Énergie NB Power

Quality today ... for an assured future

0087-78210-0005-001-IR-A 00

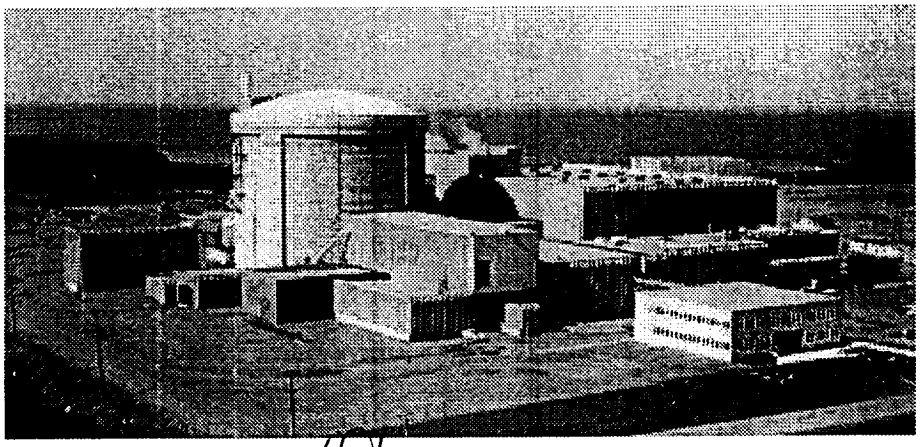
POINT LEPREAU GENERATING STATION

INFORMATION REPORT

PHT System Chemistry Monitoring and Control Improvements Following the K16A Feeder Leak

IR-78210-05

(3)



PREPARED BY:	Andrew Dykeman	DATE: March 18, 2001
REVIEWED BY:	Cyril MacNeil/Glen Brown	DATE: 01/03/19
REVIEWED BY:	Kamal Verma/Dave Loughead	DATE: 01/03/20
APPROVED BY:	David L. Stafford	DATE: 01 03 21
TRACKED BY:	Peggy Galbraith	DATE: March 19, 2001

Issue Date: 2001-03-22
IR-78210-05
Rev. 0

REVISION RECORD

Rev. #	Author(s)	Comments	Date
0	A. Dykeman	New Issue	March 18, 2001

DISTRIBUTION

Distribution of this document shall be as per the standard distribution list maintained by Records Management.

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1.0 PURPOSE & SCOPE

Some primary heat transport (PHT) system chemistry may have contributed to the leak from feeder K16. This IR documents the assessments done and actions taken with respect to PHT system chemistry following the leak form feeder K16.

2.0 REFERENCES

1. A.J. Elliot (1999) "Evaluation of HTS Chemistry which may lead to Environmentally Assisted Cracking of Carbon Steel"COG-JP-97-007-V8.

2. K.A. Burrill, E.L. Cheluget, D.G. Miller, C.W. Turner (1998) "Primary Coolant pH for Control of CANDU Plant Aging" AECL Report, AECL-11963

3. NB Power (2001) "Plant Chemistry Control" Point Lepreau Generating Station Operating Manual OM 78210

3.0 CURRENT PHT CHEMISTRY SAMPLING, ANALYSIS AND CONTROL PRACTICE

3.1 Sampling Method

The D_2O sampling system for PHT and auxiliaries (BSI 33710) is set up to permit "Grab" sampling. Two types of grab sampling may be done.

1. Syringe sampling at a sample septum.
2. Filling a sample bottle at a valve.

3.2 Analyses

3.2.1 Dissolved deuterium (DD2) is measured on a "Hydran" in the lab as soon as practicable after syringe sampling – usually within 10 minutes.

3.2.2 Lithium (plus other ions) and pH analyses are done.

3.2.3 Dissolved Oxygen (DO_2) is not measured in the PHT system except during a plant run up. During normal operation, the DO_2 level in the PHT system is so low that a grab sampling method will not detect any DO_2. While at high power with the specified DD_2 level in the PHT system, it is unlikely that any DO_2 can exist in the system. The presence of excess DD_2 in the system suppresses the radiolytic production of Oxygen.

3.0 CURRENT PHT CHEMISTRY SAMPLING, ANALYSIS AND CONTROL PRACTICE (Cont'd)

3.3 Control

3.3.1 The "Chemistry Control Operating Manual" OM78210, states DD_2 control limits (tighter than specifications) of 4 and 10 ml/kg. If DD_2 is below 4ml/kg a hydrogen addition is performed as per SOS 33540-1 "H2 Addition to the Primary Heat Transport System".

3.3.2 If DD_2 is greater that 10ml/kg PHT system degassing is done as per OM 33320 Section 5.1.1.1.

This table contains the pH, Lithium and conductivity action levels and actions according to the "Chemistry Control Operating Manual" OM78210.

Parameter	Low Spec.	Low control limit action	High Spec	High control limit Action
PH	10.2	Add LiOH as per Chemistry Procedure	10.4	Reduce pH by using PHT purification IX1
Conductivity (mS/m)	0.92	Add LiOH as per Chemistry Procedure	1.46	Reduce conductivity by using PHT purification IX1
Lithium (mg/kg)	0.35	Add LiOH as per Chemistry Procedure	0.55	Reduce Lithium using PHT purification IX1

3.3.3 The published (in OM78210) DO_2 action level is 0.010 mg/kg. As discussed above Under "Analysis" DO_2 is not regularly measured.

4.0 IMPROVEMENTS TO BE MADE

Because Chemistry conditions may be a contributor to feeder cracking, we reviewed our processes and determined if anything could be improved in a short period of time. Here are the conclusions and actions taken as a result of that examination.

4.1 Sampling Method and Analyses

Our existing sampling methods are industry standard. The best way to measure PHT Chemistry parameters is with on-line instruments. Two short term improvements will be investigated.

4.1.1 DD_2 Sampling/Analysis Lag Time

Dissolved Deuterium samples are taken from a sample septum using a syringe. The syringe is transported to the lab and analysed immediately. Dissolved Deuterium may diffuse through the wall of the syringe during the time the sample is taken and then injected into the Hydran. This time can be reduced if the Hydran is taken into the field and the sample injected immediately.

Action: One of the lab DD_2 analyzers will be taken to the PHT sampling cabinet to determine if there is a difference in readings based on shortening the sampling to analysis time.

4.1.2 On-line Portable Dissolved Oxygen Sampling

The Chemistry department monitored dissolved oxygen concentrations during the plant runup in November 2000. The portable Orbisphere DO_2 analyzer/logger was installed in the existing flow chamber in the PHT sampling system cabinet. The purpose of this measurement was to confirm that DO_2 disappeared during an 80 degrees C temperature hold during the PHT system warm up. DO_2 readings were recorded in the instrument data logger then downloaded and trended on completion of the runup. A field indication of DO_2 was always available while the portable instrument was installed.

Action: Chemistry will install the portable DO_2 analyzer/recorder in the existing flow chamber on the PHT sampling system for the upcoming runup and during times when increased DO_2 may be present in the system. (e.g. PHT makeup, during times when extra H_2 additions are required)

4.2 Action Limits and Specifications

Point Lepreau's present PHT action limits and specifications are presently CANDU industry standard. Any recommendations to change these limits will be examined and implemented.

4.3 Control Functions

The present control functions were examined. The recommend improvements and actions follow.

4.0 IMPROVEMENTS TO BE MADE (Cont'd)

4.3.1 Review PHT Hydrogen Addition Procedure

There have been two recent incidents where PHT hydrogen additions were performed that resulted in exceeding the high DD_2 specification. There may be room for improvement of the PHT H_2 addition process.

Action: A review of the process to add Hydrogen to the PHT system will be performed. The objective of this review will be to add the checks and warnings that will make operations aware of the importance of carefully controlling H_2 additions to the PHT system.

4.3.2 PHT 3335-IX1 Resin Change

During the most recent attempt to lower the PHT pH, the behavior of 3335-IX1 indicated that the resin was lithiated. Normal configuration of 3335-IX1 is to have non-lithiated (DOD form) resin in 3335-IX1. Placing 3335-IX1 into service normally reduces system pH rapidly by removing Lithium hydroxide from the system. A pH in the range of 10.2 to 10.4 may reduce feeder thinning rates by 25 to 45% compared to the previous CANDU pH specification of 10.2 to 10.8 [2].

Action: The resin in 3335-IX1 will be replaced.

5.0 ACTION PLAN

Steps are being taken to ensure the above mentioned actions are completed before Point Lepreau returns to operation from this unplanned outage. The action in 4.3.2 may be delayed based on the availability of PHT D_2O.

Énergie NB Power

PUMP SPECIFICATION SHEET

GENERAL	1	Description: **Vertical Turbine Fire Pump with 12" Discharge Head, Open Lineshaft**			Material Number: **581Q3360**	
	2	Plant/Project: **Point Lepreau Generating Station**	Units **1**	Sheet **1** of **3**	Rev.: **0**	
	3	Code: **NFPA 20/ULC**	Eff. Date: **Latest**	Nuclear Class: **N/A**	Equip. No. **1-7141-P-103**	
	4	QA Standards: **CSA Z299.4**		Dated: **1985**	Assigned Dwg. No. **0087-01375-3002-542-SS-A**	
	5	Applicable Specification: **N/A**		Rev.		
	6	Manufacturer: **Peerless Pump**				
PUMP	7	Model: **16HXBF**	Number of Stages: **3**	Conditions of Service: **2500usgpm at 290' TH**		
	8	Fluid: **Freshwater**	pH: **6-7**	Temperature: **Ambient**	NPSH Required: **36'**	
	9	Impeller Trim, 1st Stage: **10.88x11.69"**	Impeller Trims, Stages 2-3: **10.88x11.69"**		Pump Curve No. (Test): **C151492**	
	10	Impeller: **SAE40 Bronze**	Impeller Polish/File: **YES** ☒ NO☐	Imp. No.: **2617216**	Impeller Balancing: **YES** ☒ NO☐	
	11	Bowls: **Cast Iron - Enameled**	Bowl Outside Diameter:		Pump Weight:	
	12	Pump Shaft: **416SS**	Pump Shaft Diameter: **1.94"**		Shaft Coupling: **As required**	
	13	Bowl Bearings:	Bowl Wear Ring: **Neoprene 65 Shore**		Pump End Length: **50"**	
	14	Inlet Configuration: ☒ **Suction Bell** ☒ **316SS Strainer**	Minimum Submergence: **19"**			
	15	Recommended Motor hp/rpm: **300hp/1770rpm**	Non-Overloading Impeller Required: **YES** ☒ NO☐			
COLUMN	16	Lineshaft Type: ☒ **Open, Product Lubricated** ☐ Enclosed, Forced Lubrication				
	17	Lubricating Fluid: **Freshwater**				
	18	Column Size: **12"**	Material: **Steel**		Connection: Threaded ☐ **Flanged** ☒	
	19	Bearing Type: **Rubber**	Bearing Spans:		Bearing Retainer:	
	20	Lineshaft Diameter: **1.94"**	Lineshaft Material: **416SS**		Lineshaft Coupling Material: **As required**	
	21	Enclosing Tube Material: **N/A**			Column Top Flange OD:	
	22	Total Column Length: **286"**			Column Total Weight:	
DISCHARGE HEAD	23	Discharge Head Model: **12x12x20-125#**	Material: **Cast Iron**		Outlet Flange: **12" - 125#**	
	24	Motor Base Diameter (BD): **20"**	Top Shaft Diameter: **1.94"**			
	25	Top Shaft Supplied By: ☒ **Pump Vendor** ☐ Other		Top Shaft Material: **416SS**		
	26	Shaft Sealing: **Packing with grease nipple** ☒ Mech. Seal ☐		Top Shaft Coupling Manufacturer/Model: N/A		
	27	Packing/Seal Manufacturer:		Packing/Seal Size or Model: **6 ½" Square Rings**		
	28	Soleplate: **YES** ☒ NO☐	Soleplate Thickness: **0.88"**		Discharge Head Weight:	
	29	Accessories:				
	30					
MOTOR	31	*Motor hp:* **300hp**	Nominal Speed: **1800rpm**	Voltage/Phase: **575V/3ph**	Enclosure Type: ☒ **WP1** ☐ TEFC ☐ TENV	
	32	Motor Frame Size: **5006PH**	Thrust Capability: ☐ Normal ☒ **High**		Motor Shaft Type: ☒ **Hollow** ☐ Solid	
	33	Non-Reverse-Ratchet: **YES** ☒ NO☐	Bearing Lubrication: **Grease Nipple**		Efficiency: ☒ **Standard** ☐ High ☐ Premium	
	34	Insulation Type: **Class B**	Temperature Rise: **Class B**		Thermistors: **YES** ☒ NO ☐	
TEST	35	Hydraulic Institute Standard or Specify: **Certified Performance Test per NFPA-20 requirements**			Witnessed ☐ **Non-Witnessed** ☒	
	36	Other Test (Details): **Hydrostatic pump test**			Witnessed ☐ **Non-Witnessed** ☒	
	37					
MISCELLANEOUS	38	**Pump to be ULC Listed and FM Approved for Fire Service**				
	39					
	40	Special Paint Requirements:				
	41	Seismic Category: **NSQ** ☒ SDE ☐ DBE A ☐ DBE B ☐ (Spec. Sect.)			Seismic Specification:	
	42	Design Report: YES ☐ **NO** ☒ (Spec. Sect.)		R & M Analysis: YES ☐ **NO** ☒ (Spec. Sect.)		
	43	Env. Radiation: **N/A** (Spec. Sect.)		Environment Temperature: **Normal 18-20 °C** Abnormal °C		
	44	Inaugural Inspection: YES ☐ **NO** ☒ (Spec. Sect.)		Environmental Qual.: YES ☐ **NO** ☒		

NOTES

Motor drawing is attached for dimensional reference, as page 2 of 3.

Complete pump assembly drawing attached for dimensional reference, as page 3 of 3.

Prepared By: J. Landry — Date: 02-01-17

Reviewed By: Arun Batra — Date: 02-01-17

Approved: Jim Dickson — Date: 02-01-17

REGISTERED PROFESSIONAL ENGINEER Province of New Brunswick #M4126 J. B. Landry 02-01-17 Province du Nouveau-Brunswick INGÉNIEUR IMMATRICULÉ

CUSTOMER NAME USEMI

CUST No. CE&M 3-7-21676 U.S. No. C1330369

MARK:

QTY 1 HP 300 FRAME 5006PH PHASE 3

CYCLE 60 RPM 1770 VOLTS 575

USEMI MOTORS

Vertical Motors

0087-01375-3002-542-SS-A

VC 02-01-14

Sh 2 of 3

Section 505

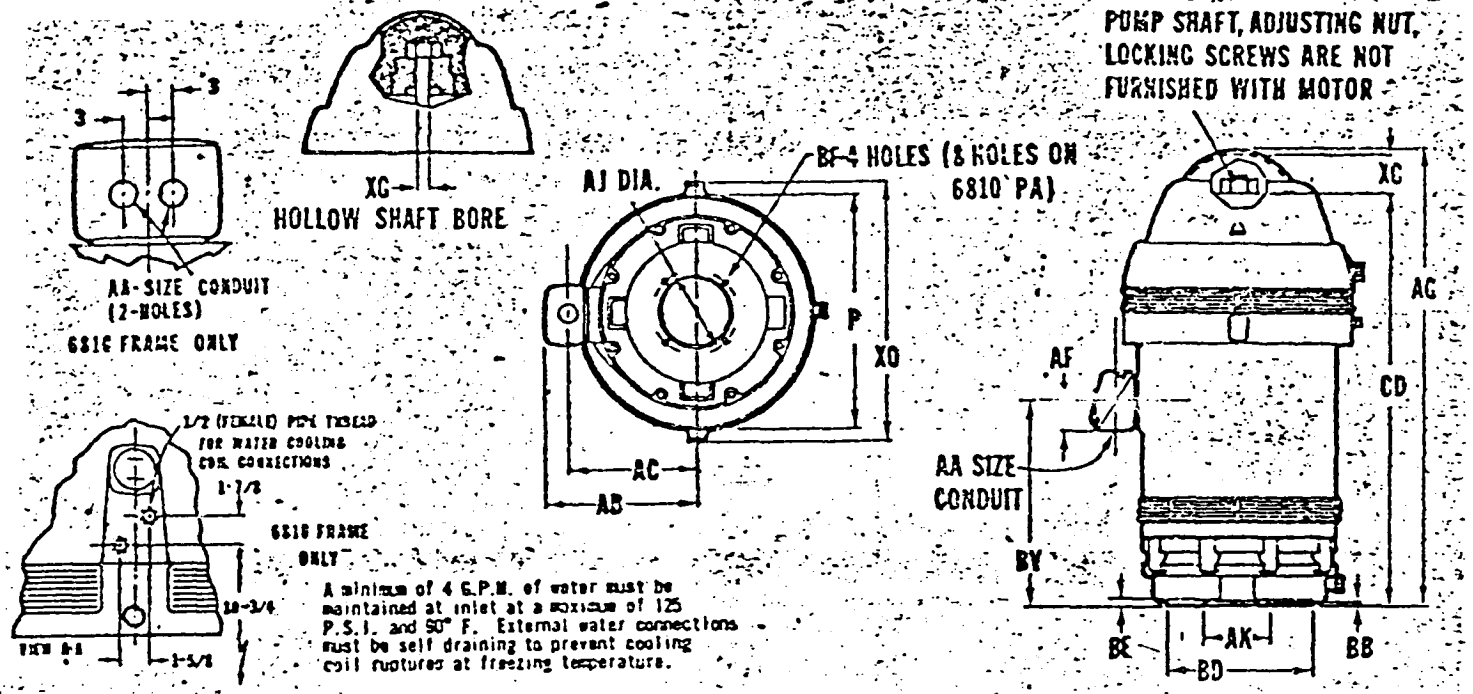
Page 11.1

FRAMES 5006P - 6810PA

VERTICAL HOLLOWSHAFT
STYLE P BASE
TYPE HU

DIMENSIONS

FEATURES Non-reverse rachet, 175% EHT, Class B insulation & rise
Siemans PTC Thermistors



ALL DIMENSIONS ARE IN INCHES

FRAME	TYPE	P*	AA	AB	AC	AF	AG	AJ DIA.	AK	BB	BD BASE DIA.	BE	BF SIZE HOLE	BY	CD	XC	XD	XO	BASIC PRODUCT PART
5006P	HU	29	3-1/2	23	17-1/2	8-1/16	55-13/16	14-3/4	13-1/2	1/4	24-1/2	7/8	11/16	19-3/4	49-25/32	5-3/4	2.505	34	113393
5006PH	HU	29	3-1/2	23	17-1/2	8-1/16	55-13/16	14-3/4	13-1/2	1/4	20	7/8	11/16	19-3/8	49-25/32	5-3/4	2.505	34	113952
5006P	HU	29	3-1/2	23	17-1/2	8-1/16	55-15/16	14-3/4	13-1/2	1/4	24-1/2	7/8	11/16	19-3/8	53-29/32	5-3/4	2.505	34	113393
5006PH	HU	29	3-1/2	23	17-1/2	8-1/16	59-15/16	14-3/4	13-1/2	1/4	20	7/8	11/16	19-3/8	53-29/32	5-3/4	2.505	34	113952
5008P	HU	29	3-1/2	23-3/4	18-7/16	8-1/16	63-15/16	14-3/4	13-1/2	1/4	24-1/2	7/8	11/16	25-9/16	58-21/32	5-1/2	2.505	35	113393
5008PH	HU	29	3-1/2	23-3/4	18-7/16	8-1/16	63-15/16	14-3/4	13-1/2	1/4	20	7/8	11/16	25-3/16	58-21/32	5-1/2	2.505	35	113952
5808P	HU	34	3-1/2	26-13/16	21-5/16	8-1/16	66-15/16	14-3/4 32	13-1/2	1/4	24-1/2	1	11/16 15/16	24-3/4	58-1/4	8-3/8	2.755	33-1/2	191183
5808P	HU	34	3-1/2	26-13/16	21-5/16	8-1/16	70-15/16	25	22	1/4	30-1/2	1	11/16 15/16	24-3/4	62-1/4	8-3/8	2.755	33-1/2	193207
5809PH	HU	34	3-1/2	26-13/16	21-5/16	8-1/16	70-15/16	14-3/4 32	13-1/2	1/4	24-1/2	1	11/16 15/16	24-3/4	62-1/4	8-3/8	2.755	29-1/2	191183
5810P	HU	34	3-1/2	26-13/16	21-5/16	8-1/16	74-15/16	26	22	1/4	30-1/2	1	11/16 15/16	28-3/4	66-1/4	8-3/8	2.755	33-1/2	193207
5810PH	HU	34	3-1/2	26-13/16	21-5/16	8-1/16	74-15/16	14-3/4 32	13-1/2	1/4	24-1/2	1	11/16 15/16	28-3/4	66-1/4	8-3/8	2.755	33-1/2	191183
6808P	HU	40-1/4	3-1/2	29-1/8	22-3/4	8-1/16	81-11/16	26	22	1/4	30-1/2	1	13/16	29-1/8	72-5/16	9-1/8	2.755	33-7/8	193459
6808PH	HU	40-1/4	3-1/2	29-1/8	22-3/4	8-1/16	81-11/16	14-3/4	13-1/2	1/4	24-1/2	1	11/16	29-1/8	72-5/16	9-1/8	2.755	33-7/8	191183
6809P	HU	40-1/4	3-1/2	25	24-1/4	8-1/16	92-9/16	26	22	1/4	30-1/2	1	13/16	37	83-3/16	9-1/8	2.755	34-7/8	193460
6809PH	HU	40-1/4	3-1/2	25	24-1/4	8-1/16	92-9/16	14-3/4	13-1/2	1/4	24-1/2	1	11/16	37	83-3/16	9-1/8	2.755	34-7/8	191183
6810PA	HU	42-1/2	3-1/2	33-13/16	25-15/16	10-1/8	96-3/8	32	26	1/4	36	1-1/2	1	43-1/16	88-7/32	7-5/32	3.375	33-1/8	176514

All rough casting dimensions may vary by 1/8" due to casting variations.

All tapped holes are unified national course, right hand thread.

* Largest motor diameter

TOLERANCES:

"AK" dimension - +.000 -.005; Face runout .007 T.I.R.

Permissible eccentricity of mounting rabbet .007 T.I.R.

+ Conduit openings may be located in steps of 90° standard with conduit conn.

U. S. ELECTRICAL MOTORS DIVISION
EMERSON ELECTRIC CO.
EMERSON

Effective: April 21, 1975

Supersedes: January 27, 1975

If properly endorsed this print is correct for frame & assembly positions indicated.

By [signature] Date 6-6-77

0087-01375-3002-542-55-A

Sh 3 of 3

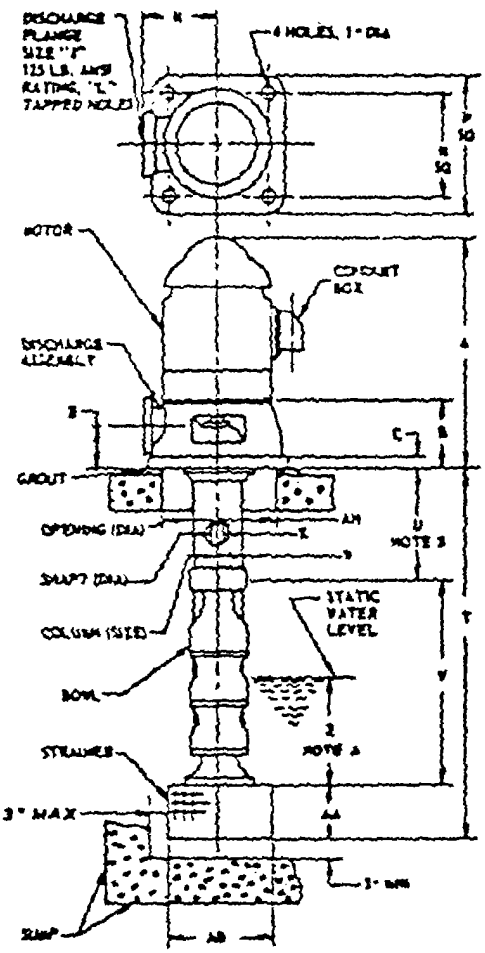
OUTLINE – MOTOR DRIVE

FMC Corporation
Pump Division
2005 Northwestern Avenue
Indianapolis Indiana 46208

07-01-1

Note 1. This drawing describes sump installation, above ground discharge casting for 175 P.S.I. max working pressure, FLANGED O.L.S. column, driver with bolted down ratchet.

Note 2. Column length "U" min 10", max 50'-0".



Note 3. Dimensions are in inches unless otherwise indicated.

Note 4. Submergence "Z" is min for proper priming and or operation at 150% of design capacity, based on sea level elevation and max water temperature of 85 F. (Per NFPA Pam. No. 20 requirements.)

See Attached Drawing
4846964
4802036

CUSTOMER TO FURNISH & MOUNT MOTOR.
FOR SOLE PLATE DIMENSIONS SEE DWG. 4802036

Approx. Wt. 3325 LBS.

Discharge Assembly	A	B	C	E	H	J	L	M	P
6 x 8 x 16½		14¾	1¼	7⅞	10¼	6	¾-10	18	20
8 x 8 x 16½		14¾	1¼	7⅞	10¼	8	¾-10	18	20
10 x 10 x 16½		18	1½	9	10¼	10	⅞-9	21	20
12 x 12 x 20		23	1¾	10½	12¼	12	⅞-9	21	23

Bowl	T	U	Length – Stage First	Length – Stage Added	V	W	X	Z	AA	AB	AH
12LB-F			21½	9¾		6		19	10	12	14
12MB-F			19½	9½		6		19	10	12	14
14MC-F			25½	12¾		10		25	12	14	15
16MC-F			27½	14½		10		45	12	16	17
16HXB-F	29'-0"	23'-10"	25¾	12¾	4'-2"	12	15/16	19	12	16	17

CUSTOMER CONSOLIDATED ENGINEERING & MACHINERY JOB NAME
P.O. NO. 37-21677 ITEM NO. P.O.-3
S.O. NO. MV 641791 SERIAL NO. 387143
MOTOR MFR. CUST. FURN. ENCL. FRAME H.P. 300 VOLTS PH. HZ.
TYPE & STAGE 16HXBF 3 STG. RPM 1775 G.P.M. 2500 LAB HEAD, FEET 290'
CERTIFIED FOR ☐ APPROVAL ☒ CONSTRUCTION BY E Nolan DATE 5/27/77
☐ UL ☒ FM LISTED PUMP ONLY

SUBJECT TO CHANGE UNLESS CERTIFIED FOR CONSTRUCTION

Pearless Pumps

DT 4845193

PLGS DEVICE SPECIFICATION SHEET (TYPE)

TITLE:	**TRANSMITTER**	**MAT. #:**	**00007836**
TYPE:	**CONDUCTIVITY**	**DOC #:**	**0087-01375-3002-459-SS-A**
MANUFACTURER:	**ROSEMOUNT**	**SHEET #**	**1 of 1** — **Rev: 3**
MODEL:	**1054BDC-01**	**TS:**	**TS-60438-01-PL**

TECHNICAL DESCRIPTION

OUTPUT		Programmable
	ANALOG	4-20 mADC 600 ohms load maximum at 120 VAC Direct or Reverse Acting Dampening 0-255 seconds (Adjustable)
	DIGITAL	EPOXY SEALED, FORM A, SPST, NO 5A @28 VDC RESISTIVE, 3A @28 VDC INDUCTIVE
INDICATION		LCD, 18mm Height, Black on Grey
RANGE		Programmable 0.02 – 20000 MICROSIEMENS / CENTIMETER (0.002 - 2000 MILLISIEMENS / METER)
ACCURACY		0.5% (OF READING)
REPEATABILITY		0.25% (OF READING)
TEMPERATURE		-20 TO 65 ^{0}C
POWER REQUIREMENTS		100 – 127 VAC 50/60 Hz (+/- 6%) 4 WATTS
ENCLOSURE		NEMA 4X, HEAVY DUTY FIBERGLASS, REINFORCED THERMOPLASTIC (14 x 17.7 X 2
FRONT PANEL		Membrane keyboard
REQUIREMENTS:		Z299.3 Certificate of Compliance

REGISTERED PROFESSIONAL ENGINEER Province of New Brunswick #M2381 H. A. Maynard Signature 02-01-16 Date Province du Nouveau-Brunswick INGÉNIEUR IMMATRICULÉ

PREPARED BY:	SIGN:	DATE: 02-01-15
REVIEWED BY:	SIGN:	DATE: 02-01-16
APPROVED BY: INST. ENG.	SIGN: H Maynard	DATE: 02-01-16

PLGS DEVICE SPECIFICATION SHEET (TYPE)

TITLE:	**TRANSMITTER, TWO CHANNEL**	**MAT. #:**	**00007888**
TYPE:	**DISSOLVED HYDROGEN DISSOLVED OXYGEN**	**DOC #: 0087-01375-3002-461-SS-A**	
MANUFACTURER:	**ORBISPHERE**	**SHEET #** **1 of 1**	**Rev: 2**
MODEL:	**3623/2111**	**TS:**	

TECHNICAL DESCRIPTION

SENSORS		Thermal Conductivity Hydrogen Sensor, Orbisphere # 31250 Oxygen Sensor, Orbisphere # 31120.01 Standard Cables and Connectors
OUTPUTS		Fully Programmable
	Analog	4-20 mADC (Maximum Impedance 500 Ohms) 0-5 VDC Relay, fail safe
	Digital	2 per measurement channel 30 W, 150 VDC and 1A Max. 60 VA, 125 VAC and 1A Max.
	Communication	RS-232C, Serial Baud Rate 9600
MOUNTING		Portable
RANGE		Programmable Dissolved Hydrogen 0 - 120 cc/kg Programmable Dissolved Oxygen 0-2000 mg/kg
ACCURACY		1.0% (OF READING)
TEMPERATURE		-20 TO 60 ^{0}C
ENCLOSURE		NEMA 4, STAINLESS STEEL (221.5 x 133 x 190mm)
POWER REQUIREMENTS		115 / 230 VAC 50/60 Hz (MAX. 30 VA)
REQUIREMENTS:		CSA Z299.3 or ISO Equivalent Certificate of Compliance

REGISTERED PROFESSIONAL ENGINEER
Province of New Brunswick
#M2381
H. A. Maynard
Signature
02-01-16
Date
Province du Nouveau-Brunswick
INGÉNIEUR IMMATRICULÉ

PREPARED BY:	SIGN: S M Thurlott	DATE: 01-12-17
REVIEWED BY:	SIGN: Victor Belliveau	DATE: 01-12-17
APPROVED BY: **INST. ENG.**	SIGN: H Maynard	DATE: 02-01-16

PLGS DEVICE SPECIFICATION SHEET (TYPE)

TITLE:	**DISSOLVED H_2 SENSOR**	**SCN:**	**00007889**
TYPE:	**MDTC**	**DOC #:**	**87-01375-3002-465-SS-A**
MANUFACTURER:	**ORBISPHERE**	**SHEET #**	**1 of 1** **Rev:2**
MODEL:	**31250**	**TS:**	

TECHNICAL DESCRIPTION

INSTALLATION:	COLLAR MOUNTING TO FLOW CHAMBER
MEMBRANE:	Orbisphere Model 29561A
MEASUREMENT RANGE:	0 - 25 cc/kg @ 25^{0}C
TEMP. RATING:	50 ^{0}C (Compensated), 200^{0}C (Maximum)
MAX. PRESSURE:	2000 kPa
WETTED MATERIALS:	PFA
CABLE:	Orbisphere Model 32505.03 (3 Meters) (Maximum 100 Meters from Analyser) 10 pin connector
PURGE GAS:	N_2 or Air
ENCLOSURE:	NEMA 4
WEIGHT:	0.95 Kg
FLOW CHAMBER:	Model: Orbisphere Model 32001.011 Material: 316 SS Connections: ¼" Swagelok Requirements: NBDOL Registration
REQUIREMENTS:	CSA Z299.3 or ISO Equivalent CERTIFICATE OF COMPLIANCE

REGISTERED PROFESSIONAL ENGINEER
Province of New Brunswick
#M2381
H. A. Maynard
Signature
02-01-16
Date
Province du Nouveau-Brunswick
INGÉNIEUR IMMATRICULÉ

PREPARED BY:	SIGN:	DATE: 01-12-17
REVIEWED BY:	SIGN:	DATE: 01-12-17
APPROVED BY: **INST. ENG.**	SIGN: H Maynard	DATE: 02-01-16

PLGS DEVICE SPECIFICATION SHEET (TYPE)

TITLE:	**CONDUCTIVITY ELEMENT**	**SCN:**	**00007892**
TYPE:	**THREADED MOUNTING**	**DOC #:87-01375-3002-462-SS-A**	
MANUFACTURER:	**ROSEMOUNT**	**SHEET #** **1 of 1**	**Rev:2**
MODEL:	**400VP-12**	**TS: TS-60438-01-PL**	

TECHNICAL DESCRIPTION

INSTALLATION:	INSERTION (SCREW IN)
CELL CONSTANT:	0.1/CM. (ABSOLUTE CONDUCTIVITY @ 25^0C)
TEMP. RATING:	0 - 105^0C
MAX. PRESSURE:	1825 kPa (250 PSIG)
WETTED MATERIALS:	TITANIUM (ELECTRODE), 316SS (FITTING), PEEK, EDPM
CABLE:	STANDARD 10 FT.
CABLE CONNECTION:	VP CONNECTOR
PROCESS CONNECTION:	3/4" MNPT
WEIGHT:	1 LB.
REQUIREMENTS:	CSA Z299.3 or ISO Equivalent CERTIFICATE OF COMPLIANCE

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PREPARED BY:	SIGN:	DATE: 02-01-03
REVIEWED BY:	SIGN:	DATE: 02-01-16
APPROVED BY: **INST. ENG.**	SIGN: H Maynard	DATE: 02-01-16

PLGS **DEVICE SPECIFICATION SHEET (TYPE)**

TITLE:	**TRANSMITTER, ONE CHANNEL**	**MAT. #:**	**00007893**
TYPE:	**DISSOLVED HYDROGEN**	**DOC #:**	**0087-01375-3002-460-SS-A**
MANUFACTURER:	**ORBISPHERE**	**SHEET #**	**1 of 1** **Rev: 2**
MODEL:	**3610/211**	**TS:**	

TECHNICAL DESCRIPTION

SENSOR		Thermal Conductivity Hydrogen Sensor, Orbisphere # 31250 Standard Cable and Connector
OUTPUTS		Fully Programmable
	Analog	4-20 mADC (Maximum Impedance 500 Ohms) 0-5 VDC Relay, fail safe
	Digital	2 per measurement channel 30 W, 150 VDC and 1A Max. 60 VA, 125 VAC and 1A Max.
	Communication	RS-232C, Serial Baud Rate 9600
MOUNTING		Portable
RANGE		Programmable Dissolved Hydrogen 0 - 120 cc/kg
ACCURACY		1.0% (OF READING)
TEMPERATURE		-20 TO 60 ^{0}C
ENCLOSURE		NEMA 4, STAINLESS STEEL (221.5 x 133 x 190mm)
POWER REQUIREMENTS		115 / 230 VAC 50/60 Hz (MAX. 30 VA)
REQUIREMENTS:		CSA Z299.3 or ISO Equivalent Certificate of Compliance

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PREPARED BY:	SIGN: DM Thurrott	DATE: 01-12-17
REVIEWED BY:	SIGN: Victor Bellucci	DATE: 01-12-17
APPROVED BY: INST. ENG.	SIGN: H Maynard	DATE: 02-01-16