

			REF.: CE/416/KORBA R&M/EP/PS		
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	PROJECT : KORBA R & M 4 X 210 MW TPS CUSTOMER : M/s CSPGCL CONSULTANT : M/s NTPC PURCHASE SPECIFICATION FOR MICROPROCESSOR BASED SMART ELECTRONIC POSITIONER				
		REVISIONS: 00	APPROVED BY  ASHISH MANJHI		
			PREPARED BY  RAJESH L	ISSUED 416	DATE 12/06/2019

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SECTION- A

GENERAL INSTRUCTIONS TO BIDDERS:

All required documents against this Tender/Specification shall be submitted in English only.

Introduction: Bidders are required to offer Microprocessor based smart electronic positioner in thermal Power Plant applications (coal fired boilers).

In order to accept the Technical offers / proposals from Bidders for the Korba R&M 4 X 210 MW TPS Project in this Specification (refer Sections C & D), certain Pre-qualification criteria are required to be met by Bidder.

Pre-qualification requirements are clearly mentioned in Section-B. Bidder to read the same carefully and submit the details required for BHEL's acceptance.

Submit duly-filled Supplier Registration Form (SRF), which shall be downloaded by Bidder from our website "www.bhel.com. This is required for registration of new vendors at BHEL EDN against item Microprocessor based smart electronic positioner. Those Vendors who are already approved by BHEL EDN against item Microprocessor based smart electronic positioner are not required to submit the Supplier Registration Form (SRF).

In case Bidder does not meet Pre-qualification requirements, their offer will be summarily rejected and Bidder's Technical offers will not be evaluated.

Evaluation methodology: Evaluation methodology as below

BHEL shall initially open Bidder's PQR documents as per Section-B of this specification for review & acceptance.

If the Bidders who are meeting PQR requirements as per Section-B of this specification, Technical Offers of those bidders only will be considered for evaluation.

If the Bidders who are meeting Scope of supply and technical requirements as per Section C & D of this specification, Those Bidders will be taken up with End user/Customer for approval.

If the Bidders who are approved by End user/Customer, Commercial bids of those bidders will be considered for further evaluation by BHEL.

1.0 Bidders are required to submit offers as detailed below :

1.1 Documents pertaining to Pre-Qualification requirement (Section B of this Specification) shall be in a Separate cover /Soft Folder with reference no. "CE/416/EP/PQR / Section B" marked on it.

1.2. Technical offers/proposals for the Project, whose requirements are mentioned in Sections C will be submitted in a separate cover/Soft Folder with RFQ Reference & Reference marked on it.

Sections C & D will be submitted in a separate cover / soft-folder with RFQ reference & Reference marked on it.

Note 1:-Whenever required during evaluation of PQR and Technical offers/bids, vendor is required to be present at BHEL Electronic Division, Bangalore, for discussions. Further in the event of order, during approval of the vendor documents by End users/Customers, if needed vendor shall accompany BHEL representative for discussions.

Note 2:- Changes in Technical Specifications will be discussed with the bidders who Qualified PQR for this tender.

SECTION- B

Pre-Qualification Requirements (PQR) of Bidders for Microprocessor based smart electronic positioner:

1. The bidder should have executed / completed work of “supply, erection, commissioning of Microprocessor based smart electronic positioner with integration of control valves / power cylinder at works or at site. The offered microprocessor based smart positioner of minimum quantity 60 sets shall have been supplied assembled with control valve / power cylinders or assembled at site by the bidder and commissioned before 15.05.2018 in at least one thermal power station having unit rating of 200MW or above. Please provide supporting Documents i.e unpriced PO copies and Commissioning MOM/End user certificate.
2. Original Equipment Manufacturers based outside India, who are making offer for this tender shall have authorized representatives in India for support related to Documentation, Erection, Commissioning & any other co-ordination work. Please provide supporting details like Authorization letter, organization chart etc.
3. Submit Reference List of Projects wherein offered system is supplied & commissioned with supporting documents (Unpriced PO Copies, Commissioning MOM/ End user certificate).
4. OEM shall furnish an undertaking that in case of change of Indian representative / agent, OEM shall continue to support supplies w.r.t to service and supply of spare parts.
5. BHEL shall issue call for service / commissioning within 10 days’ notice. Bidder shall agree to visit BHEL project sites within above notice period.

Important note: In case Bidder does not submit details mentioned in above clauses or meet the requirements of Pre-qualification requirements, Offers will be summarily rejected and Bidder’s Technical offers/proposals will not be evaluated.

SECTION - C

SCOPE OF SUPPLY:

C1 Following items are required to be supplied as per Specifications enclosed in Section-D .Bidder shall quote unit prices for each item of bill of material and mandatory spares.

1. Microprocessor based Smart Positioner with Position Feedback Transmitter Quantity for Unit #1 is 57 Nos, Quantity for Unit #2 is 57 Nos, Quantity for Unit #3 is 53 Nos, and Quantity for Unit #4 is 53 Nos .Total Quantity 220 nos for 4 units. List of Services for which positioners are required is attached as Annexures-I.
2. Accessories like mounting hardware (for all 220 Nos positioners), Software (4 Sets for all 4 units), PC / computer (4nos for all four units), ¼" or 3/8" OD Copper tube (4 meter per positioner), Brass tube Connectors (As required),reducer ½" to 3/8" or ¼" (As required), Air lock relay (For fail freeze type positioner), Air Filter Regulator (for all 220 no positioners), JB as applicable etc.
3. Cable (20 meters for each unit) between PC and multiplexer is in Vendor scope.
4. Suitable converter shall be provided to connect multiplexer and PC for each unit.
5. Multiplexer (70 Tags) per unit and volume booster (1 No), hand held calibrator (1 No) of unit prices shall be provided separately in the offer.
6. Following items to be offered as Mandatory spares:
 - a) Positioners with Position Feedback Transmitter – 10 % or 2 nos of each type whichever is high (Mandatory spares shall be provided separate for unit 1 &2, unit 3 &4).

C2 OTHER REQUIREMENTS:

1. Documents to be furnished in the event of order, before manufacturing clearance/ dispatch clearance from BHEL of items:-
 - (i) Detailed BOM including all items. Data sheets / GA drawings, Technical catalog, Quality plan. Electrical schemes with termination details for Power and signal wiring. These soft documents (PDF Format) shall be submitted for approval.
 - (ii) Test Certificates, Material Certificates (as per approved Quality plan), before dispatch of items.
 - (iii) O & M manuals – 4 sets hardcopies (2 sets to BHEL-EDN & 2 sets with consignment to site). Also, a soft copy of O & M manual to be provided.
 - (iv) In the event of order vendor to visit the CSPGCL Korba 4 X 210MW TPS, Chattisgarh Site for finalization of mounting hardware before submission of document for approval.
 2. Erection & Commissioning for offered system:
 - 2.1 Removal of existing positioners & Erection of new Positioners on Control Valves/Power cylinders. This includes tubing between offered Positioners and nearest Air header.
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- 2.2 Calibration of Positioners with Control Valve / Power cylinder.
 - 2.3 Supervision of balance works (such as cabling) related to erection / installation of Positioners on Control Valve / Power cylinder.
 - 2.4 Total Commissioning and Handing over of the offered system to Owner / End user.

ANNEXURE-I
SMART POSITIONERS FOR UNIT-1

S.No	TAG NO	SERVICE DETAIL	ACTUATOR TYPE	Make and model of Actuator/Power cylinder	Make and model of Positioner	Travel distance	Fail safe(Closed/Open) and Fail freez.IF E/P Fail safe or fail freez check	Connector size at Actuator
1	1HOFCV	HFO Control Valve	Cylinder type, single acting	ILP & VSL VA1R			Fail Safe closed	1/4
2	1LOFCV	HSD Control Valve	Diaphragm Type, single acting	ILP & VSL VA1R			Fail Safe closed	1/4
3	1APCV	Automising Steam Pr. Controller	Diaphragm Type, single acting	Blake borough brig house england Cat No: BV 500/A40A			Fail Safe closed	1/4
4	1PC6	Cold Air Damper to mill "A"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
5	1PC7	Cold Air Damper to mill "B"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
6	1PC8	Cold Air Damper to mill "C"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
7	1PC9	Cold Air Damper to mill "D"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
8	1PC10	Cold Air Damper to mill "E"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
9	1PC11	Cold Air Damper to mill "F"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
10	1PC12	Hot Air Damper to mill "A"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
11	1PC13	Hot Air Damper to mill "B"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
12	1PC14	Hot Air Damper to mill "C"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
13	1PC15	Hot Air Damper to mill "D"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
14	1PC16	Hot Air Damper to mill "E"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
15	1PC17	Hot Air Damper to mill "F"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
16	1PC25	Igniter air to furnace DP Control	Power cylinder double acting	ILP			Fail Safe closed	1/4
17	1PC3	PA Fan 'A' Van Control	Power cylinder double acting	ILP & PC333309		247N	Fail Safe closed	1/4
18	1PC4	PA Fan 'B' Van Control	Power cylinder double acting	ILP & PC333309		247N	Fail Safe closed	1/4
19	1PC5	PA Fan 'C' Van Control	Power cylinder double acting	KELTRON & C0816342291	KELTRON & KR-2W		Fail Safe closed	1/4
20	1PC1	FD Fan 'A' Impeller control	Power cylinder double acting	ILP	SMC MAKE & IP 8001-036		Fail Safe closed	1/4
21	1PC2	FD Fan 'B' Impeller control	Power cylinder double acting	ILP	SMC MAKE & IP 8001-036		Fail Safe closed	1/4

ANNEXURE-I
SMART POSITIONERS FOR UNIT-1

S.No	TAG NO	SERVICE DETAIL	ACTUATOR TYPE	Make and model of Actuator/Power cylinder	Make and model of Positioner	Travel distance	Fail safe(Closed/Open) and Fail freez.IF E/P Fail safe or fail freez check	Connector size at Actuator
22	1PC23	ID Fan 'A' Scoop control	Power cylinder double acting	ILP	SMC MAKE & IP 8001-036		Fail Safe closed	1/4
23	1PC24	ID Fan 'B' Scoop control	Power cylinder double acting	ILP	SMC MAKE & IP 8001-036		Fail Safe closed	1/4
24	1SHCVL	S.H. Spray control valve (LHS)	Diaphragm Type single acting	ILP	SMC MAKE & IP8001		Fail Safe Open	1/4
25	1SHCVR	S.H. Spray control valve (RHS)	Diaphragm Type single acting	ILP	SMC MAKE & IP8001		Fail Safe Open	1/4
26	1RHCVL	R.H. Spray control valve (LHS)	Diaphragm Type single acting	ILP & VA4R (224490)			Fail Safe Open	1/4
27	1RHCVR	R.H. Spray control valve.(RHS)	Diaphragm Type single acting	ILP & VA4R (224490)			Fail Safe Open	1/4
28	1FW68	Main Feed control valve	Diaphragm Type single acting	MASONEILLAN & 67-41375			Fail Safe Open	3/8
29	1FW70	Main Feed stand-by control valve	Power cylinder double acting	ILP & ECD45 6DB			Fail Safe Open	3/8
30	1FW73	Low Load Feed control valve	Power cylinder double acting	ILP & VDC VP6			Fail Safe Open	3/8
31	1MC-26	Condensate Recirculation valve to HOTWELL	Diaphragm type, single acting	ILP & VDC VA2D			Fail Safe Open	1/4
32	1MC-34	Condensate from HOTWELL to DEARATOR	Diaphragm type, single acting	ILP			Fail Safe closed	1/4
33	1MC-30	Condensate dump to surge tank	Diaphragm type, single acting	ILP & VDC VA2R			Fail Safe closed	1/4
34	1MC-140	make-up to condensor from surge tank	Diaphragm type, single acting	ILP & VDC VA2D			Fail Safe closed	1/4
35	1AS-256	PRDS Steam to Dearator	Diaphragm type, single acting	ILP & VSN VA3R			Fail Safe closed	1/4
36	1CR-13	CRH Steam to Dearator	Diaphragm type, single acting	ILP & VDC 1A5D			Fail Safe closed	1/4
37	1HD-28	Drip of LPH2 to F/T	Diaphragm type, single acting	ILP & VST VA3D			Fail Safe closed	1/4
38	1HD-25	Drip of LPH3 to F/T	Diaphragm type, single acting	ILP & VST VA3D			Fail Safe closed	1/4
39	1HD-12	Drip of LPH3 to LPH2	Diaphragm type, single acting	ILP & VST VA3R			Fail Safe closed	1/4
40	1HD-35	Drip of LPH2 to LPH1	Diaphragm type, single acting	ILP & VST VA3R			Fail Safe closed	1/4
41	1HD-37	Drip of HPH6 to F/T	Diaphragm type, single acting	ILP & VSC VA2D	Siemens & SIPART PS2	37.5mm	Fail Safe Open	1/4
42	1HD-40	Drip of HPH5 to F/T	Diaphragm type, single acting	ILP & VSC VA2D		37.5mm	Fail Safe Open	1/4

ANNEXURE-I
SMART POSITIONERS FOR UNIT-1

S.No	TAG NO	SERVICE DETAIL	ACTUATOR TYPE	Make and model of Actuator/Power cylinder	Make and model of Positioner	Travel distance	Fail safe(Closed/Open) and Fail freez.IF E/P Fail safe or fail freez check	Connector size at Actuator
43	1HD-19	Drip of HPHJ5 to Dearator	Diaphragm type, single acting	ILP & VDC VA2D			Fail Safe Open	1/4
44	1HD-22	Drip of HPH6 to HPH5	Diaphragm type, single acting	ILP & VSC VA2D			Fail Safe Open	1/4
45	1HD-32	Drip Of HPH6 to Dearator	Diaphragm type, single acting	ILP & VDC VA2D			Fail Safe Open	1/4
46	1AS-246	Ejector pr. Control valve	Diaphragm type, single acting	ILP & VDC VA1D			Fail Safe Open	1/4
47	1AS-147	FO day tank filtering CV1	Diaphragm type, single acting	ILP & VDC PA1D			Fail Safe closed	1/4
48	1ASD-161	FO day tank filtering CV2	Diaphragm type, single acting	ILP & VDC PA1D			Fail Safe closed	1/4
49	1SBCV	soot blower control valve	Diaphragm type, single acting	MAZDA LTD & CAG TRIM SINGLE	ABB MAKE		Fail Safe closed	1/4
50	1TAS-PCV	TAS Pr. Controlvalve	diaphragm type, double acting	MASONEILLAN & 86-49009-EB			Fail Safe closed	3/8
51	1TAS-TCV	TAS temp. controlvalve	Diaphragm type, single acting	MASONEILLAN & 88-18467			Fail Safe closed	3/8
52	1BAS-PCV	BAS Pr. Controlvalve	diaphragm type, double acting	MASONEILLAN & 86-49409-EB			Fail Safe closed	3/8
53	1BAS-TCV	BAS temp. control valve	Diaphragm type, single acting	MASONEILLAN & 88-18467			Fail Safe closed	3/8
54		Burner Tilt Position corner 1	Power cylinder double acting	KELTRON & KR 4C			Fail Safe closed	1/4
55		Burner Tilt Position corner 2	Power cylinder double acting	KELTRON & KR 4C			Fail Safe closed	1/4
56		Burner Tilt Position corner 3	Power cylinder double acting	KELTRON & KR 4C			Fail Safe closed	1/4
57		Burner Tilt Position corner 4	Power cylinder double acting	KELTRON & KR 4C			Fail Safe closed	1/4

TOTAL QUANTITY FOR UNIT #1 57 NOS

ANNEXURE-I
SMART POSITIONERS FOR UNIT-2

S.No	TAG NO	SERVICE DETAIL	ACTUATOR TYPE	Make and model of Actuator/Power cylinder	Make and model of Positioner	Travel distance	Fail safe(Closed/Open) and Fail freez.IF E/P Fail safe or fail freez check	Connector size at Actuator
1	2HOFCV	HFO Control Valve	Cylinder type, single acting	ILP & VSL VA1R			Fail Safe closed	1/4
2	2LOFCV	HSD Control Valve	Diaphragm Type, single acting	ILP & VSL VA1R			Fail Safe closed	1/4
3	2APCV	Automising Steam Pr. Controller	Diaphragm Type, single acting	Blake borough brig house england Cat No: BV 500/A40A			Fail Safe closed	1/4
4	2PC6	Cold Air Damper to mill "A"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
5	2PC7	Cold Air Damper to mill "B"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
6	2PC8	Cold Air Damper to mill "C"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
7	2PC9	Cold Air Damper to mill "D"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
8	2PC10	Cold Air Damper to mill "E"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
9	2PC11	Cold Air Damper to mill "F"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
10	2PC12	Hot Air Damper to mill "A"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
11	2PC13	Hot Air Damper to mill "B"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
12	2PC14	Hot Air Damper to mill "C"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
13	2PC15	Hot Air Damper to mill "D"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
14	2PC16	Hot Air Damper to mill "E"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
15	2PC17	Hot Air Damper to mill "F"	Power cylinder double acting	ILP & PCDE8X. 16			Fail Safe closed	1/4
16	2PC25	Igniter air to furnace DP Control	Power cylinder double acting	ILP			Fail Safe closed	1/4
17	2PC3	PA Fan 'A' Van Control	Power cylinder double acting	ILP & PC333309		247N	Fail Safe closed	1/4
18	2PC4	PA Fan 'B' Van Control	Power cylinder double acting	ILP & PC333309		247N	Fail Safe closed	1/4
19	2PC5	PA Fan 'C' Van Control	Power cylinder double acting	KELTRON & C0816342291	KELTRON & KR-2W		Fail Safe closed	1/4
20	2PC1	FD Fan 'A' Impeller control	Power cylinder double acting	ILP	SMC MAKE & IP 8001-036		Fail Safe closed	1/4
21	2PC2	FD Fan 'B' Impeller control	Power cylinder double acting	ILP	SMC MAKE & IP 8001-036		Fail Safe closed	1/4
22	2PC23	ID Fan 'A' Scoop control	Power cylinder double acting	ILP	SMC MAKE & IP 8001-036		Fail Safe closed	1/4
23	2PC24	ID Fan 'B' Scoop control	Power cylinder double acting	ILP	SMC MAKE & IP 8001-036		Fail Safe closed	1/4
24	2SHCVL	S.H. Spray control valve (LHS)	Diaphragm Type single acting	ILP	SMC MAKE & IP8001		Fail Safe Open	1/4
25	2SHCVR	S.H. Spray control valve (RHS)	Diaphragm Type single acting	ILP	SMC MAKE & IP8001		Fail Safe Open	1/4
26	2RHCVL	R.H. Spray control valve (LHS)	Diaphragm Type single acting	ILP & VA4R (224490)			Fail Safe Open	1/4
27	2RHCVR	R.H. Spray control valve.(RHS)	Diaphragm Type single acting	ILP & VA4R (224490)			Fail Safe Open	1/4
28	2FW68	Main Feed control valve	Diaphragm Type single acting	MASONEILLAN & 67-41375			Fail Safe Open	3/8
29	2FW70	Main Feed stand-by control valve	Power cylinder double acting	ILP & ECD45 6DB			Fail Safe Open	3/8
30	2FW73	Low Load Feed control valve	Power cylinder double acting	ILP & VDC VP6			Fail Safe Open	3/8

ANNEXURE-I
SMART POSITIONERS FOR UNIT-2

S.No	TAG NO	SERVICE DETAIL	ACTUATOR TYPE	Make and model of Actuator/Power cylinder	Make and model of Positioner	Travel distance	Fail safe(Closed/Open) and Fail freez.IF E/P Fail safe or fail freez check	Connector size at Actuator
31	2MC-26	Condensate Recirculation valve to HOTWELL	Diaphragm type, single acting	ILP & VDC VA2D			Fail Safe Open	1/4
32	2MC-34	Condensate from HOTWELL to DEARATOR	Diaphragm type, single acting	ILP			Fail Safe closed	1/4
33	2MC-30	Condensate dump to surge tank	Diaphragm type, single acting	ILP & VDC VA2R			Fail Safe closed	1/4
34	2MC-140	make-up to condensor from surge tank	Diaphragm type, single acting	ILP & VDC VA2D			Fail Safe closed	1/4
35	2AS-256	PRDS Steam to Dearator	Diaphragm type, single acting	ILP & VSN VA3R			Fail Safe closed	1/4
36	1CR-13	CRH Steam to Dearator	Diaphragm type, single acting	ILP & VDC 1A5D			Fail Safe closed	1/4
37	1HD-28	Drip of LPH2 to F/T	Diaphragm type, single acting	ILP & VST VA3D			Fail Safe closed	1/4
38	1HD-25	Drip of LPH3 to F/T	Diaphragm type, single acting	ILP & VST VA3D			Fail Safe closed	1/4
39	2HD-12	Drip of LPH3 to LPH2	Diaphragm type, single acting	ILP & VST VA3R			Fail Safe closed	1/4
40	2HD-35	Drip of LPH2 to LPH1	Diaphragm type, single acting	ILP & VST VA3R			Fail Safe closed	1/4
41	2HD-37	Drip of HPH6 to F/T	Diaphragm type, single acting	ILP & VSC VA2D	Siemens & SIPART PS2	37.5mm	Fail Safe Open	1/4
42	2HD-40	Drip of HPH5 to F/T	Diaphragm type, single acting	ILP & VSC VA2D		37.5mm	Fail Safe Open	1/4
43	2HD-19	Drip of HPHJ5 to Dearator	Diaphragm type, single acting	ILP & VDC VA2D			Fail Safe Open	1/4
44	2HD-22	Drip of HPH6 to HPH5	Diaphragm type, single acting	ILP & VSC VA2D			Fail Safe Open	1/4
45	2HD-32	Drip Of HPH6 to Dearator	Diaphragm type, single acting	ILP & VDC VA2D			Fail Safe Open	1/4
46	2AS-246	Ejector pr. Control valve	Diaphragm type, single acting	ILP & VDC VA1D			Fail Safe Open	1/4
47	2AS-147	FO day tank filtering CV1	Diaphragm type, single acting	ILP & VDC PA1D			Fail Safe closed	1/4
48	2ASD-161	FO day tank filtering CV2	Diaphragm type, single acting	ILP & VDC PA1D			Fail Safe closed	1/4
49	2SBCV	soot blower control valve	Diaphragm type, single acting	MAZDA LTD & CAG TRIM SINGLE	ABB MAKE		Fail Safe closed	1/4
50	2TAS-PCV	TAS Pr. Controlvalve	diaphragm type, double acting	MASONEILLAN & 86-49009-EB			Fail Safe closed	3/8
51	2TAS-TCV	TAS temp. controlvalve	Diaphragm type, single acting	MASONEILLAN & 88-18467			Fail Safe closed	3/8
52	2BAS-PCV	BAS Pr. Controlvalve	diaphragm type, double acting	MASONEILLAN & 86-49409-EB			Fail Safe closed	3/8
53	2BAS-TCV	BAS temp. control valve	Diaphragm type, single acting	MASONEILLAN & 88-18467			Fail Safe closed	3/8
54		Burner Tilt Position corner 1	Power cylinder double acting	KELTRON & KR 4C			Fail Safe closed	1/4
55		Burner Tilt Position corner 2	Power cylinder double acting	KELTRON & KR 4C			Fail Safe closed	1/4
56		Burner Tilt Position corner 3	Power cylinder double acting	KELTRON & KR 4C			Fail Safe closed	1/4
57		Burner Tilt Position corner 4	Power cylinder double acting	KELTRON & KR 4C			Fail Safe closed	1/4

TOTAL QUANTITY FOR UNIT #2 57 NOS

**ANNEXURE-I
SMART POSITIONERS FOR UNIT 3**

S.NO.	ITEM DETAIL/TAG NO.	SERVICE DETAIL	Location	Actuator make/Model	positioner make	I/p converter make	position feedback make	Fail safe/Fail Freez	End connection	Single/double acting
1	3PA01	FEED WATER CONTROL VALVE MAIN	Feed regulating station	SERVOVALVE spa 67-41375-2010	MASONEILAN-SVI-II	MASONEILAN-SVI-II (inbuilt I/P & Positioner)	MASONEILAN-SVI-II(inbuilt feedback syssem)	Fail Safe Open	3/8	Double acting
2	3PA02	FEED WATER CONTROL VALVE BY PASS	Feed regulating station	YAMATAKE VDC-VP7	YAMATAKE	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8	Mass EPT	Fail Safe Open	3/8	Double acting
3	3PA03	FEED WATER CONTROL VALVE LOW LOAD	Feed regulating station	YAMATAKE VDC-VP6	YAMATAKE	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8	Mass EPT	Fail Safe Open	3/8	Double acting
4	3PA04	BAS PRESSURE LOW LOAD CONTROL VALVE	NEAR FRS			FISHER		Fail Safe closed	3/8	single
5	3PA05	HFO CONTROL VALVE	HFO LINE	IL VDC VA1R	IL	ILP		Fail Safe closed	1/4	single
6	3PA06	HSD CONROL VALVE	HSD LINE	IL VDC VA1R	IL	ILP		Fail Safe closed	1/4	single
7	3PA07	1st STAGE ATTEMP.CONTROL VALVE L.H.S.	REAR OF BURNER FLOOR	IL VDC-VA-5A	IL	ILP		Fail Freez	1/4	single
8	3PA08	1st STAGE ATTEMP.CONTROL VALVE R.H.S.	REAR OF BURNER FLOOR	IL VDC-VA-5A	IL	ILP		Fail Freez	1/4	single
9	3PA09	2ndSTAGE ATTEMP.CONTROL VALVE L.H.S.	REAR OF BURNER FLOOR	MIL 38-91221	SIEMENS	SIEMENS SMART INBUILT I/P & POSITIONER	SIEMENS SMART INBUILT FEEDBACK SYS)	Fail Freez	1/4	single
10	3PA10	2ndSTAGE ATTEMP.CONTROL VALVE R.H.S.	REAR OF BURNER FLOOR	MIL 38-91222	SIEMENS	SIEMENS SMART INBUILT I/P & POSITIONER	SIEMENS SMART INBUILT FEEDBACK SYS)	Fail Freez	1/4	single
11	3PA11	RE-HEATER ATTEMP.CONTROL VALVE L.H.S.	REAR OF BURNER FLOOR	MIL 38-91223	SIEMENS	SIEMENS SMART INBUILT I/P & POSITIONER	SIEMENS SMART INBUILT FEEDBACK SYS)	Fail Safe Open	1/4	single
12	3PA12	RE-HEATER ATTEMP.CONTROL VALVE R.H.S.	REAR OF BURNER FLOOR	MIL 38-91224	SIEMENS	SIEMENS SMART INBUILT I/P & POSITIONER	SIEMENS SMART INBUILT FEEDBACK SYS)	Fail Safe Open	1/4	single
13	3PA13	DEAERATOR PRESSURE CONTROL VALVE AS256	SIDE OF DEAERATOR	YAMATAKE	YAMATAKE	ABB_ MODEL TEIP 11		Fail Safe Open	1/4	single
14	3PA14	DEAERATOR PRESSURE CONTROL VALVE CR13	SIDE OF DEAERATOR	IL VDC VA5D	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
15	3PA15	HPH 5 NORMAL LEVEL CV HD19	DEAERATOR LEVEL	IL VDC VA2D	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
16	3PA16	HPH 6 NORMAL LEVEL CV HD32,HD22	DEAERATOR LEVEL	IL VDC VA2D	IL	FISHER-ROSEMOUNT MODEL 3311DS1L		Fail Safe Open	1/4	single
17	3PA17	HPH 6 HIGH LEVEL CV HD37	SIDE OF FLUSH TANK	IL VDC VA2R	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
18	3PA18	HPH 5 HIGH LEVEL CV HD40	SIDE OF FLUSH TANK	IL VDC VA3R	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
19	3PA19	LPH 2 NORMAL LEVEL CV HD35	SIDE OF LPH	IL VDC VA2R	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
20	3PA20	LPH 2 HIGH LEVEL CV HD25	SIDE OF FLUSH TANK	IL VDC VA4D	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
21	3PA21	LPH 3 NORMAL LEVEL CV HD12	SIDE OF LPH	IL VDC VA3R		FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
22	3PA22	LPH 3 HIGH LEVEL CV HD28	SIDE OF FLUSH TANK	IL VDC VA3D		FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
23	3PA23	HOTWELL LEVEL CV MC34	3 METER	IL VDC VA4R	SMC SMART POSITIONER	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
24	3PA24	HOTWELL LEVEL RECIR. CV MC26	3 METER			FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
25	3PA25	HOTWELL TO SURGE TANK CV MC30	3 METER	IL VDC VA2R		FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
26	3PA26	SURGE TANK TO HOTWELL CV MC140	GROUND FLOOR	IL VDC VA2D		FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
27	3PA27	EJECTOR PRESSUREESS. CV AS246	SIDE OF HPH5,6	657-ES	FISHER	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
28	3PA28	BFP A SCOOP	O" MTR TURBINE	NORGREN	NORGREN	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
29	3PA29	BFP B SCOOP	O" MTR TURBINE	NORGREN	NORGREN	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
30	3PA30	BFP C SCOOP	O" MTR TURBINE	NORGREN	NORGREN	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single

**ANNEXURE-I
SMART POSITIONERS FOR UNIT 3**

S.NO.	ITEM DETAIL/TAG NO.	SERVICE DETAIL	Location	Actuator make/Model	positioner make	I/p converter make	position feedback make	Fail safe/Fail Freez	End connection	Single/double acting
31	3PA31	ID FAN A SCOOP CONTROL	ID FAN	IL	IL	ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
32	3PA32	ID FAN B SCOOP CONTROL	ID FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
33	3PA33	FD FAN A SCOOP CONTROL	FD FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
34	3PA34	FD FAN B SCOOP CONTROL	FD FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
35	3PA35	PA FAN A VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
36	3PA36	PA FAN B VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
37	3PA37	PA FAN C VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
38	3PA38	PA FAN D VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
39	3PA39	PA FAN E VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
40	3PA40	PA FAN F VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
41	3PA41	PA FAN A HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
42	3PA42	PA FAN B HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
43	3PA43	PA FAN C HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
44	3PA44	PA FAN D HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
45	3PA45	PA FAN E HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
46	3PA46	PA FAN F HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
47	TAS-PCV	TAS Pr. Controlvalve		MASONEILLAN & 86-49009-EB				Fail Safe closed	3/8	diaphragm type, double acting
48	TAS-TCV	TAS temp. controlvalve		MASONEILLAN & 88-18467				Fail Safe closed	3/8	Diaphragm type, single acting
49	BAS-TCV	BAS temp. control valve		MASONEILLAN & 88-18467				Fail Safe closed	3/8	Diaphragm type, single acting
50	APCV	Automising Steam Pr. Controller		Blake borough brig house england Cat No: BV 500/A40A				Fail Safe closed	1/4	Diaphragm Type, single acting
51	spare							Faille Freez	1/4	single
52	spare							Fail Safe closed	1/4	single
53	spare							Fail Safe closed	1/4	single

TOTAL SMART POSTIONERS REQ FOR UNIT #3

53 NOS

ANNEXURE-I
SMART POSITIONERS FOR UNIT 4

S.NO.	ITEM DETAIL/TAG NO.	SERVICE DETAIL	Location	Actuator make/Model	positioner make	I/p converter make	position feedback make	Fail safe/Fail Freez	End connection	Single/double acting
1	4PA01	FEED WATER CONTROL VALVE MAIN	Feed regulating station	SERVOVALVE spa 67-41375-2010	MASONEILAN-SVI-II	MASONEILAN-SVI-II (inbuilt I/P & Positioner)	MASONEILAN-SVI-II(inbuilt feedback sysyem)	Fail Safe Open	3/8	Double acting
2	4PA02	FEED WATER CONTROL VALVE BY PASS	Feed regulating station	YAMATAKE VDC-VP7	YAMATAKE	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8	Mass EPT	Fail Safe Open	3/8	Double acting
3	4PA03	FEED WATER CONTROL VALVE LOW LOAD	Feed regulating station	YAMATAKE VDC-VP6	YAMATAKE	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8	Mass EPT	Fail Safe Open	3/8	Double acting
4	4PA04	BAS PRESSURE LOW LOAD CONTROL VALVE	NEAR FRS			FISHER		Fail Safe closed	3/8	single
5	4PA05	HFO CONTROL VALVE	HFO LINE	IL VDC VA1R	IL	ILP		Fail Safe closed	1/4	single
6	4PA06	HSD CONROL VALVE	HSD LINE	IL VDC VA1R	IL	ILP		Fail Safe closed	1/4	single
7	4PA07	1st STAGE ATTEMP.CONTROL VALVE L.H.S.	REAR OF BURNER FLOOR	IL VDC-VA-5A	IL	ILP		Fail Freez	1/4	single
8	4PA08	1st STAGE ATTEMP.CONTROL VALVE R.H.S.	REAR OF BURNER FLOOR	IL VDC-VA-5A	IL	ILP		Fail Freez	1/4	single
9	4PA09	2ndSTAGE ATTEMP.CONTROL VALVE L.H.S.	REAR OF BURNER FLOOR	MIL 38-91221	SIEMENS	SIEMENS SMART INBUILT I/P & POSITIONER	SIEMENS SMART INBUILT FEEDBACK SYS)	Fail Freez	1/4	single
10	4PA10	2ndSTAGE ATTEMP.CONTROL VALVE R.H.S.	REAR OF BURNER FLOOR	MIL 38-91222	SIEMENS	SIEMENS SMART INBUILT I/P & POSITIONER	SIEMENS SMART INBUILT FEEDBACK SYS)	Fail Freez	1/4	single
11	4PA11	RE-HEATER ATTEMP.CONTROL VALVE L.H.S.	REAR OF BURNER FLOOR	MIL 38-91223	SIEMENS	SIEMENS SMART INBUILT I/P & POSITIONER	SIEMENS SMART INBUILT FEEDBACK SYS)	Fail Safe Open	1/4	single
12	4PA12	RE-HEATER ATTEMP.CONTROL VALVE R.H.S.	REAR OF BURNER FLOOR	MIL 38-91224	SIEMENS	SIEMENS SMART INBUILT I/P & POSITIONER	SIEMENS SMART INBUILT FEEDBACK SYS)	Fail Safe Open	1/4	single
13	4PA13	DEAERATOR PRESSURE CONTROL VALVE AS256	SIDE OF DEAERATOR	YAMATAKE	YAMATAKE	ABB_ MODEL TEIP 11		Fail Safe Open	1/4	single
14	4PA14	DEAERATOR PRESSURE CONTROL VALVE CR13	SIDE OF DEAERATOR	IL VDC VA5D	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
15	4PA15	HPH 5 NORMAL LEVEL CV HD19	DEAERATOR LEVEL	IL VDC VA2D	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
16	4PA16	HPH 6 NORMAL LEVEL CV HD32,HD22	DEAERATOR LEVEL	IL VDC VA2D	IL	FISHER-ROSEMOUNT MODEL 3311DS1L		Fail Safe Open	1/4	single
17	4PA17	HPH 6 HIGH LEVEL CV HD37	SIDE OF FLUSH TANK	IL VDC VA2R	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
18	4PA18	HPH 5 HIGH LEVEL CV HD40	SIDE OF FLUSH TANK	IL VDC VA3R	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
19	4PA19	LPH 2 NORMAL LEVEL CV HD35	SIDE OF LPH	IL VDC VA2R	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
20	4PA20	LPH 2 HIGH LEVEL CV HD25	SIDE OF FLUSH TANK	IL VDC VA4D	IL	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
21	4PA21	LPH 3 NORMAL LEVEL CV HD12	SIDE OF LPH	IL VDC VA3R		FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
22	4PA22	LPH 3 HIGH LEVEL CV HD28	SIDE OF FLUSH TANK	IL VDC VA3D		FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
23	4PA23	HOTWELL LEVEL CV MC34	3 METER	IL VDC VA4R	SMC SMART POSITIONER	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
24	4PA24	HOTWELL LEVEL RECIR. CV MC26	3 METER			FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single

ANNEXURE-I
SMART POSITIONERS FOR UNIT 4

S.NO.	ITEM DETAIL/TAG NO.	SERVICE DETAIL	Location	Actuator make/Model	positioner make	I/p converter make	position feedback make	Fail safe/Fail Freez	End connection	Single/double acting
25	4PA25	HOTWELL TO SURGE TANK CV MC30	3 METER	IL VDC VA2R		FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
26	4PA26	SURGE TANK TO HOTWELL CV MC140	GROUND FLOOR	IL VDC VA2D		FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
27	4PA27	EJECTOR PRESSUREESS. CV AS246	SIDE OF HPH5,6	657-ES	FISHER	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe Open	1/4	single
28	4PA28	BFP A SCOOP	O" MTR TURBINE	NORGREN	NORGREN	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
29	4PA29	BFP B SCOOP	O" MTR TURBINE	NORGREN	NORGREN	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
30	4PA30	BFP C SCOOP	O" MTR TURBINE	NORGREN	NORGREN	FISHER-ROSEMOUNT MODEL 3311DS1L B1G7G8		Fail Safe closed	1/4	single
31	4PA31	ID FAN A SCOOP CONTROL	ID FAN	IL	IL	ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
32	4PA32	ID FAN B SCOOP CONTROL	ID FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
33	4PA33	FD FAN A SCOOP CONTROL	FD FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
34	4PA34	FD FAN B SCOOP CONTROL	FD FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
35	4PA35	PA FAN A VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
36	4PA36	PA FAN B VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
37	4PA37	PA FAN C VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
38	4PA38	PA FAN D VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
39	4PA39	PA FAN E VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
40	4PA40	PA FAN F VAN CONTROL	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
41	4PA41	PA FAN A HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
42	4PA42	PA FAN B HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
43	4PA43	PA FAN C HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
44	4PA44	PA FAN D HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
45	4PA45	PA FAN E HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
46	4PA46	PA FAN F HOT AIR DAMPER	PA FAN			ABB_MODEL TEIP 11		Fail Safe closed	1/4	single
47	4AS-PCV	TAS Pr. Controlvalve		MASONEILLAN & 86-49009-EB				Fail Safe closed	3/8	diaphragm type, double acting
48	4TAS-TCV	TAS temp. controlvalve		MASONEILLAN & 88-18467				Fail Safe closed	3/8	Diaphragm type, single acting

**ANNEXURE-I
SMART POSITIONERS FOR UNIT 4**

S.NO.	ITEM DETAIL/TAG NO.	SERVICE DETAIL	Location	Actuator make/Model	positioner make	I/p converter make	position feedback make	Fail safe/Fail Freez	End connection	Single/double acting
49	4BAS-TCV	BAS temp. control valve		MASONEILLAN & 88-18467				Fail Safe closed	3/8	Diaphragm type, single acting
50	4APCV	Automising Steam Pr. Controller		Blake borough brig house england Cat No: BV 500/A40A				Fail Safe closed	1/4	Diaphragm Type, single acting
51	spare							Fail Freez	1/4	single
52	spare							Fail Safe closed	1/4	single
53	spare							Fail Safe closed	1/4	single

TOTAL SMART POSTIONERS REQ FOR UNIT #4

53 NOS

SECTION-D

A. TECHNICAL REQUIREMENT FOR MICRO PROCESSOR BASED SMART ELECTRONIC POSITIONER:

Bidders to offer as per following Specification:

- 1) Electrical
 - a) Input Signal - 4 – 20 mA
 - b) Power Supply - Loop Powered from the output card of control system
 - c) Hart protocol - Capability for remote calibration and Diagnostics (super-Imposed Hart Signal on output Signal (4 – 20 mA)
 - d) Valve position Sensing - Position Sensing (Non-contact type), 4-20 mA
O/P signal for control system to be provided
- 2) Environment
 - a) Operating Temperature - (-) 30 to 80° C
 - b) Humidity - 0-95 %
 - c) Protection class - IP – 65 minimum
- 3) Software for Configuration & Diagnostic
 - a) Software - Windows based software. Software shall meet the requirement for configuration. Diagnostics, Calibration and testing of the actuator.
 - b) Diagnostic/ travel Test Features - Advanced Diagnostic features like stroke counter or counter, leakage in actuators, on line partial closure test, valve signature analysis, step response test, valve friction /Jamming detection etc. to be provided.
 - c) Factory valve signature tests reports (Pr. Vs Valve Travel and travel vs I/P signal) Are to be provided.
- 4) Hardware
 - PC / Computer - One per unit. Latest CPU, Main memory- 2GB expandable to 4 GB, Hard Disk – 160 GB, Monitor – 20” Full Flat TFT, refresh rate min 75 Hz, Graphic Memory – 16MB, Communication port – 2 serial plus, one parallel, 1 USB port, Dual 100 Mbps Ethernet, Expansion slots – 3, 101 keys Keyboard & optical mouse, Software -MS Windows latest.

5) Configuration

- Remote Calibration Auto & Manual calibration shall be offered.

6) Operating

- Operating Range - Full range and split range signal range.

7) Modes

- a) Valve action - Direct and Reverse Valve action
- b) Flow characterization - Possible to fit valve characteristics curve linear & equal Percentage

8) Fail Safe/fail freeze

- Fail Safe/ Fail freeze features is to be provided as per Annexure-A enclosed here.

9) Pneumatic

- a) Air capacity - Sufficient to handle the valve selected / boosters to be supplied if required.
- b) Air supply pressure - To suit the Air supply pressure / quality available
- c) Process connection - ¼" NPT / 3/8" NPT as per Annexure- A Enclosed here.

10) Performance

- a) Characteristic deviation - $\leq 0.5\%$ of span
- b) Ambient temperature effect - $\leq 0.01\%$ / °C or better

11) EMC & CE compliance

- Required to international - EN 50081-2 & EN50082 or Equivalent
- Standard like EN/IEC

12) Accessories

- a) In Built operator panel - Display with push buttons for configuration
And display on the positioner itself (Password Protected / hardware lock)
- b) Hand held Hart calibrator - Universal Hart calibrator to be offered, One per unit.
- c) Pressure gauge Block - For supply and output pressure filter regulator Other accessories like ¼" OD PVC coated Copper Tube, Brass Connectors shall be offered as On required basis for making system complete.

- d) Electrical Cable entry - ½" NPT, side or bottom entry to avoid water Ingress
- e) Valves mounting assembly - For sliding stem / rotary / single acting / double acting on required basis.

13) Positioners shall be of any of the following makes: Masoneilan (GE), Yokogawa, Siemens, ABB, Fisher (Emerson), SMAR, Dresser, METSO, Yamatake.

14) Packing:

- a. Electronics components shall be wrapped individually in a bubbled polythene sheet and packed in a separate carton box. Such boxes shall be packed in a wooden/ply wood case with adequate cushioning material to withstand normal transit risk. Packing list along with Photo of each item shall be provided separately to BHEL and one copy shall be along with the item.

B. Bidder shall furnish with the offer Clause-wise compliance / deviation list. This is must for evaluating the offer.