

**ANNEXURE 'A'**

**Scope for Reconditioning of Starrag make HX-151; Plan No. 3-016,NBS, BI-12, BHEL Haridwar**

**Brief About Machine:** The machine is a 5-axis CNC machining centre comprising of 5 continuous interpolating machining axes, having 3 linear axes viz. X, Y, Z & 2 rotary axes viz. A and B. In addition CNC controlled axes for Tool changer & Work piece changer viz TGX, TM, WM are used in channel 2 of CNC for Automatic Tool Changer & Work piece changer. Machine is used for complete machining of complex Turbine blades with aero foil hub & shroud from Raw Blank in accuracy of less than 30 microns as per BHEL drawing requirements. Bidder to note that machine provides such accuracy in high cutting & rapid feed rates with axes feedback from motor encoder.

- **X-axis: Longitudinal axis (Linear); Working range :1200mm**
- **Y-axis: Transverse axis (Linear); Working range :390mm**
- **Z-axis: Vertical axis (linear); Working range :300mm**
- **A-axis: Circular axis; Working range :Continuous**
- **B axis: Swiveling axis; Working range :+/-90<sup>0</sup>**

Sl. No	Description	Quantity	Accepted (Yes/No)	Deviation	Remarks
<b>1.</b>	<b>MATERIAL SUPPLY INCLUDING SCOPE OF WORK</b>				
<b>1.1</b>	<b>Mechanical Work</b>				
<b>1.1.1</b>	<b>LM GUIDE WAYS &amp; LM SHOES (LINEAR RECIRCULATING BEARINGS)</b>				
<b>1.1.1.1</b>	<b>X axis:</b> The existing LM Guide ways areINA make TSX 45 (1 Pair) of 1875 mm length &LM shoes areINA make RUE 45 (4 No.). LM guide ways and LM shoesare to be replaced with new ones of same make, same or more load carrying capacity& same or better accuracy grade.	01 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.1.1.2</b>	<b>Y axis:</b> The existing LM Guide ways are INA make TSX 45 U (1 Pair) of 1100 mm length &LM shoes are INA make RUE 45 (4 No.). LM guide	01 Set			<u>Bidder to provide details &amp; comply</u>

	ways and LM shoes are to be replaced with new ones of same make, same or more load carrying capacity & same or better accuracy grade.				
<b>1.1.1.3</b>	<b>Z axis:</b> The existing LM Guide ways are INA make TSX45 (1 Pair) of 935 mm length & LM shoes are INA make RUE45 (4 No.) Part No. : INA RUE 45 D ADB FE W2/935 LM guide ways and LM shoes are to be replaced with new ones of same make, same or more load carrying capacity & same or better accuracy grade.	01 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.1.1.4</b>	<b>TAILSTOCK movement:</b> The existing LM Guide ways (1 pair) are of 1240 mm length & LM shoes are 4 No. Part No.: LH 30 1240 G91 PNZ3ELZ LM guide ways and LM shoes are to be replaced with new ones of same make, same or more load carrying capacity & same or better accuracy grade.	01 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.1.1.5</b>	<b>Automatic Tool Changer (ATC) TGX axis:</b> The existing LM Guide ways are INA make LAH35 GM/GMZ shoes (1 Pair) of 1350 mm length & LM shoes INA make LAH35 GM/GMZ (4 No.) LM guide ways and LM shoes are to be replaced with new ones of same make, same or more load carrying capacity & same or better accuracy grade.	01 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.1.2</b>	<b>LINEAR AXES BALL SCREWS &amp; NUTS</b>				
<b>1.1.2.1</b>	<b>X axis:</b> The existing ball screw and nut is of 40 mm diameter X 12 mm pitch, overall length: 1725 mm. The existing ball screw with nut are to be replaced with new ones of INA/NSK/BOSCH make of same or more load carrying capacity. The accuracy of the supplied Ball screw & nut should be of C5 grade or better than existing in machine.	01 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.1.2.2</b>	<b>Y axis:</b> The existing ball screw and nut is of 40 mm diameter X 12 mm pitch, overall length: 750 mm <b>(NSK REF NO: W4006G-73Z-C5Z12)</b> The existing ball screw with nut are to be replaced with new ones of INA/NSK/BOSCH make of same or more load carrying capacity. The accuracy of the supplied Ball screw & nut should be of C5 grade or better	01 Set			<u>Bidder to provide details &amp; comply</u>

	than existing in machine.				
<b>1.1.2.3</b>	<b>Z axis:</b> The existing ball screw and nut is of 40mm diameter X 10 mm pitch, overall length 775 mm. The existing ball screw with nut are to be replaced with new ones of INA/NSK/BOSCH make of same or more load carrying capacity. The accuracy of the supplied Ball screw & nut should be of C5 grade or better than existing in machine.	01 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.1.2.4</b>	<b>Automatic Tool Changer (ATC) TGX axis:</b> The existing ball screw is of 25 mm diameter X 6.5 mm pitch, overall length: 1280mm. The existing ball screw with nut are to be replaced with new ones of INA/NSK/BOSCH make of same or more load carrying capacity. The accuracy of the supplied Ball screw & nut should be of C5 grade or better than existing in machine.	01 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.1.3</b>	<b>END SUPPORT BEARINGS OF BALL SCREW</b>				
<b>1.1.3.1</b>	<b>X axis-</b> The existing end support bearings are 7602030TVP-Qty-4 No. & Ø30x47 NA 4906.2RS - Qty-01 No. End support bearings of ball screw are to be replaced with the bearings of equivalent designation & standard makes like INA, FAG, RHP, TIMKEN, SKF, FAFNIR only. The accuracy grade of the supplied bearing should be of same grade or better than existing in machine.	1 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.1.3.2</b>	<b>Y axis-</b> The existing end support bearings are 7602030TVP-Qty-4 No. End support bearings of ball screw are to be replaced with the bearings of equivalent designation & standard makes like INA, FAG, RHP, TIMKEN, SKF, FAFNIR only. The accuracy grade of the supplied bearing should be of same grade or better than existing in machine.	1 Set			<u>Bidder to provide details &amp; comply</u>

1.1.3.3	<p><b>Z axis-</b> The existing end support bearings are 7602030TVP-Qty-4 No. End support bearings of ball screw are to be replaced with the bearings of equivalent designation &amp; standard makes like INA, FAG, RHP, TIMKEN, SKF, FAFNIR only. The accuracy grade of the supplied bearing should be of same grade or better than existing in machine.</p>	1 Set			<u>Bidder to provide details &amp; comply</u>
1.1.4	<p>Items required for installation for the ball screw &amp; nut including flanges, chuck-nut, motor coupling etc. are to be included in the scope of supply as per requirement. The indicative dimension &amp; details of existing motor couplings are:</p> <ul style="list-style-type: none"> <li>• <b>X axis:</b> KM170 D1=24 D2=25</li> <li>• <b>Y axis:</b> KM170 D1=24 D2=25</li> <li>• <b>Z axis:</b> KM170 D1=24 D2=25</li> </ul>	1 Set			<u>Bidder to provide details &amp; comply</u>
1.1.5	<p>Scrapping of axes guide ways to be done if required. Thereafter Bidder is required to <b>restore geometrical accuracies</b> of all the axes as per original test charts of machine which will be provided after placement of the order.</p>				<u>Bidder to comply</u>
1.1.6	<p>Bidder to supply and install bellow/telescopic covers for X, Z &amp; Tailstock movement of same or reputed make to ensure no ingress of coolant, hydraulic oil, chips, foreign particles etc. The indicative dimension &amp; details of existing telescopic covers are:</p> <ul style="list-style-type: none"> <li>• <b>X axis:</b> Supplier: <b>Hamuel</b> Designation of Left shutter: 9001042.3 Designation of Right shutter: 9001043.3</li> <li>• <b>Z axis:</b> Combined Sheet metal and expansion bellow covering (Left: 238046.4, Right: 238047.4)</li> <li>• <b>Tailstock movement:</b> Supplier: <b>Hamuel</b> Designation of Left shutter: 9001059.3 Designation of Right shutter: 9001070.3</li> </ul> <p>Bidder must take approval of BHEL prior to finalizing the bellow/telescopic covers in case other reputed makes are proposed by the Bidder.</p>	01 Set			<u>Bidder to provide details &amp; comply</u>
1.1.7	<b>B-AXIS</b>				

<b>1.1.7.1</b>	All bearings of <b>B-axis</b> are to be replaced with the bearings of equivalent designation. Standard make like INA, FAG, RHP, TIMKEN, SKF, FAFNIR are only acceptable. Following bearings set are presently assembled in B-axis- <ul style="list-style-type: none"> <li>• YRT 180 180/280X43 INA -Qty-1 No.</li> <li>• N1028K.M.spezial 140/210x33 -Qty-1 No.</li> <li>• ZMVA 40/62- Qty-01 No.</li> <li>• NK190/26 - Qty-01 No.</li> <li>• ZKLF60145.2Z- Qty-01 No.</li> <li>• ZMVA 60/98- Qty-01 No.</li> </ul> The accuracy grade of the supplied bearing should be of samegrade or better than existing in machine.	1 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.1.7.2</b>	B axis counter balance tension spring (Ø13/73x486.5), bushing & lock bracket to be replaced with new one of same grade material & properties.	2 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.1.8</b>	Bidder to provide 2 No. Dial gauges with least count of 2 microns, 2 No. Level gauges with least count of 10 microns, 2 No. Universal dial stand of Mitutoyo or reputed make. All other testing equipments viz. mandrels, parallel shank tool, angle plates etc required for geometry testing & alignment of the machine will be provided by BHEL.	1 Set			<u>Bidder to comply</u>
<b>1.2</b>	<b><u>Hydraulic system</u></b>				
<b>1.2.1</b>	All the pumps, valves, filters, switches and other hydraulic components existing in the system has to be replaced with new one of equivalent capacity of Rexroth/Vickers/ Parker/Hydac make only. All the solenoid valves, switches, should be of 24V DC supply voltage.				<u>Bidder to provide details &amp; comply</u>
<b>1.2.2</b>	All the flexible hoses of the hydraulic system have to be replaced with new hoses of same or higher capacity.				<u>Bidder to provide details &amp; comply</u>
<b>1.2.3</b>	Counterbalance piston-cylinder of Z-axis has to be replaced with new one of equivalent capacity of Rexroth/Vickers/ Parker/Hydac	1 Set			<u>Bidder to provide details &amp; comply</u>

	make only as existing in the machine.				
<b>1.2.4</b>	Individual gauges of reputed make for monitoring the hydraulic pressure of all the important hydraulic lines are to be provided. Provision to be built in the existing system and the same should be included in the offer. Bidder to seek approval from BHEL before finalizing the locations of the dial gauges in the hydraulic plan.	1 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.2.5</b>	Hydraulic system of machine to be checked for any internal/external leakage and any modification & correction, material required for carrying out this activity should be included in the scope of supply.				<u>Bidder to comply</u>
<b>1.2.6</b>	Provision for temperature monitoring of hydraulic oil to be additionally provided. Bidder may additionally include cooling facility for hydraulic oil if required in the new scheme.	1 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.2.7</b>	Hydraulic circuit diagram is attached for reference and all relevant details regarding the same are available. <b>(Annexure-2)</b>				<u>Bidder to note</u>
<b>1.3</b>	Supply and installation of cable drag chains for routing of hydraulic, other flexible hose pipe & electrical cables to be replaced with similar ones of IGUS/SUR-HENNIG/ KABEL SCHLEPP make. Vender to ensure that the supplied cable drag chains are chip resistant, dust and vermin proof. Details of existing Cable drag chains are as below: <b>Tailstock:</b> 190x60 mm cross section & Approx. 1200 mm length fully enclosed to provide protection from chips etc. <b>Tool changer:</b> 120x55 mm cross section & Approx. 1200 mm length fully enclosed to provide protection from chips etc.	1 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.4</b>	<b><u>Lubrication system</u></b>				

1.4.1	Automatic lubrication system (Grease) of the whole machine has to be retained and the whole system has to be overhauled and cleaned to ensure proper functioning.				<u>Bidder to comply</u>
1.4.2	Existing lubrication pump, flexible piping, distributors, cartridges and all other components throughout the machine have to be replaced with same capacity. Bidder to note that lower capacity will not be acceptable & higher capacity will only be considered if required by the newly fitted machine elements subject to approval by BHEL.	1 Set			<u>Bidder to provide details &amp; comply</u>
1.4.3	In case any additional piping is required, it should be included in the scope of supply.				<u>Bidder to comply</u>
1.4.4	Lubrication circuit diagram is attached for reference and all relevant details regarding the same are available ( <b>Annexure-2</b> )				<u>Bidder to note</u>
1.5	<b><u>Coolant system</u></b>				
1.5.1	All the flexible hoses of coolant system have to be replaced with new hoses of same or higher capacity & reputed make.	1 Set			<u>Bidder to provide details &amp; comply</u>
1.5.2	Individual gauges for monitoring the coolant pressure and flow rate are to be provided. Provision to be built in the existing system and the same should be included in the offer.				<u>Bidder to provide details &amp; comply</u>
1.5.3	All Pumps, nozzles, valves, filters, switches and other components in the coolant lines existing in the system have to be replaced with new ones of equivalent specification and reputed make.				<u>Bidder to provide details &amp; comply</u>
1.5.4	Coolant system diagram is attached for reference and all relevant details regarding the same are available. ( <b>Annexure-2</b> )				<u>Bidder to note</u>
1.6	<b><u>Mist extractor system</u></b> of the machine has to be replaced with new one of same or higher capacity to ensure proper functioning of system. The system should remove the suspended particles and impurities from the air taken out from the machining chamber and	1 set			<u>Bidder to provide details &amp; comply</u>

	also have a separate collection system for the same.  Existing system is Mist extractor, AFS1100.				
<b>1.7</b>	<b><u>Pneumatic system</u></b>				
<b>1.7.1</b>	Pneumatic scheme of the whole machine has to be retained and the whole system has to be overhauled and cleaned to ensure proper functioning.				<u>Bidder to comply</u>
<b>1.7.2</b>	All the valves, filters, switches, regulators, distributors, gauges and other pneumatic components existing in the system have to be replaced with new ones of equivalent capacity of Bosch-Rexroth/FESTO/SMC make only.	1 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.7.3</b>	Existing flexible piping, connectors and other components throughout the machine have to be replaced with equivalent ones of same or higher capacity/grade of Bosch-Rexroth/FESTO/SMC make only.	1 Set			<u>Bidder to provide details &amp; comply</u>
<b>1.7.4</b>	Pneumatic system diagram is attached for reference and all relevant details regarding the same are available.( <b>Annexure-2</b> )				<u>Bidder to note</u>
<b>1.8</b>	Machine vision rotating glass spin window (Rotoclear) for clear view during production process is to be replaced with new one operating on 24V DC of Rotoclear/Visiport make and the same should be included in the offer. <b>Details of existing system are as below:</b> ROTOCLEAR S, AUTZ + HERRMANN, D-69115 Heidelberg TYPE:P1620 600 24V (16-28V) 0.66 A Anlaufstrom 5A 2300 U/min	2 No.			<u>Bidder to provide details &amp; comply</u>
<b>1.9</b>	Metal tagging of all the hydraulic, lubrication, pneumatic & coolant line, valves and other components etc. are to be done as				<u>Bidder to comply</u>

	per the original scheme of machine.				
<b>1.10</b>	<b>POSITIONING AND REPEATABILITY OF AXES</b>				
<b>1.10.1</b>	Positioning and repeatability of axes shall be measured by using Laser interferometer and shall be demonstrated within the tolerance as per the original test chart.				<u>Bidder to comply</u>
<b>1.10.2</b>	Any adjustment in the CNC controller measuring system compensation to achieve the above results shall be part of the scope of work. However Bidder to note that electronic compensation beyond +/- 20microns shall not be acceptable.				<u>Bidder to comply</u>
<b>2.</b>	<b><u>COMMISSIONING:</u></b>				
<b>2.1.</b>	Party shall undertake commissioning of all the supplied components at HEEP, BHEL, Haridwar. All material required for commissioning of the machines shall be supplied by the party free of cost and obligation. All commissioning materials shall be supplied by party.				<u>Bidder to comply</u>
<b>2.2</b>	Existing machine logic and technological processes have to be retained.				<u>Bidder to comply</u>
<b>3</b>	<b><u>FINAL ACCEPTANCE:</u></b>				
<b>3.1</b>	Final Acceptance shall be at HEEP, BHEL, Haridwar after: <ul style="list-style-type: none"> <li>a) Upon completion of the scope of supply and scope of work at BHEL.</li> <li>b) Final acceptance shall include clearance of all pending issues related to the work contract.</li> <li>c) Geometrical accuracy verification as per original test charts.</li> <li>d) Successful machining of presently being machined components as mentioned below: <ul style="list-style-type: none"> <li><b>i. LG5R, 39K; Drawing No. 01074739005 (Qty-5 Nos)</b></li> </ul> </li> </ul>				<u>Bidder to comply</u>

	<p><b>ii. LM4L,41K; Drawing No. 01030741001 (Qty-5 Nos)</b></p> <p><b>iii. The raw material, tooling, fixture and part programs for machining of the blades will be provided by BHEL.</b></p> <p>e) The prove-out blades as mentioned at d) i &amp; ii above will be machined prior to handover of the machine for reconditioning and 3D CMM reports shall be generated. Bidder to ensure that the prove-out blades after completion of work should have same or better accuracy and dimensional parameters.</p> <p>f) After settlement of all pending issues related to work and supply, a certificate for Completion of works in all respect shall be released within 15 days by Production and Maintenance personnel of BHEL which will be the referred document for Final Acceptance and final payment to the Bidder.</p>				
<b>4.0</b>	<b><u>DELIVERY :( IF DELIVERY PERIOD IS NOT OFFERED/ACCEPTABLE, OFFER WILL BE REJECTED</u></b>				<u>Bidder to comply</u>
<b>4.1</b>	<p>i) Material: 6 months from the date of completion of activity at Sr. no. ii) below.</p> <p>ii)The party shall be provided the machine within one month for 3 weeks after placement of Workorder to ascertain exact details of material required for the reconditioning work. Bidder shall have tore-assemble the machine and hand-over the machine for production after getting the necessary details.</p> <p>iii) Work: 16 weeks from date of release of machine for work. The delivery period of work for thepurpose of LD as per Clause 11 shall be considered from the date of start of work to the date of start of the machine after carrying out the work and start of the work on the first prove-out component.</p>				<u>Bidder to comply</u>

	iv) Bidder to note that early delivery shall be acceptable. Bidder should take BHEL approval before invoking this clause.				
<b>5</b>	<b><u>DOCUMENTATION</u></b> : 3 sets of all the below mentioned hard copy documentation along with one set of soft copy on 1TB hard disk to be provided				<u>Bidder to comply</u>
<b>5.1</b>	Complete list of bill of materials indicating make/ manufacturer.				<u>Bidder to comply</u>
<b>5.2</b>	Hydraulic circuit diagram having list of components with make and designation				<u>Bidder to comply</u>
<b>5.3</b>	Lubrication circuit diagram having list of components with make and designation				<u>Bidder to comply</u>
<b>5.4</b>	Pneumatic circuit diagram having list of components with make and designation				<u>Bidder to comply</u>
<b>5.5</b>	Coolant circuit diagram having list of components with make and designation				<u>Bidder to comply</u>
<b>5.6</b>	Ball screw with nut drawings & details of all the axis				<u>Bidder to comply</u>
<b>5.7</b>	Linear guide & bearing drawings & details of all the axis				<u>Bidder to comply</u>
<b>5.8</b>	Assembly diagram of the ball screw to motor of all the axes having list of components with make and designation				<u>Bidder to comply</u>
<b>5.9</b>	List of bearings				<u>Bidder to comply</u>
<b>5.10</b>	Complete drawings & details of the any modification or new system made in the machine.				<u>Bidder to comply</u>
<b>6</b>	<b><u>SPARES: (TO BE COMPULSORILY QUOTED OTHERWISE OFFER WILL BE REJECTED) :</u></b>				
	Party shall compulsorily quote following spare parts:				
<b>6.1</b>	Couplings/belt/pulley as used on the machine	1 No. each type			<u>Bidder to comply</u>
<b>6.2</b>	Hydraulic filters and Counterbalance piston-cylinder of Z-axis (Along with 3 set of seals) as used on the machine	1 No. each type			<u>Bidder to comply</u>

6.3	Central lubrication pump (1 No.), distributors (4 Nos.) as used on the machine.	1 Set			<u>Bidder to comply</u>
6.4	Central lubrication cartridges as used on the machine.	10 No. each type			<u>Bidder to comply</u>
6.5	Coolant nozzles and filters used on the machine.	2 No. each type			<u>Bidder to comply</u>
6.6	Complete set of mist extractor system filters and exhaust pipe as used on the machine.	1 Set			<u>Bidder to comply</u>
6.7	Pneumatic filters, distributors, gauges & dial as used on the machine.	1 No. each type			<u>Bidder to comply</u>
6.8	Pneumatic pipe connectors/jointer as used on the machine.	10 No. each type			<u>Bidder to comply</u>
6.9	Machine vision rotating glass spin window (Rotoclear) system as used on the machine.	1 No.			<u>Bidder to comply</u>
7	<b><u>WARRANTY:</u></b>				
7.1	Party shall stand warranty for all the supplied material and work executed for a period of one year from the date of final acceptance (Ref.: Clause No.3) of the machine at BHEL, Haridwar.				<u>Bidder to comply</u>
8	<b><u>TRAINING:</u></b>				
8.1	Party shall impart training for to BHEL staff, for operation & maintenance of the system supplied by them during installation & commissioning.				<u>Bidder to comply</u>
8.2	Bidder to arrange training on Basics/Advanced of Hydraulic and pneumatic systems at the component manufacturer's works. Training module to be finalized in consultation with BHEL. Expenses for Boarding & Lodging of BHEL personnel during training shall be borne by BHEL.				<u>Bidder to comply</u>

<b>9</b>	<b><u>BIDDER'S OBLIGATION:</u></b>				
	The Bidder shall bring all tools, tackles and testing equipment with them for successful commissioning of supplied system.				<u>Bidder to comply</u>
<b>10</b>	<b><u>QUALIFYING CONDITIONS</u></b>				
<b>10.1</b>	Average Annual financial turnover during the last 3 years, ending 31st March 2015, should be <b>at least Rs.27.19 lakhs</b> . Bidder should submit Audited balance sheets for the last three years.				<u>Bidder to provide details &amp; comply</u>
<b>10.2</b>	<p>The Bidder must have successfully reconditioned/ commissioned CNC machines with minimum 3 CNC axes during last seven years ending 30<sup>th</sup> November 2015 and should be either of the following:</p> <p>a. Three projects of machines reconditioned with each project costing not less than Rs.36.25 lakhs (exclusive of taxes &amp; duties).</p> <p>or</p> <p>b. Two projects of machines reconditioned with each project costing not less than Rs.45.32 lakhs (exclusive of taxes &amp; duties).</p> <p>or</p> <p>c. One projects of machines reconditioned with each project costing not less than Rs.72.50 lakhs (exclusive of taxes &amp; duties).</p> <p>Or</p> <p>d. The OEM of the machine M/S STARRAG will be considered as automatically qualified subject to compliance of clause no 10.1</p> <p>In case Bidder has carried out reconditioning along with retrofitting, the complete value of work including material will be taken as project cost for clause no. a,b &amp;c above.</p> <p>The above reconditioned machines should be running satisfactorily for at least 6 months prior to 30<sup>th</sup> November 2015 . 6 months period will be calculated on the basis of commissioning certificates/relevant MOMs provided.</p> <p>Bidder to provide P.O. / W.O copies and commissioning/</p>				<u>Bidder to provide details &amp; comply</u>

	performance certificates for satisfactory operation of the above retrofitted systems along with name, address & contact details of their customer. BHEL reserves the right to verify the information provided. Bidder is advised to attach only the relevant certificates and not attach papers irrelevant against this clause.				
<b>11</b>	<b><u>LATE DELIVERY PENALTY (LD) CLAUSE:-</u></b>				
<b>11.1</b>	LD @ ½% per week subject to a maximum of 10% of the Material cost including spare parts shall be applicable for delay in deliveries. The time period from invitation date for Pre dispatch inspection from Bidder to the date of arrival of Pre Dispatch Team to Bidder's works and any other reasons attributed to BHEL will not be accounted for in delivery period. This period will be excluded for the purpose of calculating LD. Bidder should intimate regarding PDI 7 days in advance only				<u>Bidder to comply</u>
<b>11.2</b>	LD @ 2% per week subject to a maximum of 10% of the Commissioning Charges shall be applicable for delay beyond scheduled commissioning date as per Clause 4 iii) for reasons attributed to the party.				<u>Bidder to comply</u>
<b>12</b>	<b><u>PRE-DISPATCH INSPECTION</u></b>				
<b>12.1</b>	Pre-dispatch inspection of all the items covered under Scope of Supply at Para (1) & Spares at Para (6) shall be carried out by BHEL personnel at party's works.				<u>Bidder to comply</u>
<b>12.2</b>	Supplier shall invite BHEL for carrying out pre- inspection.				<u>Bidder to comply</u>
<b>12.3</b>	Deputed BHEL persons shall do pre acceptance of material under scope of supply at Bidder works and give dispatch clearance.				<u>Bidder to comply</u>
<b>12.4</b>	Expenses of Boarding and lodging of BHEL personnel during PDI				<u>Bidder to note</u>

	shall be borne by BHEL.				
<b>13</b>	<b><u>SUBMISSION OF BILL OF MATERIAL (BOM)</u></b>				
	Before inviting BHEL for Pre-dispatch inspection, Bidder shall submit to BHEL the Bill of Material (BOM) and proposed hydraulic, coolant, pneumatic and lubrication drawing/ schematic for scrutiny.				<u>Bidder to comply</u>
<b>14</b>	<b><u>EARNEST MONEY DEPOSIT ( EMD):</u></b>				<u>Bidder to comply</u>
<b>14.1</b>	Bidders have to deposit the Rs1,50,000/- as EMD. EMD may be deposited through pay order or through demand draft in favor of HEEP, BHEL, Haridwar only.				<u>Bidder to comply</u>
<b>14.2</b>	EMD shall be converted to Security deposit if the work is awarded.				<u>Bidder to comply</u>
<b>14.3</b>	EMD of unsuccessful bidders shall be refunded back normally within fifteen days of acceptance of award of work by the successful tenderer.				<u>Bidder to comply</u>
<b>14.4</b>	EMD shall not carry any interest.				<u>Bidder to comply</u>
<b>14.5</b>	EMD by tenderer will be forfeited as per tender documents if:				<u>Bidder to comply</u>
<b>14.5.1</b>	After opening the tender, the tenderer revokes his tender within the validity period or increases his earlier quoted rates.				<u>Bidder to comply</u>
<b>14.5.2</b>	The tenderer does not commence the work within the period as per LOI/contract.				<u>Bidder to comply</u>
<b>14.6</b>	<b>Offers without EMD will be rejected and will not be considered for evaluation. However "MSEsuppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM II certificate having deemed validity (five years from the date of issue of acknowledgement in EM II) or valid NSIC certificate or EM II certificate along with attested copy of a CA certificate (Format enclosed at</b>				<u>Bidder to comply</u>

	<b>Annexure -1 where deemed validity of EM II certificate of five years has expired)applicable for the relevant financial year (latest audited). Date to be reckoned for determining thedeemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission ofsuch documents will lead to consideration of their bid at par with other bidders. No benefit shall beapplicable for this enquiry if any deficiency in the above required documents are not submitted beforeprice bid opening. If the tender is to be submitted through e procurement portal, then the aboverequired documents are to be uploaded on the portal. Documents should be notarized or attested by aGazetted officer.”</b>				
<b>15</b>	<b><u>SECURITY DEPOSIT (SD):-</u></b>				
<b>15.1</b>	Successful Bidder shall deposit security. The rate of security deposit will be as below:				<u>Bidder to comply</u>
	For work Up to RS.10 Lakhs : 10% of work order value				<u>Bidder to comply</u>
	Above RS.10 Lakhs up toRS.50 Lakhs :RS.1 Lakh + 7.5% amount exceeding RS.10 Lakhs				<u>Bidder to comply</u>
	Above RS.50 Lakhs: RS.4 Lakhs + 5% amount exceeding RS.50 Lakhs				<u>Bidder to comply</u>
<b>15.2</b>	The security deposit should be submitted before the start of work in the following forms:				<u>Bidder to comply</u>
	i) Cash (As permissible under the Income Tax Act)				<u>Bidder to comply</u>
	ii) Pay Order, Demand Draft in favour of HEEP, BHEL, Haridwar.				<u>Bidder to comply</u>
	iii) Local cheques of Scheduled Banks, subject to realization.				<u>Bidder to comply</u>
	iv) Bank Guarantee from Scheduled Banks/Public Financial Institution as defined in the companies Act. The Bank guarantee format should have the approval of BHEL.				<u>Bidder to comply</u>

15.3	EMD of successful tenderer can be converted and adjusted against the Security Deposit.				<u>Bidder to comply</u>
15.4	Security Deposit shall not carry any interest.				<u>Bidder to comply</u>
15.5	<b>100% of the Security Deposit</b> amount shall be refunded to the Bidder after final acceptance of work. <b>SD shall be released after the submission of Performance Bank Guarantee(PBG) by the Bidder.</b>				<u>Bidder to comply</u>
<b>16</b>	<b><u>Performance Bank Guarantee (PBG):</u></b>				
16.1	Bidder shall be required to submit a Performance Bank Guarantee (PBG) for 10% of the total work order/ contract value which shall be valid for a period of 12 months from the date of final acceptance of the machine.				<u>Bidder to comply</u>
16.2	The PBG shall be submitted on a non-judicial stamp paper of value not less than Rs.100/- issued by any one of the nationalized banks.				<u>Bidder to comply</u>
<b>17</b>	<b><u>PAYMENT TERMS:</u></b> <b>(Note: No advance payment shall be made to the Bidder.)</b>				
17.1	Part payment will be made after completion of following milestones				<u>Bidder to comply</u>
17.1.1	Payment of 80% of material cost along with 100% of all taxes & duties (Excise duty, CST/VAT as applicable) shall be payable after inspection & acceptance of material at HEEP, BHEL, Haridwar. Bidder to ensure that all relevant documents are submitted.				<u>Bidder to comply</u>
17.1.2	Final payment of balance 20% of material cost, 100% of commissioning charges including service taxes as applicable amount will be made after Final acceptance of the machine (As per Clause 3). The payment shall be made subject to submission of				<u>Bidder to comply</u>

	PBG as per “Para 16”.				
<b>17.2</b>	All the payments shall be made through e-payment after submission of following documents along with first bill				<u>Bidder to comply</u>
<b>17.2.1</b>	E-payment form duly filled (Form will be provided by BHEL)				<u>Bidder to comply</u>
<b>17.2.2</b>	Income tax exemption letter( if applicable)				<u>Bidder to comply</u>
<b>17.3</b>	Excise duty & CST/VAT will be paid on material cost and service tax will be paid on commissioning charges at actuals. Related original documents to be submitted for availing MODVAT credit by BHEL.				<u>Bidder to comply</u>
<b>17.4</b>	Timely submission of CENVATABLE invoices along with necessary documents to enable availment of CENVAT (Excise duty, Service Tax & VAT) credit by BHEL. <b>Note: Wherever CENVAT credit cannot be availed within given time limit due to delay in submission of invoices or for any other reasons attributed to bidder, loss of such CENVAT credit will be recovered from such bidder.</b>				<u>Bidder to comply</u>
<b>17.5</b>	Bidders should submit their invoices against goods and services immediately after supply of goods and services but not later than 30 days from the invoice date. In case of any delay consequential losses like loss of input credit and non-availability of concessional forms etc. shall be to bidders account.				<u>Bidder to comply</u>
<b>18</b>	<b><u>Risk Purchase Clause</u></b> : In case of delays in supplies / defective supplies or non-fulfillment of any other terms & conditions given in the work order the purchaser may cancel the work order in full or part thereof and may also make the purchase of the material / service from elsewhere / alternative source at the risk and cost of supplier. Bidder does not agree to above clause, their offer is liable to be rejected. In case any Bidder accepts risk purchase clause initially				<u>Bidder to comply</u>

	and subsequently declines to honour the term in the eventuality of RISK PURCHASE, they may be banned for business with BHEL.				
<b>19</b>	<b><u>GENERAL CONDITIONS:</u></b>				<u>Bidder to comply</u>
<b>19.1</b>	A point wise compliance statement shall be submitted by the party with reference to the above scope of supply against each clause/ sub-clause with relevant details & comments. Non-compliance to any of the clauses & quoting inadequate quantity can lead to dis-qualification of the offer.				<u>Bidder to comply</u>
<b>19.2</b>	The Bidder is advised to inspect the machine prior to quoting ascertain all the relevant details required for successful completion of the work.				<u>Bidder to comply</u>
<b>19.3</b>	The proposed mechanical schematic & Bill of material for the machine shall be provided by the Bidder prior to pre dispatch inspection.				<u>Bidder to comply</u>
<b>19.4</b>	Specifications such as part no./Model/Type, grade/ capacity/load rating etc. of machine component shall be stated in the offer by the party. Ordering brochure/catalogue should be attached wherever necessary.				<u>Bidder to comply</u>
<b>19.5</b>	Bidder must compulsorily quote the quantity exactly as per the Scope of supply. No reduction in quantity as per the above Scope of supply is permissible.				<u>Bidder to comply</u>
<b>19.6</b>	Bidder must quote the Spare parts separately in the offer otherwise the offer will be rejected.				<u>Bidder to comply</u>
<b>19.7</b>	The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site www.bhel.com				<u>Bidder to comply</u>
<b>19.8</b>	<b>The award of works will be made on basis of the total of</b>				<u>Information to Bidder</u>

	<b>Material cost , Spare Parts cost, Commissioning charges and all taxes, duties as applicable ( Cost to BHEL)</b>				
<b>19.9</b>	The Bidder should submit their best price at this stage itself and they will not be allowed to revise the price. Any revision / discount given by the Bidder subsequently will be ignored.				<u>Information to Bidder</u>
<b>19.10</b>	Check List as per Annexure 'C' must be enclosed with techno-commercial bid				<u>Bidder to comply</u>
<b>19.11</b>	The risk of delay/loss in transmission by post/courier rest with the bidder.				<u>Bidder to comply</u>
<b>19.12</b>	Conditional tender is likely to be rejected.				<u>Bidder to comply</u>
<b>19.13</b>	BHEL reserves the right to reject the lowest or any tender or accept any tender in full or in part without assigning any reasons whatsoever.				<u>Bidder to comply</u>
<b>19.14</b>	If any information/documents submitted by the contractor are found false/fake at any stage, the tender will be cancelled and earnest money deposited shall be forfeited debarring from the future participation in tenders				<u>Bidder to comply</u>
<b>19.15</b>	In case more than one contractor quotes equal L-1 rates, lottery shall be drawn among L-1 parties to decide one L-1 party.				<u>Bidder to comply</u>
<b>19.16</b>	<b>Bidder must note that all the reconditioning work in the scope of this tender, has to be carried out at BHEL works only. In any case, Bidder will not be allowed to transport the complete machine or major assemblies outside BHEL works. Therefore, Bidder is advised to inspect the machine before bidding to collect &amp; ascertain all the relevant details required for successful completion of work.</b>				<u>Bidder to comply</u>
<b>20</b>	<b><u>BHEL'S OBLIGATION/ FACILITIES:</u></b>				
<b>20.1</b>	Existing mechanical & electrical schematic of the machine shall be provided by BHEL to the Bidder.				<u>Bidder to comply</u>

20.2	Crane facility along with lifting tackles, trolleys etc. will be made available free of charge while working in BHEL premises only. Any civil work required for the erection of panel shall be done by BHEL.				<u>Bidder to comply</u>
20.3	Facilities of minor welding, brazing, minor machining limited to fitting work /rework etc. will be made available free of cost inside BHEL premises.				<u>Bidder to comply</u>
20.4	Consumables like lubricants, kerosene oil, cotton waste etc. will be supplied free of cost by BHEL during execution of works inside BHEL premises. Contractor should make his own arrangements for all types of hand tools including pneumatic/electrical drill machines, grinders, scraping tools along with the general purpose measuring instruments, straight edges etc.				<u>Bidder to comply</u>
21	<b><u>OFFER :-</u></b> The offer should be submitted in two parts and in following manner.				
21.1	<b><u>Techno-commercial Bid :</u></b>				
21.1.1	The envelop shall contain the Techno-commercial Bid (ANNEXURE 'A') with technical details and commercial terms & conditions along with relevant documents like copies of ESI, PF code, PAN No., Service Tax Regn. No., TIN No., CST No., Experience Certificates, Audited Balance Sheet of last 3 years, P.O copies & Commissioning/ Performance certificates (against Pre-qualifying conditions) , <b>Tender fees, EMD</b> and Check List as per ANNEXURE 'C'.				<u>Bidder to comply</u>
21.1.2	The envelop shall be super scribed with "Techno-Commercial Bid", Name of work & NIT No.				<u>Bidder to comply</u>
21.1.3	Point-wise compliance of this scope of supply and work is to be				<u>Bidder to comply</u>

	given by Bidders while submitting their techno-commercial offer in the format provided by BHEL. Each page of the compliance list has to be signed by the Bidder.				
21.1.4	The Bidder must note that no prices are to be quoted/ mentioned in the techno-commercial offer. Bidder must include un-priced Price bid.				<u>Information to Bidder</u>
21.2	<b>Price Bid :</b>				
21.2.1	The second envelope shall contain only the price bid with separate price for material, spares, work & applicable taxes & duties on Price Bid Format only as per <b>ANNEXURE 'B'</b> .				<u>Bidder to comply</u>
21.2.2	Any other information in the price bid shall not be considered and the quotation is likely to be rejected. Price bid document shall be signed by the bidder at the bottom of the page.				<u>Bidder to comply</u>
21.2.3	The envelope shall be sealed and super scribed with "Price Bid", Name of work & NIT No.				<u>Bidder to comply</u>
21.2.4	Price bids of techno commercially accepted Bidders shall be opened.				<u>Bidder to comply</u>
21.3	Both the above two envelopes shall be kept in another sealed cover. The cover shall be super-scribed with "Quotation for (name of work), NIT No. & due date and shall be submitted in the <b>Tender Box kept in the Tender room of Purchase department at the 4th floor of the Main Administrative Building of BHEL,HEEP,HARIDWAR</b> and it should also contain the Bidder's address.				<u>Bidder to comply</u>
21.4	In case the date of tender opening happens to be a BHEL declared holiday, tenders shall be opened on the next working day.				<u>Information to Bidder</u>
22	<b>Commercial Terms:</b>				
22.1	Prices shall be quoted on "Firm Price" basis only. <b>The prices</b>				<u>Bidder to comply</u>

	<b>should be on F.O.R BHEL, Haridwar basis inclusive of Packing &amp; Forwarding, transit insurance &amp; Transportation charges.</b> Applicable % of ED & Sales Tax, Installation/ Commissioning Charges & Service Tax should be clearly indicated in attached Price bid format as per “ <b>Annexure B</b> ”				
<b>22.2</b>	Validity of offer shall be for a minimum period of 120 days from the date of Tender Opening.				<u>Bidder to comply</u>
<b>22.3</b>	Freight & transit insurance charges from Dispatching station to BHEL, Haridwar shall be borne by the party.				<u>Bidder to comply</u>
<b>22.4</b>	The material will be dispatched to Central plant stores with instruction to forward the same to <b>Engineer (WEX/MM-NBS), HEEP, BHEL, Haridwar.</b>				<u>Bidder to comply</u>
<b>23.</b>	<b>Packing:</b>				
	Supplier shall arrange for adequate protection and packing of the consignment so as to avoid loss and damage during transit and also take appropriate measures to prevent metal parts from rusting and corrosion during transit. Handling instructions shall be clearly printed /painted on the packages. Each package should carry a detailed packing slip. Supplier shall be responsible for any loss/damage during transit due to defective/inadequate packing.				<u>Bidder to comply</u>

**ANNEXURE 'B' (PRICE BID FORMAT)**

Name of Work :

NIT No. & Date :

Bidder's Offer No. & Date :

Sl. No.	Description of item	Unit	Qty	Basic Rate (in Rs.)	Excise Duty (In %)	VAT/CST (In %) (VAT with FORM-17 or CST with C-FORM)	Service Tax (In %)	Total Value (in Rs)
1	Material	Set	01	Rs.				Rs.
2	Spares	Set	01	Rs.				Rs.
3	Installation & Commissioning	Set	01	Rs.				Rs.
	<b>TOTAL COST (in Figures)</b>							Rs.
	<b>TOTAL COST (in Words) :</b>							

**Note: Bidder may please note that all relevant columns should be duly filled up and in case any column is left blank it will be considered as inclusive in the prices quoted. All pages to be duly signed and stamped by authorised signatory.**

Sign & Seal

**ANNEXURE 'C' (CHECK LIST FOR TENDER)**

**NIT No. :** \_\_\_\_\_

Bidder shall ensure that following documents / particulars have been enclosed with tender. This check list shall be enclosed with Techno-commercial Bid.

<b>S. No.</b>	<b>Particulars</b>	<b>YES/NO</b>	<b>REMARKS</b>
1.	<b>Sealed Techno-commercial Bid with Un-priced price bid</b> as per Annexure 'A' of NIT		
2.	<b>Sealed Price Bid</b> as per Annexure 'B' of NIT		
3.	<b>Compliance</b> to all the points of the Annexure 'A' of NIT		
4.	<b>Audited balance sheets</b> for the last three years should be submitted i.e, 2014-13, 2013-12, 2012-11 required as per Clause 10.1 of Annexure 'A' of NIT		
5.	<b>P.O. copies and Commissioning/ Performance certificates</b> required as per Clause 10.2 of Annexure 'A' of NIT		
6.	<b>Name, address &amp; contact details of their customer</b> required as per Clause 10.2 of Annexure 'A' of NIT		
7.	<b>Tender Fee</b> enclosed		
8.	<b>Earnest Money Deposit (EMD)</b> required as per Clause 14 of Annexure 'A' of NIT; For MSME vendors certificates should be attached as per Clause 14.6 of Annexure 'A' of NIT.		
9.	Specifications such as part no./Model/Type, grade/ capacity/load rating etc. of machine component shall be stated in the offer by the party. Ordering brochure/catalogue should be attached required as per Clause 19.5 of Annexure 'A' of NIT.		

Sign & Seal

**ANNEXURE-'1'**

**Certificate by Chartered Accountant on Letter Head**

This is to certify that M/s ..... (hereinafter referred to as 'company') having its registered office at ..... is registered under MSMED Act 2006, Entrepreneur Memorandum No. Part –II ..... Dtd: ..... Category: ..... (Micro/ small). (Copy enclosed).

Further verified from Books of account that the investment of the company as per the latest audited financial year..... as per MSMED Act 2006 is as follows:

- 1. For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by Ministry of small scale Industries vide its notification No. S.O. 1722(E) Dtd. October 5 , 2006):  
**Rs. .... Lacs**
- 2. For Service Enterprises:** Investment in equipments (i.e. original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under MSMED Act, 2006):  
**Rs. .... Lacs**

**(Strike off whichever is not applicable)**

The above investment of Rs..... Lacs is within permissible limit of Rs.....Lacs for..... (Micro/ small) (Strike off whichever is not applicable) category under MSMED Act 2006.

**Or**

The company has graduated from its original capacity (Micro/ small) (Strike off whichever is not applicable) and date of graduation of such enterprise from its original capacity is..... (dd/mm/yy) which is within the period of 3 years from the date of graduation of such enterprise from its original category as notified vide S. O. No. 3322 (E) dated 01.11.2013 published in the gazette notification dated 04.11.2013 by ministry if MSME.

Date:

(Signature)

Name-

Membership No.-

Seal of Chartered accountant

Vendor's Signature & Seal

## ANNEXURE-2

19.04.2002 14:34

1. Designation	2. Designation	Page	.Function	+Place	designation	Date	special notes
HX-151/15	1. table of contents	1			Table of contents	04.09.2001	7585
HX-151/15	2. hydraulics/pneumatics diagram	1			Description	01.04.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	2			Description	15.01.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	3			Description	15.01.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	4	.BA10	+PH00	Hydraulic unit	09.10.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	5	.BA10	+PH00	Counterweight	05.05.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	6	...BA10	+PH00	Hydraulic unit	11.10.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	7		+PH00	Hydraulic unit	11.10.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	8	.BB10	+PH00	Hydraulic unit	11.10.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	9	.BM10	+PS00	Workpiece changer	17.05.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	10	.BM10	+PS10	Workpiece magazine	17.05.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	11	.BA10		Machine lubrication	18.05.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	12	.BA50	+MS04	Once-through lubrication	19.05.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	13	.BC20	+ML00	Coolant unit	17.08.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	14			Chip conveyor	14.06.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	15	.BA10		Compressor cooling unit	14.06.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	16	.BA10	+PP00	Compressed air maintenance unit	12.10.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	17	.BB30	+MS06	Compressed air	16.06.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	18	.BB51	+PZ10	Tool magazine	19.06.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	19	.BM10	+PS00	Workpiece changer	19.06.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	20	.BM20	+PS10	Workpiece magazine	19.06.1999	7585
HX-151/15	2. hydraulics/pneumatics diagram	21	.BL50	+MS06	Tool breakage monitoring	19.06.1999	7585
HX-151/15	3. list of devices	1			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	2			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	3			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	4			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	5			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	6			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	7			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	8			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	9			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	10			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	11			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	12			list of devices	19.04.2002	7585
HX-151/15	3. list of devices	13			list of devices	19.04.2002	7585

copyright (c) by STARRAG

Gezeichnet mit ELCAD (RI)				Datum	19.04.2002			Table of contents		IV-241/7585		HX51	
c				Bearb.	Stefan Hanseimann	BHEL, Hardwar, Indien		Starrag, Switzerland					
b				Depr.	Stefan Hanseimann								
a													
Änderung				Datum	Name	Norm	Ersatz durch:	Ersatz für:	Ursprung:	7585	Table of contents		Blatt 1
													Bl.

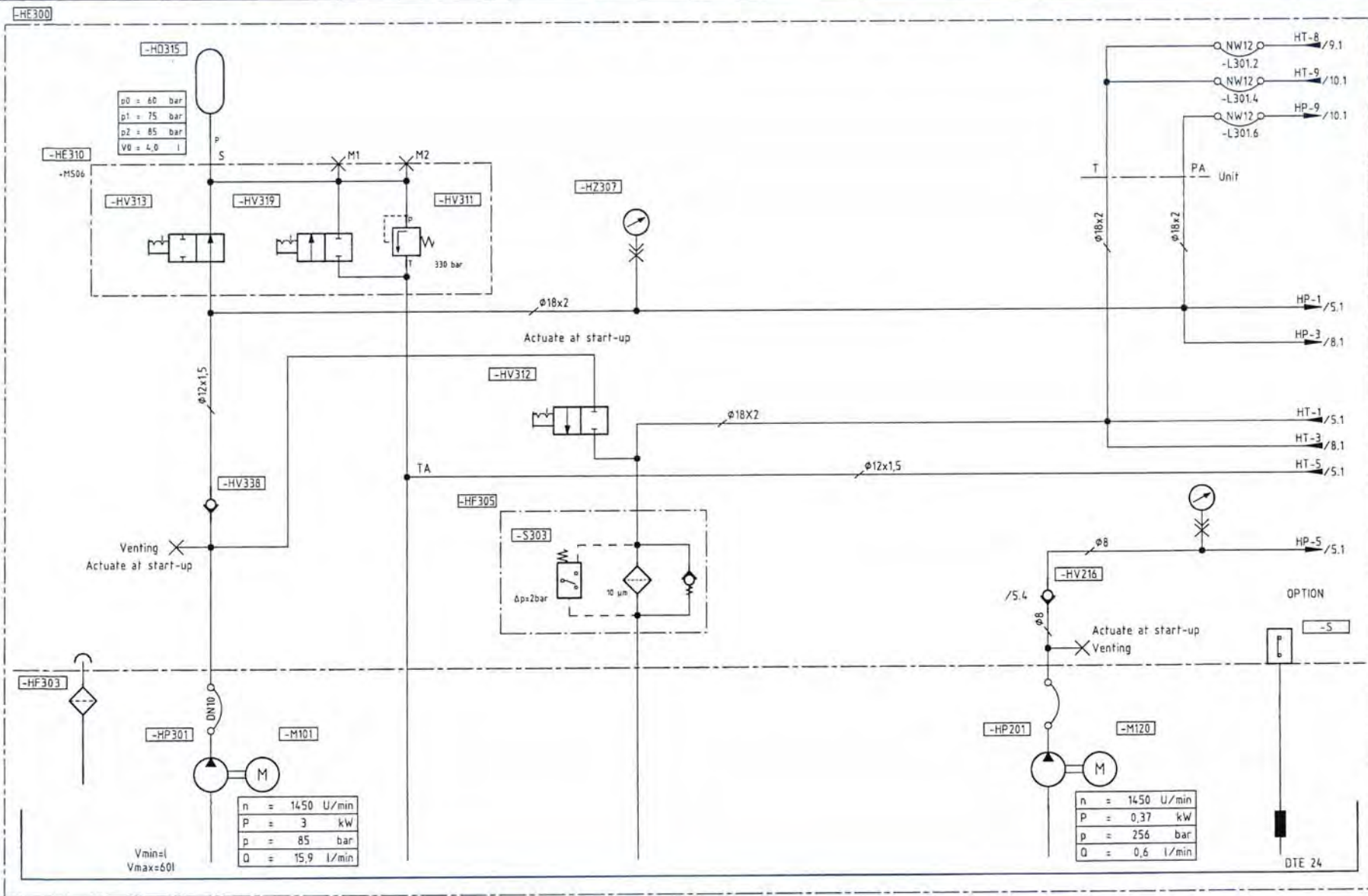






19.04.2002/14.35

copyright (c) by Starrag



Gezeichnet mit ELCAD (R)				Datum: 09.10.1999		Hydraulic diagram		=HX51 BA10	
BHEL, Hardwar, Indien				Starrag, Switzerland		HX-151/15		=PH00	
2. hydraulics/pneumatics diagram				7585		HP-241/7585		Blatt 4	
Hydraulic unit				21 Bl.					

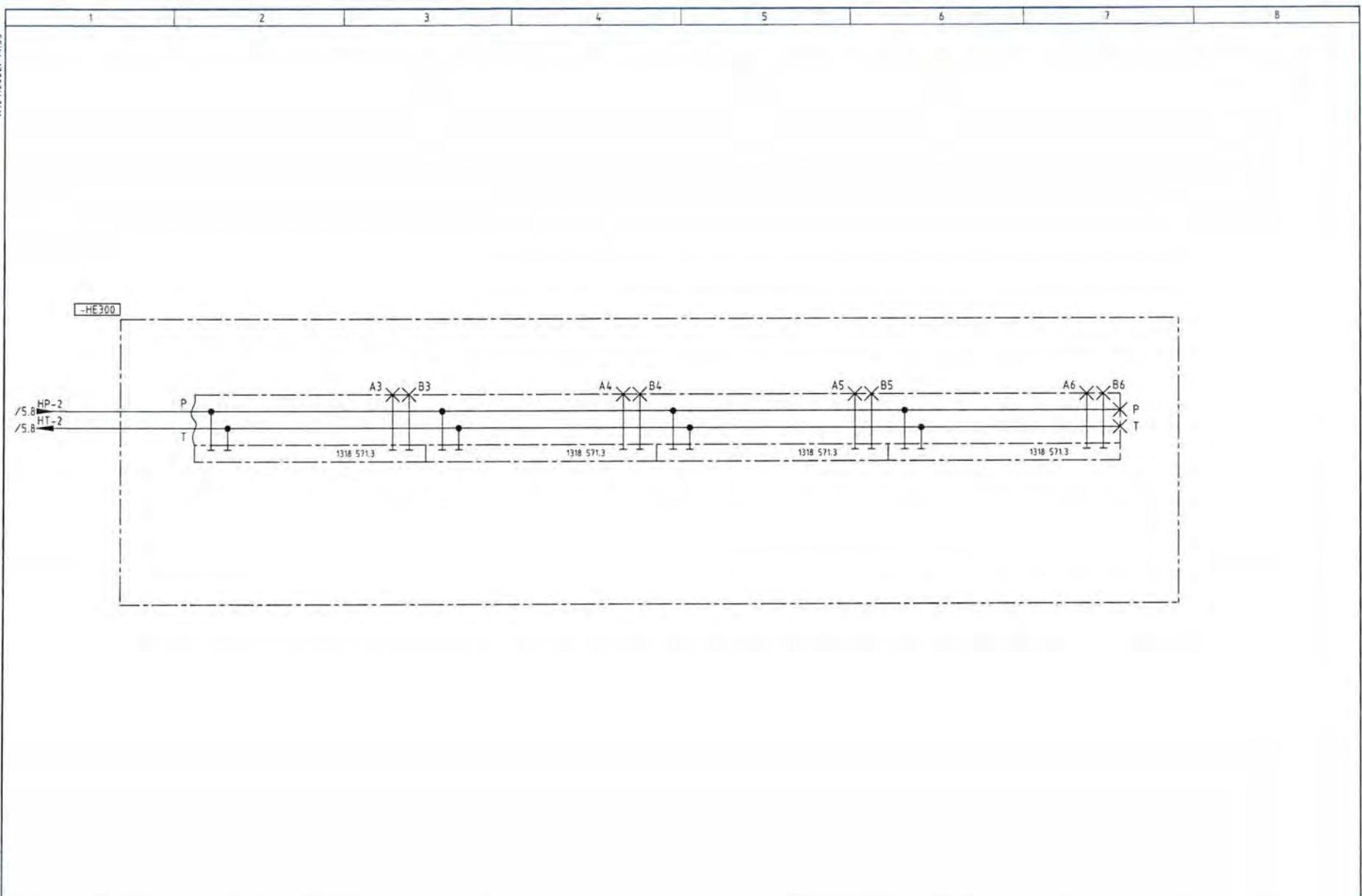


19.04.2002/14:35

copyright (c) by Starrag

Gezeichnet mit ELCAD (R)

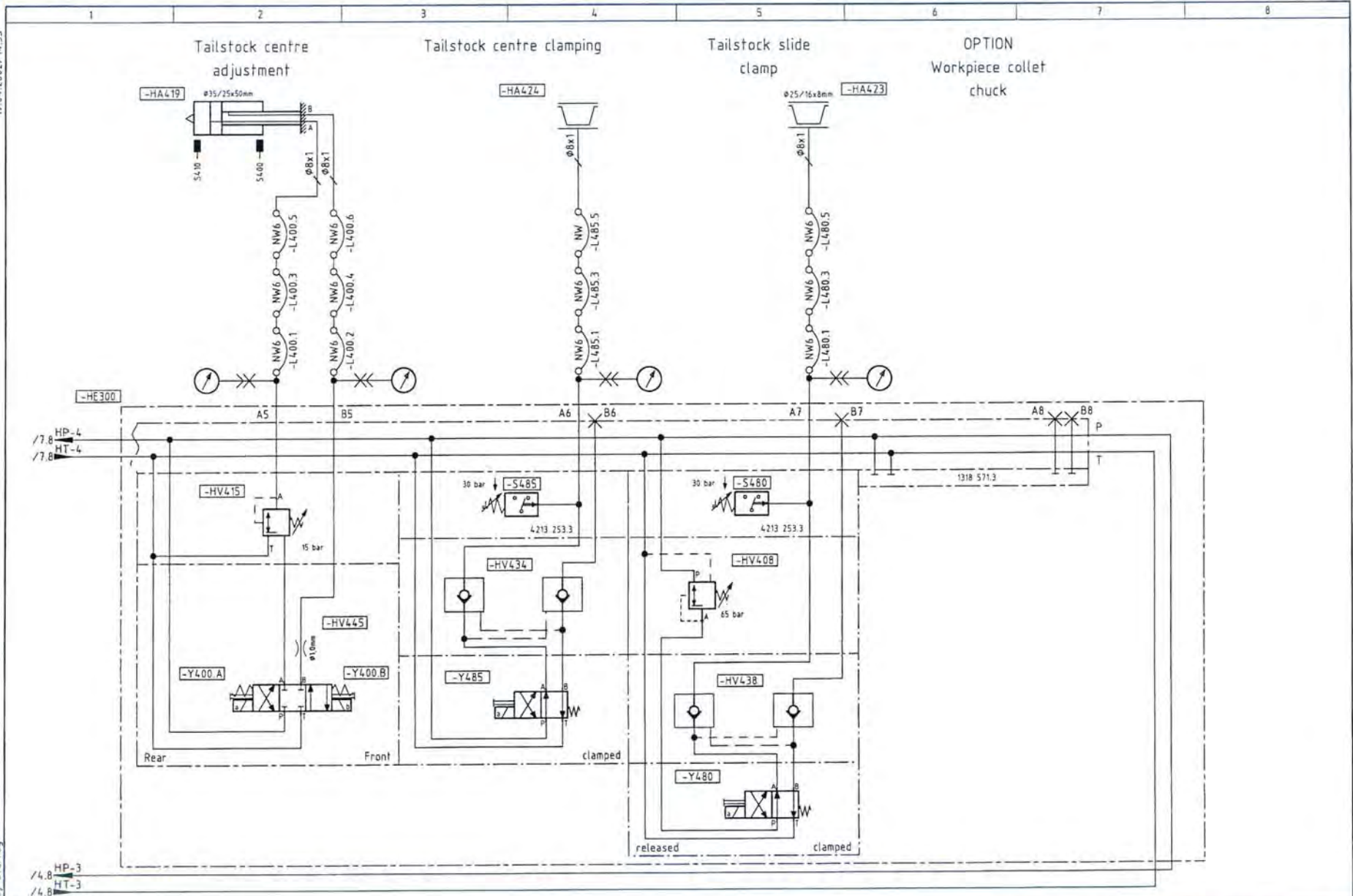
r		Datum	11.10.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Hydraulic diagram HX-151/15 2. hydraulics/pneumatics diagram	HP-241/7585		±HX51	BA10
b		Bearb.	Stefan Hanselmann						±PH00	
a		Gepr.	Stefan Hanselmann						7585	Hydraulic unit
Anderung		Datum	Name	Norm	Ersatz durch:	Ersatz für:	Ursprung:			21 Bl.





19.01.2002/14:35

copyright (c) by Starrag



Gezeichnet mit ELCAD (RI)

1		Datum	11.10.1999
2		Bearb.	Stefan Hanselmann
3		Gepr.	Stefan Hanselmann
Änderung	Datum	Name	Norm

BHEL, Hardwar, Indien	Starrag, Switzerland
Ersatz durch:	Ersatz für:
	Ursprung:

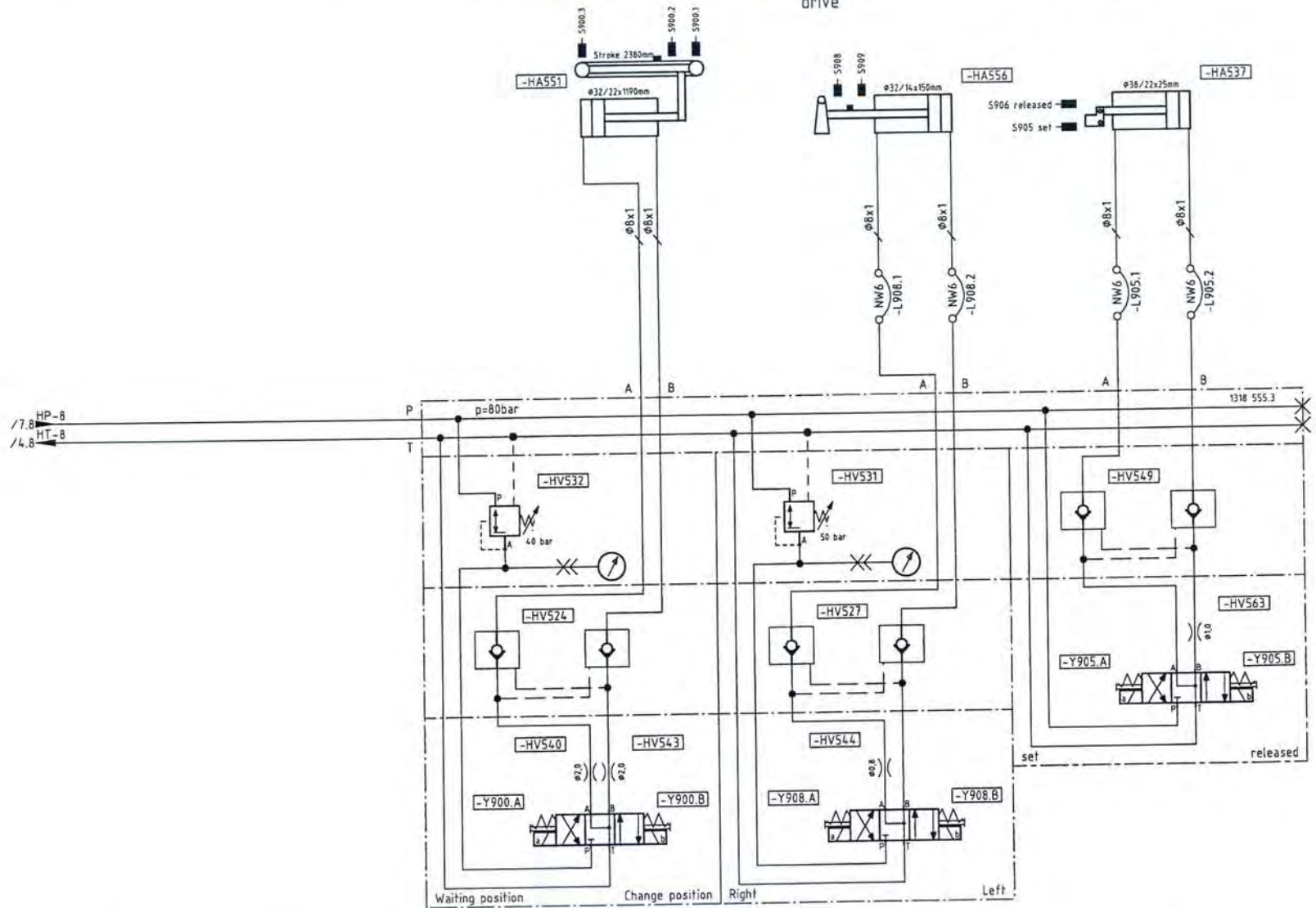
Hydraulic diagram  
HX-151/15  
2. hydraulics/pneumatics diagram

HP-241/7585		eHX51	BB10
7585	Hydraulic unit		Blatt 6
			21 Bl.

Longitudinal drive

Vertical gripper drive

Stop Longitudinal



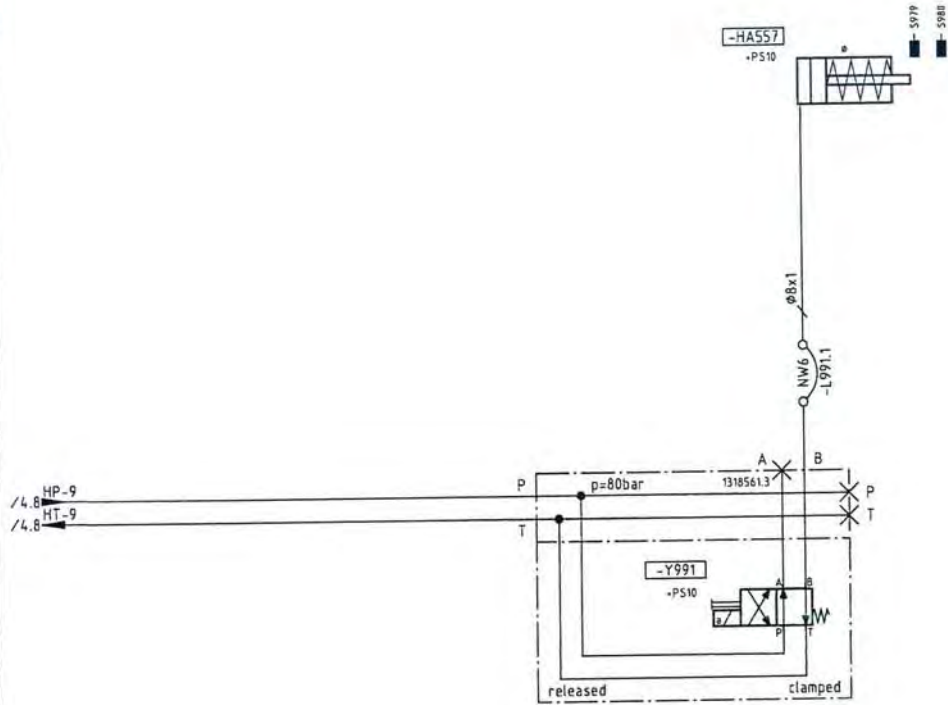
Gezeichnet mit ELCAD (R)				Datum: 17.05.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Hydraulic diagram	HP-241/7585	HX51 BM10
c				Bearb. Stefan Hanselmann			HX-151/15	7585	Workpiece
b				Gepr. Stefan Hanselmann			2. hydraulics/pneumatics diagram		Blatt 9
a									21 Bl.
Anderung:		Datum:	Name:	Norm:	Ersatz durch:	Ersatz für:	Ursprung:	changer	

19.04.2007/14:35

copyright (c) by Starrag

1 2 3 4 5 6 7 8

Gripper C

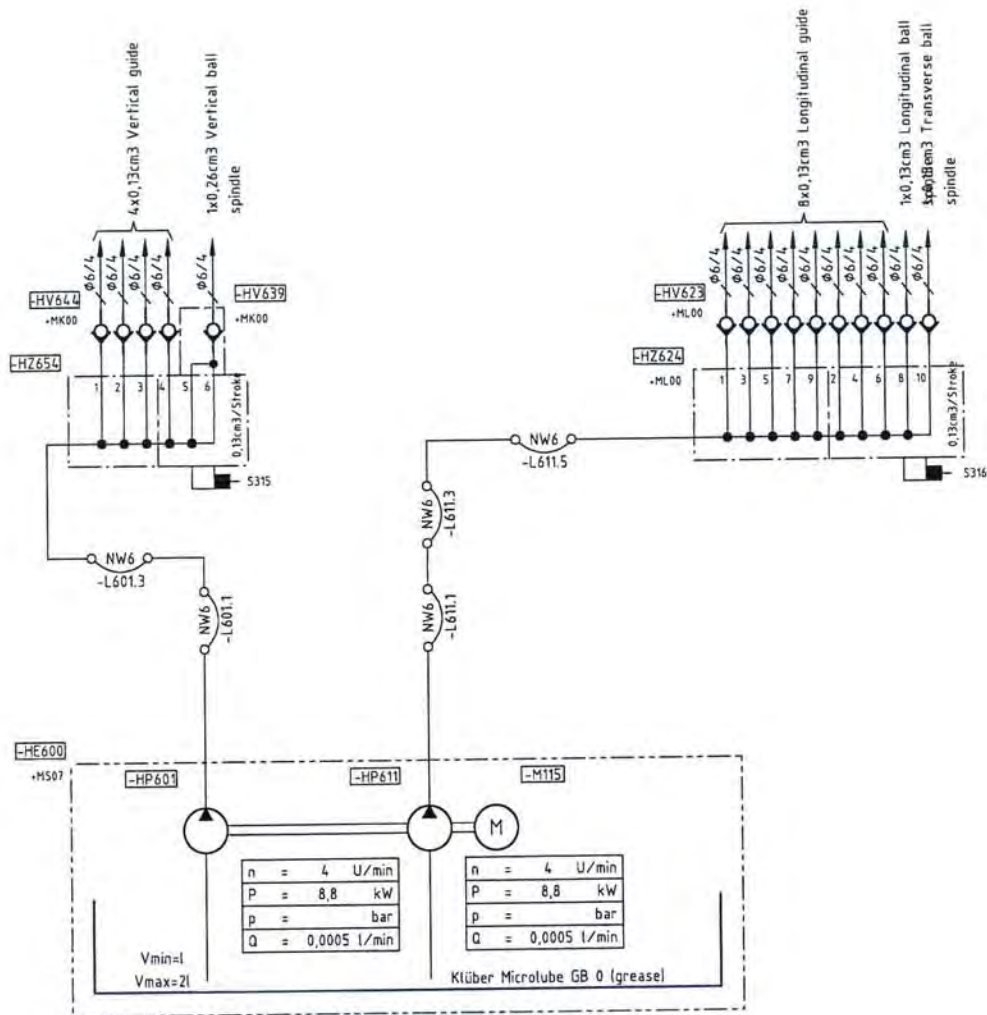


Gezeichnet mit ELCAD (R)				Datum	17.05.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Hydraulic diagram HX-151/15 2. hydraulics/pneumatics diagram	HP-241/7585		+HX51	BH10
c			Bearb.	Stefan Hanselmann							7585	Workpiece
a			Gepr.	Stefan Hanselmann								21 Bl.
Aenderung	Datum	Name	Norm	Ersatz durch:	Ersatz für:	Ursprung:						magazine

19.04.2002/14.35

copyright (c) by Starrag

Machine lubrication



Gezeichnet mit ELCAD (RI)

Datum: 18.05.1999  
Bearb.: Stefan Hanselmann  
Gepr.: Stefan Hanselmann

BHEL, Hardwar, Indien

Starrag, Switzerland

Hydraulic diagram  
HX-151/15  
2. hydraulics/pneumatics diagram

HP-241/7585

HX51 BA10

7585

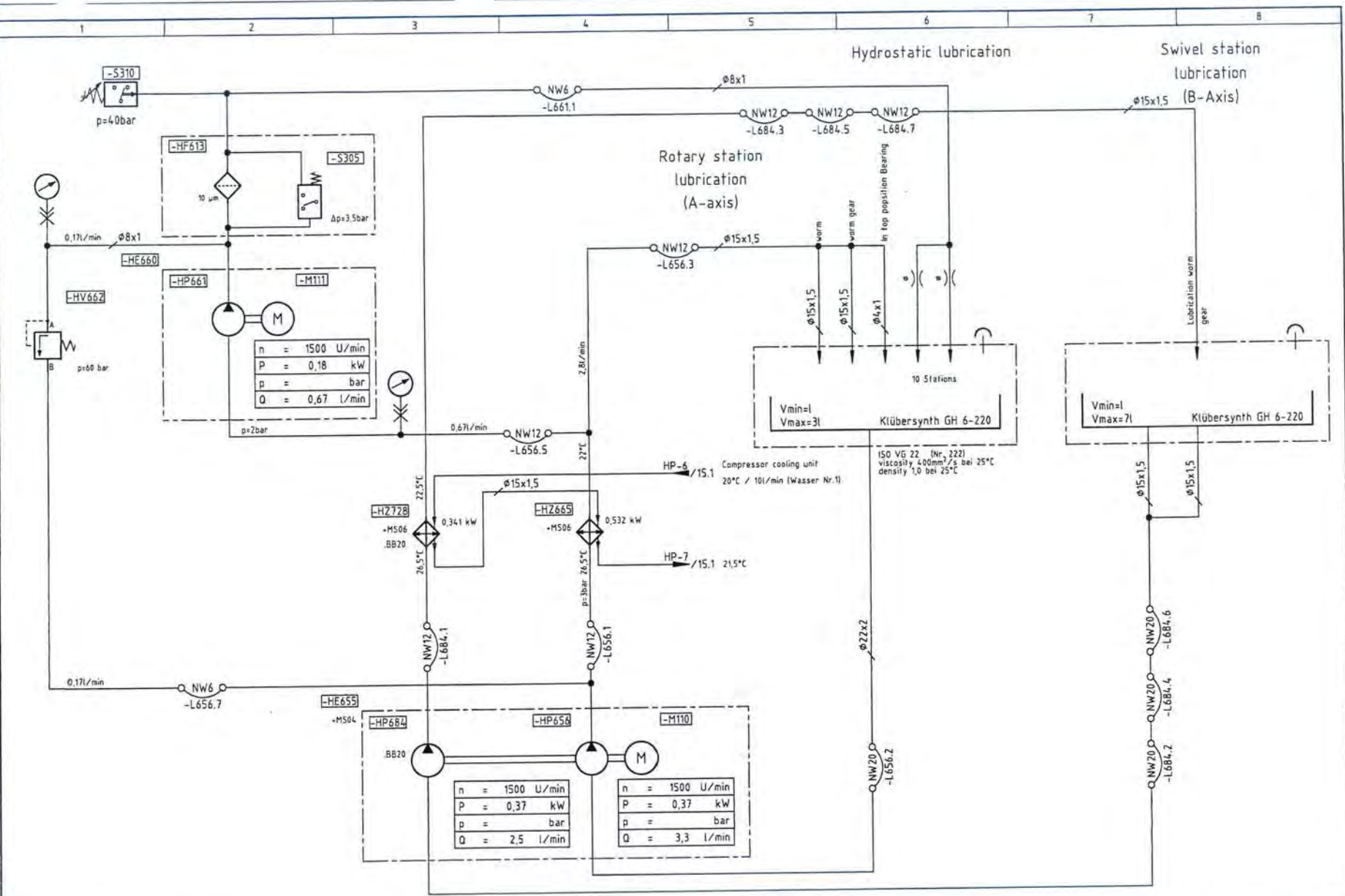
Machine lubrication

Blatt 11  
21 Bl.

Anderung Datum Name Norm Ersatz durch: Ersatz für: Ursprung:

19.04.2002/14-35

copyright (c) by Starrag

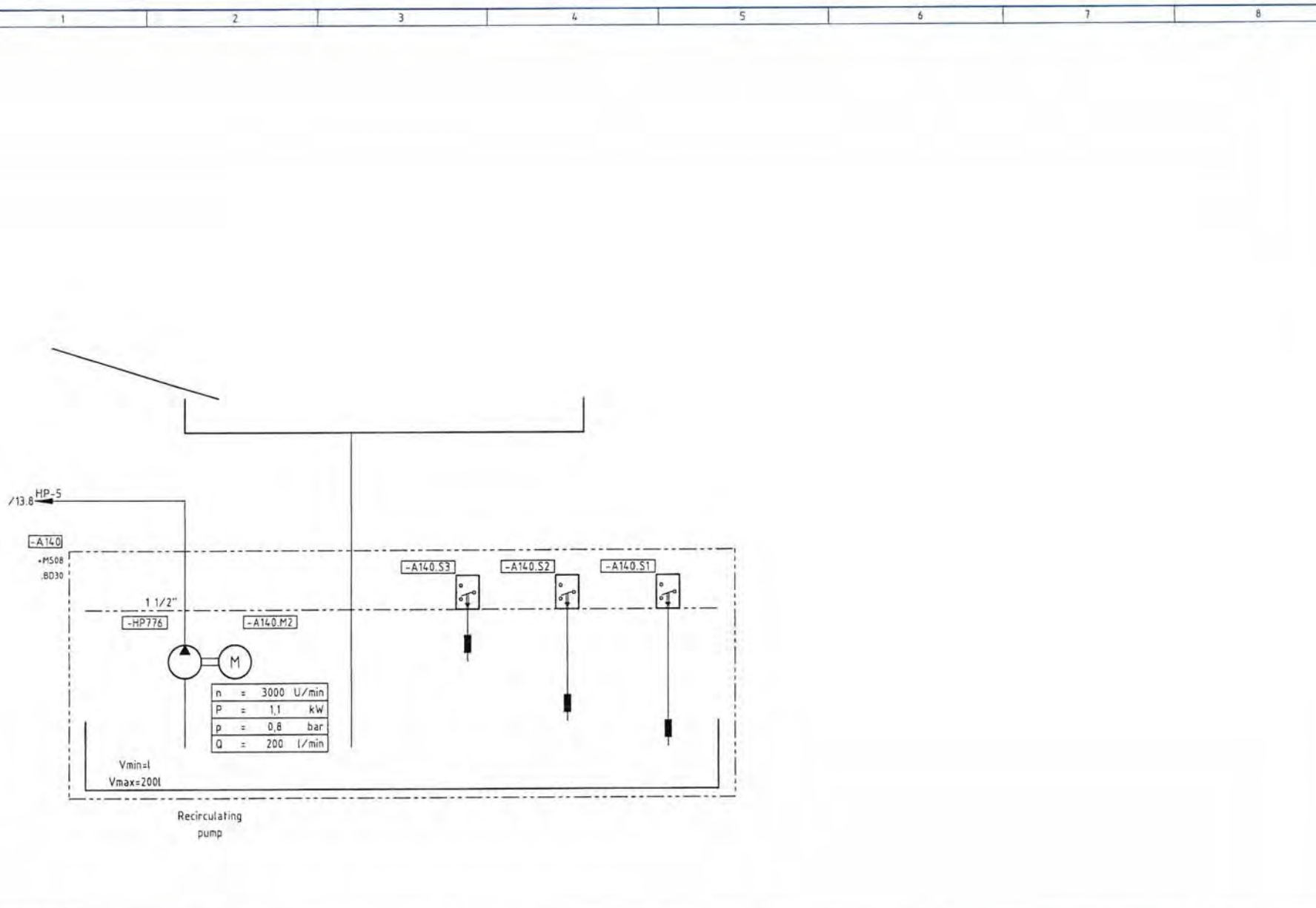


Gezeichnet mit ELCAD (R)				Datum 19.05.1999		BHEL, Hardwar, Indien		Starrag, Switzerland		Hydraulic diagram		HP-241/7585		HX51 BAS0	
z				Bearb. Stefan Hanselmann		2. hydraulics/pneumatics diagram		7585		Once-through		Blatt 12		MS04	
a				Gepr. Stefan Hanselmann		Ersatz durch:		Ersatz für:		Ursprung:		71 Bl.			
Änderung				Datum		Name		Norm							



19.04.2002/14:35

Copyright (c) by Starraq



Gezeichnet mit ELCAD (R)

c	Datum	14.06.1999	
b	Bearb.	Stefan Hanselmann	
a	Gepr.	Stefan Hanselmann	
Anderung	Datum	Name	Norm

BHEL, Hardwar, Indien

Starraq, Switzerland

Hydraulic diagram  
HX-151/15  
2. hydraulics/pneumatics diagram

HP-241/7585

Blatt 14  
21 Bl.

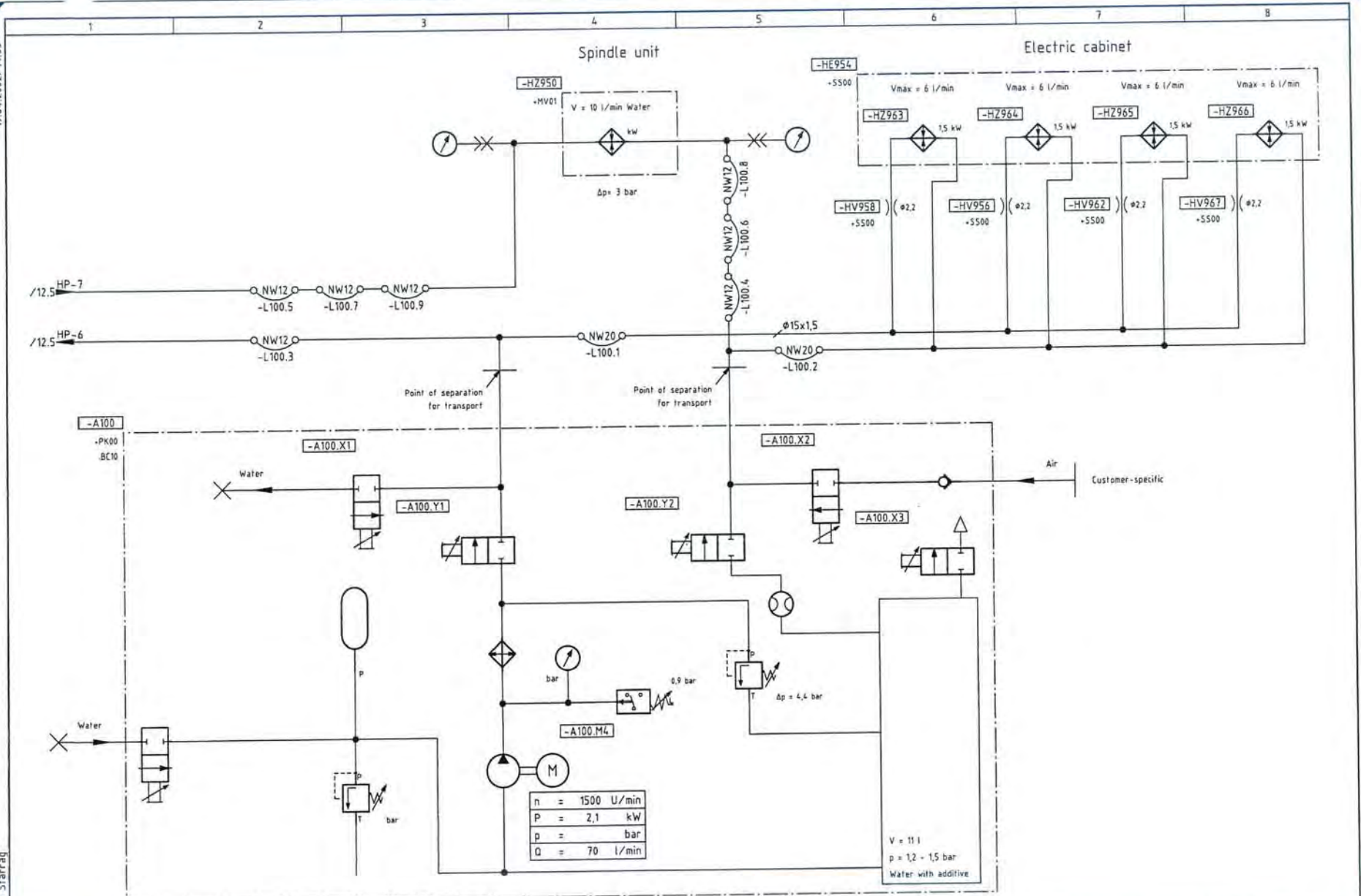
7585

Chip conveyor

HXS1

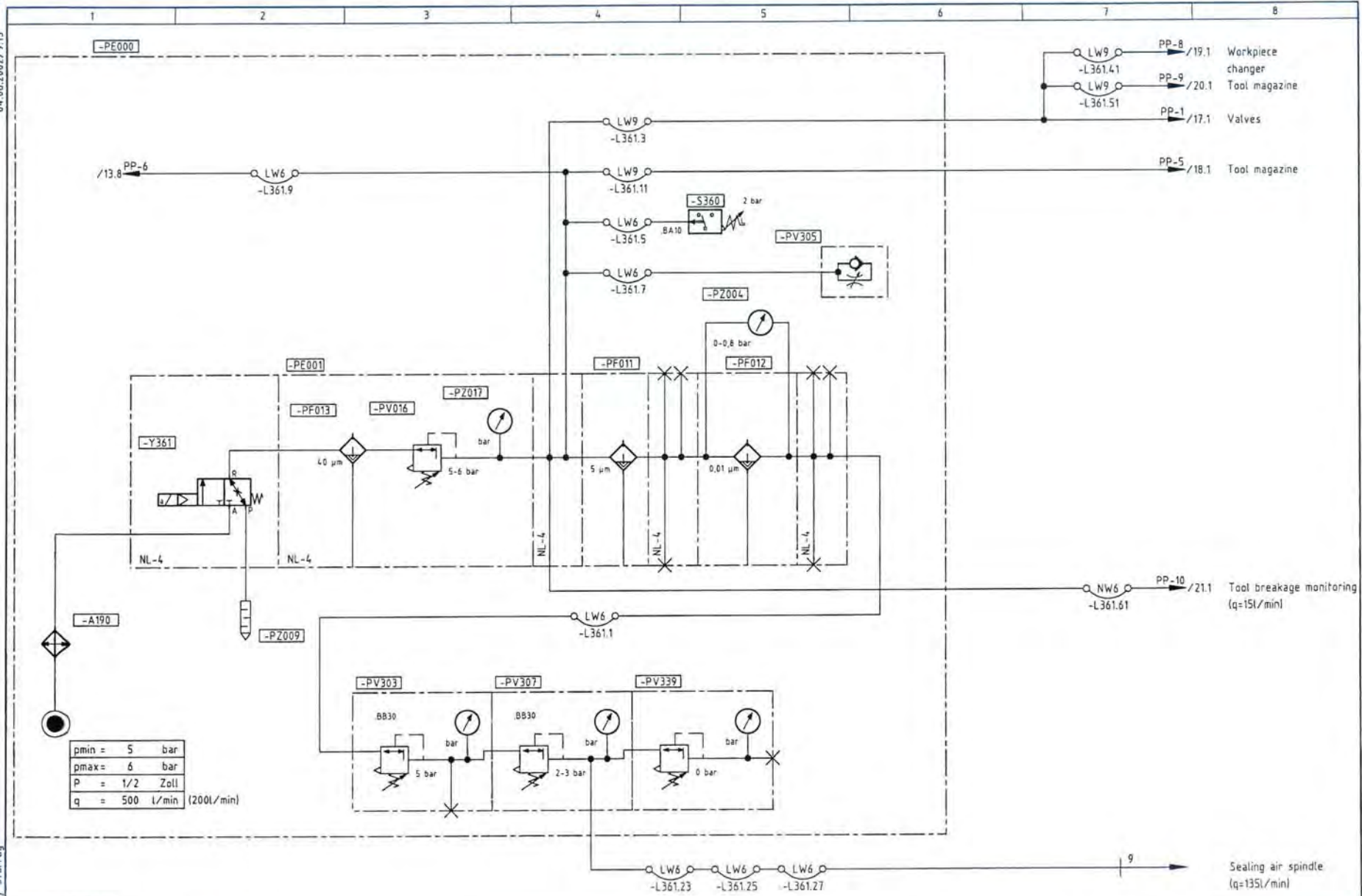
19.04.2002/14:35

Copyright (c) by Starrag



Gezeichnet mit ELCAD (R)				Datum 14.06.1999		BHEL, Hardwar, Indien		Starrag, Switzerland		Hydraulic diagram		HP-241/7585		=HX51 .BA10	
c				Bearb.	Stefan Hanselmann						HX-151/15				Blatt 15
tr				Depr.	Stefan Hanselmann						2. hydraulics/pneumatics diagram	7585	Compressor cooling unit		21 Bl.
a															
Änderung		Datum	Name	Norm	Ersatz durch:	Ersatz für:	Ursprung:								

04.06.2002/9:13

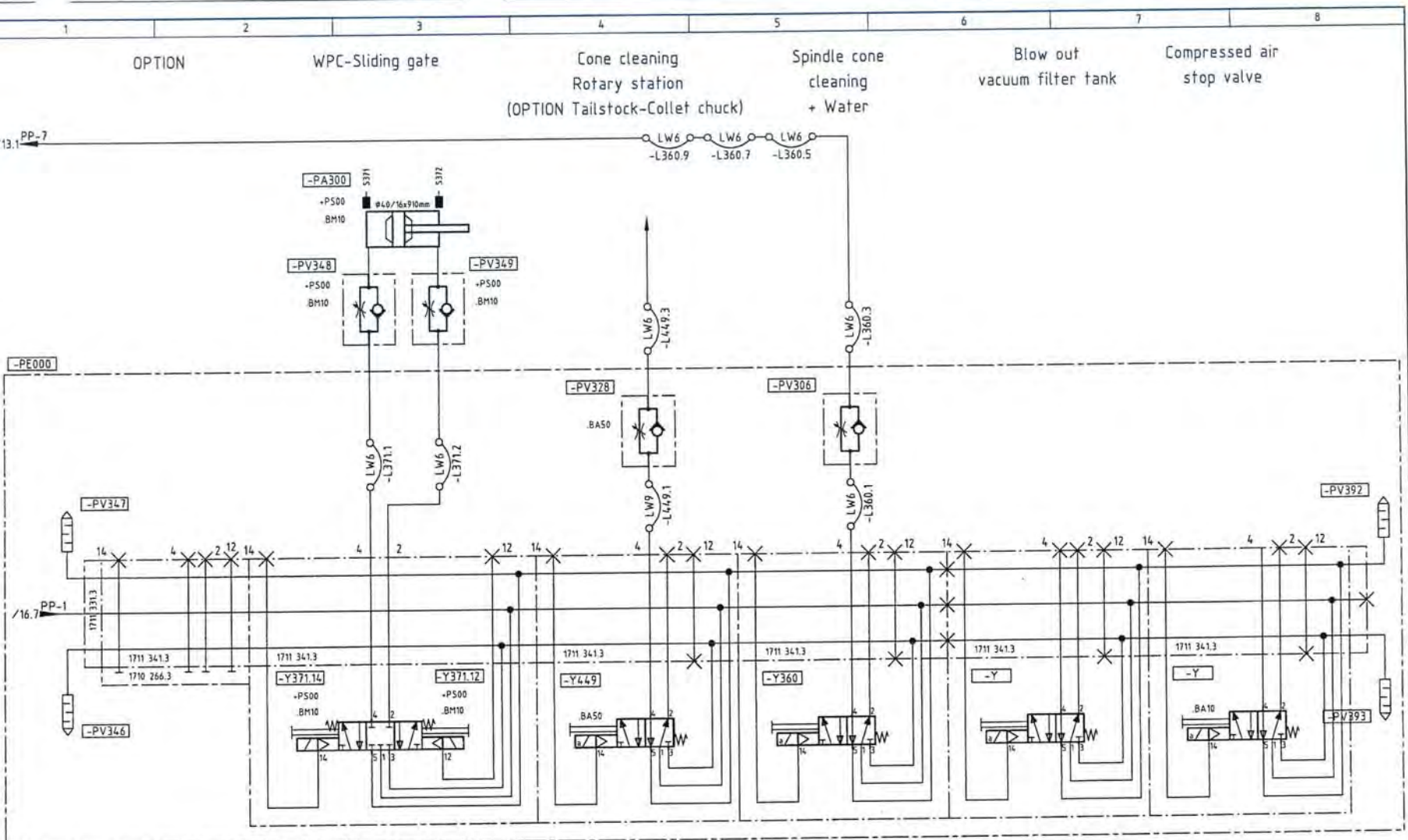


copyright (c) by Starrag

Gezeichnet mit ELCAD (R)				Datum: 12.10.1999		BHEL, Hardwar, Indien		Starrag, Switzerland		Pneumatic diagram		HP-241/7585		HX51 BA10	
				Bearb. Stefan Hanselmann						HX-151/15		7585		PP00	
				Gepr. Stefan Hanselmann						2. hydraulics/pneumatics diagram		Compressed air		Blatt 16	
Änderung				Datum		Name		Norm		Ersatz durch:		Ersatz für:		Ursprung	
												7585		21 Bl.	
												Sealing air spindle (q=135l/min)			
												maintenance unit			

19.04.2002/14.35

copyright (c) by Starrag



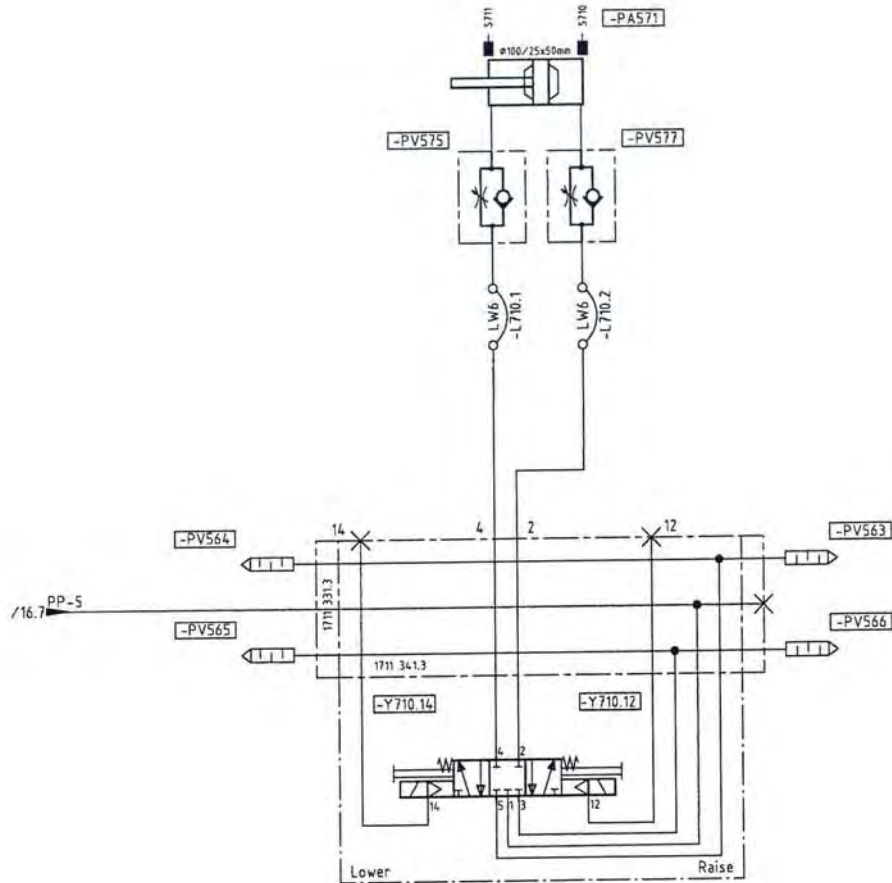
Gezeichnet mit ELCAD (RI)				Datum: 16.06.1999		BHEL, Hardwar, Indien		Starrag, Switzerland		Pneumatic diagram		HP-241/7585		+HX51 BB30	
				Bearb. Stefan Hanselmann						HX-151/15				+HS06	
				Gepr. Stefan Hanselmann						2. hydraulics/pneumatics diagram		7585		Compressed air	
Blatt 17				Ersatz durch:		Ersatz für:		Ursprung:						21 Bl.	

19.04.2002/14-35

copyright (c) by Starrag

1 2 3 4 5 6 7 8

Vertical



Gezeichnet mit ELCAD (RI)

c			Datum	19.06.1999
b			Bearb.	Stefan Hanselmann
a			Gepr.	Stefan Hanselmann
Änderung	Datum	Name	Norm	

BHEL, Hardwar, Indien

Starrag, Switzerland

Pneumatic diagram  
HX-151/15  
2. hydraulics/pneumatics diagram

HP-241/7585

HX51 BB51  
PZ10

7585

Tool magazine

Blatt 18  
21 Bl.

Ersatz durch:      Ersatz für:      Ursprung:

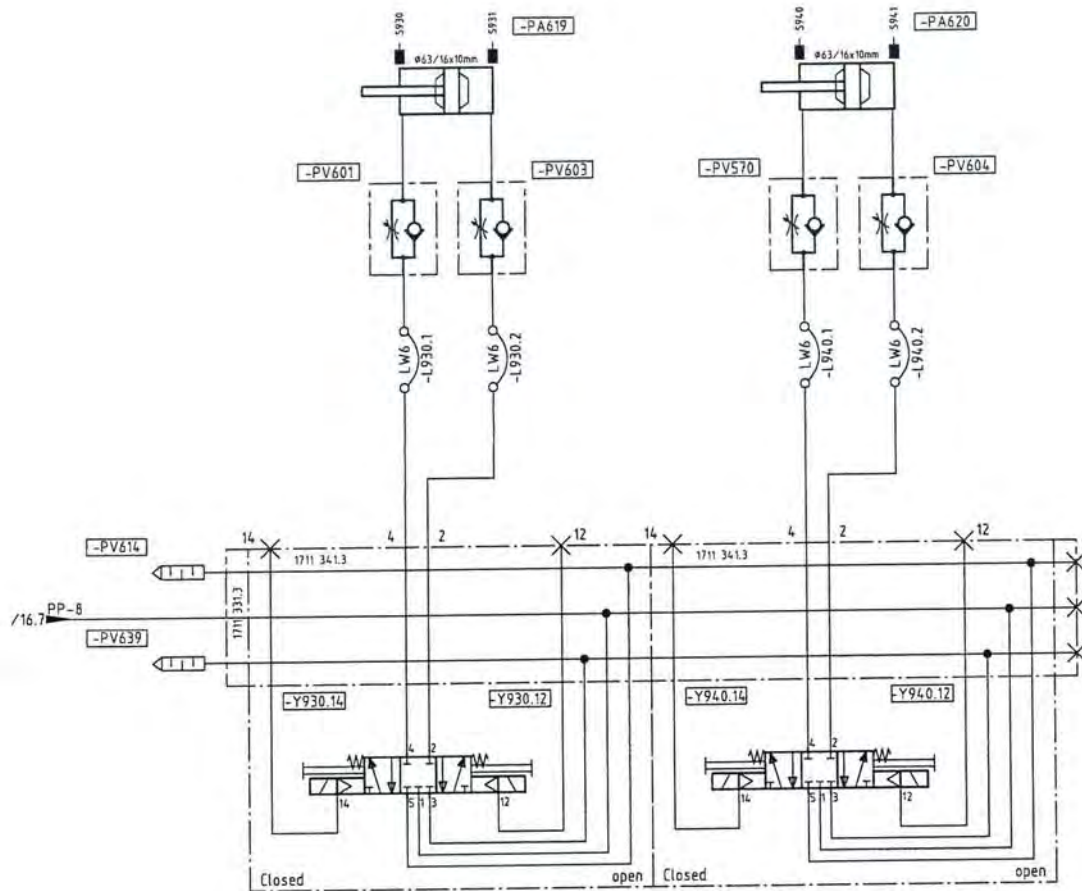
19.04.2007/14.35

copyright (c) by Starrag

1 2 3 4 5 6 7 8

Gripper A

Gripper B

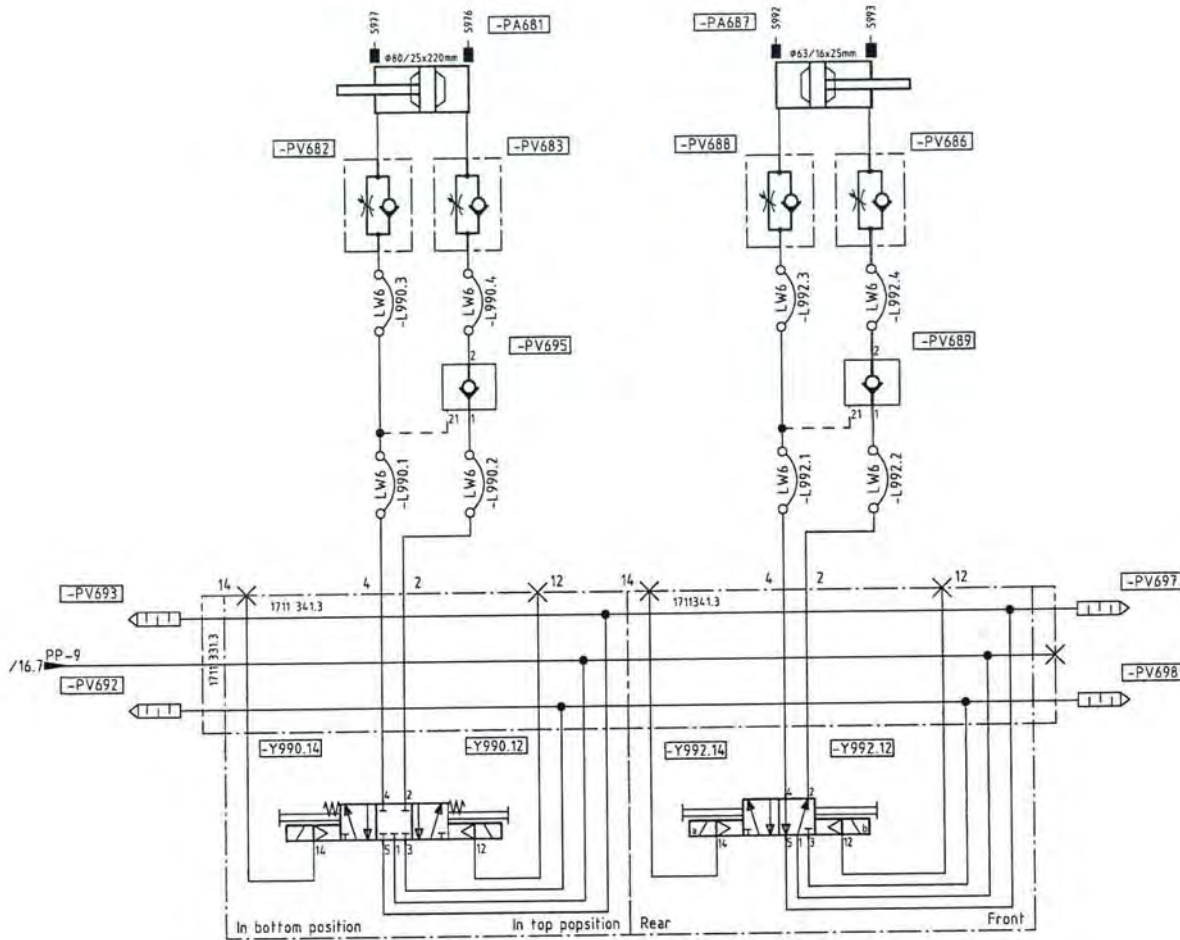


Gezeichnet mit ELCAD (R)				Datum 19.06.1999		BHEL, Hardwar, Indien		Starrag, Switzerland		Pneumatic diagram		HX-151/15		HP-241/7585		HX51 BM10	
c				Bearb. Stefan Hanselmann						HX-151/15		7585		Workpiece		Blatt 19	
b				Gepr. Stefan Hanselmann						2. hydraulics/pneumatics diagram						21 Bl.	
a				Ersatz durch:		Ersatz für:		Ursprung:						changer			

1 2 3 4 5 6 7 8

Vertical

Horizontal



Gezeichnet mit ELCAD IRI

c	Datum	19.06.1999
b	Bearb.	Stefan Hanselmann
a	Gepr.	Stefan Hanselmann

BHEL, Hardwar, Indien

Starrag, Switzerland

Pneumatic diagram  
HX-151/15  
2. hydraulics/pneumatics diagram

HP-241/7585

aHX51 .BM20  
-P510

7585

Workpiece

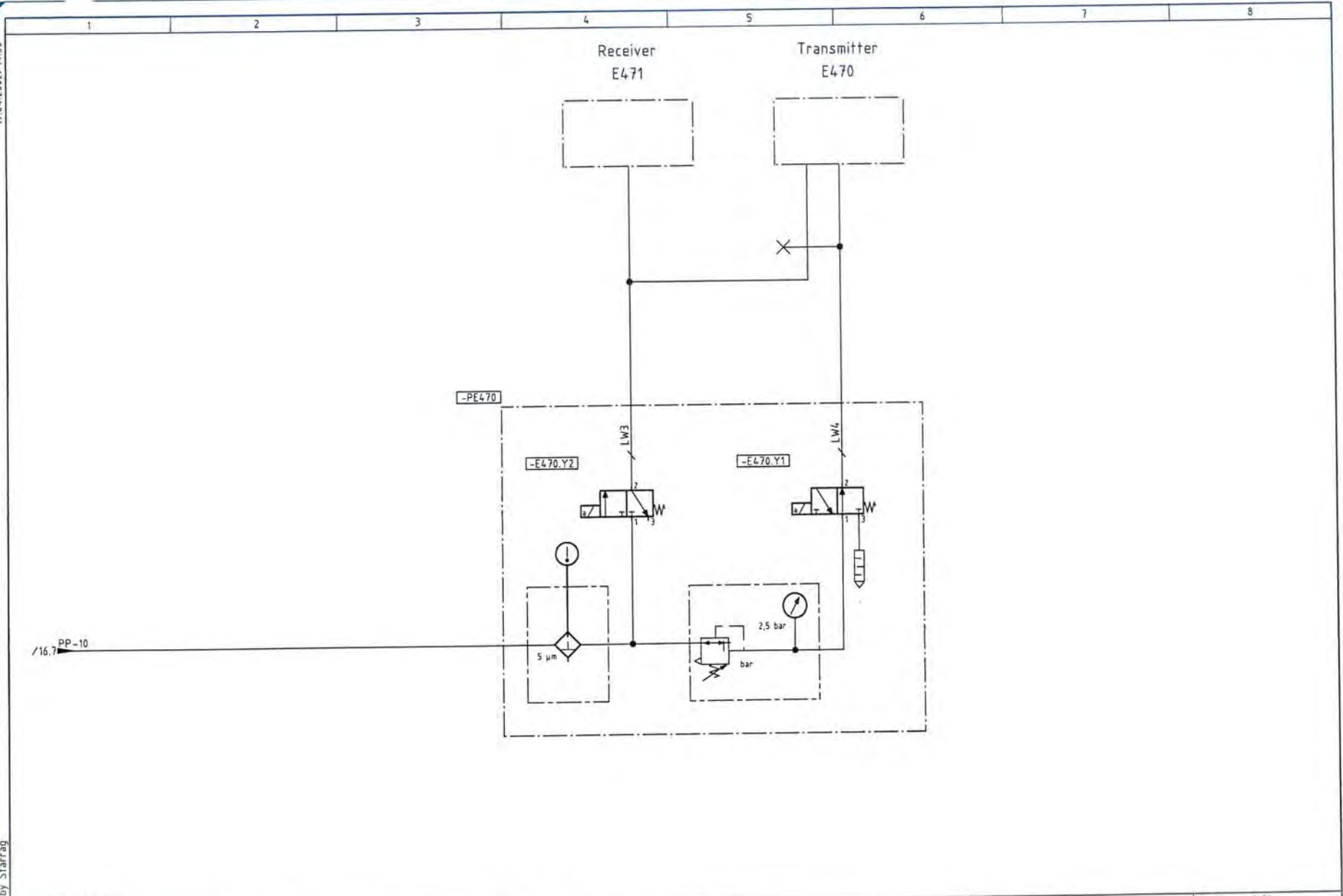
Blatt 20  
21 Bl.

Anderung	Datum	Name	Norm	Ersatz durch:	Ersatz für:	Ursprung:
----------	-------	------	------	---------------	-------------	-----------

magazine

19.04.2007/14:35

copyright (c) by Starrag



Gezeichnet mit ELCAD (R)				Datum	19.06.1999	BHEL, Hardwar, Indien		Starrag, Switzerland		Pneumatic diagram HX-151/15		HP-241/7585		HX51	BL50
c				Bearb.	Stefan Hanselmann					2. hydraulics/pneumatics diagram		7585	Tool breakage monitoring	MS06	
a				Gepr.	Stefan Hanselmann									Blatt 21	
Änderung		Datum	Name	Norm	Ersatz durch:	Ersatz für:	Ursprung:							21 Bl.	

Device	Page	Designation	Type designation	Manufacturer	lift t2	product number	Assembly site	Function
-HE300	/4.1	Hydraulics Plant	HX-151	REXROTH		248509.4	Hydraulic unit	.BA10
-HE310	/4.1	Safety block	ABZSS 10M-2X/330B/S12V	Rexroth		1280921.3	Hydraulic unit	.BA10
-HF303	/4.1	Ventilating filter	ELFP4-F10W1.0	Flutec		1677101.3	Hydraulic unit	.BA10
-HD315	/4.2	Bubble accumulator	IHV 04-330/38	Olaer		1280801.3	Hydraulic unit	.BA10
-HP301	/4.2	Internally geared pump	PGF2-2X/011RH01VE4	Rexroth		1265051.3	Hydraulic unit	.BA10
-HP301	/4.2	Seal	AB33-33/C250 RGC 275	Rexroth		1265203.3	Hydraulic unit	.BA10
-HP301	/4.2	Pump support	AB33-37/A250/0-V7/10+PGF2-E4	Rexroth		1265252.3	Hydraulic unit	.BA10
-HP301	/4.2	Coupling	AB33-22/KD24-20/28	Rexroth		1265152.3	Hydraulic unit	.BA10
-HV313	/4.2					-HE210	Hydraulic unit	.BA10
-HV338	/4.2	Check valve	RHD12-PL	Ermeto		1301408.3	Hydraulic unit	.BA10
-M101	/4.2	Three-phase current-Motor	ABB M2AA 112M 3GAA 112 001	ABB		4605662.3	Hydraulic unit	.BA10
-HF305	/4.3	Return filter	RFBN-HC0160DE10D1.X/LED	Hydac		1225501.3	Hydraulic unit	.BA10
-HF305	/4.3	Filter element	0160R10 BN/HC	Hydac		1225601.3	Hydraulic unit	.BA10
-HV311	/4.3					-HE210	Hydraulic unit	.BA10
-HV319	/4.3					-HE210	Hydraulic unit	.BA10
-HV312	/4.4	Ball valve	KHB-18LR-1212-02X	Flutec		1631301.3	Hydraulic unit	.BA10
-HZ307	/4.4	Pressure gauge	AB31-13/063-400	Rexroth		1295211.3	Hydraulic unit	.BA10
-S303	/4.4					-HF305	Hydraulic unit	.BA10
-HP201	/4.7	Radial piston pump	1PF1R4/1X/0,40-700WA01M01	Rexroth		1265101.3	Hydraulic unit	.BA10

Gezeichnet mit ELCAD 1R1		Datum	19.04.2002	BHEL, Hardwar, Indien		Starrag, Switzerland		Parts list HX-151/15		GL-241/7585		=HX51:
c		Bearb.	Stefan Hanselmann					3. list of devices		7585		list of devices
b		Gepr.	Stefan Hanselmann									Blatt 1
a				Ersatz durch:		Ersatz für:		Ursprung:				Bl.
Änderung		Datum	Name	Norm								



Device	Page	Designation	Type designation	Manufacturer	lift t2	product number	Assembly site	Function
-HV208	/5.6					-HE210	Rear column	..BA10
-HV205	/5.7	Check valve	RHDI 1/2A3C 0,2bar	Rexroth		1301431.3	Rear column	..BA10
-HA203	/5.8	Plunger-Cylinder	HZP 0005-ST P/22-390	Hamül		248508.4	Knee/Column	..BA10
-HE300	/6.1	Hydraulics Plant	HX-151	REXROTH		248509.4	Hydraulic unit	...BA10
-HE300	/7.1	Hydraulics Plant	HX-151	REXROTH		248509.4	Hydraulic unit	....BA10
-HA231	/7.2	Tool clamping cylinder	Schlichtmaschine HSK-A63	Ott		8497.3	Spindle	BB30
-HA425	/7.3	Cylinder Workpiece gripper	HSK-A80	Starrag		8429.3	Rotary station	.BA50
-Y106	/7.3	4/3 Directional control valve	4WE 6 D6X/EG24N9K4	Rexroth		1317001.3	Hydraulic unit	.BB30
-Y440	/7.4	4/3 Directional control valve	4WE 6 D6X/EG24N9K4	Rexroth		1317001.3	Hydraulic unit	.BA50
-S901	/7.5	Pressure switch	HED 8 OH 1X/50K14S	Rexroth		4213201.3	Hydraulic unit	.BM10
-Y901	/7.5	4/3 Directional control valve	4WE 6 D6X/EG24N9K4	Rexroth		1317001.3	Hydraulic unit	.BM10
-S241	/7.6	Pressure switch	HED 8 OH 1X/50K14S	Rexroth		4213201.3	Hydraulic unit	.BF50
-Y241	/7.7	4/3 Directional control valve	4WE 6 D6X/EG24N9K4	Rexroth		1317001.3	Hydraulic unit	.BF50
-HE300	/8.1	Hydraulics Plant	HX-151	REXROTH		248509.4	Hydraulic unit	.BB10
-HA419	/8.2	Tailstock		Starrag		3057702.7	Tailstock slide	.BB10
-HV415	/8.2	Pressure reducing valve	ZDR6 DA2-4X/75Y	Rexroth		1311625.3	Hydraulic unit	.BB10
-HV445	/8.2	Diaphragm	RR000152066	Rexroth		1318410.3	Hydraulic unit	.BB10
-Y400.A	/8.2	4/3-Directional control valve	4WE 6 E6X/EG24N9K4	Rexroth		1317002.3	Hydraulic unit	.BB10
-HA424	/8.4	Tailstock		Starrag		3056501.7	Tailstock slide	.BB10

Gezeichnet mit ELCAD IRI

Datum	19.04.2002	BHEL, Hardwar, Indien	Starrag, Switzerland	Parts list HX-151/15	GL-241/7585	zHX51
Bearb.	Stefan Hanselmann				7585	list of devices
Gepr.	Stefan Hanselmann			3. list of devices		Blatt 3 BI
Änderung	Datum	Name	Norm	Ersatz durch	Ersatz für	Ursprung



19.04.2002 14:35

Device	Page	Designation	Type designation	Manufacturer	lift t2	product number	Assembly site	Function
-HA537	/9.7	Cylinder	32C SBD HMIRN14 MC 40-M-44-22	Parker		1251605.3	Workpiece changer	.BM10
-HV549	/9.7	Resettable check valve	Z2S6 - 2-60	Rexroth		1303642.3	Workpiece changer	.BM10
-HV563	/9.7	Diaphragm	RR000152066	Rexroth		1318410.3	Workpiece changer	.BM10
-Y905.A	/9.7	4/3 Directional control valve	4WE 6 J 6X/EG24N9K4	Rexroth		1317005.3	Workpiece changer	.BM10
-HA557	/10.4		95.600.183.1.0	Ott		243868.4	Workpiece magazine	.BM10
-Y991	/10.4	4/3 Directional control valve	4WE 6 D6X/EG24N9K4	Rexroth		1317001.3	Workpiece magazine	.BM10
-HE600	/11.1	Doppelpumpe Fett-Schmierung	KFA10-W 230V, 50-60Hz	Vogel	230V 65/78W	4521095.3	Left-hand column	.BA10
-HV644	/11.1	screw fitting with check valve	Vpkm-Rv	Maag		1501631.3	Knee	.BA10
-HZ654	/11.1	Progressive distributor	VPBM-3 ZYN/S	Maag		1501625.3	Knee	.BA10
-HP601	/11.2					-HE600	Left-hand column	.BA10
-HV639	/11.2	joiner	Vpbm-C2	Vogel		1501661.3	Knee	.BA10
-HP611	/11.3					-HE600	Left-hand column	.BA10
-M115	/11.3					-HE600	Left-hand column	.BA10
-HV623	/11.4	screw fitting with check valve	Vpkm-Rv	Maag		1501631.3	Longitudinal slide	.BA10
-HZ624	/11.4	Progressive distributor	VPBM-5 ZYN/S	Maagtechnik	24V	1501627.3	Longitudinal slide	.BA10
-HE660	/12.1	Pump unit	TFP 50/0,45 D CI01 F	Turolla		4522028.3	Stand rear left side	.BA50
-HV662	/12.1	Pressure limiting valve	MV41ER G 1/4"	Hawe		1311201.3	Stand rear left side	.BA50
-S310	/12.1	Pressure switch	Nr.0159 430 14 1 062	Suco	250V 5-50 Bar	4213108.3	Stand rear left side	.BA50
-HF613	/12.2	Filter	Pi-1034/160/80	Starrag		164147.4	Stand rear left side	.BA50

copyright (c) by STARRAG

Gezeichnet mit ELCAD (R)				Datum	19.04.2002	BHEL, Hardwar, Indien		Starrag, Switzerland	Parts list	GL-241/7585	SHX51
				Bearb.	Stefan Hanselmann				HX-151/15		
				Gepr.	Stefan Hanselmann				3. list of devices	7585	list of devices
Anderung	Datum	Name	Norm	Ersatz durch:	Ersatz für:	Ursprung:					Blatt 5
											Bl.

19.04.2002 14:35

Device	Page	Designation	Type designation	Manufacturer	lift t2	product number	Assembly site	Function
-HP661	/12.2					-HE660	Stand rear left side	.BA50
-M111	/12.2					-HE660	Stand rear left side	.BA50
-S305	/12.2	Contamination indicator	PIS 3032, 1S	Mahle	3,5Bar	1220144.3	Stand rear left side	.BA50
-HE655	/12.3	Pump unit	PBB 2,2+1,7 D C031 F	Sauer Sundstrand	400/460V 370W	4522284.3	Stand rear left side	.BA50
-HP684	/12.3					-HE655	Stand rear left side	.BB20
-HZ728	/12.3	Plate heat exchanger	B8-30	Olaer		1205304.3	Rear column	.BB20
-HP656	/12.4					-HE655	Stand rear left side	.BA50
-HZ665	/12.4	Plate heat exchanger	B8-40	Olaer		1205305.3	Rear column	.BA50
-M110	/12.4					-HE655	Stand rear left side	.BA50
-A121.M2	/13.1					-HE745	Longitudinal beam right	.BI40
-HE745	/13.1	high pressure supply unit		Knoll	50 bar	240042.4	Longitudinal beam right	.BI40
-HF784	/13.1					-HE745	Longitudinal beam right	.BI40
-HP751	/13.1					-HE745	Longitudinal beam right	.BI40
-HV747	/13.1					-HE745	Longitudinal beam right	.BI40
-HV779	/13.1					-HE745	Longitudinal beam right	.BI40
-HV785	/13.1					-HE745	Longitudinal beam right	.BI40
-HZ746	/13.1					-HE745	Longitudinal beam right	.BI40
-S340	/13.1	Pressure switch	C-9612/2S 10-104B,1 UK,	Barksdale	250V 10A	4213006.3	Longitudinal beam right	.BI40
-A121.S2	/13.2					-HE745	Longitudinal beam right	.BI40

Copyright (c) dx STARRAG

Gezeichnet mit E/CAD (R)				Datum: 19.04.2002	Bearb.: Stefan Hanselmann	BHEL, Hardwar, Indien	Starrag, Switzerland	Parts list HX-151/15	GL-241/7585	eHX51
a				Gepr.: Stefan Hanselmann				3. list of devices	7585	list of devices
Änderung	Datum	Name	Norm	Ersatz durch:	Ersatz für:	Ursprung:				Blatt 6 BL





04.06.2002 9:14

copyright (c) by STARRAG

Device	Page	Designation	Type designation	Manufacturer	lift t2	product number	Assembly site	Function
-A100	/15.1	Oil recooling device	DK-86V/S0	Schimpke	400/460V	242151.4	Compressor cooling unit	.BC10
-A100.X1	/15.3					-A100	Compressor cooling unit	.BC10
-A100.Y1	/15.3					-A100	Compressor cooling unit	.BC10
-A100.M4	/15.4					-A100	Compressor cooling unit	.BC10
-HZ950	/15.4					126.6	Y-slide	.BA10
-A100.X2	/15.5					-A100	Compressor cooling unit	.BC10
-A100.Y2	/15.5					-A100	Compressor cooling unit	.BC10
-A100.X3	/15.6					-A100	Compressor cooling unit	.BC10
-HE954	/15.6	switch cabinet combination	HX-151	Bader		242160.4	Switch cabinet	.BA10
-HV956	/15.6	Nozzle screw G1/4"/2,2	G1/4"/2,2	Starrag		1342124.3	Switch cabinet	.BA10
-HV958	/15.6	Nozzle screw G1/4"/2,2	G1/4"/2,2	Starrag		1342124.3	Switch cabinet	.BA10
-HZ963	/15.6					-HE954	Switch cabinet	.BA10
-HV962	/15.7	Nozzle screw G1/4"/2,2	G1/4"/2,2	Starrag		1342124.3	Switch cabinet	.BA10
-HZ964	/15.7					-HE954	Switch cabinet	.BA10
-HZ965	/15.7					-HE954	Switch cabinet	.BA10
-HV967	/15.8	Nozzle screw G1/4"/2,2	G1/4"/2,2	Starrag		1342124.3	Switch cabinet	.BA10
-HZ966	/15.8					-HE954	Switch cabinet	.BA10
-A190	/16.1	Compressor cooling unit	FD16	Atlas Copco		1700001.3	Right-hand column Pneum.	BA10
-PE000	/16.1	Pneumatic unit	HX-151	Bosch		246511.4	Pneumatic unit	.BA10

Gezeichnet mit ELCAD IRI

c	Datum	30.05.2002	
b	Bearb.	Stefan Hanselmann	
a	Gepr.	Stefan Hanselmann	
Änderung	Datum	Name	Norm

BHEL, Hardwar, Indien	Starrag, Switzerland
Ersatz durch:	Ersatz für:
Ursprung:	

Parts list  
HX-151/15  
3. list of devices

GL-241/7585

HX51

7585

list of devices

Blatt 9  
Bl.

04.06.2002 9:14

Device	Page	Designation	Type designation	Manufacturer	lift t2	product number	Assembly site	Function
-PE001	/16.2	Filter-Pressure control valve	0 821 300 373	Bosch		1700580.3	Pneumatic unit	.BA10
-PZ009	/16.2	Silencer	G 1/2" 1 827 000 003	Bosch		1700985.3	Pneumatic unit	.BA10
-Y361	/16.2	3/2 Path -Stop valve	0 821 300 932	Bosch	24V	1711387.3	Pneumatic unit	.BA10
-PF013	/16.3					-PE001	Pneumatic unit	.BA10
-PV016	/16.3					-PE001	Pneumatic unit	.BA10
-PV303	/16.3	Pressure control valve NL2	0 821 302 408	Bosch		1711011.3	Pneumatic unit	.BB30
-PZ017	/16.3					-PE001	Pneumatic unit	.BA10
-PF011	/16.4	Filter with water separator	0 821 303 509	Bosch		1700641.3	Pneumatic unit	.BA10
-PV307	/16.4	Pressure control valve NL2	0 821 302 411	Bosch		1711012.3	Pneumatic unit	.BB30
-PF012	/16.5	Microfilter for automatic water separator	0 821 303 536	Bosch		1700666.3	Pneumatic unit	.BA10
-PV305	/16.5	One-way restrictor	0 821 200 005	Bosch		1711553.3	Pneumatic unit	.BA10
-PV339	/16.5	Pressure control valve+Pressure gauge	0 821 302 404	Bosch		1711036.3	Pneumatic unit	.BA10
-PZ004	/16.5	Differential pressure-Pressure gauge	1 827 231 058	Bosch		1711121.3	Pneumatic unit	.BA10
-S360	/16.5	P/E transducer	0 821 100 011	Bosch		4213171.3	Pneumatic unit	.BA10
-PE000	/17.1	Pneumatic unit	HX-151	Bosch		246511.4	Pneumatic unit	.BB30
-PV346	/17.1	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Pneumatic unit	.BB30
-PV347	/17.1	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Pneumatic unit	.BB30
-PA300	/17.3	double-action cylinder	6801-DSW40-910-PPV-A-B	Festo		9001088.3	Workpiece changer	.BM10
-PA300	/17.3	Proximity switch	Smeo-1-S-Led-24-B,3draht	Festo	12-27V	4208003.3	Workpiece changer	.BM10

copyright (c) by STARRAG

Gezeichnet mit E/CAD TRI				Datum: 30.05.2002	BHEL, Hardwar, Indien	Starrag, Switzerland	Parts list HX-151/15	GL-241/7585	HW51
				Bearb: Stefan Hanselmann			3. list of devices	7585	list of devices
				Gepr: Stefan Hanselmann					Blatt 10
Änderung				Datum:	Name:	Norm:	Ersatz durch:	Ersatz für:	Ursprung:
									Bl.



04.06.2002 9:14

Device	Page	Designation	Type designation	Manufacturer	lift t2	product number	Assembly site	Function
-PV614	/19.1	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Workpiece changer	.BM10
-PV639	/19.1	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Workpiece changer	.BM10
-PV601	/19.2	One-way restrictor	0 821 200 180	Bosch		1711506.3	Workpiece changer	.BM10
-Y930.14	/19.2	5/3 Directional control valve	0 820 027 102	Bosch		1710237.3	Workpiece changer	.BM10
-PA619	/19.3	Short-stroke cylinder	0 822 010 671	Bosch		1701596.3	Workpiece changer	.BM10
-PV603	/19.3	One-way restrictor	0 821 200 180	Bosch		1711506.3	Workpiece changer	.BM10
-PV570	/19.4	One-way restrictor	0 821 200 180	Bosch		1711506.3	Workpiece changer	.BM10
-Y940.14	/19.4	5/3-Directional control valve	0 820 027 110	Bosch	24V	1710236.3	Workpiece changer	.BM10
-PA620	/19.5	Short-stroke cylinder	0 822 010 671	Bosch		1701596.3	Workpiece changer	.BM10
-PV604	/19.5	One-way restrictor	0 821 200 180	Bosch		1711506.3	Workpiece changer	.BM10
-PV692	/20.1	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Workpiece magazine	.BM20
-PV693	/20.1	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Workpiece magazine	.BM20
-PV682	/20.2	One-way restrictor	0 821 200 184	Bosch		1711509.3	Workpiece magazine	.BM20
-Y990.14	/20.2	5/3 Directional control valve	0 820 027 102	Bosch		1710237.3	Workpiece magazine	.BM20
-PA681	/20.3	double-action cylinder	0 822 354 0/Hub 220	Bosch		1701889.3	Workpiece magazine	.BM20
-PV683	/20.3	One-way restrictor	0 821 200 184	Bosch		1711509.3	Workpiece magazine	.BM20
-PV695	/20.3	Resettable check valve	0 821 003 026	Bosch		1711307.3	Workpiece magazine	.BM20
-PA687	/20.4	Short-stroke cylinder	0 822 010 674	Bosch		1701597.3	Workpiece magazine	.BM20
-PV686	/20.4	One-way restrictor	0 821 200 180	Bosch		1711506.3	Workpiece magazine	.BM20

Gezeichnet mit E/CAD (R)

c		Datum		30.05.2002		BHEL, Hardwar, Indien		Starrag, Switzerland		Parts list		GL-241/7585		aHX51	
b		Bearb.		Stefan Hanselmann						HX-151/15					
a		Gepr.		Stefan Hanselmann						3. list of devices		7585		list of devices	
Änderung		Datum		Name		Norm		Ersatz durch		Ersatz für		Ursprung		Blatt 12	
														Bl.	

copyright (c) by STARRAG

