BBCO Wastewater Pretreatment
25 Omega Dr.
Williston, VT 05459
D&K Project No. 530759
ADDENDUM NO. 2

February 17, 2026

TO: PROSPECTIVE BIDDERS

FROM: DuBois & King, Inc.
6 Green Tree Dr.
South Burlington, VT 05403

This Addendum forms part of the Contract Documents and modifies the original Bidding Documents dated January 30, 2026. **NOTE: Contractor to Acknowledge receipt of this Addendum in the space provided on Page 1 of the Bid Form. Failure to do so may subject the Bidder to disqualification.**

I. ADDITIONAL INFORMATION OR CLARIFICATION

Note that some questions are paraphrased based on emails received to date:

1. Is the purchase of the generator and transfer switch in the electrical scope?
   Response: Yes

2. Is there a specification on the transfer switch?
   Response: Please see Addendum No. 1 E6.1.

3. Are we to assume the new generator and transfer switch is to provide back-up power for Panel NP1?
   Response: Yes, Panel NP1 is backed up by the new portable generator via new MTS.

4. Will the classified area be marked or are we to assume all wiring on the exterior is to be Classified C1D1?
   Response: Assume all wiring leaving the tanks on the exterior until the conduit seals at the control panels on the interior is classified Class 1, Div 1.

5. Drawing E1.1- Are the items shown on TK202 and TK301 at the top or bottom of the tanks?
   Response: Items are at the bottom of the tank.

6. TK301 and TK202 on drawing C3 are in the reverse order on drawing E1.1, which drawing is correct?
   Response: Please see Addendum No. 1 E1.1.

7. Drawing C3- From control panel location to furthest tank at 1:10 scale it measures 75'. Drawing E1.1- From control panel location to furthest tank at ?" scale it measures 45' Which one is correct?
   Response: Power – Callout 1 scale is ¼"=1'-0". Refer to civil drawing C3 for accurate distance.

8. Which wage rates are to be used, Davis Bacon or State Prevailing?
   Response: State Prevailing wages are to be used. Davis Bacon not required.

9. Please confirm that the intent is to not relocate either the louver or the mechanical units on the side of the existing building while running the new pipes for the tanks?
   Response: The louver and condensing unit on the side of the existing building are to remain in place.

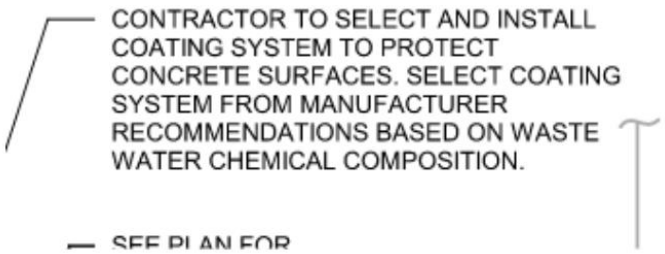
10. Please confirm if the contract between the equipment supplier and the owner includes any rigging/setting in place on contractor furnished pads or if this cost should be carried by the contractor?
    Response: Equipment supplier will deliver the equipment to the site. Rigging/setting in place of owner furnished equipment shall be by contractor.

11. Please confirm if any of the equipment inside will require poured in place housekeeping pads?
    Response: No, equipment can be placed on existing concrete floor.

12. Advertisement for bid notes project bid day of 2/20 and project start as 2/23, please confirm what work is scheduled to start by 2/23.
    Response: February 23 is the anticipated notice to proceed date. No work is required to start on 2/23, but the contractor can begin work as soon as the notice to proceed is issued.

13. Will emailed bids be acceptable?
    Response: Yes, an electronic submission of the bid will be acceptable. The deadline for an electronic submission will be the same as required in the Bid Documents. Electronic submissions shall be emailed to Matt Healey, at the following address: mhealey@dubois-king.com. If an electronic submission is made, one (1) hard copy shall follow through the mail to the address identified in the Bid Documents. Bidders are fully responsible for ensuring that electronically-submitted bids are successfully delivered. The Owner and Engineer take no responsibility for electronic delivery and receipt.

14. Sheet S1.1 notes coating system on tank slabs as shown below; please provide specification on coating required.
    Response: Contractor to select and install coating system based on waste water chemical composition.



15. Please provide specification on existing interior slab coating in order to match concrete patches.
    Response: **Contractor to select and install coating system based on waste water chemical composition.**

16. Sheet P2.1 note 13 calls for Sensorex S8000 PH analyzer to be installed in discharge of CIP tank, please provide specification on associated transmitter for use with the sensor.
    Response: **Rosemount 1056 Transmitter data sheet is attached.**

17. Sheet P2.1 note 8 references 2" PVC below grade. Is this required to be installed underslab as it leaves the membrane filtration module? No sawcutting of slab is shown. Please provide required elevation as it exits the building. It is assumed the owner supplied equipment includes a pump to create the force main to the manhole?
    Response: **2" PVC leaving the membrane filtration module to be installed underslab. Sawcut the slab as required. Elevation of foce main approximately 330.50 leaving building. Owner furnished equipment to include pump to create force main to the manhole.**

18. At the exterior tank pads and feed tank, is asphalt patching required to infill the over excavation? Or will stone fill suffice?
    Response: **Asphalt patching will be required.**

19. On drawing C4 the 2" pipe from the Feed Forward tank the Bio Tank is shown primarily above grade, on drawing P2.1 the 2" pipe is shown primarily below grade. Which installation is required?
    Response: Installation on P2.1 is correct. Pipe should be primarily below grade.

20. Please provide cutsheets/submittals on owner supplied equipment.
    Response: Enereau system manual and P&ID of owner furnished equipment is attached.

21. Please confirm new portable generator is to be furnished by electrical contractor.
    Response: **Yes**

22. At least one bathroom appears to be ceramic tile floor finish, please confirm patching requirements at tile finish.
    Response: Remove tile floor in bathrooms and patch concrete to match adjacent area.

23. Please confirm who is supplying pumps, no pumps are specified other than SP-1. It is unclear which pumps are supplied by owner. If pumps are to be supplied by contractor (tank vendor, PC or EC) please provide specifications on pumps.
    Response: The only pump provided by the contractor is pump SP-1. All other pumps in tanks to be furnished by the owner.

24. What is the estimated arrival date for the owner furnished equipment?
    Response: Estimated arrival date for owner furnished equipment is Mid-May.

25. How many shifts does the brewery operate?
    Response: Brewery operates one shift a day and brews 3-5 days a week. Brewing schedule can be adjusted to accommodate construction.

26. Is the intent for the service disconnects at the tanks to be explosion proof or stainless steel?
    Response: **The local service disconnects shall be Nema 4X and located within sight of the tanks on the exterior wall. The disconnects do not need to be XP rated as long as listed seal-off fittings are installed where the conduit emerges from grade between the tanks and disconnects.**

27. Is the transfer switch intended to be automatic or manual?
    Response: **Transfer switch is manual transfer equal to ASCO series 300.**

28. Is there an anticipated construction phasing schedule?
    Response: Construction phasing shall be developed by the contractor and coordinated with the owner.

29. Is the intent to provide protection from falling ice for exterior piping?
    Response: Provide top pipe along wall (2" PVC from Feed Forward Tank (TK201) to Bio Tank (TK202)) as schedule 80 PVC with 2" Cellular Glass Insulation equal to Owens Corning FOAMGLAS and .032 inch thick aluminum jacketing for protection from falling ice.

30. Is there a specification on precast sump pit/cover that is preferred?
    Response: Sump pit/cover specification as follows:

Concrete Construction: Precast concrete sections complying with <u>ASTM C478/C478M</u>.
Provide a single unit comprising base, walls, and access way.
Minimum Wall Thickness: 5 inches.
Concrete: 5000 psi at 28 days.
Waterproofing Admixture: Admixture formulated to reduce permeability to liquid water with no adverse effect on concrete properties.
Permeability of Cured Concrete: No measurable leakage when tested in accordance with <u>COE CRD-C 48</u> at 200 psi; provide test reports.
Joint Gaskets: <u>ASTM C443</u> (<u>ASTM C443M</u>) Type B.
Access Hatch Covers: Aluminum, with lifting mechanism, automatic hold open arm, slam lock with handle, and flush lift handle with red vinyl grip.

Use automatic hold open arm that locks in 90 degree position.
Construction: 1/4 inch thick diamond pattern plate with 1/4 inch channel frame and continuous anchor flange
Live Load Capacity: 300 pounds per square foot.

31. Does the feed forward tank require a 24” tank pad similar to the Equalization and Bio Reactor Tanks?
Response: **The feed forward tank is a below grade structure and does not require a pad.**

II. ATTACHMENTS

A. PRE-BID MEETING AGENDA AND SIGN-IN SHEET

B. ENEREAU SYSTEM MANUAL AND P&ID OF OWNER FURNISHED EQUIPMENT

C. ROSEMOUNT 1056 TRANSMITTER DATA SHEET

END OF ADENDUM

PRE-BID CONFERENCE

DuBois & King inc.

ENGINEERING ♦ PLANNING ♦ MANAGEMENT ♦ DEVELOPMENT

D&K PROJ. NO.:	530759
DATE & TIME:	Tuesday, February 12, 2026 @ 10AM
LOCATION:	Project Site

BBCO Wastewater Pretreatment

25 Omega Dr.
Williston, VT 05495

AGENDA

1. Introduction of Attendees
   - Owner, owners' representatives
   - D&K, engineers' representatives
   - Others (sign-in on Attendance Sheet)

2. Distribution of Bid Documents
   - Download Documents from DuBois & King, Inc. website (Issuing Office) www.dubois-king.com/projects-bidding-active

3. Review Bid Requirements
   - Bid due date, place

     Friday, February 20, 2026, until 4 PM

     DuBois & King, Inc.
     6 Green Tree Dr.
     South Burlington, VT 05403

   - Addenda's to be posted on website

   - Deadline for questions – Friday February 13, 2026, until 12 PM

4. General overview of project, construction items and tasks

5. Review contract requirements
   - Construction schedule
     Substantial Completion: June 30, 2026

6. Questions & Answers.

7. Other issues or topics that may be presented.

8. Adjourn.

DuBois & King inc.
ENGINEERING ◆ PLANNING ◆ MANAGEMENT ◆ DEVELOPMENT

6 Green Tree Dr.
South Burlington, VT 05403
Phone: 802-878-7661

PRE-BID MEETING ATTENDANCE SHEET

February 12, 2026 @10:00 AM

BBCO Wastewater Pretreatment

25 Omega Dr.
Williston, VT 05495

(Print Clearly)

Name	Company (Affiliation)	Telephone No.	Email Address
Matt Healey, P.E.	DuBois & King, Inc. South Burlington, VT	**Direct Dial: 802-728-7228** Office: 802-878-7661	mhealey@dubois-king.com
Joe Lemnah, Owner	Burlington Beer Company Williston, VT	802-863-2337	joe@burlingtonbeercompany.com
Beth Lemnah, Co-Owner	Burlington Beer Company Williston, VT	802-863-2337	beth@burlingtonbeercompany.com
Brian Hwang	Cummings Electric	802 242 0337	brian@cummingselectric.com
LARRY EASTMAN	" "	802-658-1797	larry@cummings electric.com
Mike Roussin	Ormond Bushey & Sons	802-872-8110	Mroussin12@Gmail.com

DuBois & King inc.
ENGINEERING ♦ PLANNING ♦ MANAGEMENT ♦ DEVELOPMENT

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South Burlington, VT 05403
Phone: 802-878-7661

PRE-BID MEETING ATTENDANCE SHEET

February 12, 2026 @10:00 AM

Name	Company (Affiliation)	Telephone No.	Email Address
DAN PARKER	PEAK MECHANICAL	888-771-8881	JCRESSEY@PEAKMECHANICALVT.COM
Owen Trudeau	ECI	802-318-6601	bheath@ecivt.com
Mark Farrington	Farrington Construction	802-985-8669	mark@farrcovt.com
Alex Smith	Stewart Construction	802-373-9935	asmith@scivt.com
Justin Mashia	Alliance	802-324-5498	JMashia@agosA.com
Tyler Thibault	CT Electric	802-318-0479	Tthibault@ctelectricvt.com
Chris Trono	CT Electric	802-310-9039	Ctrono@ctelectricvt.com
CHRIS MINADEO	NEAGLEY & CHASE	802 314-0919	CMINADEO@NEAGLEYCHASE.COM
DYLAN MAGOON	NEAGLEY + CHASE	802-782-9071	DMAGOON@NEAGLEYCHASE.COM

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6 Green Tree Dr.
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Phone: 802-878-7661
ENGINEERING ♦ PLANNING ♦ MANAGEMENT ♦ DEVELOPMENT

PRE-BID MEETING ATTENDANCE SHEET

February 12, 2026 @10:00 AM

Name	Company (Affiliation)	Telephone No.	Email Address
Phil Greaves	Standard Elec.	802-309-1174	Pgreaves@standardelectricvt.com
Rick Hodgson	Alliance	802-505-9906 764-0306	RickH@AGUSA.com
NICK OUITT	OMEGA EXCAVATION	802-793-9800	NOUITT@OMEGAEXVT.com

SYSTEM MANUAL

Burlington Beer Company

ESP22031

Rev.02
Issued: 25.10.23

Process Narrative

Client **Burlington Beer Company**

Project No. **ESP22031**

	Equipment Item	Tag	
1	The Enereau nrPUR wastewater treatment system is controlled from the Enereau Process Control Panel, CP101. Motor Starters for the single-phase Permeate and Backpulse pumps are in CP101. The Motor Starter for the 3-phase Air Scour Blower and Feed Forward Pump is in a Motor Control Centre, MCC101, mounted on the MFM skid. All other motors are controlled by an Auxiliary Control Panel (CP201) with corresponding motor starters located in MCC201.		
	Process Control Panel	CP101	
	Air Scour Control Centre	MCC101	
	Auxiliary Control Panel	CP201	
	Auxiliary MCC	MCC201	
2	Process wastewater (WW) from the brewing operations is collected in a client-supplied Equalization (EQ) tank, TK301.		
	EQ Tank	TK301	***Client supplied***
3	A pH Control Module is installed in TK301 to monitor and control the influent pH and to adjust the level to a range appropriate for downstream biological digestion. The pH Control Module operates as a continuous recirculation loop with a submerged recirculation pump, integral pH Indicator/Controller, pH Sensor, and Acid/Base Dosing Pumps.		
	pH Recirculation Pump	P301	
	P301 check valve	XV301	
	Return flow isolation valve	BV301	
	Sample valve	BV302	
	Feed flow isolation valve	BV303	
	pH Indicator/Controller	pHIC	
	pH sensor	pHS	
	Acid dosing pump	DP301	
	Base dosing pump	DP302	
4	Level Transmitter, LS301 , is installed in TK301 and transmits signals to CP201 (low, high, high-high). A submersible transfer pump module, P302, is installed in TK301. When the water level in TK301 rises above the high level, P302 transfers WW from TK301 through a Screen, SCR301, to a client-supplied Feed Forward tank, TK201, until the water level falls below the low sensor. A high-high level initiates an alarm if the water level rises above that point. A submersible aeration module is installed in TK301 to maintain an aerobic environment.		
	EQ Level Transmitter	LIT301	
	EQ Transfer Pump	P302	
	P302 check valve	XV302	
	Static Screen	SCR301	
	SCR301 inlet isolation valve	BV304	
	SCR301 outlet isolation valve	BV305	
	EQ aerator	JA301	
5	As noted, the pretreated WW is transferred from TK301 to the Feed Forward tank TK201. On a continuous basis, a submersible Feed Forward pump module in TK201 transfers WW to the client-supplied Aerobic BioReactor (ABR) tank, TK202. A level sensor, LS201, installed in TK201 transmits a signal to CP101 to initiate the Permeate Cycle. A level sensor, LS202, installed in TK201 alerts for high level in TK201 and sends an interupt signal to CP201 to interupt P302.		
	Feed Forward Tank	TK201	***Client supplied***
	TK201 Permeate Cycle Level	LS201	
	TK202 High Level	LS202	
	Feed Forward pump	P201	
	P201 check valve	XV201	

6 The ABR is a continuously mixed biological digestion process. A submersible aeration module is immersed in TK202 to provide the oxygen required for the digestion process. As noted above, WW is transferred from TK201 to TK202, from where it flows by gravity to the Membrane Tank, TK101 and, in turn back to TK201. This continuously recirculating flow of WW from TK201 through TK202 to TK101 and back to TK201 is termed the Return Activated Sludge (RAS) flow. Periodically, at a target Mixed Liquor Suspended Solids (MLSS) concentration, sludge may be discharged from TK202 to a client-supplied Waste Sludge Tank. This is termed Waste Activated Sludge (WAS).

BioReactor Tank	TK202	***Client supplied***
TK202 process aerator	JA201	
WAS Discharge Valve	BV201	***Client supplied***

7 The Membrane Filtration Module (MFM) provides the solids-liquid separation process on the digested mixed liquor. The MFM train comprises the Membrane Tank, TK101, with one (1) cassette of ultrafiltration modules in the tank, MM101, a skid-mounted Permeate Pump & Air Scour module, and a Backpulse/Clean-in-Place (BP/CIP) module.

The inlet piping for the Permeate Pump Assembly on the MFM skid is connected to a manifold that, in turn, is connected to the permeate connections at the top of MM101. A permeate pump, P101, with a Permeate Auto Valve, AV101, on the pump inlet, draws ultrafiltered water through the membranes under suction and discharges the treated water into the CIP Tank, TK102. The Air Scour Blower assembly, AB101, is connected to a manifold that, in turn, is connected to the air inlet connections at the top of MM101. The air scour blower injects air into an aeration manifold at the bottom of the cassette, from where it rises as a continuous stream of coarse bubbles to scour biofilm off the membranes and enhance permeation. In Auto, the process operation is described in the Permeate Cycle section below. A low level sensor, LS101, will interrupt the Auto cycle if the level in the membrane tank reaches a cut off level.

A submersible pump, P102, is installed in TK102. P102 is the Backpulse & Clean-in-Place (CIP) pump and, when energized from ECP101, transfers permeate or CIP solution through an Auto Valve, AV102, through the membranes in a reverse flow direction to clean biofilm off the outside surface of the membranes.

A client-supplied submersible pump, P103, complete with integral low-level cut-off, is installed in TK102. When energized by integral level sensor rising above the high-level set-point, P103 transfers permeate the municipal discharge infrastructure piping.

The Backpulse/Clean-in-Place (BP/CIP) module is programmed to backpulse treated permeate through the permeate piping to the membranes for a preset period. For CIP, cleaning solution may be added to the BP/CIP tank and the BP/CIP pump manually energized to pump cleaning solution to the membranes.

Membrane tank	TK101	
UF Membrane Cassette	MM101	
TK101 low level sensor	LS101	
Permeate pump	P101	
P101 flow control valve	BV101	
TMP sensor	PIT101	
P101 inlet auto valve	AV101	
P101 flow sensor	FIT101	
Air Scour blower	AB101	
AB101 isolation valve	BV103	
AB101 pressure relief valve	PRV101	
AB101 pressure sensor	PIT102	
AB101 by-pass valve	BV104	
AB101 silencer	S101	
BP/CIP tank	TK102	
BP/CIP pump	P102	
P102 flow control valve	BV102	
P102 auto discharge valve	AV102	
TK101 isolation valve	BV105	
Final effluent discharge pump	P103	***Client supplied***
P103 check valve	XV101	***Client supplied***

8 The **Permeate Cycle** is a four (4) step sequence of operations that repeats on a typical 10-minute cycle that starts & stops based on signals from LS201

Step 1	Permeation
Step 2	Relaxation 1

Step 3	Backpulse
Step 4	Relaxation 2

9 The Mixed Liquor Suspended Solids (MLSS) in the system will range typically from 7 mg/L to 15 mg/L. As the MLSS approaches the 15 mg/L level, sludge should be wasted from the system. This is termed Waste Activated Sludge (WAS). WAS may be discharged from the system by pumping mixed liquor from the aerobic BioReactors. Typically, about 25-33% of the overall mixed liquor volume will be removed on each WAS cycle.

Control Summary

Client **Burlington Beer Company**

Project Number **ESP22031**

Equipment Item	Tag	Size (HP)	Power	Duty
Motor Controls in CP101				
Permeate pump	P101	0.5	115/1/60	<50%
BP/CIP pump	P102	0.5	115/1/60	<10%
Motor Controls in MCC101				
Air Scour blower	AB101	2.0	208/3/60	100%
Feed Forward pump	P201	1.0	208/3/60	100%
Auxiliary Motor Controls - MCC201				
pH Recirculation Pump	P301	0.5	208/3/60	100%
EQ Transfer Pump	P302	0.5	208/3/60	50%
EQ aerator	JA301	3.0	208/3/60	100%
TK202 process aerator	JA201	16.0	208/3/60	100%

Appendix 1

Membrane Module and Cassette Details

Cassette Material: Type 304 SS

For this project one (1) membrane cassette is supplied.
The membrane cassette has a total of 15 modules.
The weight of the membrane cassette maintains vertical stability within the Membrane Tank.
The cassette has a Permeate connection flange fitting at one end and an Air-scour connection flange fitting at the opposite end.
Permeate is extracted through the Permeate connection during the filtration step.
During the backpulse step, clean water is pumped through the Permeate connection to the membranes in a reverse-flow direction.
Air is injected through the Air-scour connection to a grid of coarse bubble aeration diffusers at the base of the cassette and is used to enhance permeate flow by scouring the surface of the membranes.
The Membrane Cassette Permeate and Air-scour flanges are connected by hoses to corresponding on the Permeate Skid.
- Air: 1.5" Flange
- Permeate: 1.5" Flange

Each of the membrane modules is connected into the cassette permeate collection header.
There are coarse-bubble aeration pipes installed at the base of each cassette and connected to the cassette air distribution header.
Cassette airflow requirements are determined by the total membrane capacity, not the installed surface area.

Cassette installation and removal

To Install the cassette into the Membrane Filtration Tank,

1 Attach equal-length lifting cables to the lifting eyes on each top corner of the cassette, taking care to avoid any pressure on the membrane elements or the permeate ports
2 Connect the other end of the lifting cables to an overhead lifting hoist or similar lifting device.
3 Slowly lower the cassette into the tank until the cassette is sitting solidly on floor of the tank.
4 Once the membrane cassette is seated on the Membrane Tank floor, connect and secure the permeate and air hoses using hose clamps.

To remove a cassette,

1 Turn off the permeate pump, air scour blower and mixed liquor feed to the Membrane Filtration.
2 Drain the liquid in the Membrane Filtration Tank to the top of the membrane modules.
3 Disconnect the air and permeate hose clamps from both the cassette and Membrane Filtration Tank flanges before lifting the cassette.
4 Attach equal-length lifting cables to the lifting eyes on each top corner of the cassette, taking care to avoid any pressure on the membrane elements or the permeate ports
5 Hoist the cassette vertically until it is fully clear of the tank.

Storage & Handling

The membranes are stabilized with a glycerin solution when delivered. Once the glycerin solution is removed or once the membranes are wetted, the membranes must not be allowed to dry out.

If it is not possible to maintain the membranes in water after they have been wetted, or if the system is not used for a period of more than a month, the modules should be cleaned with a Recovery CIP process and stored as noted below.

Submerged Storage:

Store the membrane in a tank with an aqueous solution of sodium bisulphite (0.5–1.0%) or an aqueous solution of benzoic acid (0.5%)

External Storage: (maximum of 6 months)

The modules must be submerged in the following preservative for more than 10 minutes

- 78% Deionized water (conductivity < 2 µS/cm)
- 20% Glycerin
- 2% Ecolab Ultrasil 73

The preservative has a density of about 1,045 g/cm³.

During longer storage periods, the concentration of the preservative must be controlled, or the solution has to be replaced at regular intervals of about 6 months. All the pores of the membrane need to be completely filled with the solution. This can be achieved by a short filtration run. During preservation, operational safety procedures, particularly protection of the skin and eyes, must be followed as this acidic solution has a pH around 2.

In the case of external storage of the modules, the aerator piping must be cleaned. The cassettes should be removed, and the aerator assembly should be cleaned thoroughly to remove all biofilm on its surface. Cleaning of the aerator assembly can be done by pressure washer or mechanically with a sponge. When cleaning the aerator assembly, take care to avoid any damage to the membranes. If externally stored aerator piping is not cleaned before storage, the aerator assembly can have an uneven air distribution after re-installation, and this can damage the membranes during operation.

Membrane Cleaning

During operation, the membrane performance may decrease as a result of fouling from a variety of substances in the wastewater. Fouling may be organic or inorganic. For organic fouling, the membranes are cleaned with a solution of sodium hypochlorite (NaOCl). For inorganic fouling, the membranes are cleaned with a solution of citric acid.

Two cleaning regimes are used to maintain membrane performance: a Chemically-Enhanced Backwash (CEB) and a more intensive recovery Clean-in-Place (CIP).

The CEB cleaning should be performed twice weekly or when the Trans-membrane Pressure (TMP) reaches -200 mbar (-3 psi) when permeating treated water.

The more intensive CIP cleaning should be performed once every 2-3 months or when the membranes are highly fouled (TMP reaches -400 mbar (-6 psi) and the CEB cleaning is not sufficient.

For organic fouling, a 0.05-0.1% solution of Sodium Hypochlorite (NaOCl) is used.

For inorganic fouling, a 0.5% solution of Citric Acid is used typically, with a target pH range of 3-4

The CEB process:

1. Prepare the chemical for the cleaning solution, as noted above, in the Backpulse/CIP tank.
2. Stop the Permeate Pump and close the Permeate Motorized Isolation Valve.
3. Open the Back-pulse Motorized Isolation Valve.
4. Continue to run the air scour unit for 10-20 minutes.
5. Stop the air scour unit.
6. Backpulse at least 1-4L of the cleaning solution per m^2 of membrane surface area into the membrane tank and regulate the flow to ensure that the Trans-membrane Pressure (TMP) does not exceed 200 mbar (3 psi)
7. Allow the system to remain idle for 1-3 hours of membrane soak time. Soak time will vary depending on the extent of membrane fouling.
8. Open the Permeate Motorized Isolation Valve and close the Permeate Motorized Isolation Valve.
9. Turn on the permeate pump for 3-5 minutes to discharge the spent cleaning solution.
10. Stop the permeate pump and turn on the air scour unit for 30 minutes.
11. Return the system to normal operation.

The recovery CIP Process:

1. Prepare the chemical for the cleaning solution, as noted above, in the Backpulse/CIP tank.
2. Stop the Permeate Pump and close the Permeate Motorized Isolation Valve.
3. Open the Back-pulse Motorized Isolation Valve.
4. Continue to run the air scour unit for 10-20 minutes.
5. Stop the air scour unit.
6. Transfer the mixed liquor from the membrane tank to the bioreactor or to a spare aerated holding tank.
7. Fill the empty membrane tank with clean water – stored permeate may be used for this – ensuring that the membrane cassette is fully immersed.
8. Backpulse at least 1L per m^2 of membrane surface area of the cleaning solution into the membrane tank and regulate the flow to ensure that the TMP does not exceed 200 mbar (3 psi).
9. Bring the overall chemical concentration within the membrane tank to the recommended chemical concentrations noted above.
10. Monitor the pH of the solution to ensure that it is within the recommended range.
11. Turn on the air scour unit for 20-30 minutes to mix chemicals.
12. Turn off the air scour unit and allow the system to remain idle for at least 6 hours of membrane soak time - typically until the membrane surface is close to white.
13. Drain the cleaning solution from the membrane tank to waste or to sludge thickening and rinse the tank thoroughly with clean water.
14. Return the mixed liquor to the membrane tank.
15. Turn on the air scour unit.
16. Return system to auto mode with permeate flow set to 25% of normal flow.
17. Gradually increase the permeate pump flow in 25% increments every 2 hours until full design flow is reached.
18. Return the system to normal operation.

Operating Guidelines:

During permeation:

- TMP should not exceed -400 mbar (-6 psi)
- The maximum TMP for the membrane should never exceed -600 mbar (-8 psi)

During CIP:

- TMP should not exceed 300 mbar (4.5 psi)

Permeate Design Flux:

- 20 lmh

Backpulse Design Flux:

- 15-25 lmh

Air scour

Air flow from the base of the cassette should be visually checked on a daily basis to ensure that sufficient air is provided to scour the membranes. Maximum recommended airflow is 0.6 m3/h per m2 of cassette capacity.

Appendix 2

Process Monitoring

Minimum recommended checks. Final monitoring schedule to be approved by plant operator.

Equalization Tank	If aerated, check that there is adequate mixing within the EQ tank.
Mixed Liquor Suspended Solids (MLSS)	Check that the Return Activated Sludge (RAS) stream between the BioReactor and the membrane tank has a healthy medium brown color.
	The design MLSS concentration should be in the range 6-12 g/L.
	When the MLSS concentration reaches the upper bound, approximately 33% of the mixed liquor should be discharged/removed as Waste Activated Sludge (WAS) for offsite or onsite disposal.
Turbidity	Permeate Turbidity is monitored by inspecting the water quality in the permeate tank. The water should be clear with a turbidity of <1 NTU. Sample with a hand-held turbidity meter or visual inspection.
Dissolved Oxygen (DO)	In a healthy biological treatment system, the DO should always be aerobic (> 2 mg/L) and may be checked with a hand-held probe.
pH & Alkalinity	Check pH to ensure BioReactor is operating in a healthy range (6.5-7.5) & that there is sufficient alkalinity to buffer pH swings (typically >150 mg/L)
Temperature	Check temperature in Equalization, the Bioreactor(s) and the Membrane Tank to ensure all operations are within the acceptable range.
Influent & Effluent COD	Chemical Oxygen Demand (COD), is the value of all chemicals in the wastewater that can be oxidized, in mg/L, and may be used to estimate the bio-degradable (BOD_5) strength of the influent wastewater and treated effluent.
Influent & Effluent BOD_5	A measure of the oxygen required by the bacteria in the activated sludge to digest the organic load in the wastewater, as measured over a 5-day period.
Influent & Effluent TSS	Total Suspended Solids (TSS) is used to assess the strength of the influent and the quality of the effluent, in mg/L
Backpulse or Clean-in-Place (CIP) tank	The backpulse/CIP tank should be drained and dosed with 500 ml of sodium hypochlorite (5-6% strength) to prevent algae growth on a weekly basis.
Nutrient Balance	In addition to food (the organic fraction of the influent) and oxygen, a healthy biomass requires certain quantities of nutritional inorganic materials, such as nitrogen (N) and phosphorus (P). Although sewage and many other wastewaters are generally assumed to contain all nutritive substances needed for cell growth, N, P, and other inorganic elements may need to be supplemented for effective treatment of industrial wastewater:
	a. The typical nutrient condition is C:N:P = 100:5:1.
	b. The condition is also greatly affected by the operating condition of the activated sludge process such as mean cell residence time (MCRT) and solid retention time (SRT, θc).
BOD balance	When the BOD load is below design parameters, supplemental carbon addition maybe required to ensure a healthy F:M ratio is maintained. For a Conventional Activated Sludge (CAS) system in a MBR configuration, a typical range for F:M is 0.08 to 0.15.

**** Depending on variability of the load, during setup it is recommended to have daily checks of all parameters to establish a correct baseline for parameters not checked on site.***

Mechanical Equipment

Raw WW pre-treatment	Inspect all pre-treatment processes and equipment to ensure effective operation.
Piping & Valves	Inspect all pipe & valve couplings to ensure that they are tight and that there are no leaks. It is particularly important to ensure that no air is allowed to leak into the permeate suction lines.
Permeate Flow (Q)	The system is designed to permeate treated water at a pumped flow rate of (Q) USgpm or L/min. The permeate pump flow should be in the range of (Q) USgpm. Check flow 5 min. before & 5 min. after back-pulse (if enabled).
	It is recommended to keep a log of permeability to develop a membrane cleaning schedule.
Backpulse flow	Backpulse flow (if enabled) should be 50-60% of Q, the permeate flow rate. Check flow 30 sec. after start of backpulse.
Membrane Air Scour	Check bubble pattern to ensure proper mixing. If an airflow meter is installed, check to ensure airflow does not exceed maximum recommended value.
Process Aeration	Aeration is installed in the bioreactor. The bubble pattern should be inspected to ensure the unit is functioning and providing mixing and air supply to the system.
Return Activated Sludge (RAS) Flow	The system is designed to operate with a continuous recycle of mixed liquor between the bioreactor and membrane tanks. The overflow of the membrane tank should be visually inspected to ensure that the feed-forward pump is providing adequate mixed liquor recirculation and that the RAS has the right color (brown).
Motorized ball valves (if installed)	During the permeate cycle, the respective motorized ball valves will move between the open & closed positions as part of the sequence. Each should be observed to check operation.

Instrumentation & Controls

Level Sensors	Check that all level sensors are operational and free from any obstructions.
Transmembrane Pressure (TMP)	TMP should not exceed -400 mbar (-6 psi) during permeation (filtration) or +300 mbar (4.5 psi) during backpulse or CIP. Check TMP 5 minutes before backpulse, as well as 30 seconds after start of backpulse and again 5 minutes later (if enabled). Note TMP and corresponding flow rate in operations log.

Appendix 3

Chemicals & Reagents

pH Adjustment

Sodium Hydroxide (NaOH)
Sulfuric Acid (H_2SO_4)
Hydrochloric Acid (HCl)
Nitric Acid (HNO_3)
Phosphoric Acid (H_3PO_4)

Nutritional Balance	**Mass per Day**
Nitrogen	5% of the daily mass loading of Carbon
Phosphorus	1% of the daily mass loading of Carbon
Carbon supplements	If the carbon fraction of the raw wastewater is reduced, additional food will be required to maintain a healthy biomass. Carbon augmentation may be required (e.g. Molasses, Dog food, Waste food products). Before using any carbon supplements, check with your third-party biology supplier if the supplement is compatible with the supplied biology.

Activated Sludge Seed

Seed sludge sourced from an existing wastewater treatment plant.
Third party packaged starters.

Membrane Cleaning

Sodium Hypochlorite (NaOCl)
Citric Acid ($C_6H_8O_7$) – purchased as a powder

Appendix 4

Pre- & Post-treatment Processes

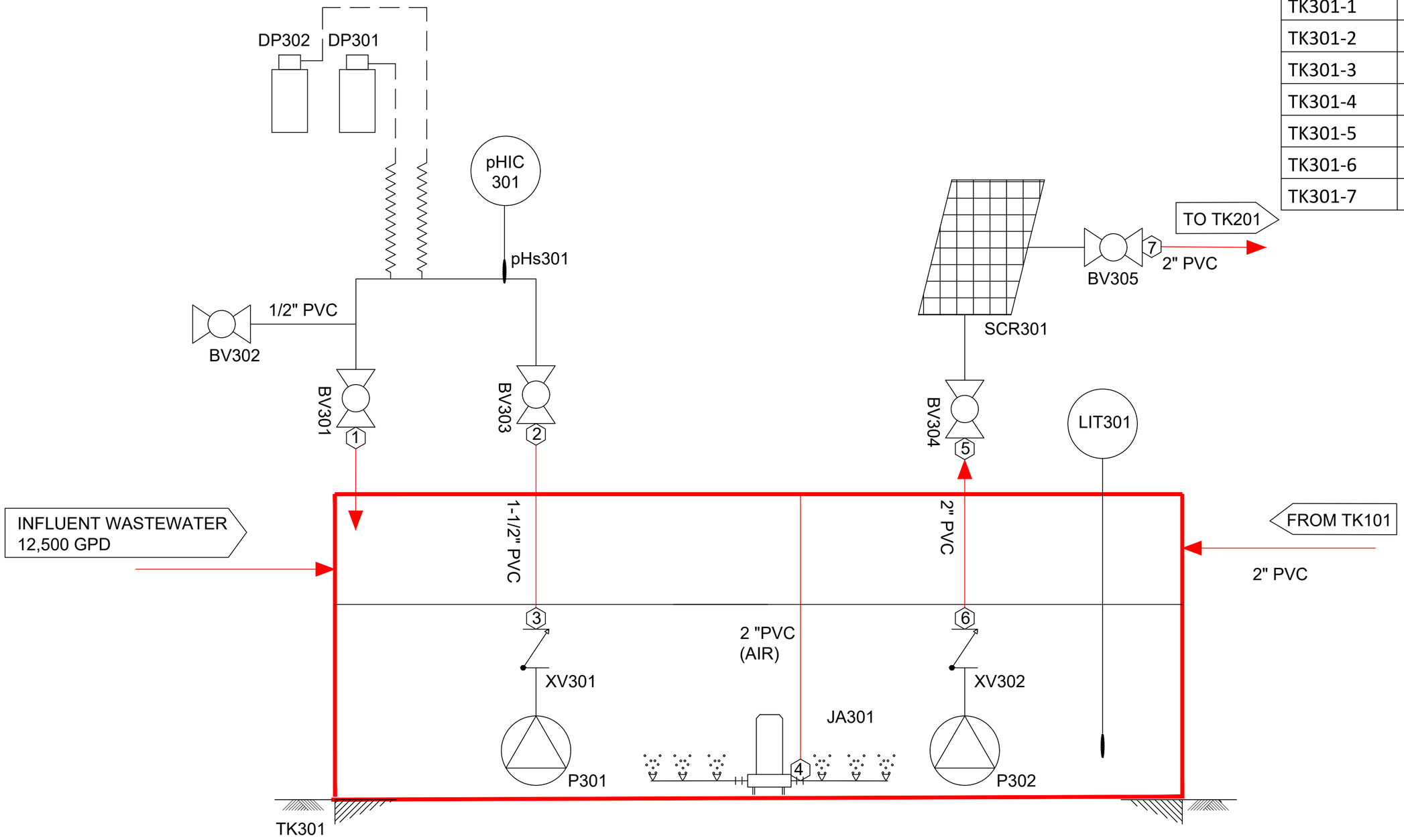
Pre-treatment

Parameter	Issue	Pre-treatment Options
Suspended Solids (SS)	Non- or marginally-biodegradable and/or harmful suspended solids may reduce the efficiency of the treatment process and/or damage the membranes and/or other mechanical equipment or instrumentation.	Side-streaming of recyclable solids, primary settlers, in-line strainers, screens, grinder/chopper pumps.
Fats, Oil & Grease (FOG)	FOG may inhibit the biological efficiency of the aerobic digestion process and/or reduce the effective permeability of the MBR membranes.	Grease traps, primary treatment tank skimmers.
pH	The aerobic digestion process functions optimally within a pH range of 6.5 to 7.5, the biomass may be inhibited at pH levels outside the range.	Manual or automatic pH measurement coupled with acid & base reagent dosing equipment.
Temperature	The biomass digests organic material optimally in the range or 10-30°C. Biomass efficiency declines significantly below 10°C or above 35°C. Membrane permeability declines significantly below 15°C. Many of the materials of construction in the mechanical equipment, including the membranes, may be harmed or destroyed at temperatures above 40°C.	Pre-treatment balancing tanks with sufficient residence time to allow high temperature influent to cool to a level below 35°C.

Post-treatment

Parameter	Issue	Post-treatment Options
Waste sludge	The biological digestion process generates a waste product, typically dead cell matter and non-biodegradable solids, at a rate of 70-100% the mass of influent BOD_5. On a daily or campaign basis, Waste Activated Sludge (WAS) must be removed from the system in order to maintain a Mixed Liquor Suspended Solids (MLSS) concentration within the target operation range, typically from 6-12 g/L.	Sludge thickeners to increase the sludge concentration from 1.5% to over 5%, filter presses, screw presses, drainage tubes.
Effluent polishing	In an advanced MBR process, the ultra-or micro-filtration membranes will remove SS larger than the membrane pore size, typically 0.05-0.4 µm, but may not remove very fine colloidal solids, dissolved solids or molecules, including alcohols and other soluble organics.	Nano-filtration, reverse osmosis, electro-dialysis, carbon adsorption.
Disinfection	The membranes used in the MBR process have a pore size that is typically 100x smaller than bacteria. However, the membranes will not prevent the passage of viruses unless they are removed coincident with host bacteria.	Oxidation (chlorine, bromine, ozone, peroxide), ultra-violet radiation, reverse osmosis.

FITTING	TYPE
TK301-1	1-1/2" SOC
TK301-2	1-1/2" SOC
TK301-3	1-1/2" SOC
TK301-4	2" FPT
TK301-5	2" SOC
TK301-6	2" SOC
TK301-7	2" SOC



NOTE: -AERATOR PIPE TO TERMINATE IN CLIENT SUPPLIED TANK VENTS.
-ALL TANKS TO BE VENTED TO ATMOSPHERE.
-ALL PUMPS TO BE INSTALLED ON SLIDE RAILS.

ENEREAU™

ENEREAU SYSTEMS GROUP INC.

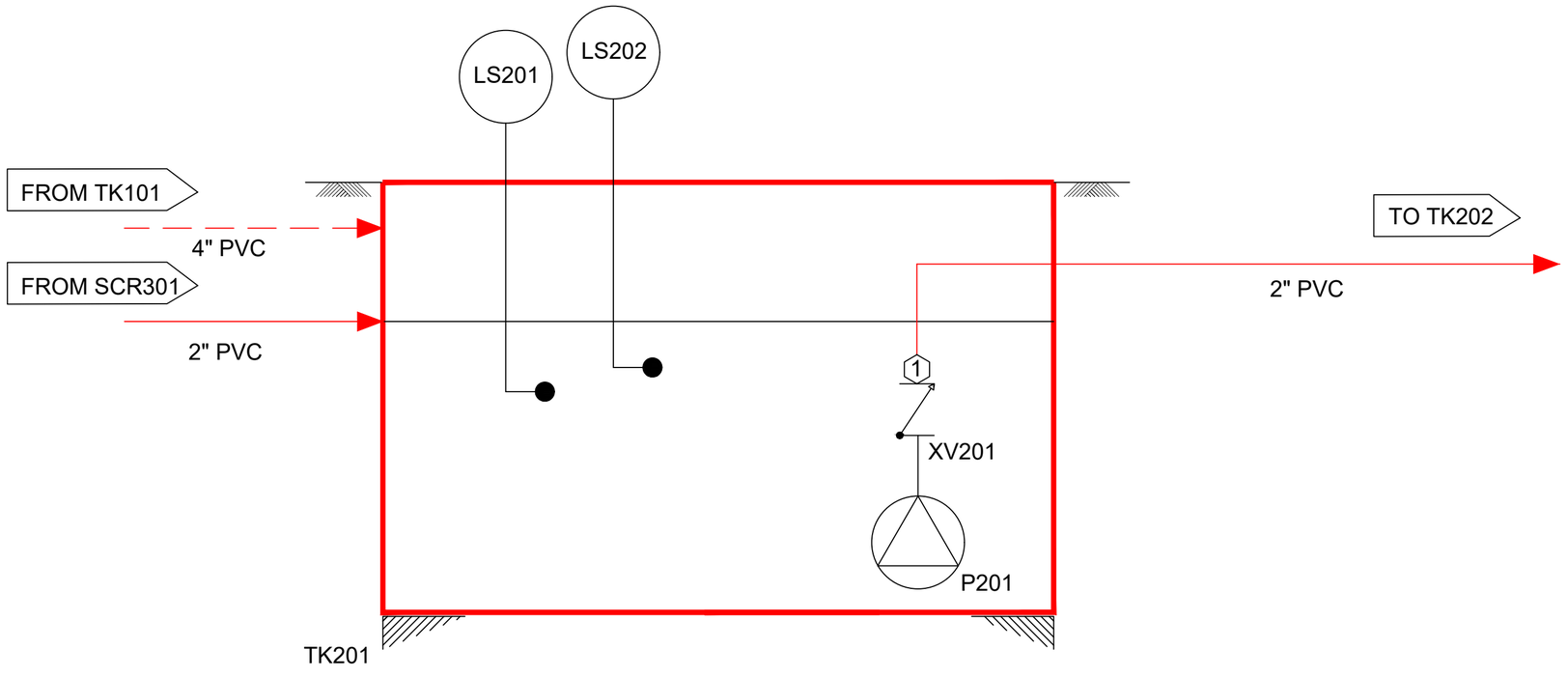
BURLINGTON BEER CO.

P&ID: EQUALIZATION TANK

REV03

PROJECT:	ESP22031
DRAWING #:	P-001
DATE:	25-10-23
DRAWN BY:	YvP
CHECKED BY:	CH

FITTING	TYPE
TK201-1	2" SOC



NOTE: -ALL TANKS TO BE VENTED TO ATMOSPHERE.
-PUMP TO BE INSTALLED ON SLIDE RAILS.

ENEREAU™

ENEREAU SYSTEMS GROUP INC.

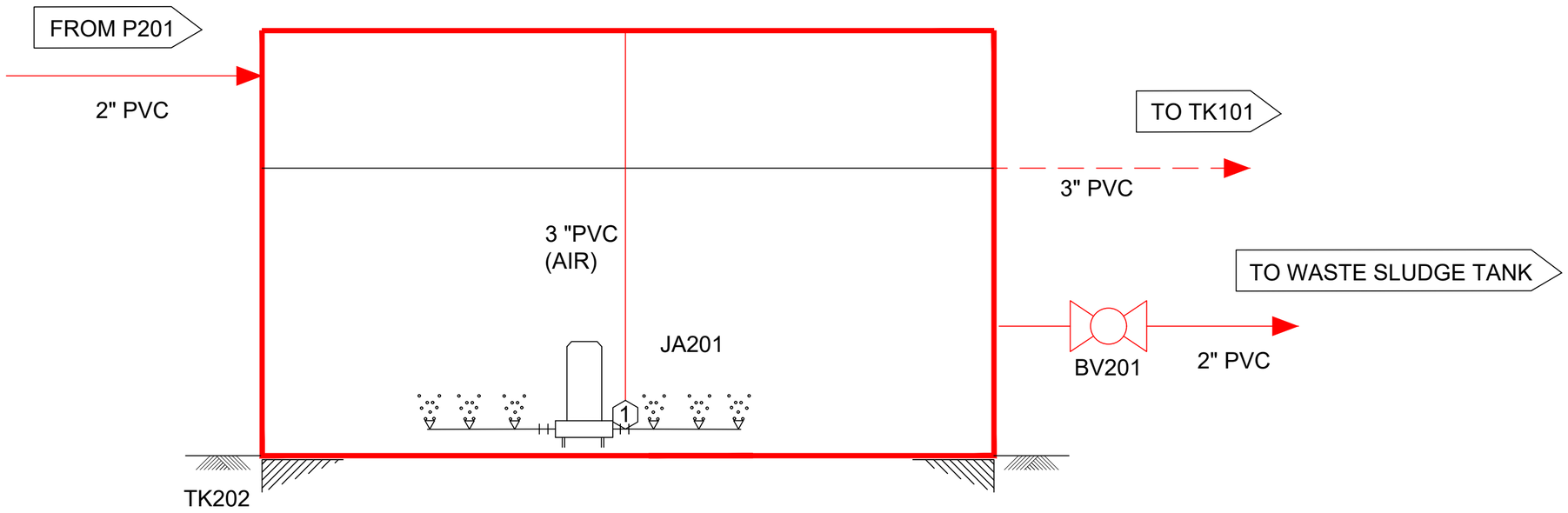
BURLINGTON BEER CO.

P&ID: FEED FORWARD TANK

REV03

PROJECT:	ESP22031
DRAWING #:	P-002
DATE:	25-10-23
DRAWN BY:	YvP
CHECKED BY:	CH

FITTING	TYPE
TK202-1	3" FPT



NOTE: -AERATOR PIPE TO TERMINATE IN CLIENT SUPPLIED TANK VENTS.
-ALL TANKS TO BE VENTED TO ATMOSPHERE.

ENEREAU™

ENEREAU SYSTEMS GROUP INC.

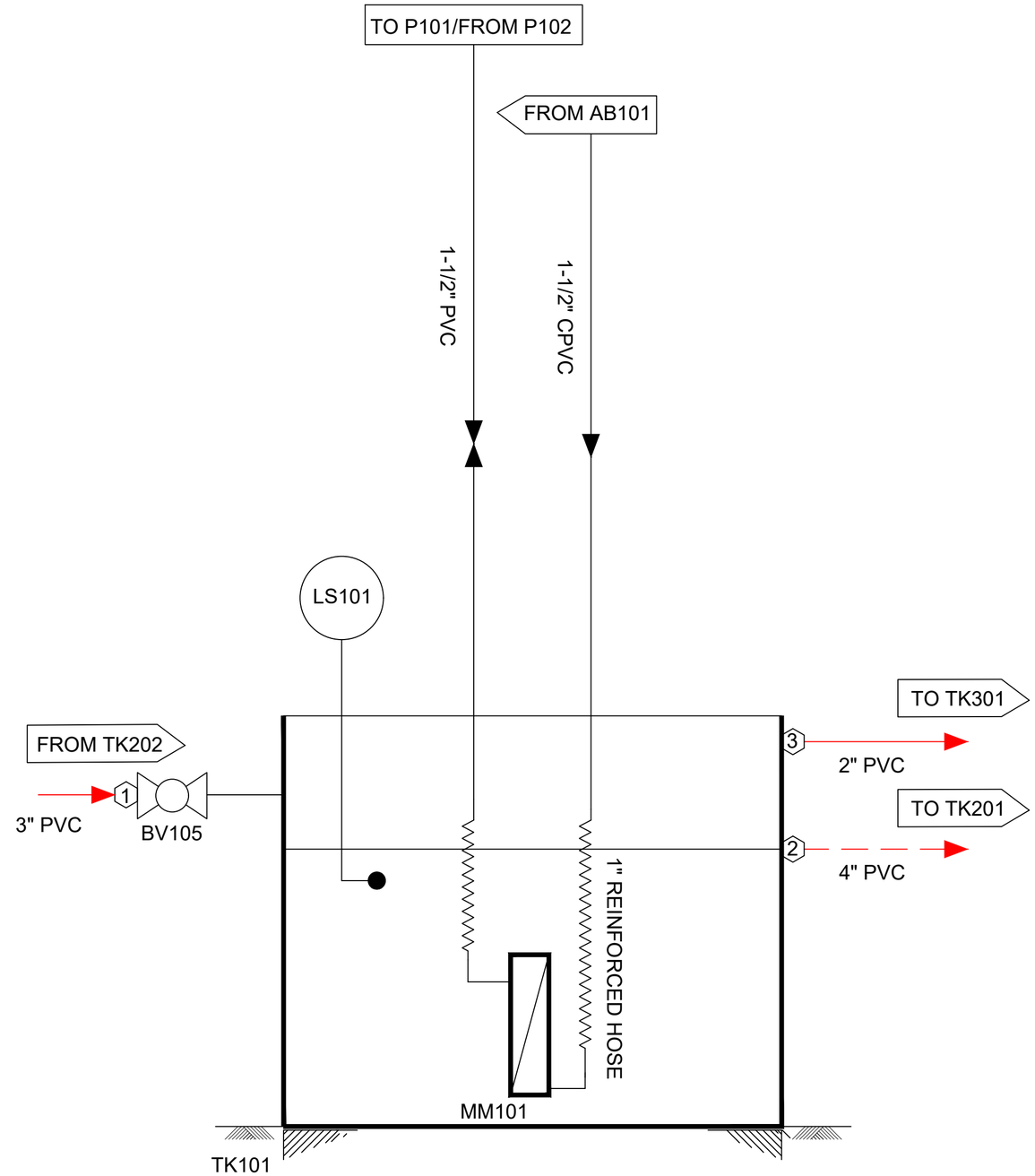
BURLINGTON BEER CO.

P&ID: BIOREACTOR

REV03

PROJECT:	**ESP22031**
DRAWING #:	**P-003**
DATE:	25-10-23
DRAWN BY:	YvP
CHECKED BY:	CH

FITTING	TYPE
TK101-1	3" SOC
TK101-2	4" FLANGE
TK101-3	2" FPT



ENEREAU™

ENEREAU SYSTEMS GROUP INC.

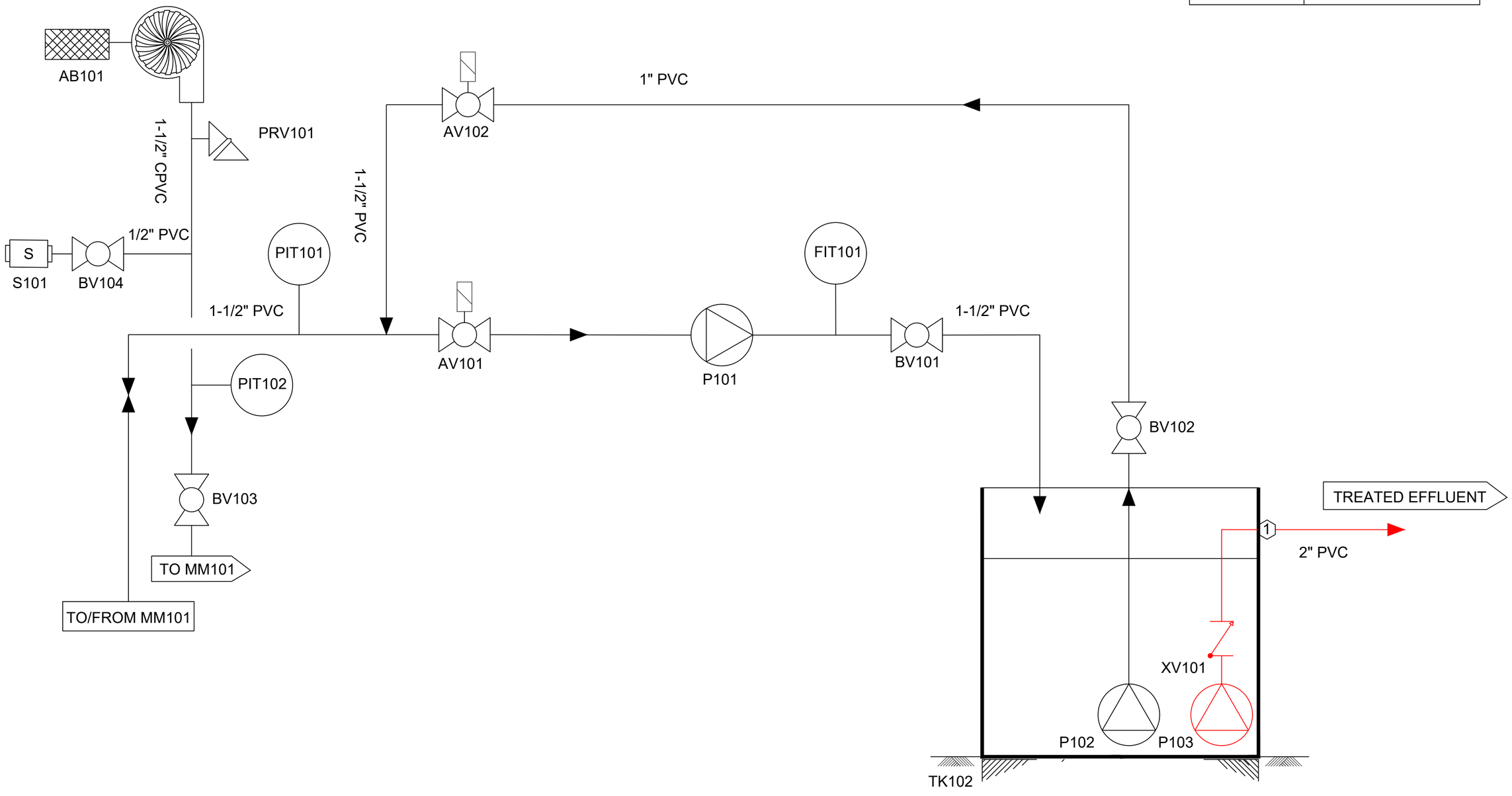
BURLINGTON BEER CO.

P&ID: MEMBRANE TANK

REV03

PROJECT:	ESP22031
DRAWING #:	P-004
DATE:	25-10-23
DRAWN BY:	YvP
CHECKED BY:	CH

FITTING	TYPE
TK102-1	2" FPT



ENEREAU™ ENEREAU SYSTEMS GROUP INC.	PROPRIETARY INFORMATION MAY NOT BE REPRODUCED OR DIVULGED WITHOUT PRIOR WRITTEN CONSENT OF ENEREAU SYSTEMS GROUP INC. DO NOT SCALE DRAWING.	BURLINGTON BEER CO.	PROJECT: ESP22031
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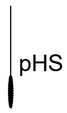
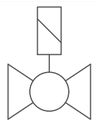
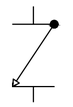
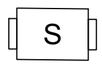
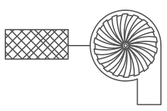
		P&ID: PERMEATE SKID	DATE: 25-10-23
			DRAWN BY: YvP
		REV03	CHECKED BY: CH

LEGEND			
FIT	FLOW INDICATOR TRANSMITTER	PIT	PRESSURE INDICATOR TRANSMITTER
LS	LEVEL SENSOR	LIT	LEVEL INDICATOR TRANSMITTER
pH	pH PROBE	PG	PRESSURE GAUGE
	SCREEN		FLOAT
	pH SENSOR		BALL VALVE
	AUTOMATED VALVE		BALL FLOAT VALVE
	CHECK VALVE		PRESSURE RELIEF VALVE
	PUMP		SILENCER
	UV		MEMBRANE MODULE
	AIR SCOUR BLOWER		HOSE
	ENEREAU SCOPE		CLIENT SCOPE

ENEREAU™

ENEREAU SYSTEMS GROUP INC.

BURLINGTON BEER CO.

P&ID: LEGEND

REV03

PROJECT:	**ESP22031**
DRAWING #:	**P-006**
DATE:	25-10-23
DRAWN BY:	YvP
CHECKED BY:	CH

Product Data Sheet
May 2017
LIQ-PDS-1056

Rosemount 1056 Dual Channel Transmitter

Multi-parameter Transmitter for Liquid Analysis

The Rosemount 1056 Dual Channel Transmitter displays up to two independent liquid analytical measurements. HART and Profibus DP digital communication options allow for connection to HART hosts and Profibus networks. Start-up and installation of the 1056 is easy by using Quick Start Programming.

ROSEMOUNT™

EMERSON™

Overview

Independent Dual Input Measurements

- Expandable to two channels of liquid analytical measurements: pH/ORP, Conductivity, Free Chlorine, Total Chlorine, Dissolved Oxygen, Ozone, and Turbidity.
- Modular boards with auto-recognition of sensor board.
- Large, easy to read, user customizable display of dual measurements in addition to diagnostic and temperature readings.

Reduced Installation and Maintenance Time

- Shorter installation times using Quick Start programming at initial install or after factory reset.
- Effortlessly connect with PLCs and DCS' by choosing the HART or Profibus DP communication options.
- Display measurements, configure alarms, and conduct maintenance with a simple to use local operator interface.
- Efficiently manage your devices using intuitive device dashboards on AMS/475 Communicators.

Accurate, Linear and Reliable Measurements of Analytical Sensors

- Faster calibration of pH sensors using auto pH Buffer solution detection.
- Linear conductivity measurements with on-board concentration curves for common acids and bases.
- Built-in features to easily display accurate amperometric and turbidity measurements.

Contents

1056 Dual Channel Transmitter

Rosemount 1056 Dual Channel Transmitter is a line powered device that can accept inputs from pH/ORP, ISE, flow, conductivity (contacting and toroidal), turbidity, and amperometric (dissolved oxygen, chlorine, and ozone) sensors.

- Faster installation using Quick Start programming, auto-recognition of sensor boards and modular design.
- At a glance view of pertinent information provided by the large customizable display.
- Visibility of process parameters by utilizing HART or Profibus DP digital communications.

Additional Information

Specifications: see "Specifications" on page 5
Certifications: see "Product Certifications" on page 6
Dimensional drawings: see "Dimensional Drawings" on page 7

Table 1. Rosemount 1056 Dual Channel Transmitter Ordering Information

Model	Transmitter type
1056	Dual channel transmitter
Power	
01	115/230 Vac, 50/60 Hz no relays (1)
02	24 Vdc with four alarm relays
03	85-265 Vac switching, 50/60 Hz with four alarm relays
Measurement 1	
20	Contacting conductivity
21	Toroidal conductivity
22	pH/ORP/ISE
23	Flow/current input
24	Chlorine
25	Dissolved oxygen
26	Ozone
27	Turbidity
Measurement 2	
30	Contacting conductivity
31	Toroidal conductivity
32	pH/ORP/ISE
33	Flow/current input
34	Chlorine
35	Dissolved oxygen

Table 1. Rosemount 1056 Dual Channel Transmitter Ordering Information(continued)

36	Ozone
37	Turbidity
38	None
Communication	
AN	4-20 mA analog
DP	Profibus DP digital communication
HT	HART® digital communication
UL Approval	
-	CSA/FM approval
UL	UL approval

1. Not compatible with Turbidity Measurements.

Table 2. Rosemount 1056 Dual Channel Transmitter Accessories List

Part Number	Description
23554-00	Cable gland kit (Qty 5)
23820-00	2 in. pipe mounting kit (Includes U-bolts, mounting bracket, nuts, washers, and screws)
23820-01	2 in. stainless steel pipe mounting kit (Includes U-bolts, mounting bracket, nuts, washers and screws)
9240048-00	Stainless steel tag (customer specified marking)

Specifications

General Analyzer

Enclosure

Material: Polycarbonate.

Rating: Type 4X and IP65.

Dimensions: 6.10 in. L x 6.10 in. W x 5.45 in. H
(155 mm x 155 mm x 131 mm)

Conduit openings: 1/2 in. or PG 13.5 conduit fittings.

Display

Features: User customizable, monochromatic graphic liquid crystal, back lit display.

Display Resolution: 128 x 96 pixel display resolution.

Dimensions: 3.8 in. (Diagonal)

Ambient Conditions

Temperature: 32 to 131 °F (0 to 55 °C)

Temperature for Turbidity: 32 to 122 °F (0 to 50 °C)

Relative Humidity: 5 to 95% (non-condensing)

Storage Temperature: -4 to 140 °F (-20 to 60 °C)

Power

01: 115 Vac ±15% 60 Hz ±6%, 10 W;
230 Vac ±15% 50 Hz ±6%, 10 W.

02: 20 to 30 Vdc. 15 W.

03: 84 to 265 Vac, 47 to 63.0 Hz. 15 W.

Power option codes 02 and 03 include four programmable relays.

⧈ Equipment protected by double insulation.

Relays

Form C, SPDT, epoxy sealed

Maximum Relay Current	
	Resistive
28 Vdc	5.0 A
115 Vac	5.0 A
230 Vac	5.0 A

Inductive Load: 1/8 HP motor (maximum) at 115/230 Vac

*Relays only available with option 02 power supply (20 - 30 Vdc) or 03 switching power supply (84 - 265 Vac)

Alarm Relays

Four configurable alarm relays for process measurement as alarms or faults with interval timer settings.

Terminal Wire Sizes

Power: 24-12 AWG

Analog outputs: 26-16 AWG

Relays: 24-12 AWG

Weight/Shipping Weight (rounded to nearest 1 lb. or 0.5 kg)

3 lb./4 lb. (1.5 kg/2.0 kg)

Product Certifications

Hazardous Location Approvals (Not available for DP)

Class I, Division 2, Group A, B, C, and D

Class II, Division 2, Groups E, F, and G

Class III T4A Tamb = 50 °C

Evaluated to the ANSI/UL Standards. The 'C' and 'US' indicators adjacent to the CSA Mark signify that the product has been evaluated to the applicable CSA and ANSI/UL Standards, for use in Canada and the U.S. respectively.

Class I, Division 2, Group A, B, C, and D

Class II and III, Division 2, Groups E, F, and G

T4A Tamb = 50 °C, Enclosure Type 4X

Ordinary Locations: (only with UL ordering option)

Pollution Degree 2

Normally only non-conductive pollution occurs. Temporary conductivity caused by condensation possible.
Altitude: 6562 ft. (2000 meter) maximum

Radio Frequency Immunity/Electromagnetic Interference (RFI/EMI)

EN-61326

Low Voltage Directive (LVD)

EN-61010-1

European Directive Information

A copy of the EC Declaration of Conformity can be found at the end of the Quick Start Guide and the User's Manual. The most recent revision of the EC Declaration of Conformity can be found at www.Emerson.com/RosemountLiquidAnalysis.

Dimensional Drawings

Figure 1. Panel Mount Dimensions

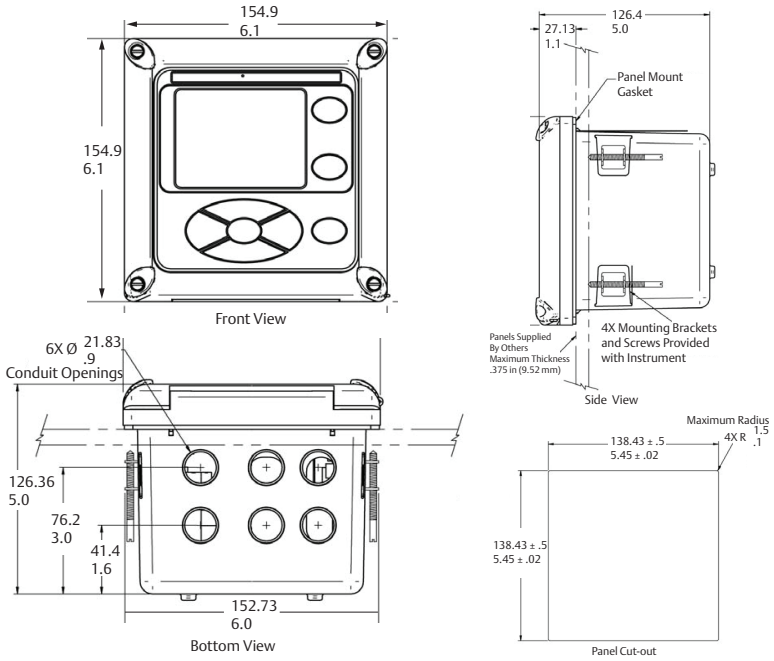
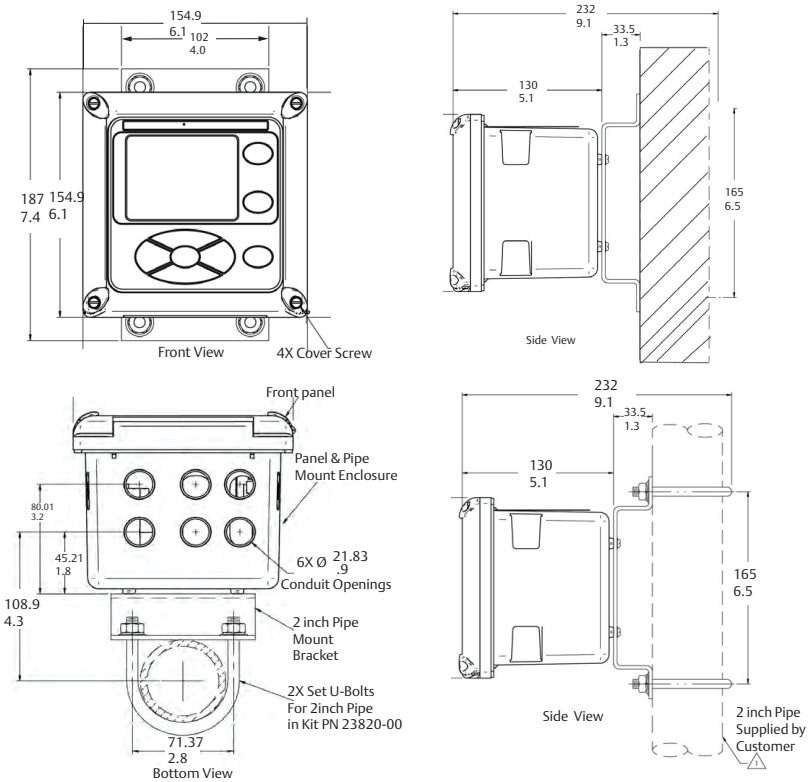


Figure 2. Wall Mount Dimensions



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