

## Section 7. Technical Specifications

The Goods and Related Services shall comply with following Technical Specifications:

Item No	Name of Item or Related Service	Technical Specification and Standards
1	2	3
<b>GOODS:</b>		
<b>Supply, Installation, Testing and Commissioning of Hot Well Level Control System of APSCL.</b>		
01.	<b>Electro-pneumatic Positioner (digital valve Controllers).</b>	Model: Emerson Fieldvue DVC6200/ Equivalent Positioner Type: DVC6200 Input Signal: 4-20 mA dc Diagnostics: Performance-PD Action: Direct, Gauges: 0-60 Psig/ 0- 4 bar Transmitter: 4-20 mA Position Transmitter Mounting Type: Field Mounting Manufacturer: Emerson/Equivalent. Country of origin: Singapore/Malaysia/G7/EU
02.	<b>DVC-6200 Aluminum Mounting KIT with Bracket + Feedback Array + Mounting</b>	Assembly including required Allen Screw for Valve Travel 4 ¼ Inch (For 5RM40G401) P/N.: GG 20240 X 082 (Aluminum) Controller Mounting Kit: Std 18-8 SST or Equivalent With all accessories. Manufacturer: Emerson/Equivalent. Country of origin: Singapore/Malaysia/G7/EU
03.	<b>DVC-6200 Aluminum Mounting KIT with Bracket + Feedback Array + Mounting</b>	Assembly including required Allen Screw for Valve Travel 1 ½ Inch (For 5RM40G402) P/N.: GG 20240 X 042 (Aluminum) Controller Mounting Kit: Std 18-8 SST or Equivalent With all accessories. Manufacturer: Emerson/Equivalent. Country of origin: Singapore/Malaysia/G7/EU
04.	<b>Feedback Array for Emerson Fieldvue DVC6200</b>	4 ¼ Inch Valve Travel (For 5RM40G401) Model: GG 20240 X 082 or equivalent Manufacturer: Emerson/Equivalent. Country of origin: Singapore/Malaysia/G7/EU
05.	<b>Feedback Array for Emerson Fieldvue DVC6200</b>	1 ¼ Inch Valve Travel(For 5RM40G402) Model: GG 20240 X 042 or equivalent. Manufacturer: Emerson/Equivalent. Country of origin: Singapore/Malaysia/G7/EU

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06.	<b>Level Troll Transmitter Complete Set (Tag: 5 SD 11L002)</b>	<p>Level Troll Type: 249BF or equivalent.          Equalizing Connection Size: DN50          Connection Location: Up Side &amp; Lower Side (3)          Rating: PN25, Connection Style: RF Flange          Displacer Length: 14 Inch          Displacer Diameter: 3 Inch          Trim Material: 316SST          Instrumentation Mtg Position: Left Hand          Process Temperature: 40 to 100°C          Process Fluid: Hot Well Water          Fluid Specific Gravity: 1.0          Type: DLC3010, Reverse Action,          Output Signal: 4 to 20 mA DC          (Replacement against s/n F146699)          Manufacturer: Emerson/Equivalent.          Country of origin: Singapore/Malaysia/G7/EU</p>
07.	<b>Level Troll Cage Head with mounting accessories</b>	<p>Type: 249BF; STYLES 3&amp;4, 1 ½ NPT          Part No.: 1Q33628X112 and 1B5530X022 (DLC3000 MTG KIT) or equivalent.          Manufacturer: Emerson/Equivalent.          Country of origin: Singapore/Malaysia/G7/EU</p>
08.	<b>Programmable Logic controller with I/O Module</b>	<p>Model: 1769 Series L31 Compact Logix or equivalent.          Channel 0 &amp; 1 RS-232 Serial Port          Communication ports parameter – CH0 - RS-232 &amp; CH1- RS-232 Default parameter as below          Protocol- DF1 Full-duplex, DF1 Full-duplex- 19.2 Kbps, Parity- None, Station Address- 0          DF1, DH-485, ASCII &amp; DF1, DH-485, fully isolated , User memory- 512 KB,          Number of I/O modules - max- 16 I/O modules          Number of I/O banks- max-3 banks          Backplane current-330 mA at 5V DC, 40 mA at 24V DC , Power dissipation- 2.61 W          Programming cable type - 1747-CP3 or 1756-CP3          Isolation voltage- 30V (continuous), Basic Insulation Type          Operational Temperature- 0~60 °C  <u><b>Programming Option: for unit 5</b></u>          Controller should set internally programmed under RS Logix 5000 platform with for Analog I/O card, all I/O channel must be configured for APSCL Hot well unit, 3 Analog in for 1 LIT, 2 valve status indication , 2 PID &amp; function blocks for main &amp; recycle control Valve operation for automatic control of hot well level  <u><b>Programming Option: for Spare unit</b></u>          Complete set L31 controller, chassis power supply, Analog Input, Output card set unit must be programmed fully as a critical spare for unit 4 &amp; 5 in case replacement needed          Manufacturer: Allen Bradley/Equivalent.          Country of origin: Singapore/Malaysia/G7/EU</p>
09.	<b>Allan Bradley 1769 Logix chassis power supply unit</b>	<p>Series compact Logix chassis power supply unit          User Power Output Voltage- 5 V dc, 24 V dc          Output Current-4 A          Maximum Operating Temperature-60 Degree C          For Use With- Compact output module          Manufacturer: Allen Bradley/Equivalent.          Country of origin: Singapore/Malaysia/G7/EU</p>

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10.	<b>Allan Bradley 1769-IF8 Series analog input card</b>	<p>8 input channel analog module  For 4~20 mA Analog signal  Maximum working voltage 30 V DC, 50~60 HZ  Operating temperature 0~60 Degree C  Channel impedance 250 K Ohm  Max current draw 70 mA at 24 VDC supply  Maximum current for each channel 0.35 A at full scale SIL 2 rated  Manufacturer: Allen Bradley/Equivalent.  Country of origin: Singapore/Malaysia/G7/EU</p>
11.	<b>Allan Bradley 1769-OF8C Series analog output card</b>	<p>8 input channel analog module  For 4~20 mA Analog signal  Maximum working voltage 30 V DC, 50~60 HZ  Operating temperature 0~60 Degree C  Maximum resistive load 0~500 Ohm for each channel  Max current draw 185 mA at 24 VDC supply  Max. accuracy for current channel 0.35 at full scale  SIL 2 rated Manufacturer: Allen Bradley/Equivalent.  Country of origin: Singapore/Malaysia/G7/EU</p>
12.	<b>Power supply unit</b>	<p>Model: Allan Bradley 1606-XLX240E or equivalent.  Input AC 100~240 V, single phase,  Din Rail Mounted with LED indication for DC output &amp; overload  Line frequency 50~60 Hz  Output 24V, 360 watts, 10A  Output voltage maximum adjustment range 24~28 V DC. SIL 2 rated  Operating temperature -20~70 Degree C  Manufacturer: Allen Bradley/Equivalent.  Country of origin: Singapore/Malaysia/G7/EU</p>
13.	<b>Allan Bradley 1606-XLX redundancy power module</b>	<p>24 VDC x 24 VDC  Type: 1606-XLS Series or equivalent.  Performance, Input Voltage: 24 - 28 VDC,  Output Voltage: 2.15 V, Output Current: 40 A,  Output Power: 960 W, Frequency Rating: 47 - 63 HZ, SIL 2 rated  Input Current: 20 A, Material: Plastic,  Mounting: DIN Rail  Operating Temperature: -25 To 70 DEG C  Manufacturer: Allen Bradley/Equivalent.  Country of origin: Singapore/Malaysia/G7/EU</p>
14.	<b>Allen-Bradley 1769-ECR</b>	<p>Compact Logix Right End Cap/Terminator, Series A. SIL 2 rated  Bus Current Draw, max: 5 mA at 5V DC  Operating altitude: 2000 m (6562 ft), Series A  Manufacturer: Allen Bradley/Equivalent.  Made in Singapore/Malaysia/G-7/ EU</p>

15.	<b>HMI ( For Unit-5)</b>	<p>Model- Cat- 2711P-RDT10C or equivalent.  Panel view Plus 1000 HMI 12" screen Touchscreen, Ethernet, and RS-232,  Screen Size: 10.4"  Power Input 18~32 VDC,  Power consumption- 70 Watt  Operating Temperature 0~55 Degree C  Line frequency 47~63 Hz  Enclosure rating- NEMA type 12, 13,  indoor use only IP54, IP65  Resolution-640 X 480  Backlight- CCFL, 50,000 Hr. life time  Keyboard function key- function key, numeric &amp; navigation  Display color combination- thin film Metrix, thin film transistor with liquid crystal display,  Battery life time- 4 years  Application flush memory 20 MB  Protocol- Ethernet, serial port, USB  <b>Programming</b>  HMI graphics display must be developed under factory suite platform for APSCL as per Howell unit, all graphics icon should be color combination, each dynamic icon animation must be done with PLC I/O channel, PID block &amp; function, Alarm, Trend display should be an option for navigation &amp; control  Manufacturer: Allen Bradley/Equivalent.  Country of origin: Singapore/Malaysia/G7/EU</p>
16.	<b>PLC &amp; HMI Panel</b>	<p>Locally fabricated panel, made of 2 mm thick galvanize sheet with gray color coated, design should meet to install the HMI on front or as per APSCL recommendation.  All PLC stuff inside the DIN rail Panel should contain Lubber, ventilation fan for cooling MCCB should be installed &amp; assign for dual AC 230 input for  Main supply from UPS &amp; utility  Internal wiring has to be with all cable marker as per electrical drawing  All I/O should assign individual 0.5 A fuse for overload protection</p>
17.	<b>Multiple conductor cables (Instrumentation cables)</b>	<p>Multiple conductor cables suitable for 24 V DC Electrical signals used for monitoring or controlling in process &amp; applications.  Size 14~18 AWG, with Internal screening or shielded  Cable outer color Black or Gray, internal Color combination Pair of white &amp; Black/Red &amp; Black. Or Combination of two color,  double Outer sleeve PVC insulated Suitable for class 1 DIV 2 hazardous atmosphere, flexible multistring internal conductor suitable for bend &amp; curve at harsh environment, cable type should be tolerable to maximum 60 Degree process temperature piping at surroundings  Made in Bangladesh/India/china/ Malaysia</p>
18.	<b>SS 316 Fittings</b>	<p>Swagelok SS Compression fittings  Swagelok Straight connector 3/8" OD tube x 1/4" MNPT, All fitting should be made of 316 SS, non-corrosive  Made in: G-7/EU</p>
19.	<b>Swagelok Ball valve</b>	<p>3/8" OD tube connection  Rated 0~500 Psig pressure, Temperature -65 to 300° F, Body material- Stainless steel, Packing Materials- PTFE , Configurations- 3-way  Swagelok Bulk head 3/8"  Made in : G-7/EU</p>
20.	<b>304 SS tube</b>	<p>3/8" OD tube suitable for Swagelok fittings,  wall thickness 0.035"  suitable for pneumatic air supply pressure 250 Psig , non-corrosive, flexibility for 180 Degree bend</p>

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21.	<b>Galvanize pipe</b>	3/4" for cable run through inside, low schedule for conduit purpose.
22.	<b>Cable Gland</b>	Cable entry gland ½' MNPT, brass or oxidize coated, anti-rust coated suitable for supplied cable size, gland should be environmental rubber seal type to restrict water egress into devise Made in India/china/ Singapore
23.	<b>Project accessories</b>	such as U clamp, bracket for tube run, pipe run, mounting saddle, screw, cable Tie, metal tie, clamp, for securing cable, tube with other consumable for complete installation- Made in Bangladesh
24.	<b>Fabricated manual option panel</b>	For valve (5RM40G401 & 5RM40G402) manual control operation, dual regulated output option by precision regulator at front of panel for fine adjustment. Regulator Brand- Norgren, watts, Fisher, type ¼" main input, 1/8" FNPT output connection - made in: G-7 or EU Individual Pressure Gauge Range 0~100 Psig back connection ¼" FNPT connection, made by Mc Daniel, Ashcroft, WIKA, Made in: G-7 or EU Panel internal tubing should be 250 psig PVC rated suitable for Swagelok connection each end, main panel input & final output end should be 3/8" Swagelok bulk head connection for valve connection With all accessories. All Internal component From G-7/ EU/ Singapore.
25.	<b>Project document</b>	Such as P&ID, electrical drawing, operating manual, product delivery literature provided with detail supplied product specification & manufacturer detail, LOOP drawing, product catalog etc. Made in Bangladesh
26.	<b>Project complete Installation, Testing &amp; Commissioning works</b>	Site acceptance test (SAT) will be done with the presence of customer representative. <b>Key Task of Project</b> Supplied electronic Level transmitter must be installed on Hot well bridle after removing existing pneumatic level transmitter power supply should be hook up & field calibration. Supplied electro-pneumatic DVC 6200 valve positioner field wiring termination with PLC with main & recycle valve Onsite calibration of all I/O Loop check & function check.
<b>RELATED SERVICES:</b>		
02.	<b>Supply, Installation, Testing and Commissioning of Hot Well Level Control System of APSCL.</b>	<b>Not Applicable</b>

N.B.

Note 01: Equipment's do not meet the requirements will not be certified.

Note 02: Quality will be certified after successful operation in the field & it will take 7 days.

Note 03: The Supplier shall provide Product Manual, Specification, O&M Manual for up gradation System, Instrument Data sheet, PLC data Sheet, Hook-up drawing, Inter - Connection diagram (Schematic Diagram), Functional diagram, PLC backup CD etc. during the delivery of the goods.

Note 04: Site visit will be highly encouraged.

Note 05: Operation philosophy of old & proposed hot well system is attached with tender documents.

Note 06: Dismantling of old materials, Supply, Installation, Testing & Commissioning is in supplier's scope.

- Note 07: At site if any modification of instrument (including extra accessories) is required that should be borne by the Supplier.
- Note 08: The supplied PLC & associated software license should be unlimited.
- Note 09: The Supplier should provide test and country of origin certificate for item no. 01, 06, 08,09,10,11,12,13,14 & 15.
- Note 10: System should be designed like that level, pressure & flow of condensate will not vary more than 3% during any operation of plant.
- Note 11: During cable laying & others works contractors' representative shall be present at site and proper PPE shall be maintained.
- Note 12: Training at site for 02 days for O&M engineers.
- Note 13: If actuator spring adjustment & maintenance is required that shall be done by the Supplier.

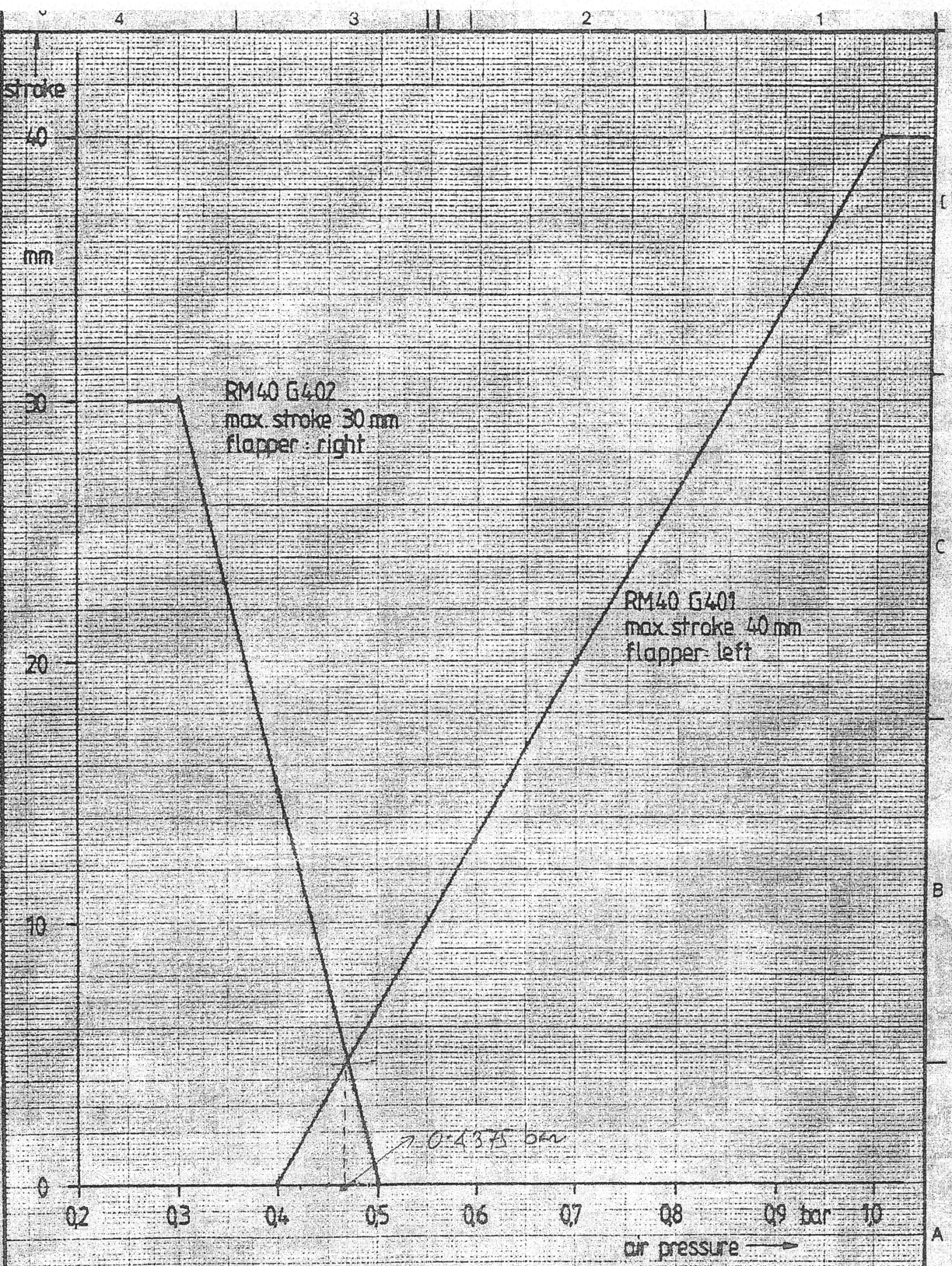


## Section 8. Drawings

**Attached.**

A handwritten signature in black ink, appearing to read "Paulina", with a stylized flourish at the end.

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2 → 0  
1 → 100 / 140



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**BBC** Titel: notwell level control valve RM40 G401 and minimum flow valve RM40 G402

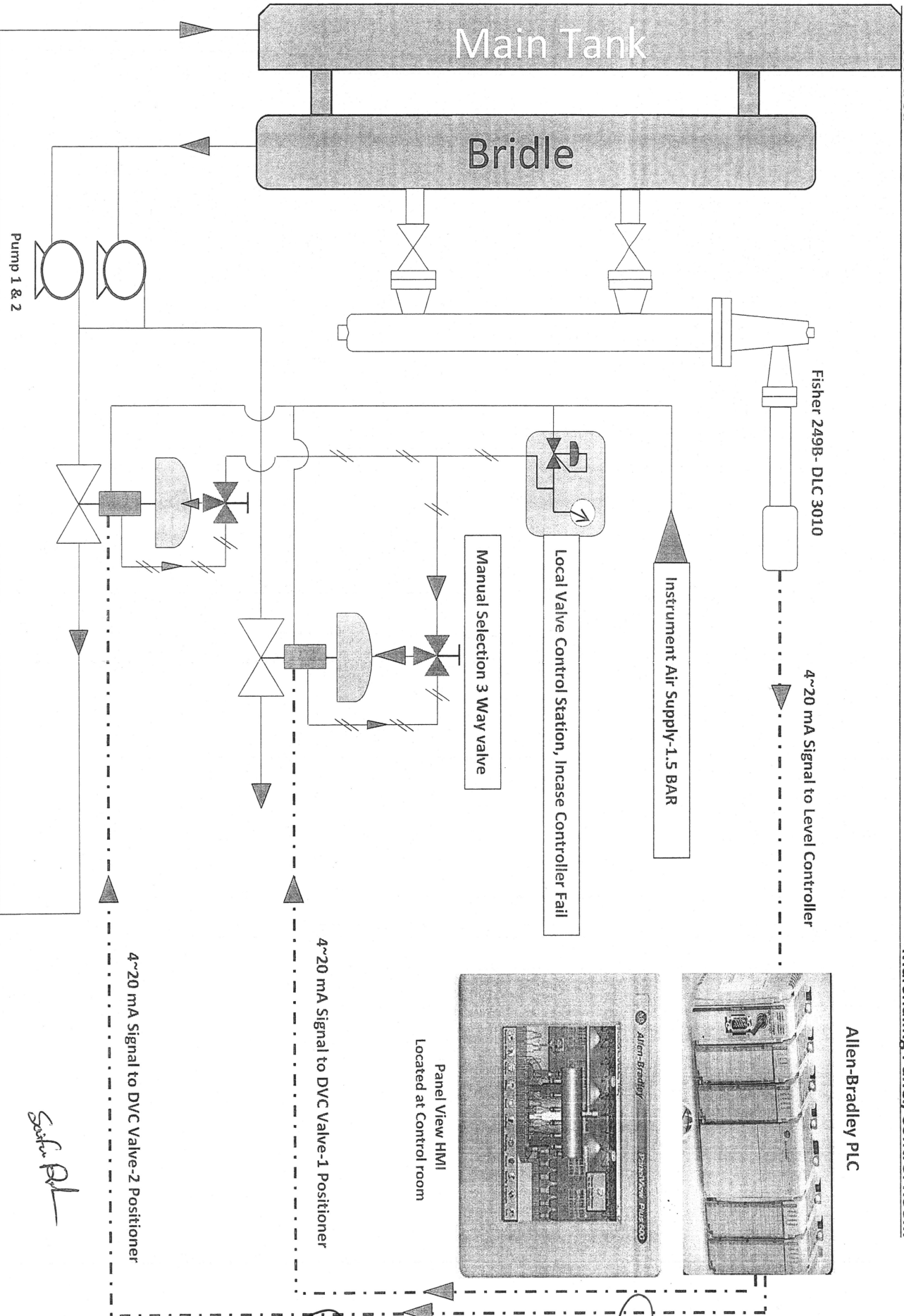
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# APSCL Hot well Split Level Control Loop (Unit: )

Process Area

Marshaling Panel/Control Room



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### **Existing system**

Currently APSCL Hot well split control loop is basically a locally manage pneumatically control, this system has been originally delivered under project scope, Level measurement & controlling by pneumatic transmitter & controller is an ancient system, it is a first generation measurement concept, there are lots of disadvantage exist with pneumatic measurement instrument such as, response delay of measurement signal, processing the control output signal for control valve for corrective action, all together In any critical process this is very tough to manage by pneumatic controller, there are other disadvantage as well, in this loop control, level indication signal or controller output is not connected in control room to monitor by process operator, so no one can see this part of process just need to run blindly, as a result if anything wrong in process after shutdown we used to notice about the abnormal situation

### **Proposal to Upgrade**

The current Fisher Level troll is a combination of Level measurement & field local Controller, the characteristics of measurement is buoyancy method & displacement type, our proposal is to convert this unit as an Electronic Transmitter unit model Emerson DLC 3010/EQUIVALENT displacer type sensor & Fisher 249B, the level sensing mechanism will be same as buoyancy type, internal electronic head will be consisting of RVDI, rotary variable differential transformer method, this advance measurement concept will measure very accurate Level of Hot well & will transmit a corresponding proportional signal to control room to monitor, this Measurement signal will be connected to a Allan Bradley PLC package, a Panel View brand HMI Human Machine Interface will be communicating with PLC, PLC will have its own configuration programmed for Split range PID control loop, HMI graphics will be built according to split range Valve loop & Animation will be done for all field devise, as per the Operator set point of level the primary control valve will start opening first, if the full percent opening of this valve is not able to meet the requirement of level then recycle valve will open next to meet the requirement of Level of Hot well tank, this is the way loop will be control automatically, the Split range function of controller will be done inside the PLC control block, as per customers need, Main control valve & recirculation control valve will operate gradually at 33.5% & 22.5% of level so each DVC valve controller will operate by standard 4~20 mA signal for respective 0~100% travel.

For each control valve, both existing Pneumatic positioner will be removed & new brand Electro-Pneumatic DVC 6200/Equivalent valve controller will be installed, this model is known as a best valve positioner in this age, which is incorporate with magnetic array feedback mechanism for quick position response, both positioner will be set up & calibrate for the each valve range.

In any case of process, operator can set the control loop in Auto, also can change to manual to operate those valve HMI screen will be touch panel type, if any case the PLC or HMI fail or out of service, a local option will be available to manipulate those valve, there will be a 3 way selection valve on each control valve, upon requirement anyone can reset this valve manually 180 degree, so local manipulate signal will be directly go to each control valve to manage the process,

From the HMI operator will be able to see % of level of hot well tank, each valve output, and historical trend, there will be accessible PID tuning parameter to tune the valve for faster or slower action.

In Allan Bradley PLC, one Analog input & output card will be configured, each card will have provision to connect 8 Each I/O, so there will be 07 Analog channel spare & 06 output channel spare for future use, we will be handed over a program back up for PLC & HMI, so customer can maintain those best way

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We will be offering RS Logix 5000 series application software which is an additional package for customer to log in to Allan Bradley compact Logix PLC directly, this is an additional option for customer to maintain their own program in their own PC, so in future anytime if needed customer can Up Load or down load the backup program, also can edit or monitor Ladder program

For this purpose dedicated measurement signal wire will be connected from control room to field transmitter location & dedicated control output signal will be connected for the both control valve as well,

Satish B. L.

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