Katherine Vater
Project Manager
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nationalgrid

December 19, 2016

Mr. Richard Dana
Project Manager MGP Remedial Section
New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Western Remedial Action, 11th Floor
625 Broadway
Albany, New York 12233-7010

Re: Containment Pad Depressurization System – Final Construction Completion Report
Former Clifton MGP Site, Richmond County, New York
NYSDEC Site No.: 2-43-023, Order on Consent Index #: D2-0001-98-04

Dear Mr. Dana:

National Grid is submitting the following Containment Pad Depressurization System (Depressurization System) Construction Completion Report (CCR) for the former Clifton Manufactured Gas Plant (MGP) Site located at 25 and 40 Willow Avenue, Clifton, Richmond County, New York (Figure 1). The 40 Willow Avenue portion of the Site was remediated in 2009, consistent with a New York State Department of Environmental Conservation (NYSDEC) Record of Decision (ROD); as part of the remedy, a "containment cell" was installed around the former relief holder to a depth of 130 feet via sheet piles (to 30 feet below ground surface [bgs]) and jet grout technology (to 130 feet bgs).

Since construction of the remedy, groundwater continuously seeped into the containment cell from approximately 130 feet bgs, creating a build-up of groundwater within the containment cell. To prevent groundwater build-up from impacting the structure of the containment cell, National Grid proposed the Containment Pad Depressurization System Installation and Startup Work Plan (Depressurization System Work Plan) by letter dated August 1, 2014, to install a Depressurization System for the containment cell as part of the long-term Operation and Maintenance of the Site under the Site Management Plan (SMP). The Depressurization System Work Plan was approved by the NYSDEC on November 5, 2014.

Contractor procurement took place from November 2014 through February 2015. Construction and installation of the Depressurization System took place from February 2015 through January 2016, with on-site work occurring from July 2015 through January 2016. This CCR presents details of the construction activities and system start-up.

Depressurization System Objectives

The objectives of the Depressurization System are to:

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- Remove groundwater within the containment cell via pumping to relieve the artesian conditions created by groundwater infiltration into the bottom of the containment cell;
- Treat the groundwater on-Site for discharge, under permit, via the New York City Department of Environmental Protection (NYCDEP) sewer system; and
- Sample and discharge treated groundwater in accordance with the NYSDEC-approved State Pollution Discharge Elimination System (SPDES) permit, the requirements of the NYCDEP permit, and all other applicable regulations.

To accomplish these objectives, National Grid installed a Depressurization System consisting of the following components:

- An influent pump installed in the existing well COU1-RWA to remove groundwater at a rate of 1 gallon per minute (gpm);
- An influent pipe connecting the influent pump to a groundwater treatment system;
- A waste water treatment plant (WWTP) to treat groundwater, consisting of an oil-water separator, particulate filters, carbon filters, anion exchange system, and associated meters, pressure gauges, controls, pumps and piping;
- An enclosure to house the treatment system; and
- A discharge pipe connecting the treatment system to the NYCDEP sewer system.

The location and details of the Depressurization System are shown in Figures 2A (Overall Site Plan), 2B (Pipe and Conduit Detail) and 2C (Treatment System Container Layout). All work was completed in accordance with the procedures specified in the 2008 NYSDEC-approved Remedial Design Work Plan for OU-2 (ENSR, 2008), including the site-specific Health and Safety Plan (HASP), Community Air Monitoring Plan (CAMP), the Quality Assurance Project Plan (QAPP), and the Depressurization System Work Plan.

Depressurization System Activities

As described in greater detail below, overall the project was implemented from November 6, 2014 through January 21, 2016, with site activities for the installation and start-up of the Depressurization System taking place between July 27, 2015 and January 21, 2016. Specifically, tasks included:

- Procurement;
- Mobilization;
- Site preparation and restoration;
- Treatment system fabrication and installation;
- Depressurization System start-up;

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- Arsenic treatment installation;
- Community Air Monitoring;
- Waste management; and
- Start-up effluent sampling.

Schedule

Procurement and off-site work took place from November 2014 through July 2015. Installation of the Depressurization System occurred from July 2015 through initial start-up in September 2015. The arsenic testing, filter installation, and a second start-up phase took place from September 2015 through January 2016. The key milestones for the installation activities are detailed in the following table:

Activity	Dates
Contractor Procurement	November 6, 2014 – February 17, 2015
Pre-Mobilization Submittals	February 23, 2015 – June 5, 2015
Off-Site P&T System Construction and Testing	May 26, 2015 – August 24, 2015
On-Site Mobilization	July 27, 2015 – July 30, 2015
Site Preparation and Restoration	July 27, 2015 – August 27, 2015
Depressurization System Installation	July 31, 2015 – August 28, 2015
Depressurization System Startup	September 2, 2015 – September 16, 2015
Arsenic Treatment Installation	September 17, 2015 – January 14, 2016
Depressurization System Start-Up Sampling	January 15, 2016 – January 21, 2016

Contractors

National Grid contracted AECOM as Project Engineer and on-site representative during system installation. AECOM personnel provided engineering and management of the remediation work to ensure general compliance with the Depressurization System Work Plan and the Contract Documents. AECOM also performed perimeter air monitoring, recording, and reporting in accordance with the approved CAMP.

National Grid contracted EnviroTrac Ltd. (EnviroTrac) of Yaphank, New York to perform the Depressurization System installation. EnviroTrac employed the following sub-contractors:

- Hunter Electric, Inc. of New York, New York: Electric subcontractor;

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- Utility Detection, Inc. of Melville, New York: Level A utility survey subcontractor; and
- Bayshore Soil Management LLC of Keasbey, New Jersey: Non-hazardous soil offsite thermal treatment facility.

Contractor Procurement

The invitation to bid included five contractors experienced in the manufacture and installation WWTPs similar in scale to that required for the Depressurization System. The procurement package, which formed the basis of performance of the work and evaluation of the bidders, was included in the Depressurization System Work Plan.

EnviroTrac was the selected contractor after detailed review of the bids received. EnviroTrac was notified of the award in February 2015.

Pre-Mobilization Submittals and Off-site Activities

EnviroTrac completed required contract submittals from February 2015 through June 2015. Submittals included:

- Health and Safety Plan: Revisions to the HASP based on the 2008 NYSDEC-approved Remedial Design Work Plan for OU-2 (ENSR, 2008); and
- Contractor Submittals: Submittal and review of Contractor submittals including the Contractors' scope of work, process flow diagrams (PFD), piping and instrumentation diagrams (P&ID), control logic diagrams and shop drawings related to the Depressurization System, Progress Schedule, and Contractors HASP.

Once the appropriate submittals had been reviewed and approved, Envirotrac began construction on the WWTP at their off-site facility. AECOM inspected the WWTP at Envirotrac's facility on August 7, 2015, prior to shipment of the system to the Site.

Mobilization

The on-site project kick-off meeting took place on July 27, 2015, and included representatives from AECOM, EnviroTrac, and National Grid. Site mobilization activities included:

- Utility Coordination and Mark-out: Completion of utility mark-outs by Consolidated Edison, Verizon, and National Grid. The proposed tie-in location for the existing electrical connection was field verified by EnviroTrac's electrician. The design alignment of the subsurface discharge line and electrical main required excavation of a trench that crossed multiple gas lines and required excavation adjacent to a gas vault. Following a discussion with National Grid Site Investigation and Remediation, National Grid Gas Operations, EnviroTrac, and AECOM, the location of the discharge line between the WWTP and the sewer tie-in was realigned as shown in Figure 2A. The realignment reduced the risk of accidental damage to the gas lines; and

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- Equipment: Site deliveries and mobilization of equipment to perform the site preparation and restoration work. Shipment of the WWTP took place at a later date, after the off-site inspection, and after installation of the influent pump and the influent and the effluent lines.

Site Work

Site work activities began on July 28, 2015 and continued for about four weeks. Project coordination included daily communications between on-site representatives, weekly conference calls to update Site conditions and status, review of completed work, discussion of health and safety issues, and scheduling of future activities. Daily documentation of field activities was recorded by AECOM personnel in a bound field book. Daily reports were submitted to National Grid at the end of the day. All daily reports are included in Attachment A. A digital photo log is included in Attachment B.

Site work activities included:

- Permitting: The EnviroTrac subcontractor, Hunter Electric, procured the electric permit from the New York City Department of Buildings (NYCDOB) for the Containment System (see Attachment C). A SPDES Permit Equivalency was issued to National Grid by the NYSDEC for discharge of the treated water into New York Harbor via existing storm sewers. The existing sewer tie-in, previously installed under a NYCDEP Discharge Connection Permit, provided connection of the discharge line to the sewer for final discharge to the New York Bay;
- Utility Preclearance: EnviroTrac's utility mark-out subcontractor, Utility Detection, performed a Level A Subsurface Utility Engineering (SUE) survey from July 28 through July 30, 2015 along the proposed discharge pipe and bollard locations. Utilities around the trenching alignment were located and exposed for installation of the discharge and electrical lines. Utility Detection exposed a total of six utility/trench crossings. Utility Detection used a hand-held demolition saw and/or core drill to cut through asphalt surface to expose the crossings. No impacts were noted in the excavated soils;
- Bollard Installation: Bollard installation on OU-2 included excavation of two 2 ft. by 2 ft. areas, placement of bollards, and backfill with cement. No visual or olfactory impacts or high photoionization detector (PID) readings were observed from the excavated soils;
- Containment Cell Ramp Removal: Removal of the ramp to the Containment Cell began on August 5, 2015 and was completed on August 6, 2016. Visually-clean ramp material (gravel and stone) was stockpiled onsite. The Containment Pad wall behind the ramp material contained pockets of hardened grout swell. The hardened grout had a slight naphthalene-like odor. EnviroTrac removed the grout and stockpiled them with other impacted material, separate from the clean ramp material. Installation of a staircase and railing in place of the ramp took place on August 10, 2015.
- Trench Excavation: On OU-1, excavation of a 2 ft. wide and 2 ft. deep trench to house the discharge line and electric conduit was completed. A subsurface discharge line, located between the outlet of the treatment system and the sewer tie-in, was necessary to promote gravitational

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discharge as required by the NYCDEP. The NYCDOB permit also required subsurface placement of the electric main. Activities completed during the trench excavation included:

- Pre-clearance and excavation along the trench alignment began on August 3, 2015. The trench was hand excavated using an air-knife and vacuum guzzler to prevent potential damage to subsurface utilities, including an 8-inch gas line. The presence of concrete and a 10-inch thick asphalt layer, observed 4 inches beneath the surface during the utility preclearance activity, impeded excavation and required saw-cutting.
- Saw-cutting of the asphalt layer begin on August 4, 2015. All asphalt debris was loaded into roll-off containers for disposal.
- Trench excavation began on August 5, 2015. An AECOM engineer screened the excavated soils via visual inspection, odor detection, and PID prior to stockpiling. To allow for re-use as backfill, unimpacted excavated soils were stockpiled onsite. No impacts were observed in the excavated soils, with the following exceptions:
  - A 20-foot stretch of trench (identified on Figure 2A) had discrete solidified nonaqueous phase liquid (NAPL) lenses with low to moderate naphthalene-like odor approximately 14 inches below the asphalt layer. PID readings ranged from 0.0 parts per million (ppm) to 6.1 ppm. The solidified NAPL lenses ranged from not present to four inches thick within the trench. Impacts were also observed on the sidewalls of the trench adjacent to an abandoned soil vapor sampling location. The piezometer was used to measure the effectiveness of jet grouting during the 2006 Jet Grout Field Study. Deeper excavation of the trench delineated the impacts vertically.
  - The bottom of the trench within the former ramp area consisted of hardened grout with a slight naphthalene-like odor. A mini-excavator removed the hardened grout and placed it with other potentially-impacted materials.
- Stockpiles of potentially-impacted soil/materials were stored on polyethylene sheeting and covered with polyethylene sheeting.
- The trench excavation was completed on August 7, 2015. The bottom of the trench was backfilled with approximately six inches of sand bedding for the electric conduit and discharge line. Following placement of the electric conduit and discharge line the trench was backfilled with sand, clean excavated soils, and clean gravel and stone from the ramp on August 21, 2015.

- Electrical Main: Installation of the electric main began on August 7, 2015 with the placement of electric conduit over the sand bedding. The depth to the conduit is approximately 16 inches below grade, with warning markers placed over it at regular intervals. The electric subcontractor pulled the electric line through the conduit on August 27, 2015 and completed the connections to the treatment system.
- Discharge Pipe: Following installation of the electric conduit within the trench, one inch of sand was placed in the trench. The one inch PVC discharge line was then placed at approximately 13

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inches below grade on August 10, 2015. The connection of the discharge line to the sewer tie-in, and insulation and heat tracing of the discharge line occurred from August 19, 2015 to August 25, 2015.

- Influent System: A Blackhawk electric piston pump is installed in recovery well COU1-RWA to remove groundwater from within the Containment Cell. A continuously-monitoring level controller is also installed within COU1-RWA. The influent pump is set to operate when groundwater rises above a depth of 13 feet below the Containment Cell surface. In addition, the groundwater level within the Containment Cell is also monitored via a continuously-monitoring level controller installed within COU1-RWB. Installation of the influent pump, the level controllers, and piping brackets to hold the influent pipe and electric service between COU1-RWA and the treatment system began on July 31, 2015. Insulation and heat trace installation and connection of the above-ground influent pipe to the treatment system took place from August 25 to August 27, 2015.

Site restoration activities included:

- Concrete Pad Repair: EnviroTrac began repair of the cracks in the concrete pad on July 28, 2015 and completed the repairs on August 24, 2015. The surface of the Containment Pad required repairs to maintain an impermeable cap on the Containment Cell, in compliance with the engineering controls requirements of the SMP. Repairs included filling of surficial cracks with cement putty and cement.
- Site Grading: Grading of low lying areas of the 40 Willow Avenue property with visually clean ramp material took place from August 21 through August 25, 2015. In addition, grading of the area designated for staging the WWTP container was accomplished by placement and compaction of clean gravel from the ramp removal.
- Site Landscaping: Landscaping activities took place August 25 through August 27, 2015. Landscaping activities included:
    - Placement of top soil around the WWTP container.
    - Planting of eight junipers near the containment cell, two junipers north of the staircase, and five east of the system container.
    - Placement of mulch adjacent to the plantings and hydro-seeding in areas of top soil restoration.
    - Installation of additional irrigation lines for the new planting areas.
    - Repair of breaks in the existing drip line and testing of repaired irrigation system.

Treatment System

WWTP fabrication (including the treatment system itself and the enclosure/container) took place offsite at the EnviroTrac facility. Figure 2C shows the as-built treatment system components, including a layout of the treatment system container. A process and flow diagram is included in Attachment D. An

AECOM process engineer visited the EnviroTrac facility to shop-test the treatment system with potable water on August 7, 2015. During shop-testing several modifications to the system were proposed, and subsequently implemented by Envirotrac. Following the modifications, the WWTP system was transported to the site on August 26, 2015. Electric and piping connections and onsite testing occurred from August 27 through September 15, 2015. The treatment system was operational on September 16, 2015.

Depressurization System Start-up Activities – September 2015

EnviroTrac and AECOM commissioned and initiated the start-up activities for the Depressurization System on September 17, 2015, including:

- Setting the user input process variables at the Human Machine Interface (HMI) screen;
- Dry testing all system controls and ensuring proper operation of critical safety devices, including pressure switches, high level floats, and freeze prevention equipment;
- Recording the flow totalizer reading;
- Leak testing all piping and system vessels;
- Hydrating the liquid phase carbon, tanks and oil water separator;
- Checking instruments, gauges, test controls, internet connection, and remote alarm notifications;
- Starting the system for full operation; and
- Collecting initial influent, mid-flow and effluent samples to ensure that the treated groundwater meets the requirement of the SPDES Permit Equivalent.

The electric subcontractor performed the final inspection on September 24, 2015, thus completing Start-up activities. Arsenic exceeded the discharge limits in the effluent samples collected as part of the start-up activities. As a result, the addition of an arsenic treatment process to the WWTP was deemed necessary and the Depressurization System was kept off-line until the arsenic treatment system was installed in January 2016.

Arsenic Treatment Installation

Evaluation of multiple arsenic treatment technologies took place from September 17, 2015 through December 18, 2015. The evaluation included:

- Collection and analysis of influent, mid-flow, and effluent analytical samples for pH, oxidation reduction potential (ORP), sulfide, and arsenic;
- Effectiveness and cost benefit analysis of physical pre-treatment, chemical pre-treatment, and ion-exchange filters; and
- Pilot test of an ion exchange resin filter cartridge.

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On December 18, 2015, in an e-mail from Katherine Vater of National Grid to Richard Dana of NYSDEC, the results of the evaluation by AECOM were presented in the form of a November 9, 2015 AECOM Memorandum entitled "Clifton WWTP Arsenic Treatment Pilot Result and Plan Forward." The plan to install arsenic filters in the WWTP was approved by the NYSDEC on December 24, 2015, in an e-mail from Richard Dana to Katherine Vater of National Grid.

AECOM procured two ion exchange filters, which were installed in series on January 14, 2016. The ion exchange filters are installed downstream of the carbon filters and upstream of the particulate filter. Attachment D includes product data sheet for the ion exchange tanks and resin installed at the site.

Depressurization System Start-up Activities – January 2016

Following installation of the two ion exchange filers, AECOM initiated another round of start-up sampling on January 15, 2016. In accordance with the SPDES Permit Equivalent requirements, AECOM collected analytical samples on seven consecutive days during the initial operation of the Depressurization System. The normal operations of the Depressurization System started on January 15, 2016. Total plant flow and pH nominally exceeded the SPDES permit equivalent limitations during the initial startup period; however these were transient events during system startup as operational parameters were being calibrated, and effluent sample results demonstrate that the containment pad depressurization system otherwise met the terms of the SPDES permit equivalent during the start-up period The results of the seven day consecutive samples are included in Table 1.

Community Air Monitoring Plan

AECOM implemented the CAMP during intrusive activities from July 27 through September 16, 2015. The purpose of the CAMP is to provide an early warning system to alert AECOM and National Grid that concentrations of total volatile organic compounds (TVOCs), respirable particulate matter (RPM_{10}) (*i.e.*, dust), or odors in ambient air are approaching alert levels or action levels due to intrusive activities. The early detection of emissions and associated contingency measures are intended to expedite any necessary mitigation measures and reduce the potential for the community to be exposed to constituents at levels above accepted regulatory limits and recommended guidelines. Attachment E contains the perimeter air monitoring data, including the background data and real-time monitoring data (DustTrak and PID data).

Real-time air monitoring for TVOCs and RPM_{10} was conducted continuously during periods of intrusive activity at upwind and downwind locations along the perimeter of work area. Upwind TVOC concentrations were measured at the start of each workday and periodically thereafter to establish background conditions. The locations of the instruments were changed during the day to adapt to changing wind directions.

Portable (battery operated) monitoring stations were used to collect the real-time data and included the following components: station case and tripod; total organic vapor analyzer; particulate monitor; and data logger. The monitoring data was converted to 15-minute averages, and stored in data-loggers at each location. The averaged values were compared to the Alert/Action Levels. The units were equipped with an audible alarm to indicate exceedances of these levels.

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There were no measurements of TVOCs and RPM_{10} above the alert or action level for any 15-minute periods that were associated with intrusive activities. The CAMP Report is included in Attachment E.

Waste Management

Installation of the Depressurization System resulted in the removal of construction and demolition (C&D) debris and non-hazardous soils from the site. C&D debris, primarily including asphalt generated during the Site work activities, was disposed of at Vanbro Corporation (d/b/a Richmond Recycling), an approved recycling facility. A total of 51.60 tons of impacted soils were transported offsite for thermal treatment at the Bayshore Soil Management facility on September 16, 2015. Manifests and Certificates of Recycling are included in Attachment F.

System Operation and Future Reporting

The Depressurization System has been in operation since January 15, 2016. Monthly effluent samples are collected in compliance with the SPDES permit. The Depressurization System was installed as part of the engineering controls for OU-1 and is part of the SMP. Beginning in in 2016, reporting under the SMP will consist of a semi-annual report and an annual Periodic Review Report. The operation of the Depressurization System, including the results of the effluent sampling, will be documented in those reports.

If you have any questions, comments, or require any additional information, please do not hesitate to contact me at (608) 826-3663 or at Katherine.Vater@nationalgrid.com.

Sincerely,

Katherine Vater
Project Manager

Enclosures
Figures
Attachments

Cc – S. Selmer, NYSDOH
R. Doshi, AECOM
S. Pandya, AECOM
File: 60137363-520

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Tables

Table 1 - Effluent Monitoring Results
Outfall 001 - Treated Groundwater Remediation Discharge
SPDES Permit Equivalent
Clifton Former MGP Site, Staten Island, New York
Site No. 2-43-023

AECOM

Sample ID	SPDES Permit Equivalent					WWTP7-01-011516				WWTP7-02-011616				WWTP7-03-011716				WWTP7-04-011816				WWTP7-05-011916			
Date Sampled	Discharge Limitations			Minimum Monitoring Requirements [1]		1/15/2016				1/16/2016				1/17/2016				1/18/2016				1/19/2016			
Parameter	Monthly Avg.	Daily Max	Units	Measurement Frequency	Sample Type	Result	Units	Mass Loading	Units	Result	Units	Mass Loading	Units	Result	Units	Mass Loading	Units	Result	Units	Mass Loading	Units	Result	Units	Mass Loading	Units
Flow	Monitor	1440	GPD	Continuous	Meter	1.0188	gpm	1,467	GPD	0.1569	gpm	226	GPD	0.3583	gpm	516	GPD	1.1674	gpm	1,681	GPD	0.4257	gpm	613	GPD
pH (range)	6.5 - 8.5		SU	Daily	Grab	**8.6 J**	SU			**8.5 J**	SU			**8.3 J**	SU			**7.9 J**	SU			**7.8 J**	SU		
TSS	Monitor	20	mg/l	Weekly	Grab	< 1 U	mg/l	6.12E-03	lbs/day	< 1 U	mg/l	9.43E-04	lbs/day	< 1 U	mg/l	2.15E-03	lbs/day	< 1 U	mg/l	7.01E-03	lbs/day	< 1 U	mg/l	2.56E-03	lbs/day
Benzene	Monitor	5	ug/l	Weekly	Grab	< 0.09 U	ug/l	5.51E-07	lbs/day	**0.42 J**	ug/l	7.92E-07	lbs/day	**0.4 J**	ug/l	1.72E-06	lbs/day	< 0.09 U	ug/l	6.31E-07	lbs/day	< 0.09 U	ug/l	2.30E-07	lbs/day
Ethylbenzene	Monitor	5	ug/l	Weekly	Grab	< 0.3 U	ug/l	1.84E-06	lbs/day	< 0.3 U	ug/l	2.83E-07	lbs/day	< 0.3 U	ug/l	6.46E-07	lbs/day	< 0.3 U	ug/l	2.10E-06	lbs/day	< 0.3 U	ug/l	7.67E-07	lbs/day
o-Xylene	Monitor	5	ug/l	Weekly	Grab	< 0.32 U	ug/l	1.96E-06	lbs/day	< 0.32 U	ug/l	3.02E-07	lbs/day	< 0.32 U	ug/l	6.89E-07	lbs/day	< 0.32 U	ug/l	2.24E-06	lbs/day	< 0.32 U	ug/l	8.18E-07	lbs/day
m/p-Xylene	Monitor	10	ug/l	Weekly	Grab	**0.69 J**	ug/l	8.45E-06	lbs/day	**0.54 J**	ug/l	5.09E-07	lbs/day	**0.67 J**	ug/l	1.44E-06	lbs/day	**0.46 J**	ug/l	6.45E-06	lbs/day	< 0.28 U	ug/l	7.16E-07	lbs/day
Toluene	Monitor	5	ug/l	Weekly	Grab	< 0.25 U	ug/l	1.53E-06	lbs/day	< 0.25 U	ug/l	2.36E-07	lbs/day	< 0.25 U	ug/l	5.38E-07	lbs/day	< 0.25 U	ug/l	1.75E-06	lbs/day	< 0.25 U	ug/l	6.39E-07	lbs/day
Acenaphthene	Monitor	10	ug/l	Weekly	Grab	< 0.88 U	ug/l	5.39E-06	lbs/day	< 0.88 U	ug/l	8.30E-07	lbs/day	< 0.88 U	ug/l	1.89E-06	lbs/day	< 0.88 U	ug/l	6.17E-06	lbs/day	< 0.9 U	ug/l	2.30E-06	lbs/day
Acenaphthylene	Monitor	10	ug/l	Weekly	Grab	< 0.65 U	ug/l	3.98E-06	lbs/day	< 0.65 U	ug/l	6.13E-07	lbs/day	< 0.65 U	ug/l	1.40E-06	lbs/day	< 0.65 U	ug/l	4.56E-06	lbs/day	< 0.66 U	ug/l	1.69E-06	lbs/day
Anthracene	Monitor	10	ug/l	Weekly	Grab	< 0.57 U	ug/l	3.49E-06	lbs/day	< 0.57 U	ug/l	5.37E-07	lbs/day	< 0.57 U	ug/l	1.23E-06	lbs/day	< 0.57 U	ug/l	4.00E-06	lbs/day	< 0.58 U	ug/l	1.48E-06	lbs/day
Benz(a)anthracene	Monitor	10	ug/l	Weekly	Grab	< 0.037 U	ug/l	2.26E-07	lbs/day	< 0.037 U	ug/l	3.49E-08	lbs/day	< 0.037 U	ug/l	7.97E-08	lbs/day	< 0.037 U	ug/l	2.60E-07	lbs/day	< 0.038 U	ug/l	9.72E-08	lbs/day
Benzo(a)pyrene	Monitor	0.09	ug/l	Weekly	Grab	< 0.026 U	ug/l	1.59E-07	lbs/day	< 0.026 U	ug/l	2.45E-08	lbs/day	< 0.026 U	ug/l	5.60E-08	lbs/day	< 0.026 U	ug/l	1.82E-07	lbs/day	< 0.027 U	ug/l	6.91E-08	lbs/day
Benzo(b)fluoranthene	Monitor	10	ug/l	Weekly	Grab	**0.026 J**	ug/l	3.18E-07	lbs/day	**0.031 J**	ug/l	5.85E-08	lbs/day	**0.028 J**	ug/l	1.21E-07	lbs/day	**0.032 J**	ug/l	4.49E-07	lbs/day	**0.023 J**	ug/l	1.18E-07	lbs/day
Benzo(ghi)perylene	Monitor	10	ug/l	Weekly	Grab	< 0.75 UJ	ug/l	4.59E-06	lbs/day	< 0.75 UJ	ug/l	7.07E-07	lbs/day	< 0.75 UJ	ug/l	1.61E-06	lbs/day	< 0.75 UJ	ug/l	5.26E-06	lbs/day	< 0.77 U	ug/l	1.97E-06	lbs/day
Chrysene	Monitor	10	ug/l	Weekly	Grab	< 0.67 U	ug/l	4.10E-06	lbs/day	< 0.67 U	ug/l	6.32E-07	lbs/day	< 0.67 U	ug/l	1.44E-06	lbs/day	< 0.67 U	ug/l	4.70E-06	lbs/day	< 0.68 U	ug/l	1.74E-06	lbs/day
Fluoranthene	Monitor	10	ug/l	Weekly	Grab	< 0.72 U	ug/l	4.41E-06	lbs/day	< 0.72 U	ug/l	6.79E-07	lbs/day	< 0.72 U	ug/l	1.55E-06	lbs/day	< 0.72 U	ug/l	5.05E-06	lbs/day	< 0.73 U	ug/l	1.87E-06	lbs/day
Fluorene	Monitor	10	ug/l	Weekly	Grab	< 0.8 U	ug/l	4.90E-06	lbs/day	< 0.8 U	ug/l	7.54E-07	lbs/day	< 0.8 U	ug/l	1.72E-06	lbs/day	< 0.8 U	ug/l	5.61E-06	lbs/day	< 0.82 U	ug/l	2.10E-06	lbs/day
Indeno(1,2,3-cd)pyrene	Monitor	10	ug/l	Weekly	Grab	< 0.21 U	ug/l	1.29E-06	lbs/day	< 0.21 U	ug/l	1.98E-07	lbs/day	< 0.21 U	ug/l	4.52E-07	lbs/day	< 0.21 U	ug/l	1.47E-06	lbs/day	< 0.21 U	ug/l	5.37E-07	lbs/day
Naphthalene	Monitor	50	ug/l	Weekly	Grab	< 0.8 U	ug/l	4.90E-06	lbs/day	< 0.8 U	ug/l	7.54E-07	lbs/day	< 0.8 U	ug/l	1.72E-06	lbs/day	< 0.8 U	ug/l	5.61E-06	lbs/day	< 0.82 U	ug/l	2.10E-06	lbs/day
Phenanthrene	Monitor	10	ug/l	Weekly	Grab	< 0.65 U	ug/l	3.98E-06	lbs/day	< 0.65 U	ug/l	6.13E-07	lbs/day	< 0.65 U	ug/l	1.40E-06	lbs/day	< 0.65 U	ug/l	4.56E-06	lbs/day	< 0.66 U	ug/l	1.69E-06	lbs/day
Pyrene	Monitor	10	ug/l	Weekly	Grab	< 0.83 U	ug/l	5.08E-06	lbs/day	< 0.83 U	ug/l	7.83E-07	lbs/day	< 0.83 U	ug/l	1.79E-06	lbs/day	< 0.83 U	ug/l	5.82E-06	lbs/day	< 0.85 U	ug/l	2.17E-06	lbs/day
Arsenic	Monitor	10	ug/l	Weekly	24 hr comp	< 0.71 U	ug/l	4.35E-06	lbs/day	**0.8 J**	ug/l	1.51E-06	lbs/day	**0.82 J**	ug/l	3.53E-06	lbs/day	**0.83 J**	ug/l	1.16E-05	lbs/day	< 0.71 U	ug/l	1.82E-06	lbs/day
Nickel	Monitor	80	ug/l	Weekly	24 hr comp	< 1.6 U	ug/l	9.79E-06	lbs/day	< 1.6 U	ug/l	1.51E-06	lbs/day	< 1.6 U	ug/l	3.44E-06	lbs/day	**3.2 J**	ug/l	4.49E-05	lbs/day	< 1.6 U	ug/l	4.09E-06	lbs/day
Cyanide, Total	Monitor	Monitor	mg/l	Weekly	Grab	< 0.004 U	mg/l	2.45E-05	lbs/day	< 0.004 U	mg/l	3.77E-06	lbs/day	< 0.004 U	mg/l	8.61E-06	lbs/day	< 0.004 U	mg/l	5.61E-05	lbs/day	< 0.004 U	mg/l	1.02E-05	lbs/day
Cyanide, Available	Monitor	0.01	mg/l	Weekly	Grab	< 0.0011 U	mg/l	6.73E-06	lbs/day	< 0.0011 U	mg/l	1.04E-06	lbs/day	< 0.0011 U	mg/l	2.37E-06	lbs/day	< 0.0011 U	mg/l	1.54E-05	lbs/day	< 0.0011 U	mg/l	2.81E-06	lbs/day
Turbidity	No increase that will cause a substantial visible contrast to Natural Conditions			Daily	Visual	**0.127 J**	NTU	Visually Clean		**0.174 J**	NTU	Visually Clean		**0.279 J**	NTU	Visually Clean		**0.299 J**	NTU	Visually Clean		**0.386 J**	NTU	Visually Clean	

Notes:

Qualifiers

Bold indicates compound was detected

J - The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.

U - The material was analyzed for, but not detected above the level of the reported sample quantitation limit.

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximated and may be inaccurate or imprecise.

Exceedances are highlighted in yellow

Mass loading calculations utilize half the value for all non-detect results

[1] Monitor these parameters daily for 7 consecutive days. If the sampling results for all parameters comply with the limits, the monitoring frequency becomes MONTHLY. If monthly sampling results do not comply with the limit for any parameter, the monitoring frequency becomes DAILY again until the sampling results for all parameters comply with the limits. Thereafter the monitoring frequency changes to MONTHLY.

Table 1 - Effluent Monitoring Results
Outfall 001 - Treated Groundwater Remediation Discharge
SPDES Permit Equivalent
Clifton Former MGP Site, Staten Island, New York
Site No. 2-43-023

Sample ID	SPDES Permit Equivalent					WWTP7-06-011916				WWTP7-07-012116			
Date Sampled	Discharge Limitations			Minimum Monitoring Requirements [1]		1/20/2016				1/21/2016			
Parameter	Monthly Avg.	Daily Max	Units	Measurement Frequency	Sample Type	Result	Units	Mass Loading	Units	Result	Units	Mass Loading	Units
Flow	Monitor	1440	GPD	Continuous	Meter	0.3007	gpm	433	GPD	0.3139	gpm	452	GPD
pH (range)	6.5 - 8.5		SU	Daily	Grab	**7.8 J**	SU			**7.2 J**	SU		
TSS	Monitor	20	mg/l	Weekly	Grab	< 1 U	mg/l	1.81E-03	lbs/day	< 1 U	mg/l	1.89E-03	lbs/day
Benzene	Monitor	5	ug/l	Weekly	Grab	< 0.09 U	ug/l	1.63E-07	lbs/day	< 0.09 U	ug/l	1.70E-07	lbs/day
Ethylbenzene	Monitor	5	ug/l	Weekly	Grab	< 0.3 U	ug/l	5.42E-07	lbs/day	< 0.3 U	ug/l	5.66E-07	lbs/day
o-Xylene	Monitor	5	ug/l	Weekly	Grab	< 0.32 U	ug/l	5.78E-07	lbs/day	< 0.32 U	ug/l	6.03E-07	lbs/day
m/p-Xylene	Monitor	10	ug/l	Weekly	Grab	**0.33 J**	ug/l	1.19E-06	lbs/day	**0.39 J**	ug/l	1.47E-06	lbs/day
Toluene	Monitor	5	ug/l	Weekly	Grab	< 0.25 U	ug/l	4.52E-07	lbs/day	< 0.25 U	ug/l	4.71E-07	lbs/day
Acenaphthene	Monitor	10	ug/l	Weekly	Grab	< 0.9 U	ug/l	1.63E-06	lbs/day	< 0.96 U	ug/l	1.81E-06	lbs/day
Acenaphthylene	Monitor	10	ug/l	Weekly	Grab	< 0.66 U	ug/l	1.19E-06	lbs/day	< 0.71 U	ug/l	1.34E-06	lbs/day
Anthracene	Monitor	10	ug/l	Weekly	Grab	< 0.58 U	ug/l	1.05E-06	lbs/day	< 0.62 U	ug/l	1.17E-06	lbs/day
Benz(a)anthracene	Monitor	10	ug/l	Weekly	Grab	< 0.038 U	ug/l	6.87E-08	lbs/day	< 0.04 U	ug/l	7.54E-08	lbs/day
Benzo(a)pyrene	Monitor	0.09	ug/l	Weekly	Grab	< 0.027 U	ug/l	4.88E-08	lbs/day	< 0.028 U	ug/l	5.28E-08	lbs/day
Benzo(b)fluoranthene	Monitor	10	ug/l	Weekly	Grab	< 0.012 U	ug/l	2.17E-08	lbs/day	< 0.013 U	ug/l	2.45E-08	lbs/day
Benzo(ghi)perylene	Monitor	10	ug/l	Weekly	Grab	< 0.77 UJ	ug/l	1.39E-06	lbs/day	< 0.82 U	ug/l	1.55E-06	lbs/day
Chrysene	Monitor	10	ug/l	Weekly	Grab	< 0.68 U	ug/l	1.23E-06	lbs/day	< 0.73 U	ug/l	1.38E-06	lbs/day
Fluoranthene	Monitor	10	ug/l	Weekly	Grab	< 0.73 U	ug/l	1.32E-06	lbs/day	< 0.78 U	ug/l	1.47E-06	lbs/day
Fluorene	Monitor	10	ug/l	Weekly	Grab	< 0.82 U	ug/l	1.48E-06	lbs/day	< 0.87 U	ug/l	1.64E-06	lbs/day
Indeno(1,2,3-cd)pyrene	Monitor	10	ug/l	Weekly	Grab	< 0.21 U	ug/l	3.79E-07	lbs/day	< 0.23 U	ug/l	4.34E-07	lbs/day
Naphthalene	Monitor	50	ug/l	Weekly	Grab	< 0.82 U	ug/l	1.48E-06	lbs/day	< 0.87 U	ug/l	1.64E-06	lbs/day
Phenanthrene	Monitor	10	ug/l	Weekly	Grab	< 0.66 U	ug/l	1.19E-06	lbs/day	< 0.71 U	ug/l	1.34E-06	lbs/day
Pyrene	Monitor	10	ug/l	Weekly	Grab	< 0.85 U	ug/l	1.54E-06	lbs/day	< 0.9 U	ug/l	1.70E-06	lbs/day
Arsenic	Monitor	10	ug/l	Weekly	24 hr comp	**0.76 J**	ug/l	2.75E-06	lbs/day	**0.8 J**	ug/l	3.02E-06	lbs/day
Nickel	Monitor	80	ug/l	Weekly	24 hr comp	< 1.6 U	ug/l	2.89E-06	lbs/day	< 1.6 U	ug/l	3.02E-06	lbs/day
Cyanide, Total	Monitor	Monitor	mg/l	Weekly	Grab	< 0.004 U	mg/l	7.23E-06	lbs/day	< 0.004 U	mg/l	7.54E-06	lbs/day
Cyanide, Available	Monitor	0.01	mg/l	Weekly	Grab	< 0.0011 U	mg/l	1.99E-06	lbs/day	< 0.0011 U	mg/l	2.07E-06	lbs/day
Turbidity	No increase that will cause a substantial visible contrast to Natural Conditions			Daily	Visual	**0.406 J**	NTU	Visually Clean		**0.546**	NTU	Visually Clean	

Notes:

Qualifiers

Bold indicates compound was detected

J - The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.

U - The material was analyzed for, but not detected above the level of the reported sample quantitation limit.

UJ - The analyte was analyzed for, but was not detected. The reported quantitation limit is approximated and may be inaccurate or imprecise.

Exceedances are highlighted in yellow

Mass loading calculations utilize half the value for all non-detect results

[1] Monitor these parameters daily for 7 consecutive days. If the sampling results for all parameters comply with the limits, the monitoring frequency becomes MONTHLY. If monthly sampling results do not comply with the limit for any parameter, the monitoring frequency becomes DAILY again until the sampling results for all parameters comply with the limits. Thereafter the monitoring frequency changes to MONTHLY.

Figures

UNITED STATES GEOLOGIC SURVEY
THE NARROWS QUADRANGLE
NEW YORK - NEW JERSEY
7.5 MINUTE SERIES (TOPOGRAPHY)

THE NARROWS, NY. - NJ.
1966
PHOTOREVISED 1981

SCALE 1:24000

1 0 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

N

AECOM

NATIONAL GRID FORMER CLIFTON MANUFACTURED GAS PLANT WWTP CONSTRUCTION COMPLETION REPORT			SITE LOCATION MAP
DATE: 07/02/16	DRWN: SNP	JOB NO.: 60137363-540	FIGURE 1

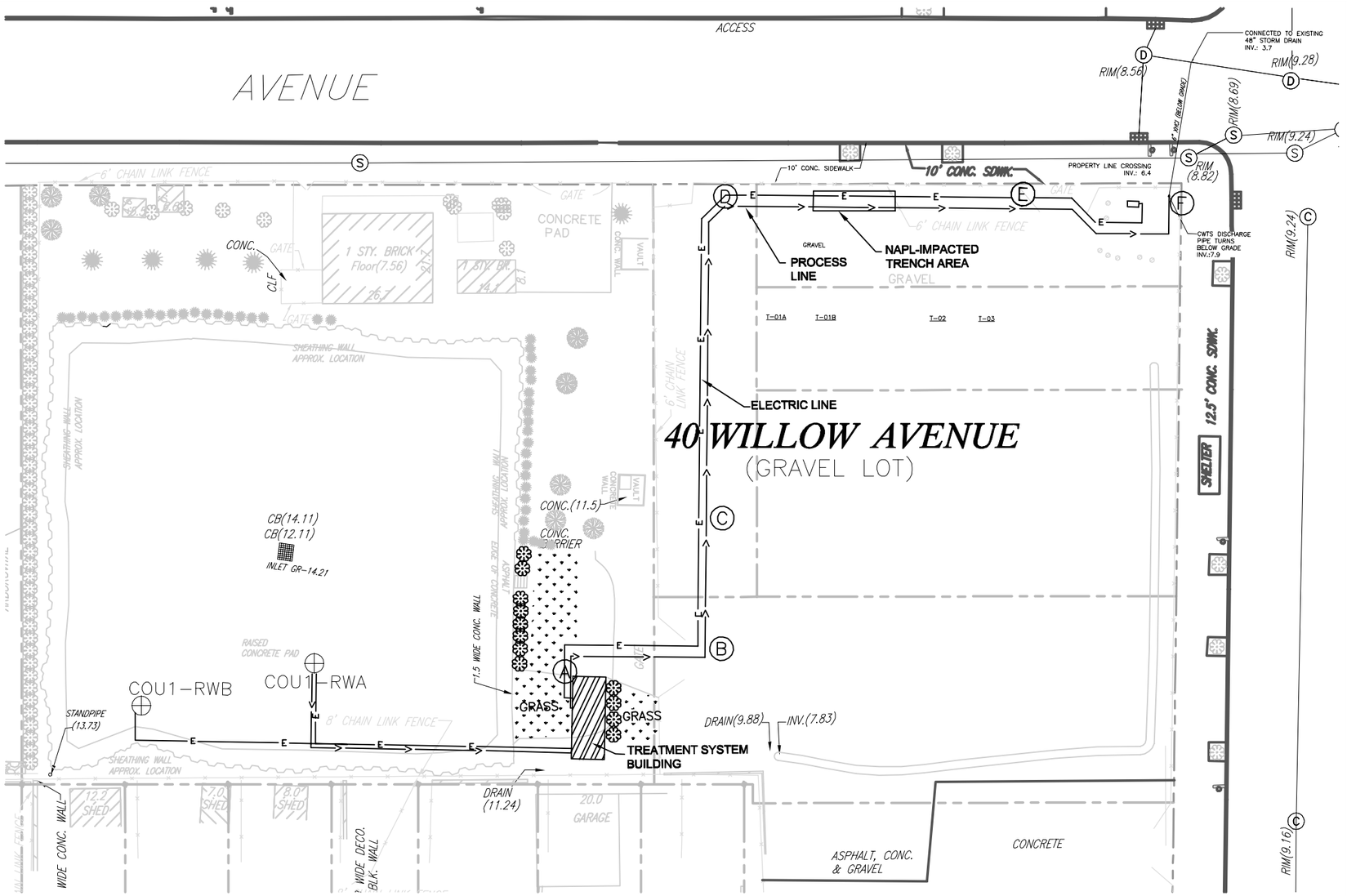
File: \\usnyc2fp001\Environment\National Grid\Clifton\60137363\CADD\FER\FIGURE 1-1.dwg Layout: ANSI_AVI-LJ User: PandyaS Plotted: Jul 11, 2016 - 8:38pm Xref's:

LEGEND

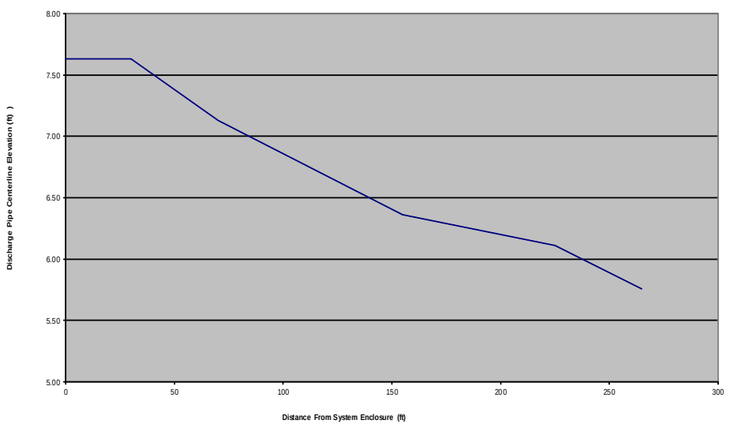
- COU1–RWA — DEPRESSURIZATION TREATMENT SYSTEM WELL
- E — ELECTRIC SUPPLY LINE
- PROCESS LINE
- TREATMENT SYSTEM BUILDING
- WATERLOO BARRIER SHEET PILE
- D — STORM SEWER LINE
- NEW PLANTS AND GRASS

15 0 30

GRAPHIC SCALE IN FEET



Discharge Pipe Elevation Profile



Trench Location ID	Ground Elevation (ft)	Depth to Discharge Pipe Center (ft)	Elevation of Discharge Pipe Center (ft)	Depth to Electric Conduit (ft)
A	8.71	1.08	7.63	18"
B	8.71	1.08	7.63	18"
C	8.21	1.08	7.13	18"
D	7.44	1.08	6.36	18"
E	7.19	1.08	6.11	18"
F	6.84	1.08	5.76	18"

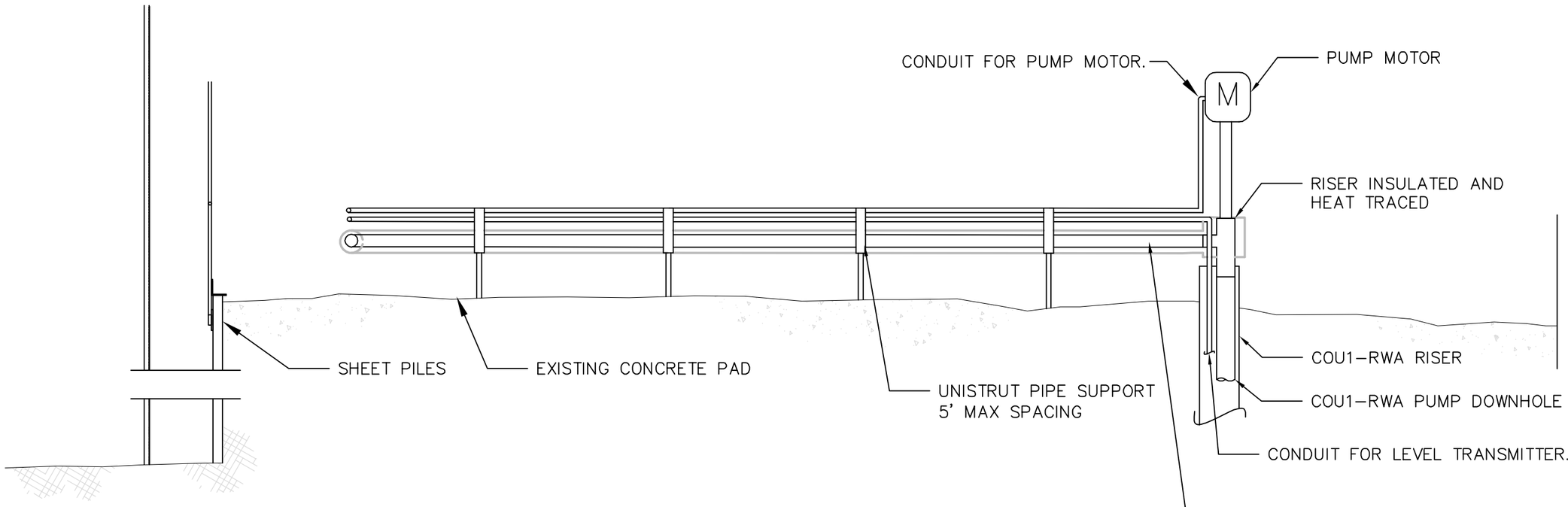
AECOM

NATIONAL GRID
FORMER CLIFTON MANUFACTURED GAS PLANT
WWTP CONSTRUCTION COMPLETION REPORT

OVERALL SITE PLAN

DATE: 11/22/2016 | DRWN: SNP | **FIGURE 2A**

JOB NO.: 60137363–540



PUMP AND INFLUENT SECTION

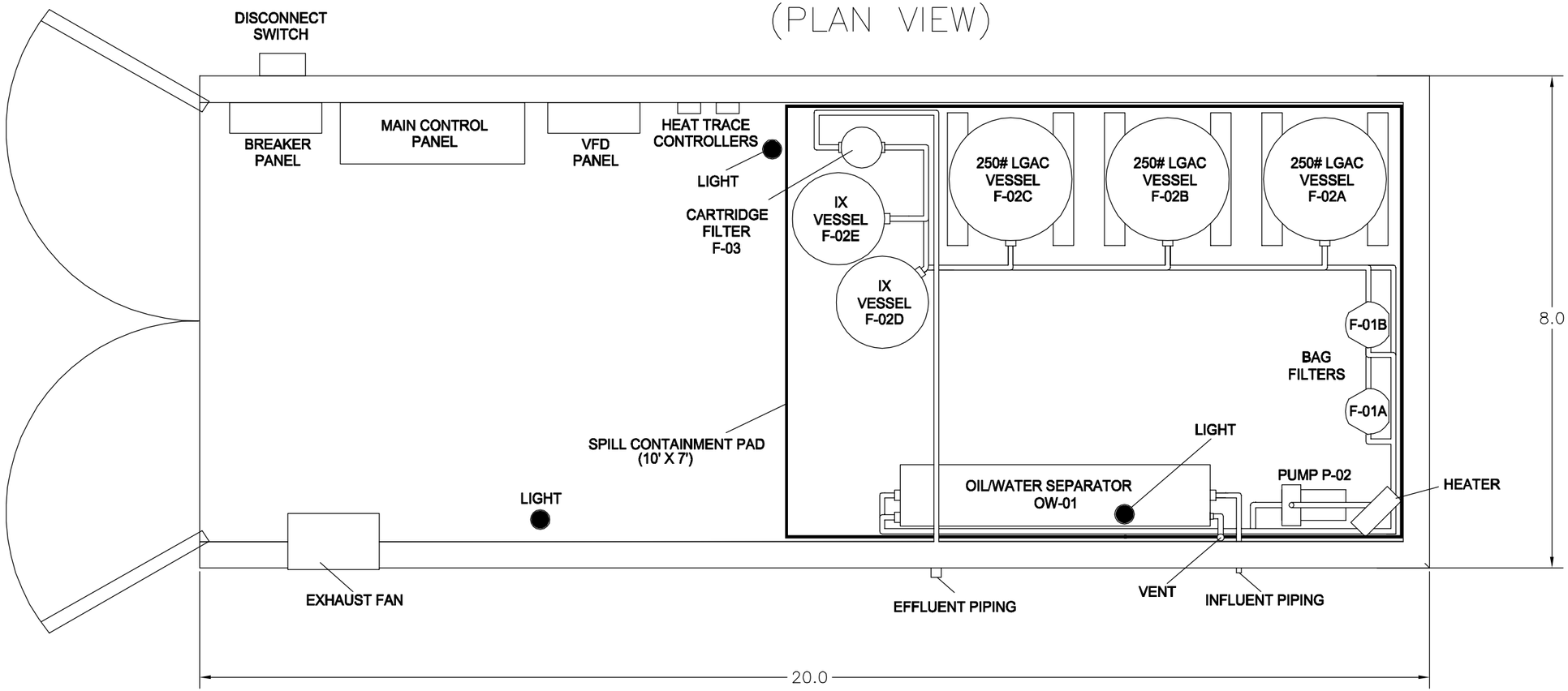
NOT TO SCALE

AECOM

NATIONAL GRID FORMER CLIFTON MANUFACTURED GAS PLANT WWTP CONSTRUCTION COMPLETION REPORT			PIPE AND CONDUIT DETAIL
DATE: 11/22/2016	DRWN: SNP		FIGURE 2B

JOB NO.: 60137363–540

TREATMENT SYSTEM BUILDING
(PLAN VIEW)



SCALE: 1"=2'

NOTES:

1. SYSTEM ENCLOSURE IS STANDARD 20-ft SHIPPING CONTAINER (8'Wx20'Lx8.5'H).
2. INTERIOR WALLS AND CEILING FRAMED OUT WITH 2"X3" STUDS, R-11 FIBERGLASS INSULATION, AND ONE-HALF INCH PLYWOOD SHEETING.

AECOM

NATIONAL GRID FORMER CLIFTON MANUFACTURED GAS PLANT WWTP CONSTRUCTION COMPLETION REPORT				**TREATMENT SYSTEM CONTAINER LAYOUT**
DATE: 11/22/2016	DRWN: SNP			**FIGURE 2C**

Attachment A

From: Doshi, Reeti
Sent: Monday, July 27, 2015 6:36 PM
To: Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Pandya, Shail; Gardner, Mike; Christopher, James
Subject: Clifton WWTP Instalaltion - Daily Update 7/27/2015
Attachments: 7.27.pdf

Hello Katherine,

Below is a summary of the Site activities for today (Monday, July 27, 2015) along with some photos.

Visitors

- A number of visitors were present on site today. The on-site project kick-off meeting, in addition to preparatory site activities, had attendees from AECOM, Envirotrac, and National Grid.
    - AECOM: R. Doshi, M. Gardner, J. Christopher
    - National Grid: B. Birmingham, J. Croft, Al, et al.
    - EnviroTrac: J. Wilkinson, N. Carroll, Vito, Rob (Utility Detection)

Health and Safety

- Topics of discussion included, but were not limited to:
    - Hospital location/route
    - Lightning, 30/30 rule
    - PPE Requirement
- There were no health and safety issues or violations.

Project Kickoff Meeting

- AECOM, EnviroTrac, National Grid SIR, and National Grid Gas Ops were present at the Site for the project kickoff meeting. The official kickoff meeting started at 10 AM.
- The project team discussed the option of rerouting the proposed conduits, and agreed upon a new trench location. The remediation system piping will exit the gate station at a location closer to the system container and follow the fence line to the previously proposed piping position along Willow Avenue. This will reduce the overall number and complexity of utility crossings.
- AECOM directed EnviroTrac in the preferred method of handling removed ramp material. EnviroTrac will be staging a stockpile of removed ramp material on the 40 Willow Avenue property for use in backfilling various locations as necessary.
- AECOM indicated to EnviroTrac which cracks in the concrete will need repairing.
- AECOM showed the location of the bollard installation to EnviroTrac and informed them about the electric conduit in that area on the 25 Willow Avenue parcel.
- National Grid Gas Ops indicated that the depth of the 8-inch gas lines on Site is likely 3 feet, but is the depth of the smaller lines are unknown. Special caution will be taken while excavating in the vicinity of these lines.
- National Grid Gas representative will be present during the ground intrusive activities around the gas lines. They are available to work 8 hour days, beginning at ~0730 hours.
- National Grid Gas discussed that the gas lines may be taken out of service while the work around gas lines is performed. J. Croft (National Grid Gas) is attempting to ensure this.

- Based on the discussion with the National Grid Gas, EnviroTrac will NOT be allowed to use a mini excavator or other machinery in the excavation of the trench. As per the bid documents and National Grid direction, EnviroTrac will use only an air knife or guzzle-truck to assist in hand digging the trench.
- There was a question regarding the need to classify the heat trace and trailer. J. Croft (National Grid Gas) will be forwarding an appropriate contact for further information on the matter to K. Vater and B. Bermingham of National Grid.
- The proposed trench has been relocated to follow along the fence line outside of the gate station parcel after discussion with National Gris SIR and National Grid Gas.
- It was determined that EnviroTrac will expose the discharge pipe tie-in location and survey it as soon as possible to get the discharge pipe profile approved by the Engineer.

Trench Excavation

- No trenching was performed today.
- AECOM, EnviroTrac, and National Grid discussed the option of rerouting the proposed conduits, and agreed upon a new trench location.
- EnviroTrac's utility mark-out sub, Utility Detection, identified underground utilities throughout the greater proposed trenching area.

Additional Site Work

- Utility Detection identified underground utilities throughout the proposed work area, including the location of the bollards.
- EnviroTrac's electrician visited the Site to verify the proposed tie-in location. It was indicated that he saw no issue with tying into the existing electrical.
- No additional site work was performed today.

Please let me know if you have any question or comment.

Thanks.
Reeti

Reeti Doshi
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From: Doshi, Reeti
Sent: Tuesday, July 28, 2015 6:45 PM
To: Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Christopher, James; Pandya, Shail; Crowell, Sean; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 7/28/2015

Katherine,

During the site meeting we found that the water valve was closed from inside the gas building due to a pipe burst during winter. That valve was opened and Jim Christopher (AECOM) would fix the pipe and restart the sprinkler system in next couple of weeks. Below is a summary of the Site activities for today (Tuesday, July 28, 2015). Some photos taken at the site today are saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: R. Doshi, J. Pfeiffer, J. Christopher
- National Grid: B. Birmingham, J. Croft
- EnviroTrac: J. Wilkinson, N. Carroll, 2 laborers

Health and Safety

- Topics of discussion included, but were not limited to:
  - Heat stresses/ availability of A/C rest areas and water cooler
  - Personal limitations
  - Foolhardy behavior/slips, trips, and falls
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation

- No trenching was performed today.
- EnviroTrac attempted to daylight the 6 utility/trench crossings today:
  - The discharge line was cleared off; at the point at which it passes under the sidewalk the depth to the pipe is ~0.9 feet.
  - An electrical line at the Willow Ave. gate was daylighted, the depth of the utility is ~1.3 feet.
  - The electrical utility at the box is under a concrete pad, and will need to be cut to daylight.
  - The remaining 3 crossings are gas. Roughly 0.7 feet of gravel is covering an asphalt surface which is at least 0.6 feet thick.
- No impacts were noted in excavated soils.

Additional Site Work

- EnviroTrac began repairing cracks in the OU1 slab. The work is being performed as the crews is available. The slab repair is ~20% complete.
- A piezometer was located near the fence along at Willow Avenue. While it is within the trench-line, it should not impede installation.

Upcoming Site Work

- OU1 slab crack repairs will continue with crew availability as necessary.
- Bollard pre-clearing and installation is anticipated for tomorrow.

- Using a hand-held demolition saw, EnviroTrac will be sawcutting asphalt surfaces for the purpose of daylighting utilities. This work will commence tomorrow. 4 locations will need to be sawcut: the 2" gas control line, the 8" gas main, and the 2" electrical at the box.
- Ramp removal and asphalt removal are pending. A mini-excavator and a Bobcat are to be delivered to site this Friday or (more likely) the following Monday, August 3rd.

Beyond the requirement to hand dig the trench, there has been no indication that the work will be completed outside of schedule.

AECOM and B. Bermingham discussed EnviroTrac's method of removing asphalt by saw cutting over the gas line and then pulling it along trench using a mini excavator with National Grid Gas (J. Croft). He did not object and informed the project team that the gas line is shut down, so gas may still be present, but at lower pressure. He is still looking into classification and heat tracing requirements around sub-station and gas line, respectively.
Katherine/Brian,
Do we need his written approval for EnviroTrac's proposed method for trenching?

Please let me know if you have any questions or comments.

Thanks.
Reeti

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From: Christopher, James
Sent: Wednesday, July 29, 2015 6:04 PM
To: Doshi, Reeti; Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Pandya, Shail; Crowell, Sean; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 7/29/2015

Katherine,

Below is a summary of the Site activities for today (Wednesday, July 29, 2015). Some photos taken at the site today are saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: J. Christopher
- National Grid: B. Birmingham, A.Pantaleon
- EnviroTrac: N. Carroll, Brian Walsh, R. Bauer

Health and Safety

- Topics of discussion included, but were not limited to:
  - Heat stresses- sun protection
  - Safe saw-cutting practices
  - Fueling procedures
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation

- No trenching was performed today.
- EnviroTrac attempted to daylight the remaining 4 utility/trench crossings today:
  - The electrical utility at the box is under a concrete pad, and will need to be cut or drilled to daylight. No attempt was made to daylight this utility today.
  - EnviroTrac attempted to daylight the control line and gas main nearer the proposed WWTP location. The asphalt in this area is ~0.8' thick. Despite saw-cutting, EnviroTrac was only able to break through the asphalt at the control line. Due to a shallow water table, ~3.2fbg, and the small diameter of the control line (2"), EnviroTrac was unable to locate the utility. We are estimating its' depth at 3.7'. EnviroTrac was unable to break through the asphalt over the adjacent 8" gas main.
- A core drill will be utilized tomorrow to provide access through the asphalt and concrete at all remaining crossings.
- No impacts were noted in excavated soils.

Additional Site Work

- Preclearing for the bollard installation began today, however a tight dry clayey material impeded progress here. One of the two bollard holes has been completed to 2 fbg.
- The OU-1 slab repair is ~20% complete.

Upcoming Site Work

- OU-1 slab crack repairs will continue with crew availability as necessary.

- Bollard pre-clearing and installation is anticipated to continue tomorrow.
- Using a core drill, EnviroTrac will be drilling through asphalt surfaces for the purpose of daylighting utilities. This work will commence tomorrow. 3 locations will need to be drilled: the 8" gas main (in two positions along the trench), and the 2" electrical at the panel.
- Ramp removal and asphalt removal are pending. A mini-excavator and a Bobcat are to be delivered to site this coming Monday, August 3rd.

Beyond the requirement to hand dig the trench, there has been no indication that the work will be completed outside of schedule.

Please let me know if you have any questions or comments.

Thank you,
Jim

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From: Christopher, James
Sent: Thursday, July 30, 2015 8:21 PM
To: Doshi, Reeti; Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Pandya, Shail; Crowell, Sean; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 7/30/2015

Katherine,

Below is a summary of the Site activities for today (Thursday, July 30, 2015). Some photos taken at the site today are saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: J. Christopher
- National Grid: B. Birmingham, A.Pantaleon
- EnviroTrac: N. Carroll, Brian Walsh, R. Bauer

Health and Safety

- Topics of discussion included, but were not limited to:
  - Open hole safety
  - Monitoring/Instrumentation
  - Heavy rain – delays/ "30/30" rule
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak). CAMP was run discontinuously due to heavy rain.

Trench Excavation

- No trenching was performed today.
- EnviroTrac attempted to daylight the remaining 4 utility/trench crossings today:
  - The electrical utility at the panel is under 0.3' of asphalt. The utility was daylighted at 1.0 fbg.
  - EnviroTrac daylighted the 8" gas main at both trench crossings, near the proposed WWTP location and at the corner of the lot near Willow Avenue.
    - The top of the 8" main near the proposed WWTP location was found at 3.3' below the top of the 10" thick asphalt (which has 0.7' of "overburden" or gravel cover).
    - The top of the 8" main near Willow Avenue was found at 2.0' below the top of the 11" thick asphalt (the asphalt has no cover in this location).
  - EnviroTrac attempted to daylight the control line near the proposed WWTP location. Due to a shallow water table, ~3.2fbg, and the small diameter of the control line (2"), EnviroTrac was unable to locate the utility.
- No impacts were noted in excavated soils.

Additional Site Work

- Preclearing for the bollard installation was completed today at both bollard locations. While the holes have been cleared, EnviroTrac did not pour any concrete or place the bollards today due to heavy rain.
- The OU-1 slab repair is ~19% complete.
- Exposed utilities, control points, and other pertinent surfaces were surveyed.

Upcoming Site Work

- OU-1 slab crack repairs will continue with crew availability as necessary.
- Pump installation will take place tomorrow, Friday, July 31st.
- Ramp removal and asphalt removal are pending. A mini-excavator and a Bobcat are to be delivered to site this coming Monday, August 3rd.

Beyond the requirement to hand dig the trench, there has been no indication that the work will be completed outside of schedule.

Please let me know if you have any questions or comments.

Thank you,
Jim

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From: Christopher, James
Sent: Friday, July 31, 2015 5:15 PM
To: Doshi, Reeti; Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Pandya, Shail; Crowell, Sean; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 7/31/2015

Katherine,

Below is a summary of the site activities for today (Friday, July 31, 2015). Some photos taken at the site today are saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: J. Christopher, R. Doshi
- National Grid: B. Birmingham, A.Pantaleon
- EnviroTrac: J. Wilkinson, N. Carroll, Brian Walsh, D. Weber

Health and Safety

- Topics of discussion included, but were not limited to:
  - Weather
  - Proper lifting techniques
  - Teamwork
- There were no health and safety issues or violations.
- No CAMP was performed today.

Trench Excavation

- No trenching was performed today.

Additional Site Work

- EnviroTrac installed the pump into RW-A.
  - The pump is the Blackhawk model 101E, per design.
    - RW-A depth to bottom: 16.75'
    - The pump inlet is set at 15.75', the transducer is set at 14.75'
  - Piping brackets have been installed along the southeast edge of the OU-1 slab.
- Mini excavator (CAT 304E) was delivered to site.
- Skid steer (Daewoo 450) was delivered to site.
- The OU-1 slab repair is ~60% complete.

Upcoming Site Work

- OU-1 slab crack repairs will continue with crew availability as necessary.
- Trench excavation will take place starting next week, the week of August 3rd.
- Bollard placement and cementing will take place as crew availability and weather permit.
- Ramp removal and asphalt removal are pending.

Please let me know if you have any questions or comments.

Thank you,

Jim

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From: Christopher, James
Sent: Monday, August 03, 2015 3:10 PM
To: Doshi, Reeti; Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Pandya, Shail; Crowell, Sean; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 8/3/2015

Katherine,

Below is a summary of the site activities for today (Monday, August 3, 2015). Some photos taken at the site today are saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: J. Christopher
- National Grid: B. Birmingham, J. Croft, R. Arndt, J. Compton
- EnviroTrac: J. Wilkinson, N. Carroll, K. Davies, B. Gimbel, S. Smith, Jim

Health and Safety

- Topics of discussion included, but were not limited to:
  - Weather
  - Smoking/eating/drinking
  - PPE requirements
  - Slips, trips, falls
  - Teamwork
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation

- No trenching was performed today.

Additional Site Work

- EnviroTrac scraped away the overburden from on top of the asphalt surface along the proposed trench location. Removed gravel has been stockpiled adjacent to the trench for ease of replacement.
- The proposed trench-line has been marked out, and is prepared for sawcutting.
- A sand delivery was received today. It is being stockpiled on the cement slab at the Bay St gate.
- The bollards were cemented into their holes, and impacted fence posts have been righted and reinforced. The sidewalk area outside of the fence (where trucks tend to bump the fence) has been coned off to allow the bollards time to set.
- The broken fence post top has been replaced.
- The old recovery well lids have been relocated next to the field trailer. They have been covered with a tarp.
- EnviroTrac moved the barriers from the edges of the ramp. They are being staged with the skid steer and mini excavator. No work has been performed in the way of removing the ramp at this time.
- The OU-1 slab repair is ~60% complete.

Upcoming Site Work

- OU-1 slab crack repairs will continue with crew availability as necessary.
- Trench excavation will take place starting tomorrow. The asphalt will be sawcut and removed from the trench area. Any trenching work which takes place will begin from the electrical panel and move up the discharge line.
- Ramp removal and asphalt removal are pending.

Please let me know if you have any questions or comments.

Thank you,
Jim

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From: Christopher, James
Sent: Tuesday, August 04, 2015 2:34 PM
To: Doshi, Reeti
Subject: Clifton WWTP Installation - Daily Update 8/4/2015

Katherine,

Below is a summary of the site activities for today (Monday, August 3, 2015). Some photos taken at the site today are saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: J. Christopher
- National Grid: B. Birmingham, J.Croft, J. Compton
- EnviroTrac: J. Wilkinson, N. Carroll, K. Davies, B. Gimbel, S. Smith, J. Byrne

Health and Safety

- Topics of discussion included, but were not limited to:
  - Weather
  - Saw noise/pedestrian traffic
  - 30/30 rule
  - Commode etiquette
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation

- No trenching was performed today.
- EnviroTrac sawcut along the trench, 212 ft, from the electrical panel towards the WWTP position.
- Asphalt was removed from the sawcut area, 212 ft, from the electric panel towards the WWTP position. Along Willow Avenue, up to the trench crossing at the 8" gas main, the asphalt was 4" thick. Along the Gate Station fence, the asphalt varied between 10" and 12" thick. All asphalt has been loaded into the roll-off.
- No impacted soils were noted below the asphalt.
- The vacuum excavator is anticipated to arrive on site tomorrow at 7:00am.

Additional Site Work

- A 20cy roll-off was dropped at the site today. It will be used for asphalt disposal.
- The bollards are vertical and stable, cemented into their holes. The impacted fence posts have been righted and reinforced, and are stable.
- No work has been performed in the way of removing the ramp at this time.
- The OU-1 slab repair is ~82% complete.

Upcoming Site Work

- OU-1 slab crack repairs will continue with crew availability as necessary.
- Trench excavation will take place starting tomorrow. The asphalt has been removed from the entire length of the Willow Ave and Gate Station fence.
- Ramp removal and stairway installation are pending.

Please let me know if you have any questions or comments.

Thank you,
Jim

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From: Christopher, James
Sent: Wednesday, August 05, 2015 5:18 PM
To: Doshi, Reeti; Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Pandya, Shail; Crowell, Sean; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 8/5/2015

Katherine,

Below is a summary of the site activities for today (Wednesday, August 5, 2015). Some photos taken at the site today are saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: J. Christopher, R. Doshi
- National Grid: B. Birmingham, J.Croft
- EnviroTrac: N. Carroll, K. Davies, B. Gimbel, S. Smith, J. Byrne, V. De P, J. Torres

Health and Safety

- Topics of discussion included, but were not limited to:
  - Weather
  - Pedestrian traffic
  - Guzzler truck safety
  - Site security
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation

- EnviroTrac trenched along the Willow Avenue stretch from the discharge line ~125'. The trench is being excavated by hand (with the use of a guzzler vacuum excavating truck) to a depth of 24" below grade. Final conduit and discharge elevations will be achieved by grading the sand bedding appropriately.
- Impacted soils were noted 14" below the asphalt along ~20' of the trench line. All comingled excavated materials were discharged onto poly-sheeting and were covered. These materials will not be used for backfilling.
  - A solidified coal tar lens (ranging from nonexistent to 3" thick) extends from a piezometer (located ~25' from the Willow Avenue gate) ~20' north (upgradient).
  - A PID was used to screen the materials: ambient reading, 0.0 ppm; headspace reading, 6.1 ppm

Additional Site Work

- The ramp removal has begun. EnviroTrac is using the mini excavator and skid steer to remove the material and stockpile it in the lot. The ramp is being excavated to the same grade as the grass in the Gate Station yard.
- Soil from the bollard holes has been drummed, staged near the recovery trailer, and labeled appropriately.
- The OU-1 slab repair is ~82% complete. Frames and cement have been purchased for larger-scale slab repair.

Upcoming Site Work

- OU-1 slab crack repairs will continue with crew availability as necessary.

- Trench excavation will continue tomorrow. EnviroTrac plans on completing the length of the Willow Ave and then the Gate Station fence.
- Ramp removal will continue tomorrow, and stairway installation is pending.

Please let me know if you have any questions or comments.

Thank you,
Jim

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From: Christopher, James
Sent: Thursday, August 06, 2015 4:11 PM
To: Doshi, Reeti; Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Pandya, Shail; Crowell, Sean; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 8/6/2015

Katherine,

Below is a summary of the site activities for today (Thursday, August 6, 2015). Some photos taken at the site today are saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: J. Christopher
- National Grid: B. Birmingham, J.Croft, J. Compton
- EnviroTrac: N. Carroll, K. Davies, B. Gimbel, S. Smith, J. Byrne, D. Schoneboom

Health and Safety

- Topics of discussion included, but were not limited to:
  - Open trench safety
  - Contaminated materials/exposure
  - Work plan
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation

- EnviroTrac comtinued to trench along the Willow Avenue stretch around the corner and to the gate into the Gate Station yard. The trench is being excavated by hand (with the use of a guzzler vacuum excavating truck) to a depth of 24" below grade. Final conduit and discharge elevations will be achieved by grading the sand bedding appropriately.
- Beneath the gravel of the ramp is a layer of grouted gravel, EnviroTrac was unable to break through this.
- No impacted soils were noted along the remainder of the trench with the open lot.
- Grout with a heavy coal tar odor was found at and about the base of the containment cell. This material was placed with yesterday's comingled soil for disposal.
  - A green grout was present with a moderate to strong coal tar odor.
  - A PID was used to screen the materials: ambient reading, 0.0 ppm; headspace reading, 0.0 ppm

Additional Site Work

- The ramp removal has been completed. EnviroTrac used the mini excavator and skid steer to remove the clean material and stockpile it in the lot, "dirty" soil has been separated for disposal. The ramp has been excavated to the same grade as the grass in the Gate Station yard.
- Soil from the sidewall of the trench at Willow Ave. has been collected and placed with other comingled materials for disposal.
- The OU-1 slab repair is ~82% complete. Frames and cement have been purchased for larger-scale slab repair.

- The stairway construction is complete, the stairs have not been installed, however, as there are large pockets of grout on the wall where the stairs will be going; it will have to be removed prior to stair installation.

Upcoming Site Work

- OU-1 slab crack repairs will continue with crew availability as necessary.
- Trench excavation will continue tomorrow. EnviroTrac will use the mini excavator to peel back the grout layer and complete the trench through the Gate Station property.
- EnviroTrac's electrician will be on site tomorrow to begin installation of the electrical conduit.
- Stairway installation is pending.

Please let me know if you have any questions or comments.

Thank you,
Jim

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From: Christopher, James
Sent: Sunday, August 09, 2015 1:35 PM
To: Doshi, Reeti; Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Pandya, Shail; Crowell, Sean; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 8/7/2015

Katherine,

Below is a summary of the site activities for Friday, August 7, 2015. Some photos taken at the site have been saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: J. Christopher
- National Grid: B. Birmingham, J.Croft, J. Compton, A. Prophete, A.Dubison
- EnviroTrac: J. Wilkinson, N. Carroll, K. Davies, B. Gimbel, S. Smith, J. Byrnes, J. Ishak

Health and Safety

- Topics of discussion included, but were not limited to:
  - PPE
  - Traffic safety
  - Good housekeeping
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation

- EnviroTrac completed trenching. Per Joe Croft, excavation within the ramp area, within the Gate station yard, was performed with the assistance of the mini excavator due to thick grouted layer.
  - Materials excavated from this area were mixed with an odoriferous grout, and were stockpiled separately for disposal.
  - Soils were screened with a PID; ambient reading- 0.0 ppm, headspace reading- 0.0 ppm
  - The trench here has been excavated to ~20" below grade, as an additional 6" of topsoil will be placed in the area.
- EnviroTrac also completed trenching along the Gate Station fence in the open lot.
  - No impacted soils were noted along the remainder of the trench within the open lot.
- The sand bedding, ~6" depending on trench depth, has been placed through the entire trench.
- The electrical conduit has been laid through the trench. It is ready for the line to pass through. No pull box has been installed.

Additional Site Work

- The OU-1 slab repairs are 100% complete, pending a final inspection.
- The stairway construction is complete, the stairs have not been installed, however, as there are large pockets of grout on the wall where the stairs will be going; it will have to be removed prior to stair installation.
- A broken fence bracket was replaced at the Willow Ave gate.

Upcoming Site Work

- OU-1 slab crack repairs will continue if necessary, based on inspection.
- Backfilling the trench to 14” below grade to prepare for the discharge pipe installation.
- Pressure testing the discharge piping prior to installation.
- Stairway installation and ramp area restoration is pending.

Please let me know if you have any questions or comments.

Thank you,
Jim

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From: Christopher, James
Sent: Monday, August 10, 2015 4:37 PM
To: Doshi, Reeti; Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Pandya, Shail; Crowell, Sean; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 8/10/2015

Katherine,

Below is a summary of the site activities for today (Monday, August 10, 2015). Some photos taken at the site have been saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: J. Christopher
- National Grid: B. Birmingham
- EnviroTrac: N. Carroll, K. Davies, B. Gimbel, S. Smith, J. Byrnes, J. Ishak

Health and Safety

- Topics of discussion included, but were not limited to:
  - Open trench safety
  - Working with pressure
  - PPE
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation

- Sand bedding has been placed in the trench to ~15" below grade. The electrical conduit has been buried by ~1".
- The water discharge line has been laid through the trench. The center of the discharge line is at 14" below grade, per piping profile.

Additional Site Work

- The OU-1 slab repairs are 100% complete, pending a final inspection.
- The stairway and railing installation is complete. The stairway has been affixed to the containment cell at the north side of the ramp, away from the WWTP position.
- Pressure testing of the water line was conducted. The water line has passed the pressure test.
  - Pressure maintained at 25 psi for 10 minutes, pressure dropped 0 psi.
  - Pressure maintained at 50 psi for 5 minutes, pressure dropped 0 psi.
  - Pressure maintained at 75 psi for 5 minutes, pressure dropped 0 psi.
  - Pressure maintained at 100 psi for 10 minutes, pressure dropped 0 psi.

Upcoming Site Work

- OU-1 slab crack repairs will continue if necessary, based on inspection.
- Installing the heat trace onto/within the water discharge line.
- Backfilling the trench beginning with excavated material and then ramp material.
- Ramp area restoration is pending WWTP delivery and placement.

Of note, there will be no work on site tomorrow.

Please let me know if you have any questions or comments.

Thank you,
Jim

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From: Doshi, Reeti
Sent: Wednesday, August 19, 2015 7:17 PM
To: Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Pandya, Shail; Shankaran, Karthik; Christopher, James; Crowell, Sean; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 8/19/2015

Katherine,

Below is a summary of the site activities for today (Wednesday, August 19, 2015). Some photos taken at the site have been saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: J. Christopher, R. Doshi, S. Pandya
- National Grid: B. Birmingham
- EnviroTrac: N. Carroll, J. Wilkinson, B. Gimbel

Health and Safety

- Topics of discussion included, but were not limited to:
  - Open trench safety
  - Hot weather
  - Staying hydrated
  - PPE
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation/Piping

- The water discharge line had been laid through the trench at approximately 14-inches below grade, per piping profile. The external heat trace was installed on the entire pipe run in the trench.
- Insulation was installed over approximately 50% of the discharge piping.
- PVC sleeve was also installed over portion of the piping where insulation has been installed.

Additional Site Work

- Heat trace was installed on the above ground influent piping.

Upcoming Site Work

- OU-1 slab crack repairs will continue if necessary, based on inspection.
- Installation of the insulation and PVC sleeve onto the water discharge line.
- Work on electrical conduit as required.
- Backfilling the trench beginning with excavated material and then ramp material.
- Ramp area restoration is pending WWTP delivery and placement.
- WWTP system delivery and startup.

Please let me know if you have any questions or comments.

Thank you,
Reeti

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From: Doshi, Reeti
Sent: Friday, August 21, 2015 5:00 PM
To: Vater, Katherine (Katherine.Vater@nationalgrid.com); bbermingham@trcsolutions.com
Cc: Pandya, Shail; Christopher, James; Shankaran, Karthik; Crowell, Sean; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 8/21/2015

Katherine,

Below is a summary of the site activities for today (Friday, August 21, 2015). Some photos taken at the site have been saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: R. Doshi
- EnviroTrac: S. Smith, R. Bauer

Health and Safety

- Topics of discussion included, but were not limited to:
  - Thunder safety
  - Slipping in wet areas
  - Trench safety in wet conditions
  - Walking around equipment
  - Communication while moving equipment
  - PPE
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation/Piping

- Sand was spread in the trench above the discharge line.
- The trench was backfilled with un-impacted soils and compacted.
- Ramp material was also placed over the trench location and compacted.

Additional Site Work

- Ramp material was spread across the 40 Willow Avenue property, especially at low spots and the site was graded.

Upcoming Site Work

- Final OU-1 slab crack repairs will be completed next week.
- Ramp area restoration is pending WWTP delivery and placement.
- Landscaping in accordance with FO-4.
- WWTP system delivery and startup.
- Electric and influent and effluent pipe hookup.

Please let me know if you have any questions or comments.

Thank you,
Reeti

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From: Doshi, Reeti
Sent: Tuesday, August 25, 2015 9:23 PM
To: Vater, Katherine (Katherine.Vater@nationalgrid.com)
Cc: bbermingham@trcsolutions.com; Pandya, Shail; Christopher, James; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 8/25/2015

Katherine,

Below is a summary of the site activities for today (Tuesday, August 25, 2015). Some photos taken at the site have been saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: R. Doshi
- EnviroTrac: N. Carroll, R. Bauer, Mike
- National Grid: B. Birmingham

Health and Safety

- Topics of discussion included, but were not limited to:
  - Slip, Trip, Fall
  - Walking around equipment
  - Communication while moving equipment
  - PPE
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation/Piping

- No additional trench work was performed today

Additional Site Work

- Ramp material was spread across the 40 Willow Avenue property.
- Bed for the system was prepared by placing excess ramp material and compacting it.
- Eight junipers were planted near the containment cell.
- Top soil was placed around the junipers.
- The jersey barriers were moved to southern property boundary as suggested by National Grid.
- The impacted material was moved to make room for the system and placed on poly. It was also bermed and covered.
- Additional irrigation line was installed with a t-connection for the new plantation area.
- Completed insulation of the above ground piping on the containment cell.

Upcoming Site Work

- Final OU-1 slab crack repairs will be completed next week.
- Gravel placement in the system area.
- Landscaping in accordance with FO-4.
- Irrigation system check and extension in accordance with the FO-5.
- WWTP system delivery and startup.
- Electric and influent and effluent pipe hookup.

Please let me know if you have any questions or comments.

Thank you,
Reeti

Reeti Doshi
Environmental Engineer
Environment
D 212.377.8703 C 646.220.8786
reeti.doshi@aecom.com

AECOM
125 Broad Street, 16th Floor
New York, NY 10004
T 212.377.8400 F 212.377.8410
www.aecom.com

From: Doshi, Reeti
Sent: Wednesday, August 26, 2015 8:28 PM
To: Vater, Katherine (Katherine.Vater@nationalgrid.com)
Cc: bbermingham@trcsolutions.com; Pandya, Shail; Gardner, Mike; Christopher, James
Subject: Clifton WWTP Installation - Daily Update 8/26/2015

Katherine,

Below is a summary of the site activities for today (Wednesday, August 26, 2015). Some photos taken at the site have been saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: R. Doshi
- EnviroTrac: N. Carroll, R. Bauer, M. Alliegro, H. Rocchio, J. Wilkinson
- National Grid: B. Birmingham

Health and Safety

- Topics of discussion included, but were not limited to:
  - Heat Stress
  - Walking around heavy equipment
  - Staying clear while system is being lifted or moved
  - Traffic control at the intersection for a few minutes while the truck with the system backs in
  - PPE
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation/Piping

- No additional trench work was performed today

Additional Site Work

- The system was brought to the site and setup is in progress.
- Gravel was placed over the system bed before the system was placed.
- The system was leveled.
- Top soil was placed in the area between fence and the system as well as between the containment cell and the system.
- Two additional junipers were planted just north of the stairs to fill the gap between existing and the new plants.
- Five Junipers were planted to east of the system container.
- Drip line was extended to the new plants.
- Mulch was placed over the plant beds.
- The broken pipe near the building was fixed.
- The breaks in the existing drip line were repaired and the irrigation system was tested. Water was reaching the new extended line.
- Gravel was imported to the site and placed in front of the system.
- Extended and connected the above ground piping to the system.
- Insulated the extended pipe.
- Electrician's representative visited the site to note what all needs to be done.

- Graded the system area and the area near the gate.

Upcoming Site Work

- Starting the irrigation system.
- WWTP system startup.
- Electric and influent and effluent pipe hookup.
- Transportation and disposal of potentially impacted material.
- Removal of excess top soil.
- Sample collection.
- Final site cleanup and demobilization.

Please let me know if you have any questions or comments.

Thank you,
Reeti

Reeti Doshi
Environmental Engineer
Environment
D 212.377.8703 C 646.220.8786
reeti.doshi@aecom.com

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New York, NY 10004
T 212.377.8400 F 212.377.8410
www.aecom.com

From: Doshi, Reeti
Sent: Thursday, August 27, 2015 8:57 PM
To: Vater, Katherine (Katherine.Vater@nationalgrid.com)
Cc: bbermingham@trcsolutions.com; Pandya, Shail; Gardner, Mike
Subject: Clifton WWTP Installation - Daily Update 8/27/2015

Katherine,

Below is a summary of the site activities for today (Thursday, August 27, 2015). Some photos taken at the site have been saved on the project portal under OU-1 Documents→WWTP Installation→Dailies.

Visitors

- AECOM: R. Doshi, J. Savona
- EnviroTrac: N. Carroll, J. Wilkinson, Sean, and 3 subcontractors (Hunter Electrical)
- National Grid: B. Birmingham

Health and Safety

- Topics of discussion included, but were not limited to:
  - Driving on site
  - Staying hydrated
  - Electrical Safety
  - Walking around heavy equipment
- There were no health and safety issues or violations.
- There were no exceedances or anomalies observed during CAMP monitoring (upwind and downwind using PID and DustTrak).

Trench Excavation/Piping

- No additional trench work was performed today

Additional Site Work

- The system was being setup.
- The extended portion of the aboveground piping was insulated and supported.
- Hydroseeding was completed over the top soil next to the system container.
- Irrigation system was turned on.
- An extra metal vault and cover from the Gas Ops property was lifted and placed in their pickup truck as directed by the Gas Ops.
- Gravel around the removed vault area was leveled.
- Covered the impacted pile securely.
- Picked up stray poly and fabric from the site.
- Electrical wires were passed through the underground conduit.

Upcoming Site Work

- WWTP system startup.
- Electric and influent and effluent pipe hookup.
- Transportation and disposal of potentially impacted material.
- Removal of excess top soil.
- Sample collection.

- Setup of the telemetry system.
- Final site cleanup and demobilization.

Please let me know if you have any questions or comments.

Thank you,
Reeti

Reeti Doshi
Environmental Engineer
Environment
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reeti.doshi@aecom.com

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Attachment B

Trench Work

Photograph 1. Pipe installation

Photograph 2. Backfilling of trench

Installation of Pipe in Trench

Photograph 3. Water discharge line in trench

Photograph 4. PVC sleeve over portion of piping with insulation

Treatment System

Photograph 5. **Depressurization System placement**

Photograph 6. **Inside of Depressurization System**

Pipe on Top of Pad

Photograph 7. **Installation of the pipe on top of the pad**

Photograph 8. **Pipe connection to Depressurization System**

Removal of Ramp

Photograph 9. Installed staircase

Photograph 10. Grading of site with ramp material

Restoration

Photograph 11. Junipers by Containment Cell

Photograph 12. Irrigation System

Attachment C

THIS PERMIT MUST BE CONSPICUOUSLY DISPLAYED ON THE JOB SITE

NYC™ Buildings

Electrical Work Permit Department of Buildings

Application Number: *R145564*

Issued: *09/01/2015 11:50 AM*

Address: *40 WILLOW AV, STREET, STATEN IS, NY 10305*

Description of Work:
6 - GENERAL WIRING

Contractor Address:
HUNTER ELECTRIC, INC.

235-07 BRADDOCK AVE.
QUEENS, NY 11428

Contractor's Comments: WIRING TRAILER FOR REMEDIATION.

For detailed information regarding this permit, please log on to BISWeb at www.nyc.gov/buildings

Emergency Telephone Day or Night: 311

Borough Commissioner:

Commissioner of Buildings:

Tampering with or knowingly making a false entry in or falsely altering this permit is a crime that is punishable by a fine, imprisonment or both.

ED-37 (Rev. 10/05)

Attachment D

NON PROCESS ITEMS

1. CONTAINER ROOM HEATER
2. CONTAINER FAN WITH INTAKE & EXHAUST LOUVERS
3. CONTAINER ROOM TEMPERATURE SENSOR SHALL BE WIRED TO PLC FOR REMOTE MONITORING

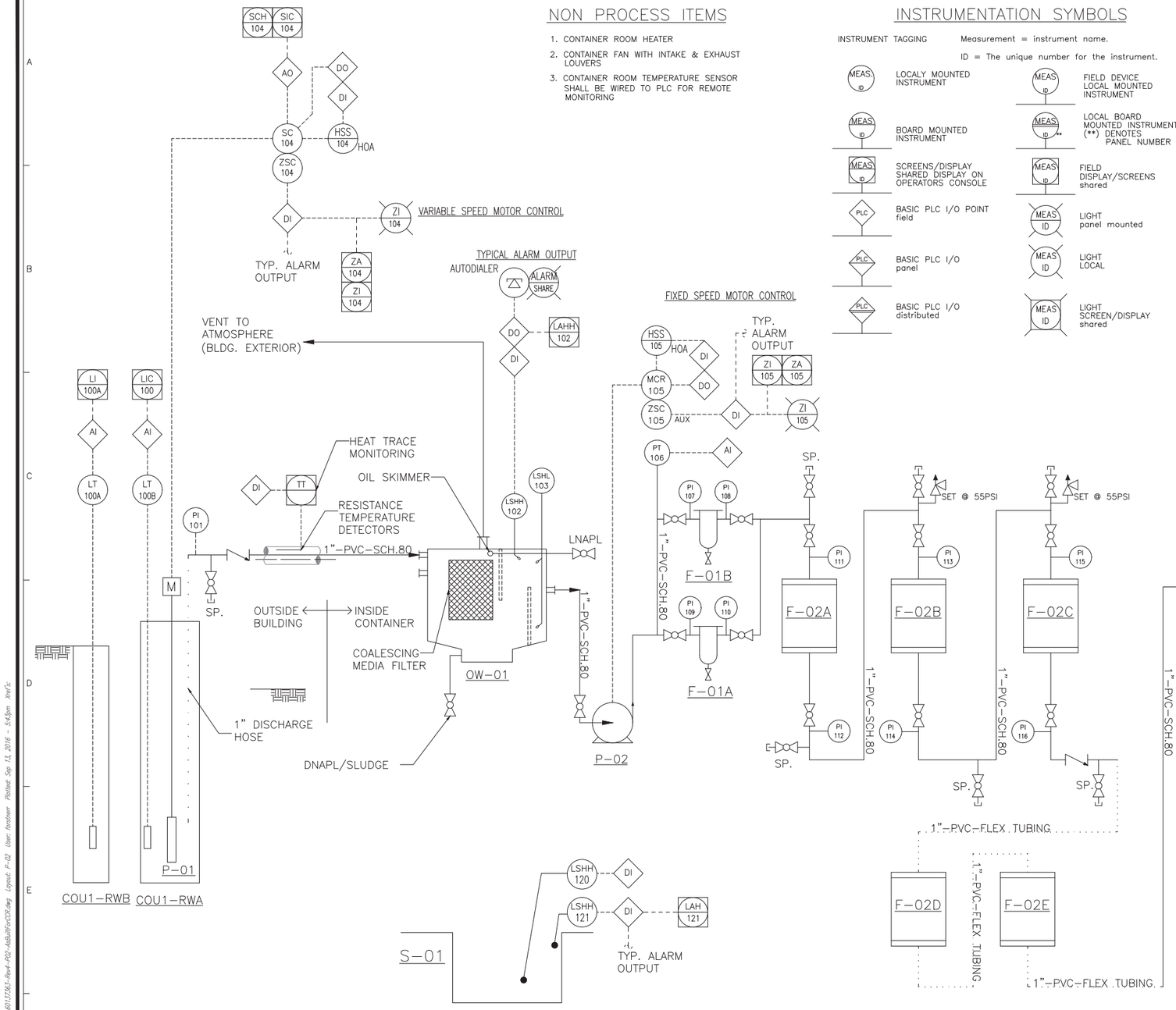
INSTRUMENTATION SYMBOLS

INSTRUMENT TAGGING Measurement = instrument name.
ID = The unique number for the instrument.

- MEAS / ID — LOCALY MOUNTED INSTRUMENT
- MEAS / ID — BOARD MOUNTED INSTRUMENT
- MEAS / ID — SCREENS/DISPLAY SHARED DISPLAY ON OPERATORS CONSOLE
- PLC — BASIC PLC I/O POINT field
- PLC — BASIC PLC I/O panel
- PLC — BASIC PLC I/O distributed
- MEAS / ID — FIELD DEVICE LOCAL MOUNTED INSTRUMENT
- MEAS / ID** — LOCAL BOARD MOUNTED INSTRUMENT (**) DENOTES PANEL NUMBER
- MEAS / ID — FIELD DISPLAY/SCREENS shared
- MEAS / ID — LIGHT panel mounted
- MEAS / ID — LIGHT LOCAL
- MEAS / ID — LIGHT SCREEN/DISPLAY shared

INSTRUMENT TAG LETTER IDENTIFICATION

	1st LETTER	2nd LETTER	3rd LETTER	4th LETTER	LAST LETTER
A	ANALYZER	ALARM	ALARM	ALARM	ALARM
B	BURNER (FLAME)				
C	CONTROL (LOOP)	CONTROLLER	CLOSED	CONTROLLER	CONTROLLER
D	DENSITY	DIFFERENTIAL *	DEVIATION		DRIVE, OPERATOR
E	VOLTAGE	ELEMENT			ELEMENT
F	FLOW	RATIO *	FLOW	FLOW	
G	GAUGE				GLASS
H	HAND (MANUAL)		HIGH	HIGH	HIGH
I	AMPERES	INDICATOR			INDICATOR
J	POWER				MTR PB & LGT
K	TIME (COUNT)				
L	LEVEL	LEVEL	LOW	LOW	LOW
M	MOTOR				METER
N					
O	OPERATIONAL				
P	PRESSURE	PRESSURE	PRESSURE		PNEUMATIC
Q	SPECIAL	INTEGRATE	INTEGRATE	INTEGRATE	INTEGRATE
R	RELIEF	RECORDER	RELAY	RECORDER	RECORDER
S	SPEED, SOLENOID	SAFETY *, SELECTOR, SWITCH	SWITCH	SWITCH	SWITCH
T	TEMPERATURE	TEMPERATURE	TOTALIZER		TRANSMITTER
U	MULTIVARIABLE	MULTIVARIABLE			MULTIVARIABLE
V	VIBRATION	VALVE	VALVE	VALVE	VALVE
W	WEIGHT				WELL
X					
Y	USERS CHOICE				TRANSDUCER
Z	POSITION				COMPUTER



LEGEND

- CONTINUOUS
- SP. — SAMPLE PORT
- PI — PRESSURE INDICATION INSTRUMENT
- BALL VALVE
- CHECK VALVE
- SAMPLE PORT, DRAIN OR SYSTEM CONNECTION POINT
- FIT 119 — FLOW INDICATOR TRANSMITTER

NOTES–
1. CONTAINER PROVIDES SECONDARY CONTAINMENT TO THE TREATMENT SYSTEM, SIZED TO HOLD MINIMUM 350 GAL. (110% OF THE LARGEST VESSEL, THE OIL WATER SEPARATOR).

RW-01
RECOVERY WELL
4" DIA PVC SCH40
WELL DEPTH=17.5 FT

P-01
PISTON PUMP
0.2 GPM AND 20 PSI MIN TDH
ANCHOR MODEL 101 E
230 VAC, 1/2 HP, 3 ø MOTOR
VARIABLE SPEED DRIVE

OW-01
OIL WATER SEPARATOR
ESD MODEL OWS-10
RATED FLOW 10 GPM

P-02
TRANSFER PUMP
DAYTON #4RU77
115 VAC, 3/4 HP, 1ø MOTOR
CENTRIFUGAL PUMP

F-01A/B
BAG FILTER
5 MICRON
BAGFILTER BASKET
PENTEK MODEL#
156110-75

F-02 A/B/C
LIQUID PHASE
250 lb CARBON FILTER
VESSEL
ESD LLPS 250

F-02 D/E
ION EXCHANGE TANK
RESINTECH FIBERGLASS
TANKS, 27 L CAPACITY EACH
WITH RESINTECH
ASM-10-HP
ION EXCHANGE RESIN

F-04
CARTRIDGE FILTER
5 GPM
0.5 MICRON
CARTRIDGE HOUSING
PENTEK MODEL#
150233

S-01
FLOOR SUMP
1'(L)X1'(W)X6"(D)

AS-BUILT

NO.	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
2	RMF	09/13/16	REVISED TO ADD ION EXCHANGE			SNP	09/01/16
1	RCW	06/21/13	ISSUE FOR BID				
0							

AECOM
WESTFORD, MASSACHUSETTS
(978) 589-3000
www.aecom.com

NATIONAL GRID
FORMER CLIFTON
MANUFACTURED GAS PLANT

PROJ. NO.: 60137363-420
DATE: 10/09/14

OU-1 WATER TREATMENT PROCESS FLOW DIAGRAM

DRAWING NUMBER: P-01
SHEET NUMBER:
REVISION 1

Project: National Grid - Former Clifton MGP Site

EnviroTrac Submittal #4 Vendor/Subcontractor List

Vendor/Subcontractor	Address	Phone#	Website	Description of materials/services to be supplied
ESD Waste2Water, Inc	495 Oak Road Ocala, FL 34472	1-800-277-3279	waste2water.com	Remedial Control Panel, level transducers, OWS, LGACs
Blackhawk Technology Company	21 W 211 Hill Ave, Glen Ellyn, IL 60137	630-469-4916	blackhawkco.com	Piston Pump/controller
Dwyer Instruments	102 Indiana Hwy. 212, Michigan City, IN 46360	1-800-872-9141	dwyer-inst.com	Level switches, pressure transmitter
Faber Industrial Technologies Inc.	1111 Paulison Ave, Clifton, NJ 07011	976-546-7900	faberinc.com	Heat trace cable and monitors
Gilmour Supply Co.	300 Oser Avenue, Hauppauge, NY 11738	631-694-2800	gilmoursupply.com/	HDPE Pipe/Fittings
Grainger	199 Orville Dr, Bohemia, NY 11716	1-800-GRAINGER	grainger.com	Transfer Pump, filters, containment platform, miscellaneous
Holbrook Pipe Supply Inc.	790 Grundy Ave. Holbrook, NY 11741	631-588-6880	holbrookpipe.com/	PVC Pipe/Fittings
Hunter Electric Inc.	23507 Braddock Avenue, Jamaica, NY 11428	718-740-2970		Electrican
McMaster Carr	200 New Canton Way, Robbinsville, NJ 08691	609-259-8900	mcmaster.com	Gauges, miscellaneous materials
Safety Rail Company LLC	4244 Shoreline Drive, Spring Park, MN 55384	888-434-2720	safetyrailcompany.com	Guardrail

Project: National Grid - Former Clifton MGP Site

EnviroTrac Submittal #8.3 Sub Component Pricing of All Major Equipment

Description	Designation	Vendor	Model	Unit Price	Qty.	Total
Oil Water Seperator	OW-01	ESD/W2W	OWS-10	$4,500.00	1	$4,500.00
Liquid Phase GAC Vessels	F-02A/B	ESD/W2W	LLPS-250	$1,500.00	3	$4,500.00
Water Level Transducers	LT	ESD/W2W	Winters LM3W40	$1,500.00	2	$3,000.00
Transfer Pump	P-02	Grainger	Dayton 4RU77	$500.00	1	$500.00
Cartridge Filter Housing	F-03	Grainger	4BA77	$120.00	1	$120.00
Cartidge Filters - 5 Micron		Grainger	4PCC4	$40.00	10	$400.00
Bag Filter Housing	F-01A/B	Grainger	4BB24	$750.00	2	$1,500.00
Bag Filters 5 Micron (pkg of 20)		Grainger	4BE57	$100.00	5	$500.00
Magnetic Flow Meter	FIT 119	Grainger	2551-310	$1,750.00	1	$1,750.00
Pressure Gauges (0-60 psi)	PI	Wika	21X.53	$30.00	13	$390.00
Blackhawk well pump and controller	P-01	Blackhawk	Anchor 101E	$13,000.00	1	$13,000.00
Pressure Transducer	PT-106	Dwyer	IS626-09-GH-P1-E1-S1	$275.00	1	$275.00
Floor Sump Level Switches	LSHH120/121	Dwyer	L8	$75.00	2	$150.00
Heat Trace - 5W/ft		Chromalox	SRL5-2CR	$12.50	100	$1,250.00
Heat Trace Monitor w/ sensor	TT	Chromalox	DTS-HAZ	$700.00	2	$1,400.00

Project: National Grid - Former Clifton MGP Site

EnviroTrac Submittal #8.4 Remediation Equipment Cut Sheets

Submittal#	Equipment ID	Description	Model #
8.4.1	P-01	Blackhawk Piston Pump	101E
8.4.2	OW-01	ESD/W2W Oil Water Separator	OWS-10
8.4.3	F-02A/B/C	ESD/W2W LGAC Vessels	LLPS-250
8.4.4	P-02	Dayton Centrifugal Transfer Pump	4RU77
8.4.5	F-01A/B	Pentek Bag Filter Housings	15611075
8.4.6	F-03	Pentek Cartridge Filter Housing	150233
8.4.7	S-01	Denios Spill Platform	K42-50-20
8.4.8	LT 100A/B	Winters Pressure Transducers	LM3W40
8.4.9	PI 101/107-118	Wika Pressure Gauges	21X.53
8.4.10	PT 106	Dwyer Pressure Transmitter	626-10-GH-P1-E1-S1
8.4.11	FIT 119	Signet Magnetic Flow Meter/Transmitter	2551-310
8.4.12	LSHH 120/121	Dwyer Liquid Level Switch	L8

BLACKHAWK TECHNOLOGY COMPANY

WHEN PUMPING RESULTS MATTER

ANCHOR ELECTRIC PISTON PUMP®

Patented Top-Head-Drive Piston Pump

TECHNICAL SPECIFICATIONS

Patented, Electric Top-Head Drive Motor

Customizable Downhole Pump

DESCRIPTION

The Anchor Electric Piston Pump Model 101E is powered by electricity. The control motor is located at surface grade for easy installation and maintenance. Top-head drive motor provides linear pumping action from grade through the sucker-rod assembly. The pump removes water and product (e.g., oil, solvents, leachate) from a two (2) inch (4.85 cm) diameter well casing or greater to depths of 804 feet (245 meters) with a 1 hp motor at 50 Hz. The fluid inlet is located at the bottom of the pump intake cylinder and removes water or product to 0 submergence depth.

MODEL 101E

FLOW RANGE
0-1.2 US GPM
4.5 LPM

OPERATIONAL DEPTH
804 Ft.
245 M
with 1 hp motor

WELL CASING SIZE
Minimum 2 In.
4.85 CM

PERFORMANCE AND TECHNICAL DATA

PERFORMANCE

Operational Depth	804 feet/245 m
Flow Range	0 to 1.2 US GPM/ 4.5 LPM 1,730 US GPD/ 6,548 LPD
Discharge per Stroke	.05 US Gallons per stroke Note: flow does not vary with depth
Motor	1/2 or 1 hp
Power Supply	120 or 230 Volt Single Phase or 230 or 460 Volt Three Phase
Maximum Discharge Pressure	348 PSI
Maximum Lift	804 feet of water or 348 PSIG Variable speed (stroke) control adjusts to well conditions; liquid drawn down to top of strainer.

TECHNICAL

Stroke Length	12" (30.48 cm)
Maximum External Diameter	2.9" (7.37 cm)
Total Cylinder Length	30" (76.2 cm)
Connection of Riser Pipe	1-1/4" (3.18 cm)
Connection to Sucker Rod	7/16" - 20
Recommended Internal Diameter of Bore Hole	2–3" (4.85 – 7.62 cm) or greater diameter
Weight of Cylinder	8 lbs.
Discharge Size	2" NPT
Installation	Unit can be installed vertically or horizontally
Driver Weight	40 lbs.
Driver Rod Weight	12 lbs./100'
Foot Valve Assembly Weight	8 lbs.
Minimum Well Casing Size	2"

BLACKHAWK TECHNOLOGY COMPANY • 21W211 HILL AVE., GLEN ELLYN, IL 60137 • P: 800.469.4887 • F: 630.469.4896
www.blackhawkco.com

ANCHOR ELECTRIC PISTON PUMP®
MODEL 101E

TECHNICAL SPECIFICATIONS

MATERIALS OF CONSTRUCTION
(Materials of construction can be modified to meet specific applications)

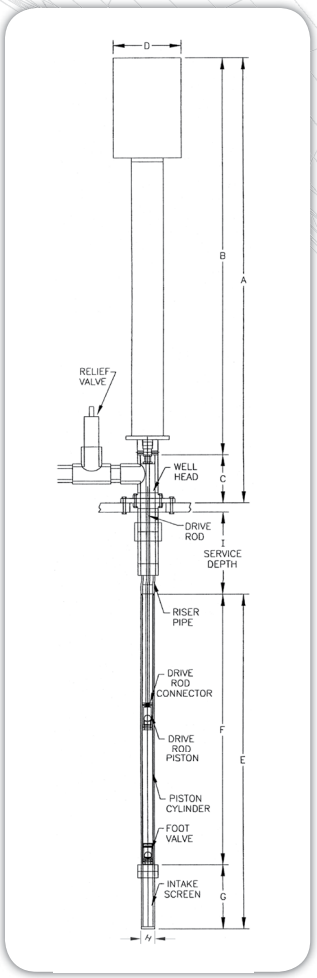
ABOVE GROUND

Drive Motor	Stainless Steel/ Aluminum
Seal Plate	Delrin®
Seal Plate Seals	Nitrile/Viton
Relief Valve	Stainless Steel
Discharge Tee	Stainless Steel
Well Head	Steel

DOWNHOLE

Drive Rod	Fiberglass
Drive Rod Connector	Stainless Steel
Drive Piston Seal	Nitrile/Viton
Drive Piston Check Ball	Stainless Steel
Drive Piston	Delrin®
Piston Cylinder	Stainless Steel/PVC
Foot Valve Check Ball	Stainless Steel
Foot Valve	Delrin® with Stainless seat
Intake Screen	Stainless Steel/PVC

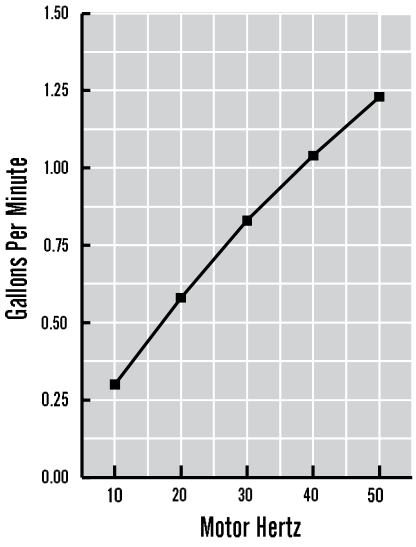
PUMP DIMENSIONS



AVAILABLE OPTIONS

- ✓ Level Control Systems
- ✓ Hazardous Duty Components
- ✓ Metered Flow Control
- ✓ Flow Measurement
- ✓ Variable Frequency Drive
- ✓ SCADA Capability

ANCHOR 101E ELECTRIC PUMP FLOW PERFORMANCE



DIMENSIONS (IN INCHES)

A	Above Well Height	48.5
B	Driver Height	43
C	Discharge Tee & Well Seal Height	5.5
D	Driver Diameter	8
E	Foot Valve Assembly Length	38
F	Foot Valve Length	30
G	Intake Screen Length	8
H	Downhole Diameter	1.9

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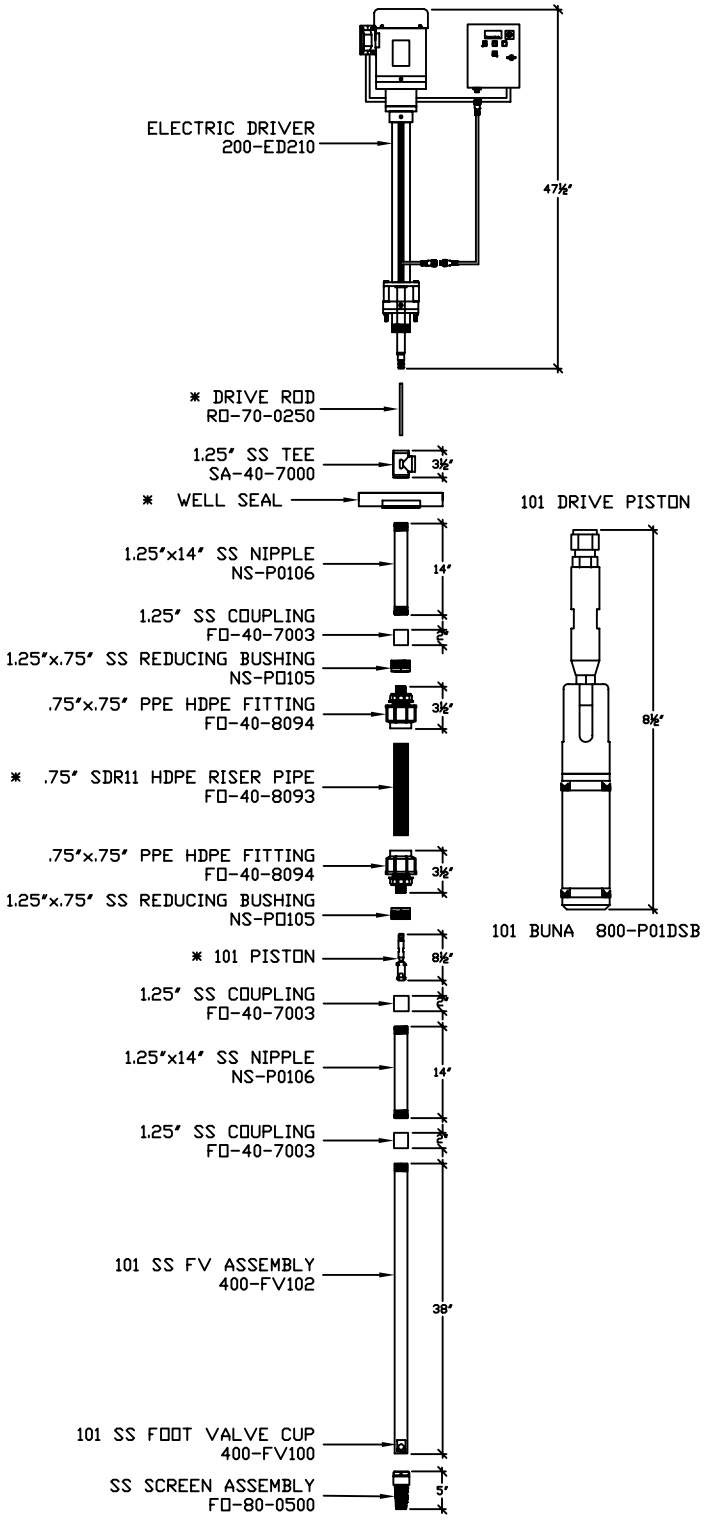
www.blackhawkco.com

BLACKHAWK
TECHNOLOGY COMPANY

.75PPE HDPE FITTINGS
FOR ANCHOR 101 DOWN HOLE



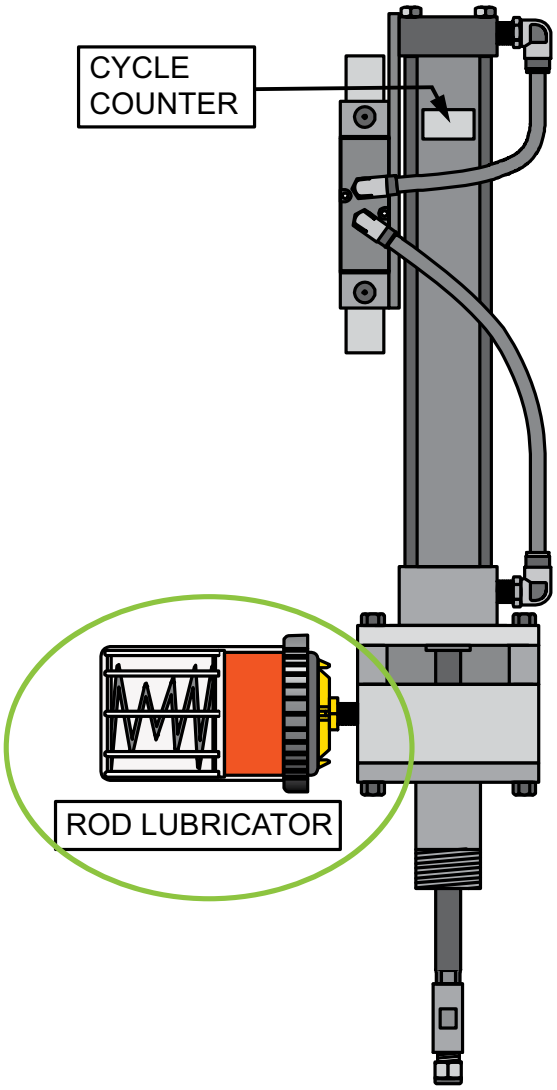
21W211 HILL AVENUE, GLEN ELLYN, IL 60137
PHONE: (630) 469-4916 FAX: (630) 469-4896
www.blackhawkco.com

* AVAILABLE BY ORDER.

(FOR REFERENCE ONLY)

800.469.4887
www.blackhawkco.com

Pneumatic Rod Lubricator



WHAT IS A ROD LUBRICATOR?

The auto-lube is a battery-powered devise that injects minute, pre-set amounts of lubricant, usually oil, to the drive rod over long periods of time. It is attached at the stuffing-box seal plate's lube point.

WHY IS IT IMPORTANT?

All drive rods need light lubrication to reduce friction and to protect the seal-plate cartridge from wear as the cartridge scrapes and wipes the rod of particulate contamination from well liquids.

Failure to lubricate, lubricating only sporadically or over lubricating will likely result in severe damage. Stuffing-box seals will wear out more quickly and require replacement. It is the operator's responsibility to maintain a lube program. Improper lubrication may void Blackhawk's warranty on pumps and pump parts.

HOW TO INSTALL

Blackhawk's lubricator screws in at the seal plate's lube point. To activate, install the alkaline battery pack in the unit. Pre-charge all fittings, lube lines and bearings with lubricant ordered. Install fitting (1, 3, 6 or 12-month), and screw into plate.

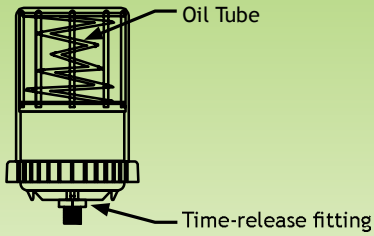
The screw-in cartridge is made from recycled polymer and can be replaced in 60 seconds. Users choose from four time-release settings, up to 12 months. The auto lube operates to 140 psi.

Blackhawk recommends

Also placing a cylinder oiler immediately before air enters the driver. Together, the oiler and the rod lubricator above-ground moving parts are protected from seizing and premature wear to extend pump life.

How It Works

Employing system technology based on positive-displacement pumping and powered by common alkaline batteries, the auto lube ejects tiny amounts of oil or grease from a tube in the unit dome. Users choose one of the four special fittings, tailored for pumping requirements, to program-control the rate of release with each stroke. When empty, the inexpensive cartridge is simply unscrewed and replaced.

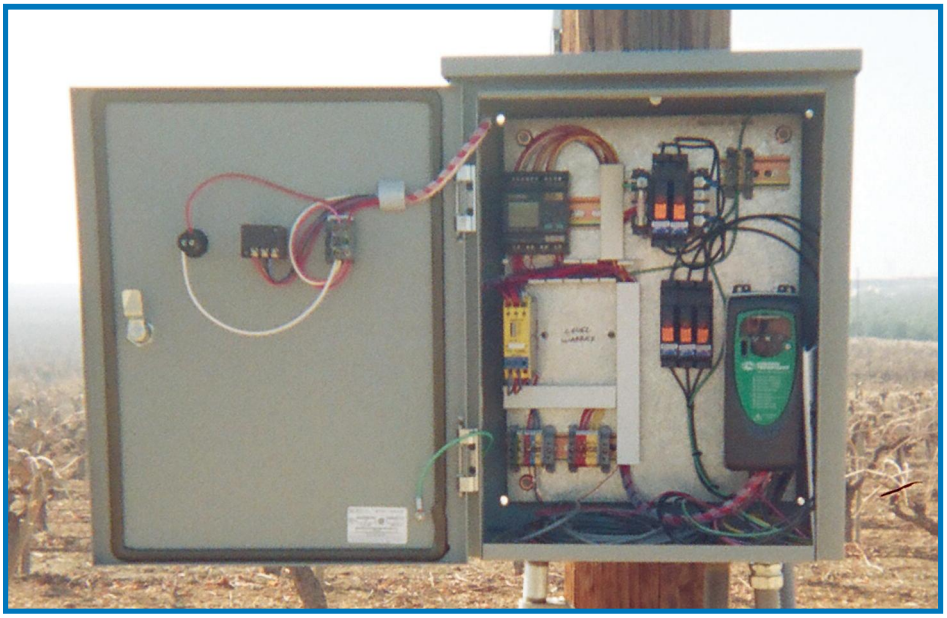


Maximize your investment in Blackhawk Pumps

Fact Sheet #3

The New Blackhawk Controller

Lower your costs and improve your pump productivity with next-generation technology from the field-proven leader - *The best pumping control in the industry*



Conventional pump controllers run fast, then stop – on and off, like a light switch. As a result, pump production is inconsistent, and operating costs are high. Stop-and-go performance is hard on critical machinery, too. As requirements for pump efficiency and effectiveness continue to rise, operators look to technological improvements to meet their higher performance goals. The new generation is here.

Choose standard model (left) or pump mount

New, state-of-the-art Blackhawk Controller reduces operating costs, boosts productivity and extends pump life

Blackhawk's industry-leading control box has taken another step in controller evolution. Programmed to optimize your individual pumping situation, the Blackhawk Controller acts as the pump's brain.

It senses downwell conditions and environment changes, then adjusts pump dynamics to match well outputs. Advanced software varies stroke counts and running speeds, which eliminates the need for the pump to shut down. The Blackhawk Controller adjusts strokes to reduce rod float, and increases upstrokes to maximize production. The effect of this tightly controlled activity is to boost productivity *while reducing the drive's overall speed.* Slower speeds mean lower horsepower requirements – resulting in reduced energy costs and less wear on vital pump components.

Tune your pump to your well – keep it running and pumping more

The Blackhawk Controller actively varies pump speed throughout the day, even during a single stroke, to run at each well's optimal speed. You get more fluid with less silt, sand and sediment, while eliminating downtime. The controller can be programmed to shut down the pump during hours of peak energy costs, or to run a pump just fast enough to help prevent sand and silt from entering the plunger.

Blackhawk puts you in control of the well and well data

You program productivity and power parameters. Monitoring is easy with useful, simply presented data displays available both at the well and to a SCADA system. The built-in communications port allows easy offsite computer monitoring of many wells by a single field operator.

Reliable, Versatile, Inexpensive

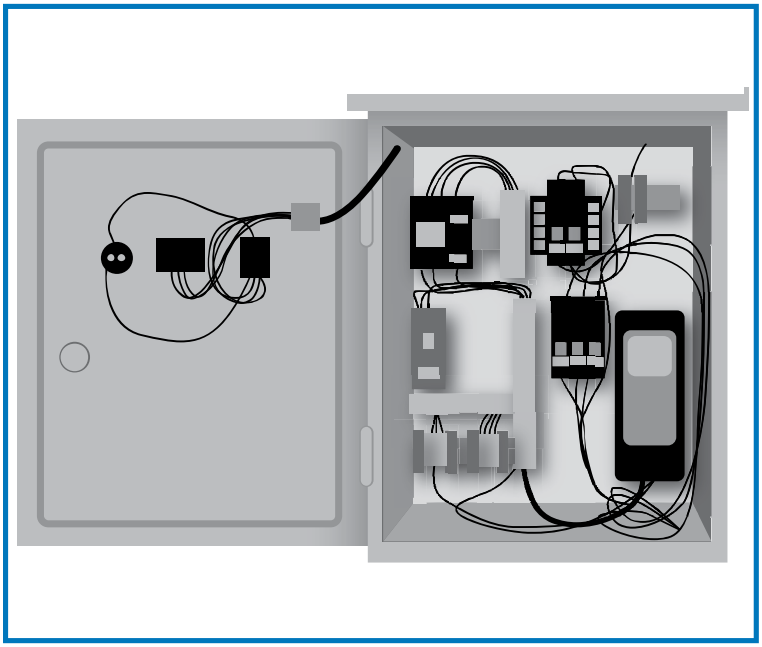
The Blackhawk Controller is built on a hardware platform from Emerson Electric, globally known for reliability. The controller works with virtually any pump in the field, and is the ideal companion to Blackhawk's Vector top-head-drive piston pump.

With increased well production, lower energy consumption, fewer mechanical failures and reduced parts replacement -- in addition to the low purchase price – Blackhawk's Controller is an excellent overall value. And it installs in less than half the time of a conventional controller, a bonus savings.

Let us show you the ROI of your individual situation - for free. We can help your pumps work harder at lower cost.

The New Blackhawk Controller

Lower your costs and improve your pump productivity with next-generation technology from the field-proven leader - *The best pumping control in the industry*

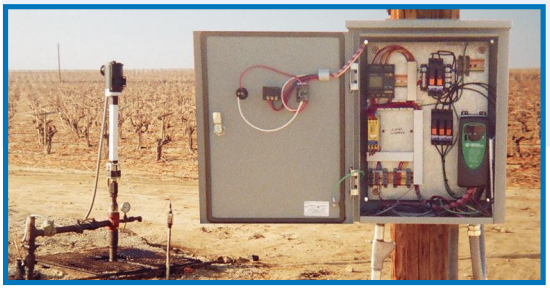


- Choose easy-to-use pump time and dwell set-up with external communication port – allowing you to decide speed, time between pumps, and time of day, week or month to pump
- Pre-program speed, hour run time, stroke count, dwell delay time for both up and down stroke, auto restart if electric service interrupted, time-of-day on/off
- Match production with actual well inflow by changing pump cycle time in the well or through continuous altering of pump speed
- Accurately control rod pumping system, determining when pump needs to run to reduce utility costs
- Built-in communications port allows operator to monitor, manage and optimize pump from a single, off-site control point
- Pump and controls come ready to plumb and plug in

Next-Generation Blackhawk Controller

Technical Specifications

- Nema 3 Enclosure 20x16x8 inches
- Auto restart on power loss
- PLC programmable VFD
- Modbus RTU RS485 via R J45 connector
- Communications upgradeable
- Hour's meter (years, days, hours, and minutes)
- 25 amp disconnect
- Required fusing to meet NEC specification
- Programmable Logic Controller (PLC)
  Adjustable PLC functions at the pump.
- Drive "ON/OFF" switch
- Speed "MIN/MAX" potentiometer
- "Pump running" light

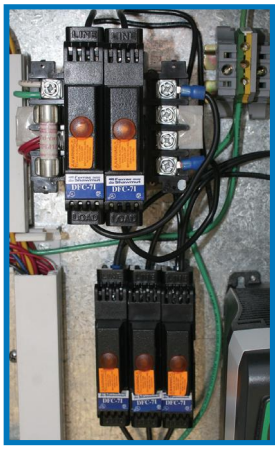


Blackhawk Control Panel Options

- External display (can be mounted up to 100' from control box)
- Stroke counter
- Stroke dwell (needs I/O or real-time clock module)
- Programmable I/O modules
- Real-time clock module for time of day run
- Conductivity level control
- Pressure transducer level control
- IS barriers for explosion-proof applications
- SCADA communication modules
  - DeviceNet
  - PROFIBUS-DP
  - CANopen
  - INTERBUS
  - Ethernet

Notes:

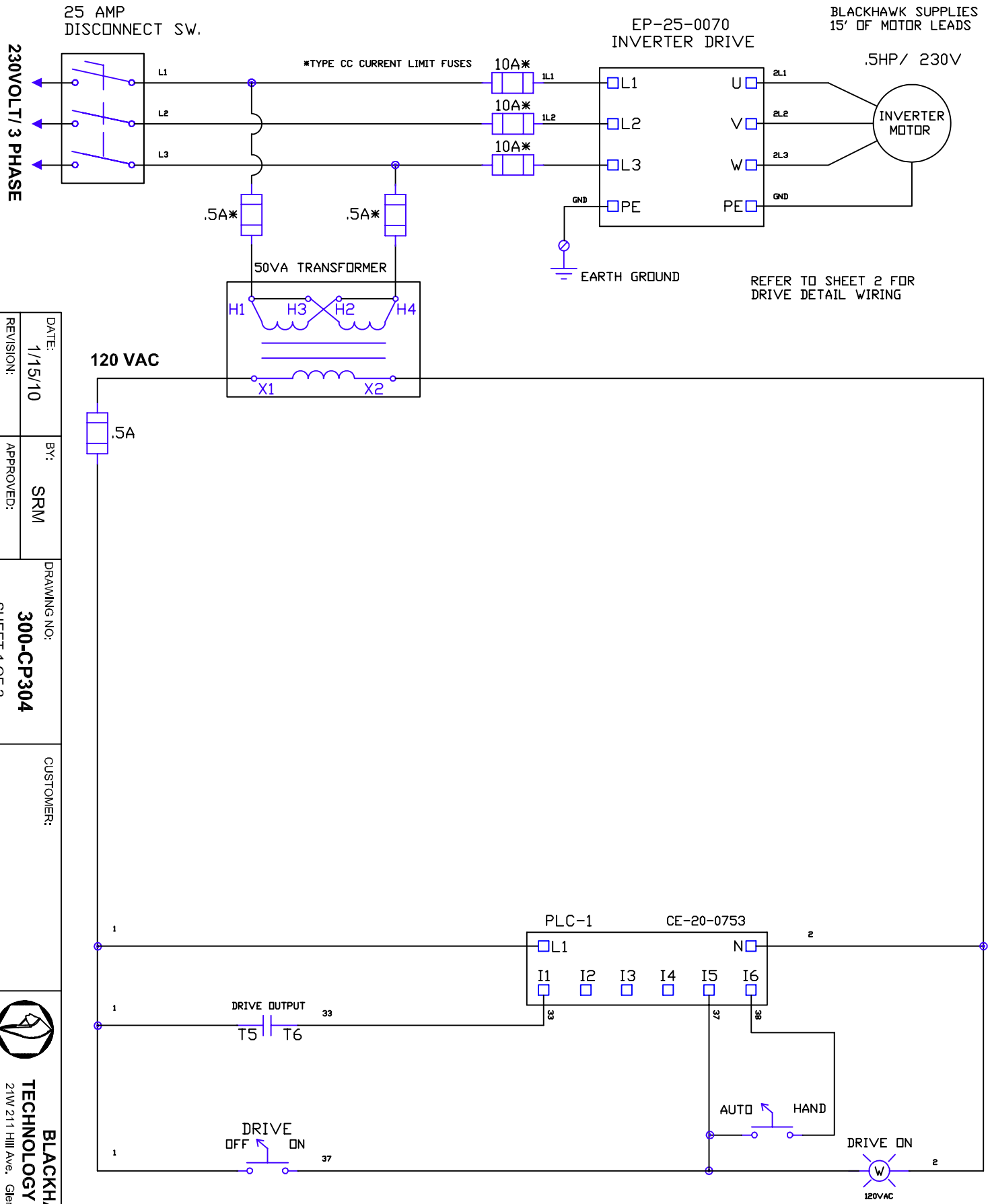
- *Only one module per drive may be used*
- *Functions are stored on a removable reprogrammable logic chip*
- *Functions may not be changed on the chip without a laptop computer*



BLACKHAWK TECHNOLOGY COMPANY • 21W161 HILL AVE., GLEN ELLYN, IL 60137 • P: 630.469.4916 • F: 630.469.4896

www.blackhawkco.com

A GROUND SPIKE IS REQUIRED
(NOT SUPPLIED)



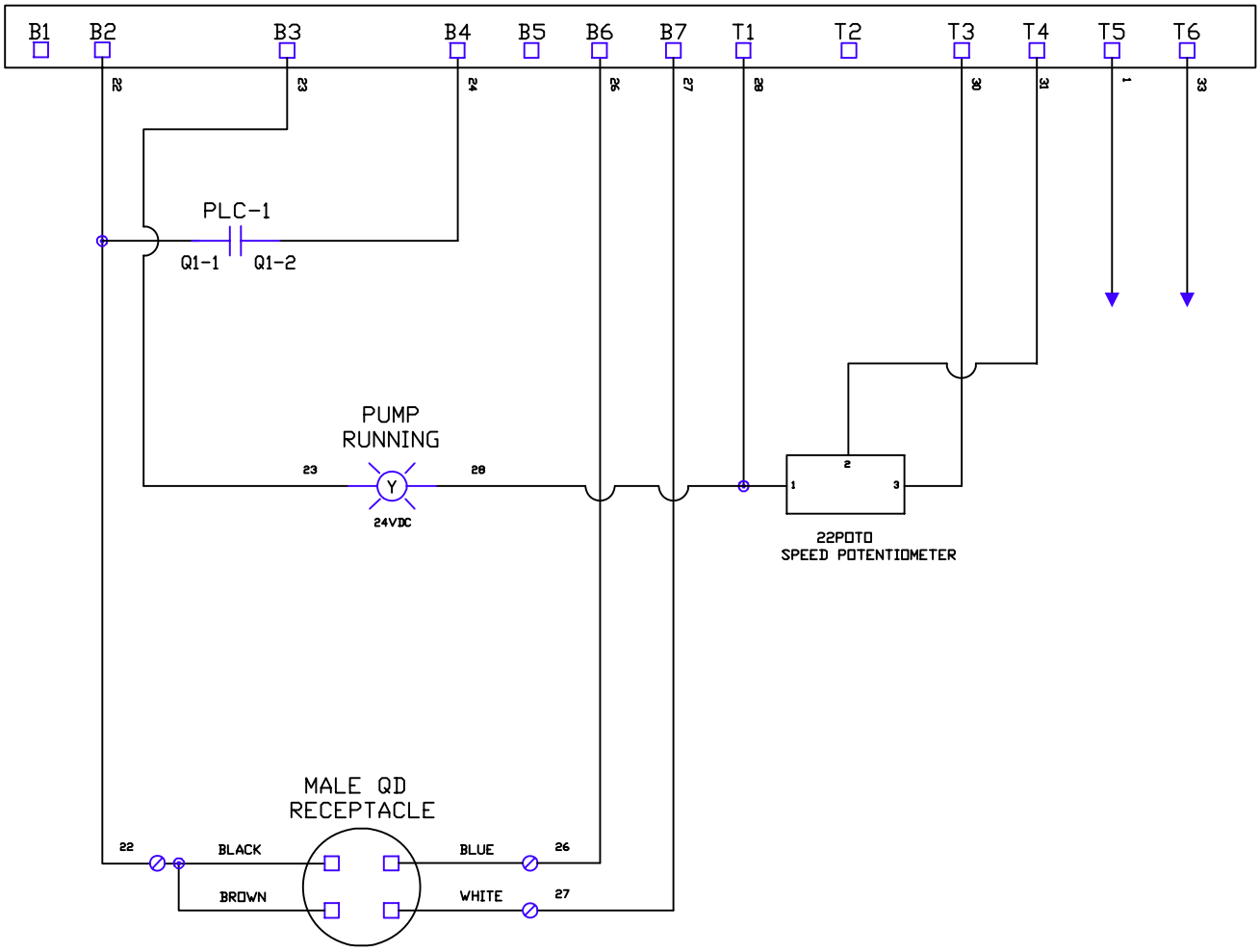
CONTINUE TO SHEET 2

DATE: 1/15/10
REVISION:
BY: SRM
APPROVED:
DRAWING NO: 300-CP304
SHEET 1 OF 2
CUSTOMER:

BLACKHAWK TECHNOLOGY COMPANY
21W 211 Hill Ave. Glen Ellyn, IL. 60137
Ph.630/469-4916 Fx.630/469-4896

CONTINUED FROM SHEET 1

EP-25-0070 INVERTER DRIVE

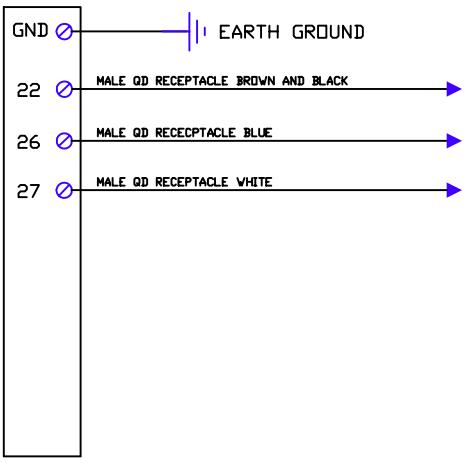


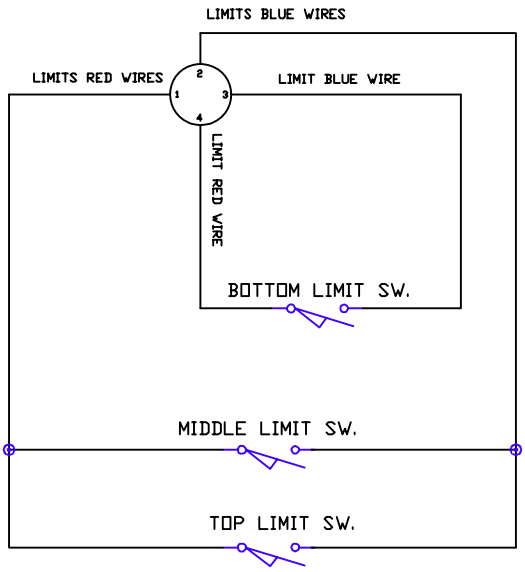
ALL PUMP LIMIT SWITCH WIRING MUST BE ISOLATED FROM ALL OTHER CONTROL AND POWER WIRING. A SEPARATE CONDUIT IS REQUIRED.
ONLY. REFER TO DRIVE MANUAL FOR INSTRUCTIONS.

BLACKHAWK SUPPLIES A 15' JUMPER FOR THE LIMIT SWITCHES

FEMALE QUICK DISCONNECT PLUG

FIELD TERMINAL STRIP CONNECTION SUMMARY





DATE: 1/15/10
REVISION:
BY: SRM
APPROVED:
DRAWING NO: 300-CP304
SHEET 2 OF 2
CUSTOMER:

BLACKHAWK TECHNOLOGY COMPANY
21W 211 Hill Ave. Glen Ellyn, IL. 60137
Ph.630/469-4916 Fx.630/469-4896

ESD Waste2Water,Inc.
Partnership for a Cleaner Tomorrow

Enhanced Oil/Water Separator

ESD Waste2Water,Inc. manufactures a complete line of above ground corrugated plate enhanced oil/water separators. The separators are designed to remove free and dispersed non-emulsified oil and settable solids in accordance with API 421.

All of the ESD Waste2Water,Inc. oil/water separators are manufactured out of 5052 H32 marine grade aluminum or stainless steel.

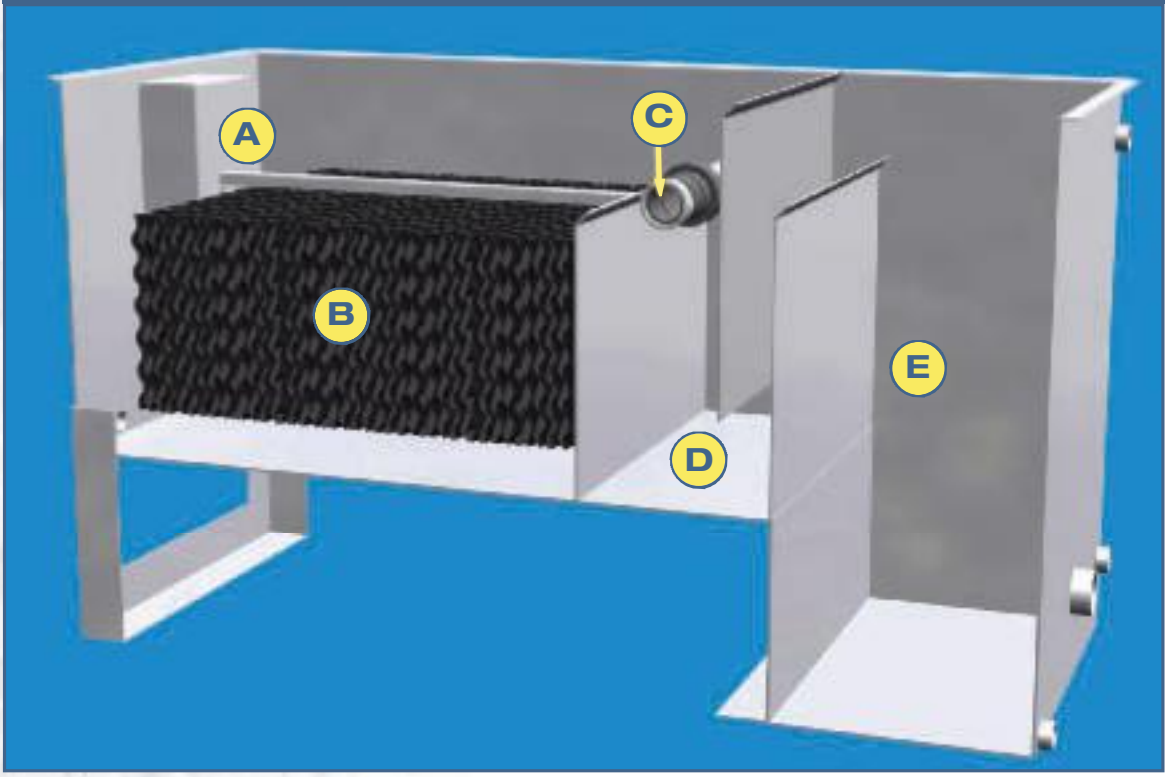
Certified to UL-508A Standards

Typical applications:

- Groundwater Treatment
- Equipment and Vehicle Washing
- Aircraft Maintenance Operations
- Oil Field Services
- Food Processing
- Storm Water Runoff
- Floor Drains
- Bulk Storage Facilities

ESD Waste2Water, Inc.
Partnership for a Cleaner Tomorrow

Enhanced Oil/Water Separator Diagram



A Inlet Compartment
The inlet compartment is equipped with a non-clogging diffuser to ensure the untreated water is distributed evenly to the separation chamber. The inlet compartment is designed to ensure no short-circuiting is encountered.

B Separation Chamber
The separation chamber is equipped with inclined parallel plate media for enhanced oil/water separation. The flow through the media is in a cross-flow configuration. This allows for the oil to rise without interfering with falling solids. The plates are installed to allow for easy dismantling, cleaning and re-installation.

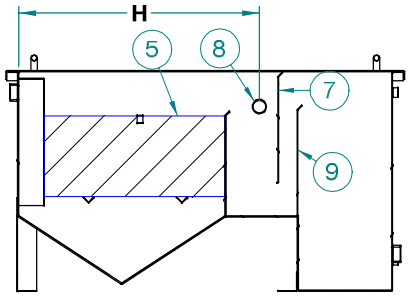
C Oil Collection
The separated oil is collected at the end of the separation chamber via a rotary skimmer. The rotary skimmer is easily adjusted for optimum oil collection.

D Clarifier
The clarifier is located after the separation chamber prior to the clean water chamber. The clarifier is equipped w/ a manual drain to facilitate the removal of collected solids.

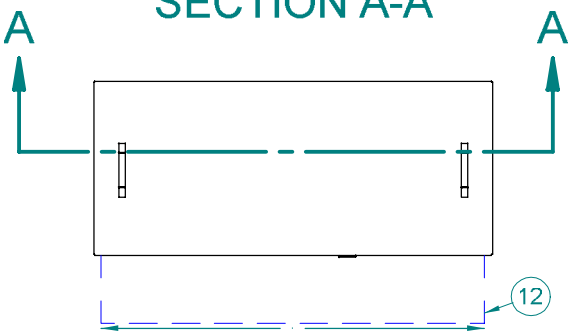
E Clean Water Chamber
The water will pass through the clarifier and into the clean water chamber. The clean water chamber allows for either gravity or pump discharge.

495 Oak Road
Ocala, Florida 34472
Tel: 800.277.3279 • Fax: 352-680-9278
www.waste2water.com

OWS		
ITM	DESCRIPTION	QTY
1	2" FNPT , INLET	1
2	2" FNPT , OUTLET	1
3	OIL OUTLET	1
4	1" FNPT VENT	1
5	COALESCING MEDIA	1
6	ACCESS LID	1
7	OIL STOP WEIR	1
8	PVC OIL SKIMMER	1
9	OVERFLOW BAFFLE	1
10	1" FNPT SIGHT GLASS PORT	2
11	OPT. SIGHT GLASS w/ MULTI LEVEL PROBE	1
12	OPT. PRODUCT TANK	1
13	1 1/2" FNPT SLUDGE DRAIN	1
14	1" FNPT DRAIN	3

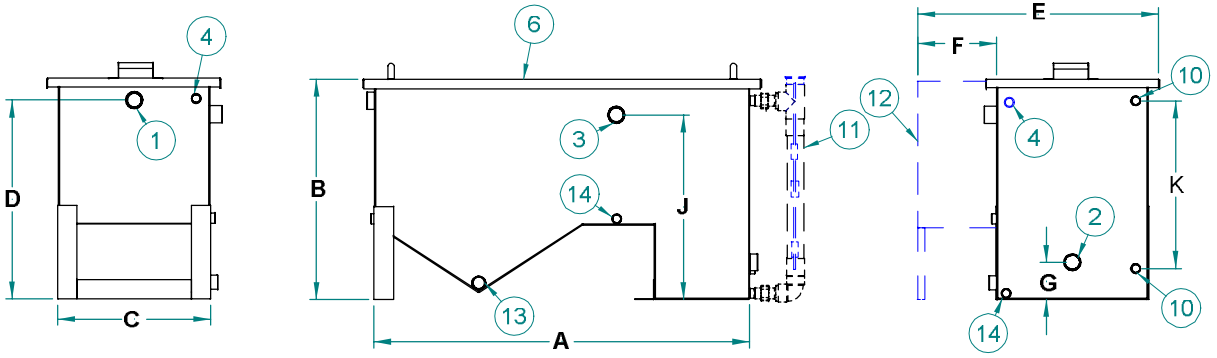


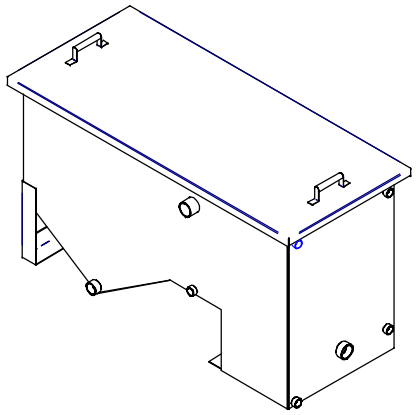
SECTION A-A



		OWS			
		OWS-10	OWS-25	OWS-50	OWS-80
A	LENGTH	60 1/2"	60 1/2"	83"	83"
B	HEIGHT	35 1/2"	35 1/2"	60"	60"
C	WIDTH	12"	24 1/2"	36"	48"
D	INLET HEIGHT	32"	32"	56"	56"
E	WIDTH (INCLUDING OPT PRODUCT TANK)	21 1/2"	38"	56"	66"
F	WIDTH OF PRODUCT TANK	12"	12"	18	18"
G	OUTLET HEIGHT	12"	12"	12"	12"
H	PRODUCT OUTLET	39"	39"	54"	54"
J	PRODUCT OUTLET HEIGHT	29 3/4"	29 3/4"	53 1/2"	53 1/2"
K	SIGHT TUBE PORTS	27"	27"	49"	49"
	SHIPPING WEIGHT (LBS)	115	175	450	520
	OPERATING WEIGHT (LBS)	650	1300	4500	5300
	SEPARATOR VOLUME (GALLONS)	40	80	280	305
	EFFLUENT VOLUME (GALLONS)	19	38	135	220
	SLUDGE VOLUME (GALLONS)	9	18	76	101
	COALESING AREA (CUBIC FEET)	2.5	5	16	24
	OPT PRODUCT TANK VOLUME (GALLONS)	35	55	160	220

NOTES:
1. MATERIAL : 3/16" ALUMINUM SHT 5052
2. GASKET : NEOPRENE
3. INTERNAL PIPE : SCH 80 PVC





ESD Waste2Water, Inc.
495 Oak Road
Ocala, FL 34472
Phone (800) 277-3279
Fax (352) 680-0059

SCALE VERIFCATION
THIS BAR REPRESENTS ONE INCH ON ORIGNAL DRAWING
1"
USE TO VERIFY DRAWING

SIZE: B
SHEET #: 1 OF 1
SCALE: NTS
UPDATED BY: J. Andrews

DRAWN BY: J. Andrews
APPROVED BY:
COMPLETED: 6/5/10
UPDATED:

OIL WATER SEPARATOR
GENERAL LAYOUT
SPEC

JOB NUMBER:
PRODUCT NUMBER: OWS
FILE NAME: "OWS ALL MODELS SPEC.dft"

Liquid Low Pressure Steel Filters

LLPS 250-10,000 lb. Vessels

The **LLPS** series Liquid Phase Carbon filters are designed for water treatment applications. With a wide range of sizes, the LHPS series can fulfill a wide range of applications. These treatment filters hold 250-10,000 pounds of activated carbons or any variety of media with flow rates of up to 400 GPM.

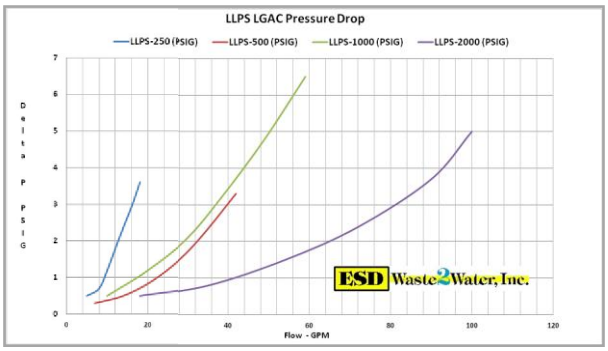
APPLICATIONS:

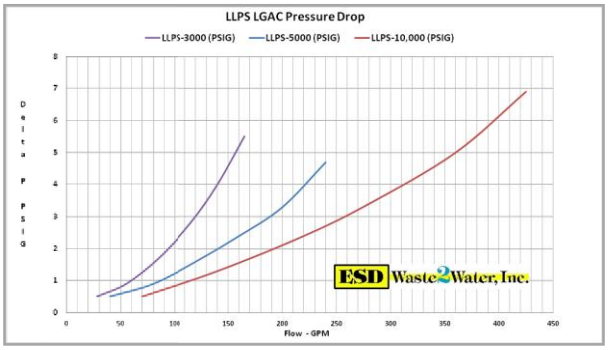
- Wastewater filtration
- Groundwater Remediation
- Underground Storage Tank Cleanup
- Dissolved Organic Removal
- Product Purification
- Tank Cleaning
- Pilot Testing
- Emergency Spill Treatment

FEATURES:

- Simple Installation and Operation
- Flexibility to be used in series of parallel operation
- Can be supplied with various medias
- Modular design for easy and rapid deployment and installation

PRESSURE DROP VS FLOW RATE





Specifications

Liquid Low Pressure Steel Filters	250	500	1000	2000	3000	5000	10,000
Dimensions: diameter x overall height	24" x 48"	30" x 72"	36" x 84"	50" x 101"	60" x 108"	72" x 120"	96" x 130"
Vessel Construction	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
Inlet/Outlet Connection	2 " FNPT/2"MNPT	2 " FNPT	2 " FNPT	3 " FNPT	3 " FNPT	3 " FNPT	6 " Flange
Pounds of Carbon	250	500	1000	2000	3000	5000	10,000
Internal Piping	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC
Interior Coating	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy
Exterior Coating	Epoxy Mastic	Epoxy Mastic	Epoxy Mastic	Epoxy Mastic	Epoxy Mastic	Epoxy Mastic	Epoxy Mastic
Carbon Bed Volume (cu.ft.)	8.6	16.5	33	68.5	107	170	350
Cross Section (sq.ft.)	3.1	4.9	7	12.6	19.3	28	50
Vessel Weight (lbs) Shipping Operational	 452 850	 870 1765	 1475 3100	 2985 6400	 4400 9875	 7325 16,550	 13,225 29,050
Flow, GPM (max.)	10	25	50	90	135	200	400
Pressure, PSIG (max.)	40	40	40	40	40	40	40
Temperature, °F (max)	140°	140°	140°	140°	140°	140°	140°

***The information provided in this literature contains merely general descriptions or characteristics of performance, which in actual case of use do not always apply as, described or which may change as a result of further product development. Specifications provided herein are subject to change without prior notice.*

ESD Waste2Water, Inc.
495 Oak Road, Ocala, FL 34472
Toll Free (800) 277-3279 • (352) 680-0400 • Fax (352) 680-9278
www.waste2water.com

Transfer Pump (P-02)

How can we improve our Product Images?

Compare

Centrifugal Pump, 3/4hp, 1-Ph, 115/230V

DAYTON

Price
$437.85 / each

Deliver one time only

Auto-Reorder Every 1 Month

1 Add to Cart

+Add to list

Availability for Qty 1 Go

Shipping Pick Up

Expected to arrive **Thu. Mar 5**

Ship to: **11710** (Change)

Add Repair & Replacement Coverage for $89.95 each.

Be the first to write a review | Ask & Answer

Item # **4RU77** Mfr. Model # **4RU77** UNSPSC # **40151503**

Catalog Page # **N/A** Shipping Weight **31.0 lbs.**

Country of Origin **USA** | *Country of Origin is subject to change.*

Note: Product availability is real-time updated and adjusted continuously. The product will be reserved for you when you complete your order. More

Technical Specs

Item	**Centrifugal Pump**
Close Couple	**Yes**
Housing Material	**Cast Iron**
HP	**3/4**
Phase	**1**
Voltage	**115/230VAC**
Amps	**12.4/6.2**
Hz	**60**
Inlet	**1-1/4"**
Outlet	**1"**
Motor Enclosure	**ODP**
NEMA/IEC Frame	**48Y**
Motor RPM	**3450**
Service Factor	**1.27**
Impeller Type	**Closed**
Impeller Material	**Noryl**
Impeller Dia.	**5"**

Back to Top

GPM of Water @ 50 Ft. of Head	**35**
GPM of Water @ 60 Ft. of Head	**31**
GPM of Water @ 70 Ft. of Head	**26**
GPM of Water @ 80 Ft. of Head	**21**
GPM of Water @ 90 Ft. of Head	**14**
Max. Head	**100 ft.**
Min. GPM @ Head	**14 @ 90 ft.**
Max. GPM @ Head	**43 @ 20 ft.**
Best Efficiency GPM @ Head	**28 @ 65 ft.**
Best Efficiency Range GPM @ Head	**16-38 gpm @ 85-58 ft.**
Max. Specific Gravity	**1**
Wetted Materials	**Stainless Steel, Carbon, Cast Iron, Noryl, Ceramic, Buna-N**
Max. Case Pressure	**100 psi**
Max. Fluid Viscosity	**1 cP**
Max. Pressure	**125 psi**

Shaft Material	**Stainless Steel**
Seal Type	**Type 21**
Seal Material	**Buna-N Elastomers, Carbon/Ceramic Face, 316 Stainless Steel Metal Parts**
Max. Liquid Temp.	**140 Degrees F**
GPM of Water @ 20 Ft. of Head	**46**
GPM of Water @ 30 Ft. of Head	**43**
GPM of Water @ 40 Ft. of Head	**40**

Bearing Type	**Ball**
Number of Port Positions	**4**
Drain Plug Position	**4 Position**
Manufacturers Warranty Length	**1 yr.**
Liquid Compatibility	**Nonflammable, Non Abrasive**
Length	**12-3/8"**
Width	**7-13/16"**
Height	**8-5/8"**

Bag Filter Housing, Alum, 1 1/4 In FNPT

PENTEK

Price
$567.00 / each

Deliver one time only

Auto-Reorder Every 1 Month

1 Add to Cart

+Add to list

Availability for Qty 1 Go

Shipping Pick Up

Expected to arrive **Thu. Mar 5**

Ship to: **11710** (Change)

How can we improve our **Product Images**?

Compare

Be the first to write a review | Ask & Answer

Item # **4BB24** Mfr. Model # **156110-75** UNSPSC # **40161525**

Catalog Page # **3800** Shipping Weight **12.55 lbs.**

Country of Origin **USA** | *Country of Origin is subject to change.*

Note: Product availability is real-time updated and adjusted continuously. The product will be reserved for you when you complete your order. More

Technical Specs

Item	**Bag Filter Housing**	Connection	**1-1/4" (F)NPT**
Series	**GP**	Seal Material	**Viton**
Filter Bag Size	**4**	Basket Material	**Stainless Steel**
Housing Material	**Aluminum**	Max. Pressure	**150 psi**
Outlet	**Bottom**	Flow Rate	**40 gpm**
Height	**20-1/2"**	Max. Water Temp.	**300 Degrees F**
Housing Dia.	**5"**	Cover Type	**Speed Bar Closure**

Back to Top

Cartridge Filter Housing (F-03) Pentek#150233

PENTEK® BIG BLUE® HEAVY DUTY SERIES
FILTER HOUSINGS

FOR LARGE-CAPACITY, HIGH FLOW APPLICATIONS

Big Black not shown

Pentair® Pentek® Big Blue® and Big Black Heavy Duty Filter Housings offer the versatility to meet all of your large-capacity filtration needs, including high-flow and heavy-sediment applications. The extra large housing allows for greater cartridge capacity, reducing the number of vessels required for high flow-rate applications. Sumps are available in both 10" and 20" lengths.

The High-Flow Polypropylene (HFPP) cap is available with 3/4", 1" or 1-1/2" NPT inlet and outlet ports. The 1-1/2" internal port allows a greater volume of liquid to pass through the HFPP cap more rapidly.

Big Blue and Big Black Housings are compatible with a broad range of chemicals and are available with or without a pressure relief button. They accept a wide variety of 4-1/2" diameter cartridges.

FEATURES/BENEFITS

Large capacity housing suitable for high flow applications

Available in 10" and 20" lengths

Pressure relief/bleed on inlet side of cap

Accepts up to 4-1/2" diameter cartridges

SPECIFICATIONS

Housing – Polypropylene

Cap – Polypropylene (HFPP)

Button Assembly – 300-Series stainless steel, EPDM, and polypropylene

O-Ring – Buna-N®

Temperature Rating-
40-100°F (4.4-37.8°C)

Maximum Pressure-
10": 100 psi (6.9 bar)
20" : 90 psi (6.2 bar)

NSF COMPONENT

The 150233, 150234, 150235, 150236, 150237, 150238, 150239, 150240, 150467, 150468, 150469, and 150470 are Tested and Certified by NSF International to NSF/ANSI Standard 42 for material and structural integrity requirements.

SPECIFICATIONS AND PERFORMANCE

PART #	DESCRIPTION	MAXIMUM DIMENSIONS	INITIAL ΔP (PSI) @ FLOW RATE (GPM)
150469*	3/4" #10 Big Blue® Black/Blue HFPP w/PR	12.75" x 7.38" (324 x 187 mm)	2 psi @ 15 gpm (0.14 bar @ 57 Lpm)
150470*	3/4" #10 Big Blue Black/Blue HFPP w/o PR	12.75" x 7.38" (324 x 187 mm)	2 psi @ 15 gpm (0.14 bar @ 57 Lpm)
150467*	3/4" #20 Big Blue Black/Blue HFPP w/PR	23.04" x 7.38" (585 x 187 mm)	2 psi @ 15 gpm (0.14 bar @ 57 Lpm)
150468*	3/4" #20 Big Blue Black/Blue HFPP w/o PR	23.04" x 7.38" (585 x 187 mm)	2 psi @ 15 gpm (0.14 bar @ 57 Lpm)
158799*	3/4" #20 Big Blue Black/White HFPP w/PR	23.04" x 7.38" (585 x 187 mm)	2 psi @ 15 gpm (0.14 bar @ 57 Lpm)
150237*	1" #10 Big Blue Black/Blue HFPP w/PR	13.30" x 7.45" (338 x 189 mm)	1 psi @ 15 gpm (0.07 bar @ 57 Lpm)
150238*	1" #10 Big Blue Black/Blue HFPP w/o PR	13.30" x 7.45" (338 x 189 mm)	1 psi @ 15 gpm (0.07 bar @ 57 Lpm)
150233*	1" #20 Big Blue Black/Blue HFPP w/PR	23.22" x 7.45" (590 x 189 mm)	1 psi @ 15 gpm (0.07 bar @ 57 Lpm)
150234*	1" #20 Big Blue Black/Blue HFPP w/o PR	23.22" x 7.45" (590 x 189 mm)	1 psi @ 15 gpm (0.07 bar @ 57 Lpm)
150239*	1-1/2" #10 Big Blue Black/Blue HFPP w/PR	13.45" x 7.45" (342 x 189 mm)	1 psi @ 20 gpm (0.07 bar @ 76 Lpm)
150240*	1-1/2" #10 Big Blue Black/Blue HFPP w/o PR	13.45" x 7.45" (342 x 189 mm)	1 psi @ 20 gpm (0.07 bar @ 76 Lpm)
150235*	1-1/2" #20 Big Blue Black/Blue HFPP w/PR	23.74" x 7.45" (603 x 189 mm)	1 psi @ 20 gpm (0.07 bar @ 76 Lpm)
150236*	1-1/2" #20 Big Blue Black/Blue HFPP w/o PR	23.74" x 7.45" (603 x 189 mm)	1 psi @ 20 gpm (0.07 bar @ 76 Lpm)
150671	1" #10 Big Blue Black/Black HFPP w/o PR	13.30" x 7.45" (338 x 189 mm)	1 psi @ 15 gpm (0.07 bar @ 57 Lpm)
150426	1" #10 Big Blue Black/Black HFPP w/PR	13.30" x 7.45" (338 x 189 mm)	1 psi @ 15 gpm (0.07 bar @ 57 Lpm)
150383	1" #20 Big Blue Black/Black HFPP w/PR	23.22" x 7.45" (590 x 189 mm)	1 psi @ 15 gpm (0.07 bar @ 57 Lpm)
150672	1" #20 Big Blue Black/Black HFPP w/o PR	23.22" x 7.45" (590 x 189 mm)	1 psi @ 15 gpm (0.07 bar @ 57 Lpm)
150639	1-1/2" #20 Big Blue Black/Black HFPP w/o PR	23.74" x 7.45" (603 x 189 mm)	1 psi @ 15 gpm (0.07 bar @ 57 Lpm)

*NSF component listed

CAUTION: Protect against freezing to prevent cracking of the filter and water leakage.

ACCESSORIES

PART #	DESCRIPTION
150296	SW-3 Wrench for 10" Big Blue®
144368	SW-4 Wrench for 20" Big Blue
SH144229	Cartridge Coupler for 4-1/2" Cartridges
151122	Buna-N® O-ring for Big Blue
244718	WB-ZP - Zinc Plated Bracket ONLY
150061	WB-ZP Kit - Zinc Plated Bracket
357639	WB-SS - Stainless Steel Bracket ONLY
357640	WB-SS Kit - Stainless Steel Bracket
144928	WB-PC Kit - Powder Coated White Bracket
144258	Two-Housing Bracket
144259	Three-Housing Bracket
160210	Big Blue /Big White/Big Clear Skid, Fiberglass Hardware Kit (Assembly Required)

PENTAIR

FILTRATION & PROCESS
5730 NORTH GLEN PARK ROAD, MILWAUKEE, WI 53209
262.238.4400, CUSTOMER CARE: 800.279.9404, WWW.PENTAIRAQUA.COM

Large Volume Dispensing Platforms

Designed to contain large volume spills from dispensing or pumping operations as well as storage applications.

- Single unit construction provides large uniform storage platform
- Large sump volumes allow for compliant spill containment even when storing multiple tanks, IBC's or stacked drums
- High load capacity of 225 psf allow placement of heavy equipment or tanks
- Sumps are coated with chemical resistant mastic epoxy
- Custom configurations and load ratings available. Call for quotation

exclusive DENIOS

$ 2,360.00

10' x 7' Platform with 246-gallon sump. Order No. K42-5020

Containment Sump S-01

All equipment to be mounted on properly sized support bases to ensure loading capacity does not exceed 225 psf.
e.g. LGAC vessels to be mounted on 2'x2' steel base. (850# /4ft²), OWS to be mounted on two (2) 1.5'x1' aluminum bases (650#/3ft²).

Description		7' x 3'	10' x 7'	16' x 7'	13' x 9'
Dimension - L x D x H	(in)	87 x 41 x 9	120 x 88 x 9	197 x 88 x 9	157 x 110 x 9
Approx. Floor Space	(sq ft)	22	69	114	115
Gross Spill Capacity	(gal)	66	246	422	430
Load Capacity	(psf)	225	225	225	225
Shipping Weight	(lbs)	365	1016	1863	1898
Order No.		K42-5010	K42-5020	K42-5030	K42-5040
Price		**$ 1,625.00**	**$ 2,360.00**	**$ 4,016.00**	**$ 4,314.00**

LM3 Slim Line All-Purpose Submersible Transmitter

Level Transducers (LT100A/B) Winters #LM3W40

Description & Features:

- Slimline probe is especially suited for applications with restricted space
- Designed for continuous level measurement in water or other liquids with low viscosity
- 316L SS probe with stainless steel sensor for ease in cleaning
- Available ranges from H_2O up to 300 psi
- ±0.35% accuracy rating
- NEMA 6P / IP68
- Approved for outdoor use
- Customizable
- 1 year warranty

Applications:

- Appropriate for all hazardous areas where an intrinsically safe rating is required, including oil & gas and chemical installations

Specifications	
Output Signal	Standard 2-wire: 4-20 mA / Vs = 12-36 Vdc
Accuracy	±0.35% FSO BFSL Optional nominal pressure > 5 psi: <±0.25% FSO BFSL
Permissible Load	Rmax = [(Vs - Vs min) / 0.02] Ohm
Influence Effects	Supply: 0.05% FSO / 10 V Load: 0.05% FSO / kOhm
Long-term Stability	<±0.1% FSO/yr
Response Time	<10 ms
Permissible Temperatures	Medium: 14°F to 158°F (-10°C to 70°C) Storage: -13°F to 158°F (-25°C to 70°C)
Reverse Polarity Protection	No damage. No function.
Electromagnetic Protection	Emission and immunity according to EN 61326
Electrical Connection	Cable with sheath material*: PVC grey, PUR black, FEP black
Housing	316Ti SS
Seals	FKM (Viton®, Kalrez®) / EPDM (Nordel®)
Diaphragm	316L SS
Weight	100 g (without cable)
Current Consumption	25 mA max
Connecting Cables	Cable capacitance: Signal line/shield and signal line/signal line: 160 pF/m Cable inductance: Signal line/shield and signal line/signal line: 1 µH/m
Enclosure Rating	NEMA 6P / IP68

Thermal Errors (Offset and Span)					
Nominal Pressure (psi)	<1	<4	<5	<15	>15
Tolerance Band (% FSO)	<±2	<±1.5	<±1	<±1	<±0.75
TC, Average (% FSO/10K)	±0.3	±0.2	±0.14	±0.1	±0.07
Compensated Range	32°F to 122°F 0°C to 50°C			32°F to 158°F 0°C to 70°C	

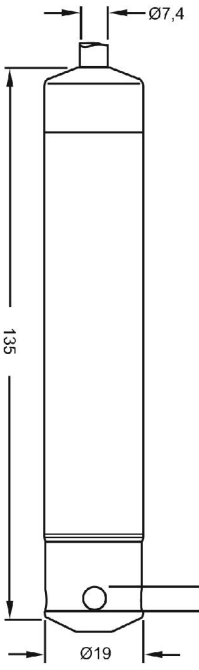
Pin Configuration		
Electrical Connection		Cable Colours
2-wire system	Supply + Supply -	White Brown
	Ground	Yellow/green (shield)

* Cable with integrated air tube for atmosphere pressure reference

Order Codes

Range	Over-pressure	Burst Pressure	Code
0/50" water	15 psi	22 psi	LM3W05
0/100" water	15 psi	22 psi	LM3W10
0/150" water	15 psi	22 psi	LM3W15
0/200" water	15 psi	22 psi	LM3W20
0/300" water	15 psi	22 psi	LM3W30
0/400" water	15 psi	22 psi	LM3W40
0/5 psi	15 psi	44 psi	LM3005
0/10 psi	44 psi	109 psi	LM3010
0/15 psi	44 psi	109 psi	LM3015
0/25 psi	87 psi	218 psi	LM3025
0/50 psi	290 psi	218 psi	LM3050
0/100 psi	290 psi	725 psi	LM3100
0/200 psi	870 psi	1,740 psi	LM3200
0/300 psi	1,450 psi	1,740 psi	LM3300

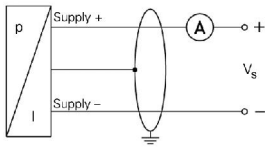
Kalrez®, Viton®, Nordel® are registered trademarks of DuPont Performance Elastomers



Note: Measurements are in mm

Wiring Diagram

2-wire-system (current)



Bourdon Tube Pressure Gauge
Model 21X.53 Stainless Steel Construction

Applications

- Intended for adverse service conditions where pulsating or vibration exists (with liquid filling)
- Hydraulics & compressors
- Suitable for gaseous or liquid media that will not obstruct the pressure system

Special features

- Vibration and shock resistant (with liquid filling)
- Stainless steel case
- Pressure ranges up to 15,000 psi

Bourdon Tube Pressure Gauge Model 21X.53

Standard Features

Design
ASME B40.100 & EN 837-1

Sizes
2”, 2½” & 4” (50, 63 & 100 mm)

Accuracy class
2” & 2½”: ± 2/1/2% of span (ASME B40.100 Grade A)
4”: ± 1% of span (ASME B40.100 Grade 1A)

Ranges
Vacuum / Compound to 200 psi
Pressure from 15 psi to 15,000 psi
Pressure from 15 psi to 10,000 psi - 2” size
or other equivalent units of pressure or vacuum

Working pressure

2 & 2½”:	Steady:	3/4 scale value
	Fluctuating:	2/3 full scale value
	Short time:	full scale value
4”:	Steady:	full scale value
	Fluctuating:	0.9 x full scale value
	Short time:	1.3 x full scale value

Operating temperature
Ambient: -40°F to +140°F (-40°C to +60°C) - dry
-4°F to +140°F (-20°C to +60°C) - glycerine filled
-40°F to +140°F (-40°C to +60°C) - silicone filled
Medium: +140°F (+60°C) maximum

Temperature error
Additional error when temperature changes from reference temperature of 68°F (20°C) ±0.4% for every 18°F (10°C) rising or falling. Percentage of span.

Weather protection
Weather resistant (NEMA 3 / IP 54) - dry case
Weather tight (NEMA 4X / IP 65) - liquid-filled case

Pressure connection
Material: copper alloy
Lower mount (LM) or center back mount (CBM) - 2” & 2½”
Lower mount (LM) or lower back mount (LBM) - 4”
1/8” NPT, 1/4” NPT or 1/2” NPT limited to wrench flat area

Bourdon tube
2½” Size- Material: Copper alloy
30” Hg (VAC) to 800 PSI- C-type (soldered)
1000PSI to 15,000PSI- helical type (soldered)
Changes to stainless steel at 7,500 PSI brazed
4”Size- Material: Copper alloy $\leq$ 1,000 PSI
316 stainless steel $\geq$ 1,500 PSI
30” Hg (Vac) to 1,000 PSI- C-type (soldered)
1,500 PSI to 15,000 PSI- helical type (brazed)
Changes to stainless steel at 1,500 PSI

Movement
Copper alloy

Dial
White ABS with stop pin and with black lettering

Pointer
Black aluminum

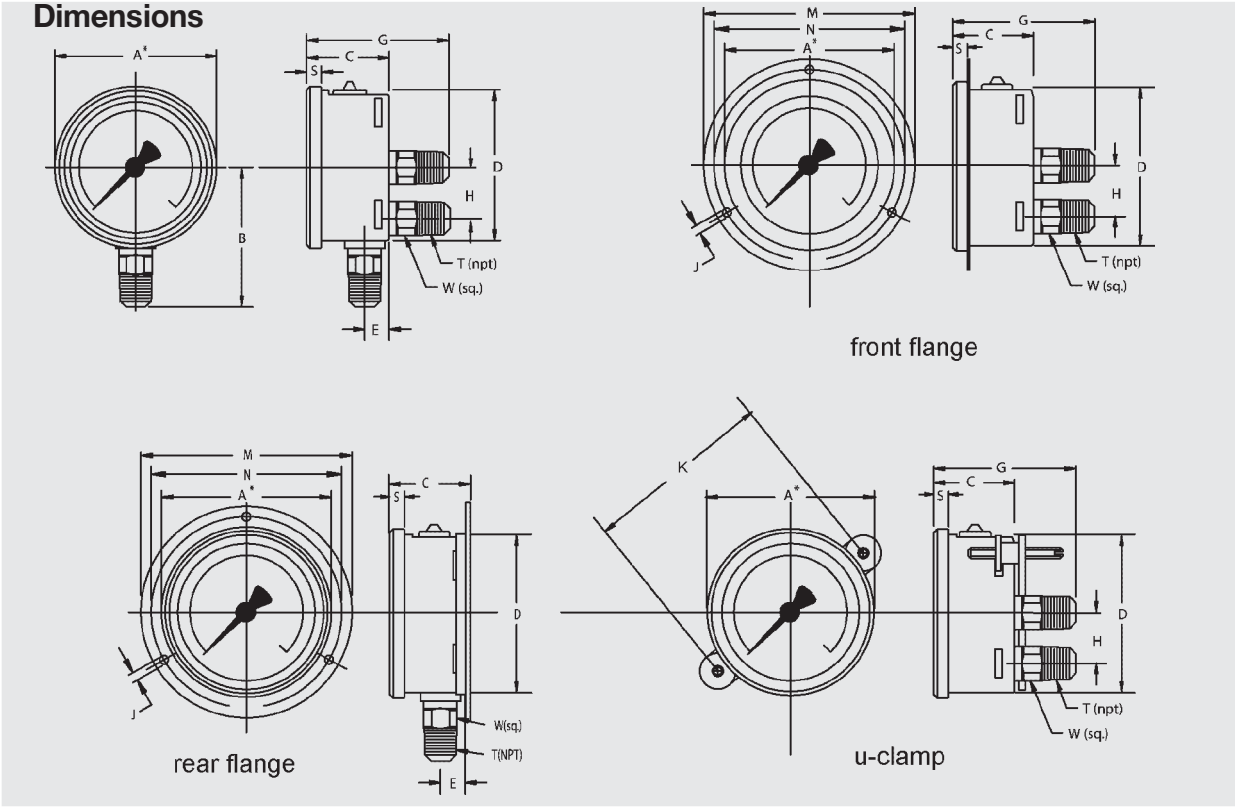
Case
304 stainless steel with vent plug and stainless steel crimp ring. Suitable for liquid filling. Case connection sealed with EPDM o-ring (glycerine filled) or Viton o-ring (dry or silicone filled).

Window
Polycarbonate with Buna-N gasket

Case fill
Glycerine 99.7% - Type 213.53

Optional extras
- Brass restrictor
- Stainless steel front or rear flange - 2½" & 4"
- Zinc-plated steel or SS u-clamp bracket (field installable)
- External zero adjustment (2½" only)
- Red drag pointer or mark pointer
- Silicone or Fluorolube case filling
- Special connections limited to wrench flat area
- Custom dial layout
- Other pressure scales available
  bar, kPa, MPa, kg/cm² and dual scales

Dimensions



Size		A	B	C	D	E	G	H	J	K	L	M	N	S	T	W	Weight	
2"	mm	55	48	30	50	12	53	-	3.6	n/a	6.5	71	60	5.5		14	0.27 lb.	dry
	in	2.17	1.89	1.18	1.97	0.47	2.09	-	0.14	n/a	0.26	2.80	2.36	0.22	1/4"	0.55	0.33 lb.	filled
2.5"	mm	69	54	32	62	13	54	-	3.6	72	7.5	85	75	6.5		14	0.36 lb.	dry
	in	2.69	2.13	1.26	2.45	0.51	2.13	-	0.14	2.83	0.30	3.35	2.95	0.26	1/4"	0.55	0.44 lb.	filled
4"	mm	107	87	48	100	15.5	79.5	30	4.8	109	9	132	116	8		22	1.10 lb.	dry
	in	4.21	3.43	1.89	3.91	0.61	3.13	1.18	0.19	4.29	0.35	5.20	4.57	0.31	1/2"	0.87	1.76 lb.	filled

Note: For 1/4" NPT connections on 4" gauges, reduce B dimension by 5mm/0.2"

Recommended panel cut-out:
2"- U-clamp: 51mm
front flange: n/a

2½"- U-clamp: 63mm
front flange: 65mm

4"- u-clamp: 101mm
front flange: 104mm

4½"- panel mount adapter 104mm minimum (not shown)

Ordering information
Pressure gauge model / Nominal size / Scale range / Size of connection / Optional extras required

WIKA Instrument Corporation
1000 Wiegand Boulevard
Lawrenceville, GA 30045
Tel (770) 513-8200 Toll-free 1-888-WIKA-USA
Fax (770) 338-5118
E-Mail info@wika.com
www.wika.com

Pressure Transmitter (PT106) Dwyer#626-10-GH-P1-E1-S1

Series 626 & 628

Industrial Pressure Transmitter

Complete Offering of Ranges, Connections and Outputs

General Purpose Housing (-GH)

General Purpose Housing (-GH) with DIN C

626 with LED Display (CH housing only)

Conduit Housing (-CH)

Scan here to watch product video

*Please see our website for dimensional drawings.

The Series 626 Pressure Transmitters possess a highly precise 0.25% full scale accuracy piezo-resistive sensor contained in a compact, rugged, NEMA 4X (IP66) stainless steel general purpose housing or cast aluminum conduit housing.

The Series 628 Pressure Transmitters are ideal for OEMs with 1% full scale accuracy sensors. The transmitter is also available in the general purpose stainless steel housing and the cast aluminum conduit housing.

The corrosion resistant 316L stainless steel wetted parts allow the Series 626 and 628 transmitters to measure the pressure in a multitude of processes from hydraulic oils to chemicals. The Series 626 and 628 are available in absolute and pressure ranges with a variety of optional outputs, process connections and electrical terminations to allow you to select the right transmitter for your application.

APPLICATIONS

- Compressors
- Pumping systems
- Irrigation equipment
- Hydraulic
- Industrial process monitoring

FEATURES

- Metal conduit housing option
- Robust 316 SS oil filled sensor
- Compact design

SPECIFICATIONS

Service: Compatible gases and liquids.
Wetted Materials: Type 316L SS.
Accuracy:
626 : 0.25% F.S.;
: 0.20% RSS;
628 : 1.0% F.S.;
: 0.5% RSS;
626 Absolute Ranges : 0.5% F.S.;
: 0.30% RSS.
(Includes linearity, hysteresis, and repeatability.)
Temperature Limit: 0 to 200°F (-18 to 93°C).
Compensated Temperature Range: 0 to 175°F (-18 to 79°C).
Thermal Effect: ±0.02% FS/°F (includes zero and span).
Pressure Limits: See table.
Power Requirements: 10-30 VDC (for 4-20 mA, 0-5, 1-5, 1-6 VDC outputs); 13-30 VDC (for 0-10, 2-10 VDC outputs); 5 VDC ±0.5 VDC (for 0.5-4.5 VDC ratio-metric output).
Output Signal: 4-20 mA, 0-5 VDC,1-5 VDC, 0-10 VDC, or 0.5-4.5 VDC.
Response Time: 50 ms.
Loop Resistance: 0-1000 Ohms max. R max = 50 (Vps-10) Ohms (4-20 mA output), 5K Ohms (0-5, 1-5, 1-6, 0-10, 2-10, 0.5-4.5 VDC output).
Stability: 1.0% FS/year (Typ.).
Current Consumption: 38 mA maximum (for 4-20 mA output); 10 mA maximum (for 0-5, 1-5, 1-6, 0-10, 2-10, 0.5-4.5 VDC output); 140 mA maximum (for all 626/628/629-CH with optional LED).
Electrical Connections: Conduit Housing (-CH): terminal block, 1/2″ female NPT conduit; General Purpose Housing (-GH): cable DIN EN 175801-803-C.
Process Connection: 1/4″ male or female NPT and BSPT.
Enclosure Rating: NEMA 4X (IP66).
Mounting Orientation: Mount in any position.
Weight: 10 oz (283 g).
Agency Approvals: CE.

Pressure Limits

Range Number	Pressure Range	Maximum Pressure (psig)	Over Pressure (psig)	Range Number	Pressure Range (psig)	Maximum Pressure (psig)	Over Pressure (psig)
00	0-15 psia	30	45	12	0-200	400	1000
30	15-0 psia	30	45	13	0-300	600	1500
06	0-5 psig	10	50	14	0-500	1000	2500
07	0-15 psig	30	150	15	0-1000	2000	5000
08	0-30 psig	60	300	16	0-1500	3000	5000
09	0-50 psig	100	300	18	0-3000	6000	7500
10	0-100 psig	200	500	19	0-5000	7500	10000
11	0-150	300	750	26	0-8000	10000	12000

Ordering Chart

Accuracy	626							0.25% Full-Scale Accuracy
	628							1.0% Full-Scale Accuracy
Range		-00						0-15 psia
		-01						0-30 psia
		-02						0-50 psia
		-03						0-100 psia
		-04						0-200 psia
		-05						0-300 psia
		-06						0-5 psi
		-07						0-15 psi
		-08						0-30 psi
		-09						0-50 psi
		-10						0-100 psi
		-11						0-150 psi
		-12						0-200 psi
		-13						0-300 psi
		-14						0-500 psi
		-22						0-600 psi
		-15						0-1000 psi
		-16						0-1500 psi
		-18						0-3000 psi
		-19						0-5000 psi
		-26						0-8000 psi
		-67						0-0.5 bar
		-71						0-2.5 bar
		-75						0-10 bar
		-81						0-40 bar
Housing			-CH					Conduit Housing
			-GH					General Purpose Housing
Process Connection				-P1				1/4″ male NPT
				-P2				1/4″ female NPT
				-P3				1/4″ male BSPT
				-P5				1/4″ female SAE with Refrigerant Valve Depressor ①
				-P9				1/2″ male NPT ①
Electrical Connection					-E1			Cable Gland with 3' of Prewired Cable
					-E3			Cable Gland with 9' of Prewired Cable
					-E4			DIN EN 175801-803-C ①
					-E5			1/2″ female NPT Conduit ②
					-E6			M-12 4 Pin Connector
					-E8			Packard Connector
Signal Output						-S1		4-20 mA
						-S2		1-5 VDC
						-S4		0-5 VDC
						-S5		0-10 VDC
						-S7		0.5-4.5 VDC ①
Options							-AT	Aluminum Tag
							-NIST	NIST Traceable Certificate
							-LED	Bright Red LED display ②③

①Available with -GH Housing only
②Available with -CH Housing only
③LED option is not NEMA 4X (IP66)
④Power Requirement: 5 VDC ±10%

ACCESSORIES
A-164, 16.4′ (5 m) cable with M-12 4-pin female connector
A-960, 3′ packard cable
A-961, 9′ packard cable
A-962, 20′ packard cable

Signet 2551 Magmeter Flow Sensor

Magnetic Flow Meter/Transmitter (FIT119) #3-2551-P0-21

Available in a variety of wetted materials and ideal for pipe sizes up to DN900 (36 in.)

The Signet 2551 Magmeter is an insertion style magnetic flow sensor that features no moving parts. The patented* sensor design is available in corrosion-resistant materials to provide long-term reliability with minimal maintenance costs. Material options include PP with stainless steel, PVDF with Hastelloy-C, or PVDF with Titanium. Utilizing the comprehensive line of Signet installation fittings, sensor alignment and insertion depth is automatic. These versatile, simple-to-install sensors deliver accurate flow measurement over a wide dynamic range in pipe sizes ranging from DN15 to DN900 (½ to 36 inches), satisfying the requirements of many diverse applications.

Signet 2551 Magmeters offer many output options of frequency/digital (S^3L) or 4 to 20 mA which are available on both the blind and display versions. The frequency or digital (S^3L) sensor output can be used with Signet's extensive line of flow instruments while the 4 to 20 mA output can be used for a direct input to PLCs, chart recorders, etc. Both the 4 to 20 mA output and digital (S^3L) sensor interface is available for long distance signal transmission. An additional benefit is the empty pipe detection which features a zero flow output when the sensors are not completely wetted. Also, the frequency output is bi-directional while the 4 to 20 mA output can be set for uni- or bi-directional flow using the display or the 3-0250 USB to Digital (S^3L) Configuration/Diagnostic setup tool which connects to PCs for programming capabilities.

In addition the display version of the 2551 Magmeter is available with relays and features permanent and resettable totalizer values which can be stored and seen on the display. Also, the display contains multi-languages with English, Spanish, German, French, Italian and Portuguese menu options.

Features

- **Test certificate included for -X0, -X1**
- **Patented Magmeter technology***
- **No moving parts**
- **Bi-directional flow**
- **Empty pipe detection**
- **Installs into pipe sizes DN15 to DN900 (0.5 to 36 in.)**
- **Operating range 0.05 to 10 m/s (0.15 to 33 ft/s)**
- **Accurate measurement even in dirty liquids**
- **Polypropylene or PVDF retaining nuts**
- **Blind 4 to 20 mA, digital (S^3L), frequency, relay output**
- **No pressure drop**
- **Corrosion resistant materials; PP or PVDF with SS, Hastelloy-C, or Titanium**
- **Multi-language display menu available**

Applications

- **Chemical Processing**
- **Water and Wastewater Monitoring**
- **Metal Recovery and Landfill Leachate**
- **Commercial Pools, Spas, and Aquariums**
- **HVAC**
- **Irrigation**
- **Scrubber Control**
- **Neutralization Systems**
- **Industrial Water Distribution**

* U.S. Patent No: 7,055,396 B1

Specifications

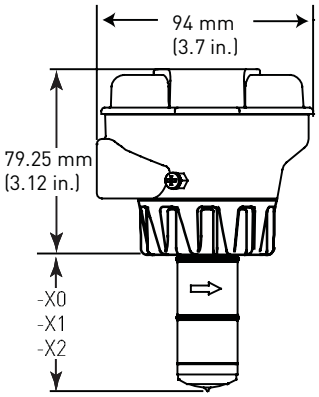
General			
Operating Range	0.05 to 10 m/s	0.15 to 33 ft/s	
Pipe Size Range	DN15 to DN900	½ in. to 36 in.	
Linearity	± 1% reading plus 0.1% of full scale		
Repeatability	±0.5% of reading @ 25 °C (77 °F)		
Minimum Conductivity	20 µS/cm		
Wetted Materials			
Sensor Body/Electrodes and Grounding Ring	-P0, -P1, -P2: PP/316L SS		
	-T0, -T1, -T2: PVDF/Titanium		
	-V0, -V1, -V2: PVDF/Hastelloy-C		
O-rings	FPM (standard) EPR (EPDM), FFPM (optional)		
Case	PBT		
Display Window	Polyamide (transparent nylon)		
Protection Rating	NEMA 4X/IP65		
Electrical			
Power Requirements	4 to 20 mA	24 VDC ±10%, regulated, 22.1 mA max.	
	Frequency	5 to 24 VDC ±10%, regulated, 15 mA max.	
	Digital (S^3L)	5 to 6.5 VDC, 15 mA max.	
Auxiliary (only required for units with relays)		9 to 24 VDC, 0.4 A max.	
Reverse Polarity and Short Circuit Protected			
Current Output 4 to 20 mA	Loop Accuracy	32 µA max. error (25 °C @ 24 VDC)	
	Isolation	Low voltage < 48 VAC/DC from electrodes and auxiliary power	
	Maximum Cable	300 m (1000 ft)	
	Error condition	22.1 mA	
	Max. Loop Resistance	300 Ω	
	Compatible with PLC, PC or similar equipment		
	4 to 20 mA load needed		
Frequency Output	Output Modes	Freq., or Mirror Relay (display version only)	
	Max. Pull-up Voltage	30 VDC	
	Max. Current Sink	50 mA, current limited	
	Maximum Cable	300 m (1000 ft)	
	Compatible with Signet Model 8550, 8900, 9900, 9900-1BC		
Digital (S^3L) Output	Serial ASCII, TTL level 9600 bps		
	Compatible with Model Signet 8900 controller		
Relay Specifications			
#1, #2 Type	Mechanical SPDT		
Rating	5 A @ 30 VDC max., 5 A @ 250 VDC max.		
#3 Type	Solid State		
	50 mA @ 30 VDC, 50 mA @ 42 VAC		
Hysteresis	User adjustable for exiting alarm condition		
Alarm On Trigger Delay	Adjustable (0 to 9999.9 sec.)		
Relay Modes	Off, Low, High, Window, and Proportional Pulse		
Relay Source	Flow Rate, Resettable Totalizer		
Error Condition	Selectable; Fail Open or Closed		
Display			
Characters		2 x 16	
Contrast		User-set in four levels	
Backlighting (only on relay versions)		Requires external 9-24 VDC, 0.4 mA max.	
Max. Temperature/Pressure Rating			
Storage Temperature		-20 °C to 70 °C	-4 °F to 158 °F
Relative Humidity		0 to 95% (non-condensing)	
Operating Temperature	Ambient	-10 °C to 70 °C	14 °F to 158 °F
	Media	0 °C to 85 °C	32 °F to 185 °F
Maximum Operating Pressure		10.3 bar @ 25 °C	150 psi @ 77 °F
		1.4 bar @ 85 °C	20 psi @ 185 °F
Shipping Weight			
	0.680 kg	1.50 lb	
Standards and Approvals			
	CE, FCC, UL, CUL (for display versions with relays)		
	RoHS compliant, China RoHS		
	NEMA 4X / IP65 Enclosure (with cap installed)		
	Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management and OHSAS 18001 for Occupational Health and Safety		

Dimensions

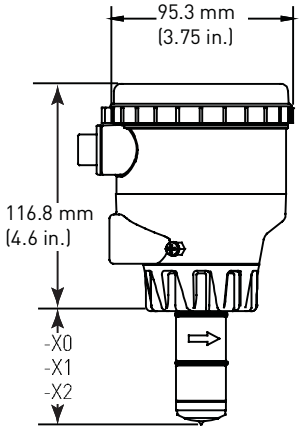
Pipe Range	
1/2 to 4 in.	-X0 = 58 mm (2.3 in.)
5 to 8 in.	-X1 = 91 mm (3.6 in.)
10 to 36 in.	-X2 = 167 mm (6.6 in.)

X = Sensor Body P, T, or V

Blind version

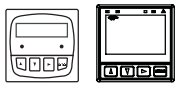


Display version



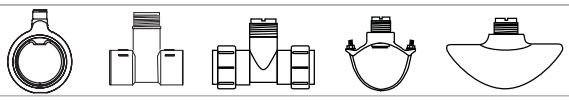
System Overview

Stand-Alone	Panel Mount	Field Mount - Pipe, Tank, Wall	4 to 20 mA Input
Signet Model 2551 Magmeter	Signet Instruments 8550 8900 9900 9900-1BC	Signet Instruments 8550 9900 with 3-8050 Universal Mount Kit	Customer Supplied Chart Recorder or Programmable Logic Controller



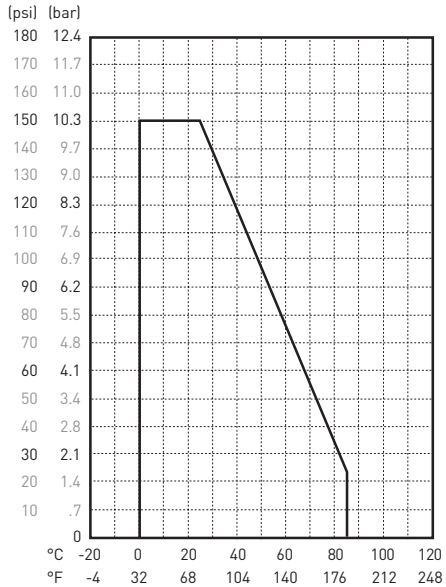
Signet 2551 Magmeter

Signet Fittings



All sold separately

Operating Temperature/Pressure Graphs

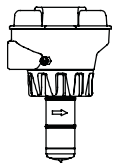
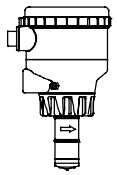
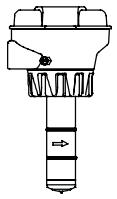
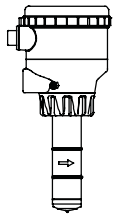
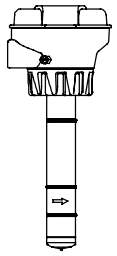
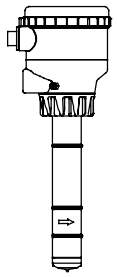


Note:
The pressure/temperature graphs are specifically for the Signet sensor. During system design the specifications of all components must be considered. In the case of a metal piping system, a plastic sensor will reduce the system specification. When using a PVDF sensor in a PVC piping system, the fitting will reduce the system specification.

Application Tips
- Note minimum process liquid conductivity requirement is 20 µs/cm.
- Install sensor using standard Signet installation fittings for best results.
- Sensor is capable of retrofitting into existing 515 and 2536 fittings.

Please refer to Wiring, Installation, and Accessories sections for more information.

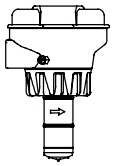
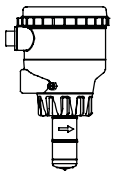
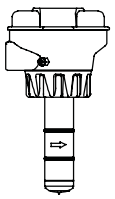
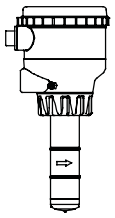
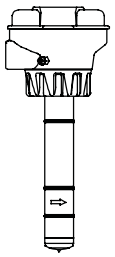
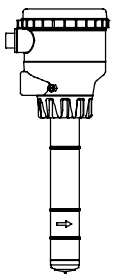
Ordering Information

Pipe Size	Mfr. Part No.	Code	Sensor Body
Frequency or Digital (S^3L) output programmable open collector for use with any Signet Flow Instrument or the 8900 or 9900 Instruments**			
DN15 to DN100 (½ to 4 in.)			
No Display			
	3-2551-P0-11	**159 001 105**	Polypropylene and 316L SS
	3-2551-T0-11	**159 001 108**	PVDF and Titanium
	3-2551-V0-11	**159 001 257**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P0-21	**159 001 267**	Polypropylene and 316L SS
	3-2551-T0-21	**159 001 436**	PVDF and Titanium
	3-2551-V0-21	**159 001 269**	PVDF and Hastelloy-C
with display			
	3-2551-P0-41	**159 001 261**	Polypropylene and 316L SS
	3-2551-T0-41	**159 001 433**	PVDF and Titanium
	3-2551-V0-41	**159 001 263**	PVDF and Hastelloy-C
DN125 to DN200 (5 to 8 in.)			
No Display			
	3-2551-P1-11	**159 001 106**	Polypropylene and 316L SS
	3-2551-T1-11	**159 001 109**	PVDF and Titanium
	3-2551-V1-11	**159 001 258**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P1-21	**159 001 268**	Polypropylene and 316L SS
	3-2551-T1-21	**159 001 437**	PVDF and Titanium
	3-2551-V1-21	**159 001 270**	PVDF and Hastelloy-C
with Display			
	3-2551-P1-41	**159 001 262**	Polypropylene and 316L SS
	3-2551-T1-41	**159 001 434**	PVDF and Titanium
	3-2551-V1-41	**159 001 264**	PVDF and Hastelloy-C
DN250 to DN900 (10 to 36 in.)			
No Display			
	3-2551-P2-11	**159 001 107**	Polypropylene and 316L SS
	3-2551-T2-11	**159 001 448**	PVDF and Titanium
	3-2551-V2-11	**159 001 450**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P2-21	**159 001 435**	Polypropylene and 316L SS
	3-2551-T2-21	**159 001 454**	PVDF and Titanium
	3-2551-V2-21	**159 001 456**	PVDF and Hastelloy-C
with Display			
	3-2551-P2-41	**159 001 432**	Polypropylene and 316L SS
	3-2551-T2-41	**159 001 460**	PVDF and Titanium
	3-2551-V2-41	**159 001 462**	PVDF and Hastelloy-C

**This option is a programmable open collector output that is available with display versions only.

Ordering Information (continued)

Pipe Size	Mfr. Part No.	Code	Sensor Body
4 to 20 mA output for use with PLC, PC or similar equipment			
DN15 to DN100 (½ to 4 in.)			
No Display			
	3-2551-P0-12	**159 001 110**	Polypropylene and 316L SS
	3-2551-T0-12	**159 001 113**	PVDF and Titanium
	3-2551-V0-12	**159 001 259**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P0-22	**159 001 273**	Polypropylene and 316L SS
	3-2551-T0-22	**159 001 439**	PVDF and Titanium
	3-2551-V0-22	**159 001 275**	PVDF and Hastelloy-C
with Display			
	3-2551-P0-42	**159 001 279**	Polypropylene and 316L SS
	3-2551-T0-42	**159 001 442**	PVDF and Titanium
	3-2551-V0-42	**159 001 281**	PVDF and Hastelloy-C
DN125 to DN200 (5 to 8 in.)			
No Display			
	3-2551-P1-12	**159 001 111**	Polypropylene and 316L SS
	3-2551-T1-12	**159 001 114**	PVDF and Titanium
	3-2551-V1-12	**159 001 260**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P1-22	**159 001 274**	Polypropylene and 316L SS
	3-2551-T1-22	**159 001 440**	PVDF and Titanium
	3-2551-V1-22	**159 001 276**	PVDF and Hastelloy-C
with Display			
	3-2551-P1-42	**159 001 280**	Polypropylene and 316L SS
	3-2551-T1-42	**159 001 443**	PVDF and Titanium
	3-2551-V1-42	**159 001 282**	PVDF and Hastelloy-C
DN250 to DN900 (10 to 36 in.)			
No Display			
	3-2551-P2-12	**159 001 112**	Polypropylene and 316L SS
	3-2551-T2-12	**159 001 449**	PVDF and Titanium
	3-2551-V2-12	**159 001 451**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P2-22	**159 001 438**	Polypropylene and 316L SS
	3-2551-T2-22	**159 001 455**	PVDF and Titanium
	3-2551-V2-22	**159 001 457**	PVDF and Hastelloy-C
with Display			
	3-2551-P2-42	**159 001 441**	Polypropylene and 316L SS
	3-2551-T2-42	**159 001 461**	PVDF and Titanium
	3-2551-V2-42	**159 001 463**	PVDF and Hastelloy-C

Accessories and Replacement Parts

Mfr. Part No.	Code	Description
O-Rings		
1220-0021	**198 801 000**	O-ring, FPM (2 required per sensor)
1224-0021	**198 820 006**	O-ring, EPR (EPDM) (2 required per sensor)
1228-0021	**198 820 007**	O-ring, FFPM (2 required per sensor)
Replacement Transducers		
3-2551-P0	**159 001 211**	PP/316L SS, DN15 to DN100 (½ to 4 in.) pipe
3-2551-P1	**159 001 212**	PP/316L SS, DN125 to DN200 (5 to 8 in.) pipe
3-2551-P2	**159 001 444**	PP/316L SS, DN250 to DN900 (10 to 36 in.) pipe
3-2551-T0	**159 001 213**	PVDF/Titanium, DN15 to DN100 (½ to 4 in.) pipe
3-2551-T1	**159 001 214**	PVDF/Titanium, DN125 to DN200 (5 to 8 in.) pipe
3-2551-T2	**159 001 445**	PVDF/Titanium, DN250 to DN900 (10 to 36 in.) pipe
3-2551-V0	**159 001 376**	PVDF/Hastelloy-C, DN15 to DN100 (½ to 4 in.) pipe
3-2551-V1	**159 001 377**	PVDF/Hastelloy-C, DN125 to DN200 (5 to 8 in.) pipe
3-2551-V2	**159 001 446**	PVDF/Hastelloy-C, DN250 to DN900 (10 to 36 in.) pipe
Replacement Electronics Module		
3-2551-11	**159 001 215**	Magmeter electronics, frequency or digital (S^3L) output
3-2551-12	**159 001 216**	Magmeter electronics, 4 to 20 mA output
3-2551-21	**159 001 372**	Magmeter display electronics, frequency or digital (S^3L) output, with relays
3-2551-22	**159 001 373**	Magmeter display electronics, 4 to 20 mA output w/relays
3-2551-41	**159 001 374**	Magmeter display electronics, frequency or digital (S^3L) output
3-2551-42	**159 001 375**	Magmeter display electronics, 4 to 20 mA output
Other		
P31536	**198 840 201**	Sensor plug, Polypropylene
7310-1024	**159 873 004**	24 VDC Power Supply, 0.42 A, 10W
7310-2024	**159 873 005**	24 VDC Power Supply, 1.0 A , 24W
7310-4024	**159 873 006**	24 VDC Power Supply, 1.7 A, 40W
7310-6024	**159 873 007**	24 VDC Power Supply, 2.5 A, 60W
7310-7024	**159 873 008**	24 VDC Power Supply, 4.0 A, 96W
3-8050.390-1	**159 001 702**	Retaining Nut Replacement Kit, NPT, Valox
3-8050.390-3	**159 310 116**	Retaining Nut Replacement Kit, NPT, PP
3-8050.390-4	**159 310 117**	Retaining Nut Replacement Kit, NPT, PVDF
3-8551.521	**159 001 378**	Clear plastic cap for display
1222-0042	**159 001 379**	O-ring for clear plastic cap, EPR (EPDM)
3-0250	**159 001 538**	USB to digital (S^3L) Configuration/Diagnostic tool

3-2551.099 Rev F (04/13)

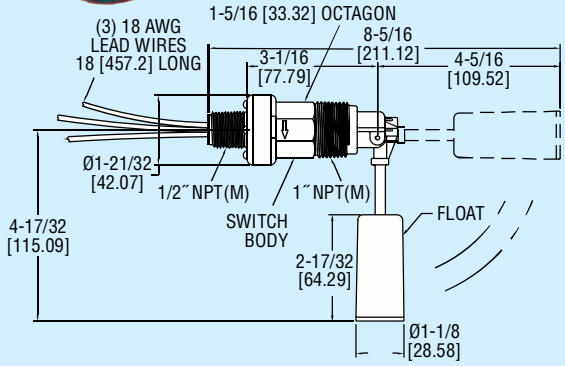
3401 Aero Jet Avenue, El Monte, CA 91731-2882 U.S.A. • Tel. (626) 571-2770 • Fax (626) 573-2057 • www.gfsignet.com • e-mail: signet.ps@georgfischer.com

Series L8

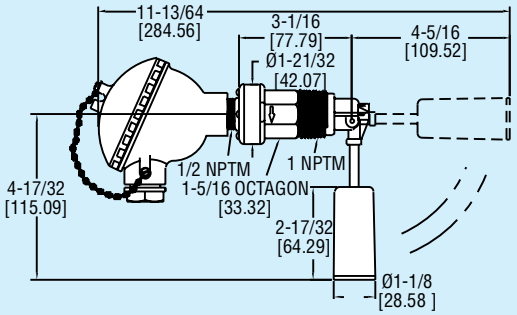
FLOTECT® Liquid Level Switch

Low Cost, Leak Proof Body, Excellent Chemical Resistance

L8



L8-WP2



Scan here to watch product video

Model L8 Flotect® Liquid Level Switch features a leak proof body and float constructed from tough, durable polyphenylene sulfide which has excellent chemical resistance. Because the liquid level snap switch is magnetically actuated, there is no direct mechanical linkage to leak or fail, assuring longer life and decreased maintenance costs. This inexpensive unit is ideal for liquid level alarm, indication or control. Installation is quick and easy—simply install in a horizontal position with the index arrow pointing down. The L8 Flotect® Liquid Level Switch is UL recognized as an industrial motor controller per UL standard 508, suitable for mounting in a protected environment. This lightweight switch can be used in numerous chemical processes, industrial systems and similar applications where process conditions are compatible with polyphenylene sulfide, ceramic 8 and 316 SS. This liquid level switch provides accurate setpoint control of liquids with specific gravities as low as 0.6. This compact and reliable control is designed to handle temperatures up to 212°F (100°C) and pressures to 150 psig (10 bar).

APPLICATIONS

The Model L8 Flotect® Liquid Level Switch is ideal for predetermined liquid levels in tanks through pump control or solenoid valve control. It provides excellent liquid level alarm or indication when combined with the Series AN14 Indicating Annunciator.

- Environmental control
- Chemical/Petroleum processing
- Waste water
- Plating and washing tanks
- Scrubber systems
- Sewage treatment
- Holding tanks
- Car washes
- Cooling towers
- Remediation systems

SPECIFICATIONS

Service: Compatible liquids.
Wetted Materials:
Float and body: Polyphenylene sulfide (PPS);
Pin and spring: 316 SS or Inconel®;
Magnet: Ceramic 8.
Temperature Limit: 212°F (100°C).
Pressure Limit: 150 psig (10.34 bar).
Enclosure Rating: General purpose. WP/WP2 option is weatherproof.
Switch Type: SPDT snap switch. MV option is a SPDT gold contact snap switch.
Electrical Rating: 5A @ 125/250 VAC, 5A resistive, 3A inductive @ 30 VDC. MV option: 1A @ 125 VAC, 1A resistive, 0.5A inductive @ 30 VDC.
Electrical Connections: 18 AWG, 18" (460 mm) long.
Conduit Connection: 1/2" male NPT, 1/2" female NPT on WP and WP2.
Process Connection: 1" male NPT.
Mounting Orientation: Horizontal with index arrow pointing down.
Weight: 5 oz (0.142 kg).
Agency Approvals: CE, cUR, UR.
Specific Gravity: 0.6 minimum.

Series L8, Level Switch

OPTIONS

Gold Plated Contacts, for dry circuits. Rated 1A @ 125 VAC; 1A resistive, 0.5A inductive @ 30 VDC. To order add suffix -MV.
Example: **L8-MV**
Inconel® Alloy Option. Inconel® Alloy replaces standard 316 SS wetted parts. Wetted parts are Inconel®Alloy, ceramic 8, and Polyphenylene Sulfide. To order add suffix -INC.
Example: **L8-INC**
Weatherproof Enclosure. Optional housing is phenylpolioxide and provides weatherproof protection for electrical wiring. To order add suffix -WP. (Not UL approved)
Example: **L8-WP**
Weatherproof Enclosure. Optional housing is aluminum and provides weatherproof protection for electrical wiring. To order add suffix -WP2. (Not UL approved)
Example: **L8-WP2**

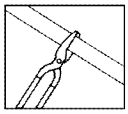
Project: National Grid - Former Clifton MGP Site

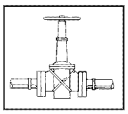
EnviroTrac Submittal #9 Heat Tracing Cut Sheets

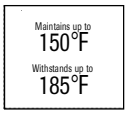
Submittal#	Description	Model #
9.1	Chromalox Self Regulating Heat Trace Cable	SRL5-2CR
9.2	Chromalox Heat Trace Monitor	DTS-HAZ

SRL

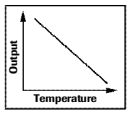
Self-Regulating Low Temperature Heating Cable


Cut to Any Length in Field


Can be Single Overlapped



Low Temperature



Self Regulating

- **Self-Regulating, Energy Efficient**
- **16 AWG Buss Wire**
- **Circuit Lengths to 660 Feet**
- **Process Temperature Maintenance to 150°F (65°C)**
- **Maximum Continuous Exposure Temperature (Power Off) 185°F (85°C)**
- **Industrial Freeze Protection Applications**
- **Freeze Protection of Fire Protection System Piping**
- **Field Splicing Without Disrupting Heat Output**
- **3, 5, 8 and 10 Watts per Foot**
- **120 and 208-277 Volts Available From Stock**
- **Approximate Size 3/8" x 1/8"**
- **Minimum Bend Radius is 1-1/8"**

UL ◀FM▶ CSA

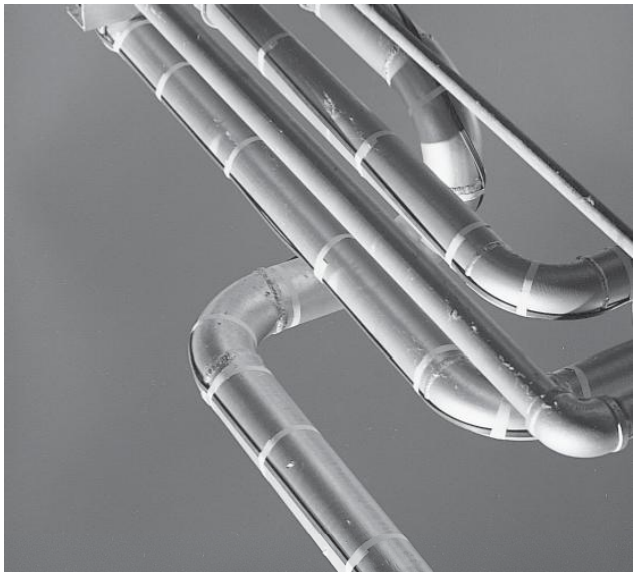
Chromalox®
PRECISION HEAT AND CONTROL

Description

Chromalox SRL self-regulating heating cable provides safe, reliable heat tracing for freeze protection of pipes, valves, tanks and similar applications. Constructed of industrial grade 16 AWG buss wire with a tinned copper braid and optional overjacketing, SRL ensures operating integrity in Div. 2 hazardous environments as well as certain corrosive industrial environments. SRL heating cable has a maximum maintenance temperature rating of 150°F (65°C).

Features

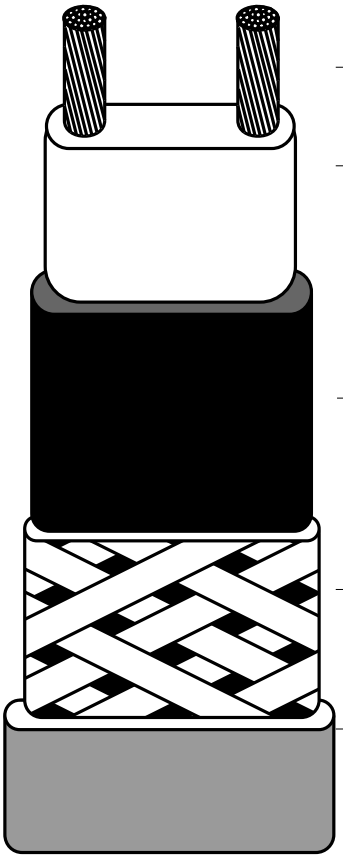
- Energy efficient, self-regulating SRL uses less energy when less heat is required.
- Easy to install, SRL can be cut to any length (up to maximum circuit length) in the field.
- Field splices can be performed easily in minutes with no scrap or wasted cold sections.
- SRL features lower installed cost than steam tracing, less maintenance expense, and less downtime.
- SRL can be single overlapped without burnout, which simplifies heat tracing of in-line process equipment such as valves, elbows and pumps.
- Because SRL is self-regulating, overtemperature conditions are virtually impossible.
- Chromalox termination, splice, tee and end seal kits reduce installation time.
- UL listed for use on fire protection System piping



PH: 1-888-996-9258 • FX: 615-793-3563

SRL — Self-Regulating Low Temperature Heating Cable

Construction



Twin 16 AWG Copper Buss Wires ..... Provide reliable electrical current capability.

Semiconductive Polymer Core Matrix ..... "Self-Regulating" component of the cable, its electrical resistance varies with temperature. As process temperature drops, the core's heat output increases; as process temperature rises, the heat output decreases.

Water Resistant Polyolefin Jacket ..... Flame retardant, electrically insulates the matrix and buss wires and provides resistance to water and some inorganic chemical solutions.

Tinned Copper Braid ..... Provides additional mechanical protection in any environment, and a positive ground path.

High Temperature Fluoropolymer or TPR Overjacket (Optional) ..... Corrosion resistant, flame retardant overjacket is highly effective in many environments. TPR coatings protect against certain inorganic chemical solutions. Fluoropolymer coatings are used for exposure to organic or corrosive solutions. These coatings also protect against abrasion and impact damage.

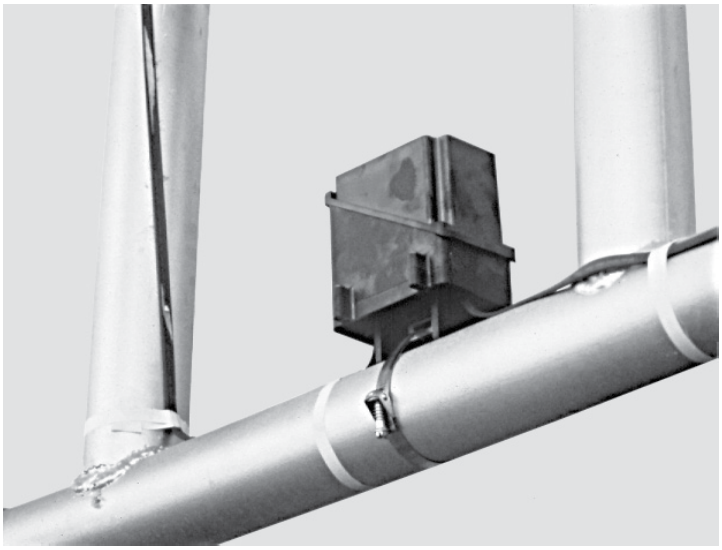
Approvals

FM – Factory Mutual approved for ordinary areas.
UL Listed, CSA Certified for ordinary areas.
UL Listed for fire protection system piping
FM approved for hazardous (classified) areas when used with Chromalox accessories:

- Class I, Div. 2, Groups B, C, D (gases, vapors)
- Class II, Div. 2, Groups F, G (combustible dust)
- Class III, Div. 2 (easily ignitable fibers and filings)
- 3 Watt rated T6 temperature class
- 5 and 8 Watt rated T5 temperature class
- 10 Watt rated T4A temperature class

CSA Certified for hazardous (classified) areas when used with Chromalox accessories:

- Class I, Div. 2, Groups A, B, C, D;
- Class II, Div. 2, Groups F, G



Applications

- Process Temperature Maintenance
- Freeze Protection of Pipes
- Freeze Protection of Fire Protection System Piping
- Fluid Flow and Viscosity Maintenance

Heating Cable System Design

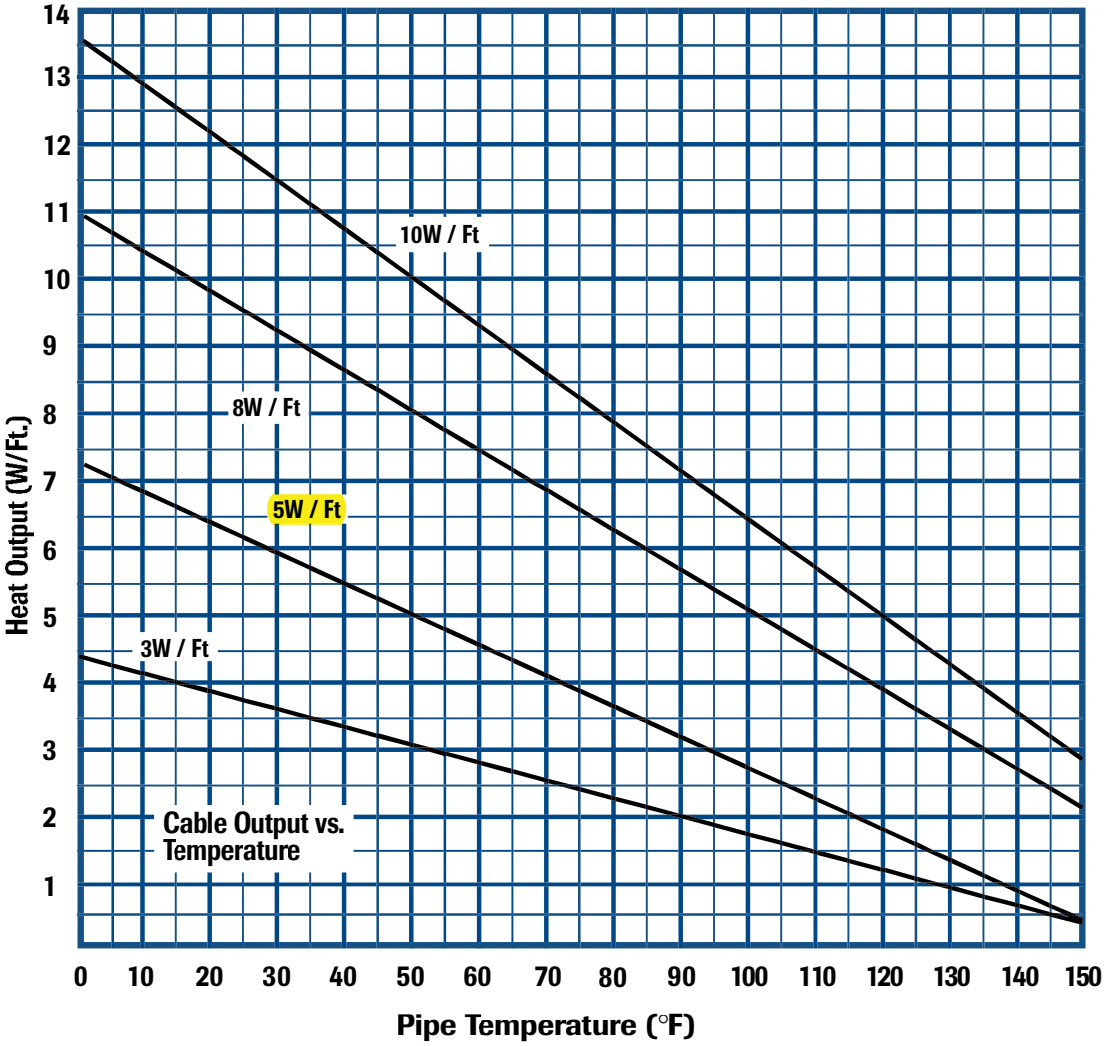
1. Calculate Heat Loss

Using the Chromalox Design Guide (PJ 304) for Heat Tracing, calculate the heat loss of the system. To calculate the heat loss (Watts) you will need to know pipe diameter, insulation type and thickness, minimum ambient temperature and the pipe maintenance temperature.

2. Select Cable Rating

After calculating the heat loss in the pipe and adjusting for any application deviations, you may determine which cable rating to choose. Using the SRL Thermal Output Ratings graph, select the lowest cable rating that will provide the pipe maintenance temperature. Adjust the cable output for line voltage if necessary. See figures from output wattage at alternative voltages table on page 5.

Thermal Output Ratings On Insulated Metal Pipe



3. Determine Total Cable Length

In addition to the system piping, in-line equipment such as valves, flanges and pipe supports require additional heat tracing to maintain the system operating temperatures.

Total feet of traced pipe + Cable allowance for components = Total cable length

Component Cable Allowances

Component	Cable Allowance (Ft.)		# of Components		Total Additional Cable
Flange Pair	1.5	x	_____	=	_____
Pipe Support	2.0	x	_____	=	_____
Butterfly Valve	2.5	x	_____	=	_____
Ball Valve	2.7	x	_____	=	_____
Globe Valve	4.0	x	_____	=	_____
Gate Valve	5.0	x	_____	=	_____

If spiral wrapping or multiple runs of cable are being used, adjust the allowance by multiplying by the wrapping factor or the number of runs being used on the pipe.
Guidelines for tracing tanks and vessels are also given in the Chromalox Design Guide (PJ304).

4. Determine Circuits/Circuit Protection

Circuit protection depends on the breaker size being used and the start-up temperature. The National Electric Code (NEC 1999) requires the use of ground fault protection breakers for heating cable. The following chart shows the maximum circuit length for a given breaker rating. To determine the number of circuits required for each pipe, divide the total cable (circuit) length found in Step 3 by the maximum circuit length found in the chart. Round up to the next higher number.

$$\textit{Number of Circuits} = \frac{\textit{Heater Length}}{\textit{Maximum Circuit Length}}$$

Maximum Circuit Length (Ft.) by Start-up Temperature (°F) and Breaker Size (Amps)

Cable Rating	50°F Start-Up (Ft.) Circuit Breaker	10 A	15 A	20 A	25 A	30 A	40 A	0°F Start-Up (Ft.) Circuit Breaker	10 A	15 A	20 A	25 A	30 A	40 A	-20°F Start-Up (Ft.) Circuit Breaker	10 A	15 A	20 A	25 A	30 A	40 A
SRL3-1C		205	305	360	NR	NR	NR		135	200	270	330	360	NR		120	185	245	300	360	NR
SRL3-2C		400	600	660	NR	NR	NR		275	415	555	660	NR	NR		245	370	495	600	660	NR
SRL5-1C		125	185	250	270	NR	NR		90	135	180	225	270	NR		80	120	160	205	245	270
SRL5-2C		250	375	505	540	NR	NR		180	270	360	450	540	NR		160	245	325	405	490	540
SRL8-1C		100	150	200	215	NR	NR		70	110	145	180	215	NR		65	100	130	165	200	210
SRL8-2C		185	285	375	420	NR	NR		135	200	265	335	395	420		120	175	235	300	350	420
SRL10-1C		60	95	130	160	180	NR		50	80	105	130	155	180		45	70	95	120	140	180
SRL10-2C		100	160	210	260	315	360		80	125	170	210	255	340		75	120	160	195	240	320

*Thermal magnetic circuit breakers are recommended since magnetic circuit breakers could "nuisance trip" at low temperature.
NR = Not Required. Maximum circuit length has been reached in a smaller breaker size.

Self-Regulating Low Temperature Heating Cable – SRL

Specifications

Cable Ratings

Model Number	Output @ 50°F (W/Ft.)	Nominal Voltage (Vac)	Maximum Circuit Length* (Ft.)
SRL3-1C	3	120	360
SRL3-2C	3	208-277	660
SRL5-1C	5	120	270
SRL5-2C	5	208-277	540
SRL8-1C	8	120	215
SRL8-2C	8	208-277	420
SRL10-1C	10	120	180
SRL10-2C	10	208-277	360

*See chart on page 4 for maximum circuit lengths by start-up temperature and circuit breaker size

Output Wattage at Alternate Voltages (50°F) W/Ft.

Cable Rating	208 Volts	% Change In Output	220 Volts	% Change In Output	277 Volts	% Change In Output
SRL3	2.4	-20	2.6	-13	3.4	+15
SRL5	4.1	-18	4.5	-10	5.6	+13
SRL8	6.88	-14	7.28	-9	8.96	+12
SRL10	8.7	-13	9.2	-8	11.1	+10

Ordering Information

Output (W/Ft.)	Voltage (Vac)	Model Number	PCN
3	120	SRL3 - 1C	382678
		SRL3 - 1CR	382731
		SRL3 - 1CT	383400
	208-277	SRL3 - 2C	382686
		SRL3 - 2CR	382740
		SRL3 - 2CT	383419
5	120	SRL5 - 1C	382694
		SRL5 - 1CR	382758
		SRL5 - 1CT	383443
	208-277	SRL5 - 2C	382707
		SRL5 - 2CR	382766
		SRL5 - 2CT	383451

Output (W/Ft.)	Voltage (Vac)	Model Number	PCN
8	120	SRL8 - 1C	382555
		SRL8 - 1CR	382598
		SRL8 - 1CT	383460
	208-277	SRL8 - 2C	382563
		SRL8 - 2CR	382600
		SRL8 - 2CT	383478
10	120	SRL10 - 1C	382820
		SRL10 - 1CR	382846
		SRL10 - 1CT	383486
	208-277	SRL10 - 2C	382838
		SRL10 - 2CR	382854
		SRL10 - 2CT	383494

To Order: Specify length, Model Number, PCN and Installation Accessories.

SRL — Self-Regulating Low Temperature Heating Cable

Model Numbers

SRL **5** **-** **1** **C** **T**

SRL
Self-Regulating, Low Temperature Heating Cable

Output (watts)
3, 5, 8, 10 Watts per Foot

Voltage
1 = 120 Volts
2 = 208-277 Volts

Braid
C = Standard tinned-copper metallic braid for ground path

Overcoat Options
T = Fluoropolymer corrosion resistant overjacket over braid for hostile/ corrosive environments
R = TPR overjacket over braid for protection against certain inorganic chemical solutions

Accessories

Chromalox has a complete line of accessories specifically designed for use with SRL cable. Use only Chromalox accessories to ensure the performance of the heat trace system.

	Model	Description
Thermostat	RTAS	DL Series air-sensing thermostat with Microswitch® for local control of circuit.
	RTBC	DL Series pipewall-sensing thermostat with Microswitch® for local control of circuit.
Power Connection	RTPC	DL Series power connection set kit.
	RTST	DL Series splice and tee set kit.
	RTES	DL Series end seal kit.
Pipe Straps	PS-1, PS-3, PS-10	Pipe straps to affix thermostat and power connection splice kits to pipes.
Fiberglass Tape	FT-2	Tape to affix cable to pipe, 66' x 1/2" roll, install on 12" centers.
Aluminum Tape	AT-1	Tape to aid heat transfer, 180 foot roll. Apply over cable along entire length of circuit.
Caution Labels	CL-1	“Electrical Heat Tracing” caution labels, 5 per package. Install every 10 feet.
Control Panels		Contact your Chromalox representative for Control Panel information.

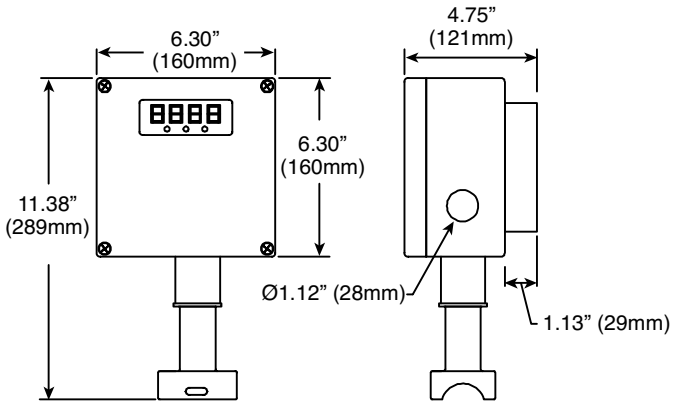
Note – For PCN's, refer to the DL Series connection system accessories product data sheet.

PJ320-2
PDS SRL
APRIL 04

DTS Series

Heat Trace Digital Thermostat

- 30 Amp Solid State Relay (SSR) Output
- On/Off Control With 100 Degree Deadband Programmable In One Degree Increments
- Selectable Soft-Start Feature – Eliminates SR Cable In-Rush
- LED Indication for Power, Alarm and Load
- Large LED Display for Process Variables
- Programmable High & Low Temperature Alarms
- Solid State Alarm for Remote Indication of Alarm Status –
  - AC Alarm: DTS-HAZ
  - DC Alarm: DTS-HAZ-DC
- NEMA 4X Enclosure
- Integral Pipe Stand
- 100 Ohm Platinum RTD - Included
- Enclosure Serves as Heating Cable, A/C Power & Sensor Connection
- Works with SR, CWM and MI Cable
- 100 to 277 VAC Operation
- RoHS Compliant
- UL, cUL Listed, CE Approved
- C1D2 Hazardous Area Approval
- IECEx/ATEX Zone II
- Optional Wall Mount



Description

The DTS-HAZ digital thermostat is a microprocessor based temperature control and power connection kit. It is used for freeze protection or process temperature maintenance of pipes or tanks protected by heat tracing products. This thermostat can be used with Constant Wattage, Mineral Insulated or Self-Regulating heating cables in Ordinary area or Class 1, Division 2 and IECEx/ATEX Zone II hazardous area locations.

This unit is designed to provide local temperature control and monitoring for heat traced pipes or tanks across a variety of industries and applications and will switch 30 amperes of current.

The DTS-HAZ provides easy programming of the temperature set point, high and low temperature alarms, the deadband, the temperature units, the soft start function and the alarm state through the front panel push buttons. LED lights are provided for indication of power to the unit, heater power on (load) and alarm status. A Fail Safe solid state alarm is included for wiring to your building management system to indicate alarm status. This alarm may be set to open or close on all alarm conditions including loss of power, high or low temperature alarm and RTD failure. The loss of power indication qualifies this unit to be used to sense temperature and control heat trace when used in fire protection systems. Choose either the DC or the AC customer supplied voltage alarm variation. The minimum operating ambient temperature is -40°F (-40°C). This unit has programmable high and low temperature alarm set points from -80°F (-62°C) to 1150°F (621°C).

The DTS-HAZ employs a Soft Start feature that uses a proprietary software algorithm which eliminates the inherent self-regulating in-rush current, resulting in less nuisance tripping at cold temperatures. For added flexibility, the user may disable the soft start feature for non-heat trace applications. The alarm contact may be either normally open or normally closed.

A 100 Ohm platinum RTD is provided with a 3 foot (1 M) lead resulting in flexible mounting options for the user.

DTS Series
Heat Trace Digital Thermostat *(cont'd.)*

PCN	Model
387364	DTS-HAZ
316187	DTS-HAZ-DC

Accessories

PCN	Model
318043	DTS Wall Mount Kit
308144	RTD Extension Wire (50 ft/15m)

Applications

- Freeze Protection of Piping
- Process Temperature Maintenance
- Tank Freeze Protection
- Tank Process Temperature Maintenance

Environments

- Hazardous Areas, Class I, Div 2, Groups A,B,C,D – Temperature Rating: T4A
- IECEx/ATEX Zone II, Temperature Rating: T4

Sensors

- 100 OHM PT RTD
- Probe Length = 4" (10.2 cm)
- Probe Diameter = 1/4" (6.35 mm)
- Leadwire Length = 3ft (1 M)*

* The maximum allowable length of the RTD wire is 50ft (15m) in order to remain UL/cUL compliant.

Markets

- Agriculture
- Alternative Fuels
- Chemical Processing
- Food Processing
- Oil / Gas
- Pharmaceutical
- Power Generation
- Water Treatment
- Building and Construction
- Transportation
- HVAC/Refrigeration

Features

- User Selectable Soft-Start Program
- Small Enclosure. The 6.25 inch by 6.25 inch enclosure houses the temperature control and monitoring unit along with terminals for connecting instrument power, heating cable and RTD.
- 100 Ohm platinum RTD which can be pipe mounted or can be used to sense ambient air temperature.
- Pipe stand-off mount for direct pipe mounting.
- Integral wiring. The wiring of the heating cable, alarm, AC power line and the RTD sensor are all accomplished within the enclosure. This feature reduces both labor and material costs by eliminating the need for an additional heat trace power connection kit as well as the time for the additional wiring.

Specifications

Operating Voltage	100 to 277 VAC, 50/60 Hz, Single Phase
Operating Temperature	
- Hazardous Areas	-40°F to 104°F (-40°C to 40°C)
- Ordinary Areas	-40°F to 140°F (-40°C to 60°C)
Input	100 Ohm platinum RTD
Output	30 amp solid state relay
Alarms	High temp to 1150°F (621°C) Low temp to -80°F (-62°C) RTD Failure Red LED alarm status indicator on front panel
Solid State Alarm Rating - AC	12-277 VAC, 1.8 Amps RMS - Customer Supplied
Solid State Alarm Rating - DC	0-42 Vdc, 1.8 Amps RMS- Customer Supplied

Alarm Function:

Mode	Default	Optional
Normal Operation	Closed	Open
Alarm Condition	Open	Closed
Power Off	Open	Open

Deadband	1°F (or °C) to 100°F (or °C), programmable
Set Points	-80°F to 1100°F programmable (-62°C to 593°C)
Units of Temperature	°F or °C, selectable
Control Mode	On/Off control
Soft Start	User selectable integral soft start, patent pending software algorithm, which eliminates nuisance breaker tripping associated with self-regulating cable in-rush

Current Approvals

- CE, UL, cUL Listed
- Ordinary Areas
- Hazardous Area
- Class I, Div. 2 – Groups A, B, C, D
- ATEX/IECEx Zone II (Ex nA IIC)

Approvals Pending

- GOST

HEAT TRACING PRODUCTS

Submittal #8.1 Brief Description of the System Including a Control Logic Report/ Loop Description

Groundwater Pump and Treat System Description –

Groundwater is to be pumped from recovery well COU1-RWA with a ½-HP piston bump (Blackhawk model Anchor 101E) into a 10-gpm rated oil/water separator (ESD/W2W #OWS-10). A ½-HP centrifugal transfer pump (Goulds #1MC1C5E0) will pump the water from the separator through two (2) bag filters (Pentek #156110-75), three (3) 250-lb carbon vessels (ESD/W2W #LLPS-250), one cartridge filter (Pentek #150233), and into the SPDES permitted discharge line.

The system is to be constructed inside a standard 20-ft shipping container that has been framed out with 2"x3" studs and ½"-plywood sheeting, and R-11 fiberglass insulation. The container will be equipped with lights, heating, ventilation, and a secondary containment sump beneath the water carrying components of the system.

A main PLC based control panel will be used to monitor/control the system components. The control panel will have remote monitoring capabilities and will send notification of alarm conditions.

Refer to FIG-1 P&ID for more details and the control interlock/alarm schedule.

Submittal#8.4.4

Pump, Centrifugal, 1/2hp

GOULDS WATER TECHNOLOGY

How can we improve our Product Images?

Compare

Price
$653.85 / each

Deliver one time only

Auto-Reorder Every 1 Month

1 Add to Cart

+Add to list

Availability for Qty 1 Go

Shipping Pick Up

Expected to arrive **Fri. Mar 13**

Ship to: **11710** (Change)

Add Repair & Replacement Coverage for $129.00 each.

Be the first to write a review | Ask & Answer

Item # **4XW72** Mfr. Model # **1MC1C5E0** UNSPSC # **40151503**

Catalog Page # **3715** Shipping Weight **36.0 lbs.**

Country of Origin **USA** | *Country of Origin is subject to change.*

Note: Product availability is real-time updated and adjusted continuously. The product will be reserved for you when you complete your order. More

Technical Specs

Item	Centrifugal Pump
HP	1/2
Phase	3
Voltage	208-230/460
Amps	2.7-2.6/1.3
Duty	Continuous
Inlet	1-1/4" NPT
Outlet	1" NPT
Motor Enclosure	TEFC
NEMA/IEC Frame	48
Service Factor	1.15
Wetted Materials	ANSI 316L Stainless Steel,Carbon,Ceramic,Buna N
Impeller Material	ANSI 316L Stainless Steel
Housing Material	Cast Iron
Volute Material	ANSI 316L Stainless Steel
Shaft Material	300 Stainless Steel
Screw Material	316L Stainless Steel

Port Rotation	Top
Drain Plug	3/8"
Manufacturers Warranty Length	1 yr.
Best Efficiency GPM @ Head	29 gpm @ 52 ft.
Best Efficiency Range GPM @ Head	18-40 gpm @ 62-35 ft.
Impeller Dia.	4-7/16"
Inlet Pressure	50 psi
Max. Dia. Solids	1/16"
Max. GPM @ Head	44 gpm @ 25 ft.
Max. Head	71 ft.
Max. Liquid Temp.	212 Degrees F
Max. Pressure	75 psi
Min. GPM @ Head	10 gpm @ 68 ft.
RPM	3500
Shaft Size	5/8"
Height	10-3/4"

Seal Type	**Type 6**
Seal Material	**Standard, Carbon Ceramic Faces, Buna Elastomer and Stainless Steel Parts**
Seal Application	**Water**
Max. Specific Gravity	**1.0**
Max. Fluid Viscosity	**40 SSU**
Impeller Type	**Closed**

Length	**18-5/8"**
Width	**8-1/2"**
GPM of Water @ 30 Ft. of Head	**44**
GPM of Water @ 40 Ft. of Head	**36**
GPM of Water @ 50 Ft. of Head	**30**
GPM of Water @ 60 Ft. of Head	**20**

Transfer Pump (P-02) Model #1MC1C5E0

TECHNICAL BROCHURE
BMCC

MCC

END SUCTION CENTRIFUGAL PUMPS
BOMBAS CENTRÍFUGAS DE SUCCIÓN FINAL SERIE MCC

GOULDS
WATER TECHNOLOGY
a xylem brand

A Full Range of Product Features
Un producto con una amplia gama de características

Superior Materials of Construction: AISI 316L stainless steel impeller and seal housing for corrosion resistance, and improved strength and ductility. Cast iron casing for strength and durability.

High Efficiency Impeller: Enclosed impeller in 316L stainless steel maintains maximum efficiencies over the life of the pump without adjustment.

Casing: Cast iron construction with NPT threaded, centerline connections, easily accessible vent, prime and drain connections. Nine position casing rotation for easy piping.

Mechanical Seal: Standard John Crane seal with carbon ceramic faces, BUNA elastomers, and stainless metal parts. Optional high temperature and chemical duty seals available.

Motors: NEMA standard open drip- proof, totally enclosed fan cooled enclosures. Rugged ball bearing design for continuous duty under all operating conditions.

Materiales de construcción superiores: impulsor y caja de sello de acero inoxidable AISI 316L para mayor resistencia a la corrosión y más solidez y ductilidad. Carcasa de hierro fundido para mayor solidez y durabilidad.

Impulsor de alta eficiencia: impulsor encerrado en acero inoxidable 316L mantiene una eficiencia máxima durante toda la vida útil de la bomba sin requerir ajuste.

Carcasa: construcción de hierro fundido con conexiones de línea central NPT roscadas, orificio de ventilación fácilmente accesible, conexiones de purga y drenaje. Nueve posiciones de rotación de la carcasa para facilitar la conexión de las tuberías.

Sello mecánico: sello John Crane estándar con superficies cerámicas de carbón, elastómeros BUNA y piezas metálicas de acero inoxidable. Sellos opcionales para alta temperatura y para aplicaciones químicas disponibles.

Motores: Gabinetes NEMA estándar a prueba de goteo abierto, totalmente encerrados, enfriados por ventilador. Diseño de rodamientos resistentes para un servicio continuo bajo todas las condiciones de funcionamiento.

The various versions of the MCC are identified by a product code number on the pump label. This number is also the catalog number for the pump. The meaning of each digit in the product code number is shown at right.

Las diferentes versiones de la MCC se identifican con un número de código de producto en la etiqueta de la bomba. Este número es también el número de catálogo de la bomba. El significado de cada dígito en el código del producto se muestra a la derecha.

MCC Product Line Numbering System
Sistema de numeración de la línea de productos MCC

Example Product Code,
Ejemplo código del producto

1 MC 1 C 1 E 0

Mechanical Seal and O-ring
0 = Pre-engineered standard
For optional mechanical seal modify catalog order no. with seal code listed below.

Sello mecánico y anillo 'O'
0 = Estándar aprobado
Para sello mecánico opcional modificar el número de orden del catálogo con el código del sello según la siguiente tabla.

Mechanical Seal (⅝" seal), *Sello Mecánico (sello de ⅝")*					
Seal Code, *Código del Sello*	Rotary, *Rotativo*	Stationary, *Estacionario*	Elastomers, *Elastómeros*	Metal Parts, *Partes Metálicas*	Part No., *Pieza Número*
0	Carbon	Ceramic, *Cerámica*	BUNA	18-8 SS	10K10
2		Sil-Carbide, *Carburo de silicona*	EPR	Type 316 SS *Tipo 316 SS*	10K18
4			Viton		10K55*
5	Sil-Carbide, *Carburo de silicona*		EPR		10K81
6			Viton		10K62

Note: * replaces obsolete 10K24,
*Nota: * reemplace la obsoleta 10K24.*

Impeller Option Code
Código del Impulsor Opcional

Impeller Code, *Código del Impulsor*	Pump Size, *Tamaño de la Bomba* 1MC 1 x 1¼ – 6 Diameter	2MC 1¼ x 1½ – 6 Diameter	3MC 1½ x 2 – 6 Diameter
K	–	6⅛	–
G	–	5 15/16	5⅜
H	–	5½	5
A	6⅛	5¼	4¾
B	5¾	5 1/16	4⅝
C	5 3/16	4⅞	4⅜
D	4¾	4⅝	4 1/16
E	4 7/16	4¼	3⅝
F	4 1/16	3⅞	–

Driver, *Motor*
1 = 1 PH, ODP
2 = 3 PH, ODP
3 = 3 PH, 575V ODP
4 = 1 PH, TEFC
5 = 3 PH, TEFC
6 = 3 PH, 575V TEFC

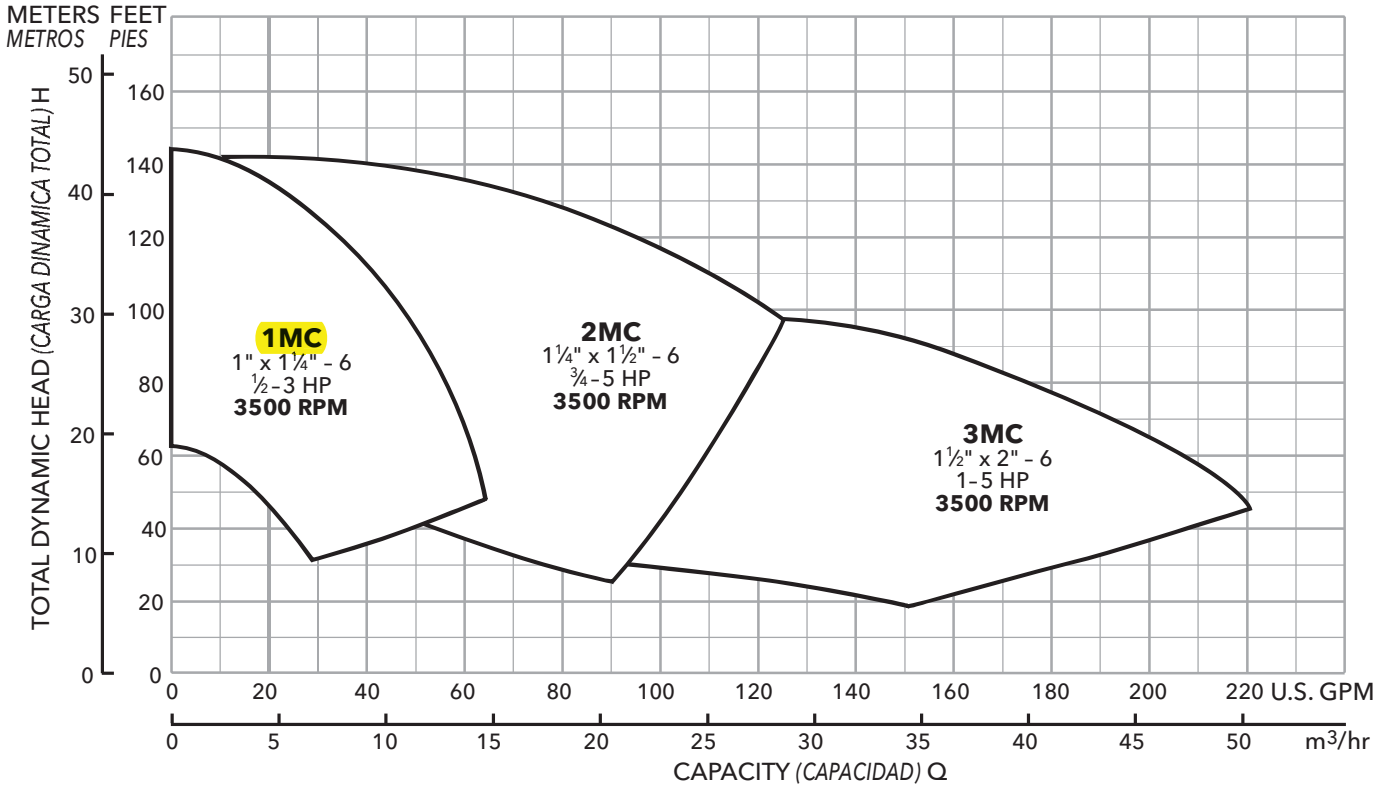
HP Rating, *Capacidad en HP*
C = ½ HP E = 1 HP G = 2 HP J = 5 HP
D = ¾ HP F = 1½ HP H = 3 HP

Driver: Hertz/Pole/RPM,
Motor: Hercios/Polo/RPM
1 = 60 Hz, 2 pole, 3500 RPM
4 = 50 Hz, 2 pole, 2900 RPM

Material
MC = Cast iron, *Hierro fundido*

Pump Size, *Tamaño de la bomba*
1 = 1 x 1¼ – 6 2 = 1¼ x 1½ – 6 3 = 1½ x 2 – 6

Performance Coverage (60 Hz)
Rango de operación (60 Hz)



NOTES:
Not recommended for operation beyond printed H-Q curve.

For critical application conditions consult factory.

Not all combinations of motor, impeller and seal options are available for every pump model. Please check with Goulds Water Technology on non-cataloged numbers.

All standard 3500 RPM ODP and TEFC motors supplied by Goulds Water Technology, have minimum of 1.15 service factor. Standard catalog units may utilize available service factor.

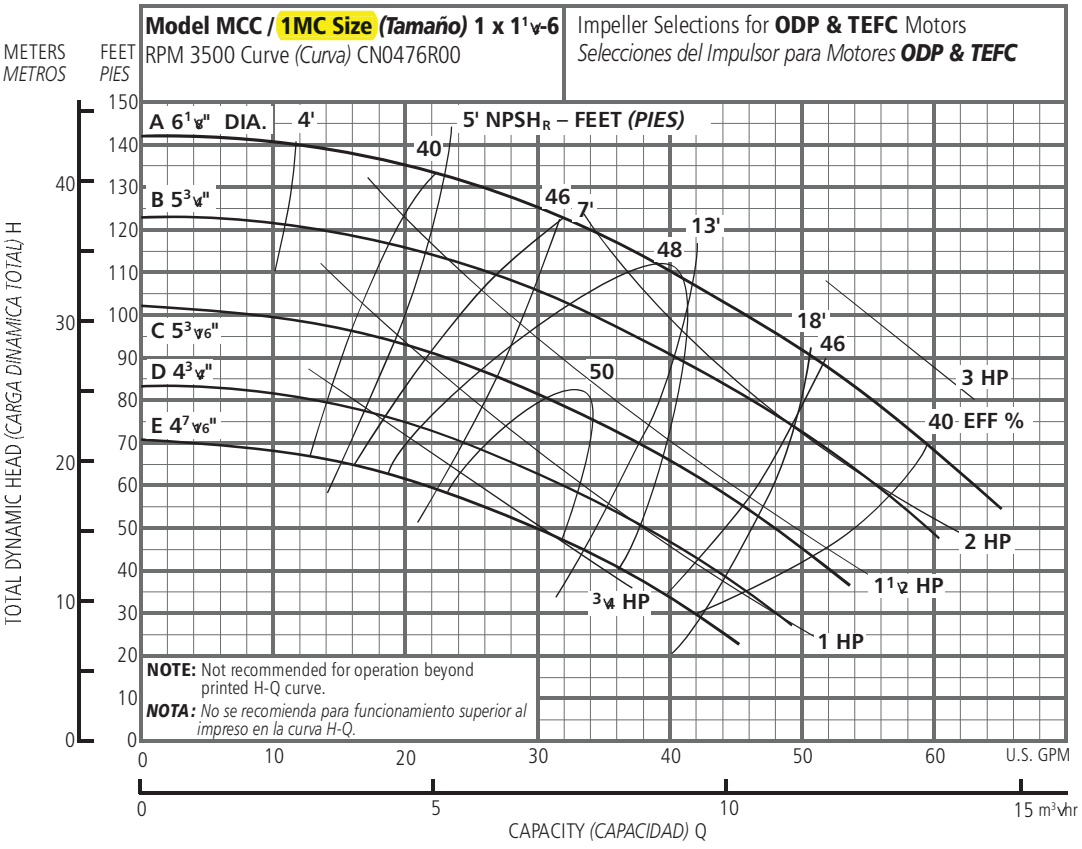
NOTAS:
No se recomienda para funcionamiento superior al indicado en la curva H-Q.

Para condiciones de aplicaciones críticas consultar con la fábrica.

No todas las combinaciones de motor, impulsor y sellos se encuentran disponibles para todos los modelos de bomba. Por favor consultar con Goulds Water Technology sobre los números no catalogados.

Todos los motores estándar de 3500 RPM, ODP (abiertos resguardados) y TEFC (totalmente encerrados con enfriamiento forzado) provistos por Goulds Water Technology tienen un factor mínimo de servicio de 1,15. Las unidades estándar de catálogo pueden utilizar el factor de servicio disponible.

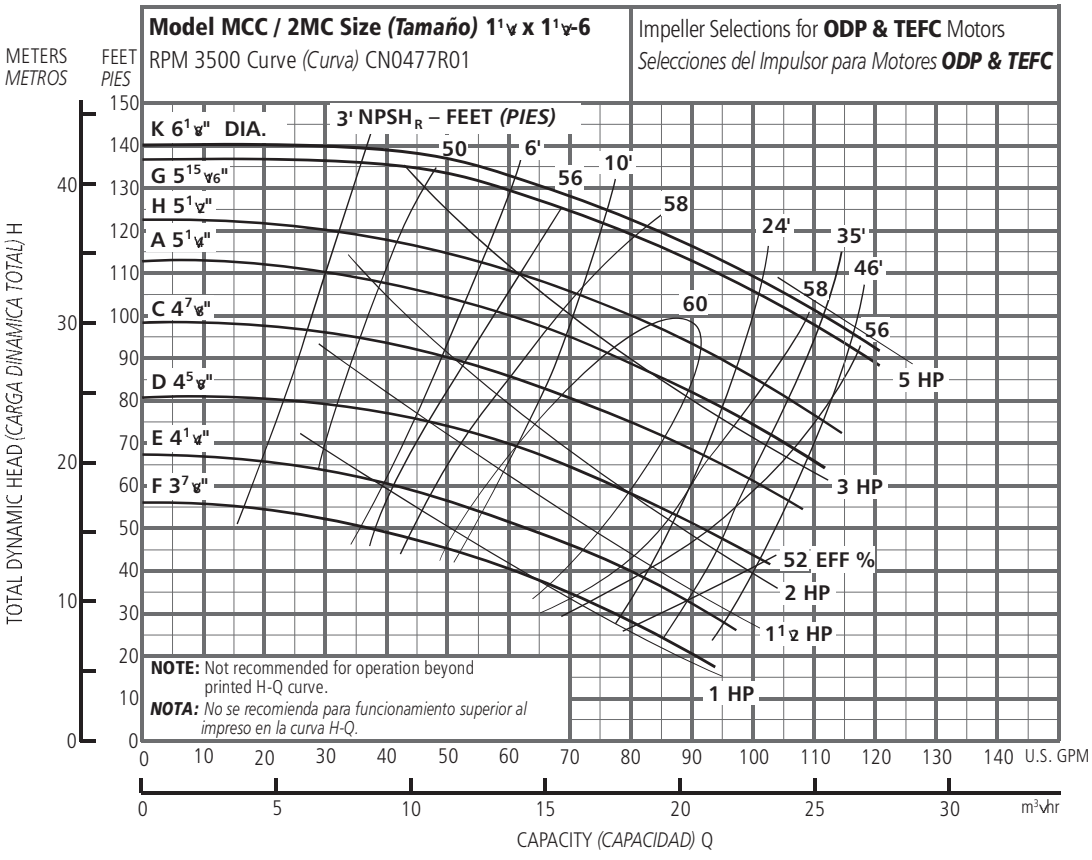
Performance Curves – 60 Hz, 3500 RPM
Curvas de desempeño – 60 Hz, 3500 RPM



Ordering Code, *Código de Pedido*	Standard HP Rating, *Capacidad HP estándar*	Imp. Dia.
E	½	4 7/16
D	¾	4¾
C	1	5 3/16
B	1½	5¾
A	2	6⅛

NOTE: Although not recommended, the pump may pass a 1/16" sphere.

NOTA: Si bien no se recomienda, la bomba puede pasar una esfera de 1/16".



Ordering Code, *Código de Pedido*	Standard HP Rating, *Capacidad HP estándar*	Imp. Dia.
F	¾	3⅞"
E	1	4¼
D	2	4⅝
C	3	4⅞
A	3	5¼
H	5	5½
G	5	5 15/16
K	5	6⅛

NOTE: Although not recommended, the pump may pass a 3/16" sphere.

NOTA: Si bien no se recomienda, la bomba puede pasar una esfera de 3/16".

Signet 2551 Magmeter Flow Sensor

Magnetic Flow Meter/Transmitter (FIT-119) #3-2551-P0-41

Submittal#8.4.11

Available in a variety of wetted materials and ideal for pipe sizes up to DN900 (36 in.)

The Signet 2551 Magmeter is an insertion style magnetic flow sensor that features no moving parts. The patented* sensor design is available in corrosion-resistant materials to provide long-term reliability with minimal maintenance costs. Material options include PP with stainless steel, PVDF with Hastelloy-C, or PVDF with Titanium. Utilizing the comprehensive line of Signet installation fittings, sensor alignment and insertion depth is automatic. These versatile, simple-to-install sensors deliver accurate flow measurement over a wide dynamic range in pipe sizes ranging from DN15 to DN900 (½ to 36 inches), satisfying the requirements of many diverse applications.

Signet 2551 Magmeters offer many output options of frequency/digital (S^3L) or 4 to 20 mA which are available on both the blind and display versions. The frequency or digital (S^3L) sensor output can be used with Signet's extensive line of flow instruments while the 4 to 20 mA output can be used for a direct input to PLCs, chart recorders, etc. Both the 4 to 20 mA output and digital (S^3L) sensor interface is available for long distance signal transmission. An additional benefit is the empty pipe detection which features a zero flow output when the sensors are not completely wetted. Also, the frequency output is bi-directional while the 4 to 20 mA output can be set for uni- or bi-directional flow using the display or the 3-0250 USB to Digital (S^3L) Configuration/Diagnostic setup tool which connects to PCs for programming capabilities.

In addition the display version of the 2551 Magmeter is available with relays and features permanent and resettable totalizer values which can be stored and seen on the display. Also, the display contains multi-languages with English, Spanish, German, French, Italian and Portuguese menu options.

Features

- **Test certificate included for -X0, -X1**
- **Patented Magmeter technology***
- **No moving parts**
- **Bi-directional flow**
- **Empty pipe detection**
- **Installs into pipe sizes DN15 to DN900 (0.5 to 36 in.)**
- **Operating range 0.05 to 10 m/s (0.15 to 33 ft/s)**
- **Accurate measurement even in dirty liquids**
- **Polypropylene or PVDF retaining nuts**
- **Blind 4 to 20 mA, digital (S^3L), frequency, relay output**
- **No pressure drop**
- **Corrosion resistant materials; PP or PVDF with SS, Hastelloy-C, or Titanium**
- **Multi-language display menu available**

CE c UL us LISTED MEASURING EQUIPMENT 77CJ 25 FC

Applications

- **Chemical Processing**
- **Water and Wastewater Monitoring**
- **Metal Recovery and Landfill Leachate**
- **Commercial Pools, Spas, and Aquariums**
- **HVAC**
- **Irrigation**
- **Scrubber Control**
- **Neutralization Systems**
- **Industrial Water Distribution**

* U.S. Patent No: 7,055,396 B1

Specifications

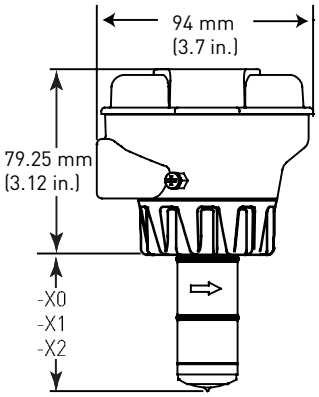
General			
Operating Range	0.05 to 10 m/s	0.15 to 33 ft/s	
Pipe Size Range	DN15 to DN900	½ in. to 36 in.	
Linearity	± 1% reading plus 0.1% of full scale		
Repeatability	±0.5% of reading @ 25 °C (77 °F)		
Minimum Conductivity	20 µS/cm		
Wetted Materials			
Sensor Body/Electrodes and Grounding Ring	-P0, -P1, -P2: PP/316L SS		
	-T0, -T1, -T2: PVDF/Titanium		
	-V0, -V1, -V2: PVDF/Hastelloy-C		
O-rings	FPM (standard) EPR (EPDM), FFPM (optional)		
Case	PBT		
Display Window	Polyamide (transparent nylon)		
Protection Rating	NEMA 4X/IP65		
Electrical			
Power Requirements	4 to 20 mA	24 VDC ±10%, regulated, 22.1 mA max.	
	Frequency	5 to 24 VDC ±10%, regulated, 15 mA max.	
	Digital (S^3L)	5 to 6.5 VDC, 15 mA max.	
Auxiliary (only required for units with relays)		9 to 24 VDC, 0.4 A max.	
Reverse Polarity and Short Circuit Protected			
Current Output 4 to 20 mA	Loop Accuracy	32 µA max. error (25 °C @ 24 VDC)	
	Isolation	Low voltage < 48 VAC/DC from electrodes and auxiliary power	
	Maximum Cable	300 m (1000 ft)	
	Error condition	22.1 mA	
	Max. Loop Resistance	300 Ω	
	Compatible with PLC, PC or similar equipment		
	4 to 20 mA load needed		
Frequency Output	Output Modes	Freq., or Mirror Relay (display version only)	
	Max. Pull-up Voltage	30 VDC	
	Max. Current Sink	50 mA, current limited	
	Maximum Cable	300 m (1000 ft)	
	Compatible with Signet Model 8550, 8900, 9900, 9900-1BC		
Digital (S^3L) Output	Serial ASCII, TTL level 9600 bps		
	Compatible with Model Signet 8900 controller		
Relay Specifications			
#1, #2 Type	Mechanical SPDT		
Rating	5 A @ 30 VDC max., 5 A @ 250 VDC max.		
#3 Type	Solid State		
	50 mA @ 30 VDC, 50 mA @ 42 VAC		
Hysteresis	User adjustable for exiting alarm condition		
Alarm On Trigger Delay	Adjustable (0 to 9999.9 sec.)		
Relay Modes	Off, Low, High, Window, and Proportional Pulse		
Relay Source	Flow Rate, Resettable Totalizer		
Error Condition	Selectable; Fail Open or Closed		
Display			
Characters		2 x 16	
Contrast		User-set in four levels	
Backlighting (only on relay versions)		Requires external 9-24 VDC, 0.4 mA max.	
Max. Temperature/Pressure Rating			
Storage Temperature		-20 °C to 70 °C	-4 °F to 158 °F
Relative Humidity		0 to 95% (non-condensing)	
Operating Temperature	Ambient	-10 °C to 70 °C	14 °F to 158 °F
	Media	0 °C to 85 °C	32 °F to 185 °F
Maximum Operating Pressure		10.3 bar @ 25 °C	150 psi @ 77 °F
		1.4 bar @ 85 °C	20 psi @ 185 °F
Shipping Weight			
	0.680 kg	1.50 lb	
Standards and Approvals			
	CE, FCC, UL, CUL (for display versions with relays)		
	RoHS compliant, China RoHS		
	NEMA 4X / IP65 Enclosure (with cap installed)		
	Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management and OHSAS 18001 for Occupational Health and Safety		

Dimensions

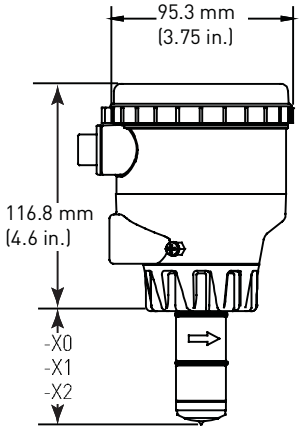
Pipe Range	
1/2 to 4 in.	-X0 = 58 mm (2.3 in.)
5 to 8 in.	-X1 = 91 mm (3.6 in.)
10 to 36 in.	-X2 = 167 mm (6.6 in.)

X = Sensor Body P, T, or V

Blind version

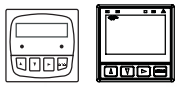


Display version



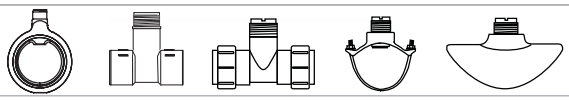
System Overview

Stand-Alone	Panel Mount	Field Mount - Pipe, Tank, Wall	4 to 20 mA Input
Signet Model 2551 Magmeter	Signet Instruments 8550 8900 9900 9900-1BC	Signet Instruments 8550 9900 with 3-8050 Universal Mount Kit	Customer Supplied Chart Recorder or Programmable Logic Controller



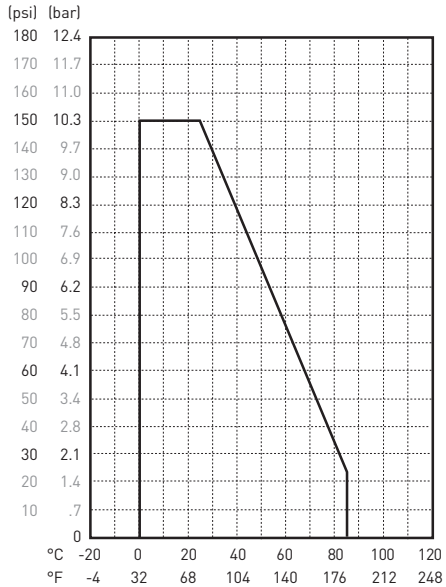
Signet 2551 Magmeter

Signet Fittings



All sold separately

Operating Temperature/Pressure Graphs

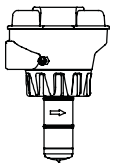
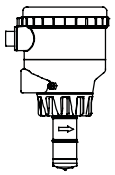
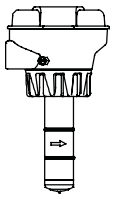
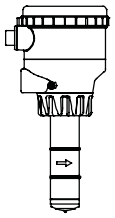
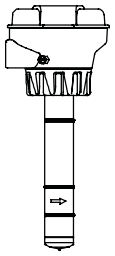
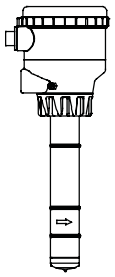


Note:
The pressure/temperature graphs are specifically for the Signet sensor. During system design the specifications of all components must be considered. In the case of a metal piping system, a plastic sensor will reduce the system specification. When using a PVDF sensor in a PVC piping system, the fitting will reduce the system specification.

Application Tips
- Note minimum process liquid conductivity requirement is 20 µs/cm.
- Install sensor using standard Signet installation fittings for best results.
- Sensor is capable of retrofitting into existing 515 and 2536 fittings.

Please refer to Wiring, Installation, and Accessories sections for more information.

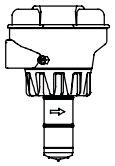
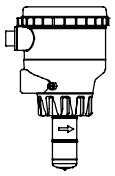
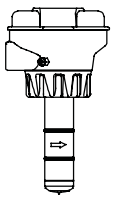
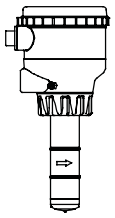
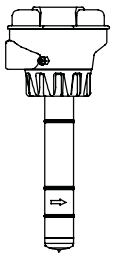
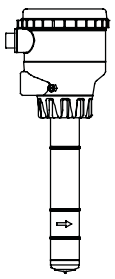
Ordering Information

Pipe Size	Mfr. Part No.	Code	Sensor Body
Frequency or Digital (S^3L) output programmable open collector for use with any Signet Flow Instrument or the 8900 or 9900 Instruments**			
DN15 to DN100 (½ to 4 in.)			
No Display			
	3-2551-P0-11	**159 001 105**	Polypropylene and 316L SS
	3-2551-T0-11	**159 001 108**	PVDF and Titanium
	3-2551-V0-11	**159 001 257**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P0-21	**159 001 267**	Polypropylene and 316L SS
	3-2551-T0-21	**159 001 436**	PVDF and Titanium
	3-2551-V0-21	**159 001 269**	PVDF and Hastelloy-C
with display			
	3-2551-P0-41	**159 001 261**	Polypropylene and 316L SS
	3-2551-T0-41	**159 001 433**	PVDF and Titanium
	3-2551-V0-41	**159 001 263**	PVDF and Hastelloy-C
DN125 to DN200 (5 to 8 in.)			
No Display			
	3-2551-P1-11	**159 001 106**	Polypropylene and 316L SS
	3-2551-T1-11	**159 001 109**	PVDF and Titanium
	3-2551-V1-11	**159 001 258**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P1-21	**159 001 268**	Polypropylene and 316L SS
	3-2551-T1-21	**159 001 437**	PVDF and Titanium
	3-2551-V1-21	**159 001 270**	PVDF and Hastelloy-C
with Display			
	3-2551-P1-41	**159 001 262**	Polypropylene and 316L SS
	3-2551-T1-41	**159 001 434**	PVDF and Titanium
	3-2551-V1-41	**159 001 264**	PVDF and Hastelloy-C
DN250 to DN900 (10 to 36 in.)			
No Display			
	3-2551-P2-11	**159 001 107**	Polypropylene and 316L SS
	3-2551-T2-11	**159 001 448**	PVDF and Titanium
	3-2551-V2-11	**159 001 450**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P2-21	**159 001 435**	Polypropylene and 316L SS
	3-2551-T2-21	**159 001 454**	PVDF and Titanium
	3-2551-V2-21	**159 001 456**	PVDF and Hastelloy-C
with Display			
	3-2551-P2-41	**159 001 432**	Polypropylene and 316L SS
	3-2551-T2-41	**159 001 460**	PVDF and Titanium
	3-2551-V2-41	**159 001 462**	PVDF and Hastelloy-C

**This option is a programmable open collector output that is available with display versions only.

Ordering Information (continued)

Pipe Size	Mfr. Part No.	Code	Sensor Body
4 to 20 mA output for use with PLC, PC or similar equipment			
DN15 to DN100 (½ to 4 in.)			
No Display			
	3-2551-P0-12	**159 001 110**	Polypropylene and 316L SS
	3-2551-T0-12	**159 001 113**	PVDF and Titanium
	3-2551-V0-12	**159 001 259**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P0-22	**159 001 273**	Polypropylene and 316L SS
	3-2551-T0-22	**159 001 439**	PVDF and Titanium
	3-2551-V0-22	**159 001 275**	PVDF and Hastelloy-C
with Display			
	3-2551-P0-42	**159 001 279**	Polypropylene and 316L SS
	3-2551-T0-42	**159 001 442**	PVDF and Titanium
	3-2551-V0-42	**159 001 281**	PVDF and Hastelloy-C
DN125 to DN200 (5 to 8 in.)			
No Display			
	3-2551-P1-12	**159 001 111**	Polypropylene and 316L SS
	3-2551-T1-12	**159 001 114**	PVDF and Titanium
	3-2551-V1-12	**159 001 260**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P1-22	**159 001 274**	Polypropylene and 316L SS
	3-2551-T1-22	**159 001 440**	PVDF and Titanium
	3-2551-V1-22	**159 001 276**	PVDF and Hastelloy-C
with Display			
	3-2551-P1-42	**159 001 280**	Polypropylene and 316L SS
	3-2551-T1-42	**159 001 443**	PVDF and Titanium
	3-2551-V1-42	**159 001 282**	PVDF and Hastelloy-C
DN250 to DN900 (10 to 36 in.)			
No Display			
	3-2551-P2-12	**159 001 112**	Polypropylene and 316L SS
	3-2551-T2-12	**159 001 449**	PVDF and Titanium
	3-2551-V2-12	**159 001 451**	PVDF and Hastelloy-C
with Display, two SPDT relays, one solid state relay			
	3-2551-P2-22	**159 001 438**	Polypropylene and 316L SS
	3-2551-T2-22	**159 001 455**	PVDF and Titanium
	3-2551-V2-22	**159 001 457**	PVDF and Hastelloy-C
with Display			
	3-2551-P2-42	**159 001 441**	Polypropylene and 316L SS
	3-2551-T2-42	**159 001 461**	PVDF and Titanium
	3-2551-V2-42	**159 001 463**	PVDF and Hastelloy-C

Accessories and Replacement Parts

Mfr. Part No.	Code	Description
O-Rings		
1220-0021	**198 801 000**	O-ring, FPM (2 required per sensor)
1224-0021	**198 820 006**	O-ring, EPR (EPDM) (2 required per sensor)
1228-0021	**198 820 007**	O-ring, FFPM (2 required per sensor)
Replacement Transducers		
3-2551-P0	**159 001 211**	PP/316L SS, DN15 to DN100 (½ to 4 in.) pipe
3-2551-P1	**159 001 212**	PP/316L SS, DN125 to DN200 (5 to 8 in.) pipe
3-2551-P2	**159 001 444**	PP/316L SS, DN250 to DN900 (10 to 36 in.) pipe
3-2551-T0	**159 001 213**	PVDF/Titanium, DN15 to DN100 (½ to 4 in.) pipe
3-2551-T1	**159 001 214**	PVDF/Titanium, DN125 to DN200 (5 to 8 in.) pipe
3-2551-T2	**159 001 445**	PVDF/Titanium, DN250 to DN900 (10 to 36 in.) pipe
3-2551-V0	**159 001 376**	PVDF/Hastelloy-C, DN15 to DN100 (½ to 4 in.) pipe
3-2551-V1	**159 001 377**	PVDF/Hastelloy-C, DN125 to DN200 (5 to 8 in.) pipe
3-2551-V2	**159 001 446**	PVDF/Hastelloy-C, DN250 to DN900 (10 to 36 in.) pipe
Replacement Electronics Module		
3-2551-11	**159 001 215**	Magmeter electronics, frequency or digital (S^3L) output
3-2551-12	**159 001 216**	Magmeter electronics, 4 to 20 mA output
3-2551-21	**159 001 372**	Magmeter display electronics, frequency or digital (S^3L) output, with relays
3-2551-22	**159 001 373**	Magmeter display electronics, 4 to 20 mA output w/relays
3-2551-41	**159 001 374**	Magmeter display electronics, frequency or digital (S^3L) output
3-2551-42	**159 001 375**	Magmeter display electronics, 4 to 20 mA output
Other		
P31536	**198 840 201**	Sensor plug, Polypropylene
7310-1024	**159 873 004**	24 VDC Power Supply, 0.42 A, 10W
7310-2024	**159 873 005**	24 VDC Power Supply, 1.0 A , 24W
7310-4024	**159 873 006**	24 VDC Power Supply, 1.7 A, 40W
7310-6024	**159 873 007**	24 VDC Power Supply, 2.5 A, 60W
7310-7024	**159 873 008**	24 VDC Power Supply, 4.0 A, 96W
3-8050.390-1	**159 001 702**	Retaining Nut Replacement Kit, NPT, Valox
3-8050.390-3	**159 310 116**	Retaining Nut Replacement Kit, NPT, PP
3-8050.390-4	**159 310 117**	Retaining Nut Replacement Kit, NPT, PVDF
3-8551.521	**159 001 378**	Clear plastic cap for display
1222-0042	**159 001 379**	O-ring for clear plastic cap, EPR (EPDM)
3-0250	**159 001 538**	USB to digital (S^3L) Configuration/Diagnostic tool

3-2551.099 Rev F (04/13)

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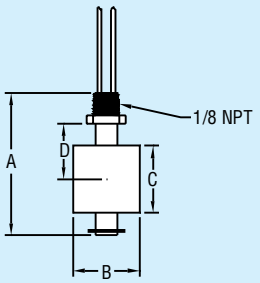
UL LISTED



Series F6 & F7 compact level switches combine low cost and reliability with fast, simple installation. Hermetically sealed reed switches are actuated by magnets permanently bonded inside the float and can be easily adapted to open or close a circuit on rising or falling levels. Vertical mount models are shipped with normally open switch contacts which close as the float rises toward the mounting threads. Reverse switch action by removing the float, rotating it end-for-end and replacing it on the stem. Vertical models mount internally, oriented within 30° of vertical, or select optional fittings for external mounting. Switch ratings are suitable for many solid state control systems and monitors or alarms. Simple relay interfaces can be used for higher current applications.

Dimensions in Inches (mm)

Model	(A) Stem Length	(B) Float Diameter	(C) Float Height	(D) Actuation from Hex①
F7-SB	2.75 (70)	1.38 (35)	1.13 (29)	1.2 (31)
F7-SS2	2.06 (52)	1.0 (25)	1.0 (25)	0.73 (19)
F6-SS	2.17 (55)	1.11 (28)	1.11 (28)	–
F7-MPP	1.63 (41)	0.63 (16)	0.63 (16)	0.47 (12)
F7-PP	2.18 (55)	1.18 (30)	1.0 (25)	0.69 (18)
F7-BT	2.18 (55)	1.18 (30)	1.0 (25)	0.69 (18)
F7-K	2.13 (54)	1.0 (25)	1.0 (25)	0.65 (17)
F7-C11	2.06 (52)	1.0 (25)	1.0 (25)	0.56 (14)
F7-C21	2.06 (24)	1.0 (25)	1.0 (25)	0.56 (14)
F7-BB	3.19 (81)	1.88 (48)	1.81 (46)	1.19 (30)
F7-PS	3.38 (86)	1.88 (48)	1.88 (48)	1.25 (32)
F7-PVC	3.44 (87)	1.5 (38)	1.81 (46)	0.75 (19)
F7-T1	3.47 (88)	2.13 (54)	1.94 (49)	0.92 (22)
F7-ST713	3.38 (86)	2.06 (52)	2.06 (52)	1.09 (28)
F7-ST714	3.38 (86)	2.06 (52)	2.06 (52)	1.09 (28)

Model	Applications	Material Float/Stem	Temp. Limits	Press. Limits	Min. S.G.	Electrical Rating	Wire Leads	Mtg NPT (M)	Weight oz (g)
F7-SB	General purpose	Buna-N & Epoxy/ 316 SS	220°F (105°C)	150 psig 10 bar	0.60	25 VA: 1A @ 220 VAC	22 AWG 18″ (45 cm)	1/8″	2 (58)
F7-SS2	High temp/pressure, corrosives	316 SS (CYC)/ 316 SS	300°F (149°C)	450 psig 31 bar	0.75	25 VA: 1A @ 200 VAC	22 AWG 18″ (45 cm)	1/8″	1.2 (34)
F6-SS	Corrosives	316 SS/ 316 SS	257°F (125°C)	218 psig 15 bar	0.65	20 VA: 0.08A @ 240 VAC	20 AWG 11.8″ (30 cm)	1/8″	1.59 (45)
F7-MPP**	Broad chemical compatibility	Polypropylene/ Polypropylene	180°F (82°C)	100 psig 6.89 bar	0.90	10 VA: 0.1A @ 100 VAC	22 AWG 24″ (61 cm)	1/8″	0.8 (23)
F7-MPP-NO**	Broad chemical compatibility	Polypropylene/ Polypropylene	176°F (80°C)	100 psig 6.89 bar	0.90	50 VA: 0.2A @ 240 VAC	22 AWG 24″ (61 cm)	1/8″	0.8 (23)
F7-PP	Broad chemical compatibility	Polypropylene & Epoxy/Polypropylene	220°F (105°C)	100 psig 6.89 bar	0.60	30 VA: 0.14A @ 220 VAC	22 AWG 24″ (61 cm)	1/8″	0.8 (23)
F7-BT	Oils & Fuels	Buna-N & Epoxy/ PBT*	220°F (105°C)	150 psig 10 bar	0.45	30 VA: 0.14A @ 220 VAC	22 AWG 24″ (61 cm)	1/8″	0.7 (20)
F7-K	Food/beverage, corrosives	PVDF/ PVDF	180°F (82°C)	100 psig 6.89 bar	1.00	50 VA: 0.25A @ 150 VAC	22 AWG 24″ (61 cm)	1/8″	1.5 (43)
F7-C11	General purpose	Buna-N/ Brass	180°F (82°C)	150 psig 10 bar	0.45	20 VA: 0.08A @ 240 VAC	22 AWG 24″ (61 cm)	1/8″	1.5 (43)
F7-C21	Oils & water, general purpose	Buna-N/ 316 SS	180°F (82°C)	150 psig 10 bar	0.45	20 VA: 0.08A @ 240 VAC	22 AWG 24″ (61 cm)	1/8″	1.5 (43)
F7-BB	High viscosity liquids	Buna-N/ Brass	180°F (82°C)	150 psig 10 bar	0.55	20 VA: 0.08A @ 240 VAC	22 AWG 24″ (61 cm)	1/4″	5 (140)
F7-PS	Water-based liquids, complies with FDA	Polysulfone/ Polysulfone†	225°F (107°C)	50 psig 3 bar	0.55	20 VA: 0.08A @ 240 VAC	22 AWG 24″ (61 cm)	1/4″	4 (110)
F7-PVC	Chemical & plating	CPVC/ CPVC	180°F (82°C)	15 psig 1 bar	0.85	20 VA: 0.08A @ 240 VAC	22 AWG 24″ (61 cm)	1/4″	5 (140)
F7-T1	Viscous, sticky or corrosive liquids	PTFE/ TFE	300°F (149°C)	30 psig 2 bar	0.80	20 VA: 0.08A @ 240 VAC	22 AWG 24″ (61 cm)	1/4″	6 (170)
F7-ST713	Oils, water & chemicals	316 SS/ 316 SS	300°F (149°C)	750 psig 52 bar	0.80	20 VA: 0.08A @ 240 VAC	22 AWG 24″ (61 cm)	1/4″	6 (170)

①Distance between hex and liquid (S.G. = 1.0) level at actuation point will vary with specific gravity changes.
*PBT - Polybutylene Terephthalate.
†Incudes 316 SS clip.
‡Spherical floats.
** F7-MPP is normally closed/F7-MPP-NO is normally open

UL Listed

OPTIONAL FITTINGS — For external mounting of vertical models
A-347, 1/8″ x 1-1/4″ NPT carbon steel adapter
A-347-SS, 1/8″ x 1-1/4″ NPT 316 SS adapter
A-348, 1/8″ x 1-1/2″ NPT carbon steel adapter

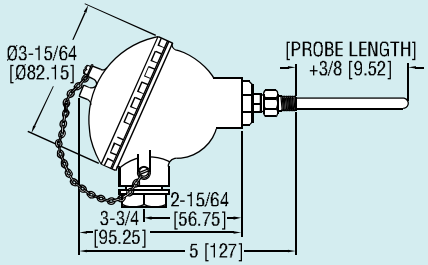
Series
TTW

Weatherproof Immersion Temperature Transmitter

Submittal#8.4.13

Pt100 RTD, PC Programmable Transmitter

Scan here to watch product video



The Series TTW Immersion Temperature Transmitter combines three popular products into a single package. Our TBU series head mounted temperature transmitter is factory mounted into our A-709 enclosure. A Pt100 RTD version of our TE series is wired to the transmitter, giving insertion lengths up to 18″. Each transmitter is factory programmed and calibrated to output a 4 to 20 mA signal proportional to the 32 to 212°F (0 to 100°C) temperature range.

Model	Probe Length
TTW-104	4″
TTW-106	6″
TTW-108	8″
TTW-112	12″
TTW-118	18″

SPECIFICATIONS

Temperature Sensor
Accuracy: ±3°F (±1.7°C).
Temperature Limits: Operating: -40 to 302°F (-40 to 150°C).
Sensor Curves: Pt100 RTD (TE Series Curve D).

Temperature Transmitter
Input Range: -328 to 986°F (-200 to 530°C).
Output: Two-wire 4 to 20 mA.
Output Impedance: 600 Ω @ 24 VDC.
Power Requirements: 12 to 35 VDC.
Accuracy: ±0.2% FS.
Temperature Limits: -40 to 185°F (-40 to 85°C).
Response Time: <100 msec.

Enclosure
Temperature Limits: -40 to 212°F (-40 to 100°C).
Rating: NEMA 4X (IP65).
Material: Painted aluminum housing.

ACCESSORY

TBU-90, Programming Cable and Software

Submittal#8.4.14

How can we improve our Product Images?

Compare

Exhaust Fan, 18 In, 115V, 1/4hp, 1725rpm

DAYTON

Your Price
$318.48 / each

Deliver one time only

Auto-Reorder Every 1 Month

1 Add to Cart

+Add to list

Availability for Qty 1 Go

Shipping Pick Up

Expected to arrive **Fri. Mar 13**

Ship to: **11710** (Change)

Add Repair & Replacement Coverage for $89.95 each.

View Repair Parts for this item

★★☆☆☆ | 2.0 of 5 | 1 review | Write a Review | Ask & Answer

Item # **1HLA5** Mfr. Model # **1HLA5** UNSPSC # **40101502**

Catalog Page # **4094** Shipping Weight **30.0 lbs.**

Country of Origin **USA** | *Country of Origin is subject to change.*

Note: Product availability is real-time updated and adjusted continuously. The product will be reserved for you when you complete your order. More

Technical Specs

Item	**Shutter Mount Exhaust Fan**
Blade Dia.	**18"**
Number of Speeds	**1**
Voltage	**115V**
CFM @ 0.000-In. SP	**2590**
Motor HP	**1/4**
Square Opening Required	**19"**
CFM @ 0.125-In. SP	**2190**
CFM @ 0.250-In. SP	**1705**
Sones @ 0.000-In. SP @ 5 Ft.	**14.3**
Motor RPM	**1725**
Hz	**60**
Phase	**1**
Full Load Amps	**4.5**
Max. Ambient Temp.	**104 Degrees F**

Motor Enclosure	**Totally Enclosed Air-Over**
Motor Insulation	**Class A**
Bearing Type	**Ball**
Height	**21-1/8"**
Width	**21-1/8"**
Max. Depth	**18-1/4"**
Frame Material	**Cold Rolled Steel**
Frame Finish	**Galvanized Steel**
Blade Material	**Stamped Aluminum**
Guard Material	**Steel**
Wire Guard Finish	**Gray Polyester**
Number of Blades	**3**
Thermal Protection	**Auto**
Standards	**UL Listed for US and Canada**
Includes	**Shutter**

Back to Top

QMARK®
A Marley Engineered Products Brand

Submittal#8.4.15

TYPE MUH
UNIT HEATER

c UL us
FILE #E21609

- Unit mounts either horizontally or vertically. Totally versatile. For factories, warehouses, garages, stores, shipping rooms, power stations, aircraft hangers. Can be used for primary, supplementary, spot, or dual-system heating.
- Wide range of optional control kits are field installable, increasing the MUH adaptability to the specification market.
- Forced air unit heater with 10 power ratings; from 3KW to 50 KW heating output; 208, 240, 277 and 480V, 10,230 to 170,500 BTU/hr.
- 32 compatible models (no need to try to assemble a heating system from 70 or 80 models!)
- Heavy gauge die-formed steel housing. Two-toned, smartly styled.
- Advanced pull-through air flow design draws air across heating element for more even air distribution and cooler element operation.
- Specially designed venturi outlet to meet that added throw as required in vertical position.
- Branch circuit fusing (when required).
- Completely enclosed fan motor.
- 1- or 3-phase wiring on 5 through 10 KW 208/240V and 15 KW 208V units (field interchangeable).
- Aluminum-finned, copper clad steel sheath heating element has longer useful life, because of cooler sheath temperature and faster heat dissipation.
- 24V control transformer standard on most models, providing a safer and more accurate means of temperature control. 3KW and 5KW, 208-277V, have line voltage controls as standard (24V control available on made-to-order basis).
- Automatic reset linear thermal cut-out, capillary type, provides protection over entire length of element areas (Manual reset protection available on made-to-order basis).
- 2-speed fan selector switch (25 to 50 KW models).
- Fan delay feature eliminates cold drafts. Element heats up before fan cuts in, then fan continues to distribute heat after element shuts off.
- Ruggedly built, yet lighter weight for easier installation. No piping flues, valves, or traps.
- Individually adjustable discharge louvers to control air flow.
- Choice of optional diffusers for variety of air patterns, maximizing heat concentration and coverage in the vertical position.
- Meets all UL, NEC, and OSHA requirements.

SELECTION CHART

CAT. NO.	VOLTS	ELECTRICAL DATA				CONTROL VOLT (1)	2 STAGE ELEMENT CONTROL	AIR DELIVERY DATA			FAN MOTOR DATA			MAXIMUM EFFECTIVE MOUNTING HEIGHT		HORI. AIR THROW	WIRE SIZE	INSTALLED WEIGHT (LBS.) W/BRACK.
		PHASE	KW	BTU/HR. COP	AMPS (3)			CFM(2)	FPM(2)	ΔT(°F)	VOLTS	RPM(2)	HP	HORIZ.	VERT.			
MUH03-81	208	1Ø	3.0	10.2	14.5	208	N/A	350	800	27 °	208	1600	1/100	8	9	12	AWG 12	27
MUH03-21	208/240	1Ø	2.2/3.0	7.5/10.2	11.0/12.5	208/240	N/A	350	800	27 °	208/240	1600	1/100	8	9	12	AWG 12	27
MUH03-71	277	1Ø	3.0	10.2	11.0	277	N/A	350	800	27 °	277	1600	1/100	8	9	12	AWG 14	27
MUH03-31	347	1Ø	3.0	10.2	8.6	347	N/A	350	800	27 °	347	1600	1/100	8	9	12	AWG 14	27
MUH03-41	480	3Ø	3.0	10.2	3.6	24	N/A	350	800	27 °	480	1600	1/100	8	9	12	AWG 14	27
MUH03-61	600	3Ø	3.0	10.2	2.9	600	N/A	350	800	27 °	600	1600	1/100	8	9	12	AWG 14	27
MUH05-81	208	1-3Ø	5.0	17.0	24.0	208	5A	350	800	45 °	208	1600	1/100	8	9	12	AWG 10	27
MUH05-21	208/240	1-3Ø	3.7/5.0	12.6/17.0	18.0/21.0	208/240	5A	350	800	45 °	208/240	1600	1/100	8	9	12	AWG 10	27
MUH05-71	277	1Ø	5.0	17.0	18.0	277	N/A	350	800	45 °	277	1600	1/100	8	9	12	AWG 10	27
MUH05-31	347	1Ø	5.0	17.0	14.4	347	N/A	350	800	45 °	347	1600	1/100	8	9	12	AWG 10	27
MUH05-41	480	3Ø	5.0	17.0	6.0	24	N/A	350	800	45 °	480	1600	1/100	8	9	12	AWG 14	27
MUH05-61	600	3Ø	5.0	17.0	4.8	600	N/A	350	800	45 °	600	1600	1/100	8	9	12	AWG 10	27
MUH-07-8	208	1-3Ø	7.5	25.6	36.0	24	5B	650	970	37 °	208	1600	1/30	9	14	18	AWG 6	38
MUH-07-2	208/240	1-3Ø	5.6/7.5	19.1/25.6	27.0/31.3	24	5B	650	970	37 °	208/240	1600	1/30	9	14	18	AWG 8	38
MUH-07-7	277	1Ø	7.5	25.6	27.0	24	5B	650	970	37 °	277	1600	1/30	9	14	18	AWG 8	38
MUH-07-3	347	1Ø	7.5	25.6	21.6	24	5B	650	970	37 °	347	1600	1/30	9	14	18	AWG 14	38
MUH-07-4	480	3Ø	7.5	25.6	9.0	24	5B	650	970	37 °	480	1600	1/30	9	14	18	AWG 14	38
MUH-07-6	600	3Ø	7.5	25.6	7.3	24	5B	650	970	37 °	600	1600	1/30	9	14	18	AWG 14	38
MUH-10-8	208	1-3Ø	10.0	34.1	48.0	24	5B	650	970	49 °	208	1600	1/30	9	14	18	AWG 4	38
MUH-10-2	208/240	1-3Ø	7.5/10.0	25.6/34.1	36.0/42.0	24	5B	650	970	49 °	208/240	1600	1/30	9	14	18	AWG 6	38
MUH-10-7	277	1Ø	10.0	34.1	36.0	24	5B	650	970	49 °	277	1600	1/30	9	14	18	AWG 6	38
MUH-10-3	347	1Ø	10.0	34.1	28.8	24	5B	650	970	49 °	347	1600	1/30	9	14	18	AWG 14	38
MUH-10-4	480	3Ø	10.0	34.1	12.0	24	5B	650	970	49 °	480	1600	1/30	9	14	18	AWG 14	38
MUH-10-6	600	3Ø	10.0	34.1	9.7	24	5B	650	970	49 °	600	1600	1/30	9	14	18	AWG 14	38
MUH-15-8	208	1-3Ø	15.0	51.2	72.0	24	5A	910	1640	52 °	208	1530	1/20	11	20	35	AWG 2	53
MUH-15-2	208/240	3Ø	11.2/15.0	38.2/51.2	31.3/36.1	24	5C	910	1640	52 °	208/240	1530	1/20	11	20	35	AWG 6	53
MUH-15-4	480	3Ø	15.0	51.2	18.0	24	5C	910	1640	52 °	480	1530	1/20	11	20	35	AWG 10	53
MUH-15-6	600	3Ø	15.0	51.2	14.5	24	5C	910	1640	52 °	600	1530	1/20	11	20	35	AWG 12	53
MUH-20-8	208	3Ø	20.0	68.2	56.0	24	5A	1320	2060	48 °	208	1500	1/10	12	23	41	AWG 4	60
MUH-20-2	208/240	3Ø	15.0/20.0	51.2/68.2	41.2/48.0	24	5C	1320	2060	48 °	208/240	1500	1/10	12	23	41	AWG 4	60
MUH-20-4	480	3Ø	20.0	68.2	24.0	24	5C	1320	2060	48 °	480	1500	1/10	12	23	41	AWG 10	60
MUH-20-6	600	3Ø	20.0	68.2	19.3	24	5C	1320	2060	48 °	600	1500	1/10	12	23	41	AWG 12	60
MUH-25-2	208/240	3Ø	18.7/25.0	63.8/85.2	52.0/60.0	24	5A	2100/1800	2100/2030	38 °/44 °	208/240	1600/1375	1/4	13	23	50	AWG 3	93
MUH-25-4	480	3Ø	25.0	85.2	30.0	24	5C	2100/1800	2100/2030	38 °/44 °	480	1600/1375	1/4	13	23	50	AWG 8	93
MUH-25-6	600	3Ø	25.0	85.2	24.2	24	5C	2100/1800	2100/2030	38 °/44 °	600	1600/1375	1/4	13	23	50	AWG 10	93
MUH-30-8	208	3Ø	30.0	102.3	84.0	24	5A	2100/1800	2100/2030	45 °/53 °	208	1600/1375	1/4	12	20	50	AWG 1	93
MUH-30-2	208/240	3Ø	22.5/30.0	76.7/102.3	63.0/72.3	24	5A	2100/1800	2100/2030	45 °/53 °	208/240	1600/1375	1/4	12	20	50	AWG 2	93
MUH-30-4	480	3Ø	30.0	102.3	36.0	24	5C	2100/1800	2100/2030	45 °/53 °	480	1600/1375	1/4	12	20	50	AWG 6	93
MUH-30-6	600	3Ø	30.0	102.3	29.0	24	5C	2100/1800	2100/2030	45 °/53 °	600	1600/1375	1/4	12	20	50	AWG 8	93
MUH-40-2	208/240	3Ø	30.0/40.0	102.3/136.4	83.4/96.4	24	5A	3000/2600	3260/2900	42 °/49 °	208/240	1525/1420	1/2	15	28	60	AWG 1/0	114
MUH-40-4	480	3Ø	40.0	136.4	48.0	24	5A	3000/2600	3260/2900	42 °/49 °	480	1525/1420	1/2	15	28	60	AWG 4	114
MUH-40-6	600	3Ø	40.0	136.4	38.7	24	5A	3000/2600	3260/2900	42 °/49 °	600	1525/1420	1/2	15	28	60	AWG 6	114
MUH-50-8	208	3Ø	50.0	170.5	139.0	24	5A	3000/2600	3260/2900	53 °/61 °	208	1525/1420	1/2	15	25	60	AWG 4/0	114
MUH-50-2	208/240	3Ø	37.5/50.0	127.3/170.5	104.2/120.4	24	5A	3000/2600	3260/2900	53 °/61 °	208/240	1525/1420	1/2	15	25	60	AWG 3/0	114
MUH-50-4	480	3Ø	50.0	170.5	60.2	24	5A	3000/2600	3260/2900	53 °/61 °	480	1525/1420	1/2	15	25	60	AWG 4	114
MUH-50-6	600	3Ø	50.0	170.5	48.3	24	5A	3000/2600	3260/2900	53 °/61 °	600	1525/1420	1/2	15	25	60	AWG 3	114

Note:

1. All standard units are supplied with a low voltage control transformer and contactor (24V) except MUH-03 & 05, 208, 240 & 277 volt models. Low voltage control on these units are available on made to order. All units are also available on special order for 120 volt control; internal and transformer or external without transformer.
2. On dual voltage units; CFM, FPM, and RPM are shown at higher voltage.
3. On dual phase units, maximum amp draw is listed for respective voltage.
4. 25 thru 50 KW models have two speed motors and dual CFM ratings.

5A. Standard.
5B. Optional - made to order - amp load unbalanced on 3 Phase.
5C. Optional - made to order - amp load balanced on 3 Phase.

ACCESSORIES

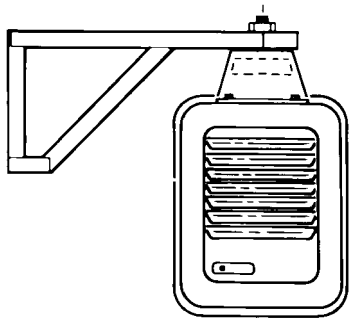
CATALOG #	DESCRIPTION	ELECTRICAL RATING	USE WITH HEATER NO.
MT-1	Single Pole Internal Thermostat Temp. Range: 40°F - 85°F	25A; 120, 240V. A.C. Res. 22A; 277V.A.C. Res.	All MUH Series Heaters (except MUH05-21 3Ø and mUH025-81 3Ø, which use MT-2).
MT-2	Two Stage Internal Thermostat Temp. Range: 40°F - 85°F	25A; 120, 240V. A.C. Res. 22A; 277V.A.C. Res. 125V.A; Pilot Duty	MUH05-21 3Ø, MUH05-81 3Ø, MUH-15-8, MUH-20-8, MUH-25-2, MUH-30-2, MUH-30-8, MUH-40-2, MUH-50-2, MUH-50-4, MUH-50-8
MCFS	Internal Summer Fan Switch	6A; 600V.A.C. Res. 2 HP; 250, 480, 600V.A.C. 1, 2, or 3Ø	All MUH Series Heaters
MRFS-1	Remote Summer Fan Switch (Line Voltage)	2 HP; 250-480V.A.C.	All MUH Series Heaters
NRFS-2	Remote Summer Fan Switch with Relay (24V Coil-Single Pole Normally Open)	6 AFL, 35 ALR, 250V.A.C. 60 Hz 3 AFL, 18 ALR, 480V.A.C. 60 Hz	All MUH Series Heaters (except MUH03-21, MUH03-71, MUH03-81, MUH05-21, MUH05-71, MUH05-81 Units, unless optional control transformer is supplied.
MHRT	Heater Recovery Thermostat with Relay (24V Coil-Single Pole Normally Open) Hi — 120°F; Low — 60°F	6 AFL, 35 ALR, 250V.A.C. 60 Hz 3 AFL, 18 ALR, 480V.A.C. 60 Hz	All MUH Series Heaters (except MUH03-21, MUH03-71, MUH03-81, MUH05-21, MUH05-71, MUH05-81 Units, unless optional control transformer is supplied.
MPDS-25	Power Disconnect Switch (3 Pole)	25A, 600V.A.C. Res.	MUH03-21, MUH03-41, MUH03-71, MUH03-81, MUH05-21, MUH05-41, MUH05-71, MUH05-81, MUH-07-4, MUH-10-4, MUH-15-4, MUH-20-4
MPDS-60	Power Disconnect Switch (3 Pole)	63A, 600V.A.C. Res.	MUH-07-02, MUH-07-7, MUH-07-8, MUH-10-2 ,MUH-10-7, MUH-10-8, MUH-15-2 MUH-15-8 3Ø only, MUH-20-2, MUH-20-8, MUH-25-2, MUH-25-4, MUH-30-4 MUH-40-4, MUH-50-4

UNIVERSAL WALL & CEILING BRACKET

CATALOG NO.	USED ON
MMB-10	MUH-03, 05, 07 & 10
MMB-20	MUH-15 & 20
MMB-30	MUH-25 & 30
MMB-50	MUH-40 & 50

CEILING BRACKET

CATALOG NO.	USED ON
MCMB-10	MUH-03, 05, 07 & 10
MCMB-20	MUH-15 & 20
MCMB-30	MUH-25 & 30
MCMB-50	MUH-40 & 50

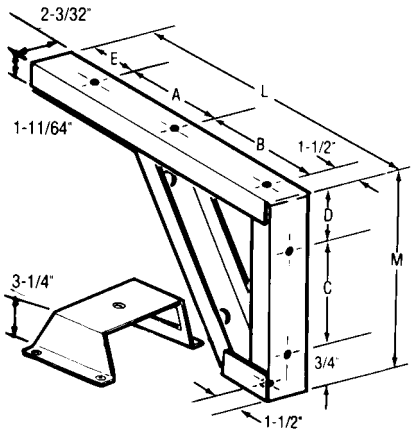


BRACKET SIZE

DIMENSION	3 - 20Kw	25 - 50Kw
A	7 1/4"	9 7/16"
B	9 1/2"	14 3/8"
C	7 1/4"	12 1/8"
D	1 15/16"	2 1/16"
E	2 1/4"	3"
L	20 1/2"	28 15/16"
M	9 15/16"	14 15/16"
N	3 1/4"	4 1/2"

OPTIONAL VERTICAL CEILING MOUNTING BRACKET

CATALOG NUMBER	USED ON	STANDARD CARTON QTY.	WT. LBS.
MVDMB5	MUH03-05	1	5
MVDMB20	MUH07-20	1	7
MVDMB50	MUH25-50	1	9



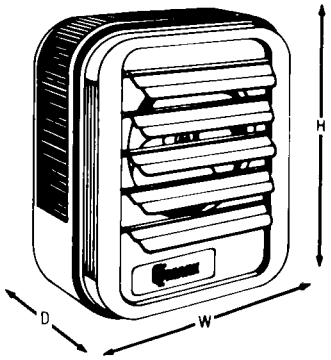
OPTIONAL BUILT-IN CONTROLS AND ACCESSORIES ON MUH HEATERS

FACTORY INSTALLED ONLY††
DESCRIPTION
MUH-03 & 05 (208, 208/240, 277V Supply) 24 or 120V Control Transformer and Power Contactor 24 or 120V H.C. Power Contactor
MUH-03 & 05 (480V Supply) & MUH-07 thru MUH-50, Optional 120V Control
2-Stage Control of Elements (See Note 5)
Manual Reset.
Outlet Mesh (Bird Screen) For all MUH Heaters

††Optional built-in controls and accessories factory installed only - Not to be field installed

DIMENSIONS

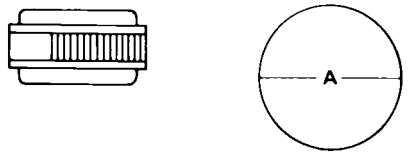
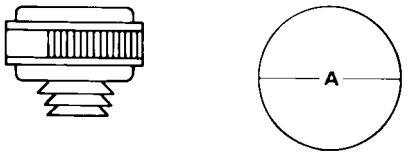
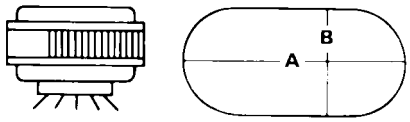
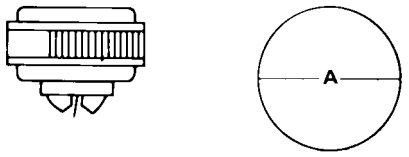
CAT. NO.	HEIGHT	WIDTH	DEPTH
MUH-03 & 05	16"	14"	7 1/2"
MUH-07 & 10	21 3/4"	19"	7 1/2"
MUH-15 & 20	21 3/4"	19"	12 3/4"
MUH-25 & 30	30"	26 5/8"	11 3/4"
MUH-40 & 50	30"	26 5/8"	17 1/8"



MOUNTING LIMITATIONS

Unit heaters should not be used in potentially explosive atmospheres. The finish is not intended for direct salt spray exposure in marine applications or the highly corrosive atmospheres of swimming pools, chemical storage bins, etc. Do not install unit heaters above recommended maximum mounting height. Obstructions must not block unit heater air inlet or discharge. Heaters must be mounted at least 7' above the floor to prevent accidental contact with the heating element or fan blade which could cause injury.

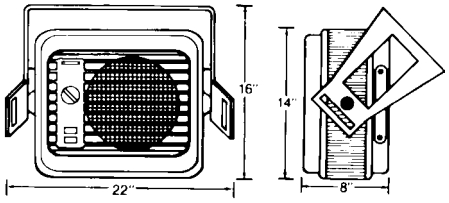
DIFFUSER SELECTOR TABLES FOR VERTICAL MOUNTING

CATALOG NO.	DESCRIPTION	CATALOG NO.	MAX. MNT. HT.	A DIMENSION	DIFFUSER PATTERN AND AREA
NONE	WITHOUT DIFFUSER No diffuser needed where a straight downflow air pattern is required. For maximum air throw, remove louvers. Any of three diffusers can be added to basic heater.	MUH-03 &MUH-05	9	18	
NONE		MUH-07 & MUH-10	14	26	
NONE		MUH-15	20	35	
NONE		MUH-20	23	40	
NONE		MUH-25	23	63	
NONE		MUH-30	20	55	
NONE		MUH-40	28	70	
NONE		MUH-50	25	63	
MAD-S	ANEMOSTAT DIFFUSER The "comfort" diffuser. Produces draft-free air movement at low mounting heights. Floor coverage shown in table.	MUH-03 & MUH-05	8	18	
MAD-M		MUH-07 & MUH-10	12	28	
MAD-M		MUH-15	15	35	
MAD-M		MUH-20	17	40	
MAD-L		MUH-25	19	60	
MAD-L		MUH-30	17	55	
MAD-L		MUH-40	22	77	
MAD-L		MUH-50	20	70	
MLD-S	LOUVER DIFFUSER Permits directional (straight line) air flow as in air curtain application over doorways. Rectangular coverage, Louvers can be turned in either direction.	MUH-03 & MUH-05	9	25(A) 12(B)	
MLD-M		MUH-07 & MUH-10	14	39 (A) 19(B)	
MLD-M		MUH-15	18	50(A) 25(B)	
MLD-M		MUH-20	20	56(A) 28(B)	
MLD-L		MUH-25	23	72(A) 36(B)	
MLD-L		MUH-30	20		
MLD-L		MUH-40	24	88(A) 44(B)	
MLD-L		MUH-50	22	80(A) 40(B)	
MRD-S	RADIAL DIFFUSER Increases floor coverage. Adjustable fins, in vertical mode, direct downward in a tight pattern. Conversely, when fins are tilted to 45° angle, floor coverage is up to 25% greater at relatively low mounting heights.	MUH-03 & MUH-05	9	20	
MRD-M		MUH-07 & MUH-10	14	31	
MRD-M		MUH-15	18	40	
MRD-M		MUH-20	20	45	
MRD-L		MUH-25	23	69	
MRD-L		MUH-30	20	60	
MRD-L		MUH-40	24	75	
MRD-L		MUH-50	22	68	

TYPE MUH-35
UNIT HEATER

c UL us
FILE #E21609

- Mounts either on the wall or from the ceiling can be used for primary or spot heating. For factories, garages, schools, etc.
- Airflow can be directed horizontally, vertically or any position between for precise control.
- Multiple wattage heat selector switch. Either 5KW or 3.3KW @ 240V (3.7KW or 2.5KW @ 208V) for just the right amount of heat.
- Fan only switch allows fan to cycle automatically with elements or run continuously for air movement when no heat is required.
- Built-in bi-metal thermostat. Range 40° to 90°F.
- Heater is shipped with ceiling/wall bracket.
- Heavy gauge die-formed steel housing.
- Advanced pull-through air flow design draws air across heating element for more even air distribution and cooler element operation.
- Specially designed venturi outlet to meet that added throw as required in vertical position.
- Completely enclosed fan motor.
- Aluminum-finned, copper clad steel sheath heating element has longer useful life, because of cooler sheath temperature and faster heat dissipation.
- Automatic reset linear thermal cut-out capillary type, provides protection over entire length of element area.
- Ruggedly built, yet lighter weight for easier installation. No piping flues, valves, or traps.
- Meets all UL, NEC, and OSHA requirements.



SELECTION CHART

CATALOG NUMBER	ELECTRICAL DATA						2 STAGE ELEMENT CONTROL	AIR DELIVERY DATA			FAN MOTOR DATA			MAXIMUM EFFECTIVE MOUNTING HEIGHT		HORIZ. AIR THROW	WIRE SIZE	INSTALLED WEIGHT (lbs) W/ BRACKET
	VOLTS	PHASE	KW	BTU/HR (000)	AMPS	CONTROL VOLTAGE		CFM	FPM	ΔT(°F)	VOLTS	RPM	HP	HORIZ.	VERT.			
MUH-35	240/208	1	5.0/3.7	17.0/12.6	21.0/18.0	17.0/12.6	MUH-35	210	550	71°	240/208	1600	1/100	8	51	24	AWG 10	22

ARCHITECT'S AND ENGINEER'S SPECIFICATIONS*

- Unit mounts either horizontally or vertically. Totally versatile. For factories, warehouses, garages, stores, shipping rooms, power stations, aircraft hangers. Can be used for primary, supplementary, spot, or dual-system heating.
- Wide range of optional control kits are field installable, increasing the MUH adaptability to the specification market.
- Forced air unit heater with 10 power ratings; from 3KW to 50 KW heating output; 208, 240, 277 and 480V, 10,230 to 170,500 BTU/hr.
- 32 compatible models (no need to try to assemble a heating system from 70 or 80 models!)
- Heavy gauge die-formed steel housing. Two-toned, smartly styled.
- Advanced pull-through air flow design draws air across heating element for more even air distribution and cooler element operation.
- Specially designed venturi outlet to meet that added throw as required in vertical position.
- Branch circuit fusing (when required).
- Completely enclosed fan motor.
- 1- or 3-phase wiring on 5 through 10 KW 208/240V and 15 KW 208V units (field interchangeable).
- Aluminum-finned, copper clad steel sheath heating element has longer useful life, because of cooler sheath temperature and faster heat dissipation.
- 24V control transformer standard on most models, providing a safer and more accurate means of temperature control. 3KW and 5KW, 208-277V, have line voltage controls as standard (24V control available on made-to-order basis).
- Automatic reset linear thermal cut-out, capillary type, provides protection over entire length of element areas (Manual reset protection available on made-to-order basis).
- 2-speed fan selector switch (25 to 50 KW models).
- Fan delay feature eliminates cold drafts. Element heats up before fan cuts in, then fan continues to distribute heat after element shuts off.
- Ruggedly built, yet lighter weight for easier installation. No piping flues, valves, or traps.
- Individually adjustable discharge louvers to control air flow.
- Choice of optional diffusers for variety of air patterns, maximizing heat concentration and coverage in the vertical position.
- Meets all UL, NEC, and OSHA requirements.

*QMark reserves the right to make changes without prior notice.

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360°

How can we improve our Product Images?

Compare

Line Volt Mechanical Tstat, 120 to 277VAC

DAYTON

Submittal#8.4.16

Price
$50.76 / each

Deliver one time only

Auto-Reorder Every 1 Month

1 Add to Cart

+Add to list

Availability for Qty 1 Go

Shipping | Pick Up

Expected to arrive **Fri. Mar 13**

Ship to: **11710** (Change)

Add Repair & Replacement Coverage for $12.95 each.

Be the first to write a review | Ask & Answer

Item # **2E816** Mfr. Model # **2E816** NSN # **5930-01-381-7792**

UNSPSC # **41112209** Catalog Page # **4220** Shipping Weight **1.05 lbs.**

Country of Origin **China** | *Country of Origin is subject to change.*

Note: Product availability is real-time updated and adjusted continuously. The product will be reserved for you when you complete your order. More

Technical Specs

Item	**Line Volt Mechanical Tstat**
Switch Type	**SPDT**
Switch Action	**Open/Close on Rise**
Number of Switches	**1**
Control Range	**-10 Degrees to 100 Degrees F**
Differential	**6 to 8 Degrees F**
Height	**5-1/2"**
Width	**2"**
Depth	**2"**
Sensor Type	**Bi-Metal**
Features	**Ventilation Control**

Back to Top

For Use With	**Agricultural, Commercial and Industrial Applications**
Color	**Gray**
Application	**Heating and Cooling**
Voltage Range	**120 to 277VAC**
Inductive Amps @ 120V	**13.8A**
Inductive Amps @ 240V	**10A**
Full Load Amps @ 120V	**15A**
Full Load Amps @ 240VAC	**10A**
Contact Rating Resistive @ 120V	**22A**
Contact Rating Resistive @ 240V	**22A**
Standards	**UL**

How can we improve our Product Images?

Compare

Line Volt Mechanical Tstat, 120 to 277VAC

DAYTON

Submittal#8.4.17

Price
$47.48 / each

Deliver one time only

Auto-Reorder Every 1 Month

1 Add to Cart

+Add to list

Availability for Qty 1 Go

Shipping | Pick Up

Expected to arrive **Mon. Mar 16**

Ship to: **11710** (Change)

Add Repair & Replacement Coverage for $12.95 each.

Be the first to write a review | Ask & Answer

Item # **2E815** Mfr. Model # **2E815** NSN # **5930-01-378-1780**

UNSPSC # **41112209** Catalog Page # **4220** Shipping Weight **0.9 lbs.**

Country of Origin **China** | *Country of Origin is subject to change.*

Note: Product availability is real-time updated and adjusted continuously. The product will be reserved for you when you complete your order. More

Technical Specs

Item	**Line Volt Mechanical Tstat**
Switch Type	**SPST**
Switch Action	**Open on Rise**
Number of Switches	**1**
Control Range	**-10 Degrees to 100 Degrees F**
Differential	**6 to 8 Degrees F**
Height	**5-1/2"**
Width	**2-13/100"**
Depth	**2-63/100"**
Sensor Type	**Bi-Metal**
Features	**Commercial**
For Use With	**Agricultural, Commercial and Industrial Applications**

Color	**Gray**
Application	**Heating Only**
Voltage Range	**120 to 277VAC**
Inductive Amps @ 120V	**13.8A**
Inductive Amps @ 240V	**10A**
Full Load Amps @ 120V	**15A**
Full Load Amps @ 240VAC	**10A**
Contact Rating Resistive @ 120V	**22A**
Contact Rating Resistive @ 240V	**22A**
Includes	**Contacts that Open on Temperature Rise for Heating Applications**
Standards	**CSA**

Back to Top

SEA BOX®

Double Doors Both Ends Standard
20’ x 8’ 6” Dry Freight ISO Cargo Container

Submittal#8.4.18

SB862.6
Double Doors Both Ends Standard
20’ x 8’ 6” Dry Freight ISO Cargo Container

112811-R00

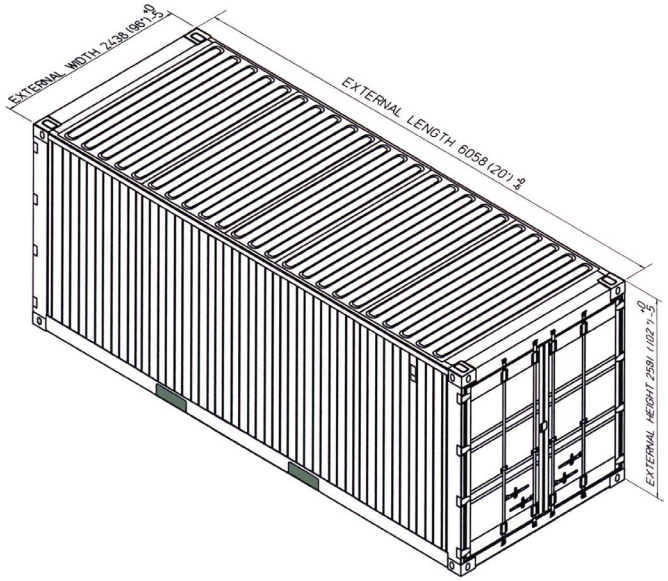
PRODUCT FEATURES

STANDARD FEATURES

- Corrugated steel sides, roof + swing doors on both ends
- (2) way laden forklift pockets
- 1 1/8” thick marine plywood floors, forklift tested to 16,000 lbs per 44 square inches
- Wall tie down steel lashing rings, 6,000 lbs. cap. each (24 total)
- Door corner post tie downs, (20) total = restraint system, shoring slot will support 2” x 6” lumber
- Vents, (2) each

OPTIONAL FEATURES

- Manifest box (2) each
- 2nd set unladen forklift pockets
- 383 Green exterior CARC paint



ALL NEW CONTAINERS ARE MANUFACTURED TO THE LATEST ISO STANDARD

	LENGTH		HEIGHT		WIDTH		DOOR OPENING	
	Exterior	Interior	Exterior	Interior	Exterior	Interior	Height	Width
Ft in	19’ 10 1/2”	19’ 2 1/16”	8’ 6”	7’ 10 1/4”	8’ 0”	7’ 8 1/2”	7’ 5 5/8”	7’ 8 1/8”
Metric	6,058	5,844	2,591	2,394	2,438	2,350	2,276	2,340

	TARE WEIGHT	PAYLOAD	GROSS WEIGHT	CUBIC CAPACITY
Lbs	5,450	47,460	52,910	1,161 Cu.Ft.
Kgs	2,472	21,528	24,000	32.8 Cu.M.

ISO 9001:2008

CERTIFIED QUALITY MANAGEMENT SYSTEM

GSA CONTRACT # GS-02F-0024P Advantage!™

ALL DIMENSIONS AND WEIGHTS ARE NOMINAL AND SUBJECT TO MINOR VARIATIONS THAT MAY OCCUR DURING THE MANUFACTURING PROCESS

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www.seabox.com

Retro-FM

Submittal#9.3

Below are several downloadable documents about Heat-Line:

Product Information

Retro-FM is a tubular self-regulating heating system designed for freeze protection for pressurized sewage and grey water force mains and large diameter pressurized pipes. Retro-FM is easily installed in existing problematic pipes without the need to excavate. Insulation and thermostatic controls can be added to optimize energy efficiency as required.

The Retro-FM is constructed with Heat-Line certified, self-regulating heating cable system installed inside ½" HDPE tube with factory applied fusion end-seal. The system is manufactured to a predetermined length and supplied complete with necessary plumbing components.

Product Application

Retro-FM is supplied job-ready with a 1 inch Brass MIP staged fitting to quickly interface into force main T fittings.

Retro-FM is custom manufactured to specified lengths and comes with a 20 foot SJEOOW hard usage power supply lead, with (GFC) or without (CS) integral ground fault circuit protection.

Retro-FM is designed to freeze protect many large diameter pressurized pipe systems which contain fluids that are compatible to be in contact with polyethylene. Retro-FM employs Heat-Line self-regulating heating cable factory installed inside HDPE tube and fusion end sealed. The purpose of the HDPE tube is to provide a barrier from fluids while providing extremely efficient freeze protection. The system will push inside most pipes. For long distances Retro-FM can be drawn in with a fish tape or rope.

The self-regulating heating cable technology renders the system safe to use with all metal and non-metal pipes. Even if the pipe is dry, the self-regulating heating cable presents no danger of over-heating, making it suitable for pipes that drain back or are periodically dry.

Retro-FM is the only heating cable system designed to internally protect pressurized waste pipes. These applications include but are not limited to rural and municipal sewage force mains.

Retro-FM can be used as a system to prevent freezing or as a precautionary system to use only if a freeze up occurs. The Retro-FM is also a fully serviceable product. If a blockage occurs, the entire system can be removed and re-installed.

For non-pressurized pipe systems, please see RETRO-DWS.
For new or exposed pipe systems also see EXT5R systems.

When ordering Retro-FM you will need to know the diameter of the pipe and length of heating cable that is required.

Important Considerations

Retro-FM defends against many various and difficult freezing processes and conditions. The use of this product and its compatibility with a particular application is at the complete discretion of the user. The possibility exists that this product may cause an obstruction, especially where foreign objects or solids may flow in direct contact with it. The product is designed to be serviceable and if this is a concern we would recommend a service schedule.

Specifications

- cCSAus approved heating cable (Canada and USA)
- 120 Volt systems - 5watt /ft. at 50°F, maximum length 220 ft
- 240 Volt systems - 5watt /ft. at 50°F, maximum length 300'
- 27 milliamp ground fault circuit interrupter plug-in device (with GFC model only)
- Minimum pipe size required is 2" ID.

Benefits of Heat-Line

- cCSAus approved heating cable (Canada and USA)
- 5 year limited warranty
- Most reliable and energy efficient system on the market
- Can be fully insulated to increase energy efficiency
- Easily and quickly installed inside most existing pipes without their removal
- Can be installed inside metallic and non-metallic pipes
- Provides reliable freeze protection of many pipe diameters
- Will never melt or burnout the pipe, even if the pipe is dry
- Long length systems available
- Can be used with various control devices including timers and thermostats
- Ground fault protection is integral to the system
- Simply plugs into a 120V or 240V receptacle (GFC model only). No extra electrical work is required
- No other product combines these features or offers the reliability and flexibility

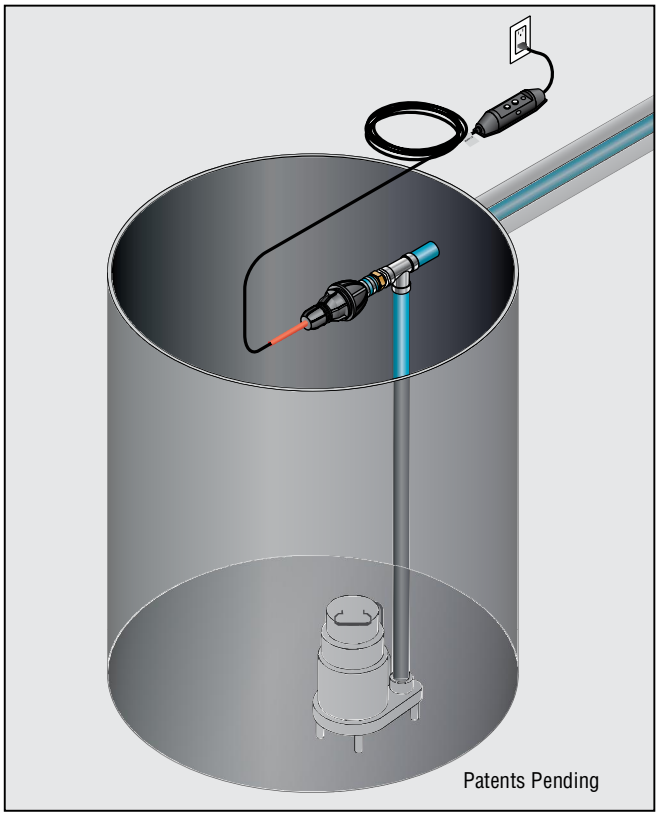
Included in a Retro-DWS

- Factory finished, self-regulating heating cable tube set
- 27 milliamp GFCI (ground fault circuit interrupter) electrical plug in device (GFC model only)

Retro-FM™

Force Main and Large Diameter Pipe Freeze Protection

Installation Instructions



Kit Description

Retro-FM is a tubular self-regulating heating system designed for use in pressurized sewage and grey water force mains, as well as other large diameter pipe systems. The entry fitting is pressure rated and CSA certified for this use. The tubular core is constructed of HDPE (high density polyethylene) and will push inside most pipes for long distances. They can also be drawn in with a fish tape.

Retro-FM utilizes a conductive polymer tubular heater technology which provides a barrier from the fluids while providing extremely efficient freeze protection. Retro-FM can be used as a system to prevent freezing or as a precautionary system. If the system freezes, Retro-FM can be energized to begin the thawing process.

Retro-FM is supplied job ready with a 1 inch brass MIP staged fitting and a 1 inch FIP x 2 inch MIP PVC reducing bushing to quickly interface into force main Tee fittings. Supplied with a 20 foot electrical cold lead. Available with Ground-Fault Protection (GFCI) or Cord-Set (CS) both in 120 volt and 240 volt.

Tools Required

- Adjustable wrench
- Pump pliers

Additional Materials Required

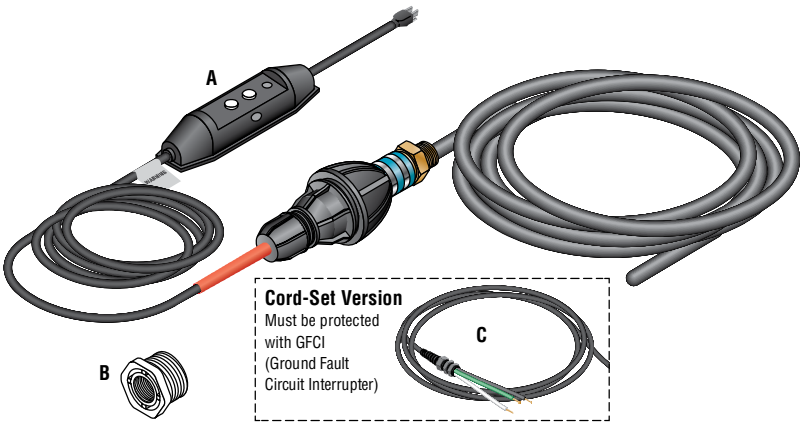
- Teflon tape or thread sealant
- Reduction bushings and fitting components as required

Approvals

Heating Cable	C SP US	LR85446 CSA 2E, 3A, 3B, 3C, 3D TYPE A (USA)
Pipe		NSF PE 4710 ASTM 2737

Kit Contents

Item	Qty	Description
A	1	Retro-FM –Predetermined length (GFC shown)
B	1	1" FIP x 2" MIP PVC reducing bushing
C	1	Optional Cord-Set (CS) power connection



Optional Accessories

- MilliAmp MA-10 electrical equipment protection device (GFCI/ELCI)
- HLJ-Stat 120V thermostat device
- GF-Stat 120V/240V thermostat device
- Closed cell pipe foam insulation for various pipe sizes

⚠ WARNING:

Important Safety Instructions and Rules for safe Installation and Operation

FIRE AND SHOCK HAZARD. This component is an electrical device which must be installed properly. Read and follow these rules and instructions carefully. Failure to follow them could result in serious bodily injury and/or property damage.

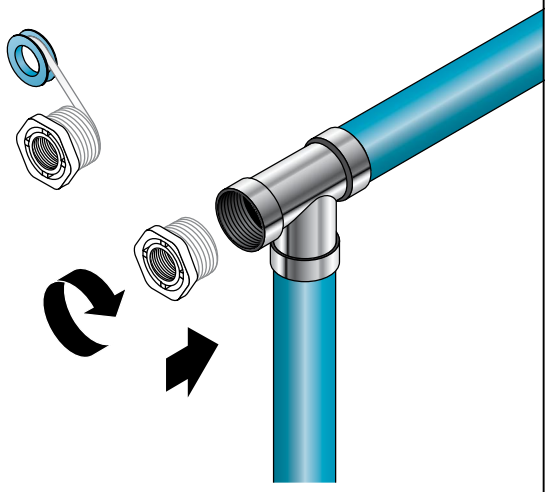
WHEN PERFORMING WORK OR REPAIRS ON YOUR WATER SYSTEM BE SURE TO UNPLUG YOUR HEAT-LINE SYSTEM FROM THE POWER SUPPLY.

- Check your local building, plumbing and electrical codes before installing. You must comply with their rules. Retro-FM meets cCSAus codes for use in Canada and the United States.
- Before installing this product have the electrical outlet checked by an electrician to make sure it is properly installed and grounded in accordance with your local Electrical Code.
- Before installing or servicing your Retro-FM **BE CERTAIN** that the power source is disconnected.
- Do not use extension cords.
- This product is designed to keep drains from freezing in serious climate conditions. The Retro-FM tube may obstruct certain materials, especially solids in the drains so a service schedule for proper maintenance is recommended. **The use of this product is at the sole discretion of the user. Heat-Line will not be liable for obstructions or blockages that may occur in some situations.**
- Never tamper with or alter the electrical apparatus associated with your Heat-Line system.

Retro-FM Installation Instructions

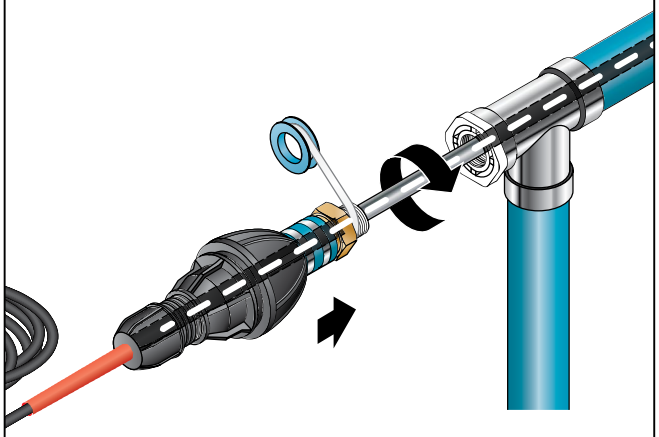
1

- Using the provided PVC reducing bushing, install into threaded Tee to accept 1-inch MIP Retro-FM fitting. If the provided PVC reducing bushing is not suitable determine and install required bushing.
- Use appropriate Teflon tape or thread sealants.



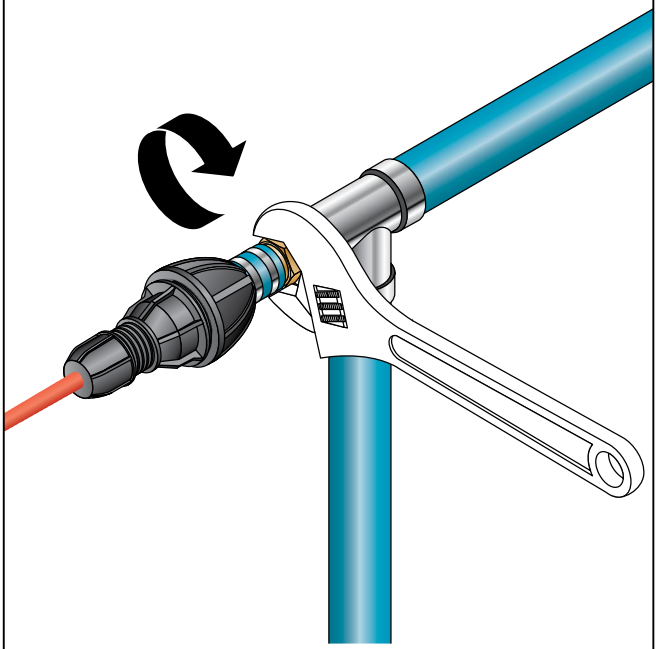
2

- Push or draw in Retro-FM tubular heater.
- Use appropriate Teflon tape or thread sealants and apply directly to 1 inch Brass MIP staged fitting.



3

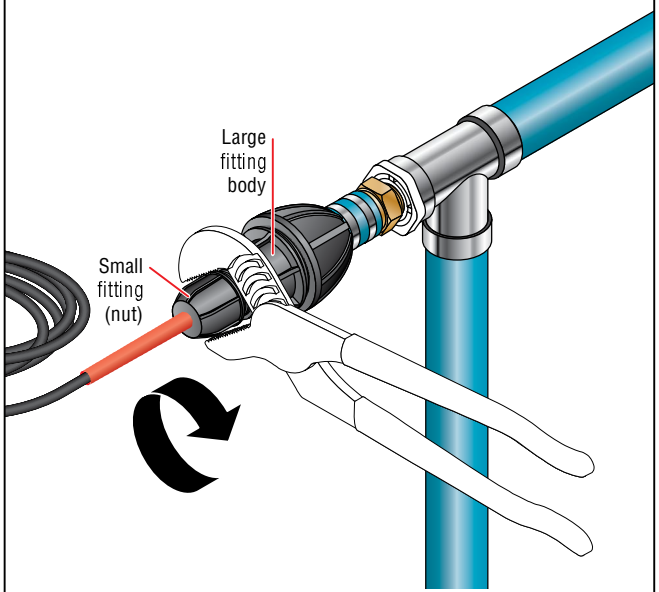
- Tighten 1 inch brass MIP staged fitting with a wrench.
- Large fitting body should rotate around tubular heater as the brass MIP fitting tightens.



4

- Engage small fitting (nut) to large fitting body and tighten with a pump plier.

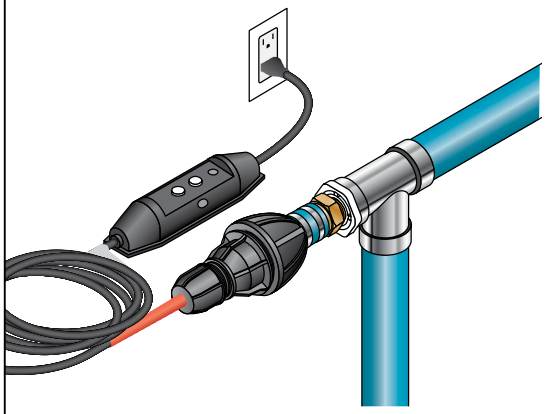
CAUTION: It is an O-ring seal, **DO NOT** over-tighten.



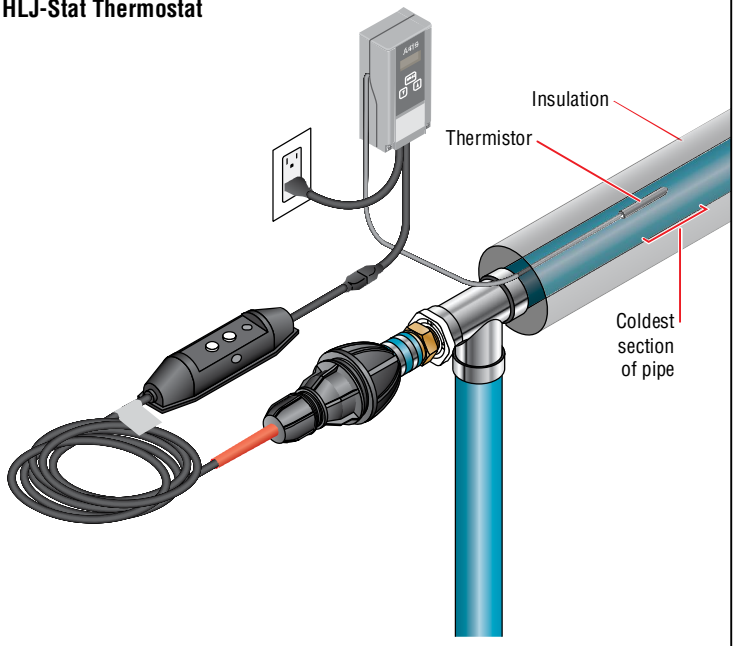
5

- In accordance with standard industry practices test the integrity of the seal.
- Plug in heater and Test/Reset GFCI located in cord set and or GFCI located in Heat-Line accessory.

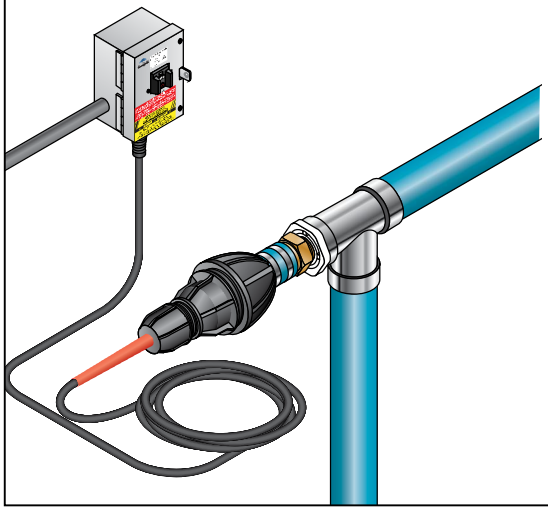
Typical Retro-FM-GFC Model Installation



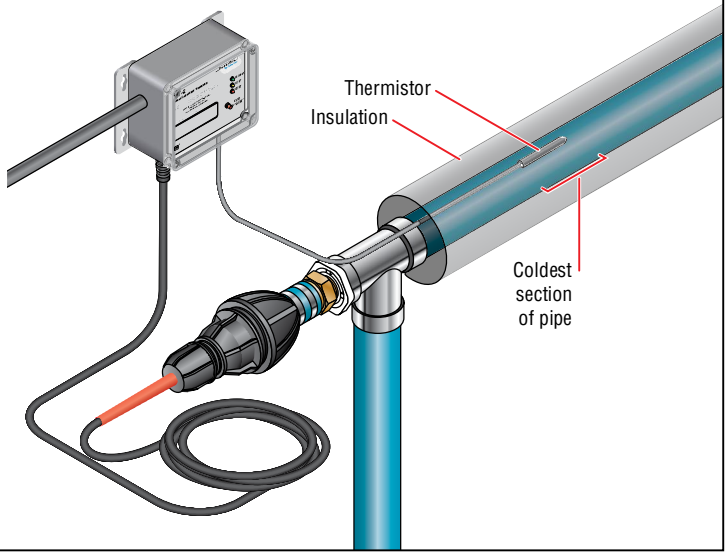
Retro-FM-GFC Installation with Heat-Line HLJ-Stat Thermostat



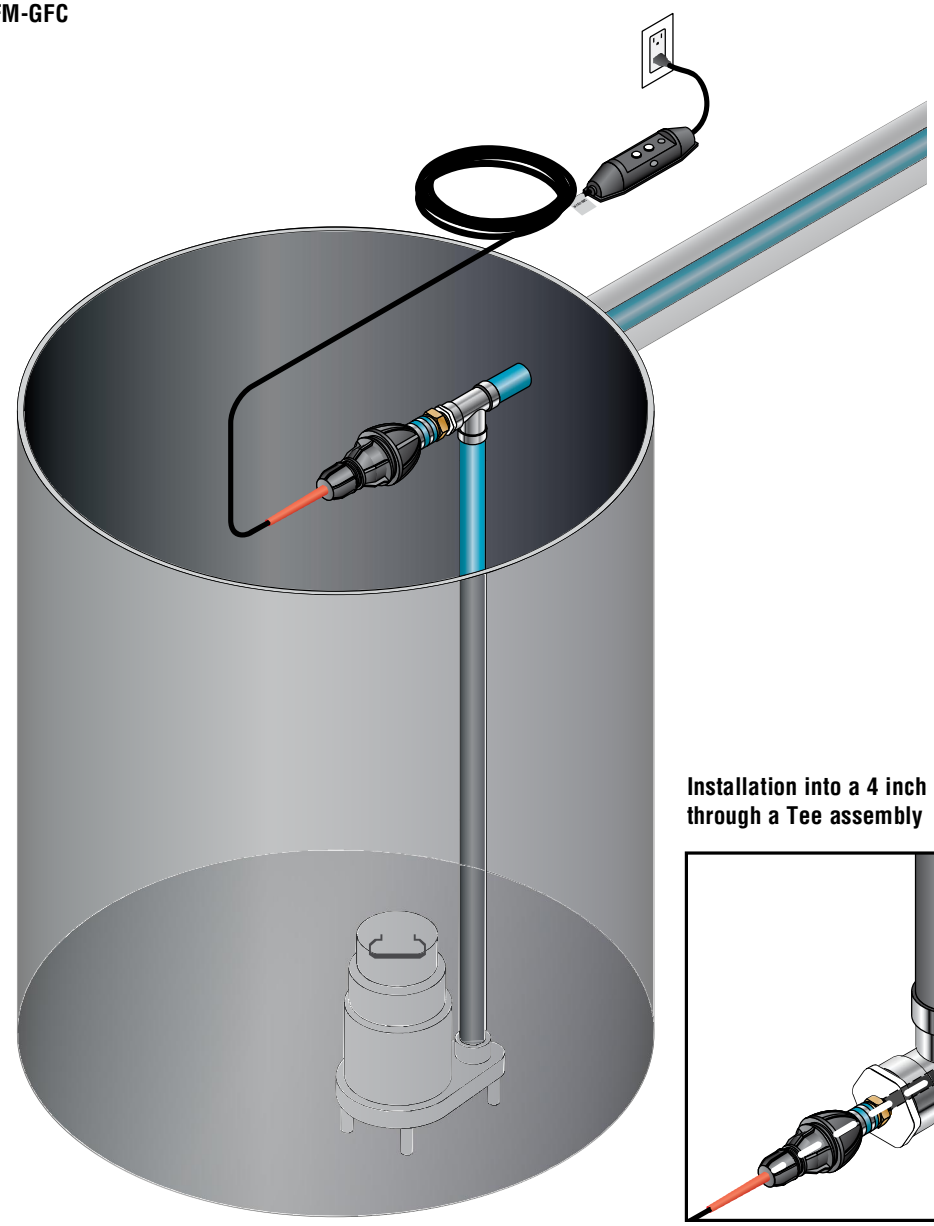
Retro-FM-CS Installation with Heat-Line MilliAmp GFCI/ELCI



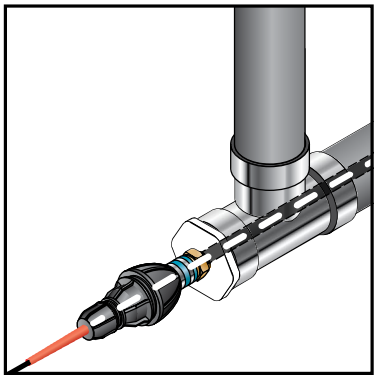
Retro-FM-CS Installation with Heat-Line GF-Stat Thermostat with Built in GFCI/ELCI



Typical Sewage Basin Installation with Retro-FM-GFC



Installation into a 4 inch pipe through a Tee assembly



Heat-Line
A Division of Christopher MacLean Ltd.
1095 Green Lake Road
Carnarvon, ON
Canada K0M 1J0
Tel: (705) 754-4545
(800) 584-4944
Fax: (705) 754-4567
info@heatline.com
www.heatline.com

SUBMITTAL FOR CHARLOTTE PIPE®
PVC SCHEDULE 80 PRESSURE PIPE AND FITTING SYSTEM

Date: _____

Job Name: _____ Location: _____

Engineer: _____ Contractor: _____

Scope:
This specification covers PVC Schedule 80 pipe and fittings for pressure applications. This system is intended for pressure applications where the operating temperature will not exceed 140° F.

Specification:
Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a cell class of 12454 as identified in ASTM D 1784.

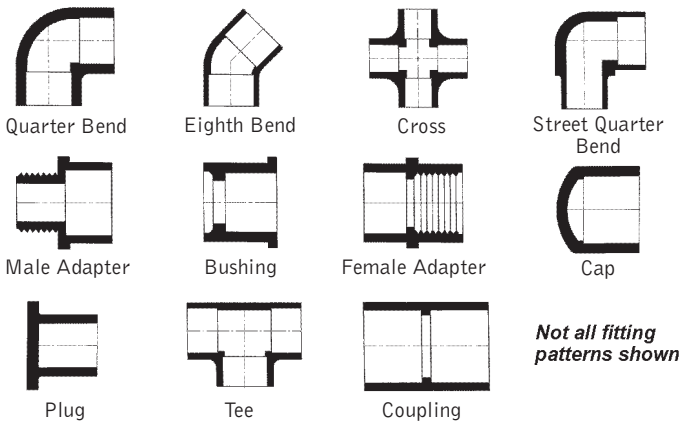
PVC Schedule 80 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785. Injection molded PVC Schedule 80 fittings shall conform to ASTM D 2467. PVC Schedule 80 threaded fittings shall conform to ASTM D 2464. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. All pipe and fittings shall be manufactured in the United States. Pipe and fittings shall conform to NSF International Standard 61 or the health effects portion of NSF Standard 14.

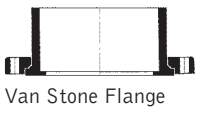
Installation:
Installation shall comply with the latest installation instructions published by Charlotte Pipe and Foundry and shall conform to all applicable plumbing, fire, and building code requirements. Buried pipe shall be installed in accordance with ASTM F 1668 and ASTM D 2774. Solvent cement joints shall be made in a two-step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire-stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with PVC compounds. The system shall be hydrostatically tested after installation. **WARNING!** Never test with or transport/store compressed air or gas in PVC pipe or fittings. Doing so can result in explosive failures and cause severe injury or death.

Referenced Standards:

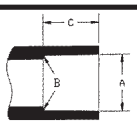
ASTM D 1784: Rigid Vinyl Compounds
ASTM D 1785: PVC Plastic Pipe, Schedule 80
ASTM D 2464 or D 2467: PVC Threaded Fittings, Schedule 80
ASTM D 2467: PVC Socket Fittings, Schedule 80
ASTM D 2564: Solvent Cements for PVC Pipe and Fittings
ASTM D 2774: Underground Installation of Thermoplastic Pressure Piping
ASTM F 1668: Procedures for Buried Plastic Pipe
NSF Standard 14: Plastic Piping Components & Related Materials
NSF Standard 61: Drinking Water System Components–Health Effects

MADE IN U.S.A.





Schedule 80 Tapered Socket Dimensions



PVC SCHEDULE 80 - ASTM D 2467

Nominal Size	Schedule 80 and Schedule 40 Socket Diameter Entrance A	Bottom B	Tolerance	Schedule 80 Socket Length C (Minimum)	Schedule 40 Socket Length C (Minimum)
½	0.848	0.836	±0.004	0.875	0.688
¾	1.058	1.046	±0.004	1.000	0.719
1	1.325	1.310	±0.005	1.125	0.875
1¼	1.670	1.655	±0.005	1.250	0.938
1½	1.912	1.894	±0.006	1.375	1.094
2	2.387	2.369	±0.006	1.500	1.156
2½	2.889	2.868	±0.007	1.750	1.750
3	3.516	3.492	±0.008	1.875	1.875
4	4.518	4.491	±0.009	2.250	2.000
6	6.647	6.614	±0.011	3.000	3.000
8	8.655	8.610	±0.015	4.000	4.000
10	10.780	10.735	±0.015	5.000	5.000
12	12.780	12.735	±0.015	6.000	6.000

PIPE REFERENCE GUIDE

Product	Sizes Available															
	¼	⅜	½	¾	1	1¼	1½	2	2½	3	4	6	8	10	12	14	16
PVC Schedule 80	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

PVC Schedule 80 Pipe

>> PVC Schedule 80 Pipe, Type 1, Grade 1 - Plain End

ASTM D 1784 & ASTM D 1785

PVC SCHEDULE 80 (GRAY)			PLAIN END			PVC 1120
PART NO.	NOM. SIZE	UPC # 611942-	AVG. OD (IN.)	MIN. WALL (IN.)	MAX WORK PRESSURE AT 23° C OR 73° F	WT. PER 100 FT. (LBS.)
PVC 10002	¼" x 20'	04920	0.540	.119	1130 PSI	10.0
PVC 10003	⅜" x 20'	04917	0.675	.126	920 PSI	13.8
PVC 10005	½" x 20'	03968	0.840	.147	850 PSI	20.3
PVC 10007	¾" x 20'	03969	1.050	.154	690 PSI	27.5
PVC 10010	1" x 20'	03970	1.315	.179	630 PSI	40.5
PVC 10012	1¼" x 20'	03973	1.660	.191	520 PSI	55.9
PVC 10015	1½" x 20'	03976	1.900	.200	470 PSI	67.7
PVC 10020	2" x 20'	03977	2.375	.218	400 PSI	93.6
PVC 10025	2½" x 20'	03978	2.875	.276	420 PSI	142.8
PVC 10030	3" x 20'	03979	3.500	.300	370 PSI	191.1
PVC 10040	4" x 20'	03980	4.500	.337	320 PSI	279.3
PVC 10060	6" x 20'	03981	6.625	.432	280 PSI	532.7
PVC 10080	8" x 20'	04175	8.625	.500	250 PSI	808.9
PVC 10100	10" x 20'	04768	10.750	.593	230 PSI	1199.3
PVC 10120	12" x 20'	04770	12.750	.687	230 PSI	1650.1
PVC 10140	14" x 20'	04816	14.000	.750	220 PSI	1930.0
PVC 10160	16" x 20'	04919	16.000	.843	220 PSI	2544.1

NSF Listed. Meets All Requirements of ASTM D 1784 and ASTM D 1785.

⚠ WARNING

Testing with or use of compressed air or gas in PVC / ABS / CPVC pipe or fittings can result in explosive failures and cause severe injury or death.

- NEVER test with or transport/store compressed air or gas in PVC / ABS / CPVC pipe or fittings.
- NEVER test PVC / ABS / CPVC pipe or fittings with compressed air or gas, or air over water boosters.
- ONLY use PVC / ABS / CPVC pipe or fittings for water or approved chemicals.
- Refer to warnings in PPFA User Bulletin 4-80 and ASTM D 1785.

PERFORMANCE PIPE
A DIVISION OF CHEVRON PHILLIPS CHEMICAL COMPANY LP

Submittal#10.2

PE 4710 (PE3408)
Energy - DriscoPlex® 6400 Series
PE4710 IPS Pipe Data

Pipe weights are calculated in accordance with PPI TR-7. Average inside diameter calculated using nominal OD and minimum wall plus 6% for use in estimating fluid flows. Actual ID will vary. When designing components to fit the pipe ID, refer to pipe dimensions and tolerances in applicable pipe specifications. Pressure Ratings are for water at 73.4° F. For other fluid and service temperature, ratings may differ. Refer to Engineering Manual for Chemical and Environmental Considerations.

Pressure		400 psi			317 psi			250 psi			200 psi			160 psi			125 psi			
Rating		DR 6.0			DR 7.0			DR 9.0			DR 11.0			DR 13.5			DR 17			
IPS Pipe Size	Nom OD (in)	Min Wall (in)	Avg ID (in)	Wgt (lbs/ft)	Min Wall (in)	Avg ID (in)	Wgt (lbs/ft)	Min Wall (in)	Avg ID (in)	Wgt (lbs/ft)	Min Wall (in)	Avg ID (in)	Wgt (lbs/ft)	Min Wall (in)	Avg ID (in)	Wgt (lbs/ft)	Min Wall (in)	Avg ID (in)	Wgt (lbs/ft)	IPS Pipe Size
1"	1.315	0.219	0.851	0.33	0.188	0.916	0.29													
1 1/4"	1.660	0.277	1.073	0.52	0.237	1.158	0.46	0.184	1.270	0.37	0.151	1.340	0.31	0.123	1.399	0.26				1 1/4"
1 1/2"	1.900	0.317	1.228	0.69	0.271	1.325	0.61	0.211	1.453	0.49	0.173	1.533	0.41	0.141	1.601	0.34				1 1/2"
2"	2.375	0.396	1.535	1.07	0.339	1.656	0.95	0.264	1.815	0.77	0.216	1.917	0.64	0.176	2.002	0.53	0.140	2.078	0.43	2"
3"	3.500	0.583	2.264	2.33	0.500	2.440	2.06	0.389	2.675	1.66	0.318	2.826	1.39	0.259	2.951	1.16	0.206	3.063	0.94	3"
4"	4.500	0.750	2.910	3.85	0.643	3.137	3.40	0.500	3.440	2.75	0.409	3.633	2.31	0.333	3.794	1.92	0.265	3.938	1.55	4"
6"	6.625	1.104	4.285	8.35	0.946	4.619	7.37	0.736	5.065	5.96	0.602	5.349	5.00	0.491	5.584	4.15	0.390	5.798	3.36	6"
8"	8.625	1.438	5.576	14.15	1.232	6.013	12.50	0.958	6.594	10.11	0.784	6.963	8.47	0.639	7.270	7.04	0.507	7.550	5.69	8"
10"	10.750	1.792	6.951	21.98	1.536	7.494	19.42	1.194	8.219	15.70	0.977	8.679	13.16	0.796	9.062	10.93	0.632	9.410	8.83	10"
12"	12.750	2.125	8.245	30.92	1.821	8.889	27.31	1.417	9.746	22.08	1.159	10.293	18.51	0.944	10.749	15.38	0.750	11.160	12.43	12"
14"	14.000				2.000	9.760	32.93	1.556	10.701	26.63	1.273	11.301	22.32	1.037	11.802	18.54	0.824	12.253	14.98	14"
16"	16.000				2.286	11.154	43.01	1.778	12.231	34.78	1.455	12.915	29.15	1.185	13.488	24.22	0.941	14.005	19.57	16"
18"	18.000				2.571	12.549	54.43	2.000	13.760	44.02	1.636	14.532	36.89	1.333	15.174	30.65	1.059	15.755	24.77	18"
20"	20.000				2.857	13.943	67.20	2.222	15.289	54.34	1.818	16.146	45.54	1.481	16.860	37.84	1.176	17.507	30.58	20"
22"	22.000				3.143	15.337	81.32	2.444	16.819	65.75	2.000	17.760	55.10	1.630	18.544	45.79	1.294	19.257	37.00	22"
24"	24.000				3.429	16.731	96.77	2.667	18.346	78.25	2.182	19.374	65.58	1.778	20.231	54.49	1.412	21.007	44.03	24"
26"	26.000							2.889	19.875	91.84	2.364	20.988	76.96	1.926	21.917	63.95	1.529	22.759	51.67	26"
28"	28.000							3.111	21.405	106.51	2.545	22.605	89.26	2.074	23.603	74.17	1.647	24.508	59.93	28"
30"	30.000							3.333	22.934	122.27	2.727	24.219	102.47	2.222	25.289	85.14	1.765	26.258	68.80	30"
32"	32.000										2.909	25.833	116.58	2.370	26.976	96.87	1.882	28.010	78.28	32"
34"	34.000										3.091	27.447	131.61	2.519	28.660	109.36	2.000	29.760	88.37	34"
36"	36.000										3.273	29.061	147.55	2.667	30.346	122.60	2.118	31.510	99.07	36"

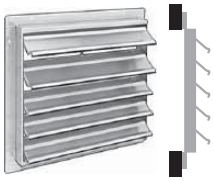
Pressure ratings are calculated using 0.63 design factor for HDS at 73°F as listed in PPI TR-4 for PE4710 materials. Temperature, chemical and environmental use considerations may require use of additional design factors.

Other Sizes and Dimensions Available

Performance Pipe, a division of
Chevron Phillips Chemical Company LP
PO Box 269006
Plano, TX 75026-9006
Phone: 800-527-0662
Fax: 972-599-7348

Wall Louvers

Movable-Blade Wall Louvers

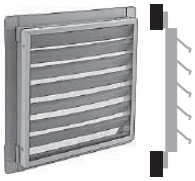


Surface Mount

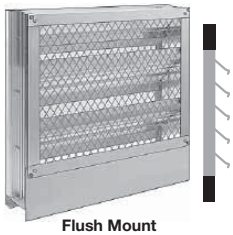
These gravity-operated louvers remain open only when air flows, preventing backdrafts. All have a flange with 1/4″ Ht. × 1/2″ Wd. slots (fasteners not included). Frame is 3″ deep and made of 0.037″ galvanized steel. Blades are 0.017″ thick aluminum. Louvers that fit 36 1/2″ and smaller openings are single panel; louvers that fit 42 1/2″ and larger openings are double panel. Maximum air velocity is 2,500 fpm. Temperature range is –40° to 180° F.

Fits Opening Wd.	Fits Opening Ht.	Overall Wd.	Overall Ht.		
Surface Mount					
10 1/2″	10 1/2″	13″	13″	20015K61	$37.11
12 1/2″	12 1/2″	15″	15″	20015K62	41.09
16 1/2″	16 1/2″	19″	19″	20015K63	46.50
18 1/2″	18 1/2″	21″	21″	20015K64	54.82
20 1/2″	20 1/2″	23″	23″	20015K65	63.46
24 1/2″	24 1/2″	27″	27″	20015K66	75.69
30 1/2″	30 1/2″	33″	33″	20015K67	90.29
36 1/2″	36 1/2″	39″	39″	20015K68	101.93
42 1/2″	42 1/2″	45″	45″	20015K72	129.88
48 1/2″	48 1/2″	51″	51″	20015K73	144.60
54 1/2″	54 1/2″	57″	57″	20015K74	220.26

Heavy Duty Fixed-Blade Wall Louvers



Surface Mount



Flush Mount

Constructed with a thick frame and blades, these louvers have a long service life.

Surface-mount louvers have a 1 1/2″ wide flange for mounting outside your wall. They're 1 3/4″ deep and have a 1/8″ thick frame. Blades are 1/16″ thick. They include a plastic insect screen.

Flush-mount louvers mount inside your wall. They're 4″ deep and include a bird screen. Blades are designed to direct water away from the louvers. *Extruded aluminum louvers* are 0.081″ thick. *Galvanized steel louvers* are 0.064″ thick.

Surface Mount

Fits Opening Wd.	Fits Opening Ht.	Overall Wd.	Overall Ht.	PVC	
12″	12″	13 3/4″	13 3/4″	20405K11	$95.00
12″	18″	13 3/4″	19 3/4″	20405K12	107.25
12″	24″	13 3/4″	25 3/4″	20405K13	143.75
14″	24″	15 3/4″	25 3/4″	20405K14	150.38

Flush Mount

Fits Opening Wd.	Fits Opening Ht.	Overall Wd.	Overall Ht.	Extruded Aluminum		Galvanized Steel	
18″	18″	17 1/2″	17 1/2″	2100K251	$169.29	2100K151	$194.17
24″	24″	23 1/2″	23 1/2″	2100K252	247.02	2100K152	228.57
24″	36″	23 1/2″	35 1/2″	2100K254	299.40	2100K154	296.43
36″	24″	35 1/2″	23 1/2″	2100K253	307.50	2100K153	295.24
36″	36″	35 1/2″	35 1/2″	2100K255	386.67	2100K155	377.98
36″	48″	35 1/2″	47 1/2″	2100K258	397.90	2100K158	383.20
48″	36″	47 1/2″	35 1/2″	2100K256	387.70	2100K156	383.80
48″	48″	47 1/2″	47 1/2″	2100K259	431.25	2100K159	416.79
60″	48″	59 1/2″	47 1/2″	———	———	2100K161	489.29
60″	60″	59 1/2″	59 1/2″	2100K264	591.47	2100K164	585.93

Corrosion-Resistant Movable-Blade Wall Louvers

Flush-Mount PVC

Surface-Mount Type 304 Stainless Steel

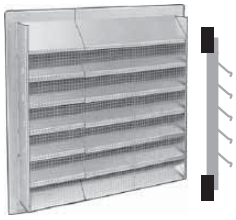
Able to withstand harsh environments, these louvers won't rust. They are gravity operated. The louvers remain open only when air flows, preventing backdrafts.

Flush-mount PVC louvers have a 1 3/4″ deep frame and 1/16″ thick blades. Louvers that fit 18″ and smaller openings are single panel; 24″ and higher are double panel. Max. air velocity is 1,200 fpm. Temperature range is 5° to 140° F.

Surface-mount Type 304 stainless steel louvers have a flange with 1/4″ dia. holes (fasteners not included). Frame is 2 3/8″ deep; blades are 0.019″ thick. They are single panel. Max. air velocity is 2,500 fpm. Temperature range is –20° to 200° F.

Fits Opening Wd.	Fits Opening Ht.	Overall Wd.	Overall Ht.		
Flush-Mount PVC					
12″	12″	11 7/8″	11 7/8″	19615K35	$80.62
16″	16″	15 7/8″	15 7/8″	19615K37	94.00
18″	18″	17 7/8″	17 7/8″	19615K39	96.75
24″	24″	23 7/8″	23 7/8″	19615K47	138.22
30″	30″	29 7/8″	29 7/8″	19615K53	166.11
36″	36″	35 7/8″	35 7/8″	19615K57	195.56
Surface-Mount Type 304 Stainless Steel					
12″	12″	15″	15″	6420T18	217.98
16″	16″	19″	19″	6420T22	263.96
18″	18″	21″	21″	6420T24	279.38
20″	20″	23″	23″	6420T26	321.77
24″	24″	27″	27″	6420T29	382.59
30″	30″	33″	33″	6420T33	428.00
36″	36″	39″	39″	6420T37	520.42

Adjustable-Width Fixed-Blade Wall Louvers

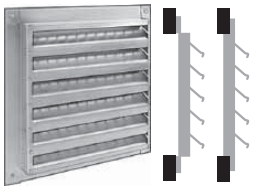


Recess Mount

Get an exact fit for your opening by sliding out the louver to the width you need. Made of corrosion-resistant aluminum, they have a 4″ deep frame (mounting fasteners included) and 0.04″ thick blades. Louvers include a galvanized steel bird screen.

Fits Opening Wd.	Fits Opening Ht.		
Recess Mount			
12″ to 18″	14″	1152T52	$99.02
18″ to 24″	18″	1152T54	136.02
21″ to 36″	30″	1152T58	242.02
24″ to 36″	36″	1152T63	295.00
36″ to 48″	48″	1152T61	379.27

Fixed-Blade Wall Louvers



Surface/Recess Mount

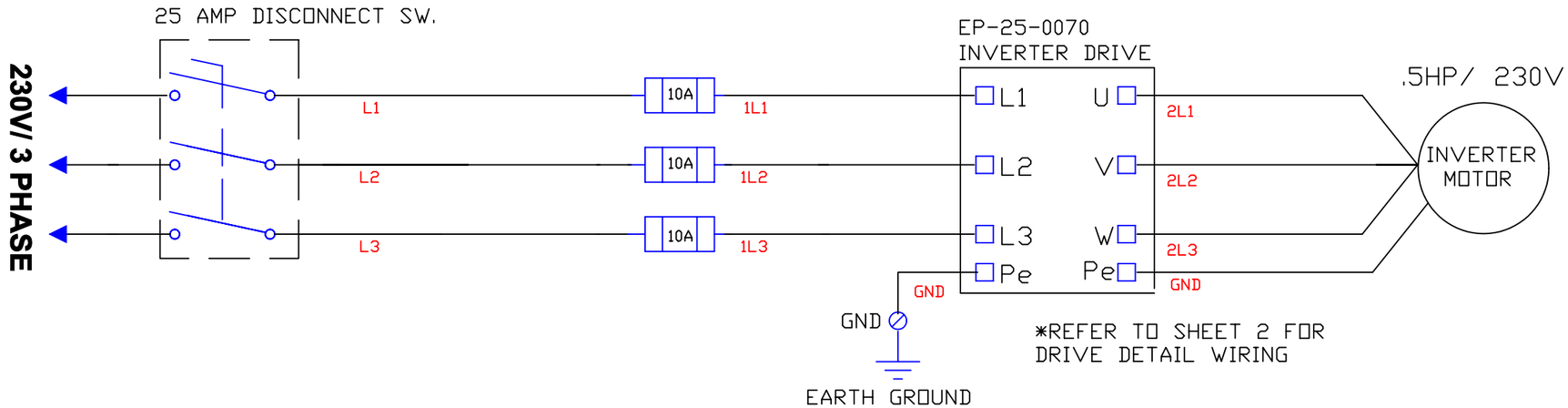
Always open, these are our most basic wall louvers. They surface or recess mount. All have a 1 1/4″ wide flange.

White plastic louvers have 1/16″ thick blades. Frame is 0.06″ thick and 1 3/8″ deep.

Aluminum louvers have 0.015″ thick blades. Frame is 0.04″ thick and 1 1/2″ deep.

SUBMITTAL #8.4.19

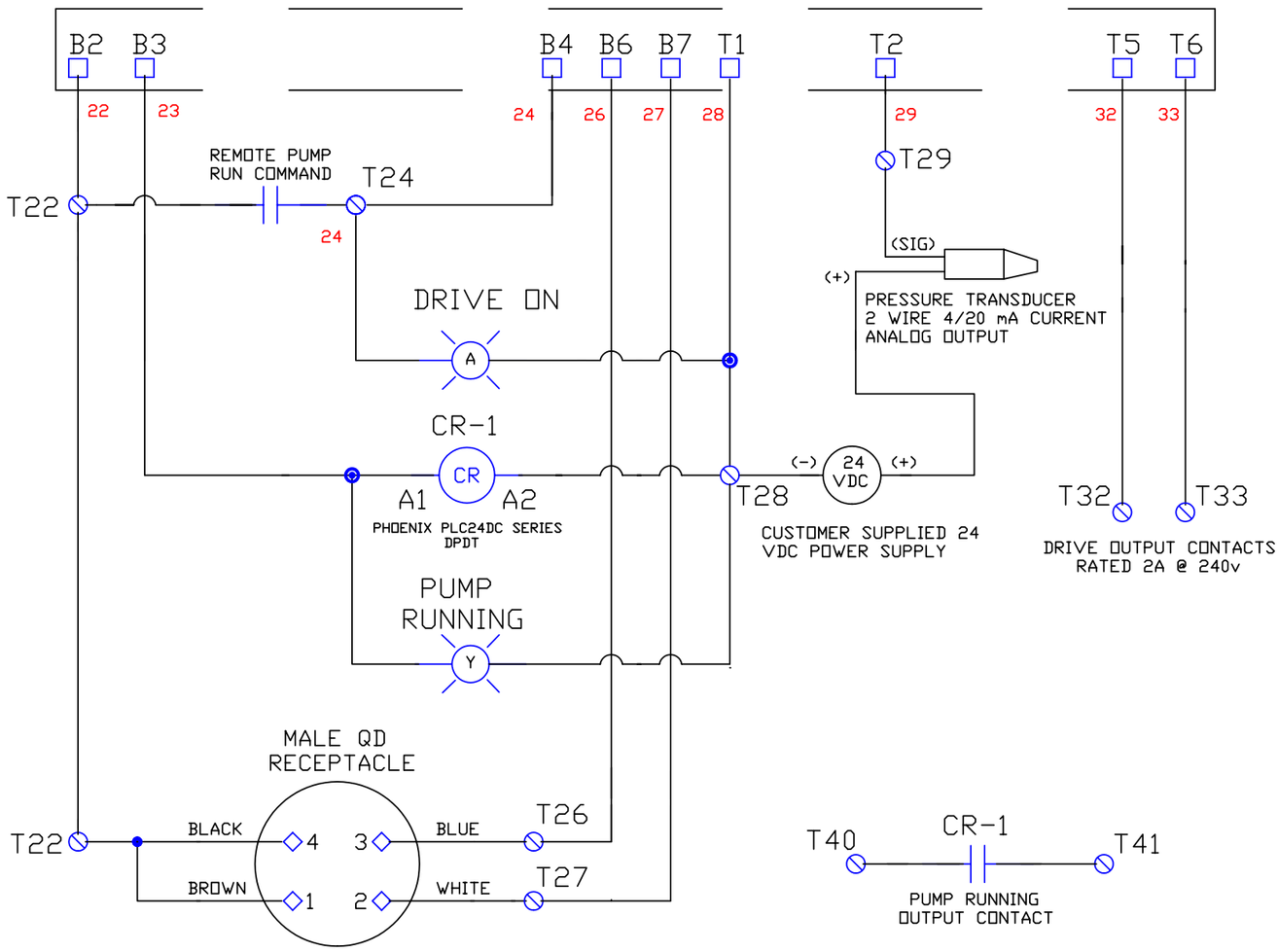
Fits Opening Wd.	Fits Opening Ht.	White Plastic Overall Wd.	White Plastic Overall Ht.			Aluminum Overall Wd.	Aluminum Overall Ht.	Aluminum Plain		Aluminum White Painted	
8″	8″	10 1/2″	10 1/2″	2038K1	$9.69						
12″	12″	14 1/2″	14 1/2″	2038K2	11.40	14 1/2″	14 5/8″	2038K14	$19.00	2038K61	$22.11
12″	18″	14 1/2″	20 1/2″	2038K3	15.54	14 1/2″	20 1/2″	2038K16	23.46	2038K62	26.60
14″	24″	16 3/4″	26 3/4″	2038K6	19.12	16 1/2″	26 3/8″	2038K59	31.66	2038K63	36.60
18″	24″	20 3/4″	26 3/4″	2038K7	28.60	20 1/2″	26 3/8″	2038K21	41.37	2038K64	44.77
24″	30″	———	———	———	———	26 1/2″	32 1/4″	2038K23	59.94	2038K65	69.11



CONTINUE TO SHEET 2

DATE: 5/4/15	BY: SA	DRAWING NO: **300-CP324K** SHEET 1 OF 2	CUSTOMER: AEC/NATIONAL GRID	**BLACKHAWK ENVIRONMENTAL COMPANY** 21W 211 Hill Ave. Glen Ellyn, IL. 60137 Ph.630/469-4916 Fx.630/469-4896
REVISION:	APPROVED:			

EP-25-0070 INVERTER DRIVE WIRING DETAIL

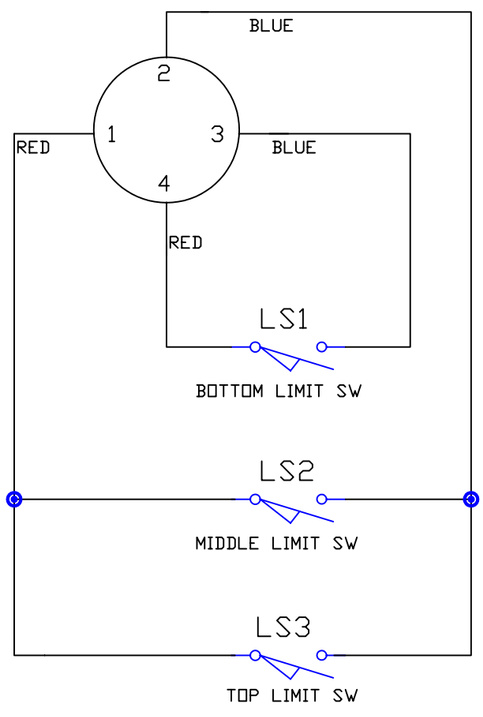


FIELD TERMINAL STRIP CONNECTION SUMMARY

GND	EARTH GROUND
T22	BROWN & BLACK MALE QD RECEPT/ REMOTE PUMP RUN CONTACT
T24	REMOTE PUMP RUN COMMAND CONTACT
T26	BLUE MALE QD RECEPTACLE
T27	WHITE MALE QD RECEPTACLE
T28	0v COMMON (SPEED REFERENCE)
T29	4-20mA ANALOG SPEED REFERENCE
T32	"DRIVE FAULT" OUTPUT CONTACT
T33	CONTACT RATED 2A @ 240v
T40	LOCAL PUMP RUN OUTPUT CONTACT
T41	CONTACT RATED 2A @ 240v

*ALL LIMIT SWITH WIRING MUST BE ISOLATED FROM ALL CONTROL & POWER WIRING . A SEPERATE CONDUIT IS REQUIRED

BLACKHAWK 15' LIMIT SWITCH WIRING HARNESS/ FEMALE DISCONNECT PLUG

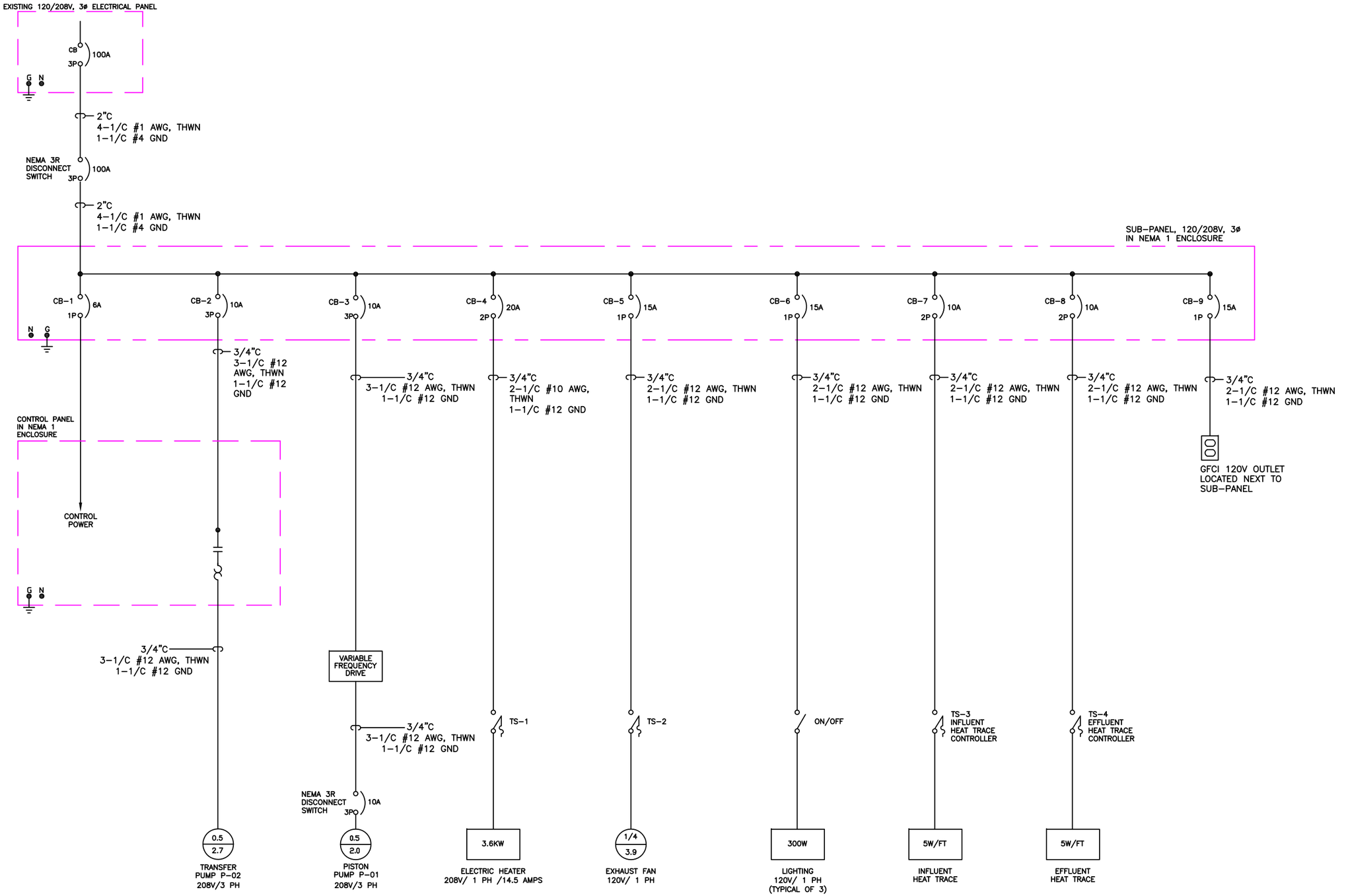


*ALL LIMIT SWITH WIRING MUST BE ISOLATED FROM ALL CONTROL & POWER WIRING . A SEPERATE CONDUIT IS REQUIRED

DATE: 5/4/15
REVISION:
BY: SA
APPROVED:
DRAWING NO: 300-CP324K
SHEET 2 OF 2
CUSTOMER: AECOM/NATIONAL GRID

BLACKHAWK ENVIRONMENTAL COMPANY
21W 211 Hill Ave. Glen Ellyn, IL. 60137
Ph.630/469-4916 Fx.630/469-4896

SUBMITTAL #8.8



LEGEND:

- CB-X, 1P, 20A — CIRCUIT BREAKER OR DISCONNECT SWITCH (RATINGS AS SHOWN)
- FULL VOLTAGE NON-REVERSING MOTOR STARTER
- OVERLOAD RELAY
- HP / FLA — MOTOR LOAD
- SINGLE POLE SWITCH
- THERMOSTAT

DRAWN/REVISED BY: JW
REVISION DATE: MARCH 24, 2015

FIGURE: 3

DRAWING TITLE

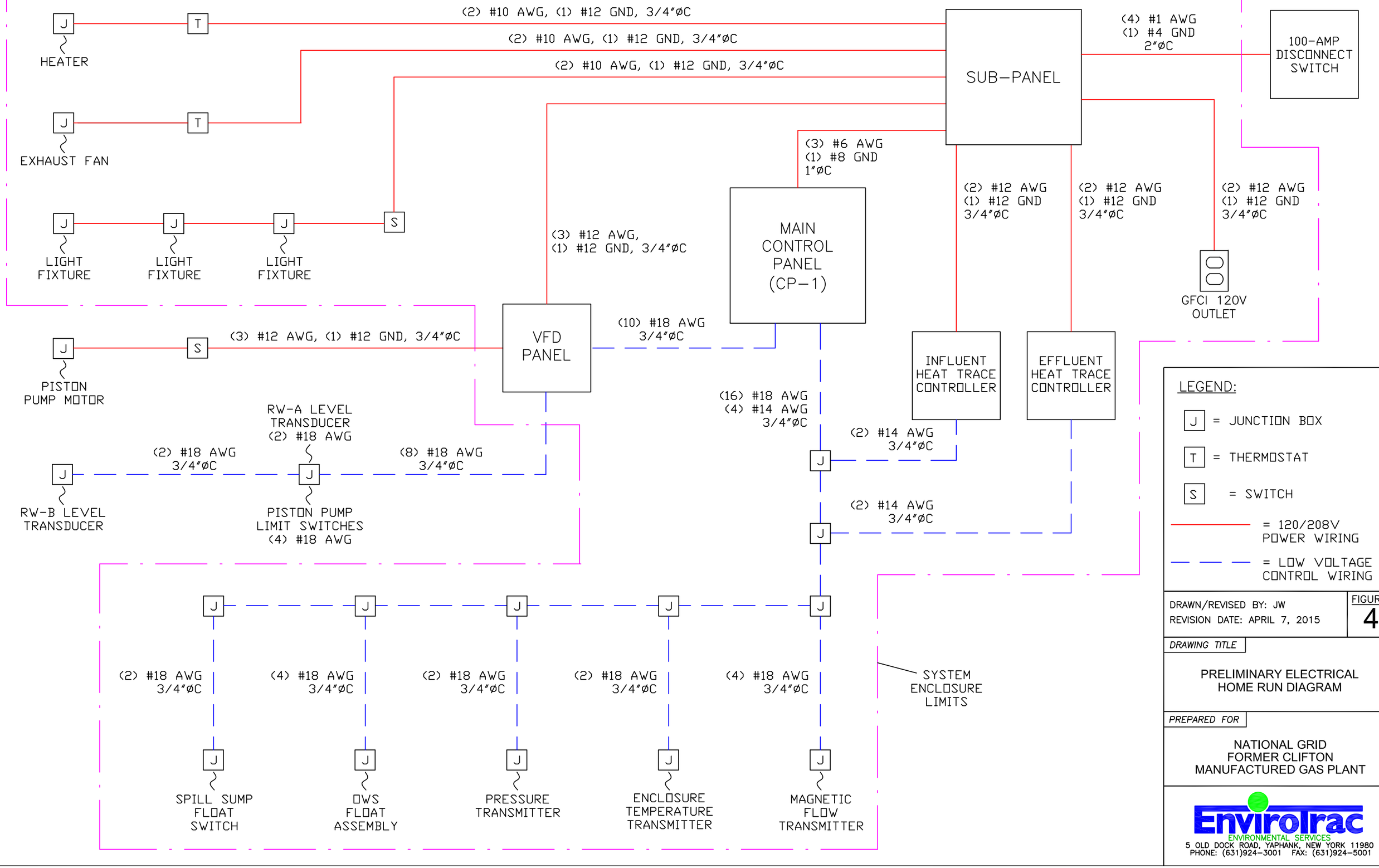
PRELIMINARY ELECTRICAL SINGLE LINE DIAGRAM

PREPARED FOR

NATIONAL GRID
FORMER CLIFTON
MANUFACTURED GAS PLANT

EnviroTrac
ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980
PHONE: (631)924-3001 FAX: (631)924-5001

SUBMITTAL #8.9



LEGEND:

- J = JUNCTION BOX
- T = THERMOSTAT
- S = SWITCH
- = 120/208V POWER WIRING
- = LOW VOLTAGE CONTROL WIRING

DRAWN/REVISED BY: JW
REVISION DATE: APRIL 7, 2015

FIGURE: 4

DRAWING TITLE

PRELIMINARY ELECTRICAL
HOME RUN DIAGRAM

PREPARED FOR

NATIONAL GRID
FORMER CLIFTON
MANUFACTURED GAS PLANT

EnviroTrac
ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980
PHONE: (631)924-3001 FAX: (631)924-5001

Project: National Grid - Clifton Former MGP Site
Submittal #8.12 P&T System Cause and Effect Spreadsheet

Tag No.	Description	Event	Set Point	Effect	Displays/Alarms		
					Local/Field	HMI Treatment Bldg.	Data Log
Level Instrumentation in wells COU1-RWA and COU1-RWB - Option 1							
LT-100A	Level transducer in well COU1-RWA for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWA	≥ Field selectable water level	Energize Piston Pump P-01		D	X
			< Field selectable water level	De-energize Piston Pump P-01			
LT-100B	Level transducer in well COU1-RWB for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWB				D	X
Level Instrumentation in wells COU1-RWA and COU1-RWB - Option 2							
LT-100A	Level transducer in well COU1-RWA for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWA				D	X
LT-100B	Level transducer in well COU1-RWB for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWB	≥ Field selectable water level	Energize Piston Pump P-01		D	X
			< Field selectable water level	De-energize Piston Pump P-01			
Level Instrumentation in wells COU1-RWA and COU1-RWB - Option 3							
LT-100A	Level transducer in well COU1-RWA for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWB minus Level in well COU1-RWA	≥ Field selectable water level	Energize Piston Pump P-01		D	X
			< Field selectable water level	De-energize Piston Pump P-01			
LT-100B	Level transducer in well COU1-RWB for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWB				D	X
Level Instrumentation in Oil/Water Separator (OW-01)							
LSHH-102	High High Level switch in OW-01	High-High level in OW-01	≥ 28"	De-energize P-01, De-energize P-02, Energize OW-01 High-High Level Alarm until level recedes to low level.		A	X
LSH-103	High Level switch in OW-01	High level in OW-01	≥ 24"	Energize P-02.			X
LSL-104	Low Level switch in OW-01	Low level in OW-01	< 6"	De-energize P-02.			X
Level Instrumentation in Spill Containment Sump (S-01)							
LSHH-121	High High Level switch in S-01	High-High level in OW-01	≥ 2"	De-energize P-01, De-energize P-02, Energize S-01 High-High Level Alarm		A	X
Pressure Instrumentation on Discharge Pump (P-02)							
PT-107	Pressure transmitter in P-02 discharge pipeline for continuous measurement of pressure	Pressure in pipeline before bag filters.	≥ Field selectable pressure levels PSH & PSHH	PSH - Energize High Pressure Alarm		D,A	X
				PSHH - De-energize P-01, De-energize P-02, Energize High High Pressure Alarm		D,A	X
Flow Instrumentation on Discharge Pump (P-02)							
FIT-119	Indicating Flow meter/transmitter in P-02 discharge pipeline for continuous measurement of flow total and flowrate.	Flow and total in discharge pipeline after cartridge filters.				D	X
Temperature Instrumentation in System Enclosure							
TT-120	Temperature transmitter for continuous measurement of system enclosure interior temperature.	System enclosure internal temperature.	< Field selectable temperature set point	De-energize P-01, Energize Low Temperature Alarm		D,A	X
Heat Trace Monitors							
HTM-122	Heat trace thermostat with alarm output for influent piping heat trace	Influent Heat Trace Failure	Heat Trace Controller Alarm	De-energize P-01, Energize Low Temperature Alarm		A	X
HTM-123	Heat trace thermostat with alarm output for effluent piping heat trace	Effluent Heat Trace Failure	Heat Trace Controller Alarm	De-energize P-01, De-energize P-02, Energize Heat Trace Alarm		A	X
Piston Pump P-01							
HS P-01	Local disconnect Switch for P-01 Motor	Hand Switch in On/Off position	On/Off	Energize/ De-energize Power to P-01	X		X
HOA P-01	Hand-Off-Auto Switch for P-01	Off Position		De-energize Pump P-01 (Bypass PLC output)		D	X
		Hand Position		Send enable command to VFD. No permissive/ interlocks associated with pump running		D	X
		Auto position		Control by PLC based on level in extraction well(s)		D	X
VFD P-01	Variable Frequency drive for control of P-01	Frequency control to control motor run direction and speed based on P-01 integral limit switches which monitor the position of the piston pump drive rod.	Bottom, Middle, and Top Limit Switches	Control of motor run direction and speed based on limit switches. VFD to output to PLC run indication and alarm indication.		D,A	X
Transfer Pump P-02							
HOA P-01	Hand-Off-Auto Switch for P-01	Off Position		De-energize Pump P-02 (Bypass PLC output)		D	X
		Hand Position		Energize Pump P-02. No PLC control and No permissive/ interlocks associated with pump running		D	X
		Auto position		Control by PLC based on level in extraction well(s)		D	X

Project: National Grid - Clifton Former MGP Site
Submittal #8.13 P&T System Instrumenattion Wiring Schedule

Tag No.	Description	Make	Model	# of Wires	Wire Size	Shielded/Non-shielded
Level Instrumentation in wells COU1-RWA and COU1-RWB						
LT-100A	Level transducer in well COU1-RWA for continuous measurement of water level in well (Level measured from bottom) 4-20mA Output	Winters	LM6W40	2	18 AWG	Shielded
LT-100B	Level transducer in well COU1-RWB for continuous measurement of water level in well (Level measured from bottom) 4-20mA Output	Winters	LM6W40	2	18 AWG	Shielded
Level Instrumentation in Oil/Water Separator (OW-01)						
LSHH-102	High High Level switch in OW-01	ESD/W2W	Stem float assembly with three float switches	4	18 AWG	Non-shielded
LSH-103	High Level switch in OW-01					
LSL-104	Low Level switch in OW-01					
Level Instrumentation in Spill Containment Sump (S-01)						
LSHH-121	High High Level switch in S-01	Dwyer	F6-SS	2	18 AWG	Non-shielded
Pressure Instrumentation on Discharge Pump (P-02)						
PT-107	Pressure transmitter in P-02 discharge pipeline for continuous measurement of pressure 4-20mA Output	Dwyer	626-10-GH-P1-E1-S1	2	18 AWG	Shielded
Flow Instrumentation on Discharge Pump (P-02)						
FIT-119	Indicating Flow meter/transmitter transmitter in P-02 discharge pipeline for continuous measurement of flow total and flowrate. 4-20mA Output	Signet	3-2551-P0-41	3	18 AWG	Shielded
Temperature Instrumentation in System Enclosure						
TT-120	Temperature transmitter for continuous measurement of system enclosure interior temperature. 4-20mA Output	Dwyer	TTW	2	18 AWG	Shielded
Heat Trace Monitors						
HTM-122	Heat trace thermostat with alarm output for influent piping heat trace	Chromalox	DTS	3 for208V power wiring	12 AWG	Non-shielded
				2 for alarm output	14 AWG	Non-shielded
HTM-123	Heat trace thermostat with alarm output for effluent piping heat trace	Chromalox	DTS	3 for208V power wiring	12 AWG	Non-shielded
				2 for alarm output	14 AWG	Non-shielded
Variable Frequency Drive				**Wiring to PLC**		
VFD P-01	Variable frequency drive for controlling speed and direction of piston pump motor.	Emerson		2 for run output	18 AWG	Non-shielded
				2 for alarm output	18 AWG	Non-shielded
				2 for enable input	18 AWG	Non-shielded
				Wiring to Limit Switches		
				4	18 AWG	Shielded

SUBMITTAL #9.4

Johns Manville

Micro-Lok® *HP*

High-Performance Fiber Glass Pipe Insulation

DESCRIPTION

Micro-Lok *HP* Fiber Glass Pipe Insulation is a high-performance insulation made from rotary glass fibers bonded with a thermosetting resin and produced in 36" (0.92 m) lengths. Micro-Lok *HP* insulation is used to insulate standard iron pipe and copper tubing. The 3' (0.92 m) sections are available plain or with a factory-applied vapor-barrier jacket. The all-service (ASJ) vapor-retarder jacket includes a longitudinal, self-sealing closure lap. The jacket system is adhered to each fiber glass section using a specially formulated adhesive to ensure jacket securement. Latex paint may be applied to the Micro-Lok *HP* jacket after installation.

The factory-installed tape system permits installation at ambient temperatures down to 20°F (-7°C) and will not soften or separate when exposed to high ambient temperatures and humidity.

USES

Micro-Lok *HP* fiber glass pipe insulation is suitable for installation over hot, cold, concealed and exposed piping systems with operating temperatures up to 850°F (454°C). Weather-protective jacketing is required for outdoor applications. Pipes operating below ambient temperatures require all joints to be sealed with the factory-applied, self-seal lap and butt strips.

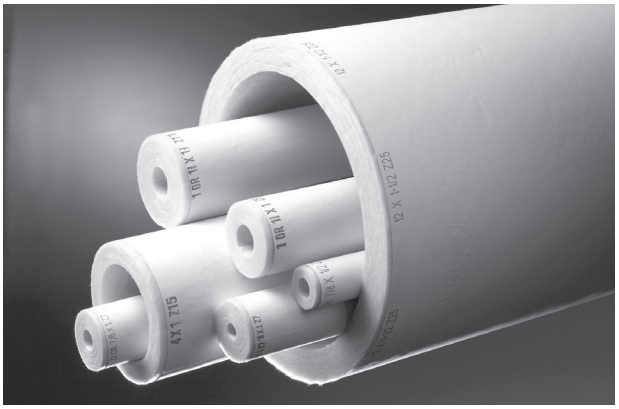
PHYSICAL PROPERTIES

Service Temp. Range (ASTM C411)	0°F to 850°F (-18°C to 454°C)
Moisture Sorption	<5% by weight
Alkalinity	<0.6% expressed as Na_2O
Corrosivity (ASTM C665)	Does not accelerate
Capillarity	Negligible (after 24 hours)
Shrinkage (ASTM C356)	None
Microbial Growth (ASTM C1338)	Does not promote microbial growth
Surface Burning Characteristics	Composite FHC 25/50 per ASTM E84, NFPA 255, CAN/ULC S102.2
Limited Combustibility	NFPA 90A and 90B
Jacketing	ASTM C1136 (Type I)
Water Vapor Permeance (ASTM E96 – Procedure A)	0.02 perms max.
Burst Strength (ASTM D774)	50 Beach Units (1.5 Joules min.)
Tensile Strength (ASTM D828)	45 lbs./in. (7.9N/mm) width min. (MD) 30 lbs./in. (5.23N/mm) width min. (CD)

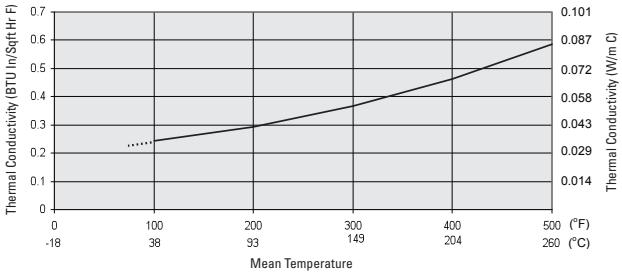
Operating Temperature Limits: 0°F to 850°F (-18°C to 454°C)

SPECIFICATION COMPLIANCE

- ASTM C547 Type I (Replaces HH-I-558B, Form D, Type III, Class 12, Class 13 up to 850°F [454°C])
- ASTM C585 – Dimension Standard
- ASTM C1136 (Jacketing) (Replaces HH-B-100B, Type I & II)
- MIL-I-22344D
- NRC 1.36, ASTM C795, MIL-I-24244C
- Coast Guard/IMO Approved 164.109/56/0 (plain, unjacketed only – excluding ⅞ x ½ [22 mm x 13 mm], ½ x ½ [13 mm x 13 mm])
- MEA compliant
- California Bureau of Home Furnishings and Thermal Insulation – Registry Number CA-T040 (CO)
- Firestop Assemblies: Meets requirement for jacketed fiber glass pipe insulation product density at or above 3.5 pcf.
- ASTM E84, CAN ULC S102.2 – 25/50 listed and labeled Intertek testing laboratories



THERMAL CONDUCTIVITY ("K")



MEAN TEMPERATURE	K	K(SI)
75˚F (24˚C)	0.23	0.034
100˚F (38˚C)	0.24	0.035
200˚F (93˚C)	0.28	0.040
300˚F (149˚C)	0.34	0.049
400˚F (204˚C)	0.44	0.063
500˚F (260˚C)	0.55	0.079

GREEN BUILDING ATTRIBUTES

Manufacturing Location	Defiance, Ohio (43512)	
Recycled Content	36%	
Volatile Organic Compounds (ASTM D5116) (Analysis ASTM D6196 & ASTM D5197)	Total	0.15 g/l
Fiber Glass Pipe Insulation	Formaldehyde	0.009 ppm
	Aldehydes	0.009 ppm
Volatile Organic Compounds (Calculated)	Total	<49 g/l
Self-Sealing Lap & Butt Strips		

GREEN BUILDING CERTIFICATIONS

GREENGUARD®	
• Indoor Air Quality	Certified
• Children and Schools	Certified
LEED® Credits	
LEED-NC	See JM.com/buildgreen JM LEED Credit Guide (HIG-1231)

GREENGUARD® Certified products have been screened for more than 10,000 volatile organic compounds (VOCs) and meet stringent standards for low chemical emissions based on established criteria from key public health agencies.

Micro-Lok® *HP*

High-Performance Fiber Glass Pipe Insulation

SIZE AVAILABILITY

Insulation Thickness		Iron Pipe Size Range		Copper Tubing Size Range	
in.	mm	in.	mm	in.	mm
½	13	½–6	13–152	⅝–4⅛[§]	16–105
1	25	½–24	13–610	⅝–6⅛	16–156
1½	38	½–24	13–610	⅝–6⅛	16–156
2	51	½–24	13–610	1⅛–6⅛	29–156
2½	64	1–24	25–610	1⅜–6⅛	35–156
3	76	1–24	25–610	1⅜–6⅛	35–156
3½	89	1½–24[*]	38–610	–	–
4	102	3–24[**]	76–610	–	–
4½	114	3–24[†]	76–610	–	–
5	127	3–20[††]	76–508	–	–

Notes:

[*] *2½" and 23" IPS not available in this insulation thickness.*

[**] *22" and 23" IPS not available in this insulation thickness.*

[†] *21", 22" and 23" IPS not available in this insulation thickness.*

[††] *19" IPS not available in this insulation thickness.*

[§] *3⅝" CTS not available in this insulation thickness.*

QUALIFICATIONS FOR USE

A sufficient thickness of insulation must be used to keep the maximum surface temperature of Micro-Lok *HP* insulation below 150°F (66°C). In addition, at operating temperatures above 500°F (260°C), Micro-Lok *HP* pipe insulation must be applied in a thickness ranging from 2" (51 mm) minimum to 6" (152 mm) maximum.

During initial heat-up to operating temperatures above 350°F (177°C), an acrid odor and some smoke may be given off as the organic binders used in the fiber glass pipe insulation begin to decompose. When this occurs, caution should be exercised to ventilate the area well. This loss of binder does not directly affect the thermal performance of the pipe insulation, but the compressive strength and resiliency of the product are reduced. For applications with excessive physical abuse or vibration at high temperatures, consult your local Insulation Systems Market Development Manager for alternate material recommendations.

CHILLED WATER SYSTEMS

For chilled water systems, see Chilled Water InsulSpec™ – 3-Part Specification, MECH-239.

APPLICATION RECOMMENDATIONS*

MICRO-LOK *HP* PIPE INSULATION AND BUTT STRIPS

1. Do not apply Micro-Lok *HP* insulation if air temperature is below 20°F (-7°C) or above 130°F (54°C) due to the effect of temperature on tape performance. We recommend stapling when application falls outside this temperature range.

When stapling, we recommend mastic be applied over staples to prevent moisture penetration.

2. If stored below 20°F (-7°C) or above 130°F (54°C), insulation cartons should stand within the recommended temperature range for 24 hours prior to application.

3. Once release paper is removed, both adhesive and lap must be kept free of dirt and water, and the lap sealed immediately.

4. When adhered, the lap and butt strips must be pressurized by rubbing firmly with a plastic squeegee or the back of a knife blade to ensure positive closure.

**For complete application recommendations and installation instructions, see MECH-238 and MECH-239 InsulSpec Specifications.*

Johns Manville

717 17th St.
Denver, CO 80202
1-800-654-3103
JM.com

North American Sales Offices, Insulation Systems

Eastern Region
P.O. Box 158
Defiance, OH 43512
(800) 334-2399
Fax: (419) 784-7866

Western Region & Canada
P.O. Box 5108
Denver, CO 80217
(800) 368-4431
Fax: (303) 978-4661

The physical and chemical properties of Micro-Lok® *HP* High-Performance Fiber Glass Pipe Insulation listed herein represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Numerical flame spread and smoke developed ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions. Check with the Regional Sales Office nearest you to ensure current information. **All Johns Manville products are sold subject to Johns Manville's standard Terms and Conditions including Limited Warranty and Limitation of Remedy. For a copy of the Johns Manville standard Terms and Conditions, Limited Warranty and Limitation of Remedy, and information on other Johns Manville thermal insulations and systems, call (800) 654-3103.**

MECH-228 1/14 (Replaces 10/13)

JMCOM140070

Johns Manville

Micro-Lok® *HP*

High Performance Fiber Glass Pipe Insulation
Dimensional Data

Iron Pipe Sizes

Nominal Pipe Size (in.)	Pipe O.D. (in.)	Wall Thickness and O.D. of Insulation (in.)									
		Nominal ½" Wall		Nominal 1" Wall		Nominal 1½" Wall		Nominal 2" Wall		Nominal 2½" Wall	
		Actual Wall Thickness (in.)	Insulation O.D. (in.)	Actual Wall Thickness (in.)	Insulation O.D. (in.)	Actual Wall Thickness (in.)	Insulation O.D. (in.)	Actual Wall Thickness (in.)	Insulation O.D. (in.)	Actual Wall Thickness (in.)	Insulation O.D. (in.)
½	0.90	0.52	1.93	0.97	2.83	1.53	3.95	2.03	4.95	2.30	5.50
¾	1.15	0.51	2.17	0.84	2.83	1.40	3.95	1.90	4.95	2.71	6.57
1	1.40	0.51	2.41	1.03	3.45	1.53	4.45	2.05	5.50	2.59	6.57
1¼	1.70	0.52	2.73	0.88	3.45	1.63	4.95	1.90	5.50	2.44	6.57
1½	1.97	0.52	3.00	0.99	3.95	1.49	4.95	2.30	6.57	2.80	7.57
2	2.40	0.53	3.45	1.03	4.45	1.55	5.50	2.09	6.57	2.59	7.57
2½	2.91	0.52	3.95	1.02	4.95	1.83	6.57	2.33	7.57	2.83	8.57
3	3.54	0.52	4.57	0.98	5.50	1.52	6.57	2.02	7.57	2.52	8.57
3½	4.15	0.46	5.07	1.21	6.57	1.71	7.57	2.21	8.57	2.71	9.57
4	4.55	0.51	5.57	1.01	6.57	1.51	7.57	2.01	8.57	2.51	9.57
4½	5.15	0.47	6.09	1.21	7.57	1.71	8.57	2.21	9.57	2.78	10.70
5	5.62	0.52	6.65	0.98	7.57	1.48	8.57	1.98	9.57	2.54	10.70
6	6.69	0.51	7.71	0.94	8.57	1.44	9.57	2.01	10.70	2.51	11.70
7	7.70	0.52	8.73	0.94	9.57	1.50	10.70	2.00	11.70	2.50	12.70
8	8.72	0.51	9.74	0.99	10.70	1.49	11.70	1.99	12.70	2.62	13.95
9	9.72	0.51	10.74	0.99	11.70	1.49	12.70	2.12	13.95	2.62	14.95
10	10.85	0.52	11.89	0.93	12.70	1.55	13.95	2.05	14.95	2.55	15.95
11	11.86	0.52	12.89	1.05	13.95	1.55	14.95	2.05	15.95	2.55	16.95
12	12.86	0.52	13.89	1.05	14.95	1.55	15.95	2.05	16.95	2.55	17.95
14	14.13	0.50	15.13	0.91	15.95	1.41	16.95	1.91	17.95	2.41	18.95
15	15.13	0.50	16.13	0.91	16.95	1.41	17.95	1.91	18.95	2.41	19.95
16	16.13	0.50	17.13	0.91	17.95	1.41	18.95	1.91	19.95	2.41	20.95
17	17.15	0.50	18.15	0.90	18.95	1.40	19.95	1.90	20.95	2.40	21.95
18	18.16	0.50	19.16	0.90	19.95	1.40	20.95	1.90	21.95	2.40	22.95
19	19.16	0.50	20.16	0.90	20.95	1.40	21.95	1.90	22.95	2.40	23.95
20	20.17	0.50	21.17	0.89	21.95	1.39	22.95	1.89	23.95	2.39	24.95
21	21.17	0.50	22.17	0.89	22.95	1.39	23.95	1.89	24.95	2.39	25.95
22	22.17	0.50	23.17	0.89	23.95	1.39	24.95	1.89	25.95	2.39	26.95
23	23.17	0.50	24.17	0.89	24.95	1.39	25.95	1.89	26.95	2.39	27.95
24	24.19	0.50	25.19	0.88	25.95	1.38	26.95	1.88	27.95	2.38	28.95

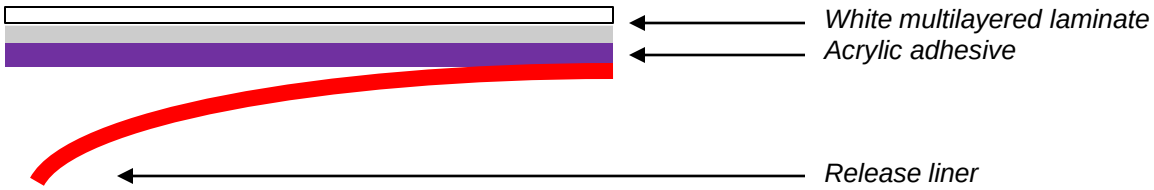
VentureClad® 1577CW-WM

SUBMITTAL #9.5

JACKETING SYSTEM - WHITE

Venture Tape® VentureClad 1577CW-WM is a white zero permeability vapor barrier for insulation cladding and jacketing applications. A multilayered, self adhesive material installs quickly and easily with no special tools required, resulting in significant time, labor, and cost savings. VentureClad 1577CW-WM exceeds most building code requirements and can be used for new construction as well as repair on existing structures.

Product Construction



Features & Benefits

- *ASTM E84 (25/45 Flame/Smoke Rating)*
- *BS476 parts 6 & 7 class 'O'*
- *High performance jacketing product performs well over a wide temperature range*
- *Puncture and tear resistant*
- *Self adhesive material installs easily with no off-site fabrication required*
- *Meets FDA compositional requirements for indirect food contact (21 CFR 175.105 and 21 CFR 175.125; FDA: Indirect Food Additives: Adhesives and Components of Coatings)*
- *IMO Resolution A653(16)*
- *IMO Resolution MSC 61(67) Annex 1 Part 5 and Annex 2 IMO Resolution MSC 61(67) Annex 1 Part 2 and Annex 2*
- *Coast Guard 164.112/1121/WCL MED0290TE*
- *ULC S102 Classification (25/25 Flame/Smoke Rating)*
  ULC file # R10984

Test	Typical Value	Typical Value (Metric)	Test Method
Product Thickness Ω	8.0 mils	0.20 mm	PSTC-133
Peel Adhesion Δ	65 oz/in	18.0 N/25 mm	PSTC-101
Shear Adhesion	>24 hrs @ 2.2 psi	>24 hrs @ 15.2 kPa	PSTC-107
Tensile Strength	69 lb/in	312 N/25 mm	PSTC-131
Elongation	80 %	80 %	PSTC-131
Puncture	35 lbs	155 N	ASTM D1000
Emittance	0.80		ASTM C1371
WVTR	0.00 perm		ASTM E96
Service Temperature	-94 to 248 °F	-70 to 120 °C	

Ω - excluding liner

Δ - 20 minute dwell

Typical values are not intended to be used for specification development. Technical data is believed to be true and accurate; Venture Tape recommends that the purchaser test for fitness of use in all applications.

Product Configurations

- *Standard widths: 23" and 35½" and standard length: 50 yards*
- *Custom widths and lengths available, contact Venture Tape for specifications and requirements*

Contact Venture Tape today for a complete list of products or a free sample

Toll Free North America 800-343-1076
From United Kingdom 0-800-962-957
From Australia 1-800-122-797
www.venturetape.com

VentureTape®

GTA - NHT, Inc.
Venture Tape
30 Commerce Rd., Rockland, MA 02370
Tel 781-331-5900; Fax 781-871-0065
800-343-1076 (U.S.A.), 800-544-1024 (Canada)
Toll Free Fax 877-264-5490
www.venturetape.com

GTA TAPES & ADHESIVES a 3M Company

VentureClad® 1577CW-WM

CHEMICAL RESISTANCE

Acids	Acetic acid (all concentrations)	resistant
	50% formic acid	resistant
	10% hydrochloric acid	resistant
	30% hydrochloric acid	partially resistant
	10% and 35% hydrofluoric acid	resistant
	10% nitric acid	resistant
	65% and 100% nitric acid	not resistant
	30% and 85% phosphoric acid	resistant
	20% sulphuric acid	partially resistant
	Sulphur dioxide gas, dry	resistant
	>80% sulphuric acid	not resistant
Aldehydes	Acetaldehyde	resistant
	Formaldehyde	resistant
Alcohols	Benzyl alcohol	partially resistant
	Cyclohexanol	resistant
	Ethyl alcohol	resistant
	Glycerine	resistant
	Glycol	resistant
	Isopropyl alcohol	resistant
	Methyl alcohol	resistant
Aqueous alkaline solutions	Ammonium hydroxide	not resistant
	Calcium hydroxide	partially resistant
	Sodium hydroxide	not resistant
Chlorinated hydrocarbons	Carbon tetrachloride	partially resistant
	Chlorinated biphenyls	partially resistant
	Chloroform	resistant
	Trichloroethylene	resistant
Esters	Ethyl acetate	resistant
Hydrocarbons	Aliphatic hydrocarbons	resistant
	Benzene	resistant
	Gasoline (petrol)	resistant
	Mineral oils	resistant
	Toluene	resistant
	Xylene	resistant
Miscellaneous substances	Chlorine	resistant
	Hydrogen peroxide	resistant
	Oxygen	resistant
	Water	resistant
Other organic solutions	Acetone	resistant
	Diethylether	resistant
	Nitrobenzene	not resistant
	Phenol	not resistant
Salt solutions	Alkaline carbonates	resistant
	Bichromates	resistant
	Cyanides	resistant
	Fluorides	resistant

Chemical resistance info based in part on vendor or independent test data.

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GTA TAPES & ADHESIVES a 3M Company

ESD Waste2Water, Inc.

Submittal Data

Control Panel & Components

ESD Project # 13653

EnviroTrac LTD
National Grid
Clifton Former MGP Site

495 Oak Road
Ocala, FL 34472
1-800-277-3279
www.waste2water.com

Project: National Grid - Clifton Former MGP Site
Submittal #8.12 P&T System Cause and Effect Spreadsheet

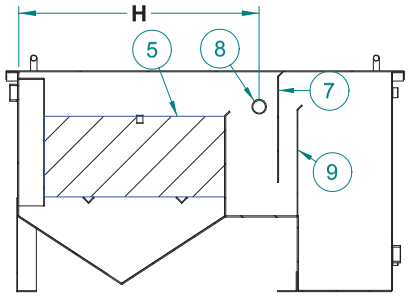
Tag No.	Description	Event	Set Point	Effect	Displays/Alarms		
					Local/Field	HMI Treatment Bldg.	Data Log
Level Instrumentation in wells COU1-RWA and COU1-RWB - Option 1							
LT-100A	Level transducer in well COU1-RWA for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWA	≥ Field selectable water level	Energize Piston Pump P-01		D	X
			In-between High and Low Setpoints	4-20mA speed reference signal from PLC to VFD: PLC shall use the level inputs and use a Proportional Integral Derivative (PID) control algorithm to send out the speed reference analog output.			
			< Field selectable water level	De-energize Piston Pump P-01			
LT-100B	Level transducer in well COU1-RWB for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWB				D	X
Level Instrumentation in wells COU1-RWA and COU1-RWB - Option 2							
LT-100A	Level transducer in well COU1-RWA for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWA				D	X
LT-100B	Level transducer in well COU1-RWB for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWB	≥ Field selectable water level	Energize Piston Pump P-01		D	X
			In-between High and Low Setpoints	4-20mA speed reference signal from PLC to VFD: PLC shall use the level inputs and use a Proportional Integral Derivative (PID) control algorithm to send out the speed reference analog output.			
			< Field selectable water level	De-energize Piston Pump P-01			
Level Instrumentation in wells COU1-RWA and COU1-RWB - Option 3							
LT-100A	Level transducer in well COU1-RWA for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWB minus Level in well COU1-RWA	≥ Field selectable water level	Energize Piston Pump P-01		D	X
			In-between High and Low Setpoints	4-20mA speed reference signal from PLC to VFD: PLC shall use the level inputs and use a Proportional Integral Derivative (PID) control algorithm to send out the speed reference analog output.			
			< Field selectable water level	De-energize Piston Pump P-01			
LT-100B	Level transducer in well COU1-RWB for continuous measurement of water level in well (Level measured from bottom)	Level in well COU1-RWB				D	X
Level Instrumentation in Oil/Water Separator (OW-01)							
LSHH-102	High High Level switch in OW-01	High-High level in OW-01	≥ 28"	De-energize P-01, De-energize P-02, Energize OW-01 High-High Level Alarm until level recedes to low level.		A	X
LSH-103	High Level switch in OW-01	High level in OW-01	≥ 24"	Energize P-02.			X
LSL-104	Low Level switch in OW-01	Low level in OW-01	< 6"	De-energize P-02.			X
Level Instrumentation in Spill Containment Sump (S-01)							
LSHH-121	High High Level switch in S-01	High-High level in OW-01	≥ 2"	De-energize P-01, De-energize P-02, Energize S-01 High-High Level		A	X
Pressure Instrumentation on Discharge Pump (P-02)							
PT-107	Pressure transmitter in P-02 discharge pipeline for continuous measurement of pressure	Pressure in pipeline before bag filters.	≥ Field selectable pressure levels PSH & PSHH	PSH - Energize High Pressure Alarm		D,A	X
				PSHH - De-energize P-01, De-energize P-02, Energize High High Pressure Alarm		D,A	X
Flow Instrumentation on Discharge Pump (P-02)							
FIT-119	Indicating Flow meter/transmitter in P-02 discharge pipeline for continuous measurement of flow total and flowrate.	Flow and total in discharge pipeline after cartridge filters.				D	X
Temperature Instrumentation in System Enclosure							
TT-120	Temperature transmitter for continuous measurement of system enclosure interior temperature.	System enclosure internal temperature.	< Field selectable temperature set point	De-energize P-01, Energize Low Temperature Alarm		D,A	X
Heat Trace Monitors							
HTM-122	Heat trace thermostat with alarm output for influent piping heat trace	Influent Heat Trace Failure	Heat Trace Controller Alarm	De-energize P-01, Energize Low Temperature Alarm		A	X
HTM-123	Heat trace thermostat with alarm output for effluent piping heat trace	Effluent Heat Trace Failure	Heat Trace Controller Alarm	De-energize P-01, De-energize P-02, Energize Heat Trace Alarm		A	X
Piston Pump P-01							
HS P-01	Local disconnect Switch for P-01 Motor	Hand Switch in On/Off position	On/Off	Energize/ De-energize Power to P-01	X		X
HOA P-01	Hand-Off-Auto Switch for P-01	Off Position		De-energize Pump P-01 (Bypass PLC output)		D	X
		Hand Position		Send enable command to VFD. No permissive/ interlocks associated with pump running		D	X
		Auto position		Control by PLC based on level in extraction well(s)		D	X
VFD P-01	Variable Frequency drive for control of P-01	Frequency control to control motor run direction based on P-01 integral limit switches which monitor the position of the piston pump drive rod.	Bottom, Middle, and Top Limit Switches	Control of motor run direction based on limit switches. VFD to output to PLC run indication, running frequency which is controlled by PLC input described above, and alarm indication.		D,A	X
Transfer Pump P-02							
HOA P-01	Hand-Off-Auto Switch for P-01	Off Position		De-energize Pump P-02 (Bypass PLC output)		D	X
		Hand Position		Energize Pump P-02. No PLC control and No permissive/ interlocks associated with pump running		D	X
		Auto position		Control by PLC based on level in extraction well(s)		D	X

Section 1

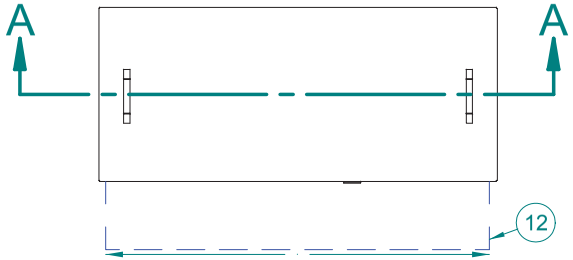
Oil Water Separator

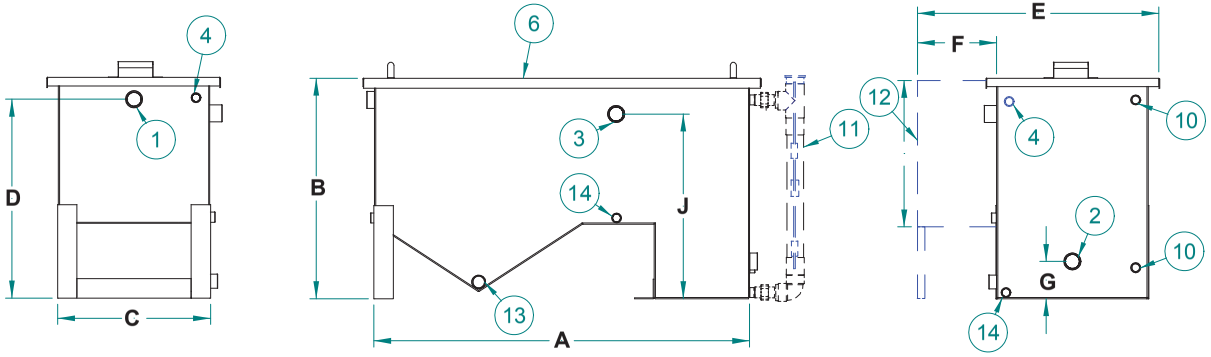
OWS-501 OWS10

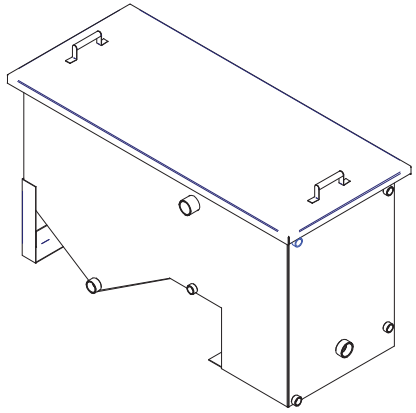
OWS		
ITM	DESCRIPTION	QTY
1	2" FNPT , INLET	1
2	2" FNPT , OUTLET	1
3	OIL OUTLET	1
4	1" FNPT VENT	1
5	COALESCING MEDIA	1
6	ACCESS LID	1
7	OIL STOP WEIR	1
8	PVC OIL SKIMMER	1
9	OVERFLOW BAFFLE	1
10	1" FNPT SIGHT GLASS PORT	2
11	OPT. SIGHT GLASS w/ MULTI LEVEL PROBE	1
12	OPT. PRODUCT TANK	1
13	1 1/2" FNPT SLUDGE DRAIN	1
14	1" FNPT DRAIN	3



SECTION A-A







		OWS-10	OWS-25	OWS-50	OWS-80
A	LENGTH	60 1/2"	60 1/2"	83"	83"
B	HEIGHT	35 1/2"	35 1/2"	60"	60"
C	WIDTH	12"	24 1/2"	36"	48"
D	INLET HEIGHT	32"	32"	56"	56"
E	WIDTH (INCLUDING OPT PRODUCT TANK)	21 1/2"	38"	56"	66"
F	WIDTH OF PRODUCT TANK	12"	12"	18	18"
G	OUTLET HEIGHT	12"	12"	12"	12"
H	PRODUCT OUTLET	39"	39"	54"	54"
J	PRODUCT OUTLET HEIGHT	29 3/4"	29 3/4"	53 1/2"	53 1/2"
	SHIPPING WEIGHT (LBS)	115	175	450	-
	OPERATING WEIGHT (LBS)	650	1300	4500	-
	SEPARATOR VOLUME (GALLONS)	40	80	280	305
	EFFLUENT VOLUME (GALLONS)	19	38	135	220
	SLUDGE VOLUME (GALLONS)	9	18	76	101
	COALESING AREA (CUBIC FEET)	2.5	5	16	24
	OPT PRODUCT TANK VOLUME (GALLONS)	35	55	160	220

OWS

NOTES:
1. MATERIAL : 3/16" ALUMINUM SHT 5052
2. GASKET : NEOPRENE
3. INTERNAL PIPE : SCH 80 PVC

ESD Waste2Water, Inc.
495 Oak Road
Ocala, FL 34472
Phone (800) 277-3279
Fax (352) 680-0059

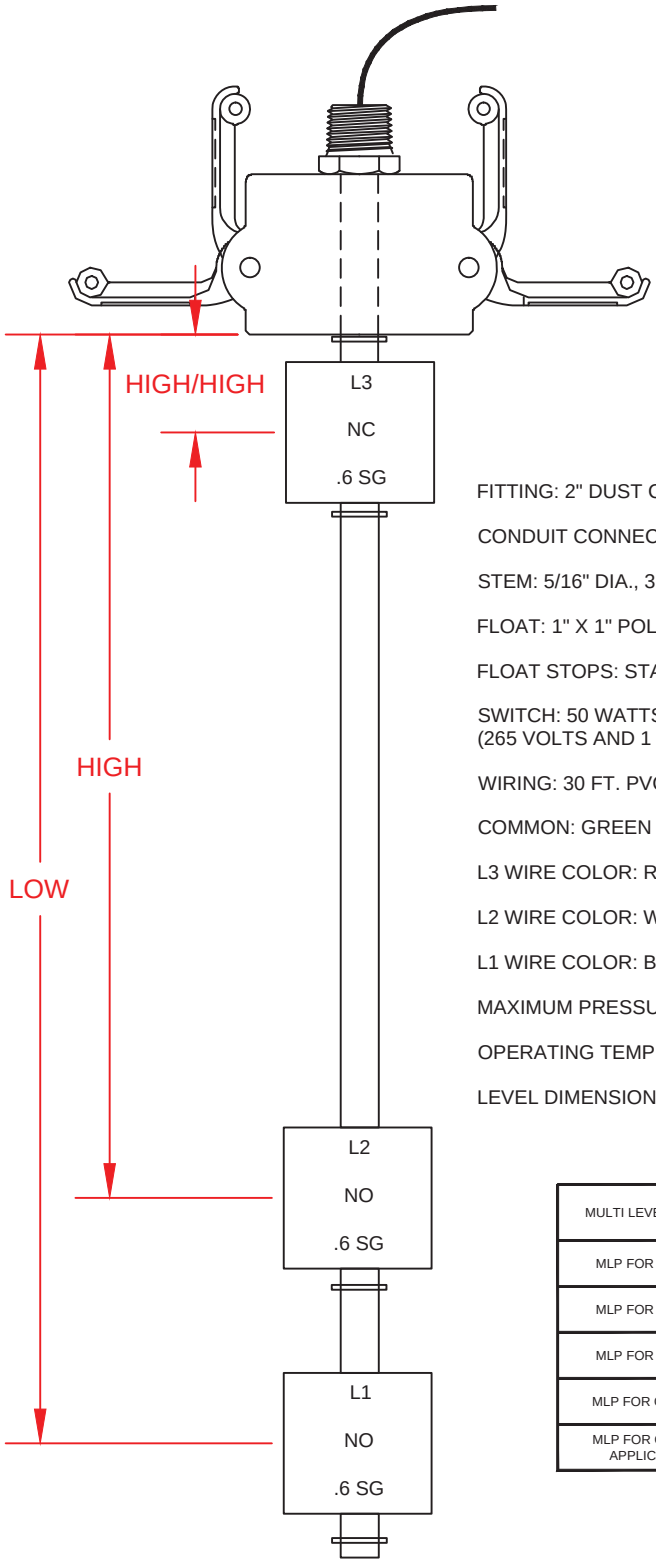
SCALE VERIFCATION
THIS BAR REPRESENTS ONE INCH ON ORIGNAL DRAWING
1"
USE TO VERIFY DRAWING

SIZE: B
SHEET #: 1 OF 1
SCALE: NTS
UPDATED BY: J. Andrews
DRAWN BY: J. Andrews
APPROVED BY:
COMPLETED: 6/5/10
UPDATED:

OIL WATER SEPARATOR
GENERAL LAYOUT
SPEC

JOB NUMBER:
PRODUCT NUMBER: OWS
FILE NAME: "OWS ALL MODELS SPEC.dft"

LSL, LSH, LSHH-501 Oil Water Separator Multi Level Probe



FITTING: 2" DUST CAP, POLYPROPYLENE

CONDUIT CONNECTION: 1/2" MNPT, STAINLESS STEEL

STEM: 5/16" DIA., 316 STAINLESS STEEL

FLOAT: 1" X 1" POLYPROPYLENE

FLOAT STOPS: STAINLESS STEEL RETAINING RINGS

SWITCH: 50 WATTS (MAXIMUM), SPST
(265 VOLTS AND 1 AMP MAXIMUM VALUES)

WIRING: 30 FT. PVC CABLE, 4 CONDUCTOR, 22 GA. STRANDED

COMMON: GREEN

L3 WIRE COLOR: RED

L2 WIRE COLOR: WHITE

L1 WIRE COLOR: BLACK

MAXIMUM PRESSURE: 50 PSI

OPERATING TEMPERATURE: -20F° TO 180F°

LEVEL DIMENSIONS BELOW REFERENCE THE LEVEL SWITCH POINT

MULTI LEVEL PROBE	OAL	HIGH/HIGH L3	HIGH L2	LOW L1
MLP FOR OWS-10	32"	18"	17"	4"
MLP FOR OWS-25	32"	18"	17"	4"
MLP FOR OWS-50	50"	36"	35"	4"
MLP FOR OWS-100				
MLP FOR CUSTOM APPLICATION				

OWS MULTILEVEL PROBE

DWG NO: OWS MLP

DATE: 12/09/13

495 Oak Road
Ocala, FL 34470
PHONE: (800) 277-3279
FAX: (352) 680-9278

ESD Waste2Water,Inc.

OIL WATER SEPARATOR
3 FLOAT MULTI-LEVEL PROBE

Section 2

Instrumentation

LT-100A,B Submersible Level Transmitter Model LM6W40

Description & Features:

- Designed for continuous level measurement in water or other liquids with low viscosity
- 316L SS probe with stainless steel sensor for ease of cleaning
- Available ranges from H_2O up to 300 psi
- ±0.1% and ±0.35% accuracy ratings
- NEMA 6P / IP68. Approved for outdoor use. Explosion proof option available
- Customizable
- 1 year warranty

Applications:

- Typical installations include ground or tank level monitoring of water and sewage treatment measurement

Specifications	
Output Signal	Standard 2-wire: 4-20 mA / Vs = 12-36 Vdc Optional 3-wire: 0-20 mA / Vs = 14-36 Vdc 0-10 V / Vs = 14-36 Vdc
Accuracy	±0.35% FSO BFSL Optional nominal pressure > 5 psi: <±0.25% FSO BFSL > 2 psi: <±0.1% FSO BFSL
Permissible Load	Current 2-wire: Rmax = [(Vs - Vs min) / 0.02] Ohm Current 3-wire: Rmax = 500 Ohm Voltage 3-wire: Rmin = 10 kOhm
Influence Effects	Supply: 0.05% FSO / 10 V Load: 0.05% FSO / kOhm
Long-term Stability	<±0.1% FSO/yr
Response Time	<10 ms*
Permissible Temperatures	Medium: 14°F to 158°F (-10°C to 70°C) Storage: -13°F to 158°F (-25°C to 70°C)
Reverse Polarity Protection	No damage. No function.
Electromagnetic Compatibility	Emission and immunity according to EN 61326
Electrical Connection	Cable with sheath material[2]: PVC grey, PUR black, FEP black, others available
Pollution Degree	4, electrical equipment for outdoor use
Housing	316Ti SS
Seals	FKM, others available
Diaphragm	316L SS
Weight	200 g (without cable)
Current Consumption	Current: 25 mA max Voltage: 7 mA max
Connecting Cables	Cable capacitance: Signal line/shield and signal line/signal line: 160 pF/m Cable inductance: Signal line/shield and signal line/signal line: 1 µH/m
Enclosure Rating	NEMA 6P / IP68

* With optional accuracy 0.1% FSO the response time is 200 msec

1 Approved for atmospheric pressure from 12 to 16 psi
2 Cable with integrated air tube for atmospheric pressure reference

Note: Measurements are in mm. Total length of devices with accuracy 0.1% FSO IEC 60770 increases by 35mm

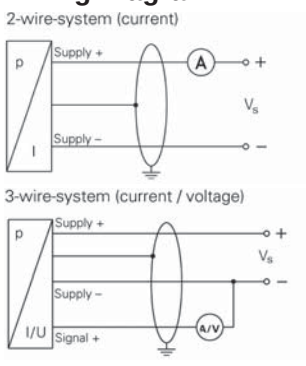
Order Codes

Range	Over-pressure	Burst Pressure	Code
0/50" water	15 psi	22 psi	LM6W05
0/100" water	15 psi	22 psi	LM6W10
0/150" water	15 psi	22 psi	LM6W15
0/200" water	15 psi	22 psi	LM6W20
0/300" water	15 psi	22 psi	LM6W30
0/400" water	15 psi	22 psi	LM6W40
0/5 psi	15 psi	22 psi	LM6005
0/10 psi	44 psi	109 psi	LM6010
0/15 psi	44 psi	109 psi	LM6015
0/25 psi	87 psi	218 psi	LM6025
0/50 psi	290 psi	218 psi	LM6050
0/100 psi	290 psi	725 psi	LM6100
0/200 psi	870 psi	1,740 psi	LM6200
0/300 psi	1,450 psi	1,740 psi	LM6300

Thermal Errors (Offset and Span)					
Nominal Pressure (psi)	<1	<4	<6	<15	>15
Tolerance Band (% FSO)	<±2	<±1.5	<±1	<±1	<±0.75
TC, Average (% FSO/10K)	±0.3	±0.2	±0.14	±0.1	±0.07
Compensated Range	32°F to 122°F 0°C to 50°C			32°F to 158°F 0°C to 70°C	

Pin Configuration		
Electrical Connection		Cable Colours (DIN 47100)
2-wire system	Supply + Supply -	White Brown
	Ground	Yellow/green (shield)
3-wire system	Supply + Supply - Signal +	White Brown Green
	Ground	Yellow/green (shield)

Wiring Diagram



Transmitters

Section 3

Carbon

T-801, 802, 803 Carbon LLPS-250

Liquid Low Pressure Steel Filters

LLPS 250-10,000 lb. Vessels

The **LLPS** series Liquid Phase Carbon filters are designed for water treatment applications. With a wide range of sizes, the LHPS series can fulfill a wide range of applications. These treatment filters hold 250-10,000 pounds of activated carbons or any variety of media with flow rates of up to 400 GPM.

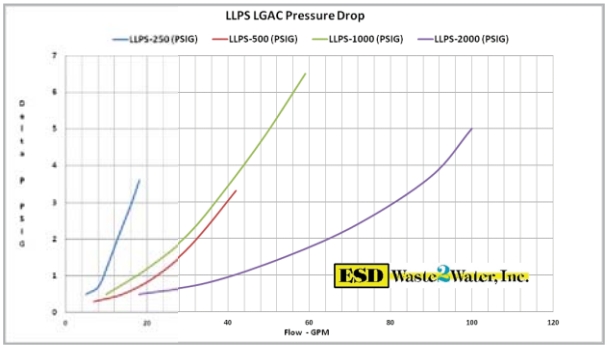
APPLICATIONS:

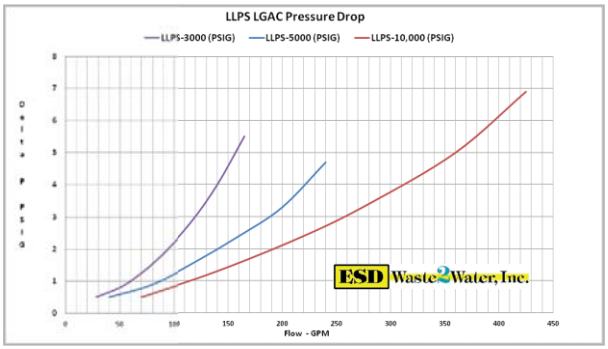
- Wastewater filtration
- Groundwater Remediation
- Underground Storage Tank Cleanup
- Dissolved Organic Removal
- Product Purification
- Tank Cleaning
- Pilot Testing
- Emergency Spill Treatment

FEATURES:

- Simple Installation and Operation
- Flexibility to be used in series of parallel operation
- Can be supplied with various medias
- Modular design for easy and rapid deployment and installation

PRESSURE DROP VS FLOW RATE





Specifications

Liquid Low Pressure Steel Filters	250	500	1000	2000	3000	5000	10,000
Dimensions: diameter x overall height	24” x 48”	30” x 72”	36” x 84”	50” x 101”	60” x 108”	72” x 120”	96” x 130”
Vessel Construction	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
Inlet/Outlet Connection	2 ” FNPT/2”MNPT	2 ” FNPT	2 ” FNPT	3 ” FNPT	3 ” FNPT	3 ” FNPT	6 ” Flange
Pounds of Carbon	250	500	1000	2000	3000	5000	10,000
Internal Piping	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC	Sch 40 PVC
Interior Coating	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy
Exterior Coating	Epoxy Mastic	Epoxy Mastic	Epoxy Mastic	Epoxy Mastic	Epoxy Mastic	Epoxy Mastic	Epoxy Mastic
Carbon Bed Volume (cu.ft.)	8.6	16.5	33	68.5	107	170	350
Cross Section (sq.ft.)	3.1	4.9	7	12.6	19.3	28	50
Vessel Weight (lbs) Shipping Operational	 452 850	 870 1765	 1475 3100	 2985 6400	 4400 9875	 7325 16,550	 13,225 29,050
Flow, GPM (max.)	20	40	60	100	150	200	400
Pressure, PSIG (max.)	40	40	40	40	40	40	40
Temperature, °F (max)	140°	140°	140°	140°	140°	140°	140°

***The information provided in this literature contains merely general descriptions or characteristics of performance, which in actual case of use do not always apply as, described or which may change as a result of further product development. Specifications provided herein are subject to change without prior notice.*

ESD Waste2Water, Inc.
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Section 4

Control Panel

ESD Web2Water®

Control Platform

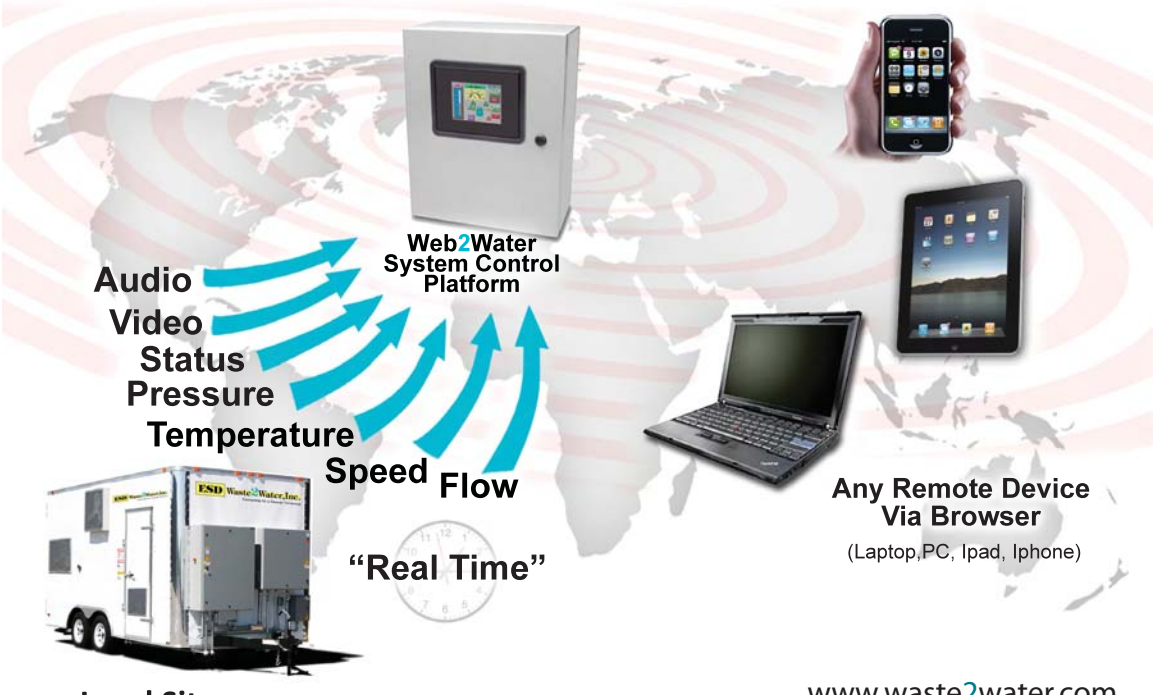
A Web Based, Wireless, Remote Monitoring, Telemetry & Control PLC Platform

The ESD "Web2Water®" (W2W) Control Platform is designed to both operate and control all types of Industrial process systems including wastewater treatment and soil and groundwater remediation systems.

W2W is designed to provide the most economical, stable and interactive remote monitoring, telemetry & system control platform available on the market today. ESD has configured the platform with the intent of providing the system operator the most user friendly and intuitive interface experience available, without sacrificing cost or uptime dependability.

W2W utilizes an Allen Bradley MicroLogix PLC, C-More color touch screen operator interface terminal (OIT) with built-in FTP server, e-mail client, and Web server, and a wireless 3G high speed modem supporting major carriers such as AT&T and Verizon Wireless at up to 7.2 Mbps. One simple compact economical platform provides local PLC control, remote control, remote alarming, automatic system status updates, remote interactive control (start / stop / modify) data-logging and trending, and can ship with all wireless communications fully established and operational prior to shipping.

Web2Water® Architecture



www.waste2water.com

Local PLC control – unlimited discrete and analog I/O capability / expansion

Real time local and remote display of any / all operational parameters

Local and remote alarm notification via e-mail or text

Functional Features & Benefits:

- Local PLC control – unlimited discrete and analog I/O capability / expansion
- Web based remote access via any browser – NO SOFTWARE to buy, install, or upgrades
- Full remote based interactive control – start / stop routines, set point adjustments, etc.
- Site video surveillance and security monitoring with local web cam, Pan, Zoom, Tilt (PZT) control
- Accessible from any device - laptop, desktop, iPad, iPhone, other PDA's and tablets
- No proprietary hardware or software – Allen Bradley PLC, C-More Operator Interface (OIT)
    - o *Can be supported by an expansive worldwide network of Allen Bradley controls specialist*

- No remote or local software required - no up-front software purchases or legacy software update costs
- Requires no programming knowledge
- Integrated motor control, VFD's, circuit protection, etc.
- Graphics based local color touch screen operator interface terminal (OIT)
- Remote graphical interface is identical to the local interface
    - o *Real time local and remote display of any / all operational parameters including process air and liquid flow rates and totals, pressure, vacuums, output status, VFD control, temperatures, timing programs and sequences*

- Data-logging and trending of all operational parameters, including local and remote data downloads to Excel or CSV file formats for data analysis or regulatory reporting
- Remote programming changes by ESD support team (no site visit required to change PLC code)
- Local and remote operator changes to set points such as alarm values, VFD speeds, timing programs without any programming knowledge
- Local and remote alarm notification via e-mail or text
- Can be installed on LAN or WAN for remote access as well as wireless
- Arrives with all wireless communications functional and tested – no need to contact wireless service providers
- Install on new or existing systems – simple retro fit capabilities
- Extremely robust and secure wireless platform – FCC and and CE approved
- Wireless Security – Ipsec VPN, GRE Tunnel, Friends List
- UL listed and Labeled – 508 and 698A for Industrial Controls Relating to a Hazardous Location

ESD
Waste2Water, Inc.

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Fax (352) 680-9278

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LISTEN. THINK. SOLVE.®

PRODUCT PROFILE

MicroLogix™ 1400 / 1766

Small Programmable Logic Controller

Advantages

- Expand your application capabilities with up to 7 expansion I/O modules for a maximum of 144 discrete I/O
- Up to 6 embedded 100 kHz high-speed counters (on controllers with dc inputs)
- 2 Serial ports with DF1/ DH485/Modbus RTU/DNP3/ASCII protocol support
- Ethernet port provides you with peer-to-peer messaging, web server and email capabilities
- Built-in LCD with backlight allows you to view controller and I/O status, and provides a simple interface for messages, bit / integer monitoring and manipulation

Target Applications

- *General Industrial Machinery (Material Handling, Packaging, Assembly, etc.)*
- *HVAC/Building Automation*
- *SCADA (Oil & Gas, Water/Waste Water, and Electric Power)*
- *Food & Beverage*
- *Pharmaceutical*
- *Commercial Machinery (Vending, Industrial Washers & Dryers, etc.)*

Overview

The new Allen-Bradley® MicroLogix™ 1400 from Rockwell Automation complements the existing MicroLogix family of small programmable logic controllers. MicroLogix 1400 combines the features you demand from MicroLogix 1100, such as EtherNet/IP, online editing, and a built-in LCD, plus provides you with enhanced features, such as: higher I/O count, faster High Speed Counter/PTO and enhanced network capabilities

Take advantage of the built-in LCD with back lighting to set the Ethernet network configuration, display floating point values on a user configurable display, display OEM logos at startup and read or write any binary, integer and long file elements in the data table. Controllers without embedded analog come with 32 digital I/O count, while analog versions have 32 digital I/O and 6 analog I/O. All versions can be expanded using up to seven 1762 I/O modules - the same I/O modules that MicroLogix 1100 and 1200 utilize.

Three embedded communication ports provide you with superior communications capabilities. MicroLogix 1400 offers an isolated RS232C/RS485 combination port; a non-isolated RS232C port; and an RJ-45 port for 10/100 Mbps EtherNet/IP peer-to-peer messaging.

Similar to the rest of the MicroLogix family, MicroLogix 1400 is programmed with RSLogix 500 programming software (Version 8.1 and above) as well as new RSLogix Micro programming software.

SPECIFICATIONS

MicroLogix	1766-L32BWA	1766-L32AWA	1766-L32BXB	1766-L32BWAA	1766-L32AWAA	1766-L32BXBA
Input Power	120/240 VAC		24 VDC	120/240 VAC		24 VDC
Memory	non-volatile battery backed RAM					
User Program / User Data Space	10 K / 10K configurable					
Data Logging / Recipe Storage	128 K (without Recipe) / up to 64 K (after subtracting Data Logging)					
Battery Back-up	Yes					
Back-up Memory Module	Yes					
Digital Inputs	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC	(12) Fast 24VDC (8) Normal 24VDC	(20) 120VAC	(12) Fast 24VDC (8) Normal 24VDC
Digital Outputs	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC	(12) Relay	(12) Relay	(6) Relay (3) Fast DC (3) Normal DC
Analog Inputs / Outputs	None			(4) Voltage Inputs / (2) Voltage Outputs		
Serial Ports	(1)RS232C/RS485*, (1)RS232C**					
Serial Protocols	DF1 Full Duplex, DF1 Half Duplex Master/Slave, DF1 Radio Modem, DH-485, Modbus RTU Master/Slave, ASCII, DNP 3 Slave					
Ethernet Ports	(1) 10/100 EtherNet/IP port					
Ethernet Protocols	EtherNet/IP messaging only					
Trim Potentiometers	2 Digital					
High-Speed Inputs	Up to 6 channels @ 100 kHz	N/A	Up to 6 channels @ 100 kHz	Up to 6 channels @ 100 kHz	N/A	Up to 6 channels @ 100 kHz
Real Time Clock	Yes, embedded					
PID	Yes (limited by loop and stack memory)					
PWM /PTO	N/A		3 channel PTO (100kHz)\PWM (40kHz)	N/A		3 channel PTO (100kHz)\PWM (40kHz)
Dual Axis Servo control	N/A		Through embedded PTO	N/A		Through embedded PTO
Embedded LCD	Yes					
Floating Point Math	Yes					
Online Editing	Yes					
Operating Temperature	-20 °C to +60 °C					
Storage Temperature	-40 °C (or -30 °C) to +85 °C					

* Isolated. RS232/RS485 combo port. Same as MicroLogix 1100 Comm 0

** Non-isolated RS232. standard D-sub connector.

www.rockwellautomation.com

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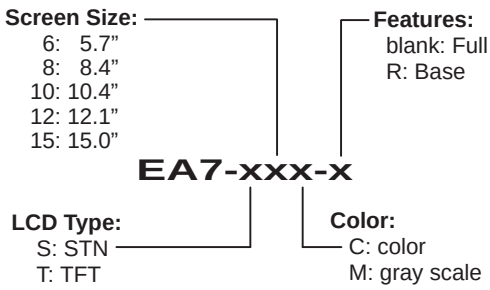
Publication 1766-PP001A-EN-P – July 2008

C-more Operator Panels Overview

Touch Panel Part Number Key:



Compatibility with our past!

All *C-more* panels have been designed to fit in the same dimensional cutout as a similar sized EZTouch panel*. In addition, *C-more* can convert and run existing EZTouch projects created with EZTouch Edit 3.1a sold by AutomationDirect. Just point, click and convert EZTouch projects to *C-more* and you are ready to go. All your hard work is transferred. To replace an EZTouch:

1) Remove it from its mounting cutout.
2) Click on your existing EZTouch project in the C-more browser. It will be converted to a C-more project, which can be downloaded into the new C-more panel.
3) Now mount the new C-more into the old cutout (using adapter plate where required) and reconnect your existing cables.

It's that simple!

Getting started

Installing the software and configuring the *C-more* panel is simple. You will need the following to successfully connect and configure a project for the panel:

- ***C-more*** touch panel - 6", 8", 10", 12" or 15" model
- ***C-more*** Programming Software, p/n EA-PGMSW
- ***C-more*** programming cable, USB or Ethernet
- 24 VDC switching power supply (min. 1.5A, switching) or the optional ***C-more*** AC Power Adapter
- Personal Computer - to run ***C-more*** programming software
- PLC communications cable (serial or Ethernet) to connect the ***C-more*** Touch Panel to your controller

* Replacement of an EZTouch wide bezel 6" model requires adapter EA-6-ADPTR.

Part Number	Description	Price
EA7-S6M-R	6-inch ***C-more*** grayscale STN touch panel (5.7 inch viewable screen), 15 shades of gray, 320 x 240 pixel QVGA screen resolution, 333 MHz CPU, 24 VDC (20.4-28.8 VDC operating range), NEMA 4/4X, IP-65 (when mounted correctly; for indoor use only), non-replaceable 50,000 hour half-life backlight. *Base Model: Built-in USB, no Ethernet or CompactFlash support.	<--->
EA7-S6C-R	6-inch ***C-more*** color STN touch panel (5.7 inch viewable screen), 256 colors, 320 x 240 pixel QVGA screen resolution, 333 MHz CPU, 24 VDC (20.4-28.8 VDC operating range), NEMA 4/4X, IP-65 (when mounted correctly; for indoor use only), non-replaceable 50,000 hour half-life backlight. *Base Model: Built-in USB, no Ethernet or CompactFlash support.	<--->
EA7-S6M	6-inch ***C-more*** grayscale STN touch panel (5.7 inch viewable screen), 15 shades of gray, 320 x 240 pixel QVGA screen resolution, 333 MHz CPU, 24 VDC (20.4-28.8 VDC operating range), NEMA 4/4X, IP-65 (when mounted correctly; for indoor use only), non-replaceable 50,000 hour half-life backlight. Built-in Ethernet and USB; supports CompactFlash.	<--->
EA7-S6C	6-inch ***C-more*** color STN touch panel (5.7 inch viewable screen), 256 colors, 320 x 240 pixel QVGA screen resolution, 333 MHz CPU, 24 VDC (20.4-28.8 VDC operating range), NEMA 4/4X, IP-65 (when mounted correctly; for indoor use only), non-replaceable 50,000 hour half-life backlight. Built-in Ethernet and USB; supports CompactFlash.	<--->
EA7-T6C	6-inch ***C-more*** color TFT touch panel (5.7 inch viewable screen), 65K colors, 320 x 240 pixel QVGA screen resolution, 333 MHz CPU, 24 VDC (20.4-28.8 VDC operating range), NEMA 4/4X, IP-65 (when mounted correctly; for indoor use only), non-replaceable 50,000 hour half-life backlight. Built-in Ethernet and USB; supports CompactFlash.	<--->
EA7-T8C	8-inch ***C-more*** color TFT touch panel (8.4 inch viewable screen), 65K colors, 640 x 480 pixel VGA screen resolution, 400 MHz CPU, 24 VDC (20.4-28.8 VDC operating range), NEMA 4/4X, IP-65 (when mounted correctly; for indoor use only), user replaceable 50,000 hour half-life backlight. Built-in Ethernet and USB; supports CompactFlash.	<--->
EA7-T10C	10-inch ***C-more*** color TFT touch panel (10.4 inch viewable screen), 65K colors, 640 x 480 pixel VGA screen resolution, 400 MHz CPU, 24 VDC (20.4-28.8 VDC operating range), NEMA 4/4X, IP-65 (when mounted correctly; for indoor use only), user replaceable 50,000 hour half-life backlight. Built-in Ethernet and USB; supports CompactFlash.	<--->
EA7-T12C	12-inch ***C-more*** color TFT touch panel (12.1 inch viewable screen), 65K colors, 800 x 600 pixel SVGA screen resolution, 400 MHz CPU, 24 VDC (20.4-28.8 VDC operating range), NEMA 4/4X, IP-65 (when mounted correctly; for indoor use only), user replaceable 50,000 hour half-life backlight. Built-in Ethernet and USB; supports CompactFlash.	<--->
EA7-T15C	15-inch ***C-more*** color TFT touch panel (15.0 inch viewable screen), 65K colors, 1024 x 768 XGA screen resolution, 400 MHz CPU, 24 VDC (20.4-28.8 VDC operating range), NEMA 4/4X, IP-65 (when mounted correctly; for indoor use only), user replaceable 50,000 hour half-life backlight. Built-in Ethernet and USB; supports CompactFlash.	<--->
EA-PGMSW	***C-more*** touch panel Windows-based configuration software. Requires Windows® Vista, 2000 Service Pack 4 or XP Home or Professional Service Pack 2. Includes software installation guide and CD-ROM. Requires USB 1.1 or Ethernet connection to touch panel. Cables sold separately.	<--->
USB-CBL-AB3	Standard 3-ft. (0.9m) USB 2.0 cable, A-type connector to B-type connector, used to connect personal computer to any ***C-more*** touch panel for setup and programming. (Note: Touch panels require a 24 VDC power source for configuration and operation.)	<--->
USB-CBL-AB6	Standard 6-ft. (1.8m) USB 2.0 cable, A-type connector to B-type connector, used to connect personal computer to any ***C-more*** touch panel for setup and programming. (Note: Touch panels require a 24 VDC power source for configuration and operation.)	<--->
USB-CBL-AB10	Standard 10-ft (3 meter) USB 2.0 cable, A-type connector to B-type connector, used to connect personal computer to any ***C-more*** touch panel for setup and programming. (Note: Touch panels require a 24 VDC power source for configuration and operation.)	<--->
USB-CBL-AB15	Standard 15-ft. (4.6m) USB 2.0 cable, A-type connector to B-type connector, used to connect personal computer to any ***C-more*** touch panel for setup and programming. (Note: Touch panels require a 24 VDC power source for configuration and operation.)	<--->

C-more Part Number Cross Reference

EZTouch (as sold by AutomationDirect)			***C-more** **
EZTouch 6", grayscale STN (0–45 °C)		***C-more 6" Adapter***	***C-more 6", grayscale STN (0–50 °C)***
EZ-S6M-R	*Requires:*	*EA-6-ADPTR*	 *EA7-S6M-R* <--->
EZ-S6M-RS			
EZ-S6M-F	*Requires:*	*EA-6-ADPTR*	 *EA7-S6M* <---> *(includes Ethernet)*
EZ-S6M-FS			
EZTouch 6", 128 Color STN (0–45 °C)		***C-more 6" Adapter***	***C-more 6", 256 Color STN or 65,536 Color TFT (0–50 °C)***
EZ-S6C-K	*Requires:*	*EA-6-ADPTR*	 *EA7-S6C-R* <---> *(256 Color STN)*
EZ-S6C-KS			
EZ-S6C-F	*Requires:*	*EA-6-ADPTR*	 *EA7-S6C* <---> *(256 Color STN; includes Ethernet)*
EZ-S6C-FS			
EZ-S6C-FST			 *EA7-T6C* <---> *(65,536 Color TFT; includes Ethernet)*
EZTouch 8", 128 Color STN (0–40 °C)			***C-more 8", 65,536 Color TFT (0–50 °C)***
EZ-S8C-F			 *EA7-T8C* <---> *(includes Ethernet)*
EZ-S8C-FS			
EZ-S8C-FST			
EZTouch 10", 128 Color TFT (0–50 °C)			***C-more 10", 65,536 Color TFT (0–50 °C)***
EZ-T10C-F			 *EA7-T10C* <---> *(includes Ethernet)*
EZ-T10C-FS			
EZ-T10C-FST			
EZ-T10C-FSE			
No 12" EZTouch available			***C-more 12", 65,536 Color TFT (0–50 °C)***
			 *EA7-T12C* <---> *(includes Ethernet)*
EZTouch 15", 128 Color TFT (0–45 °C)			***C-more 15", 65,536 Color TFT (0–50 °C)***
EZ-T15C-FS			 *EA7-T15C* <---> *(includes Ethernet)*
EZ-T15C-FST			
EZ-T15C-FSE			

**** Note: All C-more touch panels are NEMA 4/4X, IP-65 (when mounted correctly, for indoor use only), non-FDA.***

C-more Selection Guide & Specifications

Specification \ Model	8" TFT color w/ full features	10" TFT color w/ full features	12" TFT color w/ full features	15" TFT color w/ full features
Part Number	***EA7-T8C***	***EA7-T10C***	***EA7-T12C***	***EA7-T15C***
				
Price	<--->	<--->	<--->	<--->
Display Actual Size and Type	8.4" TFT color	10.4" TFT color	12.1" TFT color	15.0" TFT color
Color Scale	65,536 colors			
Display Viewing Area	6.73" x 5.05" [170.9 mm x 128.2 mm]	8.31" x 6.24" [211.2 mm x 158.4 mm]	9.47" x 7.62" [240.6 mm x 184.5 mm]	11.97" x 8.98" [304.1 mm x 228.1 mm]
Screen Pixels	640 x 480 (VGA)		800 x 600 (SVGA)	1024 x 768 (XGA)
Display Brightness	300 cd/m² (NITS)	270 cd/m² (NITS)	260 cd/m² (NITS)	220 cd/m² (NITS)
LCD Panel Dot Pitch	0.267 mm x 0.267 mm	0.33 mm x 0.33 mm	0.267 mm x 0.267 mm	0.297 mm x 0.297 mm
Backlight Average Lifetime*	Approximately 50,000 hours			
Backlight User Replaceable	Yes - Part Number EA-xx-BULB, xx = panel size			
Touch Panel Type	Analog Resistive (10-bit resolution, 1024 x 1024 touch area)		Analog Resistive (12-bit resolution, 4096 x 4096 touch area)	
CPU Type	32-Bit RISC CPU (400 MHz)		32-Bit RISC CPU (400 MHz) Plus Graphic Accelerator Chip	
Battery	Replaceable battery – ADC Part # D2-BAT-1 (Manufacturer Part # CR2354)			
System Memory	SDRAM 32 MBytes		SDRAM 64 MBytes	
System Flash Memory	FLASH 32 MBytes		FLASH 64 MBytes	
Backup Memory (SRAM)	Control data backup memory (SRAM) 256 KBytes			
Logging Data Memory	CompactFlash Memory Card p/n EA-FLASH-128MB, industrial grade, high speed (Optional) or USB Pen Drive p/n SDCZ4-2048-A10 (Optional)			
Number of Screens	Up to 999 – limited by available project memory (10 MBytes)		Up to 999 – limited by available project memory (40 MBytes)	
Realtime Clock	Built into panel (PLC clock is still accessible if available)			
Calendar – Month/Day/Year	Yes - battery backup			
Screen Saver	Yes, backlight turns off after a 30–1500 minute adjustable time, or can be disabled			
Serial PLC Interface	Serial PLC Port: RS-232C/422/485 15-Pin D-sub (female)			
USB Port – Type B	Download/Program – USB Port – type B (ver. 1.2)			
USB Port – Type A	Port for USB device options – type A (ver. 1.2)			
Ethernet Port	Ethernet 10/100 Base-T			
Audio Line Out	Audio Line Out, 1 Volt rms, stereo – requires amplifier and speaker(s)			
CF Card – Slot #1	Optional: CompactFlash Memory Card p/n EA-FLASH-128MB, industrial grade, high speed, CF slot #1 located on top side of touch panel.			
Expansion Assembly (p/n EA-EXP-OPT)	Optional: Use the CF Card Interface Module p/n EA-CF-IF in the right slot of the Expansion Assembly for installing CF card - Slot #2. The left slot of the Expansion Assembly is for future options.			
Supply Power	24 VDC, -15%, +20% (20.4–28.8 VDC operating range) (Use an AC Power Adapter, p/n EA-AC, to power the touch panel from a 100-240 VAC, 50/60 Hz. power source.)			
Power Consumption	15 W @ 24 VDC	17 W @ 24 VDC	20 W @ 24 VDC	33 W @ 24 VDC
Recommended Input Fuse	3.0 A DC slow blow			
Operating Temperature	0 to 50°C (32 to 122°F)			
Storage Temperature	–20 to +60°C (–4 to +140°F)			
Humidity	10–85% RH, non-condensing			
Noise Immunity	Noise voltage: 1000 Vp-p, Pulse width: 1 µs, Rise time: 1 ns			
Withstand Voltage	1000 VDC for 1 minute, between DC power supply input terminal and safety ground			
Insulation Resistance	Over 20 MΩ between DC power supply input terminal and safety ground			
Vibration	IEC61131-2 compliant, 10–57 Hz: 0.075 mm amplitude, 57–150 Hz 1.0 G: 10 sweep cycles per axis on each of 3 mutually perpendicular axes			
Shock	15 G peak, 11 ms duration, 2 shocks per axis, on 3 mutually perpendicular axes			
Enclosure	NEMA 4/4X , IP-65 (When mounted correctly. For indoor use only.)			
Agency Approvals	UL, cUL, CE			
Dimensions	8.748" x 10.894" x 2.053" [222.2 mm x 276.7 mm x 52.1 mm]	10.669" x 13.661" x 2.079" [271.0 mm x 347.0 mm x 52.8 mm]	11.024" x 13.366" x 2.075" [280.0 mm x 339.5 mm x 52.7 mm]	13.000" x 16.748" x 2.048" [330.2 mm x 425.4 mm x 52.0 mm]
Weight	2.60 lb. [1,180 g]	3.55 lb. [1,610 g]	4.59 lb. [2,080 g]	7.01 lb. [3,180 g]

**** NOTE: The backlight average lifetime is defined as the average usage time it takes before the brightness becomes 50% of the initial brightness. The lifetime of the backlight depends on the ambient temperature. The lifetime will decrease under low or high temperature usage.***

C-more 8" TFT Color Touch Panel - Full Model

The *C-more* 8" TFT color full featured touch panel uses a 8.4" diagonal analog (1024 X 1024) touch screen with a 640 x 480 (VGA) pixel resolution TFT LCD (liquid crystal display) with 65K colors. *C-more* 8" touch panels can be directly mounted into any EZTouch 8" touch panel cutouts.

Part No. EA7-T8C

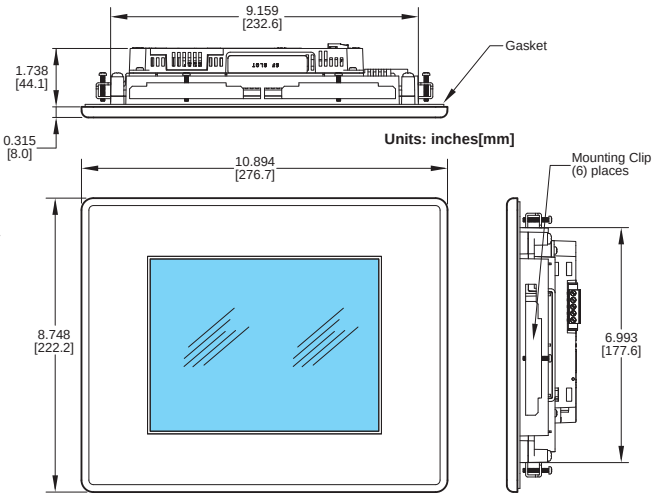
<---->

Features

- 8.4" diagonal color TFT (Thin Film Transfer) LCD display with 65K colors
- 640 x 480 pixel resolution
- 300 NITS display brightness
- 50,000 hour average backlight lifetime, user replaceable
- Analog resistive (1024 X 1024) touch screen allowing unlimited touch areas
- USB port B (program/download) and USB port A (USB device options)
- Ethernet 10/100 Base-T port (program/download & PLC comm)
- Serial PLC interface (RS-232/422/485)
- 1 GByte CompactFlash card slot, built-in
- Expansion assembly (optional) for CompactFlash devices (use with optional CF Card Interface Module)
- 24 VDC powered, 110 VAC power adapter (optional)
- Audio Line Out, stereo - requires amplifier and speaker(s)
- 10 MByte project memory
- Data logging
- 0 to 50°C (32 to 122°F) operating temperature range
- NEMA 4/4X, IP-65 compliant when mounted correctly, indoor use only
- Slim design saves panel space
- UL, cUL & CE agency approvals
- 2-year warranty from date of purchase

Function	Available	Associated Features
Ethernet	Yes	FTP - Email - Web Server
USB	Yes	Data Logging
Compact Flash	Yes	Data Logging/Project
Expansion Assembly	Yes	CF Module & future modules
Audio Out	Yes	Speaker/Amplifier Connection

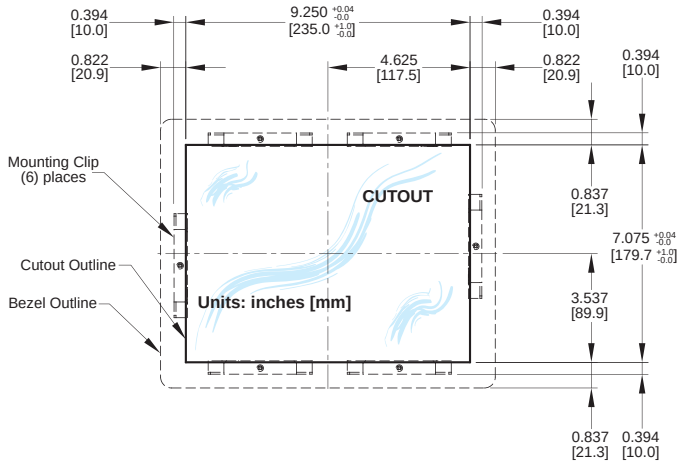
Dimensions



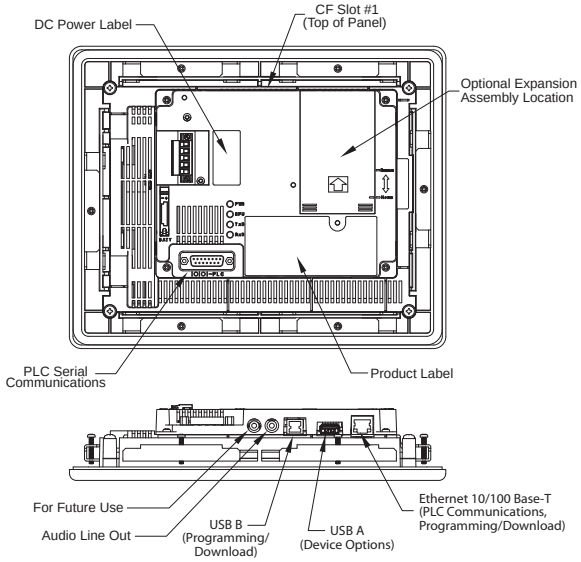
PLC Drivers	
Serial	**Avail.**
AutomationDirect CLICK	Yes
Direct LOGIC K-sequence	Yes
Direct NET	Yes
Modbus (Koyo Addressing)	Yes
Allen-Bradley DF1 Full & Half Duplex	Yes
Allen-Bradley PLC5 DF1	Yes
Allen-Bradley DH-485	Yes
Allen-Bradley DF1 Full & Half Duplex - Tag Based *	Yes
Modbus RTU	Yes
Entivity Modbus RTU	Yes
GE SNPX (90/30, 90/70), Micro 90, VersaMax Micro)	Yes
Omron Host Link C200 Adapter C500	Yes
Omron FINS (CJ1, CS1)	Yes
Mitsubishi FX	Yes
Mitsubishi Q02, Q02H, Q06H, Q12H, Q25H	Yes
Mitsubishi Q, QnA Serial	Yes
Siemens PPI (S7-200 CPU)	Yes
Ethernet	
Direct LOGIC Ethernet	Yes
Modbus TCP/IP	Yes
Entivity Modbus TCP/IP	Yes
Allen-Bradley EtherNet/IP™ Server - Generic I/O Messaging*	Yes
Allen-Bradley EtherNet/IP Client - Tag Based*	Yes
Allen-Bradley EtherNet/IP Client - MicroLogix 1100 & SLC 5/05 via native Ethernet port; MicroLogix 1000, 1100, 1200, 1500 & SLC 5-03, 04, 05 via AB ENI Adapter	Yes
Omron FINS	Yes
Mitsubishi Q, QnA Ethernet	Yes
Siemens (S7-300 CPU, S7-200)	Yes

* ControlLogix™ and CompactLogix™

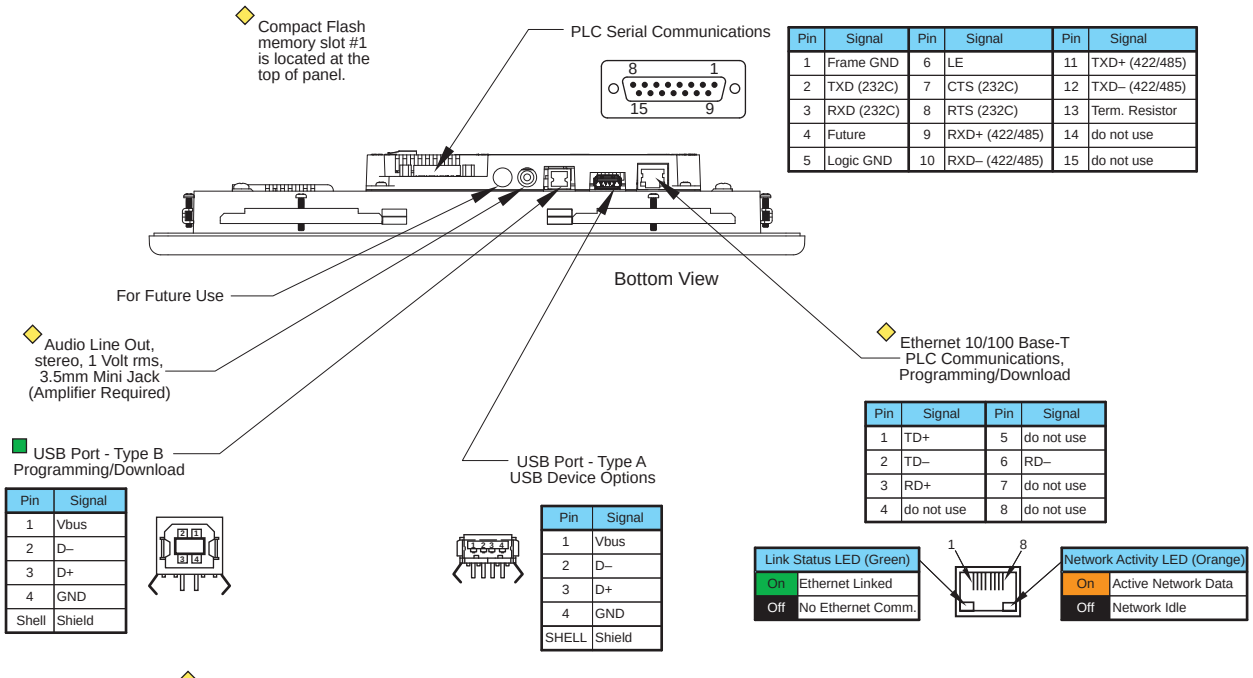
Mounting Cutout



Ports & Memory Expansion



C-more Communication Ports



Pin	Signal	Pin	Signal	Pin	Signal
1	Frame GND	6	LE	11	TXD+ (422/485)
2	TXD (232C)	7	CTS (232C)	12	TXD– (422/485)
3	RXD (232C)	8	RTS (232C)	13	Term. Resistor
4	Future	9	RXD+ (422/485)	14	do not use
5	Logic GND	10	RXD– (422/485)	15	do not use

Pin	Signal
1	Vbus
2	D–
3	D+
4	GND
Shell	Shield

Pin	Signal
1	Vbus
2	D–
3	D+
4	GND
SHELL	Shield

Pin	Signal	Pin	Signal
1	TD+	5	do not use
2	TD–	6	RD–
3	RD+	7	do not use
4	do not use	8	do not use

◆ Note: Device is not available on Base Feature touch panels, part numbers EA7-S6M-R and EA7-S6C-R.

■ Note: Use USB Programming Cable, p/n USB-CBL-AB15.

Ethernet Port

The Ethernet port has several uses:

- Download program to panel
- Communicate to PLCs/PCs
- Send e-mail
- Access FTP server
- Act as a Web server

The Ethernet port has an RJ-45 8-wire modular connector with green and orange LEDs.

- The orange LED indicates the Ethernet communication status. It illuminates when there is data activity on the network.
- The green LED indicates link status and illuminates when a link is established.

Ethernet connections to PLCs/PCs:

- ***Direct***LOGIC Ethernet
- Modbus TCP/IP
- Allen-Bradley EtherNet/IP™ Server - Generic I/O Messaging (ControlLogix™, CompactLogix™, and FlexLogix™)
- Allen-Bradley EhterNet/IP Client - Tag Based (ControlLogix, CompactLogix, and FlexLogix™)
- Allen-Bradley EhterNet/IP Client - MicroLogix 1100 & SLC 5/05, both via native Ethernet port
- Allen-Bradley MicroLogix 1000, 1100, 1200, 1500, SLC 5-03/04/05, all via ENI Adapter
- Entivity Modbus TCP/IP
- Omron Ethernet FINS
- Siemens Ethernet ISO over TCP

Note: The base panels (-R part numbers) do not include an Ethernet port, and do not have these capabilities.

USB Port B

Program *C-more* via the USB programming port. It's fast and easy, with no baud rate settings, parity, or stop bits to worry about. We stock standard USB cables for your convenience. USB Port B can be used to upload or download projects to and from a PC.

USB Port A

The Universal Serial Bus (USB) Port A is a standard feature for all models and can be used to connect various USB HID (Human Input Device) devices to the panel, such as:

- USB pen drives, (SDCZ4-2048-A10)
- USB keyboards
- USB barcode scanners
- USB card scanners

C-more can log data to the USB pen drive as well as load projects to the panel from the pen drive. You can also back up project files and panel firmware.

Sound Interface (Audio Line Out)

When attached to an amplifier and speaker(s), *C-more* can play warning sounds or pre-recorded messages such as: "conveyor is jammed". *C-more* supports WAV type files. The output is stereo.

PLC Port

The PLC port is an RS-232, RS-422 or RS-485 female 15-pin D-sub connector. Use this port for serial connections to PLCs. The port supports the following PLC protocols:

All AutomationDirect.com PLCs:
- ***Direct***LOGIC K-sequence
- ***Direct***NET
- Modbus (Koyo Addressing)
- CLICK

Allen Bradley:
- DF1 Full & Half Duplex
- DF1 Full & Half Duplex - Tag Based
- PLC5 DF1
- DH485

Modbus RTU
Entivity Modbus RTU
GE SNPX (90/30, 90/70, Micro 90, VersaMax Micro)
Omron:
- Host Link (C200 Adapter, C500)
- FINS (CJ1, CS1)

Mitsubishi:
- Melsec FX
- Q/QnA

Siemens PPI (S7-200 CPU)

C-more PLC Comm Protocols & Cables

PLC Compatibility Table			
PLC Family	**Model**		**Protocols**
Allen-Bradley	MicroLogix 1000/1100/1200/1500, SLC 5-/01/02/03, PLC5		DH485/AIC/AIC+
	MicroLogix 1000, 1100, 1200 and 1500		DF1 Half Duplex; DF1 Full Duplex
	SLC 5-/03/04/05		
	ControlLogix™, CompactLogix™, FlexLogix™		
	PLC-5		DF1 Full Duplex
	ControlLogix, CompactLogix, FlexLogix - Tag Based		DF1 Half Duplex; DF1 Full Duplex
	ControlLogix, CompactLogix, FlexLogix - Generic I/O Messaging		EtherNet/IP Server
	ControlLogix, CompactLogix, FlexLogix - Tag Based		EtherNet/IP Client
	MicroLogix 1100 & SLC 5/05, both via native Ethernet port		
	MicroLogix 1000, 1100, 1200, 1500 & SLC 5-03/04/05, all via ENI Adapter		
Modbus TCP/IP	Modbus TCP/IP devices		Modbus TCP/IP
GE	90/30, 90/70, Micro 90, VersaMax Micro		SNPX
Mitsubishi	FX Series		FX Direct
	Q02, Q02H, Q06H, Q12H, Q25H		Q CPU
	Q, QnA Serial		QnA Serial
	Q, Qna Ethernet		QnA Ethernet
Omron	C200 Adapter, C500		Host Link
	CJ1/CS1 Serial, CJ1/CS1 Ethernet		FINS
Modicon	984 CPU, Quantum 113 CPU, AEG Modicon Micro Series 110 CPU: 311-xx, 411-xx, 512-xx, 612-xx		Modbus RTU
Siemens	S7-200 CPU, RS-485 Serial		PPI
	S7-300 CPU, S7-200 Ethernet		Ethernet ISO over TCP
CLICK	all		AutomationDirect Modbus (CLICK)
***Direct*LOGIC**	DL05/DL06	all	K-Sequence
			***Direct*NET**
			Modbus (Koyo addressing)
		H0-ECOM/H0-ECOM100	***Direct*LOGIC Ethernet**
	DL105	all	K-Sequence
	DL205	D2-230	K-Sequence
		D2-240	K-Sequence
			***Direct*NET**
		D2-250/D2-250-1/D2-260	K-Sequence
			***Direct*NET**
			Modbus (Koyo addressing)
		D2-240/D2-250-1/D2-260 Using DCM	***Direct*NET**
			Modbus (Koyo addressing)
		H2-ECOM/H2-ECOM100	***Direct*LOGIC Ethernet**
	DL305	D3-330/330P (Requires the use of a Data Communications Unit)	***Direct*NET**
		D3-340	***Direct*NET**
		D3-350	K-Sequence
			***Direct*NET**
			Modbus (Koyo addressing)
		D3-350 DCM	***Direct*NET**
			Modbus (Koyo addressing)
	DL405	D4-430	K-Sequence
			***Direct*NET**
		D4-440	K-Sequence
			***Direct*NET**
		D4-450	K-Sequence
			***Direct*NET**
			Modbus (Koyo addressing)
		All with DCM	***Direct*NET**
			Modbus (Koyo addressing)
		H4-ECOM/H4-ECOM100	***Direct*LOGIC Ethernet**
	H2-WinPLC (Think & Do) Live V5.2 or later and Studio any version		Think & Do Modbus RTU (serial port)
	H2-WinPLC (Think & Do) Live V5.5.1 or later and Studio V7.2.1 or later		Think & Do Modbus TCP/IP (Ethernet port)

Cable Description	Cable Part Number	Price
AutomationDirect CLICK, ***Direct*LOGIC PLC RJ-12 port, DL05, DL06, DL105, DL205, D3-350, D4-450 & H2-WinPLC (RS-232C)	***EA-2CBL***	<--->
***Direct*LOGIC (VGA Style) 15-pin port, DL06, D2-250 (250-1), D2-260 (RS-232C)	***EA-2CBL-1***	<--->
***Direct*LOGIC PLC RJ-11 port, D3-340 (RS-232C)	***EA-3CBL***	<--->
***Direct*LOGIC DL405 PLC 15-pin D-sub port, DL405 (RS-232C)	***EA-4CBL-1***	<--->
***Direct*LOGIC PLC 25-pin D-sub port, DL405, D3-350, DL305 DCU and all DCM's (RS-232C)	***EA-4CBL-2***	<--->
Allen-Bradley MicroLogix 1000, 1100, 1200 & 1500 (RS-232C)	***EA-MLOGIX-CBL***	<--->
Allen-Bradley SLC 5-03/04/05 ControlLogix, CompactLogix, FlexLogix, DF1 port (RS-232C)	***EA-SLC-232-CBL***	<--->
Allen-Bradley PLC-5 DF1 port (RS-232C)	***EA-PLC5-232-CBL***	<--->
Allen-Bradley SLC 500 DH485 port (RS-485A)	***EA-DH485-CBL***	<--->
GE 90/30, 90/70, Micro 90, VersaMax Micro 15-pin D-sub port (RS-422A)	***EA-90-30-CBL***	<--->
MITSUBISHI FX Series 25-pin port (RS-422A)	***EA-MITSU-CBL***	<--->
MITSUBISHI FX Series 8-pin mini-DIN (RS-422A)	***EA-MITSU-CBL-1***	<--->
OMRON Host Link C200 Adapter, C500 (RS-232C)	***EA-OMRON-CBL***	<--->

NOTE: EZTouch serial PLC communication cables are compatible with C-more touch panels.

EA-2CBL

EA-2CBL-1

C-more Computer Programming Connections

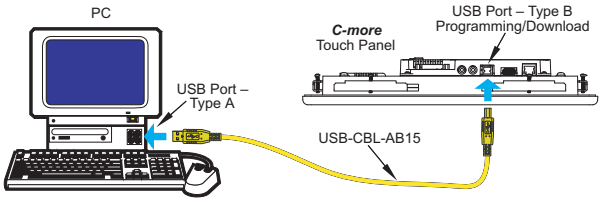
Using the *C-more* Programming Software for project development, the touch panel can be connected to a PC (personal computer) in one of several ways:

- Connect a USB Programming Cable (USB-CBL-AB15) from a USB port type A on the PC to the USB type B programming port on the C-more touch panel. The USB connection is for direct connection only and does not support USB hubs.
- Connect the ***C-more*** touch panel to a PC via an Ethernet hub or switch, and CAT5 Ethernet cables (full feature panels only). Multiple panels can be programmed in this configuration.
- Use an Ethernet crossover cable directly between the ***C-more*** touch panel's Ethernet port and the PC Ethernet port (full feature panels only).

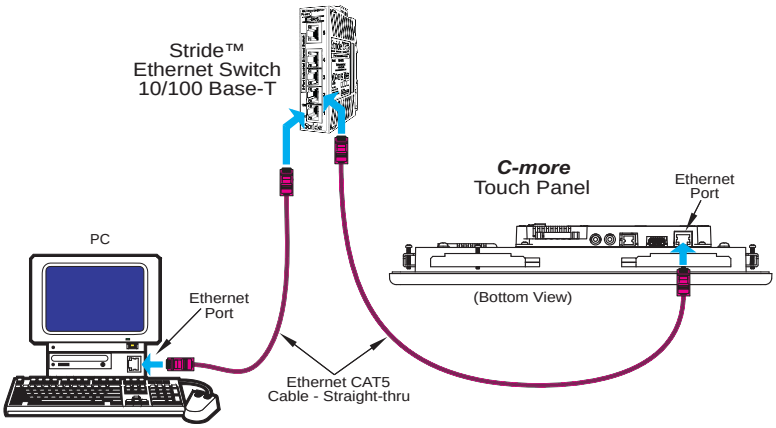
Following are the minimum system requirements for running *C-more* Programming Software, p/n EA-PGMSW, on a PC:

- Personal Computer with a 333 MHz or higher processor (CPU) clock speed recommended; (Windows® 2000 with Service Pack 4 or Windows® XP, 800 MHz or higher processor (CPU) clock speed recommended (Windows® Vista (32 bit)); Intel® Pentium/Celeron family, or AMD® K6/Athlon/Duron family, or compatible processor recommended
- Keyboard and Mouse or compatible pointing device
- Super VGA color video adapter and monitor with at least 800 x 600 pixels resolution (1024 x 768 pixels recommended) 64K color minimum
- 300 MB free hard-disk space
- 128 MB free RAM (512 MB recommended); 512 MB free RAM (1 GB recommended) for Vista
- CD-ROM or DVD drive for installing software from the CD
- USB port or Ethernet 10/100 Mbps port for project transfer from software to touch panel (Ethernet port not available on -R models)
- Operating System - Windows® Vista, Windows® XP Home / Professional Edition or Windows® 2000 with Service Pack 4.

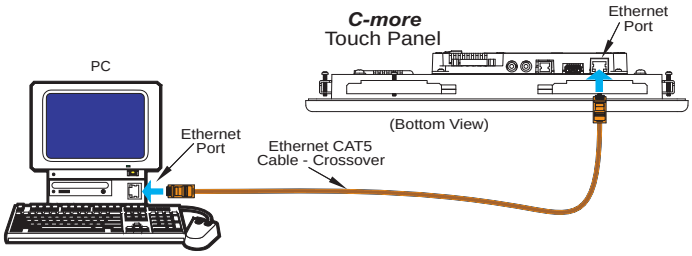
USB Connectivity



Ethernet Connectivity via a Hub or Switch



Ethernet Direct Connection



USB Programming Cable

Part No. USB-CBL-AB15

<--->

Other lengths available see USB-CBL-AB3, USB-CBL-AB6, USB-CBL-AB10 on page 9-27

Stride™ Ethernet Switch

Part No. SE-SW5U

<--->

Ethernet Configuration Kit

Part No. RT-CNFGKIT

<--->

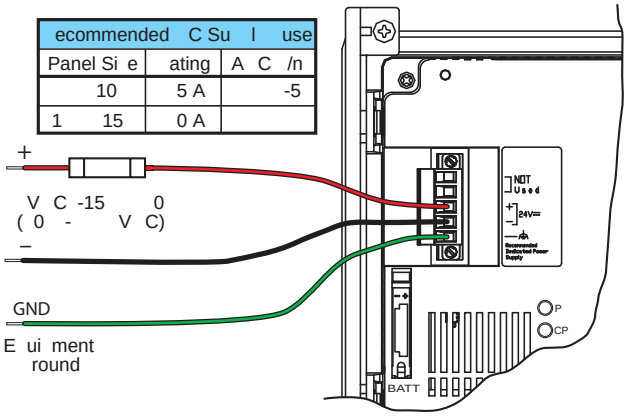
The Ethernet Configuration Kit includes a five-port 10/100 Base-T Ethernet switch, four straight-through cables, and one crossover cable. (The cables are at least five feet in length.) The kit provides a great convenience for configuring systems, demonstration systems or basic control projects using Ethernet.

C-more Power Connection Wiring

Providing Power to the Touch Panel

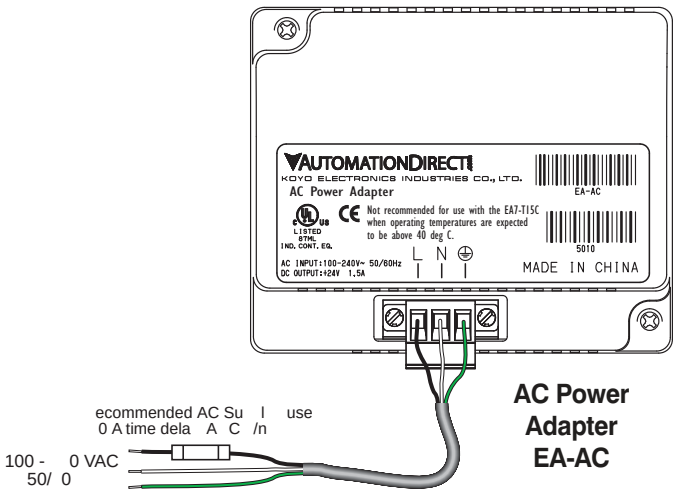
- Connect a dedicated 24 VDC switching power supply rated for a minimum of 1.5 Amps to the DC connector on the rear of the ***C-more*** touch panel. Connect the ground terminal to a proper equipment ground.
- or, install a ***C-more*** AC Power Adapter (EA-AC) to the rear of the touch panel and connect an AC voltage source of 100-240 VAC, 50/60Hertz, to its AC connector.
- then, turn on the power source and check the LED status indicators on the rear of the ***C-more*** touch panel for proper operation.

DC Wiring



Recommended Power Supply:
AutomationDirect Part No. PS24-050D

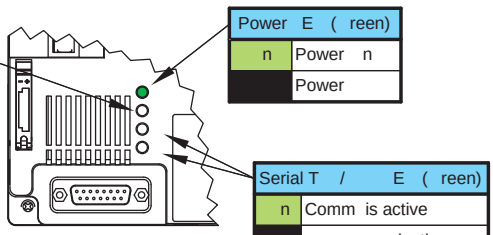
AC Wiring



AC Power Adapter EA-AC

C-more E Status ndicators

CP Status E (reen range ed)	
	Power
reen	ormal CP un State
ed	emor Error
Blin ing ed	erating S stem not ound
Blin ing range	C Bac light ailure
Blin ing reen	Power oss etection



ear View

WARNING: To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and it is your responsibility to determine which codes should be followed, and to verify that the equipment, installation, and operation are in compliance with the latest revision of these codes.

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The C-more Family

Features	Base Model	Full Featured Model
More durable		
- 50,000 hour bulb life	y	y
- Replaceable bulbs on 8", 10", 12", and 15" models	-	y
Better screens		
- Bright screens (NIT ratings)	y	y
- TFT with 65,536 colors available on all sizes	-	y
- 256 color STN screens on 6" models	y	y
More flexibility		
- Analog touch screen (no touch cell grid!)	y	y
- Overlapping objects	y	y
Better communications		
- USB Port-A	y	y
- USB Port-B	y	y
- Built-in Ethernet port	-	y
- Built-in serial communications	y	y
More capacity		
- Built-in 10Mbyte project memory	y	y
- CompactFlash card slot #1 (data logging)	-	y
- Supports USB memory devices (data logging)	y	y
- Symbol Factory™ library with 4,000 symbols.	y	y
More objects		
- Over 50 objects including 16 pen trends, switches, PID trend faceplate, PID bar graph faceplate	y	y
- Create custom objects and store in user library	y	y
- Improved multilanguage support for objects in German, French, Italian, Spanish, Chinese and Japanese characters	y	y
More high end features		
- Project simulator	y	y
- Bitmap animation	y	y
- E-mail messaging	-	y
- Built-in FTP server	-	y
- Pop-up window within a touch screen	y	y
- Data logging to USB/CompactFlash	USB only	y
- Historical alarms with time and date stamp along with alarm frequency reporting.	y	y
- Supports simultaneous communication to multiple brands of PLCs.	-	y
- Event Manager	y	y
- Audio line out	-	y
Improved ease of use		
- Improved multi-language support.	y	y
- Improved dialog boxes	y	y
- "Power User" property box	y	y
- More fonts and sizes	y	y
- Master background screens	y	y
- Improved recipes	y	y
Optional accessories		
- Optional "Screw on" 110VAC power supply	y	y
- Expansion unit for additional CompactFlash	-	y

Supported drivers

All AutomationDirect.com *Direct*LOGIC PLCs and PC-based control:

K-Sequence (DL05/06/105/205/350/405)

*Direct*NET (DL05/06/105/205/350/405)

*Direct*NET (DL330/340)

*Direct*LOGIC Modbus (DL05/06/205/350/405)

ECOM Ethernet (DL05/06/205/405) Ethernet

Entivity Modbus RTU (H2-WinPLC)

Entivity Modbus TCP/IP Ethernet (H2-WinPLC)

Modicon Modbus RTU

Modicon Modbus TCP/IP Ethernet

Allen-Bradley:

AB DF1 Full Duplex (SLC500)

AB DF1 Half Duplex (MicroLogix/SLC500)

AB DF1 Full Duplex (PLC5)

AB DH485 (MicroLogix/SLC500/AIC)

AB DF1 Full Duplex (MicroLogix)

AB DF1 Full Duplex Tag-Based (Control/CompactLogix /FlexLogix)

AB DF1 Half Duplex Tag-Based (Control/CompactLogix /FlexLogix)

AB EtherNet/IP Client (MicroLogix 1100)

AB EtherNet/IP Client (SLC5/05/ENI Adapter)

AB EtherNet/IP Client Tag-Based (Control/CompactLogix /FlexLogix)

AB EtherNet/IP Server:

(Generic IO Messaging) (Control/CompactLogix/FlexLogix)

GE 90/30 and 90/70 SNPX

Omron Host Link Adapter (C200/C500)

Omron FINS Serial (CS/CJ)

Mitsubishi Direct FX

Allen-Bradley Tag Import

Import tags directly from the RSLogix 5000 L5K file. *C-more* Software now supports direct insertion of ControlLogix, CompactLogix and FlexLogix tags from the PLC into *C-more* (no mapping or translations required).

Hardware User Manual

EA-USER-M

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At a minimum, you should follow all applicable sections of the National Fire Code, National Electrical Code, and the codes of the National Electrical Manufacturer's Association (NEMA). There may be local regulatory or government offices that can also help determine which codes and standards are necessary for safe installation and operation.

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Afin de réduire au minimum le risque d'éventuels problèmes de sécurité, vous devez respecter tous les codes locaux et nationaux applicables régissant l'installation et le fonctionnement de votre équipement. Ces codes diffèrent d'une région à l'autre et, habituellement, évoluent au fil du temps. Il vous incombe de déterminer les codes à respecter et de vous assurer que l'équipement, l'installation et le fonctionnement sont conformes aux exigences de la version la plus récente de ces codes.

Vous devez, à tout le moins, respecter toutes les sections applicables du Code national de prévention des incendies, du Code national de l'électricité et des codes de la National Electrical Manufacturer's Association (NEMA). Des organismes de réglementation ou des services gouvernementaux locaux peuvent également vous aider à déterminer les codes ainsi que les normes à respecter pour assurer une installation et un fonctionnement sûrs.

L'omission de respecter la totalité des codes et des normes applicables peut entraîner des dommages à l'équipement ou causer de graves blessures au personnel. Nous ne garantissons pas que les produits décrits dans cette publication conviennent à votre application particulière et nous n'assumons aucune responsabilité à l'égard de la conception, de l'installation ou du fonctionnement de votre produit.

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Pour des renseignements additionnels touchant la garantie et la sécurité, veuillez consulter la section Modalités et conditions de notre documentation. Si vous avez des questions au sujet de l'installation ou du fonctionnement de cet équipement, ou encore si vous avez besoin de renseignements supplémentaires, n'hésitez pas à nous téléphoner au 770-844-4200.

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AIRLINK™ RAVEN XE
INTELLIGENT 3G GATEWAY FOR EV-DO REV A NETWORKS

KEY FEATURES

■ Product and Benefits
- Persistent 3G Network Connectivity
- Low Power Consumption
- Compact Size for Easy Integration
- Rugged Aluminum Case
- Certified for Hazardous Environments
- Remote Management and Configuration

■ Highly Intelligent
- Security
  - IPsec VPN
  - GRE Tunneling
- Events Reporting Engine
- Embedded Protocols
- Highly Configurable

TECHNICAL SPECIFICATIONS

■ Technology
- CDMA EV-DO Revision A
- With Fallback to:
  - CDMA 1x
  - CDMA IS-95

■ Bands
- 800 Mhz Cellular
- 1900 Mhz PCS

■ Environmental
- Operating Temperature:
  - -30° to 70° Celsius
- Storage Temperature:
  - -40° to 85° Celsius

■ Dimensions
- 76 mm x 25 mm x 104 mm
- 3.0 in x 1.0 in x 4.1 in
- 185 grams
- 6.5 oz

■ Power Consumption (@12V DC)
- Transmit (Typical/Max) 140.250 mA
- Idle 35 mA
- Input Current 30 mA to 300 mA
- Input Voltage 9 - 28 V DC

■ Standards/Approvals
- FCC
- Industry Canada
- Class I Div 2
- RoHS
- Carrier specific approvals

■ Host Interfaces
- Ethernet: 10BaseT RJ-45
- USB Type B5 Pin mini
- Antenna Connection:
  - Cellular - 50 Ohm SMA
  - Receive Diversity - 50 Ohm SMA
  - I/O Ports: 2

■ Application Interfaces
- TCP/IP, UDP/IP, DHCP, HTTP, SNMP, SMTP, SMS, MSCI, Modbus and more

■ LED Indicators
- Network
- Signal
- Activity
- Power

Reliability and Support

Since 1993, Sierra Wireless has been delivering high quality data products backed by a dedicated field and call center support team. The AirLink brand stands for reliable, intelligent data devices that enhance operations while reducing costs and increasing revenues.

SIERRA WIRELESS, CONNECTING PEOPLE AND SYSTEMS TO MOBILE BROADBAND NETWORKS AROUND THE WORLD

Sierra Wireless products connect people and machines to wireless networks around the world. We offer an advanced, comprehensive product line, addressing consumer, enterprise, original equipment manufacturer, and specialized vertical industry markets. Our solutions are used for mobile computing, transportation, industrial M2M (machine-to-machine), enterprise, residential and consumer communications applications. We also provide professional services to customers requiring expertise in wireless design, integration, and carrier certification.

For more information, please visit our website, www.sierrawireless.com.

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HEART OF THE WIRELESS MACHINE®

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P/N RXECDMA 092809

SIERRA WIRELESS

AIRLINK™ RAVEN XE

(EV-DO REV A NETWORKS)

3G Rugged Ethernet Gateway

Powerful, intelligent connectivity

24/7 unmanned operation

Sleek, compact form factor

AIRLINK™ RAVEN XE
INTELLIGENT 3G GATEWAY FOR EV-DO REV A NETWORKS

Ethernet Gateway

The Raven XE provides 3G connectivity in a compact and sleek form factor ideal for enterprise customers requiring 24/7 unmanned operation of remote assets and high-speed broadband connectivity. The Raven XE is designed to handle rugged and robust commercial mobile and portable network connectivity applications.

The high-speed Ethernet interface and 3G optimized architecture make the Raven XE ideal for various commercial fixed or portable network connectivity applications.

Rugged Intelligence

Powered by ALEOS™ technology, the long-standing industry benchmark for reliable and feature-rich intelligence, the Raven XE provides the solution for enterprise customers requiring 24/7 unmanned operation of remote assets and high-speed broadband connectivity. Embedded machine protocols, ease of integration, and security protocols like IPSec VPN and GRE tunneling make the Raven XE the ideal solution for commercial and industrial applications requiring data security.

Ideal for Broadband Data Applications

The Raven XE is a versatile tool for a myriad of 3G data applications. Its small form factor enables integration into close quarters, such as ATMs, kiosks and media servers, while it's rugged design makes it an ideal option for surveillance and digital signage. Further, it's routing features, like NAT and Port Forwarding enabling the Raven XE to be connected to a switch for a routing solution.

- EASY INTEGRATION WITH CUSTOMER EQUIPMENT
- CONSISTENT USER EXPERIENCE ACROSS MULTIPLE WIRELESS NETWORK TECHNOLOGIES
- ETHERNET CONNECTIVITY FOR EASY SETUP
- REMOTE MANAGEMENT AND TROUBLESHOOTING
- IPSEC VPN TO PROTECT YOUR DATA FROM UNAUTHORIZED ACCESS

Applications
• Surveillance/Streaming Video
• Retail/POS
• Vending/Kiosk
• Banking/ATM
• Digital Signage
• Remote Monitoring and Control
• Business Continuity
• Wireless Networking

POWERED BY: ALEOS™

ALEOS™

ALEOS Intelligence

Embedded Technology from Sierra Wireless

KEY BENEFITS

- Simplifies Installation and maintenance
- Persistent network connectivity
- Real-Time Notification
- Over-The-Air (OTA) Upgrades
- Device Management & Control

ACEware™ AirLink Control Environment

ACEware™ Device Management

The Sierra Wireless suite of tools and utilities, leveraging the intelligence of ALEOS. ACEware simplifies deployment as well as remote monitoring, control and management of the entire wireless solution.

The ACEware suite of device management tools include:

ACEmanager	Remote device monitoring and configuration tool. Included with every AirLink device.
ACEnet	Enterprise-grade, hosted remote management application. Enables management of an entire fleet of AirLink gateways and routers.

* For more information on ALEOS and ACEware, please reference the ALEOS datasheet

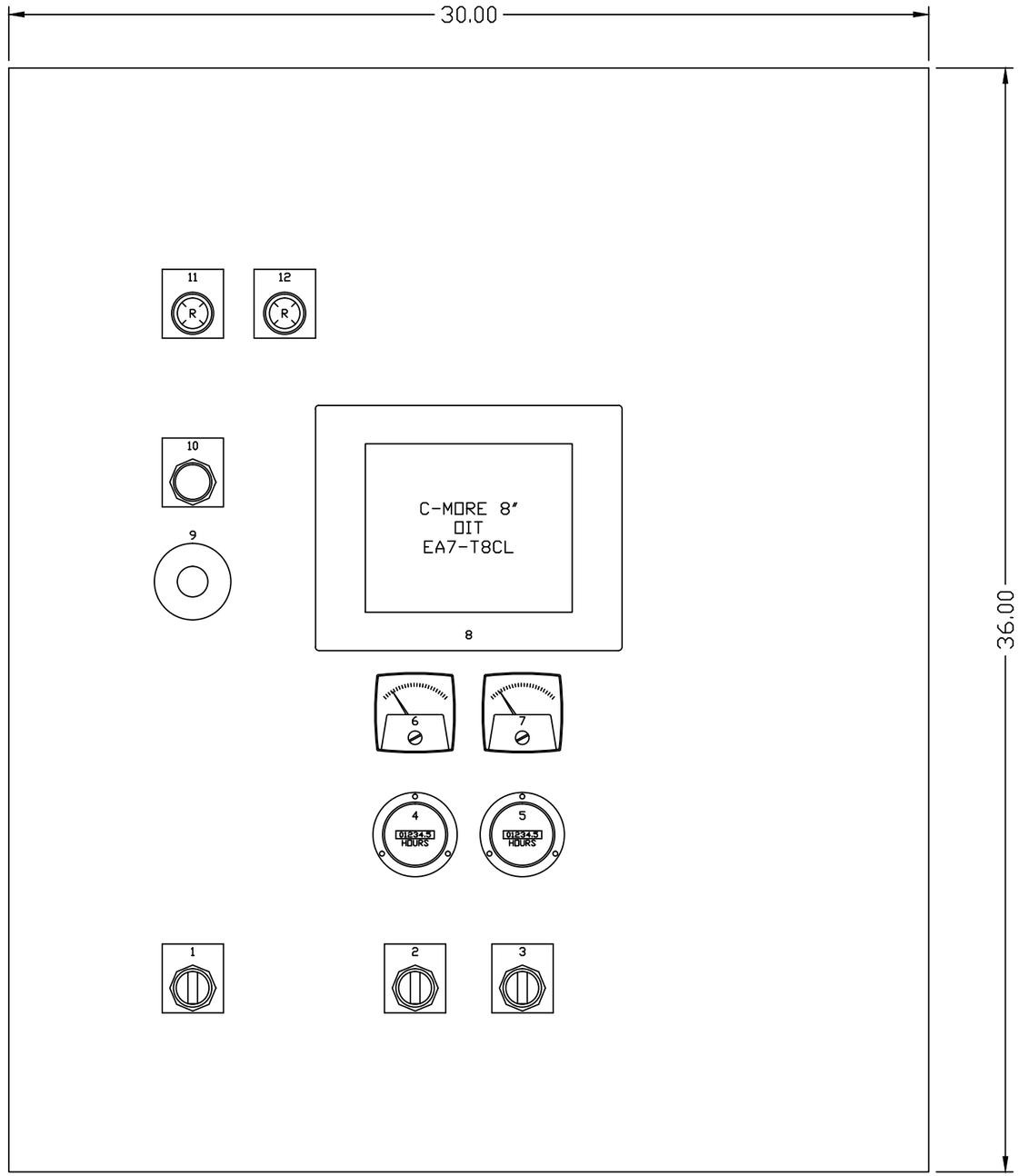
Section 5

Electrical Engineer Drawings

LEGEND PLATE TABLE

ITEM #	LINE 1	LINE 2	LINE 3
1	CONTROL POWER	OFF ON	
2	EXTRACTION WELL	PUMP P-01	HAND OFF AUTO
3	OWS TRANSFER	PUMP P-02	HAND OFF AUTO
4	HOURMETER	P-01	
5	HOURMETER	P-02	
6	AMMETER	P-01	
7	AMMETER	P-02	
8	OIT		
9	EMERGENCY	STOP	
10	RESET		
11	EMERGENCY	STOP	
12	TREATMENT	SYSTEM	ALARM
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

NOTE: SELECTOR SWITCHES ARE ILLUMINATED



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ESD
Waste2Water,Inc.
495 Oak Road
Ocala, FL 34472

PREPARED FOR:
ENVIRO TRAC LTD
YAPHANK, NY

PROJECT NAME:
NATIONAL GRID CLIFTON
FORMER MGP SITE

TITLE:
PANEL LAYOUT

DRAWN BY: PMG

ENGINEERING: DSH

MFG:

QC:

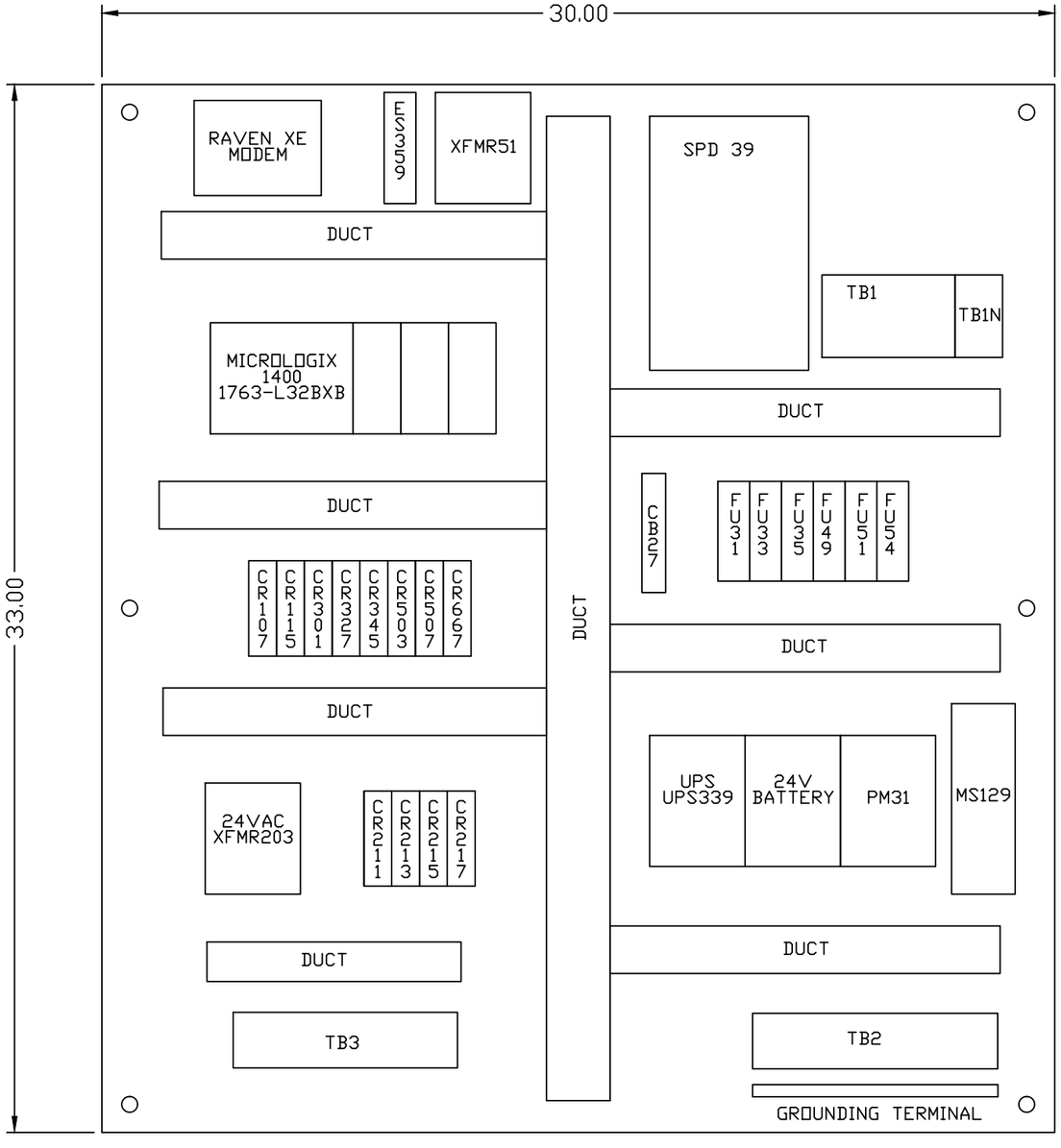
DATE: 04/21/15

DWG NO: 13653-4-01

SCALE: NTS

SHEET: 01 OF 02

NOTES:
1) 36" X 30" X 12" ENCLOSURE
2) SEGREGATE ALL ANALOG WIRING.



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QC:

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DWG NO: 13653-4-02

SCALE: NTS

SHEET: 02 OF 02

LEGEND:

- TERMINAL BLOCK (NUMBERED BY WIRE NUMBER)
- SCREW TERMINAL
- AMMETER
- AMMETER W/CT
- CIRCUIT BREAKER
- CONTACT N.O.
- CONTACT N.C.
- CONTACT TDCB
- CONTACT TDCM
- CONTACT INTERVAL
- CONTACT TDOB
- CONTACT TDOM
- COIL
- CYCLE COUNTER
- HOURMETER
- PUSHBUTTON
- SELECTOR SWITCH
- EMERGENCY STOP
- FLOW SWITCH
- TEMPERATURE SWITCH
- FUSE (1)
- NOTE # (1)
- GOTO LINE # (101)
- GROUND
- SOLENOID VALVE
- DISCONNECT SWITCH
- MOTOR
- OVERLOAD
- LEVEL SWITCH (CONDUCTIVITY)
- LEVEL SWITCH
- PILOT LAMP
- PILOT LAMP (PUSH TO TEST)
- PRESSURE SWITCH
- MOTOR PROTECTOR (SHORT CIRCUIT & OVERLOAD PROTECTION)
- "ALL IN ONE" MOTOR STARTER (CONTACTOR,SHORT CIRCUIT & OVERLOAD PROTECTION)
- TRANSFORMER (240VAC: H1 H3 H2 H4; 120VAC: X1 X2)

ELECTRICAL COMPONENT ABBREVIATIONS:

AM	AMMETER
CB	CIRCUIT BREAKER
CR	CONTROL RELAY
FU	FUSE
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
HM	HOUR METER
HS	HAND/SELECTOR SWITCH
ISR	INTRINSICALLY SAFE RELAY
ISAR	INTRINSICALLY SAFE ANALOG REPEATER
MC	MOTOR CONTACTOR
MP	MOTOR PROTECTOR
MS	MOTOR STARTER
OL	OVERLOAD
PB	PUSHBUTTON
PL	PILOT LIGHT
PM	PHASE MONITOR
SP	SURGE PROTECTOR
SS	SOFT START
TB	TERMINAL BLOCK
TR	TIME DELAY RELAY
TMR	7 DAY TIMER
VFD	VARIABLE FREQUENCY DRIVE
XFMR	TRANSFORMER

PROCESS DEVICE ABBREVIATIONS:

LS-	LEVEL SWITCH
LT-	LEVEL TRANSMITTER
LSHH-	LEVEL SWITCH HIGH-HIGH
LSH-	LEVEL SWITCH HIGH
LSL-	LEVEL SWITCH LOW
LSLL-	LEVEL SWITCH LOW-LOW
PS-	PRESSURE SWITCH
PT-	PRESSURE TRANSMITTER
PSLL-	PRESSURE SWITCH LOW-LOW
PSHH-	PRESSURE SWITCH HIGH-HIGH
TS-	TEMPERATURE SWITCH
TT-	TEMPERATURE TRANSMITTER
TSHH-	TEMPERATURE SWITCH HIGH-HIGH
FS-	FLOW SWITCH
FT-	FLOW TRANSMITTER
FQ/FT-	FLOW TOTALIZER W/PULSE

NOTES:

1) LABEL: INSTALLER TO PROVIDE EQUIPMENT GROUNDING CONDUCTOR WHICH SHALL BE #10AWG.
2) ALL POWER WIRING SHALL BE #12AWG UNLESS OTHERWISE NOTED.
3) ALL 120VAC CONTROL WIRING SHALL BE #16AWG RED(LINE) OR WHITE(NEUTRAL) UNLESS OTHERWISE NOTED.
4) ALL 24VAC CONTROL WIRING SHALL BE #16AWG BLACK(LINE) OR GRAY(NEUTRAL) UNLESS OTHERWISE NOTED.
5) ALL DISCRETE DC CONTROL WIRING SHALL BE #16AWG YELLOW(+) OR YELLOW W/BLK STRIPE(-).
6) ALL ANALOG DC WIRING SHALL BE 300V #18AWG SHIELDED CABLE UNLESS OTHERWISE NOTED.
7) ALL INTRINSICALLY SAFE WIRING IN PANEL SHALL BE #22AWG BLUE.
8) INSTALL ALL INTRINSICALLY SAFE CABLE AND EQUIPMENT IN ACCORDANCE WITH ARTICLE 504 OF THE NATIONAL ELECTRICAL CODE.
9) MAXIMUM LENGTH OF ANY CABLE CONNECTED TO ANY I. S. BARRIER SHALL BE 10,000 FEET.
10) U.L. 508A AND 698A LISTED CONTROL PANEL.
11) LABEL: UPS VOLTAGE PRESENT WHEN POWER IS OFF.
12) LABEL: THIS CONTROL PANEL IS ENERGIZED BY MORE THAN ONE POWER SOURCE!
13) TERMINAL BLOCK TB3 IS FOR CONNECTION TO A CLASS 1 REMOTE CONTROL CIRCUIT.
14) REMOTE E-STOP BY OTHERS.

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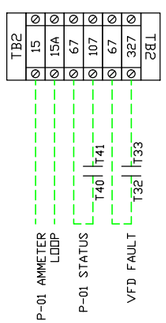
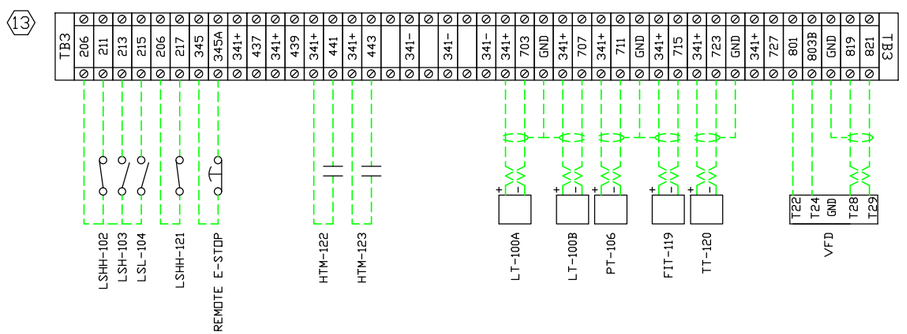
TERMINAL CONNECTIONS:





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YAPHANK, NY

PROJECT NAME:
NATIONAL GRID CLIFTON FORMER MGP SITE

TITLE:
ELECTRICAL

DRAWN BY: PMG
ENGINEERING: DSH
MFG:
QC:
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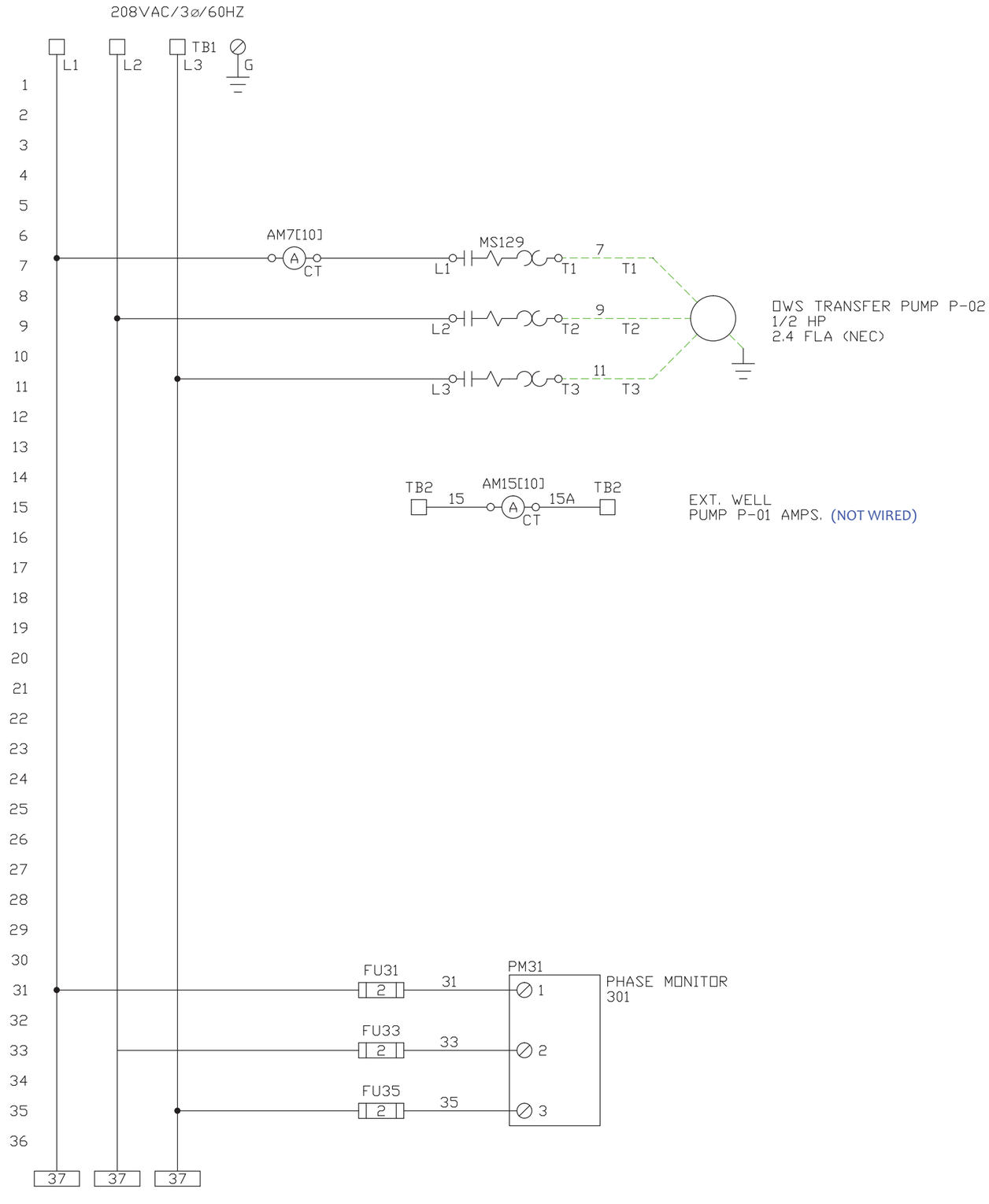
DWG NO: 13653-5-00
SCALE: NTS
SHEET: 01 OF 10



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PROJECT NAME:
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FORMER MGP SITE

TITLE:
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DRAWN BY: PMG

ENGINEERING: DSH

MFG:

QC:

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SCALE: NTS

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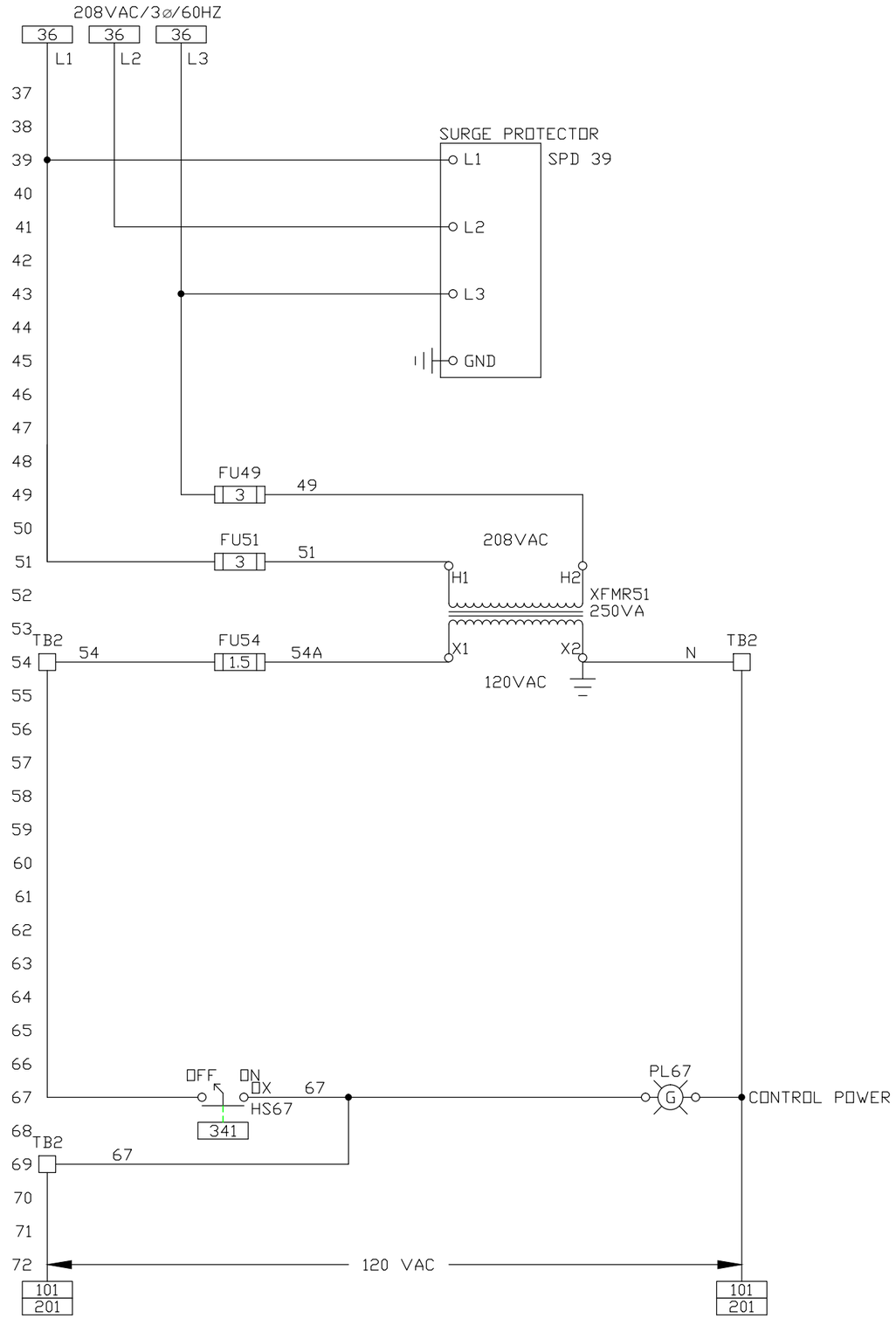

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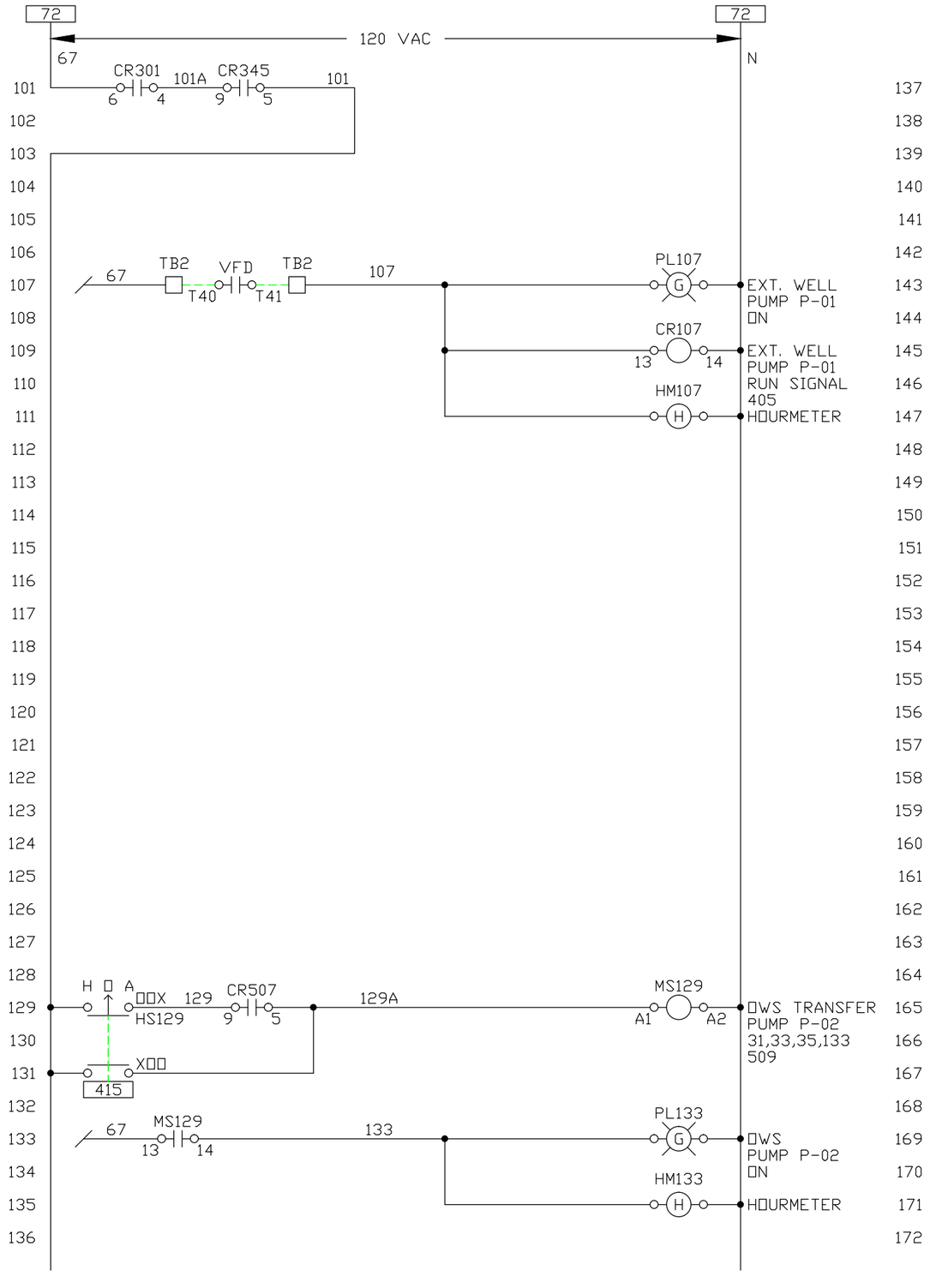

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SCALE: NTS

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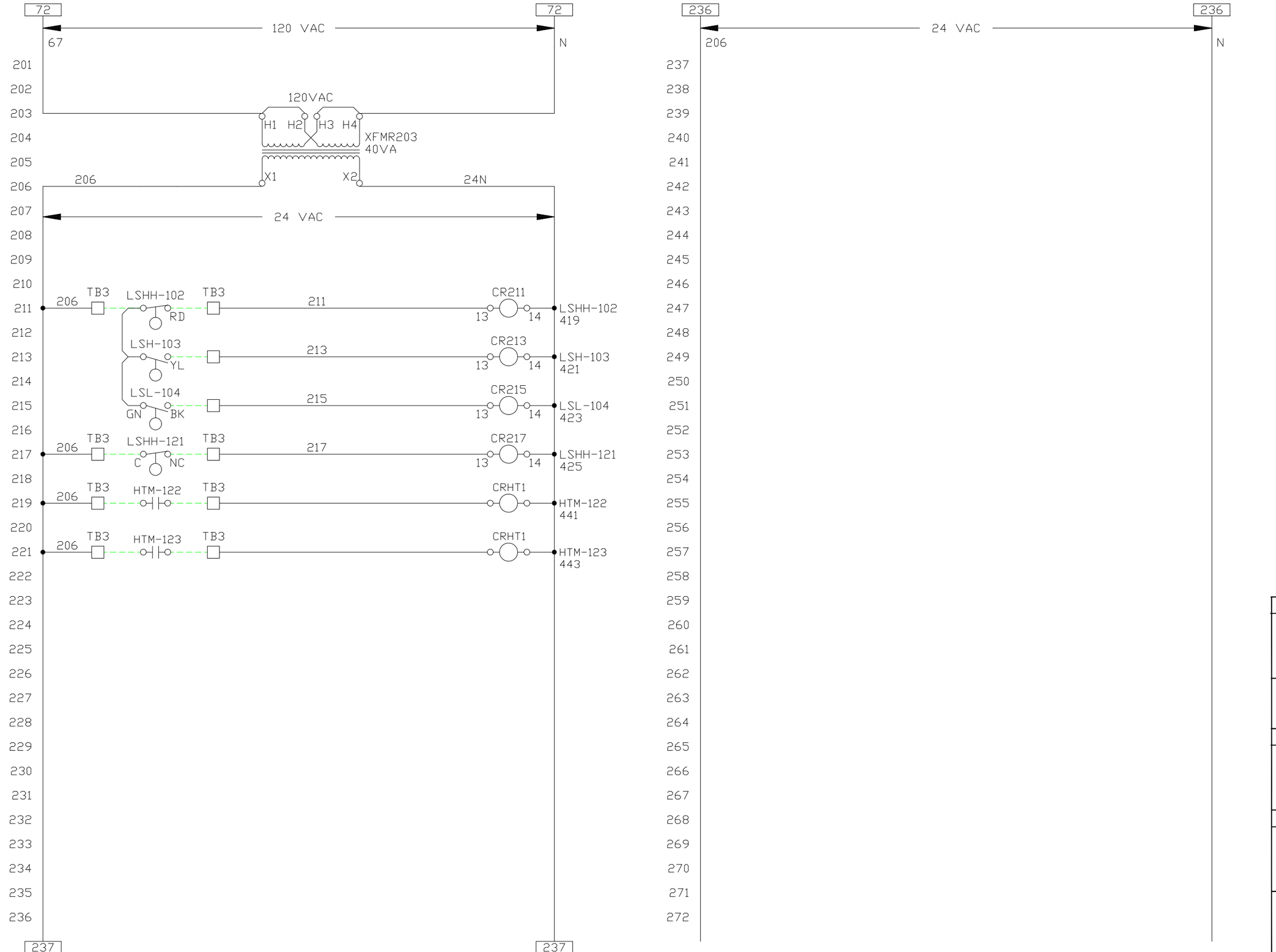

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AS–BUILT CONTROL SCHEMATIC
DRAWING #13653–5–04

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REVISION DATE: SEP. 30, 2015

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5 of 10

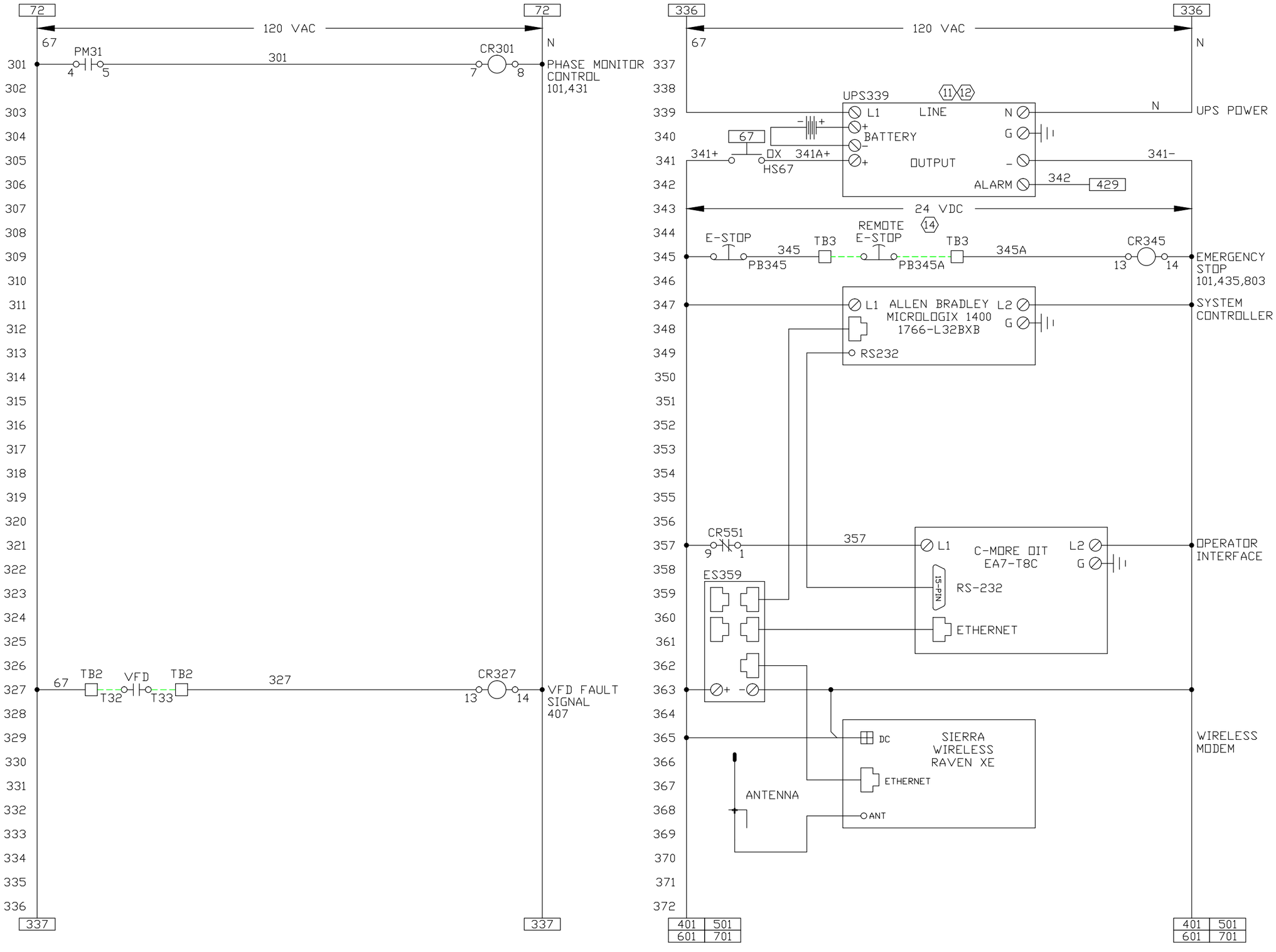
DRAWING TITLE

AS–BUILT ELECTRICAL
SINGLE LINE DIAGRAM

PREPARED FOR

NATIONAL GRID
FORMER CLIFTON
MANUFACTURED GAS PLANT

EnviroTrac
ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980
PHONE: (631)924–3001 FAX: (631)924–5001



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TITLE:
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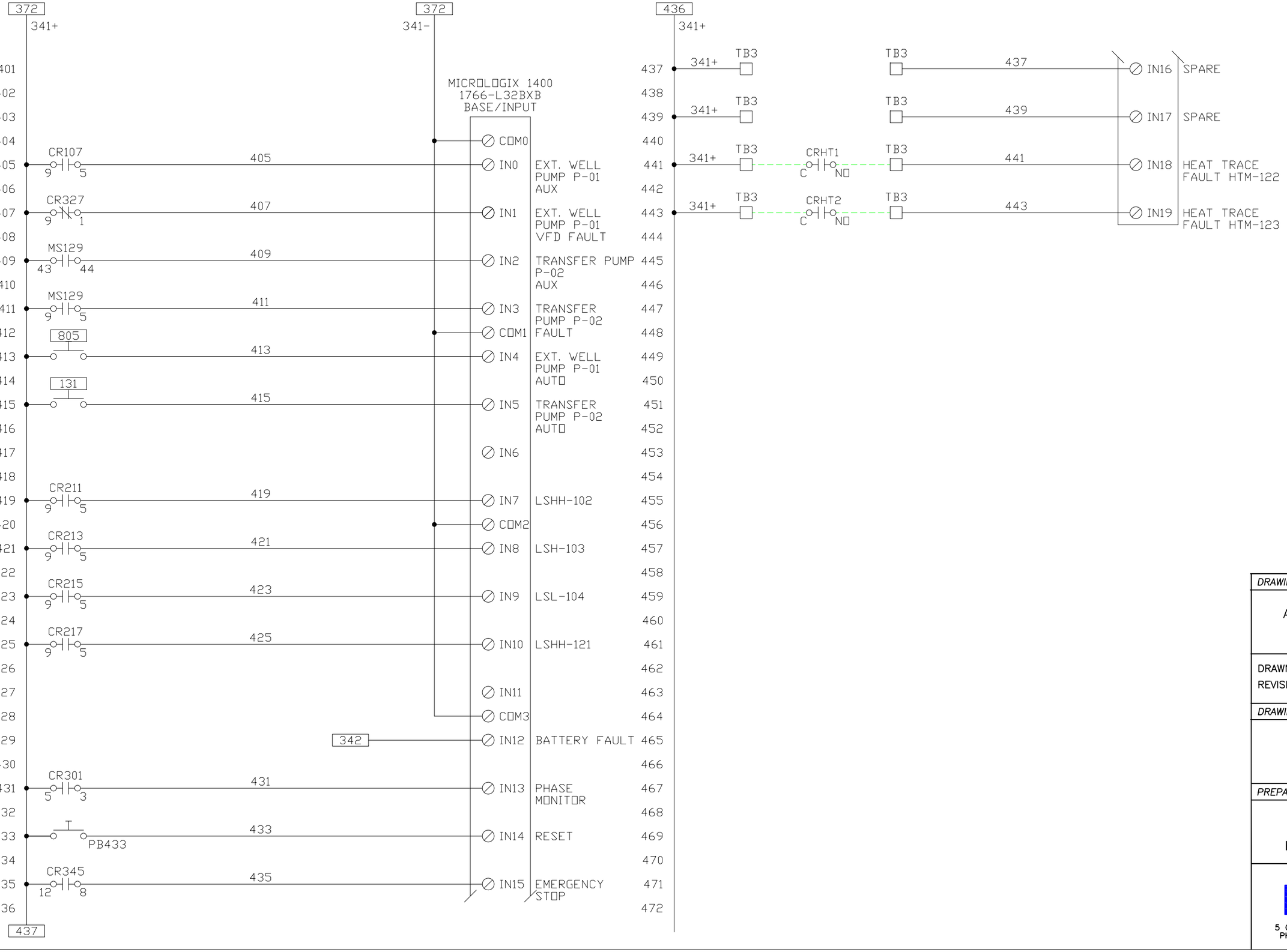

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AS–BUILT ELECTRICAL
SINGLE LINE DIAGRAM

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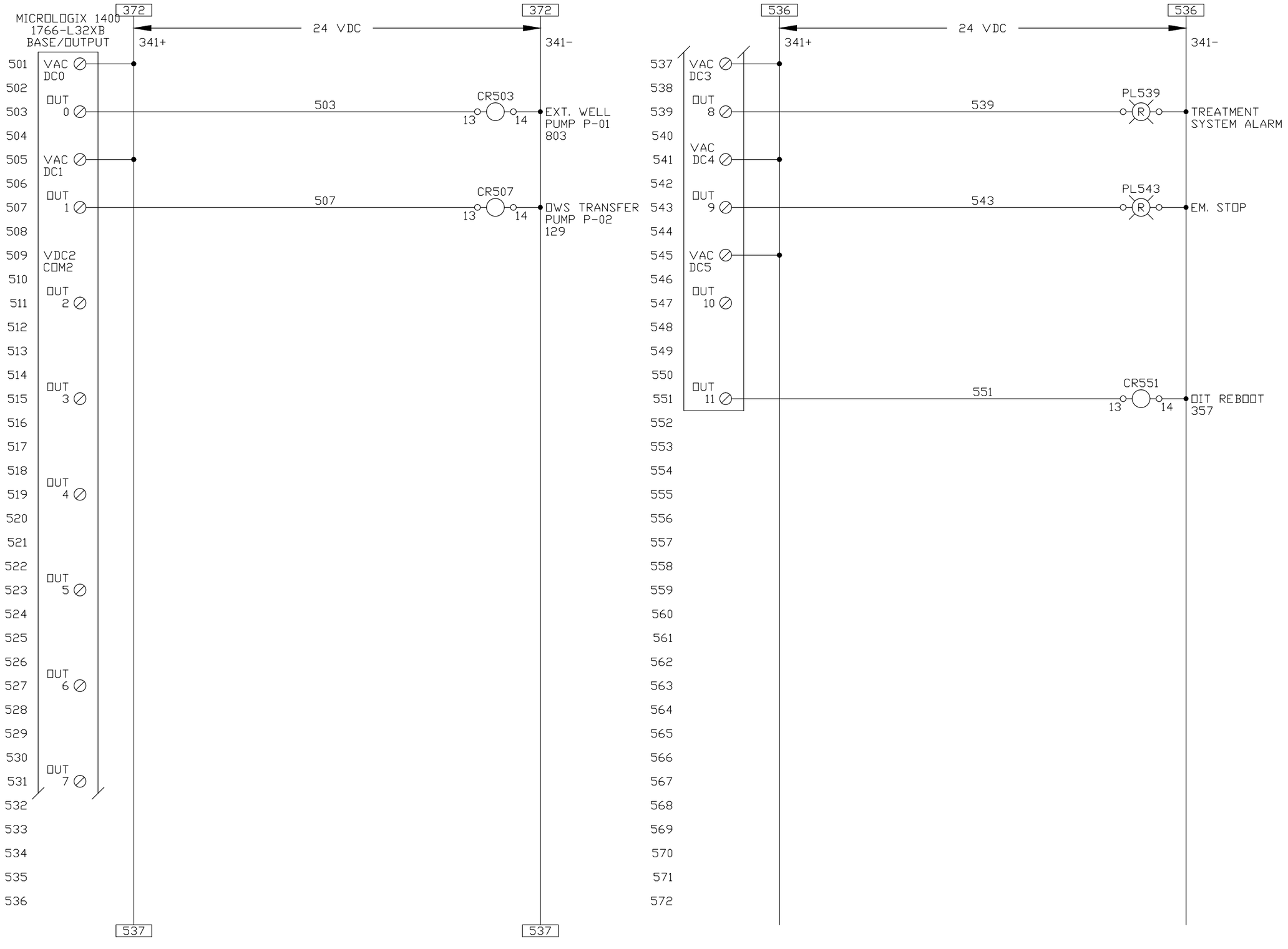
FORMER CLIFTON
MANUFACTURED GAS PLANT

EnviroTrac
ENVIRONMENTAL SERVICES
5 OLD DOCK ROAD, YAPHANK, NEW YORK 11980
PHONE: (631)924–3001 FAX: (631)924–5001



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FORMER MGP SITE

TITLE:
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DRAWN BY: PMG

ENGINEERING: DSH

MFG:

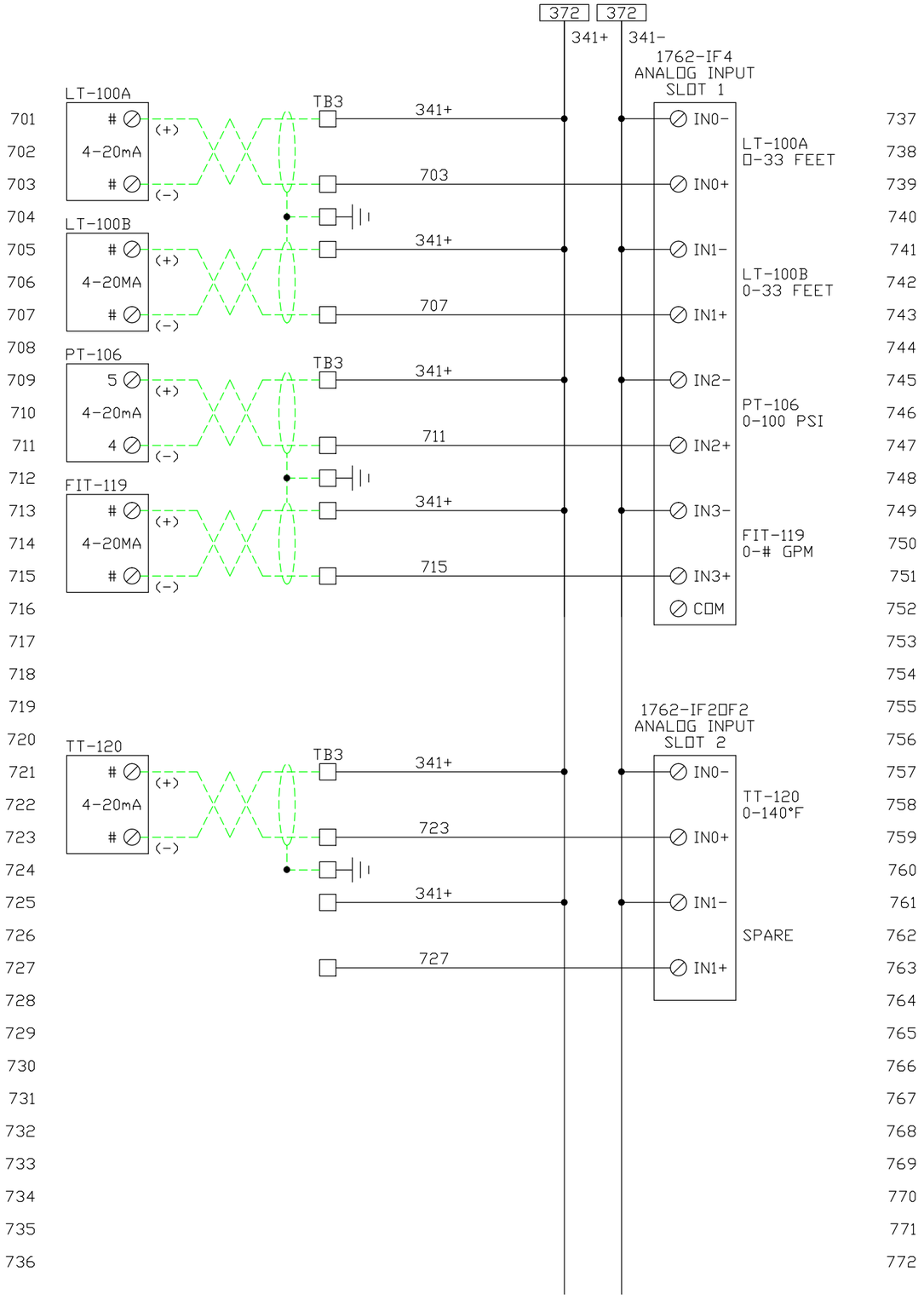
QC:

DATE: 04/21/15

DWG NO: 13653-5-07

SCALE: NTS

SHEET: 08 OF 10



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ENGINEERING: DSH

MFG:

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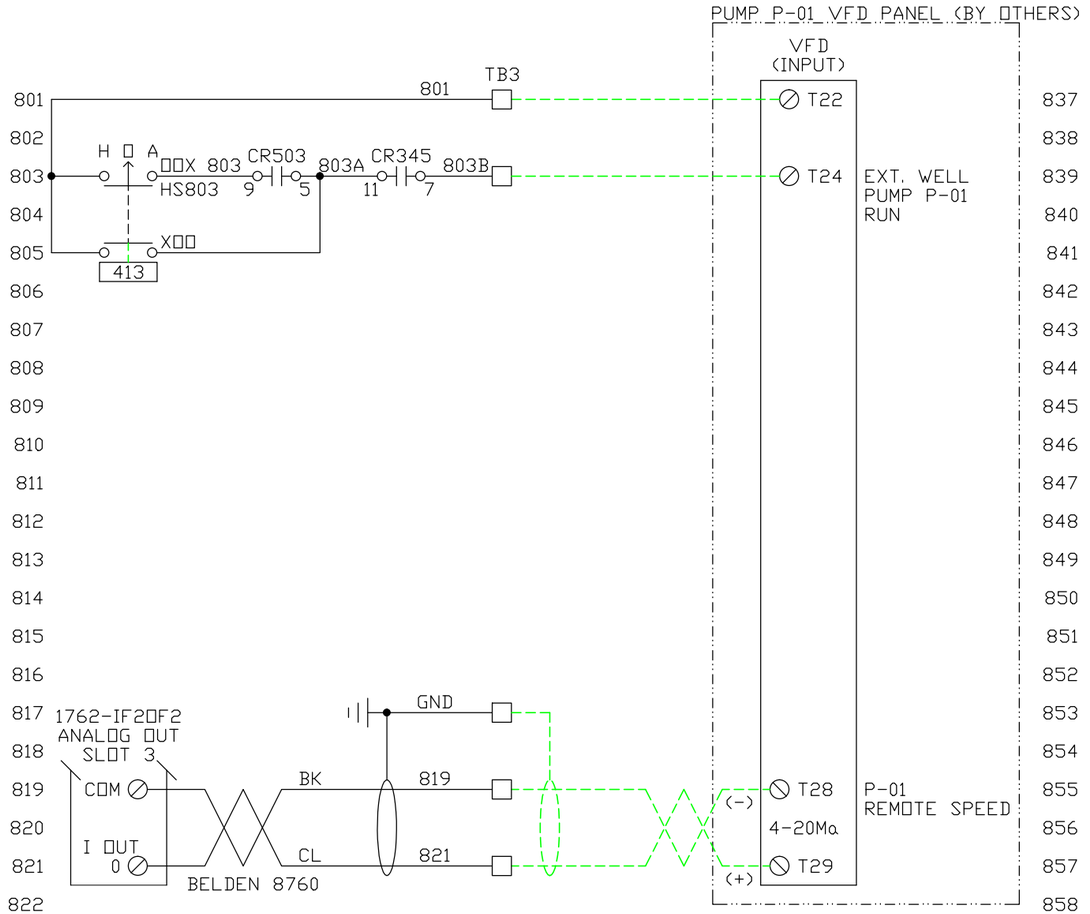
DATE: 04/21/15

DWG NO: 13653-5-08

SCALE: NTS

SHEET: 09 OF 10



DATE	BY	REVISION
05/14/15	CUST	REV-1

ESD
Waste2Water,Inc.
495 Oak Road
Ocala, FL 34472

PREPARED FOR:
ENVIRO TRAC LTD
YAPHANK, NY

PROJECT NAME:
NATIONAL GRID CLIFTON
FORMER MGP SITE

TITLE:
ELECTRICAL

DRAWN BY: PMG

ENGINEERING: DSH

MFG:

QC:

DATE: 04/21/15

DWG NO: 13653-5-09

SCALE: NTS

SHEET: 10 OF 10

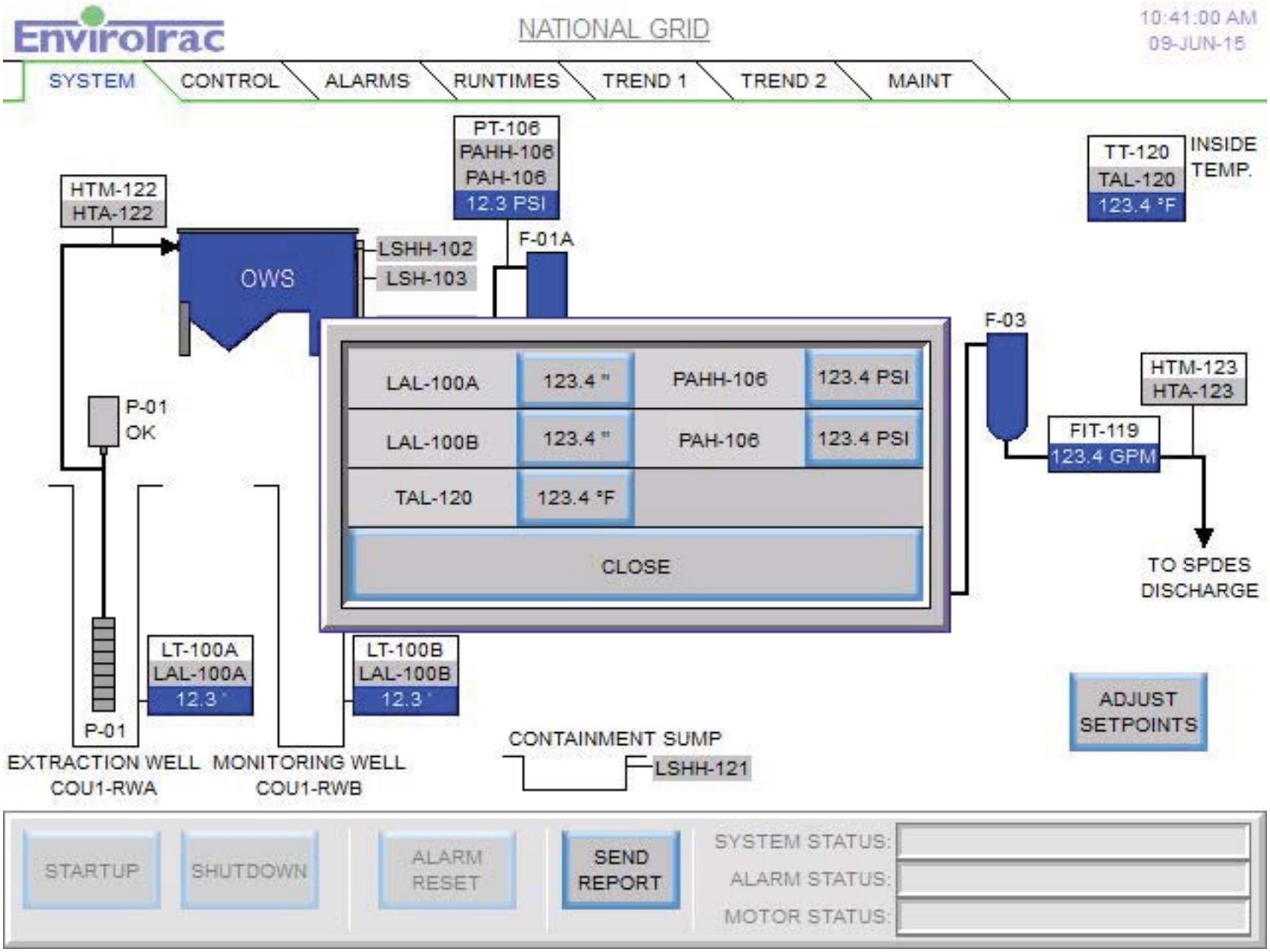
Electrical Load Summary

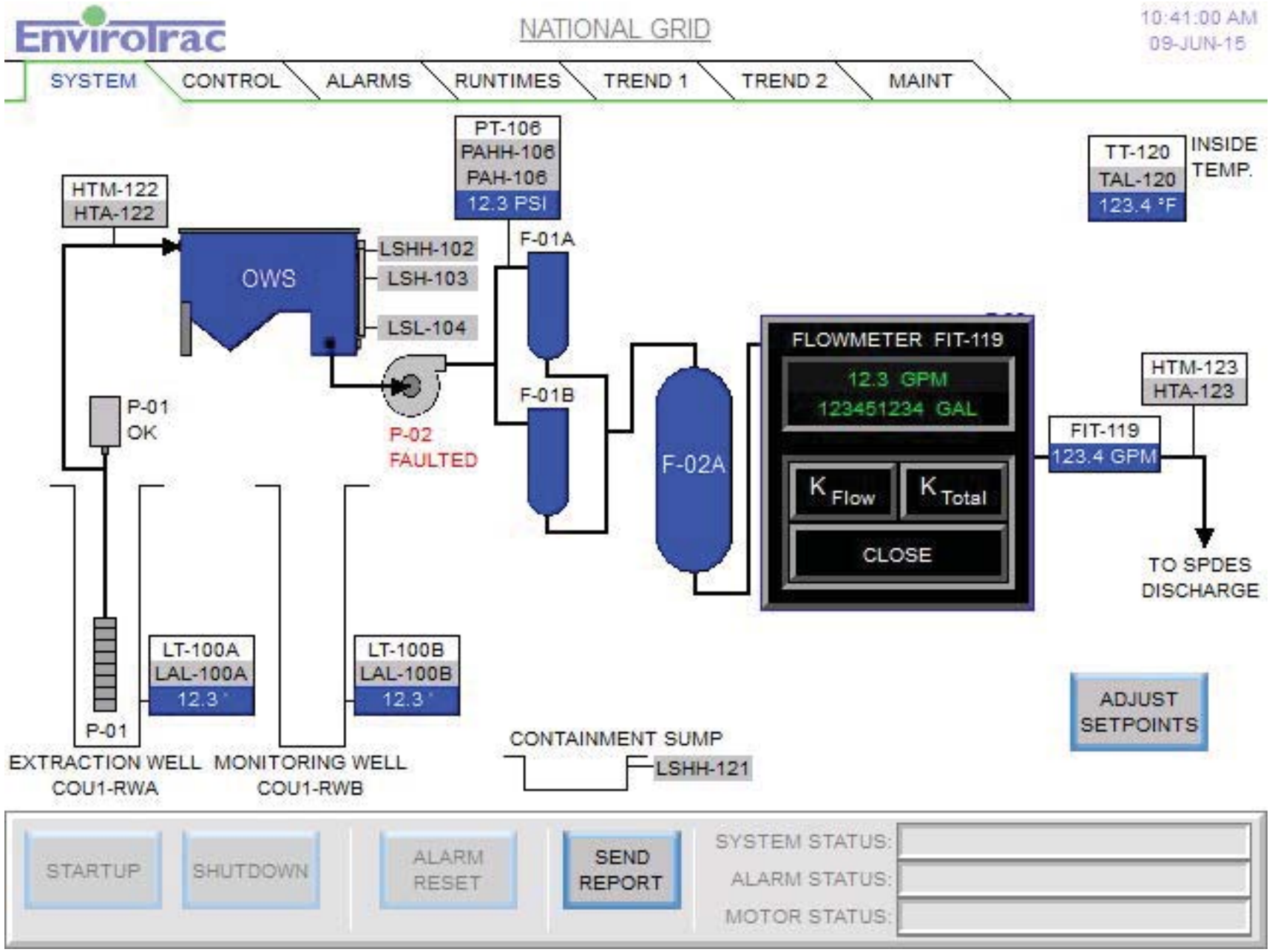
Project Name: Envirotrac / National Grid
System Voltage/Phase: 208/3
Drawing Number: 13653-7-01
Date: 4/28/15

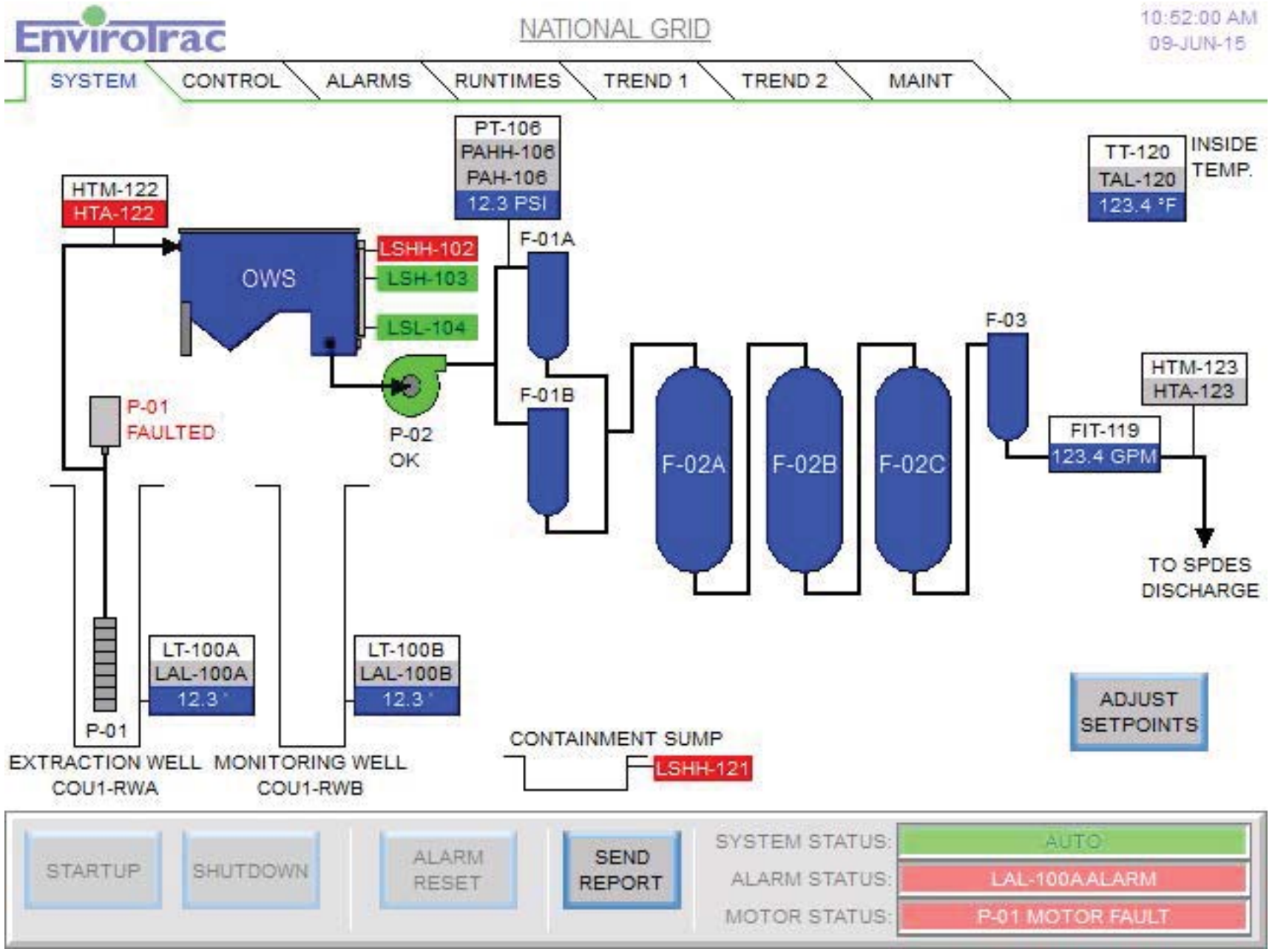
Created By:	DSH
Engineering:	
Manufacturing:	
Quality Control:	

NAME OF MOTOR LOAD	H/P	VOLT/ PHASE	LINE-1 AMPS	LINE-2 AMPS	LINE-3 AMPS	NEUT. AMPS	PER NEC TABLE
OWS TRANSFER PUMP P-02	1/2	208/3	2.4	2.4	2.4	-	430-250
LIGHTING AND POWER LOADS							
CONTROL TRANSFORMER		120/1	1.2		1.2		
GFCI RECEPTACLE		120/1	16.0			16.0	
TOTAL LOAD			19.6	2.4	3.6	16.0	

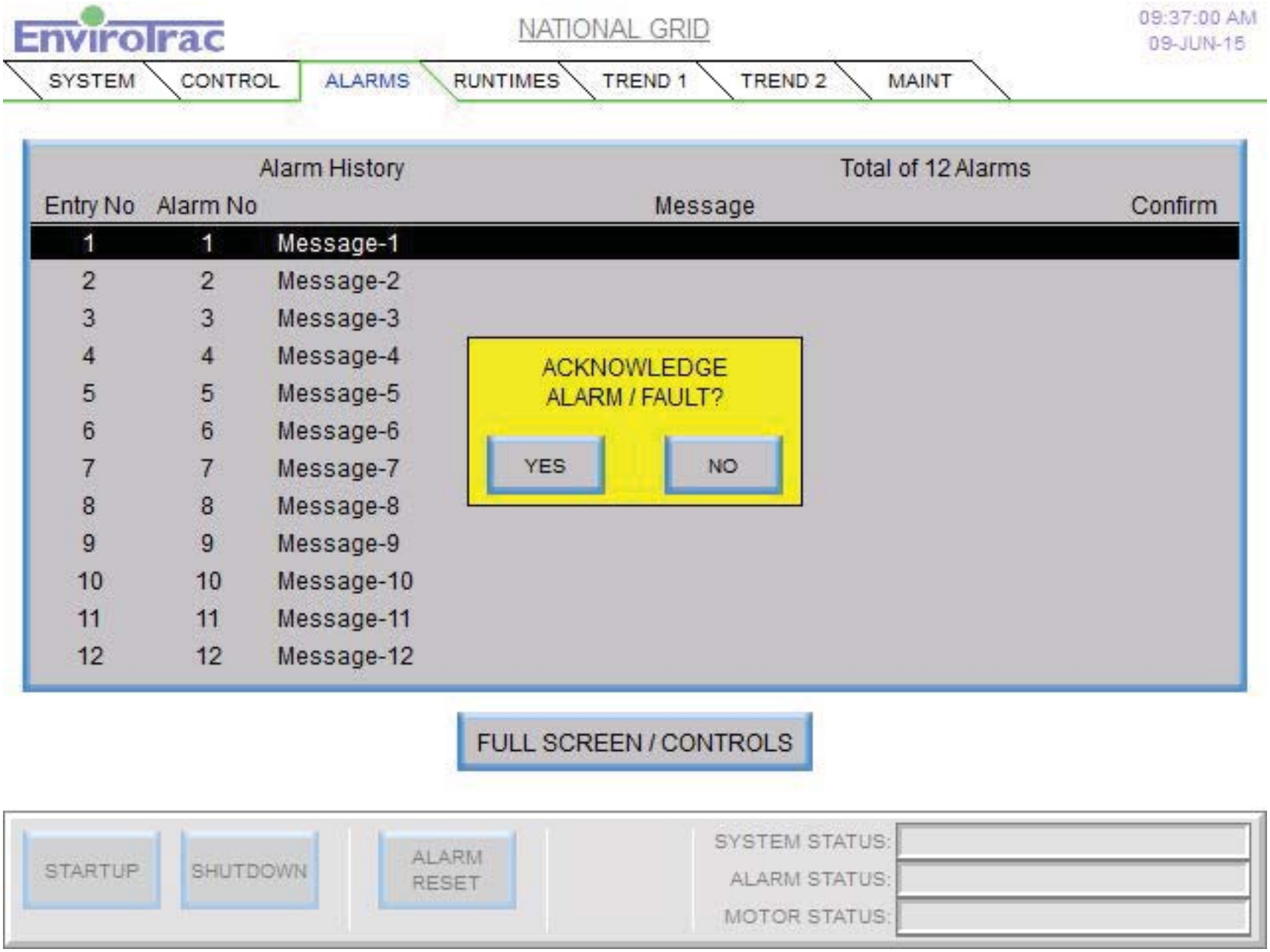
NOTE: This document is to be used only for calculating feeder short circuit protection and sizing motor feeder circuit conductors as needed. Individual motor overload protection must be sized according to motor nameplate only.


EnviroTrac
NATIONAL GRID
10:41:00 AM
09-JUN-15
SYSTEM
CONTROL
ALARMS
RUNTIMES
TREND 1
TREND 2
MAINT
PT-106
PAHH-106
PAH-106
12.3 PSI
TT-120
TAL-120
123.4 °F
INSIDE TEMP.
HTM-122
HTA-122
OWS
LSHH-102
LSH-103
F-01A
F-03
LAL-100A
123.4 "
PAHH-106
123.4 PSI
LAL-100B
123.4 "
PAH-106
123.4 PSI
TAL-120
123.4 °F
CLOSE
HTM-123
HTA-123
FIT-119
123.4 GPM
TO SPDES DISCHARGE
P-01
OK
LT-100A
LAL-100A
12.3 '
LT-100B
LAL-100B
12.3 '
P-01
EXTRACTION WELL
COU1-RWA
MONITORING WELL
COU1-RWB
CONTAINMENT SUMP
LSHH-121
ADJUST SETPOINTS
STARTUP
SHUTDOWN
ALARM RESET
SEND REPORT
SYSTEM STATUS:
ALARM STATUS:
MOTOR STATUS:


EnviroTrac
NATIONAL GRID
10:41:00 AM
09-JUN-15
SYSTEM
CONTROL
ALARMS
RUNTIMES
TREND 1
TREND 2
MAINT
PT-106
PAHH-106
PAH-106
12.3 PSI
TT-120
TAL-120
123.4 °F
INSIDE TEMP.
HTM-122
HTA-122
OWS
LSHH-102
LSH-103
LSL-104
F-01A
F-01B
P-01
OK
P-02
FAULTED
F-02A
FLOWMETER FIT-119
12.3 GPM
123451234 GAL
K Flow
K Total
CLOSE
HTM-123
HTA-123
FIT-119
123.4 GPM
TO SPDES DISCHARGE
LT-100A
LAL-100A
12.3 '
LT-100B
LAL-100B
12.3 '
P-01
EXTRACTION WELL
COU1-RWA
MONITORING WELL
COU1-RWB
CONTAINMENT SUMP
LSHH-121
ADJUST SETPOINTS
STARTUP
SHUTDOWN
ALARM RESET
SEND REPORT
SYSTEM STATUS:
ALARM STATUS:
MOTOR STATUS:


EnviroTrac
NATIONAL GRID
10:52:00 AM
09-JUN-15
SYSTEM
CONTROL
ALARMS
RUNTIMES
TREND 1
TREND 2
MAINT
PT-106
PAHH-106
PAH-106
12.3 PSI
TT-120
TAL-120
123.4 °F
INSIDE TEMP.
HTM-122
HTA-122
OWS
LSHH-102
LSH-103
LSL-104
F-01A
F-01B
F-03
HTM-123
HTA-123
FIT-119
123.4 GPM
P-01
FAULTED
P-02
OK
F-02A
F-02B
F-02C
TO SPDES DISCHARGE
LT-100A
LAL-100A
12.3 '
LT-100B
LAL-100B
12.3 '
P-01
EXTRACTION WELL
COU1-RWA
MONITORING WELL
COU1-RWB
CONTAINMENT SUMP
LSHH-121
ADJUST SETPOINTS
STARTUP
SHUTDOWN
ALARM RESET
SEND REPORT
SYSTEM STATUS:
AUTO
ALARM STATUS:
LAL-100A ALARM
MOTOR STATUS:
P-01 MOTOR FAULT


EnviroTrac
NATIONAL GRID
09:37:00 AM
09-JUN-15
SYSTEM
CONTROL
ALARMS
RUNTIMES
TREND 1
TREND 2
MAINT
WELL PUMP
P-01
12.3 HZ
FAULT
OFF
AUTO
HI = 123.4
LO = 123.4
START
STOP
MANUAL
AUTO
PID
CLR
STOP
33.0
24.8
16.5
8.3
0.0
0
2.5
5
7.5
10
OUTPUT
50%
ALARM
AUTO
FEET
P = 123
I = 123
D = 123
SP = 123.4
MAN = 123.4%
AUTO
MANUAL
DIFF
LT-100A
LT-100B
OWS PUMP
P-02
FAULT
ON
MANUAL
START
STOP
MANUAL
AUTO
STARTUP
SHUTDOWN
ALARM RESET
SYSTEM STATUS:
ALARM STATUS:
MOTOR STATUS:


EnviroTrac
NATIONAL GRID
09:37:00 AM
09-JUN-15
SYSTEM
CONTROL
ALARMS
RUNTIMES
TREND 1
TREND 2
MAINT
Alarm History
Total of 12 Alarms
Entry No
Alarm No
Message
Confirm
1 1 Message-1
2 2 Message-2
3 3 Message-3
4 4 Message-4
5 5 Message-5
6 6 Message-6
7 7 Message-7
8 8 Message-8
9 9 Message-9
10 10 Message-10
11 11 Message-11
12 12 Message-12
ACKNOWLEDGE ALARM / FAULT?
YES
NO
FULL SCREEN / CONTROLS
STARTUP
SHUTDOWN
ALARM RESET
SYSTEM STATUS:
ALARM STATUS:
MOTOR STATUS:

EnviroTrac

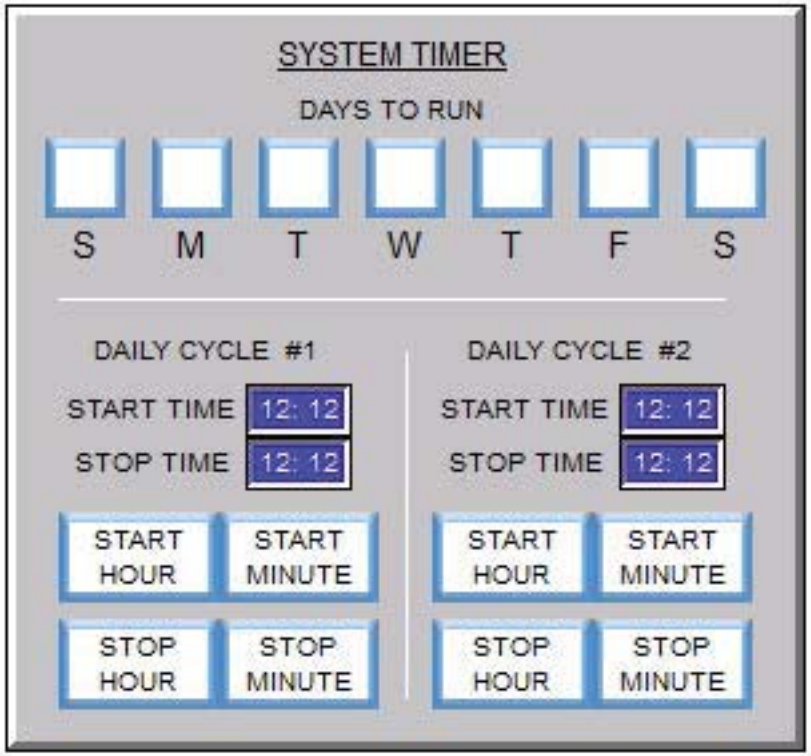
NATIONAL GRID

09:37:00 AM
09-JUN-15

SYSTEM | CONTROL | ALARMS | RUNTIMES | TREND 1 | TREND 2 | MAINT

RUN TIMES

	HOURS
EXTRACTION WELL PUMP P-01	123451.2
TRANSFER PUMP P-02	123451.2



STARTUP | SHUTDOWN | ALARM RESET

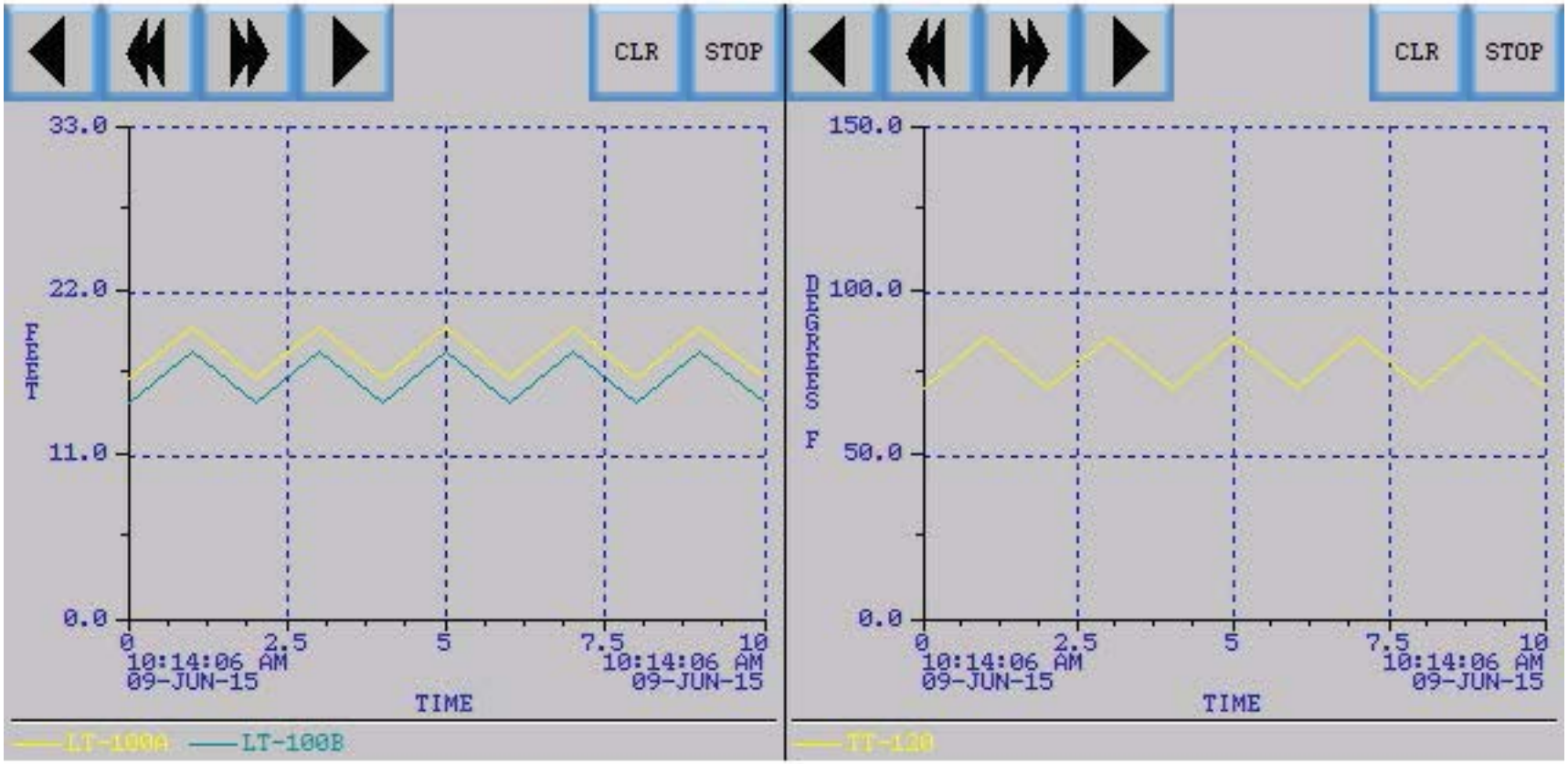
SYSTEM STATUS:
ALARM STATUS:
MOTOR STATUS:

EnviroTrac

NATIONAL GRID

09:37:00 AM
09-JUN-15

SYSTEM | CONTROL | ALARMS | RUNTIMES | TREND 1 | TREND 2 | MAINT



STARTUP

SHUTDOWN

ALARM RESET

SYSTEM STATUS:

ALARM STATUS:

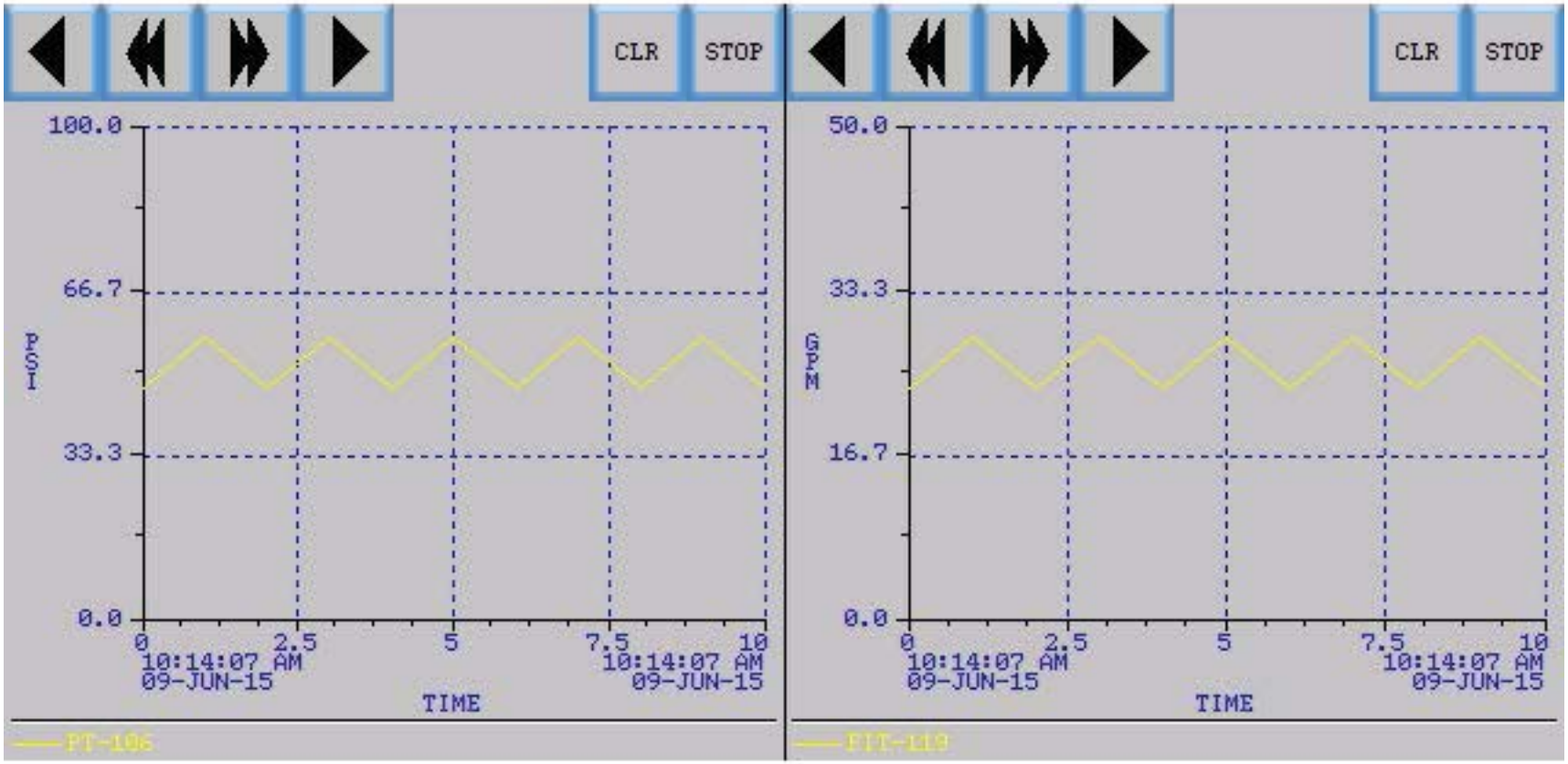
MOTOR STATUS:

EnviroTrac

NATIONAL GRID

09:37:00 AM
09-JUN-15

SYSTEM | CONTROL | ALARMS | RUNTIMES | TREND 1 | TREND 2 | MAINT



STARTUP | SHUTDOWN | ALARM RESET

SYSTEM STATUS:

ALARM STATUS:

MOTOR STATUS:

EnviroTrac

NATIONAL GRID

09:37:00 AM
09-JUN-15

SYSTEM | CONTROL | ALARMS | RUNTIMES | TREND 1 | TREND 2 | MAINT

PLC 1763-L32BWA

IN0	IN8	IN16	O/0	O/8
IN1	IN9	IN17	O/1	O/9
IN2	IN10	IN18	O/2	O/10
IN3	IN11	IN19	O/3	O/11
IN4	IN12		O/4	
IN5	IN13		O/5	
IN6	IN14		O/6	
IN7	IN15		O/7	

SLOT 1 1762-IF4	SLOT 2 1762-IF2OF2
IN0:12345	IN0:12345
IN1:12345	IN1:12345
IN2:12345	O0:12345
IN3:12345	O1:12345

FIT-119 SET GALLONS

UP TO 1 MILLION 123451.2

MILLIONS 12345

INCDEC HOUR

DELAY/TIMER CONTROL

START UP 12345 (SEC)

OWS LEVEL HI-HI LATCH 12345 (SEC)

DAILY REPORT HOUR -12

DAILY REPORT MINUTE -12

SETUP

LT-100A FEET BELOW SURFACE 12345

LT-100B FEET BELOW SURFACE 12345

FIT-119 FLOW @ 20mA 12

BATTERY OK
AC POWER ON

STARTUP | SHUTDOWN | ALARM RESET

SYSTEM STATUS:
ALARM STATUS:
MOTOR STATUS:

RESINTECH

FIBERGLASS TANKS

PRODUCT CATALOG AND TECHNICAL INFORMATION

ENPRESS is the nation's fastest growing developer and manufacturer of composite pressure vessels for water treatment systems. Located near Cleveland, Ohio, their highly automated plant is dedicated solely to the manufacture of composite vessels. ResinTech is proud to offer and represent this cutting edge technology as a complement to the ion exchange resin and activated carbon product line.

ENPRESS LLC
Where Innovation Flows™

FEATURES & BENEFITS

- **STATE-OF-THE-ART DESIGN**
  Injection molded heads and polypropylene liners, manufactured to the tightest tolerances
- **HIGH IMPACT CONSTRUCTION**
  Built to withstand the rigors of portable exchange service
- **STRONG AND LIGHTWEIGHT**
  Up to 16 pounds lighter than competitive brands (14x47)
- **BASE DESIGNED FOR ROLLING**
  Safely and easily move tanks across the floor at the customer's location and in the shop

1 Resintech Plaza • 160 Cooper Road • West Berlin,NJ 08091 • Phone:(856)768-9600 • Fax:(856)768-9601 • E-mail:ixresin@resintech.com • Web Site:www.resintech.com

RESINTECH® ION EXCHANGE TANKS

By ENPRESS™

DI EXCHANGE TANKS

ENPRESS LLC, a leading manufacturer of composite pressure vessels for use in water treatment, introduces a line of tanks designed for the rigors of the Portable Exchange DI market.

TANK

The use of a special high temperature, high pressure injection process results in a durable tank that exhibits superior abuse and impact resistance. The glass-filled threaded inlet is mechanically and chemically welded to the dome so potential leak paths are eliminated. The manufacturing process incorporates computer controlled cut-lengths to achieve the most consistent vessel height in the industry, with tolerances as low as 3/16". ENPRESS tank inlets accept all 2.5" NPSM, 4" UN, and 4.5" buttress-threaded inlets and heads. All tanks are backed by an exclusive 5 year limited warranty for non-permanent DI applications.

LINER

All tanks feature an industry exclusive co-polymer polypropylene liner formulation that provides superior performance in both hot and cold environments, along with superior impact and abuse resistance.

BASE

The revolutionary base design provides a significant weight reduction as compared to traditional rubber bases, making the Enpress tank system lightweight and easy to handle (saving up to 16 pounds per vessel!) The poly bases provide full support of the bottom dome of the vessel and have an integrated rib that facilitates rolling the tank across the floor. No more struggles of rolling a flat tire-like vessel across the floor. Also, the tank bases have integrated ribs and glue points that allow for uniform gluing of the boot to the tank, keeping the tank level and preventing the base from coming off.

ResinTech offers a complete line of DI Exchange heads, riser tubes, internals and fittings for all your application needs. See bulletin "DI Tank Parts and Fittings" for detailed information

SPECIFICATIONS

OPERATING PARAMETERS:

- Maximum operating pressure: 150 psi/10 Bar
- Maximum operating temp: 120˚F/50˚C

DESIGN PARAMETERS:

- 250,000+ cycles, 0 to 150 psi, without leakage
- 4:1 safety factor (600 psi minimum burst)
- Stress Rupture: minimum 1,000 hours at 150˚F and 150 psi static pressure

AVAILABLE IN 5 STANDARD COLORS

- Natural, Blue, Almond, Grey, Black
- Custom colors available upon request.

INNER SHELL MATERIAL

- Co-polymer polypropylene
- Custom formulation provides superior performance in both hot and cold temperature environments.
- Superior elasticity of polypropylene allows for controlled 'breathing' without stressing the material.

BASE:

- Injection molded impact/temperature resistant polypropylene

INJECTION MOLDED TOP AND BOTTOM DOMES

- Precision molding process produces consistent, part-to-part quality
- Uniform wall thickness provides optimum glass and inlet performance
- High temperature/high pressure injection molding allows the glass-filled threaded inlet to be mechanically and chemically welded to the dome, eliminating potential leak paths

EXTRUDED SIDE WALL

- Produces consistent wall thickness over the entire length of the part, eliminating potential thin spots or stress points.
- Computer controlled cut provides consistent lengths within 0.180 inches from part-to-part.

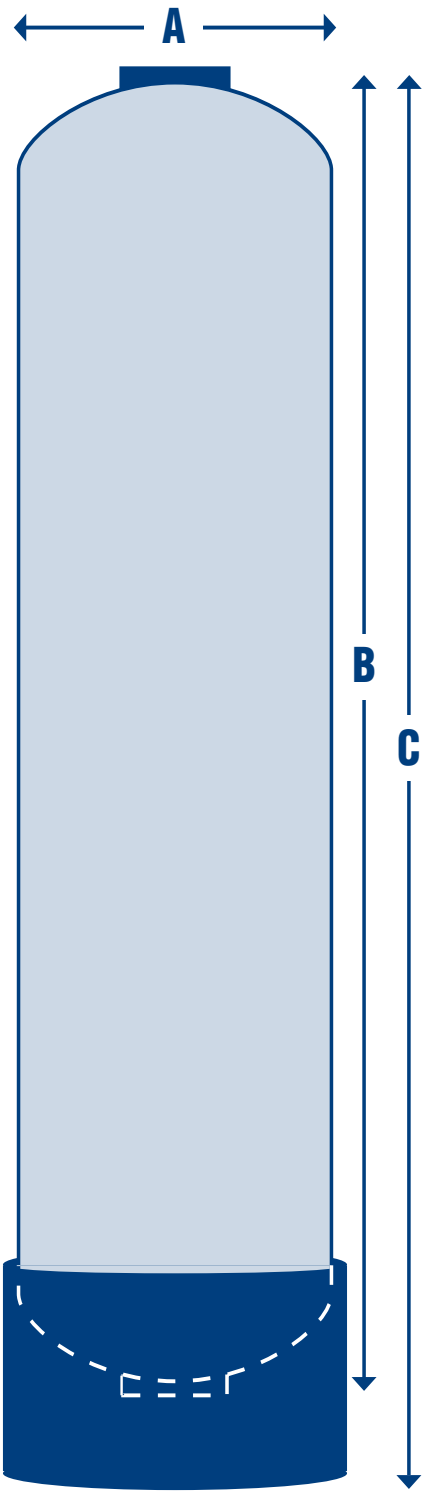
FIBERGLASS/EPOXY WINDING

- All vessels are precision wound with premium fiberglass roving on a computer controlled, 4 axis winder to optimize material and glass yield and performance.
- Epoxy laminate is oven-cured to exacting specifications for superior environmental performance.

TANK SIZE (DIA. X HT.)	A TANK DIAMETER (INCHES)	B HEIGHT W/O BASE INCH (MM)	C HEIGHT W BASE INCH (MM)	CAPACITY GALLONS (LITERS)	CAPACITY (CUBIC FEET)	EMPTY TANK WEIGHT W/ BASE (LBS,)
7 x 18		17.9 (455)	18.4 (467)	2.4 (9.1)	0.32	3.6
7 x 24		23.1 (587)	23.6 (599)	3.4 (12.9)	0.45	4.3
7 x 30	7”	29.4 (747)	30.4 (772)	4.4 (16.7)	0.59	5.1
7 x 35		34.4 (874)	34.9 (886)	5.0 (18.9)	0.67	5.7
7 x 44		43.8 (1113)	43.8 (1113)	6.5 (24.6)	0.87	6.9
8 x 18		17.9 (455)	18.4 (467)	3.2 (12.1)	0.43	4.4
8 x 24		23.1 (587)	23.5 (597)	4.3 (16.3)	0.57	5.1
8 x 30	8”	29.4 (747)	29.9 (759)	5.7 (21.6)	0.76	6.0
8 x 35		34.4 (874)	34.9 (886)	6.6 (25.0)	0.88	6.7
8 x 40		39.3 (998)	39.8 (1011)	7.6 (28.8)	1.02	7.4
8 x 44		43.7 (1110)	44.2 (1123)	8.5 (32.2)	1.14	8.0
9 x 18		17.9 (455)	18.4 (470)	4.0 (15.1)	0.53	5.0
9 x 35		34.4 (874)	34.8 (884)	8.3 (31.4)	1.11	8.2
9 x 40	9”	39.7 (1008)	40.3 (1024)	9.8 (37.1)	1.31	9.0
9 x 42		41.7 (1059)	42.3 (1074)	10.3 (39.0)	1.38	9.3
9 x 48		47.8 (1214)	48.3 (1227)	11.9 (45.0)	1.59	10.6
10 x 18		17.9 (455)	18.5 (470)	4.8 (18.2)	0.64	5.9
10 x 22		21.4 (544)	22.0 (559)	5.9 (22.3)	0.79	6.6
10 x 24		23.1 (587)	23.7 (602)	6.6 (25.0)	0.88	7.0
10 x 30		39.4 (747)	30.0 (762)	8.6 (32.6)	1.15	8.4
10 x 35		34.4 (874)	35.0 (889)	10.3 (39.0)	1.38	9.4
10 x 40	10”	39.9 (1013)	40.6 (1031)	12.1 (45.8)	1.62	10.5
10 x 44		43.5 (1105)	44.3 (1125)	13.3 (50.3)	1.78	11.4
10 x 47		46.4 (1179)	47.2 (1199)	14.2 (53.8)	1.90	12.0
10 x 54		53.8 (1367)	54.4 (1382)	16.5 (62.5)	2.21	13.5
10 x 60		59.9 (1521)	60.6 (1539)	18.7 (70.8)	2.50	14.9
10 x 65		64.4 (1637)	65.1 (1654)	20.1 (76.1)	2.69	15.8
12 x 29		28.9 (734)	29.5 (749)	12.1 (45.8)	1.62	10.8
12 x 36		35.7 (907)	36.3 (922)	15.1 (57.2)	2.02	12.6
12 x 40		39.1 (993)	39.8 (1011)	16.8 (63.6)	2.25	13.5
12 x 42	12”	41.7 (1059)	42.4 (1077)	18.0 (68.1)	2.41	14.2
12 x 44		43.8 (1113)	44.5 (1130)	18.9 (71.6)	2.53	14.7
12 x 48		47.8 (1214)	48.5 (1232)	20.8 (78.7)	2.78	15.8
12 x 52		52.1 (1323)	52.8 (1341)	22.9 (86.6)	3.06	16.9
13 x 30		29.4 (747)	30.0 (762)	14.6 (55.3)	1.95	12.0
13 x 35		34.5 (876)	35.1 (892)	17.5 (66.2)	2.34	14.1
13 x 44		43.6 (1107)	44.4 (1128)	22.7 (85.9)	3.03	17.9
13 x 48	13”	47.6 (1209)	48.3 (1227)	24.9 (94.3)	3.33	19.5
13 x 54		53.6 (1361)	54.3 (1379)	28.0 (106.0)	3.74	21.8
13 x 60		69.9 (1521)	60.6 (1539)	31.7 (120.0)	4.24	24.3
13 x 65		64.4 (1636)	65.1 (1654)	34.3 (129.8)	4.59	26.0
14 x 30		39.1 (740)	30.1 (765)	16.1 (60.8)	2.15	14.9
14 x 47		46.9 (1191)	47.9 (1216)	27.3 (103.5)	3.65	22.5
14 x 54	14”	53.1 (1349)	54.1 (1375)	31.2 (118.1)	4.17	24.7
14 x 65		64.1 (1629)	65.1 (1654)	38.1 (144.3)	5.10	29.0
14 x 72		71.1 (1807)	72.1 (1832)	42.6 (161.3)	5.69	31.8
16 x 23		- -	23.1 (587)	15.4 (58.3)	2.06	17.0
16 x 28		- -	28.0 (711)	19.5 (73.8)	2.61	18.5
16 x 36		- -	36.5 (927)	27.1 (102.6)	3.62	21.0
16 x 44	16”	- -	44.25 (1124)	33.9 (128.3)	4.53	25.0
16 x 53		- -	53.3 (1353)	41.7 (157.9)	5.57	21.0
16 x 65		- -	64.7 (1643)	51.7 (195.7)	6.91	33.0
21 x 62	21”	- -	67.0 (1702)	84.0 (318.0)	11.23	102.0
24 x 72	24”	- -	73.1 (1857)	115.0 (435.3)	15.37	127.0

RESINTECH

TECHNICAL DATA
TANK DIMENSIONS AND VOLUMES



NOTE: ALL DATA IS FOR REFERENCE ONLY AND IS SUBJECT TO CHANGE WITHOUT NOTICE

FIBERGLASS TANK - LIST PRICE SCHEDULE

	SIZE	OPENING	CARTON	LIST PRICE
7"	7x18	2.5"	24	$62.12
	7x24	2.5"	24	$69.20
	7x30	2.5"	24	$74.46
	7x35	2.5"	24	$75.39
	7x44	2.5"	24	$78.42

	SIZE	OPENING	CARTON	LIST PRICE
8"	8x18	2.5"	28	$65.38
	8x24	2.5"	32	$72.35
	8x30	2.5"	18	$77.56
	8x35	2.5"	18	$84.14
	8x40	2.5"	18	$84.37
	8x44	2.5"	18	$84.57

	SIZE	OPENING	CARTON	LIST PRICE
9"	9x18	2.5"	28	$74.18
	9x35	2.5"	18	$94.92
	9x40	2.5"	14	$98.72
	* 9x42	2.5"	16	$112.85
	9x48	2.5"	16	$109.76

	SIZE	OPENING	CARTON	LIST PRICE
10"	10x18	2.5"	48	$88.13
	10x22	2.5"	32	$90.02
	10x24	2.5"	32	$96.78
	10x30	2.5"	12	$104.88
	10x35	2.5"	12	$107.00
	10x40	2.5"	12	$110.13
	10x44	2.5"	12	$117.35
	10x47	2.5"	14	$123.14
	10x54	2.5"	16	$127.99
	10x60	2.5"	1	$159.72
	10x65	2.5"	1	$164.66

	SIZE	OPENING	CARTON	LIST PRICE
12"	12x29	2.5"	9	$153.44
	12x29	4.0"	9	$154.97
	12x36	2.5"	9	$156.57
	12x36	4.0"	9	$158.14
	* 12x36	4.5" Buttress	9	$258.25
	* 12x42	2.5"	9	$171.52
	12x42	4.0"	9	$162.98
	* 12x42	4.5" Buttress	9	$259.76
	12x44	2.5"	9	$166.36
	12x44	4.0"	9	$168.01
	12x48	2.5"	9	$171.97
	12x48	4.0"	9	$173.89
	12x52	2.5"	9	$179.04
	12x52	4.0"	9	$169.28

	SIZE	OPENING	CARTON	LIST PRICE
13"	13X30	2.5"	12	$162.06
	13X35	2.5"	12	$170.58
	13X44	2.5"	9	$179.86
	13X48	2.5"	9	$187.45
	13X54	2.5"	9	$205.12
	13X60	2.5"	1	$260.73
	13X65	2.5"	1	$266.06

BAND INCLUDED

	SIZE	OPENING	CARTON	LIST PRICE
14"	14x30	2.5"	10	$202.51
	14x30	4.0"	10	$204.53
	* 14x47	2.5"	8	$362.11
	* 14x47	4.5" Buttress	8	$362.11
	14x47 Elastomer Base	4.5" Buttress	8	$384.74
	14x54	2.5"	8	$277.48
	14x54	4.0"	8	$280.28
	14x65	2.5"	1	$321.76
	14x65	4.0"	1	$325.00
	* 14x65	4.5" Buttress	1	$416.41*
	14x72	2.5"	1	$372.32
	14x72	4.0"	1	$376.08

	SIZE	OPENING	CARTON	LIST PRICE
16"	16x23	2.5"	1	$257.41
	16x23	4.0"	1	$259.54
	16x28	2.5"	1	$276.12
	16x28	4.0"	1	$278.67
	16x36	2.5"	1	$276.12
	16x44	4.0"	1	$333.15
	16x44	2.5"	1	$335.83
	16x36	4.0"	1	$297.97
	16x53	2.5"	1	$339.31
	16x53	4.0"	1	$342.28
	16x65	2.5"	1	$360.11
	16x65	4.0"	1	$363.74

COMMERCIAL TANKS

SIZE	OPENING	CARTON	LIST PRICE
21x62	4.0" Stainless Steel	1	$800.13
24x72	4.0" Stainless Steel	1	$1228.82

OPTIONS

BOTTOM OPENING OPTIONS

SIZE	OPENING		LIST PRICE
7 - 10" Diameter	2.5"	NPSM	$31.10
12" Diameter	2.5" or 4.0"	NPSM	$54.47
13" Diameter	2.5"	NPSM	$68.03
14" Diameter	2.5" or 4.0"	NPSM	$82.88
16" Diameter	2.5" or 4.0"	NPSM	$117.84

- Side openings not available

BASE EXTENSION

TANK DIAMETER	LIST PRICE
7" Extended	$21.29
8" Extended	$24.18
9" Extended	$28.23
10" Extended	$59.64
12" Extended	$77.04
13" Extended	$92.83
14" Extended	$102.32
16" Extended	$123.29

DOME HOLE OPTIONS

SIZE	OPENING	LIST PRICE
10" Diameter	1 1/4" w/Closure	$73.20
12-13" Diameter	1 1/4" w/Closure	$87.73

BUMPER BAND OPTIONS

SIZE	LIST PRICE
7" - 14" Diameter	$10.30

SINGLE CARTON COST ADDED FOR LESS THAN BULK PACK QUANTITIES

SIZE	LIST PRICE
7" -14" Diameter	$15.45

*** PRICE INCLUDES BUMPER BAND**

CONTACT YOUR RESINTECH REPRESENTATIVE FOR YOUR DISCOUNT MULTIPLIER.

WARRANTY: FIVE YEAR LIMITED WARRANTY FOR NON-PERMANENT APPLICATIONS

NOTE - ALL DATA IS FOR REFERENCE ONLY AND IS SUBJECT TO CHANGE WITHOUT NOTICE. MINIMUM ORDER QUANTITIES FOR SPECIAL OPENING OR INTERNAL TANK FEATURES, PLEASE CONSULT RESINTECH, INC.

1 Resintech Plaza • 160 Cooper Road • West Berlin,NJ 08091
Phone:(856)768-9600 • Fax:(856)768-9601
E-mail: ixresin@resintech.com • Web Site: www.resintech.com

RESINTECH INC
INNOVATIONS IN ION EXCHANGE

ASM-10-HP

HYBRID ANION EXCHANGE RESIN
ARSENIC SELECTIVE
CI FORM

RESINTECH ASM-10-HP is a chloride form arsenic selective hybrid anion exchange resin. ASM-10-HP has hydrated iron oxide monoatomically dispersed throughout the polymer. It captures arsenate first by ion exchange and then by absorption into the iron oxide hybrid. ResinTech ASM-10-HP is intended for arsenic removal from potable water, and can also be used as an ion exchanger for removal of uranium and other trace level contaminants.

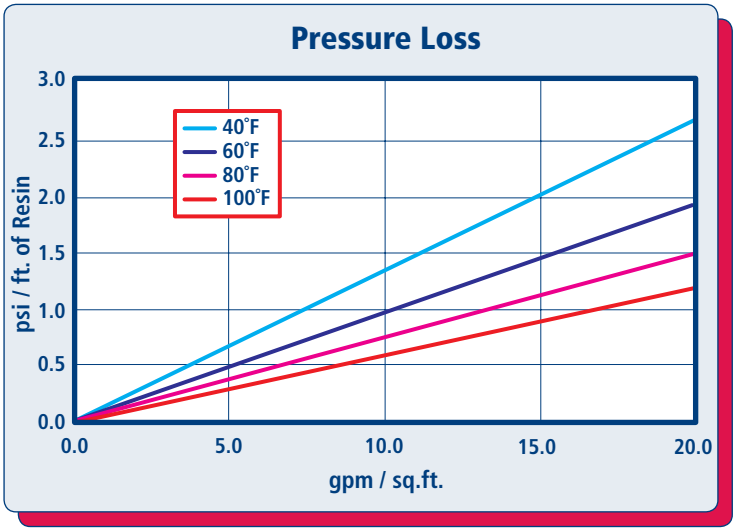
NSF/ANSI-61 CERTIFIED FOR MATERIAL SAFETY

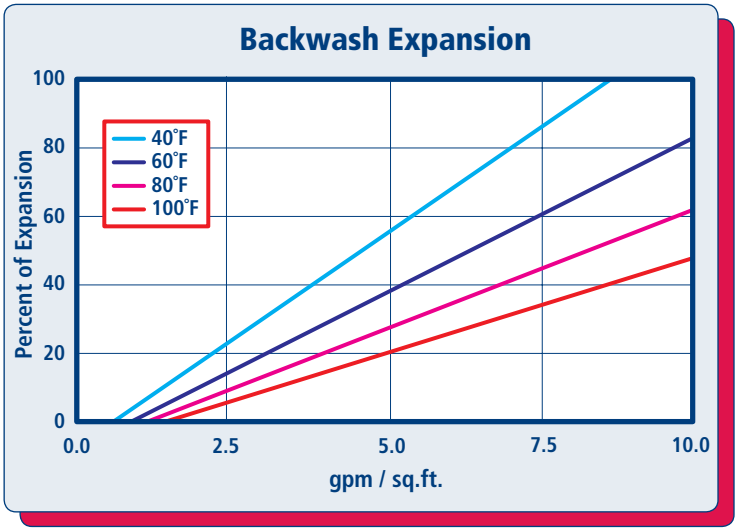
FEATURES & BENEFITS

- **HIGH AFFINITY FOR ARSENIC OVER OTHER ANIONS**
  Highest arsenic removal capacity of any organic based arsenic removal media
- **NO ARSENIC DUMPING**
  Effluent arsenic levels will not exceed influent levels if resin is operated past exhaustion point
- **SUPERIOR PHYSICAL STABILITY**
  93% plus sphericity and high crush strengths together with carefully controlled particle distribution provides long life and low pressure drop
- **COMPLIES WITH US FDA REGULATIONS**
  Conforms to paragraph 21CFR173.25 of the Food Additives Regulations of the US FDA

Prior to first use for potable water, resin should be backwashed for a minimum of 20 minutes, followed by 10 bed volumes of downflow rinse.

HYDRAULIC PROPERTIES





PRESSURE LOSS

The graph above shows the expected pressure loss of ResinTech ASM-10-HP per foot of bed depth as a function of flow rate at various temperatures.

BACKWASH

The graph above shows the expansion characteristics of ResinTech ASM-10-HP as a function of flow rate at various temperatures.

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RESINTECH® ASM-10-HP

PHYSICAL PROPERTIES

Polymer Structure	Styrene/DVB
Polymer Type	Gel
Functional Group	Hybrid
Physical Form	Spherical beads
Ionic Form as shipped	Chloride
Water Retention	
Chloride form	35 to 45 percent
Shipping Weight	50 lbs per cu. ft.
Screen Size Distribution (U.S. mesh)	16 to 50
Maximum Fines Content (<50 mesh)	1 percent
Minimum Sphericity	93 percent
Uniformity Coefficient	1.6 approx.
Resin Color	Black

Note: Physical properties can be certified on a per lot basis, available upon request

SUGGESTED OPERATING CONDITIONS

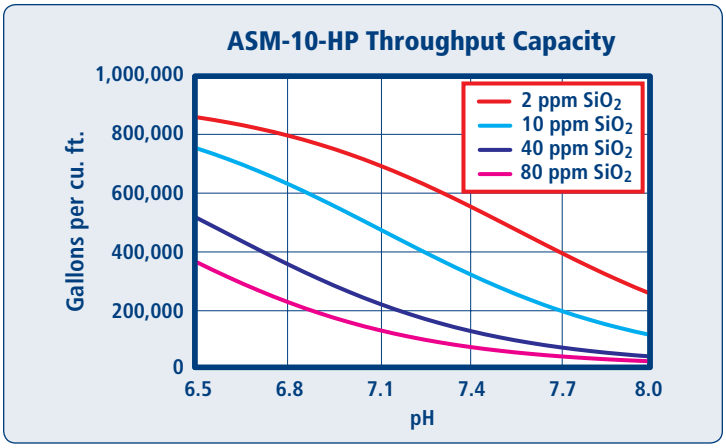
Maximum continuous temperature	
Chloride form	170˚F
Minimum bed depth	24 inches
Backwash expansion	50 to 75 percent
Maximum pressure loss	25 psi
Operating pH range	4 to 8 SU
Service flow rate	1 to 5 gpm/cu.ft.

Note: These guidelines describe average low risk operating conditions. They are not intended to be absolute minimums or maximums.
For operation outside these guidelines, contact ResinTech Technical Support

APPLICATIONS

ARSENIC REMOVAL

Under ideal conditions *ResinTech ASM-10-HP* will reduce 50 ppb of arsenate to less than 10 ppb for more than 500,000 gallons per cubic foot. Limiting factors are high pH, high silica concentration, and high sulfate concentration. Capacity can also be reduced by intermittant operation and various foulants, notably suspended solids.

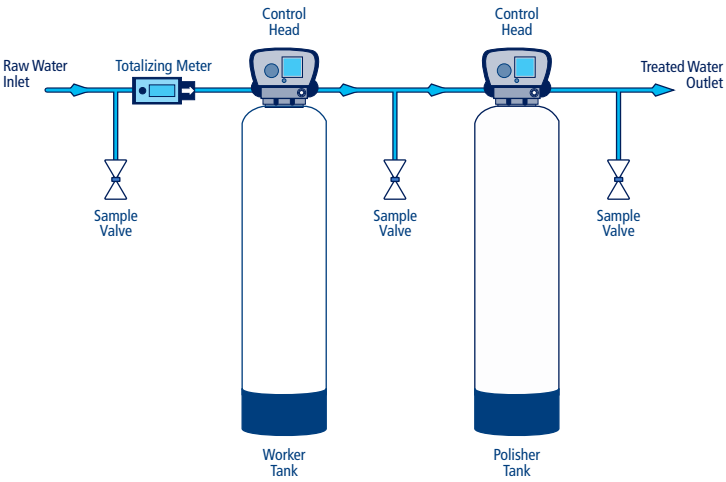


Capacity is based on clean waters that do not contain significant levels of organics, iron, manganese, or other contaminants. The chart is based on 50 ppb of arsenate (As^{+5}) in the feed and TDS less than 500 ppm. ASM-10-HP removes only modest amounts of As^{+3}, therefore pre-oxidation to As^{+5} may be required. No engineering downgrade has been applied.

SILICA REMOVAL

ResinTech ASM-10-HP can be used at moderate pH to remove silica. At a flow rate of 0.5 BV/min, removal efficiency of ninety percent is possible for several hundred bed volumes of throughput. Silica does not dump as the resin exhausts. Even though silica removal is not complete, some lowering of silica occurs for hundred of thousands of bed volumes.

SUGGESTED SYSTEM CONFIGURATION FOR ASM-10-HP



RESINTECH INC.
INNOVATIONS IN ION EXCHANGE

East Coast - West Berlin, NJ p:856.768.9600 • Midwest - Chicago, IL p:708.777.1167 • West Coast - Los Angeles, CA p:323.262.1600

CGS-0413

Attachment E

Weekly Air Monitoring Summary

Client:	National Grid
Location:	40 Willow Avenue, Staten Island, NY Clifton Former MGP Site
Period:	July 27th through July 31st, 2015

This report summarizes the community air monitoring activities performed at the former Clifton Manufactured Gas Plant (MGP) site (site) between July 27 and July 31, 2015. The community air monitoring provides a measure of protection for the downwind community (i.e. downwind receptors including residences and businesses not directly involved with a work activities) from potential airborne releases as a direct result of investigative and remedial work activities.

During the report period there were no Total Volatile Organic Concentration (TVOC) or Respirable Particulate Matter (RPM_{10}) concentrations greater than the Action and Response Limits from ground intrusive activities. Equipment startup and relocation of CAMP units resulted in two detections of RPM_{10} above the Action Levels. This data summary report includes both tabular information and written discussions summarizing the ambient air-quality data collected during the report period in accordance with the site CAMP (AECOM, 2008.)

Introduction

Engineering controls, dust suppression, and odor suppression are used as necessary throughout the daily work activities. Community air monitoring data is reviewed and compared to the New York State Department of Environmental Conservation (NYSDEC)/New York State Department of Health (NYSDOH) Action Limits. In order to manage the site more effectively National Grid has employed more conservative Alert and Response Limits to help mitigate fugitive emissions before the Action Limits are reached. The purpose of the Alert and Response limits are to help manage the Site and prevent concentrations above the Action Limits.

- **Table 1**: Site specific Alert, Response and Action Limits and the corresponding Site conditions

Work Activities

Work activities for the report period included:

- Monday July 27, 2015 – Mobilization. No CAMP monitoring
- Tuesday July 28, 2015 – Level A Site Utility Investigation via hand-clearing and hand-held power tools. Repair of Containment Pad surface.
- Wednesday July 29, 2015 - Level A Site Utility Investigation via hand-clearing and hand-held power tools. Repair of Containment Pad surface.
- Thursday July 30, 2015 - Level A Site Utility Investigation via hand-clearing and hand-held power tools. Repair of Containment Pad surface. Intermittent heavy rains prevented continuous data collection.
- Friday July 31, 2015 - No intrusive work. Repair of Containment Pad surface. CAMP monitoring not performed.

Real-Time Air Monitoring Summary – TVOC and RPM_{10}

Continuous real-time air monitoring for RPM_{10} and TVOC was conducted upwind and downwind of the work area along the site perimeter at two (2) PAM (portable air monitoring) stations. The intent of the real-time air monitoring program is to provide an early detection of short-term emissions and potential off Site migration of remediation related RPM_{10} and

TVOCs. The real-time perimeter air monitoring system consists of an upwind and downwind monitoring station, supplemented by routine periodic/as-needed hand-held and observational air monitoring.

In accordance with the site specific CAMP and DER-10 there were no exceedances of TVOC and 15-minute average RPM_{10} concentrations caused by ground intrusive or impacted soil activities. However, there were periods of elevated RPM_{10} concentrations greater than the Response and Action Limit that were caused by non-ground intrusive or non-impacted soil activities.

- PAM-1, July 28, 2015, 8:41AM – 8:41AM: elevated RPM_{10} concentrations above the Action Limit resulting from relocation of CAMP unit. No mitigation required.

- PAM-1, July 30, 2015, 12:40PM – 12:40PM: elevated RPM_{10} concentrations above the Action Limit resulting from startup of vacuum excavator adjacent to CAMP unit. No mitigation required.

Table 1
Site Specific Alert, Response, and Action Limits and the Corresponding Site Conditions
40 Willow Avenue WWTP Installation
Former Clifton MGP Site, Staten Island, New York

				Site Condition			
Target – units	**Alert Limit**	**Response Limit**	**Action Limit**	**Operational Condition**	**Alert Condition (Above Background[1])**	**Response Condition (Above Background[1])**	**Action Condition (Above Background[1])**
TVOC (PID) – ppm	3.7	5	25	$[C_{avg}] \leq 3.7$	$[C_{avg}] > 3.7$ and $[C_{avg}] \leq 5.0$	$[C_{avg}] > 5.0$ and $[C_{avg}] \leq 25.0$	$[C_{avg}] > 25.0$
PM_{10} – µg/m^3	NA	100	150	$[C_{avg}] \leq 100$	NA	$[C_{avg}] > 100$ and $[C_{avg}] \leq 150$	$[C_{avg}] > 150$

Definitions:

TVOC = Total Volatile Organic Compounds

PID = Photoionization Detector

PM_{10} = Respirable Particulate Matter

ppm = Parts per million volume

µg/m^3 = Micrograms per cubic meter

$[C_{avg}]$ = 15-minute average concentration of target

DT = Dräger Tubes

NA = Not applicable, odor intensity will be either an Operational Level or Action Level; there is no Alert and/or Response Limit and there is no Alert Limit for PM_{10}.

Notes:

[1] Background is defined as the current upwind concentration. Background concentrations will be used to calculate the actual Property contributions to TVOCs and PM_{10} during the final evaluation of the Site condition.

Table 2
Weekly Real-Time Maximum Respirable PM and TVOC Concentration Summary
40 Willow Avenue WWTP Installation
Former Clifton MGP Site, Staten Island, New York

	PAM-1		PAM-2	
	PM_{10} µg/m^3	**TVOC ppm**	**PM_{10} µg/m^3**	**TVOC ppm**
Maximum 15-Minute Average Concentrations (Action Limits: PM_{10} = 150 ug/m^3 / TVOC = 25 ppm /Response Limits: PM_{10} = 100 ug/m^3 / TVOC = 5.0 ppm)				
Monday 7/27/2015	X	X	X	X
Tuesday 7/28/2015	**760**	4.2	82	0
Wednesday 7/29/2015	146	0	100	0
Thursday 7/30/2015	**691**	0.1	134	0
Friday 7/31/2015	X	X	X	X

PAM = Portable Air Monitoring Station

PM_{10} = Respirable Particulate Matter (µg/m3)

TVOC = Total Volatile Organic Compounds (ppm)

X = Monitoring not required per Site specific CAMP

ND = Non Detect

TBD = To Be Determined

- Highlighted concentrations remained above the Response or Action Limits after being corrected for the background concentrations and were subject to further analysis based onsite activities and offsite activities (shown in the following tables if applicable).
- PAM stations collect average 15-minute PM_{10} and TVOC concentrations updated every one minute during periods of Site activities (estimated to be Monday – Friday between 7AM and 5PM).

Weekly Air Monitoring Summary

Client:	National Grid
Location:	40 Willow Avenue, Staten Island, NY Clifton Former MGP Site
Period:	August 3rd through August 7th, 2015

This report summarizes the community air monitoring activities performed at the former Clifton Manufactured Gas Plant (MGP) site (site) between August 3 and August 7, 2015. The community air monitoring provides a measure of protection for the downwind community (i.e. downwind receptors including residences and businesses not directly involved with a work activities) from potential airborne releases as a direct result of investigative and remedial work activities.

During the report period there were no Total Volatile Organic Concentration (TVOC) or Respirable Particulate Matter (RPM_{10}) concentrations greater than the Action and Response Limits from ground intrusive activities. Equipment startup and dust generating activities resulted in two detections of RPM_{10} above the Action Levels. This data summary report includes both tabular information and written discussions summarizing the ambient air-quality data collected during the report period in accordance with the site CAMP (AECOM, 2008.)

Introduction

Engineering controls, dust suppression, and odor suppression are used as necessary throughout the daily work activities. Community air monitoring data is reviewed and compared to the New York State Department of Environmental Conservation (NYSDEC)/New York State Department of Health (NYSDOH) Action Limits. In order to manage the site more effectively National Grid has employed more conservative Alert and Response Limits to help mitigate fugitive emissions before the Action Limits are reached. The purpose of the Alert and Response limits are to help manage the Site and prevent concentrations above the Action Limits.

- **Table 1**: Site specific Alert, Response and Action Limits and the corresponding Site conditions

Work Activities

Work activities for the report period included:

- Monday August 3, 2015 – Removal of overburden from asphalt pad with CAT 304E excavator.
- Tuesday August 4, 2015 – Asphalt pad saw cutting with a walk-along saw, and asphalt removal with CAT 304E excavator.
- Wednesday August 5, 2015 – Excavation of utility trench to a depth of 24” using a Guzzler vacuum excavator truck. Gross excavation of OU-1 vehicle access ramp with CAT 304E excavator. Repair of Containment Pad surface.
- Thursday August 6, 2015 - Excavation of utility trench to a depth of 24” using a Guzzler vacuum excavator truck. Gross excavation of OU-1 vehicle access ramp with CAT 304E excavator.
- Friday August 7, 2015 - Excavation of utility trench to a depth of 24” assisted by CAT 304E excavator. Placement of sand bedding through trenchline. Repair of Containment Pad surface.

Real-Time Air Monitoring Summary – TVOC and RPM_{10}

Continuous real-time air monitoring for RPM_{10} and TVOC was conducted upwind and downwind of the work area along the site perimeter at two (2) PAM (portable air monitoring) stations. The intent of the real-time air monitoring program is to provide an early detection of short-term emissions and potential off Site migration of remediation related RPM_{10} and TVOCs. The real-time perimeter air monitoring system consists of an upwind and downwind monitoring station, supplemented by routine periodic/as-needed hand-held and observational air monitoring.

In accordance with the site specific CAMP and DER-10 there were no exceedances of TVOC and 15-minute average RPM_{10} concentrations caused by ground intrusive or impacted soil activities. However, there were periods of elevated RPM_{10} concentrations greater than the Response and Action Limit that were caused by non-ground intrusive or non-impacted soil activities.

- PAM-1, August 3, 2015, 8:43AM – 8:44AM: elevated RPM_{10} concentrations above the Action Limit resulting from dust generating activities. Water applied for dust suppression.

- PAM-1, August 3, 2015, 11:06AM – 11:07AM: elevated RPM_{10} concentrations above the Response Limit resulting from dust generating activities. Water applied for dust suppression.

- PAM-1, August 3, 2015, 11:18AM – 11:21AM: elevated RPM_{10} concentrations above the Response Limit resulting from dust generating activities. Water applied for dust suppression.

- PAM-1, August 3, 2015, 11:48AM – 11:48AM: elevated RPM_{10} concentrations above the Response Limit resulting from dust generating activities. Water applied for dust suppression.

- PAM-1, August 3, 2015, 11:59AM – 12:03PM: elevated RPM_{10} concentrations above the Response Limit resulting from dust generating activities. Water applied for dust suppression.

- PAM-1, August 4, 2015, 7:50AM – 8:14AM: elevated RPM_{10} concentrations above the Response and Action Limits resulting from equipment start-up immediately adjacent to PAM-1. No mitigation required.

- PAM-1, August 5, 2015, 8:40AM – 8:40AM: elevated RPM_{10} concentrations above the Response Limit resulting from unknown source. No mitigation required.

Table 1
Site Specific Alert, Response, and Action Limits and the Corresponding Site Conditions
40 Willow Avenue WWTP Installation
Former Clifton MGP Site, Staten Island, New York

				Site Condition			
Target – units	**Alert Limit**	**Response Limit**	**Action Limit**	**Operational Condition**	**Alert Condition (Above Background[1])**	**Response Condition (Above Background[1])**	**Action Condition (Above Background[1])**
TVOC (PID) – ppm	3.7	5	25	$[C_{avg}] \leq 3.7$	$[C_{avg}] > 3.7$ and $[C_{avg}] \leq 5.0$	$[C_{avg}] > 5.0$ and $[C_{avg}] \leq 25.0$	$[C_{avg}] > 25.0$
PM_{10} – $\mu g/m^3$	NA	100	150	$[C_{avg}] \leq 100$	NA	$[C_{avg}] > 100$ and $[C_{avg}] \leq 150$	$[C_{avg}] > 150$

Definitions:

TVOC = Total Volatile Organic Compounds

PID = Photoionization Detector

PM_{10} = Respirable Particulate Matter

ppm = Parts per million volume

$\mu g/m^3$ = Micrograms per cubic meter

$[C_{avg}]$ = 15-minute average concentration of target

DT = Dräger Tubes

NA = Not applicable, odor intensity will be either an Operational Level or Action Level; there is no Alert and/or Response Limit and there is no Alert Limit for PM_{10}.

Notes:

[1] Background is defined as the current upwind concentration. Background concentrations will be used to calculate the actual Property contributions to TVOCs and PM_{10} during the final evaluation of the Site condition.

Table 2
Weekly Real-Time Maximum Respirable PM and TVOC Concentration Summary
40 Willow Avenue WWTP Installation
Former Clifton MGP Site, Staten Island, New York

	PAM-1		PAM-2	
	PM_{10} µg/m^3	**TVOC ppm**	**PM_{10} µg/m^3**	**TVOC ppm**
Maximum 15-Minute Average Concentrations (Action Limits: PM_{10} = 150 ug/m^3 / TVOC = 25 ppm /Response Limits: PM_{10} = 100 ug/m^3 / TVOC = 5.0 ppm)				
Monday 8/3/2015	**226**	1.0	119	0.0
Tuesday 8/4/2015	**241**	0.3	89	0.0
Wednesday 8/5/2015	88	0.0	**160**	0.0
Thursday 8/6/2015	105	0.0	**299**	0.0
Friday 8/7/2015	52	0.0	**199**	0.0

PAM = Portable Air Monitoring Station

PM_{10} = Respirable Particulate Matter (µg/m3)

TVOC = Total Volatile Organic Compounds (ppm)

X = Monitoring not required per Site specific CAMP

ND = Non Detect

TBD = To Be Determined

- Highlighted concentrations remained above the Response or Action Limits after being corrected for the background concentrations and were subject to further analysis based onsite activities and offsite activities (shown in the following tables if applicable).
- PAM stations collect average 15-minute PM_{10} and TVOC concentrations updated every one minute during periods of Site activities (estimated to be Monday – Friday between 7AM and 5PM).

Weekly Air Monitoring Summary

Client:	National Grid
Location:	40 Willow Avenue, Staten Island, NY Clifton Former MGP Site
Period:	August 10th through August 14th, 2015

This report summarizes the community air monitoring activities performed at the former Clifton Manufactured Gas Plant (MGP) site (site) between August 10 and August 14, 2015. The community air monitoring provides a measure of protection for the downwind community (i.e. downwind receptors including residences and businesses not directly involved with a work activities) from potential airborne releases as a direct result of investigative and remedial work activities.

During the report period there were no Total Volatile Organic Concentration (TVOC) or Respirable Particulate Matter (RPM_{10}) concentrations greater than the Action and Response Limits from ground intrusive activities. Activities did not result in any detections above the Action Levels. This data summary report includes both tabular information and written discussions summarizing the ambient air-quality data collected during the report period in accordance with the site CAMP (AECOM, 2008.)

Introduction

Engineering controls, dust suppression, and odor suppression are used as necessary throughout the daily work activities. Community air monitoring data is reviewed and compared to the New York State Department of Environmental Conservation (NYSDEC)/New York State Department of Health (NYSDOH) Action Limits. In order to manage the site more effectively National Grid has employed more conservative Alert and Response Limits to help mitigate fugitive emissions before the Action Limits are reached. The purpose of the Alert and Response limits are to help manage the Site and prevent concentrations above the Action Limits.

- **Table 1**: Site specific Alert, Response and Action Limits and the corresponding Site conditions

Work Activities

Work activities for the report period included:

- Monday August 10, 2015 – 2" HDPE water discharge line was placed in the trench and pressure tested.
- Tuesday August 11, 2015 – No work performed today.
- Wednesday August 12, 2015 – No work performed today.
- Thursday August 13, 2015 – No work performed today.
- Friday August 14, 2015 – No work performed today.

Real-Time Air Monitoring Summary – TVOC and RPM_{10}

Continuous real-time air monitoring for RPM_{10} and TVOC was conducted upwind and downwind of the work area along the site perimeter at two (2) PAM (portable air monitoring) stations. The intent of the real-time air monitoring program is to provide an early detection of short-term emissions and potential off Site migration of remediation related RPM_{10} and TVOCs. The real-time perimeter air monitoring system consists of an upwind and downwind monitoring station, supplemented by routine periodic/as-needed hand-held and observational air monitoring.

In accordance with the site specific CAMP and DER-10 there were no exceedances of TVOC and 15-minute average RPM_{10} concentrations caused by ground intrusive or impacted soil activities. There were no elevated RPM_{10} or TVOC concentrations greater than the Response and Action Limit.

Table 1
Site Specific Alert, Response, and Action Limits and the Corresponding Site Conditions
40 Willow Avenue WWTP Installation
Former Clifton MGP Site, Staten Island, New York

				Site Condition			
Target – units	**Alert Limit**	**Response Limit**	**Action Limit**	**Operational Condition**	**Alert Condition (Above Background[1])**	**Response Condition (Above Background[1])**	**Action Condition (Above Background[1])**
TVOC (PID) – ppm	3.7	5	25	$[C_{avg}] \leq 3.7$	$[C_{avg}] > 3.7$ and $[C_{avg}] \leq 5.0$	$[C_{avg}] > 5.0$ and $[C_{avg}] \leq 25.0$	$[C_{avg}] > 25.0$
PM_{10} – $\mu g/m^3$	NA	100	150	$[C_{avg}] \leq 100$	NA	$[C_{avg}] > 100$ and $[C_{avg}] \leq 150$	$[C_{avg}] > 150$

Definitions:

TVOC = Total Volatile Organic Compounds

PID = Photoionization Detector

PM_{10} = Respirable Particulate Matter

ppm = Parts per million volume

$\mu g/m^3$ = Micrograms per cubic meter

$[C_{avg}]$ = 15-minute average concentration of target

DT = Dräger Tubes

NA = Not applicable, odor intensity will be either an Operational Level or Action Level; there is no Alert and/or Response Limit and there is no Alert Limit for PM_{10}.

Notes:

[1] Background is defined as the current upwind concentration. Background concentrations will be used to calculate the actual Property contributions to TVOCs and PM_{10} during the final evaluation of the Site condition.

Table 2
Weekly Real-Time Maximum Respirable PM and TVOC Concentration Summary
40 Willow Avenue WWTP Installation
Former Clifton MGP Site, Staten Island, New York

	PAM-1		PAM-2	
	PM_{10} µg/m^3	**TVOC ppm**	**PM_{10} µg/m^3**	**TVOC ppm**
Maximum 15-Minute Average Concentrations (Action Limits: PM_{10} = 150 ug/m^3 / TVOC = 25 ppm /Response Limits: PM_{10} = 100 ug/m^3 / TVOC = 5.0 ppm)				
Monday 8/10/2015	88	0.0	78	0.0
Tuesday 8/11/2015	NA	NA	NA	NA
Wednesday 8/12/2015	NA	NA	NA	NA
Thursday 8/13/2015	NA	NA	NA	NA
Friday 8/14/2015	NA	NA	NA	NA

PAM = Portable Air Monitoring Station

PM_{10} = Respirable Particulate Matter (µg/m3)

TVOC = Total Volatile Organic Compounds (ppm)

X = Monitoring not required per Site specific CAMP

ND = Non Detect

TBD = To Be Determined

- Highlighted concentrations remained above the Response or Action Limits after being corrected for the background concentrations and were subject to further analysis based onsite activities and offsite activities (shown in the following tables if applicable).
- PAM stations collect average 15-minute PM_{10} and TVOC concentrations updated every one minute during periods of Site activities (estimated to be Monday – Friday between 7AM and 5PM).

Weekly Air Monitoring Summary

Client:	National Grid
Location:	40 Willow Avenue, Staten Island, NY Clifton Former MGP Site
Period:	August 19th through August 21st, 2015

This report summarizes the community air monitoring activities performed at the former Clifton Manufactured Gas Plant (MGP) site (site) between August 19 and August 21, 2015. The community air monitoring provides a measure of protection for the downwind community (i.e. downwind receptors including residences and businesses not directly involved with a work activities) from potential airborne releases as a direct result of investigative and remedial work activities.

During the report period there were no Total Volatile Organic Concentration (TVOC) or Respirable Particulate Matter (RPM_{10}) concentrations greater than the Action and Response Limits from ground intrusive activities. Equipment startup and dust generating activities resulted in multiple detections of RPM_{10} above the Action Levels. This data summary report includes both tabular information and written discussions summarizing the ambient air-quality data collected during the report period in accordance with the site CAMP (AECOM, 2008.)

Introduction

Engineering controls, dust suppression, and odor suppression are used as necessary throughout the daily work activities. Community air monitoring data is reviewed and compared to the New York State Department of Environmental Conservation (NYSDEC)/New York State Department of Health (NYSDOH) Action Limits. In order to manage the site more effectively National Grid has employed more conservative Alert and Response Limits to help mitigate fugitive emissions before the Action Limits are reached. The purpose of the Alert and Response limits are to help manage the Site and prevent concentrations above the Action Limits.

- **Table 1**: Site specific Alert, Response and Action Limits and the corresponding Site conditions

Work Activities

Work activities for the report period included:

- Monday August 17, 2015 – No work on site.
- Tuesday August 18, 2015 – No work on site.
- Wednesday August 19, 2015 – Piping installation and insulation dressing.
- Thursday August 20, 2015 – Piping insulation and bedding/trench backfilling.
- Friday August 21, 2015 – WWTP utility trench was backfilled, and remaining material was spread around site.

Real-Time Air Monitoring Summary – TVOC and RPM_{10}

Continuous real-time air monitoring for RPM_{10} and TVOC was conducted upwind and downwind of the work area along the site perimeter at two (2) PAM (portable air monitoring) stations. The intent of the real-time air monitoring program is to provide an early detection of short-term emissions and potential off Site migration of remediation related RPM_{10} and TVOCs. The real-time perimeter air monitoring system consists of an upwind and downwind monitoring station, supplemented by routine periodic/as-needed hand-held and observational air monitoring.

In accordance with the site specific CAMP and DER-10 there were no exceedances of TVOC and 15-minute average RPM_{10} concentrations caused by ground intrusive or impacted soil activities. However, there were periods of elevated RPM_{10} concentrations greater than the Response and Action Limit that were caused by non-ground intrusive or non-impacted soil activities.

- PAM-1, August 19, 2015, 9:51AM – 9:52AM: elevated RPM_{10} concentrations above the Response Limit resulting from dust generating activities. Water applied for dust suppression.

- PAM-1, August 19, 2015, 10:00AM hour: two instantaneous elevated RPM_{10} concentrations above the Response Limit resulting from dust generating activities. Water applied for dust suppression.

- PAM-1, August 19, 2015, 12:53PM – 12:54PM: elevated RPM_{10} concentrations above the Action Limit resulting from dust generating activities. Water applied for dust suppression.

- PAM-1, August 21, 2015, 10:00AM hour: seven elevated RPM_{10} concentrations above the Response and Action Limits resulting from trench backfilling with clean material immediately adjacent to PAM-1.

- PAM-1, August 21, 2015, 11:00AM hour: seven elevated RPM_{10} concentrations above the Response and Action Limits resulting from grading remaining clean fill around site. Dust generated was instantaneous, no mitigation applied.

- PAM-1, August 21, 2015, 12:07PM: one elevated RPM_{10} concentration above the Action Limit resulting from grading remaining clean fill around site. Dust generated was instantaneous, no mitigation applied.

- PAM-1, August 21, 2015, 1:10PM – 1:12PM: elevated RPM_{10} concentrations above the Response Limit resulting from dust generating activities.

Table 1
Site Specific Alert, Response, and Action Limits and the Corresponding Site Conditions
40 Willow Avenue WWTP Installation
Former Clifton MGP Site, Staten Island, New York

				Site Condition			
Target – units	**Alert Limit**	**Response Limit**	**Action Limit**	**Operational Condition**	**Alert Condition (Above Background[1])**	**Response Condition (Above Background[1])**	**Action Condition (Above Background[1])**
TVOC (PID) – ppm	3.7	5	25	$[C_{avg}] \leq 3.7$	$[C_{avg}] > 3.7$ and $[C_{avg}] \leq 5.0$	$[C_{avg}] > 5.0$ and $[C_{avg}] \leq 25.0$	$[C_{avg}] > 25.0$
PM_{10} – $\mu g/m^3$	NA	100	150	$[C_{avg}] \leq 100$	NA	$[C_{avg}] > 100$ and $[C_{avg}] \leq 150$	$[C_{avg}] > 150$

Definitions:

TVOC = Total Volatile Organic Compounds

PID = Photoionization Detector

PM_{10} = Respirable Particulate Matter

ppm = Parts per million volume

$\mu g/m^3$ = Micrograms per cubic meter

$[C_{avg}]$ = 15-minute average concentration of target

DT = Dräger Tubes

NA = Not applicable, odor intensity will be either an Operational Level or Action Level; there is no Alert and/or Response Limit and there is no Alert Limit for PM_{10}.

Notes:

[1] Background is defined as the current upwind concentration. Background concentrations will be used to calculate the actual Property contributions to TVOCs and PM_{10} during the final evaluation of the Site condition.

Table 2
Weekly Real-Time Maximum Respirable PM and TVOC Concentration Summary
40 Willow Avenue WWTP Installation
Former Clifton MGP Site, Staten Island, New York

	PAM-1		PAM-2	
	PM_{10} µg/m^3	**TVOC ppm**	**PM_{10} µg/m^3**	**TVOC ppm**
Maximum 15-Minute Average Concentrations (Action Limits: PM_{10} = 150 ug/m^3 / TVOC = 25 ppm /Response Limits: PM_{10} = 100 ug/m^3 / TVOC = 5.0 ppm)				
Monday 8/17/2015	NA	NA	NA	NA
Tuesday 8/18/2015	NA	NA	NA	NA
Wednesday 8/19/2015	**229**	0.1	36	0.0
Thursday 8/20/2015	**139**	0.0	43	0.0
Friday 8/21/2015	**722**	0.2	**108**	0.0

PAM = Portable Air Monitoring Station

PM_{10} = Respirable Particulate Matter (µg/m3)

TVOC = Total Volatile Organic Compounds (ppm)

X = Monitoring not required per Site specific CAMP

ND = Non Detect

TBD = To Be Determined

- Highlighted concentrations remained above the Response or Action Limits after being corrected for the background concentrations and were subject to further analysis based onsite activities and offsite activities (shown in the following tables if applicable).
- PAM stations collect average 15-minute PM_{10} and TVOC concentrations updated every one minute during periods of Site activities (estimated to be Monday – Friday between 7AM and 5PM).

Weekly Air Monitoring Summary

Client:	National Grid
Location:	40 Willow Avenue, Staten Island, NY Clifton Former MGP Site
Period:	August 24th through August 28th, 2015

This report summarizes the community air monitoring activities performed at the former Clifton Manufactured Gas Plant (MGP) site (site) between August 24 and August 28, 2015. The community air monitoring provides a measure of protection for the downwind community (i.e. downwind receptors including residences and businesses not directly involved with a work activities) from potential airborne releases as a direct result of investigative and remedial work activities.

During the report period there were no Total Volatile Organic Concentration (TVOC) or Respirable Particulate Matter (RPM_{10}) concentrations greater than the Action and Response Limits from ground intrusive activities. This data summary report includes both tabular information and written discussions summarizing the ambient air-quality data collected during the report period in accordance with the site CAMP (AECOM, 2008.)

Introduction

Engineering controls, dust suppression, and odor suppression are used as necessary throughout the daily work activities. Community air monitoring data is reviewed and compared to the New York State Department of Environmental Conservation (NYSDEC)/New York State Department of Health (NYSDOH) Action Limits. In order to manage the site more effectively National Grid has employed more conservative Alert and Response Limits to help mitigate fugitive emissions before the Action Limits are reached. The purpose of the Alert and Response limits are to help manage the Site and prevent concentrations above the Action Limits.

- **Table 1**: Site specific Alert, Response and Action Limits and the corresponding Site conditions

Work Activities

Work activities for the report period included:

- Monday August 24, 2015 – Grading ramp area and material handling on-site.
- Tuesday August 25, 2015 – Ramp area grading, preparing gravel bed for the system, top soil delivery and placement, extension of the irrigation system, and material handling on-site.
- Wednesday August 26, 2015 – Gravel bed for the system, system delivery and placement, gravel delivery, grading the area around the system, plantation, irrigation system extension, grading of areas on 40 Willow Avenue property, and material handling on-site.
- Thursday August 27, 2015 – Irrigation system repair, hydro-seeding, passing electrical cables through conduit, no intrusive work or material handling on-site.
- Friday August 28, 2015 – Electrical connection, above ground heat tracing, no intrusive work or material handling on-site.

Real-Time Air Monitoring Summary – TVOC and RPM_{10}

Continuous real-time air monitoring for RPM_{10} and TVOC was conducted upwind and downwind of the work area along the site perimeter at two (2) PAM (portable air monitoring) stations. The intent of the real-time air monitoring program is to provide an early detection of short-term emissions and potential off Site migration of remediation related RPM_{10} and TVOCs. The real-time perimeter air monitoring system consists of an upwind and downwind monitoring station, supplemented by routine periodic/as-needed hand-held and observational air monitoring.

In accordance with the site specific CAMP and DER-10 there were no exceedances of TVOC and 15-minute average RPM_{10} concentrations caused by ground intrusive or impacted soil activities. However, there were one reading of elevated upwind RPM_{10} concentrations greater than the Action Limit on August 24 and August 25, 2015 and one elevated downwind RPM_{10} reading on August 24, 2015 that were caused by non-ground intrusive or non-impacted soil activities. RPM_{10} concentrations immediately before and after these elevated readings were very low. Since no ground intrusive activities were performed or material movement occurred on August 27 and August 28, 2015, the air monitoring data were not logged.

- PAM-1, August 24, 2015, 13:44 – 13:45 : elevated upwind RPM_{10} concentrations above the Action Limit resulting from non-site related activity; either due to a temporary wind gust or movement of the station.

- PAM-2, August 24, 2015, 12:28 – 12:29 : elevated downwind RPM_{10} concentrations above the Action Limit resulting from non-site related activity; either due to a temporary wind gust or movement of the station.

- PAM-1, August 25, 2015, 12:59 – 13:00 : elevated upwind RPM_{10} concentrations above the Action Limit resulting from non-site related activity; either due to a temporary wind gust or movement of the station.

Table 1
Site Specific Alert, Response, and Action Limits and the Corresponding Site Conditions
40 Willow Avenue WWTP Installation
Former Clifton MGP Site, Staten Island, New York

				Site Condition			
Target – units	**Alert Limit**	**Response Limit**	**Action Limit**	**Operational Condition**	**Alert Condition (Above Background[1])**	**Response Condition (Above Background[1])**	**Action Condition (Above Background[1])**
TVOC (PID) – ppm	3.7	5	25	$[C_{avg}] \leq 3.7$	$[C_{avg}] > 3.7$ and $[C_{avg}] \leq 5.0$	$[C_{avg}] > 5.0$ and $[C_{avg}] \leq 25.0$	$[C_{avg}] > 25.0$
PM_{10} – $\mu g/m^3$	NA	100	150	$[C_{avg}] \leq 100$	NA	$[C_{avg}] > 100$ and $[C_{avg}] \leq 150$	$[C_{avg}] > 150$

Definitions:

TVOC = Total Volatile Organic Compounds

PID = Photoionization Detector

PM_{10} = Respirable Particulate Matter

ppm = Parts per million volume

$\mu g/m^3$ = Micrograms per cubic meter

$[C_{avg}]$ = 15-minute average concentration of target

DT = Dräger Tubes

NA = Not applicable, odor intensity will be either an Operational Level or Action Level; there is no Alert and/or Response Limit and there is no Alert Limit for PM_{10}.

Notes:

[1] Background is defined as the current upwind concentration. Background concentrations will be used to calculate the actual Property contributions to TVOCs and PM_{10} during the final evaluation of the Site condition.

Table 2
Weekly Real-Time Maximum Respirable PM and TVOC Concentration Summary
40 Willow Avenue WWTP Installation
Former Clifton MGP Site, Staten Island, New York

	PAM-1		PAM-2	
	PM_{10} µg/m^3	**TVOC ppm**	**PM_{10} µg/m^3**	**TVOC ppm**
Maximum 15-Minute Average Concentrations (Action Limits: PM_{10} = 150 ug/m^3 / TVOC = 25 ppm /Response Limits: PM_{10} = 100 ug/m^3 / TVOC = 5.0 ppm)				
Monday 8/24/2015	293	0.3	176	0.2
Tuesday 8/25/2015	238	0.0	79	0.0
Wednesday 8/26/2015	78	0.0	76	0.0
Thursday 8/27/2015	NA	NA	NA	NA
Friday 8/28/2015	NA	NA	NA	NA

PAM = Portable Air Monitoring Station

PAM-1 = Upwind

PAM-2 = Downwind

PM_{10} = Respirable Particulate Matter (µg/m3)

TVOC = Total Volatile Organic Compounds (ppm)

X = Monitoring not required per Site specific CAMP

ND = Non Detect

NA = data not recorded due to non intrusive and/or no material handling taking place.

TBD = To Be Determined

- Highlighted concentrations remained above the Response or Action Limits after being corrected for the background concentrations and were subject to further analysis based onsite activities and offsite activities (shown in the following tables if applicable).
- PAM stations collect average 15-minute PM_{10} and TVOC concentrations updated every one minute during periods of Site activities (estimated to be Monday – Friday between 7AM and 5PM).

Weekly Air Monitoring Summary

Client:	National Grid
Location:	40 Willow Avenue, Staten Island, NY Clifton Former MGP Site
Period:	September 16, 2015

This report summarizes the community air monitoring activities performed at the former Clifton Manufactured Gas Plant (MGP) site (site) on September 16, 2015. The community air monitoring provides a measure of protection for the downwind community (i.e. downwind receptors including residences and businesses not directly involved with a work activities) from potential airborne releases as a direct result of investigative and remedial work activities.

During the report period there were no Total Volatile Organic Concentration (TVOC) or Respirable Particulate Matter (RPM_{10}) concentrations greater than the Action and Response Limits from ground intrusive activities. This data summary report includes both tabular information and written discussions summarizing the ambient air-quality data collected during the report period in accordance with the site CAMP (AECOM, 2008.)

Introduction

Engineering controls, dust suppression, and odor suppression were available, but not needed throughout the daily work activities. Community air monitoring data is reviewed and compared to the New York State Department of Environmental Conservation (NYSDEC)/New York State Department of Health (NYSDOH) Action Limits. In order to manage the site more effectively National Grid has employed more conservative Alert and Response Limits to help mitigate fugitive emissions before the Action Limits are reached. The purpose of the Alert and Response limits are to help manage the Site and prevent concentrations above the Action Limits.

- **Table 1**: Site specific Alert, Response and Action Limits and the corresponding Site conditions

Work Activities

Work activities for the report period (September 16, 2015) included:

- Loading of stockpiled potentially impacted soils into two trucks for off-site disposal.
- Grading of the gravel area in front of the stockpile location.
- Treatment system startup.

Real-Time Air Monitoring Summary – TVOC and RPM_{10}

Continuous real-time air monitoring for RPM_{10} and TVOC was conducted upwind and downwind of the work area along the site perimeter at two (2) PAM (portable air monitoring) stations. The intent of the real-time air monitoring program is to provide an early detection of short-term emissions and potential off Site migration of remediation related RPM_{10} and TVOCs. The real-time perimeter air monitoring system consists of an upwind and downwind monitoring station, supplemented by routine periodic/as-needed hand-held and observational air monitoring.

In accordance with the site specific CAMP and DER-10 there were no exceedances of TVOC and 15-minute average RPM_{10} concentrations caused by ground intrusive or impacted soil activities. There were no elevated RPM_{10} concentrations greater than the Response and Action Limits during non-ground intrusive or non-impacted soil activities either.

Table 1
Site Specific Alert, Response, and Action Limits and the Corresponding Site Conditions
40 Willow Avenue WWTP Installation
Former Clifton MGP Site, Staten Island, New York

				Site Condition			
Target – units	**Alert Limit**	**Response Limit**	**Action Limit**	**Operational Condition**	**Alert Condition (Above Background[1])**	**Response Condition (Above Background[1])**	**Action Condition (Above Background[1])**
TVOC (PID) – ppm	3.7	5	25	$[C_{avg}] \leq 3.7$	$[C_{avg}] > 3.7$ and $[C_{avg}] \leq 5.0$	$[C_{avg}] > 5.0$ and $[C_{avg}] \leq 25.0$	$[C_{avg}] > 25.0$
PM_{10} – $\mu g/m^3$	NA	100	150	$[C_{avg}] \leq 100$	NA	$[C_{avg}] > 100$ and $[C_{avg}] \leq 150$	$[C_{avg}] > 150$

Definitions:

TVOC = Total Volatile Organic Compounds

PID = Photoionization Detector

PM_{10} = Respirable Particulate Matter

ppm = Parts per million volume

$\mu g/m^3$ = Micrograms per cubic meter

$[C_{avg}]$ = 15-minute average concentration of target

DT = Dräger Tubes

NA = Not applicable, odor intensity will be either an Operational Level or Action Level; there is no Alert and/or Response Limit and there is no Alert Limit for PM_{10}.

Notes:

[1] Background is defined as the current upwind concentration. Background concentrations will be used to calculate the actual Property contributions to TVOCs and PM_{10} during the final evaluation of the Site condition.

AECOM

Client: National Grid
Location: Clifton - 40 Willow Avenue, Staten Island, NY
Date: 9/16/15
Field Personnel: R. Doshi

Project: Clifton Former M&P Site
Project Number: 60137363
Weather: Sunny, 70's
Ambient Noise: Low

Community Air Monitoring Plan / Noise Field Log

Time	Upwind PID	Upwind Dust Trak	Work Area PID	Downwind PID	Downwind Dust Trak	dB Readings[1]	Comments
7:45	0.0	0.070	0.0	0.0	0.050	N/A	CAMP Setup
8:00	0.0	0.038	0.0	0.0	0.028		No intrusive activities
8:15	0.0	0.040	0.0	0.0	0.026		The First truck
8:30	0.0	0.048	0.0	0.0	0.055		was loaded w/ Soil
8:45	0.0	0.026	0.0	0.0	0.033		during this time
9:00	0.0	0.038	0.0	0.0	0.030		
9:15	0.0	0.050	0.0	0.0	0.028		
9:30	0.0	0.045	0.0	0.0	0.033		
9:45	0.0	0.033	0.0	0.0	0.027		
10:00	0.0	0.048	0.0	0.0	0.026		
10:15	0.0	0.061	0.0	0.0	0.025		
10:30	0.0	0.066	0.0	0.0	0.021		No Intrusive Activities
10:45	0.0	0.058	0.0	0.0	0.028		
11:00	0.0	0.050	0.0	0.0	0.020		
11:15	0.0	0.048	0.0	0.0	0.027		
11:30	0.0	0.038	0.0	0.0	0.025		
11:45	0.0	0.040	0.0	0.0	0.026		
12:00	0.0	0.058	0.0	0.0	0.025		
12:15	0.0	0.070	0.0	0.0	0.026		The Second truck was
12:30	0.0	0.038	0.0	0.0	0.020		loaded w/ stockpiled
12:45	0.0	0.037	0.0	0.0	0.016		soil at this time
13:00	0.0	0.040	0.0	0.0	0.020		No intrusive activities

AECOM

Client: National Grid
Location: Clifton - 40 Willow Avenue, Staten Island, NY
Date: 9/16/15
Field Personnel: R. Doshi

Project: Clifton Former MGP Site
Project Number: 60137363
Weather: Sunny, 70s
Ambient Noise: Low

Community Air Monitoring Plan / Noise Field Log

Time	Upwind PID	Upwind Dust Trak	Work Area PID	Downwind PID	Downwind Dust Trak	dB Readings[1]	Comments
13:15	0.0	0.053	0.0	0.0	0.022	N/A	Area in front of the stockpile was being graded at this time
13:30	0.0	0.055	0.0	0.0	0.023		
13:45	0.0	0.048	0.0	0.0	0.018		
14:00	0.0	0.040	0.0	0.0	0.016		No Intrusive Activities
14:15	0.0	0.045	0.0	0.0	0.015		
14:30	0.0	0.037	0.0	0.0	0.010	↓	

Attachment F

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
2715-1135			0124449

GENERATOR

5. Generator's Name and Mailing Address
NATIONAL GRID - CLIFTON
40 WILLOW AVENUE
STATEN ISLAND, NY 10305
Generator's Phone: 917-794-7944

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name — U.S. EPA ID Number

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address
BAYSHORE SOIL MANAGEMENT LLC
75 CROWS MILL ROAD
KEASBEY, NJ 08832
Facility's Phone: 732-738-4000

U.S. EPA ID Number: NJ1225001522

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON-HAZARDOUS MGP CONTAMINATED SOIL					
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
BSM 2715-1135

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Andrew Prophete — Signature — Month: 9 — Day: 16 — Year: 15

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: URIEL TRUCKING #15 ASBSON — Signature — Month: 9 — Day: 16 — Year: 15

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month — Day — Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name — Signature — Month — Day — Year

GENERATOR'S/SHIPPER'S INITIAL COPY

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number 2715-112	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number 20124448

GENERATOR

5. Generator's Name and Mailing Address

NATIONAL GRID - CLIFTON
40 WILLOW AVENUE
STATEN ISLAND, NY 10305

Generator's Phone: 617-794-6514

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name — U.S. EPA ID Number

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address

BAYSHORE SOIL MANAGEMENT LLC
75 CROWS MILL ROAD
KEASBEY, NJ 08832

U.S. EPA ID Number: NJ1228001632

Facility's Phone: 732-738-6000

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
	1. NON-HAZARDOUS MGP CONTAMINATED SOIL					
	2.					
	3.					
	4.					

13. Special Handling Instructions and Additional Information

BSM 2715-112S

TIME LIVING SITE 9:30 AM

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Andrew Whole — Signature — Month: 9 — Day: 16 — Year: 15

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: URBAN TRUCKING #15 ASBSON — Signature — Month: 9 — Day: 16 — Year: 15

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month — Day — Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name — Signature — Month — Day — Year

GENERATOR'S/SHIPPER'S INITIAL COPY

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Thermal Treatment

Of 51.60 Tons of

Coal Tar Contaminated Soil
(Received on 09/16/15)

From the **National Grid Clifton MGP site, Staten Island, NY**

Bayshore Soil Management, LLC.

September 17, 2015
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG110004
Keasbey, New Jersey

Certificate Number 2715-1125-091615