ANNEXURE 'A'

Scope for Reconditioning of Starrag make HX-151; Plan No. 3-016,NBS, Bl-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 :+/-90^0**

Sl. No	Description	Quantity	Accepted (Yes/No)	Deviation	Remarks
1.	**MATERIAL SUPPLY INCLUDING SCOPE OF WORK**				
1.1	**Mechanical Work**				
1.1.1	**LM GUIDE WAYS & LM SHOES (LINEAR RECIRCULATING BEARINGS)**				
1.1.1.1	**X axis**: The existing LM Guide ways are INA make TSX 45 (1 Pair) of 1875 mm length &LM shoes are INA make RUE 45 (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			Bidder to provide details & comply
1.1.1.2	**Y axis**: 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			Bidder to provide details & comply

	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.				
1.1.1.3	**Z axis**: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			Bidder to provide details & comply
1.1.1.4	**TAILSTOCK movement:** 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			Bidder to provide details & comply
1.1.1.5	**Automatic Tool Changer (ATC) TGX axis:** 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			Bidder to provide details & comply
1.1.2	**LINEAR AXES BALL SCREWS & NUTS**				
1.1.2.1	**X axis**: 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			Bidder to provide details & comply
1.1.2.2	**Y axis**: The existing ball screw and nut is of 40 mm diameter X 12 mm pitch, overall length: 750 mm **(NSK REF NO**: W4006G-73Z-C5Z12) 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			Bidder to provide details & comply

1.1.2.3	**Z axis**: 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			Bidder to provide details & comply
1.1.2.4	**Automatic Tool Changer (ATC) TGX axis:** 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			Bidder to provide details & comply
1.1.3	**END SUPPORT BEARINGS OF BALL SCREW**				
1.1.3.1	**X axis**- 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			Bidder to provide details & comply
1.1.3.2	**Y axis**- 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			Bidder to provide details & comply
1.1.3.3	**Z axis**- 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			Bidder to provide details & comply
1.1.4	Items required for installation for the ball screw &nut including flanges, chuck-nut, motor coupling etc. are to be included in the	1 Set			Bidder to provide details & comply

	scope of supply as per requirement. The indicative dimension & details of existing motor couplings are: • **X axis**: KM170 D1=24 D2=25 • **Y axis**: KM170 D1=24 D2=25 • **Z axis**:KM170 D1=24 D2=25				
1.1.5	Scrapping of axes guide ways to be done if required. Thereafter Bidder is required to **restore geometrical accuracies** of all the axes as per original test charts of machine which will be provided after placement of the order.				Bidder to comply
1.1.6	Bidder to supply and install bellow/telescopic covers for X, Z & Tailstock movement of same or reputed make to ensure no ingress of coolant, hydraulic oil, chips, foreign particles etc. The indicative dimension & details of existing telescopic covers are: • **X axis**: Supplier: **Hamuel** Designation of Left shutter: 9001042.3 Designation of Right shutter: 9001043.3 • **Z axis**: Combined Sheet metal and expansion bellow covering **(**Left: 238046.4, Right: 238047.4) • **Tailstock movement**: Supplier: **Hamuel** Designation of Left shutter: 9001059.3 Designation of Right shutter: 9001070.3 Bidder must take approval of BHEL prior to finalizing the bellow/ telescopic covers in case other reputed makes are proposed by the Bidder.	01 Set			Bidder to provide details & comply
1.1.7	**B-AXIS**				

1.1.7.1	All bearings of **B-axis** 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- • YRT 180 180/280X43 INA -Qty-1 No. • N1028K.M.spezial 140/210x33 -Qty-1 No. • ZMVA 40/62- Qty-01 No. • NK190/26 - Qty-01 No. • ZKLF60145.2Z- Qty-01 No. • ZMVA 60/98- Qty-01 No. The accuracy grade of the supplied bearing should be of same grade or better than existing in machine.	1 Set			Bidder to provide details & comply
1.1.7.2	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			Bidder to provide details & comply
1.1.8	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			Bidder to comply
1.2	**Hydraulic system**				
1.2.1	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.				Bidder to provide details & comply
1.2.2	All the flexible hoses of the hydraulic system have to be replaced with new hoses of same or higher capacity.				Bidder to provide details & comply
1.2.3	Counterbalance piston-cylinder of Z-axis has to be replaced with new one of equivalent capacity of Rexroth/Vickers/ Parker/Hydac	1 Set			Bidder to provide details & comply

	make only as existing in the machine.				
1.2.4	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			Bidder to provide details & comply
1.2.5	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.				Bidder to comply
1.2.6	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			Bidder to provide details & comply
1.2.7	Hydraulic circuit diagram is attached for reference and all relevant details regarding the same are available. **(Annexure-2)**				Bidder to note
1.3	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: **Tailstock:** 190x60 mm cross section & Approx. 1200 mm length fully enclosed to provide protection from chips etc. **Tool changer:**120x55 mm cross section & Approx. 1200 mm length fully enclosed to provide protection from chips etc.	1 Set			Bidder to provide details & comply
1.4	**Lubrication system**				
1.4.1	Automatic lubrication system (Grease) of the whole machine has				Bidder to comply

	to be retained and the whole system has to be overhauled and cleaned to ensure proper functioning.				
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			Bidder to provide details & comply
1.4.3	In case any additional piping is required, it should be included in the scope of supply.				Bidder to comply
1.4.4	Lubrication circuit diagram is attached for reference and all relevant details regarding the same are available **(Annexure-2)**				Bidder to note
1.5	**Coolant system**				
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			Bidder to provide details & comply
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.				Bidder to provide details & comply
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.				Bidder to provide details & comply
1.5.4	Coolant system diagram is attached for reference and all relevant details regarding the same are available.**(Annexure-2)**				Bidder to note
1.6	**Mist extractor system** 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 also have a separate collection system for the same.	1 set			Bidder to provide details & comply

	Existing system is Mist extractor, AFS1100.				
1.7	**Pneumatic system**				
1.7.1	Pneumatic scheme of the whole machine has to be retained and the whole system has to be overhauled and cleaned to ensure proper functioning.				Bidder to comply
1.7.2	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			Bidder to provide details & comply
1.7.3	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			Bidder to provide details & comply
1.7.4	Pneumatic system diagram is attached for reference and all relevant details regarding the same are available.**(Annexure-2)**				Bidder to note
1.8	Machine vision rotating glass spin window (Rotoclear)for clear view during production process is to be replaced with new one operating on 24V DCof Rotoclear/Visiport make and the same should be included in the offer. **Details of existing system are as below:** ROTOCLEAR S, AUTZ + HERRMANN, D-69115 Heidelberg TYPE:P1620 600 24V (16-28V) 0.66 A Anlaufstrom 5A 2300 U/min	2 No.			Bidder to provide details & comply
1.9	Metal tagging of all the hydraulic, lubrication, pneumatic & coolant line, valves and other components etc. are to be done as per the original scheme of machine.				Bidder to comply
1.10	**POSITIONING AND REPEATABILITY OF AXES**				
1.10.1	Positioning and repeatability of axes shall be measured by using				Bidder to comply

	Laser interferometer and shall be demonstrated within the tolerance as per the original test chart.				
1.10.2	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.				Bidder to comply
2.	**COMMISSIONING:**				
2.1.	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.				Bidder to comply
2.2	Existing machine logic and technological processes have to be retained.				Bidder to comply
3	**FINAL ACCEPTANCE:**				
3.1	Final Acceptance shall be at HEEP, BHEL, Haridwar after: a) Upon completion of the scope of supply and scope of work at BHEL. b) Final acceptance shall include clearance of all pending issues related to the work contract. c) Geometrical accuracy verification as per original test charts. d) Successful machining of presently being machined components as mentioned below: **i. LG5R, 39K; Drawing No. 01074739005 (Qty-5 Nos)** **ii. LM4L,41K; Drawing No. 01030741001 (Qty-5 Nos)** **iii. The raw material, tooling, fixture and part programs for machining of the blades will be provided by BHEL.** e) The prove-out blades as mentioned at d) i & ii above will				Bidder to comply

	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. 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.				
4.0	**DELIVERY :(IF DELIVERY PERIOD IS NOT OFFERED/ACCEPTABLE, OFFER WILL BE REJECTED**				Bidder to comply
4.1	i) Material: 6 months from the date of completion of activity at Sr. no. ii) below. 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. iii) Work: 16 weeks from date of release of machine for work. The delivery period of work for the purpose 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. iv) Bidder to note that early delivery shall be acceptable. Bidder should take BHEL approval before invoking this clause.				Bidder to comply
5	**DOCUMENTATION :** 3 sets of all the below mentioned hard copy documentation along with one set of soft copy on 1TB hard				Bidder to comply

	disk to be provided				
5.1	Complete list of bill of materials indicating make/ manufacturer.				Bidder to comply
5.2	Hydraulic circuit diagram having list of components with make and designation				Bidder to comply
5.3	Lubrication circuit diagram having list of components with make and designation				Bidder to comply
5.4	Pneumatic circuit diagram having list of components with make and designation				Bidder to comply
5.5	Coolant circuit diagram having list of components with make and designation				Bidder to comply
5.6	Ball screw with nut drawings & details of all the axis				Bidder to comply
5.7	Linear guide & bearing drawings & details of all the axis				Bidder to comply
5.8	Assembly diagram of the ball screw to motor of all the axes having list of components with make and designation				Bidder to comply
5.9	List of bearings				Bidder to comply
5.10	Complete drawings & details of the any modification or new system made in the machine.				Bidder to comply
6	**SPARES: (TO BE COMPULSORILY QUOTED OTHERWISE OFFER WILL BE REJECTED) :**				
	Party shall compulsorily quote following spare parts:				
6.1	Couplings/belt/pulley as used on the machine	1 No. each type			Bidder to comply
6.2	Hydraulic filters and Counterbalance piston-cylinder of Z-axis (Along with 3 set of seals)as used on the machine	1 No. each type			Bidder to comply
6.3	Central lubrication pump (1 No.), distributors (4 Nos.) as used on the machine.	1 Set			Bidder to comply
6.4	Central lubrication cartridges as used on the machine.	10 No. each type			Bidder to comply
6.5	Coolant nozzles and filters used on the machine.	2 No. each			Bidder to comply

		type			
6.6	Complete set of mist extractor system filters and exhaust pipe as used on the machine.	1 Set			Bidder to comply
6.7	Pneumatic filters, distributors, gauges & dial as used on the machine.	1 No. each type			Bidder to comply
6.8	Pneumatic pipe connectors/jointer as used on the machine.	10 No. each type			Bidder to comply
6.9	Machine vision rotating glass spin window (Rotoclear) system as used on the machine.	1 No.			Bidder to comply
7	**WARRANTY:**				
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.				Bidder to comply
8	**TRAINING:**				
8.1	Party shall impart training for to BHEL staff, for operation & maintenance of the system supplied by them during installation & commissioning.				Bidder to comply
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.				Bidder to comply
9	**BIDDER'S OBLIGATION:**				
	The Bidder shall bring all tools, tackles and testing equipment with them for successful commissioning of supplied system.				Bidder to comply
10	**QUALIFYING CONDITIONS**				

10.1	Average Annual financial turnover during the last 3 years, ending 31st March 2015, should be **at least Rs.27.19 lakhs**. Bidder should submit Audited balance sheets for the last three years.				Bidder to provide details & comply
10.2	The Bidder must have successfully reconditioned/ commissioned CNC machines with minimum 3 CNC axes during last seven years ending on 28 June 2016 and should be either of the following: a. Three projects of machines reconditioned with each project costing not less than Rs.36.25 lakhs (exclusive of taxes & duties). or b. Two projects of machines reconditioned with each project costing not less than Rs.45.32 lakhs(exclusive of taxes & duties). or c. One projects of machines reconditioned with each project costing not less than Rs.72.50 lakhs(exclusive of taxes & duties). Or d. The OEM of the machine M/S STARRAG will be considered as automatically qualified subject to compliance of clause no 10.1 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 &c above. The above reconditioned machines should be running satisfactorily for at least 6 months prior to 28 June 2016. 6 months period will be calculated on the basis of commissioning certificates/relevant MOMs provided. Bidder to provide P.O. / W.O copies and commissioning/ 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.				Bidder to provide details & comply

11	**LATE DELIVERY PENALTY (LD) CLAUSE:-**				
11.1	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				Bidder to comply
11.2	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.	`			Bidder to comply
12	**PRE-DISPATCH INSPECTION**				
12.1	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.				Bidder to comply
12.2	Supplier shall invite BHEL for carrying out pre- inspection.				Bidder to comply
12.3	Deputed BHEL persons shall do pre acceptance of material under scope of supply at Bidder works and give dispatch clearance.				Bidder to comply
12.4	Expenses of Boarding and lodging of BHEL personnel during PDI shall be borne by BHEL.				Bidder to note
13	**SUBMISSION OF BILL OF MATERIAL (BOM)**				
	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.				Bidder to comply

14	**EARNEST MONEY DEPOSIT (EMD):**				Bidder to comply
14.1	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.				Bidder to comply
14.2	EMD shall be converted to Security deposit if the work is awarded.				Bidder to comply
14.3	EMD of unsuccessful bidders shall be refunded back normally within fifteen days of acceptance of award of work by the successful tenderer.				Bidder to comply
14.4	EMD shall not carry any interest.				Bidder to comply
14.5	EMD by tenderer will be forfeited as per tender documents if:				Bidder to comply
14.5.1	After opening the tender, the tenderer revokes his tender within the validity period or increases his earlier quoted rates.				Bidder to comply
14.5.2	The tenderer does not commence the work within the period as per LOI/contract.				Bidder to comply
14.6	**Offers without EMD will be rejected and will not be considered for evaluation. However "MSE suppliers 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 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 the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price**				Bidder to comply

	bid opening. If the tender is to be submitted through e procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer."				
15	**SECURITY DEPOSIT (SD):-**				
15.1	Successful Bidder shall deposit security. The rate of security deposit will be as below:				Bidder to comply
	For work Up to Rs.10 Lakhs : 10% of work order value				Bidder to comply
	Above Rs.10 Lakhs up toRs.50 Lakhs :Rs.1 Lakh + 7.5% amount exceeding Rs.10 Lakhs				Bidder to comply
	Above Rs.50 Lakhs: Rs.4 Lakhs + 5% amount exceeding Rs.50 Lakhs				Bidder to comply
15.2	The security deposit should be submitted before the start of work in the following forms:				Bidder to comply
	i) Cash (As permissible under the Income Tax Act)				Bidder to comply
	ii) Pay Order, Demand Draft in favour of HEEP, BHEL, Haridwar.				Bidder to comply
	iii) Local cheques of Scheduled Banks, subject to realization.				Bidder to comply
	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.				Bidder to comply
15.3	EMD of successful tenderer can be converted and adjusted against the Security Deposit.				Bidder to comply
15.4	Security Deposit shall not carry any interest.				Bidder to comply
15.5	**100% of the Security Deposit** amount shall be refunded to the Bidder after final acceptance of work. **SD shall be released after the submission of Performance Bank Guarantee(PBG) by the Bidder.**				Bidder to comply

16	**Performance Bank Guarantee (PBG):**				
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.				Bidder to comply
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.				Bidder to comply
17	**PAYMENT TERMS:** **(Note: No advance payment shall be made to the Bidder.)**				
17.1	Part payment will be made after completion of following milestones				Bidder to comply
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.				Bidder to comply
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 PBG as per "Para 16".				Bidder to comply
17.2	All the payments shall be made through e-payment after submission of following documents along with first bill				Bidder to comply
17.2.1	E-payment form duly filled (Form will be provided by BHEL)				Bidder to comply
17.2.2	Income tax exemption letter(if applicable)				Bidder to comply
17.3	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.				Bidder to comply

17.4	Timely submission of CENVATABLE invoices along with necessary documents to enable availment of CENVAT (Excise duty, Service Tax & VAT) credit by BHEL. **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.**				Bidder to comply
17.5	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.				Bidder to comply
18	**Risk Purchase Clause** : 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 and subsequently declines to honour the term in the eventuality of RISK PURCHASE, they may be banned for business with BHEL.				Bidder to comply
19	**GENERAL CONDITIONS:**				Bidder to comply
19.1	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-				Bidder to comply

	qualification of the offer.				
19.2	The Bidder is advised to inspect the machine prior to quoting ascertain all the relevant details required for successful completion of the work.				Bidder to comply
19.3	The proposed mechanical schematic & Bill of material for the machine shall be provided by the Bidder prior to pre dispatch inspection.				Bidder to comply
19.4	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.				Bidder to comply
19.5	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.				Bidder to comply
19.6	Bidder must quote the Spare parts separately in the offer otherwise the offer will be rejected.				Bidder to comply
19.7	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				Bidder to comply
19.8	**The award of works will be made on basis of the total of Material cost , Spare Parts cost, Commissioning charges and all taxes, duties as applicable (Cost to BHEL)**				Informationto Bidder
19.9	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.				Information to Bidder
19.10	Check List as per Annexure 'C' must be enclosed with techno-commercial bid				Bidder to comply
19.11	The risk of delay/loss in transmission by post/courier rest with the bidder.				Bidder to comply
19.12	Conditional tender is likely to be rejected.				Bidder to comply

19.13	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.				Bidder to comply
19.14	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				Bidder to comply
19.15	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.				Bidder to comply
19.16	**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 & ascertain all the relevant details required for successful completion of work.**				Bidder to comply
20	**BHEL'S OBLIGATION/ FACILITIES:**				
20.1	Existing mechanical & electrical schematic of the machine shall be provided by BHEL to the Bidder.				Bidder to comply
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.				Bidder to comply
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.				Bidder to comply
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				Bidder to comply

	pneumatic/electrical drill machines, grinders, scraping tools along with the general purpose measuring instruments, straight edges etc.				
21	**OFFER :-** The offer should be submitted in two parts and in following manner.				
21.1	**Techno-commercial Bid** :				
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) , **Tender fees, EMD** and Check List as per **ANNEXURE 'C'.**				Bidder to comply
21.1.2	The envelop shall be super scribed with "Techno-Commercial Bid", Name of work & NIT No.				Bidder to comply
21.1.3	Point-wise compliance of this scope of supply and work is to be 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.				Bidder to comply
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.				Information to Bidder
21.2	**Price Bid :**				
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**ANNEXURE 'B'**.				Bidder to comply
21.2.2	Any other information in the price bid shall not be considered and				Bidder to comply

	the quotation is likely to be rejected. Price bid document shall be signed by the bidder at the bottom of the page.				
21.2.3	The envelope shall be sealed and super scribed with "Price Bid", Name of work & NIT No.				Bidder to comply
21.2.4	Price bids of techno commercially accepted Bidders shall be opened.				Bidder to comply
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 **Tender Box kept in the Tender room of Purchase department at the 4th floor of the Main Administrative Building of BHEL,HEEP,HARIDWAR** and it should also contain the Bidder's address.				Bidder to comply
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.				Information to Bidder
22	**Commercial Terms:**				
22.1	Prices shall be quoted on "Firm Price" basis only. **The prices should be on F.O.R BHEL, Haridwar basis inclusive of Packing & Forwarding, transit insurance & Transportation charges.** Applicable % of ED & Sales Tax, Installation/ Commissioning Charges & Service Tax should be clearly indicated in attached Price bid format as per "**Annexure B**"				Bidder to comply
22.2	Validity of offer shall be for a minimum period of 120 days from the date of Tender Opening.				Bidder to comply
22.3	Freight & transit insurance charges from Dispatching station to BHEL, Haridwar shall be borne by the party.				Bidder to comply
22.4	The material will be dispatched to Central plant stores with instruction to forward the same to **Engineer (WEX/MM-NBS), HEEP, BHEL, Haridwar.**				Bidder to comply

23.	**Packing:**				
	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.				Bidder to comply

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.
	TOTAL COST (in Figures)							Rs.
	TOTAL COST (in Words) :							

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.

S. No.	Particulars	YES/NO	REMARKS
1.	**Sealed Techno-commercial Bid with Un-priced price bid** as per Annexure 'A' of NIT		
2.	**Sealed Price Bid** as per Annexure 'B' of NIT		
3.	**Compliance** to all the points of the Annexure 'A' of NIT		
4.	**Audited balance sheets** for the last three years should be submitted i.e, 2014-15, 2013-14, 2012-13 required as per Clause 10.1 of Annexure 'A' of NIT		
5.	**P.O. copies and Commissioning/ Performance certificates** required as per Clause 10.2 of Annexure 'A' of NIT		
6.	**Name, address & contact details of their customer** required as per Clause 10.2 of Annexure 'A' of NIT		
7.	**Tender Fee** enclosed		
8.	**Earnest Money Deposit (EMD)** 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 Charted 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

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

Gezeichnet mit ELCAD (R)

c				Datum	19.04.2002	BHEL, Hardwar, Indien	Starrag, Switzerland	Table of contents HX-151/15 1.Table of contents	IV-241/7585
b				Bearb.	Stefan Hanselmann				
a				Gepr.	Stefan Hanselmann				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	7585 Table of contents

=HX51
Blatt 1
Bl.

Hydraulic diagram/Pneumatic diagram

Compressed air supply	:	6bar (min. 5bar)
Regulations	:	DIN ISO 1291-1/-2
	:	

Customer	:	BHEL, Hardwar, Indien
Plant	:	7585
Diagram number	:	241/7585
Year of construction	:	2002
Administrator project	:	Stefan Hanselmann

functions according to catalogue of machines:

Function:	Contents:
.BA10	Basic machine
.BA50	Rotary station, Hydrostatic bearing
.BB10	Tailstock
.BB20	B-Axis
.BB30	Spindle STARRAG 15'000 1/min
.BB50	Tool magazine (30)
.BC10	Compressor cooling unit
.BC20	Coolant supply Vacuum rotary filter
.BC30	manual rinsing with scavenging pistolcentre
.BD30	Chip conveyor
.BF30	automatic tip pressure adjustment
.BF50	B-Axis / B-Axis clamp
.BG10	Rotary station
.BH49	Spindle Gamfior 15'000 1/min
.BH50	Spindle Gamfior 24'000 1/min
.BI09	Tool magazine (Servo motor)
.BI10	Tool magazine
.BI20	Heat exchanger
.BI29	Compressor cooling unit
.BI30	Coolant supply Paper tape filter
.BI40	Coolant supply Spindle Internal
.BK10	Workpiece changer-Gate
.BL50	Tool breakage monitoring
.BM10	Workpiece changer
.BM20	Workpiece magazine

designation : =AANN +AANN -ANNN

= Plant

= HX51 : HX-151

= HX52 : HX-152

= HX53 : HX-153

= NX54 : NX-154

= NF.. : NF-

= CF.. : CF-

= DF.. : DF-

= ZT80 : ZT-800

= ZT81 : ZT-800

= ZT84 : ZT-800

= ZT10 : ZT-1000

= ZT11 : ZT-1100

= ZT14 : ZT-1400

= ZS50 : ZS-500

+ Place

+ SS00-SS09 : Switch cabinet

+ SP00-SP09 : PAC cabinet

+ MA00-MA01 : Working area

+ MB00- : Swivel

+ MC00- : Machine rear

+ MD00- : Gear

+ ME00- : Compressor cooling unit

+ MF00- : Milling head

+ MG00-MG10 : Basic machine

+ MK00- : Knee

+ ML00-ML09 : Longitudinal

+ MN00- : Coolant unit

+ MP00- : Spindle

+ MR00-MR01 : Tailstock slide

+ MS00-MS08 : Machine column

+ MT00- : Main panel

+ MU00- : Machine end left

+ MV00-MV01 : Vertical slide

+ PA00-PA01 : Cover

+ PF00-PF09 : Chip conveyor

+ PH00- : Hydraulic unit

+ PK00-PK05 : Schimpke

+ Place

+ PP00- : Pneumatic unit

+ PR00- : Rotary table

+ PS00-PS10 : Workpiece changer

+ PT01-PT09 : Gate/Barrier

+ PV00- : Vacuum rotary filter

+ PW00-PW02 : Retooling station

+ PZ00-PZ13 : Tool magazine

- BMK

- 1.letters :

- H: Hydraulics

- P: Pneumatics

- 2.letters :

- P: Pump drive/compressors

- A: Drives

- M: Motors

- S: signal sensor

- V: Valves

- E: Unit

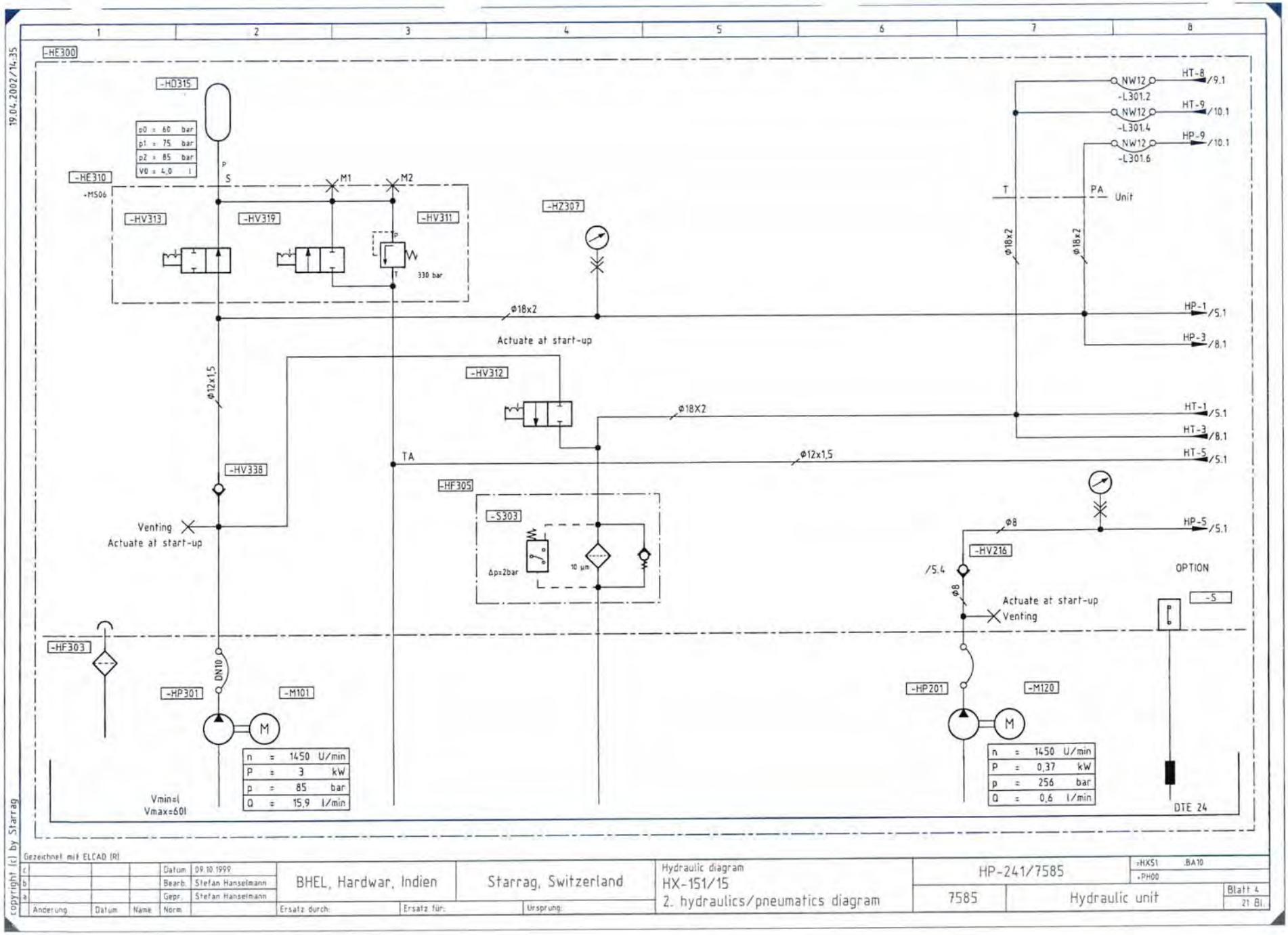
- D: Pressure accumulator

- F: Filter

- Z: every other component

Gezeichnet mit ELCAD (R)

c				Datum	15.01.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Hydraulic diagram HX-151/15 2. hydraulics/pneumatics diagram	HP-241/7585 =HX51
b				Bearb.	Stefan Hanselmann				*
a				Gepr.	Stefan Hanselmann				7585 Description
	Anderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	



19.04.2002/14.35

Gezeichnet mit ELCAD (R)

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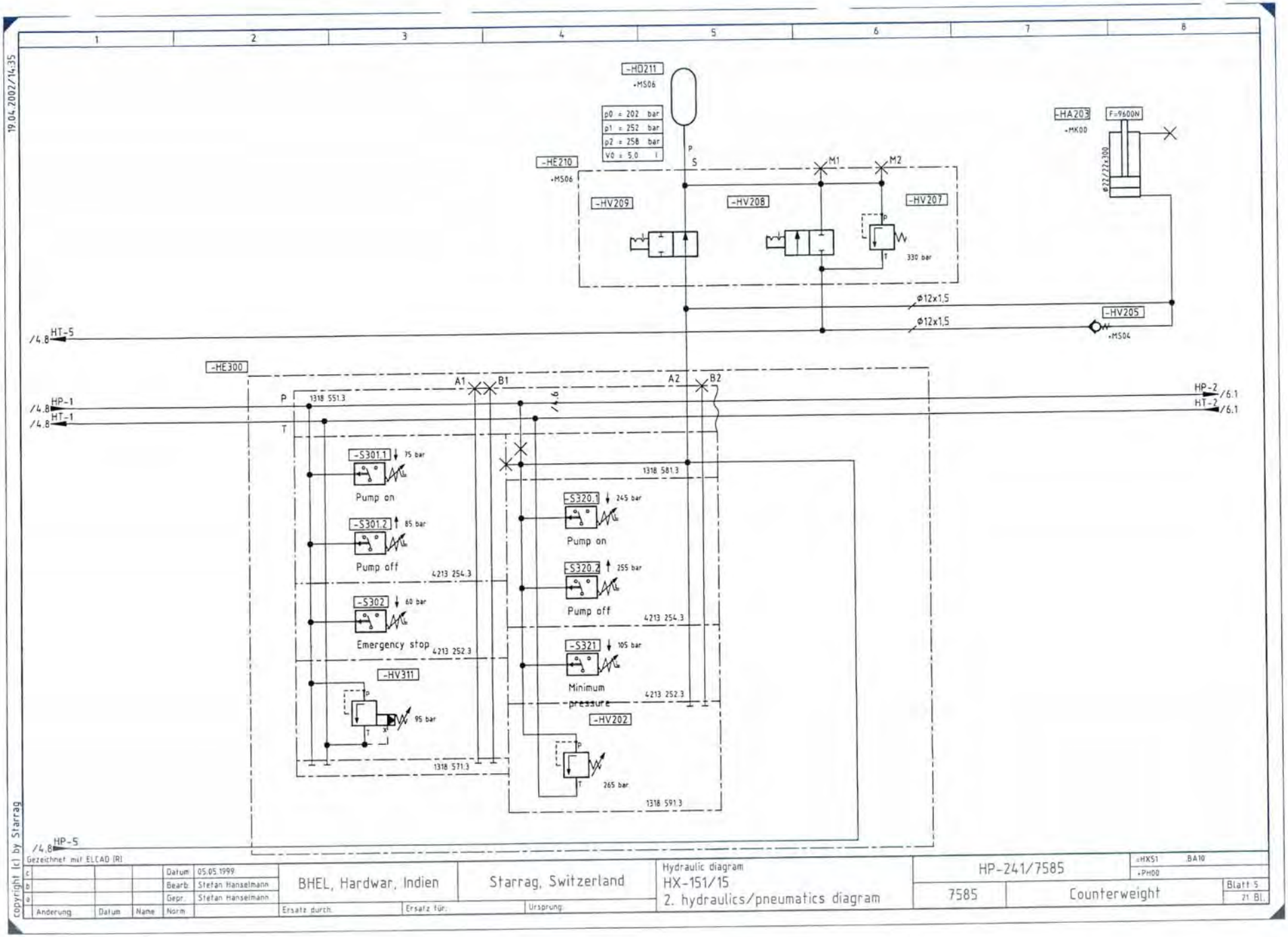
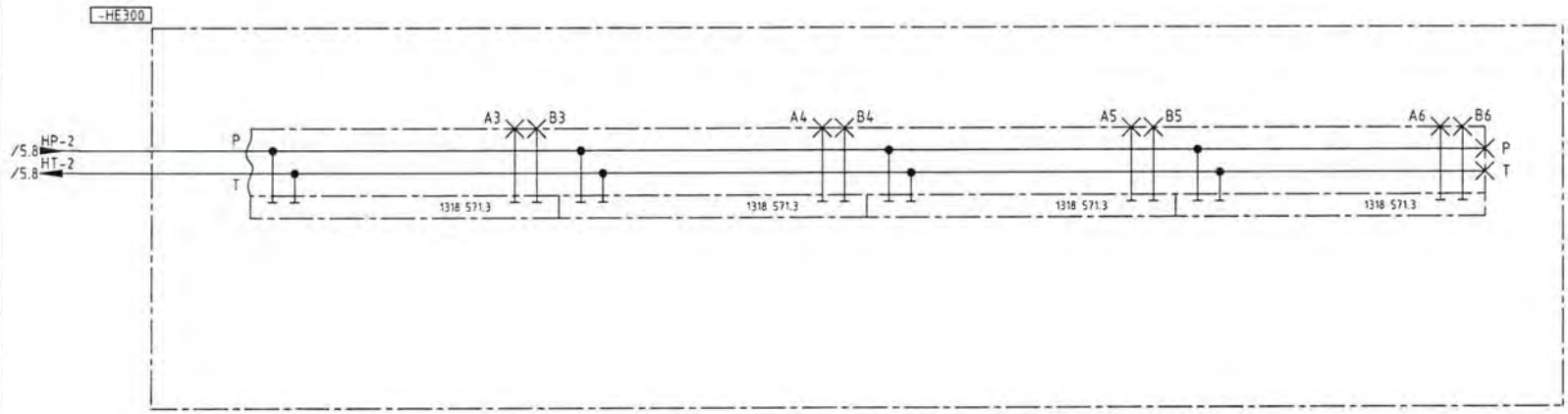
b				Bearb.	Stefan Hanselmann				
a				Gepr.	Stefan Hanselmann				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	7585 Hydraulic unit

=HX51 .BA10
+PH00

Blatt 4
21 Bl.


-HD211
+MS06
p0 = 202 bar
p1 = 252 bar
p2 = 258 bar
V0 = 5.0 l
-HE210
+MS06
P
S
M1
M2
-HV209
-HV208
-HV207
330 bar
-HA203
+MK00
F=9600N
ø22/12x300
ø12x1,5
ø12x1,5
-HV205
+MS04
/4.8 HT-5
-HE300
A1
B1
A2
B2
P
T
1318 551.3
/4.6
/4.8 HP-1
/4.8 HT-1
HP-2 /6.1
HT-2 /6.1
-S301.1 75 bar
Pump on
-S301.2 85 bar
Pump off
4213 254.3
-S302 60 bar
Emergency stop
4213 252.3
-HV311
95 bar
1318 571.3
1318 581.3
-S320.1 245 bar
Pump on
-S320.2 255 bar
Pump off
4213 254.3
-S321 105 bar
Minimum pressure
4213 252.3
-HV202
265 bar
1318 591.3
/4.8 HP-5
1 2 3 4 5 6 7 8
19.04.2002/14.35
copyright (c) by Starrag
Gezeichnet mit ELCAD (R)
Datum 05.05.1999
Bearb. Stefan Hanselmann
Gepr. Stefan Hanselmann
Norm
Änderung Datum Name
Ersatz durch:
Ersatz für:
Ursprung:
BHEL, Hardwar, Indien
Starrag, Switzerland
Hydraulic diagram
HX-151/15
2. hydraulics/pneumatics diagram
HP-241/7585
7585
Counterweight
=HX51 .BA10
+PH00
Blatt 5
21 Bl.



Gezeichnet mit ELCAD (R)

c				Datum	11.10.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Hydraulic diagram HX-151/15 2. hydraulics/pneumatics diagram	HP-241/7585
b				Bearb.	Stefan Hanselmann				
a				Gepr.	Stefan Hanselmann				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	7585 Hydraulic unit

=HX51 -BA10
+PH00

Blatt 6
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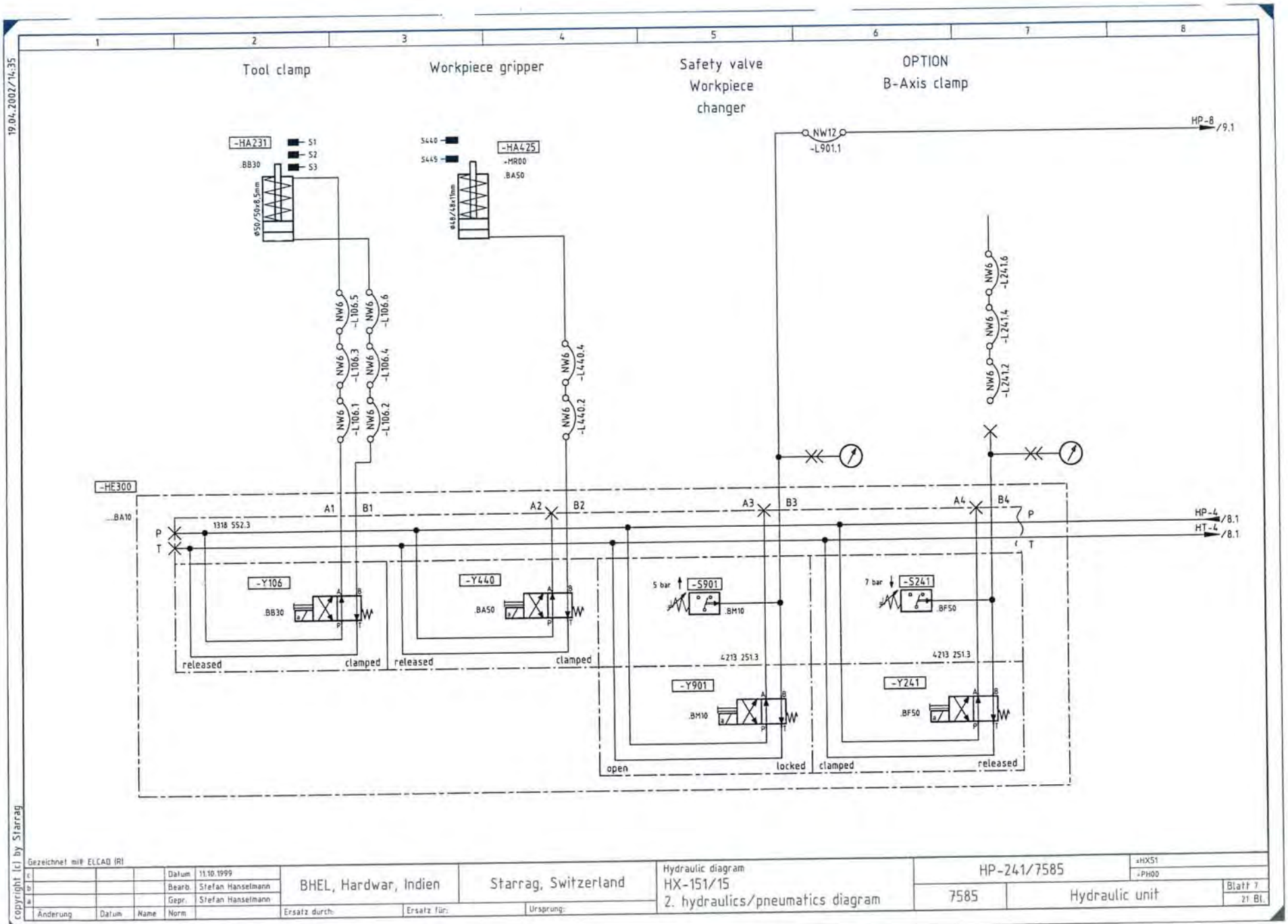

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b				Bearb.	Stefan Hanselmann				+HX51
a				Gepr.	Stefan Hanselmann				+PH00
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	7585 Hydraulic unit

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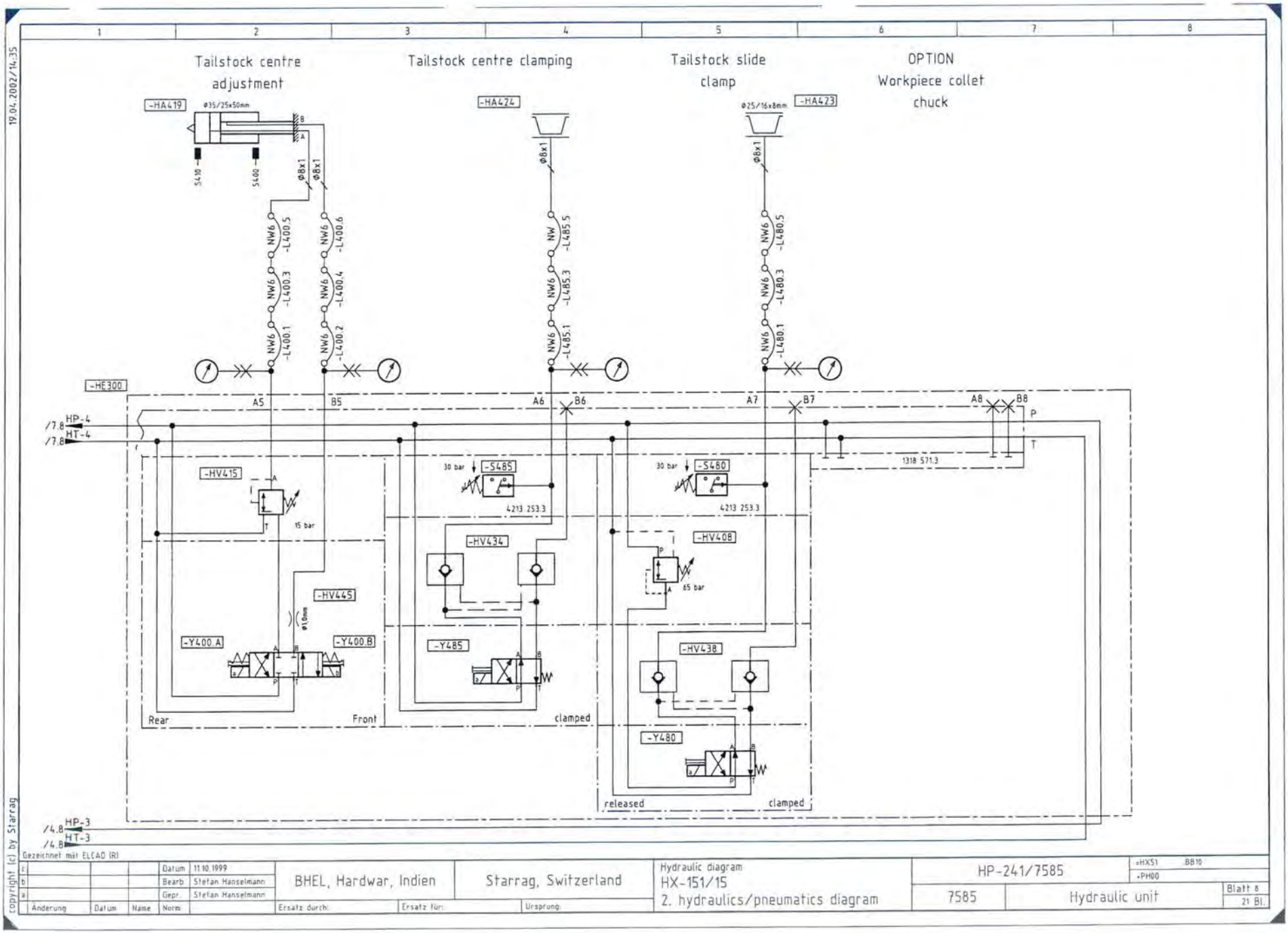
19.04.2002/14:35


Tailstock centre adjustment
Tailstock centre clamping
Tailstock slide clamp
OPTION Workpiece collet chuck
-HA419
-HA424
-HA423
-HE300
-HV415
-HV434
-HV445
-HV408
-HV438
-S485
-S480
-Y400.A
-Y400.B
-Y485
-Y480
HP-4
HT-4
HP-3
HT-3
15 bar
65 bar
30 bar
4213 253.3
1318 571.3
Rear
Front
clamped
released
Gezeichnet mit ELCAD (R)
BHEL, Hardwar, Indien
Starrag, Switzerland
Hydraulic diagram
HX-151/15
2. hydraulics/pneumatics diagram
HP-241/7585
7585
Hydraulic unit
Blatt 8
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19.04.2002/14:35
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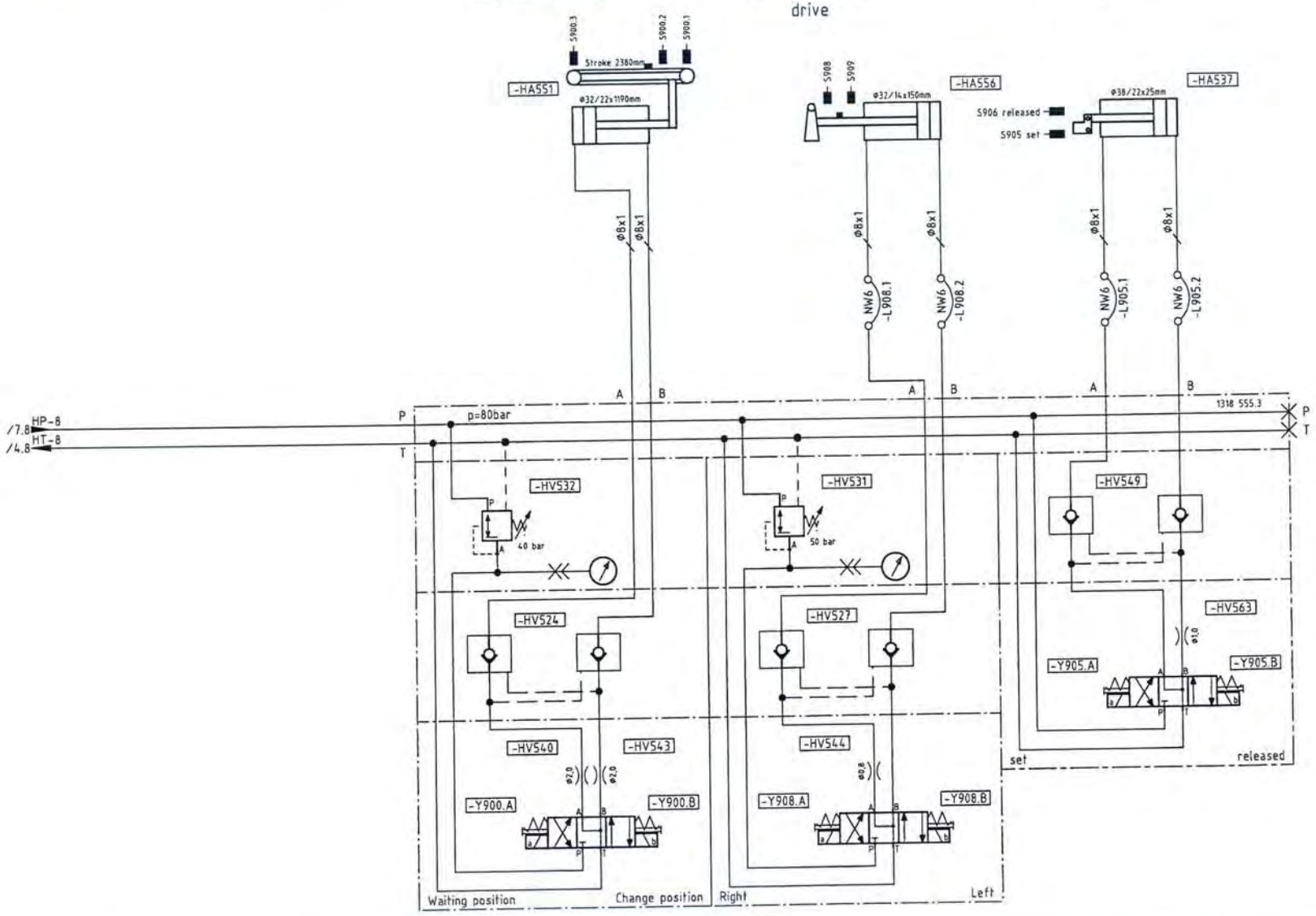


19.04.2002/14:35

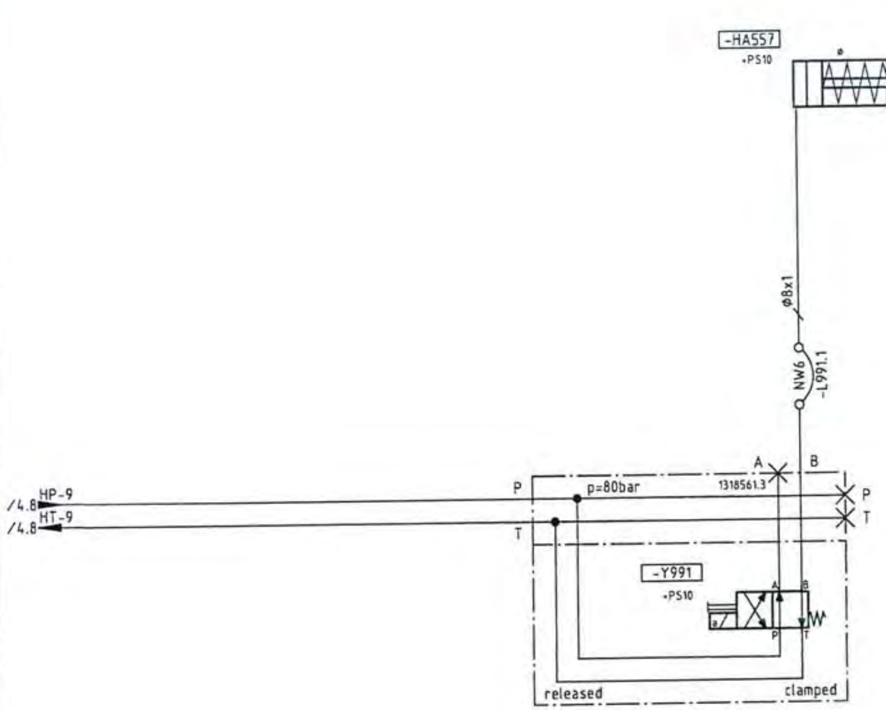
Gezeichnet mit ELCAD (R)

c				Datum	17.05.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Hydraulic diagram HX-151/15 2. hydraulics/pneumatics diagram
b				Bearb.	Stefan Hanselmann			
a				Gepr.	Stefan Hanselmann			
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:

HP-241/7585	+HX51	BM10	
	+PS00		
7585	Workpiece changer		Blatt 9 21 Bl.

1	2	3	4	5	6	7	8

Gripper C

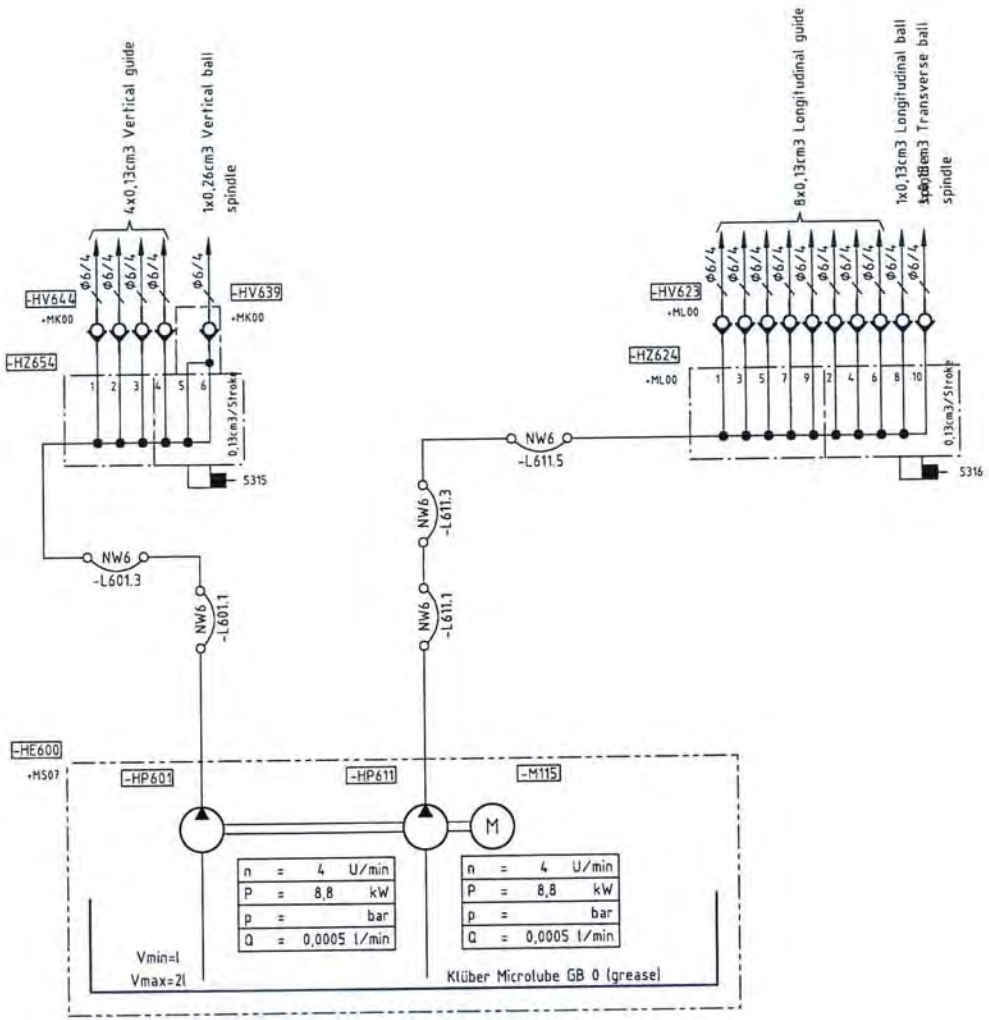


Gezeichnet mit ELCAD (R)

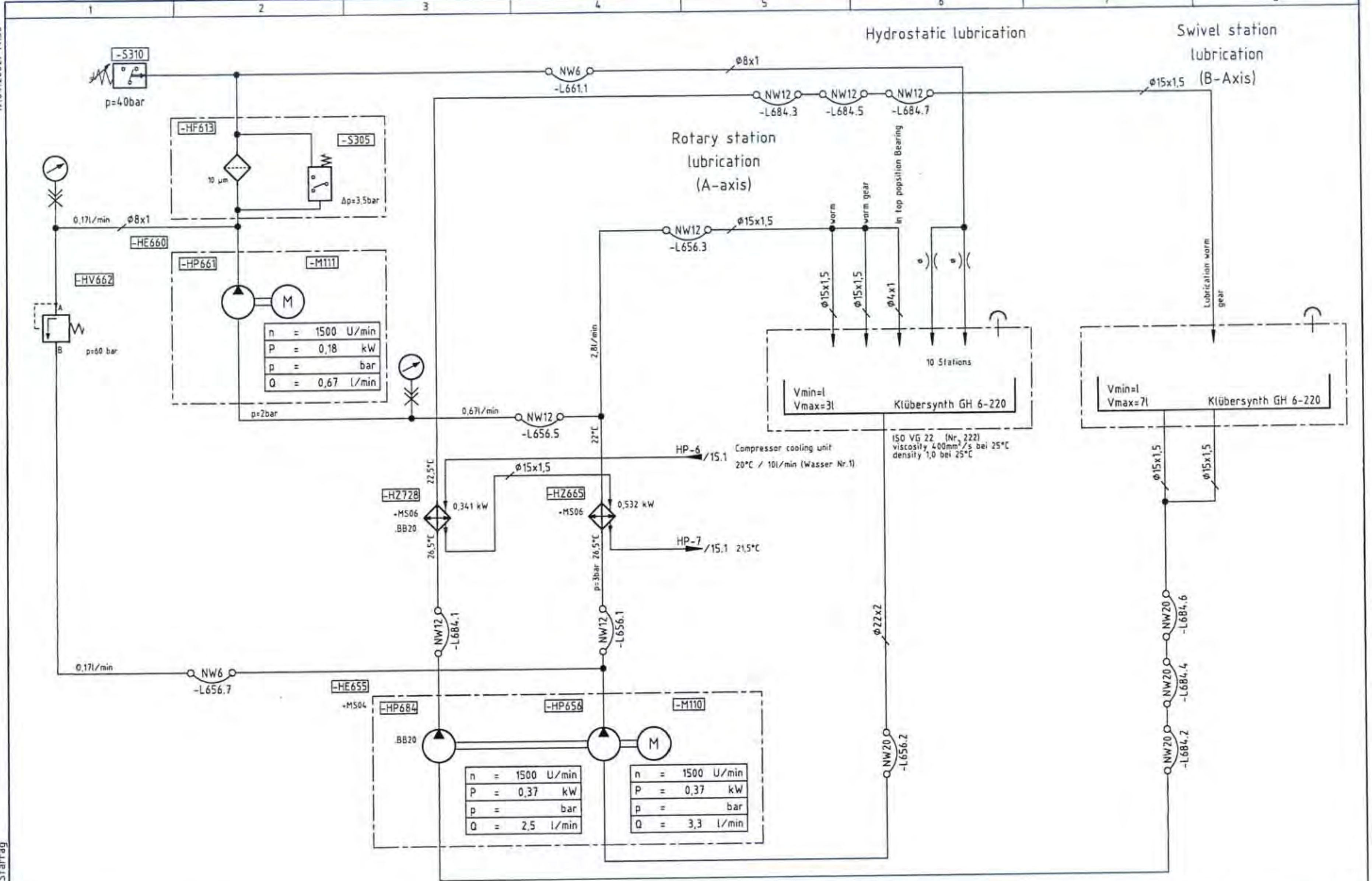
c			Datum	17.05.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Hydraulic diagram HX-151/15 2. hydraulics/pneumatics diagram
b			Bearb.	Stefan Hanselmann			
a			Gepr.	Stefan Hanselmann			
Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für: / Ursprung:	

HP-241/7585	=HXS1 BM10 .PS10	
7585	Workpiece magazine	Blatt 10 / 21 Bl.

Machine lubrication



Gezeichnet mit ELCAD (R)				Datum	18.05.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Hydraulic diagram HX-151/15 2. hydraulics/pneumatics diagram	HP-241/7585	+HX51 .BA10
c				Bearb.	Stefan Hanselmann					
b				Gepr.	Stefan Hanselmann				7585	Machine lubrication
a										Blatt 11 21 Bl.
	Anderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:		



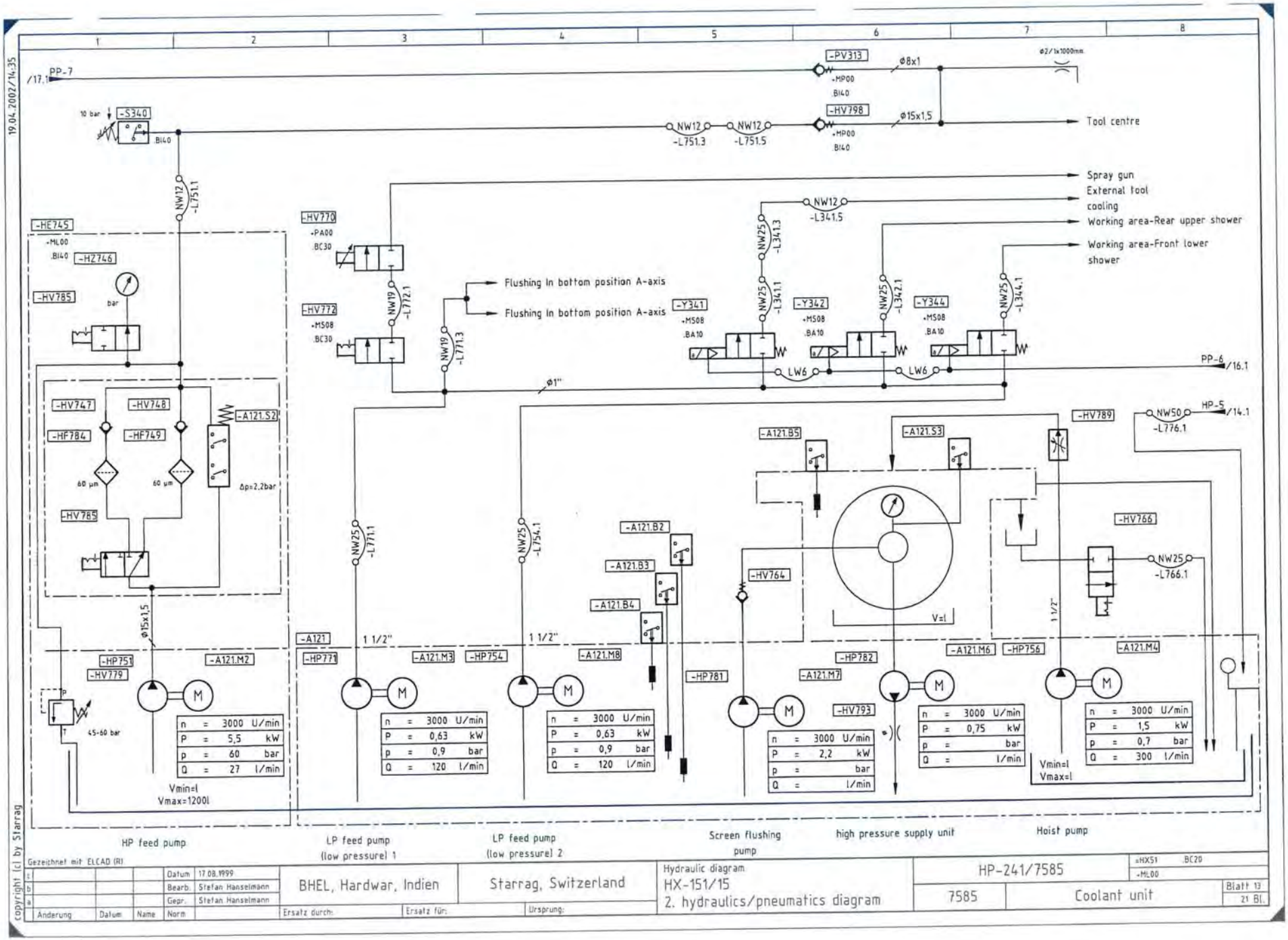
n	=	1500	U/min
P	=	0,18	kW
p	=		bar
Q	=	0,67	l/min

n	=	1500	U/min
P	=	0,37	kW
p	=		bar
Q	=	2,5	l/min

n	=	1500	U/min
P	=	0,37	kW
p	=		bar
Q	=	3,3	l/min

Gezeichnet mit ELCAD (R)

c			Datum	19.05.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Hydraulic diagram HX-151/15 2. hydraulics/pneumatics diagram	HP-241/7585	=HX51 .BA50 +MS04	
b			Bearb.	Stefan Hanselmann				7585	Once-through lubrication	Blatt 12
a			Gepr.	Stefan Hanselmann						21 Bl.
Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:			



19.04.2002/14.35

Gezeichnet mit ELCAD (R)

c				Datum	17.08.1999	BHEL, Hardwar, Indien	Starrag, Switzerland
b				Bearb.	Stefan Hanselmann		
a				Gepr.	Stefan Hanselmann		
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:

Ursprung:

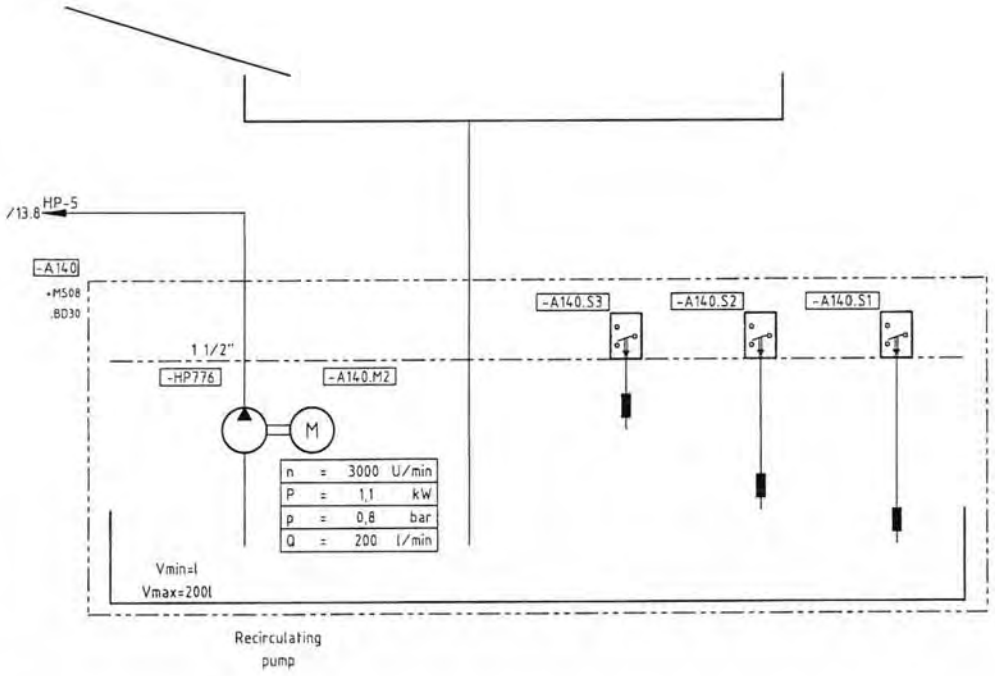
Hydraulic diagram
HX-151/15
2. hydraulics/pneumatics diagram

HP-241/7585

=HX51 .BC20
=ML00

7585 | Coolant unit

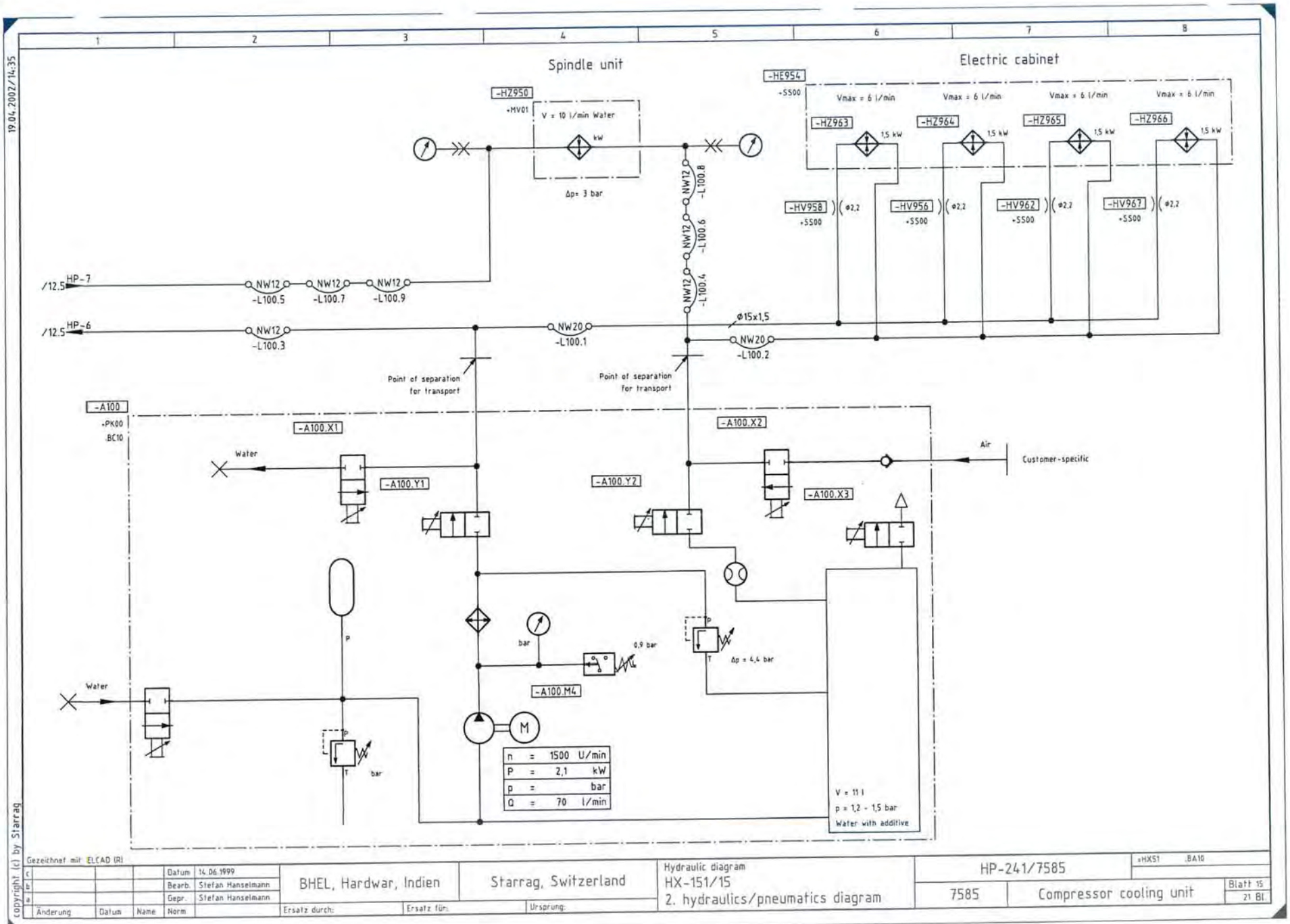
Blatt 13
21 Bl.



Gezeichnet mit ELCAD (R)

c				Datum	14.06.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Hydraulic diagram HX-151/15 2. hydraulics/pneumatics diagram	HP-241/7585
b				Bearb.	Stefan Hanselmann				=HXS1
a				Gepr.	Stefan Hanselmann				
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	7585 Chip conveyor

Blatt 14 21 Bl.



Gezeichnet mit: ELCAD (R)

Änderung	Datum	Name	Norm	Datum	14.06.1999
				Bearb.	Stefan Hanselmann
				Gepr.	Stefan Hanselmann

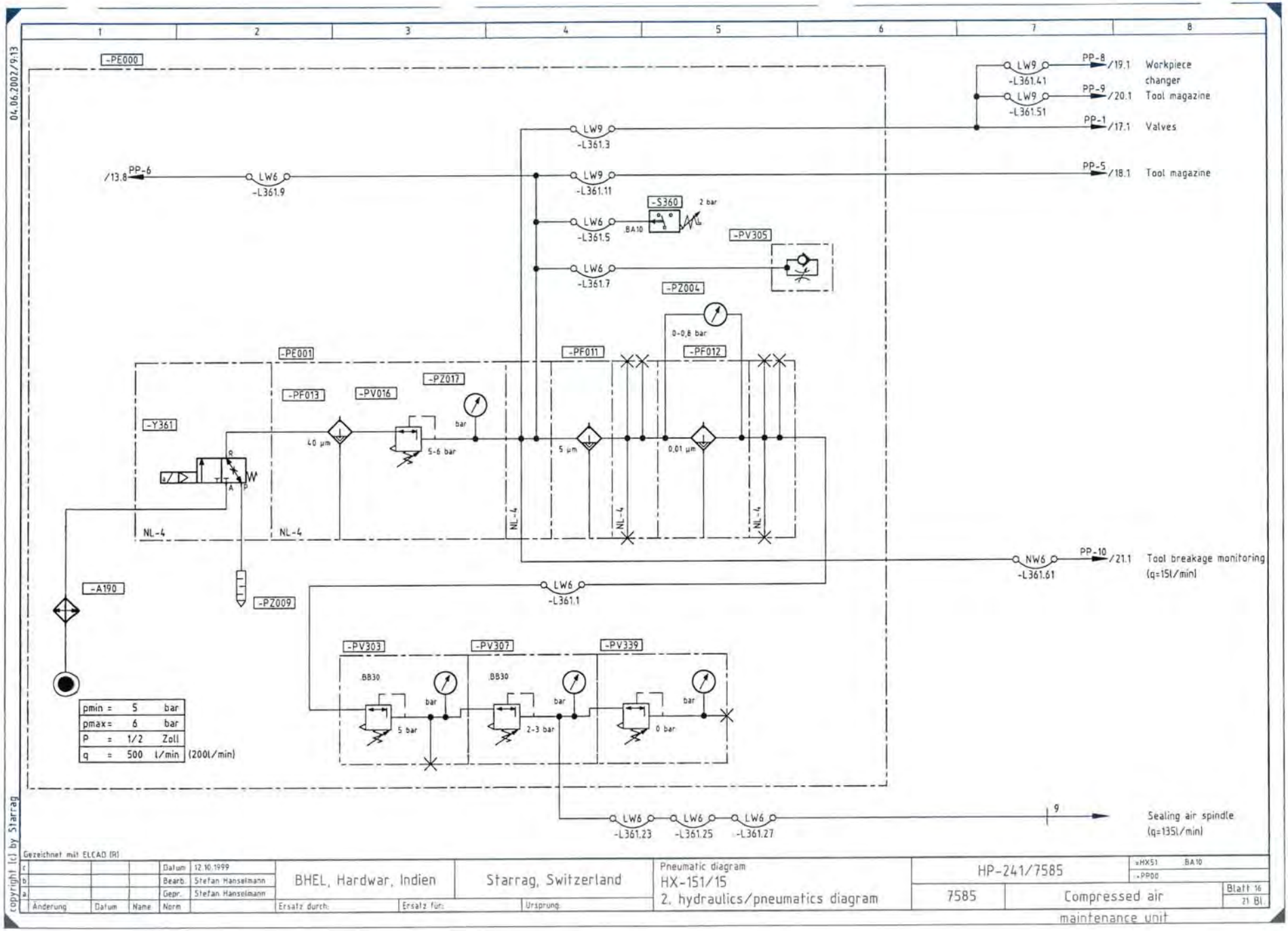
BHEL, Hardwar, Indien | Starrag, Switzerland

Ersatz durch: | Ersatz für: | Ursprung:

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

HP-241/7585 | +HXS1 :BA10

7585 | Compressor cooling unit | Blatt 15 / 21 Bl.



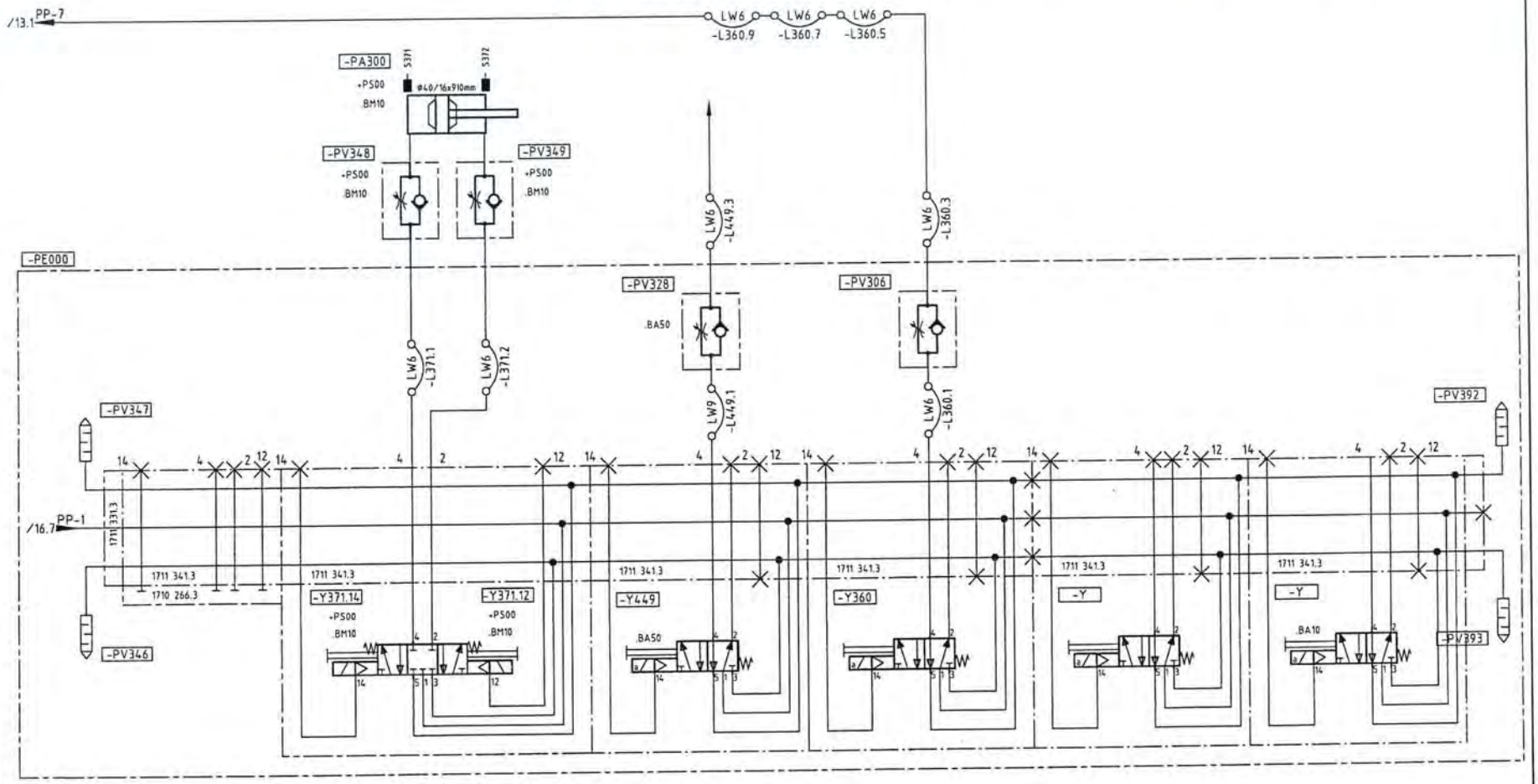
04.06.2002/9:13

Gezeichnet mit ELCAD (R)

c				Datum	12.10.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Pneumatic diagram HX-151/15 2. hydraulics/pneumatics diagram
b				Bearb.	Stefan Hanselmann			
a				Gepr.	Stefan Hanselmann			
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:

HP-241/7585	=HX51 -BA10 -PP00		
7585	Compressed air maintenance unit	Blatt 16 21 Bl.	

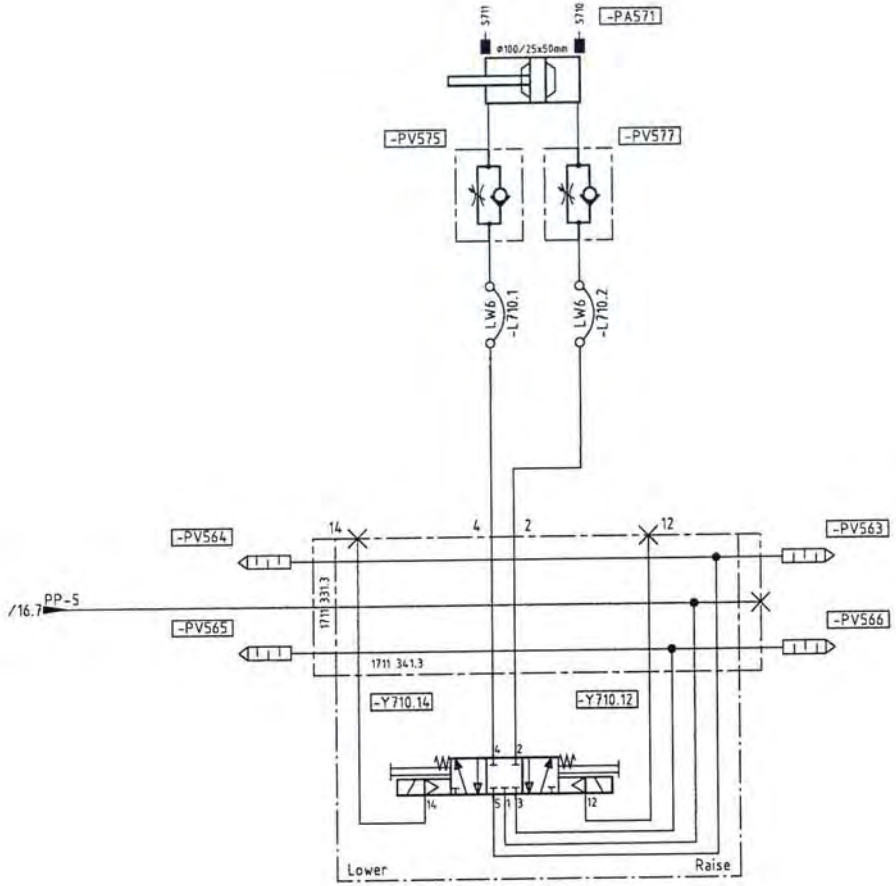
1	2	3	4	5	6	7	8
OPTION		WPC-Sliding gate	Cone cleaning Rotary station (OPTION Tailstock-Collet chuck)	Spindle cone cleaning + Water	Blow out vacuum filter tank	Compressed air stop valve	



Gezeichnet mit ELCAD (R)

c				Datum	16.06.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Pneumatic diagram HX-151/15 2. hydraulics/pneumatics diagram	HP-241/7585	+HXS1 .BB30 +MS06
b				Bearb.	Stefan Hanselmann					
a				Gepr.	Stefan Hanselmann				7585	Compressed air
	Anderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:		Blatt 17 21 Bl.

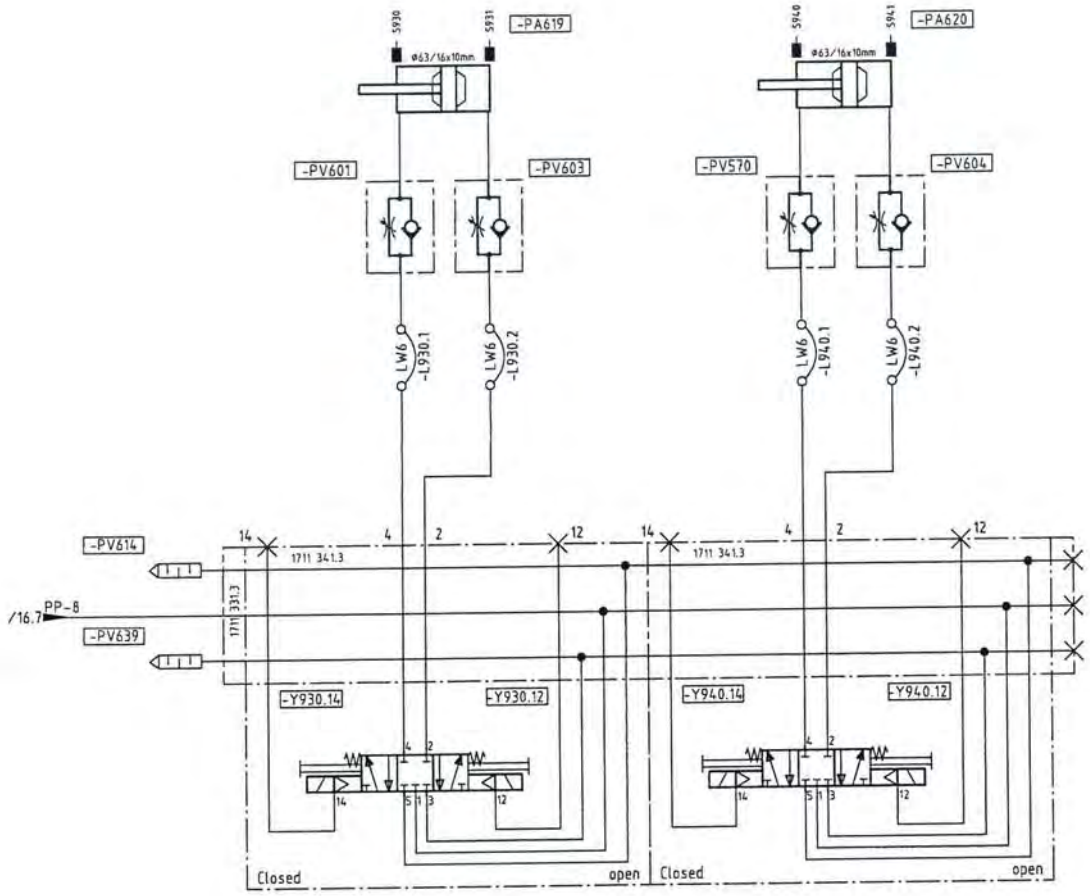
Vertical



Gezeichnet mit ELCAD (R)										
c				Datum	19.06.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Pneumatic diagram	HP-241/7585	=HX51 BB51 +P210
b				Bearb.	Stefan Hanselmann			HX-151/15		
a				Gepr.	Stefan Hanselmann			2. hydraulics/pneumatics diagram	7585	Tool magazine
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:		Blatt 18 21 Bl.

Gripper A

Gripper B

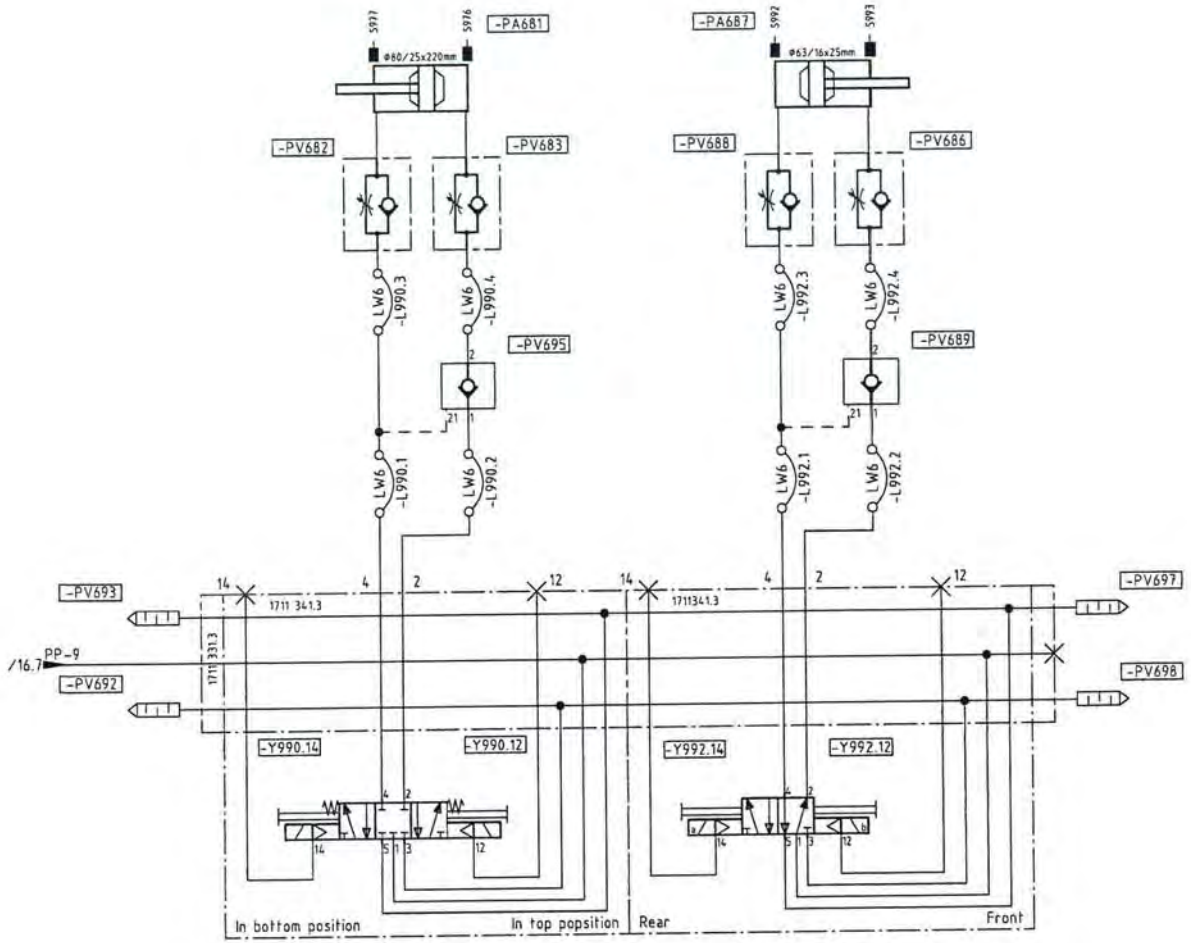


Gezeichnet mit ELCAD (R)										
c				Datum	19.06.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Pneumatic diagram HX-151/15 2. hydraulics/pneumatics diagram	HP-241/7585	=HX51 .BM10 +PS00
b				Bearb.	Stefan Hanselmann					
a				Gepr.	Stefan Hanselmann				7585	Workpiece changer
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:		Blatt 19 21 Bl.

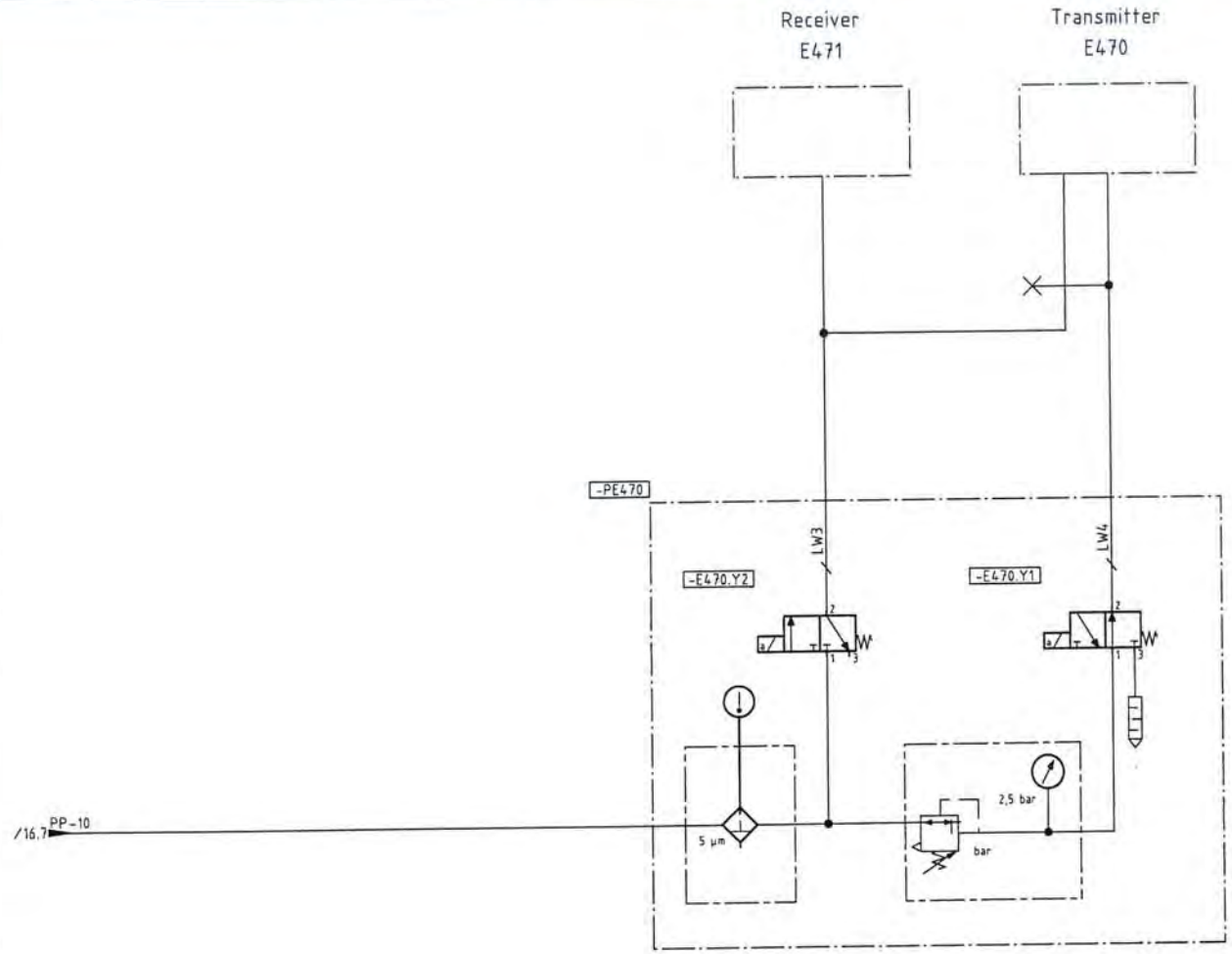
1	2	3	4	5	6	7	8

Vertical

Horizontal



Gezeichnet mit: ELCAD IRI										
c				Datum	19.06.1999	BHEL, Hardwar, Indien	Starrag, Switzerland	Pneumatic diagram HX-151/15 2. hydraulics/pneumatics diagram	HP-241/7585	=HX51 .BM20 -PS10
b				Bearb.	Stefan Hanselmann					
a			/	Gepr.	Stefan Hanselmann				7585	Workpiece magazine
	Änderung	Datum	Name	Norm.		Ersatz durch:	Ersatz für:	Ursprung:		Blatt 20 21 Bl.



Gezeichnet mit: ELCAD (R)

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

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

c			Datum	19.04.2002
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 =HXS1.
7585 list of devices
Blatt 1
Bl.

Device	Page	Designation	Type designation	Manufacturer	lift t2	product numbe	Assembly site	Function
-HP201	/4.7	Seal	AB33-33/C160 RGC 275	Rexroth		1265201.3	Hydraulic unit	.BA10
-HP201	/4.7	Pump support	AB33-37/A160/1-R4 MINI	Rexroth		1265251.3	Hydraulic unit	.BA10
-HP201	/4.7	Coupling	AB33-22/KD19-14/14	Rexroth		1265151.3	Hydraulic unit	.BA10
-HV216	/4.7	Check valve	RHD 8-PS/A3C	Ermeto		1301421.3	Hydraulic unit	.BA10
-M120	/4.7	Three-phase current-Motor	M2AA 071B 3GAA 072 002	ABB		4605661.3	Hydraulic unit	.BA10
-S	/4.8	Float switch	AB31-06/200S	Domeisen		4210301.3	Hydraulic unit	.BA10
-HE300	/5.2	Hydraulics Plant	HX-151	REXROTH		248509.4	Hydraulic unit	..BA10
-HV311	/5.3	Pressure limiting valve	ZDBK 6 VP2-1X/210V	Rexroth		1311211.3	Hydraulic unit	..BA10
-S301.1	/5.3	Pressure switch	HED 8OH 1X/100K 14S	Rexroth		4213202.3	Hydraulic unit	..BA10
-S301.2	/5.3	Pressure switch	HED 8OH 1X/100K 14S	Rexroth		4213202.3	Hydraulic unit	..BA10
-S302	/5.3	Pressure switch	HED 8OH 1X/100K 14S	Rexroth		4213202.3	Hydraulic unit	..BA10
-HE210	/5.4	Safety block	ABZSS 10M-2X/330B/S12V	Rexroth		1280921.3	Rear column	..BA10
-HV202	/5.4	Pressure control valve	DBDS 6K1X/315	Rexroth		1311124.3	Hydraulic unit	..BA10
-S320.1	/5.4	Pressure switch	HED 8 OH 1X/350K14S	Rexroth		4213203.3	Hydraulic unit	..BA10
-S320.2	/5.4	Pressure switch	HED 8 OH 1X/350K14S	Rexroth		4213203.3	Hydraulic unit	..BA10
-S321	/5.4	Pressure switch	HED 8 OH 1X/350K14S	Rexroth		4213203.3	Hydraulic unit	..BA10
-HD211	/5.5	Bubble accumulator	IHV 05-330/38	Olaer		1280807.3	Rear column	..BA10
-HV209	/5.5					-HE210	Rear column	..BA10
-HV207	/5.6					-HE210	Rear column	..BA10

Gezeichnet mit ELCAD (R)

a				Datum	19.04.2002	BHEL, Hardwar, Indien	Starrag, Switzerland	Parts list HX-151/15 3. list of devices	GL-241/7585
b				Bearb.	Stefan Hanselmann				=HXS1.
a				Gepr.	Stefan Hanselmann				.
	Änderung	Datum	Name	Norm		Ersatz durch:	Ersatz für:	Ursprung:	7585 list of devices Blatt 2 Bl.

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

Device	Page	Designation	Type designation	Manufacturer	lift t2	product number	Assembly site	Function
-HV434	/8.4	Check valve-intermediate plate	Z2SRK 6-1-1X/V	Rexroth		1303651.3	Hydraulic unit	.BB10
-S485	/8.4	Pressure switch	HED 8 OH 1X/50K14S	Rexroth		4213201.3	Hydraulic unit	.BB10
-Y485	/8.4	4/3 Directional control valve	4WE 6 D6X/EG24N9K4	Rexroth		1317001.3	Hydraulic unit	.BB10
-HA423	/8.5	Tailstock		Starrag		3056501.7	Tailstock slide	.BB10
-HV408	/8.5	Pressure reducing valve	ZDR6DP2-4X/75YM	Rexroth		1311624.3	Hydraulic unit	.BB10
-HV438	/8.5	Check valve-intermediate plate	Z2SRK 6-1-1X/V	Rexroth		1303651.3	Hydraulic unit	.BB10
-S480	/8.5	Pressure switch	HED 8 OH 1X/50K14S	Rexroth		4213201.3	Hydraulic unit	.BB10
-Y480	/8.5	4/2 Directional control valve	DG 4V-3S-2AL-MU-H5-60	Vickers	24V	1317051.3	Hydraulic unit	.BB10
-HV532	/9.3	Pressure reducing valve	ZDR6DP2-4X/75YM	Rexroth		1311624.3	Workpiece changer	.BM10
-HA551	/9.4	Cylinder	32C JJ HMIRN29 MC1190-M-12-34	Parker		1251608.3	Workpiece changer	.BM10
-HV524	/9.4	Resettable check valve	Z2S6 - 2-60	Rexroth		1303642.3	Workpiece changer	.BM10
-HV540	/9.4	Diaphragm	RR00158547	Rexroth		1318420.3	Workpiece changer	.BM10
-HV543	/9.4	Diaphragm	RR00158547	Rexroth		1318420.3	Workpiece changer	.BM10
-Y900.A	/9.4	4/3 Directional control valve	4WE 6 J73-6X/EG24N9K4/A12	Rexroth		1317021.3	Workpiece changer	.BM10
-HV527	/9.5	Resettable check valve	Z2S6 - 2-60	Rexroth		1303642.3	Workpiece changer	.BM10
-HV531	/9.5	Pressure reducing valve	ZDR6DP2-4X/75YM	Rexroth		1311624.3	Workpiece changer	.BM10
-HV544	/9.5	Diaphragm	RR00138642	Rexroth		1318408.3	Workpiece changer	.BM10
-Y908.A	/9.5	4/3 Directional control valve	4WE 6 J 6X/EG24N9K4	Rexroth		1317005.3	Workpiece changer	.BM10
-HA556	/9.6	Cylinder	32C SBD HMIRN14 MC150-M-33-11	Parker		1251603.3	Workpiece changer	.BM10

Gezeichnet mit ELCAD (R)

c				Datum	19.04.2002
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 4 Bl.

Device	Page	Designation	Type designation	Manufacturer	lift t2	product numbe	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	Maagtechnic	24V	1501627.3	Longitudinal slide	.BA10
-HE660	/12.1	Pump unit	TFP 50/0,45 D C101 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

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b				Bearb.	Stefan Hanselmann			
a				Gepr.	Stefan Hanselmann			
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-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

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Device	Page	Designation	Type designation	Manufacturer	lift t2	product numbe	Assembly site	Function
-HF749	/13.2					-HE745	Longitudinal beam right	.BI40
-HV748	/13.2					-HE745	Longitudinal beam right	.BI40
-A121	/13.3	Vacuum rotary filter		Knoll		248500.4	Longitudinal beam right	.BC20
-A121.M3	/13.3					-A121	Longitudinal beam right	.BC20
-HP771	/13.3					-A121	Longitudinal beam right	.BC20
-HV770	/13.3	Water pistol		Hausamann		1633003.3	Covering	.BC30
-HV772	/13.3	Ball valve	7000 Gn 1"	Nussbaum		1625083.3	Right-hand column	.BC30
-A121.M8	/13.4			PM_DS		-HP754	Longitudinal beam right	.BC20
-HP754	/13.4	submergible pump	Tb250/350	Brinkmann	400/460V 0,63kW	4528016.3	Longitudinal beam right	.BC20
-A121.B2	/13.5					-A121	Longitudinal beam right	.BC20
-A121.B3	/13.5					-A121	Longitudinal beam right	.BC20
-A121.B4	/13.5					-A121	Longitudinal beam right	.BC20
-A121.M7	/13.5					-A121	Longitudinal beam right	.BC20
-HP781	/13.5					-A121	Longitudinal beam right	.BC20
-HV764	/13.5					-A121	Longitudinal beam right	.BC20
-Y341	/13.5	3/2- Path - Pilot valve	Typ : 324/2 M 125 1	Interapp	24V	1319021.3	Right-hand column	.BA10
-Y341	/13.5	2/2- Path - Water valve	514/25 D 1951-1	Interapp	24V	1319001.3	Right-hand column	.BA10
-A121.B5	/13.6					-A121	Longitudinal beam right	.BC20
-A121.M6	/13.6					-A121	Longitudinal beam right	.BC20

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Device	Page	Designation	Type designation	Manufacturer	Lift t2	product numbe	Assembly site	Function
-HP782	/13.6					-A121	Longitudinal beam right	.BC20
-HV793	/13.6					-A121	Longitudinal beam right	.BC20
-HV798	/13.6	Check valve	Rhd15-Pl	Ermeto		1301409.3	Milling spindle	.BI40
-PV313	/13.6	Check valve	Rhz 8-Plr-Ed	Ermeto		1301344.3	Milling spindle	.BI40
-Y342	/13.6	3/2- Path - Pilot valve	Typ : 324/2 M 125 1	Interapp	24V	1319021.3	Right-hand column	.BA10
-Y342	/13.6	2/2- Path - Water valve	514/25 D 1951-1	Interapp	24V	1319001.3	Right-hand column	.BA10
-A121.M4	/13.7					-A121	Longitudinal beam right	.BC20
-A121.S3	/13.7					-A121	Longitudinal beam right	.BC20
-HP756	/13.7					-A121	Longitudinal beam right	.BC20
-HV789	/13.7					-A121	Longitudinal beam right	.BC20
-Y344	/13.7	3/2- Path - Pilot valve	Typ : 324/2 M 125 1	Interapp	24V	1319021.3	Right-hand column	.BA10
-Y344	/13.7	2/2- Path - Water valve	514/25 D 1951-1	Interapp	24V	1319001.3	Right-hand column	.BA10
-HV766	/13.8					-A121	Longitudinal beam right	.BC20
-A140	/14.1	Chip conveyor		Bermec	0	248625.4	Right-hand column	.BD30
-A140.M2	/14.2					-A140	Right-hand column	.BD30
-HP776	/14.2					-A140	Right-hand column	.BD30
-A140.S3	/14.3					-A140	Right-hand column	.BD30
-A140.S2	/14.4					-A140	Right-hand column	.BD30
-A140.S1	/14.5					-A140	Right-hand column	.BD30

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Device	Page	Designation	Type designation	Manufacturer	Lift t2	product numbe	Assembly site	Function
-A100	/15.1	Oil recooling device	DK-86V/SO	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

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Device	Page	Designation	Type designation	Manufacturer	lift t2	product numbe	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

Device	Page	Designation	Type designation	Manufacturer	lift t2	product number	Assembly site	Function
-PV348	/17.3	One-way restrictor	0 821 200 183	Bosch		1711508.3	Workpiece changer	.BM10
-PV349	/17.3	One-way restrictor	0 821 200 183	Bosch		1711508.3	Workpiece changer	.BM10
-Y371.14	/17.3	5/3 Directional control valve	0 820 027 102	Bosch		1710237.3	Pneumatic unit	.BM10
-PV328	/17.4	One-way restrictor	0 821 200 005	Bosch		1711553.3	Pneumatic unit	.BA50
-Y449	/17.4	5/2 Directional control valve	0 820 024 076	Bosch		1710213.3	Pneumatic unit	.BA50
-PV306	/17.5	One-way restrictor	0 821 200 005	Bosch		1711553.3	Pneumatic unit	.BB30
-Y360	/17.5	5/2 Directional control valve	0 820 024 076	Bosch		1710213.3	Pneumatic unit	.BB30
-Y	/17.7	5/2 Directional control valve	0 820 024 076	Bosch		1710213.3	Pneumatic unit	.BB30
-PV392	/17.8	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Pneumatic unit	.BB30
-PV393	/17.8	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Pneumatic unit	.BB30
-Y	/17.8	5/2 Directional control valve	0 820 024 076	Bosch		1710213.3	Pneumatic unit	.BA10
-PV564	/18.2	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Tool magazine	.BB51
-PV565	/18.2	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Tool magazine	.BB51
-PA571	/18.3	double-action cylinder	0 822 355 002/Hub 50	Bosch		1701891.3	Tool magazine	.BB51
-PV575	/18.3	One-way restrictor	0 821 200 184	Bosch		1711509.3	Tool magazine	.BB51
-PV577	/18.3	One-way restrictor	0 821 200 184	Bosch		1711509.3	Tool magazine	.BB51
-Y710.14	/18.3	5/3 Directional control valve	0 820 027 102	Bosch		1710237.3	Tool magazine	.BB51
-PV563	/18.4	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Tool magazine	.BB51
-PV566	/18.4	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Tool magazine	.BB51

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a				Gepr.	Stefan Hanselmann				-
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-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

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-PV688	/20.4	One-way restrictor	0 821 200 180	Bosch		1711506.3	Workpiece magazine	.BM20
-PV689	/20.4	Resettable check valve	0 821 003 026	Bosch		1711307.3	Workpiece magazine	.BM20
-Y992.14	/20.4	5/2-Directional control valve	0 820 024 552	Bosch		1710223.3	Workpiece magazine	.BM20
-PV697	/20.5	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Workpiece magazine	.BM20
-PV698	/20.5	Silencer	G 3/8 1 827 000 002	Bosch		1700984.3	Workpiece magazine	.BM20
-PE470	/21.3	Pneumatic unit	P87.0634-050-A5	Blum		1700801.3	Rear column	.BL50
-E470.Y2	/21.4	3/2-Directional control valve	Mfh- 3-M5	Blum		9000627.3	Rear column	.BL50
-E470.Y1	/21.6	3/2-Directional control valve	Mofh- 3-M5	Blum		9000628.3	Rear column	.BL50

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