	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: SBPRV_DATA1	
		SECTION :Boiler Mountings/PE(FB)	
		REV. NO. 00	DATE : 30.07.2019
		SHEET 1 OF 2	

Material Code:L172812182501001,002 **Tag No. : 10HCB01AA101&10HCB01AA102** **Qnty. : 2 No. / BOILER**

100% CAPACITY PNEUMATIC ACTUATOR SBPRV DATA SHEET – A&B

	DATA SHEET – A FOR CONTROL VALVE WITH PNEUMATIC ACTUATOR (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**1728, PANKI TPS EXTN. 1X660 MW**	
	SERVICE	**SBPRV**	
	LOCATION	OUTDOOR	
	DUTY	MODULATING	
	PIPE SIZE (inlet / outlet)	D127X 20/ D127 X 20	
	PIPE MATERIAL (inlet / outlet)	**SA335 P91 / SA335 P91**	
	MEDIUM	SUPERHEATED STEAM	
BODY	MODEL No.		
	TYPE OF BODY : GUIDING : No. OF PORTS	GLOBE / CAGE / ONE	
	BODY SIZE : PORT SIZE : DESIGN CV		
	END CONNECTION & RATING (ANSI)	**BUTT WELD; Style-P;d1=92mm**	
	BODY MATERIAL	**SA 217C12A**	
	PACKING MATERIAL	GRAFOIL	
	BONNET TYPE	STD / EXTENDED / FINNED	
	TRIM FORM	LINEAR / MODIFIED PARABOLIC	
	TRIM MATERIAL: SEAT / PLUG // CAGE / STEM		
	BALANCED / UNBALANCED		
	FLOW	BELOW SEAT / ABOVE SEAT	
	VALVE OUTLET VELOCITY	< 150 m/s (STEAM)	
	REQUIRED LEAKAGE CLASS	**IV**	
	NOISE LEVEL in dBA (SPEC . 3 . 1 . 14)	LESS THAN 85 dBA	
	ANTI CAVITATION TRIM		
	VALVE LIFT in mm		
PNEUMATIC ACTUATOR	MODEL No. & SIZE	SPRING ACTION CLOSES THE VALVE	
	CLOSE AT : OPEN AT ($Kg/cm^2(g)$)		
	TRAVEL TIME FOR		
	OPEN TO CLOSE, CLOSE TO OPEN	<10 Secs / <10 Secs	
	VALVE POSN. ON SIGNAL AIR FAILURE	STAY PUT	
	VALVE POSN. ON SUPPLY AIR FAILURE	STAY PUT	
PERFORMANCE OF VALVE	LINEARITY	± 2%	
	HYSTERISIS	± 1%	
	SENSITIVITY	± 0.5%	
	ACCURACY (OVERALL)	± 2%	

SERVICE CONDITIONS

Sl. No.	LOAD	FLOW t / h	INLET PR. $kg/cm^2(g)$	OUTLET PR. $kg/cm^2(g)$	PR. DROP $kg/cm^2(g)$	INLET TEMP (°C)	Sp. Gravity	Calc. Cv	Valve Lift %	Valve outlet velocity	Noise Level dBA
01	BMCR	22	283.9	40	243.9	522					
02	TMCR	22	281.3	40	241.3	525					
03	80% TMCR	22	219.7	40	179.7	521					
04	60% TMCR	22	208.3	40	168.3	519					
05	40% TMCR	22	127.8	40	87.8	446					
06	100% TMCR	22	278.5	40	238.5	508					
07	BMCR	8	283.9	40	243.9	522					
08	TMCR	8	281.3	40	241.3	525					
09	80% TMCR	8	219.7	40	179.7	521					
10	60% TMCR	8	208.3	40	168.3	519					
11	40% TMCR	8	127.8	40	87.8	446					
12	100% TMCR	8	278.5	40	238.5	508					

ACTUATOR SIZING PRESSURE : 302 Kg/cm^2 (a)
BODY DESIGN: PRESSURE / TEMPERATURE : 302 Kg/cm^2 (g) / 536°C
IBR FORM – III C : REQUIRED
TOTAL WEIGHT (VALVE+ACTUATOR+ACCESSORIES) : Kgs.
Valves should be directly weldable to connecting pipe without the use of Reducers. Only Globe / Inline Valves acceptable. Angle Valves not acceptable.

	DATA SHEET FOR CONTROL VALVES (WITH PNEUMATIC ACTUATOR)	SPECIFICATION NO.: SBPRV_DATA1	
		SECTION : Boiler Mountings/PE(FB)	
		REV. NO. : 00	DATE : 30.07.2019
		SHEET 2 OF 2	

Material Code: L1728121825010001&002 **Tag No. : 10HCB01AA101&10HCB01AA102** **Qnty. : 1 No. / BOILER**

100% CAPACITY PNEUMATIC ACTUATOR SBPRV DATA SHEET – A&B

DATA SHEET – A FOR CONTROL VALVE WITH PNEUMATIC ACTUATOR (TO BE FILLED UP BY PURCHASER)			DATA SHEET – B (TO BE FILLED UP BY BIDDER)
ACCESSORIES	SMART POSITIONER AIR FILTER REGULATOR AIR LOCK RELAY POSITION LIMIT SWITCH POSITION TRANSMITTER SOLENOID VALVE I/P CONVERTER JUNCTION BOX HAND WHEEL (SIDE MOUNTED) LOCAL POSITION INDICATOR VOLUME BOOSTER & DUMP VALVE	REQUIRED REQUIRED REQUIRED REQUIRED INBUILT IN SMART POSITIONER NOT REQUIRED INBUILT IN SMART POSITIONER REQUIRED REQUIRED REQUIRED REQUIRED / NOT REQUIRED	
SMART POSITIONER REFER SPECN. ENCLOSED.	MANUFACTURER & MODEL No. BYPASS : GAUGES : ENCLOSURE CLASS INPUT SIGNAL in mA OUTPUT SIGNAL	 YES / NO / TWO : IP-65 4 -20 mA,24 V DC TO SUIT ACTUATOR	
AIR FILTER REGULATOR	MANUFACTURER & MODEL No. AIR SUPPLY PRESSURE in kg/cm²(g) OUTPUT PRESSURE in kg/cm²(g) OUTPUT GAUGE	 3.0 to 5.0 TO SUIT ACTUATOR REQUIRED	
AIR LOCK	MANUFACTURER & MODEL No. SET PRESSURE in kg/cm²(g) SUPPLY PRESSURE in kg/cm²(g) RESET TYPE VENT PLUG	 3.0 to 5.0 AUTO	
LIMIT SWITCH	MANUFACTURER & MODEL No. OPEN : & : CLOSE CONTACT TYPE RATING (AC/DC) ENCLOSURE CLASS	 1 No. FOR OPEN & 1 No. FOR CLOSE 1 No. DPDT (2NO + 2 NC contacts) 5A at 240V AC and 0.2A at 220V DC IP65	
POSITION TRANSMITTER	MANUFACTURER & MODEL No. TYPE SUPPLY OUTPUT RATING ACCURACY ENCLOSURE CLASS		INBUILT IN SMART POSITIONER
SOLENOID VALVE	MANUFACTURER & MODEL No. RATING OPERATION / 4 WAY, DUAL COIL COIL INSULATION CLASS ENCLOSURE CLASS	 24V, DC STAYPUT / CLASS-H IP65 / NEMA4	NOT APPLICABLE
HANDWHEEL	ORIENTATION	SIDE MOUNTED	
JUNCTION BOX	TYPE / No. OF WAYS / SIZE CABLE GLANDS: (SIZE / QNTY / MATERIAL) 3 NOs OF 9 PIN PLUG (1 NO SPARE) ENCLOSURE CLASS	CAGE CLAMP/ THIRTY SIX / 2.5 SQ.MM REQUIRED: 16 MM / 3 No. / BRASS WITH NICKEL PLATED / BOTTOM IP65	
I/P CONVERTER	INPUT SIGNAL : POWER SUPPLY SPLIT RANGE ENCLOSURE CLASS		INBUILT IN SMART POSITIONER

AIR CONNECTION SIZE SHOULD BE ¼" NPT (F)

	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR SEAL
SIGN. :				SIGN.:
NAME :	R.GOPINATH	R.JAI GANESH	V.GUNASEKARAN	NAME:
DATE :	30.07.2019	30.07.2019	30.07.2019	DATE:

V. GUNASEKARAN
Senior Manager
Boiler Mountings / PE (FB)
BHEL, TRICHY - 620 014

FORM NO. PEM-6666-0

	DATA SHEET FOR CONTROL VALVES (WITH ELECTRICAL ACTUATOR)	SPECIFICATION NO.: SBPRV_DATA2
		SECTION : Boiler Mountings/PE(FB)
		REV. NO. 00 / DATE : 30.07.2019
		SHEET 1 OF 2

Material Code:L172812182501003 **Tag No. : 10HCB01AA051**

100% CAPACITY ELECTRICAL ACTUATOR SBPRV DATA SHEET – A&B

	DATA SHEET – A FOR CONTROL VALVE WITH ELECTRICAL ACTUATOR (TO BE FILLED UP BY PURCHASER)		DATA SHEET – B (TO BE FILLED UP BY BIDDER)
GENERAL	PROJECT	**1728, PANKI TPS EXTN. 1X660 MW**	
	SERVICE	**SBPRV**	
	LOCATION	OUTDOOR	
	DUTY	MODULATING **(INCHING)**	
	PIPE SIZE (inlet / outlet)	D127 x 20 / D127 x 20	
	PIPE MATERIAL (inlet / outlet)	**SA335 P91 / SA335 P91**	
	MEDIUM	SUPERHEATED STEAM	
BODY	MODEL No.		
	TYPE OF BODY : GUIDING : No. OF PORTS	GLOBE / CAGE / ONE	
	BODY SIZE : PORT SIZE : DESIGN CV		
	END CONNECTION & RATING (ANSI)	**BUTT WELD; Style-P;d1=92mm**	
	BODY MATERIAL	**SA 217C12A**	
	PACKING MATERIAL	GRAFOIL	
	BONNET TYPE	STD / EXTENDED / FINNED	
	TRIM FORM	LINEAR / MODIFIED PARABOLIC	
	TRIM MATERIAL: SEAT / PLUG // CAGE / STEM		
	BALANCED / UNBALANCED		
	FLOW	BELOW SEAT / ABOVE SEAT	
	VALVE OUTLET VELOCITY	< 150 m/s (STEAM)	
	REQUIRED LEAKAGE CLASS	**IV**	
	NOISE LEVEL in dBA (Spec. 3.1.14)	LESS THAN 85 dBA	
	ANTI CAVITATION TRIM		
	VALVE LIFT in mm		

SERVICE CONDITIONS

Sl. No.	LOAD	FLOW t / h	INLET PR. kg/cm²(g)	OUTLET PR. kg/cm²(g)	PR. DROP kg/cm²(g)	INLET TEMP (°C)	Sp. Gravity	Calc. Cv	Valve Lift %	Valve outlet velocity	Noise Level dBA
01	BMCR	22	283.9	40	243.9	522					
02	TMCR	22	281.3	40	241.3	525					
03	80% TMCR	22	219.7	40	179.7	521					
04	60% TMCR	22	208.3	40	168.3	519					
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09	80% TMCR	8	219.7	40	179.7	521					
10	60% TMCR	8	208.3	40	168.3	519					
11	40% TMCR	8	127.8	40	87.8	446					
12	100% TMCR	8	278.5	40	238.5	508					

ACTUATOR SIZING PRESSURE : **302 Kg/cm² (a)**
BODY DESIGN: PRESSURE / TEMPERATURE : **302 Kg/cm² (g) / 536°C**
IBR FORM – III C : REQUIRED
TOTAL WEIGHT (VALVE+ACTUATOR+ACCESSORIES) : **Kgs.**

Note:

1) **Valves should be directly weldable to connecting pipe without the use of Reducers. Only Globe / Inline Valves acceptable. Angle Valves not acceptable.**

2) **Filled up Vendor Datasheets & Electrical Wiring Diagram are to be submitted with offer.**

3) **Enclosed specifications for Electrical Actuator & Integral Starter are to be referred.**

FORM NO. PEM-6666-0

	DATA SHEET FOR CONTROL VALVES (WITH ELECTRICAL ACTUATOR)	SPECIFICATION NO.: SBPRV_DATA2
		SECTION :Boiler Mountings/PE(FB)
		REV. NO. 00 / DATE : 30.07.2019
		SHEET 2 OF 2

100% CAPACITY ELECTRICAL ACTUATOR SBPRV DATA SHEET – A&B

	DATA SHEET – A FOR CONTROL VALVE WITH ELECTRICAL ACTUATOR (TO BE FILLED UP BY PURCHASER)		DATA SHEET-B (TO BE FILLED UP BY BIDDER)
ACTUATOR	TYPE	ELECTRICAL WITH INTEGRAL STARTER	
	MAKE		
	MODEL No.		
	SIZE		
	DUTY	MODULATING (INCHING)	
	SUPPLY VOLTAGE	415V, 3 Phase AC, 50 Hz	
	DIFFERENTIAL PRESSURE FOR SIZING	243.9 kg/cm² (g)	
	CONTROL VOLTAGE	240 V / 110 V AC	
	MOTOR RATING in KW / RPM		
	SIZING	Open / Close at rated speed against designed dP at 90% of rated voltage and 150 starts per hour capability.	
	ENCLOSURE	Totally enclosed, weather proof, IP : 55	
	GEAR TRAIN	METAL (Fibre gears not acceptable). Self locking to prevent drift under torque switch spring pressure when motor is de-energised.	
	MANUAL HAND WHEEL	Shall disengage automatically during motor operation	
OTHER ACCESSORIES	MOTOR TYPE	SQUIRREL CAGE INDUCTION MOTOR. DIRECT ONLINE WITH STARTING CURRENT LIMITED TO SIX TIMES THE RATED CURRENT.	
	ENCLOSURE	Totally enclosed, self-ventilated, IP-55 Deg. of protection.	
	INSULATION	CLASS-B.	
	BEARINGS	Double shielded, grease lubricated anti-friction.	
	THERMISTERS	To be provided & wired out to Terminal Box. However, inbuilt thermostat and wired out to Terminal box is also acceptable.	
	EARTH TERMINALS	2 (TWO)	
	STARTING CURRENT in amps		
	RUNNING CURRENT in amps		
	SEATING CURRENT in amps		
	POSITION TRANSMITTER:	YES.	
	MAKE & MODEL No.		
	TYPE	LVDT	
	INPUT VOLTAGE	24V, DC	
	OUTPUT REQUIRED	4 to 20 mA (Non-isolated)	
	ENCLOSURE	IP-65	
	LIMIT SWITCHES:	YES – ROTARY DRUM TYPE, capable of being set at any point between full open and full close position.	
	MAKE & MODEL No.		
	TYPE	2 NO + 2 NC SPDT Contact	
	CONTACTS / RATING	5A, 240V, AC / 0.5A, 220V, DC	
	ACTUATION POINTS	1 Full open & 1 Full close	
	QUANTITY	4 Nos. (1 for open, 1 for close and 2 Auxiliary)	
	TORQUE SWITCHES:	YES	
	MAKE & MODEL No.		
	TYPE	2 NO + 2 NC SPDT Contact	
	RATING	5A, 240V, AC / 0.5A, 220V, DC	
	QUANTITY	2 Nos. (1 for open & 1 for close)	
	LOCAL POSITION INDICATOR:	YES (FOR 0 – 100% TRAVEL)	
	SPACE HEATER:	240V, SINGLE PHASE	
	TERMINAL BOX:	YES (Along with 5 & 9 pin plug and socket. One No. of 9 pin plug & socket shall be supplied as loose for spare)	
	MAKE		
	No. of TERMINALS		
	TERMINAL BLOCK:	650V GRADE	
	WIRING:	650V STRANDED COPPER WIRE	

	PREPARED BY	CHECKED BY	APPROVED BY	VENDOR SEAL
SIGN. :				SIGN.:
NAME :	R.GOPINATH	AJAI GANESH	V.GUNASEKARAN	NAME:
DATE :	30.07.2019	30.07.2019	30.07.2019	DATE:

V. GUNASEKARAN
Senior Manager
Boiler Mountings / PE (FB)
BHEL, TRICHY - 620 014

ENGINEERING SPECIFICATION

FOR

SBPRV & SH/RH SPRAY CONTROL VALVES

SPECIFICATION NO: BM/CV_SPEC: 001

Prepared by:	Reviewed by:	Approved by:
A.Jai Ganesh Dy. Manager PE / FB (BM)	V.Gunasekaran Senior Manager PE / FB (BM)	K.Sridharan DGM PE / FB (BM)

Revision Log — Template Form Revision No.: 00

Revision No.	Date	Reason	Prepared		Reviewed		Approved	
			Name	Sign.	Name	Sign.	Name	Sign.
01	12.03.16	Revisit	AJG		VGS		KS	
02	10.03.17	Updated	PJS		AJG		KS	
03	24.05.17	Moisture Sep. added	PJS		AJG		KS	
04	28.09.17	SBPRV trim materials revised in Sl.no:18	PAK		AJG		KS	
05	09.07.18	RH Spray Control Valve trim, Sl no 15	PJS		AJG		KS	

1. The control valves and accessory equipment offered under this specification shall be designed, constructed and tested in accordance with the latest applicable standards and codes.

2. All the Control Valves and accessories offered by the Bidder, shall be of proven make, whose guaranteed and trouble free performance has been proven at least for two years in not less than three coal fired utility stations of reheat type.

3. The design of all valve bodies shall conform to the requirements of ANSI B-16.34 and other applicable standards for dimensions, material thickness and material specification for their respective pressure classes.

4. **The valve sizing for SH/ RH spray control valves shall be suitable for obtaining maximum flow conditions with valve opening at approximately 80% of total valve stem travel and minimum flow conditions with valve stem travel not less than 10% of total valve stem travel.**

5. **The valve sizing for SBPRV (Soot Blower Pressure Reducing Valve) valves shall be suitable for obtaining maximum flow conditions with valve opening at approximately 80% of total valve stem travel and minimum flow conditions with valve stem travel not less than 30% of total valve stem travel.**

6. All the Control Valves shall be capable of handling at least 120% of the required maximum flow. Further the valve stem travel range from minimum flow condition to maximum flow condition shall not be less than 50% of the total valve stem travel.

7. Valve sizing shall be in accordance with the latest edition of ISA Handbook on Control Valves with due consideration for the measures to avoid chocked flow. Bidder shall ensure that valve outlet velocity does not exceed 8 m / sec. for liquid services, 150 m / sec. for steam services and 50% of sonic velocity for flashing services.

8. The turndown of the valve offered should not be less than 30:1 for SH / RH Spray Control Valve applications and SBPRV.

9. The control valve size should not be smaller than connecting line size by more than 1 step.

10. **The trims of all regulating control valves should be cage guided type. Top guided design is not acceptable.**

11. Bidder shall provide valves designed to prevent cavitation, wire drawing, flashing on down stream side of valve and in down stream piping when operating through full range under the specified conditions. In cavitation services, the valves shall be provided with anti-cavitation trims specially designed to prevent the occurrence of cavitation by dropping the pressure in stages.

12. **Bidder shall furnish in his proposal detailed calculations to establish whether cavitation will occur or not under any operating condition for a particular application. These calculations shall be subject to Owner's review and approval and in case it is established at any stage of the contract that cavitation will occur, the Bidder shall provide anti-cavitation trim for the same at no extra price. Further the Bidder shall furnish in his proposal the detailed write up, technical literature, etc. clearly indicating as to how the occurrence of cavitation shall be prevented by the design of his offered anti-cavitation trim.**

13. Bidder to furnish calculation to check whether flashing or cavitation will occur for services like SH/RH Spray Control Valves.

14. Super Heater spray control Valves should be cage guided valve with low noise anti cavitation trim which are suitable for withstanding high pressure drops and which minimize the adverse effects of cavitation/ flashing on Control Valve parts. If pressure drop is more, multi stage valves shall be offered.

15. Re Heater spray control Valves should have specially designed (such as cage guiding valves with **three or more concentric cages** with holes in the cage to control the location of the Vena Contract or **multi stage multi path** discrete pressure reduction trims etc.) multi stage trim which are suitable for withstanding high pressure drops and which minimize the adverse effects of cavitation/ flashing on Control Valve parts. All pressure reduction shall be achieved only in valve trim parts. Pressure reduction orifices in the valve outlet line is not acceptable.

16. SBPRV control valve should have specially designed (such as cage guiding valves with two or more concentric cages with holes in the cage to control the location of the Vena Contract or multi stage multi path discrete pressure reduction trims etc.) multi stage trim which are suitable for withstanding high pressure drops and which minimize the adverse effects of cavitation/ flashing on Control Valve parts. All pressure reduction shall be achieved only in valve trim parts. Pressure reduction orifices in the valve outlet line is not acceptable.

17. All control valves shall have stems, guide bushings, plugs, seat rings, stem lock pins, stuffing box parts and other trim parts made of stainless steel alloys and suitably hardened. Valve guide posts and bushings shall be stellite faced. Stellite faced guide posts and bushings shall be differential hardened for applications involving high pressure drop as well as for flashing and cavitation applications.

18. Vendor to consider SBPRV operating conditions as severe service conditions because of high pressure drop across the valve trim. All the trim parts shall be of materials as listed in the Table:1. No deviations will be accepted pertaining to trim materials.

Table:1

TRIM	TRIM MATERIAL
Seat material	F91 + Stellited No.06 + Ion Nitrided
Plug material	Inconel 718
Cage material	Inconel 718
Stem material	Inconel 718

19. For SH/ RH spray control valves the trim materials shall be as follows
    a) Cage : - CA6NM + Chrome Plated / 17-4 PH *
    b) Plug :- CA6NM + Chrome Plated /17-4 PH *
    c) Stem :- CA6NM + Chrome Plated / 17-4 PH *
    d) Seat :- SS 316 Stellited / SS410/ CA6NM + Chrome Plated/17-4 PH *

    *17-4PH is to be used where design temperature <343 deg C

20. SH /RH Block and Control valves and SBPRV shall have minimum permissible leakage class V as per FCI 70.2.

21. The valve design shall take into account noise abatement considerations. The design objective will be to limit the generation of valve induced noise to 85 dBA at 1 metre from the valve surface under actual operating conditions. The noise abatement shall be obtained by valve body and Low Noise trim design and not by the use of silencers. Bidder shall furnish noise calculation details for each control valve and establish that sound level is less than 85 dB without using any external device or insulation.

22. The Bidder shall be responsible for proper sizing of the valves and selection of appropriate models for meeting the operating requirements.

23. Bidder shall furnish filled in BHEL's data sheets, sizing calculations including the inlet / outlet velocity calculations for each of the valves with the proposal which will be subjected to Owner's approval during detailed engineering stage.

24. All valves shall be linear/modified parabolic / equal percentage / quick opening as specified in data sheets.

25. All valves shall be only of globe body design & straightaway pattern. Angle type valve is not acceptable for any service.

26. Bidder shall supply quick-change type of trim for all control valves. The trim shall be removable through the top after bonnet removal without any cutting or welding of the valve. Where applicable, plugs shall be designed to include pressure balancing for cage-guided valves. Welded / armored seats are not acceptable.

16. Bonnet joints for all Control Valves shall be of the flanged and bolted type. Bonnet joints shall be designed for easy disassembly and for assurance of correct valve stem alignment. Bonnet joints of the internal threaded or union type will not be acceptable.

17. Plug shall be one-piece construction either cast, forged, or machined from solid bar stock. Plugs shall be screwed and pinned to valve stems or shall be integral with the valve stems.

18. Valve's gland packing material shall be grafoil for all the valves.

19. The boiler water will be acid cleaned on site using 1 to 1.5% (by weight) inhibited hydro fluoric acid. The valve manufacturer will have to take into account above-mentioned requirement during design of these valves. The body material shall be selected by Bidder to be compatible with the nature of the fluid, service conditions and piping material to which it is welded and shall be subject to Owner's approval during detailed engineering stage.

20. Valve body ends shall be butt welded or socket- welded type as indicated in datasheets.

22. Welded end for Control Valves shall be butt welded as per ANSI B16.25 for Control Valves of size 65mm (2-1/2") and above. For valves sizes 50mm (2") and below welded end shall be socket welded as per ANSI B16.11.

23. The end for all the Control Valves shall be matched to the corresponding details for the piping on which the valve is installed. **All necessary expanders/reducers are to be supplied by the vendor to match the pipe sizes.**

24. **Extended / Finned bonnets shall be used on all valves when the design temperature of the valve is greater than 280 deg.C.**

25. Stem travel indicators shall be provided on all valves.

26. Flow directions, Valve tag number shall be marked/embossed in valve body for checking during erection.

LIST OF APPROVED VENDORS FOR SOLENOID VALVE (If applicable):

1) Asco 2) Rotex.

PNEUMATIC VALVE ACTUATORS

1) All Control Valves shall be furnished with pneumatic spring opposed diaphragm/piston type actuators depending upon the process requirements.

2) The Bidder shall be responsible for proper selection and sizing of valve actuators in accordance with the pressure drop and maximum shut-off pressures. The Bidder shall ensure while sizing the actuators that proper and adequate size is selected which do not restrict or endanger the plant operation and ensure the required leakage class. The actuator size of the valve actuator shall be subject to owner's approval during detailed engg. stage.

3) The actuators shall be designed to produce the required stem force with supply air pressure of 3 to 5 kg/sq.cm. unless otherwise specified.

4) Valve actuators shall be capable of operating at an ambient temperature of 60°C continuously.

5) All actuators shall also have provisions for manual operation during emergency / maintenance along with graduated local position indicator.

6) Valve actuators and stems shall be adequate to handle the unbalanced forces occurring under the specified flow conditions or the maximum differential pressure specified. An adequate allowance for stem force, at least 0.15 Kg/sq.cm. per linear millimeter of seating surface, shall be provided in the selection of the actuator to ensure light seating unless otherwise specified.

VALVE ACCESSORIES FOR PNEUMATIC ACTUATORS

1) All accessory devices like SMART positioners, solenoid valves (If applicable), air locks, air filter regulators, limit switch assemblies, junction boxes, hand jack / hand wheels, pneumatic tubing, etc. shall be provided as per the requirements. **Moisture separator** is to be provided to separate moisture if any in the air line.

TESTS AND EXAMINATIONS

All valves shall be tested in accordance with the quality assurance program agreed between the Owner and the Contractor, which shall meet the requirements of IBR and other applicable codes. The customer approved Quality Plan is to be followed. The tests shall include but not limited to the following.

1) Non-destructive examination shall be performed as per ANSI-B-16.34 (Steel Valves).

2) 100% radio graphic test on body of all valves having rating of 900 lbs or above; magnetic particles / dye penetrant examination on all internal and external machined surfaces and 100% ultra sonic testing of forgings and bars (of size 50 mm and above) of all valves with rating of 900 lbs or above shall be performed as per ANSI B16.34.

3) **Hydrostatic Test**

Valves shall be subjected to hydrostatic shell test in accordance with ANSI-B16.34 prior to seat leakage test. If the valves are reworked on the pressure parts for any reason after hydrostatic test, they must be retested. Valves shall be hydrostatically tested in Manufacturer's Works in accordance with code requirements. All hydrostatic testing and inspection shall be completed before any paint is applied to valve body. Certificates of inspection shall be executed in accordance with the latest codes and required codes shall be forwarded to the Engineer. All gaskets used for test shall be of the same material and design as specified for the finished product. Where mechanical gasket joints are broken following tests, new gaskets shall be furnished with the equipment, and the joints shall be retested.

4) **Leakage Test**

Valve closure test and seat leakage tests shall be performed in accordance with ANSI - B16.34 and as per applicable Leakage Class. The leakage from packing shall be zero or bubble tight.

5) **Functional Tests**

The fully assembled or completed valves including the actuators control devices and accessories shall be functionally tested to demonstrate the operability and response time of the valve and the actuator. This may be done by cycling the valves 3 or 4 times form open to close position. The same controller can be used to test each valve. These tests shall also include the verification of control valve operation features such as stay put operation, fail to open, fail to close on air failure, control signal failure etc. in line with the specification requirements. Performance tests such as Linearity, Hysteresis, Sensitivity & Accuracy are to be checked as per specification

6) **Cv Test**

Cv test shall be carried out as type test on each size type and design of the valves as per ISA-75.02 standard and the test reports, shall be furnished for Owner's approval. This is to be performed specifically for this project even though Cv test reports of earlier projects are available.

DOCUMENTS REQUIRED

1. Along with offer

a) POINTWISE REPLY SHALL BE SENT FOR ALL THE ABOVE SPECIFICATIONS ALONG WITH A LIST OF TECHNICAL DEVIATIONS, IF ANY.
b) Cross sectional drawing of the valve (Trim) showing materials of various parts.
c) Lift vs Cv curves.
d) Filled up data sheets.
e) Calculations to demonstrate the suitability of the selected valve to combat.

- Cavitation in case the valve is for liquid application.
- Vibration.
- Noise.
- Flashing in case the valve is for saturated liquid application.
- Valve sizing calculations. (Cv, valve outlet velocity)
- Catalogs of the Valve and Accessories offered.

f) Commissioning spares required along with the price for the same.
g) Actuator sizing calculations.
h) Pneumatic hook up diagram similar to the one enclosed.
i) Terminal box wiring diagram.

WITHOUT THE ABOVE DETAILS, THE OFFERS WILL BE TREATED AS INCOMPLETE AND LIABLE FOR REJECTION

2. After placement of order.

a) Dimensional drawing for approval.
b) O&M manuals – 1 set of Hard copy to be sent to site along with equipment.
c) Data sheets & drawings for approval.
d) Test Certificates.
e) O&M manual in soft copy – One copy of O&M manuals in soft copy is to be submitted in CD-ROM (Compact disc). The O&M manuals should be furnished within three months from the date of placement of order.

3. Details to be indicated on the Name Plate

a) Tag No. & Valve serial No.
b) Body material, size and pressure rating.
c) Trim material, size and characteristic body material, size and pressure rating.
d) Action on air failure.
e) Spring range.
f) Stem travel in mm.
g) Valve action.

****

BHARAT HEAVY ELECTRICALS LIMITED,
THIRUCHIRAPALLI-620 014

CONTROLS & INSTRUMENTATION/FOSSIL BOILERS

Technical specification for Electrical Actuator
(Open/Close duty & Inching duty applications)

Specification Number: - TCI: 318/Rev. 01

Revision History

Rev. No.	Date	Description	Prepared	Reviewed	Approved
00	09-12-2013	Initial release	-sd-	-sd-	-sd-
01	08-02-2019	Revision after revisit			

Sl. No.	Details	Requirements		
1	Site Conditions	Ambient Temperature: -20° C to +50° C Relative Humidity : 95% Atmosphere : Tropical, dusty, salty, corrosive and highly polluted		
2	Actuator Application	Open/Close, inching duty, suitable for Valve/Gate applications.		
3	Actuator type	Type 1	Type 2	Type 3
		Electrical Actuator without integral starter.	Electrical Actuator with integral starter. The Starter shall be as per technical specification.	Electrical Actuator with integral starter and 9 pin plug & socket arrangement. The Starter shall be as per technical specification.
4	Actuator Construction	Actuator shall be of totally enclosed weatherproof construction. Protection Class: - IP 65		
5	Gearing	Suitable gearboxes shall be coupled (if required) to achieve the torque requirements of the load. All the gears available in the actuator shall be of suitable metal. Actuator shall have self-locking facility.		
6	Manual operation through Hand-wheel	Shall have a de-clutch lever and a hand wheel mechanism for manual operation. The hand wheel mechanism shall be designed such that it is declutched automatically when the power supply to the motor, is restored.		
7	Torque requirement	Shall be designed to meet with the required torque at the output shaft as per the load requirement.		
8	Operating time	The operating time of the actuator required for the complete travel has to match with the load requirement.		
9	Supply voltage	415 V, 3 phase AC supply, 50Hz.		

Sl. No.	Details	Requirements
10	Power supply variation	The actuator shall operate without any trouble under power supply voltage variation of ± 10% of the rated value, power supply frequency variation of ± 5% of the rated value, combined voltage and frequency variation of 10% of the rated value.
11	Motor construction	Shall be of Totally Enclosed, Self-Ventilated construction. Shall have double shielded, grease lubricated anti-friction bearings.
12	Motor Insulation	Motor winding shall be tropicalized, suitable for the site conditions as indicated above. Shall have class F insulation with temperature rise of the motor winding limited to Class B. Temperature rise over ambient temperature of 50° C shall be 70° C.
13	Motor duty cycle	The duty cycle of the motor shall be short time S2 duty cycle rated for the period of operation of 15 minutes or rated for 3 successive open-close operations whichever is longer. For inching duty, the motor shall be suitable for 150 starts/hour.
14	Standards	Actuator shall be conforming to the standard EN15714 - 2 for all requirements.
15	Motor Thermostat	Motor winding shall be provided with inbuilt thermostat connected in series (one thermostat in each phase) and shall be wired to terminal box.
16	Space heater for Motor	Shall have a space-heater with suitable rating and the power supply shall be derived internally from the main power supply.
17	Earth terminals	2 Nos. of earth terminals shall be provided on the body of the motor.

Sl. No.	Details	Requirements
18	Torque & position limit switches	2 numbers of adjustable torque limit switches (one for open and one for close), each with 2 NO and 2 NC potential free contacts. The torque limit switches shall have calibration in Kg-m (for whole actuator including gear box if supplied), so that the switches could be easily set to any desired value, within the range specified for each actuator. Torque switches shall be bypassed in both the end positions using the position Limit switches available at the other end of the travel. Actuators shall have provision for bypassing the torque switch, initially for 3 seconds or during initial 5% opening of the valve. 4 numbers of position limit switches, rotary drum type capable of being set at any position (2 nos. for open and 2 nos. for close) each with 2 NO & 2 NC potential free contacts. Contacts of limit and torque switches shall be Silver plated having high conductivity and non -corrosive type. Contact rating of all the above limit switches shall be 2A at 240 V AC and 0.2 A at 220 V DC.
19	Local position indicator	Shall be provided to indicate 0 to 100% travel.
20	Position Feedback transmitter	For inching duty applications, position feedback transmitter has to be supplied. Shall be 2 wire, non-contact type (LVDT) electronic position feedback transmitter with an output of 4-20 mA DC and shall be loop powered from external power supply. The output shall also be capable of driving minimum 500 ohms load in the control circuits.
21	Internal wiring	Shall be done with 1.5 sq.mm PVC insulated, stranded copper wire of 650V grade for control signals. For Power circuits, internal wiring shall be done by using suitable size of stranded copper conductor cables, taking care of the motor current rating. Ferrules should be used for easy identification. Internal wiring and the terminal block drawing shall be neatly pasted on the internal side of the terminal box.

Sl. No.	Details	Requirements
22	Terminal box	Motor terminals shall be of stud type. All terminals of the position limit switches, torque limit switches, space heaters shall be terminated in the terminal box. The terminals shall be of plug in cage clamp type, suitable for the cables of size 2.5 sq.mm. Minimum 6 numbers of spare terminals shall be made available in the terminal board. Terminal box of actuator shall be weatherproof, conforming to IP 65 and shall have enough space for connecting cable glands/plug and sockets. Terminal box shall be fitted with a removable front cover-plate.
23	Cable Termination philosophy	Vendor to refer the respective terminal block drawing (Type 1/Type 2/Type 3) furnished by BHEL along with the enquiry and shall follow the same.
		Power Cable :- (Common to Type1/Type 2/Type 3)) Double compression type, Brass with Nickel plated, weather proof cable glands shall be provided for the termination of power cable. Cable gland along with blanking washers shall be selected suitable for the power cable sizes as indicated below. a) Upto 3 kW – 3C x 2.5 sq.mm. Copper, OD – 17 mm ± 2 mm. b) > 3 kW & upto 7 kW - 3C x 6 sq.mm, Aluminium, OD – 19 mm ± 2 mm.
		Termination of Control Cable (Type 1 & Type 2) :- For Type 1 and Type 2 actuators, 3 Nos. of Double Compression type, Brass with Nickel plated, weather proof cable glands have to be supplied for the termination of the control/instrumentation cables suitable for a cable OD of 18mm.
		Termination of Control Cable (Type 3) :- For Type 3 actuator, 9 Pin plug & sockets (2 Nos. wired + 1 No. spare as loose supply) shall be provided to suit 4 pair 0.5 sq.mm. Copper overall shielded (16 mm OD), instrumentation cable.
24	Paint & finish	All external Parts shall be finished and painted to produce a neat and durable surface which would prevent Corrosion & Rusting. All fasteners used in the equipment shall be of a corrosion resistant material.

Sl. No.	Details	Requirements
25	Lubricant	The gear box of the actuator shall be either oil filled or grease filled.
26	Inspection & Testing	For the purpose of inspection & testing of the electrical actuator, Quality Plan Ref. QA:CI: STD: QP:13 has to be referred.

Technical Specification for Electronic Integral Starter (Applicability as per the project requirement)

Sl. No.	Details	Requirements
1.	Integral starter	Control logic of the starter shall be designed by using suitable electronic control circuit. The starter shall have the following minimum features: • Power supply isolation switch & fuses of suitable rating. • Thermal Over load relay. • Lockable Local- Off -Remote selector switch. • Push buttons for Local Operation (OPEN, CLOSE, STOP) • Indication lamps (OPEN, CLOSE, TRIP) • Remote Signal interface • Output Contacts • Status indication • Fault annunciation
2.	Open/Close Command	Interposing relays of coil burden <=2.5VA shall be provided to initiate opening and closing using 24V DC command from the external control system, respectively. Actuator shall also be suitable for remote operation by potential free contacts for Open & Close, the necessary 24V DC power supply shall be derived internally. Contactors shall be provided for forward and reverse operation and the same shall be suitably rated and interlocked in the control circuit.
3.	Protection Features in Starter	Shall have various protection features such as Single Phasing prevention, Wrong phase sequence protection, Automatic phase correction, Over heating protection through thermostat, Short Circuit protection, Overload, Supply Under Voltage, over and above other standard protection features as per manufacturer's design.
4.	Control Supply	Control supply voltage of the starter shall be 24V DC and the same shall be derived internally by the manufacturer. If control voltage rating other than 24 V DC is used, then necessary primary and secondary fuses shall be provided. Also, Opto isolation circuits shall be provided with suitable coupling relays for 24V DC commands from external control system.

Sl. No.	Details	Requirements
5.	Local Operation	Provision shall be available to operate the actuator locally. Lockable local/off/remote selection shall be provided on the front panel of the actuator.
6.	Status indication	The following status indication signals shall be provided in the actuator over and above the standard signals available in the actuator as per the manufacturer's standard • Actuator Open • Actuator Close • Actuator in travel
7.	Group Fault/Output Contacts	A Common potential free contact for collective fault annunciation of following faults such as Thermal Overload trip, Motor Thermostat trip, Control supply failure, Power Supply Failure/Single Phasing, Local/Remote switch in LOCAL/OFF, Torque Switch acted along with Other protections acted shall be provided for customer's use. Potential free output contacts shall be provided for Local/Remote/Off positions of the selector switch.
8.	Fault Annunciation	The following fault annunciation signals shall be provided in the actuator over and above the standard signals available in the actuator as per the manufacturer's standard, • Open Torque Switch/Close Torque Switch acted • Motor thermostat trip • Motor Overload relay acted Actuator shall have necessary provision for diagnosing the fault locally.
9.	Details to be furnished	The ratings of the various components of the starter, various signal exchanges to/from the starter and the wiring interconnections shall be clearly indicated in the wiring drawing of the actuator.

Controls & Instrumentation/Fossil Boilers
Project specific data for Electrical actuator

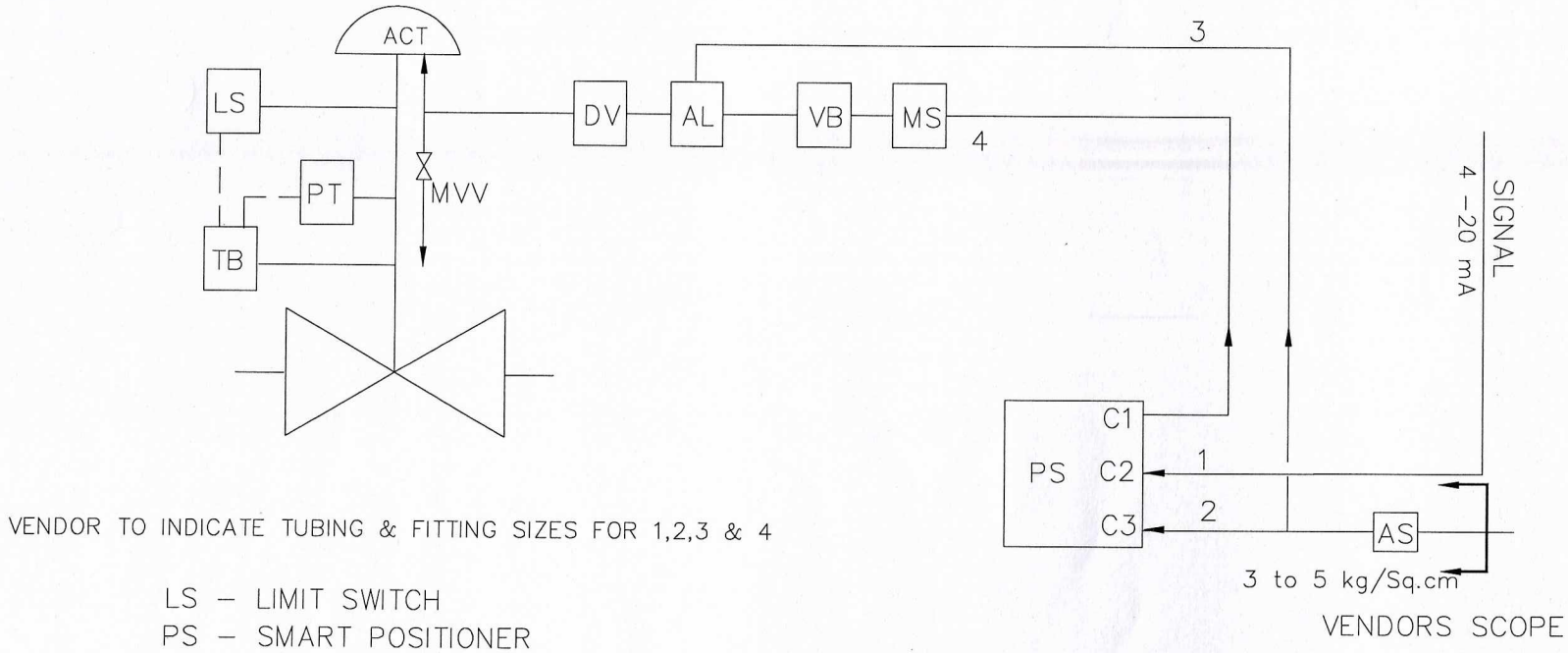
CI: PANKI: ECI:CV

Project: PANKI
Cust. No.: 1727

Sl. No	Description
1.	Intermediate limit switches 2 nos. of intermediate limit switch rotary drum type capable of being set at any position each with 2 NO & 2 NC potential free contacts. Other requirements of limit switches (Contact rating and type) shall be referred in Clause no. 18 of the technical specification TCI:318, Rev. 01
2.	Diagnostic module and Data download • The actuator shall include a diagnostic module, which will store and enable down load of historical actuator data, torque details etc. to permit analysis of the actuator and valve in service performance. • Data down load shall be carried out without removing any covers and all shall be available locally to the actuator or remotely via telecommunication data transfer. Diagnostic and configuration software shall be made for user PC system.

HOOKUP DIAGRAM FOR SH/ RH SPRAY CONTROL VALVE AND SBPRV

(FOR REFERENCE)



VENDOR TO INDICATE TUBING & FITTING SIZES FOR 1,2,3 & 4

LS – LIMIT SWITCH
PS – SMART POSITIONER
AS – AIR SET
AL – AIR LOCK
MVV – MANUAL VENT VALVE
TB – TERMINAL BOX (36 WAY)
PT – POSITION TRANSMITTER
ACT – ACTUATOR

MS – MOISTURE SEPARATOR
DV – DUMP VALVE
VB – VOLUME BOOSTER
(DV & VB may be provided if required)

VENDORS SCOPE

PREPARED:	DEEPAK.P
CHECKED:	SAJI P.J
APPROVED:	K.SRIDHARAN

Bharat Heavy Electricals Limited
High Pressure Boiler Plant, Tiruchirappalli-620 014.

TECHNICAL DELIVERY CONDITIONS

FOR SUB - DELIVERY COMPONENTS OF

CONTROLS AND INSTRUMENTATION

Technical specification

Of

SMART POSITIONER

Rev. No.	Date	Description	Prepared	Reviewed	Approved
00 – 05	19-09-18	Initial Release	-sd-	-sd-	-sd-
06	17-10-19	Revised after revisit			

Sl. No	Technical Description/Requirement	
1	SITE CONDITIONS:- Altitude above Sea Level Atmosphere Relative humidity Operating temperature	 500 Meters Tropical, Dusty, Windy & Heavily polluted atmosphere 100 % -30 to 80 degree Celsius
2	Input demand signal	4-20 mA demand signal from DCS.
3	Power Supply	2 wire system, Loop powered from output card of DCS.
4	Operational signal range	4-20 mA. Split range operation shall also be possible if required as per the application.
5	Air Supply	Shall be suitable for 3 – 7 kg/cm^2 Shall be suitable to work with instrument air of quality - Class 2 or Class 3 meeting the requirements of the standard ISO 8573.1
6	Type of Action (Direct/Reverse)	Shall match with the requirement of the Control Valve/damper application.
7	Flow Characterization	Shall match with valve characteristics, Linear/Equal percentage etc.
8	Stroke time	Shall match with the requirement of the Control Valve/damper application.
9	Single/Double Acting	Shall match with the requirement of the Control Valve/damper application.
10	Pneumatic Process Connection	Shall match with the requirement of the Control Valve/damper application.
11	Communication by Hart Protocol	SMART positioner shall be compatible for Remote calibration & Diagnostics using HART protocol.

Sl. No	Technical Description/Requirement	
12	Calibration	SMART positioner shall be compatible for Auto Start with self-calibration, Remote calibration using Hart protocol & local/manual calibration using push buttons available on the positioner.
13	Position feedback Sensing & Transmitter	Position Sensing shall be integral to the SMART positioner. 4-20 mA hardwired current signal for Position feedback shall be provided from the positioner.
14	Electrical Cable entry	Side or bottom entry to avoid water ingress.
15	Protection Class	IP 65
16	Action required during failure of 4 to 20 mA control signal.	Shall be configured for the fail safe position as per the requirement of Control Valve/damper application.
17	Characteristic Deviation	≤ 0.5% of span or better.
18	Influence of temperature rise on positioner	≤ 0.01% per degree Celsius.
19	Accessories	Pressure Gauge Block:- For Supply & output pressure, pressure gauges shall be provided on the positioner. Operator panel:- The positioner shall have a display with push buttons for configuration and for read out. Valve Mounting accessories:- Required mounting accessories & fasteners for mounting the positioner on valve actuators shall be taken care of by the valve vendor.
20	Electro Magnetic Compatibility	SMART positioner shall conform to EMC requirements as per the relevant international standards IEC/EN.

Sl. No	Technical Description/Requirement	
21	Hardwired Digital Output Signals from the positioner.	Fault signal output.
22	Diagnostic Features	Positioner shall be provided with diagnostic features for monitoring.
23	Test reports & Catalogues	1. Test Certificates as per Manufacturer's Standard. 2. SMART positioner catalogues & O&M manuals.
24	General Note	The SMART positioner with its accessories/electronic cards shall be sourced completely from the OEM.

Controls & Instrumentation/Fossil Boilers
E,C&I input for Control Valve accessories

CI: PANKI: ECI:CV, Rev. 01

Project : PANKI (1 X660 MW)
Cust. No. : 1728

Sl. No	Description	Vendor's Compliance
1.	**SMART positioner :-** Vendor to supply SMART positioner as per the requirements indicated in the Technical specification TCI:317/Rev. 06 Project Specific requirement: SMART positioner shall be provided with dust tight, weather proof and corrosion resistant, metal casing (Die cast Aluminium/SS316 enclosure) meeting IP 65 protection class requirements.	
2.	**Integral Junction Box :-** All the valve accessories shall be wired suitably and shall terminated in an integral junction box. The terminal blocks in the junction box shall be of cage clamp type suitable for 2.5 sq.mm. cable. Junction box shall meet the requirements of the protection class of IP - 65. The signals shall be terminated as per the TB nos. mentioned in BHEL wiring drawing.	
3.	**Method of Termination of external cables to the integral junction box (i.e. Command & Feedback signals from external control system) :-** 3 Nos. of 9 Pin plug & socket arrangements (2 Nos. wired + 1 No. spare as loose supply) shall be provided suitable for the cable of OD 16mm. The socket shall be fixed to the junction box and shall be wired up to the terminal blocks as per the wiring drawing.	
4.	**Requirement of Remote Configuration & Diagnostic Software for SMART positioner :-** • MS WINDOWS (latest version) based diagnostic software capable of handling 1 tag at a time, meeting the requirement of Configuration, Diagnostics, Calibration and testing of the actuator, is required. The Software shall be supplied in a CD/DVD format. As applicable, the diagnostic software shall be compatible for diagnostic features like Stroke counter or Travel counter, Leakage in actuators, Valve Signature analysis, Step Response test, Valve friction /Jamming detection etc. • Factory Valve Signature Tests Reports (Pressure versus Valve travel and Travel versus I/P signal) are to be provided.	

5.	**Limit Switch Type & Contact Rating :-** Limit switches shall be of high conductivity and non-corrosive type with either 1 No. of DPDT (2 NO + 2 NC contacts) or 2 Nos. of SPDT (2 NO + 2 NC contacts). Contact Rating : 3A at 240 V AC and 0.1 A at 220 V DC. Quantity and applicability of the limit switch shall be as per the application requirement as indicated in the valve/actuator datasheet.	

Make and Model of SMART positioner :

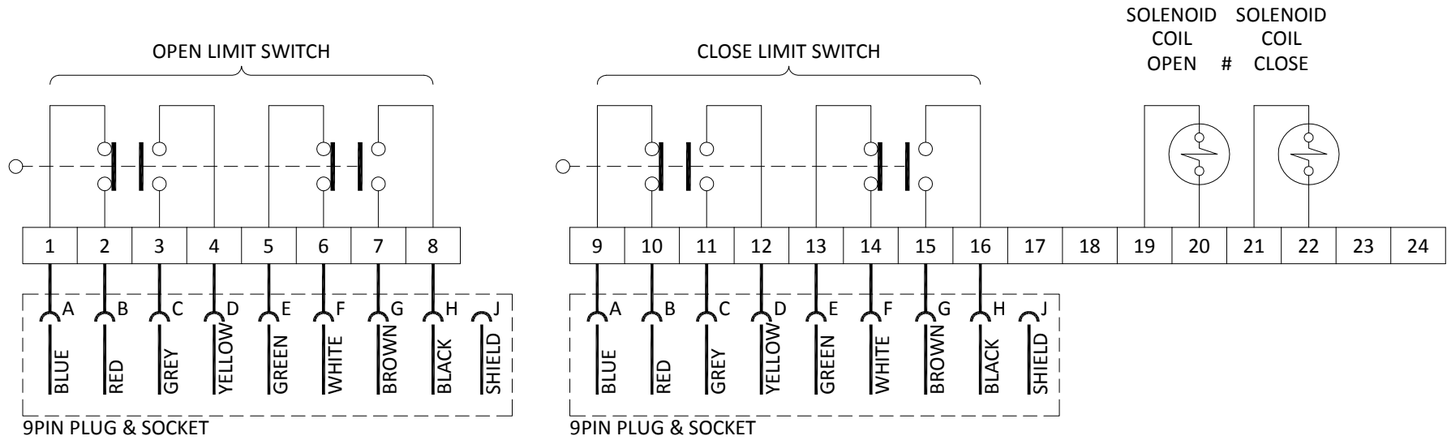
Note to Vendor :

1. Vendor to indicate "Confirmed" meeting the requirements as spelt above in the vendor's compliance column.
2. Vendor to indicate the make and model of the smart positioner.

Name of the vendor with Signature & seal :

DRAWING NO: 3-97-599-24077

TB DIAGRAM OF OPEN/CLOSE DUTY POWER CYLINDER (PNEUMATIC ACTUATOR)



NOTE

(a). FOR OPEN/CLOSE DUTY

(i). 2 Nos., 9 PIN PLUG & SOCKET (SOCKET MOUNTED ON TERMINAL BOX BUT PLUG MAY BE SUPPLIED AS LOOSE) TO SUIT 4PAIR x 0.5 SQ.MM, INSTRUMENTATION CABLE OF OD 17MM.

(ii). 1 No. CABLE GLAND TO SUIT 5C x 2.5 SQ.MM (Cu.) CONTROL CABLE OF OD 17MM.

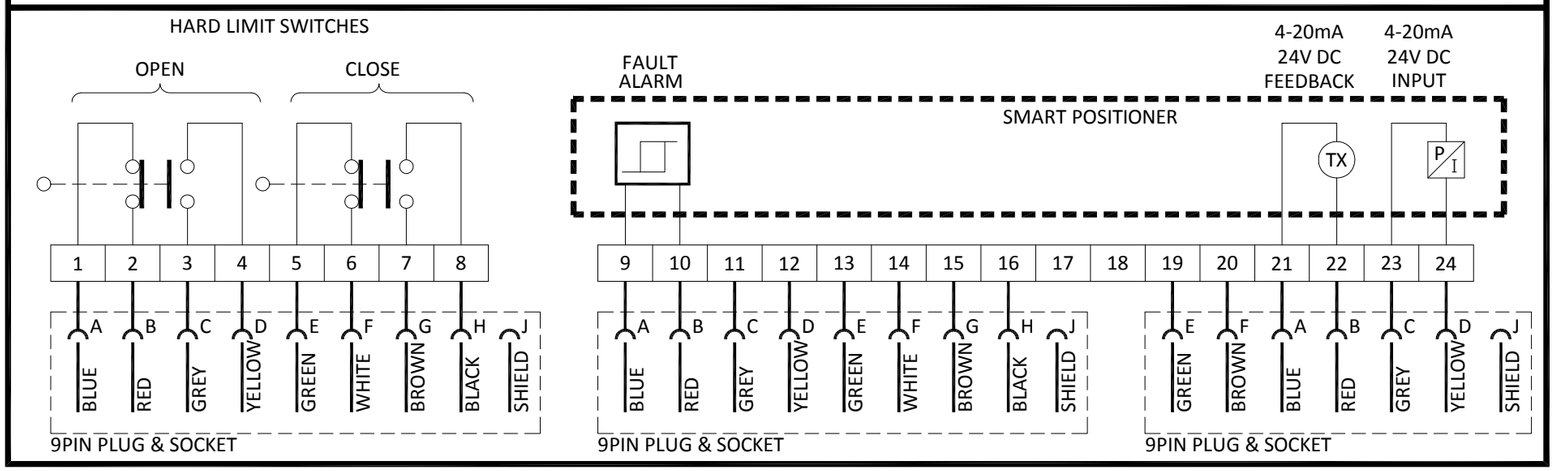
(b). FOR REGULATING DUTY

(i). 3 Nos., 9 PIN PLUG & SOCKET (SOCKET MOUNTED ON TERMINAL BOX BUT PLUG MAY BE SUPPLIED AS LOOSE) TO SUIT 4PAIR x 0.5 SQ.MM, INSTRUMENTATION CABLE OF OD 17MM

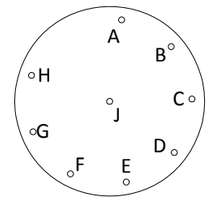
APPLICABLITY OF LIMIT SWITCHES SHALL BE REFERRED IN VALVE DATA SHEETS / SPECIFICATION.

- SINGLE OR DUAL SOLENOID FOR THE RESPECTIVE APPLICATION SHALL BE AS PER VALVE SPECIFICATION.

TB DIAGRAM OF REGULATING DUTY POWER CYLINDER (PNEUMATIC ACTUATOR)



9 PIN PLUG & SOCKET ARRANGEMENT



REV	DATE	ALTERED :
01	231019	CHD. / APPD. :
ZONE	REVISED AFTER REVISIT.	

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OWNER : UTTAR PRADESH RAJYA VIDYUT UTPADAN NIGAM LIMITED

PROJECT : PANKI THERMAL POWER EXTENSION PROJECT
1 x 660MW, Customer No. 1728

REVIEW CONSULTANT: NTPC LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)

CONSULTANT : DEVELOPMENT CONSULTANTS PRIVATE LIMITED, KOLKATA

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

	NAME	SIGNATURE	DATE	NO. OF VAR
DRN	A. Thamburaj	311218	31-12-18	—
CHD	M.Muruga Prabu	Sd. / MM	31-12-18	
APPD	V.M.Selvaraaj	Sd. / VMS	31-12-18	

DEPT. - C&I		SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
CODE - 392		NTS	———	—	—	—

TITLE: TERMINAL BLOCK DIAGRAM FOR POWER CYLINDER (DRAWN FOR INTERMEDIATE POSITION OF PC)

CARD CODE U 01

NTPC DRG. No. : Customer Drg No

BHEL DRG. No. : 3-97-599-24077

REV 01

SHEET No. : Sheet 01 of 01

FILE NAME : PAKPCTB1

BHEL	**CHECK LIST FOR SH/RH BLOCK/CONTROL VALVES AND SBPRV**	SPEC. NO. :PANKI 1 X 660MW	
		SECTION: Boiler Mountings/PE (FB)	
		REV NO.: 00	Date: 28.10.2014
		SHEET : 1 OF 1	

CUSTOMER NAME : PANKI 1 X 660MW CUST. Nos.:1728

Vendor should submit this **Filled up** Check list along with Technical and Unpriced Offer during Initial Offer submission and with each Revised Submission . Put tick mark " √ " in appropriate boxes relevant to the submission. Indicate Revision Number in case of revised submission. Offer will not be evaluated without receipt of filled up Check list signed and company seal affixed .

SL NO	ENCLOSURES / DETAILS FURNISHED	FIRST SUBMISSION REV 00	REVISED SUBMISSION REV____
01	Completely Filled up **BHEL Datasheets** for all services clearly indicating Vendor name, models, size, Rating, Materials, Cv, Lift%, Valve weight etc with vendor signature and Company seal.	YES ☐ NO ☐	YES ☐ NO ☐
02	Valve & Accessory models like Actuator, Positioner, Air lock, Limit switch, Position Transmitter, Solenoid valve, I/P Converter, Terminal Box etc. offered meets all the Specification indicated in BHEL datasheets and accepting IBR Form-IIIC submission.	YES ☐ NO ☐	YES ☐ NO ☐
03	Valves can be directly welded to connecting line sizes indicated in BHEL Datasheets without reducers	YES ☐ NO ☐	YES ☐ NO ☐
04	Lift % vs. Cv% curve for each and every valve model offered (Excluding Block Valve).	YES ☐ NO ☐	YES ☐ NO ☐
05	Terminal Box wiring diagram (For Pneumatic Actuators)	YES ☐ NO ☐	YES ☐ NO ☐
06	Vendor's Pneumatic Hookup diagram as applicable for each service considering whether actuator is Single Acting or Double Acting	YES ☐ NO ☐	YES ☐ NO ☐
07	Sizing Calculations showing Formula used with variables and constants for each of the following: i) Cv sizing for all services ii) Actuator sizing for all services iii) Noise calculation for control valves iv) Cavitation check calculation for SH/RH Spray control valves v) Valve outlet velocity calculation	 YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐	 YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐ YES ☐NO ☐
08	Valve and All Accessory catalogs if models are revised or these are offered for the first time.	YES ☐ NO ☐	YES ☐ NO ☐
09	The Quantities, Models and other vendor indicated details in **Quotation (Unpriced Bid)** are matching with BHEL Enquiry Sl.Nos. Quantities and those filled in BHEL Datasheets	YES ☐ NO ☐	YES ☐ NO ☐
10	Duly filled up "BHEL Special Contract Requirements" with Vendor Seal and Signature **(If applicable and sent by BHEL)**	YES ☐ NO ☐	YES ☐ NO ☐
11	ELECTRICAL ACTUATOR DETAILS (If applicable for this project) 1) Electrical Actuator –vendor wiring diagram 2) Actuator vendor's datasheets 3) BHEL datasheets for actuator	YES ☐ NO ☐	YES ☐ NO ☐
	VALVE VENDOR NAME :		
	SIGNATURE OF COMPANY REPRESENTATIVE WITH DATE :		
	SEAL OF COMPANY REPRESENTATIVE :		

NB: STRIKEOUT WHICHEVER IS NOT APPLICABLE