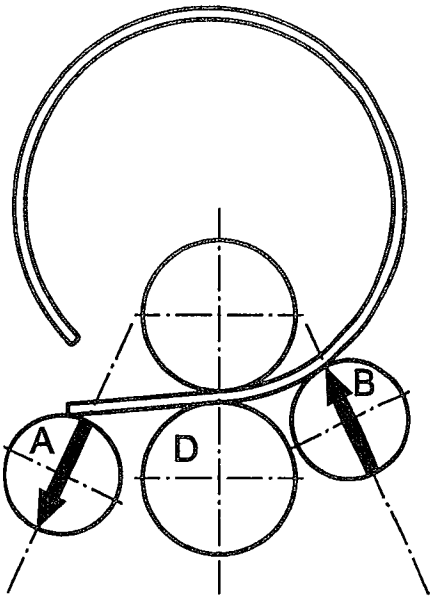
8A. Roll cylinder till plate is no longer against A-roll.



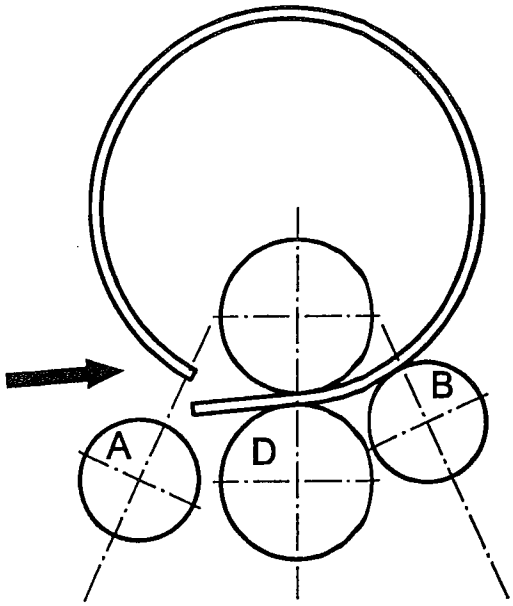
Continued ⇒

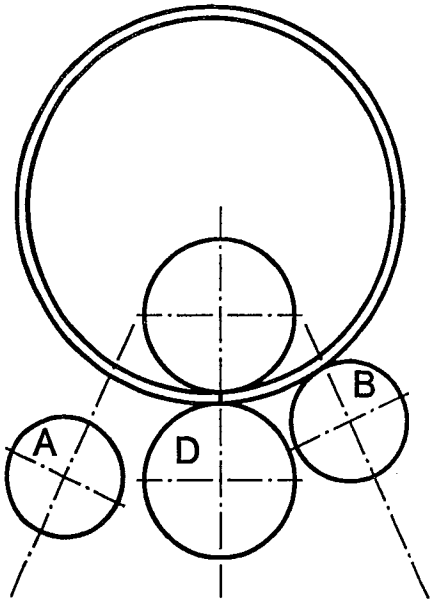
Working principle in PAS/PASS machines (Figures 8B - 9B)

8B. Then lower A-roll and compensate with B-roll.



9A/B. Roll cylinder ready.
Be careful with overlap.





CONE BENDING IN PASS MACHINES (PASS 110-310)

(Only valid for standard machines and machines equipped with PSR/wCNC)

(See drawing No. I-4.8106)

To bend cones in the machine, it must be equipped with a cone bending device.

Put the plate into the machine with the minor end towards the cone bending key.

Put the front end of the plate in line with center of the Lower roll and the Top roll.

When bending cones, the Lower roll should pinch harder at the major end than the minor end in order to obtain an effective feeding and turning of the plate. That means the Lower roll has to be tilted to be higher in the major end (Motor frame side of the machine).

The tilting of the Lower roll can be about 0-5 mm, depending of the machine size. To tilt the Lower roll, adjust the nut for the Lower roll key block at the Drop end side. See separate instruction "PARALLEL ADJUSTMENT OF THE LOWER ROLL".

Note ! The tilting of the Lower roll should be opposite of the cone angle !

The two side rolls should be tilted in relation to the cone angle. To tilt the Side rolls, use the push buttons marked with symbols for parallelism located on the Drop end frame. Maximum permissible tilting of the Side rolls is approx. 30-50 mm, depending on the machine size, per meter roll length.

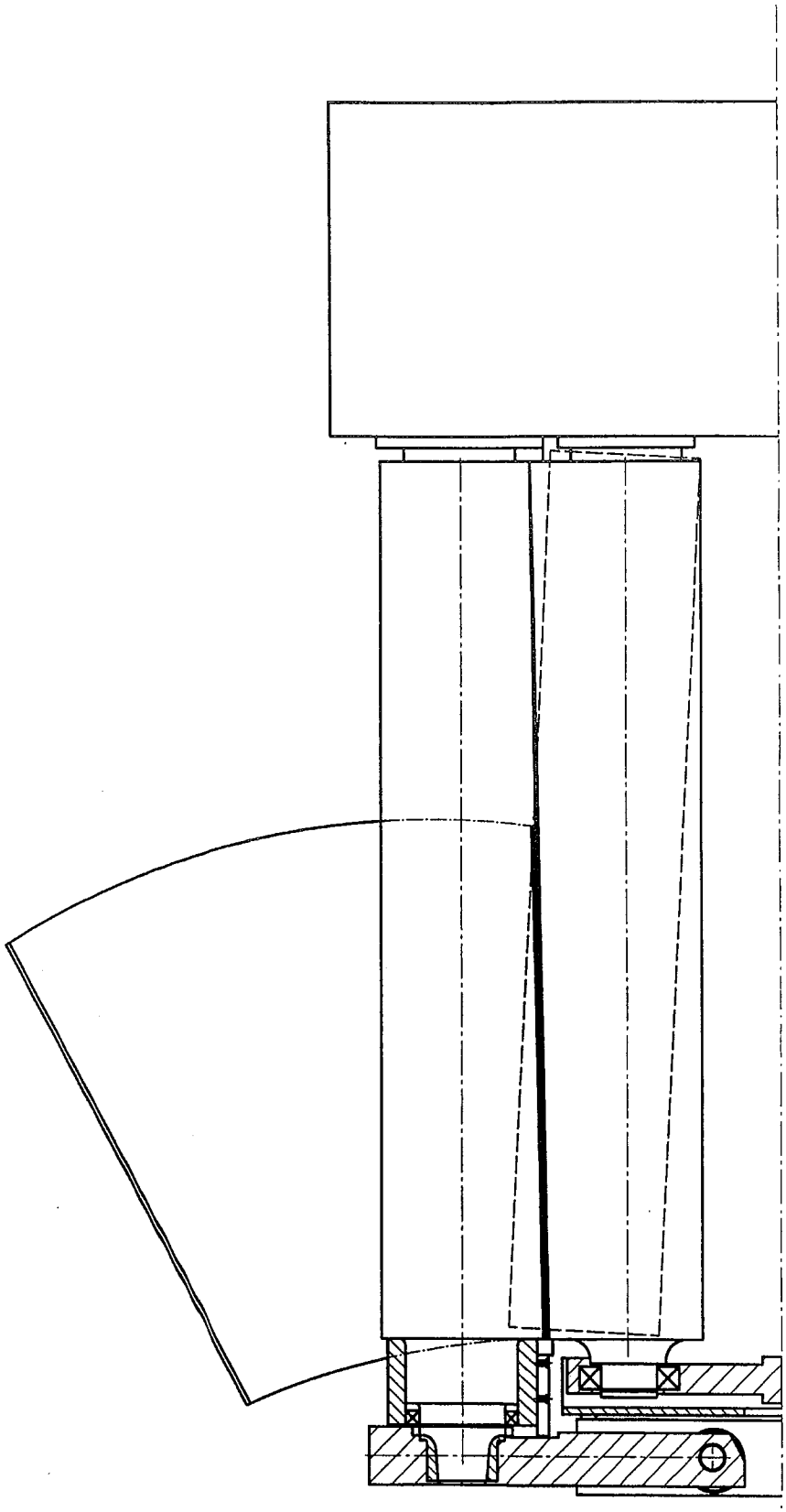
Caution ! **If the maximum permissible tilt exceeded, the machine will get damaged !**

Prebending of the cone plate is done in the same way as ordinary prebending.

When the prebending has been done, it is an advantage to bend the cone plate by the two side rolls and the top roll. This method reduces the bending forces and the friction between the rolls and the plate.

The cone bending capacity is approx. 70% of the normal prebending capacity.

Note ! When rolling normal cylinders, the results will sometimes be better if the Lower roll and Side rolls are a little higher in the Drop end side, than the Motor side to compensate for deflection in the Drop end frame. This tilt is accomplished in the same manner as tilting for cone bending as described above.



ROUNDO	PAS/PASS	I-4.8106

LINMANÖVRERAT NÖDSTOPP (Extra utrustning)

Apparaten har två brytande kontakter. Den ena bryter när man drar i linan, medan den andra bryter om linan går sönder eller är otillräckligt spänd. Det är alltså viktigt att linan är riktigt injusterad.
Efter ett nödstopp måste återställning ske med återställningsknappen.

WIRE OPERATED EMERGENCY STOP (Optional equipment)

The device has two opening switches. One is opening when you pull the wire. The other is opening if the wire has broken or is not enough stretched. Therefore, it is very important that the wire is adjusted correctly. After a release a reset has to be done by the reset button on the device.

KABELBETÄTIGTE NOTABSCHALTUNG (Sonderausrustung)

Die Einheit hat zwei brechende Kontakte. Der eine bricht wenn man das Seil zieht. Der andere bricht wenn das Seil kaputtgeht oder nicht genugend gespannt ist. Das ist also sehr wichtig, dass das Seil richtig eingestellt ist. Nach einer Auslösung muss die Ruckstellung mit der Rucknahmetaste gemacht werden.

LUBRICATION AND MAINTENANCE INSTRUCTIONS PASS 280-310
and PASS 255 with separate hydraulic motors for Top and Lower roll

Please see enclosed pictures pages elsewhere in this manual.

1. Hydraulic oil tank

Check oil level every day at inspection glass. If required, fill up. During oil check/ filling all hydraulic cylinders should be in the bottom position.

* Low oil level is detected by an electrical level guard. This will shut down the machine and light the warning lamp in the control panel.
* Only machines equipped with PAS/wCNC control system.

Oil change:
Change oil and filters every 2000 working hours or once a year. After an oil change, let the machine rest for at least 24 hours, to let the air separate from the oil.

Oil type: BP Energol HLP 46 or Shell Tellus 46.
Filter types: See hydraulic diagram / parts list.

2. Sliding/guide planes and key blocks

The sliding planes for the bearing boxes of the Lower roll and Side rolls as well as the key blocks for the Lower roll, shall be cleaned and lubricated once a week by application/grease nipples.

Lubricant: Molykote BR-2

NOTE ! ALL KEY BLOCKS, SLIDING AND GUIDE PLANES MUST ALWAYS BE KEPT CLEAN AND FREE FROM DIRT, MILL SCALES, ETC.

3. Roller bearings

The bearings of the rolls (bearing boxes) are packed with bearing grease at the factory. Repack after 4000 working hours or after 5 years. This is done via the bearing covers and grease nipples.

Lubricant: Shell Alvania EP2 or BP Energrease LS-EP2.

4. End yoke pivot shafts, etc.

The End yoke pivot shafts as well as the cylinder bolts for the end yoke shall be greased twice a month via grease nipples.

Lubricant: Shell Alvania EP2 or BP Energrease LS-EP2.

5. Planetary gear boxes

Change oil in these after the first 100 – 150 hours of operation. Subsequent oil changes should occur after every 2000 – 3000 working hours, or once a year.
Please see separate instruction, page 999 for oil volume, etc.!
Type/size of planetary gear boxes, see table of contents.

Lubricant: BP Energol GR-XP 220 / Shell Omala EP 220

5a.

The bolts for the gear box torque bars should be lubricated once a month via grease nipples. (2 each) Use Shell Alvania EP2 or BP Energrease LS-EP2.

6. Top support / lifting roll device (Optional equipment)

If the machine is equipped with top support/lifting roll device, the spindle and sliding planes shall be lubricated once a week.

Lubricant: Molykote BR-2

7. Side support. (Optional equipment)

If the machine is equipped with a side support, the pivot shafts and cylinder bolts for this should be lubricated once a month via grease nipples.

Lubricant: Shell Alvania EP2 or BP Energrease LS-EP2.

8. Support rolls for the Lower roll. (Optional equipment)

*Worm gear box : This should always be filled with grease well above the worm screw. Fill via the top cover of the gear box.
Lubricant: "Liquid grease" type BP HT-EP00

Sliding planes/key block for support rolls:
The sliding planes should be cleaned and lubricated once a week by application/ grease nipples.
The key block shall be cleaned and lubricated once a week by application/grease nipples on the support frame and near the key block.
Lubricant: Molycote BR-2

*) Only machines with **motorized** support rolls.

9. Motorized tilting of Lower roll (Optional equipment)

Worm gear box : This should always be filled with grease well above the worm screw. Fill via the top cover of the gear box.
Lubricant: "Liquid grease" type BP HT-EP00

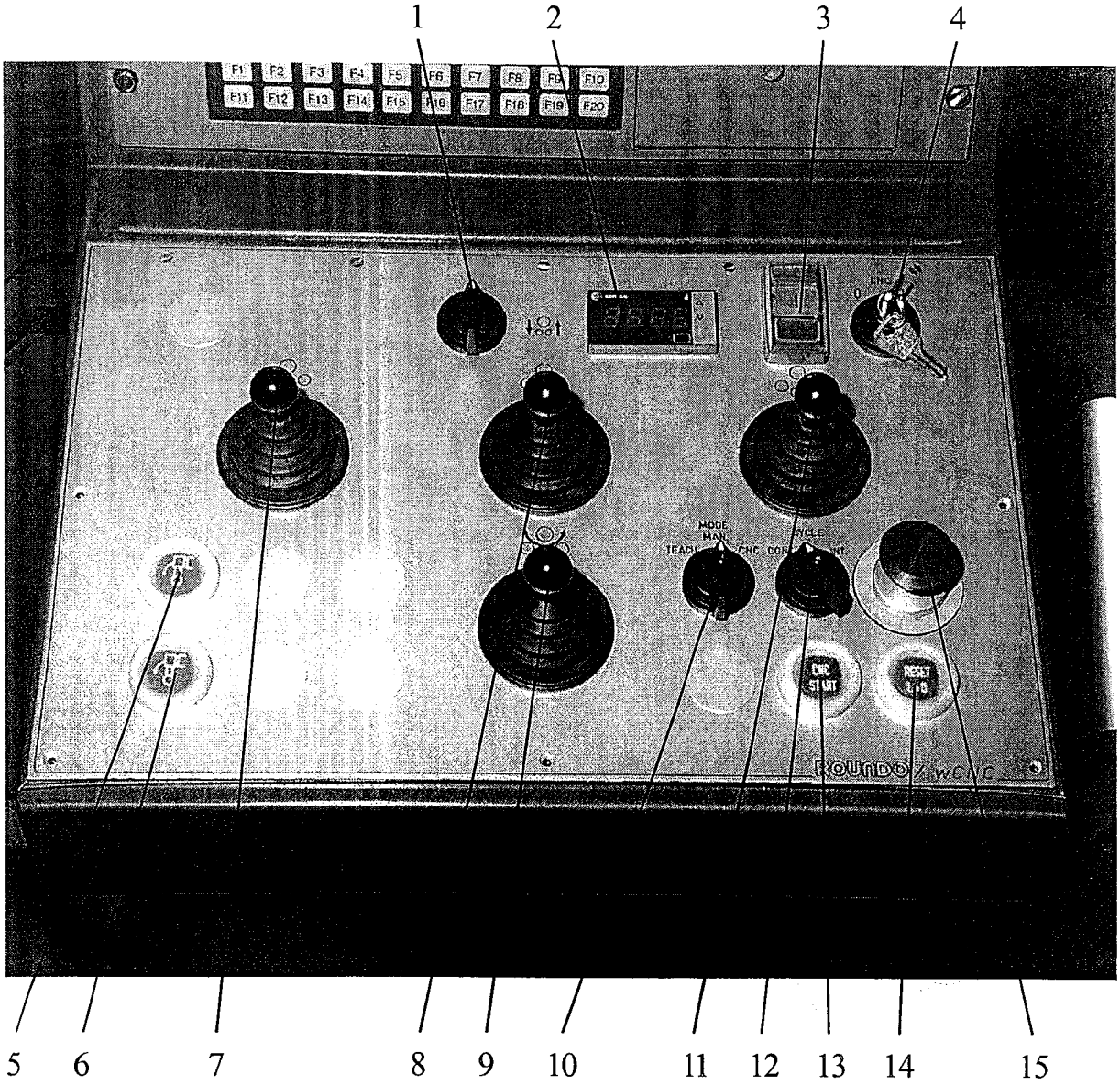
The key block shall be cleaned and lubricated once a week by application/grease nipples on the Drop end frame and near the key block.
Lubricant: Molycote BR-2

Lubricants of equal quality to the above recommended may also be used.

Note! If the machine is equipped with a Central Lubrication System (Optional equipment), lubrication points No. 2 and 4 above will not be valid. These points will be covered by this system. Please see separate instruction "Central lubrication system" found elsewhere in this manual.

Important ! All cover plates etc- which have been removed for service or lubrication, must be refit before using the machine again !

Control Panel ROUNDO PASS 310 PSR/wCNC (No. 027613)



1. Support rolls Up/Down
2. Digital readout for support rolls
3. Start/Stop Hydraulics
4. Key switch (CNC)
5. Drop end Up
6. Drop end Down
7. Left side roll Up/Down
8. Lower roll (D) Up/Down
9. Roll rotation (C)
10. MODE switch (MAN/CNC)
11. Right side roll Up/Down
12. CYCLE switch (CONT-INT) Radius check
13. CNC start
14. Reset L = 0
15. Emergency stop

STARTING UP THE MACHINE - MANUAL CONTROL

PASS 110 - 310 with PSR/wCNC

Every morning or each time the Control system has been switched off (not the Hydraulics) the machine/system must be initiated (calibrated) again.

Thus, the Reference positions of the two rolls A and B must be found as the CNC has "forgotten" the position of these axes after the "reset".

The Starting and Calibrating procedures are made as follows:

- Turn the Main switch (fused disconnect switch) for the incoming power on.
  It is recommended that when the machine is not in operation, this switch shall be switched off.

- Turn the Key-switch for the Hydraulic Start circuit on.
  (Optional equipment, normally located on the door of the electrical cubicle on the machine).

- Start the Hydraulics by pressing "I" on the Start/Stop push button on the Control panel.
  If nothing happens, any of the following things might have occurred:
  * Any of the Emergency stops is activated (Reset).

  NOTE! If the machine is equipped with **Wire operated Emergency stop** (optional) too, the wire must be properly adjusted.
  The switch has two sets of contacts, one for pulling the wire and one if the wire breaks.
  Therefore, it is important that the wire has been properly adjusted.
  After a release the switch must be reset by the button on the unit.

  * Thermal motor protection relay has released. Check and reset.

- Let the Hydraulics run for a few minutes at first start in the morning when the oil is cold, before operating.

- Turn the MODE-switch "MAN-CNC"*) in Manual position (if not already done).

- Turn the Key-switch for the CNC-unit (PC) on the Control panel to "ON".
  (NOTE! This system is separated from the Hydraulic start circuit).
  After a while the PC work station "wakes up", boots and loads the program showing the INITIAL picture/page of the system.
  Please see the PAS/wCNC manual for more information.
  On the lower part of the screen the Function Menu is shown (F1 to F12).
  Press Function key [F3] and the VALUES/MANUAL is displayed.
  This page is showing the positions of all 3 Master axes; A, B and L (Top roll rotation).
  Please note that the position values of the two Side rolls (A and B) are red "0.0".
  This indicates that the Reference values are not found. (The machine is not Initiated/ Calibrated!).

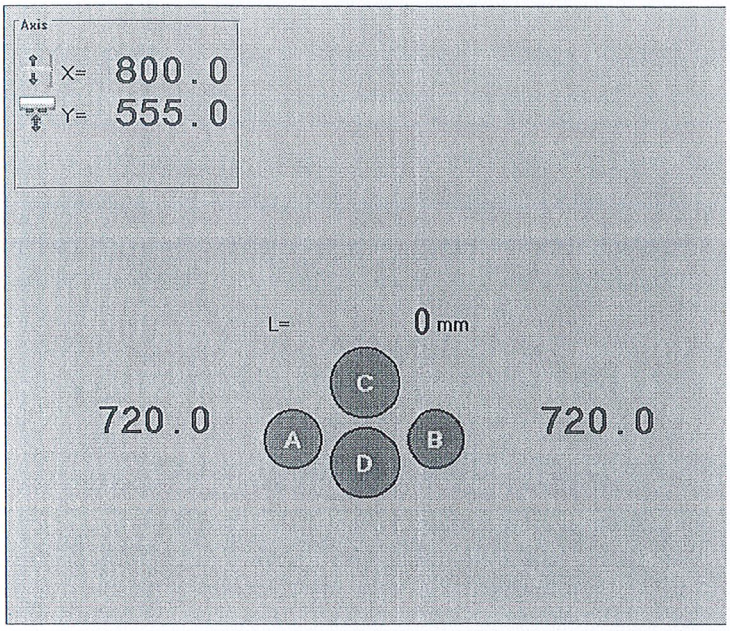
- To give each of these two axes their correct position values, the Reference points for each axis have to be found. (= Reference signal from the Linear incremental encoders).
  The Reference points of the Side rolls are marked by Black and Yellow arrows located on the Machine frame (-s) and the Bearing boxes respectively.
  Where the arrows meet, the Reference values can be found.
  Depending on where the rolls were located when the machine was switched off last time, respective roll shall be moved up or down.

- Start by regulating Side roll A by moving the Joystick up or down. The roll moves with fixed low speed against the Reference point (the display shows the positive or negative movement of the Master side).
  When the Reference points are found, the roll stops automatically and the display is showing the correct value for the roll position (A = XXXX.X) and the position value turns to normal black.
  Release (center) the Joystick and then again move the stick and regulate the Side roll all the way down.

- Do the same procedure with the other Side roll (B), collecting the Reference values, and move the roll to its lower position.
  Please note that when the Reference values have been found on respective roll, the Adjustment speed can be proportionally adjusted between Min. and Max. by the Joystick.

NOTE! It is important to visually check that both ends of respective roll are moving at the Calibration of the rolls, as parts of the machine otherwise can break apart!
It is recommended to always make the Reference run **upwards** (machine switched off with the rolls below the Reference points)!
At the Calibration of the rear Side roll (B) it is advisable to move over the Control panel to this side (for visibility).

- The machine is now ready to be operated Manually or, Automatically (CNC-mode) via a Program.



Values page on screen (Example)

- Also regulate the last axis, the Rotation of Top roll (C) and Lower roll (D) forward and reverse.
  Forward is "against" Side roll B.
  Note that the length measuring operates on the disply, "L="
  The digits count positively forward and negatively when operating reverse.
  (A - sign is placed in front of the digits when 0 is passed when reversing).
  The Rotation speed is proportionally adjustable by the Joystick between Min. and Max.
  The displayed value, "L=" is the circumference of the Top roll (C), i.e. the **Inner** length of a rolled plate.
  This value can be cleared /reset ("L=0") any time manually in MAN-mode. This is done by pressing the "RESET/L=0" push button on the panel.

- Furthermore, for Manual operation there is a group of two push buttons for the Drop end/ Top roll balancing (erection) operations.
  When rolling cylinders or objects that are closing (cylinders etc.) the Drop end must be opened in order to remove the finished objects from the machine.

Opening of the Drop end is made as follows:

Make sure that the Side rolls and Lower roll are in their lower positions and not pressing against the Top roll.

Press the push button with the symbol for "DROP END DOWN" and keep it pressed until the Drop end is completely opened.

The Balancing device is now balancing the Top roll.

In order to simplify the removal of finished rolled objects it is now possible to *erect the Top roll by continuing to press the push button with the symbol for "DROP END DOWN".
Keep the push button pressed until the Top roll is fully erected.

The Top roll is levelled (balanced) again by pressing the push button with the symbol for "DROP END UP".
Keep the push button pressed until the Top roll stops as the horizontal level (the Top roll stops automatically when balanced).

Close the Drop end again by pressing the push button with the symbol for "DROP END UP".
Keep the button pressed for 1 - 2 seconds after the closing in order to secure the Drop end by the hydraulic pressure.

The Drop end shall be pressed inwards every morning after starting up plus regularly when operating the machine without using the Drop end.
The reason for this is to keep a hydraulic pressure in the Drop end cylinder and prevent the Yoke from opening when rolling.

NOTE! - When the Drop end is opened, the operation of the rolls (4-axes) will not be possible!

- It is very important that the end of the Top roll and Drop end meet each other correctly!
  Otherwise the machine could be damaged.

- Please see further details regarding Drop end/Top roll balancing operation in a separate paragraph earlier in this manual.

* On machines equipped with lifting roll device, the erection of the Top roll can be disabled by means of a manual closing valve located on the side of the machine. This will prevent the Top roll to erect and hit the lifting roll when this is set for small diameters (close to the Top roll).

- Setting of pinching (Lower roll) pressure is done by turning the knob on the relief valve located near the Drop end frame. The pressure can be read on the adjacent pressure gauge. This regulates the Lower roll pressure **upwards** (= dynamic working pressure), i.e. Pinching pressure between the Top- and Lower roll.
  Regulate the Lower roll upwards with the relief valve set to a medium/lower value until it hits the Top roll.
  Keep the Joystick on until the hydraulic pressure has risen and reached the set/desired value.

  If the pinching pressure shall be changed from a set value, the Lower roll **must** first be lowered somewhat before regulating again!

  The range of the pressure is approx. 45 - 160 bar (Min. - Max.).

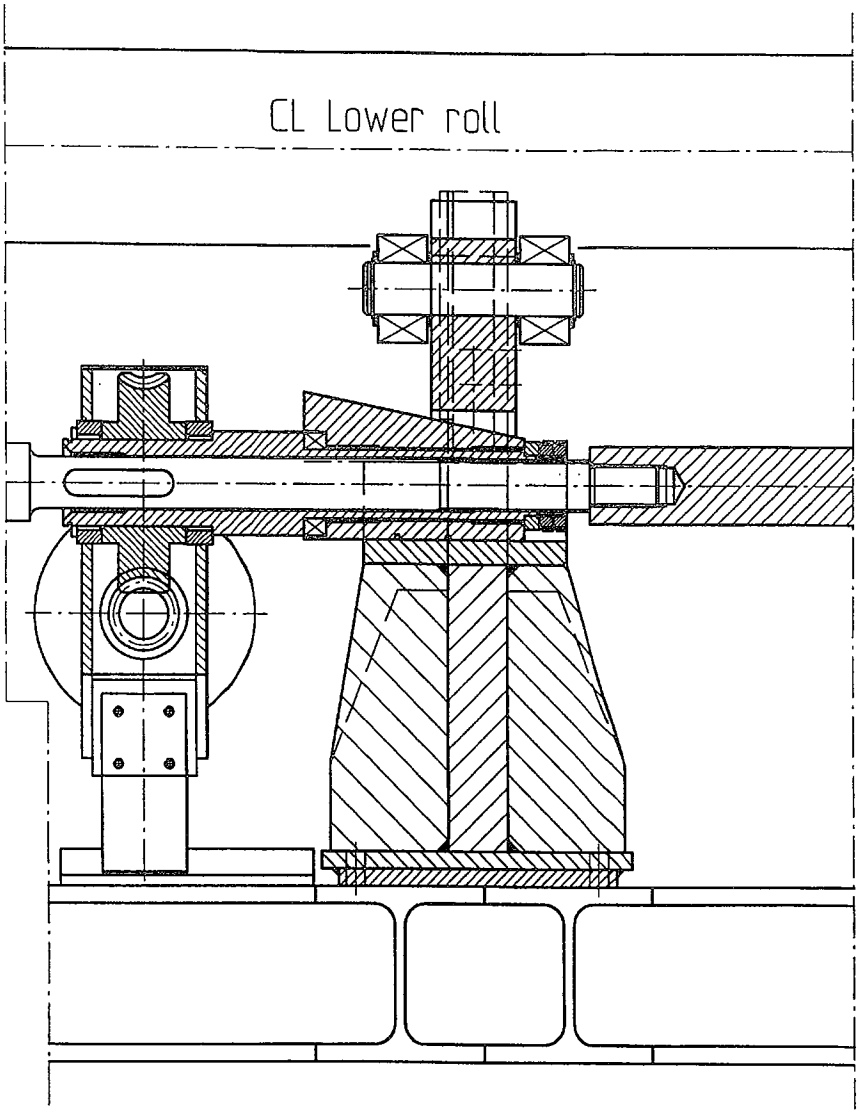
  NOTE! Do not use too high Pinching pressure with narrow plate or without any plate in the machine. This could damage the rolls!

- The remaining push buttons and switches are in function only in CNC-mode and will be described elsewhere in this manual and in "PAS/wCNC - manual".

  NOTE! The Hydraulics can be stopped by the Top push button (or any Emergency stop) **without** losing the Reference values!

  It is only when the CNC-unit has been switched off that a new roll calibration has to be performed again.

If the machine contains other functions controlled by the CNC such as support rolls, lifting roll etc., these axes have to be calibrated. This is done in the same manner as calibrating the side rolls.



Motorized support rolls PASS 110 - 310

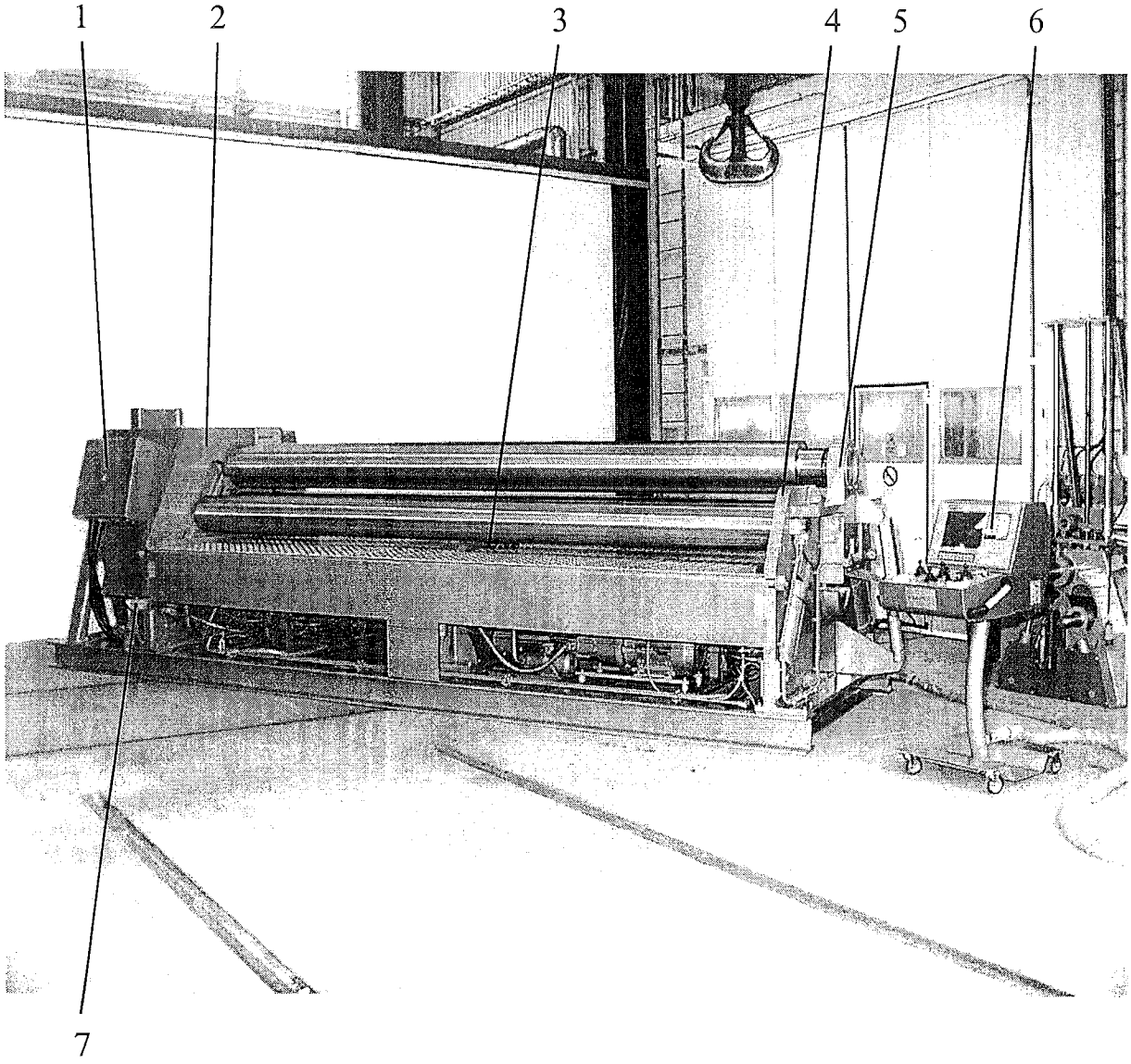
This machine is equipped with support rolls under the lower roll. The purpose of these rolls is to compensate for the deflection of the top- and lower roll during bending. Thick or hard plate requires more pressure from the support rolls than thin or soft plate. The support rolls will always follow the movement of the lower roll.

The position of the support rolls related to the lower roll can be adjusted depending on which type of plate that should be bent. This is done by operating the proper switch on the control panel. The position of support rolls can be read on a display.

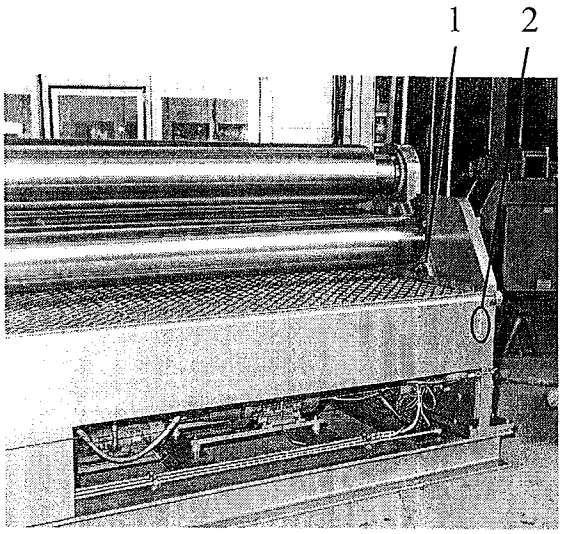
On a standard machine one unit on the display equals 0.02mm vertical movement of the support rolls.

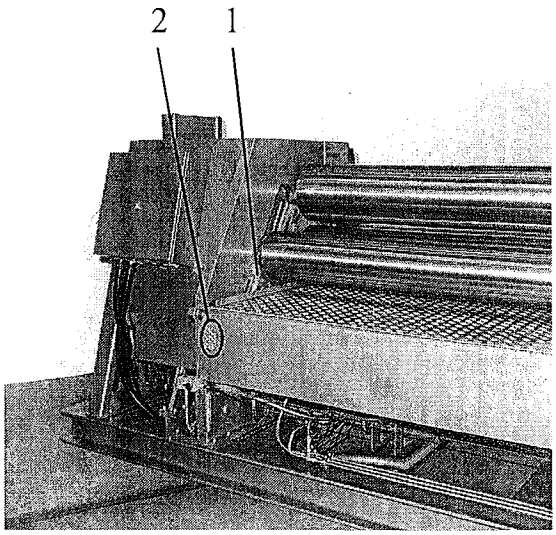
NOTE ! The support rolls must never be operated, neither up nor down, when there is load on the lower roll.

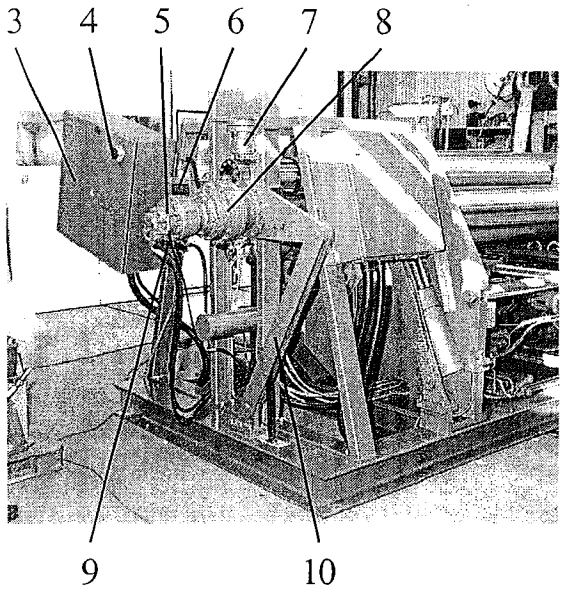
PASS 310 x 4500 PSR/wCNC Special with interchangeable top roll (No. 027613)



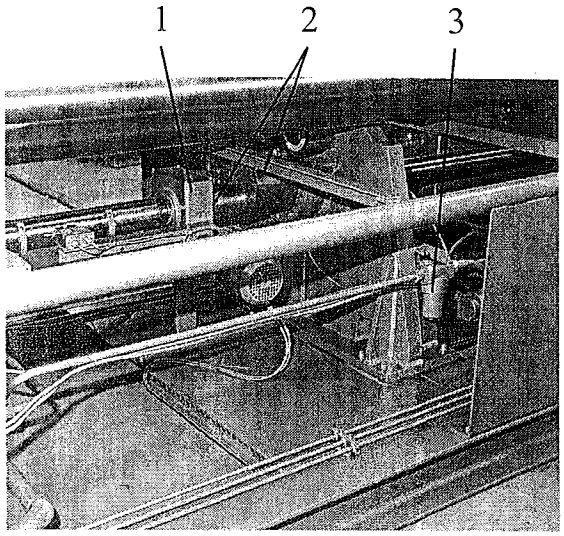
1. Electronics cubicle
2. Motor frame
3. Support rolls
4. Drop end frame
5. Drop end
6. Control unit
7. Wire operated emergency stop

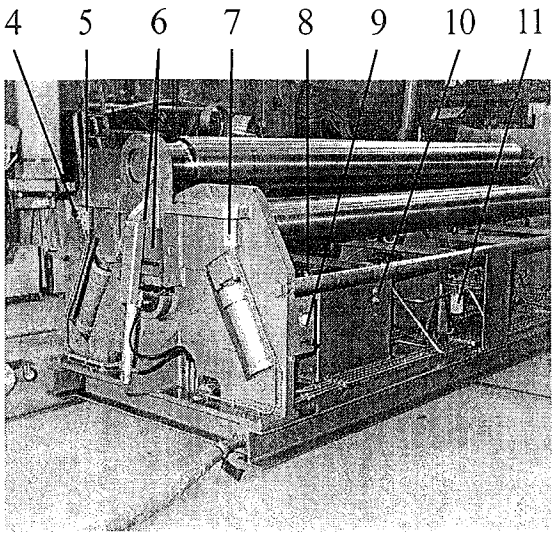






1. Lubrication point (2)
2. Lubrication point (2 + 8)
3. Main electric cubicle (Hinged)
4. Emergency stop
5. Hydraulic motor (2x)
6. Oil cooler
7. Balancing cylinder
8. Planetary gearbox (2x)
9. Disconnect switch/Incoming power cable
10. Position of hydraulic drive unit and torque arms during roll change





1. Worm gearbox (8)
2. Sliding planes/key blocks (8)
3. Hydraulic pressure filter
4. Emergency stop
5. Parallel adjustment left Side roll
6. Lubrication point (4)
7. Parallel adjustment right Side roll
8. Filler cap
9. Adjustment knob and pressure gauge for Pinching pressure for Lower roll
10. Hydraulic oil tank, oil level Max/Min (1)
11. Hydraulic return filter

INSTRUCTION MANUAL

ROUNDO PASS 310 x 4500 Special with Top roll Ø340, and Ø220, with PSR/wCNC

(Please see enclosed pictures pages elsewhere in this manual)

Exchange of top rolls

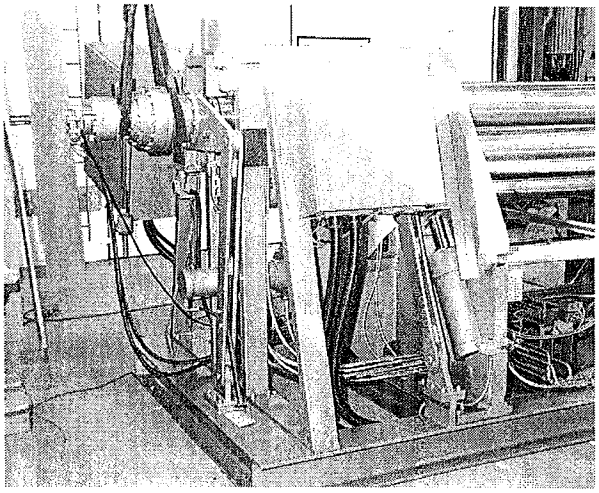
Make sure the Drop end is closed and the Lower roll and Side rolls are in their lower position before proceeding.

1. Remove the upper cover plates of the motor frame.
2. Apply a crane with soft loops to the hydraulic drive unit of the top roll. . (Picture No.1)
3. Remove the bolts from the flange coupling between the Top roll and the planetary gear box (Picture No.2).
4. Apply the hinged cover flap to the linear transducer (Picture No.3). When properly applied, the lower limit switch will be activated (indicated by a light).
5. Remove the crane and loops from the hydraulic drive unit. The unit will rest on it's torque arms. (Picture No. 4)
6. Undo the Seeger ring (Snap ring) for the Top roll (Picture No. 5)
7. Apply a crane with soft loops around the top roll, Do not lift, but just tighten the loops enough to support the Top roll. Put pieces of wood under the Top roll near the Motor frame and the Drop end frame. Then open the Drop end. (Picture No.6)
8. Use the crane to carefully pull out the top roll slightly from it's bearing in the Motor frame. Make sure the front spacer ring follows the Top roll (Picture No. 7). **Note: The front spacer ring is only used with the large Top roll (Ø340) !**
9. Pull out the Top roll just enough to be able to remove the Seeger ring and the two rear spacers. (Picture No.8, 9 and 10). **Note: Only one rear spacer is used with the small Top roll (Ø220)**
10. Carefully remove the top roll from the machine, using the crane (Picture No.11). Store it at an appropriate place.
11. Move the Cam plate for the limit switch to the proper position according to the Top roll used (picture No. 12) (ITR 340 and ITR 220). This will ensure Lower roll's lowest position is suitable for the actual Top roll.

Fitting of the new top roll is done in reverse order !

When the new Top roll is installed, fold down the cover flap for the linear transducer and refit the cover plates for the motor frame !

1



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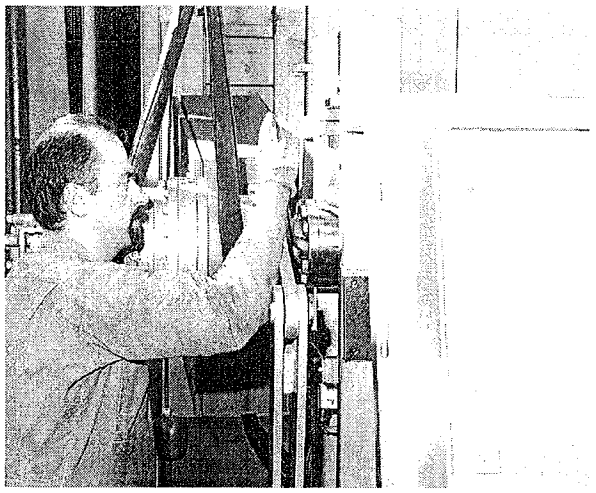
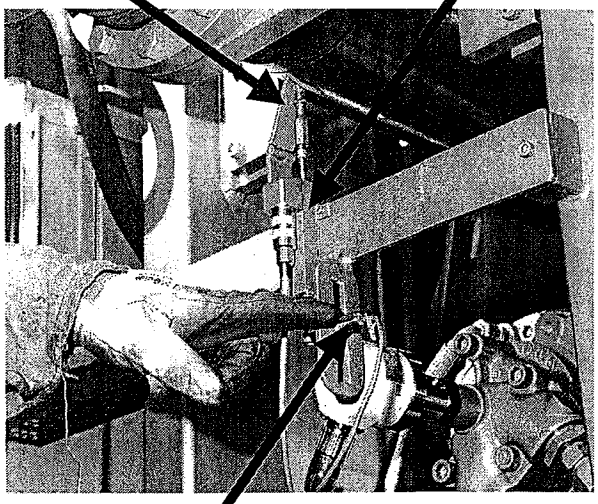


Hinged cover flap

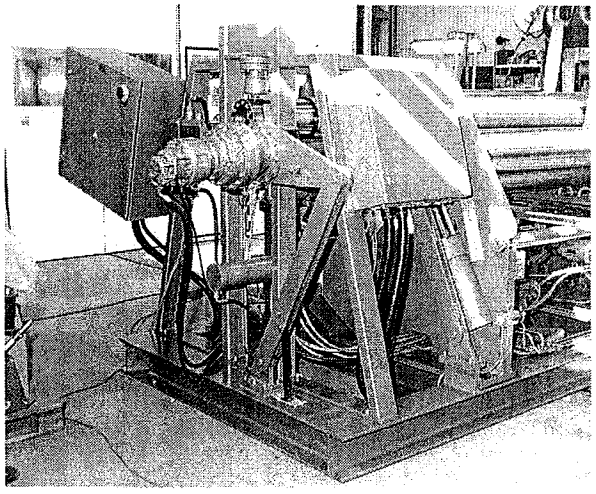
Linear transducer

3



Inductive limit switch

4



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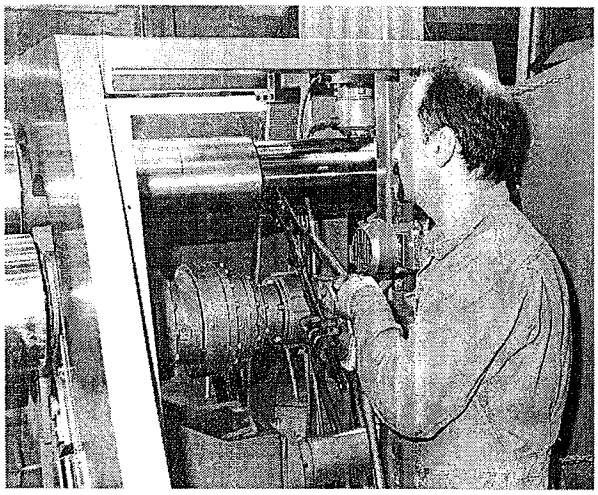

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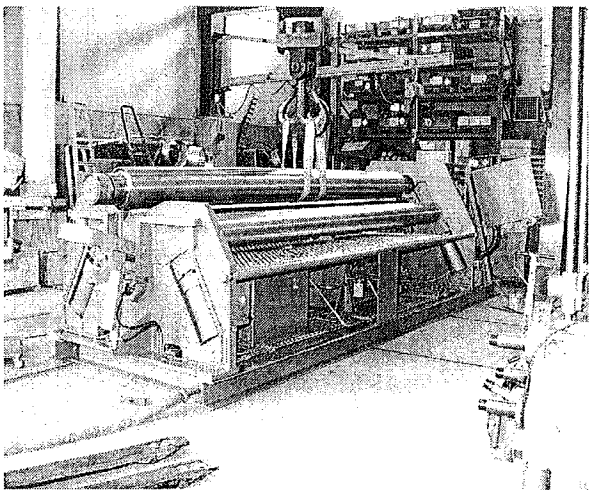

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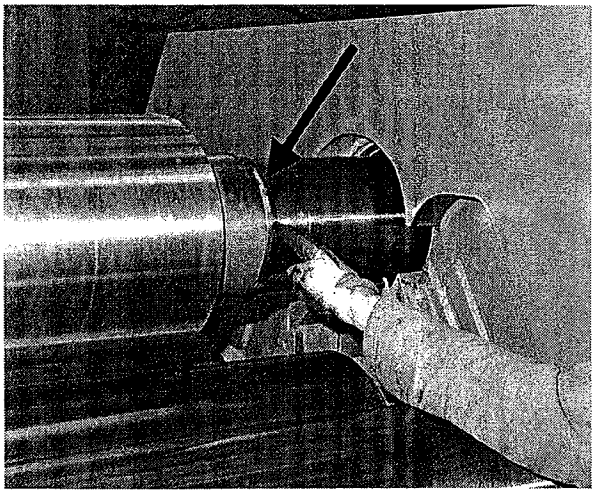

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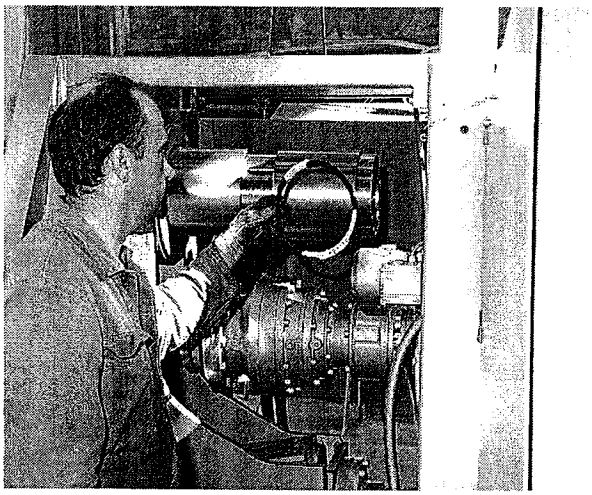

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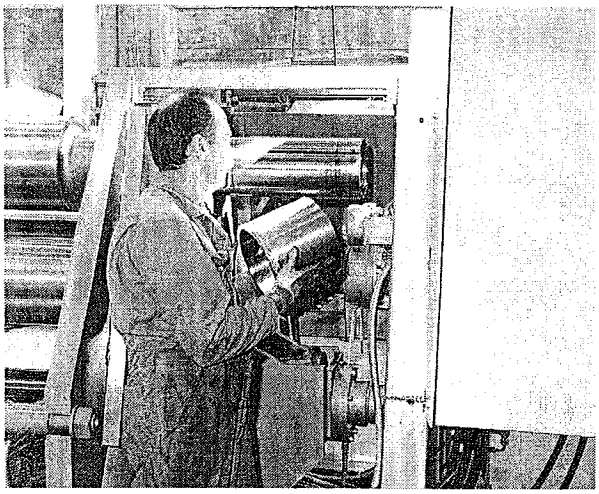

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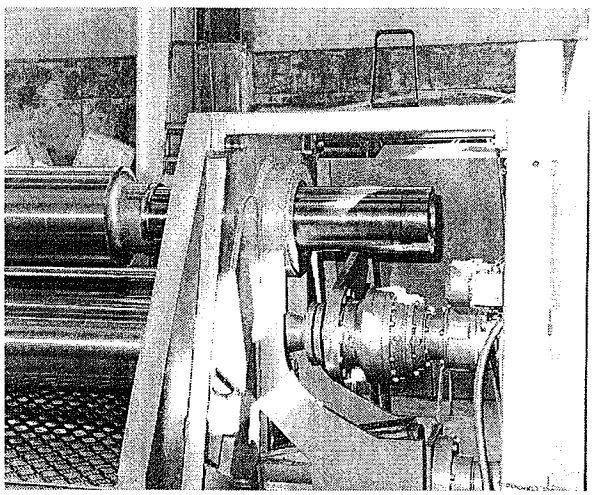

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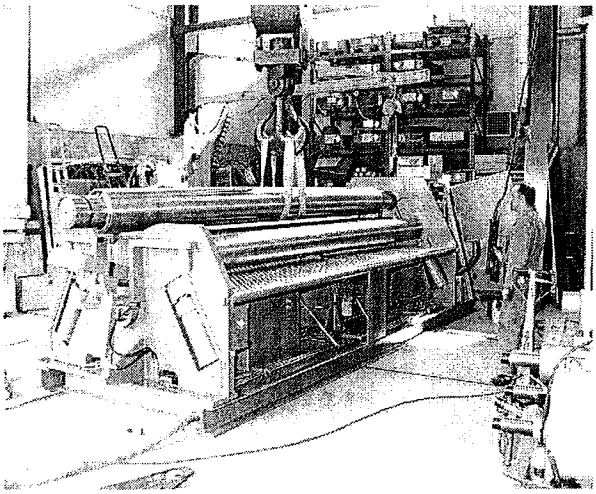

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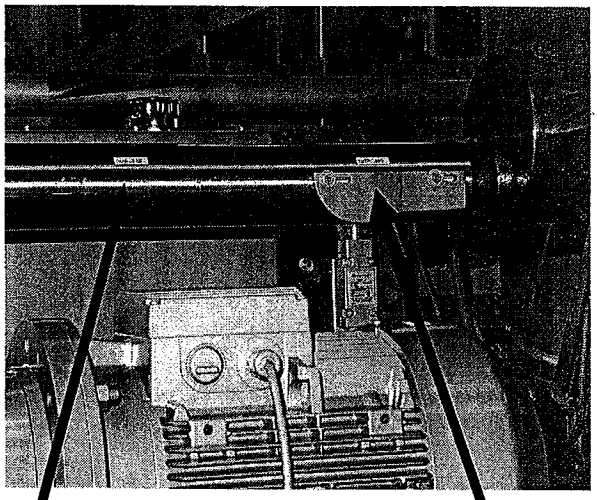
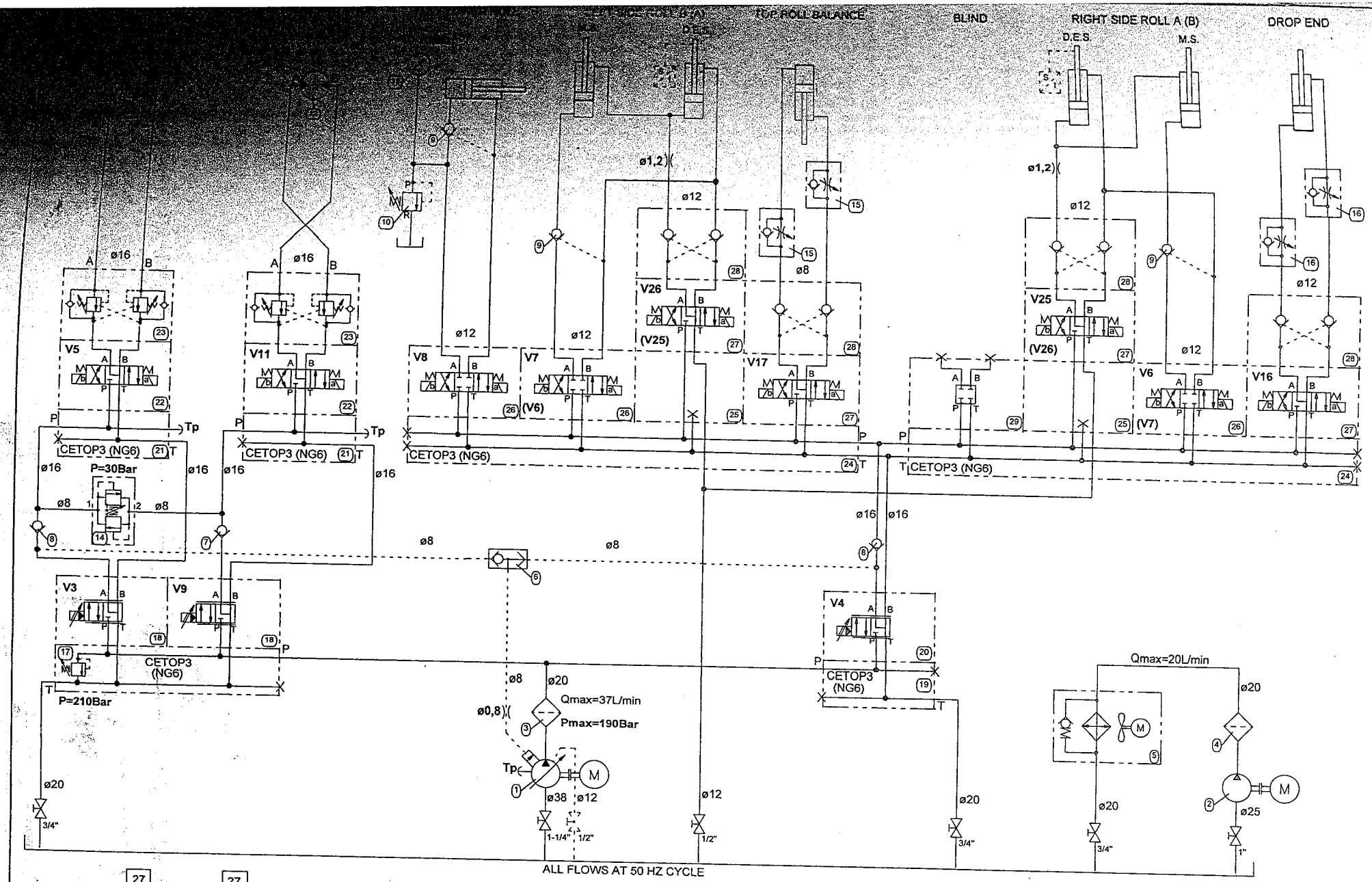


Top roll Ø220

Top roll Ø340

Positions of cam plate for limit switch

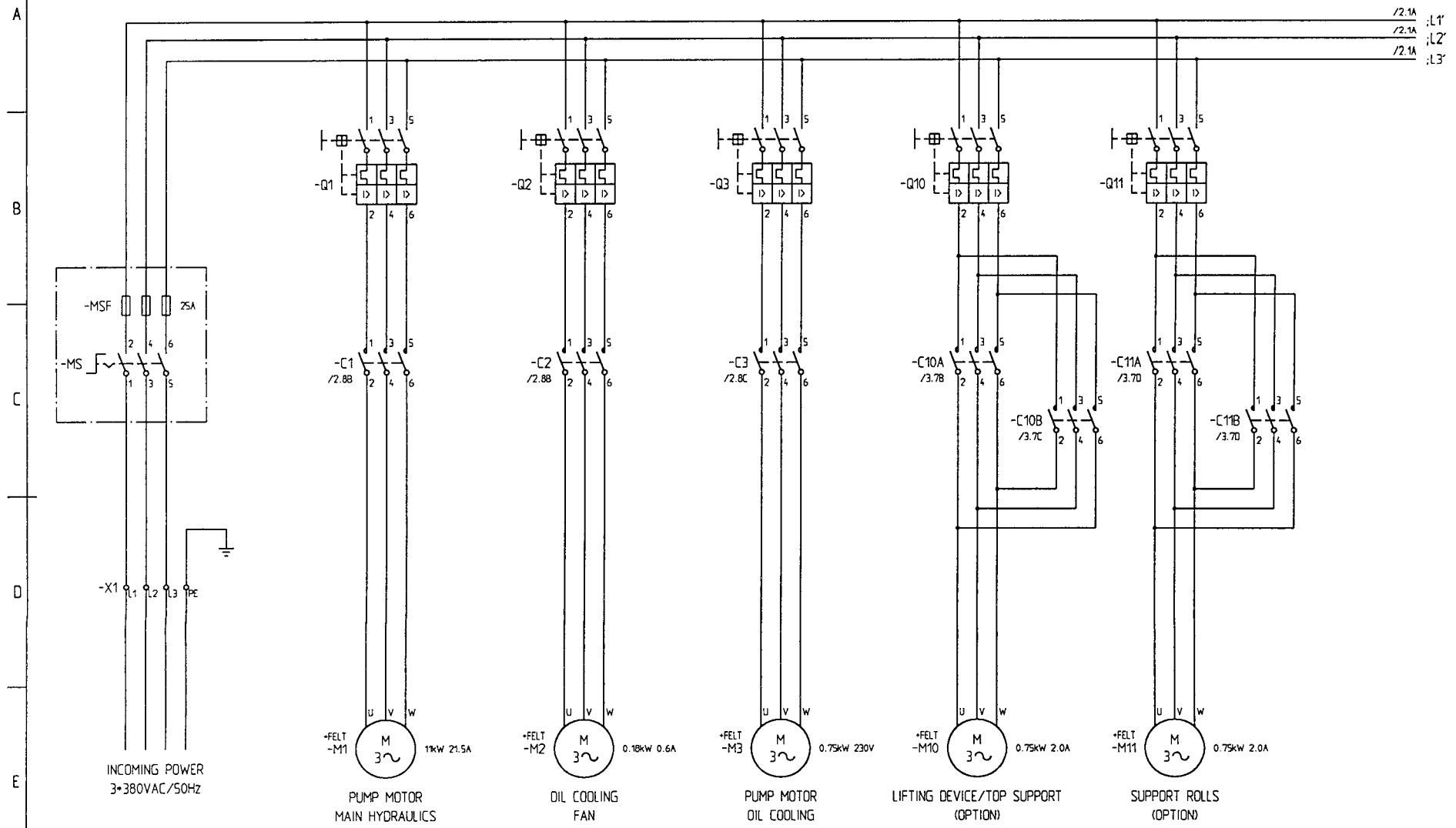


Designed: T.T.	Drawn: T.T.	PARTS LIST: I-4.10691	Replacing: / Date: 02-06-26
Roundo		HYDRAULIC DIAGRAM PASS 310 PSR/wCNCi (#7613) INTERPOLATION, SEPARATE COOLING/FILTER CIRCUIT	Drawing No: I-3.10445

A2-3MALL

ITEM	QTY.	DESCRIPTION	MANUFACTURER	PART NUMBER
1	1	PUMP	ATOS	PVPC-L-3029/1D
2	1	PUMP/MOTOR	OILTECH	QPM2-20-4-0,75
3	1	PRESSURE FILTER	PARKER	18P110QM298B2B21
4	1	RETURN LINE FILTER	PARKER	12PS10CTPR2B
5	1	OIL COOLER	OILTECH	TBI04-4/BP2,50
6	1	SHUTTLE VALVE	HAWE	WV8-S
7	1	CHECK VALVE	TEMETO	RHV-16-PSR-ED
8	2	CHECK VALVE	TEMETO	RHD-16-PS
9	3	CHECK VALVE	HAWE	RH-2
10	1	RELIEF VALVE	HAWE	MVR-28C
11	1	PRESSURE GAUGE	UCC	SD-PG-456-250
12	1	HYDR. MOTOR+GEARBOX	SAI+TRASMITAL	GM05-150.1/D40+306L2-15,3-HZ-SF-S2BA-A
13	1	HYDR. MOTOR+GEARBOX	SAI+TRASMITAL	GM05-150.1/D40J+306L2-15,3-FP-GOA-S2BA-A
14	1	RELIEF VALVE, BI-DIRECT.	HYDRA FORCE	CR-10-28A-2B-N-24 (1/4")
15	2	FLOW CONTROL VALVE	TOGNELLA	FT257/5-1/4
16	2	FLOW CONTROL VALVE	TOGNELLA	FT257/5-3/8
17	1	MANIFOLD+RELIEF VALVE	TERLING	FB03-2/RV-8866-GT-AL
18	2	DIR. PROPORTIONAL VALVE	ATOS	DHZO-A-053-L3/6 (12 VDC)
19	1	MANIFOLD	TERLING	EB03-1-8866-GT-AL
20	1	DIR. PROPORTIONAL VALVE	ATOS	DHZO-A-053-L5/6 (12 VDC)
21	2	MANIFOLD	TERLING	EB03-1-8866-GT-AL
22	2	DIRECTIONAL VALVE	ATOS	DHI-0713-X24DC
23	2	COUNTER BALANCE VALVE	SUN	CBCG-LCN+EBY/2
24	2	MANIFOLD	TERLING	FB03-4-8866-GT-AL
25	2	DRAIN MODULE	TERLING	39CE660/DP03-T
26	3	DIRECTIONAL VALVE	ATOS	DHI-0711-X24DC
27	4	DIRECTIONAL VALVE	ATOS	DHI-0713-X24DC
28	4	CHECK VALVE	HAWE	H-RHC2-2/03-A/B
29	1	COVER PLATE	ATOS	6-BA-40251

Designed:	Drawn:	FOR HYDRAULIC DIAGRAM: I-3.10445	Replacing:	Date:
T.T.	T.T.			02-06-26
Roundo		HYDRAULIC PARTS LIST PASS 310 PSR/wCNCi (#7613)	Drawing No:	I-4.10691 PLMALL

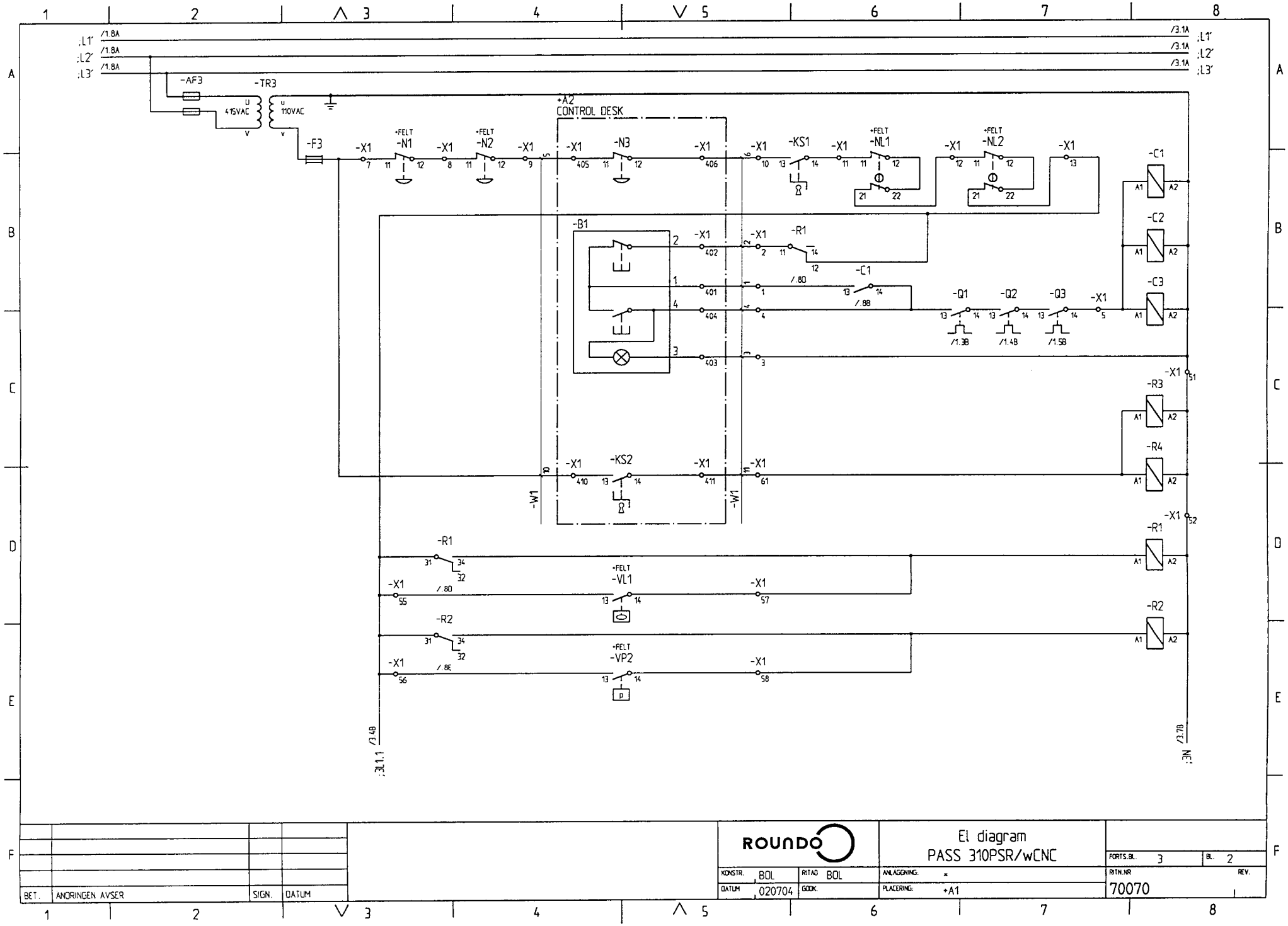


BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

ROUNDO

KONSTR. BOL	RITAD BOL	ANLÄGGNING: =	FORTS.BL. 2	BL. 1
DATUM 020704	GODK.	PLACERING: +A1	RITN.NR 70070	REV.

El diagram
PASS 310PSR/wCNC



BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

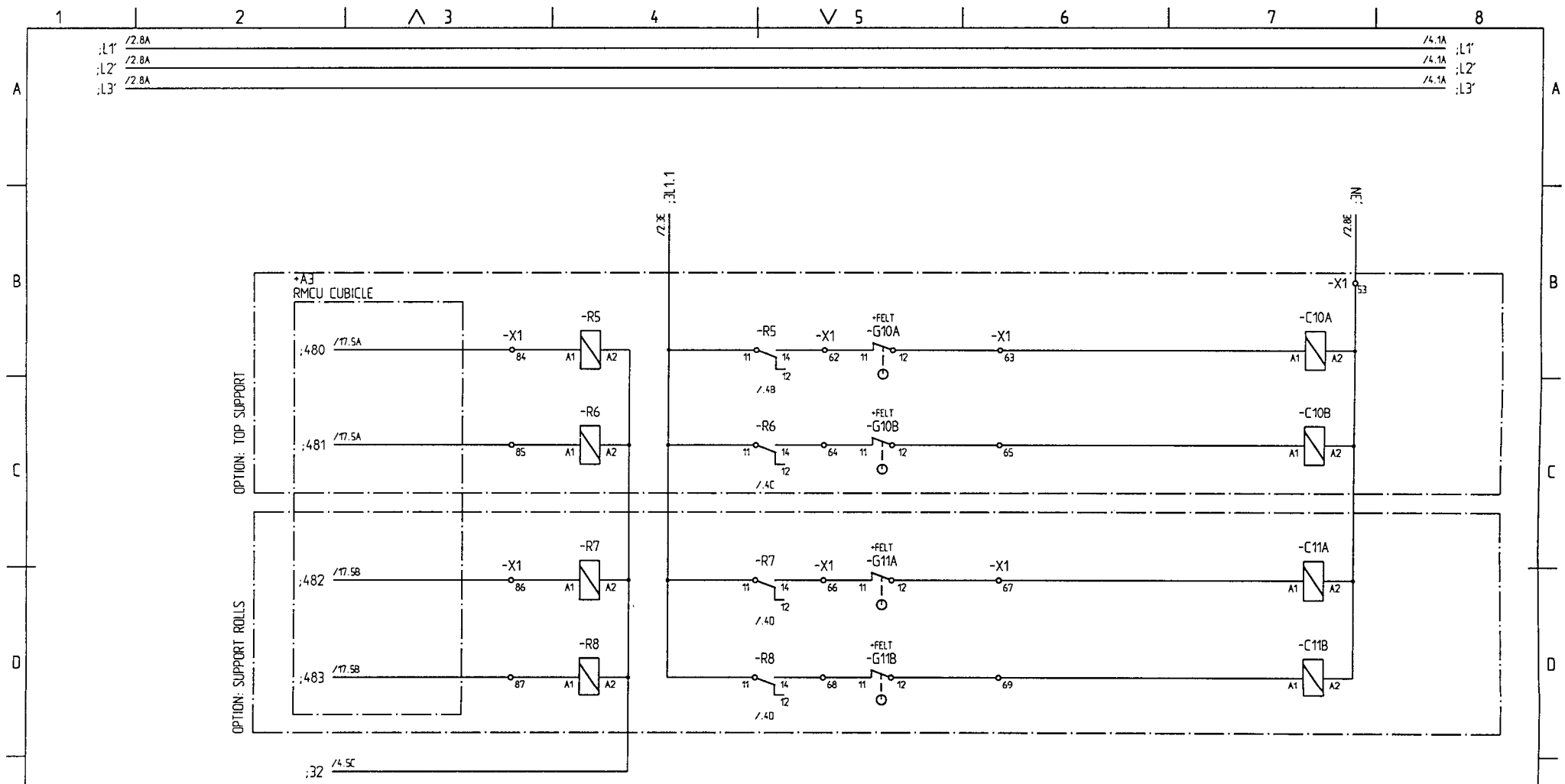
ROUNDO

KONSTR.	BOL	RITAD	BOL
DATUM	020704	GODK.	

El diagram
PASS 310PSR/wCNC

ANLÄGGNING:	x
PLACERING:	+A1

FORTS.BL.	3	BL.	2
RITN.NR	70070	REV.	



BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

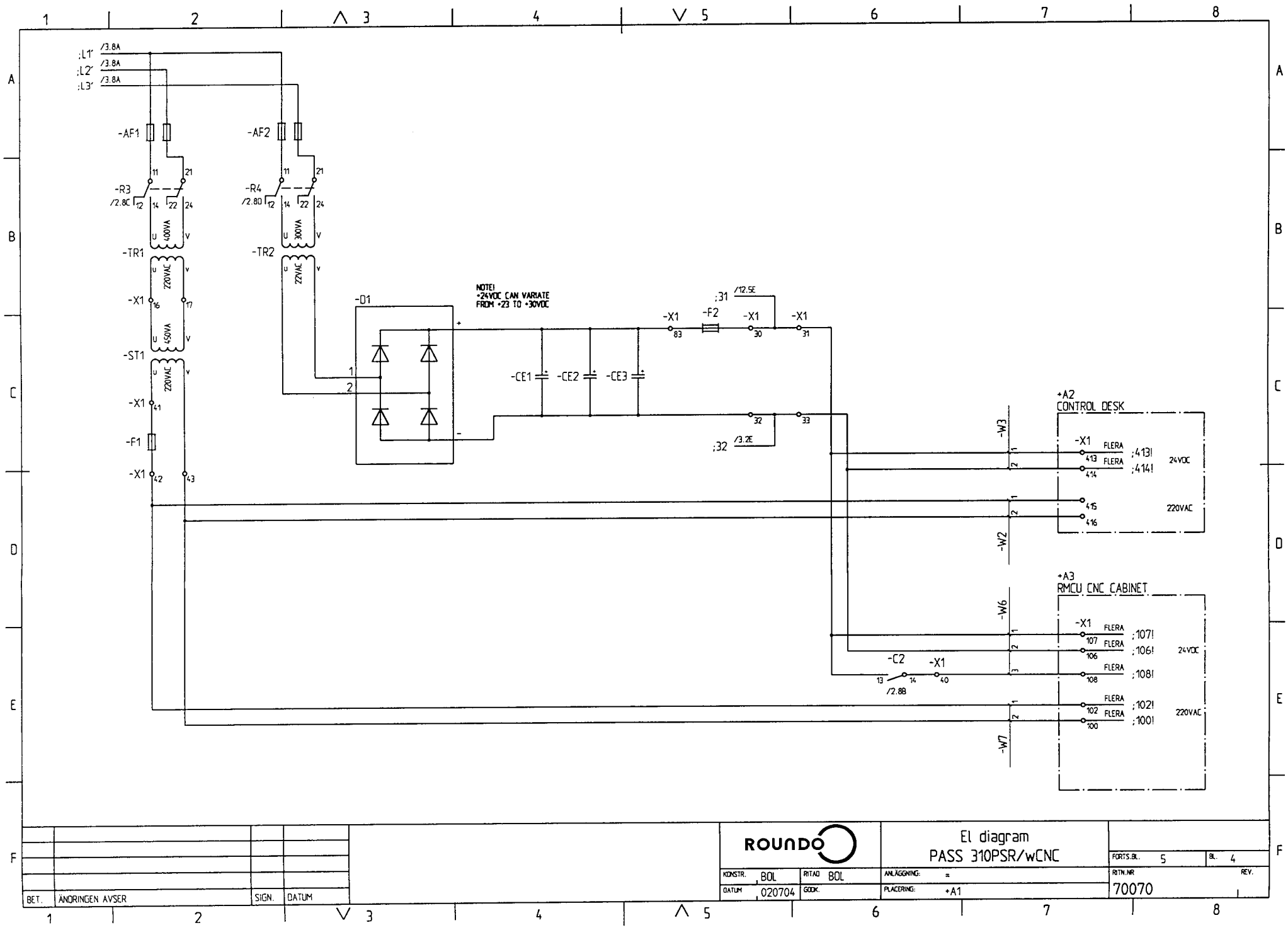
ROUNDO

KONSTR.	BOL	RITAD	BOL
DATUM	020704	GODK.	

El diagram
PASS 310PSR/wCNC

ANLÄGGNING: =
PLACERING: +A1

FORTS.BL. 4 | BL. 3
RITN.NR 70070 | REV.



BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

ROUNDO

KONSTR.	BOL	RITAD	BOL
DATUM	020704	GODK.	

El diagram
PASS 310PSR/wCNC

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PLACERING:	+A1

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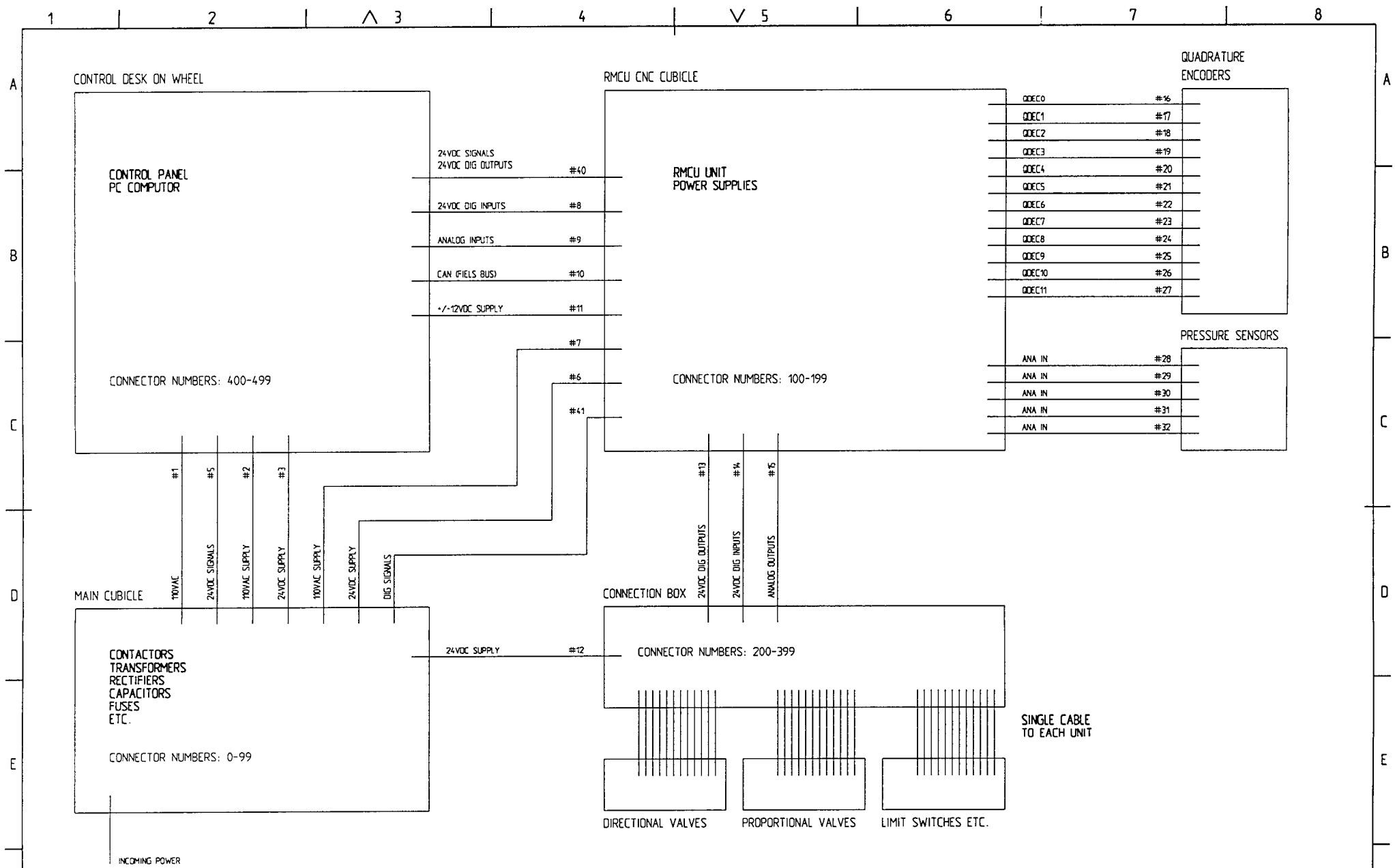
RITN.NR	70070	REV.	



BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

ROUNDO

KONSTR. BOL	RITAD BOL	ANLÄGGNING:	=
DATUM 020704	GODK.	PLACERING:	+

El diagram
PASS 310PSR/wCNC

FORTS.BL. 6 | BL. 5

RITN.NR 70070 REV.

RMCU OVERVIEW

BET.	ANDRINGEN AVSER	SIGN.	DATUM

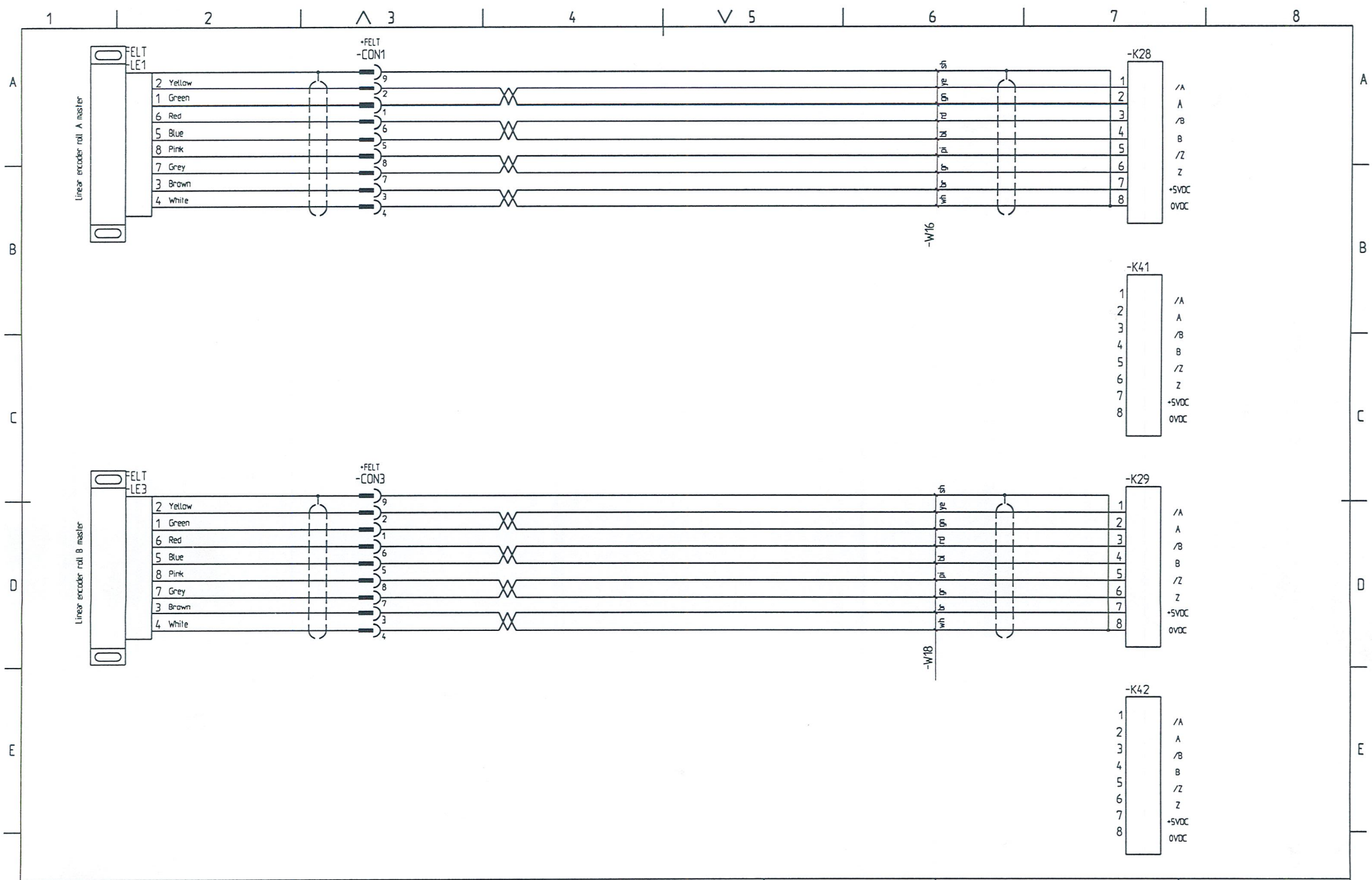
ROUNDO

KONSTR.	BOL	RITAD	BOL
DATUM	020704	GODK.	

El diagram
PASS 310PSR/wCNC

ANLÄGGNING:	=
PLACERING:	+

FORTS.BL.	7
BL.	6
RITN.NR	REV.
70070	

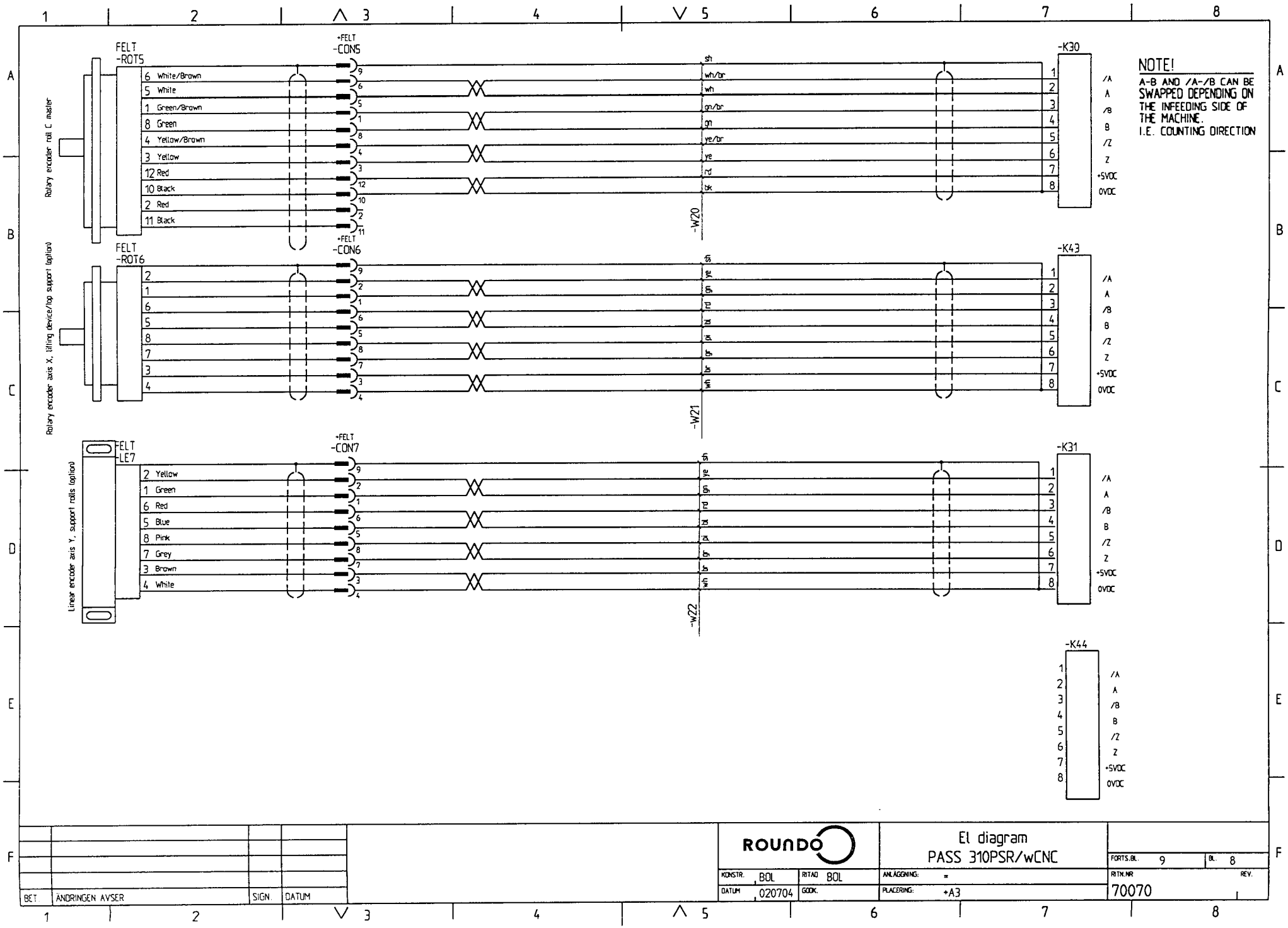


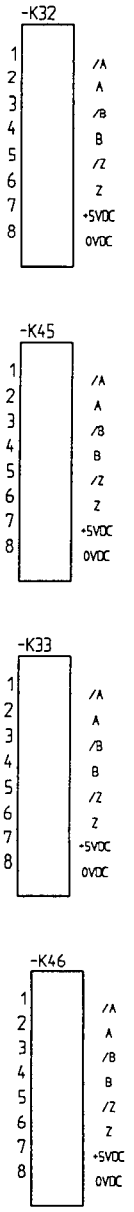
BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

ROUNDO

El diagram
PASS 310PSR/wCNC

KONSTR.	BOL	RITAD	BOL	ANLÄGGNING:	=	FORTS.BL.	8	BL.	7
DATUM	020704	GODK.		PLACERING:	+A3	RITN.NR	70070	REV.	


FELT -ROT5
+FELT -CON5
Rotary encoder roll C master
6 White/Brown
5 White
1 Green/Brown
8 Green
4 Yellow/Brown
3 Yellow
12 Red
10 Black
2 Red
11 Black
-W20
-K30
/A
A
/B
B
/Z
Z
+5VDC
0VDC
FELT -ROT6
+FELT -CON6
Rotary encoder axis X, lifting device/top support (option)
-W21
-K43
FELT -LE7
+FELT -CON7
Linear encoder axis Y, support rolls (option)
2 Yellow
1 Green
6 Red
5 Blue
8 Pink
7 Grey
3 Brown
4 White
-W22
-K31
-K44
NOTE!
A-B AND /A-/B CAN BE SWAPPED DEPENDING ON THE INFEEDING SIDE OF THE MACHINE.
I.E. COUNTING DIRECTION
ROUNDO
El diagram
PASS 310PSR/wCNC
KONSTR. BOL
RITAD BOL
DATUM 020704
GODK.
ANLÄGGNING: =
PLACERING: +A3
FORTS.BL. 9
BL. 8
RITN.NR 70070
REV.
BET. ÄNDRINGEN AVSER SIGN. DATUM

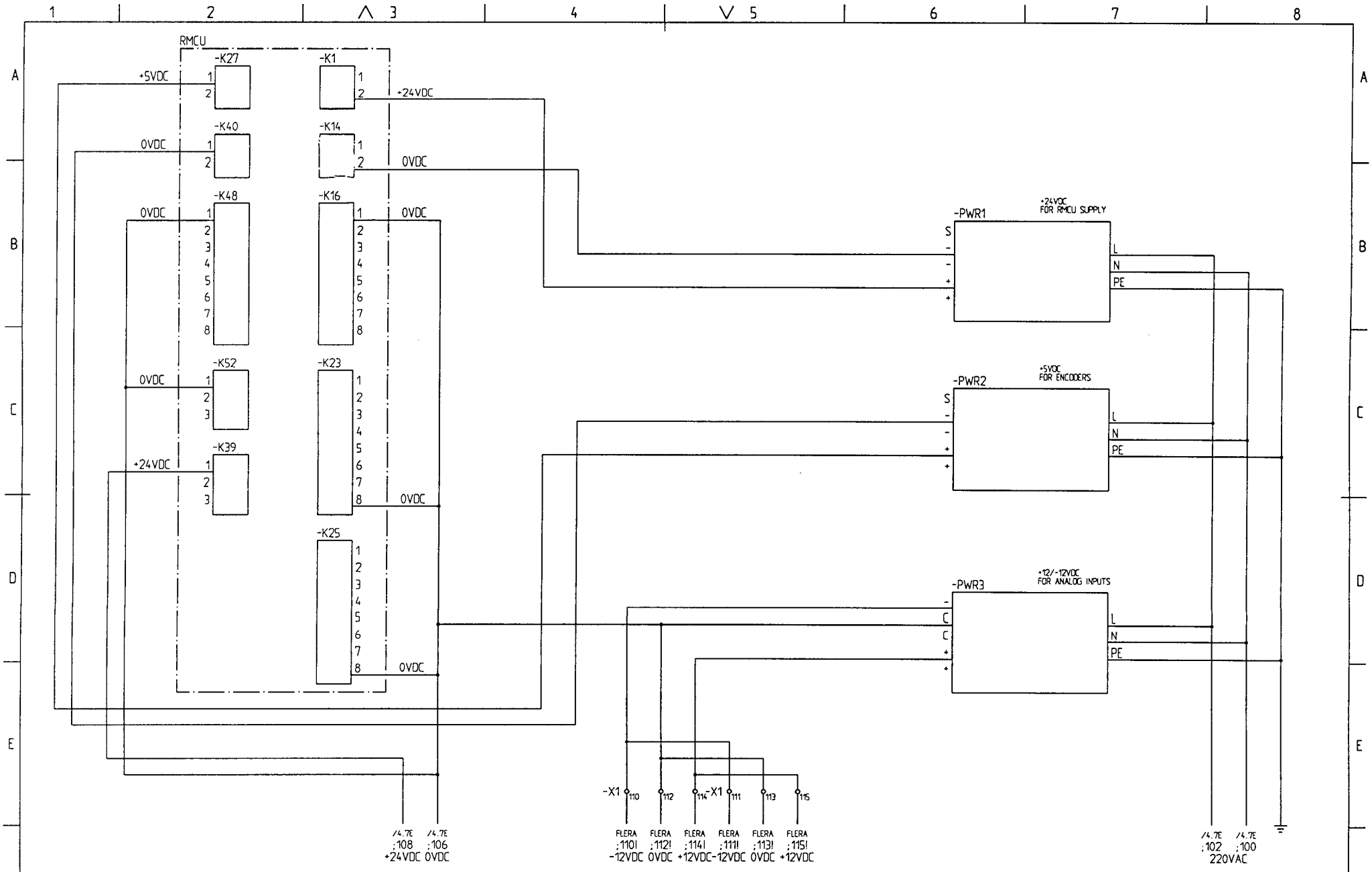


BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

ROUNDO

El diagram
PASS 310PSR/wCNC

KONSTR.	BOL	RITAD	BOL	ANLÄGGNING:	=	FORTS.BL.	10	BL.	9
DATUM	020704	GODK.		PLACERING:	+A3	RITN.NR	70070	REV.	



BET.	ANDRINGEN AVSER	SIGN.	DATUM

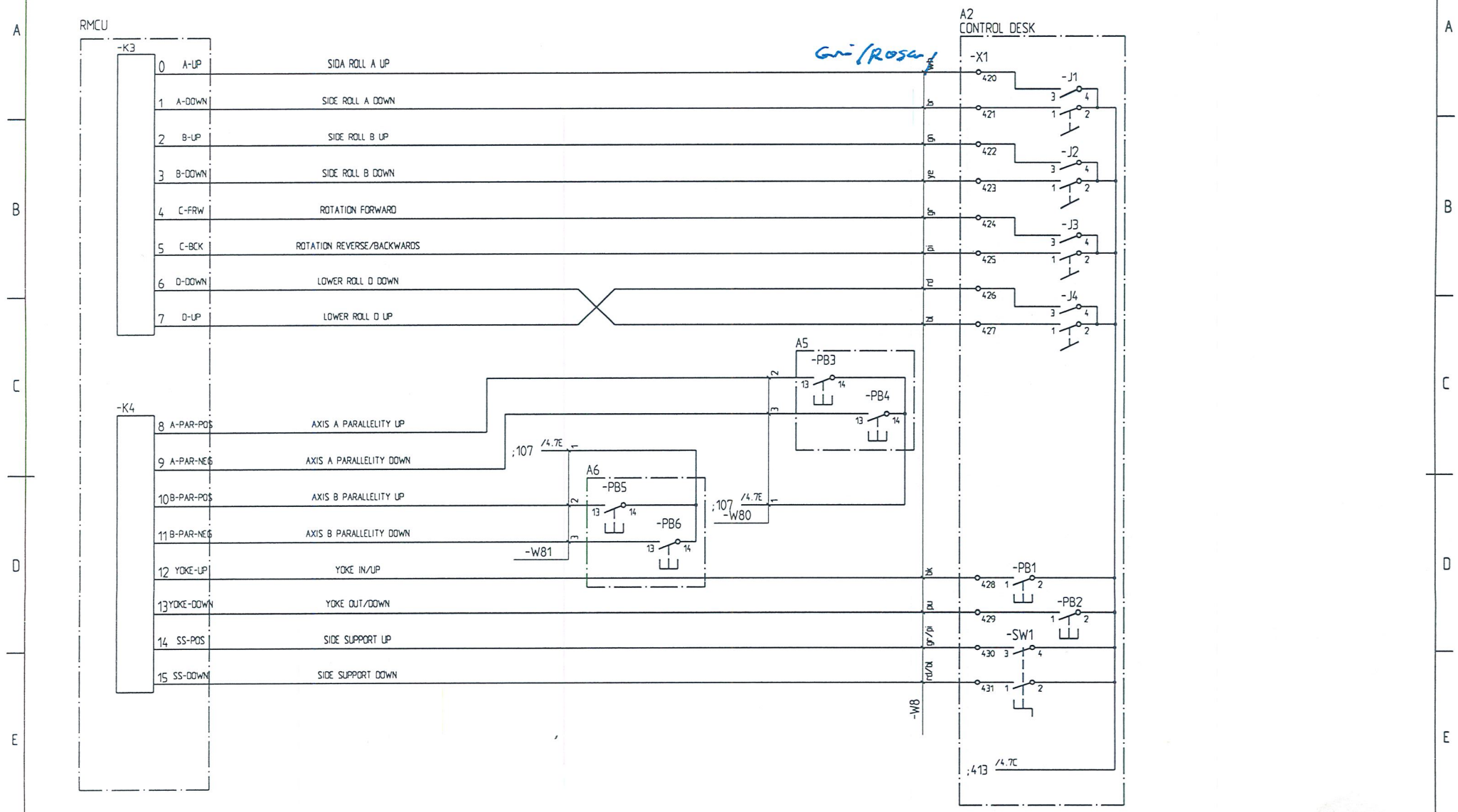
ROUNDO

El diagram
PASS 310PSR/wCNC

KONSTR.	BOL	RITAD	BOL	ANLÄGGNING:	=
DATUM	020704	GODK.		PLACERING:	+A3

FORTS.BL. 11 | BL. 10

RITN.NR 70070 | REV.

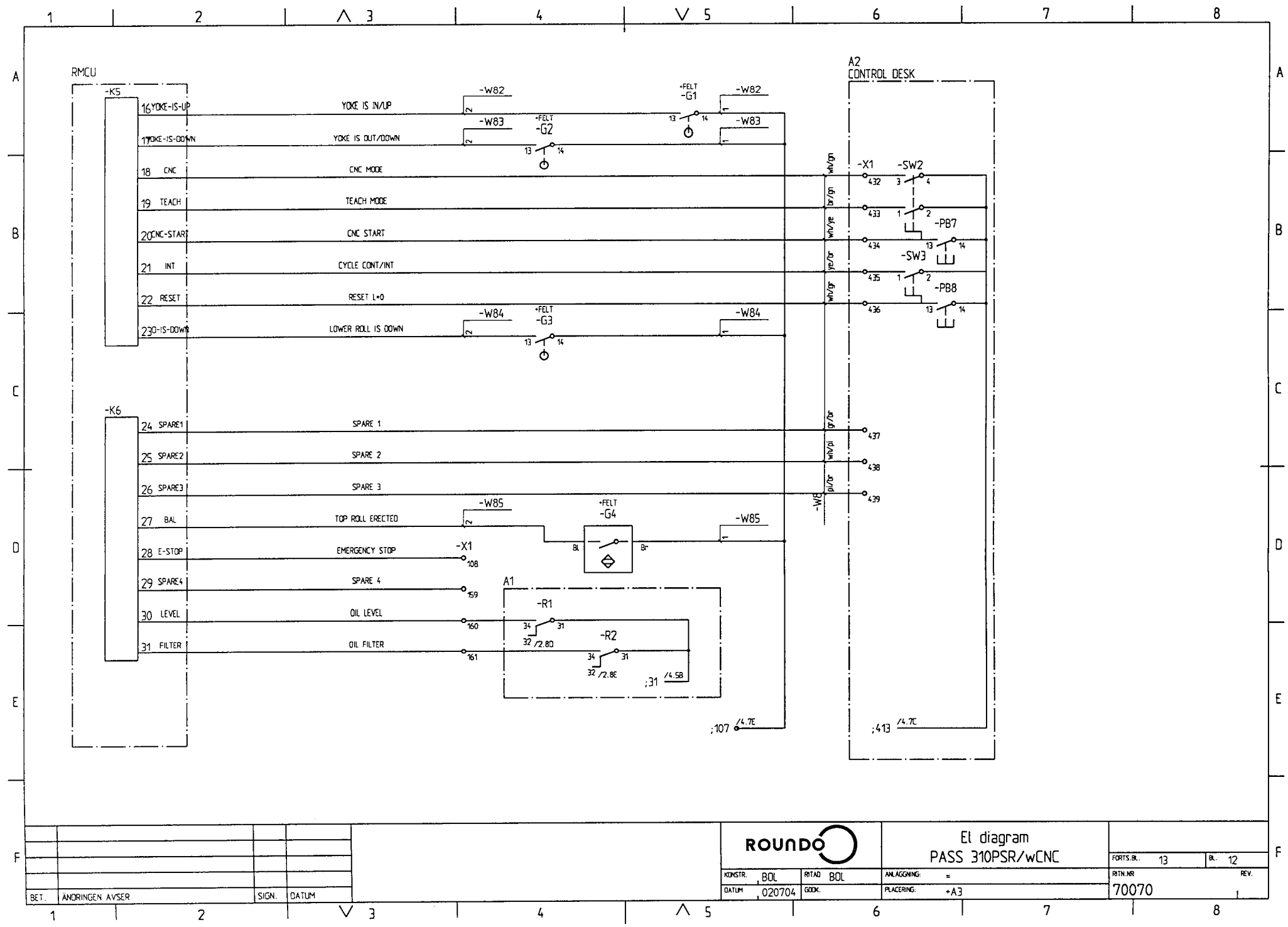


BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

ROUNDO

KONSTR. BOL	RITAD BOL	ANLÄGGNING: =	FORTS.BL. 12	BL. 11
DATUM 020704	GODK.	PLACERING: +A3	RITN.NR 70070	REV.

El diagram
PASS 310PSR/wCNC

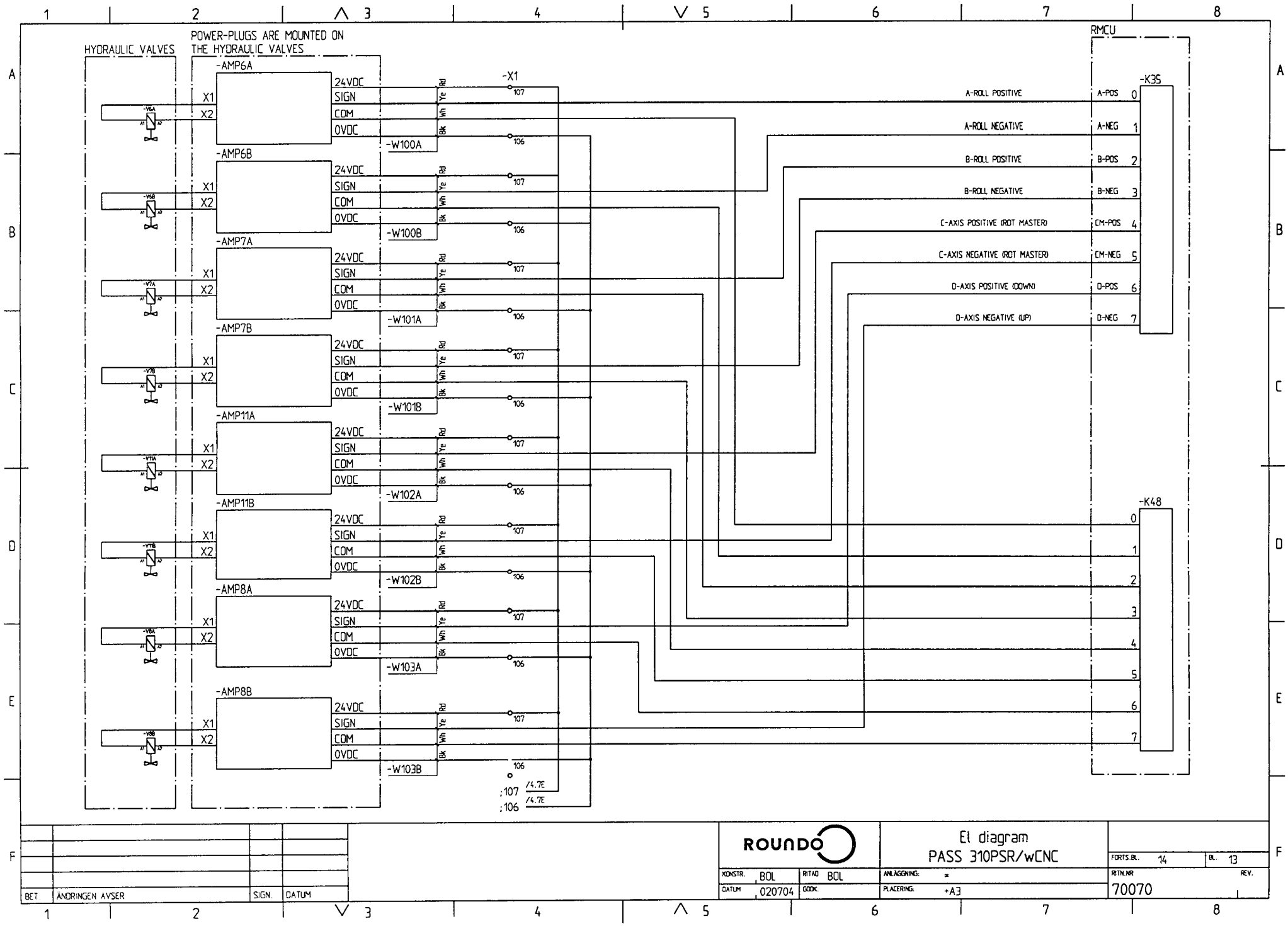


BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

ROUNDO

KONSTR. BOL	RITAD BOL	ANLÄGGNING: =	FORTS.BL. 13 / BL. 12
DATUM 020704	GODK.	PLACERING: +A3	RITN.NR 70070 / REV.

El diagram
PASS 310PSR/wCNC



BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

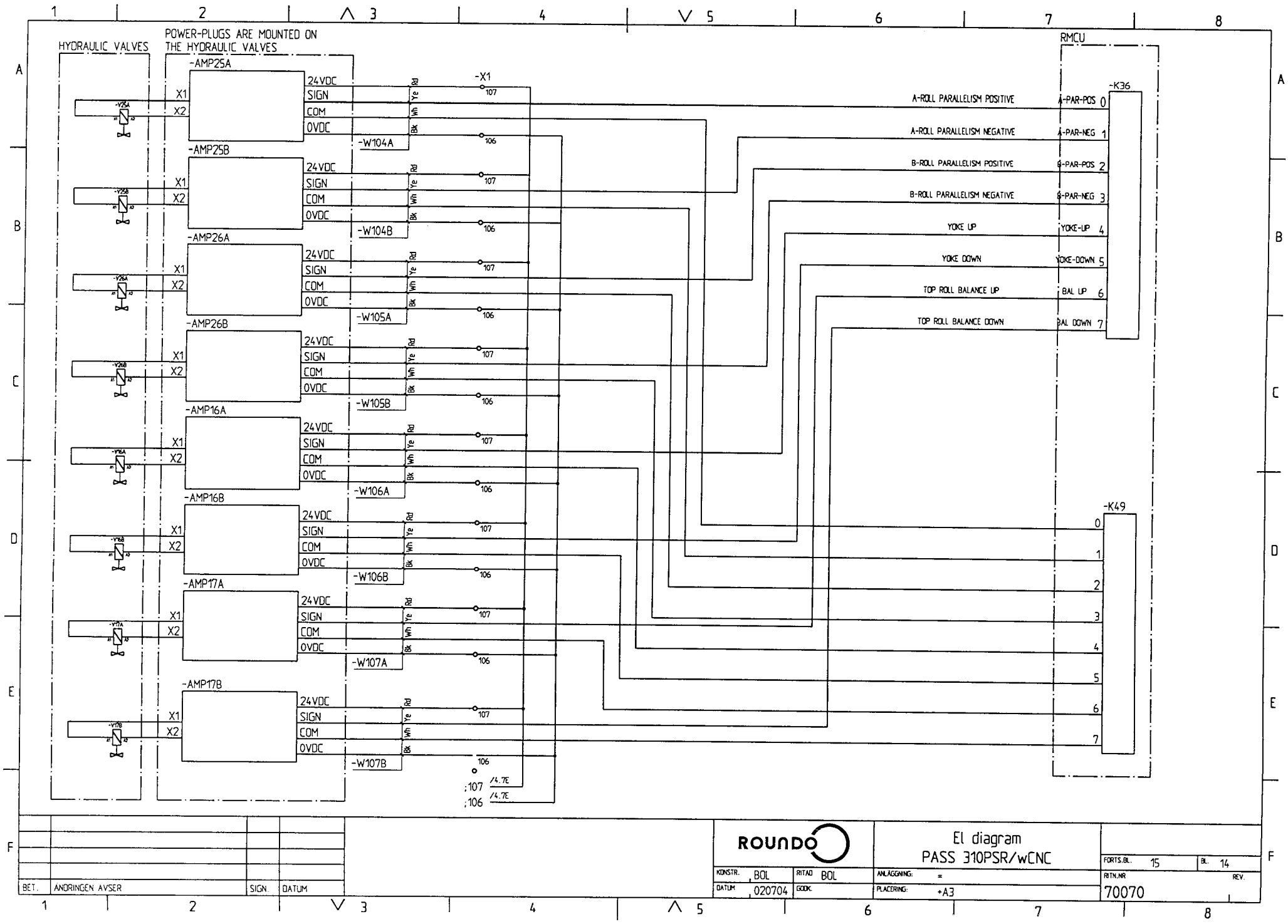
ROUNDO

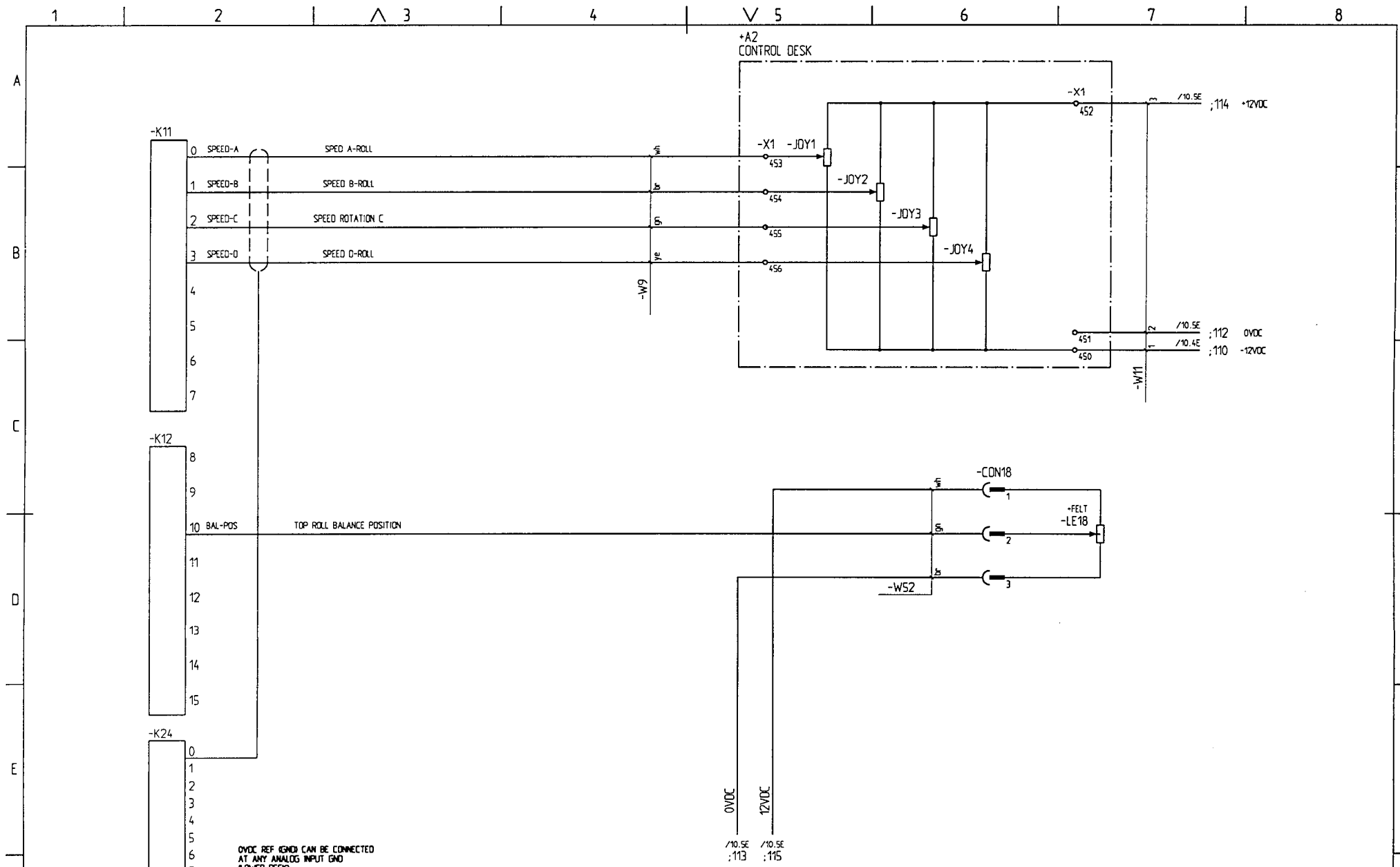
El diagram
PASS 310PSR/wCNC

KONSTR.	BOL	RITAD	BOL	ANLÄGGNING:	*
DATUM	020704	GODK.		PLACERING:	+A3

FORTS.BL. 14 | BL. 13

RITN.NR 70070 | REV.


HYDRAULIC VALVES
POWER-PLUGS ARE MOUNTED ON THE HYDRAULIC VALVES
-AMP25A
-AMP25B
-AMP26A
-AMP26B
-AMP16A
-AMP16B
-AMP17A
-AMP17B
X1
X2
24VDC
SIGN
COM
0VDC
Rd
Ye
Wh
Bk
-X1
107
106
-W104A
-W104B
-W105A
-W105B
-W106A
-W106B
-W107A
-W107B
;107 14.7E
;106 14.7E
RMCU
-K36
A-ROLL PARALLELISM POSITIVE
A-ROLL PARALLELISM NEGATIVE
B-ROLL PARALLELISM POSITIVE
B-ROLL PARALLELISM NEGATIVE
YOKE UP
YOKE DOWN
TOP ROLL BALANCE UP
TOP ROLL BALANCE DOWN
A-PAR-POS 0
A-PAR-NEG 1
B-PAR-POS 2
B-PAR-NEG 3
YOKE-UP 4
YOKE-DOWN 5
BAL UP 6
BAL DOWN 7
-K49
0
1
2
3
4
5
6
7
BET.
ANDRINGEN AVSER
SIGN.
DATUM
ROUNDO
El diagram
PASS 310PSR/wCNC
KONSTR. BOL
RITAD BOL
DATUM 020704
GODK.
ANLÄGGNING: =
PLACERING: +A3
FORTS.BL. 15
BL. 14
RITN.NR 70070
REV.



BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

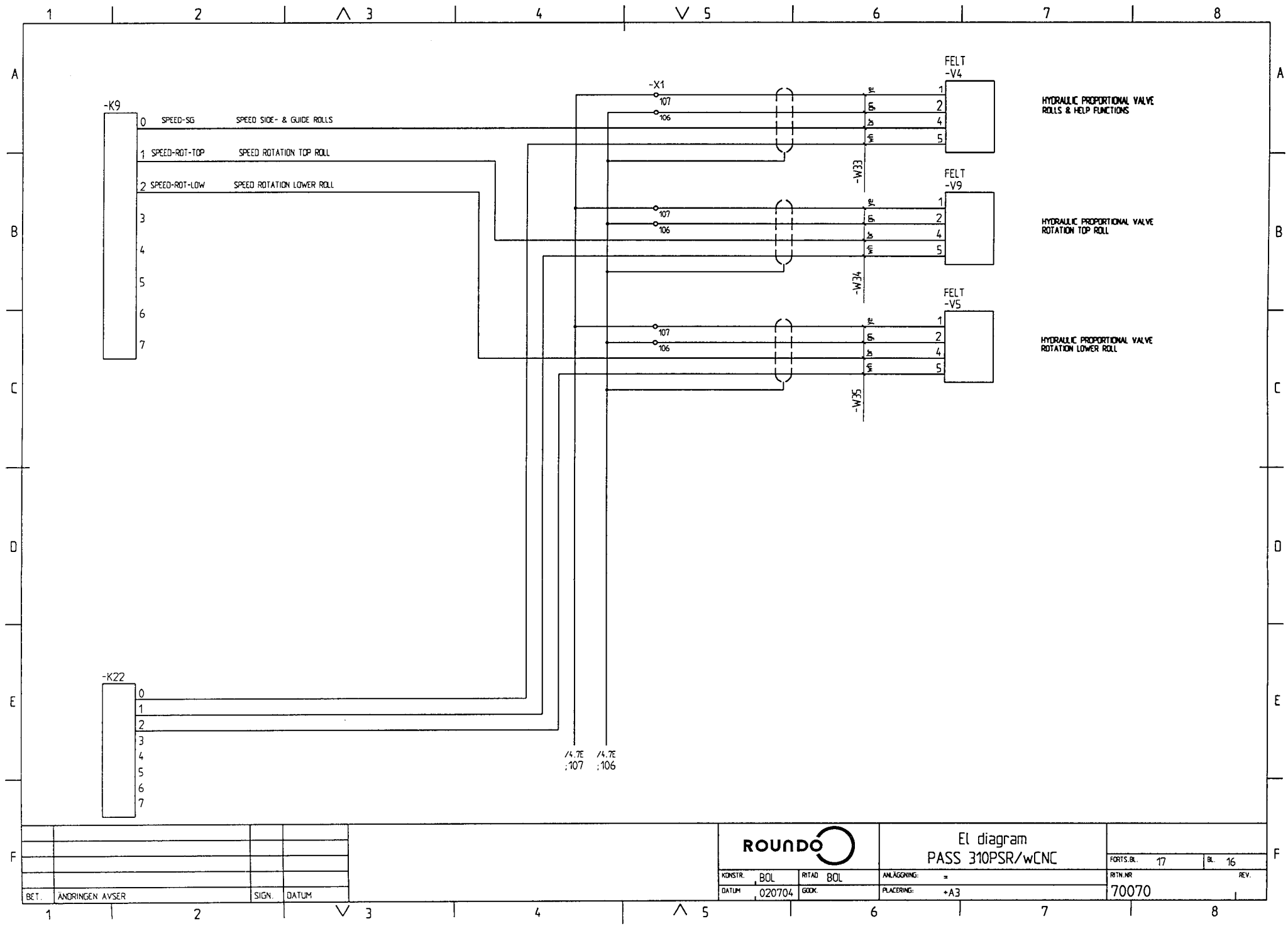
ROUNDO

KONSTR.	BOL	RITAD	BOL
DATUM	020704	GODK.	

El diagram
PASS 310PSR/wCNC

ANLÄGGNING:	=
PLACERING:	+A3

FORTS.BL.	16	BL.	15
RITN.NR		REV.	
70070			



BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

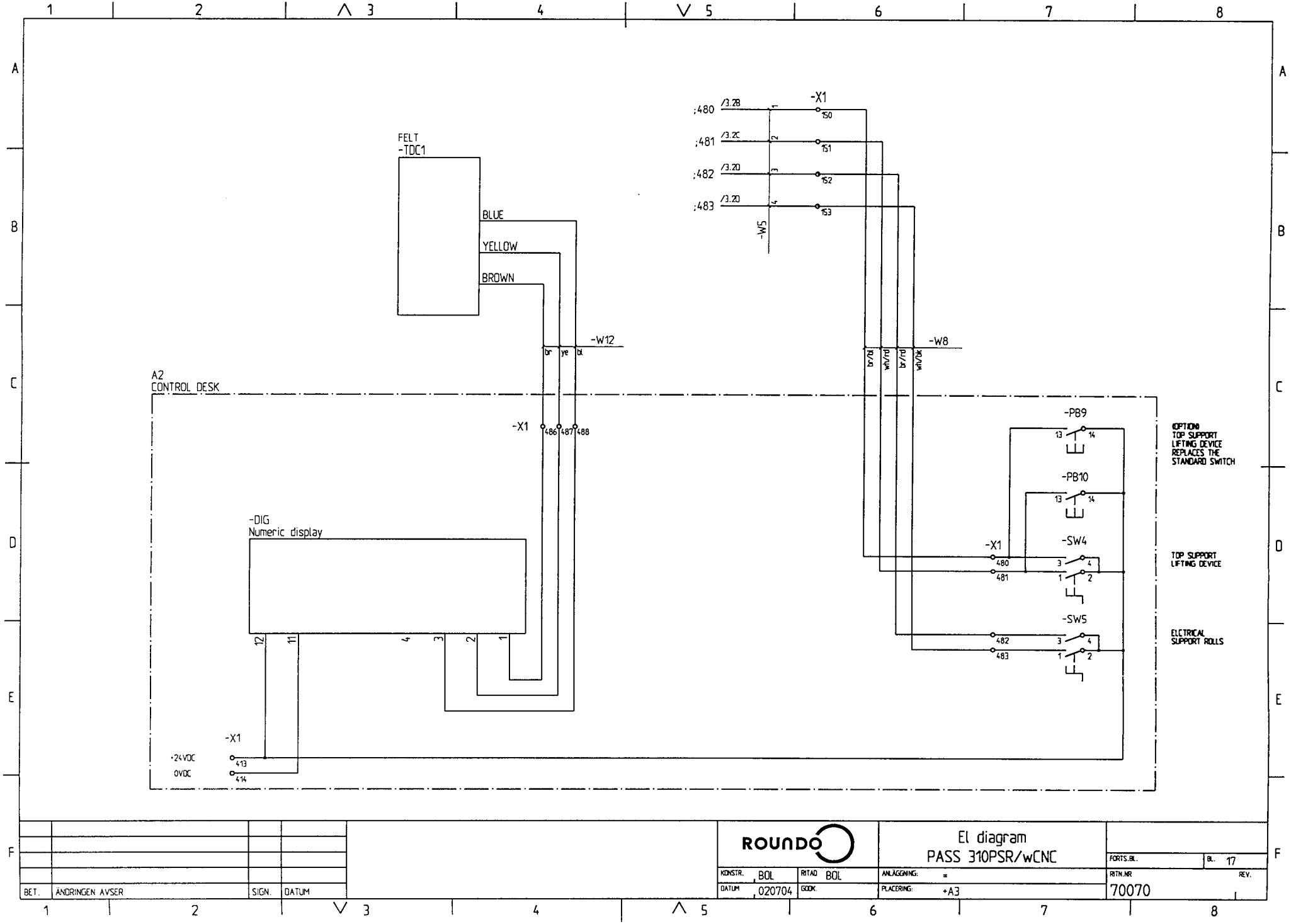
ROUNDO

El diagram
PASS 310PSR/wCNC

KONSTR.	BOL	RITAD	BOL
DATUM	020704	GODK.	
ANLÄGGNING:	=		
PLACERING:	+A3		

FORTS.BL. 17 | BL. 16

RITN.NR 70070 REV.



BET.	ÄNDRINGEN AVSER	SIGN.	DATUM

ROUNDO

KONSTR. BOL	RITAD BOL	ANLÄGGNING: =	FORTS.BL.	BL. 17
DATUM 020704	GODK.	PLACERING: +A3	RITN.NR 70070	REV.

El diagram
PASS 310PSR/wCNC

POS	POSTBET.	ANT.	BESKRIVNING	ELEKTRISKA DATA	FABRIKAT	TYPNUMMER	BESTÄLLNINGSNUMMER	E-NUMMER	BLADREF	INDEX	ANMÄRKNING
1	-CE1	1	Kondensator 22000uF 40V	22000uF 40V		22000uF 40V	67-585-93		/4.4C	CA003	
2	-CE2	1	Kondensator 22000uF 40V	22000uF 40V		22000uF 40V	67-585-93			CA003	
3	-CE3	1	Kondensator 22000uF 40V	22000uF 40V		22000uF 40V	67-585-93		/4.5C	CA003	
4	-MSF	3	Säkring USA std.	25A	Gould Shawmut	ADTR25	ADTR25		/1.1C	FSU007	
5		1	Säkringshållare USA		Gould Shawmut	USCC3	USCC3			FZ003	
6	-AF1	1	Automatsäkring	6A	Siemens	5SX2 206-7	5SX2 206-7		/4.2A	QB001	
7	-F1	1	Säkring 5x20mm	2A	Littlefuse	218002	33-105-96		/4.2C	FSZ002	
8		1	Säkringsplint		Weidmuller	WSI 6	10-00101100			XF001	
9	-AF2	1	Automatsäkring	6A	Siemens	5SX2 206-7	5SX2 206-7		/4.3A	QB001	
10	-F2	1	Säkring 5x20mm	10A	Littelfuse	218010	33-106-61		/4.5C	FSZ005	
11		1	Säkringsplint		Weidmuller	WSI 6	10-00101100			XF001	
12	-AF3	1	Automatsäkring	6A	Siemens	5SX2 206-7	5SX2 206-7		/2.2A	QB001	
13	-F3	1	Säkring 5x20mm	2A	Littlefuse	218002	33-105-96		/2.3B	FSZ002	
14		1	Säkringsplint		Weidmuller	WSI 6	10-00101100			XF001	
15	-C10A	1	Kontaktor	4kW 9A	Siemens	3RT10 16-1AF01	3RT10 16-1AF01		/3.7B	KM012	
16	-C10B	1	Kontaktor	4kW 9A	Siemens	3RT10 16-1AF01	3RT10 16-1AF01		/3.7C	KM012	
17	-C11A	1	Kontaktor	4kW 9A	Siemens	3RT10 16-1AF01	3RT10 16-1AF01		/3.7D	KM012	
18	-C11B	1	Kontaktor	4kW 9A	Siemens	3RT10 16-1AF01	3RT10 16-1AF01			KM012	
19	-C1	1	Kontaktor		Siemens	3RT10 26-1AG20	3RT10 26-1AG20		/2.8B	KM015	
20	-R1	1	Relä	115VAC	Releco	C3-A 30	C3-A 30		/2.8D	KW001	
21		1	Sockel 11pol		Releco	S3-S	S3-S			KZ001	
22	-C2	1	Kontaktor	4kW 9A	Siemens	3RT10 16-1AF01	3RT10 16-1AF01		/2.8B	KM012	
23	-R2	1	Relä	115VAC	Releco	C3-A 30	C3-A 30		/2.8E	KW001	
24		1	Sockel 11pol		Releco	S3-S	S3-S			KZ001	
25	-C3	1	Kontaktor	4kW 9A	Siemens	3RT10 16-1AF01	3RT10 16-1AF01		/2.8C	KM012	
26	-R3	1	Relä	115VAC 10A	Releco	C7-A20	C7-A20			KW008	
27		1	Relä sockel		Releco	S7-M	S7-M			KZ009	
28	-R4	1	Relä	115VAC 10A	Releco	C7-A20	C7-A20		/2.8D	KW008	
29		1	Relä sockel		Releco	S7-M	S7-M			KZ009	
30	-R5	1	Hjälprelä	24VDC 10A	Releco	C10A 10X24D	C10A 10X24D		/3.4B	KH001	
31		1	Sockel 1pol 12VDC		Releco	S-10	S-10			KZ007	

ITEM	REFERS TO	SIGN.	DATE

ROUNDO

El diagram
PASS 310PSR/wCNC

DESIGN.	BOL	DRAWN	BOL
DATE	05.07.02	APPR.	

PLANT	=
LOCATION	+A1

VERSION

NEXT SH. 2 | SH. 1

DRAWING NO. 70070 | REV. -

POS	POSTBET.	ANT.	BESKRIVNING	ELEKTRISKA DATA	FABRIKAT	TYPNUMMER	BESTÄLLNINGSNUMMER	E-NUMMER	BLADREF	INDEX	ANMÄRKNING
32	-R6	1	Hjälprelä	24VDC 10A	Releco	C10A 10X24D	C10A 10X24D		/3.4C	KH001	
33		1	Sockel 1pol 12VDC		Releco	S-10	S-10			KZ007	
34	-R7	1	Hjälprelä	24VDC 10A	Releco	C10A 10X24D	C10A 10X24D		/3.4D	KH001	
35		1	Sockel 1pol 12VDC		Releco	S-10	S-10			KZ007	
36	-R8	1	Hjälprelä	24VDC 10A	Releco	C10A 10X24D	C10A 10X24D			KH001	
37		1	Sockel 1pol 12VDC		Releco	S-10	S-10			KZ007	
38	-MS	1	Säkerhetsbrytare	60A 600V	Cutler Hammer	DH 362 FGK	DH 362 FGK		/1.1C	QC006	
39	-Q1	1	Motorskyddsbrytare	20-25A	Siemens	3RV1021-4DA10	3RV1021-4DA10		/1.3B	QM028	
40	-Q2	1	Motorskyddsbrytare	0.45-0.63A	Siemens	3RV1011-0GA10	3RV1011-0GA10	31 172 06	/1.4B	QM002	
41	-Q3	1	Motorskyddsbrytare	1.4-2A	Siemens	3RV1011-1BA10	3RV1011-1BA10		/1.5B	QM017	
42	-Q10	1	Motorskyddsbrytare	1.4-2A	Siemens	3RV1011-1BA10	3RV1011-1BA10			QM017	
43	-Q11	1	Motorskyddsbrytare	1.4-2A	Siemens	3RV1011-1BA10	3RV1011-1BA10		/1.6B	QM017	
44	-KS1	1	Nyckel brytare		Siemens	3SB12 02-AB20	3SB12 02-AB20		/2.5B	SK007	
45	-ST1	1	Spänningsstab	450VA	Beckman	GT450/J	GT 450/J		/4.2C	TU002	
46	-TR1	1	Transformator 220V 400VA	400VA	Tramo	OFL-400	1200-03997		/4.2B	TA004	
47	-TR2	1	Transformator +20-460/22	300VA	Tramo	1200-04907	1200-04907		/4.3B	TA016	
48	-TR3	1	Transformator +20-460/110	200VA	Tramo	1200-04906	1200-04906		/2.2A	TA014	
49	-D1	1	Likriktarbrygga 25A	25A		2502/MIC	70-038-58		/4.3B	UA001	
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ITEM	REFERS TO	SIGN.	DATE

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DESIGN.	DRAWN	PLANT	=
DATE 05.07.02	APPR.	LOCATION	+A1

VERSION

NEXT SH. 3 | SH. 2

DRAWING NO. | REV. -

POS	POSTBET.	ANT.	BESKRIVNING	ELEKTRISKA DATA	FABRIKAT	TYPNUMMER	BESTÄLLNINGSNUMMER	E-NUMMER	BLADREF	INDEX	ANMÄRKNING
63	-DIG	1	Mätinstrument		GEFRAN	4T72	4T-72-4-01-9		/17.2D	PA001	
64	-B1	1	Tryckknapp		Siemens	3SA8810-0CB01	3SA8810-0CB01		/2.4B	ST001	
65	-J1	1	Joystick		Binder	33250-04D05	33250-04D05		/11.6A	SJ004	
66	-PB1	1	Tryckknapp		Aluseal	G1-4 + K1-22	G1-4 + K1-22		/11.6D	ST003	
67	-SW1	1	Omkopplare		Kraus & Naimer	CG8 A214-600 FT1	CG8 A214-600 FT1		/11.6E	SK001	
68	-J2	1	Joystick		Binder	33250-04D05	33250-04D05		/11.6B	SJ004	
69	-KS2	1	Omkopplare		Kraus & Naimer	CG8 A250-V750FT1	CG8 A250-V750FT1		/2.4D	SK011	
70	-PB2	1	Tryckknapp		Aluseal	G1-4 + K1-22	G1-4 + K1-22		/11.6D	ST003	
71	-SW2	1	Omkopplare		Kraus & Naimer	CG8 A210-600 FT1	CG8 A210-600 FT1		/12.6B	SK006	
72	-J3	1	Joystick		Binder	33250-04D05	33250-04D05		/11.6B	SJ004	
73	-N3	1	Nödströmbrytare		Aluseal	3.4406	3.4406		/2.4B	SN001	
74	-SW3	1	Omkopplare		Kraus & Naimer	CG8 A220-600 FT1	CG8 A220-600 FT1		/12.6B	SK009	
75	-J4	1	Joystick		Binder	33250-04D05	33250-04D05		/11.6C	SJ004	
76	-SW4	1	Omkopplare		Kraus & Naimer	CG8 A214-600 FT1	CG8 A214-600 FT1		/17.7D	SK001	
77	-SW5	1	Omkopplare		Kraus & Naimer	CG8 A214-600 FT1	CG8 A214-600 FT1		/17.7E	SK001	
78	-PB7	1	Tryckknapp		Aluseal	G1-4 + K1-22	G1-4 + K1-22		/12.6B	ST003	
79	-PB8	1	Tryckknapp		Aluseal	G1-4 + K1-22	G1-4 + K1-22			ST003	
80	-PB9	1	Tryckknapp		Aluseal	G1-4 + K1-22	G1-4 + K1-22		/17.7C	ST003	
81	-PB10	1	Tryckknapp		Aluseal	G1-4 + K1-22	G1-4 + K1-22		/17.7D	ST003	
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ITEM	REFERS TO	SIGN.	DATE

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DESIGN.	DRAWN	PLANT	=
DATE 05.07.02	APPR.	LOCATION	+A2

VERSION

NEXT SH. 4 | SH. 3

DRAWING NO. | REV. -

POS	POSTBET.	ANT.	BESKRIVNING	ELEKTRISKA DATA	FABRIKAT	TYPNUMMER	BESTÄLLNINGSNUMMER	E-NUMMER	BLADREF	INDEX	ANMÄRKNING
94	-PWR1	1	AC/DC Omv.	24VDC	Puls	ML 50.100	ML 50.100		/10.6B	UDC006	
95	-PWR2	1	AC/DC Omv.	+5VDC	Puls	ML30.101	ML30.101		/10.6C	UDC005	
96	-PWR3	1	AC/DC Omv.	+/-12VDC	Puls	ML 30.106	ML 30.106		/10.6D	UDC003	
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DESIGN.	DRAWN	PLANT	*
DATE 05.07.02	APPR.	LOCATION	+A3

VERSION

NEXT SH. 5 | SH. 4

DRAWING NO. | REV. -

POS	POSTBET.	ANT.	BESKRIVNING	ELEKTRISKA DATA	FABRIKAT	TYPNUMMER	BESTÄLLNINGSNUMMER	E-NUMMER	BLADREF	INDEX	ANMÄRKNING
125	-PB3	1	Tryckknapp		Aluseal	G1-4 + K1-12	G1-4 + K1-12		/11.5C	ST007	
126	-PB4	1	Tryckknapp		Aluseal	G1-4 + K1-12	G1-4 + K1-12			ST007	
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ITEM	REFERS TO	SIGN.	DATE

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DESIGN.	DRAWN	PLANT	=
DATE 05.07.02	APPR.	LOCATION	+AS

VERSION		
NEXT SH. 6	SH. 5	
DRAWING NO.		REV.
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POS	POSTBET.	ANT.	BESKRIVNING	ELEKTRISKA DATA	FABRIKAT	TYPNUMMER	BESTÄLLNINGSNUMMER	E-NUMMER	BLADREF	INDEX	ANMÄRKNING
156	-PB5	1	Tryckknapp		Aluseal	G1-4 + K1-12	G1-4 + K1-12		/11.40	ST007	
157	-PB6	1	Tryckknapp		Aluseal	G1-4 + K1-12	G1-4 + K1-12			ST007	
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ITEM	REFERS TO	SIGN.	DATE

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DESIGN.		DRAWN	
DATE	05.07.02	APPR.	

PLANT =

LOCATION +A6

VERSION

NEXT SH. 7 | SH. 6

DRAWING NO. | REV. -

POS	POSTBET.	ANT.	BESKRIVNING	ELEKTRISKA DATA	FABRIKAT	TYPNUMMER	BESTÄLLNINGSNUMMER	E-NUMMER	BLADREF	INDEX	ANMÄRKNING
187	-LE1	2	Linjärgivare LS303/370		Heidenhain	LS303/370	LS 303-370KJ Z185		/7.2A	BL010	
188	-LE3	1	Linjärgivare LS303/370		Heidenhain	LS303/370	LS 303-370KJ Z185		/7.2C	BL010	
189	-G4	1	Induktiv NO		Honeywell	NBB2-12GM50-E2	NBB2-12GM50-E2		/12.4D	BI005	
190	-ROT5	1	Roterande pulsgivare		Hengstler	RI 58	RI58-O/0250AK.42TD		/8.2A	BP006	
191	-ROT6	1	Rot. pulsgiv. Heng. RI58 1000		Hengstler	RI 58	RI58-O/1000ES.41IB-C5		/8.2B	BP001	
192	-LE7	1	Linjärgivare LS303/170		Heidenhain	LS303-0170	LS303-0170 10U KJ03 0020085		/8.2C	BL003	
193	-M1	1	Trefasmotor	11kW 21.5A	Siemens	1LA7163-4AA11	1LA7163-4AA11		/1.3E	MD023	
194	-M2	1	Trefasmotor	0.18kW 0.6A	Siemens	1LA5063-4AB17	1LA5063-4AB17		/1.4E	MD034	
195	-M3	1	Trefasmotor	0.75kW 230V	Oiltech	QPM2	QPM2 20-4-0.75		/1.5E	MD040	
196	-M10	1	Trefasmotor	0.75kW 2.0A	ABB	M2AA80B	3GAA082002-BSA			MD025	
197	-M11	1	Trefasmotor	0.75kW 2.0A	ABB	M2AA80B	3GAA082002-BSA		/1.6E	MD025	
198	-TDC1	1	Linjär givare res 100mm		Gefran	PZ34-A-100-3M	PZ34-A-100-3M		/17.3B	RL019	
199	-LE18	1	Linjärgivare analog		Gefran	PY3 C50	PY3 C50		/15.7D	RL018	
200	-G10A	1	Gränsläge		Telemecanique	ZCK-J21+ZCK-E65	ZCK-J21+ZCK-E65		/3.5B	SG001	
201	-G10B	1	Gränsläge		Telemecanique	ZCK-J21+ZCK-E65	ZCK-J21+ZCK-E65		/3.5C	SG001	
202	-G11A	1	Gränsläge		Telemecanique	ZCK-J21+ZCK-E65	ZCK-J21+ZCK-E65		/3.5D	SG001	
203	-G11B	1	Gränsläge		Telemecanique	ZCK-J21+ZCK-E65	ZCK-J21+ZCK-E65			SG001	
204	-G1	1	Gränsläge		Telemecanique	ZCK-J21+ZCK-E65	ZCK-J21+ZCK-E65		/12.5A	SG001	
205	-N1	1	Nödströmbrytare		Aluseal	3.4406	3.4406		/2.3B	SN001	
206	-NL1	1	Linnödstopp		Guardmaster	LRS-4	13044		/2.6B	SN003	
207	-G2	1	Gränsläge		Telemecanique	ZCKJ21	ZCKJ21		/12.4A	SG005	
208		1	Huvud		Telemecanique	ZCKE067	ZCKE067			SG008	
209	-N2	1	Nödströmbrytare		Aluseal	3.4406	3.4406		/2.4B	SN001	
210	-NL2	1	Linnödstopp		Guardmaster	LRS-4	13044		/2.7B	SN003	
211	-G3	1	Gränsläge		Telemecanique	ZCKJ21	ZCKJ21		/12.4C	SG005	
212		1	Huvud		Telemecanique	ZCKE64	ZCKE64			SG010	
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ITEM	REFERS TO	SIGN.	DATE

ROUNDO

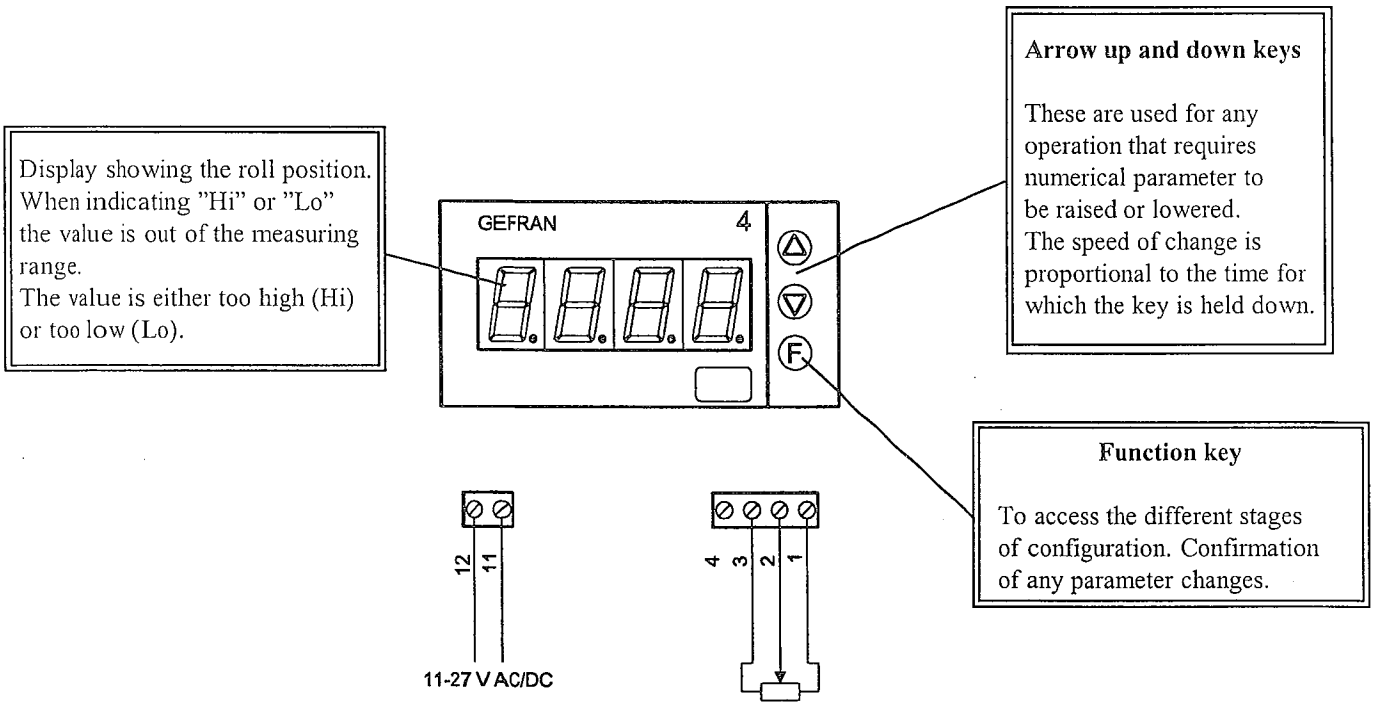
El diagram
PASS 310PSR/wCNC

DESIGN.	BOL	DRAWN	BOL
DATE	05.07.02	APPR.	
PLANT	=		
LOCATION	+FELT		

VERSION

NEXT SH. | SH. 7

DRAWING NO. 70070 - REV.



Locking and Unlocking the keyboard

1. Press function key "F" and keep it pressed until "PA" can be seen.
2. Press "arrow up" until the figures "99" are shown.
3. Press function key "F" until "Pr" can be seen.
4. Press "arrow up" until the figures "36" can be seen.
5. Keep function key "F" pressed for two seconds to confirm and lock the keyboard. The length measuring value will now be shown.
6. For unlocking press "arrow down" until the figure "0" can be seen instead of figures "36". Confirm with function key "F".

CALIBRATION OF THE LENGTH TRANSDUCERS

1. Check that the display is counting in the right way. If not, change the wires on connections 1 and 3 at the back side of the display.

2. Press function key "F" and keep it pressed until "PA" is shown.

3. Press arrow up until the figures "99" can be seen.

4. Press "F" until "UC" is shown.

5. Press arrow up until figure "5" can be seen.

6. Press "F" and "C.L" can be seen on the display (calibration for the lowest measuring value).

7. Move the roll to the position where the value shall be at the lowest. Confirm by pressing function key "F" once and now "CH", calibration for the highest value, will be shown.

8. Move the roll to the position where the value shall be at the highest and confirm by pressing function key "F".

9. To leave the calibration menu and come back to the usual length measuring function, keep function key "F" pressed for two seconds and the length measuring value will be shown.

10. If the display shows "Hi" or "Lo" it is out of the measuring range, or it is counting in the wrong way.
    Change the wires on connections 1 and 3 at the back side of the display.

Start with step 2 again for a new calibration.

Changing the parameters

1. Unlock the keyboard, please see the instruction "Locking and Unlocking the keyboard".

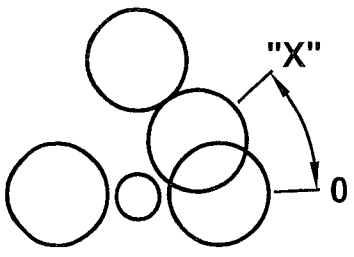
2. Press function key "F" and keep it pressed until "In" can be seen.

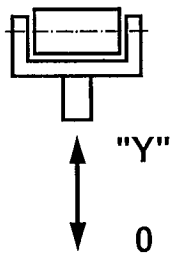
3. Press function key "F" once and "t P" will be shown.

4. Raise or lower with the "Arrow up or down"-keys for right numerical parameter. Please see table below.

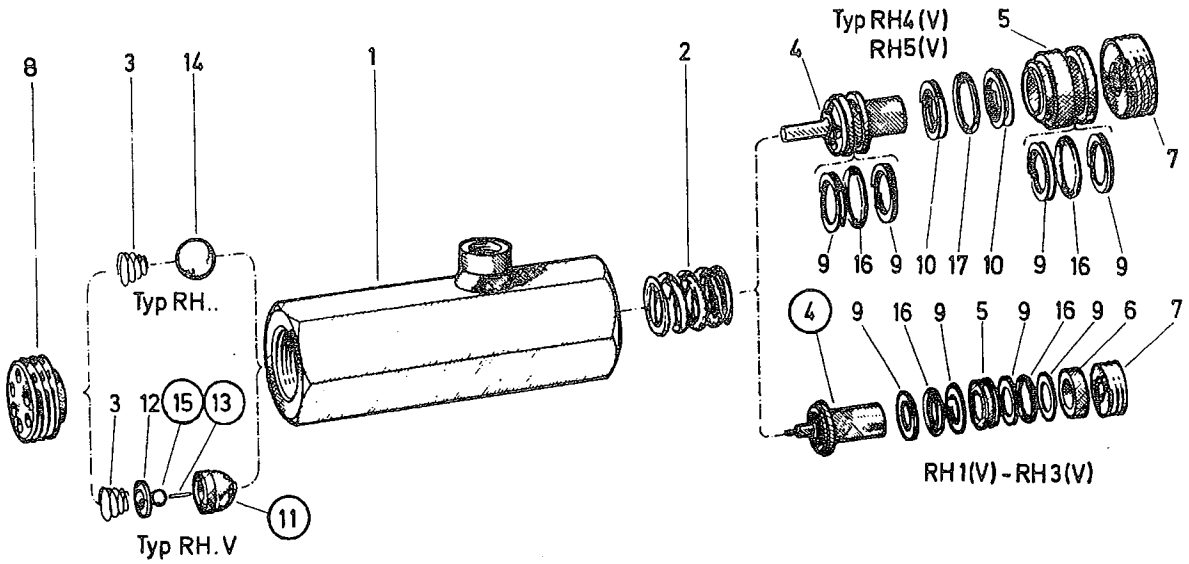
t P = 52	Type of signal
C.I. = 3	Sampling time
F.t = 0	Digital Filter, main input
F.d = 0.5	Digital Filter, process ver.
d.P. = 0	Decimal point pos.
L.S = 0	Lowest value of the scale
H.S = "X" or "Y"	Highest value of the scale
O.F = 0	Offset correction
t.u. = 0	Function for raise key
t.d. = 0	Function for lower key
L.L. = 0	
H.L. = not used	

Keep function key "F" pressed for two seconds and the length measuring will be shown.





Machine	"X"	"Y"
PSE 110, PSE 150 R-1 - R-2-S	400	---
PS 205 - PS 320 R-3 - R-4-S	600	400
PS 340 - PS 420 R-5 - R-62-S	800	800
PS 460 - PS 550 R-7-S - R-10-S	1200	1000
PS 600 R-11-S	1600	1000
R-13-S	1800	1000
R-15-S		1200

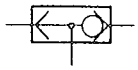


1. Gehäuse kompl	Housing complete	Ventilhus
2. Druckfeder	Pressure spring	Tryckfjäder
3. Feder	Spring	Fjäder
4. Kolben	Piston	Kolv
5. Distanzring	Spacer	Distansring
6. Ring	Ring	Ring
7. Gewindering	Threaded ring	Gängring
8. Gewindebüchse	Thread bushing	Gängbussning
9. Stützring	Support ring	Stödring
10. Stützring	Support ring	Stödring
11. Kugelkolben	Ball piston	Kulkolv
12. Scheibe	Plate	Skiva
13. Stößel	Pin	Stift
14. Kugel	Ball	Kula
15. Kugel	Ball	Kula
16. O-Ring	O-ring	O-ring
17. O-Ring	O-ring	O-ring

Shuttle Valves Type WV

1. General

The shuttle valve is a check valve featuring two blockable inlets and one outlet. The feed end with the higher pressure is connected with the outlet, the second inlet flow thus being blocked (DIN 24 300). The valve functions automatically.

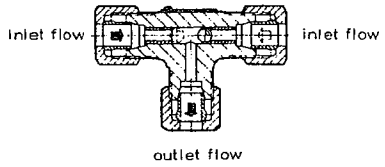


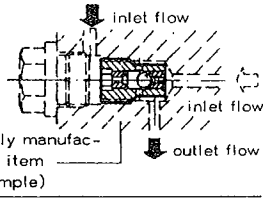
2. Characteristics

2.1. Main Data

	for pipe mounting						for screwing into auxiliaries, e.g. base plate
Types and designation for ordering	WV6-S	WV8-S	WV10-S	WV12-S	WV14-S	WV16-S	WVC-1
maximum flow approx. l/min	6	15	25	40	60	100	6
max. press. bar	315						315
Pipe outer dia. mm	6	8	10	12	14	16	Screw-in cartridge
	Precision tube, seamless, DIN 2391 and 1629, Sheet 4						
Weight g	120	170	225	290	320	390	7

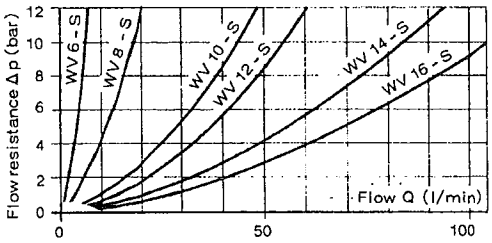
Diagrammatical section

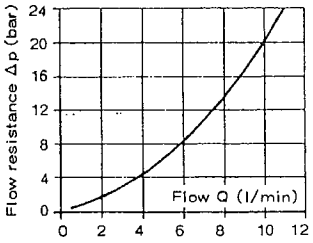




Δp - Q characteristic curves

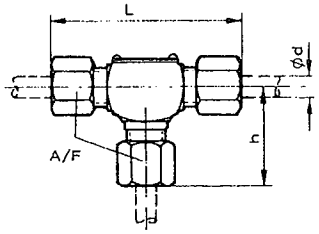
Oil viscosity during test: 65 mm²/s



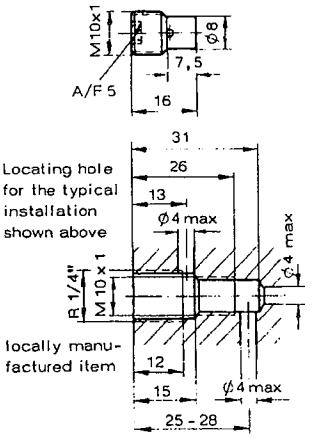


Dimensions of units

All dimensions are in mm; subject to change without notice



Type	WV 6-S	WV 8-S	WV 10-S	WV 12-S	WV 14-S	WV 16-S
L	62	64	68	76	80	86
h	31	32	34	38	40	43
ϕd	6	8	10	12	14	16
A/F	17	19	22	24	27	30

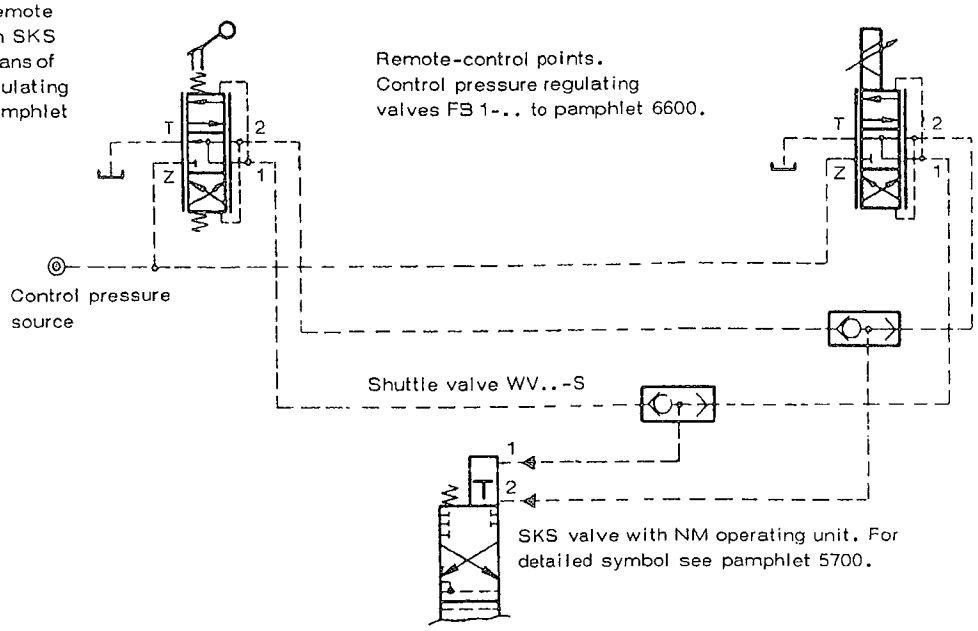


2.2. Further Data

Design	seated ball valve
Installed position	as required; carried by the piping (WV) or screwed into the auxiliary equipment (WVC)
Pipe connection	In the case of the WV type, connection is made in the normal manner used for cutting-ring connectors. The fitting instructions of the manufacturers, e.g. ERMETO, should be observed.
Pressure fluid	Hydraulic oil 9 ... 68 mm²/s at 40 to 50°C Viscosity range: limiting values at approx. 4 and 1500 mm²/s opt. operation approx. 10... 500 mm²/s
Temperatures	Oil and ambient: - 40 to + 80°C; note viscosity limitations.

3. Typical Application

Combined remote control of an SKS valve by means of pressure regulating valves to pamphlet 6600.



Atos spa
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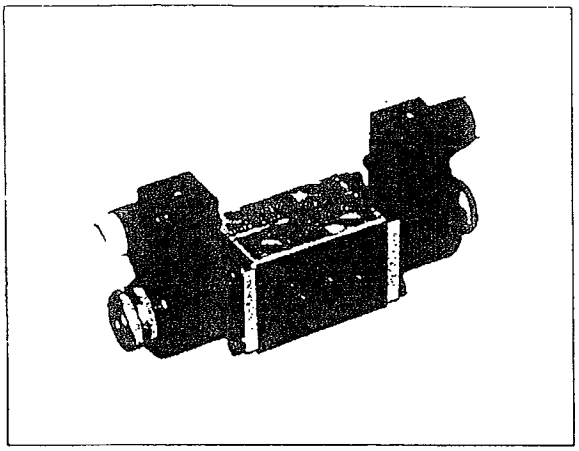
via alla Piana 57 - Telex 332471
☎ 0331 922078 - Fax 920005

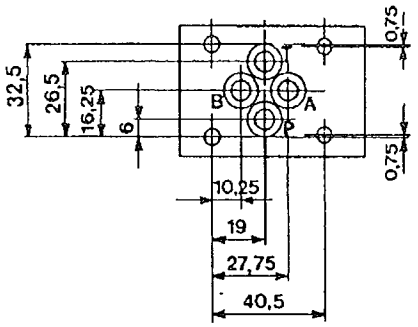
Solenoid operated directional control valves type DHI

direct operated - Cetop 03 interface - design 10



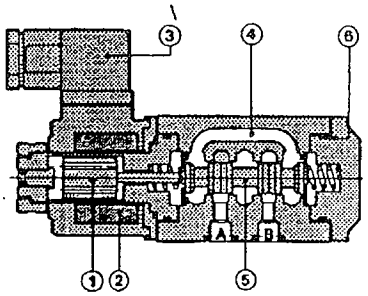
The new hydraulic directional control valves type DHI are spool type, direct operated, solenoid valves.
They are 3 or 4 way, 2 or 3 position, suitable for subplate mounting according to CETOP 03 standard, for max flows up to 50 (75) l/min (see note 6) and max operating pressure up to 320 bar.
Solenoid valves can be equipped with new electric and/or electronic connectors able to satisfy the requirements of modern machines for electric interfaces and switching characteristics.

DHI mounting surface CETOP 03



Interface seals: 4 off OR 108
Fastening bolts: 4 off M5x50
Ports: Ø 7,5 mm (max)

SCHEMATIC CROSS SECTION



① Wet solenoids: moving parts are protected, lubricated and cushioned in oil.
② Coils easily replaceable without the aid of special tools or exposure of valve internal parts.
③ Adjustable and independent standard electric/electronic connectors.
④ Moulded oil passages, largely cored with extrawide channels to tank.
⑤ Interchangeable spools for a wide variety of configurations.
⑥ All seals are static.

RATINGS AND SPECIFICATIONS

Mounting surface: CETOP 03

Max recommended flow P→A and P→B	50 l/min
Max recommended flow A→T and B→T	75 l/min
Max recommended pressure on P-A-B ports	320 bar
Max recommended pressure on T port	100 bar

Electric power supply
The valves have highly reliable solenoids which are suitable for direct current (DC) or alternating current (AC) electric supply, in accordance with the coils and connectors used: see the following notes on connectors and note 7, electric features.

Electric and electronic connectors
The valves are equipped with electric or electronic connectors for the proper interface to the electric supply system.

Electric connectors:
SP-666 standard connector, suitable for connection to direct current (DC) or rectified current (RC) or alternating current (AC) electric supply system.
SP-777 as above SP-666, but with built-in signal lamp, for connection to direct current (DC) or rectified current (RC) or alternating current (AC) electric supply system.
SP-999 with built-in rectifier bridge for supplying DC coils by alternating current (AC).

Electronic connectors (see table G410 and note 7 electric features):
E-SA improve performances and give faster shifting times of DC sol. valves supplied by AC electric system.
E-SE improve performances and reduce power consumption of DC solenoid valves supplied by DC electric system.
E-SR permit the switching of AC or DC solenoid valves by a low power signal (max 20 mA).
E-SD eliminate electric disturbances when AC or DC solenoid valves are switched off.
Note: disturbances suppressor devices, similar to E-SD, are, as standard, built in all E-SA, E-SE, E-SR.

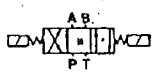
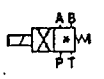
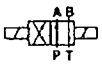
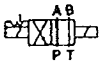
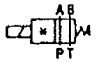
NOTES
DHI solenoid valves are available with:
1) Interchangeable standard spools, for a wide variety of connection configurations.
2) Various spool-spring configurations (spring centered, no springs, detented, spring off-set).
3) Standard or extended manual override pin protected by rubber cap and appropriate sealing (option /WP)

MODEL CODE

D H I – 06 3 1/2 /A – N 24 DC /10 /WG

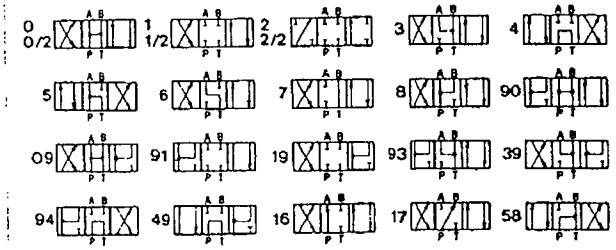
- D: directional control valves, subplate mounted
- H: size: H = CETOP 03
- I: type of solenoid: I = solenoid OI
- 06: 06 = single solenoid; 07 = double solenoid
- 3: spool-spring arrangements:
  0 = no springs
  1 = spring centered
  3 = spring off-set (external positions)
  5 = detented (external positions)
  6 = detented (centre and external positions)
  7 = spring off-set (centre and external positions)
- 1/2: spool type (table A)
- /A: options:
  A = solenoid mounted on port «B» side (only for single solenoid valves). Standard type, with solenoid mounted on port «A» side does not require indication in the code.
  WP = extended manual override pin (protected by rubber cap)
- N: type of electric/electronic connector
  N = SP-666; A = E-SA
  P = SP-777; E = E-SE
  Q = SP-999; D = E-SD
  X = without connector; R = E-SR
  see note on connectors (first page)
- 24 DC: electric system supply voltage: Volt
  12, 24, 48, 110, 220 DC or RC
  110/50, 115/60, 220/50, 230/60 AC
  DC = direct current
  AC = alternating current
  RC = rectified current
  00 = valve without coils
  see note 7
- /10: design number, subject to change Installation dimensions unchanged from 10 thru 19
- /WG: special seals (omit if not required) for fire resistant fluis:
  WG = water glycol
  PE = phosphate ester

SYMBOLS AND DESIGNATION

Symbol (**)	DHI	Symbol (**)	DHI
	DHI-071*		DHI-061*
	DHI-070*		DHI-061*/A
	DHI-075*		DHI-067*
	DHI-063*/2		DHI-067*/A
	DHI-063*/2/A		

(*) The code of the valve has to be completed with the digit (1, 2, 3, etc.) indicating the spool type-number (see «TABLE A - Spool Types»).
(**) The symbol doesn't show the hydraulic connection in centre position because it depends by the spool type as shown in TABLE A.

TABLE A - SPOOL TYPES



Notes:

1) Spools type 0/2, 1/2, 2/2 are only used for 2 positions, single solenoid valves, operating on the spool external positions (DHI-63*/2).
2) Spools type 0 and 3 are also available as 0/1 and 3/1, where in centre position oil passages from user to tank are reduced.
3) Spools type 1, 4 and 5 are also available as 1/1, 4/8 and 5/1. They are appropriately shaped, to reduce water-hammer-shocks, during the intermediate passages from external to centre position, with positive overlapping on 1/1 and negative overlapping on 4/8 and 5/1.
4) Spools type 1, 3, 8 and 1/2 are available as 1P, 3P, 8P and 1/2 P for limited internal leakages. These spools are normally used on pilot valves.
5) On request, other types of spools are available.

INSTALLATION AND DUTY RULES

1 **Installation**

DHI spring off-set, spring centered and detented valves can be installed in any position. The valves type DHI-70* (no spring), when operated by impulses, must be installed with their longitudinal axis horizontal.
Sealing between valve and mounting subplate assured by O-rings supplied with the valve. When a subplate is not used, a machined pad must be provided for mounting, having surface finish with flatness 0,01/100 and roughness $\sqrt{0.4}$.

2 **Fluid and temperature range**

The valves operate with good quality hydraulic oil containing the necessary additives (anti-wear, anti-frothing, anti-oxidizing agents).
The recommended range of viscosity lies between 2.8 and 380 cSt (2.3 to 50°E); in average conditions of employment an oil having a viscosity of 24 cSt (3.5°E) at 50°C is recommended.
Fluid temperature: the maximum fluid temperature recommended is 70°C; higher temperature would result in a rapid damage of the seals.
Filtration: a fluid filtration of 25 microns in absolute value is recommended.
The use of fire resistant fluids requires special seals (to be indicated in the model code).
Ambient temperature range -20 up to +70°C.

3 **Electric wiring**

Electric wiring is done on adjustable, fully insulated, plug and socket connectors.
The wiring can be done on the plug indipendently of the valve situation. The coil can be rotated on its axis when the locking nut is released.

4 **Operation**

Energizing solenoid port «A» side the hydraulic connections are: P→B, A→T except for DHI-0714 and DHI-0715 where the connections are P→A, B→T and for DHI-067* where, by energizing the solenoid, the spool is driven to centre position.
On type DHI-6**, solenoid is normally mounted on the port «A» side.

5 **Working limits**

In the table here besides are given, for some typical spools and values of operating pressure, the max recommended flow rates for a correct valve operations.
For the DHI version with E-SA, E-SE, E-SR connectors the max. operating frequency is 2 Hz.

6 **P-Q performance table for DHI valves in standard operating conditions (voltage supply: nominal voltage less 10%).**

The pressure and flow rate values are referred to inlet port «P». On the return line, port «T», a flow rate 1.5 times greater than the max value on «P» is allowed.
For spool type «9» the working limits correspond to 40% of the values indicated for the principal spools.
For spools type 1P, 3P, 8P and 1/2P the max. recommended flow on P port is 25 l/min.

Model and spool type \ P (bar)		100	210	320
DHI-A (*)	0, 0/2, 1, 1/2, 8	50 l/min	50 l/min	25 l/min
DHI-**		50 l/min	50 l/min	12 l/min
DHI-A (*)	3, 4, 5 6, 7	50 l/min	50 l/min	25 l/min
DHI-**		50 l/min	25 l/min	12 l/min
DHI-A (*)	2, 2/2	25 l/min	18 l/min	9 l/min
DHI-**		18 l/min	9 l/min	–

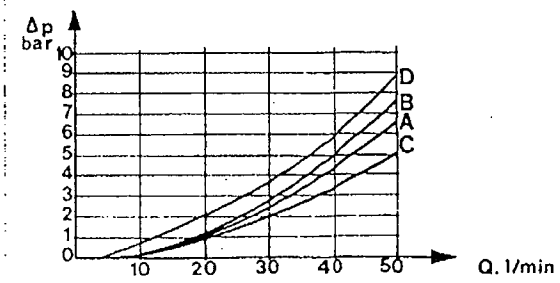
(*) With E-SA connector ** With other connectors

7 **Electric features**

Valve	Electric system supply	Power consumption (1)	Nominal voltage (5) (6)	Type of coil (*)	Color of the coil label
DHI-0***-N DHI-0***-P	DC or RC	24 W	12 DC 24 DC 48 DC	SP-COU 12 DC SP-COU 24 DC SP-COU 48 DC	green red silver
DHI-0***-E	DC	7 W (2)	12 DC 24 DC	SP-COU 6 DC SP-COU 12 DC	brown green
DHI-0***-N DHI-0***-P	AC	50 VA (3)	110/50 AC 115/60 AC 220/50 AC 230/60 AC	SP-COI 110/50 AC SP-COI 115/60 AC SP-COI 220/50 AC SP-COI 230/60 AC	yellow white sky-blue grey
DHI-0***-A	AC	55 VA (4)	110 → 125 AC (7) 220 → 250 AC (7)	SP-COU 24 DC SP-COU 48 DC	red silver
DHI-0***-Q	AC	30 VA	110 → 115 AC (7) 220 → 230 AC (7)	SP-COU 110 DC SP-COU 220 DC	gold blue

(*) Protection class: H; Duty cycle: 100%
(1) Values based on tests performed with the fluid temperature of 50°C and the ambient temperature of 20°C.
(2) In a cycle, where the solenoid is energized/de-energized in 1 second (1 Hz), the average power consumption is 7 W; for longer cycles, the power consumption is less than half this value.
When the solenoid is energized the inrush current value is 6 A at 12 V DC and 3 A at 24 V DC, corrisponding with a peak of power consumption of 72 W.
These current peaks persist for a period shorter than 50 msec and they must be considered when the electric circuit is designed.
(3) When the solenoid is energized, an inrush current of approx 3 times the holding current value flows in the coil. Inrush current values persist for few msec. and correspond with a power consumption of 130 VA.
(4) When the solenoid is energized the inrush current value is 4.6 A at 110 V AC and 2.3 A at 220 V AC: the peak of power consumption is 500 VA; these current peaks persist for a period shorter than 40 msec and they must be considered when the electric circuit is designed.
(5) Tolerance on the nominal voltage is –10% +5%.
(6) On request, other voltage values are available. (7) Electric frequencies can be 50 Hz as well as 60 Hz.

8 **ΔP/Q Characteristics**



spool type \ flow direction	P·A	P·B	A·T	B·T	P·T
0, 0/2	C	C	C	C	B
1, 8	A	A	A	A	–
1/2, 2, 2/2	B	B	B	B	–
3, 6, 7	A	A	C	C	–
4, 5	D	D	D	D	A

(*) Based on fluid viscosity of 24 cSt (3.5°E) at 50°C

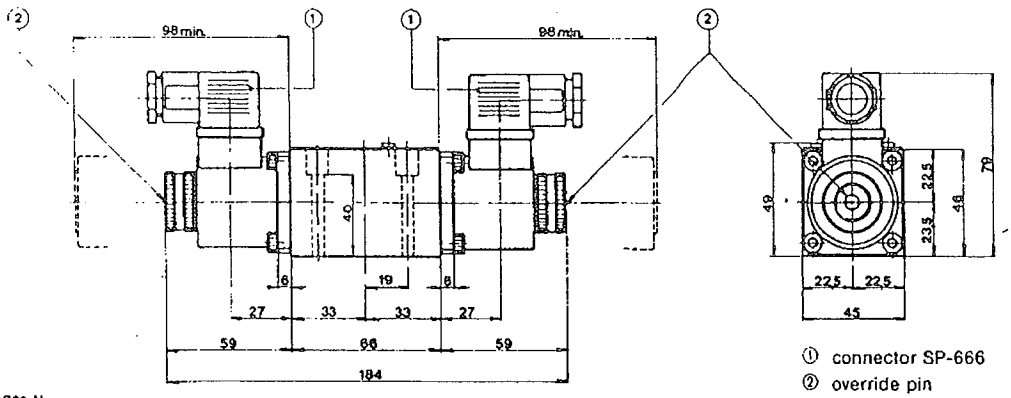
9 Switching times (average values)

	energizing (AC)	energizing (DC)	de-energizing	
DHI-0***-N, -P	30 msec	45 msec	20 msec	**Test conditions:**
DHI-0***-Q	45 msec	–	80 msec	**– 36 l/min - 150 bar**
DHI-0***-A	20 msec	–	40 msec	**– nominal voltage**
DHI-0***-D, -R	30 msec	45 msec	50 msec	**– mineral oil: 24 cSt (3,5°E) viscosity at 50°C**
DHI-0***-E	–	30 msec	40 msec	

The response time is affected by the elasticity of the hydraulic circuit, by the variation of the hydraulic characteristics and temperature. For further information and for different values of the response time please consult ATOS technical office

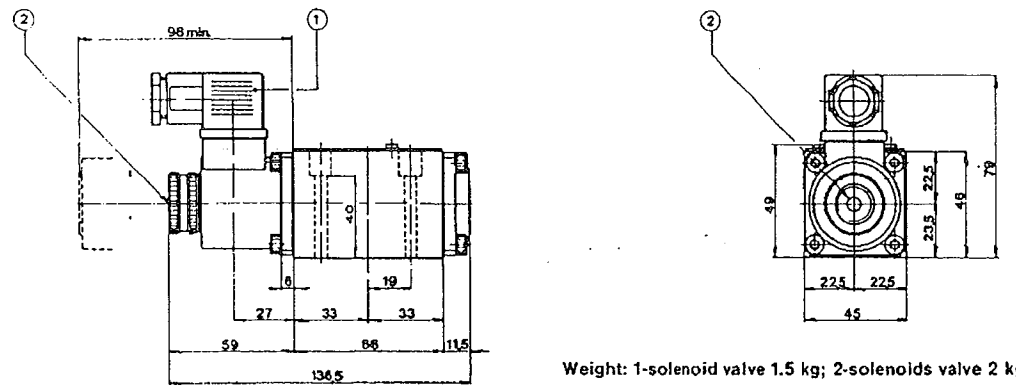
INSTALLATION DIMENSIONS (mm)

DHI-07**-N



① connector SP-666
② override pin

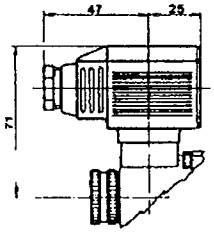
DHI-06**-N



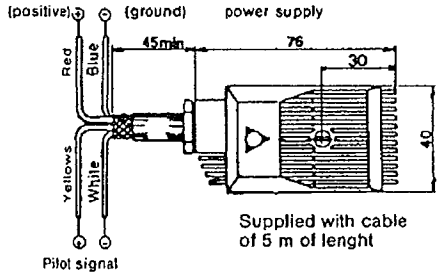
Weight: 1-solenoid valve 1.5 kg; 2-solenoids valve 2 kg

Note: The quoted height dimensions are for valves fitted with the standard electrical connector SP-666; with E-SD, SP-777, SP-999 connectors the height is increased by 12 mm; with E-SR connectors the height is increased by 18 mm; for dimensions and electric connections for E-SA, E-SE connectors see also table G410.

E-SA, E-SE

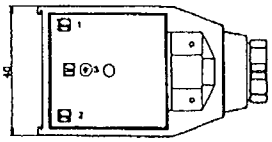


E-SR

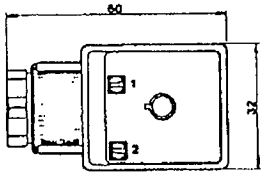


Supplied with cable of 5 m of lenght

E-SA, E-SE



E-SD



E-SA, E-SD

for AC supply 1, 2 = supply voltage
3 = coil ground

E-SE, E-SD

for DC supply
1 = + (positive)
2 = – (negative)
3 = coil ground

MOUNTING SUBPLATES

Subplate type	Port position	Ports A-B-P-T BSP	Ø counterbore mm	Weight kg
BA - 102	A-B-P-T on the bottom	1/4"	19	1,2
BA - 202		3/8"	23	1,2
BA - 302		1/2"	27	1,8
BA - 204	A-B on a side P-T on the bottom	3/8"	23	1,8

6/86 The subplates are supplied with 4 bolts M5x50. For further details see table K320

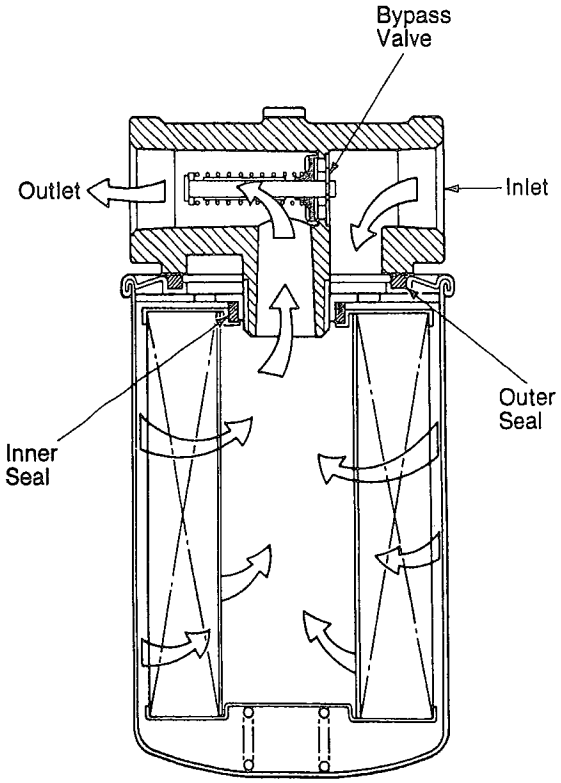
Parker Fluidpower

FILTER

12PS, 22PS, 32PS and 42PS

452

Spin-on Filters for low pressure in-line filtration



- Glass fibre or paper element media
- Spin-on disposable canisters
- Flow rates to 350 l/min
- 10 bar maximum working pressure
- Suitable for suction & return line applications
- Available with or without bypass
- Visual or electrical indicator options

Specification

Filter Model	Max. Flow (l/min.) 10 CT media		Max. Flow (l/min.) 10 BT media		Weight kg	Ports	
	Return	Suction	Return	Suction		BSPF	SAE Flange Face
12-PS	75	35	65	30	1.2	¾	—
22-PS	160	80	180	90	3.4	1¼	—
32-PS	350	160	350	160	6.1	1½	—
42-PS	350	160	350	160	10.5	1½	1½

Maximum working pressure: 10 bar.
Operating temperature: −30°C to 110°C.
Seals: Buna (nitrile).
Filter head material: Aluminium alloy.
Filter bowl material: Steel.
Fluids: Compatible with hydraulic oils, coolant fluids & petroleum-based fluids.

Element media: 10CT — 10 micrometre nominal filtration. (resin impregnated cellulose).
10BT — 10 micrometre absolute filtration. (glass fibre composite material).

Indication: Visual — 42mm dia gauge. (0 to 12 bar. Return line). (0 to 76 cm.Hg. Suction line).
Electrical switch — 240v, 50 to 60 Hz, 2A MAX current. (Normally open or normally closed).

Transmission applications: The no bypass options RX and SX are available on all filter models.

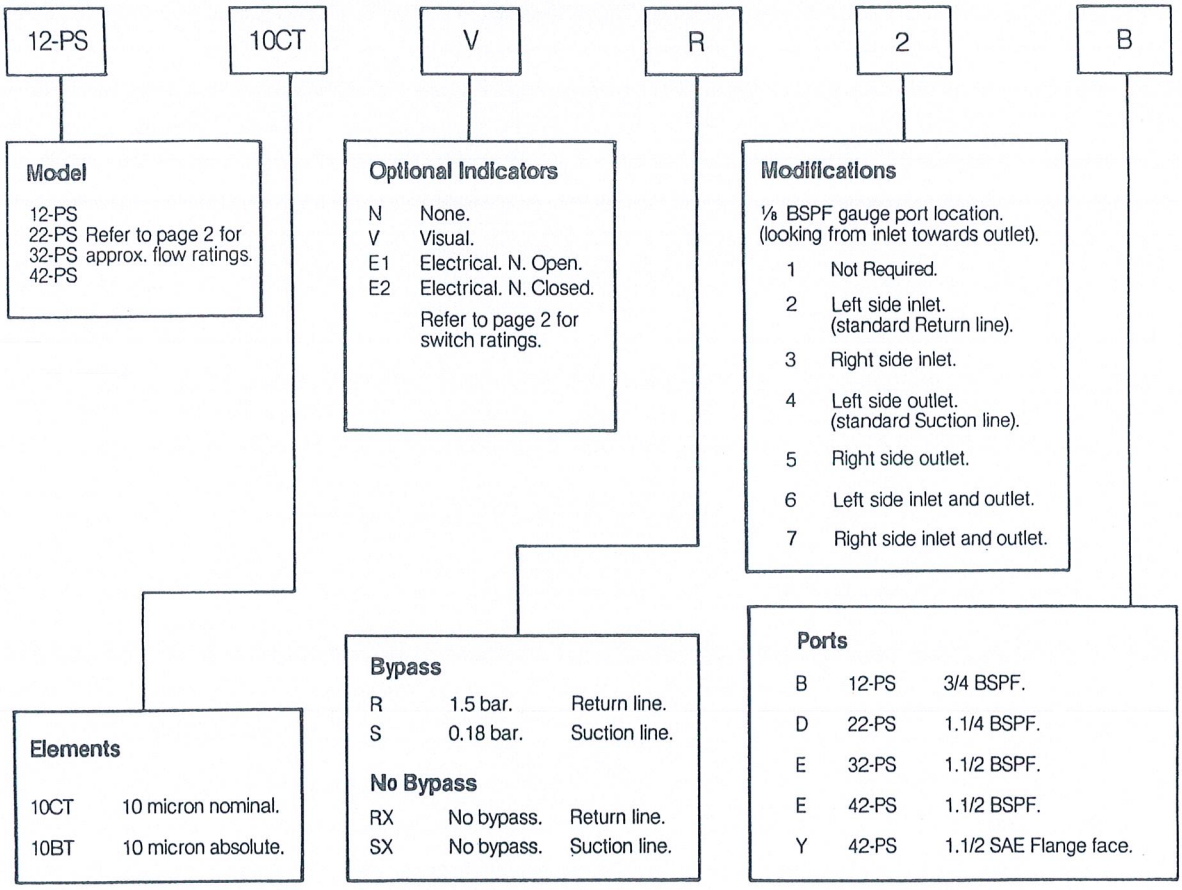
Parker Hannifin (UK) Limited • Fluidpower Service Centre
Greycaine Road • Watford WD2 4QA • ✆ Watford (0923) 44377 • Telex 23765

Parker Fluidpower

FILTER
12PS, 22PS, 32PS and 42PS

How To Order

Select the features required from the boxes below.
The example shown should be ordered as:
12-PS-10CT-V-R-2



Replacement Element Part Numbers

12-PS		22-PS		32PS (2 Req'd)		42PS (2 Req'd)	
10CT	10BT	10CT	10BT	10CT	10BT	10CT	10BT
921166	926501	926502	926503	926502	926503	926502	926503

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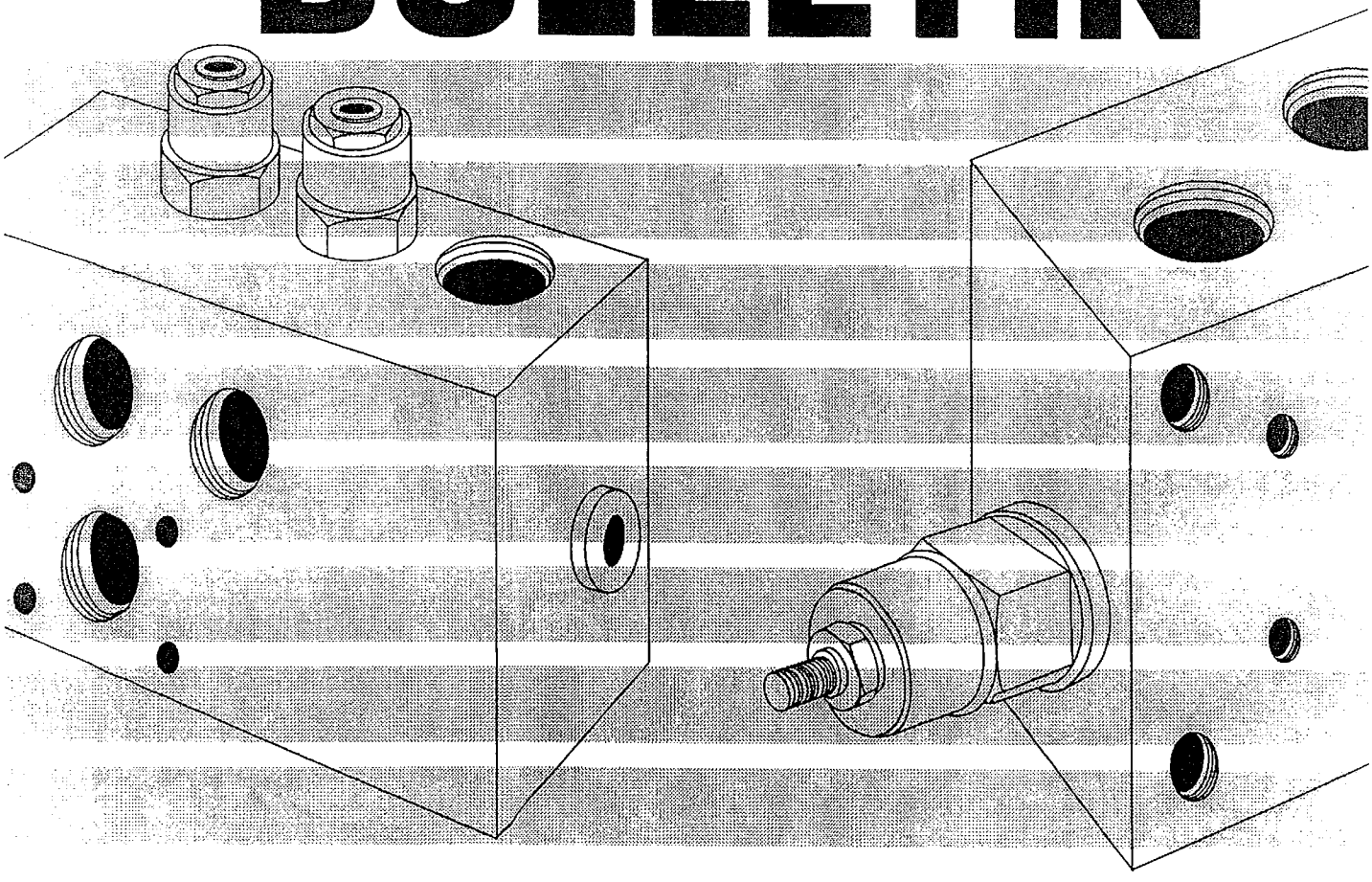
473

SUN SERVICE BULLETIN



sun hydraulics® LIMITED

Wheler Road
Coventry CV3 4LA England
Telephone: (01203) 307696
Fax: (01203) 307082

Service Instructions

Sun cartridges are basic service items; they are easily removed from their mounting in the cavity for cleaning or replacement. It is not necessary to remove an entire Sun valve assembly, i.e. cartridge/body assembly, from the circuit piping or solenoid valve stack. Simply unscrew the Sun cartridge from its mounting configuration for trouble shooting or replacement.

NOTE: Before removing any Sun cartridge from its mounting, first refer to the equipment manufacturers' service documentation for recommendations relating to precautions for securing any moving elements associated with the equipment. (If documentation does not exist, ensure that all loads are adequately supported before performing any service work.)

While considered service items, Sun cartridges are not designed to be disassembled in the field. If, for any reason, a Sun cartridge does not perform as required, follow the trouble shooting steps that follow. If the cartridge still does not function, it should be replaced with a new, factory–tested Sun cartridge. *Non–functioning cartridges should be returned to Sun through your local distributor for evaluation. A full report of our findings will be issued on request.*

Service Kits

Sun Service Kits contain replacement parts for all external seals on cartridges and sandwich bodies. Additionally, service kits are available for field retrofit of various removeable control options for Sun cartridges.

Detailed information on the sizes and locations of external seals are provided in this bulletin. Service kits are arranged according to cavity, with an accompanying listing of Sun cartridges that fit a specific cavity.

Trouble Shooting

The most common cause of failure of a Sun cartridge is dirt in the hydraulic fluid, which can then lodge in the working parts of the cartridge and interfere with their operation.

If necessary, most Sun cartridges can be easily cleaned without altering their settings. To clean a Sun cartridge that is not functioning, follow these steps:

1. First refer to the equipment manufacturers' service documentation for recommendations relating to precautions for securing any moving elements associated with the equipment. (If documentation does not exist, ensure that all loads are adequately supported before performing any service work.)
2. Carefully de–pressurize the hydraulic system.
3. Remove the cartridge from its cavity.
4. Inspect the cartridge for visible contaminants and, if found, carefully remove any obvious particles.
5. Through the nose of the cartridge, manually operate the inner working parts several times. Use a piece of plastic tubing to avoid damaging soft seats, sharp edges, finished surfaces or the screen protecting the pilot orifice. All parts should move freely. If possible, this inspection should be done with the cartridge submerged in clean mineral spirits.
6. After flushing, blow dry the cartridge with clean, filtered air.
7. Replace any seals that are worn or damaged, using the appropriate Sun seal kit.
8. Dip the cartridge in clean hydraulic fluid, and then reinstall the cartridge and tighten to the specified torque and retest.
9. If this procedure does not eliminate the operational problem, replace the malfunctioning cartridge with new, factory–tested Sun cartridge.

Installation Torque Values

When installing Sun Cartridges, be sure to torque to values shown.

Series P	Series 1	Series 2	Series 3	Series 4
25 to 30 LB./FT. **30 to 40 Nm**	**30 to 35 LB./FT.** **40 to 50 Nm**	**45 to 50 LB./FT.** **60 to 65 Nm**	**150 to 160 LB./FT.** **200 to 215 Nm**	**350 to 375 LB./FT.** **465 to 500 Nm**
For cartridges with 22,0 mm hex M16 Thread	For cartridges with 7/8" hex (22,2 mm) M20 Thread	For cartridges with 1–1/8" hex (28,6 mm) 1"–14 UNS Thread	For cartridges with 1–1/4" hex (31,8 mm) M36 Thread	For cartridges with 1–5/8" hex (41,0 mm) M48 Thread
Cavities T–8A, T–9A	Cavities T–10A, T–11A T–13, T–21A T–31A, T–61A	Cavities T–2A, T–3A T–5A, T–22A T–32A, T–62A	Cavities T–16A, T–17A T–23A, T–33A T–63A	Cavities T–18A, T–19A T–24A, T–34A T–64A

Industry Standard O–Ring Reference

Sun Model Codes for O–Rings include the ARP568 Uniform Dash Number as part of the coding. For field repair when Sun Service Kits are not readily available, this information may prove useful.

O–Ring Model Codes are typically a nine–position code, where the 4th, 5th, and 6th position indicate the type of seal material and the 7th, 8th, and 9th position indicate the ARP568 Uniform Dash Number. Each seal kit has and early date reference included with the kit.

(Sun o–ring Part Number)

* * * * * * * * *

Seal Material

101 = 70 duro. Viton
102 = 90 duro. Viton
001 = 70 duro. Buna–N
002 = 90 duro. Buna–N

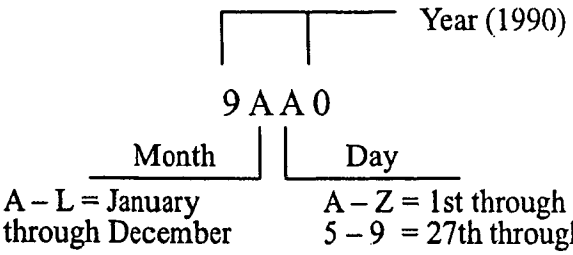
ARP568 Number

Manufacturing Date Code Reference for Cartridges and Bodies

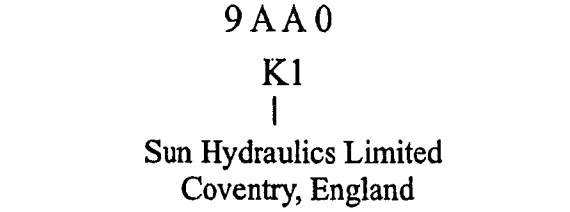
Sun date stamps all products to provide a means to track their production history. Date codes are stamped on one of the hex body flats on all cartridges, and on one surface of all standard bodies. Through 31 December 1985, Sun used a date code system that designated the calendar quarter in which a product was manufactured.

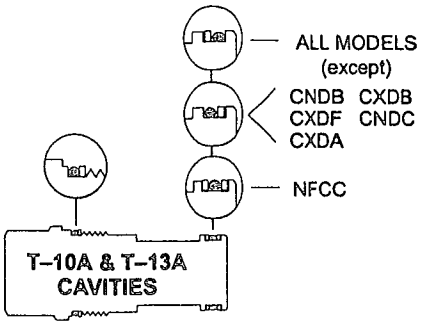
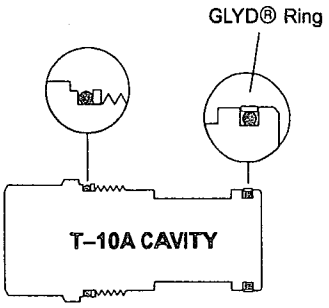
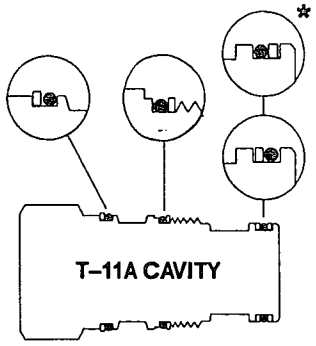
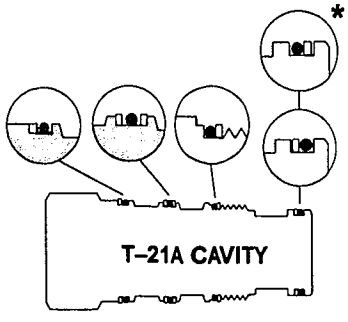
61 = January through March 1985
62 = April through June 1985
63 = July through September 1985
64 = October through December 1985

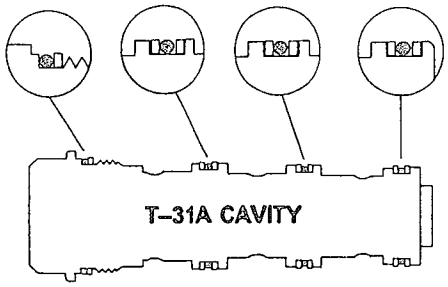
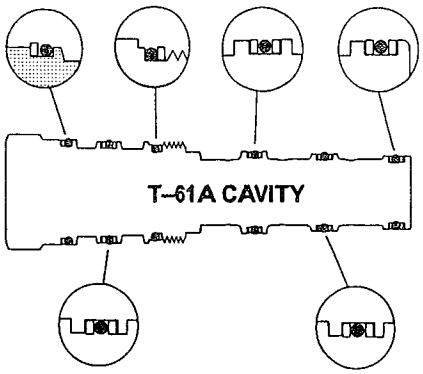
Beginning 1 January 1986, Sun used a date code system that designated the specific date of manufacture. For months, the letters **A** through **L** designate January through December. For days, the letters **A** through **Z** designate the 1st through 26th days, and the numbers **5** through **9** designate the 27th through 31st days.



Beginning 1 January 1994, Sun added a second line to its date code system to identify those products that are manufactured or assembled at our facility in Coventry, England. Any product with a **K1** stamped on the second line indicates it was either manufactured or assembled at our factory in England.



Cartridge Seal Kit Description and Number	Cartridge Model Code	Description
SERIES 1 Cartridges T–10A & T–13A Cavities **990–010–006 (VITON)** **990–010–007 (BUNA–N)**	***T–10A*** CNDB CXDB CXDF LREE RBAC RBAT RPEC RPEE RPET RQEB XFAA XFCA XFOA ***T–13A*** CDAC CNCC CNDC CDAA CSAA CSAC CXCB CXCD CXDA FCCB FDBA FLDA FQCA FXCA LRDE NCCA NCCB NCCC NCCD NFCB NFCC NKCB RDDB RPES SCCB SCDB XGAA XGCA	 990–010–006 **VITON SEALS** 1) 500–102–017 1) 500–102–015 990–010–007 **BUNA–N SEALS** 1) 500–002–017 1) 500–002–015 **BACK–UP RINGS** (supplied with above) 1) 515–002–016 2) 515–002–015
SERIES 1 Cartridges T–10A Cavity **990–310–006 (VITON)** **990–310–007 (BUNA–N)**	**RDDA** only	 990–310–006 **VITON SEALS** 1) 500–102–017 1) 500–101–014 990–310–007 **BUNA–N SEALS** 1) 500–002–017 1) 500–001–014 **BACK–UP RINGS** (Supplied with above) 1) 515–002–016 1) 530–102–015 GLYD® Ring
SERIES 1 Cartridges T–11A Cavity **990–011–006 (VITON)** **990–011–007 (BUNA–N)**	CACA CACG CACK CACL CBBA CBBB CBBC CBBD CBBG CBBH CBBY CBCA CBCB CBCG CBCH CBCY CCCA CDAB CDAD CKCA CKCB CKCC CKCD CKCE CKCF CKCG CKCH CKCI CKCL CKCV CNCD CNCE CNDE CODA CODB CODC CODD CODL CSAB CSAD CXCE CXDC DKDC DKDD DODC DODD DPBA DPBB DPBC DPBD DRBA* DRBB* DRBC* DRBD* DSCB DVBA DVBB DVBC DVBD FADA FBDA FRCA LKDA LKDB LKDC LKDD LKDO LODA LODB LODC LODD LODO LPDA* LPDC* LRCC LRDA LRDC PBDB* PPDB* PRDB* QPAA QPAB QPAC QPAD RBAD RHEA RSDC RVCA RVCB SCCA SCDA SQDB SXCA XEAA XEBA XECA XECB XEOA XEOB	 * Install nose end back–up and seal in reverse order. See balloon cross–section for details. 990–011–006 **VITON SEALS** 2) 500–102–017 1) 500–102–015 990–011–007 **BUNA–N SEALS** 2) 500–002–017 1) 500–002–015 **BACK–UP RINGS** (Supplied with above) 1) 515–002–017 1) 515–002–016 1) 515–002–015
SERIES 1 Cartridges T–21A Cavity **990–021–006 (VITON)** **990–021–007 (BUNA–N)**	CVCV CWCA CWCG CWCK CWCL DKDP DKDR DKDS DODP DODR DODS DPBM DPBN DPBO DPBP DRAX DRAY DRBR* DVBM DVBN DVBO DVBP FVCA PVDA* PVDB* QCDA* QCDB* QCDC* QCDD* RVCD XMCA XMOA XMOB	 * Install nose end back–up and seal in reverse order. See balloon cross–section for details. 990–021–006 **VITON SEALS** 1) 500–101–018 2) 500–102–017 1) 500–102–015 990–021–007 **BUNA–N SEALS** 1) 500–001–018 2) 500–002–017 1) 500–002–015 **BACK–UP RINGS** (Supplied with above) 1) 515–002–018 2) 515–002–017 1) 515–002–016 1) 515–002–015

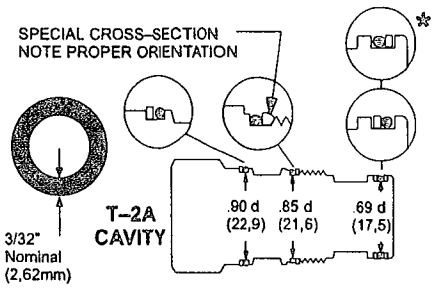
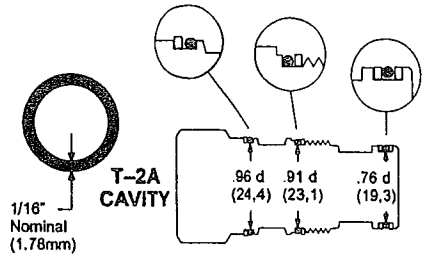
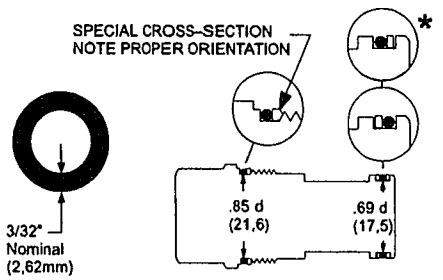
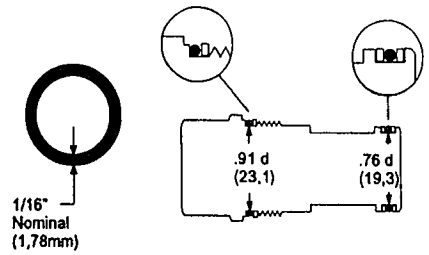
Cartridge Seal Kit Description and Number	Cartridge Model Code	Description
SERIES 1 Cartridges **T–31A Cavity** **990–031–006 (VITON)** **990–031–007 (BUNA–N)**	DSCH DSCS FSBA FSBD FSBS FSCA FSCD FSCH FSCS FSCT LHDA XRCA	 990–031–006 **VITON SEALS** 1) 500–102–017 1) 500–101–015 2) 500–101–014 990–031–007 **BUNA–N SEALS** 1) 500–002–017 1) 500–001–015 2) 500–001–014 **BACK–UP RINGS** (Supplied with above) 1) 515–002–016 2) 515–002–015 4) 515–002–014
SERIES 1 Cartridges **T–61A Cavity** **990–061–006 (VITON)** **990–061–007 (BUNA–N)**	DCCA DCCB	 990–061–006 **VITON SEALS** 2) 500–101–014 1) 500–101–015 2) 500–102–017 1) 500–101–018 990–061–007 **BUNA–N SEALS** 2) 500–001–014 1) 500–001–015 2) 500–002–017 1) 500–001–018 **BACK–UP RINGS** (Supplied with above) 4) 515–002–014 2) 515–002–015 1) 515–002–016 2) 515–002–017 1) 515–002–018

Series 2 Cartridge Seal Kit Information

During 1985, **SUN** made a design change to all external seals on then existing Series 2 Cartridges [1 1/8" (28,6mm) hex, 1"–14 thread]. The seals were changed ***from*** 3/32" (2,62mm) cross–section ***to*** 1/16" (1,78mm) cross–section O–rings and back–up rings. Series 2 Cartridges that were effected by this change fit the Sun T–2A three–port cavity and the Sun T–3A and T–5A two–port cavities. In recent years, Sun has included both cross–section seals in its T–2A and T–3A and T–5A service kits. While these combined kits are still available, if you are replacing seals on a cartridge that was manufactured from 1986 to present, you may purchase the kit that contains only the 1/16" (1,78 mm) seals.

It is imperative that the correct cross–section seals be used to guarantee the proper functioning of the cartridge being serviced. If the cartridge you are servicing is date stamped 1986 or later, the 1/16" (1,78 mm) seal kit should be used. if the cartridge is date stamped 1985 or earlier, it is recommended the kit containing both cross sections be ordered.

When replacing spiral back–up rings, take special care that the ***spiral is wound like a left–hand thread,*** so that the back–up ring will follow the cartridge into the cavity properly when being assembled. When installing continuous back–up rings, use the same technique and the same care used to install O–rings.

Cartridge Seal Kit Number and Description	Cartridge Model Code	Description
SERIES 2 Cartridges **T–2A Cavity** **990–102–006 (VITON)** **990–102–007 (BUNA–N)**	CAEA CAEG CAEK CAEL CBDA CBDB CBDC CBDD CBDG CBDH CBEA CBEB CBEC CBED CBEF CBEG CBEH CBEI CBEW CBEY CCEA CKEA CKEB CKEC CKED CKEE CKEF CKEG CKEH CKEI CKEV CNEE CNFE COFA* COFB* COFC* COFO CXEE CXFC DKFC DKFD DOFC DOFD DPCA DPCB DPCC DPCD DVCA DVCB DVCC DVCD FAFA FBFA FRDA FRDB FRDC FXDB LKFA LKFB LKFC LKFD LKFO LOFA LOFB LOFC LOFD LOFO LPFA* LPFC* LRFA LRFB LRFC PBFA* PBFB* PBFC* PPFA* PPFB* PPFC* PPFD* PPFE* RPGA RSFC RSFE RSFF RVEA RVEB RVEC RVEF SCEA SCFA SQFB SXEA XBAA XBBA XBCA XBOA * Install nose end back–up and seal in reverse order. See balloon cross–section for details.	3/32" (2,62 mm) Cross–section Seals  990–102–006 **VITON SEALS** 1) 500–101–118 1) 500–102–117 1) 500–102–115 990–102–007 **BUNA–N SEALS** 1) 500–001–118 1) 500–002–117 1) 500–002–115 **BACK–UP RINGS** (supplied with above) 1) 525–002–118 1) 550–004–002 1) 525–002–115
990–202–006 (VITON) **990–202–007 (BUNA–N)**		1/16" (1,78 mm) Cross–section Seals  990–202–006 **VITON SEALS** 1) 500–101–021 1) 500–102–020 1) 500–101–018 990–202–007 **BUNA–N SEALS** 1) 500–001–021 1) 500–002–020 1) 500–001–018 **BACK–UP RINGS** (supplied with above) 1) 515–002–021 1) 515–002–020 2) 515–002–018
990–002–006 (VITON) **990–002–007 (BUNA–N)**		***These kits contain both the 1/16" (1,78 mm) and 3/32" (2,62 mm) seal kits shown above. If you are unsure about which size seals you require, order the combination kit.***
SERIES 2 Cartridges **T–3A & T–5A Cavities** **990–103–006 (VITON)** **990–103–007 (BUNA–N)**	T–3A CNFB* CXFB* CXFD* CXFF* LRGE NKEA NQEB NQED RBAA RBAB RGFA RPGB RPGC RPGD RPGE RQGB RZEA XCCA XCOA T–5A CNEC CNFA* CNFC* CXEB CXEC CXED CXFA* CXFG DFDA DFDB FCAB FCDB FDCB FLFA FQEA FXDA LRFE NBFA NCEA NCEB NCEC NFDB NFDC NKEB RCFB XDCA * Install nose end back–up and seal in reverse order. See balloon cross–section for details.	3/32" (2,62 mm) Cross–section Seals  990–103–006 **VITON SEALS** 1) 500–102–117 1) 500–102–115 990–103–007 **BUNA–N SEALS** 1) 500–002–117 1) 500–002–115 **BACK–UP RINGS** (supplied with above) 1) 550–004–002 1) 525–002–115
990–203–006 (VITON) **990–203–007 (BUNA–N)**		1/16" (1,78 mm) Cross–section Seals  990–203–006 **VITON SEALS** 1) 500–102–020 1) 500–101–018 990–203–007 **BUNA–N SEALS** 1) 500–002–020 1) 500–001–018 **BACK–UP RINGS** (supplied with above) 1) 515–002–020 2) 515–002–018
990–003–006 (VITON) **990–003–007 (BUNA–N)**		***These kits contain both the 1/16" (1,78 mm) and 3/32" (2,62 mm) seal kits shown above. If you are unsure about which size seals you require, order the combination kit.***

COUNTERBALANCE CARTRIDGES

Three Port Counterbalance Valves (with Pilot–to–Open Assist) – CB*A (3:1), CB*G (4.5:1), CB*H (10:1)

The basic purpose of counterbalance valves is to convert negative (overrunning) loads into positive loads so that directional control valves always see a positive load. This greatly simplifies precise motion control. The performance parameters optimized in SUN's three port counterbalance valves (with pilot–to–open assist) are:

- Low leakage on closing. The maximum leakage test specification for new valves is 5 drops/min. leakage at 85% of pressure setting. Subsequent use can cause seat damage when contamination or shock are present in the system. Systematic replacement programs may be in order.
- Low relief valve hysteresis over a wide flow range.
- Good tolerance to oil–borne contamination.
- Very reliable and stable with both hot and cold oil.
- Operating pressures up to 350 bar.
- Flow capacities to 480 L/min.
- Available with 3:1, 4.5:1, or 10:1 pilot ratios (see note below).
- Adjustment screw can be used to lower setting, thus providing an emergency manual release when pilot pressure is not available.
- Optional check valve springs (2 bar is recommended to avoid normal shock damage and 0,3 bar to avoid cavitation).
- Intentional minor leakage past the pilot piston is standard on most valves to purge air from the pilot line and improve stability. Sealed pilot pistons are standard on some valves.

NOTE: The setting of counterbalance valves should be at least 1.3 times the load induced pressure. Valves should be selected accordingly.

NOTE: Counterbalance valves should have pressure adjustments set on a test stand if possible, as it is very hard to know how the valve is set when it is in a circuit (1.3 times the maximum load induced pressure should be the minimum).

NOTE: In general, lower pilot ratios provide better motion control and stability, especially on spongy systems (with high capacitance) and with high inertial loads (with high inductance).

NOTE: High pilot ratios generally provide adequate control of motors, (but hydraulically released "deadman" brakes should be used to lock static loads due to motor leakage).

NOTE: High pilot ratios improve hydraulic system efficiency (lower heat generation), sometimes at the cost of stability and motion control.

NOTE: Counterbalance valves should normally not be used in closed loop hydrostatic systems as they can cause overheating.

NOTE: SUN's three port counterbalance cartridges (with pilot–to–open assist) usually work well with the opening characteristics of most directional valve spools (which almost simultaneously open P to A and B to T). SUN's three port counterbalance valves (with pilot–to–open assist) generally work best with meter–in directional valve spools (that open B to T before opening P to A). Some meter–out directional valve spools essentially double the load on cylinders by adding pump pressure on top of already loaded cylinders before permitting oil to flow to tank through the counterbalance valve. In these cases, four port vented counterbalance cartridges (CW**) should be considered.

NOTE: System stability can almost always be improved by adding an accumulator in the pilot line (by keeping the pilot pressure steadier).

NOTE: System stability can always be improved by adding a meter–out restrictive flow control between the cylinder or motor port and the counterbalance valve (by reducing the metering required of the counterbalance valve).

NOTE: Counterbalance valves can be damaged by severe decompression shock. To prevent shock damage, add a restriction between the cylinder and counterbalance valve.

NOTE: Counterbalance valves are not low pressure devices. Energy cannot be saved by using larger valves. System pressures should generally exceed 50 bar.

NOTE: When counterbalance valves are physically mounted at or near the bottom of cylinders, it is wise to consider providing a pilot line filter, or, at least, a pocket where dirt in the pilot line can settle. Sludge (such as found in reservoir bottoms) can cause valves to seize. **Be thoughtful about valve placement.**

SUN Two Port Counterbalance Valves (Direct Acting Relief Valves with Reverse Free Flow Check) (Not yet catalogued in one cartridge. See RDDA and bodies with reverse free flow check valves on pages 11.19 and 12.011.)

SUN's direct acting relief valves with reverse free flow check are suitable for **counterbalancing constant fixed loads** where the valve can be set at 1.3 times the constant load induced pressure. Performance parameters optimized in SUN's RD*A direct acting relief valves are:

- Low leakage on closing. The test specification for new valves is 10 drops/min. leakage. Subsequent use can cause damage when contamination or shock are present in the system. Systematic replacement programs may be in order.
- Low hysteresis and low leakage on closing. Valves reseat with leakage less than 10 drops/min. at 90% of valve setting.
- Fast opening and closing (2 ms).
- Relative insensitivity to oil–borne contamination.
- Reliability on closing with cold oil and exceptional stability (no oscillation) with hot oil, pressure shocks, or back pressure.

NOTE: Pressure at port 2 (return) will be directly additive to the valve setting.

SUN Three Port Counterbalance Valves (Direct Acting Sequence Valves with Reverse Free Flow Checks) (SC*A–pages 2.12, 2.13)

SUN's direct acting sequence valves with reverse free flow check are suitable for **counterbalancing constant fixed loads** where the valve can be set at 1.3 times the

constant load induced pressure. Port 3 (control spring chamber drain) has been added to make the pressure setting insensitive to back pressure at port 2.

- Low leakage on closing. The test specification for new valves is 5 drops/min. leakage. Subsequent use can cause seat damage when contamination or shock are present in the system. Systematic replacement programs may be in order.
- Built–in reverse free flow check.
- Low hysteresis and low leakage on closing. Valves reseat with leakage less than 5 drops/min. at 85% of valve setting.
- Fast opening and closing (2 ms).
- Relative insensitivity to oil–borne contamination.
- Reliability on closing with cold oil and exceptional stability (no oscillation) with hot oil, pressure shocks, or back pressure.
- Zero pilot flow (nevertheless, the control chamber drain must not be plugged. See note.)

NOTE: Port 3 (control chamber drain) must be connected to maintain a pressure reference in the control chamber. If port 3 is blocked, seal weepage will eventually cause valves to malfunction. Pressure at port 3 will be directly additive to the valve setting.

SUN's Three Port Counterbalance Valves (Reducing/ Relieving Valves) (PP*B–pages 3.10, 3.11)

SUN's reducing/relieving valves are sometimes used to provide a constant force which, for example, can replace counterweights in vertical lifts. (See Technical Tips for reducing/relieving valves on page 3.02)

SUN's Four Port Vented Counterbalance Valves (with pilot-to–open assist) CW*A and CW*G

SUN's four port vented counterbalance cartridges (with pilot–to–open assist) are similar to SUN three port counterbalance valves but add port 4 (vent) as a drain port, which makes the valve insensitive to backpressure at port 2 when the valve is piloted open to allow oil to flow from port 1 (load) to port 2 (valve). Insensitivity to backpressure on port 2 (valve) makes this valve useful in regenerative circuits, with meter–out directional valves, with proportional and servo valves, and in some hydrostatic transmission circuits.

Performance parameters optimized in SUN's four port counterbalance cartridges are similar to three port counterbalance cartridges except that the valves are only available with 3:1 and 5:1 pilot ratios.

NOTE: Port 4 (vent) should never be plugged as seal weepage will eventually cause the valves to malfunction. Pressure at port 4 will be directly additive to valve setting.

Pressure Required to Lower Load

NOTE: The following equations are idealized. Back pressure at port 2 is excluded from these equations.

NOTE: Back pressure at port 2 adds to the effective setting at a rate of 1 plus the pilot ratio times the backpressure. *Example:* Using a 3:1 counterbalance valve with 14 bar of back pressure, the setting increase would be 55 bar.

Where:

L = Load induced pressure

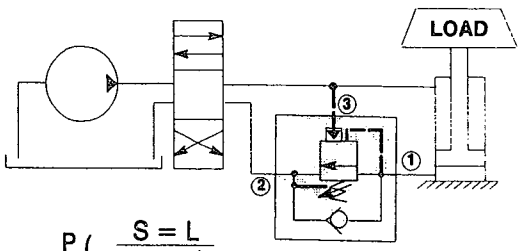
P = Pilot pressure required to lower load

P_R = Pilot ratio of valve (e.g. 3:1 = 3)

S = Setting of Valve

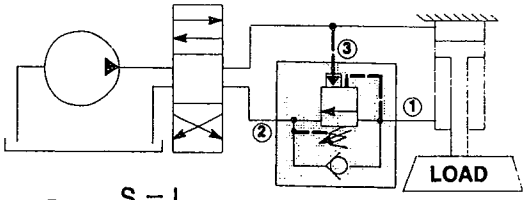
C_R = Cylinder Area Ratio = $\frac{\text{Bore Dia}^2}{\text{Bore Dia}^2 - \text{Rod Dia}^2}$

1) Counterbalance valve on the blind end of the cylinder with a load retracting the cylinder rod.



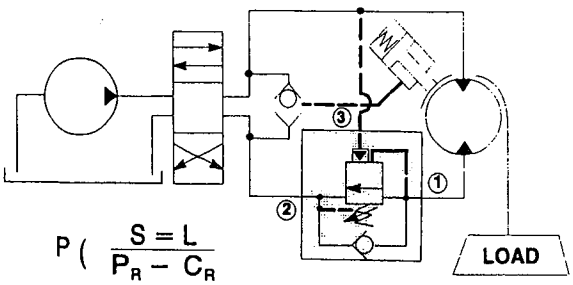
$$P\left(\frac{S = L}{P_R - \frac{1}{C_R}}\right.$$

2) Counterbalance valve on the rod end of the cylinder with a load extending the cylinder rod.



$$P\left(\frac{S = L}{P_R - C_R}\right.$$

3) Counterbalance valve on a motor or an equal area actuator with an overrunning load.



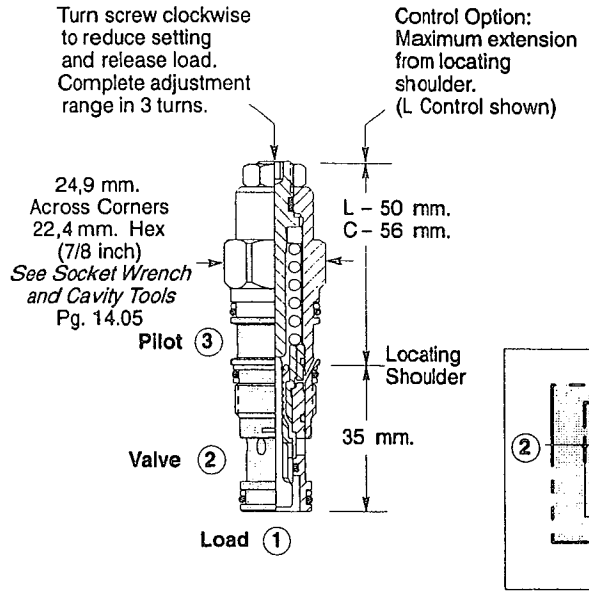
$$P\left(\frac{S = L}{P_R - C_R}\right.$$

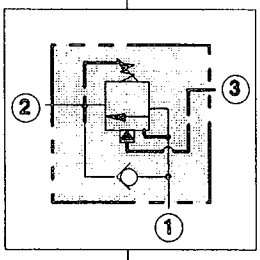
COUNTERBALANCE VALVE

Refer to page 4.02 for further technical information.

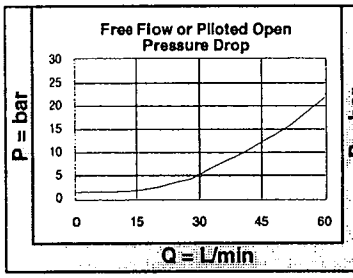
- 3:1 pilot ratio, load holding to 210 bar (with 280 bar setting).
- Load reactive pilot assist for overcentre load control applications.

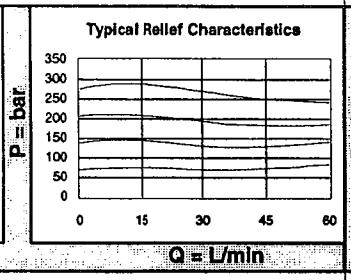
0 to 60 L/min Nominal
Series 1 Cartridge T–11A Cavity SB
Installation Torque 45 to 50 Nm





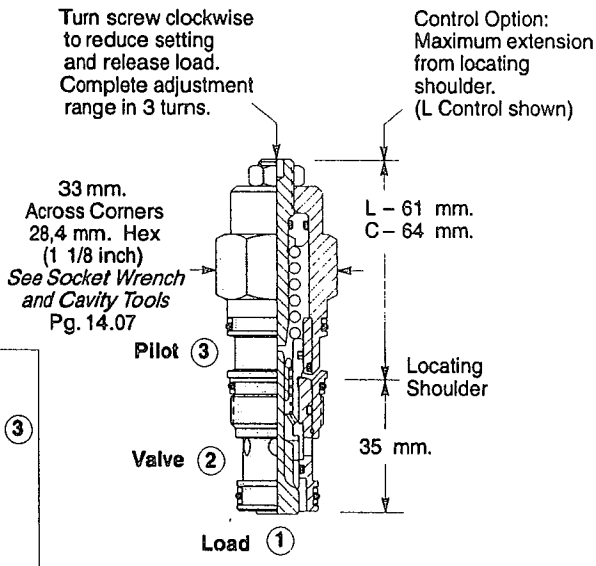
Back pressure at Port 2 may adversely affect operation of valve. (For circuits with back pressure, use CW*A).
Maximum leakage = 5 drops/min. at reseat with standard setting.
Reseat exceeds 85% of set pressure.



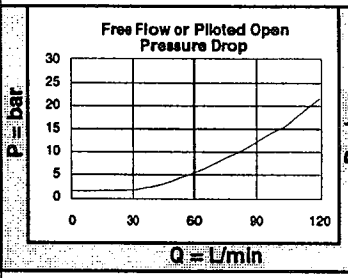


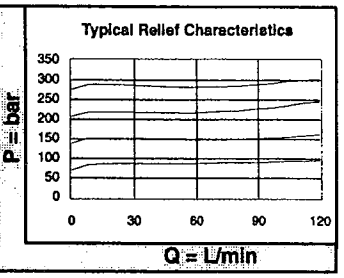
MODEL **CBCA–LHN** PRICE

0 to 120 L/min Nominal
Series 2 Cartridge T–2A Cavity SB
Installation Torque 60 to 65 Nm



Back pressure at Port 2 may adversely affect operation of valve. (For circuits with back pressure, use CW*A).
Maximum leakage = 5 drops/min. at reseat with standard setting.
Reseat exceeds 85% of set pressure.





MODEL **CBEA–LHN** PRICE

OPTIONS

CB * A – * * * – * * * / *
Basic cartridge from above

CONTROLS
See page xvi for more details on Optional Controls Listed on This Page

L Standard Screw Adjustment

Nonstandard Controls
C Tamper Resistant Factory Set

⊗ADJUSTMENT RANGES
GENERAL PURPOSES
(2 bar Cracking Pressure)
H 70 to 280 bar, 210 bar Standard Setting
I 25 to 105 bar, 70 bar Standard Setting

SPECIAL PURPOSES
(0,3 bar Cracking Pressure)
A 70 to 280 bar, 210 bar Standard Setting
B 25 to 105 bar, 70 bar Standard Setting

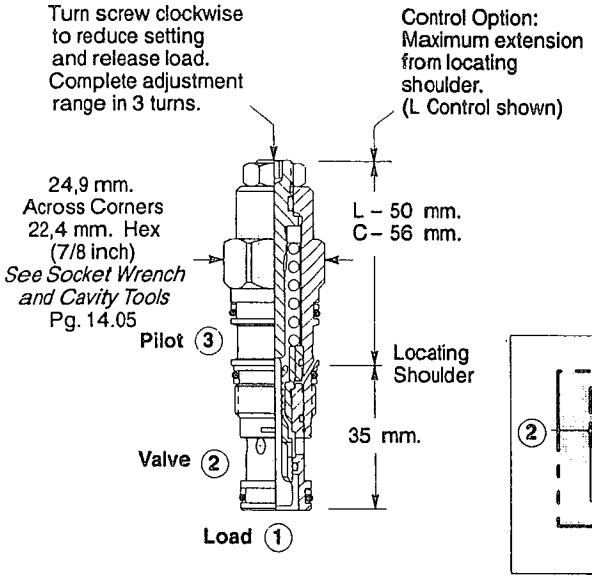
Customer Specified Setting Stamped on Hex
⊗ Setting should be 1.3 times maximum load induced pressure.

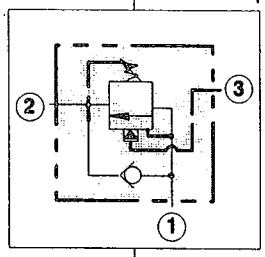
SEALS
N Buna–N
V Viton

BODY
Omit for Cartridge Only or See Body Locator Page 4.08

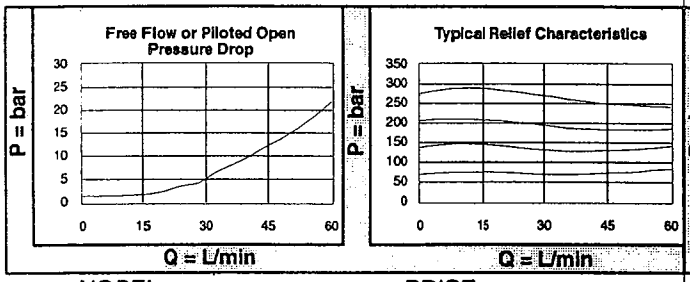
- 4.5:1 pilot ratio, load holding to 280 bar (with 350 bar setting).
- Load reactive pilot assist for overcentre load control applications.

0 to 60 L/min Nominal
Series 1 Cartridge T-11A Cavity SB
Installation Torque 45 to 50 Nm



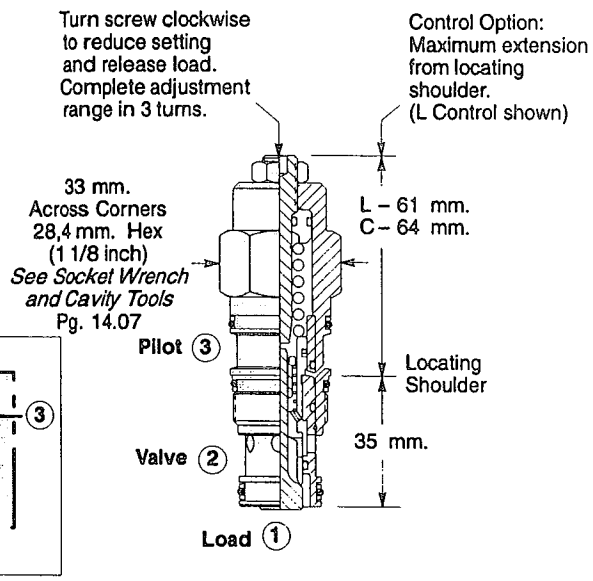


Back pressure at Port 2 may adversely affect operation of valve (For circuits with back pressure, use CW*G).
Maximum leakage = 5 drops/min. at reseat with standard setting.
Reseat exceeds 85% of set pressure.

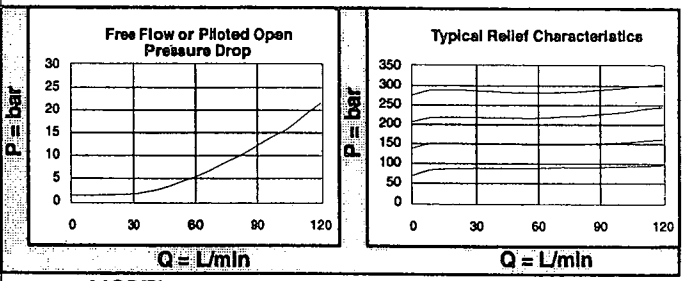


MODEL **CBCG–LJN** PRICE

0 to 120 L/min Nominal
Series 2 Cartridge T-2A Cavity SB
Installation Torque 60 to 65 Nm



Back pressure at Port 2 may adversely affect operation of valve (For circuits with back pressure, use CW*G).
Maximum leakage = 5 drops/min. at reseat with standard setting.
Reseat exceeds 85% of set pressure.



MODEL **CBEG–LJN** PRICE

OPTIONS

CB*G– * – *** / ***** (Basic cartridge from above)

CONTROLS (See page xvi for more details on Optional Controls Listed on This Page)
- **L** Standard Screw Adjustment

Nonstandard Controls
- **C** Tamper Resistant Factory Set

⊗ADJUSTMENT RANGES

GENERAL PURPOSES (2 bar Cracking Pressure)
- **J** 140 to 350 bar, 210 bar Standard Setting
- **K** 70 to 175 bar, 140 bar Standard Setting

SPECIAL PURPOSES (0,3 bar Cracking Pressure)
- **C** 140 to 350 bar, 210 bar Standard Setting
- **D** 70 to 175 bar, 140 bar Standard Setting

Customer Specified Setting Stamped on Hex

⊗ ***Setting should be 1.3 times maximum load induced pressure.***

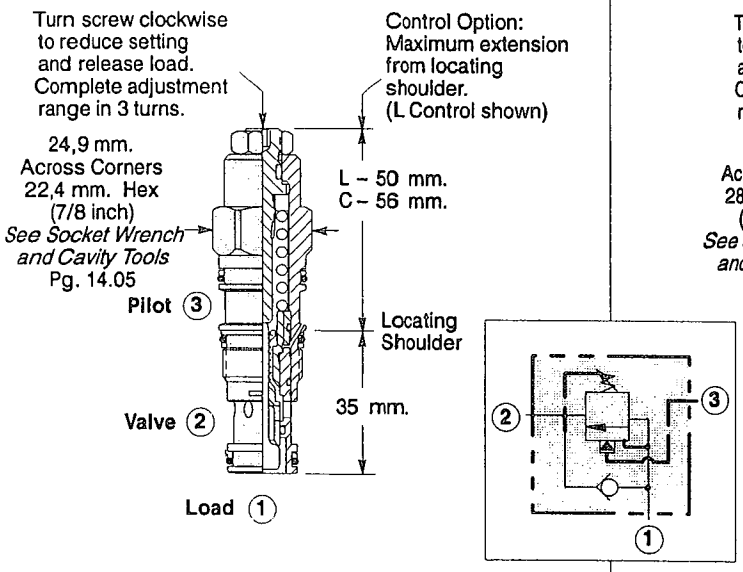
SEALS
- **N** Buna-N
- **V** Viton

BODY
Omit for Cartridge Only or See Body Locator Page 4.08

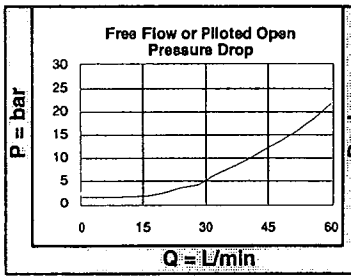
Refer to page 4.02 for further technical information.

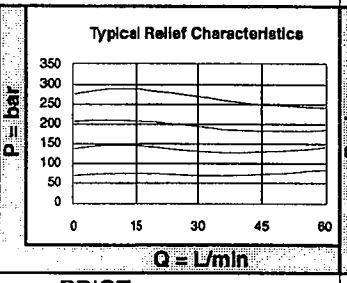
- 10:1 pilot ratio, load holding to 280 bar (with 350 bar setting).
- Load reactive pilot assist for overcentre load control applications.

0 to 60 L/min Nominal
Series 1 Cartridge T-11A Cavity SB
Installation Torque 45 to 50 Nm



Back pressure at Port 2 may adversely affect operation of valve (For circuits with back pressure, use CW*G).
Maximum leakage = 5 drops/min. at reseat with standard setting.
Reseat exceeds 85% of set pressure.

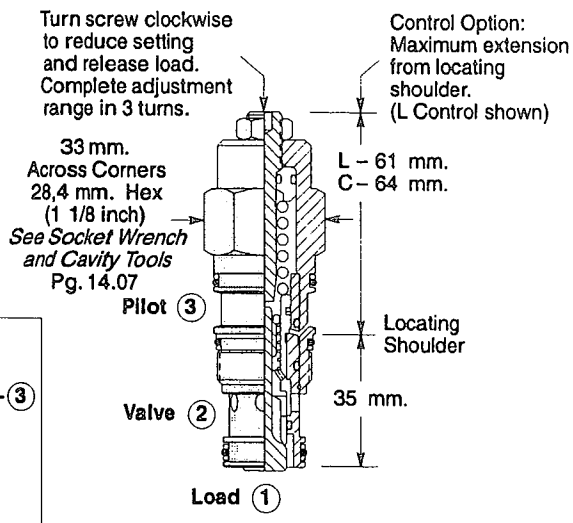




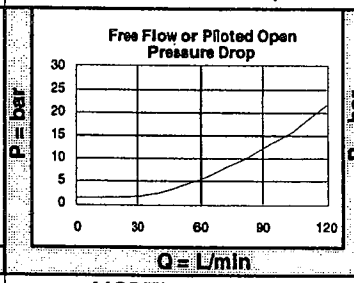
MODEL
CBCH–LJN

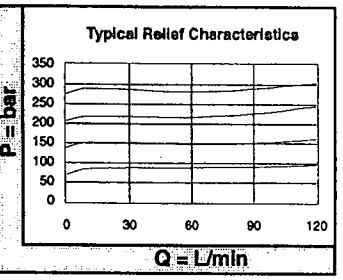
PRICE

0 to 120 L/min Nominal
Series 2 Cartridge T-2A Cavity SB
Installation Torque 60 to 65 Nm



Back pressure at Port 2 may adversely affect operation of valve (For circuits with back pressure, use CW*G).
Maximum leakage = 5 drops/min. at reseat with standard setting.
Reseat exceeds 85% of set pressure.





MODEL
CBEH–LJN

PRICE

OPTIONS

CB*H– *– ***/***

Basic cartridge from above

CONTROLS
See page xvi for more details on Optional Controls Listed on This Page

L Standard Screw Adjustment

Nonstandard Controls

C Tamper Resistant Factory Set

⊗ADJUSTMENT RANGES

GENERAL PURPOSES
(2 bar Cracking Pressure)

J 140 to 350 bar
210 bar Standard Setting

K 70 to 175 bar
140 bar Standard Setting

SPECIAL PURPOSES
(0,3 bar Cracking Pressure)

C 140 to 350 bar
210 bar Standard Setting

D 70 to 175 bar
140 bar Standard Setting

Customer Specified Setting Stamped on Hex

⊗ ***Setting should be 1.3 times maximum load induced pressure.***

SEALS

N Buna-N

V Viton

BODY

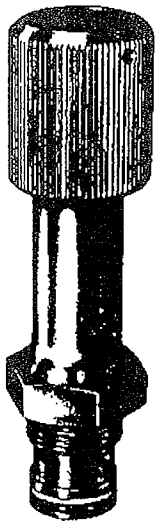
Omit for Cartridge Only
or
See Body Locator Page 4.08

Druckbegrenzungs- und Vorspannventile

1. Allgemeines

1.1. Wirkungsweise

Die direktbeaufschlagten Druckbegrenzungs- und Vorspannventile werden in Arbeitsrichtung durch federbelastete Kugelventile gegen den Öldruck geschlossen gehalten. Übersteigt der Arbeitsdruck den Einstellwert der Feder, öffnet das Gerät, wobei das Öl auf Druck Null entspannt wird. Der Öffnungsdruck ist durch Verändern der Federvorspannkraft verstellbar. Der Anschluß R ist mit dem vollen Druck belastbar, so daß die Ventile vielseitig verwendet werden können.



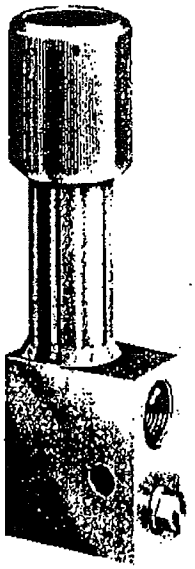
1.2. Verwendung

1.2.1. Druckbegrenzungsventile

Sie dienen in hydraulischen Kreisläufen und Anlagen zur direkten Begrenzung des maximalen Betriebsdruckes (Hauptventil) oder zur Druckeinstellung fernbetätigter, vorgesteuerter Druckbegrenzungsventile (Pilotventil).

1.2.1. Vorspannventile

Sie haben die Aufgabe, in der Hydraulik-Anlage einen bestimmten Vorspanndruck während des Arbeitsganges zu erzeugen.



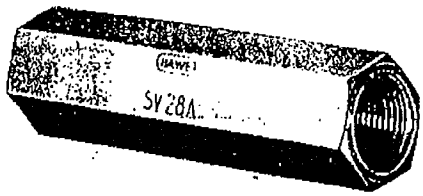
1.3. Ausführung

Die Ventile bestehen aus einem Ganzstahlgehäuse, korrosionsbeständigem Kugelventil mit gehärtetem Ventilsitz, Federbolzen und Dämpfungskolben. Mit letzterem wird Geräusch- und Flatterfreiheit erreicht. Für die verschiedenen Druckbereiche und Durchflußströme werden Kugeln und Federn entsprechender Abmessungen eingebaut.

1.4. Typenerklärung

Die Typenbezeichnung besteht aus drei bzw. vier Gruppen, wobei jede Gruppe ein bestimmtes Merkmal charakterisiert. Für Öle mit extrem niedriger Viskosität und evtl. hoher Öltemperatur sind Druckbegrenzungs- und Vorspannventile mit engem Passungsspiel in der Dämpfung zu wählen. Dies wird durch Anhängen des Kennbuchstaben E an die Grundtypenbezeichnung ausgedrückt.

Gruppe 1	Gruppe 2	Gruppe 3	Gruppe 4
M V R	2 8	A	– E
Ventilart	Baugröße	Schlüssel für Druckbereich	Enges Passungsspiel in der Dämpfung



1.5. Bestellbeispiele

Typ MV 28 B — Druckbegrenzungsventil (Eckventil) vom Werk fest eingestellt auf 200 bar Betriebsdruck, für Durchflußströme bis 50 l/min

Typ MVRC 30 A — Vorspannventil (Eckventil), regelbar von 0 bis 300 bar, für Durchflußstrom bis max. 50 l/min. Verringerung des max. Druckbereiches (≤ 300 bar) siehe Pos. 2.4.2.

2. Technischer Teil

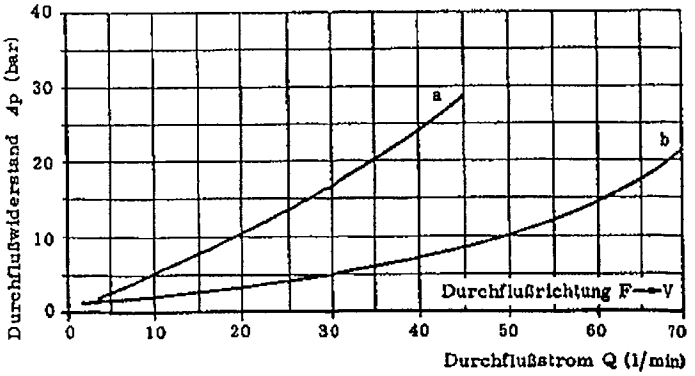
B

2.1. Typenzusammenstellung

Art	Form	Typ (Bestellbezeichnung)	werksseitiger Einstelldruck bar	Druckbereich bar	max. Durchfluß l/min	Gewicht in kg	Sinnbild	Bemerkung
Druckbegrenzungsventil	Einschraubventil	SVE(R) 17 A	450	700	25	0,6 0,7 *)	SVE.. / SVER..	Das Ventil ist in eine nach Pos. 2,3,1 ausgebildete Aufnahmebohrung einzuschrauben. Es ist als festeingestellte Ausführung Typ SVE... und regelbare Ausführung Typ SVER... lieferbar. Der zur Abdichtung nötige Kupferring und O-Ring werden mitgeliefert.
		SVE(R) 18 A	400	400	25			
		SVE(R) 18 B	200	200	25			
		SVE(R) 18 C	100	100	25			
		SVE(R) 18 D	10	10	25			
		SVE(R) 30 A	300	300	75			
		SVE(R) 34 D	150	150	100	1,0 1,2 *)		
		SVE(R) 34 E	60	60	100			
		SVE(R) 34 F	20	20	100			
	Ventil für geraden Leitungseinbau	SV 27 A	450	700	25		SV ..	Die Typen SV .. sind Ventile mit gerader Durchflußrichtung zum direkten Einbau zwischen Druck- und Rücklaufleitung.
		SV 28 A	400	400	50			
		SV 28 B	200	200	50	0,5		
		SV 28 C	100	100	50			
		SV 28 D	10	10	25			
		SV 30 A	300	300	75			
		SV 34 D	150	150	100	0,7		
		SV 34 E	60	60	100			
		SV 34 F	20	20	100			
Druckbegrenzungsventil	Eckventil, Leitungsführung im 90°-Winkel	MV(R) 27 A	450	700	25		MV.. / MVR..	Die Typen MV und MVR sind Eckventile, bei denen die Anschlüsse einen rechten Winkel bilden. Sie sind als festeingestellte Ausführung Typ MV .. und als regelbare Ausführung Typ MVR .., lieferbar.
		MV(R) 28 A	400	400	50			
		MV(R) 28 B	200	200	50	0,7 0,8 *)		
		MV(R) 28 C	100	100	50			
		MV(R) 28 D	10	10	25			
		MV(R) 30 A	300	300	75			
		MV(R) 34 D	150	150	100	1,5 1,8 *)		
		MV(R) 34 E	60	60	100			
		MV(R) 34 F	20	20	100			
Vorspannventil	Einschraubventil	SVE(R)C 30 A	300	300	50	1,0 1,2 *)	SVC.. MVC.. SVEC..	Für die Ventile gilt das gleiche wie für die Druckbegrenzungsventile, nur daß zusätzlich ein Rückschlagventil eingebaut ist. Sie werden also dann verwendet, wenn in der einen Richtung (F→V) druckloser Durchlauf nötig ist, in der entgegengesetzten Richtung (V→F) das Drucköl aber erst nach Erreichen des eingestellten Druckes durchfließen soll. Gegendruck bei F addiert sich dem Vorspanndruck bei V (konstruktiv bedingt).
		SVE(R)C 30 B	100	100	50			
		SVE(R)C 30 C	20	20	50			
	Ventil für geraden Leitungseinbau	SVC 27 A	450	700	15			
		SVC 28 A	400	400	25			
		SVC 28 B	200	200	25	0,5		
		SVC 28 C	100	100	25			
		SVC 28 D	10	10	25			
		SVC 30 A	300	300	50			
		SVC 30 B	100	100	50	0,7		
		SVC 30 C	20	20	50			
	Eckventil, Leitungsführung im 90°-Winkel	MV(R)C 27 A	450	700	15		MVRC.. SVERC..	
		MV(R)C 28 A	400	400	25			
		MV(R)C 28 B	200	200	25	0,7 0,8 *)		
		MV(R)C 28 C	100	100	25			
		MV(R)C 28 D	10	10	25			
		MV(R)C 30 A	300	300	50			
		MV(R)C 30 B	100	100	50	1,5 1,8 *)		
		MV(R)C 30 C	20	20	50			

*) Gewicht für regelbare Ausführung

2.2. Durchflußwiderstände bei Vorspannventilen



Kurve a: SVC 27, SVC 28
MVC 27, MVC 28

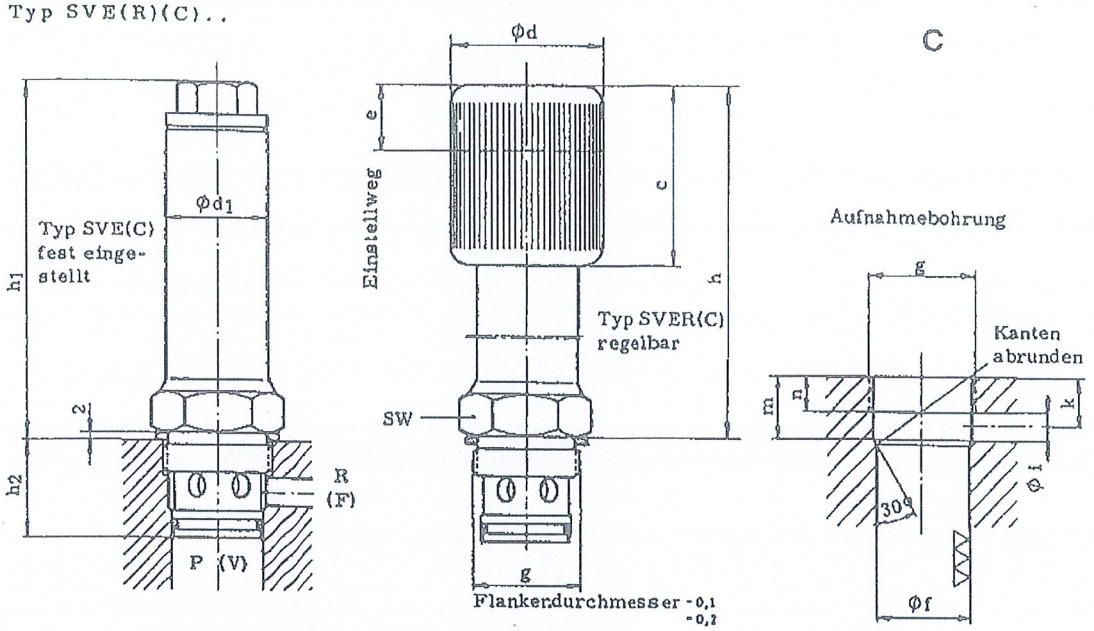
Kurve b: SVC 30, MVC 30
SVEC 30

Zur Messung verwendetes Öl: Mobil Flowrex E

Temperatur: 21°C ≙ 8 E

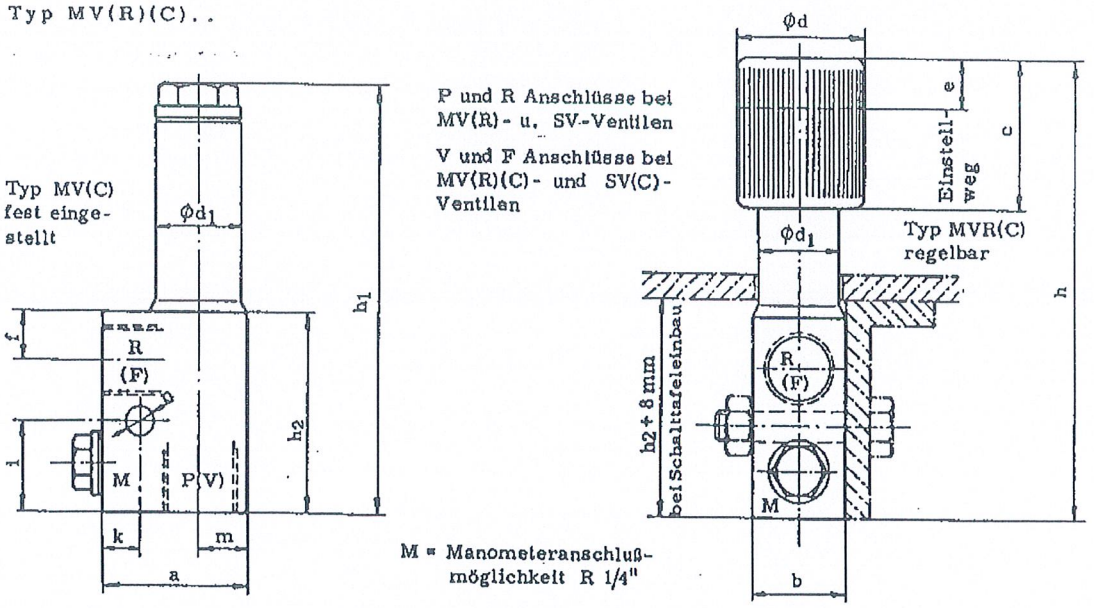
2.3. Maßbilder

2.3.1. Typ SVE(R)(C)..



Typ	c	ϕd	ϕd1	e	h	h1	h2	SW	g	ϕf	ϕi	k	m	n
SVE(R) 17 und 18	44	41	26	15	116	89	25	36	M28x1,5	25H8	8	12	16	9
SVE(R)(C) 30 u. 34	60	50	35	20	155	116	38	46	M40x1,5	36H8	14	18	26	14

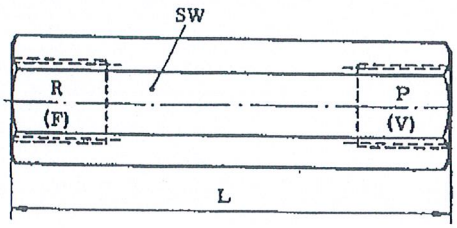
2.3.2. Typ MV(R)(C)..



Typ	a	b	c	ϕd	ϕd1	e	f	h	h1	h2	i	k	m	n	P(V) R(F)
MV(R)(C) 27 u. 28	45	30	44	41	26	15	14	155	128	60	28	12	15	9	R 1/2"
MV(R)(C) 30 u. 34	60	40	60	50	35	20	18	210	174	70	30	15	20	11	R 3/4"

2.3.3. Typ SV(C)..

Typ	L	SW	P(V) u. R(F)
SV(C) 27 und 28	115	27	R 1/2"
SV(C) 30 und 34	150	32	R 3/4"



Alle Maße in mm. Maßänderungen vorbehalten !

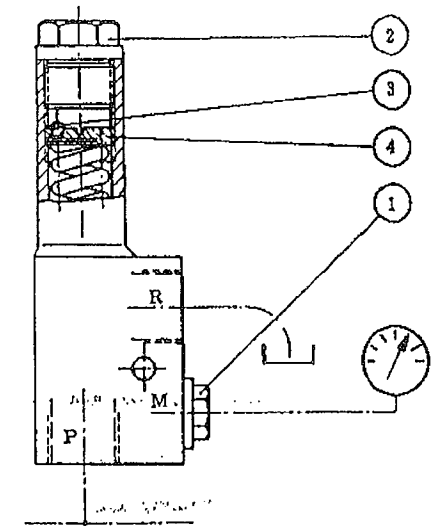
2.4. Einstellanweisung

zur Einstellung anderer als in der Tabelle Pos. 2.1 angegebenen Drücke.

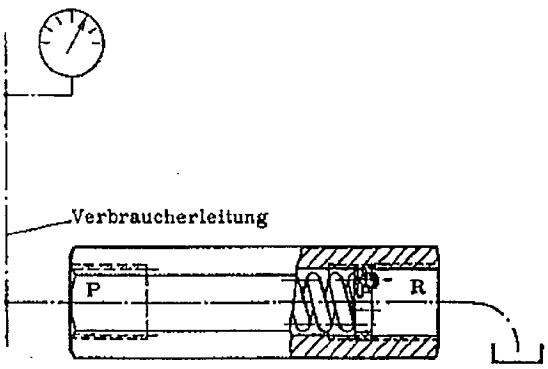
D

2.4.1. Verstellung nicht regelbarer Druckbegrenzungsventile SVE..., SV... und MV...

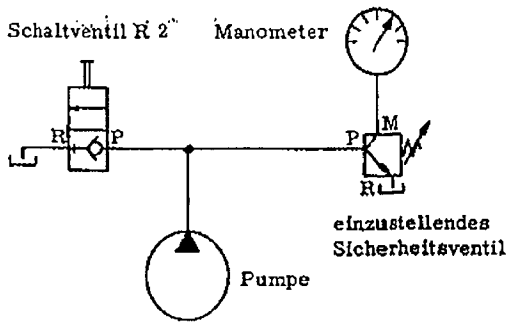
1. Verschlußschraube R 1/4" herausschrauben und Manometer anschließen
2. Verschlußschraube entfernen
3. Madenschraube lockern
4. Gewindescheibe mittels Schraubenzieher unter Manometerbeobachtung verstellen
5. Nach erfolgter Einstellung Madenschraube festziehen und Verschlußschraube aufschrauben



Verbraucherleitung

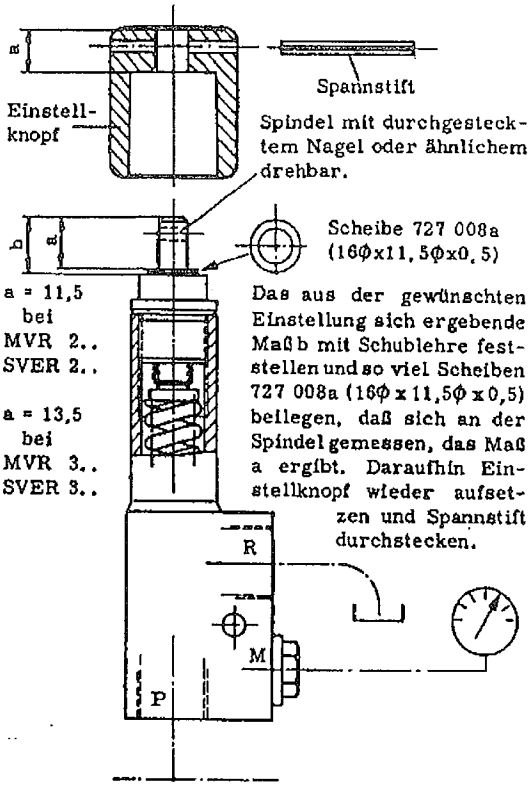


2.4.3. Einfachste Prüfanordnung zur Ventileinstellung



2.4.2. Veränderung (Verringerung) des Einstellbereiches regelbarer Druckbegrenzungsventile SVER... und MVR...

Diese Begrenzung ist nur erforderlich, wenn der gewünschte, maximale Betriebsdruck unter der Werkseinstellung liegt und mit Rücksicht auf die Anlage nicht überschritten werden soll.



Verbraucherleitung

Achtung: Bei SV(C)-Ventilen erfolgt die Einstellung über den Rücklaufanschluß R. Das dort austretende Öl in einem Behälter auffangen. Bei größeren Ölmengen Spritztuch überlegen.
Während der Einstellung muß die Pumpe direkt über das Sicherheitsventil fördern. Ist das Ventil bereits in eine Hydroanlage eingebaut, dann geschieht dies nach Erreichen der Endlage des Verbrauchers (Zylinders) unter Beibehaltung der Schaltstellung des Steuergerätes.
Um ein Hochschnellen des Manometers und damit eine Beschädigung zu vermeiden, ist zunächst das Schaltventil auf freien Durchlauf zu stellen und nach Einschalten der Pumpe langsam zu schließen (siehe Prüfvorgang).

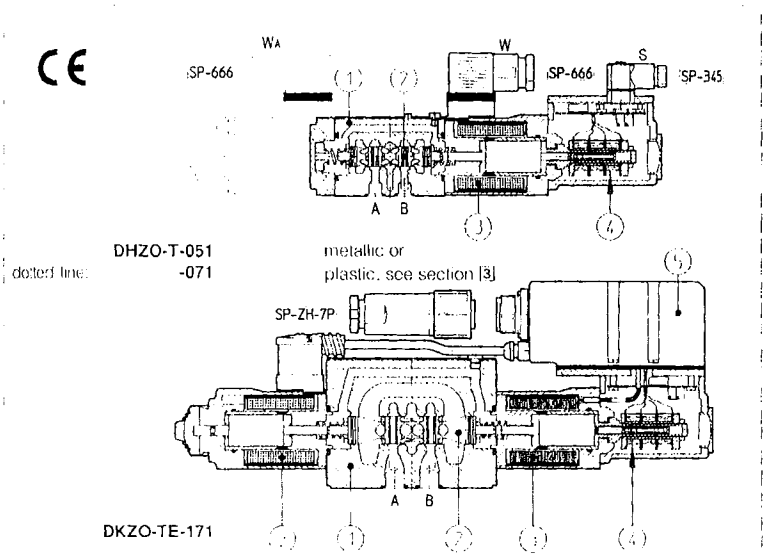
Prüfvorgang:
R 2 auf freien Durchlauf stellen. Pumpe einschalten und R 2 langsam schließen. Einstelldruck am Manometer ablesen und das Sicherheitsventil auf den gewünschten Wert einstellen. Nach Einstellung R 2 öffnen und Pumpe abschalten.

Alle Maße in mm!
Maßänderungen vorbehalten!

Atos spa
21018 Sesto Calende, Italy - Fax 0 331 920005

Proportional directional valves type DHZO and DKZO

direct operated, ISO/Cetop sizes 03 and 05



DHZO and DKZO valves provide both directional and non-compensated flow controls according to the electronic reference signals.

They operate in association with electronic drivers, see table [5] which supply the proportional valves with correct current signal to align valve regulation to the reference signal supplied to the electronic driver (wich may be integral of Eurocard type)

These valves have a 4-way spool ② sliding into a 5-chambers ① and directly operated by ZO solenoids ③.
They are available in different options:
- ZO-A, suitable for open or closed loop applications, see block diagrams at section [4], equipped with manual override.
- ZO-T with integral electronic transducer, ④ featuring improved static and dynamic performances;
- ZO-TE as above plus integral electronics ⑤ preset in control loop.

DHZO and DKZO mounting interfaces, ISO/Cetop 03 and 05 respectively
Maximum flow up to 50 [l/min] and 100 [l/min] respectively with valve differential pressure Δp=30 bar, see table [2].
To compensate flow variations due to pressure variations, modular pressure compensators are available to keep a constant Δp across the valve (see tab. D150)

Coils are fully plastic encapsulated (insulation class H) and valves have antivibration, antishock and weather-proof features.

For applications demanding high static and dynamic performances in closed loop control refer to technical tables F180 and F215.

1 MODEL CODE

DHZO – T – 07 1 – S 5 / * ** / *

DHZO = ISO 03
DKZO = ISO 05

A = for open loop application
T = with integral transducer
TE = as T plus integral electronics

valve size and configuration - see section [2]
0* = ISO/Cetop 03
1* = ISO/Cetop 05
***5** = external pilot, central position spring centered
***7** = 4 position, spring centered

Spool overlapping in central position - see section [2]
1 = P, A, B, T with positive overlapping
3 = P (no overlapping)
A, B, T negative overlapping

Spool size **5** = Qnom **3** = 50% Qnom

Spool type
L = linear **S** = progressive
D = as S, but A, B flow path have ratio 2:1

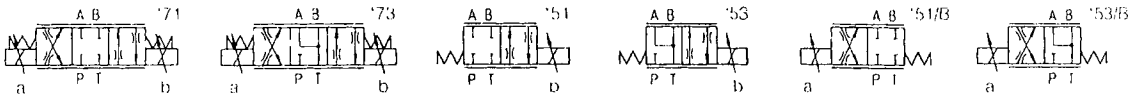
Synthetic fluids
WG= water-glycol
PE= phosphate ester

Design number

Options
Y = external drain
B = solenoid at side of port A
only for -A models:
6 = with 6 V coil instead of standard 12 V coil
18 = with 18 V coil instead of standard 12 V coil
N = manual micrometric adjustment
only for -TE models:
I = current reference 4÷20 mA
M = external monitor spool position

2 HYDRAULIC CHARACTERISTICS (1) - see notes at section [4]

Hydraulic symbols:



Valve model		DHZO						DKZO			
Pressure limits [bar]	(2)	ports P, A, B = 350, T = 160/250						ports P, A, B = 315 T = 160/250			
		-A			-T -TE (3)			-A		-T -TE (3)	
Spool	(4)	S5 L5 D5	S3 L3		S5 L5 D5	S3 L3		S5 L5 D5	S3 L3	S5 L5 D5	S3 L3
Max flow [l/min]	(5)										
at Δp = 30 bar		50	30		50	30		100	60	100	60
at Δp = 70 bar		70	45		70	45		*50	90	150	90
at Δp max = ( ) bar		90 (140)	70 (200)		100 (250)	80 (315)		170 (120)	120 (160)	200 (200)	130 (250)
Response time [ms]	(6)	< 30			< 15			< 40		< 20	
Hysteresis [%]		≤ 5%			≤ 0.2%			< 5%		≤ 0.2%	
Repeatability		± 1%			± 0.1%			± 1%		± 0.1%	

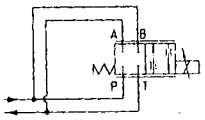
3 MAIN CHARACTERISTICS OF PROPORTIONAL DIRECTIONAL VALVES TYPE DHZO AND DKZO

Assembly position / location	Any position / The nearest possible to the actuator			
Subplate surface finish	Roughness index $\sqrt{}^{0.4}$; flatness ratio 0.01/100 (ISO 1101)			
Ambient temperature	-20°C to +70°C for -A, -T version / 0°C to +50°C for -TE version			
Fluid	Hydraulic oil as per DIN 51524 ... 535, for other fluids see section [1].			
Recommended viscosity	15 ÷ 100 mm²/s at 40°C (ISO VG 15 ÷ 100)			
Fluid contamination class	ISO 18/15 achieved with in line filters at 10 µm value and $\beta_{10} \geq 75$ (recommended)			
Fluid temperature	1 ÷ 80 °C ... if T ≥ 60°C select/PE seals			
LVDT electric characteristics (-T and -TE versions)	Supply: +15V ±3% 125 mA; -15V ±3% 25 mA; Signal: 0 ÷ 5 (± 5 V ...)			
Coil resistance R at 20°C	R = 3,3 Ω for standard 12 V coil; 2 ÷ 2,2 Ω for 6 V coil; 13 ÷ 13,4 Ω for 18 V coil			
Valve execution	DHZO-A (24V coil; 12V coil; 6V coil; 18V coil)	DHZO-T	DKZO-A (24V coil; 12V coil; 6V coil; 18V coil)	DKZO-T
Max solenoid current	2,2 A; 2,75 A; 1 A	2,6 A	2,6 A; 3,25 A; 1,2 A	3 A
Max power	30 Watt	35 Watt	35 Watt	40 Watt
Relative duty factor	Continuous rating (ED = 100%)			

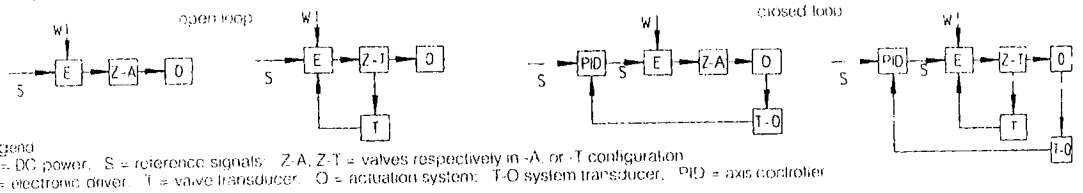
Power connector W for -A and -T version	Type SP-666 (plastic - black); 3 pins, cable clamp PG11, cable max. Ø 10 mm
Signal connector S for -T versions	Type SP-345 (plastic - grey); 4 pins, cable clamp PG7, cable max Ø 4 ÷ 7,5 mm
Single connector for -TE versions	Type SP-ZM-7P (metallic); 7 pins, cable clamp PG11, cable max Ø 10 mm Type SP-ZH-7P (plastic); 7 pins, cable clamp PG11, cable max Ø 10 mm **to be ordered separately**
Connectors features	SP-666: DIN 43650 - ISO 4400; IP 65 (DIN 40050); VDE 0110; SP 345: VDE 0660; IP 65 (DIN 40050); VDE 0110; SP-ZM-7P: according to MIL-C-5015G; IP 66 (DIN 40050); SP-ZH-7P: mounting dimensions according to MIL-C-5015G; IP 67 (DIN 40050)

4 NOTES TO TABLES [2] AND [3]

(1) Typical characteristics in table 2 refer to valves coupled with Atos electronic drivers and operation with ISO VG 46 mineral oil at 50°C.
(2) If pressure in T port exceed 160 bar, option /Y (external drain) is advisable.
(3) In valves type DHZO-TE-07 and DKZO-TE-17 (double solenoid valves with integral electronics), the electrical cabling of the second solenoid (Z0-A) is included.
(4) Spools D* have same performances of S* but with full flow on P→A, A→T and half flow on P→B, B→T. Different spool regulations available on request.
(5) Flows for max electronic signal at ΔP = 30 and 70 bar, that are typical reference values respectively for average and high performance loops. These different values indicate the total ΔP across the valve, each flow path accounting for about 50%. For different ΔP across the valve, (max) flow values are according to Flow/ΔP diagrams 6.2.
(6) Reponse times at step signal (0% →100%) are measured from 10% to 90% of step value and are strictly referred to valve regulation.
(7) Operation as throttle valve:
Single solenoid valves (*51) can be used as simple throttle valves:
DHZO: flow rate up to 120 l/min, Pmax = 250 bar (option /Y advisable)
DKZO: flow rate up to 300 l/min, Pmax = 250 bar (option /Y advisable)
For this application the use of valve -T or -TE is advisable
(consult our technical office)



(8) Typical block diagrams of proportional systems: for use of -A, -T valves, note that Z0-T valves may be used in open or in closed loop.



Legend:
W = DC power; S = reference signals; Z-A, Z-T = valves respectively in -A, or -T configuration;
E = electronic driver; T = valve transducer; O = actuation system; T-O system transducer; PID = axis controller

5 ELECTRONIC DRIVERS

Valves operation is optimized in association with Atos electronic drivers, which have factory preset electronic calibration.

Models	Valve model	Execution (1)	Max power (2)	Driver response	Reference signals (3)	Ramps (4)	Special functions (5)	Alarm (6)
E-MP-AC-01F	DHZO-A-05 DKZO-A-15	I	40W	normal	C, (A)	YES	NO	NO
E-BI-AC-01F		B	50W	fast	C	YES	NO	NO
E-RP-AC-01F		S	50W	fast	C, (A)	YES	NO	NO
E-ME-AC-01F		E	50W	fast	C, (A)	YES	ENABLE	NO
E-BI-AC-05F	DHZO-A-07 DKZO-A-17	B	50W	fast	V	YES	NO	NO
E-RP-AC-05F		S	50W	fast	V, C, (A)	YES	NO	NO
E-ME-AC-05F		E	50W	fast	V, C, (A)	YES	ENABLE	NO
E-ME-T-01H	DHZO-T-05 DKZO-T-15	E	50W	high performance	C, (A)	YES	ENABLE	YES
E-RI-TE-01H	DHZO-TE-05 DKZO-TE-15	X	50W		C, (A)	NO	MONIT. (option /M)	YES
E-ME-T-05H	DHZO-T-07 DKZO-T-17	E	50W	high performance	V, (A)	YES	ENABLE	YES
E-RI-TE-05H	DHZO-TE-07 DKZO-TE-17	X	50W		V, (A)	NO	MONIT. (option /M)	YES

NOTES

(1) Execution, Format/Connector:
I = Plug DIN 43650-IP65, VDE 0110 direct on solenoid;
B = Fast plug-in standard undecal base housing, relay type;
S = Sealed box with cable clamp and screw type;
E = Eurocard 100x160 mm (plug in unit DIN 41494);
X = Sealed box on the valve: IP65-DIN 40050.
(2) Power supply at 24 V ± 10%.
(3) Reference signals:
A (option) = 4÷20 mA
0÷20 mA (only for E-MI)
C = 0÷10 V or
0÷5 V (not available for E-RP)
V = ±10 V or
±5 V (not available for E-RI)
(4) Ramps options, i.e. control of rapidity on rise and fall of supply current and consequently of hydraulic parameters.
(5) Enable: to allow driver operation only with an electric enabling signal.
Monitor (/M option): actual value of spool position.
0V ÷ 10V for single solenoid valves
0V ± 10V for double solenoid valves
(6) Options to monitor anomalous operating conditions of driver.

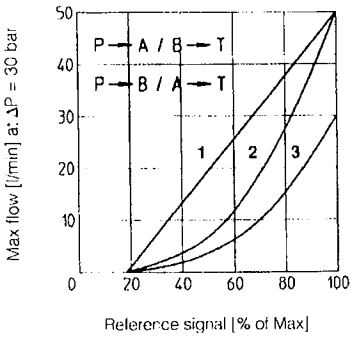
Note Electrical signal (e.g. actual value - feedback signals) taken via valve electronics must not be used to switch off the machine safety functions. This is in accordance with the regolations to the European standard «Safety requirements of fluid technology systems and components - hydraulics»

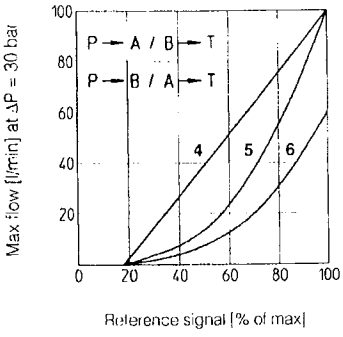
6 DIAGRAMS

6.1 Regulation diagrams
stated for -A, -T, and -TE version

DHZO
1 = linear spool L5
2 = progressive spool S5
3 = progressive spool S3

DKZO:
4 = linear spool L5
5 = progressive spool S5
6 = progressive spool S3

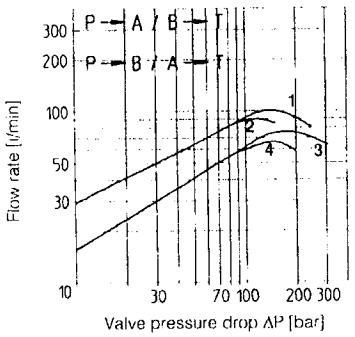


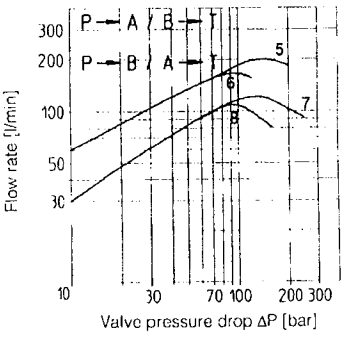


6.2 Flow /Δp diagrams
stated at 100% of valve stroke

DHZO:
1 = -T, -TE: S5 L5
2 = -A: S5 L5
3 = -T, -TE: S3
4 = -A: S3

DKZO:
5 = -T, -TE: S5 L5
6 = -A S5 L5
7 = -T, -TE: S3
8 = -A: S3

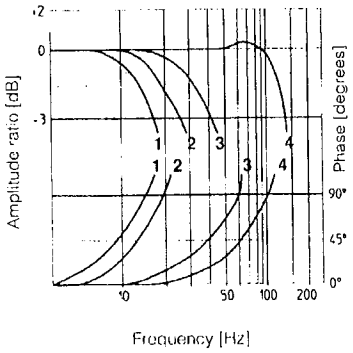


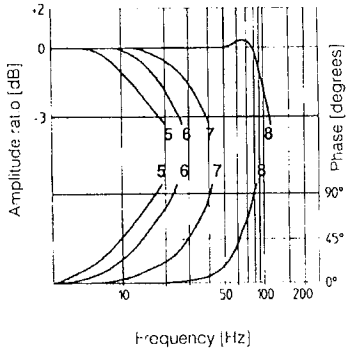


6.3 Bode diagrams
stated at nominal hydraulic conditions

DHZO:
1 = -A: 10% ↔ 90% nominal stroke
2 = -A: 50% ± 5% nominal stroke
3 = -T, -TE: 10% ↔ 90% nominal stroke
4 = -T, -TE: 50% ± 5% nominal stroke

DKZO:
5 = -A: 10% ↔ 90% nominal stroke
6 = -A: 50% ± 5% nominal stroke
7 = -T, -TE: 10% ↔ 90% nominal stroke
8 = -T, -TE: 50% ± 5% nominal stroke





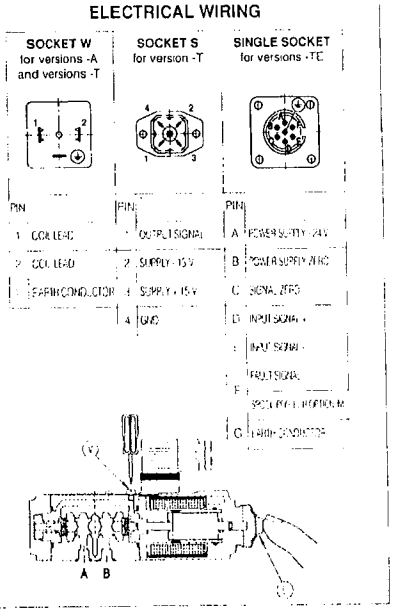
7.1 Warning
- Don't install ZO valves before flushing the hydraulic circuit by using ON/OFF valves of flushing subplates; see tab. P002.
- Don't connect or disconnect electric plugs before switching-off power.

7.2 Set-up
- fix the valve on related mounting plate or manifold by means of fixing screws indicated at section [8] and wire the electrical connection;
- calibration of BIAS on electronic driver may be required to obtain correspondence between zero reference and rest point of spool and, only for -A models, of SCALE to obtain the desired corrispondence between reference and valve regulation;
- start with preliminary movements at low speeds (Ref. < ± 2V for security), bleeding-off the valve by operating the air-bleed screw Ⓥ to ensure that solenoids are kept full of hydraulic fluid and till strange noises and vibrations end; if it is required fill the valve with hydraulic fluid by opening the screw Ⓥ.
- the valve is ready to work.

7.3 Set-up of integral transducer (only for -T and -TE valves)
- transducer zero offset (spool in central position) is factory adjusted and sealed. If sealing is removed, Atos decline responsibilities for uncorrect operation.

NOTE To operate the valve in manual mode, push cap Ⓒ at the end of solenoid. This could be necessary during set-up or in emergency conditions to move the controlled actuator when electrical failure occurs.
When the valve have the /Y option, select /Y option also for mounting plate.

ELECTRICAL WIRING

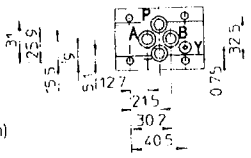


8 INSTALLATION DIMENSIONS [mm]

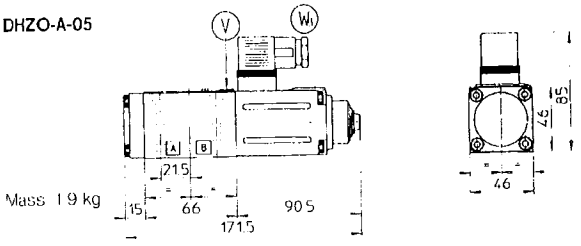
DHZO

P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
Y = DRAIN PORT (see note)
V = AIR BLEED-OFF

ISO/Cetop 03
Fastening bolts:
4 socket head screws M5 x 50
Seals: 4 OR 108; 1 OR 2025
Diameter of ports A, B, P, T: Ø 7,5 mm (max)
Diameter of port Y: Ø = 3,2 mm (only for /Y option)

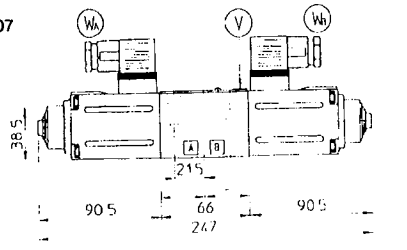


DHZO-A-05



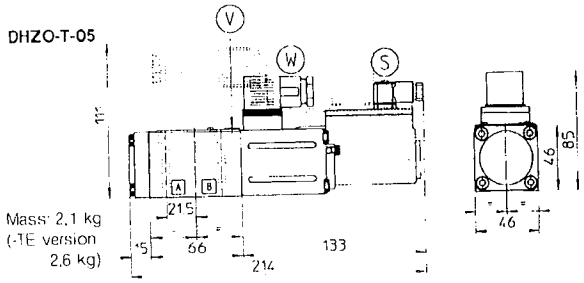
Mass: 1.9 kg

DHZO-A-07



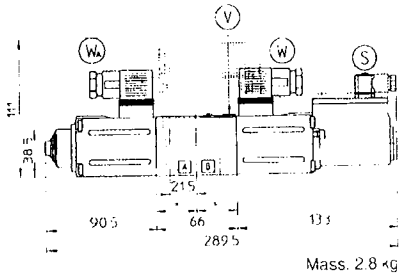
Mass: 2.6 kg

DHZO-T-05



Mass: 2,1 kg
(-TE version 2,6 kg)

DHZO-T-07



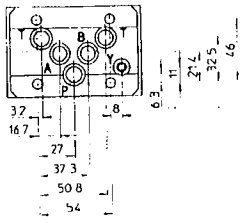
Mass: 2.8 kg
(-TE version 3,3 kg)

NOTE: For valve with /Y option, select /Y option also for mounting plate.

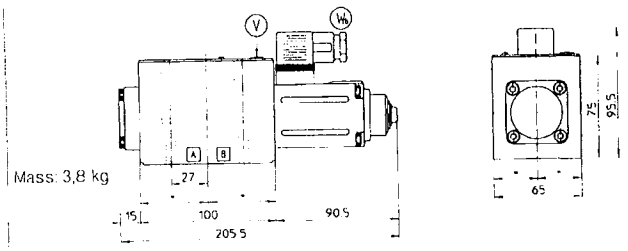
DKZO

P = PRESSURE PORT
A, B = USE PORT
T = TANK PORT
Y = DRAIN PORT (see note)
V = AIR BLEED-OFF

ISO/Cetop 05
Fastening bolts: 4 socket head screws M6 x 40
Seals: 5 OR 2050; 1 OR 108
Diameter of ports A, B, P, T: Ø 11,2 mm (max)
Diameter of port Y: Ø = 5 mm (only for /Y option)

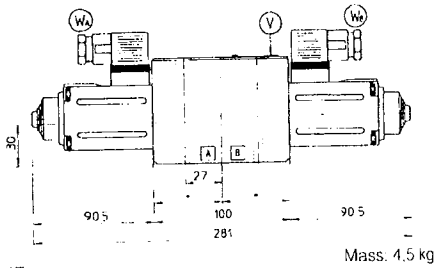


DKZO-A-15



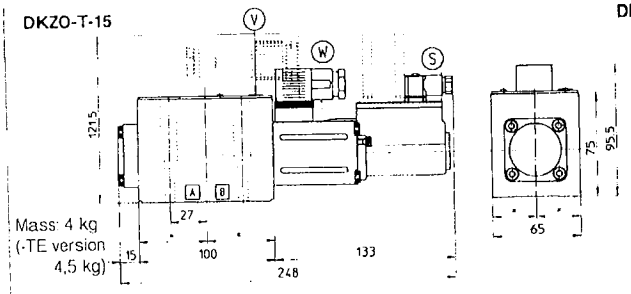
Mass: 3,8 kg

DKZO-A-17



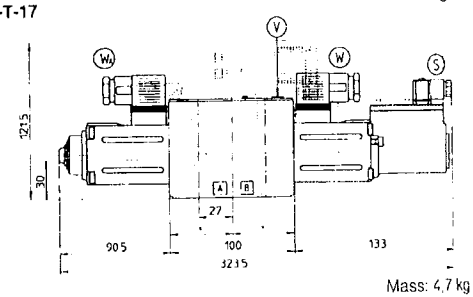
Mass: 4,5 kg

DKZO-T-15



Mass: 4 kg
(-TE version 4,5 kg)

DKZO-T-17



Mass: 4,7 kg
(-TE version 5,2 kg)

NOTE: For valve with /Y option, select /Y option also for mounting plate.

9 MOUNTING PLATES

Size	Model	Ports location	BSP Ports A, B, P, T (X, Y)	Ø Counterbore [mm] A, B, P, T (X, Y)	Mass [kg]
03	BA-202	Ports A, B, P, T underneath;	3/8"		1.2
	BA-204	Ports P, T underneath; ports A, B on lateral side	3/8"	25.5	1.8
	BA-302	(/Y): Ports A, B, P, T (X, Y) underneath.	1/2" (1/8")	30 (16.5)	1.8
05	BA-308	(/Y): Ports A, B, P, T (X, Y) underneath.	1/2" (1/4")	30 (21.5)	2.5
	BA-428	(/Y): Ports A, B, P, T (X, Y) underneath.	3/4" (1/4")	36.5 (21.5)	5.5

Mounting plates with A and B ports on lateral side are available, see technical table K280

OILTECH
MEMBER OF THE OLAER GROUP

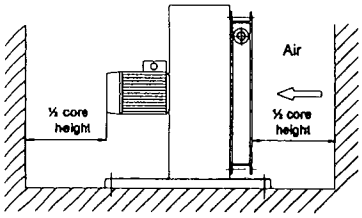
513

Installation and servicing instructions TBI air oil cooler

Strictly observe this information prior to installation of Oiltech TBI air oil cooler.

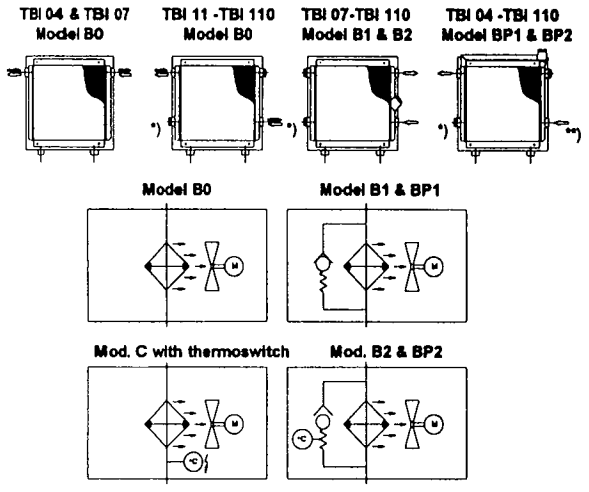
Mounting

The Oiltech air oil coolers permit both suspended and foot mounting. To prevent personal injury, always secure the cooler adequately. The distance from the nearest wall should not be less than half the height of the cooler core.



Hydraulic connection

Connect the cooler as illustrated below using hydraulic hoses both to and from the cooler. We recommend mounting in a separate cooling circuit. In case this is not possible, install the cooler in the system return line. Avoid linking to systems that could yield in pressure peaks superior to 14 bar. Olaer/Oiltech shall not be liable for the consequences of any modification and/or variation with regard to connections.



*) This connection only exists on TBI 76 - TBI 110
**) This connection does not exist on TBI 04 & TBI 07

Electrical connection

Danger 380 Volt!
May only be done by a qualified electrician!

In case the cooler is equipped with a thermoswitch, as per model C, a relay should be used if the current load is superior to:

10 A	at	12 V DC
5 A	at	24 V DC
10 A (6 A ind.)	at	250 V AC

Prior to start-up

- Check cooler core and fan guard for damages.
- Check that the cooler is provided with a caution label for rotating fan.
- Check that the cooler is correctly connected according to the above. Olaer/Oiltech shall not be liable for the consequences of any variation.

At start-up

- Check rotation direction of the fan, i.e. that the electric motor poles are correctly connected.

Noise level

Due to the noise level, remaining close to the cooler an extended period is not recommended. Inappropriate placement of the cooler - e.g. on a large flat plate - could give rise to increased noise level. Contact Olaer/Oiltech for advise.

Cleaning

The most easy way to clean the air fins is by using compressed air. Fouling can be dealt with using a high-pressure washing system and a degreasing agent. Flush with water.

NB: When using a high-pressure washing system, point the jet carefully parallel to the air fins. Be careful, the cooler core must be cool.

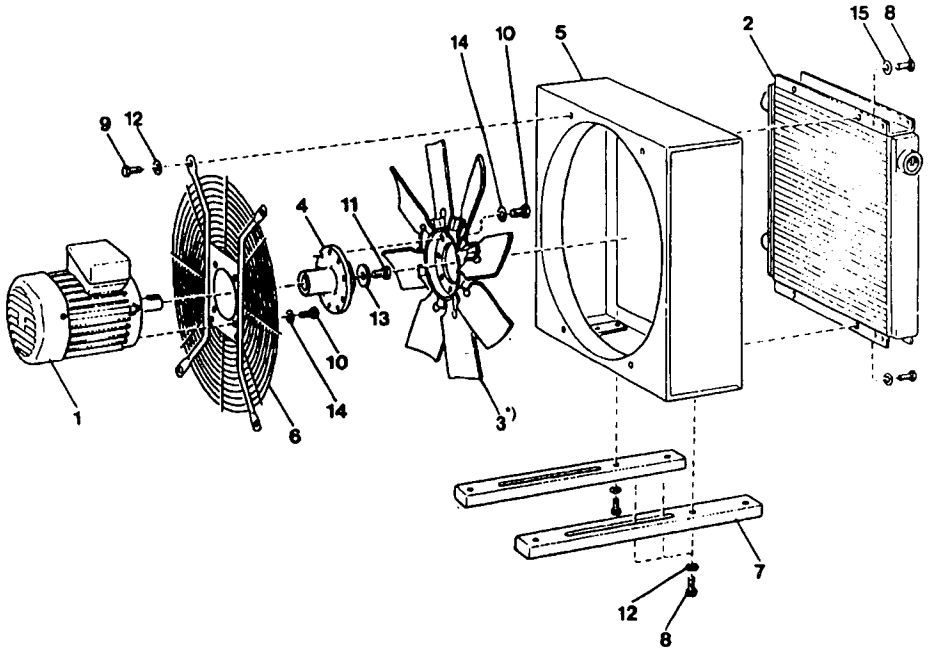
When cleaning the inside of the cooler core, this should be connected to a closed circuit. Flush the inside with degreasing agent. After cleaning, flush with the same fluid as used in the system itself.

Miscellaneous

- In the event of breakdown, contact Olaer/Oiltech. Olaer/Oiltech shall not be liable for the consequences of any repair and/or modification made by the customer.
- When handling the cooler, e.g. for cleaning and/or repair, disconnect all power supplies. Be careful, the cooler may be hot.
- The fan generates static electricity by air friction. Do not put sensitive equipment (electronics etc.) in the immediate vicinity of the cooler.
- Contact Olaer/Oiltech when using fluids with high viscosity (e.g. thick lubricating oils) or in case of cold starting.

Spare parts

1.	Electromotor
2.	Cooler core
3.	Fan*)
4.	Fan boss
5.	Fan housing
6.	Fan guard
7.	Support
8-11.	Screws
12-15.	Washers



*) The appearance of the fan varies depending on cooler model.

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OILTECH
MEMBER OF THE OLAER GROUP

Oiltech AB, Förrådsvägen 2, S-181 41 Lidingö, Sweden. Tel +46 8 636 07 00, Fax +46 8 767 97 56

516

Brochure 2310-GB-3

Hydraulic Filter Division
High Pressure Filters

Models 18P, 28P, 38P

Parker
Filtration

Hydraulic Filter Division
High Pressure Filters
Models 18P, 28P, 38P

Specification

Maximum Allowable Operating Pressure (MAOP) and fatigue rating
414 bar (6000 psi). Factor of safety 3:1.
Fatigue rating; 2 million cycles, 0 - 414 bar.

Operating Temperature
-40°C to 120°C (-30°F to 250°F)

Materials of Construction
SG Iron head, Steel bowl

Ports
Inlet & outlet ports can be threaded internally or flange faced.

Port Style	*Model*		
	18P	*28P*	*38P*
BSPF(G)	3/4"	1"	1 1/4", 1 1/2"
SAE	12	16	20, 24
ISO 6149	M27	M33	M42, M48
SAE 6000 Config.	3/4"	1"	1 1/4"
Metric 6000-M Config.*	3/4"	1"	1 1/4"

*6000-M is SAE style with appropriate metric fixing threads.

Bypass Valve and Indicator Settings
Table below gives bypass valve and corresponding indicator setting.

Bypass	*Indicator*
3.5 bar	2.5 bar
7.0 bar	5.0 bar

Weights (kg)

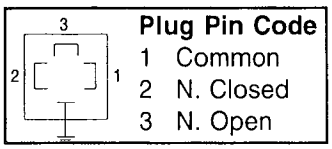
Model	*Length 1*	*Length 2*
18P	4.2	5.7
28P	6.7	9.2
38P	15.8	20.3

Fluid Compatibility
Suitable for use with mineral oils, most water glycols and other water based fluids. For other fluids, please consult Hydraulic Filter Division.

Seals
Head to bowl, diametral with anti-extrusion ring.
Materials - Nitrile or fluoroelastomer*.

Element Condition Indicators (Differential Pressure Type)
Cartridge type visual, with auto reset.
Cartridge type electrical, with auto reset and socket to DIN43650, protection class IP65.

Electrical Ratings
Power - 5 VA max
Current - 0.25 A max (resistive)
Voltage - 28 VDC max, 28VAC (50-60Hz) max.
Contacts - Normally open or normally closed. Wired to DIN plug pin code, below.



Filter Element
'Microglass II' disposable inorganic fibre media.
Available as 2, 5, 10 or 20µ absolute (ßx ≈ 200).
Media is supported both up and downstream, and the whole assembly bonded using an epoxy adhesive. End caps and support tube are tin plated giving excellent corrosion protection.

Element Collapse Rating
Standard; 20 bar differential minimum.
High collapse; 210 bar differential minimum.

Test Standards
Elements are tested to all relevant standards, including ISO4572 Multipass Test. Complete assemblies tested in accordance with ISO3968, "Determination of pressure drop flow characteristics of hydraulic fluidpower filters" using mineral oil fluid SAE 10 @ 30 cSt viscosity.

Quality
Parker Filtration is accredited to the ISO9002 quality standard.

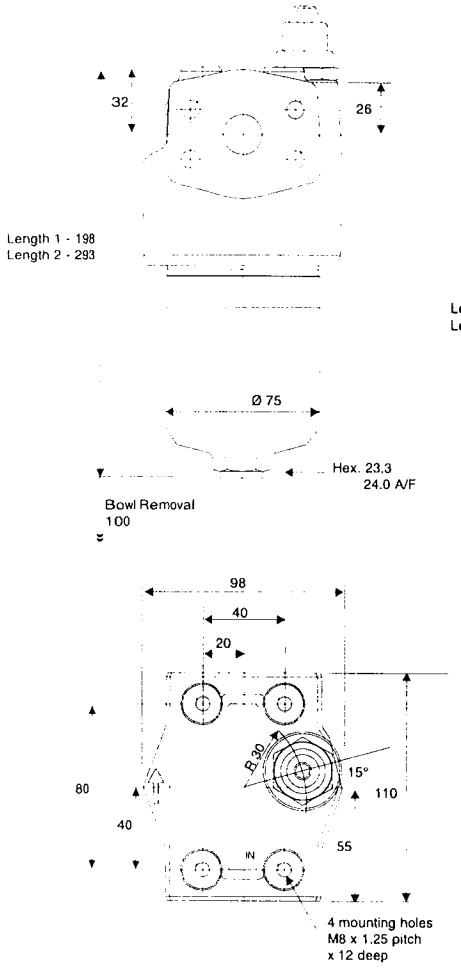
Certificate No. 902127

*Fluoroelastomers are available under various registered trademarks, including Viton (a registered trademark of DuPont) and Fluorel (a registered trademark of 3M).

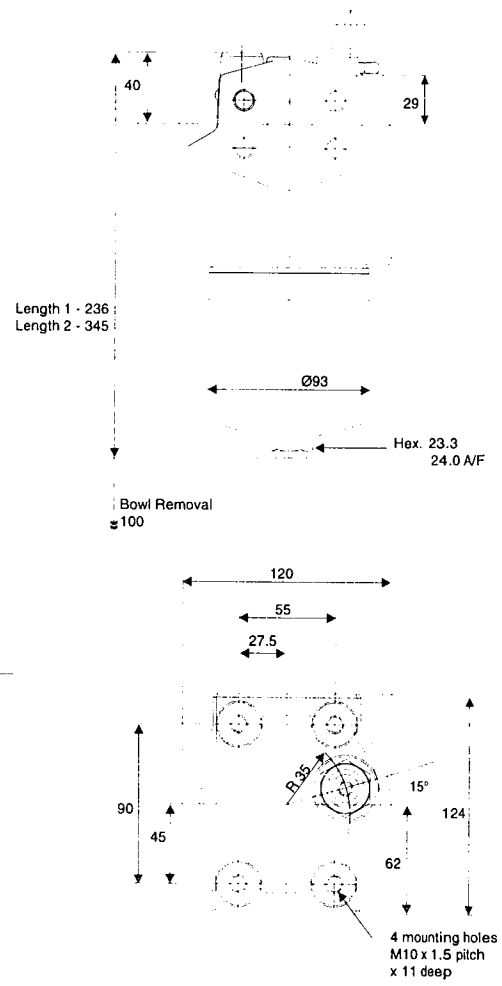
Installation Details

High Pressure Filters
18P, 28P, 38P

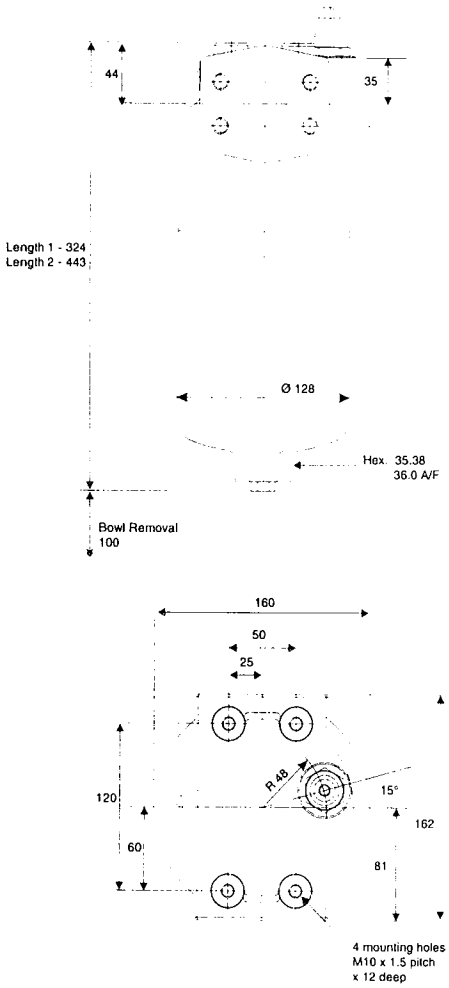
18P



28P

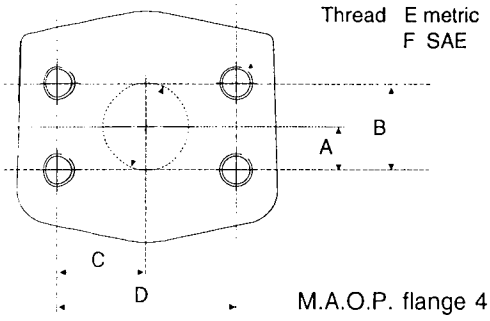


38P



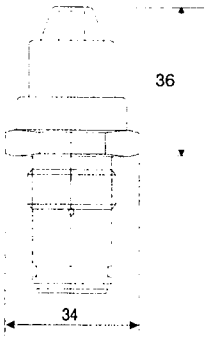
Flange Face Details

ø G

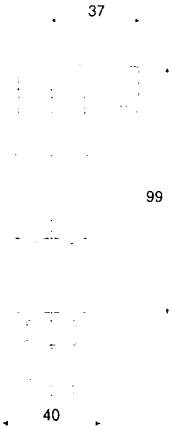


M.A.O.P. flange 414 bar

Indicator Options



Visual Indicator

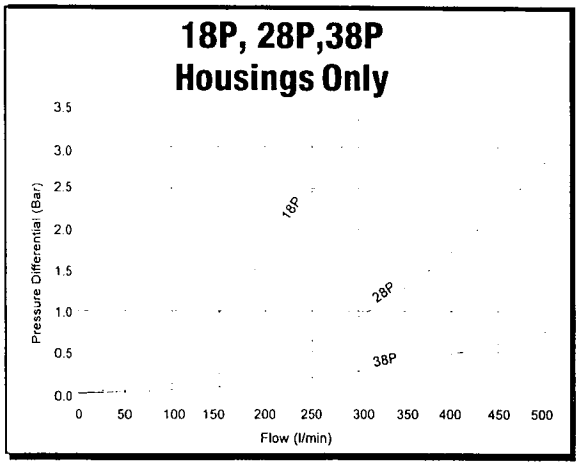


Electrical Indicator

Dimensions (mm)

Model	A	B	C	D	E	F	G
18P	11.9	23.8	25.4	50.8	M10 x 1.5-6H x 18 Deep	3/8-16 UNC-2B x 18 Deep	19.0
28P	13.4	26.8	26.2	52.4	M12 x 1.75-6H x 20 Deep	7/16-14 UNC-2B x 20 Deep	25.4
38P	15.7	31.7	33.0	66.7	M14 x 2-6H x 20 Deep	1/2-13 UNC-2B x 20 Deep	31.8

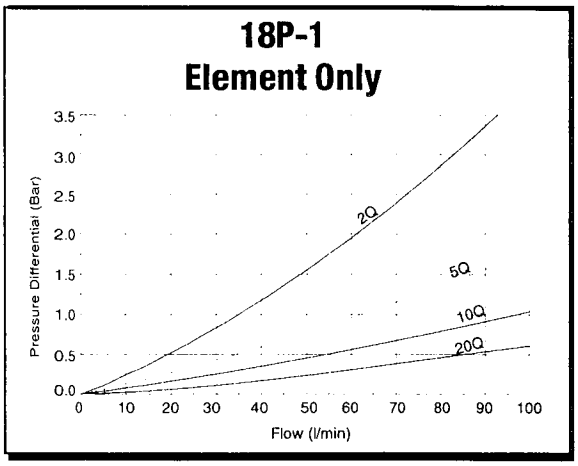
Performance - 18P, 28P, 38P

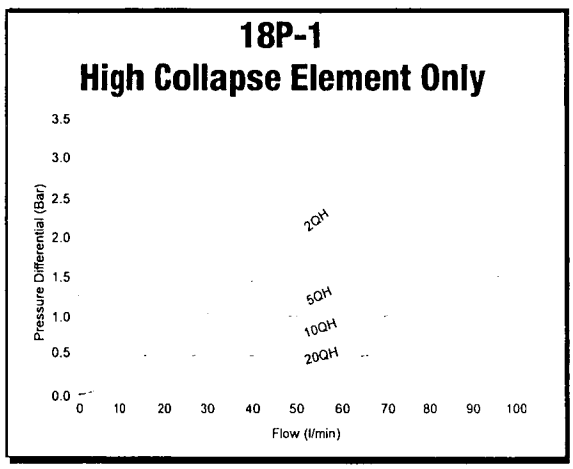


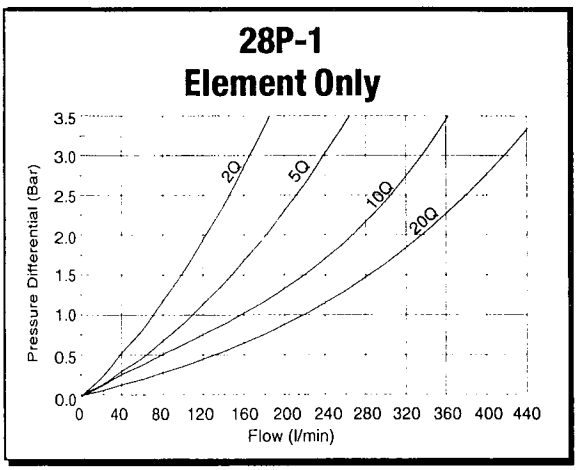
To select the correct housing and element, it is recommended that the ratio between the bypass setting and the differential pressure across the filter with a clean element, at the rated flow, should be at least 2:1.

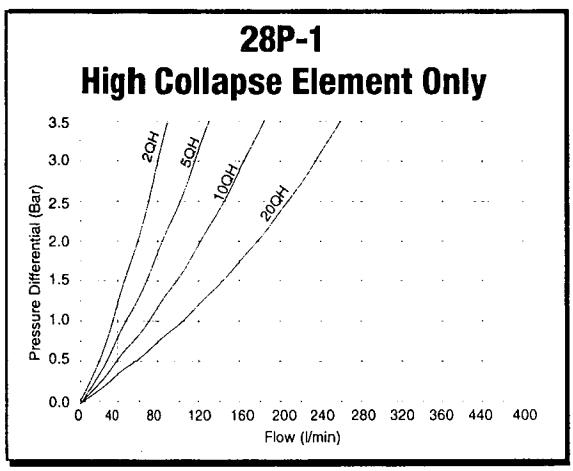
To find total pressure differential through the filter assembly, add the 'housing only' pressure differential to the 'element only' pressure differential, at the rated flow.
Total ΔP = Housing ΔP + Element ΔP

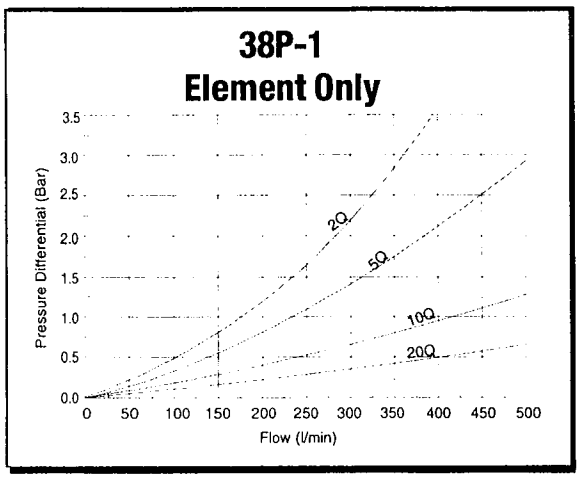
Flow curves at 30 cSt viscosity.

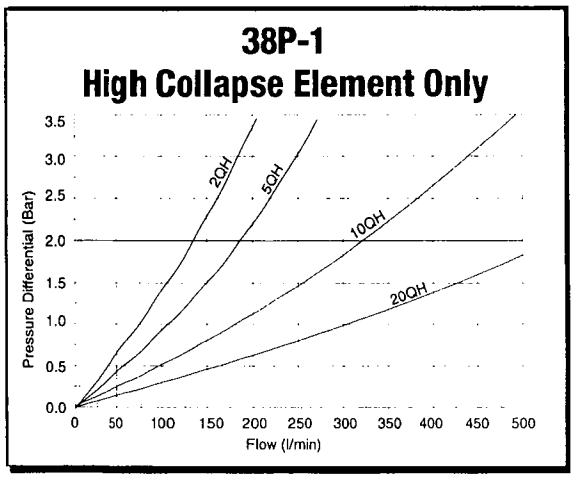






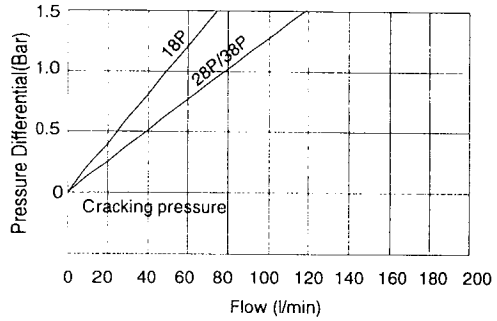




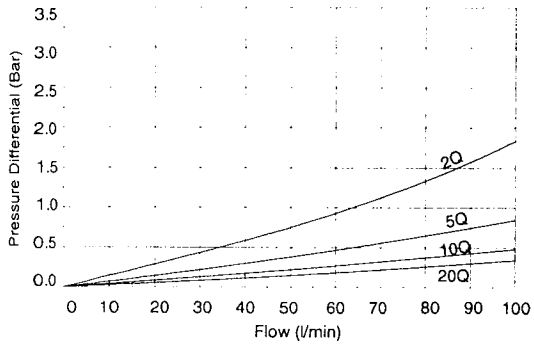


Performance - 18P, 28P, 38P

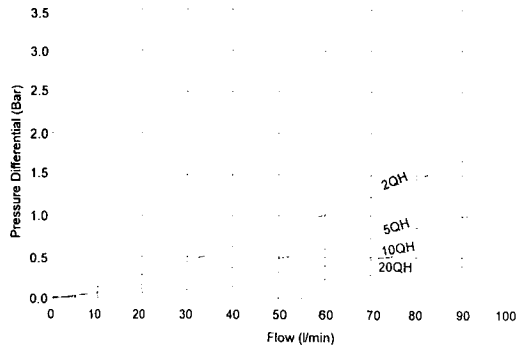
18P, 28P,38P Bypass Valve



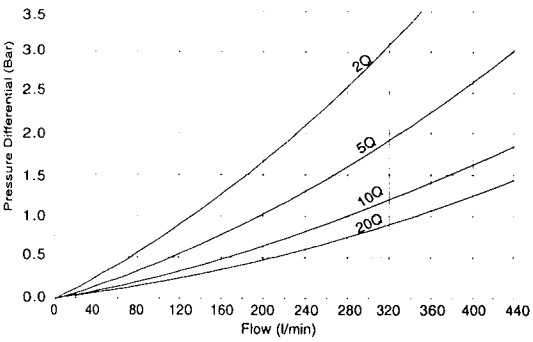
18P-2 Element Only



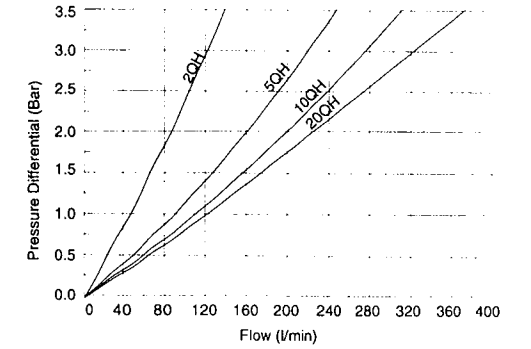
18P-2 High Collapse Element Only



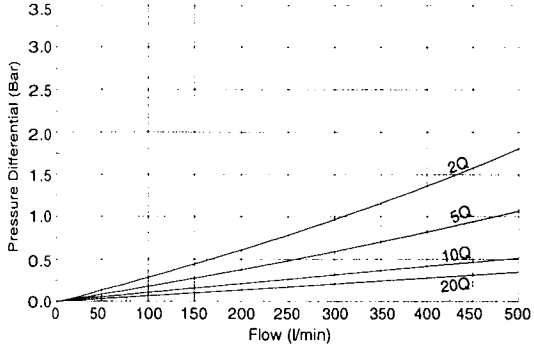
28P-2 Element Only



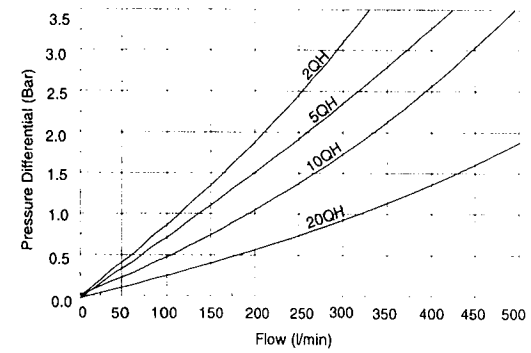
28P-2 High Collapse Element Only



38P-2 Element Only



38P-2 High Collapse Element Only



Microglass II 'Q' Media Performance

High Pressure Filters 18P, 28P, 38P

The startling difference in contaminant holding capacity between Microglass II media and another generally available media can be seen in Figure 1 below. The graph, based on actual results, demonstrates that even though the Microglass II media has a higher initial ΔP that its useful capacity is more than 3 times that of element A.

The multilayer construction of Microglass II media offers not only a higher capacity but also a longer life. In Figure 2 below the initial 'clean element' ΔP of two interchangeable elements is compared. When 10 grams of ACFTD is added to each element the increase in ΔP measured across each confirms that Microglass II will give a longer life than element A.

Figure I

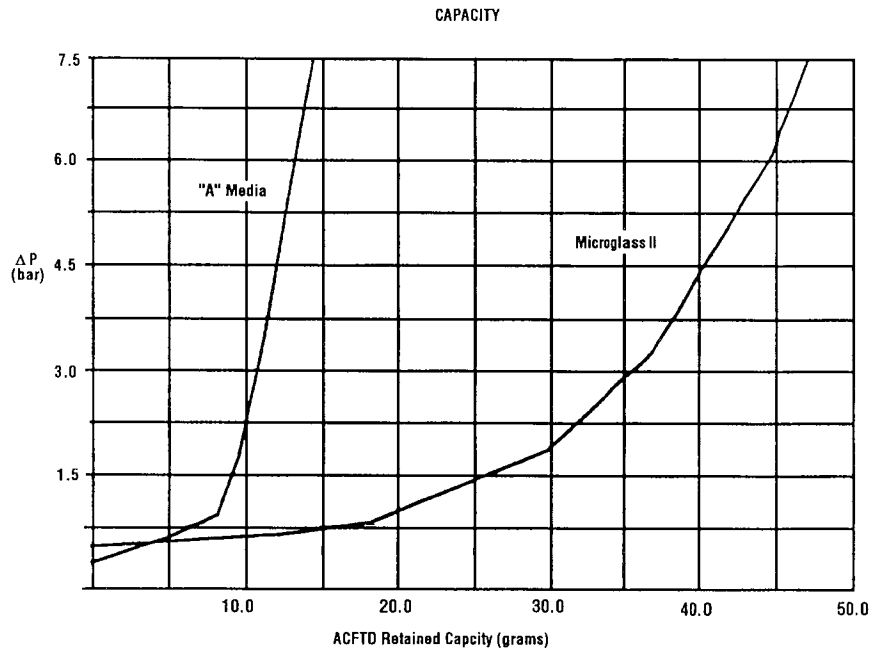
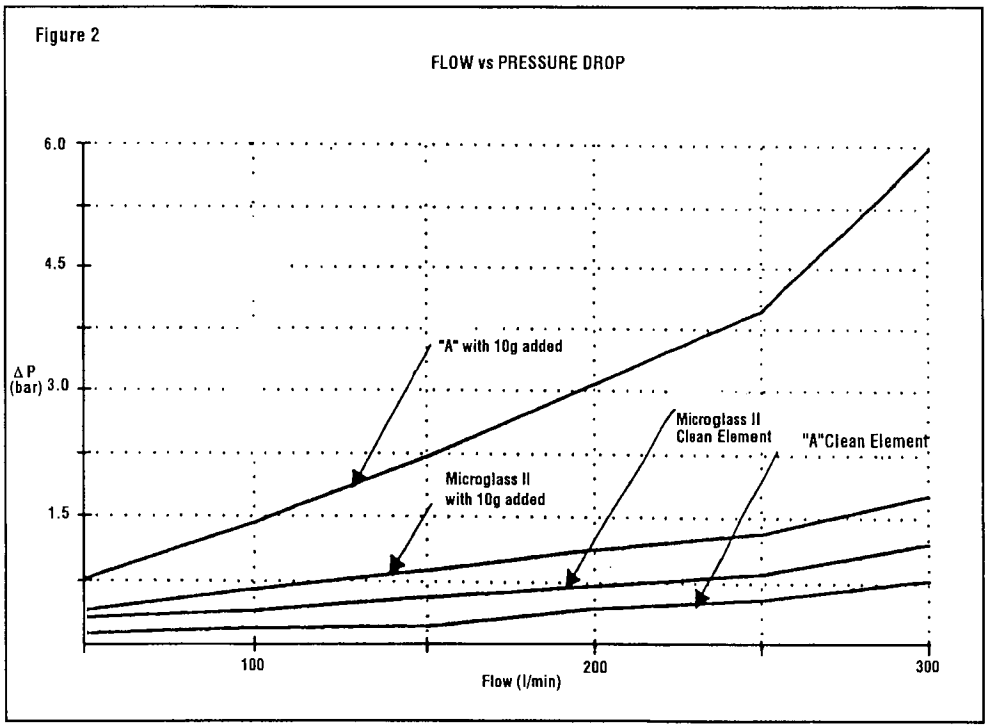


Figure 2



Operation & Element Servicing

High Pressure Filters
18P, 28P, 38P

Operating & Element Service Instructions

Installation

The 18P, 28P, 38P high pressure filters are designed to operate in systems where the operating pressure does not exceed 414 Bar.

The filter should be mounted with the bowl down and secured to a suitable bracket using the mounting holes provided on the filter head. Ensure that the filter is orientated so that the visual indicator if fitted is clearly visible. See page 5 of this brochure for mounting hole and port connection detail. When connecting to the system the arrow stamped on the filter head should coincide with the flow direction.

Operation

Fluid enters the inlet port on the head and flows around the annular area of the bowl outside the filter element, passes through the filter media and exits the housing via the outlet port. The pressure differential across the filter will be at its lowest when the element is clean. See the flow curves on page 6 and 7 for differential pressure detail at rated flow. Contaminants removed from the fluid system build up both on and within the filter media. The pressure differential across the filter increases as the amount of trapped contaminant increases.

This increase in pressure differential is reflected on the visual or electrical indicator if fitted. If no indicator is fitted then it is suggested that the element be changed at predetermined intervals.

When the pressure differential across the filter element meets the bypass valve spring rate the valve opens preventing over pressurisation of the element. Filter elements should be changed before the bypass valve opens as shown externally by either the visual or electrical indicator.

Element Servicing

Ensure that the hydraulic system is switched off and that the pipework is de-pressurised. Drain fluid from filter bowl by removing bowl drain plug if fitted. With suitable spanner unscrew the bowl from the filter head revealing the dirty element. Grasp the element and pull downwards with a slight twisting movement to remove. Discard used element and check head and bowl for damage. Clean inside bowl with a cleaning agent (do not use cloth or paper towels). Check that the appropriate seal is fitted to the element, lubricate and replace the element in the filter head. Replace the head to bowl seal and anti extrusion ring as shown in the instructions included with the new element, lubricate and refit the bowl to the head. On repressurising the filter check for leaks.

Replacement Element Part Numbers

Nitrile Seals

Model	2Q	5Q	10Q	20Q
18P-1	G04242	G04243	G04244	G04245
18P-2	G04250	G04251	G04252	G04253
28P-1	G04258	G04259	G04260	G04261
28P-2	G04266	G04267	G04268	G04269
38P-1	G04274	G04275	G04276	G04277
38P-2	G04282	G04283	G04284	G04285

Fluoroelastomer Seals*

Model	2Q	5Q	10Q	20Q
18P-1	G04246	G04247	G04248	G04249
18P-2	G04254	G04255	G04256	G04257
28P-1	G04262	G04263	G04264	G04265
28P-2	G04270	G04271	G04272	G04273
38P-1	G04278	G04279	G04280	G04281
38P-2	G04286	G04287	G04288	G04289

Nitrile Seals

Model	2QH	5QH	10QH	20QH
18P-1	G04290	G04291	G04292	G04293
18P-2	G04298	G04299	G04300	G04301
28P-1	G04306	G04307	G04308	G04309
28P-2	G04314	G04315	G04316	G04317
38P-1	G04322	G04323	G04324	G04325
38P-2	G04330	G04331	G04332	G04333

Fluoroelastomer Seals*

Model	2QH	5QH	10QH	20QH
18P-1	G04294	G04295	G04296	G04297
18P-2	G04302	G04303	G04304	G04305
28P-1	G04310	G04311	G04312	G04313
28P-2	G04318	G04319	G04320	G04321
38P-1	G04326	G04327	G04328	G04329
38P-2	G04334	G04335	G04336	G04337

Seal Kits

Model	Nitrile	Fluoroelastomer*
18P	S04350	S04351
28P	S04352	S04353
38P	S04354	S04355

Spare Indicators

Setting	Visual	Visual/Electrical
2.5 bar	933127	933148
5.0 bar	933128	933149

Ordering Information

Box 1	Box 2	Box 3	Box 4	Box 5	Box 6	Box 7	Box 8	Box 9
F3	28P	1	10Q	M2	98	C2C2	1	-

Box 1
Seals

Symbol	Description
O	Nitrile
F3	Fluoroelastomer*

Box 2
Model Number

Symbol
18P
28P
38P

Box 3
Element Length

Symbol	Description
1	Single Length
2	Double Length

Box 4
Element Media
Microglass II (Q) Media ßx>200

Symbol	Description
2Q	2µ absolute
5Q	5µ absolute
10Q	10µ absolute
20Q	20µ absolute
2QH	2µ absolute (High Collapse)
5QH	5µ absolute (High Collapse)
10QH	10µ absolute (High Collapse)
20QH	20µ absolute (High Collapse)

Box 5
Indicator

Symbol	Description
N	None
H2	Electrical DIN plug
M2	Visual/Autoreset

Note: Indicator differential pressure settings
2.5 bar with 3.5 bar bypass
5.0 bar with 7.0 bar bypass
5.0 bar with no bypass

Box 6
Bypass

Symbol	Description
50	3.5 bar
98	7 bar
X	No Bypass

Box 7
Ports

Model	Symbol	Description
18P	B2B2	G ¾ thread
	M4M4	12, SAE thread
	B3B3	M27, ISO6149
	Y3Y3	¾ " 6000 - M flange face
	Y9Y9	¾ " SAE 6000 Config. flange face
28P	C2C2	G1
	N4N4	16, SAE thread
	C3C3	M33, ISO6149
	Y3Y3	1" 6000 - M flange face
	Y9Y9	1" SAE 6000 Config. flange face
38P	D2D2	G1 ¼
	E2E2	G1 ½
	O4O4	20, SAE thread
	P4P4	24, SAE thread
	D3D3	M42, ISO6149
	E3E3	M48, ISO6749
	Y3Y3	1 ¼" 6000 - M flange face
	Y9Y9	1 ¼" SAE 6000 Config. flange face

Box 8
Options

Symbol	Description
1	With bypass
11	No bypass

Box 9
Design Number
Applied to the filter assembly by Parker Filtration.

NB. Please use the full model code, including design number, when ordering replacement parts and elements.

*Fluoroelastomers are available under various registered tradedmarks, including Viton (a registered trademark of DuPont) and Fluorel (a registered trademark of 3M).

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517

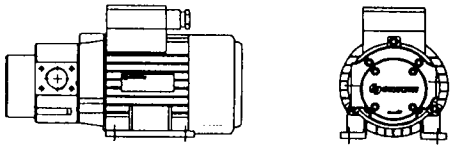
Installation and servicing instruction QPM low pressure pump

Strictly observe this instruction prior to installation of Oiltech QPM low pressure pump.

Mounting

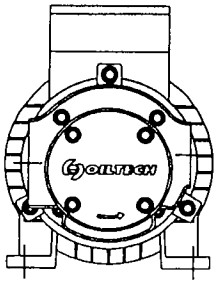
The Oiltech QPM low pressure pump allows both vertical and horizontal mounting. To prevent personal injury, secure the pump to the foundation from the feet of the electromotor.

QPM 20 - 80



Hydraulic connection

Place the pump suction side as close to the tank as possible. Use as short a suction line as possible. Connect the suction line to the largest pump connection. Suction line diameter should not be inferior to pump connection diameter. A larger diameter is recommended. Avoid flow rates in excess of 1 m/s in the suction line. Minimise the difference in height between tank fluid level and the pump. It is advisable to place the pump below fluid level. Maximum suction height 5 meter (negative suction pressure max. 0,5 bar). A QPM pump provided with a extremely long suction line can generate problems at initial start-up because of too much air in the line. In such a case prime the suction line with oil. Olaer/Oiltech shall not be held responsible for the consequences of any variation with regard to connections.

Suction =>  Pressure =>

Contaminated fluid could reduce pump life. Minimum 25 µm filtration is recommended.

Note! The pump must never be run in such a way that maximum pump pressure is exceeded, see QPM pamphlet. This could occur if the system on the pressure side is shut or severely throttled, which could damage the pump and cause personal injury.

The pump is not provided with pressure relief valve as standard. Install relief valves in case where the system is fitted with isolating valves, shut-off valves, etc. and also at cold start-ups.

Electrical connection

> ***Caution!***
> ***Connection may only be made by a duly qualified electrician.***
> ***Voltage and connection, see electromotor.***

Prior to start-up

Check that valves and similar throttling devices are open at start-up.

At start-up

Check that the direction of rotation of the pump is correct. The best way to do this is by looking at the electromotor fan.

Noise level

The QPM low pressure pump is designed for extremely low noise level. However, inappropriate location could generate noise. Consult Olaer/Oiltech.

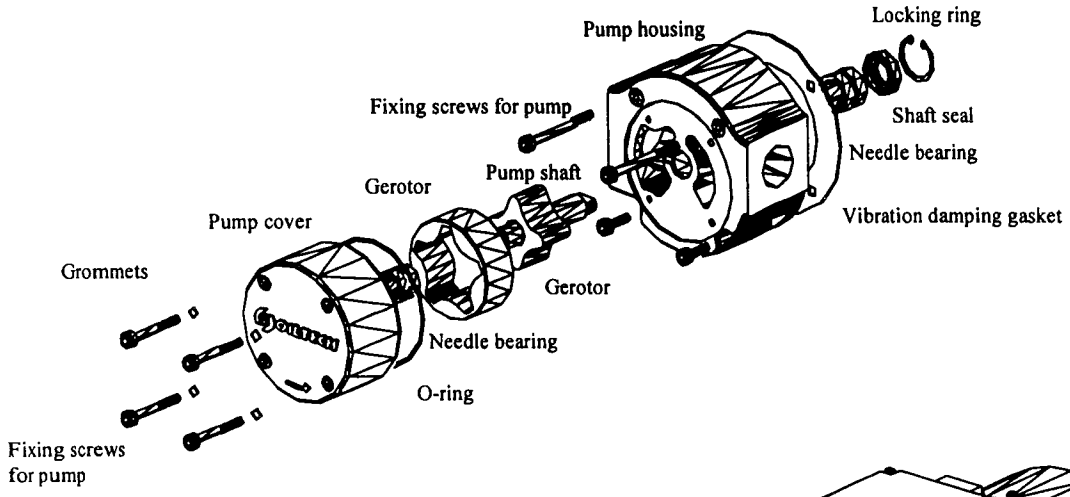
Cleaning

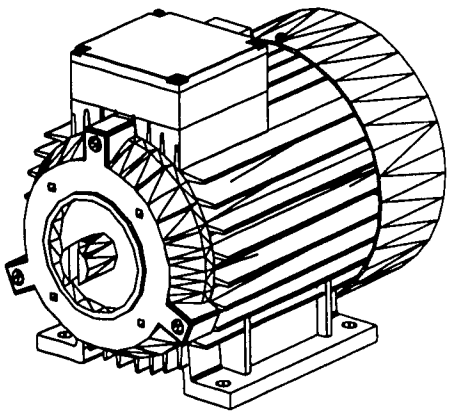
Olaer/Oiltech shall not be held responsible for the consequences of any interference with the pump such as inside cleaning. In case where the pump has been running with contaminated fluid, clean it by running it with clean fluid.

Note! When cleaning the exterior of the pump remove the electrical connections from the electromotor.

Miscellaneous

- In the event of a breakdown, consult Olaer/Oiltech who shall not be held responsible for the consequences of any customer repair and/or modification.
- Consult Olaer/Oiltech when using fluids different from normal hydraulic fluids such as heavy lubricating oils or in case of cold starting.





Electromotor

OILTECH
MEMBER OF THE OLAER GROUP

Oiltech AB, Förrådsvägen 2, S-181 41 Lidingö, Sweden. Fax +46 8 767 97 56, Tel +46 8 636 07 00

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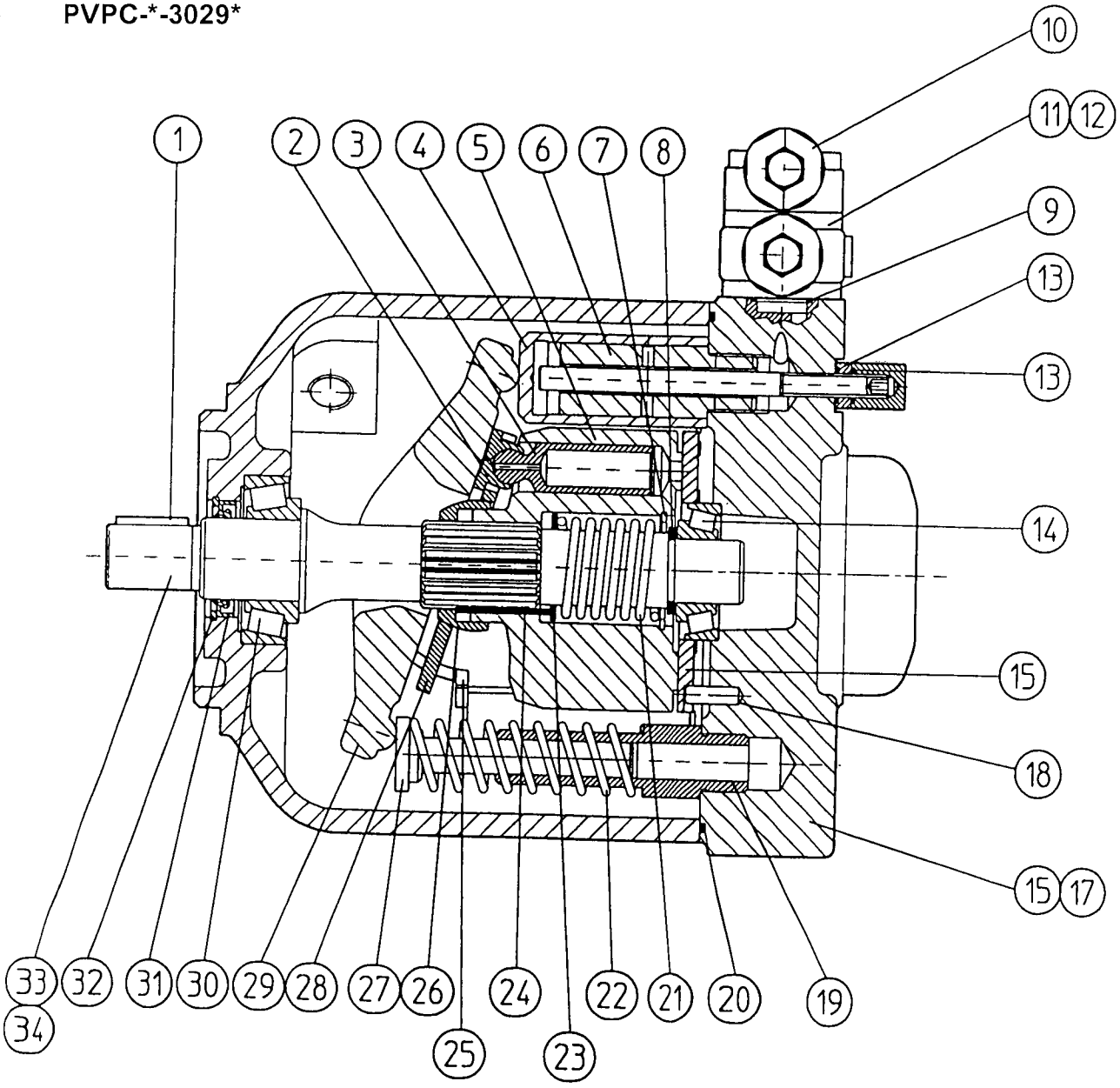
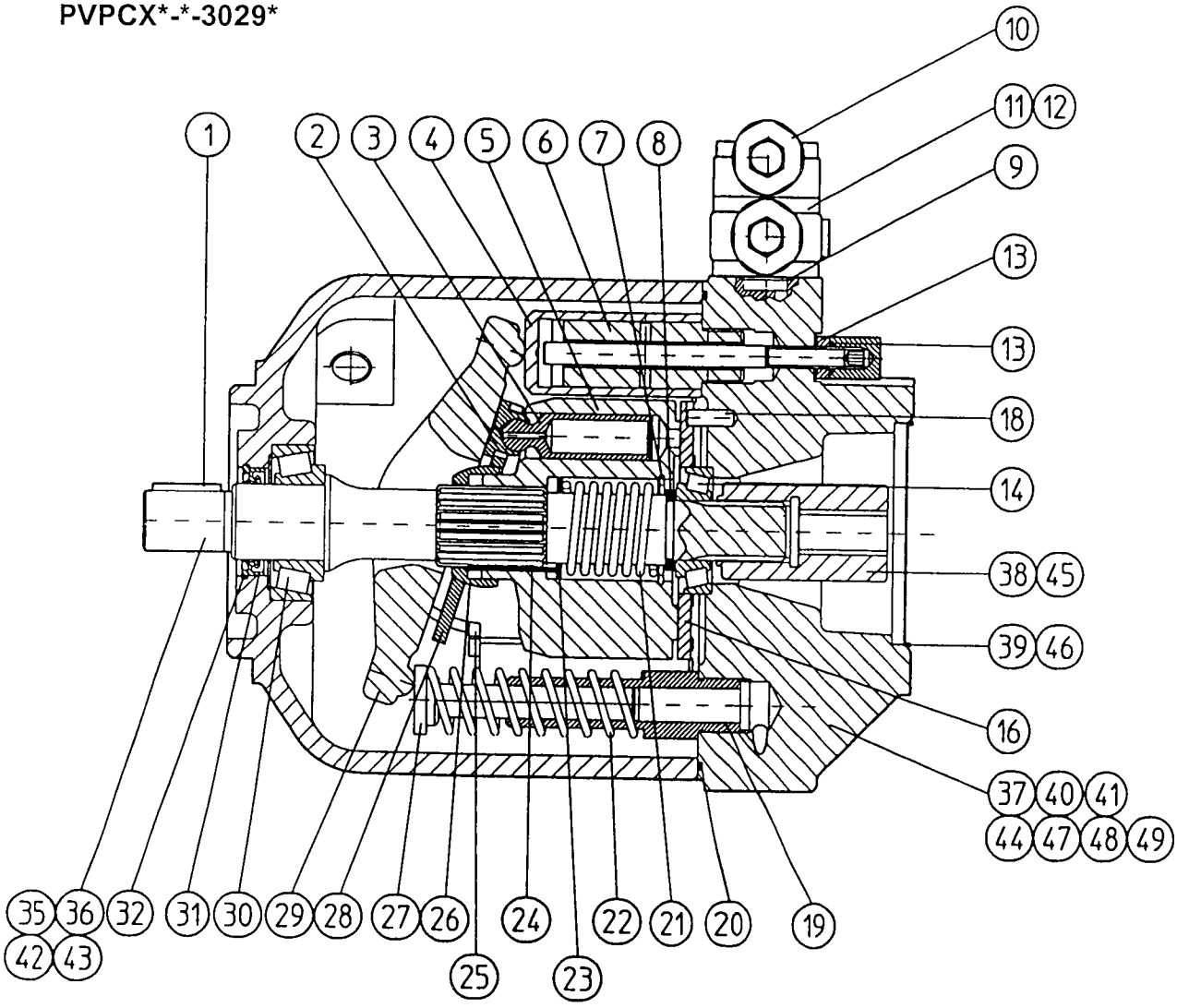
PVPC-*-3029*



PVPCX*-*-3029*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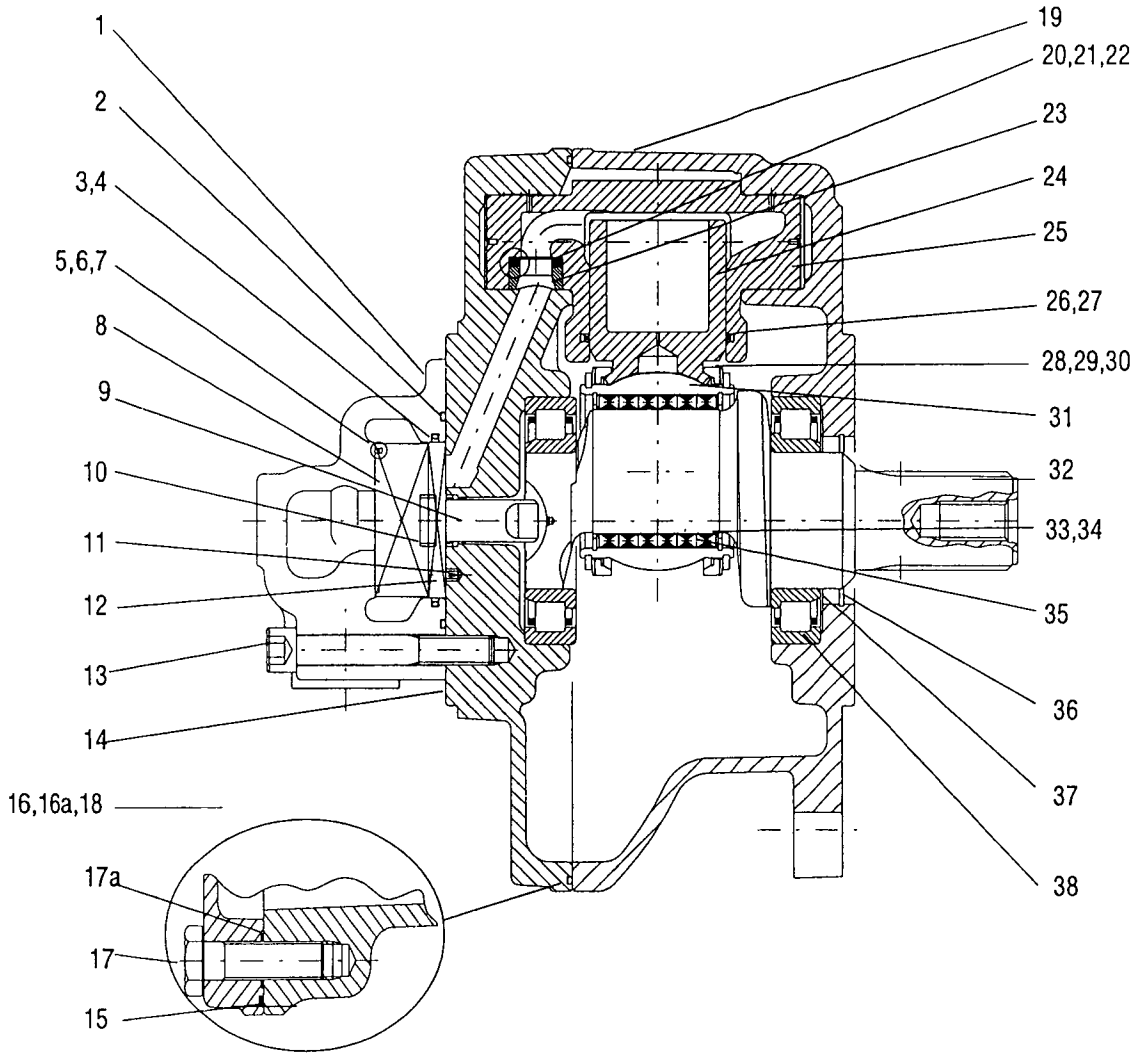
SPARE PARTS:

Versions			Pos	Code	Q.ty	Description
C	L	R				
●	●	●	1	Y-9-42710000	1	SHAFT KEY
●	●	●	2	Y-9-45960300	9	PISTON SLIPPER
●	●	●	3	Y-9-46221000	9	PISTON
●	●	●	4	Y-9-48471000	1	PILOT PISTON
●	●	●	5	Y-9-42450500	1	CYLINDERS BLOCK
●	●	●	6	Y-9-48471510	1	PILOT STEM
●	●	●	7	Y-9-40665000	1	CIRCLIP 32
●	●	●	8	Y-9-37851900	1	SHOULDER WASHER SHAFT
●	●	●	9	Y-9-37976000	1	O-RING SEAL
●	●	●	10	Y-9-06870000	1	PRESSURE CONTROL
	●		11	Y-9-06870011	1	FLOW CONTRL
		●	12	Y-9-06870021	1	FLOW CONTRL
●	●	●	13	Y-9-37902000	2	O-RING SEAL
●	●	●	14	Y-9-34242500	1	BEARING
●	●	●	15	Y-9-23370011	1	COVER
●	●	●	16	Y-9-45960100	1	RETAINIG PLATE
●	●	●	17	Y-9-35150000	4	SCREW TCEI
●	●	●	18	Y-9-49271600	1	DOWEL PIN
●	●	●	19	Y-9-48470500	1	COUNTRBALANCING STEM
●	●	●	20	Y-9-38302000	1	O-RING SEAL
●	●	●	21	Y-9-45340650	1	PISTONS SPRING
●	●	●	22	Y-9-45340550	1	COUNTERBALANCING SPRING
●	●	●	23	Y-9-37852500	1	SHOULDER WASHER
●	●	●	24	Y-9-49255500	3	DOWEL PIN
●	●	●	25	Y-9-42136100	2	SEMI-RING
●	●	●	26	Y-9-42136000	1	SPLINED RING
●	●	●	27	Y-9-48470000	1	COUNTERBALANCING SPOOL
●	●	●	28	Y-9-45960200	1	PISTONS GUIDE PLATE
●	●	●	29	Y-9-45960000	1	SWASH PLATE
●	●	●	30	Y-9-34243000	1	BEARING
●	●	●	31	Y-9-39735000	1	SHAFT SEAL
●	●	●	32	Y-9-40690000	1	CIRCLIP
●	●	●	33	Y-9-47553500	1	SHAFT TYPE "1"
●	●	●	34	Y-9-47553000	1	SHAFT TYPE "5"

SPARE PARTS:

PREARRANGEMENT FOR PVPCXA-3029*						
Versions			Pos	Code	Q.ty	Description
C	L	R				
●	●	●	35	Y-9-47553510	1	SHAFT TYPE "1"
●	●	●	36	Y-9-47553010	1	SHAFT TYPE "5"
●	●	●	37	Y-9-23376010	1	COVER
●	●	●	38	Y-9-44907852	1	COUPLING
●	●	●	39	Y-9-38010600	1	O-RING SEAL
●	●	●	40	Y-9-35135000	2	SCREW TCEI
●	●	●	41	Y-9-27780000	2	WHASHER
PREARRANGEMENT FOR PVPCXB-3029*						
Versions			Pos	Code	Q.ty	Description
C	L	R				
●	●	●	42	Y-9-47553510	1	SHAFT TYPE "1"
●	●	●	43	Y-9-47553010	1	SHAFT TYPE "5"
●	●	●	44	Y-9-23376000	1	COVER
●	●	●	45	Y-9-44907850	1	COUPLING
●	●	●	46	Y-9-39100000	1	O-RING SEAL
●	●	●	47	Y-9-37371010	2	CAPTIVE
●	●	●	48	Y-9-37841000	2	WHASHER
●	●	●	49	Y-9-36845000	2	NUT



PART LIST OF GM SERIES MOTOR / LISTA PARTI MOTORI SERIE GM

PO.	Description	Descrzione
1	Distributor cover	Coperch. Distributore
2	O-ring	Tenuta O-r
3	Seal (Plastic)	Tenuta(plastica)
4	O-ring	Tenuta O-r
5	Seal (steel)	Tenuta (acciaio)
6	Seal (Plastic)	Tenuta(plastica)
7	O-ring	Tenuta O-r
8	Rotary distributor	Rotante distributore
9	Drive pin	Perno di trascinam.
10	Centering bush	Anello di centraggio
11	Locating pin	Spina
12	Bronze disc	Disco bronzo
13	Distributor bolt	Vite distributore
14	Motor cover	Coperchio motore
15	O-ring	Tenuta O-r
16	Assembly bolt	Vite
16a	O-ring	Tenuta O-r
17	Main bolts	Vite
17a	O-ring	Tenuta O-r
18	Locating pin	Spina

PO.	Description	Descrzione
19	Motor body	Corpo motore
20	O-ring	Tenuta O-r
21	Anti-extr. Ring(plastic)	Anello antiest.(plastica)
22	Anti-extr. Ring(steel)	Anello antiest.(acciaio)
23	Steel insert	Inserto acciaio
24	Piston	Pistone
25	Cylinder	Cilindro
26	O-ring seal	Tenuta O-r
27	Seal(plastic)	Tenuta (plastica)
28	Piston retaining ring	Anello ritegno pist.
29	Retaining spring	Molla di ritegno
30	C-clip	Anello di sicurezza
31	Spher. Support ring	Supporto sferico
32	Crankshaft	Albero motore
33	Spacer ring	Anello di spallam.
34	C-clip	Anello di sicurezza
35	Roller	Rullo
36	C-clip	Anello di sicurezza
37	Shaft seal	Anello di tenuta
38	Shaft bearing	Cuscinetto

Note:

1. Po.s 1- 13 refer detail part list of distributors /vedi lista parti distributori.
2. Po.s 14 - 38 refer to individual part list of the series/ vedi lista particolari della serie motori (GM05,GM1.....
3. Po.s 16,16a is applicalble only for GM05 motor / e' applicabile solo su motori GM05

SAI

GM05 SPARE PARTS LIST / CODICI DI RICAMBIO

Description	Descrizione	Pos.	QTY/Q	Specification	Code/Codice
Motor body	Corpo motore	19	1	standard	0 164 116 101
Motor cover	Cop. Motore	14	1	standard	0 164 113 102
Shaft	Premontaggio	28,29	1	Male/maschio S16 DIN5480	0 103 105 294
sub-assembly	albero	30,31		Male/maschio S24 DIN5480	0 104 150 294
		32,33		Male/maschio S16 UNI221	0 103 102 294
		34,35		Male/mas S24 UNI221	0 104 102 294
				Parallel/cilindr.S16,ϕ30	0 103 103 294
				Parallel/cilindr.S24,ϕ30	0 104 122 294
				Fem. S16 DIN5480	0 103 104 294
				Fem. S24 DIN5480	0 104 160 294
				Fem. S16 UNI221	0 103 112 294
				Fem. S24 UNI221	0 104 132 294
				Tapered/conico S24	0 104 180 294
Pist. Retain. Ring	Anello rit.	28	2		0 106 102 211
Retain. Spring	Molla di ritegno	29	2		0 106 100 220
C-clip	Anello di sicure.	30	2		0 010 001 013
Shaft bearings	Cuscinetti	38	2	Ball.b/c.a sfere	0 010 007 033
				Roller b./c. a rulli	0 010 007 060
Shaft seal	Anello tenuta	37	1		0 010 002 066
C-clip	Anello di sicure.	36	1		0 010 001 066
Motor body/	O-r corpo	15	1	O-ring/O-r	0 010 012 059
cover O-ring	e coperchio	16a	2	O-ring/O-r	0 010 012 022
		17a	5	O-ring/O-r	0 010 012 287
Assembly bolts	Vite	16	2	Sock.Head /V TCEI M6x30 8.8 UNI5931	0 010 025 007
Main bolts	Vite	17	5	Sock.Head/V TCEI M12x50 12.9 UNI5931	0 010 025 342
Locating pin	Spine	18	2		0 010 020 048
Seal kit	Kit Guarnizione	2,3,4,5,6,7,15,16a,17a,20,21,22,36,37			0 164 410 212

Cylinder sub-assembly(QTY-5) /Pre-assembl. Cilindri(Q-5)

Cylinder ϕ	Cyl. Sub-assembly (Po.24,25,26,27)	O-ring (Po .26)	Plastic seal (Po.27)
ϕ25	0 164 111 286	0 010 012 246	0 010 038 112
ϕ28	0 164 112 286	0 010 012 194	0 010 038 001
ϕ35	0 164 117 186	0 010 012 214	0 010 038 002
ϕ37	0 164 116 186	0 010 012 137	0 010 038 019
ϕ 40	0 164 114 286	0 010 012 035	0 010 038 004
ϕ 42	0 164 108 086	0 010 012 126	0 010 038 108
ϕ 45	0 164 109 186	0 010 012 205	0 010 038 104

SAI

GM1 SPARE PARTS LIST / CODICI DI RICAMBIO

Description	Descrizione	Pos.	QTY/Q	Specification	Code/Codice
Motor body	Corpo motore	19	1	standard	0 148 109 001
Motor cover	Cop. Motore	14	1	standard	0 148 105 002
Shaft	Premontaggio	28,29	1	Male/maschio S32 DIN5480	0 103 105 294
sub-assembly	albero	30,31		Male/maschio S32 UNI221	0 106 102 294
		32,33		Fem. S32 DIN5480	0 106 133 294
		34,35		Fem. S32 UNI221	0 106 132 294
				Tapered/conico S32 ,ϕ45	0 106 180 294
				Parallel/cilindr.S32 ,ϕ40	0 106 120 294
Pist. Retain. Ring	Anello rit.	28	2		0 106 102 211
Retain. Spring	Molla di ritegno	29	2		0 106 100 220
C-clip	Anello di sicure.	30	2		0 010 001 013
Shaft bearings	Cuscinetti	38	2	Ball.b/c.a sfere	0 010 007 033
				Roller b./c. a rulli	0 010 007 150
Shaft seal	Anello tenuta	37	1		0 010 002 066
C-clip	Anello di sicure.	36	1		0 010 001 066
Motor body/	O-r corpo	15	1	O-ring/O-r	0 010 012 181
cover O-ring	e coperchio	17a	5	O-ring/O-r	0 010 012 237
Main bolts	Vite	17	5	Hex. Head/T.E M14x35 8.8 UNI5737	0 010 025 213
Locating pin	spine	18	2		0 010 020 048
Seal kit	Kit Guarnizione	2,3,4,5,6,7,15,17a,20,21,22,36,37			0 148 402 212

Cylinder sub-assembly(QTY-5) /Pre-assembl. Cilindri(Q-5)

Cylinder ϕ	Cyl. Sub-assembly (Po.24,25,26,27)	O-ring (Po .26)	Plastic seal (Po.27)
ϕ28	0 148 102 086	0 010 012 194	0 010 038 001
ϕ35	0 148 001 086	0 010 012 214	0 010 038 002
ϕ37	0 148 004 086	0 010 012 137	0 010 038 019
ϕ40	0 148 003 186	0 010 012 035	0 010 038 004
ϕ44	0 148 001 186	0 010 012 205	0 010 038 005
ϕ 48	0 148 002 186	0 010 012 217	0 010 038 007
ϕ 50	0 148 000 186	0 010 012 218	0 010 038 008

SAI

GM2 SPARE PARTS LIST / CODICI DI RICAMBIO

Description	Descrizione	Pos.	QTY/Q	Specification	Code/Codice
Motor body	Corpo motore	19	1	standard	0 150 105 001
Motor cover	Cop. Motore	14	1	standard	0 150 105 002
Shaft	Premontaggio	28,29	1	Male/maschio S40 DIN5480	0 128 150 294
sub-assembly	albero	30,31		Male/maschio S40 UNI220	0 128 100 294
		32,33		Fem. S40 DIN5480	0 128 131 294
		34,35		Fem. S40 UNI22O	0 128 130 294
				Tapered/conico S40 ,ϕ45	0 128 180 294
				Parallel/cilindr.S40,ϕ40	0 128 132 294
Pist. Retain. Ring	Anello rit.	28	2		0 128 102 311
Retain. Spring	Molla di ritegno	29	2		0 131 101 220
C-clip	Anello di sicure.	30	2		0 010 001 059
Shaft bearings	Cuscinetti	38	2	Ball.b/c.a sfere	0 010 007 037
				Roller b./c. a rulli	0 010 007 009
Shaft seal	Anello tenuta	37	1		0 010 002 032
C-clip	Anello di sicure.	36	1		0 010 001 061
Motor body/	O-r corpo	15	1	O-ring/O-r	0 010 012 277
cover O-ring	e coperchio	17a	10	O-ring/O-r	0 010 012 287
Main bolts	Vite	17	10	Hex. head M12x50 8.8 UNI5737	0 010 025 130
Locating pin	spine	18	2		0 010 020 048
Seal kit	Kit Guarnizione	2,3,4,5,6,7,15,17a,20,21,22,36,37			0 150 402 212

Cylinder sub-assembly(QTY-5) /Pre-assembl. Cilindri(Q-5)

Cylinder ϕ	Cyl. Sub-assembly (Po.24,25,26,27)	O-ring (Po .26)	Plastic seal (Po.27)
ϕ35	0 150 006 186	0 010 012 214	0 010 038 002
ϕ40	0 150 007 186	0 010 012 035	0 010 038 004
ϕ44	0 150 003 186	0 010 012 205	0 010 038 005
ϕ47	0 150 005 186	0 010 012 217	0 010 038 007
ϕ52	0 150 004 186	0 010 012 037	0 010 038 010
ϕ56	0 150 002 186	0 010 012 180	0 010 038 024
ϕ60	0 150 000 186	0 010 012 335	0 010 038 035
ϕ63	0 150 001 186	0 010 012 040	0 010 038 014

SAI

GM3 SPARE PARTS LIST / CODICI DI RICAMBIO

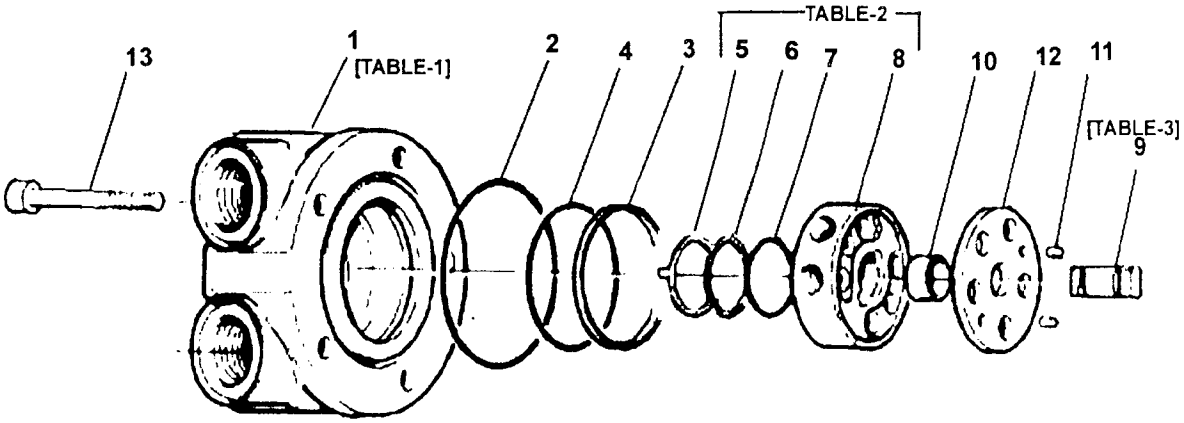
Description	Descrizione	Pos.	QTY/Q	Specification	Code/Codice
Motor body	Corpo motore	19	1	standard	0 153 100 101
Motor cover	Cop. Motore	14	1	standard	0 153 100 102
Shaft	Premontaggio	28,29	1	Male/maschio S56 DIN5480	0 131 106 294
sub-assembly	albero	30,31		Male/maschio S56UNI221	0 131 120 094
		32,33		Fem. S56 DIN5480	0 131 121 094
		34,35		Fem. S56 UNI220	0 131 120 294
				Tapered/conico S56,ϕ45	0 131 180 194
				Parallel/cilindr.S56 ,ϕ40	0 131 105 294
Pist. Retain. Ring	Anello rit.	28	2		0 131 120 211
Retain. Spring	Molla di ritegno	29	2		0 131 102 220
C-clip	Anello di sicure.	30	2		0 010 001 038
Shaft bearings	Cuscinetti	38	2	Roller b./c. a rulli	0 010 007 093
Shaft seal	Anello tenuta	37	1		0 010 002 032
C-clip	Anello di sicure.	36	1		0 010 001 061
Motor body/	O-r corpo	15	1	O-ring/O-r	0 010 012 178
cover O-ring	e coperchio	17a	10	O-ring/O-r	0 010 012 062
Main bolts	Vite	17	10	Soc. head/V.TCEI M14x60 UNI5931	0 010 025 276
Locating pin	spine	18	2		0 010 020 022
Seal kit	Kit Guarnizione	2,3,4,5,6,7,15,17a,20,21,22,36,37			0 153 401 212

Note:
Displacement 900 ,1000 cc motor are without piston retaining spring.Cilindrata 900,1000 cc senza molla di ritengo

Cylinder sub-assembly(QTY-5) /Pre-assembl. Cilindri(Q-5)

Cylinder ϕ	Cyl. Sub-assembly (Po.24,25,26,27)	O-ring (Po .26)	Plastic seal (Po.27)
ϕ40	0 153 103 086	0 010 012 035	0 010 038 004
ϕ44	0 153 107 086	0 010 012 205	0 010 038 005
ϕ47	0 153 101 086	0 010 012 217	0 010 038 007
ϕ52	0 153 105 086	0 010 012 037	0 010 038 010
ϕ56	0 153 102 186	0 010 012 180	0 010 038 024
ϕ 60	0 153 102 086	0 010 012 039	0 010 038 035
ϕ63	0 153 000 086	0 010 012 040	0 010 038 014
ϕ67	0 153 100 086	0 010 012 219	0 010 038 017

DISTRIBUTORS / DISTRIBUTORI



D30

POS.	DESCRIPTION DESCRIZIONE	CODE CODICE
2	O-RING SEAL GUARNIZIONE OR	0 010 012 043
10	BUSH BOCCOLA	0 140 000 012
13	BOLT No.5 12.9 M12x30 VITE	0 010 025 335

D31,D310,D312,D313,D314

POS.	DESCRIPTION DESCRIZIONE	CODE CODICE
2	O-RING SEAL GUARNIZIONE OR	0 010 012 313
10	BUSH BOCCOLA	0 140 000 012
13	BOLT No.1 12.9 M12x65 VITE No.4 12.9 M12x40	0 010 025 346 0 010 025 338

D37

POS.	DESCRIPTION DESCRIZIONE	CODE CODICE
2	O-RING SEAL GUARNIZIONE OR	0 010 012 313
10	BUSH BOCCOLA	0 140 000 012
13	BOLT No.1 12.9 M12x80 VITE No.4 12.9 M12x40	0 010 025 343 0 010 025 338

D40,D47

POS.	DESCRIPTION DESCRIZIONE	CODE CODICE
2	O-RING SEAL GUARNIZIONE OR	0 010 012 043
3	PLASTIC SEAL GUARNIZIONE ANELLO	0 010 038 054
4	O-RING SEAL GUARNIZIONE OR	0 010 012 040
10	BUSH BOCCOLA	0 140 000 012
11	LOCATING PINS SPINE	0 010 020 048
12	BRONZE DISC DISCO BRONZO	0 140 000 250
13	BOLT No.5 12.9 M12x80 VITE	0 010 025 343

D48,D481,D49,D491

POS.	DESCRIPTION DESCRIZIONE	CODE CODICE
2	O-RING SEAL GUARNIZIONE OR	0 010 012 064
3	PLASTIC SEAL GUARNIZIONE ANELLO	0 010 038 054
4	O-RING SEAL GUARNIZIONE OR	0 010 012 040
10	BUSH BOCCOLA	0 140 000 012
11	LOCATING PINS SPINE	0 010 020 048
12	BRONZE DISC DISCO BRONZO	0 140 000 250
13	BOLT No.4 12.9 M12x60 VITE	0 010 025 309

D504

POS.	DESCRIPTION DESCRIZIONE	CODE CODICE
2	O-RING SEAL GUARNIZIONE OR	0 010 012 043
3	PLASTIC SEAL GUARNIZIONE ANELLO	0 010 038 054
4	O-RING SEAL GUARNIZIONE OR	0 010 012 040
10	BUSH BOCCOLA	0 140 000 012
11	LOCATING PINS SPINE	0 010 020 048
12	BRONZE DISC DISCO BRONZO	0 140 000 250
13	BOLT No.4 12.9 M12x80 VITE	0 010 025 343

D51

POS.	DESCRIPTION DESCRIZIONE	CODE CODICE
2	O-RING SEAL GUARNIZIONE OR	0 010 012 043
3	PLASTIC SEAL GUARNIZIONE ANELLO	0 010 038 054
4	O-RING SEAL GUARNIZIONE OR	0 010 012 040
10	BUSH BOCCOLA	0 140 000 012
11	LOCATING PINS SPINE	0 010 020 048
12	BRONZE DISC DISCO BRONZO	0 140 000 250
13	BOLT No.412.9 M12x60 VITE	0 010 025 309

D90

POS.	DESCRIPTION DESCRIZIONE	CODE CODICE
2	O-RING SEAL GUARNIZIONE OR	0 010 012 079
3	PLASTIC SEAL GUARNIZIONE ANELLO	0 010 038 058
4	O-RING SEAL GUARNIZIONE OR	0 010 012 047
10	BUSH BOCCOLA	0 190 000 212
11	LOCATING PINS SPINE ϕ 6x8	0 010 020 026
12	BRONZE DISC DISCO BRONZO	0 190 000 250
13	BOLT No.5 12.9 M14x110 VITE	0 010 025 442

D250

POS.	DESCRIPTION DESCRIZIONE	CODE CODICE
2	O-RING SEAL GUARNIZIONE OR	0 010 012 110
3	PLASTIC SEAL GUARNIZIONE ANELLO	0 010 038 114
4	O-RING SEAL GUARNIZIONE OR	0 010 012 054
10	BUSH BOCCOLA	0 195 000 312
11	LOCATING PINS SPINE ϕ12x28	0 010 022 036
12	BRONZE DISC DISCO BRONZO	0 195 102 250
13	BOLT No.5 12.9 M30x150 VITE	0 010 025 449

NOTE: ALL DISTRIBUTOR BOLTS ARE OF SOCKET HEAD TYPE .TUTTE LE VITI DEL DISTRIBUTORE SONO A TESTA ESANGONALE INCASSATA

DISTRIBUTORS / DISTRIBUTORI

TABLE-1 (Po.no:1)

DISTRIBUTOR COVER SUB-ASSEMBLY/ PREMONTAGGIO COPERCHIO DISTRIBUTORE

MODEL	STANDARD	WITH MECH.TACHO CON CONT.MECC.	MODEL	STANDARD	WITH MECH.TACHO CON CONT.MECC.
D30	0 140 030 003		D47	0 140 047 083	0 140 047 183
D31	0 140 031 303	0 140 031 403	D48	0 140 048 083	0 140 048 183
D310	0 140 031 003	0 140 031 183	D481	0 140 048 383	0 140 048 483
D311	0 140 031 683		D49	0 140 049 083	0 140 049 183
D312	0 140 031 883		D491	0 140 049 383	0 140 049 583
D313	0 140 131 883	0 140 131 783	D504	0 140 050 483	
D314	0 140 031 983		D51	0 140 050 183	
D37	0 140 037 003	0 140 037 403	D90	0 190 000 083	0 190 000 183
D40	0 140 003 083	0 140 004 083	D250	0 195 102 183	

TABLE-2

ROTARY DISTRIBUTOR / ROTANTE(POS.5-8 & POS.6a-8a)

POS. NO:	DESCRIPTION DESCRIZIONE	D3..,D4..,D5..	D90	D250
	ROTARY DISTRIBUTOR WITH STEEL ANTI EXTRUSION RING ROTANTE CON ANELLO ANTIESTRUSIONE IN ACCIAIO			
5	STEEL ANTI- EXTRUSION RING ANELLO ANTIESTRUSIONE ACCIAIO	0 140 000 013	0 190 100 013	0 195 003 013
6	PLASTIC SEAL RING GUARNIZ IN PLASTICA	0 010 038 063	0 010 038 070	0 010 038 113
7	O-RING GUARNIZIONE OR.	0 010 012 256	0 010 012 254	0 010 012 047
8	ROTARY DISTRIBUTOR DISTRIBUTORE ROTANTE	0 140 003 007	0 190 003 007	0 195 120 107
	ROTARY DISTRIBUTOR WITHOUT STEEL ANTI EXTRUSION RING ROTANTE SENZA ANELLO ANTIESTRUSIONE IN ACCIAIO			
6a	PLASTIC SEAL RING GUARNIZ IN PLASTICA	0 010 038 056	0 010 038 059	--
7a	O-RING GUARNIZIONE OR.	0 010 012 256	0 010 012 254	--
8a	ROTARY DISTRIBUTOR DISTRIBUTORE ROTANTE	0 140 000 007	0 190 000 007	--

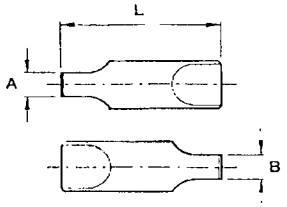
TABLE-3

DISTRIBUTOR DRIVE DIN/ PERNI DI TRASCINAMENTO (Pos.9)

DISTRIBUTORS-DISTRIBUTORI	GM05	GM1	GM2	GM3	GM4	GM5	GM6
D30,D31,D310..,D37	P3	P3	P9	P14	P36	P38	
D40,D47,D48..,D481..,D504,D51	P1	P1	P2	P33	P14	P30	
D90				P29	P37	P6	P34
D250							

DP..	A	L	B	CODE CODICE
P1	10	50	8	0 106 102 109
P2	10	54	10	0 112 103 109
P3	10	43	8	0 106 103 109
P6	10	90	10	0 190 000 009
P9	10	47	10	0 112 100 109
P14	10	64	10	0 192 000 009

DP..	A	L	B	CODE CODICE
P29	10	76	10	0 153 102 109
P30	10	85	10	0 185 100 109
P33	10	71	10	0 153 100 109
P36	10	57	10	0 154 100 109
P37	10	69	10	0 154 101 109
P38	10	78	10	0 156 103 109

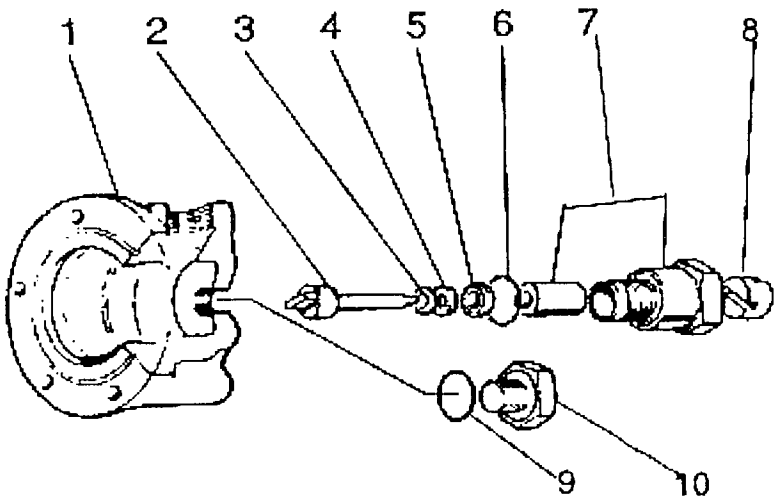


DISTRIBUTORS / DISTRIBUTORI

MECHANICAL TACHOMETER- CONTAGIRI MECCANICO

POS. NO:	DESCRIPTION DESCRIZIONE	CODE CODICE
1	DISTRIBUTOR COVER COPERCHIO DISTRIB.	TABLE-1
2	TACHO DRIVE PIN D3.... PERNO TRASCINAM	0 131 000 128
	TACHO DRIVE PIN D40,D47 PERNO TRASCINAM	0 140 000 128
	TACHO DRIVE PIN D42,D48, PERNO TRASCINAM D49	0 142 000 128
	TACHO DRIVE PIN D90 PERNO TRASCINAM	0 190 000 128
	TACHO DRIVE PIN D250 PERNO TRASCINAM	0 195 000128
3	SPACER RING ANELLO SPALLAM	0 106 100 126

POS. NO:	DESCRIPTION DESCRIZIONE	CODE CODICE
4	WASHER RONDELLA	0 106 100 127
5	RING SEAL GUARNIZIONE	0 010 012 221
6	O-RING O-R	0 010 012 314
7	TACHO SUPPORT SUPPORTO	0 106 100 225
8	COUPLING GIUNTO A CROCE	0 106 100 130
9	WASHER RONDELLA	0 010 018 095
10	PLUG TAPPO	0 010 023 015



Binder joystick, model 33 250 04 D03 (D05) 990

The joystick is equipped with two micro switches, one for each direction. These switches operate with +12 or +24 volt DC, depending on machine type. Please study figure 1, showing the micro switches of the joystick.
It is of most importance that the pins that operate the micro switches, are correctly adjusted, so that they release the switch when the joystick is centered. These pins can be seen in figures 1 and 3. If one of the micro switches remains activated, the directional valve will also stay on, and there will be an undesired movement of one of the machine axes.

For the speed control there is a potentiometer, supplied with +/- 12 or 15 volt DC. Since the potentiometer only operates approximately 60 degrees of totally 360, this means that the outgoing analog signal will be approximately +/- 2 volt DC. Please check that analog out signal is 0 volt in center position. For PAS/CNC machines, the potentiometer instead will be supplied with 0 and +12 VDC, and the center position will therefore be appr. 6 VDC.

On machines with either micro hydraulics, or two stage speed control in any other way, the joystick might be equipped with a push button at the top. Please study figure 3, showing this type of joystick.

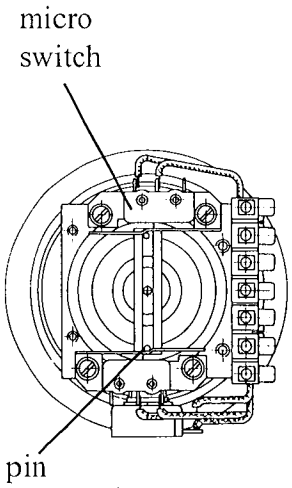


Figure 1

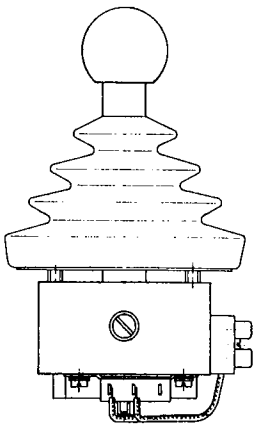


Figure 2
type D03

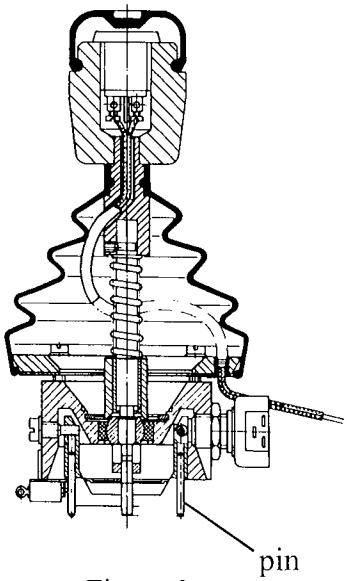


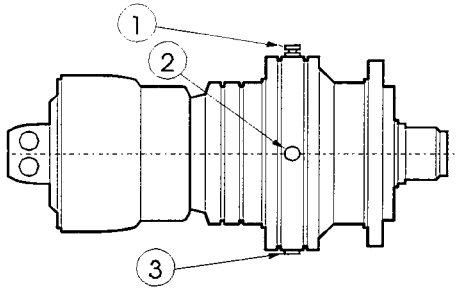
Figure 3
type D05

REFILL INSTRUCTION FOR PLANETARY GEARBOX

NOTE! Please see Table of contents for the right part number of the gearbox.

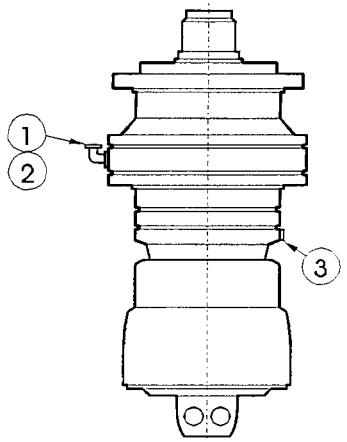
Plug positions

HORIZONTAL

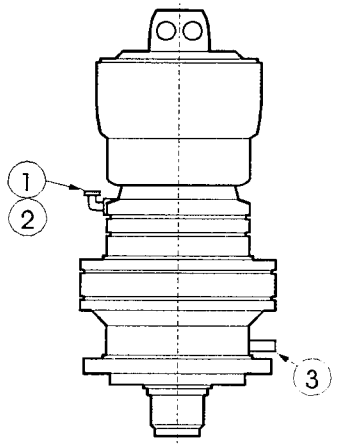


A

VERTICAL



O



T

1 Breather /Filler plug
2 Oil level plug
3 Drain plug

Type	Stages	Pos. A	Pos. O	Pos. T
300	1 2	0.4 0.7	0.8 1.4	0.7 1.2
301	1 2	0.5 1.0	1.0 2.0	0.8 1.8
303H	1 2	1.0 1.4	2.0 2.7	1.8 2.5
305H	1 2	1.3 2.0	2.2 3.0	2.1 3.0
306H	1 2	2.0 2.9	3.0 3.8	3.2 4.0
307H	1 2	2.9 4.0	4.5 6.0	4.0 5.2
309	1 2	4.0 6.0	7.0 10.0	6.0 7.0
310	1 2	3.5 5.0	6.0 9.0	5.0 6.0
311	1 2 3	6.5 9.0 13.0	12.0 16.0 22.0	10.0 13.0 20.0
312	1 2	6.0 8.0	11.0 15.0	9.0 12.0
313	1 2 3	8.0 12.0 15.0	15.0 20.0 24.0	12.0 15.0 20.0
314	1 2	7.0 11.0	14.0 18.0	11.0 14.0
315	1 2	15.0 20.0	25.0 30.0	20.0 25.0
316	1 2	14.0 18.0	23.0 28.0	18.0 23.0
317	1 2	20.0 28.0	35.0 45.0	30.0 40.0
318	1 2	20.0 28.0	35.0 45.0	30.0 40.0

Oil quantity (1)

Planetary gearbox example:

306 L2-15.3-HZ-S2AB-2A
1 2 3 4 5

Oil quantity: 2.9 dm^3
in this example.

1 = Gearbox size
2 = Stages of reduction
3 = Ratio
4 = Shaft type
5 = Mounting position A,O,T

OIL TYPE

BP ENERGOL GR-XP220/
SHELL OMALA EP220

46

1) Change oil after the first 100 hours of operation.
2) Subsequent oil change sholud occur every 2000 hours, or at least once a year.

999

ROUNDO AB

Datum/Date

06/-98

ROUNDO PASS 310

KOMPONENTLISTA	COMPONENT LIST	KOMPONENTLISTE
Ritning 1.3287	Drawing No. 1.3287	Zeichnung Nr. 1.3287
1.3075	1.3075	1.3075
1.3076	1.3076	1.3076
1.3151	1.3151	1.3151

Detalj Detail Einzel-teil	Benämning	Specification	Benennung
	Ritning 1.3287	Drawing No. 1.3287	Zeichnung Nr. 1.3287
1	Fundament	Foundation	Fundament
2	Motorstativ	Motor frame	Motorstativ
3	Bygelstativ	End yoke frame	Klapplagerstativ
4	Kil	Key	Keil
5	Stativstag	Frame bar	Stativsteg
6	Tryckstång	Operating rod	Regelstange
7	Övre vals	Top roll	Oberwalze
8	Undre vals	Lower roll	Unterwalze
9	Bronsplatta	Bronze plate	Bronzeplatte
10	Tryckstångshylsa	Operating rod case	Regelstangehülse
11	Bronsbussning	Bronze bushing	Bronzebüchse
12	Kil	Key	Keil
13	Låsplatta	Lock plate	Schlossplatte
14	Bronsbussning	Bronze bushing	Bronzebüchse
15	Mutter	Nut	Mutter
16	Bricka	Washer	Scheibe
17	Bronsbussning	Bronze bushing	Bronzebüchse
18	Säkringsring	Snap ring	Seeger-Ring
19	Cylindertapp	Cylinder bolt	Zylinderbolzen
20	Ledlager	Bearing	Gelenklager
21	Säkringsring	Snap ring	Seeger-Ring
22	Cylindergavel	Cylinder bottom	Zylinderunterteil
23	Cylinder	Cylinder	Zylinder
24	Kolvstyrring	Piston guide ring	Kolbenring
25	Kolvtätning	Piston seal	Kolbendichtung
26	O-ring	O-ring	O-Ring
27	Bronsbussning	Bronze bushing	Bronzebüchse

./2

Detalj Detail Einzel-teil	Benämning	Specification	Benennung
28	Cylindergavel	Cylinder top	Zylinderkopf
29	Kolvstångstätning	Piston rod seal	Kolbenstangedichtung
30	Avstrykare	Scraper	Abstreifer
31	Kolv	Piston	Kolben
32	Cylinderskydd	Cylinder cover	Zylinderschutz
33	Kolvtapp	Piston bolt	Kolbenbolzen
34	Säkringsring	Snap ring	Seeger-Ring
35	Lagerlock	Bearing cover	Lagerdeckel
36	Säkringsring	Snap ring	Seeger-Ring
37	Säkringsring	Snap ring	Seeger-Ring
38	Lager	Bearing	Lager
39	Lagerhus	Bearing housing	Lagergehäuse
40	Tätningsring	Sealing ring	Dichtungsring
41	Säkringsring	Snap ring	Seeger-Ring
42	Lagerlock	Bearing cover	Lagerdeckel
43	Lager	Bearing	Lager
44	Bronsbussning	Bronze bushing	Bronzebüchse
45	Lagerhus	Bearing housing	Lagergehäuse
46	Tätningsring	Sealing ring	Dichtungsring
47	Lager	Bearing	Lager
48	Säkringsring	Snap ring	Seeger-Ring
49	Tätningsring	Sealing ring	Dichtungsring
50	Lagerlock	Bearing cover	Lagerdeckel
51	Lager	Bearing	Lager
52	Lagerlock	Bearing cover	Lagerdeckel
53	Lagerlock	Bearing cover	Lagerdeckel
54	Distans	Spacer	Abstandsring
55	Styrning	Guide	Führung
56	Lager	Bearing	Lager
57	Stag	Bar	Steg
58	Bakre gavel	Rear frame	Hinterrahmen
59	Hydraulmotor	Hydraulic motor	Hydraulischer Motor
60	Hydraulmotor	Hydraulic motor	Hydraulischer Motor
61	Hållcylinderkonsol	Balancing bracket	Balancierkonsole

./3

Detalj Detail Einzel-teil	Benämning	Specification	Benennung
62	Cylindergavel	Cylinder top	Zylinderkopf
63	O-ring	O-ring	O-Ring
64	Kolvstyrring	Piston guide ring	Kolbenring
65	Kolvtätning	Piston seal	Kolbendichtung
66	Cylindergavel	Cylinder bottom	Zylinderunterteil
67	Kolv	Piston	Kolben
68	Bronsbussning	Bronze bushing	Bronzebüchse
69	Kolvstångstätning	Piston rod seal	Kolbenstangedichtung
70	Avstrykare	Scraper	Abstreifer
71	Stag	Bar	Steg
72	Säkringsring	Snap ring	Seeger-Ring
73	Tapp	Bolt	Bolzen
74	Fäste	Bracket	Konsole
75	Lagerbox	Bearing box	Lagerkasten
76	Momentarm	Torque arm	Momentarm
151	Distans	Spacer	Abstandsring
152	Lagerlock	Bearing cover	Lagerdeckel
153	Distans	Spacer	Abstandsring
	Ritning 1.3075	Drawing No. 1.3075	Zeichnung Nr. 1.3075
78	Bronsbussning	Bronze bushing	Bronzebüchse
79	Bronsbussning	Bronze bushing	Bronzebüchse
80	Sidovals	Side roll	Seitenwalze
81	Tätningsring	Sealing ring	Dichtungsring
82	Platta	Plate	Platte
83	Bronsplatta	Bronze plate	Bronzeplatte
84	Bronsplatta	Bronze plate	Bronzeplatte
85	Lagerhus	Bearing housing	Lagergehäuse
86	Lagerlock	Bearing cover	Lagerdeckel
87	Platta	Plate	Platte
88	Lagerlock	Bearing cover	Lagerdeckel
89	Säkringsring	Snap ring	Seeger-Ring
90	Lager	Bearing	Lager
91	Lagerhus	Bearing housing	Lagergehäuse
92	Bygel	End yoke	Klapplager

./4

Detalj Detail Einzel-teil	Benämning	Specification	Benennung
93	Bronsbussning	Bronze bushing	Bronzebüchse
94	Axel	Shaft	Achse
95	Säkringsring	Snap ring	Seeger-Ring
96	Kolvstångsfäste	Piston connection eye	Befestigungsohr
97	Avstrykare	Scraper	Abstreifer
98	Kolvstångstätning	Piston rod seal	Kolbenstangedichtung
99	Bronsbussning	Bronze bushing	Bronzebüchse
100	O-ring	O-ring	O-Ring
101	Cylindergavel	Cylinder top	Zylinderkopf
102	Kolv	Piston	Kolben
103	Cylinder	Cylinder	Zylinder
104	Kolvtätning	Piston seal	Kolbendichtung
105	Kolvstyrring	Piston guide ring	Kolbenring
106	Cylindergavel	Cylinder bottom	Zylinderunterteil
107	Bricka	Washer	Scheibe
108	Mutter	Nut	Mutter
109	Kolvtapp	Piston bolt	Kolbenbolzen
110	Låsplatta	Lock plate	Schlossplatte
111	Ledlager	Bearing	Gelenklager
112	Cylindertapp	Cylinder bolt	Zylinderbolzen
113	Säkringsring	Snap ring	Seeger-Ring
	Ritning 1.3076	Drawing No. 1.3076	Zeichnung Nr. 1.3076
123	Cylindergavel	Cylinder bottom	Zylinderunterteil
124	Kolvstyrring	Piston guide ring	Kolbenring
125	Kolvtätning	Piston seal	Kolbendichtung
126	Kolv	Piston	Kolben
127	Cylinder	Cylinder	Zylinder
128	Bronsbussning	Bronze bushing	Bronzebüchse
129	O-ring	O-ring	O-Ring
130	Cylindergavel	Cylinder top	Zylinderkopf
131	Kolvstångstätning	Piston rod seal	Kolbenstangedichtung
132	Avstrykare	Scraper	Abstreifer
133	Kolvstångsfäste	Piston connection eye	Befestigungsohr
134	Ledlager	Spher.plain bearing	Gelenklager

./5

Detalj Detail Einzel- teil	Benämning	Specification	Benennung
	Ritning 1.3151	Drawing No. 1.3151	Zeichnung Nr. 1.3151
135	Låsplatta	Lock plate	Schlossplatte
136	Axel	Shaft	Achse
137	Kolvstångsfäste	Piston connection eye	Befestigungsohr
138	O-ring	O-ring	O-Ring
139	Kolvtätning	Piston seal	Kolbendichtung
140	Kolvstyrring	Piston guide ring	Kolbenring
141	Kolv	Piston	Kolben
142	Avstrykare	Scraper	Abstreifer
143	Kolvstångstätning	Piston rod seal	Kolbenstangedichtung
144	Bronsbussning	Bronze bushing	Bronzebüchse
145	Cylinder	Cylinder	Zylinder
146	Cylindergavel	Cylinder bottom	Zylinderunterteil
147	Fäste	Bracket	Konsole
148	Bronsbussning	Bronze bushing	Bronzebüchse
149	Cylindertapp	Cylinder bolt	Zylinderbolzen
150	Säkringsring	Snap ring	Seeger-Ring

Date/Datum
06/-01

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ROUNDO PASS 280/310

- MOTORISERADE STÖDRULLAR
- MOTORIZED SUPPORT ROLLS
- MOTORISIERTE STÜTZROLLEN

	KOMPONENTLISTA **Ritning 2.4465**	COMPONENT LIST **Drawing No. 2.4465**	KOMPONENTLISTE **Zeichnung Nr. 2.4465**
Detalj Detail Einzel- teil	Benämning	Specification	Benennung
1	Lock	Cover	Deckel
2	Lager	Bearing	Lager
3	Snäckskruv	Worm screw	Schneckenschraube
4	Lock	Cover	Deckel
5	Radialtätning	Sealing	Dichtung
6	Distans	Spacer	Abstandsring
7	Axelkoppling	Shaft coupling	Achsenkupplung
8	Lagerhus	Bearing housing	Lagergehäuse
9	Elmotor	Electric motor	Elektrischer Motor
10	Lager	Bearing	Lager
11	Seegersäkring	Snap ring	Seeger-Ring
12	Bronsbussning	Bronze bushing	Bronzebüchse
13	Kil	Key	Keil
14	Nav	Hub	Nabe
15	Snäckhjul	Worm wheel	Schneckenrad
16	Tryckstångshylsa	Operating rod	Regelstange
17	Lager	Bearing	Lager
18	Lager	Bearing	Lager
19	Bronsplatta	Bronze plate	Bronzeplatte
20	Skydd	Cover	Deckel
21	Låsplatta	Locking plate	Schlossplatte
22	Bronsplatta	Bronze plate	Bronzeplatte
23	Stödbox	Support box	Stützkasten

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Detalj Detail Einzel-teil	Benämning	Specification	Benennung
24	Distans	Spacer	Abstandsring
25	Rulle	Roll	Rolle
26	Lager	Bearing	Lager
27	Nilosring	Nilos ring	Nilosring
28	Seegersäkring	Seeger ring	Seeger-Ring
29	Axel	Shaft	Achse
30	Tryckstång	Operating rod	Regelstange
31	Distans	Spacer	Abstandsring
32	Växellåda	Gear box	Getriebegehäuse
33	Momentplatta	Moment plate	Momentplatte
34	Momentstag	Moment bar	Momentsteg
35	Kil	Key	Keil
36	Låsring	Locking ring	Schliessring
37	Bronsbussning	Bronze bushing	Bronzebüchse
38	Lager	Bearing	Lager
39	Distans	Spacer	Abstandsring
40	Mutter	Nut	Mutter
41	Stödstativ	Support frame	Stützrahmen
42	Skydd	Cover	Deckel
43	Tryckstång	Operating rod	Regelstange