



*DPE Treatment System Operating Plan
Former Sears Auto Center
Redmond, Washington*

Prepared for:
Washington State Department of Ecology

March 15, 2023
Regen-222



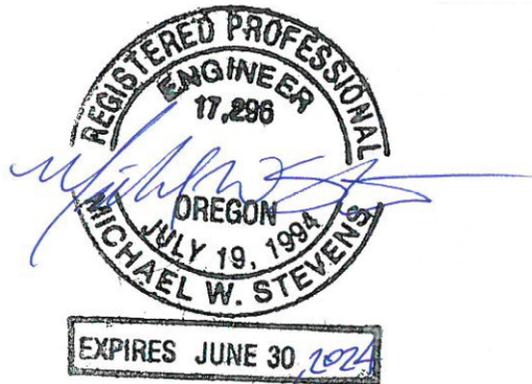
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A handwritten signature in blue ink, appearing to read 'John P. Foxwell', written over a horizontal line.

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Table of Contents

1.0 INTRODUCTION	1
2.0 TREATMENT SYSTEM OPERATING PLAN	2
3.0 SYSTEM COMPONENTS	3
3.1 Emergency/Fault Conditions.....	8
4.0 COMPONENT MAINTENANCE.....	8
5.0 SYSTEM OPERATION AND MONITORING	11
5.1 System Start Up	11
5.2 Operation Inspection	11
5.3 System Pressure and VOC Monitoring.....	12
5.4 Vapor Discharge Monitoring	13
5.5 Liquid Discharge Monitoring	14
5.6 Vacuum Response Monitoring.....	16
6.0 WASTE MANAGEMENT	16
6.1 Activated Carbon Disposal	16
6.2 Spent Filter Bags Disposal	17
6.3 Wastewater and Free Product.....	17
7.0 HEALTH AND SAFETY PROCEDURES	17

Figures

1	Site Location Map
2	Site Plan
3	System Layout
4	System Enclosure Layout
5	DPE System Schematic
6	DPE System Details
7	DPE System Specifications

Appendices

A	System Component Literature
B	Field Forms and Example Waste Log
C	NPDES Permit
D	Health and Safety Plan

1.0 Introduction

Apex Companies, LLC (Apex) has prepared this Treatment System Operating Plan (TSOP) for the dual-phase extraction (DPE) system at the former Sears Auto Service Center (the Site) in Redmond, Washington (Figure 1). The Site comprises the entire Property at the Overlake Retail Shops at 2200 148th Avenue NE, Redmond, Washington (Figure 2). The Site is located to the southwest of the larger Overlake Fashion Plaza.

The DPE system is constructed to address concentrations of gasoline range petroleum hydrocarbons (TPH-G) and related constituents such as benzene, toluene, ethylbenzene, and xylenes in soil and groundwater. The DPE system extracts soil vapors and groundwater from the Site, which are treated through vapor and water treatment components prior to discharge to the atmosphere and City of Redmond stormwater system, respectively. The expected flow rate for the system is less than 10 gallons per minute (gpm). System component literature is provided as Appendix A. DPE field form templates and an example waste log are provided as Appendix B.

Discharge to the storm sewer is permitted by Washington Department of Ecology under National Pollution Discharge Elimination System (NPDES) Waste Discharge Permit No. WA0991040, effective August 1, 2021 and modified January 5, 2023 (Appendix C). The discharge consists of only treated remediation process water. Stormwater management at the property is managed entirely separate from this system.

The layout of the DPE system is shown on Figures 3 and 4, a schematic of the DPE system components is shown on Figure 5, and construction details and specifications are shown on Figures 6 and 7, respectively. The TSOP was developed to summarize final system component specifications (Section 3.0), maintenance requirements (Section 4.0), system operations and monitoring (Section 5.0), waste management (Section 6.0), and health and safety procedures (Section 7.0). A copy of the site-specific Health and Safety Plan (HASP) is provided as Appendix D.

In accordance with Washington Administrative Code (WAC) 173-240-150, this TSOP addresses regulatory requirements outlined within the NPDES Waste Discharge Permit; specifically:

- The names and phone numbers of the responsible individuals (Appendix D).
- A description of plant type, flow pattern, operation, and efficiency expected (Section 2.0 and Figure 5).
- The principal design criteria (Section 2.0).
- A process description of each plant unit, that includes function, relationship to other plant units, and schematic diagrams (Section 3.0).
- An explanation of the operational objectives for the various wastewater parameters (Sections 5.5 and 6.3).

- A discussion of the detailed operation of each unit and a description of various controls, recommended settings, fail-safe features, etc. (Section 3.0).
- A discussion of how the facilities are to be operated during anticipated startups and shutdowns, maintenance procedures, and less than design loading conditions, so as to maintain efficient treatment (Section 5.0).
- A section on laboratory procedures that includes sampling techniques, as well as monitoring and sampling requirements, and sample analysis (Sections 5.4 and 5.5).
- Recordkeeping procedures and sample forms to be used (Section 5.2 through Section 5.5, and Appendix B).
- A maintenance schedule that incorporates manufacturer's recommendations, preventative maintenance and housekeeping schedules, and special tools and equipment usage (Section 4.0).
- A section on health and safety (Section 7.0 and Appendix D).
- A section that contains the spare parts inventory, address of local suppliers, equipment warranties, and appropriate equipment catalogues (Appendix A).
- Emergency plan procedures (Section 3.1).

Additionally, in accordance with the NPDES Waste Discharge Permit, Apex will:

- Review the TSOP annually,
- Submit to ecology for review substantial changes or updates to the TSOP whenever it incorporates them into the manual,
- Keep a copy of the approved TSOP at the permitted facility, and
- Follow the instructions and procedures of this TSOP.

2.0 Treatment System Operating Plan

Soil and groundwater remediation using DPE removes both liquid and vapor phases by drawing down the aquifer with in-well pumps and using a vacuum blower to remove vapors. DPE also provides hydraulic containment and control to limit offsite plume migration potential. The DPE system includes 10 extraction wells (Figure 3). Vapors and groundwater extracted from the wells are piped to the treatment system near the northeast entrance to Overlake Retail Shops (Figure 4).

Remediation vapors are treated with activated carbon prior to discharge. Groundwater treatment includes phase-separation, air stripping, and carbon treatment. The expected flow rate for the system is less than 10 gpm. Treated groundwater is discharged under the limitations of an Individual Industrial Waste Discharge Permit administered by Ecology. The system only treats ground water removed for treatment. The system

does not include outdoor product or raw material storage. Stormwater for the property is managed entirely separate from the remediation system.

The treatment system includes alarm response/shut-down controls. These controls are described in detail in Section 3.0. In the event that any of the aforementioned alarms are triggered, the alarm light will engage and the programmable automatic remote monitoring and control device will send a notification of the system and alarm conditions to the applicable receivers. If the alarm condition includes a system shut-down, the control system will also cut power to the active system components, including all pumps and blowers. The control logic for the system is such that it will re-initialize and start up once the system is not experiencing error conditions. Otherwise, the system will remain off until the appropriate maintenance is completed and the system is manually restarted.

System inspections will be completed during the monthly system monitoring events. Routine maintenance activities (e.g. bag filter maintenance) will be completed on an approximate monthly basis. Other maintenance will be completed on an as needed basis.

3.0 System Components

The DPE system consists of Soil Vapor Extraction (SVE) and groundwater extraction processes. This section summarizes the components for each part of the system.

Dual-Phase Extraction Wells. Ten DPE wells were completed to depths of approximately 30 feet below the ground surface (bgs), with well screens extending from 10 to 30 feet bgs. The locations of the DPE wells are shown on Figure 3.

The DPE wells were constructed with 6-inch-diameter, Schedule 40 PVC casing. Each DPE well consists of a pneumatic water pump installed at approximately 5 to 10 feet below the water table to allow for smear zone exposure and concurrent groundwater and vapor extraction/treatment. The well screens are 6-inch, Schedule 40 PVC with 0.020-inch slot size, and pre-packed with 8/12 Silica Sand. The filter material (8/12 Silica Sand) was installed in the borehole from the bottom of the well extending to 1 foot above the top of the well screen. A 6- to 12-inch plug of hydrated granular bentonite was placed above the filter material. Wells were grouted with a 10:1 mixture of Portland cement/bentonite grout to the surface seal. The wells were installed in 24-inch-square steel vaults and completed with concrete.

Piping. The vapor extraction piping is 4-inch diameter High Density Polyethylene (HDPE), the total fluids piping is 2-inch HDPE, and the pneumatic well piping is 1-inch HDPE. HDPE piping is joined with thermal fusion. The piping layout is shown on Figure 4. The trenches and piping in the trenches are sloped towards the DPE wells to reduce condensation from accumulating in the piping. Piping is bedded in pea gravel to

prevent voids or protrusions that might potentially damage the piping. Each line is fitted with a 6-inch-diameter butterfly valve to permit isolation of the respective lines and sample port before it is joined into the DPE trailer.

System Enclosure. A 24-foot by 8-foot system enclosure (DPE trailer) houses the vacuum extraction system, which includes an air compressor, a moisture separator, blower unit, the necessary piping, and a groundwater treatment system. The groundwater treatment system includes an oil-water separator, an oil storage tank, two bag filter housings, a tray air stripper and associated stripper off-gas carbon vessel (400 pound), two liquid carbon vessels (2,000 pounds each), the control panel, manifolds, transfer pumps, and gauges. The DPE trailer is placed on a compacted gravel pad, approximately 55' x 10' in area (Figure 4). Four 2,000-pound carbon vessels (two vapor phase and two liquid phase) are staged outside the DPE trailer and enclosed with slatted chain link fence. The DPE system schematic and details are provided as shown on Figure 5 and Figure 6 respectively. The DPE trailer is insulated to reduce the noise impacts from the operation of the blower unit. The control panel including system alarms and controls for the DPE system is located at the north end of the system. A 16-inch ventilation fan with a ventilation hood is located on the wall of the DPE trailer and connected to a thermostat (set at 75°F). A discharge stack will be attached to the DPE trailer and terminate a minimum of 4 feet above the compound fence. The DPE trailer was built to NEC Class 1 Div 2 standards, meaning equipment and wiring are intrinsically safe. The DPE trailer is locked for security purposes and the key is stored in a secured key box outside the door.

Utilities. The DPE system is supplied with 230 V, three phase, 3 wire plus ground, 60 Hz electrical connection.

Control and Notification System. The DPE system control and notification system is located outside of the DPE trailer (see Figure 6). The control system consists of the blower controls. The blower starter has an "On" and "Off" lever, a "Reset" lever, and a switch for "Hand", "Off", or "Auto".

All switches are operated by rotating the switch handle clockwise or counterclockwise as necessary to line up the indicator mark with the text describing the switch setting (marked on the switch base). For normal operation, the switches should be left on "Auto". For system monitoring and maintenance, the switches can be set as "Off". The "Hand" setting should be used only under closely observed conditions for specific circumstances.

The Control Panel consists of alarms for the DPE system that are initially set to the limits in the following table:

Alarm	Action	Condition	Possible Causes
DPE Blower Low Amps	Shut-Down	< 50% Normal	Blower not functioning
DPE Blower High Amps	Shut-Down	> 90% Max	Blower motor overloaded

Low DPE Vacuum	Shut-Down	< 2.0 in. Hg	Ruptured vapor extraction line, open vacuum relief valve.
High DPE Vacuum	Shut-Down	> 7.0 in. Hg	Blocked vapor extraction line, accumulated water in influent piping
High level Knock-out Drum	Shut-Down	> 90% Capacity	Knock-out drum is full
High Blower Pressure	Shut-Down	> 4.0 psig	Blocked discharge to carbon vessels, accumulated water in carbon vessels
Oil-Water Separator High Level	Shut-Down	> 90% Capacity	Transfer pump not functioning
Oil Storage Full	Notification	> 75% Capacity	The storage tank will soon require manual emptying
Oil Storage Over-Full	Shut-Down	> 90% Capacity	The storage tank is full
Bag Filter High Differential Pressure	Notification	> 20 in. H ₂ O	Filters plugged and require servicing
Bag Filter High Differential Pressure	Shut-Down	> 1 psig	Filters plugged and continued operation may damage equipment
Air Stripper Blower Low Amps	Shut-Down	< 50% Normal	Air Stripper not functioning
Air Stripper Blower High Amps	Shut-Down	> 90% Max	Air Stripper motor overloaded
Air Stripper Sump High Level	Shut-Down	> 90% Capacity	Transfer pump not functioning
Air Compressor Low Pressure	Shut-Down	< 50% Normal	Air Compressor not functioning

In the event that any of the aforementioned alarms are triggered, the alarm light will engage and the programmable automatic remote monitoring and control device (RAM® 6000 Industrial Cellular RTUs Secure Remote Monitoring & Control) will send a notification of the system and alarm conditions to the applicable

receivers. If the alarm condition includes a system shut-down, the control system will also cut power to the active system components, including all pumps and blowers.

The control logic for the system is such that it will re-initialize and start up once the system is not under out-of-bounds conditions. Otherwise, the system will remain off until the appropriate maintenance is completed and the system is manually restarted.

DPE Blower. The vapors from the DPE wells are extracted using a 15 horsepower (hp) regenerative blower located inside the DPE trailer. The blower is equipped with explosion proof motor starters and vacuum gauges.

Air Moisture Separator. The vapor stream generated by the DPE blower is run through an air moisture separator (i.e., knockout tank). Removing the moisture in the vapor stream allows for more controlled management of fluid entrained in the air stream, and reduces the likelihood of water condensing in the carbon vessels (see below) and reducing the carbon adsorption capabilities (the carbon vessels themselves would protect the DPE blower from moisture that would potentially be damaging). The knockout tank is drained by a transfer pump (controlled by a set of float switch controls) and is equipped with an over-high level float alarm to shut the system off if the tank is full. The 10 lines from the DPE wells connect together into manifold pipes that route the vapor streams into the DPE trailer and to the knockout tank.

Moisture Separator Transfer Pump. The fluids collected by the moisture separator are pumped to the oil-water separator. The transfer pump is a one-hp centrifugal pump that is controlled by float switches in the moisture separator – the high-level switch will activate the transfer pump and the low-level switch will turn the pump off (to prevent the transfer pump from damage).

Well Pumps. Each of the 10 DPE wells is equipped with a pneumatic pump [Short AutoPump (AP3)]. AutoPump has a built-in control system. They pump when there is liquid present and shut down when the level is drawn down, without the need for any sensors in the well or controls at the surface. The AutoPump operates in cycle as follows: the fluid pushed the fluid inlet check valve (bottom of the pump) open and fluid enters the pump; as the fluid level rises, air is expelled through the exhaust air valve (top of the pump) and the internal float rises to the top of its stroke. When the internal float reaches the upper position of the pump, the float triggers a level assembly, which closed the air exhaust valve and opens the air inlet allowing air to enter and pressurize the pump. The air is powered by air compressor. When the air pressure builds up within the pump body, this will cause the fluid inlet check valve to close and forces the fluid to be displaced up and out of the fluid outlet (top of the pump), then flow to the oil-water separator in the groundwater treatment system.

Air Compressor. The air to drive the pneumatic well pumps is provided by a centralized air compressor, a polar air electric operated, two-stage, 10-hp piston air compressor. The 10 individual air lines are manifolded at the compressor and are equipped with valves that allow for the control of the air flow to each pump.

Oil-Water Separator. The fluids generated by the system (from each of the 10 DPE wells and the moisture separator) are pumped to the oil-water separator, which uses gravity separation to differentially direct any collected separate-phase hydrocarbons to an oil storage tank while allowing the water fraction to continue on for further treatment. The water sump of the oil-water separator is drained by a transfer pump (controlled by a set of float switch controls) and is equipped with an over-high level float alarm to shut the system off if the sump is full. The oil storage tank is also equipped with a set of high-level float switches to first provide notification that the tank is nearly full and requires emptying and then a system shut-down if the tank is full.

Oil-Water Separator Transfer Pump. The water fraction from the oil-water separator is pumped to the bag filters. The transfer pump is a one-hp centrifugal pump that is controlled by float switches in the oil-water separator – the high-level switch will activate the transfer pump and the low-level switch will turn the pump off (to prevent the transfer pump from damage).

Bag Filters. The water flow from the oil-water separator is filtered through a set of bag filters to remove sediment and suspended particles in order to minimize fouling of the air stripper. The bag filter set includes two sequential filter housings, the first of which will include a primary coarse-filter bag and the second will include a fine-filter bag. The differential pressure across the bag filter set is monitored to first provide notification that the filters are nearly plugged and require replacement and then a system shut-down if the pressure is excessive.

Air Stripper. The water treatment includes the removal of volatile organics from the water stream through an air stripper (Model No. E.Z 4.4P). The air stripper includes an intrinsic blower that creates an air stream through which the treated water is dispersed to maximize the transfer of volatiles to the vapor phase. The vapor phase undergoes final filtration through a 400-pound carbon vessel prior to discharge, while the water phase collects in the air stripper sump. The air stripper sump is drained by a transfer pump (controlled by a set of float switch controls) and is equipped with an over-high level float alarm to shut the system off if the sump is full.

Air Stripper Transfer Pump. The treated water in the air stripper sump is pumped to the liquid-phase carbon vessels for polishing treatment. The transfer pump is a one-hp centrifugal pump that is controlled by float switches in the air stripper sump – the high-level switch will activate the transfer pump and the low-level switch will turn the pump off (to prevent the transfer pump from damage).

Flow meters. The influent line to the DPE system incorporates a 0-450 Standard cubic feet per minute (scfm) flow meter installed prior the knockout tank.

Sampling Ports. ¼-inch OD schedule 80 PVC sampling ports are installed at each of the ten lines, before and after the blower, between each of the carbon vessels, and after the carbon vessels prior to the discharge stack. Their locations are shown on Figure 5.

Vapor-Phase Carbon Treatment Vessels. The vapor effluent from the DPE wells is routed through two 2,000-pound carbon vessels to discharge to the atmosphere from one 15-ft high vent discharge stack. The vessels are filled with reactivated grade vapor phase carbon. The vapor effluent from the stripper is routed to a 400 pound carbon vessel to discharge to the atmosphere from the vent discharge stack.

Liquid-Phase Carbon Treatment Vessels. The liquid effluent from the DPE wells are routed through two 2,000-pound carbon vessels prior to discharge to the City of Redmond stormwater system. The vessels are filled with reactivated grade liquid phase carbon.

3.1 Emergency/Fault Conditions

To address the potential event of a system component failure, the system is designed to constantly monitor the operating conditions and shut the system off if continued operation could reasonably result in an uncontrolled release of either treated or untreated water (as identified in the table above). Under normal operating conditions, the system will be generating less than 10 gallons per minute of pumped groundwater, and the shut-down of the system (which includes the immediate stoppage of all pumping) will eliminate the potential for an ongoing release of untreated water. The catastrophic failure of a system component could potentially result in a short-term release of any contained water, which is generally less than 100 gallons and would be contained within the system enclosure. The inclusion of carbon adsorption as the final stage of groundwater treatment remains protective of any discharge to the sewer system even in the event of a power loss. Routine inspection of the system will also be used to ensure that the system is operating correctly, further reducing the potential for any uncontrolled discharge.

4.0 Component Maintenance

Vapor Extraction Wells and Piping. The DPE wells and piping should be inspected quarterly for any signs of damage or leaks. Any cracks in surface seal around the DPE well casing should be noted as they may indicate preferential flow pathways down the casing. A damaged well seal can be inspected by pouring 1 to 2 gallons of water onto the seal. A damaged well seal will absorb the water quickly. If the seal is slightly damaged a layer of grout can be applied to the surface seal. If the seal is severely damaged the well should be replaced.

The valves and sample ports on the lines and at the wells should be inspected quarterly. Damaged sampling ports and valves should be replaced.

Air Moisture Separator. The air moisture separator (knock-out tank) is self-managed during normal operation (the accumulated water is pumped to the oil-water separator for subsequent treatment and disposal). The unit should be inspected on a routine maintenance schedule (i.e., quarterly), including verification that the vacuum relief valve and high-level floats are operating properly. For general maintenance and troubleshooting see the maintenance manual for the air moisture separator in Appendix A.

Vacuum Filter. The vacuum filter prior to the DPE blower should be inspected on a routine maintenance schedule (i.e., quarterly) and cleaned out accordingly. The filter element should be replaced when the vacuum differential across the filter exceeds 10 inches of water (in. H₂O).

Blower. The general maintenance and troubleshooting items associated with the DPE and air stripper blowers are described in the component literature included in Appendix A. In general, the blower should be inspected according to the manufacturer's recommendations. If the measured vacuum pressures or drawn amps exceed the blower performance provided in the component literature, the vacuum relief valve (i.e., bleeder valve) should be opened until the normal design blower performance curve is achieved (which may also require an electrician to identify the cause of high amp draw, or further inspection of the system to identify cause of flow resistance).

Transfer Pumps. The general maintenance and troubleshooting items associated with each of the transfer pumps is described in the component literature included in Appendix A. In general, the transfer pumps should be inspected according to the manufacturer's recommendations. If the measured pump pressures or drawn amps exceed the performance criteria provided in the component literature, additional service may be required (such as an inspection by an electrician to identify the cause of high amp draw, or further inspection of the piping system to identify cause of flow resistance).

Well Pumps. The general maintenance and troubleshooting items associated with each of the well pumps is described in the component literature included in Appendix A. In general, the well pumps should be inspected according to the manufacturer's recommendations. If the measured pump pressures exceed the performance criteria provided in the component literature, additional service may be required (such as inspection of the piping system to identify cause of flow resistance).

Air Compressor. The general maintenance and troubleshooting items associated with the air compressor are described in the component literature included in Appendix A. In general, the air compressor should be inspected according to the manual. If the measured air compressor pressures or drawn amps exceed the performance criteria provided in the component literature, additional service may be required (such as an inspection by an electrician to identify the cause of high amp draw, or further inspection of the piping system to identify cause of flow resistance).

Oil-Water Separator. The general maintenance and troubleshooting items associated with the oil-water separator are described in the component literature included in Appendix A. In general, the oil-water separator should be inspected according to the manufacturer's recommendations. If the measured pump pressures or drawn amps exceed the performance criteria provided in the component literature, additional service may be required (such as an inspection by an electrician to identify the cause of high amp draw, or further inspection of the piping system to identify cause of flow resistance).

Bag Filters. The general maintenance and troubleshooting items associated with the bag filter units are described in the component literature included in Appendix A. In general, the bag filters should be inspected according to the manufacturer's recommendations. If the measured differential pressure across the bag filter exceeds the bag filter performance provided in the component literature, the filter media will be replaced with a new bag (either coarse or fine as appropriate for the filter housing).

Air Stripper. The general maintenance and troubleshooting items associated with the air strippers are described in the component literature included in Appendix A. In general, the air strippers should be inspected according to the manufacturer's recommendations. If the differential pressures exceed the operating range provided in the component literature or tray fouling observed during regular maintenance inspection, additional service may be required (such as tray cleaning.)

Vapor Treatment. When the concentrations in the final effluent exceed the specified air discharge criteria (PSCAA exemption requirements for new source), the granular activated carbon in the lead carbon vessel needs to be replaced. The replacement schedule is based on the final effluent sampling results.

During each carbon replacement event, the carbon is replaced in the lead carbon vessel, and the lag vessel in the respective treatment train are rotated forward in sequence (to the lead position). To replace the carbon, the blower is turned off and the influent and effluent hoses are disconnected from the lead carbon vessel. The spent activated carbon is removed using a vacuum truck and placed in 1,000-pound "supersacks". The supersacks are handled as described below in Section 6.0, Waste Management. New reactivated grade vapor/liquid phase granular activated carbon is then loaded through the manway at the top of the carbon vessel. Once the new carbon is installed and leveled, the hoses are reconnected such that the old lead vessel (now with fresh carbon) becomes the new lag vessel, and the old lag vessel becomes the new lead vessel.

Discharge Stack. The discharge stacks should be inspected regularly for any signs of blockage, damage, or leaks.

Control and Notification System. Once the controls are set, there should be no routine maintenance issues for the control and notification system.

5.0 System Operation and Monitoring

This section describes the operation and monitoring requirements for the operation of the DPE system. Prior to startup, each recovery well and monitoring well will be gauged for free-product and water levels will be measured. Initial startup will include wells without free-product to confirm the system is operating as anticipated. Once the system is operating, phased startup of recovery wells with product will be completed one at a time in order to evaluate the effects of product on the system.

5.1 System Start Up

Before startup of the DPE system, all valves to the DPE wells should be verified to be in the “open” position and all fluid levels in the system sumps should be verified to be within the normal operating parameters (i.e., between the low level and high-level float switches). The effluent lines should also be inspected and verified to be connected to the carbon vessels.

To start the DPE System under normal operation:

- Turn the power levers for the System to “On”;
- Set the equipment operation switches to “Auto”;
- Reset all alarm conditions;
- Engage the system Operate/On switch; and
- Monitor the DPE System for alarm conditions for a period of at least 10 minutes.

5.2 Operation Inspection

The DPE system has a remote monitoring device (RAM® 6000 Industrial Cellular RTUs) to provide instant access to data from certain system components (e.g. pumps, valves, and meters). However, routine inspection of the operation of the system components should be conducted regularly to ensure safety and efficiency criteria are met.

Inspections of system components will also be conducted when a breakdown of any treatment system component has occurred or when a severe condition has taken place. In the event that the warning device is activated, applicable maintenance and repairs will be conducted and the system will be restarted. The inspections and maintenance should be conducted by qualified personnel trained to operate DPE system. The routine inspections should take place as follows.

Monthly Inspection:

- Review and follow health and safety plan (HASP; see section 7.0) for conducting inspection events;

- Monitor by noting alarm conditions, noting flow rates, conducting pressure and volatile organic compound (VOC) monitoring (see Section 5.3), and sampling the vapor and liquid effluent streams (see Sections 5.4 and 5.5);
- Inspect the operation of the blower;
- Inspect accumulated oil/water level in tanks, low spots in underground piping in alleyway, and low spots in overhead piping above loading dock and collect water as necessary;
- Inspect the vapor and liquid treatment by ensuring hosing is connected properly and in the correct order of vessels, there are no leaks or blockages, and effluent stacks are in adequate condition; and
- Inspect the waste storage and update the waste log (see Section 6.0) with any changes in the hazardous and non-hazardous waste.

Quarterly Inspection:

- Resupply DPE trailer with safety and monitoring supplies (e.g. gloves, safety glasses, carbon waste labels, and blank field forms);
- Inspect the integrity of all system components including flow meters, pressure/vacuum gauges, carbon treatment vessels, knockout tanks, valves, and controls;
- Clean DPE system enclosures;
- Inspect bag filter operation; and
- Check the supply of 44-inch by 44-inch pallets for spent carbon waste storage and order more if necessary.

5.3 System Pressure and VOC Monitoring

Monitoring of the VOCs using a calibrated photoionization detector (PID) and positive pressures and negative pressures (vacuums) will be measured on a daily basis for five days after system startup, a weekly basis for three weeks, and then monthly thereafter and recorded in the monitoring sheet provided in Appendix B.

Pressure Monitoring. A Magnehelic pressure gauge of appropriate range will be used to measure the vacuums in in. H₂O at sample ports in each of the 10 separate influent lines to the DPE system and the main influent manifolds to the blower. The positive pressures will also be measured at sample ports after the blower, between the carbon vessels, and prior to the discharge stack.

VOC Monitoring. VOC measurements of the effluent to the blower, where pressures are positive, will be taken at sample ports by opening the valve at the sample port and inserting the tip of the PID into the sample port. Because the PID cannot measure readings from a vacuum, VOC monitoring at the influent line to the

blower should take place immediately after turning off the blower or a sampling pump should be utilized to take any such readings while the system is operational.

5.4 Vapor Discharge Monitoring

Treated soil vapor will be discharged to the atmosphere after treatment in compliance with PSCAA regulations for remediation project discharges. PSCAA exempts soil and groundwater remediation projects that discharge less than 15 pounds per year of benzene and 1,000 pounds per year of toxic air contaminants. Initial operations monitoring indicates the system discharges will exceed the exemption criteria under baseline conditions. A Notice of Intent has been submitted to PSCAA. Operations will be completed under the permit until it is shown that the discharges will be below the permitted discharge limits. It is expected that the post-treatment discharges will be significantly lower than the discharge limits, but standard operations will only commence once compliance is demonstrated.

During initial operations, monitoring will be initially completed on a daily basis for five days and a weekly basis for three weeks. The initial monitoring events will include remediation vapor (pre-treatment) and discharge (after treatment). Monitoring parameters and the standard monitoring schedule are outlined in the table below.

Remedial Action Component(s)	Location	Monitoring	Frequency
Vapor Treatment	Influent branches	PID, vacuum, flow rate, sample (Method TO-15)	Monthly
	Mid-Carbon	PID	Monthly
		Sample (Method TO-15)	Periodic ¹
Effluent Stack	PID, pressure, flow rate, sample (Method TO-15)	Monthly	

Note:

- 1) Samples of the remediation vapor may be periodically collected to evaluate carbon performance and evaluate breakthrough.

Vapor samples are analyzed for volatile organic compounds using EPA Method TO-15. Laboratory analyses will be completed Pace National Laboratories in Mt Juliet, Tennessee, an Ecology accredited laboratory. Other Ecology accredited laboratories may be substituted.

To collect a sample of the vapor effluent stream, a 30-minute flow controller is connected to a Summa™ canister which is connected to the sample port using Teflon® tubing and Swagelok® fittings. The sample port and the canister are then opened and allowed to fill over the 30-minute sampling period (i.e. once the vacuum in the summa canister reaches 5 inches of mercury [inHg] vacuum). The initial and final sampling times and vacuums, canister numbers, and sample identifications should be noted in the monitoring sheet provided in Appendix B.

The sample identification for each location in the DPE system should be as follows:

DPE LOCATION_MMDDYYYY

Where:

- DPE LOCATION is the sampling location in the system
- PRE-TREATMENT before the lead carbon vessel;
- MIDCARBON between the lead and lag carbon vessel;
- DISCHARGE after the lag carbon vessel.
- MM is the numerical month
- DD is the numerical day
- YYYY is the numerical year

5.5 Liquid Discharge Monitoring

Water will be discharged to the City of Redmond storm water system under an NPDES permit administered by the Department of Ecology. Initial operations monitoring will be completed to demonstrate the system will provide effective treatment. Normal operations will only commence once compliance is demonstrated.

5.5.1 Initial Operation Monitoring

Initial operations will be completed at a more intensive frequency to demonstrate compliance. At start up, liquid effluent will be contained in a temporary 20,000 gallon holding tank and sampled daily prior to batch discharge. This will be completed for five consecutive days (or other duration as required under the permit). The predicted flow rate of the system is approximately 2.5 gpm. Samples will be collected from the system sampling port and analyzed using a same-day turn-around time. This will provide sufficient time to receive sample results, discharge the batch, and maintain a continuous operating scenario.

Samples will be analyzed for the same parameters required under the NPDES permit summarized in Section 4.5.2. Batches will not be discharged without laboratory data documenting the water has been treated and is in compliance with all NPDES permit the discharge limitations.

5.5.2 Normal Operation

The liquid effluent streams of the DPE must be sampled in accordance with the schedules specified for the final effluent and stormwater discharges under the NPDES permit requirements specified in Appendix C. The following constituents are required to be include in the Site sampling plan and must be sampled/observed on a minimum monthly basis.

Monitoring Schedule for Effluent				
Parameter	Units	Laboratory Method	Minimum Sampling Frequency	Sample Type
Flow	gallons/day (gpd)		Batch	Meter or estimate
pH	standard units	SM 4500-H ⁺ B	Batch	Grab ^{1,2}
Oily Sheen	N/A	N/A	Batch	Visual
BTEX ³	µg/L	EPA SW 846 8021/8260	Monthly	Grab ¹
Benzene	µg/L	EPA SW 846 8021/8260	Monthly	Grab ¹
Toluene	µg/L	EPA SW 846 8021/8260	Monthly	Grab ¹
Ethylbenzene	µg/L	EPA SW 846 8021/8260	Monthly	Grab ¹
Xylene (m,o,p mixed isomers)	µg/L	EPA SW 846 8021/8260	Monthly	Grab ¹
TPH-G	mg/L	NWTPH Gx	Monthly	Grab ¹
TPH-D	mg/L	NWTPH Dx	Monthly	Grab ¹
Lead (Total)	µg/L	EPA 200.8	Monthly	Grab ¹
¹	Grab means an individual sample collected over a fifteen (15)-minute, or less, period.			
²	pH may be monitored in-house using pH paper or EPA method 150.1. The results must be recorded in a logbook, which must be made available to Department of Ecology inspector(s).			
³	BTEX – Use the test method specified above and report the total quantity of benzene, toluene, ethylbenzene, and the (m,o,p mixed isomers) xylenes. In addition, report the individual quantities of benzene, toluene, ethylbenzene, and xylene (m,o,p – mixed isomers).			

Sampling and analytical methods used will conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136. The samples are submitted to Pace National Laboratories in Mt Juliet, Tennessee for analysis. The sampling times and sample identifications should be noted in the monitoring sheet provided in Appendix B.

The sample identification for each location in the DPE system should be as follows:

WATER__DPE LOCATION_MMDDYYYY

Where:

- DPE is the DPE System
- LOCATION is the sampling location in the system
- MM is the numerical month
- DD is the numerical day
- YYYY is the numerical year

5.6 Vacuum Response Monitoring

This section describes the requirements for the optimization of removal of VOCs from vapor extraction wells. This section also describes the requirements for the vacuum response monitoring to assess the achieved DPE system radius of influence (ROI).

The vacuum response to the DPE system operation will be measured on an approximate quarterly basis at the DPE wells and at selected vacuum monitoring points. At the vacuum monitoring points, vacuum measurements will be taken directly using Magnehelic pressure gauges of appropriate range (in inches of H₂O) by opening the sample ports. At each of the DPE wells, readings will be taken consecutively with the valves to the DPE wells open and closed. All pressure readings should be tabulated in the field sheet provided in Appendix B.

6.0 Waste Management

This section describes the requirements for management of the waste generated by the including but not limited to spent activated carbon, hosing and personal protective equipment (PPE), spent filter bags, water accumulated in the air moisture separator, and water extracted from the DPE wells.

All waste generated at the Site should be updated in the waste log provided in Appendix C noting the following:

- Generation Date;
- Waste Number;
- Contents;
- Label (Hazardous or Non-Hazardous);
- Containers (e.g. 55-gallon drum, super sack, etc.);
- Amount (volume or mass);
- Location; and
- General notes and comments.

6.1 Activated Carbon Disposal

Two spent activated carbon waste streams are generated from the DPE system; one from the vapor phase carbon vessels and the other one from the liquid phase carbon vessels. The spent activated carbon will be tested as required to profile for regeneration or disposal. This will include, at a minimum, toxicity characteristic leaching procedure (TCLP) to evaluate if it is a characteristic (leachability) dangerous waste for benzene.

The spent activated carbon will be managed such that the carbon change vendor will remove the carbon from the vessels and transport the waste for regeneration or disposal during the same mobilization. Wastes will be taken for regeneration or disposal based on the profile designation (Washington Dangerous Waste or non-hazardous).

6.2 Spent Filter Bags Disposal

Spent filter bags and its associated suspended solids waste are generated from the water treatment process at the bag filter units in the DPE system. The spent filter bags and suspended solids waste will be tested as required to profile for regeneration or disposal. This will include, at a minimum, toxicity characteristic leaching procedure (TCLP) to evaluate if it is a characteristic (leachability) dangerous waste for benzene.

Wastes will be taken for disposal based on the profile designation (Washington Dangerous Waste or non-hazardous).

6.3 Wastewater and Free Product

Wastewater associated with the system will include condensate that accumulates in the moisture separator. The moisture separator includes a transfer pump to pump the water into the oil/water separator for treatment by the system and subsequent discharge to the City of Redmond stormwater system under NPDES permit.

Any free product that is captured by the oil-water separator will be containerized and sent to a permitted treatment facility.

7.0 Health and Safety Procedures

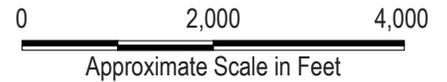
A site-specific HASP has been prepared for Apex staff for operation and maintenance of the DPE system and is included in Appendix D. The HASP was prepared in general accordance with the Occupational Safety and Health Act (OSHA) and the Washington Administrative Code (WAC). A copy of the HASP will be maintained on-site during field activities. Subcontractors working on-site will be required to prepare HASPs for their employees.

Subcontractors are responsible for all matters relating to the health and safety of their personnel and equipment in performance of the work. This includes recognition of the potential health and safety hazards associated with the work and compliance with the minimum requirements of the HASP in force for the work. Subcontractors have the option to exercise more conservative health and safety practices, provided a minimum of one day notice is given to Apex.

DRAFT



Note: Base map prepared from USGS 7.5-minute quadrangles of Kirkland and Mercer Island, WA, dated 2020 as provided by USGS.gov.



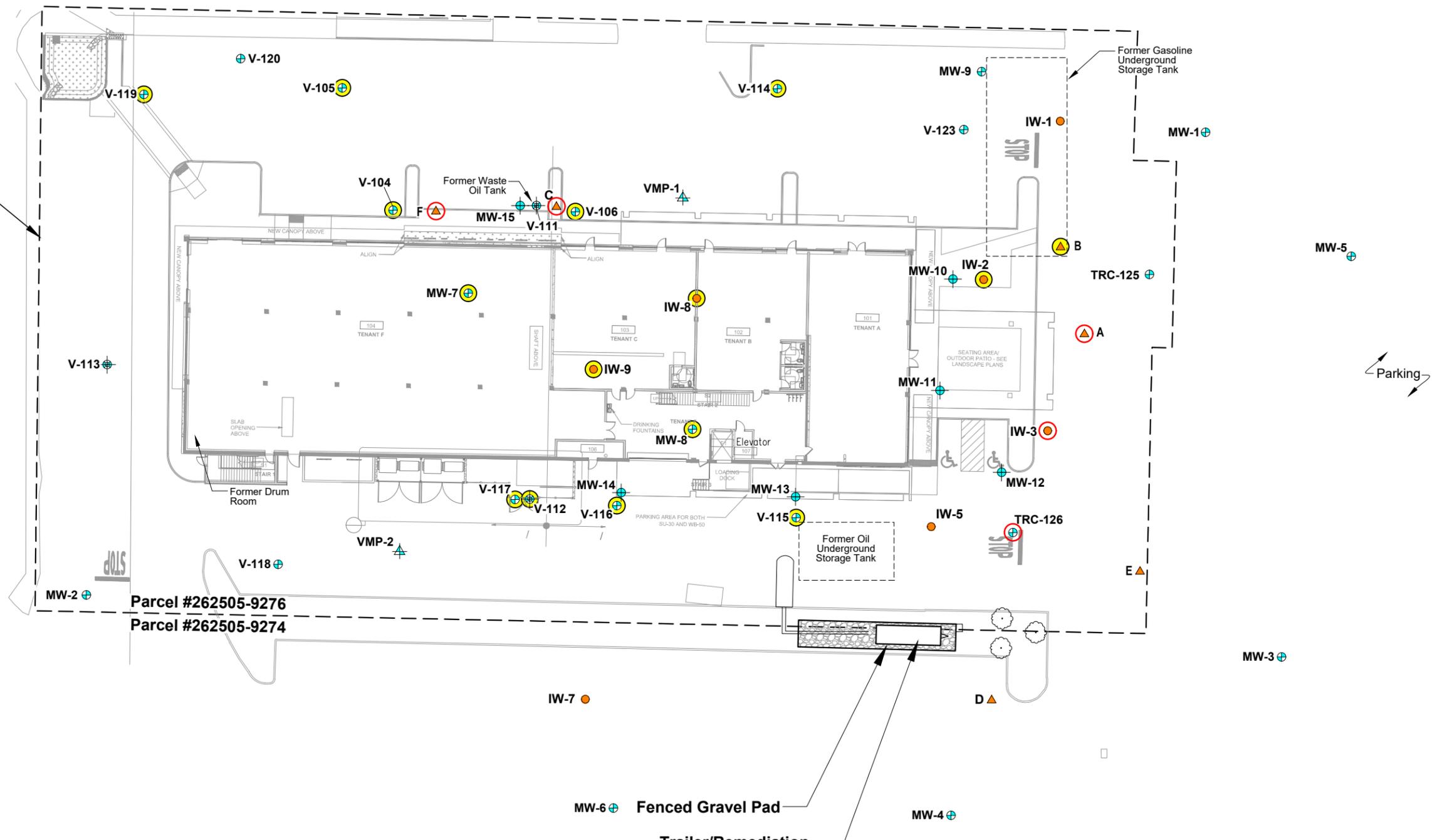
Site Location Map

Overlake Retail Shops
Former Sears Auto Center #6119
2200 148th Avenue
Redmond, Washington

 Apex Companies, LLC 15618 SW 72nd Avenue Tigard, Oregon 97224	Project Number: REGEN-222	Drawn: JP	Approved: CS	Figure 1
	March 2023			

PROJECT SITE

NE 20TH STREET

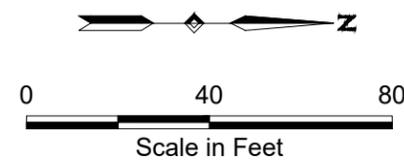


Parcel #262505-9276
Parcel #262505-9274

Legend:

- V-118 ⊕ Groundwater Monitoring Well Location
- V-113 ⊕ Deep Groundwater Monitoring Well Location
- IW-7 ● Injection Well Location
- A ▲ Presumed Soil Vapor Extraction Well Location
- MW-10 ⊕ Groundwater Monitoring Well Location (Installed February 2023)
- VMP-1 ▲ Soil Vapor Monitoring Point (Installed February 2023)
- Well Location Abandoned July 2019
- Well Damaged Beyond Repair or Lost

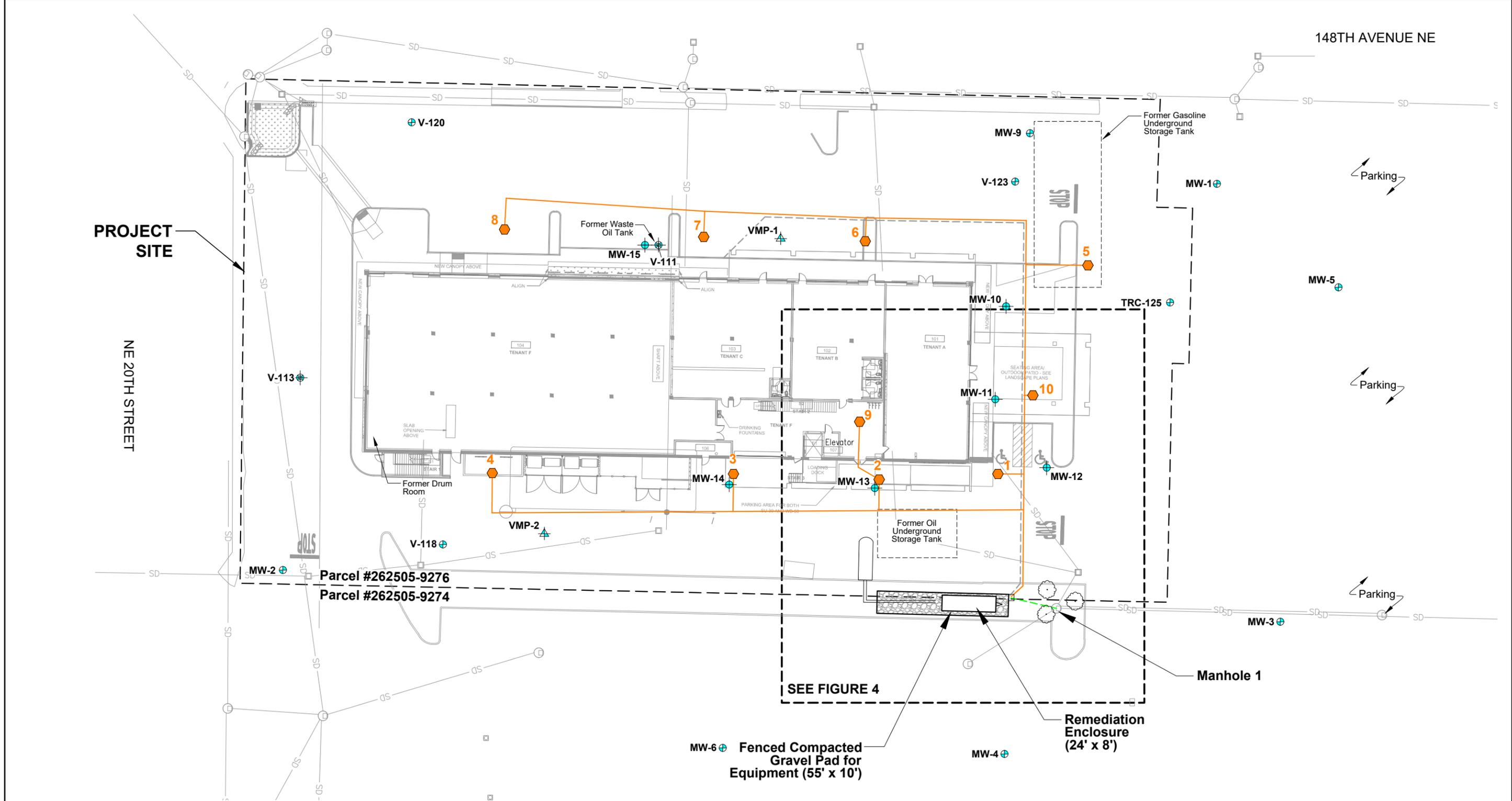
Note: All locations and features are approximate.



Site Plan

Overlake Retail Shops
Former Sears Auto Center #6119
2200 148th Avenue
Redmond, Washington

Apex Companies, LLC 15618 SW 72nd Avenue Tigard, Oregon 97224	Project Number: REGEN-222	Drawn: JP	Approved: CS	Figure 2
	March 2023			



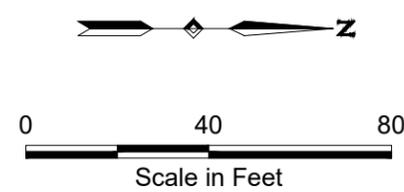
Legend:

- V-118 ⊕ Groundwater Monitoring Well Location
- V-113 ⊕ Deep Groundwater Monitoring Well Location
- MW-10 ⊕ Groundwater Monitoring Well Location (Installed February 2023)
- VMP-1 ⊕ Soil Vapor Monitoring Point (Installed February 2023)
- ⬮ Extraction Well
- ▭ System Pad
- System Piping (Vacuum and Fluids)
- - - Treated Water Discharge

Utilities:

- SD — Storm Drain Line
- ⊕ Manhole
- ▭ Catch Basin

Note: All locations are approximate.

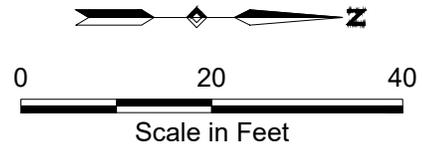
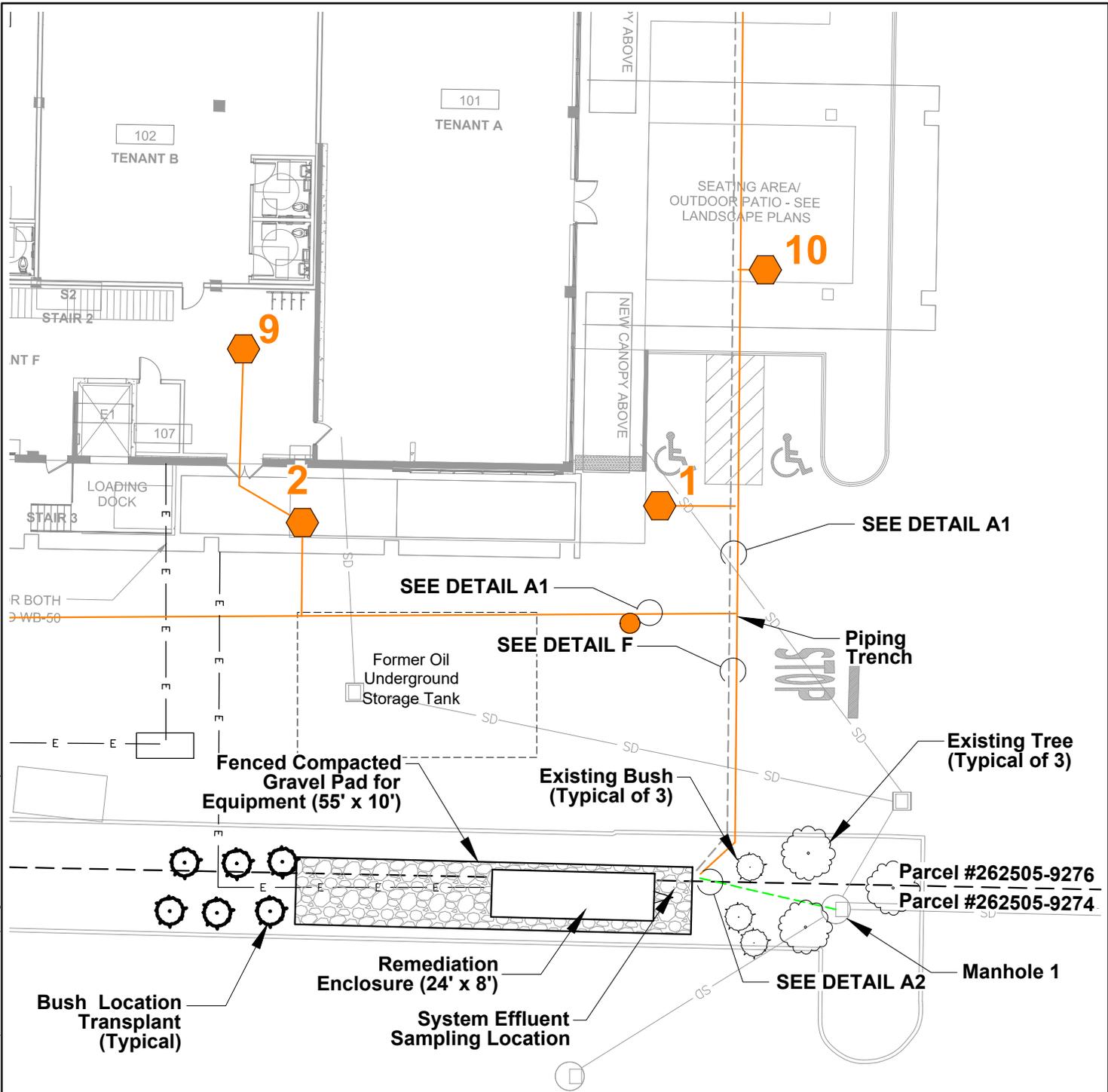


System Layout

Overlake Retail Shops
Former Sears Auto Center #6119
2200 148th Avenue
Redmond, Washington

<p>Apex Companies, LLC 15618 SW 72nd Avenue Tigard, Oregon 97224</p>	Project Number: REGEN-222	Drawn: JP	Approved: CS	<p>Figure 3</p>
	March 2023			

I:\Client\Regency\REGEN-222 Overlay\Remediation Update\REGEN-222 02-04 (Remediation Plans).dwg Modified 3/8/2023 by JPoore



- Legend:**
- Extraction Well
 - System Pad
 - System Piping (Vacuum and Fluids)
 - Treated Water Discharge
- Utilities:**
- Storm Drain Line
 - Manhole
 - Catch Basin

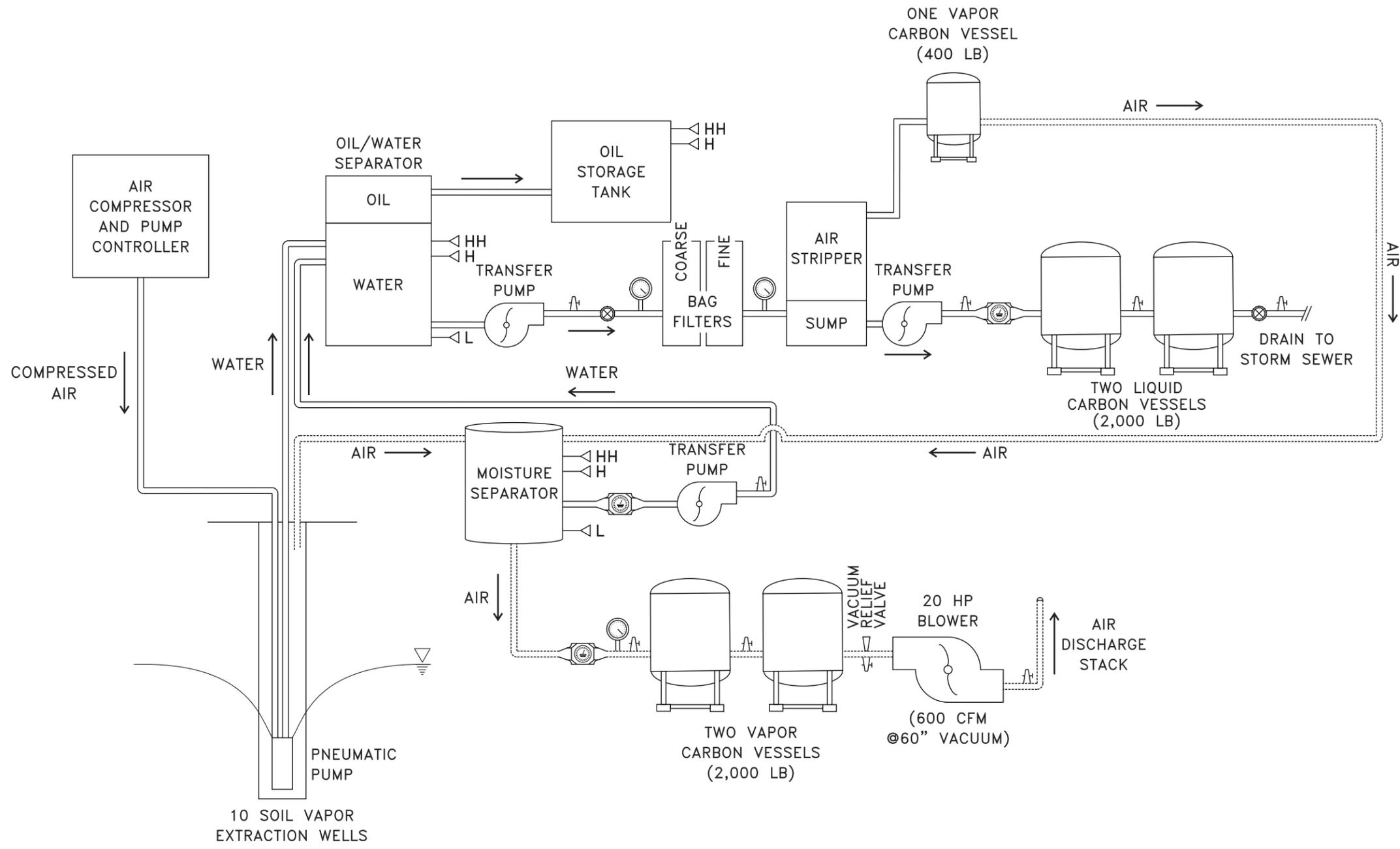
Note: All locations are approximate.

System Enclosure Layout

Overlake Retail Shops
Former Sears Auto Center #6119
2200 148th Avenue
Redmond, Washington

Apex Companies, LLC 15618 SW 72nd Avenue Tigard, Oregon 97224	Project Number: REGEN-222	Drawn: JP	Approved: CS	Figure 4
	March 2023			

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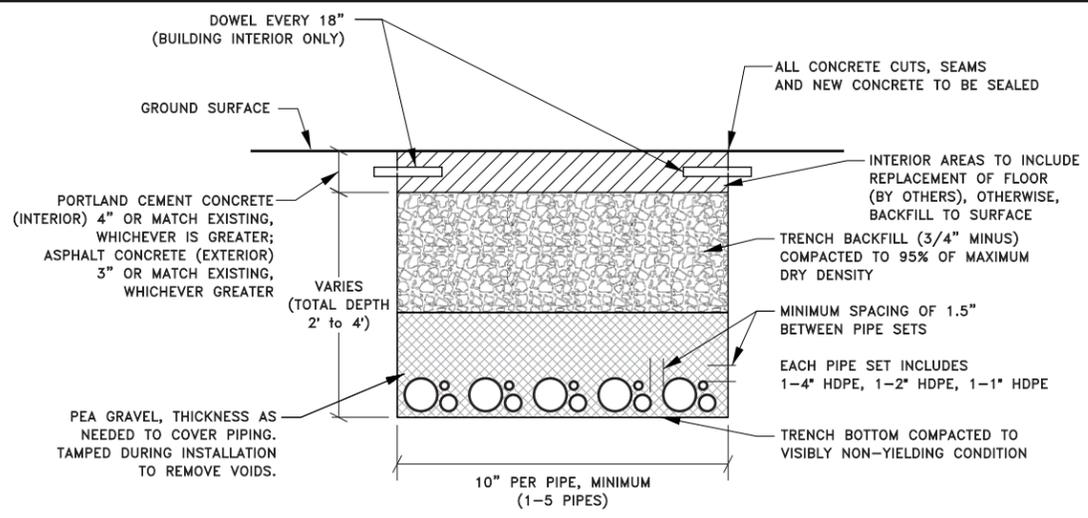
- SYSTEM ALARM**
- SHUT DOWN
 - AIR COMPRESSOR/PUMP CONTROLLER
 - ALL TRANSFER PUMPS
 - AIR STRIPPER
 - BLOWER
 - OPERATOR NOTIFICATION (TELEMETRY)
 - START-UP SEQUENCE
 - AIR STRIPPER AND BLOWER
 - TRANSFER PUMPS (POWERED)
 - AIR COMPRESSOR/PUMP CONTROLLER
 - LEVEL SWITCH
 - HH = ALARM HIGH SYSTEM SHUTDOWN
 - Ha = HIGH LEVEL (FULL) - NOTIFICATION
 - H = HIGH LEVEL, PUMP ON
 - L = LOW LEVEL, PUMP OFF
- SYSTEM CONTROLS**
- OIL/WATER SEPARATOR
 - HH = SYSTEM ALARM, SYSTEM SHUTDOWN
 - H = TRANSFER PUMP ON
 - L = TRANSFER PUMP OFF
 - OIL STORAGE
 - HH = SYSTEM ALARM, SYSTEM SHUTDOWN
 - H = NOTIFICATION (FULL)
 - BAG FILTER
 - HIGH DIFFERENTIAL PRESSURE, SYSTEM ALARM
 - AIR STRIPPER
 - LOW AMPS (NOT RUNNING) SYSTEM ALARM, SHUTDOWN
 - TRANSFER PUMP (WITH L, H, AND HH)
 - SUMP HH - ALARM SHUTDOWN
 - WELL PUMPS
 - COMPRESSOR OPERATION/PUMP CONTROLLER OPERATION
 - MOISTURE SEPARATOR
 - HH = SYSTEM ALARM, SYSTEM SHUTDOWN
 - H = TRANSFER PUMP ON
 - L = TRANSFER PUMP OFF
 - BLOWER
 - LOW AMPS (NOT RUNNING) SYSTEM ALARM, SHUTDOWN
 - DPE/SVE
 - SWITCHABLE MODE TO ALLOW SYSTEM OPERATION ONLY AS SVE (BLOWER, NOT WATER PUMPS AND TREATMENT)

- LEGEND:**
- FLOW METER
 - SYSTEM CONTROL INPUT
 - PRESSURE GAUGE
 - AIR LINE
 - SAMPLE PORT
 - WATER LINE
 - FLOW CONTROL VALVE

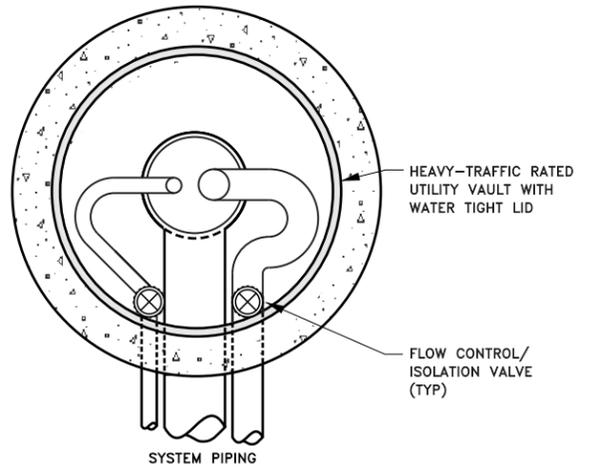
DPE System Schematic

Overlake Retail Shops
Former Sears Auto Center #6119
2200 148th Avenue
Redmond, Washington

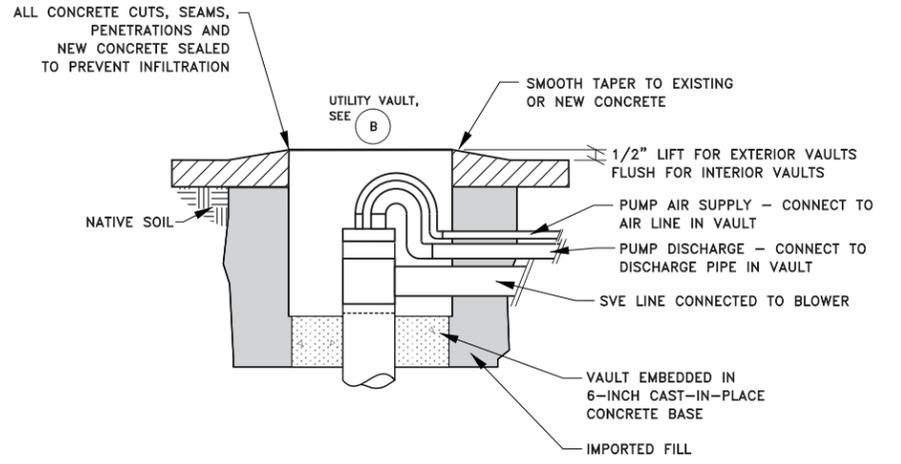
Apex Companies, LLC 15618 SW 72nd Avenue Tigard, Oregon 97224	Project Number: REGEN-222	Drawn: JP	Approved: CS	Figure 5
March 2023				



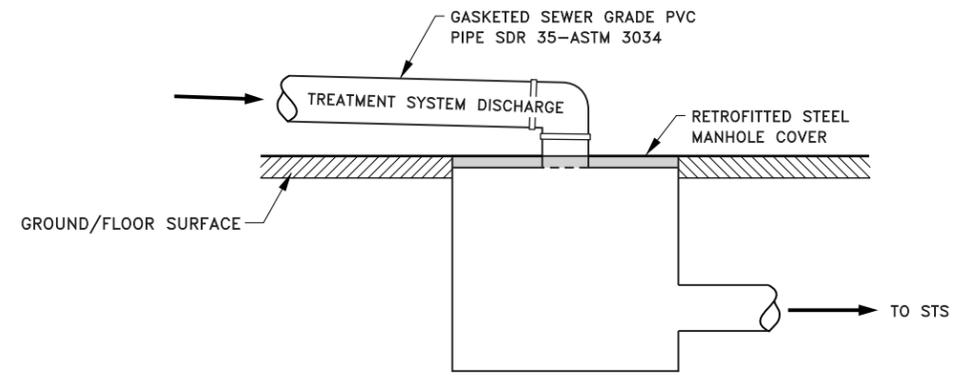
A1 TYPICAL DPE PIPING TRENCH DETAIL
NOT TO SCALE



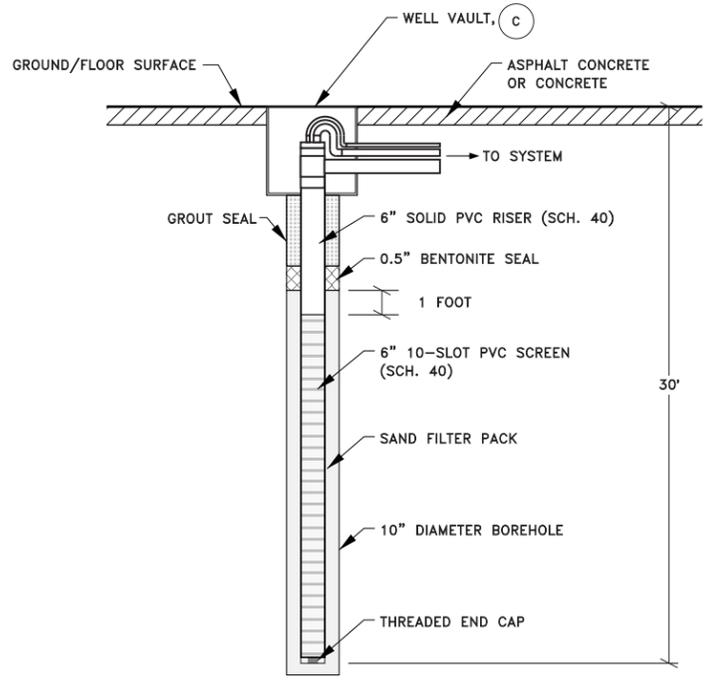
B WELL VAULT
NOT TO SCALE



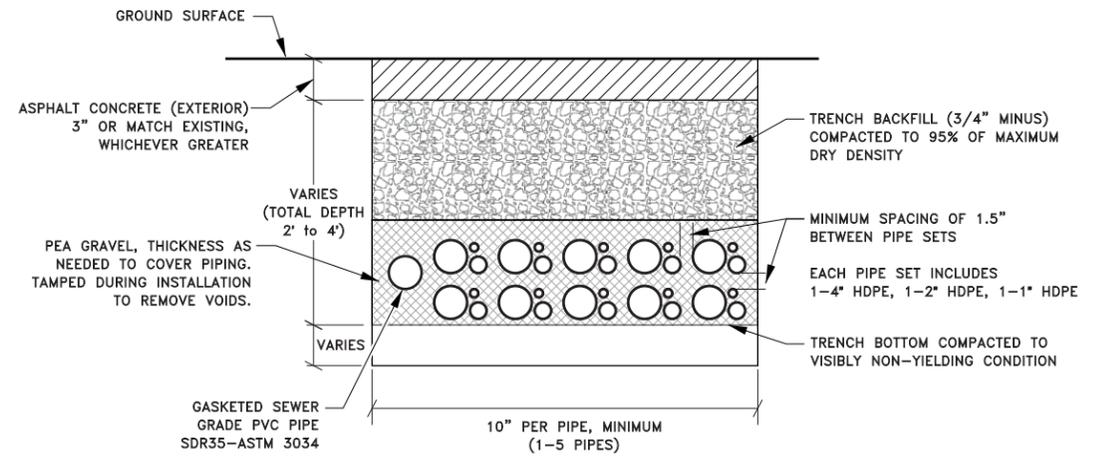
C WELL VAULT INSTALLATION DETAIL
NOT TO SCALE



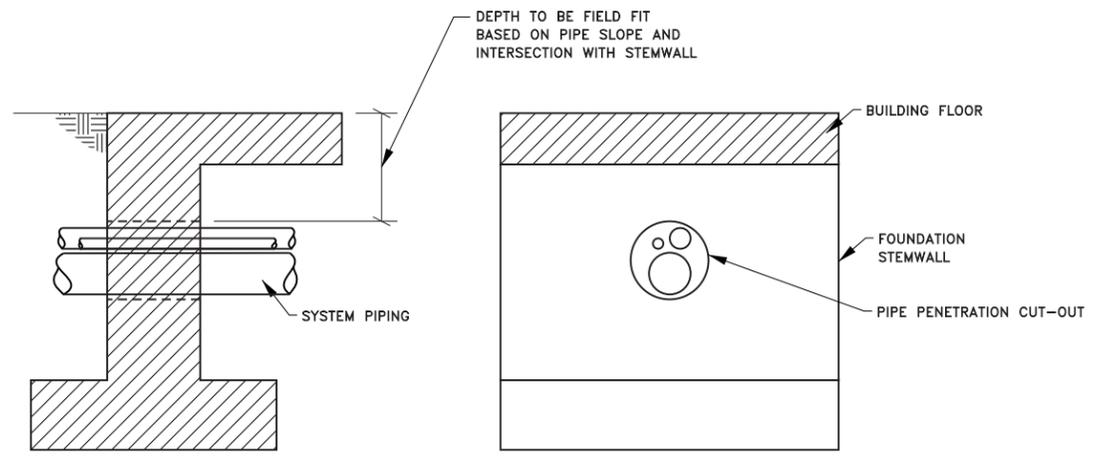
A2 TREATMENT SYSTEM DISCHARGE
NOT TO SCALE



E TYPICAL EXTRACTION WELL DETAIL
NOT TO SCALE



F DPE PIPING TRENCH DETAIL - COMBINED BRANCHES
NOT TO SCALE



D FOUNDATION PENETRATION DETAIL
NOT TO SCALE

DPE System Details				
Overlake Retail Shops Former Sears Auto Center #6119 2200 148th Avenue Redmond, Washington				
 Apex Companies, LLC 15618 SW 72nd Avenue Tigard, Oregon 97224	Project Number: REGEN-222	Drawn: JP	Approved: CS	Figure 6
	March 2023			

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GENERAL:

- 1) The work to be performed shall consist of furnishing all tools, equipment, materials, supplies, transportation and services (including fuel, power, water and essential communications), and for the performance of all labor or other operations required in strict accordance with the specifications and drawings. The work shall be completed, and all work, materials, and services not expressly shown or called for in the specifications and drawings which may be necessary for the complete and proper construction of the work in good faith shall be performed, furnished, and installed by the Contractor as though originally so specified or shown.
- 2) During all site activities, existing structures (including but not limited to groundwater monitoring wells, utilities, piping, and buildings) shall be protected from damage caused by site activities. Damaged structures shall be repaired or replaced as necessary at the Contractor's expense.
- 3) The Contractor shall locate all underground utilities prior to any on-site activities.
- 4) If any portion of this work requires a permit to lawfully complete, then it is the responsibility of the Contractor to obtain those permits.

EARTHWORK – Materials:

- 1) Imported Fill: Imported fill materials shall consist of soil or rock (as appropriate for the specified material) that is essentially free of organics and other deleterious material, and which can be readily placed, graded, and compacted as necessary.
- 2) Aggregate: Aggregate for trench backfill and pavement base shall consist of a crushed Imported Fill and shall meet the following gradation criteria (as per ODOT 2630.10 3/4"-0):

<u>Sieve Size</u>	<u>Percent Passing</u>
1 in.	100
3/4 in.	90-100
3/8 in.	55-75
1/4 in.	40-60
U.S. #10	40-60 of 1/4 in. fraction

EARTHWORK EXECUTION:

- 1) Trench excavation shall be accomplished for piping to the lines indicated on the drawings. Trench excavations shall have a minimum bottom width adequate to allow for the installation of the associated piping. Excavation walls shall be sloped or shored as necessary to allow the safe and efficient completion of the work.
- 2) The potential exists that soils encountered during the trenching activities will be impacted by contaminants (gasoline hydrocarbons). In the event that encountered soil or groundwater show evidence of contamination or LNAPL, notify the Engineer immediately. Groundwater should not be encountered during excavation activities.
- 3) All fill shall be placed in approximately horizontal, compacted layers of uniform thickness. The layers shall be carried up full width from the bottom of the fill. Each layer shall be placed in loose lifts not exceeding 12 inches in thickness. If the entire finished thickness of material is greater than 9 inches, it shall be constructed from two or more layers of approximately equal thickness.

EARTHWORK EXECUTION (CONTINUED)

- 4) All fill shall be compacted to a firm, non-yielding state using hand-tamping around pipes and mechanical compaction elsewhere. Compaction by mechanical means may use any appropriate machines (such as a backhoe-mounted vibratory plate or hand-operated compactor) provided that they are capable of compacting the fill to the specified density and do not damage adjacent structures or buried piping.
- 5) Stockpiles of excavated soil or imported fill materials may be stockpiled on-site only during the duration of the earthwork activities at a location pre-approved by the Engineer. The location of any stockpile may not interfere with local businesses or on-site operations. Stockpiles of excavated soil shall be placed in a manner to prevent sediment from reaching any local storm drain. If dust control is needed for a stockpile, the stockpile shall be covered by sheet plastic.
- 6) Debris (including asphalt removed during trenching activities) and removed soils shall be properly disposed of at a permitted disposal facility. If soil is to be removed from the site, it shall be the responsibility of the Engineer to determine the proper waste designation (including all necessary chemical analyses).

CONCRETE WORK:

- 1) Portland Cement Concrete (PCC) and associated steel reinforcement shall conform to the material specifications in Chapter 26 of the UBC, with a minimum compressive strength of 2,000 psi.
- 2) Well vaults may be either a precast component or cast-in-place (in accordance with the material specification in ODOT Section 00759). Vaults must have covers capable of supporting highway traffic and be compatible with the placement of the well head and the associated piping. All vault surfaces and penetrations shall be sealed to prevent potential spills from impacting soil adjacent to or beneath the vault. Vault lids shall be water-tight.
- 3) The placement of PCC and installation of any associated steel reinforcement shall conform to the placement specifications in Chapter 26 of the UBC. Joints between concrete components, edges, or other abutted concrete shall be sealed to prevent potential spills from impacting soil beneath the joint. New concrete placed in areas of potential traffic (such as within the warehouse) shall be doweled into the adjacent slab.

SYSTEM FINISHING AND SITE CLEANUP:

- 1) The system equipment shall be installed in accordance with the manufacturer's instructions. Access to the system equipment must be restricted and be tamper-proof.
- 2) Pavement, sidewalks, driveways, curbs, gutters, poles, and other property and surface structures removed or disturbed during or as a result of construction shall be restored to a condition equal in appearance and quality to that before the work began. Improved surfaces shall be of the same material and match the appearance of the removed surface.
- 3) The Contractor shall remove all garbage and miscellaneous debris from the site. Where possible, wastes should be recycled (such as drums).

DPE System Specifications				
Overlake Retail Shops Former Sears Auto Center #6119 2200 148th Avenue Redmond, Washington				
 APEX	Apex Companies, LLC 15618 SW 72nd Avenue Tigard, Oregon 97224	Project Number: REGEN-222	Drawn: JP	Approved: CS
	March 2023			Figure 7

Appendix A

System Component Literature



Site Reference: Overlake Plaza Budgetary

Prepared For:

Jie Xu
503 924-4704
jie.xu@apexcos.com

APEX COMPANY
600 STEWARD ST
SUITE 400
SEATTLE, WA 98342

Represented By:

Rose Riedel, Olympic Envir Equipment
360 297-5409
rosieriedel@mac.com

Prepared By:

Jim Schnebelt
800-624-2026
jschnebelt@qedenv.com

QTY	PART NO.	DESCRIPTION	UM	UNIT PRICE	EXTENSION
10	301090	Short AP3 Top Loading AutoPump * Controllerless pneumatic operation * Fully automatic air-on-demand performance * Top loading intake * Brass discharge check valve * FRP casing * Fits inside a 4" ID (100 mm) well or larger * 2-year parts & labor warranty	EA	1,922.81	19,228.10
10	301212	AP3AutoPump Brass Fittings Kit * Barbs installed on AP4 pump * 1/2" OD pump air supply tubing * 5/8" OD pump air exhaust tubing * 1" OD pump fluid discharge tubing * Includes clamps for tubing and exhaust deflector * Can be used with either single or jacketed tubing	EA	0.00	0.00
100	202397	5/32" Wire Rope 7x19 Strand for Pump Support, 304 Stainless Steel.	FT	2.10	210.00
10	990175	5/32" Wire Rope Assembly-Two Ends * 2 ea. Stainless Steel Thimbles * 2 ea. 316 Stainless Steel Quick Links * 4 ea. Adjustable Saddle Clamps (2 per end)	EA	77.13	771.30
10	S6CNST	6" slip fit well cap with compression fittings for 38884 jacketed tubing, includes pump support eyebolt.	EA	198.18	1,981.80
10	V6KIT	Kit to modify 6" slip well cap for vacuum application.	EA	75.04	750.40
10	205887	Exhaust Deflector for 5/8" tubing - 1/2" hose, Stainless Steel.	EA	19.56	195.60
10	205621	Oetiker clamp for 5/8" tubing, stainless steel (17.0- 706R).	EA	2.76	27.60



10	40006	Air filter/regulator assembly for flange, includes 5 ft. blue air hose terminating in a brass quick-connect to mate to the air line header ball valve. 3 ft. green hose pigtail ends in 1/2" PrestoLok for cap connection. (Mounting bracket sold separately except for packages)	EA	249.60	2,496.00
10	39196	Pump cycle counter with brass quick-connects. (Typically used with packages and PN 40006)	EA	292.44	2,924.40
10	39580	Cap mount filter/regulator bracket kit for caps using compression fittings or through holes (Assembled in factory).	EA	36.92	369.20
100	38884A	Nylon 12 pump jacketed tubing bundle includes: * 1/2" OD air supply tubing * 5/8" OD exhaust tubing * 1" OD discharge tubing. (Box = 200' max / spool = 450'-500' max)	FT	8.25	825.00
				TOTAL	29,779.40

TERMS & CONDITIONS: Payment Terms: NET 30

Estimated shipping time 5-10 working days after receipt of Purchase Order, transit time not included. Pricing valid for 30 days. All prices are in U. S. DOLLARS, FOB SHIPPING POINT, USA. A copy of your purchase order, or signed quote, is required at time of order. Payment terms (shown above) are calculated from invoice date, subject to credit approval. A service charge of 1% per month will be applied to all past due invoices.

Unless shown as separate line item(s), total price shown DOES NOT include applicable sales tax or shipping & handling charges. Applicable sales taxes, shipping and handling charges will be added to the invoice. Estimates available upon request.

After acceptance of an order, no order can be returned without QED approval. Standard equipment, not custom in nature, can generally be returned for credit within 30 days of purchase. The equipment must be unused and in its original packaging and is subject to a 15% restocking fee. Custom equipment or tubing cut to a requested length cannot be returned for credit. All products will be returned freight prepaid to sellers facility.

Invoice To: _____ Ship To: _____

 _____ Attn: _____

REQUESTED DELIVERY DATE: ____ / ____ / 2019 Amount Approved: \$ _____



Quote No: R-42252, Sep 11, 2019
Rev 1, 10/01/19

Accepted by: _____ PO Number: _____

Print Name: _____ Company: _____

Title: _____ Date: _____

Check box if this order is necessary to your (or another contractors) contract with the federal government.

To place an order, complete the above section and email to: info@qedenv.com (or fax to: 734-995-1170). Please note that a hard copy of your PO may be required or pay with credit card if you do not have terms with QED before shipment.

If you are going to use a credit card please call us and provide that information and reference the quote number.

When placing orders, please make paperwork out to: QED Environmental Systems, Inc.

Mailing Address:
PO Box 3726
Ann Arbor, MI, 48106

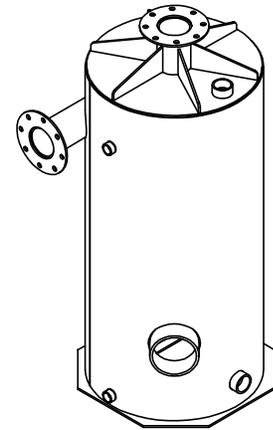
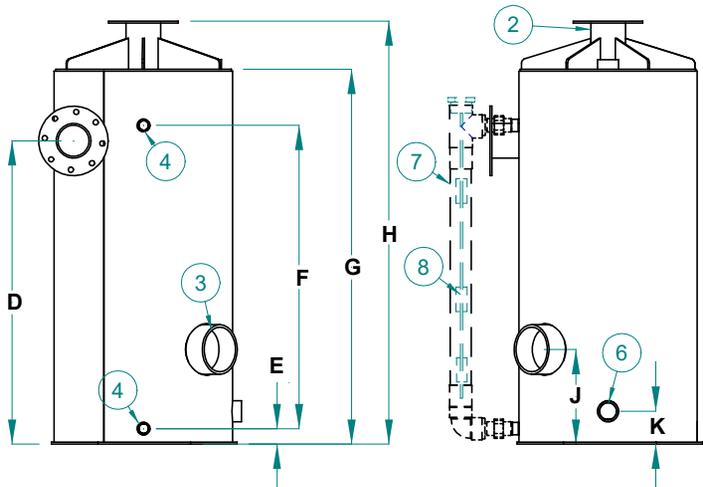
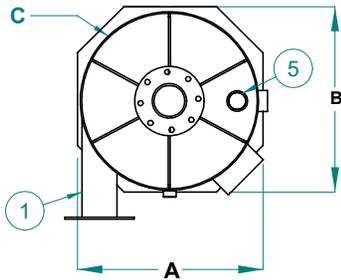
Remit To Address:
PO Box 935668
Atlanta, GA 31193-5668

TOTAL BEING APPROVED \$29,779.40

STANDARD AWS SPECIFICATION

TYPE	WORKING VOLUME @ (LSH)	AVAILABLE CONNECTION TYPE												CLEAN OUT PIPE	A	B	C (DIA.)	D	E	F	G	H	J	K					
		FLANGE					MNPT				FNPT																		
		2"	3"	4"	6"	8"	2"	3"	4"	6"	8"	2"	3"												4"	6"	8"		
AWS30	12 GAL	X	X	X	-	-	-	X	X	X	-	-	X	X	X	-	-	6"	-	-	16 1/4"	25"	2"	19"	30"	33 1/2"	6"	1 1/2"	
AWS60	24 GAL	X	X	X	X	-	-	-	X	X	X	X	-	X	X	X	-	-	6"	24"	24"	23"	25"	2"	23"	30"	36 1/2"	6"	2 1/4"
AWS80	47 GAL	X	X	X	X	-	-	-	X	X	X	X	-	X	X	X	-	-	8"	24"	24"	23"	39"	2"	39"	48"	54 3/4"	12"	4 1/4"
AWS120	50 GAL	X	X	X	X	-	-	-	X	X	X	X	-	X	X	X	-	-	8"	24"	24"	23"	49"	2"	49"	60"	66 3/4"	12"	4 1/4"
AWS220	107 GAL	-	X	X	X	X	X	X	X	X	X	X	-	X	X	X	-	-	8"	34"	34"	33 1/2"	49"	2"	49"	60"	66 3/4"	12"	4 1/4"

RECOMMENDED AIR FLOW (ACFM)						
	2"	3"	4"	6"	8"	10" *
ACFM	120	280	320	500	750	1000

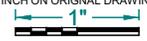


ITEM #	DESCRIPTION
1	INLET PIPE (SEE TABLE FOR AVAILABLE SIZE AND CONNECTION TYPE)
2	OUTLET PIPE (SEE TABLE FOR AVAILABLE SIZE AND CONNECTION TYPE)
3	CLEAN OUT
4	1" FNPT (MULTI LEVEL PROBE)
5	2" FNPT
6	2" FNPT
7	SIGHT TUBE 2" CLEAR PVC
8	MULTI LEVEL PROBE

NOTES:	
1.	MATERIAL : 1/8" & 3/16" ALUMINUM SHT 5052
2.	PROBE (SIGHT TUBE) : 2" CLEAR PVC
3.	Rated to 28" Hg

ALL IDEAS, DESIGNS AND PLANS INDICATED OR REPRESENTED BY THIS DRAWING ARE OWNED BY AND THE PROPERTY OF MAEE, INC. AND WERE CREATED, EVOLVED AND DEVELOPED FOR USE ON AND IN CONJUNCTION WITH THE SPECIFIED PROJECT. NONE OF THE IDEAS, DESIGNS OR PLANS SHALL BE USED OR DISCLOSED TO ANY PERSONS FIRM OR CORPORATION FOR ANY PURPOSE WHATSOEVER WITHOUT WRITTEN PERMISSION OF MAEE, INC.

Mid-Atlantic
Environmental Equipment, Inc.
15 Carroll Drive, Buffton, SC. 29910
Phone: 843 836-1804, Fax: 843 836-1805

SCALE VERIFICATION
THIS BAR REPRESENTS ONE INCH ON ORIGINAL DRAWING

USE TO VERIFY DRAWING

SIZE: B
SHEET #: 1 OF 1
SCALE: NTS
UPDATED BY:

DRAWN BY: S. Evans
APPROVED BY: N/A
COMPLETED: 06/15/10
UPDATED: 07/01/10

AWS SPECIFICATIONS GENERAL LAYOUT

JOB NUMBER:

PRODUCT NUMBER:

AWS

FILE NAME: "AWS SPEC.dft"

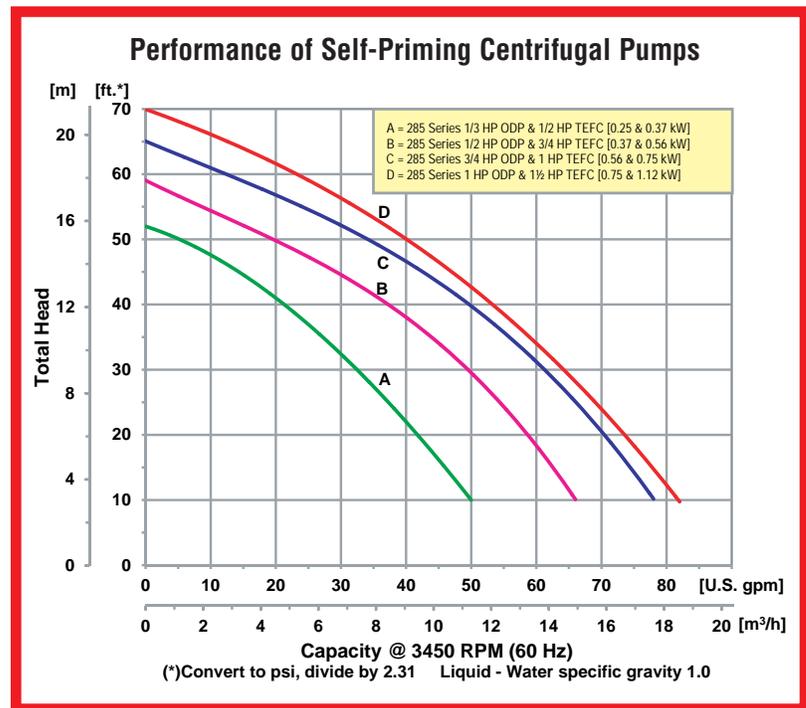
1" & 1-1/4" Self-Priming Cast Iron Centrifugal Pumps



Model 285F-95

- **Cast Iron Construction**
- **Buna-N Mechanical Seal and O-Ring**
- **Optional Viton® or Silicon Carbide Mechanical Seal and O-Ring**
- **1" & 1-1/4" NPT Suction and Discharge Ports**
- **Maximum Temperature 180° F**
- **Maximum Flow 82 GPM**
- **Maximum Head 70 Ft.**
- **Self-Priming to 20 Ft.**
- **Self-Cleaning, Semi-Open Impeller**
- **1/3 to 1-1/2 HP Single or Three Phase Motors**

The AMT Self-Priming Cast Iron Centrifugal pumps are designed for circulating, boosting, washdown, liquid transfer and dewatering applications. Dual volute design reduces radial load on motor. The centerline discharge feature is specifically designed to prevent vapor binding and makes for convenient piping connections. All models are fitted with self-cleaning, semi-open impeller. The units will self-prime to 20 feet. Mounting base features 7/16" mounting holes, which are 6" OC (on center). Built-in carrying handle offers portability.



400 Spring Street • Royersford, PA 19468 USA

www.amtpump.com • 888-amt-pump (268-7867)

For use with nonflammable liquids compatible with pump component materials. Viton® and Teflon® are registered trademarks of E. I. DuPont.

Pump Dimensional & Specification Data

Model	Curve	HP	PH	ENC	Voltage @ 60 Hz +	Full Load Amps	SUC*	DIS*	L**	W**	H	Ship Wt. (Lbs.)
2851-95	A	1/3	1	ODP	115/230	8/4	1	1	16.8 [42.7]	6.8 [17.7]	7.2 [18.3]	38
285E-95		1/2	1	TEFC	115/230	9/5			17.3 [43.9]	8.8 [22.6]	7.2 [18.3]	42
2852-95	B	1/2	1	ODP	115/230	10/5	1 1/4	1 1/4	17.0 [43.2]	6.8 [17.7]	7.2 [18.3]	39
285F-95		3/4	1	TEFC	115/230	9/5			17.8 [45.2]	8.8 [22.6]	7.2 [18.3]	46
285P-95		3/4	3	TEFC	230/460	3/2			17.3 [43.9]	8.8 [22.6]	8.6 [21.8]	45
2853-95	C	3/4	1	ODP	115/230	13/7	1 1/4	1 1/4	17.5 [44.4]	6.8 [17.7]	7.2 [18.3]	43
285G-95		1	1	TEFC	115/230	12/6			18.0 [45.7]	8.8 [22.6]	7.2 [18.3]	50
285J-95		1	3	TEFC	230/460	4/2			16.6 [42.1]	8.8 [22.6]	8.6 [21.8]	48
2855-95	D	1	1	ODP	115/230	17/9	1 1/4	1 1/4	18.3 [46.5]	6.8 [17.7]	7.2 [18.3]	47
285H-95		1 1/2	1	TEFC	115/230	18/9			18.5 [47.0]	8.8 [22.6]	7.2 [18.3]	58
285K-95		1 1/2	3	TEFC	230/460	5/3			18.3 [46.5]	8.8 [22.6]	8.6 [21.8]	56

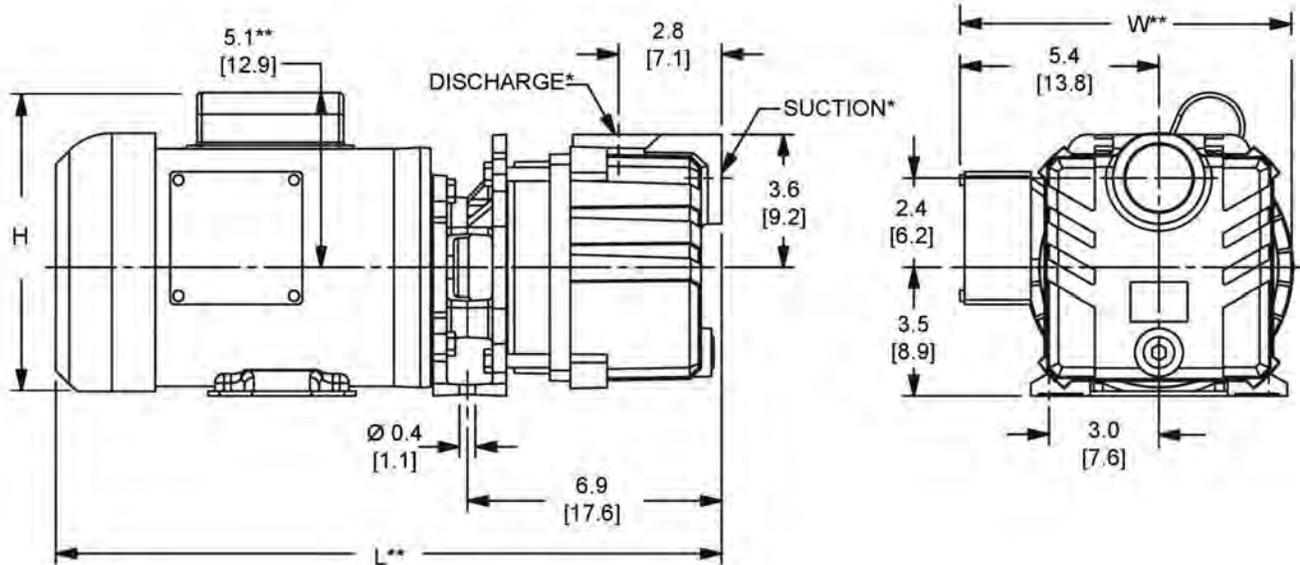
(*) Standard NPT (Female) pipe thread.

(**) This dimension may vary due to motor manufacturer's specifications.

(+) 3-Phase models can also operate on 50 Hz (This will change full load amps and service factor, RPM and priming capabilities).

NOTE: Dimensions are in inches (centimeters) and have a tolerance of $\pm 1/4"$.

NOTE: Electric supply for ALL motors must be within $\pm 10\%$ of nameplate voltage rating (e.g. 230V $\pm 10\%$ = 207 to 253).



Standard Features

- Cast Iron Construction
- Buna-N Mechanical Seal and O-Ring with optional Viton® or Silicon Carbide Mechanical Seal and O-ring
- 1" & 1-1/4" NPT Suction and Discharge Ports
- Dual Volute Design Reduces Radial Load on Motor
- Maximum Working Pressure 75 PSI
- Maximum Temperature 180° F
- Single or Three Phase, ODP or TEFC Motors Available
- Self-cleaning, Semi-open Impeller
- QSP – Quick Ship Pump for Many Models

Hazardous Duty/Explosion Proof motors available from stock ranging from 1 to 10 HP; CALL FOR QUOTATION & LEAD TIME!



ABOVE GROUND OIL WATER SEPARATORS

MAE2 offers a complete line of Above Ground Rectangular Oil Water Separators that can be customized for your specific application. All our equipment meets or exceeds API 421 guidelines. The type of material and the type of media are always based on the characteristics of your wastewater. Designed for low maintenance with no moving parts.

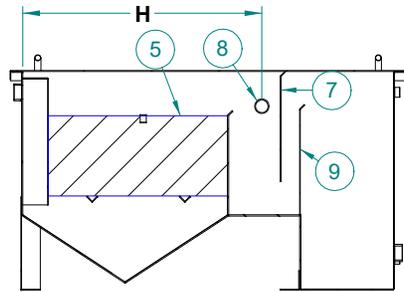
Standard Features:

- Flows from 10-1500 GPM
- Marine Grade Aluminum Construction
- PVC Coalescing Media
- Rotary Product Skimmer
- Gasketed Lid
- Inlet Diffuser
- Hydraulic Testing
- Performance Modeling

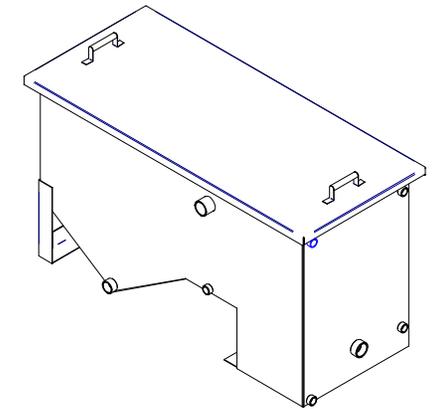
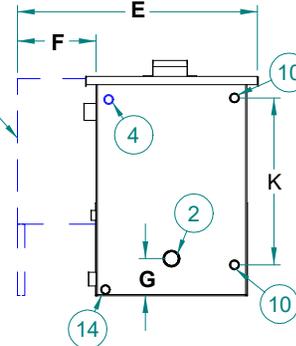
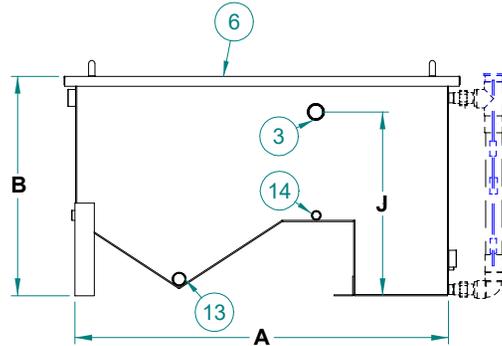
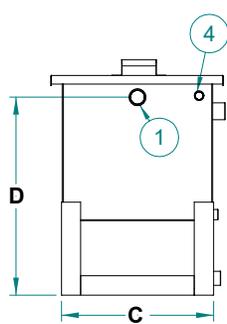
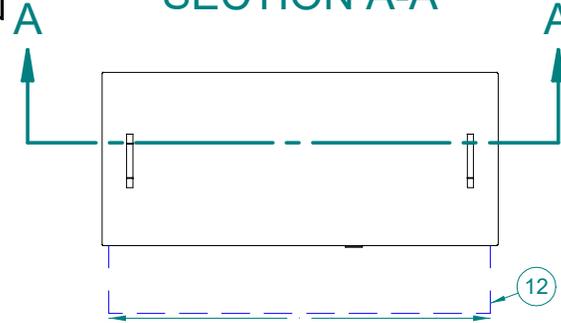
Available Options:

- Stainless Steel Construction
- Solids Collection Hopper
- Stainless Coalescing Pack
- Effluent Pump Out Sump
- Integral Product Storage
- Float Switches
- Pump Packages
- Elevated Stands
- Controls

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
COALESCING 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

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Mid-Atlantic
Environmental Equipment, Inc.
15 Carroll Drive, Buffton, SC. 29910
Phone: 843 836-1804, Fax: 843 836-1805

SCALE VERIFICATION
THIS BAR REPRESENTS ONE INCH ON ORIGINAL DRAWING
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: 07/07/10

OIL WATER SEPARATOR
GENERAL LAYOUT
SPEC

JOB NUMBER:

PRODUCT NUMBER:

OWS

FILE NAME: "OWS ALL MODELS SPEC.dft"

E-Z Stacker™

Stackable Tray Air Strippers

NEW STACKING DESIGN DELIVERS ECONOMICAL RELIABLE AIR STRIPPING

- Efficient low-flow VOC removal
- Easy one-person cleaning cuts maintenance up to 80%
- Positive-seal engineering prevents leakage problems

LOW-COST, LOW-MAINTENANCE, LOW-FLOW PERFORMANCE

The innovative design of E-Z Stacker™ Air Strippers delivers many advantages to environmental consultants, remediation contractors, and end users.

E-Z Stacker models are sized and priced to be the most economical choice for many low to moderate flow cleanup applications (up to 40 GPM). Low capital expense and low O&M requirements make the difference.

The unique E-Z Stacker configuration consists of a series of integrally-molded shell / tray modules. The multiple sieve tray design uses forced-draft air bubble generation to provide rapid, effective VOC removal.

Every element of the heavy-duty HDPE construction has been engineered for durable, reliable performance with a multi-step positive seal against leakage.

EASY DISASSEMBLY CUTS CLEANING COSTS

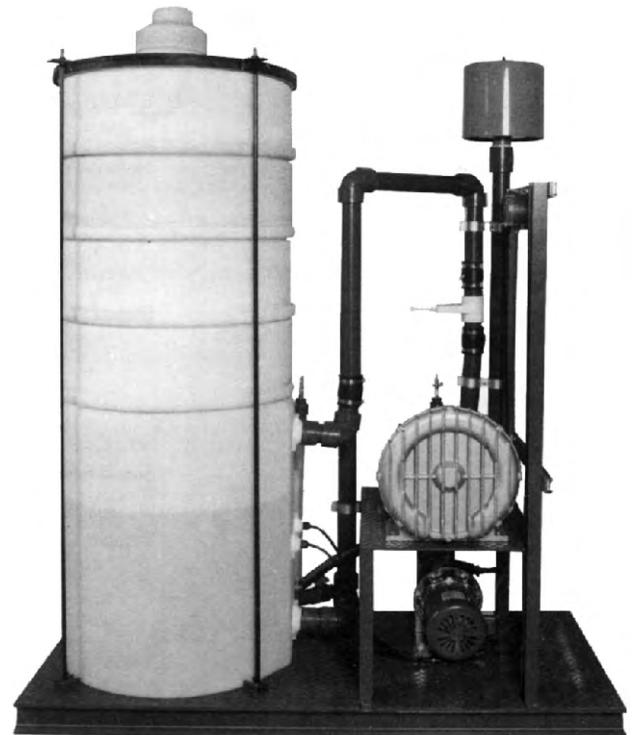
Disassembly for routine cleaning is a quick, simple, one-person job. The whole stack (4 or 6 trays) can be taken apart by releasing just four or six connections. Trays have no loose parts when disassembled, and cannot be reassembled incorrectly.

Easy-access fittings allow units to be placed in corners or other tight spaces. Two sizes are available in four or six tray versions, for maximum flow ranges from 1-40 GPM.

The competition just doesn't stack up! Call QED today to talk to one of our Applications Specialists about which E-Z Stacker model is the best choice for your project.

The World Leader in Air Powered Pumps

For Remediation, Landfills and Ground Water Sampling
Ground Water Sampling • Remediation, Leachate and Condensation Pumps
• Floating Layer Recovery Systems • Air Strippers



POSITIVE-SEAL ENGINEERING FOR LEAK-FREE PERFORMANCE

- Cylindrical shape provides consistent tray to tray contact with no loose or weak points from corners or edges.
- 360 degree lockdown ring, made of solid 2x2x.25 steel angle stock, applies even pressure to the whole circumference of the complete stack.
- Recessed tray bottom prevents contact between the water and the gaskets.
- Heavy-duty gaskets are captured on both inboard and outboard edges to eliminate creeping.
- Continuous molded-in bead provides optimum gasket compression.
- Unlike tedious, potentially weak tray to tray latches, the whole stack sets down securely with just four or six easy-access connections.

QED ENVIRONMENTAL SYSTEMS

P.O. Box 3726 Ann Arbor, MI 48106-3726 USA
1-800-624-2026 FAX (734) 995-1170
info@qedenv.com www.qedenv.com
1133 Seventh Street Oakland CA 94607-2601
1-800-537-1767 FAX (510) 444-6789

E-Z Stacker™

STANDARD ITEMS

- Water / air inlets
- Ports for level switches
- Bottom Drain
- Sight tube with sample port
- Pressure gauge
- Demister

E-Z STACKER SYSTEM OPTIONS

- Transfer pumps
- Bag filter
- Blower
- Piping
- Level sensors
- Control panel
- Skid mounting

EZ STACKER ENGINEERING SPECIFICATIONS:

Model No.	Flow (GPM)	Height (Inches)	Width (Inches)	Length (Inches)	Stripper O.D.	Air Flow (CFM)
EZ 2.4P	1-25	88	31.5	82	27	140
EZ 2.6P	1-25	108	31.5	82	27	140
EZ 4.4P	1-40	88	40	92	37	280
EZ 4.6P	1-40	108	40	92	37	280

Materials of Construction:

Trays, Sump, Cover, Internals-	HDPE with CPVC Fittings
Skid-	Epoxy Coated Mild Steel
Demister-	Polypropylene

Blowers available with explosion proof or TEFC motors

OPTIONAL ACCESSORIES AVAILABLE

E-Z Modeler

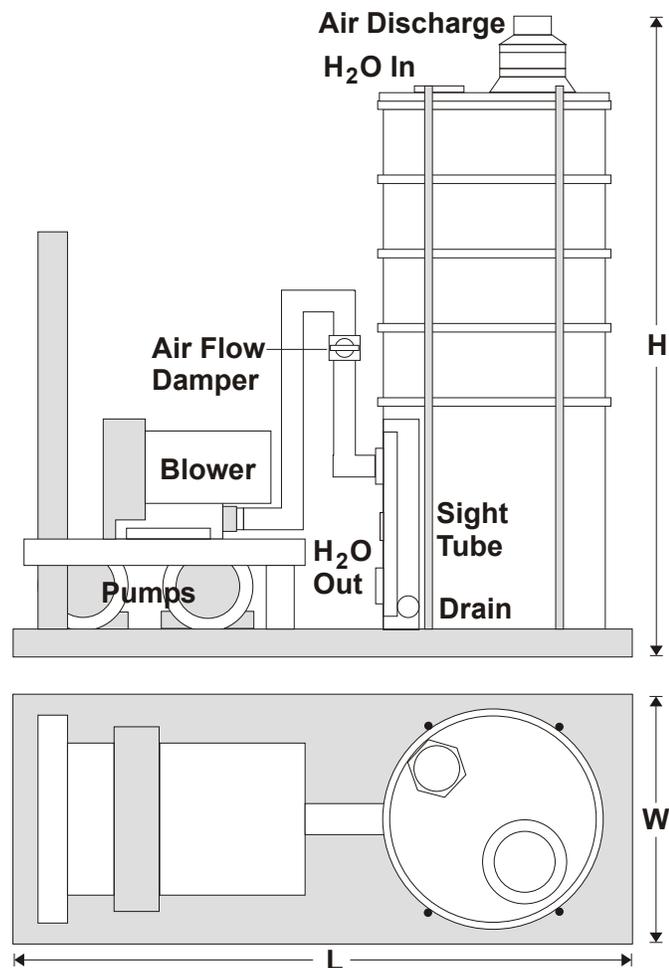
Specifying air strippers can be easy - even for MTBE!

Now there's a fast, simple way to choose the right air stripper for your remediation project, on-line!

With a few keystrokes and a couple of mouse clicks, QED's web-based **E-Z Modeler** tells you which air stripper is the best match for your flow rate and contaminant removal requirements - even for MTBE and other hard-to-remove substances.

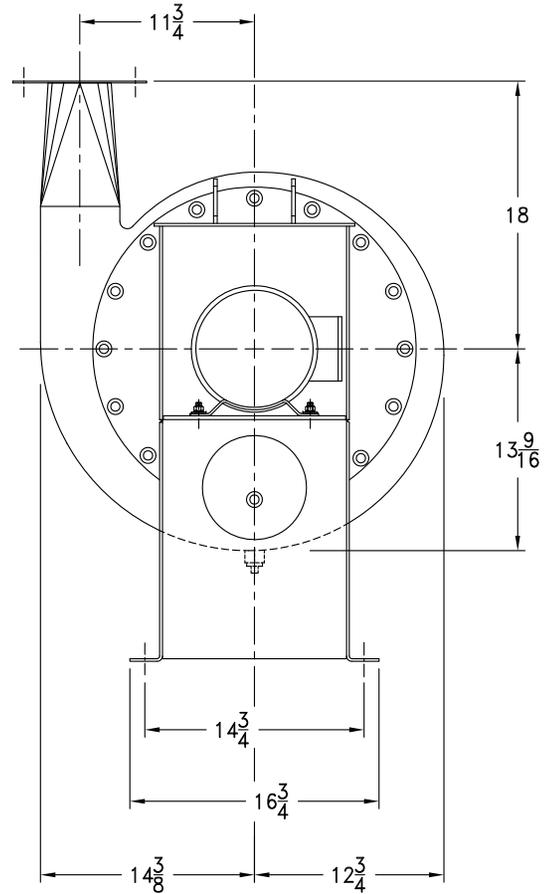
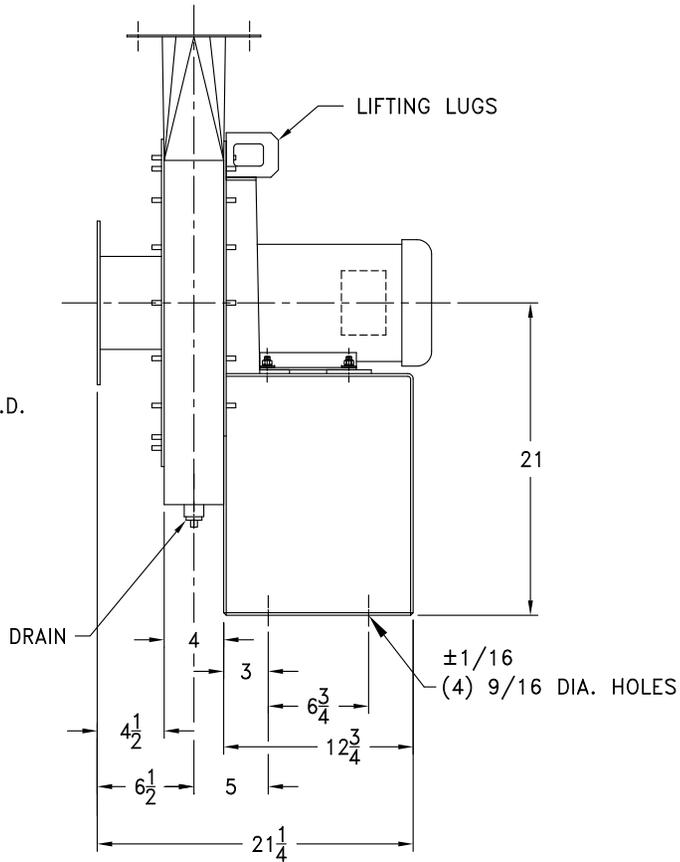
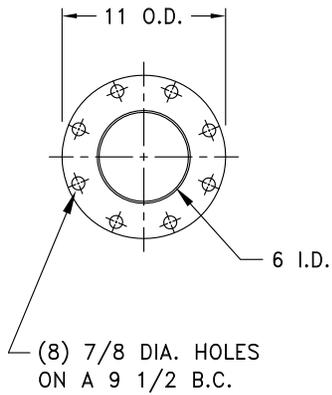
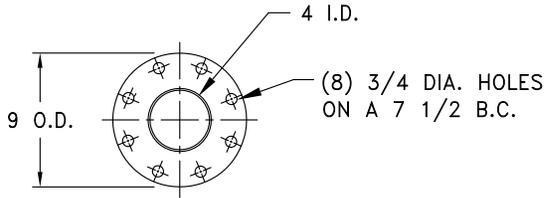


Check it out at www.qedenv.com/ezmodeler or call to talk to a QED Applications Specialist about which E-Z Stacker Stripper is right for your project - and find out how much you'll save.



STANDARD HOOK-UP REQUIREMENTS

Model No.	Water Inlet	Water Discharge (For Pump)	Water Discharge (Gravity Drain)	Air Inlet	Air Exhaust	Water Drain
EZ 2.4P	1" NPT	1" NPT	2" NPT	2" NPT	4" Pipe	1" NPT
EZ 2.6P	1" NPT	1" NPT	2" NPT	2" NPT	4" Pipe	1" NPT
EZ 4.4P	1" NPT	2" NPT	3" NPT	4" NPT	6" Pipe	1" NPT
EZ 4.6P	1" NPT	2" NPT	3" NPT	4" NPT	6" Pipe	1" NPT



CW UP BLAST DISCHARGE SHOWN

NOTES:

1. MOTOR MAY EXTEND PAST END OF BASE.
2. MOTOR: 182T-184T FRAME.

				SUPERSEDES:	TOLERANCES: FRACTIONS $\pm 1/8$ ANGLES: $\pm 1^\circ$ DECIMALS: X.XXX = ± 0.005 X.XX = ± 0.060 X.X = ± 0.120	SCALE: FULL IN CAD	cincinnati fan 7697 SNIDER ROAD MASON, OHIO 45040		
				SIMILAR TO:	ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED	DATE: 04/24/02		TITLE	
2	ADDED INLET DAMPER.	08/27/12	LG			DR. BY: JJM	HP-4A ARR. 4 (CW UB)		
1	ADDED DISCHARGE DAMPER.	05/16/12	LG			CHK. BY:			
NO.	DESCRIPTION	DATE	INITIALS		MATERIAL:	ASSEMBLY	DRAWING NO.	SHEET	REV.
	REVISIONS						A	4 of	2
							HP4A4		

BF Series

Single Bag Housings: #1, #2, #3 and #4 sizes



- Designed for industrial and commercial filter applications
- Heavy duty construction for maximum durability
- 1/8" perforated stainless steel basket (optional perforations and mesh sizes available)
- #1 and #2 Size Housings:
 - Available in 316L Stainless Steel, 304L Stainless Steel or Carbon Steel construction for a wide range of chemical compatibility
 - Clamp or Swing Bolt closures
 - Stainless steel compression spring provides positive bag sealing Adjustable stainless steel leg assembly
 - 1/4" FNPT gauge ports and 1/2" FNPT drain port
- #3 and #4 Size Housings feature:
 - 316 Stainless Steel construction
 - Clamp closure for easy bag change outs
 - Optional compression spring and adjustable mounting legs

Applications

Water	Chemicals
Food & Beverage	Electronics
Oil	Inks / Paints / Coatings
Coolants	Pulp & Paper

Specifications & Operating Parameters

Maximum Operating Pressure

150 psig (10.3 bar) @ 300°F (149°C)

Connections

Inlet /Outlet:

2" FNPT (#1 and #2 Sizes)

3/4", 1" and 1 1/2" FNPT (#3 and #4 Sizes)

Optional: RF Flanges or Sanitary Ferrules

Drain Port: 1/2" FNPT (#1 and #2 Sizes)

Gauge Ports: 1/4" FNPT - clean and dirty sides (#1 and #2 sizes)

Vent Port: 1/4" NPT Plug

Gaskets

Buna N

Optional: EPR, Silicone, Teflon Encapsulated Silicone, Viton

Baskets

1/8" perforated stainless steel

Optional: versions perforation and mesh sizes

Materials of Construction

Head / Shell:

#1 and #2 Sizes

316L Stainless Steel, 304L Stainless Steel, Carbon Steel

#3 and #4 Sizes

316L Stainless Steel

Eye Nuts: Zinc plated steel

Mounting Legs: 304L Stainless Steel

Options

- Side Inlet / Side Outlet (#1 and #2 sizes)

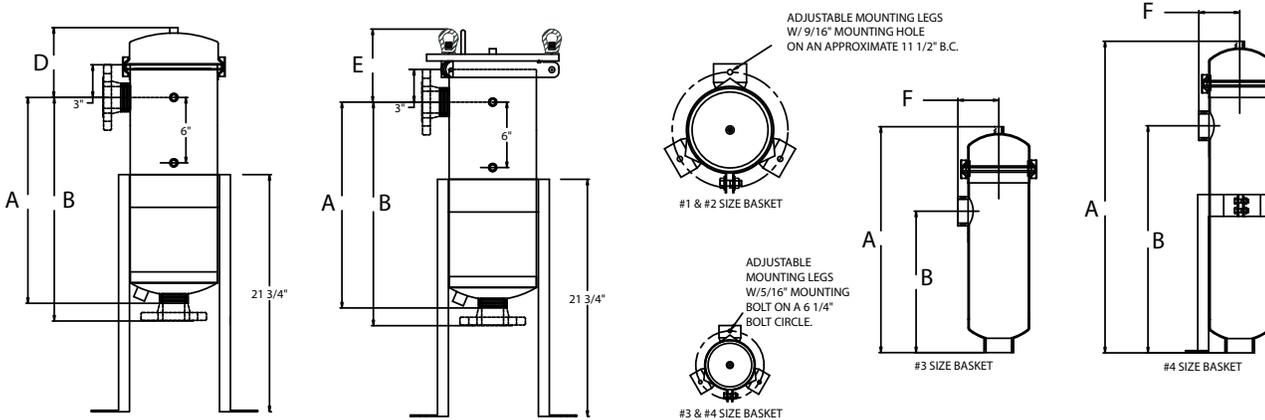
- 134 epoxy coating for sea water and corrosive applications

See ordering guide for complete selection of options

MODEL AND BAG SIZE	CLOSURE	MAX FLOW RATE* GPM (LPM)	DRAIN SIZE	DIMENSIONS					
				A	B	C	D	E	F
BFS-1 / BFC-1	Clamp or Swing Bolt	70 (265)	1/2"	18 7/8" (47.9 cm)	20 1/2" (52.1 cm)	21 3/4" (55.2 cm)	3" (7.6 cm)	6 11/16" (17.0 cm)	3" (7.6 cm)
BFS-2 / BFC-2	Clamp or Swing Bolt	150 (567)	1/2"	34 7/8" (88.6 cm)	22 3/4" (92.7 cm)	21 3/4" (55.2 cm)	3" (7.6 cm)	6 11/16" (17.0 cm)	3" (7.6 cm)
BFS-3	Clamp	25 (95)		16 9/16" (42.1 cm)	10 3/8" (26.4 cm)				
BFS-4	Clamp	40 (151)		22 7/8" (58.1 cm)	16 11/16" (42.4 cm)				

* Based upon 7 gpm (26.5 lpm) per 10" cartridge length with a 25 micron wound cartridge at 2 PSID clean and a viscosity of 1 cps. Flow rates are guidelines only. Actual flow rates are based upon fluid, viscosity, cartridge type, micron ratings and other factors

Dimensions



Ordering Guide (Example: BFS-2SB-2-316-B)

BFS - 2		SB - 2		316		B	
MODEL	BAG SIZE	CLOSURE	PIPE SIZE FNPT	OPTIONAL MATERIAL	CONNECTION ORIENTATION	GASKET	
#1 and #2 Sizes							
BFS = Stainless Steel BFC = Carbon Steel	1 2	C = Clamp SB = Swing Bolt	2 = 2" FNPT (standard) 2F = 2" RF Flange 3 = 3" FNPT 3F = 3" RF Flange 2TC = 2" Sanitary Ferrules	304 = 304 SS 316 = 316 SS 134 = 134 Coating over 304 SS*	Blank = Side In / Bottom Out 2 = Side In / Side Out	B = Buna N (Standard) E = EPR S = Silicone V = Viton	
#3 and #4 Sizes							
BFS = Stainless Steel	3 4	C = Clamp	75 = 3/4" FNPT 1 = 1" RF Flange 1.5 = 1 1/2" FNPT (standard)	316 = 316 SS	Blank = Side In / Bottom Out 2 = Side In / Side Out (Hold Down Spring Recommended)	B = Buna N (Standard) E = EPR S = Silicone V = Viton	

* Note: 134 Coating must have swing bolt closure and flanged connections.

Customization

Housings may be customized to meet your precise requirements. Contact Shelco's technical support staff or your distributor for more information.



Shelco Filters

100 Bradley Street
Middletown, CT 06457 USA

Tel: 800-543-5843 / Fax: 860-854-6120 / E-mail: info@shelco.com

MicroSentry™, MicroVantage™, Shelco Filters® and the Shelco logo are registered trademarks of the Tinny Corporation. Shelco Filters is a division of the Tinny Corporation.

Liquid High Pressure Polyglass Filters



LHPP 100-2000 lb. Vessels

The **LHPP** series Liquid Phase Carbon filters are designed for water treatment applications. With a wide range of sizes, the LHPP series can fulfill a wide range of applications. These treatment filters hold 100-2000 pounds of activated carbons or any variety of media with flow rates of up to 80 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

Specifications

Liquid High Pressure Polyglass Filters	100	200	300	500	1000	2000
Dimensions: diameter x overall height	12"x 54"	24"x 48"	20"x 72"	30"x 86"	36"x 90"	48"x 96"
Vessel Construction	Structural Polyglass					
Inlet/Outlet Connection	1" FNPT	1" FNPT	1" FNPT	2" FNPT	2" FNPT	3" FNPT
Pounds of Carbon	100	200	300	500	1000	2000
Internal Piping	Sch 40 PVC					
Interior Coating	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy
Exterior Coating	Enamel	Enamel	Enamel	Enamel	Enamel	Enamel
Carbon Bed Volume (cu.ft.)	3.3	6.5	6.5	17	33	66
Cross Section (sq.ft.)	.7	1.3	1.2	4.7	6.7	12
Vessel Weight (lbs)						
Shipping	130	240	375	645	1250	2400
Operational	250	530	910	2070	3025	5340
Flow, GPM (max.)	5	10	15	25	45	80
Pressure, PSIG (max.)	125	125	125	125	125	125
Temperature, °F (max)	120°	120°	120°	120°	120°	120°

***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.*

Mid-Atlantic Environmental Equipment

15 Carroll Drive, Bluffton SC 29910
 Toll Free (877) 623-2462 • (843) 836-1804
www.mae2.com

Stainless Steel Straight Centrifugal Pumps

High Head Pump

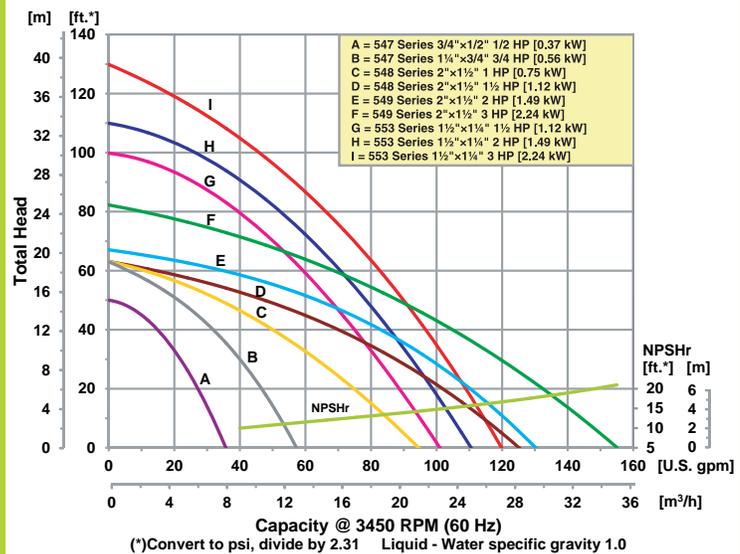
- **Stainless Steel Construction with Viton® Mechanical Seal and O-Ring**
- **Investment Cast Stainless Steel Impeller**
- **High Head and High Volume Models**
- **Maximum Temperature 200° F**
- **Maximum Flow 156 GPM**
- **Maximum Head 130 Ft.**
- **Chemical Resistant Design**
- **Discharge Port Rotates in 90° Increments**
- **547 Series: 3/4" x 1/2" Ports and 1-1/4" x 3/4" Ports**
- **548 & 553 Series: 1-1/2" x 1-1/4"**
- **549 Series: 2" x 1-1/2" Ports**

High Volume Pump

AMT Stainless Steel Solids Handling End Suction Centrifugal pumps are designed for continuous duty high flow and high pressure applications including: chemical processing, liquid transfer, cooling, pressure boosting, circulating, dirty water and applications requiring contaminant free pumping. Constructed of rugged deep drawn stainless steel for durability and corrosion resistance. Investment cast stainless steel closed impeller for enhanced performance, high efficiencies and handles a maximum of 1/8" diameter solids.

All models include Viton® Type 21 mechanical seals and O-rings which offer a broad range of chemical compatibility. Cast iron motor adapter provides a positive and rigid mounting to motor. Pumps include Totally Enclosed Fan Cooled (TEFC) motors or Open Drip Proof (ODP) motors by special quote. **Pumps are not self-priming and require flooded suction.**

Performance of Stainless Steel Straight Centrifugal Pumps



400 Spring Street • Royersford, PA 19468 USA

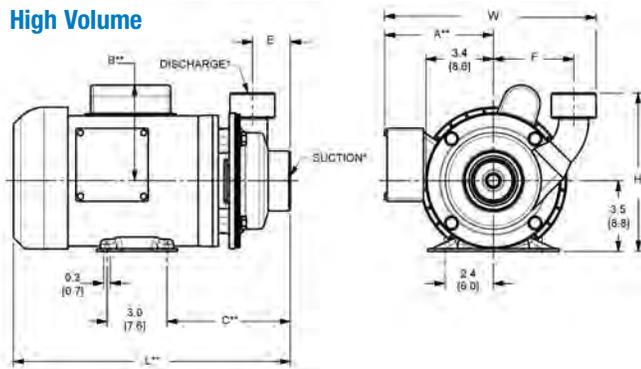
www.amtpump.com • 888-amt-pump (268-7867)

For use with nonflammable liquids compatible with pump component materials. Viton® and Teflon® are registered trademarks of E. I. DuPont.

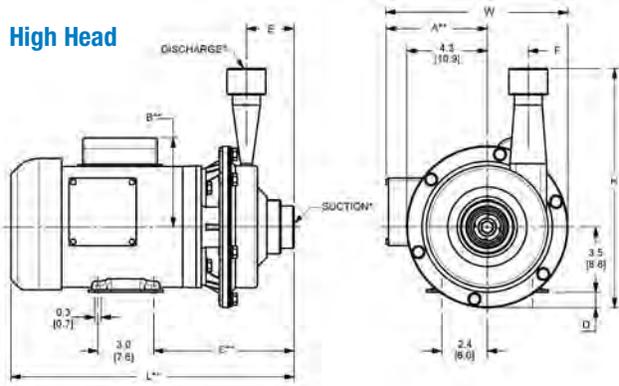
High Volume Pump Dimensional & Specification Data

Model	Curve	HP	PH	ENC	Voltage @ 60 Hz +	Full Load Amps	SUC*	DIS*	A**	B**	C**	D	E	F	L**	W	H	Ship Wt. (Lbs.)
5475-98	A	1/2	1	ODP	115/230	8/4	3/4	1/2	N/A	5.1 [13.0]	6.4 [16.3]	N/A	2.1 [5.5]	4.1 [10.5]	12.7 [32.2]	8.2 [20.8]	7.8 [14.6]	23
5471-98	B	3/4	1	TEFC	115/230	9/5	1 1/4	3/4	5.4 [13.8]	5.1 [13.0]	6.4 [16.3]	N/A	2.1 [5.5]	4.1 [10.5]	13.7 [34.8]	10.2 [26.0]	7.8 [14.6]	38
5473-98			3		230/460	3/2			5.4 [13.8]	N/A	6.4 [16.3]	N/A	2.1 [5.5]	4.1 [10.5]	13.2 [33.5]	10.2 [26.0]	7.8 [14.6]	31
5481-98	C	1	1	TEFC	115/230	12/6	1 1/2	1 1/4	5.4 [13.8]	5.1 [13.0]	6.0 [15.4]	N/A	1.8 [4.6]	4.0 [10.2]	13.6 [34.5]	10.6 [26.9]	7.8 [14.6]	40
5483-98			3		230/460	4/2			5.4 [13.8]	N/A	6.0 [15.4]	N/A	1.8 [4.6]	4.0 [10.2]	12.2 [30.1]	10.6 [26.9]	7.8 [14.6]	35
5485-98	D	1 1/2	1	TEFC	115/230	18/9	1 1/2	1 1/4	5.4 [13.8]	5.1 [13.0]	6.0 [15.4]	N/A	1.8 [4.6]	4.0 [10.2]	14.1 [35.8]	10.6 [26.9]	7.8 [14.6]	49
5487-98			3		230/460	5/3			5.4 [13.8]	N/A	6.0 [15.4]	N/A	1.8 [4.6]	4.0 [10.2]	13.9 [35.3]	10.6 [26.9]	7.8 [14.6]	38
5491-98	E	2	1	TEFC	115/230	22/11	2	1 1/2	5.4 [13.8]	5.0 [12.7]	6.1 [15.6]	N/A	1.8 [4.6]	4.0 [10.2]	14.9 [37.8]	10.6 [26.9]	7.8 [14.6]	51
5493-98			3		230/460	6/3			5.4 [13.8]	N/A	6.1 [15.6]	N/A	1.8 [4.6]	4.0 [10.2]	14.5 [36.8]	10.6 [26.9]	7.8 [14.6]	44
5495-98	F	3	1	TEFC	230	16	2	1 1/2	5.4 [13.8]	5.0 [12.7]	6.1 [15.6]	N/A	1.8 [4.6]	4.0 [10.2]	15.4 [39.1]	10.6 [26.9]	7.8 [14.6]	60
5497-98			3		230/460	8/4			5.4 [13.8]	N/A	6.1 [15.6]	N/A	1.8 [4.6]	4.0 [10.2]	15.0 [38.1]	10.6 [26.9]	7.8 [14.6]	48

High Volume



High Head



High Head Pump Dimensional & Specification Data

Model	Curve	HP	PH	ENC	Voltage @ 60 Hz +	Full Load Amps	SUC*	DIS*	A**	B**	C**	D	E	F	L**	W	H	Ship Wt. (Lbs.)
5539-98	G	1 1/2	1	TEFC	115/230	18/9	1 1/2	1 1/4	5.4 [13.8]	5.1 [13.0]	7.5 [19.1]	0.8 [2.1]	2.5 [6.5]	2.2 [5.6]	15.5 [39.4]	9.8 [24.8]	12.8 [27.2]	54
553B-98			3		230/460	5/3			5.4 [13.8]	N/A	7.5 [19.1]	0.8 [2.1]	2.5 [6.5]	2.2 [5.6]	15.3 [38.8]	9.8 [24.8]	12.8 [27.2]	44
5535-98	H	2	1	TEFC	115/230	22/11	1 1/2	1 1/4	5.4 [13.8]	5.1 [13.0]	7.5 [19.1]	0.8 [2.1]	2.5 [6.5]	2.2 [5.6]	16.3 [41.6]	9.8 [24.8]	12.8 [27.2]	56
5537-98			3		230/460	6/3			5.4 [13.8]	N/A	7.5 [19.1]	0.8 [2.1]	2.5 [6.5]	2.2 [5.6]	15.8 [40.1]	9.8 [24.8]	12.8 [27.2]	49
5531-98	I	3	1	TEFC	230	16	1 1/2	1 1/4	5.4 [13.8]	5.1 [13.0]	7.5 [19.1]	0.8 [2.1]	2.5 [6.5]	2.2 [5.6]	16.8 [42.6]	9.8 [24.8]	12.8 [27.2]	65
5533-98			3		230/460	8/4			5.4 [13.8]	N/A	7.5 [19.1]	0.8 [2.1]	2.5 [6.5]	2.2 [5.6]	16.3 [41.6]	9.8 [24.8]	12.8 [27.2]	53

(*) Standard NPT (Female) pipe thread.

Maximum Solids Handling Capacity: 1/8" Diameter

(**) This dimension may vary due to motor manufacturer's specifications.

(+) 3-Phase motors can also operate on 50 Hz. (This will change full load amps, service factor and RPM)

NOTE: Dimensions are in inches (centimeters) and have a tolerance of $\pm 1/4$ ".

NOTE: Electric supply for ALL motors must be within $\pm 10\%$ of nameplate voltage rating (e.g. 230V $\pm 10\%$ = 207 to 253).

Standard Features

- Stainless Steel Construction
- Viton® Mechanical Seal and O-ring, Optional Buna-N Seal and O-ring Available
- Investment Cast Stainless Steel Impeller
- Cast Iron Motor Adapter Provides Rigid Mounting
- AeroSpace Fusion Welding
- Stainless Steel Motor Shaft & Hardware
- 1/2 to 3 HP NEMA 56J TEFC Single & Three Phase Motors
- NEMA Base Mounted Motors
- Maximum Working Pressure 150 PSI
- Maximum Temperature 200° F
- QSP – Quick Ship Pump for Many Models

Hazardous Duty/Explosion Proof motors available from stock ranging from 1 to 10 HP; CALL FOR QUOTATION & LEAD TIME!

Chromalox®

Installation, Operation and RENEWAL PARTS IDENTIFICATION

SERVICE REFERENCE

DIVISION 4	SECTION CVEP
SALES REFERENCE (Supersedes PF457-7)	PF457-8
161-302639-001	
DATE	JUNE, 2010

Type CVEP-C Convection Air Heater for Hazardous Locations



NOTICE: Carefully remove heater from carton and check for shipping damage. Any damage claims should be entered immediately with the carrier.

GENERAL

Type CVEP Convection Heaters are designed for use in Class I, Div I hazardous environments. Units without control options are suitable for areas classified as Groups B, C & D. Units with built-in controls can be supplied for groups C and D or B, C and D. Refer to classification stamped on heater nameplate.

⚠ WARNING

FIRE/EXPLOSION HAZARD. To prevent ignition of hazardous atmospheres, this heater should not be installed in areas where vapors or gases having an ignition temperature less than 280°C (536°F)(T2A) at 1.8kW, 3.6kW, 4.5kW, 7.6kW, 9.0kW or 180°C (356°F)(T3A) at 1.6kW, 3.2kW, 4.0kW are present.

These heaters must not be operated in ambient temperatures exceeding 40°C (104°F).

1. Connect air heaters to the same line voltage as on heater nameplate.
2. Heaters can be mounted individually end to end.
3. Heaters can be mounted directly on any type of surface masonry, concrete, block, plastered walls, metal framework, etc.-using appropriate hardware.
4. All controls such as thermostat and contactor, when required must

- have the same explosion-proof rating as heater.
5. Do not install one unit above the other.
6. Units are mounted a minimum of 8" above the floor.
7. Heaters are mounted on wall in a horizontal position with terminal end at right. **Never** recess heater into wall.
8. **NOTE:** Article 500 of the National Electric Code (NEC) outlines requirements for installation of electrical equipment in hazardous (Classified) locations.
9. All unit electrical installation fittings, conduit, wiring and seals must meet NEC and local codes for hazardous locations. External line fusing or circuit breaker protection is required.
10. Failure to understand and follow these installation instructions and the "WARNING" notes contained therein may result in severe personal injury, death or substantial property damage.

⚠ WARNING

ELECTRIC SHOCK HAZARD. Any installation involving electric heaters must be performed by a qualified person and must be effectively grounded in accordance with the National Electrical Code to eliminate shock hazard.

INSTALLATION

⚠ WARNING

ELECTRIC SHOCK HAZARD. Disconnect all power before installing or servicing heater. Failure to do so could result in personal injury or property damage. Heater must be installed by a qualified person in accordance with the National Electrical Code, NFPA 70.

1. Remove front panel by removing screws.
2. Locate desired heater position on wall.
3. Locate mounting holes for rear panel. Rear panel must be a minimum of 8" from the floor.
4. Refer to Figure 1A, 1B or 1C for mounting hole layout for each cabinet size.

5. Drill a pilot hole in wall mounting surface at each mounting hole location. Use a convenient small size drill.
6. Drill the mounting holes in accordance with size in Table 1. Insert anchors where applicable.
7. Fasten rear panel to wall with screws noted in Table 1.
8. Replace front panel and screws.

⚠ WARNING

FIRE HAZARD. Never operate heater with front panel off. Adequate air flow across heating elements requires the front panel to be in place. The heating elements could overheat causing equipment damage or personal injury.

EXPLOSION PROOF MODELS

Rugged, dependable Jenny explosion proof fans are available in either direct driven 16 and 20 inch models or belt driven 24 inch models. All models feature totally enclosed explosion proof motors and are designed for years of worry-free operation.

These units conform to all OSHA specifications. All explosion proof fans are equipped with a spark resistant polypropylene blade.



D16X



D20X



B24X

Features:

- Fully assembled. Ready to operate.
- Each fan has its own properly matched, formed venturi for highest performance.
- Spark resistant polypropylene blade has a rugged cast aluminum hub.
- Sturdy, all welded construction steel frame.
- Corrosion resistant powder coated finish.
- Rugged safety backguard standard on direct drive models.
- Variable speed models with solid state variable speed control.
- All models have totally enclosed fan cooled explosion proof motors with built-in automatic reset overload protection. Motors are UL listed for Class 1, Group D and Class II, Groups E, F and G atmospheres.

Dimensions:

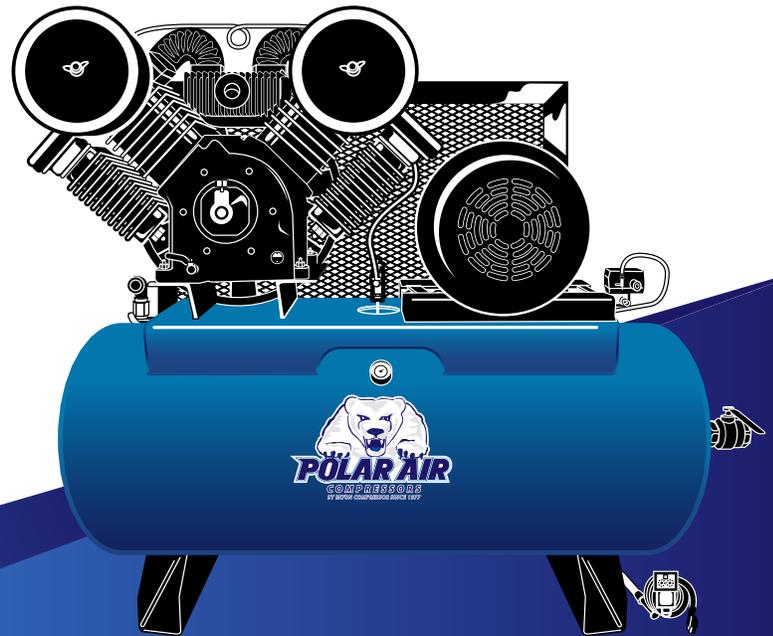
Blade Size	Width	Height	Depth
16	20	20	9
20	24	24	13
24	28	28	22

Blade Size	Model	H.P.	R.P.M.	Shp. Wt.	0" S.P.	CFM	
						1/8" S.P.	1/4" S.P.
16	D1633X	1/3	1725	42	3110	2990	2800
	D1633XV	1/3	1650-500	49	2920-900	2810-865	2630-812
20	D2033X	1/3	1725	45	4375	4180	3320
	D2033XV	1/3	1650-500	52	4110-1270	3930-1210	3120-905
24	B2433X	1/3	1100	73	4900	4730	4400
	B2433XV	1/3	1050-600	80	4690-2680	4520-2590	4200-2402
	B2450X	1/2	1250	77	5580	5390	5000

NOTE: All models shown with -V are variable speed and include control.

ELECTRIC OPERATED, PISTON COMPRESSORS

*Polar Air designs and manufactures products for safe operation. However, operators and maintenance persons are responsible for maintaining safety. All safety precautions are included to provide a guideline for minimizing the possibility of accidents and property damage while equipment is in operation. **Keep these instructions for reference.***



Contents

Model Specification Charts	3-4	Operation	13
Description	4	Safety Rules	13
Safety Information	5	Start Up	14
Tag Definitions	5	Continuous Run Feature	15
Basic Guidelines	5	Maintenance	15
Breathable Air	6	Safety Steps	15
Pressurized Components	6	Belt Adjustment	16
Personal Protective Equipment	6	Changing Oil	17
Inspection	6	Safety Valve	17
Forklift Safety	7	Tank	17
Lifting Safety	7	Maintenance Schedule	18
Installation	8	Troubleshooting	18
Area	8	Warranty	19
Piping Safety	8		
Piping / Tank Installation	9		
Electronic Auto Drain (if equipped)	10		
Electrical Safety	11		
Wiring Installation	12		

Polar Air Electric Operated, Two-Stage, 5-10 Hp Piston Air Compressors

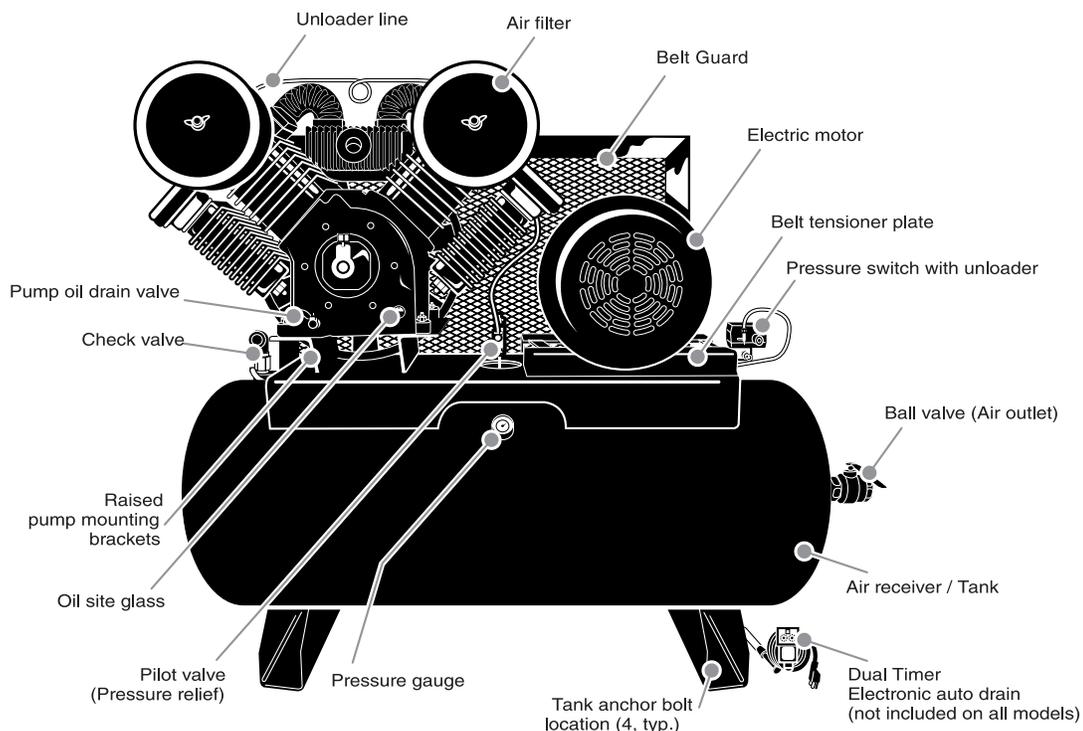
Model	PP05H08011	PP07H080V1	PP10H120Y1	PP07H080V3	PP10H120Y3
Tank Type	Horizontal	Horizontal	Horizontal	Horizontal	Horizontal
Dimensions <small>L•W•H (inches)</small>	76 x 30 x 56	76 x 30 x 56	78 x 32 x 50	76 x 30 x 56	78 x 32 x 50
Model	PP05V08011	PP07V080V1	PP10V120Y1	PP07V080V3	PP10V120Y3
Tank Type	Vertical	Vertical	Vertical	Vertical	Vertical
Dimensions <small>L•W•H (inches)</small>	34 x 24 x 72	34 x 24 x 72	50 x 32 x 78	34 x 24 x 72	50 x 32 x 78
Tank Size	80 Gallon	80 Gallon	120 Gallon	80 Gallon	120 Gallon
Description	5HP Single Phase	7.5HP Single Phase	10HP Single Phase	7.5HP Three Phase	10HP Three Phase
SCFM @ 175 psi	17.0	26.0	35.0	26.0	35.0
Max PSI	175	175	175	175	175
Motor HP	5HP	7.5HP	10HP	7.5HP	10HP
Motor RPM	1750	1750	1750	1750	1750
Voltage	208V/230V	208V/230V	208V/230V	208/230/460/575	208/230/460/575
Pump Model	APP2I0524T	APP4V1043T	APP3Y1544T	APP4V1043T	APP3Y1544T
Pump RPM	650	640	600	640	600
Noise DB(A)	73	73	76	73	76
Outlet Connection	NPT 3/4"	NPT 3/4"	NPT 1"	NPT 3/4"	NPT 1"
Weight (±5 lbs.)	715	958	1095	958	1095
Shipping Weight	800	1043	1242	1043	1242

Polar Air Electric Operated, Two-Stage, 15-25 Hp Piston Air Compressors

Model	PP15V120Y3	PP15H120Y3	PP20H120V3	PP25H120V3
Description	15 Hp Three Phase	15 Hp Three Phase	20 Hp Three Phase	25 Hp Three Phase
SCFM @ 175 psi	52.0	52.0	68.0	89.0
Max PSI	175	175	175	175
Motor HP	15 Hp	15 Hp	20 Hp	25 Hp
Motor RPM	1750	1750	1750	1750
Voltage	208/230/460/575	208/230/460/575	208/230/460/575	208/230/460/575
Tank Size	120 Gallon Vertical	120 Gallon Horizontal	120 Gallon Horizontal	120 Gallon Horizontal
Pump Model	APP3Y2062T	APP3Y2062T	APP4V2598T	APP4V2598T
Pump RPM	640	640	640	740
Noise DB(A)	76	76	78	79
Outlet Connection	NPT 1"	NPT 1"	NPT 1"	NPT 2"
Dimensions <small>L•W•H (inches)</small>	33 x 24 x 73	79 x 32 x 62	72 x 30 x 51	72 x 30 x 51
Weight (lbs.)	1410	1410	1500	1703
Shipping Weight	1512	1512	1609	1810

Description

Unit configuration and appearance varies by model.
Callouts are for general identification.



MAE²

MID-ATLANTIC ENVIRONMENTAL EQUIPMENT

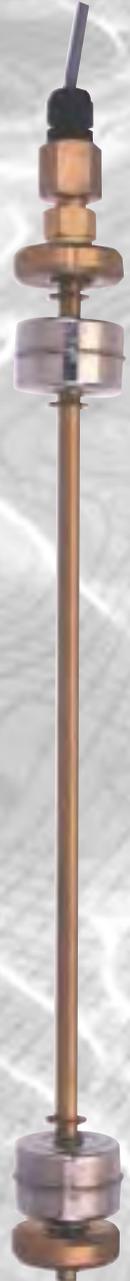
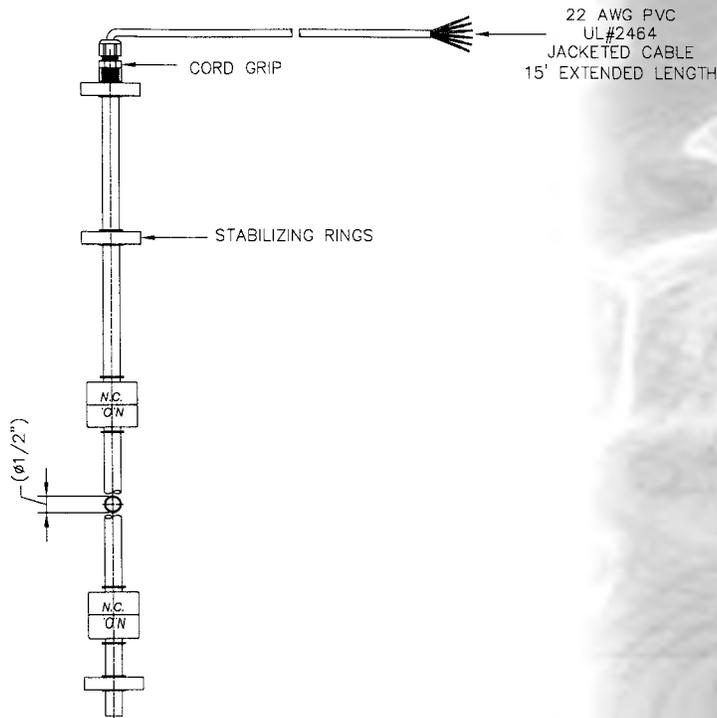
SECTION 2

Instrumentation



Model L500S: Adjustable Suspended Level Switch

The L500S series is a low cost, single or multiple level switch designed for level monitoring or leak detection in underground storage tanks, sumps or wells. Vertically mounted and suspended by the electrical cable to the desired set point, the integral weight maintains the correct orientation and removes slack from the cable. A compression fitting secures the cable and forms a leak tight seal. The L500S is available in PVC, brass/Buna and stainless steel with custom material and configurations available.



Features:

- Adjustable set points
- Integral weight ensures proper orientation
- Clearance spacers ensure float movement
- Flexible cable provides easy installation
- SPST and SPDT switch types

Electrical:

- Output: SPST 20, 50 & 100 VA
SPDT 100 VA

Environmental:

- Process Temperature:
 - PVC: -40° to +140°F (-40° to 60° C)
 - Brass/Buna: -40° to +180° F (-40° to +82° C)
 - Stainless Steel: -40° to +300° F (-40 to +148° C)
- Process Pressure:
 - PVC: 50 psig (3.4 bar)
 - Brass/Buna: 150 psig (10 bar)
 - Stainless Steel: 100 psig (6.8 bar)

Applications:

- Underground Storage Tanks
- Leak Detection
- Sumps
- Wells
- Wastewater

201L LIQUID FILLED LOWER MOUNT

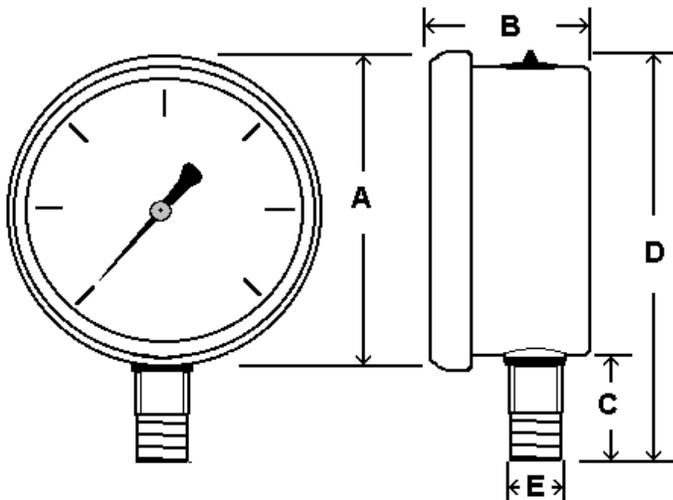


Glycerine filled for added durability in applications where vibration or pulsation is present
Stainless steel case and bezel, copper alloy internals

SPECIFICATIONS

Dial	1 ½" (40 mm), 2" (50 mm), 2 ½" (63 mm), 4" (100 mm)
Case	Stainless steel, glycerine filled
Wetted Parts	Copper alloy
Bezel	Stainless steel, fixed
Lens	Polycarbonate
Pointer	Black aluminum
Connection	Lower mount 1 ½" dial = ⅛" NPT 2" dial = ⅛" or ¼" NPT 2 ½" dial = ¼" NPT 4" dial = ¼" or ½" NPT
Scale	Standard: psi/BAR (x 100 = kPa) Single scale psi available from stock
Accuracy	3-2-3% of span 1 ½" & 2" ASME B40.1 Grade B 2-1-2% of span 2 ½" & 4" ASME B40.1 Grade A
Ambient Temp	Glycerine Filled = 30° F to 160° F Dry = -30° F to 180° F

Design meets or exceeds ASME B40.100 pressure gauge standard.



Dial	Unit	A	B	C	D	E
1 ½"	In.	1.85"	1.00"	0.67"	2.28"	⅛" NPT
	mm	47	25	17	58	
2"	In.	2.27"	1.20"	0.91"	2.95"	⅛" or ¼" NPT
	mm	58	31	23	75	
2 ½"	In.	2.80"	1.40"	1.07"	3.55"	¼" NPT
	mm	71	36	27	90	
4"	In.	4.29"	1.75"	1.17"	5.21"	¼" or ½" NPT
	mm	109	45	30	132	



2

AVAILABLE OPTIONS*

- Certificate of Accuracy, NIST traceable
- Custom Dial
- Liquid Fill Options, see page 176
- Anti-Vibration Movement, see page 109
- Glass Lens
- Dry, Fillable Case
- Cleaned for Oxygen Service (dry only)
- Special Connection Size
- Protective Rubber Cover, see page 121
- Max/Min Pointer, see page 122

*Lead times/minimums may apply

APPROXIMATE SHIPPING WEIGHTS/ BOX QUANTITIES

Dial Size	Est. Unit Weight	Box Qty
1 ½"	0.20 lbs (0.10 kg)	100
2"	0.40 lbs (0.18 kg)	100
2 ½"	0.55 lbs (0.24 kg)	50
4"	1.5 lbs (0.68 kg)	30



LP2 LOW PRESSURE CENTER BACK MOUNT

Capsule type pressure gauge for accurate measurement of low pressures
 Suitable for air, water, oil, gas or any other media not corrosive to copper alloy

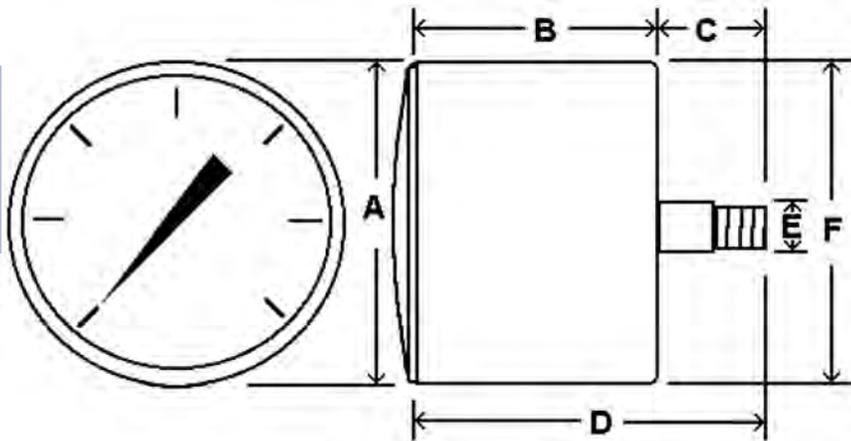
SPECIFICATIONS

Dial	2 ½" (63 mm)
Case	Chrome plated steel, dry non-fillable
Wetted Parts	Copper alloy
Lens	Plastic, removable twist lock
Pointer	Adjustable, black aluminum Adjustment screw at rear of case
Connection	Center back mount ¼" NPT
Scale	Standard: single scale inches of water column or psi
Accuracy	3-2-3% of span ASME B40.1 Grade B
Ambient Temp	-30° F to 180° F



Design meets or exceeds ASME B40.100 pressure gauge standard.

5



AVAILABLE OPTIONS*

- Certificate of Accuracy, NIST Traceable
- Custom Dial
- Special Connection Size
- Cleaned for Oxygen Service
- Protective Rubber Cover, see page 121
- Dual Scale

*Lead times/minimums may apply

Dial	Unit	A	B	C	D	E	F
2 ½"	In.	2.60"	1.92"	0.84"	2.75"	¼"	2.60"
	mm	66	49	22	71	NPT	66

APPROXIMATE SHIPPING WEIGHTS/ BOX QUANTITIES

Dial Size	Est. Unit Wt.	Box Qty
2 ½"	0.50 lbs (0.24 kg)	75

BIMETAL THERMOMETERS FIXED BACK MOUNT (90°)



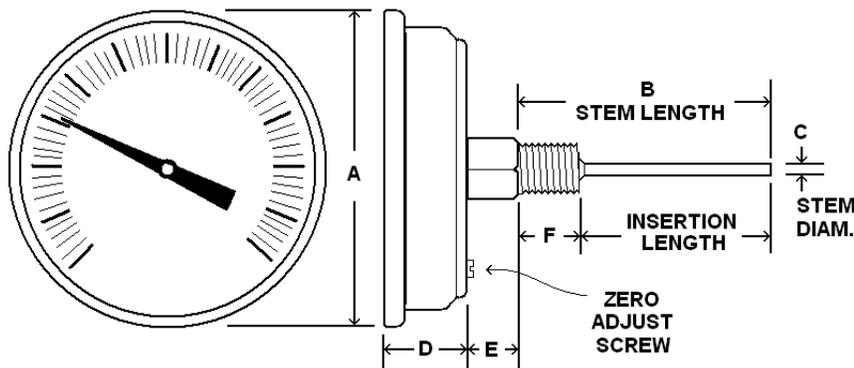
Dial type bimetal thermometer

Features anti-vibration design, anti-parallax dial, hermetically sealed case

SPECIFICATIONS

Dial	2" (50 mm), 3" (76 mm), 5" (130 mm) Anti-parallax dial design
Case	Stainless steel, hermetically sealed
Stem	316 stainless steel, welded to connection
Lens	Glass
Pointer	Black aluminum
Connection	Back mount (90°), fixed ¼" NPT on 2", ½" NPT on 2", 3" & 5"
Scale	Standard: dual scale F & C
Accuracy	1% full scale per Grade A, ASME B40.3
Ambient Temp*	-30° F to 180° F
External Adjustment	Zero reset screw on 3" & 5" dial

Design meets or exceeds ASME B40.3 thermometer standard.



AVAILABLE OPTIONS*

- Certificate of Accuracy, NIST traceable
- Custom Dial
- Special Connection Size
- Single Scale
- Special Ranges
- Custom Lens Material

*Lead times/minimums may apply

APPROXIMATE SHIPPING WEIGHTS/ BOX QUANTITIES

Dial	Unit	A	B	C	D	E	F
2"	In.	2.30"	Stem Length	0.25"	0.51"	0.39"	¼" or ½" NPT
	mm	58.4	Stem Length	6.45	12.9	10	
3"	In.	3.26"	Stem Length	0.25"	0.80"	0.43"	½" NPT
	mm	83	Stem Length	6.45	20	11	
5"	In.	5.28"	Stem Length	0.25"	0.82"	0.43"	½" NPT
	mm	134	Stem Length	6.45	22	11	

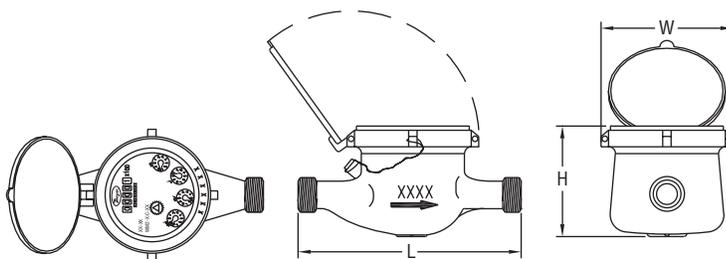
Dial Size	Est. Unit Weight	Box Qty
2"	0.20 lbs (0.10 kg)	upon request
3"	0.65 lbs (0.28 kg)	upon request
5"	1.15 lbs (0.52 kg)	upon request

*NOTE: High or low ambient temperatures may have adverse effect on accuracy. Consult PIC Gauges for instrument selection.



Series WM2 Multi-Jet Water Meters

Specifications - Installation and Operating Instructions



Size in (mm)	Spud NPSM (BSPP)	Length 'L' in (mm)	Width 'W' in (mm)	Height 'H' in (mm)	Weight lb (kg)
5/8 (15)	3/4" (3/4")	6-1/2 (165)	3-45/64 (94)	4-15/64 (107.5)	3.75 (1.7)
5/8 x 3/4	1" (1")	7-1/2 (190)	3-45/64 (94)	4-15/64 (107.5)	3.97 (1.8)
3/4 (20)	1" (1")	7-1/2 (190)	3-45/64 (94)	4-15/64 (107.5)	4.9 (2.2)
1 (25)	1-1/4" (1-1/4")	10-1/4 (260)	3-55/64 (98)	4-5/8 (117.5)	6.4 (2.9)
1-1/4 (32)	1-1/2" (1-1/2")	10-1/4 (260)	3-55/64 (98)	4-5/8 (117.5)	8.2 (3.7)
1-1/2 (40)	2" (2")	11-13/16 (300)	4-51/64 (122)	5-9/16 (141.5)	13.52 (6.17)
2 (50)	2-1/2" (2-1/2")	11-13/16 (300)	5-45/64 (145)	6-31/32 (177)	18.74 (8.5)

The **Series WM2 Multi-Jet Water Meter** is ideal for commercial and industrial applications. The multi-jet design allows simplicity and accuracy with wide flow ranges, even in low flow applications. The magnetically driven, hermetically sealed register will not leak or fog and is completely separated from the water. These water meters are designed for long service life and maintenance-free operation, complete with an internal strainer.

Installation Instructions

1. Thoroughly flush the service line upstream of the meter to remove dirt and debris.
2. Remove meter spud thread protectors.

Note: To protect meter spud threads, store the meter with thread protectors in place.

3. Set the meter in the line. Install in a horizontal plane, with the register upright, in a location accessible for reading, service and inspection. Arrows on the side of the meter and above the outlet spud indicate the direction of flow.
 4. For accurate measurement, the tap height should be higher than the meter.
 5. Do not over-tighten connections; tighten only as required to seal. Do not use pipe sealant tape on meter threads.
 6. With upstream shut-off valve only: Open shut-off valve slowly, to remove air from meter and service line. Open a faucet slowly to allow entrapped air to escape. Close the faucet.
- With both upstream and downstream shut-off valves installed. To test the installation for leaks: Close the outlet (downstream) shut-off valve. Open the inlet (upstream) shut-off slowly until meter is full of water. Open the outlet (downstream) valve slowly until air is out of the meter and service line. Open a faucet slowly to allow entrapped air to escape. Close the faucet.

SPECIFICATIONS

Service: Water.

Wetted Materials: Body: Brass, polyethylene; Couplings: Brass; Measuring Chamber: Polyethylene, ABS plastic, ferrite, acetal.

Flow Range: See model chart.

Accuracy: Transitional Flow: $\pm 5\%$; Nominal Flow: $\pm 2\%$.

Temperature Limit: 104°F (40°C).

Pressure Limit: 232 psi (16 bar).

Pressure Drop: See pressure drop chart.

Totalizing Display Maximum: See model chart.

Mounting Orientation: Horizontal with register face up.

Weight: See dimension chart.

CAUTION

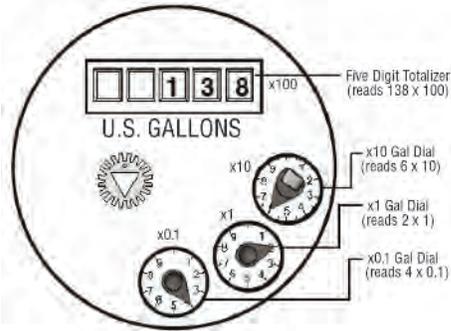
Unit must be installed in a horizontal position with the register face pointing up otherwise leakage and/or meter damage will occur.

Model	Size	Coupling Size	Max Flow	Nominal Flow Range	Transitional Flow	Display Max (Gallons)
			GPM (Gallons Per Minute)			
WM2-A-C-01	5/8"	1/2" NPT	20	1 to 20	0.25	9,999,999.99
WM2-A-C-02	5/8 x 3/4"	3/4" NPT	20	1 to 20	0.25	9,999,999.99
WM2-A-C-03	3/4"	3/4" NPT	30	2 to 30	0.5	9,999,999.99
WM2-A-C-04	1"	1" NPT	50	3 to 50	0.75	9,999,999.99
WM2-A-C-06	1-1/2"	1-1/2" NPT	100	5 to 100	1.5	99,999,999.9
WM2-A-C-07	2"	2" NPT	160	8 to 160	2	99,999,999.9

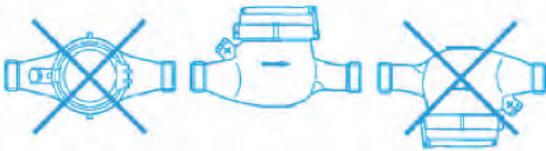
Model	Size	Coupling Size	Max Flow	Nominal Flow Range	Transitional Flow	Display Max (m ³)
			m ³ /h			
WM2-B-C-08	15 mm	1/2" BSPT	3	0.12 to 1.5	0.03	99,999.9999
WM2-B-C-10	20 mm	3/4" BSPT	5	0.2 to 2.5	0.05	99,999.9999
WM2-B-C-11	25 mm	1" BSPT	7	0.28 to 3.5	0.07	99,999.9999
WM2-B-C-12	32 mm	1-1/4" BSPT	12	0.48 to 6	0.12	99,999.9999
WM2-B-C-13	40 mm	1-1/2" BSPT	20	0.8 to 10	0.2	999,999.9999
WM2-B-C-14	50 mm	2" BSPT	30	1.2 to 15	0.3	999,999.9999

Meter Reading

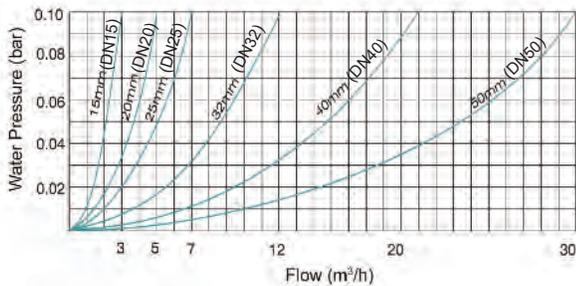
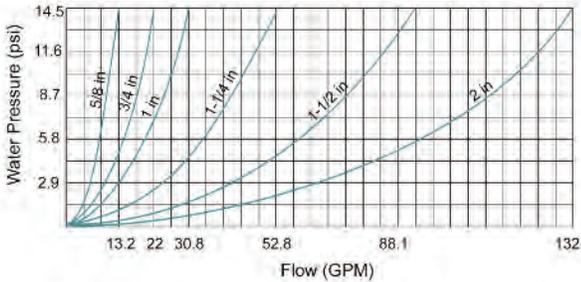
The total flow that has passed through your meter is read by starting at the top of the register with the Five-Digit Totalizer, and then read clockwise around the small dials. In the example below, the Five-Digit Totalizer reads 13800 (138 x 100), and the dials read 60 (6 x 10), 2 (2 x 1), and 0.4 (4 x 0.1) respectively. The total flow is 13862.4.



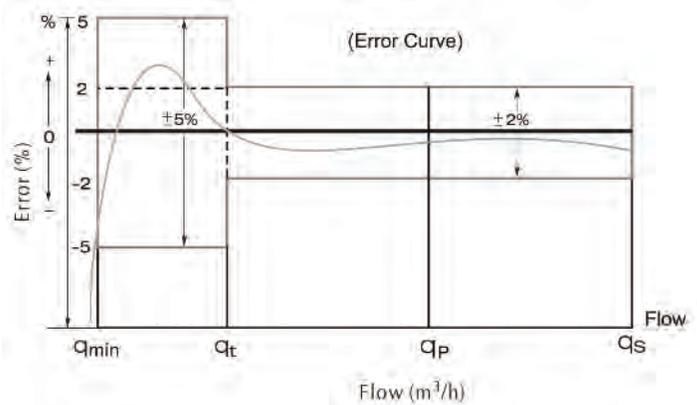
INSTALLATION



Pressure Drop



Accuracy Chart



MAINTENANCE/REPAIR

Preventative maintenance consists of periodic inspections and cleaning procedures. The procedures should be performed at regular intervals, and any defects discovered should be corrected before further operation of the meter.

Visually inspect the meter for missing hardware, broken resistor glass, or other signs of wear or deterioration. Verify proper flow rate and pressure for meter. A loss in pressure, with the resulting flow rate decrease, may indicate the meter screen is clogged and requires cleaning.

Clean the strainer yearly, or as required, depending on water condition. Pull out the strainer or back flush the meter to loosen trapped particulates

The Series WM2 is not field serviceable and should be returned if repair is needed. Field repair should not be attempted and may void warranty.

WARRANTY/RETURN

Refer to "Terms and Conditions of Sales" in our catalog and on our website. Contact customer service to receive a Return Goods Authorization number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

MAE²

MID-ATLANTIC ENVIRONMENTAL EQUIPMENT

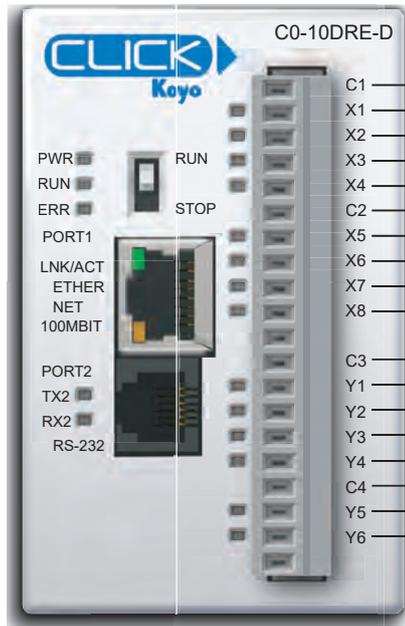
SECTION 4

Control System

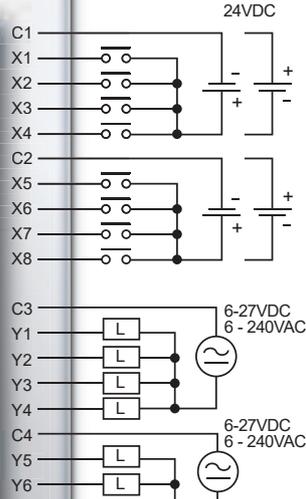
Ethernet Basic PLC

CO-10DRE-D **\$139.00**

8 DC Input/6 Relay Output Micro PLC

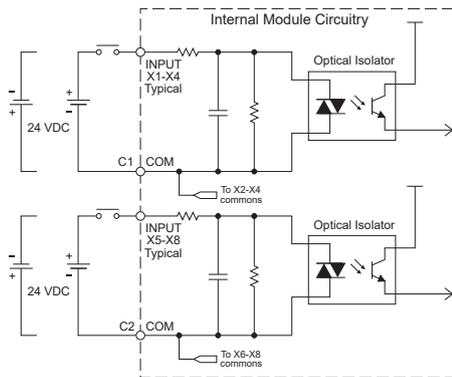


Wiring Diagram

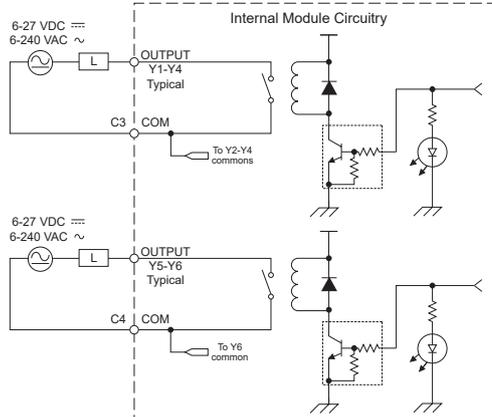


NOTE: When using Ethernet Basic PLCs, you must use CLICK programming software version V2.00 or later.

Equivalent Input Circuit



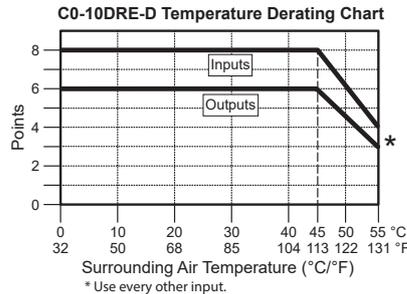
Equivalent Output Circuit



CO-10DRE-D Built-in I/O Specifications - Inputs	
Inputs per Module	8 (Sink/Source)
Operating Voltage Range	24 VDC
Input Voltage Range	21.6-26.4 VDC
Input Current	X1-4: Typ 6.5 mA @ 24 VDC X5-8: Typ 4 mA @ 24 VDC
Maximum Input Current	X1-4: 7.0 mA @ 26.4 VDC X5-8: 5.0 mA @ 26.4 VDC
Input Impedance	X1-4: 3.9 kΩ @ 24 VDC X5-8: 6.8 kΩ @ 24 VDC
ON Voltage Level	> 19 VDC
OFF Voltage Level	X1-4: < 2 VDC X5-8: < 7 VDC
Minimum ON Current	X1-4: 4.5 mA X5-8: 3.5 mA
Maximum OFF Current	X1-4: 0.5 mA X5-8: 1.5 mA
OFF to ON Response	X1-4: Typ 5 μs Max 20 μs X5-8: Typ 2 ms Max 10 ms
ON to OFF Response	X1-4: Typ 5 μs Max 20 μs X5-8: Typ 3 ms Max 10 ms
Status Indicators	Logic Side (8 points, green LED)
Commons	2 (4 points/common) Isolated

CO-10DRE-D Built-in I/O Specifications - Outputs	
Outputs per Module	6
Operating Voltage Range	6-240 VAC (47-63 Hz), 6-27 VDC
Output Voltage Range	5-264 VAC (47-63 Hz), 5-30 VDC
Output Type	Relay, form A (SPST)
Maximum Current	1 A/point; C3: 4 A/common, C4: 2 A/common
Minimum Load Current	5 mA @ 5 VDC
Maximum Inrush Current	3 A for 10 ms
OFF to ON Response	< 15 ms
ON to OFF Response	< 15 ms
Status Indicators	Logic Side (6 points, red LED)
Commons	2 (4 points/com & 2 points/com) Isolated

General Specifications	
Current Consumption at 24VDC	120 mA
Terminal Block Replacement Part No.	CO-16TB
Weight	5.6 oz (160 g)



Typical Relay Life (Operations) at Room Temperature	
Voltage & Load Type	Relay Life
30 VDC 1A Resistive	300,000 cycles
30 VDC 1A Solenoid	50,000 cycles
250 VAC 1A Resistive	500,000 cycles
250 VAC 1A Solenoid	200,000 cycles
ON to OFF = 1 cycle	

ZIPLink Pre-Wired PLC Connection Cables and Modules



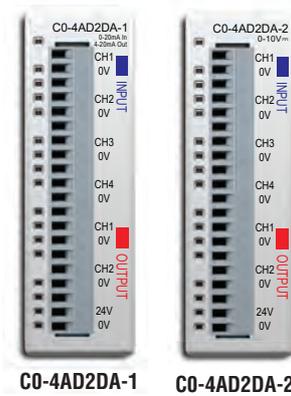
ZL-RTB20 20-pin feed-through connector module

20-pin connector cable
ZL-CO-CBL20 (0.5 m length)
ZL-CO-CBL20-1 (1.0 m length)
ZL-CO-CBL20-2 (2.0 m length)

Choosing Expansion I/O Modules

Analog I/O Modules (continued)

Analog Combo I/O Modules



Analog Combo I/O Modules			
Part Number	Analog Input Type	Analog Output Type	External Power Required
C0-4AD2DA-1	4 channel, current (0-20 mA), 13 bit	2 channel, current sourcing (4-20 mA), 12 bit	24 VDC
C0-4AD2DA-2	4 channel, voltage (0-10 V), 13 bit	4 channel, voltage (0-10 V), 12 bit	24 VDC

General Specifications For All CLICK PLC Products

These general specifications apply to all CLICK PLCs, optional I/O modules, and optional power supply products. Please refer to the appropriate I/O temperature derating charts under both the PLC and I/O module specifications to determine best operating conditions based on the ambient temperature of your particular application.

General Specifications	
Power Input Voltage Range	20-28 VDC
Maximum Power Consumption	5 W (No 5 V use from communication port)
Maximum Inrush Current	30 A (less than 1ms)
Acceptable External Power Drop	Max 10 ms
Operating Temperature	Analog, analog combo I/O modules only: 32°F to 140°F (0°C to 60°C); All other modules: 32°F to 131°F (0°C to 55°C), IEC 60068-2-14 (Test Nb, Thermal Shock)
Storage Temperature	-4°F to 158°F (-20°C to 70°C) IEC 60068-2-1 (Test Ab, Cold) IEC 60068-2-2 (Test Bb, Dry Heat) IEC 60068-2-14 (Test Na, Thermal Shock)
Ambient Humidity	30% to 95% relative humidity (non-condensing)
Environmental Air	No corrosive gases. Environmental pollution level is 2 (UL840)
Vibration	MIL STD 810C, Method 514.2, EC60068-2-6 JIS C60068-2-6 (Sine wave vibration test)
Shock	MIL STD 810C, Method 516.2, IEC60068-2-27, JIS C60068-2-27
Noise Immunity	Comply with NEMA ICS3-304, Impulse noise 1µs, 1000V EN61000-4-2 (ESD), EN61000-4-3 (RFI), EN61000-4-4 (FTB) EN61000-4-5 (Surge), EN61000-4-6 (Conducted) EN61000-4-8 (Power frequency magnetic field immunity) RFI: No interference measured at 150 and 450 MHz (5w/15cm)
Emissions	EN55011:1998 Class A
Agency Approvals	UL508 (File No. E157382, E316037); CE (EN61131-2)
Other	RoHS



CLICK Specifications

PLC Unit Specifications

Basic, Standard and Analog PLC Unit Specifications			
	Basic PLC	Standard PLC	Analog PLC
Control Method	Stored Program/Cyclic execution method	Stored Program/Cyclic execution method	Stored Program/Cyclic execution method
I/O Numbering System	Fixed in Decimal	Fixed in Decimal	Fixed in Decimal
Ladder Memory (steps)	8000	8000	8000
Total Data Memory (words)	8000	8000	8000
Contact Execution (boolean)	< 0.6us	< 0.6us	< 0.6us
Typical Scan (1k boolean)	1-2 ms	1-2 ms	1-2 ms
RLL Ladder Style Programming	Yes	Yes	Yes
Run Time Edits	No	No	No
Scan	Variable / fixed	Variable / fixed	Variable / fixed
CLICK Programming Software for Windows	Yes	Yes	Yes
Built-in Communication Ports	Yes (two RS-232 ports)	Yes (two RS-232 ports and one RS-485 port)	Yes (two RS-232 ports and one RS-485 port)
FLASH Memory	Standard on PLC	Standard on PLC	Standard on PLC
Built-in Discrete I/O points	8 inputs, 6 outputs	8 inputs, 6 outputs	4 inputs, 4 outputs
Built-in Analog I/O Channels	No	No	2 inputs, 2 outputs
Number of Instructions Available	21	21	21
Control Relays	2000	2000	2000
System Control Relays	1000	1000	1000
Timers	500	500	500
Counters	250	250	250
Interrupt	Yes (external: 8 / timed: 4)	Yes (external: 8 / timed: 4)	Yes (external: 4 / timed: 4)
Subroutines	Yes	Yes	Yes
For/Next Loops	Yes	Yes	Yes
Math (Integer and Hex)	Yes	Yes	Yes
Drum Sequencer Instruction	Yes	Yes	Yes
Internal Diagnostics	Yes	Yes	Yes
Password Security	Yes	Yes	Yes
System Error Log	Yes	Yes	Yes
User Error Log	No	No	No
Memory Backup	Super Capacitor	Super Capacitor + Battery	Super Capacitor + Battery
Battery Backup	No	Yes (battery sold separately; part # D2-BAT-1)	Yes (battery sold separately; part # D2-BAT-1)
Calendar/Clock	No	Yes	Yes
I/O Terminal Block Replacement	ADC p/n C0-16TB	ADC p/n C0-16TB	ADC p/n C0-16TB
Communication Port & Terminal Block Replacement	N/A	ADC p/n C0-3TB	ADC p/n C0-3TB
24 VDC Power Terminal Block Replacement	ADC p/n C0-4TB	ADC p/n C0-4TB	ADC p/n C0-4TB

Company Information

Control Systems Overview

CLICK PLC

Do-More PLCs Overview

Do-More H2 PLC

Do-More T1H PLC

DirectLOGIC PLCs Overview

DirectLOGIC DL05/06

DirectLOGIC DL105

DirectLOGIC DL205

DirectLOGIC DL305

DirectLOGIC DL405

Productivity 2000

Productivity 3000

Universal Field I/O

Software

C-More HMI

C-More Micro HMI

ViewMarq Industrial Marquees

Other HMI

Communications

Appendix Book 1

Terms and Conditions

CLICK Specifications

PLC Units Specifications (continued)

Ethernet Basic and Standard PLC Unit Specifications		
	Ethernet Basic PLC	Ethernet Standard PLC
Control Method	Stored Program/Cyclic execution method	Stored Program/Cyclic execution method
I/O Numbering System	Fixed in Decimal	Fixed in Decimal
Ladder Memory (steps)	8000	8000
Total Data Memory (words)	8000	8000
Contact Execution (boolean)	< 0.2us	< 0.2us
Typical Scan (1k boolean)	< 1ms	< 1ms
RLL Ladder Style Programming	Yes	Yes
Run Time Edits	Yes	Yes
Scan	Variable / fixed	Variable / fixed
CLICK Programming Software for Windows	Yes	Yes
Built-in Communication Ports	Yes (one Ethernet port and one RS-232 port)	Yes (one Ethernet port, one RS-232 port and one RS-485 port)
FLASH Memory	Standard on PLC	Standard on PLC
Built-in Discrete I/O points	8 inputs, 6 outputs	8 inputs, 6 outputs
Built-in Analog I/O Channels	No	No
Number of Instructions Available	21	21
Control Relays	2000	2000
System Control Relays	1000	1000
Timers	500	500
Counters	250	250
Interrupt	Yes (external: 8 / timed: 4)	Yes (external: 8 / timed: 4)
Subroutines	Yes	Yes
For/Next Loops	Yes	Yes
Math (Integer and Hex)	Yes	Yes
Drum Sequencer Instruction	Yes	Yes
Internal Diagnostics	Yes	Yes
Password Security	Yes	Yes
System Error Log	Yes	Yes
User Error Log	No	No
Memory Backup	Super Capacitor + Battery	Super Capacitor + Battery
Battery Backup	Yes (battery part # D2-BAT-1)	Yes (battery part # D2-BAT-1)
Calendar/Clock	Yes	Yes
I/O Terminal Block Replacement	ADC p/n C0-16TB	ADC p/n C0-16TB
Communication Port & Terminal Block Replacement	N/A	ADC p/n C0-3TB
24 VDC Power Terminal Block Replacement	ADC p/n C0-4TB	ADC p/n C0-4TB

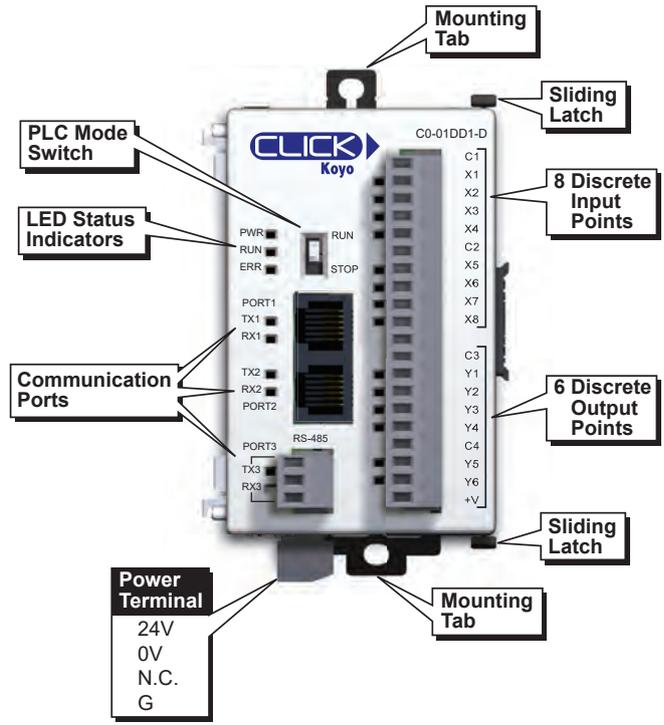
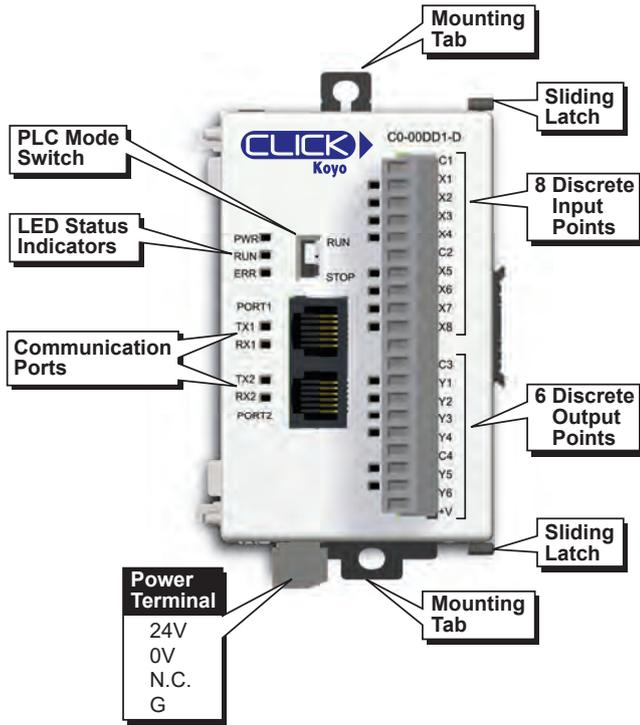


CLICK Specifications

PLC Features

Basic PLCs

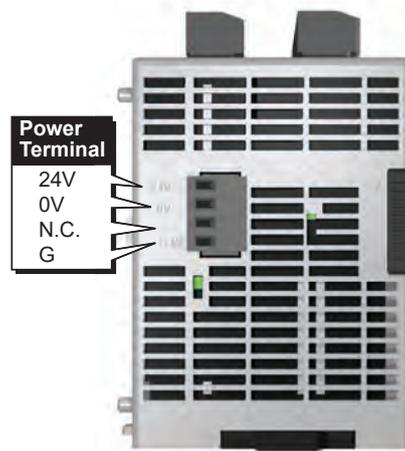
Standard PLCs



Analog PLCs



**Bottom of PLC
(Same on all models)**



Company Information

Control Systems Overview

CLICK PLC

Do-More PLCs Overview

Do-More H2 PLC

Do-More T1H PLC

DirectLOGIC PLCs Overview

DirectLOGIC DL05/06

DirectLOGIC DL105

DirectLOGIC DL205

DirectLOGIC DL305

DirectLOGIC DL405

Productivity 2000

Productivity 3000

Universal Field I/O

Software

C-More HMI

C-More Micro HMI

ViewMarq Industrial Marquees

Other HMI

Communications

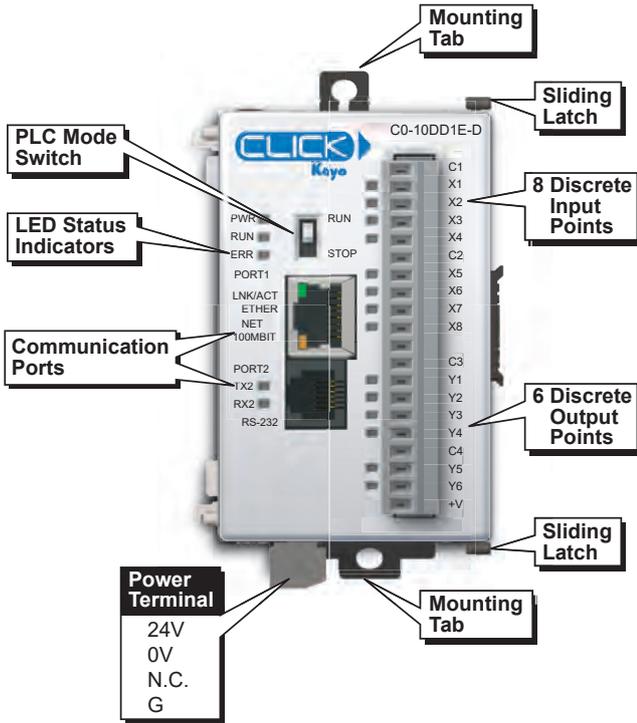
Appendix Book 1

Terms and Conditions

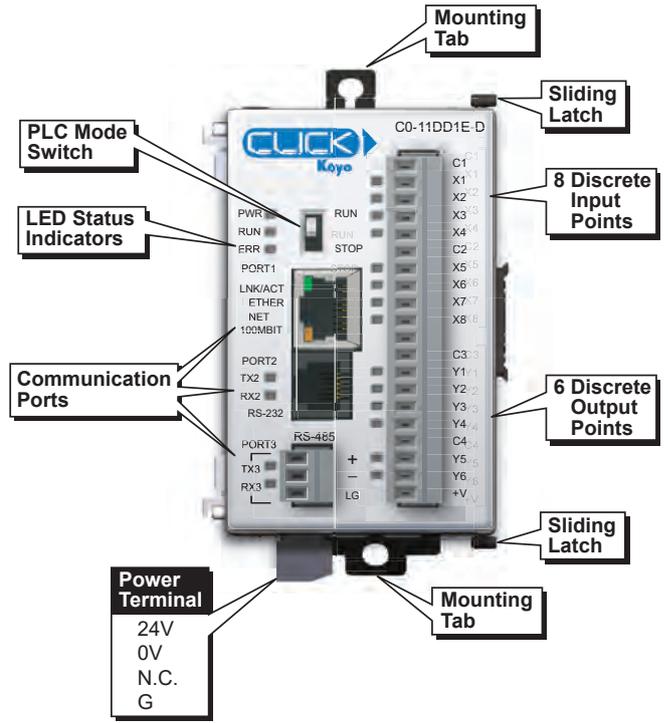
CLICK Specifications

PLC Features (continued)

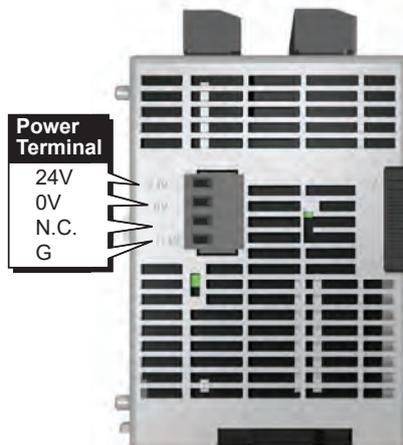
Ethernet Basic PLCs



Ethernet Standard PLCs



**Bottom of Ethernet PLC
(Same on all models)**





CLICK Specifications

PLC LED Status Indicators

Company Information

Control Systems Overview

CLICK PLC

Do-More PLCs Overview

Do-More H2 PLC

Do-More T1H PLC

DirectLOGIC PLCs Overview

DirectLOGIC DL05/06

DirectLOGIC DL105

DirectLOGIC DL205

DirectLOGIC DL305

DirectLOGIC DL405

Productivity 2000

Productivity 3000

Universal Field I/O

Software

C-More HMI

C-More Micro HMI

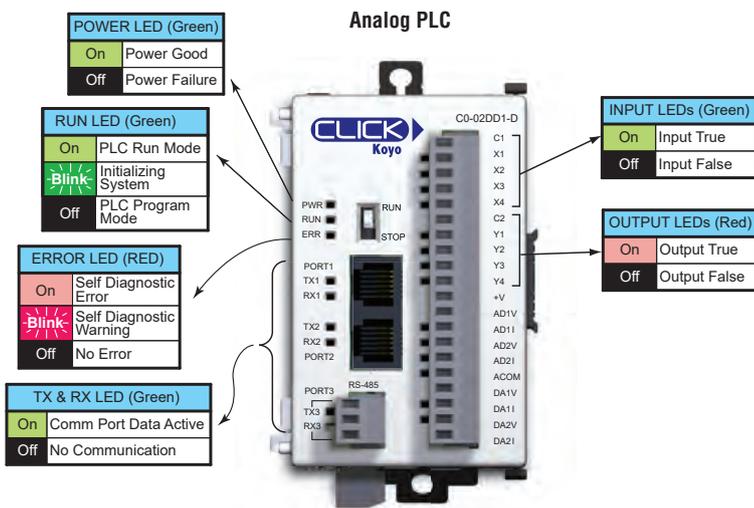
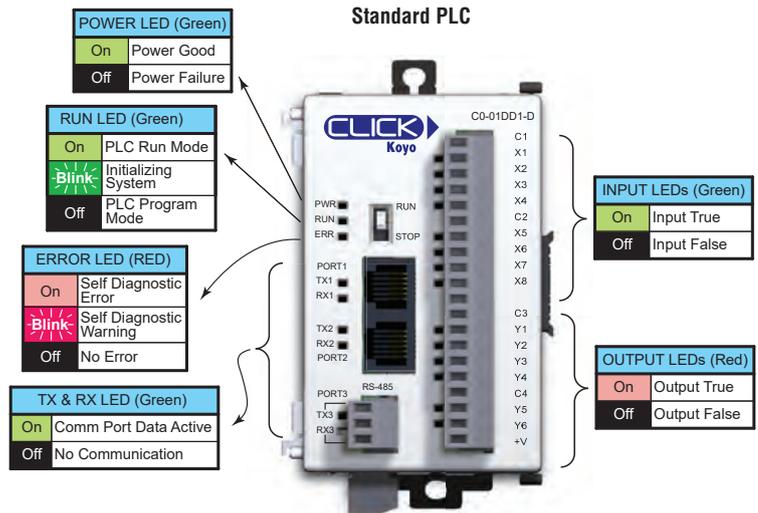
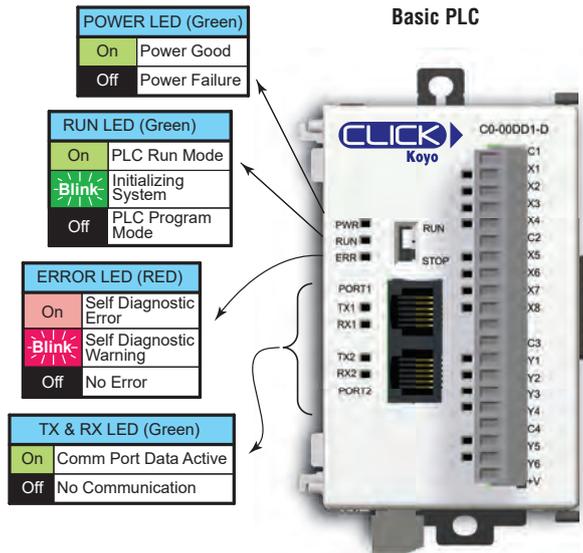
ViewMarq Industrial Marquees

Other HMI

Communications

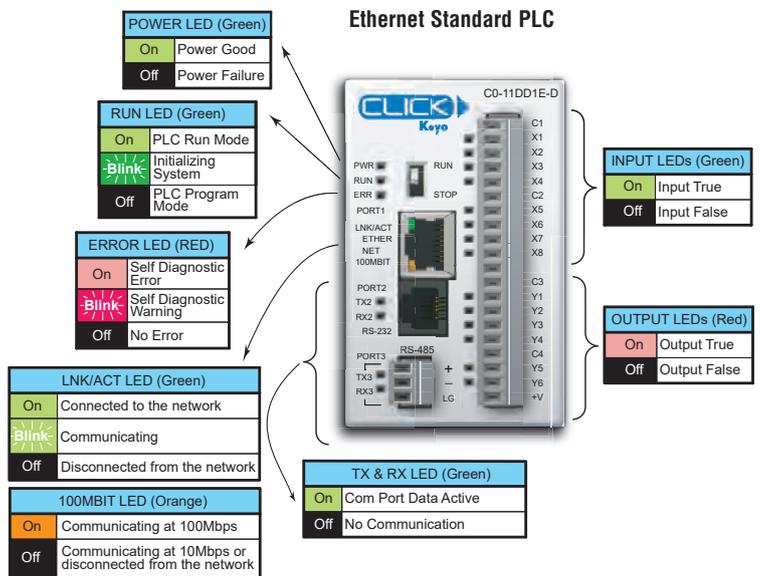
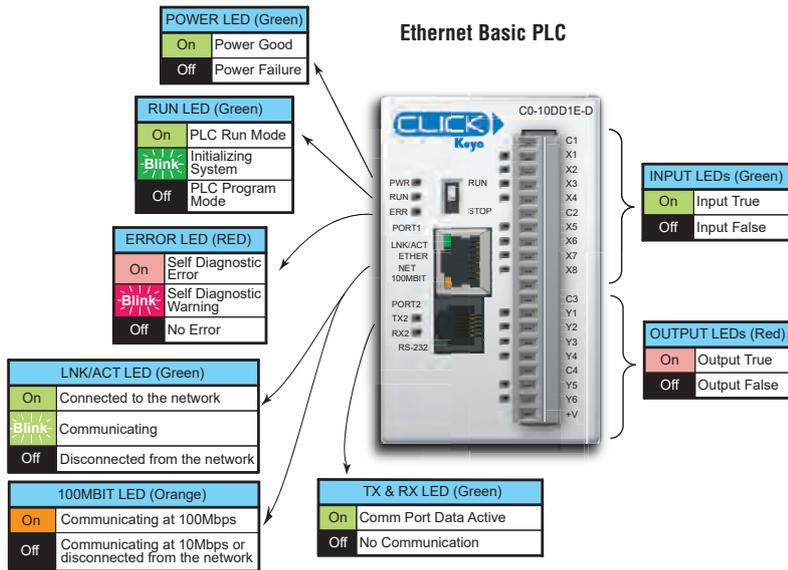
Appendix Book 1

Terms and Conditions



CLICK Specifications

PLC LED Status Indicators



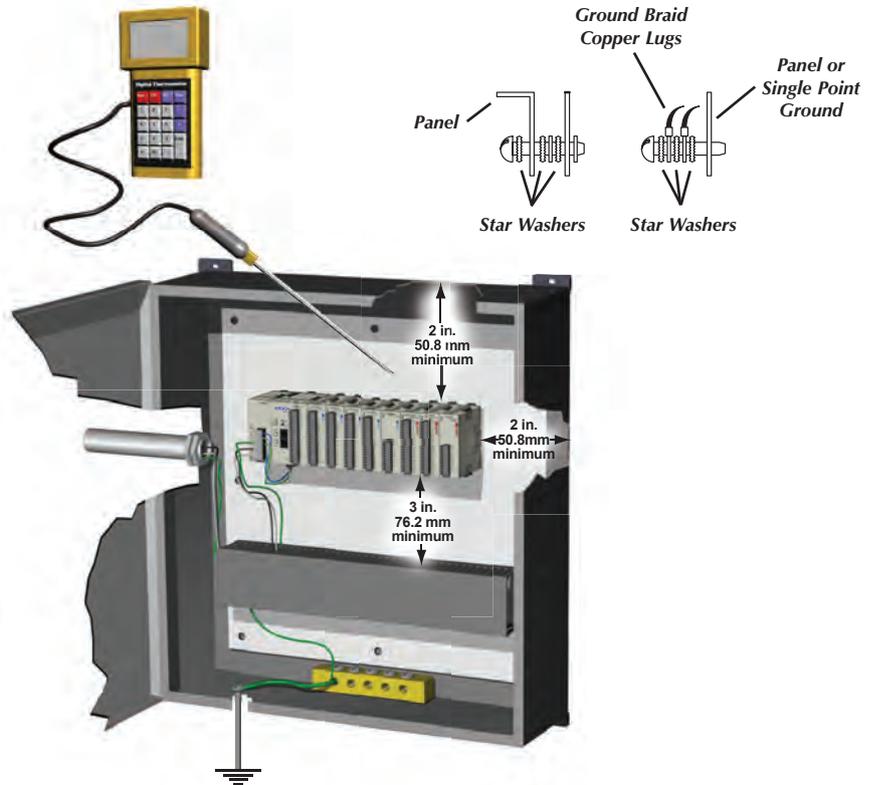
Product Dimensions and Installation

It is important to understand the installation requirements for your CLICK system. Your knowledge of these requirements will help ensure that your system operates within its environmental and electrical limits.

Plan for Safety

This catalog should never be used as a replacement for the user manual.

You can purchase, download free, or view online the user manuals for these products. Manual CO-USER-M is the user manual for the CLICK PLC. The user manual contains important safety information that must be followed. The system installation should comply with all appropriate electrical codes and standards.

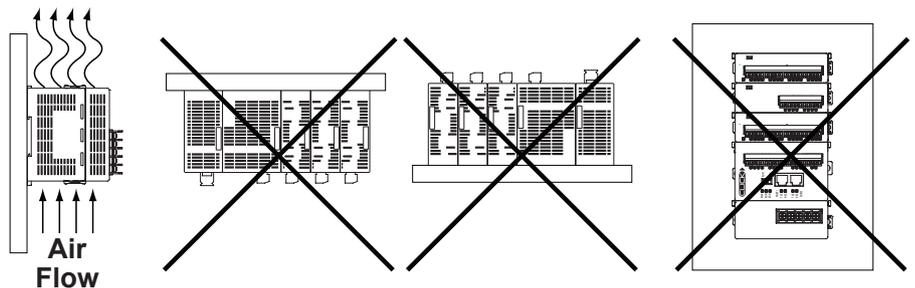


NOTE: THERE IS A MINIMUM CLEARANCE REQUIREMENT OF 2 INCHES (51 MM) BETWEEN THE CLICK PLC AND THE PANEL DOOR OR ANY DEVICES MOUNTED IN THE PANEL DOOR. THE SAME CLEARANCE IS REQUIRED BETWEEN THE PLC AND ANY SIDE OF THE ENCLOSURE. A MINIMUM CLEARANCE OF 3 INCHES (76 MM) IS REQUIRED BETWEEN THE PLC AND A WIREWAY OR ANY HEAT PRODUCING DEVICE.



Mounting Orientation

CLICK PLCs must be mounted properly to ensure ample airflow for cooling purposes. It is important to follow the unit orientation requirements and to verify that the PLC's dimensions are compatible with your application. Notice particularly the grounding requirements and the recommended cabinet clearances.



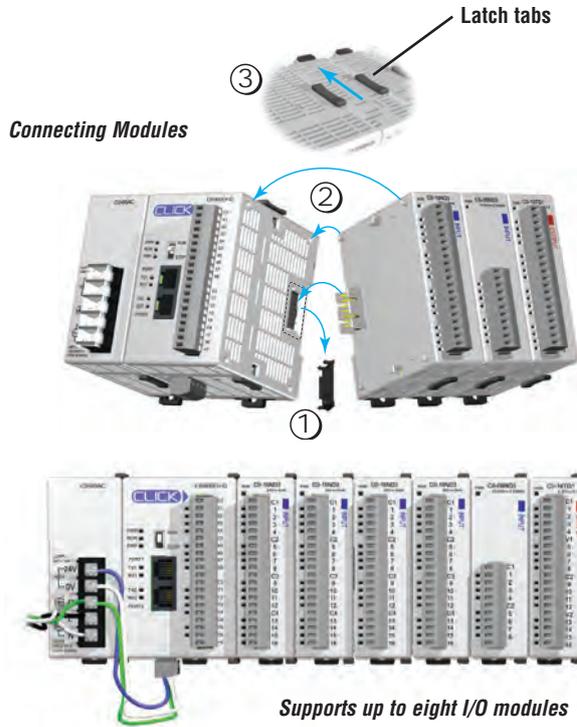


Product Dimensions and Installation

Connecting the Modules Together

CLICK PLCs, I/O modules and power supplies connect together using the extension ports that are located on the side panels of the modules (no PLC back-plane/base required).

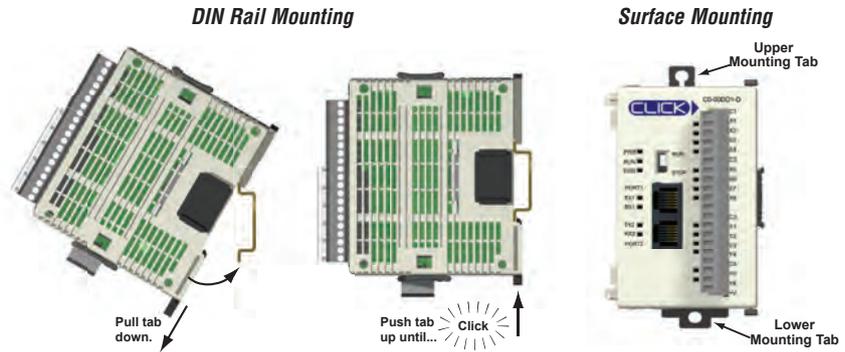
1. Remove extension port covers and slide the latch tabs forward.
2. Align the module pins and connection plug, and press the I/O module onto the right side of the PLC.
3. Slide the latch tabs backward to lock the modules together.



Mounting

The CLICK PLC system, which includes the CLICK power supplies, PLC units, and I/O modules, can be mounted in one of two ways.

1. DIN rail mounted
2. Surface mounted using the built-in upper and lower mounting tabs.



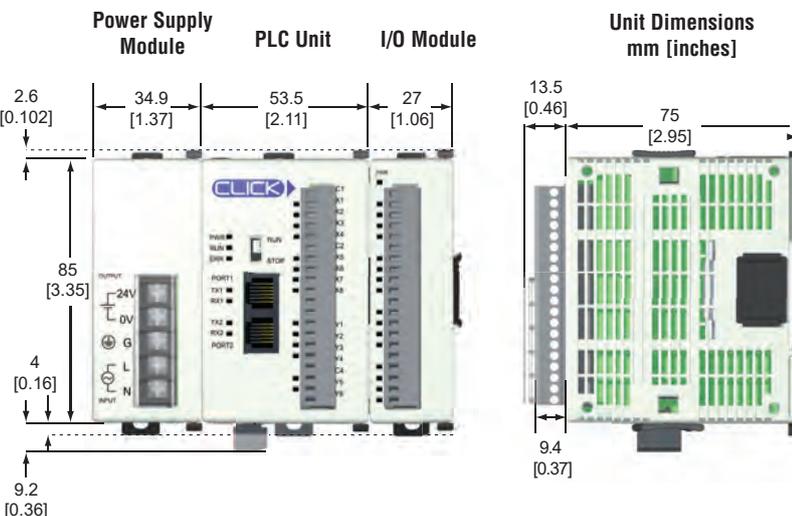
Unit Dimensions

The dimensional drawings here and on the next page show the outside dimensions of the CLICK power supply, PLC, and I/O modules. The CLICK PLC system is designed to be mounted on standard 35mm DIN rail, or it can be surface mounted.

Allow proper spacing from other components within an enclosure.

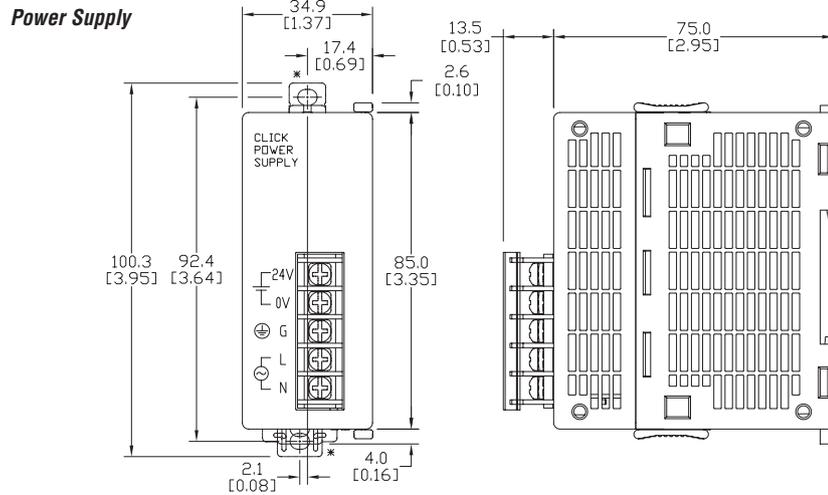
Maximum system:

Power Supply + PLC + 8 I/O modules.

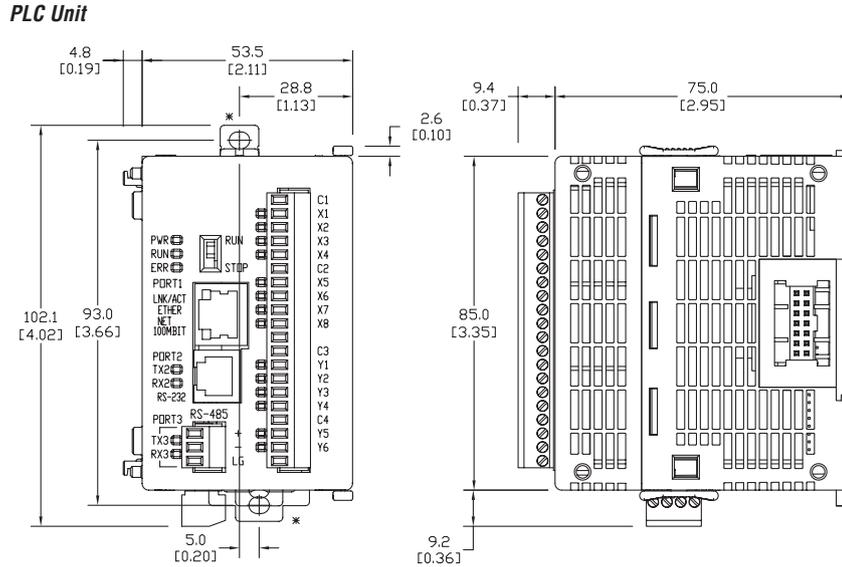


Product Dimensions and Installation

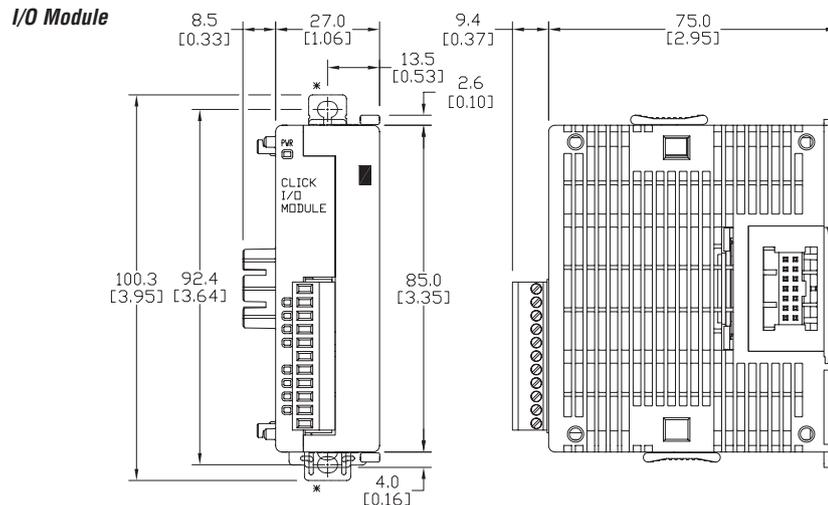
Unit Dimensions mm [inches]



*Use size M4 screws for tab mounting.



*Use size M4 screws for tab mounting.



*Use size M4 screws for tab mounting.



Networking the CLICK PLC

Built-in Communications Ports

Basic, Standard and Analog PLCs have two built-in RS-232 communications ports. Standard and Analog PLCs also have one built-in RS-485 communications port. One RS-232 port supports the Modbus RTU protocol only and can be used as the programming port. The other ports support either Modbus RTU or ASCII protocol. Both RS-232 ports supply 5V DC, so you can connect a monochrome C-more Micro HMI panel without an additional power supply.

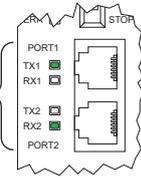
LED Status Indicators

There are LED indicators located to the left of each communications port to indicate when the port is transmitting or receiving.

Basic PLCs

Port 1 & 2 LED Status Indicators

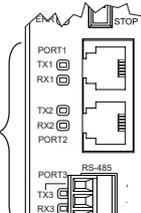
TX1 and TX2 (Green)	
On	The Comm Port is sending data.
Off	The Comm Port is not sending data.
RX1 and RX2 (Green)	
On	The Comm Port is receiving data.
Off	The Comm Port is not receiving data.



Standard and Analog PLCs

Port 1, 2, & 3 LED Status Indicators

TX1, TX2 and TX3 (Green)	
On	The Comm Port is sending data.
Off	The Comm Port is not sending data.
RX1, RX2 and RX3 (Green)	
On	The Comm Port is receiving data.
Off	The Comm Port is not receiving data.



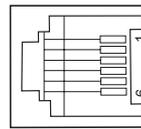
Basic PLC



Standard and Analog PLCs

Com Port 1 Specifications	
Use: Programming Port / Serial Communications (Slave only)	
Physical: 6 pin, RJ12, RS-232	
Communication speed (baud): 38400 (fixed)	
Parity: Odd	
Station Address: 1	
Data length: 8 bits	
Stop bit: 1	
Protocol: Modbus RTU (slave only)	

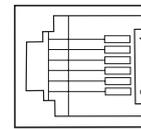
Port 1
6 pin RJ12 Phone Type Jack



Port 1 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232)
4	TXD	Transmit data (RS-232)
5	NC	No connection
6	0V	Power (-) connection (GND)

Com Port 2 Specifications	Default
Use: Serial Communications	-
Physical: 6 pin, RJ12, RS-232	-
Communication speed (baud): 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	38400
Parity: odd, even, none	Odd
Station Address: 1 to 247	1
Data length: 8 bits (Modbus RTU) or 7, 8 bits (ASCII)	8 bits
Stop bit: 1,2	1
Protocol: Modbus RTU (master/slave) or ASCII in/out	Modbus RTU

Port 2
6 pin RJ12 Phone Type Jack



Port 2 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232)
4	TXD	Transmit data (RS-232)
5	RTS	Request to send
6	0V	Power (-) connection (GND)

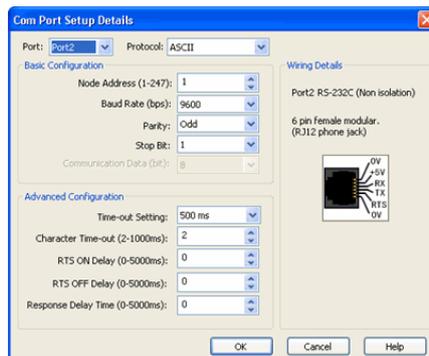
Com Port 3 Specifications	Default
Use: Serial Communications	-
Physical: 3 pin, RS-485	-
Communication speed (baud): 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	38400
Parity: odd, even, none	Odd
Station Address: 1 to 247	1
Data length: 8 bits (Modbus RTU) or 7, 8 bits (ASCII)	8 bits
Stop bit: 1,2	1
Protocol: Modbus RTU (master/slave) or ASCII in/out	Modbus RTU

Port 3
RS-485
+
-
LG

Port 3 Pin Descriptions		
1	+ (plus)	Signal A (RS-485)
2	- (minus)	Signal B (RS-485)
3	LG	Logic Ground(0 V)

Port Setup

Use CLICK programming software to easily configure the communications ports.



Networking the CLICK PLC

Prices as of October 15, 2015. Check Web site for most current prices.

Built-in Communications Ports

Ethernet Basic and Standard PLCs have one built-in Ethernet communications port and one RS-232 communications port. Ethernet Standard PLCs also have one built-in RS-485 communications port. The Ethernet port supports the Modbus TCP protocol. The RS-232 and RS-485 ports support either Modbus RTU or ASCII protocol. The RS-232 port supplies 5 VDC, so you can connect a monochrome C-more Micro HMI panel without an additional power supply.

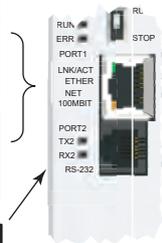
LED Status Indicators

There are LED indicators located to the left of each communication port to indicate when the port is transmitting or receiving.

Ethernet Basic PLCs

Port 1 & 2 LED Status Indicators

LNK/ACT LED (Green)	
On	Connected to the network
Blink	Communicating
Off	Disconnected from the network
100MBIT LED (Orange)	
On	Communicating at 100Mbps
Off	Communicating at 10Mbps or disconnected from the network



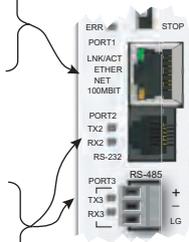
TX2 (Green)	
On	The Comm Port is sending data.
Off	The Comm Port is not sending data.

RX2 (Green)	
On	The Comm Port is receiving data.
Off	The Comm Port is not receiving data.

Ethernet Standard PLCs

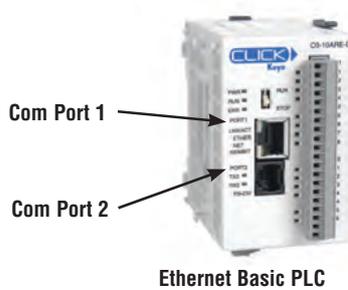
Port 1, 2 & 3 LED Status Indicators

LNK/ACT LED (Green)	
On	Connected to the network
Blink	Communicating
Off	Disconnected from the network
100MBIT LED (Orange)	
On	Communicating at 100Mbps
Off	Communicating at 10Mbps or disconnected from the network

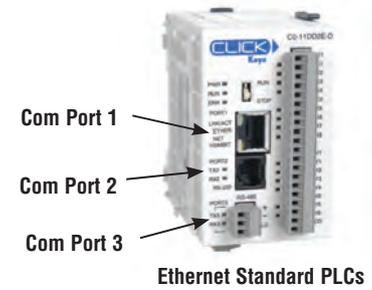


TX2 and TX3 (Green)	
On	The Comm Port is sending data.
Off	The Comm Port is not sending data.

RX2 and RX3 (Green)	
On	The Comm Port is receiving data.
Off	The Comm Port is not receiving data.



Ethernet Basic PLC

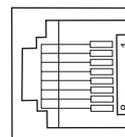


Ethernet Standard PLCs

Com Port 1 Specifications	
Use:	Programming and Ethernet Communication
Physical:	8 pin, RJ45, Ethernet
Communication speed (Mbps):	10/100
Protocol:	Modbus TCP

Port 1

8 pin RJ45

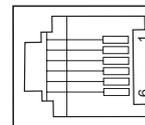


Port 1 Pin Descriptions		
1	TX+	Transmit Data (+)
2	TX-	Transmit Data (-)
3	RX+	Receive data (+)
4	NC	Not connected
5	NC	Not connected
6	RX-	Receive Data (-)
7	NC	No connection
8	NC	No connection

Com Port 2 Specifications	Default
Use:	Serial Communication
Physical:	6 pin, RJ12, RS-232
Communication speed (baud):	2400, 4800, 9600, 19200, 38400, 57600, 115200
Parity:	odd, even, none
Station Address:	1 to 247
Data length:	8 bits (Modbus RTU) or 7, 8 bits (ASCII)
Stop bit:	1, 2
Protocol:	Modbus RTU (master/slave) or ASCII in/out

Port 2

6 pin RJ12 Phone Type Jack

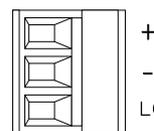


Port 2 Pin Descriptions		
1	0V	Power (-) connection (GND)
2	5V	Power (+) connection
3	RXD	Receive data (RS-232)
4	TXD	Transmit data (RS-232)
5	RTS	Request to send
6	0V	Power (-) connection (GND)

Com Port 3 Specifications	Default
Use:	Serial Communication
Physical:	3 pin, RS-485
Communication speed (baud):	2400, 4800, 9600, 19200, 38400, 57600, 115200
Parity:	odd, even, none
Station Address:	1 to 247
Data length:	8 bits (Modbus RTU) or 7, 8 bits (ASCII)
Stop bit:	1, 2
Protocol:	Modbus RTU (master/slave) or ASCII in/out

Port 3

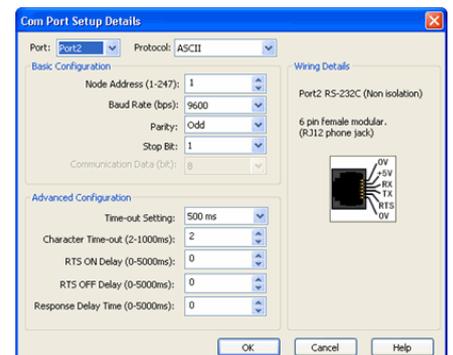
RS-485



Port 3 Pin Descriptions		
1	+ (plus)	Signal A (RS-485)
2	- (minus)	Signal B (RS-485)
3	LG	Logic Ground(0 V)

Port Setup

Use CLICK programming software to easily configure the communication ports.





Networking the CLICK PLC

Typical Communication Applications

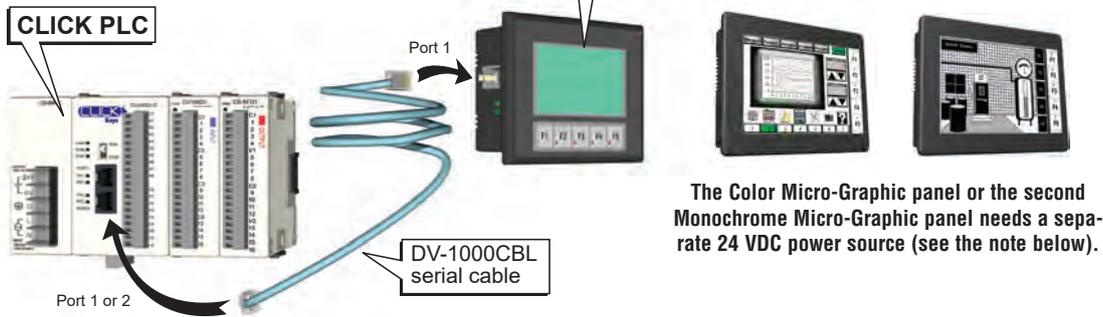
The diagrams on these three pages illustrate the typical uses for the CLICK PLC's communication ports.

Port 1 (RS-232) – Modbus RTU Slave Mode Only



 C-more Micro-Graphic panels (monochrome models only) can get 5 VDC power from Com port 1 or 2.

Example



 **NOTE:** CLICK's (RS-232) Port 1 and Port 2 can provide 5 VDC power to the panel, but not at the same time. If a C-more Micro-Graphic panel is connected to both ports, then at least one of the panels must be powered by a C-more Micro DC power adapter, EA-MG-P1 or EA-MG-SP1, or another 24 VDC power source. Color C-more Micro-Graphic panels must also be powered from a separate 24 VDC source.

Do not use the following DirectLOGIC devices with CLICK's Port 1 or 2:

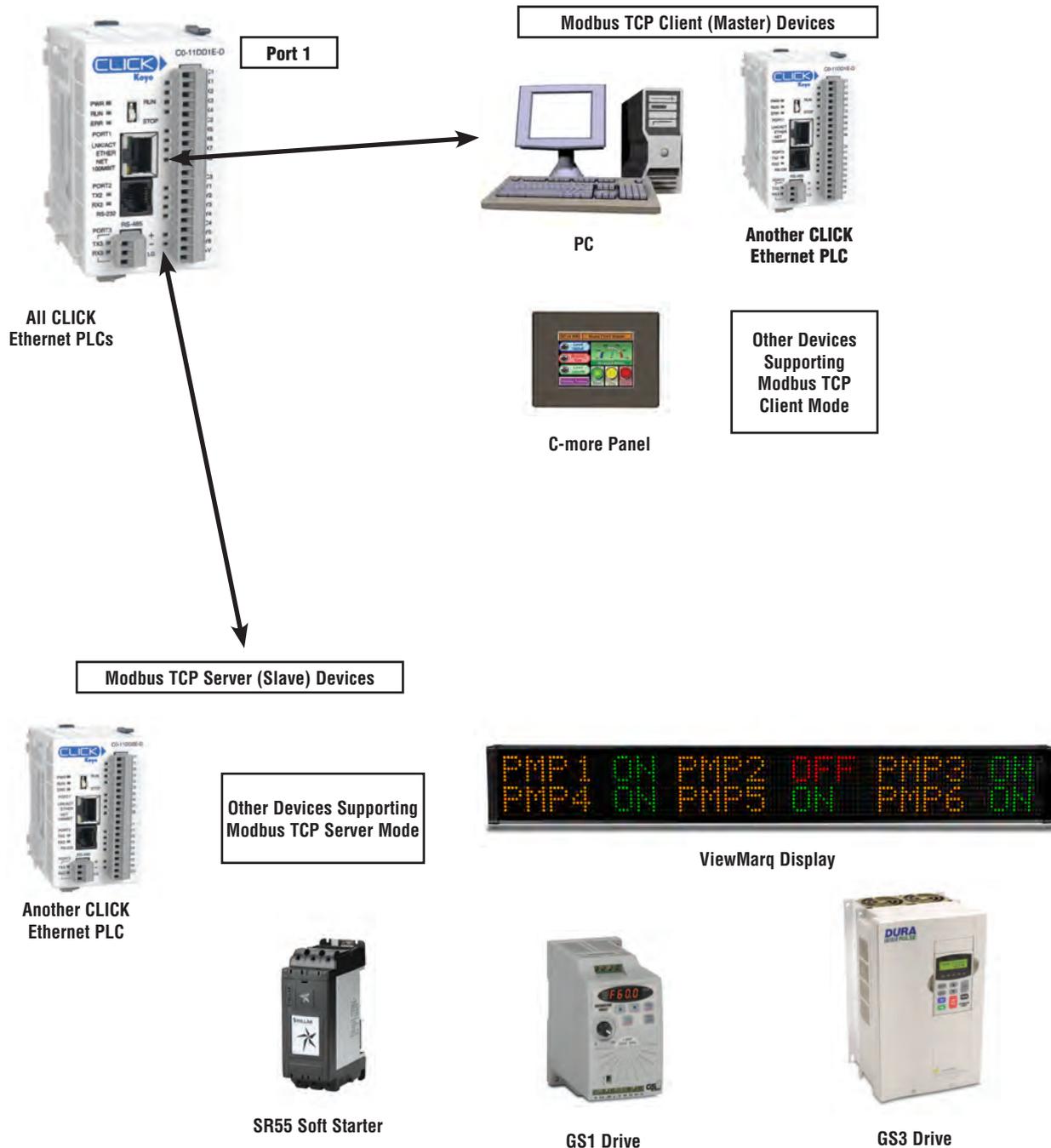


WARNING: The following DirectLOGIC PLC devices cannot be used with a CLICK PLC's Port 1 or Port 2:
 Handheld Programmer for DL05, DL06, DL105, DL205 & D3-350 CPUs, p/n D2-HPP
 Handheld Programmer for DL405 CPUs, p/n D4-HPP-1
 Timer/Counter Access for DL05, DL06, DL105, DL205, DL405 & D3-350 CPUs, p/n DV-1000



Networking the CLICK PLC

Port 1 (Ethernet) – Modbus TCP





Networking the CLICK PLC

Company Information

Control Systems Overview

CLICK PLC

Do-More PLCs Overview

Do-More H2 PLC

Do-More T1H PLC

DirectLOGIC PLCs Overview

DirectLOGIC DL05/06

DirectLOGIC DL105

DirectLOGIC DL205

DirectLOGIC DL305

DirectLOGIC DL405

Productivity 2000

Productivity 3000

Universal Field I/O

Software

C-More HMI

C-More Micro HMI

ViewMarq Industrial Marquees

Other HMI

Communications

Appendix Book 1

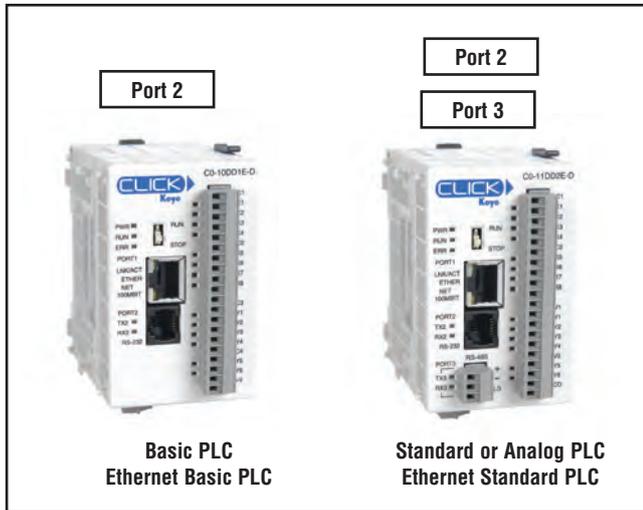
Terms and Conditions

Port 2 (RS-232) – Modbus RTU or ASCII

Port 3 (RS-485; Standard, Ethernet Standard and Analog PLCs Only) – Modbus RTU or ASCII

All PLCs have RS-232 port 2, but only Standard, Analog and Ethernet Standard PLCs have RS-485 port 3.

Ports 2 and 3 allow networking to similar devices.



Modbus RTU

Modbus RTU Master Devices



See Note on previous page about connecting a C-more Micro-Graphic panel to Port 1 or 2.

C-more and C-more Micro-Graphic Panel

Other Devices Supporting Modbus RTU Master Mode

ASCII

Devices that SEND ASCII messages



Barcode Reader

Weigh Scale

Other devices that can send ASCII data.

Devices that RECEIVE ASCII messages



Serial Printer

ViewMarq Display

Other devices that can receive ASCII data.

Modbus RTU Slave Devices



Another CLICK PLC

SOLO Temperature Controller (CLICK Port 3 Only)

Other Devices Supporting Modbus RTU Slave Mode

Power Supplies

Power Supplies

The CLICK PLC family offers two 24 VDC power supplies. They are identical except for the output current.

It is not mandatory to use one of these CLICK power supplies for the CLICK PLC system. You can use any other 24 VDC power supply that Automationdirect.com offers, including the PSP24-DC12-1 12 VDC to 24 VDC converter shown below.

CO-00AC Power Supply

Limited auxiliary AC power supply allows you to power the 24 VDC CLICK C0 series PLCs with 100-240 VAC supply power. The 0.5A DC power supply is capable of controlling the PLC plus a limited configuration based on the power budget of each I/O module. The CO-00AC is a low-cost solution for applications requiring only minimal I/O and power consumption. This power supply will not support a fully-populated CLICK PLC system with all possible I/O module combinations.

CO-01AC Power Supply

Expanded auxiliary AC power supply allows you to power the 24 VDC CLICK C0 series PLCs with 100-240 VAC supply power. The 1.3A DC power supply is capable of supporting a fully-populated CLICK PLC system with all possible I/O module combinations, with no concerns for exceeding the power budget.

PSP24-DC12-1 DC-DC Converter

With this DC-DC converter you can operate the CLICK PLC with 12 VDC input power.

CLICK 24 VDC Power Supply Ratings		
Part Number	Output Current	Price
CO-00AC	0.5 A	\$29.00
CO-01AC	1.3 A	\$39.00

CO-00AC Power Supply Specifications	
Input Voltage Range	85-264 VAC
Input Frequency	47-63 Hz
Input Current (typical)	0.3 A @ 100 VAC, 0.2 A @ 200 VAC
Inrush Current	30 A
Output Voltage Range	23-25 VDC
Output Current	0.5 A
Over Current Protection	@ 0.65 A (automatic recovery)
Weight	5.3 oz (150g)

CO-01AC Power Supply Specifications	
Input Voltage Range	85-264 VAC
Input Frequency	47-63 Hz
Input Current (typical)	0.9 A @ 100 VAC, 0.6 A @ 200 VAC
Inrush Current	30 A
Output Voltage Range	23-25 VDC
Output Current	1.3 A
Over Current Protection	@ 1.6 A (automatic recovery)
Weight	6.0 oz (170g)

PSP24-DC12-1 DC-DC Converter Specifications	
Input Voltage Range	9.5-18 VDC
Input Power (no load)	1.0 W max.
Startup Voltage	8.4 VDC
Undervoltage Shutdown	7.6 VDC
Output Voltage Range	24-28 VDC (adjustable)
Output Current	1.0 A
Short Circuit Protection	Current limited at 110% typical
Weight	7.5 oz (213g)



24 VDC Output Power Terminals (for CLICK PLC, I/O or field device, etc.)

85-264 VAC Power Source Input Terminals

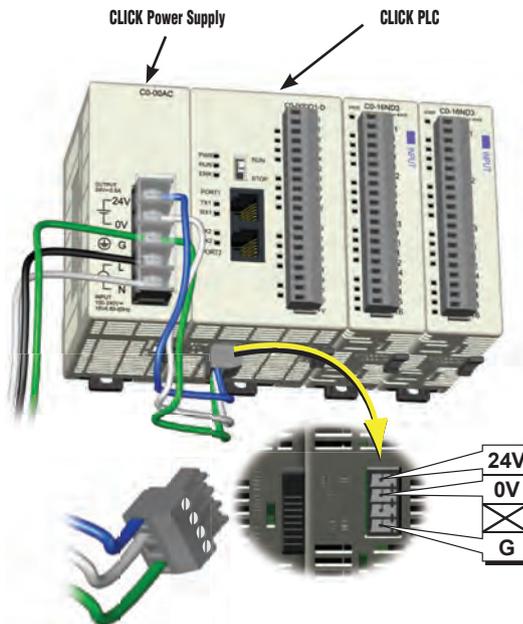


24 VDC Output Power Terminals (for CLICK PLC, I/O or field device, etc.)

85-264 VAC Power Source Input Terminals



PSP24-DC12-1



24 VDC power is supplied to the PLC unit through wiring connected from the power supply output to the 4-pin 24 VDC input connector located on the bottom of the PLC unit.



Power Budgeting

Power Budgeting

There are two areas to be considered when determining the power required to operate a CLICK PLC system. The first area is the power required by the CLICK PLC, along with the internal logic side power that the CPU provides to its own I/O and any connected I/O modules that are powered through the PLC expansion port; plus any device, such as a C-more Micro-Graphic panel, that is powered through one of the communications ports. The second area is the power required by all externally connected I/O devices. This should be viewed as the field side power required. The field side power is dependent on the voltage used for a particular input or output device as it relates to the wired I/O point, and the calculated load rating of the connected device.

It is strongly recommended that the power source for the logic side be separate from the power source for the field side to help eliminate possible electrical noise.

Power budgeting requires the calculation of the total current the 24 VDC power source needs to provide to CLICK's logic side, and also a separate calculation of the total current required for all devices operating from the field side of the PLC system.

Refer to the Power Budgeting example shown on the following page. The table shows required current for a CLICK PLC, two I/O modules, and a C-more Micro. Use the total amperage values to select the properly sized power supply.



CLICK 24 VDC Power Supply
CO-00AC or CO-01AC



Other 24 VDC Power Supply
Example: PSP24-60S

PLC Current Consumption (mA)		
Part Number	Power Budget 24 VDC (logic side)	External 24 VDC (field side)
Basic PLC Units		
CO-00DD1-D	120	60
CO-00DD2-D		
CO-00DR-D	120	0
CO-00AR-D		
Standard PLC Units		
CO-01DD1-D	140	60
CO-01DD2-D		
CO-01DR-D	140	0
CO-01AR-D		
Analog PLC Units		
CO-02DD1-D	140	60
CO-02DD2-D	140	0
CO-02DR-D		
Ethernet Basic PLC Units		
CO-10DD1E-D	120	60
CO-10DD2E-D		
CO-10DRE-D	120	0
CO-10ARE-D		
Ethernet Standard PLC Units		
CO-11DD1E-D	140	60
CO-11DD2E-D		
CO-11DRE-D	140	0
CO-11ARE-D		

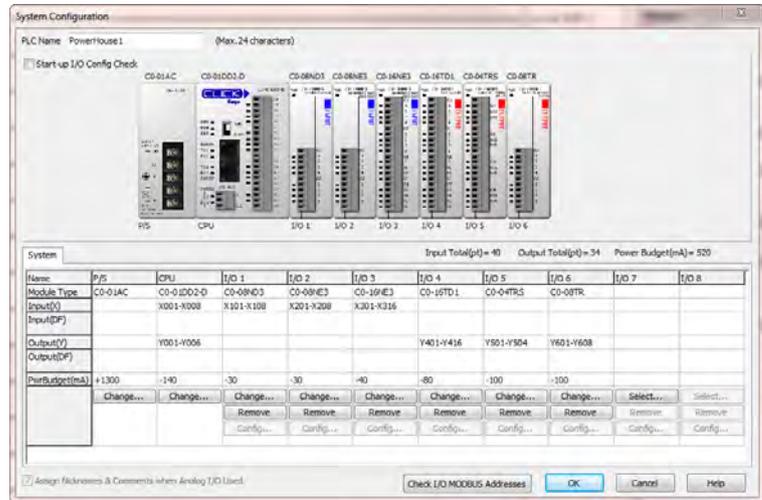
I/O Module Current Consumption (mA)		
Part Number	Power Budget 24 VDC (logic side)	External 24 VDC (field side)
Discrete Input Modules		
CO-08ND3	30	0
CO-08ND3-1	30	0
CO-16ND3	40	0
CO-08NE3	30	0
CO-16NE3	40	0
CO-08NA	30	0
Discrete Output Modules		
CO-08TD1	50	15
CO-08TD2	50	0
CO-16TD1	80	100
CO-16TD2	80	0
CO-08TA	80	0
CO-04TRS	100	0
CO-08TR	100	0

I/O Module Current Consumption (continued) (mA)		
Part Number	Power Budget 24 VDC (logic side)	External 24 VDC (field side)
Discrete Combo I/O Modules		
CO-16CDD1	80	50
CO-16CDD2	80	0
CO-08CDR	80	0
Analog Input Modules		
CO-04AD-1	20	65
CO-04AD-2	23	65
CO-04RTD	25	0
CO-04THM	25	0
Analog Output Modules		
CO-04DA-1	20	145
CO-04DA-2	20	85
Analog Combo I/O Modules		
CO-4AD2DA-1	25	75
CO-4AD2DA-2	20	65
C-more Micro-Graphic Panel		
Monochrome only	90	0

Power Budgeting

Power Budgeting Using the CLICK Programming Software

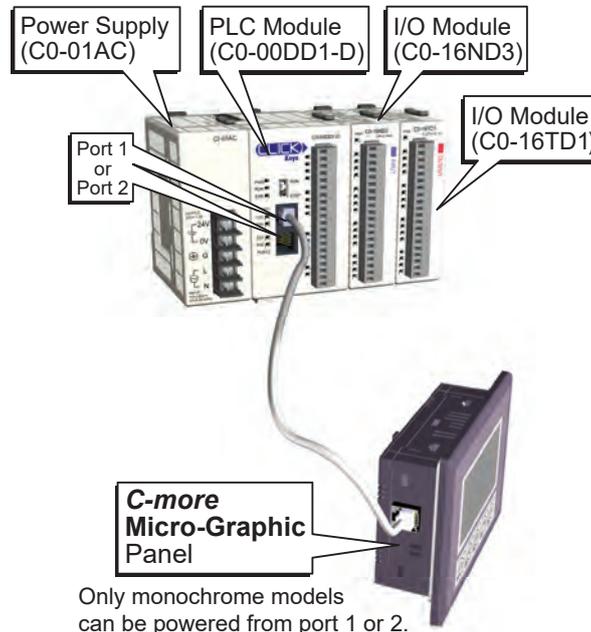
The CLICK Programming software can also be used for power budgeting. Based on the amperage rating of the power supply selected in the first column, your power budget is calculated by subtracting each consecutive module's power consumption from the total available power budget. If you exceed the maximum allowable power consumption the power budget row is highlighted in red.



Power Budgeting Example

Current Consumption (mA) Example		
Part Number	Power Budget 24 VDC (logic side)	External 24 VDC (field side)
CO-00DD1-D	120	60
CO-16ND3	40	0
CO-16TD1	80	100
C-more Micro	90	0
Total:	330	160*

* Add in calculated load of connected I/O devices.





Wiring System for CLICK PLCs

Wiring Solutions using the ZIPLink Wiring System

ZIPLinks eliminate the normally tedious process of wiring between devices by utilizing prewired cables and DIN rail mount connector modules. It's as simple as plugging in a cable connector at either end or terminating wires at only one end. Prewired cables keep installation clean and efficient, using half the space at a fraction of the cost of standard terminal blocks.

ZIPLinks are available in a variety of styles to suit your needs, including feedthrough connector module. ZIPLinks are available for all Basic, Standard and Ethernet CLICK PLC units and most discrete and analog I/O modules. Pre-printed I/O-specific adhesive label strips for quick marking of ZIPLink modules are provided with ZIPLink cables.



Solution 1: CLICK PLC and I/O Modules to ZIPLink Connector Modules

When looking for quick and easy I/O-to-field termination, a ZIPLink connector module used in conjunction with a prewired ZIPLink cable, consisting of an I/O terminal block at one end and a multi-pin connector at the other end, is the best solution.

Use the "CLICK PLC PLC Unit ZIPLink Selector" table and CLICK I/O ZIPLink selector tables located in this section:

1. Locate your PLC or I/O module.
2. Select a ZIPLink Module.
3. Select a corresponding ZIPLink Cable.

Solution 2: CLICK PLC and I/O Modules to 3rd Party Devices

When wanting to connect I/O to another device within close proximity of the I/O modules, no extra terminal blocks are necessary when using the ZIPLink Pigtail Cables. ZIPLink Pigtail Cables are prewired to an I/O terminal block with color-coded pigtail with soldered-tip wires on the other end.

Use the I/O Modules to 3rd Party Devices selector tables located in the ZIPLink section:

1. Locate your PLC or I/O module.
2. Select a ZIPLink Pigtail Cable that is compatible with your 3rd party device.



Solution 3: GS Series and DuraPulse Drives Communication Cables

Need to communicate via Modbus RTU to a drive or a network of drives?

ZIPLink cables are available in a wide range of configurations for connecting to PLCs and SureServo, SureStep, Stellar Soft Starter and AC drives. Add a ZIPLink communications module to quickly and easily set up a multi-device network.

Use the Drives Communication selector tables located in the ZIPLink section:

1. Locate your Drive and type of communications.
2. Select a ZIPLink cable and other associated hardware.



Solution 4: Serial Communications Cables

ZIPLink offers communications cables for use with CLICK PLCs that can also be used with other communications devices. Connections include a 6-pin RJ12 connector which can be used in conjunction with the RJ12 Feedthrough module.

Use the Serial Communications Cables selector table located in the ZIPLink section:

1. Locate your connector type
2. Select a cable.





Wiring System for CLICK PLCs

CLICK PLC ZIPLink Selector								
PLC		ZIPLink						
PLC Unit	# of Terms	Component	Module Part No.	Cable Part No.				
CO-00DD1-D	20	Feedthrough	ZL-RTB20	ZL-CO-CBL20 *				
CO-00DD2-D								
CO-00DR-D								
CO-00AR-D								
CO-01DD1-D								
CO-01DD2-D								
CO-01DR-D								
CO-01AR-D								
CO-10DD1E-D								
CO-10DD2E-D								
CO-10DRE-D								
CO-10ARE-D								
CO-11DD1E-D								
CO-11DD2E-D								
CO-11DRE-D								
CO-11ARE-D								
CO-02DD1-D					20	No ZIPLinks are available for analog PLC Units.		
CO-02DD2-D								
CO-02DR-D								

CLICK PLC Discrete Input Module ZIPLink Selector				
I/O Module		ZIPLink		
Input Module	# of Terms	Component	Module Part No.	Cable Part No.
CO-08ND3	11	Feedthrough	ZL-RTB20	ZL-CO-CBL11 *
CO-08ND3-1				
CO-08NE3				
CO-08NA				
CO-16ND3	20	Feedthrough	ZL-RTB20	ZL-CO-CBL20 *
		Sensor	ZL-LTB16-24	
CO-16NE3	20	Feedthrough	ZL-RTB20	
		Sensor	ZL-LTB16-24	

¹ Note: The CO-04TRS relay output is derated not to exceed 2A per point maximum when used with the ZIPLink wiring system.

² Note: Fuses (5 x 20 mm) are not included. See Edison Electronic Fuse section for (5 x 20 mm) fuse. S500 and GMA electronic circuit protection for fast-acting maximum protection. S506 and GMC electronic circuit protection for time-delay performance. Ideal for inductive circuits. To ensure proper operation, do not exceed the voltage and current rating of ZIPLink module. ZL-RFU20 = 2A per circuit.

CLICK PLC Discrete Output Module ZIPLink Selector				
I/O Module		ZIPLink		
Output Module	# of Terms	Component	Module Part No.	Cable Part No.
CO-08TD1	11	Feedthrough	ZL-RTB20	ZL-CO-CBL11 *
CO-08TD2				
CO-08TR				
CO-08TA				
CO-16TD1	20	Feedthrough	ZL-RTB20	ZL-CO-CBL20*
		Fuse	ZL-RFU20 ²	
		Relay (sinking)	ZL-RR16-24-1	
CO-16TD2	20	Feedthrough	ZL-RTB20	ZL-CO-CBL20 *
		Fuse	ZL-RFU20 ²	
		Relay (sourcing)	ZL-RR16-24-2	
CO-04TRS ¹	20	Feedthrough	ZL-RTB20	ZL-CO-CBL20 *

CLICK PLC Combo I/O Module ZIPLink Selector				
I/O Module		ZIPLink		
Combo Module	# of Terms	Component	Module Part No.	Cable Part No.
CO-16CDD1	20	Feedthrough	ZL-RTB20	ZL-CO-CBL20 *
CO-16CDD2				
CO-08CDR	11	Feedthrough	ZL-RTB20	ZL-CO-CBL11 *

CLICK PLC Analog I/O Module ZIPLink Selector				
I/O Module		ZIPLink		
Analog Module	# of Terms	Component	Module Part No.	Cable Part No.
CO-04AD-1	11	Feedthrough	ZL-RTB20	ZL-CO-CBL11 *
CO-04AD-2	11	Feedthrough	ZL-RTB20	ZL-CO-CBL11 *
CO-04RTD	20	No ZIPLinks are available for RTD and thermocouple modules.		
CO-04THM	11			
CO-04DA-1	11	Feedthrough	ZL-RTB20	ZL-CO-CBL11 *
CO-04DA-2	11	Feedthrough	ZL-RTB20	ZL-CO-CBL11 *
CO-4AD2DA-1	20	Feedthrough	ZL-RTB20	ZL-CO-CBL20 *
CO-4AD2DA-2	20	Feedthrough	ZL-RTB20	ZL-CO-CBL20 *

* Select the cable length by replacing the * with: Blank = 0.5m, -1 = 1.0m, or -2 = 2.0m.

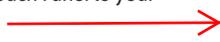
- Company Information
- Control Systems Overview
- CLICK PLC
- Do-More PLCs Overview
- Do-More H2 PLC
- Do-More T1H PLC
- DirectLOGIC PLCs Overview
- DirectLOGIC DL05/06
- DirectLOGIC DL105
- DirectLOGIC DL205
- DirectLOGIC DL305
- DirectLOGIC DL405
- Productivity 2000
- Productivity 3000
- Universal Field I/O
- Software
- C-More HMI
- C-More Micro HMI
- ViewMarq Industrial Marquees
- Other HMI
- Communications
- Appendix Book 1
- Terms and Conditions

C-more Operator Panels Overview

Getting started

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

- **C-more** touch panel - 6", 8", 10", 12" or 15" model
- **C-more** Programming Software, p/n EA9-PGMSW
- **C-more** programming cable, USB or Ethernet
- 12-24 VDC switching power supply or the optional **C-more** AC Power Adapter, p/n EA-AC
- Personal Computer - to run **C-more** programming software
- PLC communications cable (serial or Ethernet) to connect the **C-more** Touch Panel to your controller



Part Number	Description	Price
EA9-T6CL-R	C-more EA9 series touch screen interface panel, 6-inch color TFT (5.7 inch viewable screen), base model, 64k colors, 320 x 240 pixel QVGA screen resolution, 800 MHz CPU, 12-24 VDC powered, NEMA 4/4X, IP65 (when mounted correctly; for indoor use only), non-replaceable LED backlight. Includes (1) serial port, USB 2.0 Type A and B ports, supports SD memory card, no Ethernet support. Compatible with EA9-PGMSW programming software version 5.0 or later.	<--->
EA9-T6CL	C-more EA9 series touch screen interface panel, 6-inch color TFT (5.7 inch viewable screen), 64k colors, 320 x 240 pixel QVGA screen resolution, 800 MHz CPU, 12-24 VDC powered, NEMA 4/4X, IP65 (when mounted correctly; for indoor use only), non-replaceable LED backlight. Includes (3) serial ports, USB 2.0 Type A and B ports and Ethernet port; supports SD memory card. Compatible with EA9-PGMSW programming software version 5.0 or later.	<--->
EA9-T8CL	C-more EA9 series touch screen interface panel, 8-inch color TFT (8.4 inch viewable screen), 64k colors, 800 x 600 pixel SVGA screen resolution, 800 MHz CPU, 12-24 VDC powered, NEMA 4/4X, IP65 (when mounted correctly; for indoor use only), non-replaceable LED backlight. Includes (3) serial ports, USB 2.0 Type A and B ports and Ethernet port; supports SD memory card. Compatible with EA9-PGMSW programming software version 5.0 or later.	<--->
EA9-T10CL	C-more EA9 series touch screen interface panel, 10-inch color TFT (10.4 inch viewable screen), 64k colors, 800 x 600 pixel SVGA screen resolution, 800 MHz CPU, 12-24 VDC powered, NEMA 4/4X, IP65 (when mounted correctly; for indoor use only), non-replaceable LED backlight. Includes (3) serial ports, USB 2.0 Type A and B ports and Ethernet port; supports SD memory card. Compatible with EA9-PGMSW programming software version 5.0 or later.	<--->
EA9-T12CL	C-more EA9 series touch screen interface panel, 12-inch color TFT (12.1 inch viewable screen), 64k colors, 800 x 600 pixel SVGA screen resolution, 800 MHz CPU, 12-24 VDC powered, NEMA 4/4X, IP65 (when mounted correctly; for indoor use only), non-replaceable LED backlight. Includes (3) serial ports, USB 2.0 Type A and B ports and Ethernet port; supports (2) SD memory cards. Includes HDMI video out. Compatible with EA9-PGMSW programming software version 5.0 or later.	<--->
EA9-T15CL	C-more EA9 series touch screen interface panel, 15-inch color TFT (15 inch viewable screen), 64k colors, 1024 x 768 pixel XGA screen resolution, 800 MHz CPU, 12-24 VDC powered, NEMA 4/4X, IP65 (when mounted correctly; for indoor use only), non-replaceable LED backlight. Includes (3) serial ports, USB <None> 2.0 Type A and B ports and Ethernet port; supports (2) SD memory cards. Includes HDMI video out. Compatible with EA9-PGMSW programming software version 5.0 or later.	<--->
EA9-PGMSW	C-more Windows-based programming software on CD for the C-more EA9 series touch panels. Requires Windows XP Pro 32-bit, Windows 7 (Pro, Ultimate, 32 or 64-bit) or Windows 8 (Pro, Ultimate, 32 or 64-bit). Requires USB or Ethernet connection to touch panel. Cables sold separately. (Does not support C-more EA7 series panels.)	<--->
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 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 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 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 power source for configuration and operation.)	<--->

C-more Selection Guide & Specifications

Specification	Model	6" TFT color w/ base features	6" TFT color w/ full features	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		EA9-T6CL-R	EA9-T6CL	EA9-T8CL	EA9-T10CL	EA9-T12CL	EA9-T15CL
Price		<--->	<--->	<--->	<--->	<--->	<--->
Display Actual Size and Type		5.7" TFT color		8.4" TFT color	10.4" TFT color	12.1" TFT color	15.0" TFT color
Display Viewing Area		4.54" x 3.40" [115.2 mm x 86.4 mm]		6.71" x 5.03" [170.4 mm x 127.8 mm]	8.31" x 6.24" [211.2 mm x 158.4 mm]	9.69" x 7.26" [246.0 mm x 184.5 mm]	11.97" x 8.98" [304.1 mm x 228.0 mm]
Weight		1.56 lb [710g]	1.59 lb [720g]	2.93 lb [1330g]	4.19 lb [1900g]	4.89 lb [2200g]	6.50 lb [2950g]
Screen Pixels		320 x 240 (QVGA)		800 x 600 (SVGA)			1024 x 768 (XGA)
Display Brightness		280 nits (typ)		310 nits (typ)	280 nits (typ)		
LCD Panel Dot Pitch		0.18 mm x 0.18 mm		0.213 mm x 0.213 mm	0.264 mm x 0.264 mm	0.3075 mm x 0.3075 mm	0.297 mm x 0.297 mm
Color Scale		65,536 colors					
Backlight Average Lifetime*		50,000 hours @ 25°C					
Touch Panel Type		Four-wire analog resistive					
Project Memory		26MB				82MB	
Number of Screens		Up to 999 screens – limited by project memory					
Realtime Clock		Realtime Clock Built into panel, backed up for 30 days at 25°C					
Calendar - Month / Day / Year		Yes - monthly deviation 60 sec (Reference)					
Serial Port 1		15-pin D-sub female - RS232C, RS-422/485					
Serial Port 2	N/A						3-wire terminal block - RS-485
Serial Port 3	N/A						RJ-12 modular jack - RS-232C
USB Port - Type B		USB 2.0 High speed (480 Mbps) Type B - Download/Program					
USB Port - Type A		USB 2.0 High speed (480 Mbps) Type A -for USB device options					
Ethernet Port	N/A						Ethernet Port Ethernet 10/100 Base-T, auto MDI/MDI-X
Audio Line Out	N/A						3.5 mm mini jack – requires amplifier and speaker(s)
Mic In	N/A						3.5 mm mini jack
SD Card Slot		1 slot supports max 2 GB (SD,) max 32 GB (SDHC)				2 slots support max 2 GB (SD), max 32 GB (SDHC)	
HDMI Out		N/A				Yes	
Supply Power		12-24 VDC Class 2, or use the AC/DC Power Adapter, EA-AC, to power the touch panel from a 100-240 VAC, 50/60 Hz power source. Reverse Polarity Protected					
Power Consumption		16.0 W 1.30 A @ 12VDC 0.66 A @ 24VDC		18.0 W 1.50 A @ 12VDC 0.75 A @ 24VDC	18.0 W 1.50 A @ 12VDC 0.75 A @ 24VDC	21.0 W 1.75 A @ 12VDC 0.88 A @ 24VDC	29.0 W 2.40 A @ 12VDC 1.20 A @ 24VDC
Internal Fuse (non-replaceable)		4.0 A		6.3 A			
Operating Temperature		0 to 50 °C (32 to 122 °F) Maximum surrounding air temperature rating: 50°C (122°F) IEC 60068-2-14 (Test Nb, Thermal Shock)					
Storage Temperature		-20 to +60°C (-4 to +140 °F) IEC 60068-2-1 (Test Ab, Cold) IEC 60068-2-2 (Test Bb, Dry Heat) IEC 60068-2-14 (Test Na, Thermal Shock)					
Humidity		5–95% RH (non-condensing)					
Environment		For use in Pollution Degree 2 environment, no corrosive gases permitted					
Noise Immunity		NEMA ICS3-304 (EN61131-2) RFI, (145MHz, 440Mhz 10W @ 10cm) Impulse 1000V @ 1mS pulse EN61000-4-2 (ESD), EN61000-4-3 (RFI) EN61000-4-4 (FTB) EN61000-4-5 (Serge) EN61000-4-6 (Conducted) EN61000-4-8 (Power frequency magnetic field immunity)					
Withstand Voltage		1000 VAC, 1 min. (FG to Power supply)					
Insulation Resistance		> 10M ohm @ 500VDC (FG to Power supply)					
Vibration		IEC60068-2-6 (Test Fc)					
Shock		IEC60068-2-27 (Test Ea)					
Emission		EN55011 Class A (Radiated RF emission)					
Enclosure		NEMA 250 type 4/4X indoor use only UL50 type 4X indoor use only IP-65 indoor use only (When mounted correctly)					
Agency Approvals		UL508, E157382 CE (EN61131-2), RoHS (2011/65/EU) CUL Canadian C22.2					

* 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 12" TFT Color Touch Panel - Full Model

Part No. EA9-T12CL

C-more EA9 series touch screen interface panel, 12-inch color TFT (12.1 inch viewable screen), 64k colors, 800 x 600 pixel SVGA screen resolution, 800 MHz CPU, 12-24 VDC powered, NEMA 4/4X, IP65 (when mounted correctly; for indoor use only), non-replaceable LED backlight. Includes (3) serial ports, USB 2.0 Type A and B ports and Ethernet port; supports (2) SD memory cards. Includes HDMI video out. Compatible with EA9-PGMSW programming software version 5.0 or later.

Features

- 12.1" diagonal color TFT (Thin Film Transistor) LCD display with 64K colors
- 800 x 600 pixel resolution
- 280 NITS display brightness
- 50,000 hour average backlight half-life
- 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 communication)
- Remote Internet Access
- Serial PLC interface (RS-232/422/485)
- Two built-in SD memory card slots
- 12-24 VDC powered, 110VAC power adapter (optional)
- Audio Line Out, stereo - requires amplifier and speaker(s)
- Microphone in
- HDMI Port
- 82MB project memory
- Data logging
- 0 to 50°C [32 to 122°F] operating temperature range
- NEMA 4/4X, IP65 compliant when mounted correctly, indoor use only
- Slim design saves panel space
- UL, cUL & CE agency approvals
- 2-year warranty from date of purchase

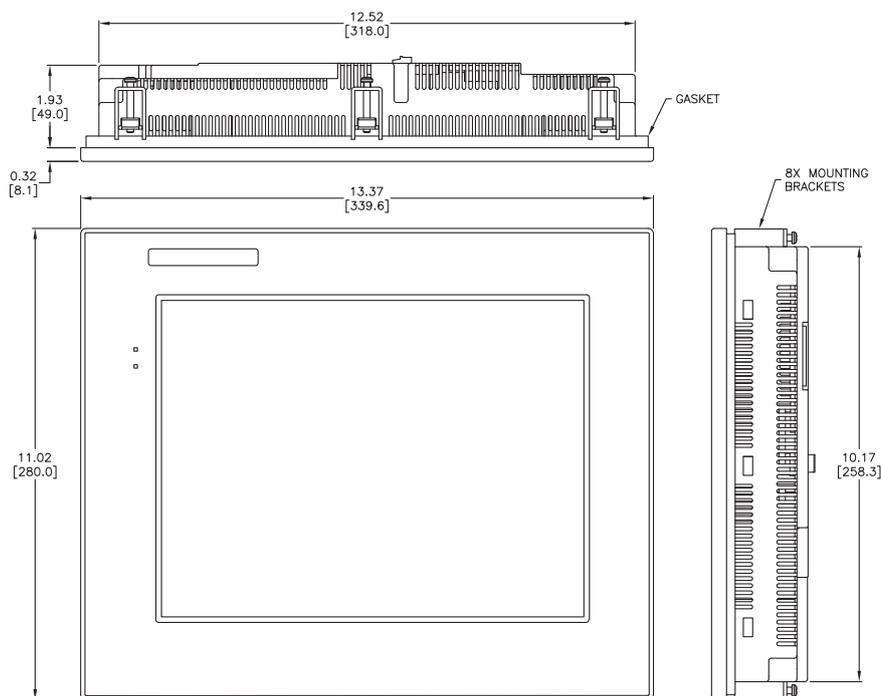


Function	Available
Ethernet	Yes
USB	Yes
SD Card	Yes
Audio Out	Yes
Mic In	Yes
HDMI Out	Yes

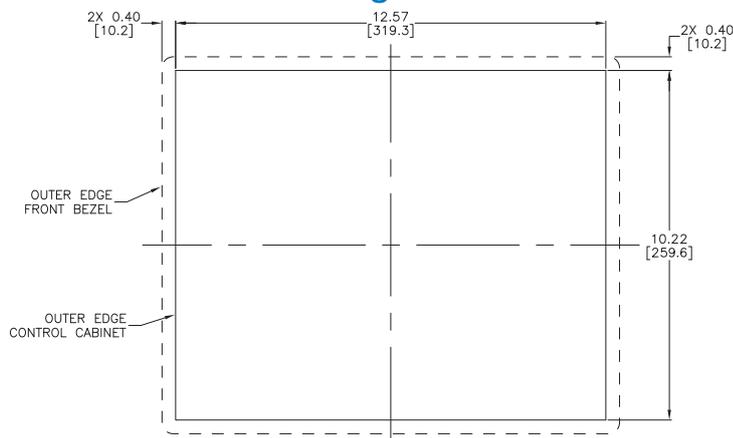


Dimensions

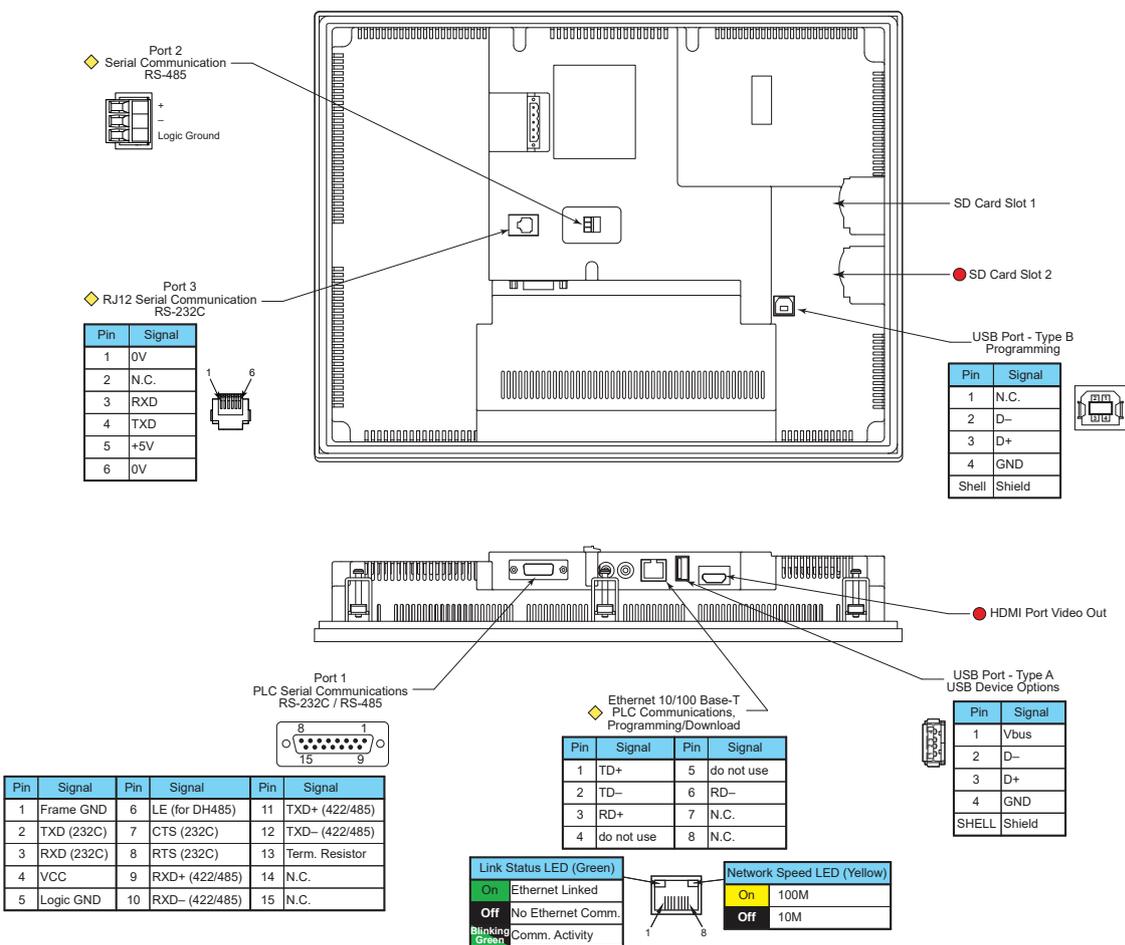
inches / [mm]



Mounting Cutout



C-more Communication Ports



◆ Note: Device is not available on Base Feature touch panel EA9-T6CL-R
 ● Note: Device is only available on touch panels EA9-T12CL and EA9-T15CL.

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
- Remote Internet Access

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

- The yellow LED indicates network speed; off for a 10 Mbps connection and illuminated for a 100 Mbps connection.
- The green LED indicates link status and illuminates when a link is established.

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, (USB-FLASH)
- 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.

Serial Port

Port 1 - Connect to your serial controller network via Port 1. Port 1 is a 15-pin port that supports RS-232 or RS-422/485.

Port 2 - Connect your RS-485 network via Port 2. Port 2 is provided with a 3-wire removable terminal block.

Port 3 - Connect to your RS-232C device via Port 3. Port 3 is an RJ12 connection.

HDMI Port

EA9-T12CL and EA9-T15CL include an HDMI Type A port to provide video output to a projector or remote monitor.

C-more Communication Protocols & Cables

Compatibility Table			
PLC Family	Model	Protocols	
Allen-Bradley	MicroLogix 1000/1100/1200/1400/1500, SLC 5-01/02/03, PLC5	DH485/AIC/AIC+	
	MicroLogix 1000, 1100, 1200 and 1500 SLC 5-03/04/05	DF1 Half Duplex; DF1 Full Duplex	
	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, 1400, 1500 & SLC 5-03/04/05, all via ENI Adapter		
	Micro 800 series	Modbus RTU Modbus TCP	
	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	
Omron	Q, QnA Ethernet	QnA Ethernet	
	C200 Adapter, C500	Host Link	
Modicon	CJ1/CS1 Serial, CJ1/CS1 Ethernet	FINS	
	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	
	S7-200 CPU, S7-300 CPU, S7-400, S7-1200 CPU; Ethernet	Ethernet ISO over TCP	
Productivity Series	Productivity3000 Serial (P3-550)	AutomationDirect P3000 Serial	
	Productivity3000 Ethernet (P3-550)	AutomationDirect P3000 Ethernet	
Do-more	all	Do-more Serial Do-more Ethernet	
	CLICK	all	AutomationDirect Modbus (CLICK) K-Sequence <i>Direct</i> NET Modbus (Koyo addressing) <i>Direct</i> LOGIC Ethernet
DirectLOGIC	DL05/DL06	all	<i>Direct</i> NET Modbus (Koyo addressing)
		H0-ECOM/H0-ECOM100	<i>Direct</i> LOGIC Ethernet
	DL105	all	K-Sequence
		D2-230	K-Sequence
		D2-240	K-Sequence <i>Direct</i> NET
	DL205	D2-250/D2-250-1/D2-260	K-Sequence <i>Direct</i> NET Modbus (Koyo addressing)
		D2-240/D2-250-1/D2-260 using D2-DCM	<i>Direct</i> NET Modbus (Koyo addressing)
		H2-ECOM/H2-ECOM100	<i>Direct</i> LOGIC Ethernet
		D3-330/330P (Requires the use of a Data Communications Unit)	<i>Direct</i> NET
	DL305	D3-340	<i>Direct</i> NET
		D3-350	K-Sequence <i>Direct</i> NET Modbus (Koyo addressing)
		D3-350 using D3-DCM	<i>Direct</i> NET Modbus (Koyo addressing)
		D4-430	K-Sequence <i>Direct</i> NET
	DL405	D4-440	K-Sequence <i>Direct</i> NET
		D4-450	K-Sequence <i>Direct</i> NET Modbus (Koyo addressing)
		All with D4-DCM	<i>Direct</i> NET Modbus (Koyo addressing)
		H4-ECOM/H4-ECOM100	<i>Direct</i> 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 Productivity Series, Do-more, CLICK, <i>Direct</i> LOGIC PLC RJ-12 port, DL05, DL06, DL105, DL205, D3-350, D4-450 & H2-WinPLC (RS-232C)	EA-2CBL	<--->
<i>Direct</i> LOGIC (VGA Style) 15-pin port, DL06, D2-250 (250-1), D2-260 (RS-232C)	EA-2CBL-1	<--->
<i>Direct</i> LOGIC PLC RJ-11 port, D3-340 (RS-232C)	EA-3CBL	<--->
<i>Direct</i> LOGIC DL405 PLC 15-pin D-sub port, DL405 (RS-232C)	EA-4CBL-1	<--->
<i>Direct</i> LOGIC PLC 25-pin D-sub port, DL405, D3-350, DL305 DCU and all DCMs (RS-232C)	EA-4CBL-2	<--->
Allen-Bradley MicroLogix 1000, 1100, 1200, 1400 & 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	<--->

Example Cables:

EA-2CBL



EA-2CBL-1



C-more Computer Programming Connections

Using the **C-more** Programming Software EA9-PGMSW for project development, the touch panel can be connected to a PC (personal computer) in one of several ways:

- Connect a USB Programming Cable such as (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 with a Cat5 Ethernet cable via an Ethernet switch. Multiple panels can be programmed in this configuration.

Following are the minimum system requirements for running **C-more** Programming Software, p/n EA9-PGMSW, on a PC:

- 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
- 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® XP Professional Edition (32 bit), Windows 7 (32 or 64 bit) or Windows 8 (32 or 64 bit)

USB Programming Cable



Part No. USB-CBL-AB15



Other lengths available see
USB-CBL-AB3, USB-CBL-AB6, USB-CBL-AB10

Stride™ Ethernet Switch



Part No. SE-SW5U



Ethernet Configuration Kit



Part No. RT-CNFGKIT

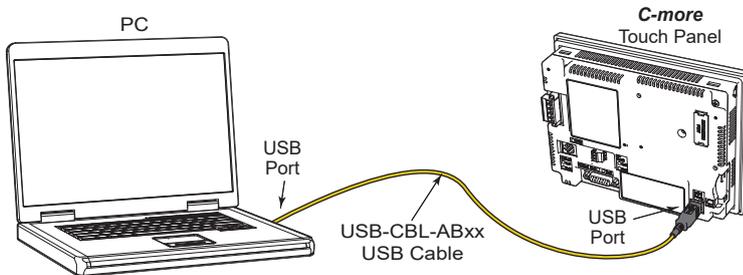


The Ethernet Configuration Kit includes a five-port 10/100 Base-T Ethernet switch, four straight-through cables, and one crossover cable. (The cables are at least five feet in length.) The kit provides a great convenience for configuring systems, demonstration systems or basic control projects using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

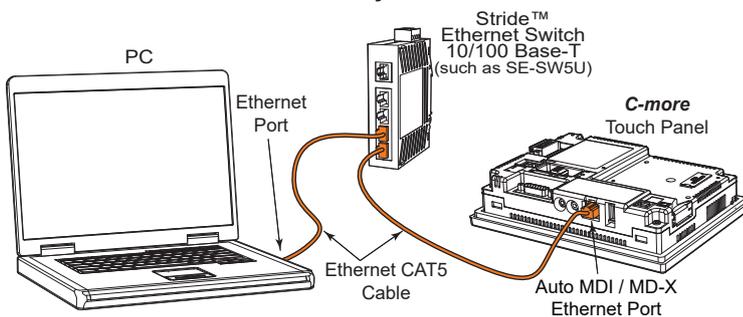
NOTE: Regarding Ethernet access to a C-more panel.
If you intend to take advantage of the methods of remote access to the panel, including the web server, PC remote access, FTP, iPhone or iPad app, you need to consider the security exposure in order to minimize the risks to your process and your C-more panel.

Security measures may include password protection, changing the ports exposed on your network, including a VPN in your network, and other methods. Security should always be carefully evaluated for each installation.

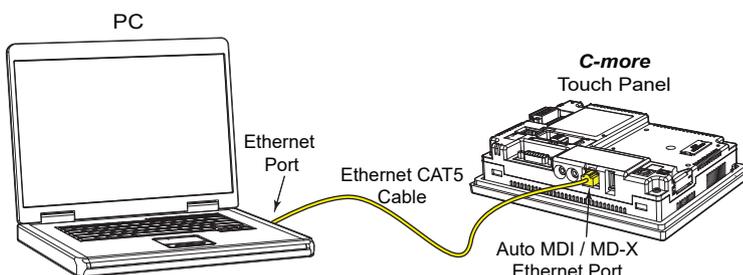
USB Connectivity



Ethernet Connectivity via a Hub or Switch



Ethernet Direct Connection

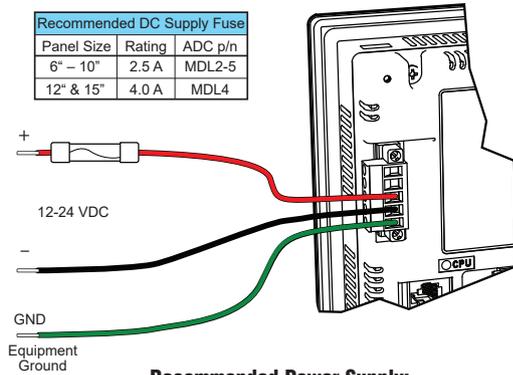


C-more Power Connection Wiring

Providing Power to the Touch Panel

- Connect a dedicated 12–24 VDC Class 2 power supply 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, 50/60 Hz, to its AC connector.
- then, turn on the power source and check the LED status indicators on the front and rear of the **C-more** touch panel for proper operation.

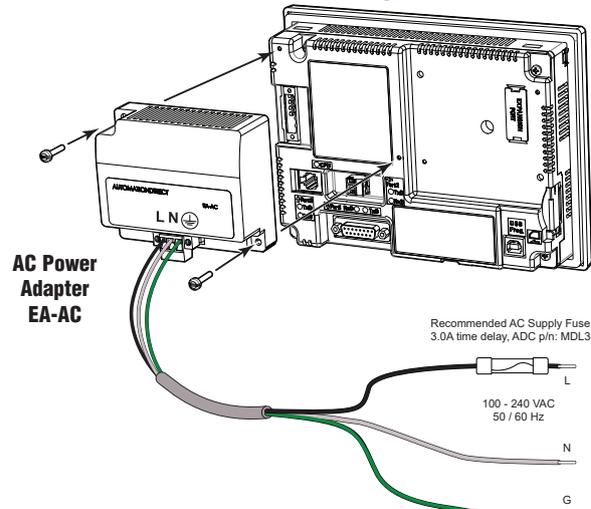
DC Wiring



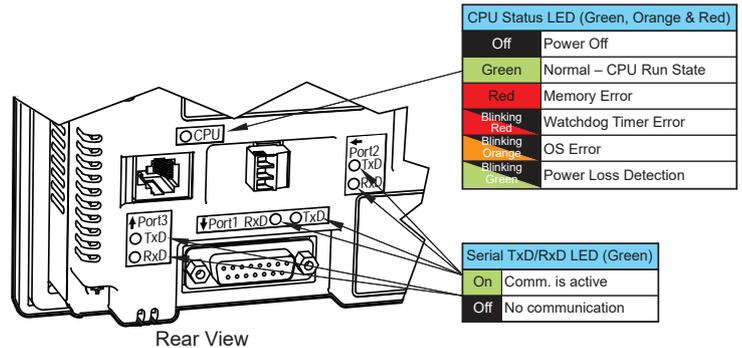
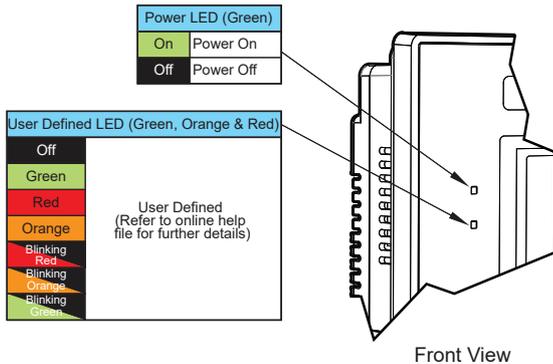
Recommended Power Supply:
AutomationDirect Part No. PSC-24-060

DC-CON Tightening Torque	
Power connector screw torque	70.4 oz-in [0.5 Nm]
Power connector mounting torque	56 oz-in [0.4 Nm]

AC Wiring



EA-AC Tightening Torque	
Power supply cable torque	71 - 85 oz-in [0.5 - 0.6 Nm]
Power connector mounting torque	71 - 85 oz-in [0.5 - 0.6 Nm]
Mounting flange screw torque	57 - 71 oz-in [0.4 - 0.5 Nm]



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.

Equipment damage or serious injury to

personnel can result from the failure to follow all applicable codes and standards. We do not guarantee the products described in this publication are suitable for your particular application, nor do we assume any responsibility for your product design, installation, or operation.

If you have any questions concerning the installation or operation of this equipment, or if you need additional information, please call us at 1-800-633-0405 or 770-844-4200.

This publication is based on information that was available at the time it was printed.

At Automationdirect.com® we constantly strive to improve our products and services, so we reserve the right to make changes to the products and/or publications at any time without notice and without obligation. This publication may also discuss features that may not be available in certain revisions of the product.

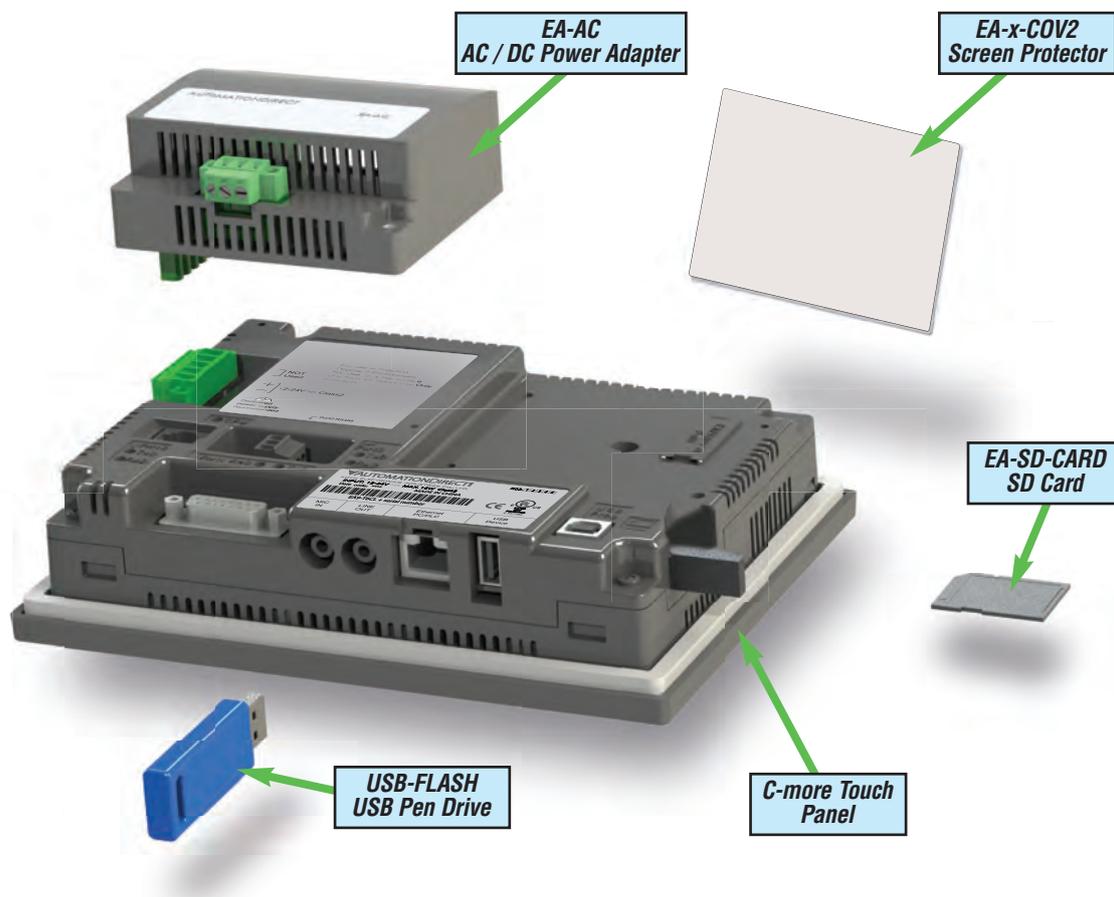
C-more Accessories

Accessories

The **C-more** touch panels can be enhanced with the accessories below:

Part Number	Description	Price
EA-AC	AC/DC Adapter for C-more EA7 and EA9 series touch panels; powered from a 100-240 VAC, 50/60 Hertz power source. Provides 24VDC at 1.5A. Power Fault features help protect data being logged to Compact Flash or SD card during power failures. C-more EA7 series panels must have firmware version 1.21 Build 6.18E or higher for proper operation.	<--->
EA-6-COV2	Non-glare protective overlay, 6-inch, protects C-more touch screen and helps reduce glare from external light sources. Compatible with C-more EA7 and EA9 series and C-more Micro-Graphic 6-inch panels. Package of 3.	<--->
EA-8-COV2	Non-glare protective overlay, 8-inch, protects C-more touch screen and helps reduce glare from external light sources. Compatible with C-more EA7 and EA9 series 8-inch panels. Package of 3.	<--->
EA-10-COV2	Non-glare protective overlay, 10-inch, protects C-more touch screen and helps reduce glare from external light sources. Compatible with C-more EA7 and EA9 series 10-inch panels. Package of 3.	<--->
EA-12-COV2	Non-glare protective overlay, 12-inch, protects C-more touch screen and helps reduce glare from external light sources. Compatible with C-more EA7 and EA9 series 12-inch panels. Package of 3.	<--->
EA-15-COV2	Non-glare protective overlay, 15-inch, protects C-more touch screen and helps reduce glare from external light sources. Compatible with C-more EA7 and EA9 series 15-inch panels. Package of 3.	<--->
EA-SD-CARD	SD memory card for non-volatile storage, 2GB industrial grade, 85 degrees C maximum operating temperature makes it suitable for data logging in industrial applications. Recommended for the C-more EA9 series touch panels.	<--->
USB-FLASH	USB Flash drive, SanDisk, 4GB (SanDisk P/N SDCZ50-004G-A46). Recommended for use with the C-more touch panels and Productivity3000 controllers.	<--->

Accessory Locations



C-more Accessories

AC/DC Power Adapter

The optional **C-more** AC/DC Power Adapter can be used to power the **C-more** touch panels from a 100-240 VAC, 50/60 Hertz, voltage source. The adapter provides 24 VDC @ 1.5 A to the touch panel's DC power connector and can be conveniently secured to the touch panel with two captive screws.

The adapter provides a power loss signal to the touch panel that causes the touch panel to stop writing data to SD memory devices providing a controlled shutdown for increased data logging reliability.

Part No. EA-AC

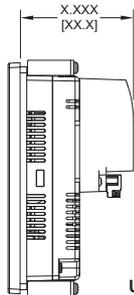


Dimensions

inches / [mm]

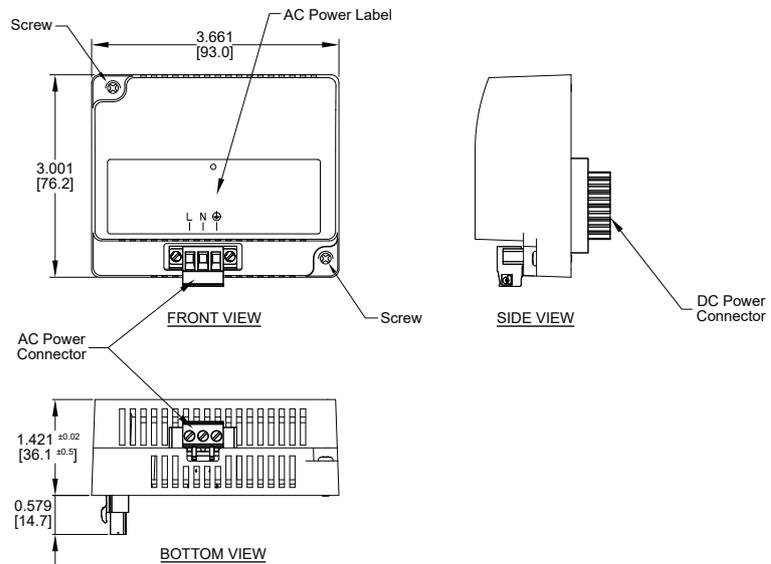


Overall Panel Depth
w/ EA-AC Installed



- EA9-T6CL-R = 2.99 [75.9]
- EA9-T6CL = 2.99 [75.9]
- EA9-T8CL = 3.51 [89.2]
- EA9-T10CL = 3.51 [89.2]
- EA9-T12CL = 3.35 [85.1]
- EA9-T15CL = 3.35 [85.1]

Units: inches[mm]



AC/DC Power Adapter Specifications			
Part Number	EA-AC	Short Circuit Protection	85VAC: 2.6 A, 100VAC: 2.8 A, 264VAC: 3.9 A
Input Voltage & Frequency	100-240 VAC +10% -15%; 50/60 Hertz	Static Electricity Discharge Resistance	Compliant with IEC61000-4-2, Contact: 4 kV, Air: 8 kV
Wire	24-14 AWG, 60 / 75°C Copper. Tighten to 72 oz-in (0.5 Nm)	Agency Approvals	UL508 - UL Recognized for use with C-more panels, cUL, CE, EMC EN61132-2
Permissible Momentary Power Failure	Within 40ms	Environment	For use in pollution degree 2 environment
Input Power	68VA or less	Grounding	Ground resistance: less than 100 ohm
Operating Temperature Range	0°C to 50°C [32 to 122°F] Maximum surrounding temperature rating, 50°C	Dimensions - inches [mm]	3.00" (H) x 3.66" (W) x 1.42" (D) [76.2 mm x 93.0 mm x 36.1 mm] (Excluding DC Power Connector.)
Storage Temperature Range	-20 to 60°C [-4 to 140°F]	Weight	6.13 oz. [175 g]
Operating & Storage Humidity	10-85% RH (non-condensing)	Cooling Method	Natural convection
Noise Immunity	1000VAC p-p (Pulse width 1 μs, rise time: 1 ns), with proper ground connection on AC terminal block.	Removable AC Power Connector (included)	EA-AC-CON or DECA Switchlab MC101-508-03G Secured with (2) captive M2.5 screws, torque to 70 oz-in [0.5 Nm]
Hi-Pot	1000VAC, 1 minute, with proper ground connection on AC terminal block.	Output Voltage and Ripple	21.6 - 26.4 VDC, Ripple < 100 mV p-p
Insulation Resistance	500VDC, 10 M ohm or above, with proper ground connection on AC terminal block.	Output Current	Maximum 1.5 A
Vibration	Compliant with IEC61131-2	Inrush Current	For 100VAC: 15A, 3ms or less For 240VAC: 20A, 3ms or less
Shock	Pulse shape: Sine half wave, Peak acceleration: 147 m/s ² (15 G), X, Y, Z: 3 directions, 2 times each	Mounting to Touch Panel	Secure with (2) spring loaded captive M3-20 screws, torque to 50 oz-in [0.35 Nm]
Thermal Protection	140°C [284°F], with autorecovery	Recommended External Fuse	3.0A (ADC p/n: MDL3)

C-more Accessories

SD Card

Part No.
EA-SD-CARD



SD memory card for non-volatile storage, 2GB industrial grade. 70 degrees C maximum operating temperature. Recommended for the **C-more** EA9 series touch panels. The SD card is the fastest option for writing data. If logged data is saved to external memory, AutomationDirect recommends using an EA-SD-CARD.

USB Pen Drive

Part No.
USB-FLASH



USB flash drive for non-volatile storage, 4GB. Recommended for the **C-more** EA9 series touch panels.

C-more Accessories

Non-glare Screen Covers (in packages of 3)

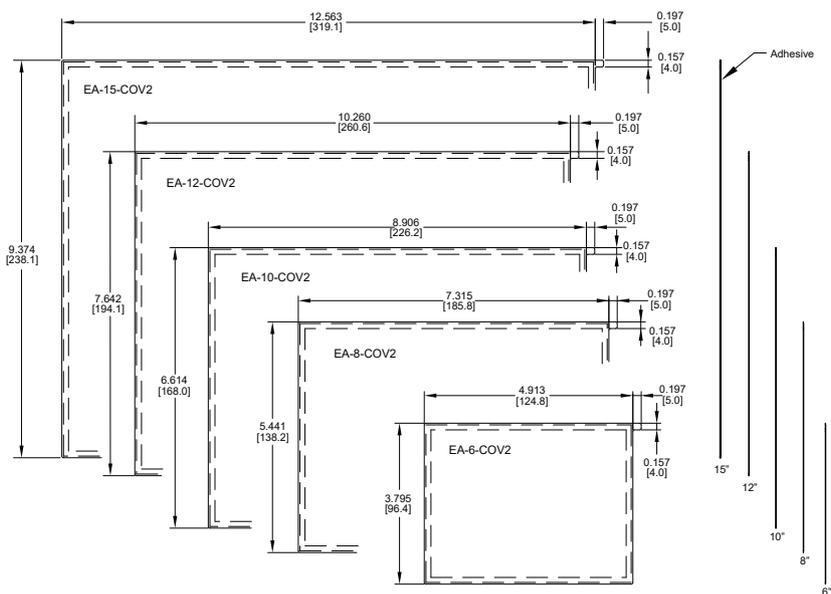
The non-glare screen covers are protective overlays used to protect the touch screen while helping to reduce the glare from external light sources.

Part Nos. EA-6-COV2, EA-8-COV2, EA-10-COV2, EA-12-COV2 and EA-15-COV2

Dimensions inches / [mm]



- EA-6-COV2 <--->
- EA-8-COV2 <--->
- EA-10-COV2 <--->
- EA-12-COV2 <--->
- EA-15-COV2 <--->



Installation

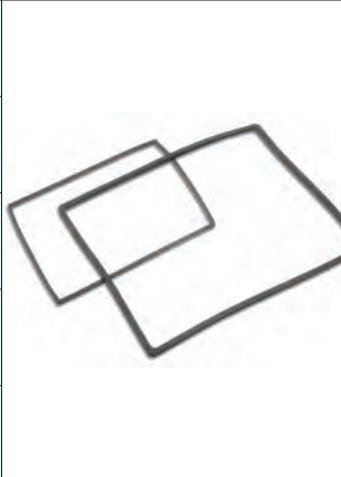


NOTE: The Protective Cover ships with a thin protective sheet on the face of the cover that needs to be carefully removed. If your panel is not clear, the protective sheet may not have been removed.

C-more Replacement Parts

The optional replacement parts can be used to replace damaged, worn or lost **C-more** components.

Replacement parts at a glance:

Part Number		Description
EA9-BRK		Panel mounting brackets, replacement, for C-more EA9 series touch panels. Package of 8 brackets and screws.
EA9-LBL		Blank label insert for front bezel, replacement, for C-more EA9 series touch panels. Package of 10.
EA9-3TB		3-pole terminal block, replacement, for 3-wire RS485 communications port on C-more EA9 series panels. Package of 2.
EA-DC-CON		5-terminal DC power connector, replacement, for C-more EA7 and EA9 series touch panels
EA-AC-CON		3-terminal AC power connector, replacement, for C-more EA7 and EA9 series touch panels
EA9-15-GSK		Panel mounting gasket, replacement, for C-more EA9-T15CL 15-inch touch panel, NEMA 4/4X
EA9-12-GSK		Panel mounting gasket, replacement, for C-more EA9-T12CL 12-inch touch panel, NEMA 4/4X
EA9-10-GSK		Panel mounting gasket, replacement, for C-more EA9-T10CL 10-inch touch panel, NEMA 4/4X
EA9-8-GSK		Panel mounting gasket, replacement, for C-more EA9-T8CL 8-inch touch panel, NEMA 4/4X
EA9-6-GSK		Panel mounting gasket, replacement, for C-more EA9-T6CL(-R) 6-inch touch panels, NEMA 4/4X

EDS-205/208 Series

5 and 8-port entry-level unmanaged Ethernet switches



- > 10/100BaseT(X) (RJ45 connector), 100BaseFX (multi-mode, SC/ST connectors)
- > IEEE802.3/802.3u/802.3x support
- > Broadcast storm protection
- > DIN-rail mounting ability
- > -10 to 60°C operating temperature range



Introduction

The EDS-205/208 series of industrial Ethernet switches are entry-level industrial 5 and 8-port Ethernet switches that support IEEE 802.3/802.3u/802.3x with 10/100M, full/half-duplex, MDI/MDIX auto-sensing RJ45 ports. The EDS-205/208 switches are rated to operate at temperatures ranging from -10 to 60°C, and are rugged enough for

any harsh industrial environment. The switches can be easily installed on a DIN-rail as well as in distribution boxes. The DIN-rail mounting capability, wide operating temperature, and the IP30 housing with LED indicators make the plug-and-play EDS-205/208 switches easy to use and reliable.

Specifications

Technology

Standards:

IEEE 802.3 for 10BaseT
 IEEE 802.3u for 100BaseT(X) and 100BaseFX
 IEEE 802.3x for Flow Control

Processing Type: Store and Forward

Flow Control: IEEE 802.3x flow control, back pressure flow control

Switch Properties

MAC Table Size: 1 K

Packet Buffer Size: 512 kbit

Interface

Fiber Ports: 100BaseFX ports (SC/ST connector, multi-mode)

RJ45 Ports: 10/100BaseT(X) auto negotiation speed, Full/Half duplex mode, and auto MDI/MDI-X connection

LED Indicators: Power, 10/100M (TP port), 100M (fiber port)

Optical Fiber

	100BaseFX	
	Multi-mode	Single-mode
Wavelength	1300 nm	1310 nm
Max. TX	-10 dBm	0 dBm
Min. TX	-20 dBm	-5 dBm
RX Sensitivity	-32 dBm	-34 dBm
Link Budget	12 dB	29 dB
Typical Distance	5 km ^a 4 km ^b	40 km ^c
Saturation	-6 dBm	-3 dBm

a. 50/125 μm, 800 MHz*km fiber optic cable
 b. 62.5/125 μm, 500 MHz*km fiber optic cable
 c. 9/125 μm single-mode fiber optic cable

Power Requirements

Input Voltage:

EDS-205: 24 VDC (12 to 48 VDC), 18 to 30 VAC (47 to 63 Hz), single input

EDS-208 Series: 24 VDC (12 to 45 VDC), 18 to 30 VAC (47 to 63 Hz), single input

Input Current:

EDS-205: 0.12 A @ 24 V

EDS-208: 0.14 A @ 24 V

EDS-208-M: 0.23 A @ 24 V

Overload Current Protection: 1.1 A

Connection: 1 removable 3-contact terminal block

Reverse Polarity Protection: Present

Physical Characteristics

Housing: Plastic, IP30 protection

Dimensions:

EDS-205: 24.9 x 100 x 86.5 mm (0.98 x 3.94 x 3.41 in)

EDS-208 Series: 40 x 100 x 86.5 mm (1.57 x 3.94 x 3.41 in)

Weight:

EDS-205: 135 g

EDS-208 Series: 170 g

Installation: DIN-rail mounting

Environmental Limits

Operating Temperature: -10 to 60°C (14 to 140°F)

Storage Temperature: -40 to 85°C (-40 to 185°F)

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

Standards and Certifications

Safety:

EDS-205: UL 508, EN 60950-1

EDS-208 Series: UL 508

EMI: FCC Part 15 Subpart B Class A, EN 55022 Class A

EMS:

EN 61000-4-2 (ESD) Level 2, EN 61000-4-3 (RS) Level 3,

EN 61000-4-4 (EFT) Level 3, EN 61000-4-5 (Surge) Level 3,

EN 61000-4-6 (CS) Level 3,

EN 61000-4-8, EN 61000-4-11

Shock: IEC 60068-2-27

Freefall: IEC 60068-2-32

Vibration: IEC 60068-2-6

Note: Please check Moxa's website for the most up-to-date certification status.

MTBF (mean time between failures)

Time:

EDS-205: 3,915,945 hrs

EDS-208 Series: 7,492,000 hrs

Database: Telcordia (Bellcore), GB

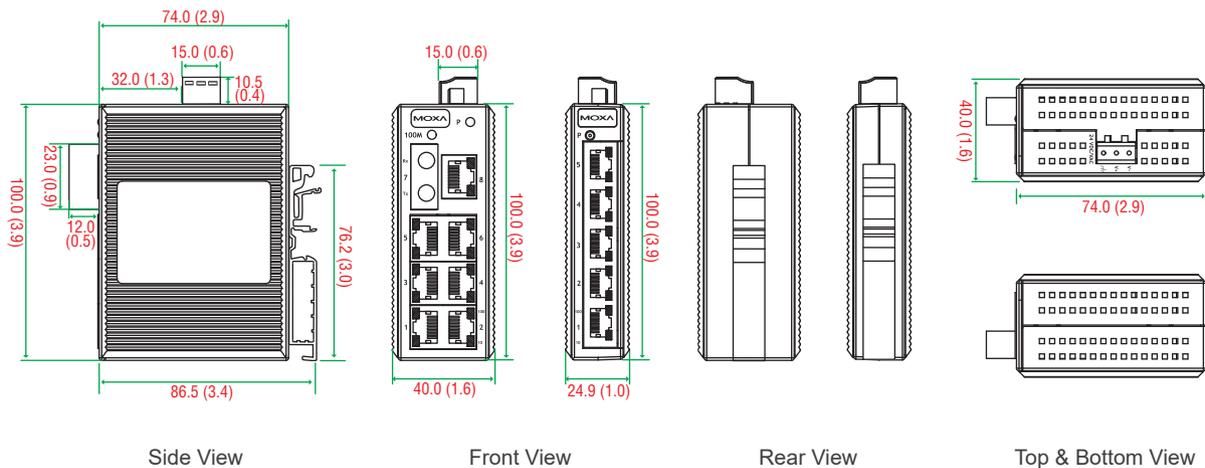
Warranty

Warranty Period: 5 years

Details: See www.moxa.com/warranty

Dimensions

Unit: mm (inch)



Ordering Information

Available Models	Port Interface			Housing Material	Power Range	
	Standard Temperature (-10 to 60°C)	10/100BaseT(X)	100BaseFX			
			Multi-mode, SC Connector			Multi-mode, ST Connector
EDS-205	5	–	–	Plastic	12 to 48 VDC	
EDS-208	8	–	–	Plastic	12 to 45 VDC	
EDS-208-M-SC	7	1	–	Plastic	12 to 45 VDC	
EDS-208-M-ST	7	–	1	Plastic	12 to 45 VDC	

Optional Accessories (can be purchased separately)

DR-4524/75-24/120-24: 45/75/120 W DIN-rail 24 VDC power supplies

MDR-40-24/60-24: 40/60 W DIN-rail 24 VDC power supplies, -20 to 70°C operating temperature

RK-4U: 4U-high 19" rack mounting kit

Package Checklist

- EDS-205 or EDS-208 switch
- Hardware installation guide (printed)
- Warranty card

DATASHEET

RAM® 6000 Industrial Cellular RTUs Secure Remote Monitoring & Control



PRODUCT HIGHLIGHTS

- Supports 4G LTE connectivity with fall back to 3G and 2G
- Real-time access to mission-critical data through built-in Modbus gateway
- Software Development Kit (SDK) for custom application support
- Native support for DNP3 and Modbus protocols
- Integrated security firewall provides intrusion protection
- Simplified deployment and configuration with single web-based GUI
- Support for new and legacy devices with RS232 serial or RJ45 Ethernet

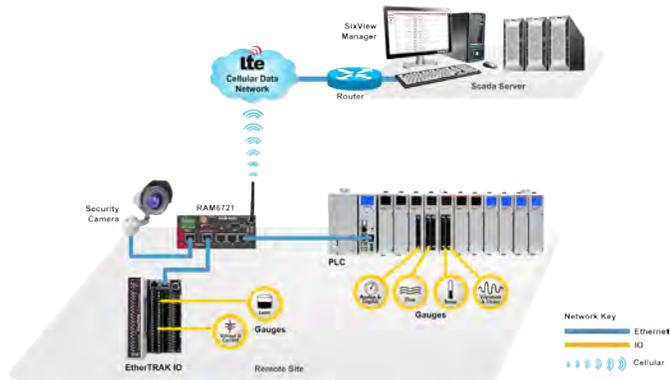
APPLICATIONS

- Utilities
 - Oil & Gas
 - Water/Wastewater
- Power & Energy
 - Smart Grid
 - Solar
 - Pole-Top

Sixnet RAM® 6000 industrial cellular RTUs with 4G LTE provide a flexible platform to remotely connect, monitor and control assets across industries including utilities, oil, gas, and water/wastewater. By seamlessly connecting to existing Modbus or DNP3 enabled RTUs, PLCs and other remote equipment, our industrial cellular RTUs provide instant access to data from pumps, valves, reclosers, transformer capacitor banks and meters. The I/O concentrator feature enables users to locally collect sensor data to optimize bandwidth.

Using a single web-based user interface, our cellular RTUs simplify I/O, network and security configurations to integrate complex hardware settings. This easy-to-manage configuration reduces the cost and complexity of deploying and administering multiple devices at remote locations. Furthermore, an integrated configurable stateful firewall provides intrusion protection and encrypted data access while a built-in Software Development Kit (SDK) enables users to develop custom applications. Working in conjunction with SixView Manager remote monitoring and control software, RAM RTUs provide low-cost, real-time access to outlying sites.

APPLICATION SCENARIO: REMOTE DATA COLLECTION



FEATURES & BENEFITS

Remote Monitoring & Control

- **Delivers instant access to SCADA data**
- **Provides a flexible, programmable platform**
 - Support for Modbus and DNP3 (Serial and IP) protocols
 - Simple integration for complex configurations
 - ID routing to existing Modbus hardware
 - Offers ability to develop custom applications
 - Provides intrusion protection and secure data access

Rugged, Compact Design

- **Deploys easily in space-constrained areas**
- **Requires less cabling and power supplies**
 - Operating temperature: -40° to +85°C
 - DIN rail mounted
 - Power over Ethernet (PoE) option

Ubiquitous Cellular Connectivity

- **Connects remote Modbus devices**
- **Lowens operational and equipment costs**
 - 2G/2.5G cellular
 - 3G/4G LTE cellular

Built-In Security & Routing

- **Supports security requirements**
- **Provides reliable access to I/O data**
 - Modbus data access via IPsec/SSL
 - Stateful firewall and packet filtering

Lower Cost of Ownership

- **Reduces infrastructure complexity**
- **Eliminates visits to remote sites**
 - Connect multiple devices to one WAN link
 - Remote TCP/IP based capabilities
 - RS232 serial connection or RJ45 Ethernet connections
 - Serial-to-IP conversion

RAM 6000 Industrial Cellular RTUs

Secure Remote Monitoring & Control

SPECIFICATIONS

Wireless Interface

- AT&T LTE with fall back to HSPA+ and EDGE
- Bell Mobility LTE with fall back to HSPA+
- Verizon LTE with fall back to EVDO
- Dual-band CDMA2000 EVDO Rev. A (backward compatible with 1xRTT)
- GSM HSPA (backward compatible with EDGE)
- EDGE/GPRS

Programmable Platform

- Software Development Kit (SDK)
- C/C++/Perl

Protocol Gateway

- I/O controller
- Modbus RTU/TCP/ASCII/RTU
- DNP3 - slave

Tunneling

- IPsec and SSL

IP

- NAT, port forwarding, dynamic DNS, DHCP
- Stateful inspection firewall, IP transparency

Ethernet Interface (10/100 auto-sensing)

- 1x RJ45
- 5x RJ45 (port 5 - WAN/LAN capability)

Serial Interface

- 1x RS-232 Serial DB9 115200bps

USB Interface

- 1x USB 2.0 mini

Mechanical

- RAM-6x0X dimensions: steel 120 x 96 x 32 mm (4.7" x 3.77" x 1.25")
- RAM-6x0X weight: 453g (1 lb)
- RAM-6x21 dimensions: steel 120 x 96 x 51 mm (4.7" x 3.77" x 2.0")
- RAM-6x21 weight: 500g (1.1 lbs)

Power Input

- 8-30 Vdc (12 Vdc nominal)

Environmental

- Operating temperature: -40° to +85°C
- Shock: IEC60068-2-27
- Vibration: IEC60068-2-6
- Humidity: 5 to 95% non-condensing

Certification

- CE, EMC: FCC, part 15 and Industry Canada, ICES-003
- Hazardous locations: Class I, Div. 2, Groups A, B, C, D, ISA 12.12.01
- Electrical safety: UL508/CSA22.2/14 (CUL)
- Carrier specific approvals

Inputs & Outputs

- 1x digital output
- 1x digital/analog input

Warranty

- 3 years on design and manufacturing defects

All specifications are subject to change. Contact Sixnet to learn more.

ORDER GUIDE

PART NUMBER	DESCRIPTION
RAM-6401	Cellular RTU, Modbus/DNP3 gateway with full router capability, 1 Ethernet port, 1 serial port, EDGE/GPRS
RAM-6401EB	Cellular RTU, Modbus/DNP3 gateway with full router capability, 1 Ethernet port, 1 serial port, PoE, EDGE/GPRS
RAM-6421	Cellular RTU, Modbus/DNP3 gateway with full router capability and WAN/LAN failover, 5 Ethernet ports, 1 serial port, EDGE/GPRS
RAM-660x	Cellular RTU, Modbus/DNP3 gateway with full router capability, 1 Ethernet port, 1 serial port, CDMA/EVDO Rev. A
RAM-6601EB	Cellular RTU, Modbus/DNP3 gateway with full router capability, 1 Ethernet port, 1 serial port, PoE, CDMA/EVDO Rev. A
RAM-6621	Cellular RTU, Modbus/DNP3 gateway with full router capability and WAN/LAN failover, 5 Ethernet ports, 1 serial port, CDMA/EVDO Rev. A
RAM-670x	Cellular RTU, Modbus/DNP3 gateway with full router capability, 1 Ethernet port, 1 serial port, 4G LTE/3G/2G
RAM-6701EB	Cellular RTU, Modbus/DNP3 gateway with full router capability, 1 Ethernet port, 1 serial port, PoE, 4G LTE/3G/2G
RAM-6721	Cellular RTU, Modbus/DNP3 gateway with full router capability and WAN/LAN failover, 5 Ethernet ports, 1 serial port, 4G LTE/3G/2G
RAM-680x	Cellular RTU, Modbus/DNP3 gateway with full router capability, 1 Ethernet port, 1 serial port, HSPA/EDGE/GPRS
RAM-6801EB	Cellular RTU, Modbus/DNP3 gateway with full router capability, 1 Ethernet port, 1 serial port, PoE, HSPA/EDGE/GPRS
RAM-6821	Cellular RTU, Modbus/DNP3 gateway with full router capability and WAN/LAN failover, 5 Ethernet ports, 1 serial port, HSPA/EDGE/GPRS

SIXVIEW MANAGER

Powerful Remote Device Management

With SixView Manager's enterprise-class device management features, users have access to:

Remote Administration

- Mass configuration changes and updates
- Remote executable (i.e., reboot)



Remote Monitoring & Reporting of Key Metrics

- Uptime
- Utilization
- Signal strength (RSSI)
- Firmware version, ESN, MDN, IMEI
- IP Address

About Red Lion

As the global experts in communication, monitoring and control for industrial automation, Red Lion has been delivering innovative solutions to customers for forty years. Our award-winning technology enables companies worldwide to gain real-time data visibility that drives productivity. Product brands include Red Lion, Sixnet and N-Tron. With headquarters in York, Pennsylvania, the company has offices across the Americas, Asia-Pacific and Europe. Red Lion is a Spectris company.

For more information, visit www.redlion.net/sixnet, call +1 (518) 877-5173 or email info@redlion.net



www.redlion.net/sixnet
+1 (518) 877-5173 | info@redlion.net

CONNECT. MONITOR. CONTROL.

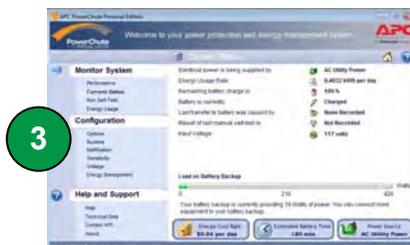
APC Back-UPS[®] 750

Best Value Battery Backup & Protection for Home and Home Office Computers

APC's Back-UPS 750 provides enough battery backup power so you can work through medium length power outages. It also safeguards your equipment against damaging surges and spikes that travel along utility and data lines. The Back-UPS 750 is also "greener" than ever, with power saving outlets that turn off power to three of your peripherals when ever your computer is turned off or goes into standby mode. And its ultra-efficient design consumes less power during normal operation than any other battery backup in its class. Together, these power-saving features can save an average of \$40/year on your electricity bill*. Coupled with the standard features of the Back-UPS series, the 750 is the perfect unit to protect your productivity from the constant threat of bad power and lost data.

* \$40 savings based on comparable competitive models, and is comprised of an ultra-efficient electrical design, and power-saving "Master" and "Controlled" outlets (assumes three hours of daily computer use at \$0.10/kw hr, with three peripherals plugged into 'Controlled' outlets: 3-in-1 printer, speakers, external storage device).

Product Features:



- 1 **5 "Battery Backup & Surge" Outlets** keep CPU, monitor and another critical device running when the power goes out or fluctuates outside safe levels.
- 2 **5 "Surge Only" Outlets** protect printers, faxes or other equipment without reducing battery capacity (including three power-saving "Controlled" outlets).
- 3 **PowerChute Software** lets you use your computer to access additional power protection and management features:
 - Preserves your work, shuts down system during outages
 - Restarts your system, minimizing work disruptions
 - Enables customization of your Back-UPS settings
 - Monitors and displays power and battery status
- 4 **Data Line Surge Protection** guards against surges and spikes traveling over phone, network and coax cable lines.
- 5 **Combination Power Button/LED Indicator** provides visual and audible status of unit.
- 6 **Ultra Efficient Electrical Design**, RoHS compliance and all recyclable packaging materials minimize environmental impact and maximize efficiency.
- 7 **Building Wiring Fault Indicator** lets you know if there are problems in your building's wiring.
- 8 **Push Button Circuit Breaker** enables quick recovery from overload.
- 9 **Automatic Diagnostic Testing** ensures your unit is ready when you need it.
- 10 **3 Yr Warranty, \$75,000 Equipment Protection Policy**, free technical phone and online support.



Back-UPS 750 Specifications

Model Number	BE750G
Output	
Output Capacity	750 VA / 450 Watts
Output Voltage, Frequency (On utility)	120V, 50 or 60Hz (auto-sensing)
Output Voltage, Frequency (On battery)	115V +/-8%, 50 or 60 Hz +/-3Hz (auto-sensing)
Output Connections	10 total NEMA 5-15R outlets: 5 battery backup & surge 5 surge protection only (incl. 3 <i>Controlled</i> outlets)
Waveform Type	Stepped Approximation to Sine Wave
Input	
Input Voltage / Frequency	120V, 50 or 60 Hz
Input Connection	6 ft cord with right angle plug (NEMA 5-15P)
Surge Protection	
AC Power Surge Protection	All outlets
Data Line Surge Protection	Analog phone line (Fax/Modem/DSL) Network line (Ethernet 10/100 Base-T) Coax cable (CATV, SATV, modem, A/V)
Physical	
Unit Dimensions (H x W x D)	13.5" x 7.1" x 3.5"
Unit Weight	10.34 lbs
Shipping Dimensions (H x W x D)	17.8" x 10.2"x 5.94"
Shipping Weight	12.54 lbs
Color	Black
UPC Code	731304256601
Battery	
Battery Type	Maintenance-free, sealed lead-acid battery, leakproof
Management	
Alarms	Visual (LED) and audible alarms
Auto-Shutdown Software	PowerChute Personal Edition (via USB interface)
Safety	
Certification/Approvals	TUV, UL1778, CSA C22.2 No.107.1, FCC Part 68 & Part 15 Class B, NOM

APC by Schneider Electric

132 Fairgrounds Rd
West Kingston, RI 02892
Tel: 800-800-4272
www.apc.com





Activated Carbon Products & Services

PO Box 1346 – Ridgefield, WA 98642 Phone: (360) 727-3775 Email: Info@PacificCoastCarbon.com

CVS400

SPECIFICATION SUMMARY

The **CVS400** vapor phase carbon adsorber is designed to treat a wide range of contaminated compounds such as hydrocarbons, chlorinated solvents, odorous compounds and many other contaminants. The addition of piping and valves can be configured to operate the CVS400 adsorber for series, parallel, or vessel isolation flows. The adsorber is designed with internal structures able to contain the carbon bed and achieve a maximum flow rate of 300 CFM.

EACH VESSEL:

Vessel Diameter	32"
Vessel Height	43"
Total Empty Weight / Vessel	90 lbs
Shipping Weight / Vessel	490 lbs
Operating Weight / Vessel	490 lbs
Maximum Pressure	4 psi
Maximum Working Temperature	140 °F
Vessel Volume	110 gal.
Carbon Capacity	400 lbs.
Carbon Bed Volume-Typical	14 Ft ³
Maximum Flow	300 CFM
Material	Epoxy Lined Carbon Steel
Interior Surface Coating	Phenolic Epoxy 5 mil min dft
Exterior Surface Primer	Rust Preventative Epoxy 3 mil min dft
Exterior Surface Coating	High Solids Urethane 3mil min dft
Standard Color	Grey(typically)

CONNECTIONS:

Influent and Effluent..... 3" or 4" FNPT

SCREEN:

Lateral.....0.020 slotted internal piping

WEIGHT:

Shipping weight (vessel & dry carbon).....	490 lbs.
Operating Weight	490 lbs.



Activated Carbon Products & Services

PO Box 70096 – Vancouver, WA 98665 Phone: (360) 949-9181 Email: Info@Pac-CoastCarbon.com

CVS2000

SPECIFICATION SUMMARY

CVS2000 vapor phase carbon adsorber is designed to treat a wide range of contaminated compounds. The addition of piping and valves can be configured to operate the CVS2000 adsorbers for series, parallel, or vessel isolation flows. The adsorber is designed with internal structures able to contain the carbon bed and achieve a maximum flow rate of 600 cfm.

EACH VESSEL:

Vessel Diameter	48"
Side Shell Height	72"
Overall Height (Approx.)	8'
Total Empty Weight / Vessel	1170 lbs
Maximum Pressure	14.9 psig
Maximum Vacuum	15 in Hg
Maximum Working Temperature.....	140 °F
Manway at head	18" dia
Vessel Volume.....	660 gal.
Carbon Capacity.....	2000 lbs.
Carbon Bed Volume-Typical.....	68 Ft ³
Maximum Flow	600cfm
Material	Carbon Steel
Supports	Skid mounted
Lifting	Lifting Lugs
Seismic	Zone 4
Interior Surface Coating.....	3M ScotchKote 134, 10-15 mil min dft
Exterior Surface Primer	Rust Preventative Epoxy 3 mil min dft
Exterior Surface Coating	High Solids Urethane 3mil min dft
Standard Color.....	Grey

CONNECTIONS:

Influent and Effluent.....	4" FNPT (SS)
----------------------------	--------------

SCREEN:

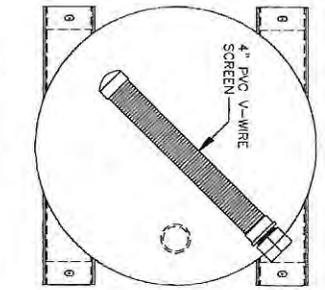
Lateral.....	4" x 36" PVC V-Wire
--------------	---------------------

WEIGHT:

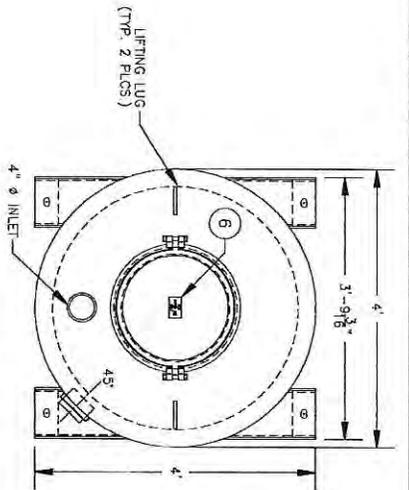
Shipping weight (vessel)	1,170 lb
Weight (vessel & carbon).....	3,170 lb
Operating Weight	3,170 lb

LIST OF COMPONENTS

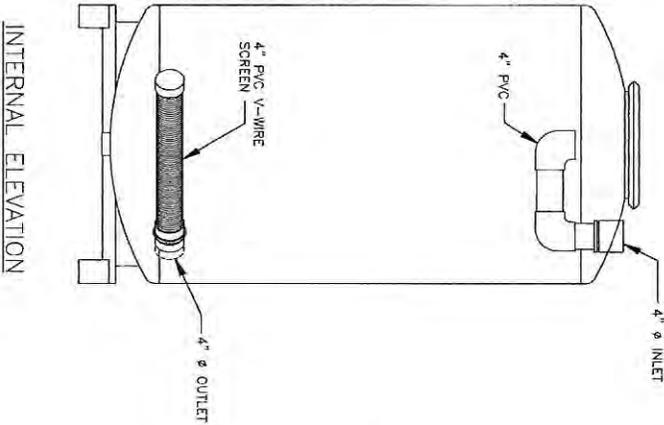
ITEM QTY	DESCRIPTION	PART NUMBER
1	TANK ASSEMBLY	SEE SHEET 2
2	SKID ASSEMBLY	SEE SHEET 3
3	MANWAY ASSEMBLY, 18" DIA	SEE SHEET 4
4	PLATE, I.O. & SERIAL NUMBER	N/A
5	BRONZE BALL VALVE, 3/4"	1003
6	DECAL, FOR WAPOR USE ONLY, 2 1/2" x 4 1/4"	N/A
7	DECAL, "VENT-SCRUB" WHITE MULAR	N/A
8	DECAL, "14.9 PSIG MAX" WHITE MULAR	N/A



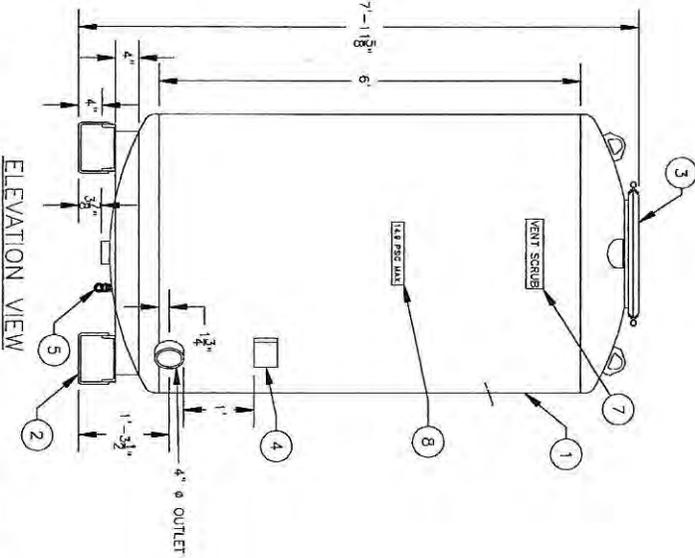
INTERNAL PLAN VIEW



PLAN VIEW



INTERNAL ELEVATION



ELEVATION VIEW

NOTES:

- DESIGN DATA:
48" DIAMETER PRESSURE VESSEL-14.9 PSIG(MAX)
VACUUM RATING - 15" HG
@ 120°F-NOT ASME CODE STAMPED FOR WAPOR USE ONLY
600 CFM
2000 LBS. ACTIVATED CARBON

- MATERIAL:
HEADS - SA 36-HR
SHELL - SA 36-HR
SMD - SA 36-HR

- SURFACE PREPARATION:
INTERIOR:

SANDBLAST: SSPC-SP-5 WHITE METAL
ABRASIVE: GARNET OR GRIT - PROFILE: 1.5-2 MILS
COATING: 3M BRAND SCOTCHKOTE 134
THICKNESS: 10-15 DFMIT - COLOR: GREEN

EXTERIOR:
SANDBLAST: SSPC-SP-10 NEAR WHITE METAL
ABRASIVE: GARNET OR GRIT - PROFILE: 1.5-2 MILS
PRIMER COAT: RUST PREVENTATIVE EPOXY PRIMER
THICKNESS: 4-6 DFMIT - COLOR: RED
FINISH COAT: HIGH BUILD POLYURETHANE
THICKNESS: 3-4 DFMIT -

- LIFTING REQUIREMENTS:
5200 LBS. MINIMUM RATING:
EST. WEIGHTS:
1170 LBS. - EMPTY VESSEL
3170 LBS. - WITH CARBON

COMPANY CONFIDENTIAL
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DESIGNER	TAC	DATE
CHECKER		DATE
ENGINEER		DATE
MANAGER		DATE

TITLE	2000
GENERAL ASSEMBLY	
CLIENT	
PROJECT	

DRAWING	2000Genassy.DWG	SHEET	1 OF 1	REV
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Appendix B

Field Forms and Example Waste Log

Appendix C

NPDES Permit

Issuance Date: July 13, 2021
Effective Date: August 1, 2021
Expiration Date: July 31, 2026
Modification Date: January 5, 2023

**National Pollutant Discharge Elimination System
Waste Discharge Permit No. WA0991040**

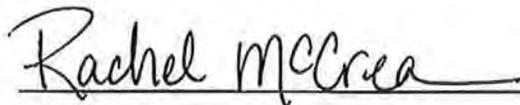
State of Washington
DEPARTMENT OF ECOLOGY
Northwest Regional Office
PO Box 330316
Shoreline, WA 98133-9716

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1342 et seq.

FW WA-Overlake Fashion Plaza II, LLC
One Independent Drive, STE 114
Jacksonville, FL 32202

is authorized to discharge in accordance with the Special and General Conditions that follow.

<u>Facility Name and Location:</u> Overlake Retail Shops (Former Sears Auto #6119) 2200 148 th Avenue NE Redmond, WA 98052 King County	<u>Receiving Water:</u> Sears Creek via City Storm Sewer
<u>Treatment Type:</u> Settling Tank, filtration, and Granular Activated Carbon Treatment	<u>Discharge Locations:</u> Outfall 001: City Storm Sewer Latitude: 47.628403°N Longitude: 122.142500°W
<u>Industry Type:</u> Groundwater Remediation Cleanup	Outfall 002: Sears Creek Latitude: 47.626453 °N Longitude: 122.144157 °W
	<u>SIC Code:</u> 4959 Groundwater Site Remediation Devices 65120205 Shopping Retail Center



Rachel McCrea
Water Quality Section Manager
Northwest Regional Office
Washington State Department of Ecology

Table of Contents

Summary of Permit Report Submittals.....	4
Special Conditions.....	5
S1. Discharge limits.....	5
S1.A. Treated groundwater discharge	5
S2. Monitoring requirements	6
S2.A. Monitoring schedule.....	6
S2.B. Sampling and analytical procedures	7
S2.C. Laboratory accreditation	7
S3. Reporting and recording requirements	7
S3.A. Reporting	7
S3.B. Permit submittals and schedules	9
S3.C. Records retention	9
S3.D. Recording of results.....	9
S3.E. Additional monitoring by the Permittee.....	10
S3.F. Reporting permit violations	10
S3.G. Other reporting	11
S3.H. Maintaining a copy of this permit.....	11
S4. Operation and maintenance	12
S4.A. Treatment system operating plan.....	12
S4.B. Bypass procedures	13
S5. Solid wastes.....	15
S5.A. Solid waste handling	15
S5.B. Leachate.....	15
S6. Non-routine and unanticipated wastewater	15
S7. Application for permit renewal or modification for facility changes.....	16
S8. Annual groundwater quality evaluation	16
S9. Well construction details	17
General Conditions	18
G1. Signatory requirements	18
G2. Right of inspection and entry	19
G3. Permit actions.....	19
G4. Reporting planned changes	21
G5. Plan review required	21
G6. Compliance with other laws and statutes	21

G7.	Transfer of this permit	21
G8.	Reduced production for compliance	22
G9.	Removed substances.....	22
G10.	Duty to provide information.....	22
G11.	Other requirements of 40 CFR.....	22
G12.	Additional monitoring	23
G13.	Payment of fees	23
G14.	Penalties for violating permit conditions	23
G15.	Upset	23
G16.	Property rights.....	24
G17.	Duty to comply.....	24
G18.	Toxic pollutants	24
G19.	Penalties for tampering.....	24
G20.	Reporting requirements applicable to existing manufacturing, commercial, mining, and silvicultural dischargers	24
G21.	Compliance schedules.....	25

Summary of Permit Report Submittals

Refer to the Special and General Conditions of this permit for additional submittal requirements.

Permit Section	Submittal	Frequency	First Submittal Date
S3.A.3.a.	Monthly Discharge Monitoring Report (DMR)	Monthly	September 28, 2021
S3.A.3.b.	Quarterly DMR	Quarterly	October 28, 2021
S3.F	Reporting Permit Violations	As necessary	
S3.G	Other Reporting	As necessary	
S4.A	Treatment System Operating Plan	1/permit cycle, updates submitted as necessary	March 15, 2023
S4.A	Treatment System Operating Plan Update	1/permit cycle, with permit renewal	January 31, 2026
S4.B	Reporting Bypasses	As necessary	
S7.	Application for Permit Renewal	1/permit cycle	January 31, 2026
S8.	Annual Groundwater Quality Evaluation	Annually	May 15, 2024 and annually thereafter
G1.	Notice of Change in Authorization	As necessary	
G4.	Permit Application for Substantive Changes to the Discharge	As necessary	
G5.	Engineering Report for Construction or Modification Activities	As necessary	
G7.	Notice of Permit Transfer	As necessary	
G10.	Duty to Provide Information	As necessary	
G21.	Compliance Schedules	As necessary	

Special Conditions

S1. Discharge limits

S1.A. Treated groundwater discharge

All discharges and activities authorized by this permit must be consistent with the terms and conditions of this permit.

The discharge of any of the following pollutants more frequently than, or at a level in excess of that identified and authorized by this permit violates the terms and conditions of this permit.

Beginning on the effective date of this permit, the Permittee is authorized to discharge treated groundwater to Sears Creek via City of Redmond storm sewer line subject to complying with the following limits:

Effluent Limitations	
Outfall 001	
(point of compliance is after treatment prior to entering the City's storm drain line)	
Parameter	Maximum Daily Effluent Limit ^a
Flow	14,400 gpd
pH	Between 6 and 9 standard units
Benzene ^e	0.44 µg/L
BTEX ^b	100 µg/L
TPH-G ^c	1 mg/L
TPH-D ^d	5 mg/L
^a Maximum daily effluent limit means the highest allowable daily discharge. The daily discharge means the discharge of a pollutant measured during a calendar day. For units of concentration, the daily discharge is the average measurement of the pollutant over the day.	
^b BTEX is defined as benzene, toluene, ethylbenzene, and xylene.	
^c TPH-G is defined as total petroleum hydrocarbons-gasoline range.	
^d TPH-D is defined as total petroleum hydrocarbons-diesel range.	
^e The effluent limit for benzene is set at 0.44 µg/L, a human health water quality-based criterion for fresh water. The method detection level (MDL) is 1 µg/L and the quantitation level (QL) is 2 µg/L for benzene, using EPA test method 624. Samples analyzed in accordance with this approved test method, and found to be below the QL, will be considered in compliance with the benzene effluent limit unless other monitoring information indicates a violation.	
If the Permittee is unable to attain the specified MDL and QL in its effluent due to matrix effects, the Permittee must submit a matrix-specific MDL, following the guidelines specified in Appendix B of 40 CFR 136, to Ecology for review and approval. Below is the web-link to EPA's guidelines to determine a matrix-specific MDL. https://www.epa.gov/sites/production/files/2016-12/documents/mdl-procedure_rev2_12-13-2016.pdf	

S2. Monitoring requirements

S2.A. Monitoring schedule

The Permittee must monitor the wastewater according to the following schedule. The Permittee must use the specified analytical methods unless the method used produces measurable results in the sample and EPA has listed it as an EPA-approved method in 40 CFR Part 136. If the Permittee uses an alternative method, not specified in the permit and as allowed above, it must report the test method, MDL, and QL on the discharge monitoring report or in the required report. If the Permittee is unable to obtain the required DL and QL in its effluent due to matrix effects, the Permittee must submit a matrix-specific detection limit and a quantitation limit to Ecology with appropriate laboratory documentation.

Parameter ^b	Units	Minimum Sampling Frequency	Sample Type	Analytical Method
Flow	gpd	Continuous	Recorder	N/A
pH ^a	Standard Units	Monthly	Grab	pH meter ^a
Benzene	µg/L	Monthly	Grab	EPA 624 (DL:1, QL:2)
BTEX ^c	µg/L	Monthly	Grab	EPA 624 (DL:1, QL:2)
Total Petroleum Hydrocarbon-G ^d	µg/L	Monthly	Grab	NWTPH-G _x (DL:≤, QL: ≤50)
Total Petroleum Hydrocarbon-D ^d	µg/L	Monthly	Grab	NWTPH-D _x (DL:, QL: ≤50)
Lead (Total)	µg/L	Quarterly	Grab	EPA 200.8 (DL:0.1, QL:0.5)
^a pH must be measured using a pH meter in the field. The calibration frequency specifications and method must be followed in accordance with the manufacturer's recommendations. A logbook must be kept to log all the readings and must be made available for Ecology's inspector(s) during inspections.				
^b The final effluent sample point is defined as the nearest accessible point after granular activated carbon treatment, prior to discharge to the City of Redmond's storm drain line.				
^c Calculate the value for BTEX by summing the concentrations of benzene, toluene, ethylbenzene, and xylenes. The test method for BTEX is EPA Method 624 or an approved equivalent method(s).				
^d To measure TPH-G and TPH-D (Total Petroleum Hydrocarbons, gasoline and diesel-range) use approved Test Methods NWTPH-G _x and NWTPH-D _x . Discussion of the test method for TPH is contained in the Analytical Methods for Petroleum Hydrocarbons, Ecology Publication No. ECY 97-602, June 1997 which was revised in 2013 (Analytical Methods for Petroleum Hydrocarbons (wa.gov)).				

S2.B. Sampling and analytical procedures

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters, including representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions affecting effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 (or as applicable in 40 CFR subchapters N [Parts 400–471] or O [Parts 501-503]) unless otherwise specified in this permit. Ecology may only specify alternative methods for parameters without limits and for those parameters without an EPA approved test method in 40 CFR Part 136.

S2.C. Laboratory accreditation

The Permittee must ensure that all monitoring data required by Ecology for permit specified parameters is prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. Flow, temperature, settleable solids, conductivity, pH, chitosan acetate, and internal process control parameters are exempt from this requirement.

S3. Reporting and recording requirements

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

S3.A. Reporting

The first monitoring period begins on the effective date of the permit. The Permittee must:

1. Summarize, report, and submit monitoring data obtained during each monitoring period on the electronic discharge monitoring report (DMR) form provided by Ecology within the Water Quality Permitting Portal. Include data for each of the parameters tabulated in Special Condition S2 and as required by the form. Report a value for each day sampling occurred (unless specifically exempted in the permit) and for the summary values (when applicable) included on the electronic form.

To find out more information and to sign up for the [Water Quality Permitting Portal](http://ecyapwq/wqwebportal/) go to: <http://ecyapwq/wqwebportal/>

2. Ensure that DMRs are electronically submitted no later than the dates specified below, unless otherwise specified in this permit.

3. Submit DMRs for parameters with the monitoring frequencies specified in S2 (monthly, quarterly, annual, etc.) at the reporting schedule identified below. The Permittee must:
 - a. Submit **monthly** DMRs by the 28th day of the following month.
 - b. Submit **quarterly DMRs**, unless otherwise specified in the permit, by the 28th day of the month following the monitoring period. Quarterly sampling periods are January through March, April through June, July through September, and October through December. The Permittee must submit the first quarterly DMR on **October 28, 2021**.
4. Enter the "No Discharge" reporting code for an entire DMR, for a specific monitoring point, or for a specific parameter as appropriate, if the Permittee did not discharge wastewater or a specific pollutant during a given monitoring period.
5. Report single analytical values below detection as "less than the detection level (DL)" by entering < followed by the numeric value of the detection level (e.g. < 2.0) on the DMR. If the method used did not meet the minimum DL and quantitation level (QL) identified in the permit, report the actual QL and DL in the comments or in the location provided.
6. Report single analytical values between the detection level (DL) and the quantitation level (QL) by entering the estimated value, the code for estimated value/below quantitation limit (j) and any additional information in the comments. Submit a copy of the laboratory report as an attachment using WQWebDMR.
7. Report the test method used for analysis in the comments if the laboratory used an alternative method not specified in the permit and as allowed in S2.
8. Calculate average values and calculated total values (unless otherwise specified in the permit) using:
 - a. The reported numeric value for all parameters measured between the detection value and the quantitation value for the sample analysis.
 - b. One-half the detection value (for values reported below detection) if the lab detected the parameter in another sample from the same monitoring point for the reporting period.
 - c. Zero (for values reported below detection) if the lab did not detect the parameter in another sample for the reporting period.
9. Report single-sample grouped parameters (for example: priority pollutants, PAHs, pulp and paper chlorophenolics, TTOs) on the WQWebDMR form and include: sample date, concentration detected,

detection limit (DL) (as necessary), and laboratory quantitation level (QL) (as necessary).

The Permittee must also submit an electronic copy of the laboratory report as an attachment using WQWebDMR. The contract laboratory reports must also include information on the chain of custody, QA/QC results, and documentation of accreditation for the parameter.

S3.B. Permit submittals and schedules

The Permittee must use the Water Quality Permitting Portal – Permit Submittals application (unless otherwise specified in the permit) to submit all other written permit-required reports by the date specified in the permit.

When another permit condition requires submittal of a paper (hard-copy) report, the Permittee must ensure that it is postmarked or received by Ecology no later than the dates specified by this permit. Send these paper reports to Ecology at:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
PO Box 330316
Shoreline, WA 98133-9716

S3.C. Records retention

The Permittee must retain records of all monitoring information for a minimum of three (3) years. Such information must include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

S3.D. Recording of results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, method, and time of sampling or measurement.
2. The individual who performed the sampling or measurement.
3. The dates the analyses were performed.
4. The analytical techniques or methods used.
5. The results of all analyses.

S3.E. Additional monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Special Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR unless otherwise specified by Special Condition S2.

S3.F. Reporting permit violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

1. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance and correct the problem.
2. If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within thirty (30) days of sampling.

a. Twenty-four-hour reporting

The Permittee must report the following occurrences of noncompliance by telephone, to Ecology at (206) 594-0000, within 24 hours from the time the Permittee becomes aware of any of the following circumstances:

- 1.) Any noncompliance that may endanger health or the environment, unless previously reported under immediate reporting requirements.
- 2.) Any unanticipated bypass that causes an exceedance of any effluent limit in the permit (See Part S4.B., "Bypass Procedures").
- 3.) Any upset that causes an exceedance of an effluent limit in the permit (See G.15, "Upset").
- 4.) Any violation of a maximum daily or instantaneous maximum discharge limit for any of the pollutants in Section S1.A of this permit.
- 5.) Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limit in the permit.

b. Report within five days

The Permittee must also submit a written report within five days of the time that the Permittee becomes aware of any reportable event under subparts a or b, above. The report must contain:

- 1.) A description of the noncompliance and its cause.

- 2.) The period of noncompliance, including exact dates and times, if known.
- 3.) The estimated time the Permittee expects the noncompliance to continue if not yet corrected.
- 4.) Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
- 5.) If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

c. Waiver of written reports

Ecology may waive the written report required in S3.F.c, above, on a case-by-case basis upon request if the Permittee has submitted a timely oral report.

d. All other permit violation reporting

The Permittee must report all permit violations, which do not require immediate or within 24 hours reporting, when it submits monitoring reports for S3.A ("Reporting"). The reports must contain the information listed in S3.F.c, above. Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

S3.G. Other reporting

1. Spills of oil or hazardous materials

The Permittee must report a spill of oil or hazardous materials in accordance with the requirements of RCW 90.56.280 and chapter 173-303-145 WAC. You can obtain further instructions on [How to Report a Spill](https://ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue/Report-a-spill) at: <https://ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue/Report-a-spill>.

2. Failure to submit relevant or correct facts

When the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it must submit such facts or information promptly.

S3.H. Maintaining a copy of this permit

The Permittee must keep a copy of this permit at the facility and make it available upon request to Ecology inspectors.

S4. Operation and maintenance

The Permittee must, at all times, properly operate and maintain all facilities or systems of treatment and control (and related appurtenances), which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes keeping a daily operation logbook (paper or electronic), adequate laboratory controls, and appropriate quality assurance procedures. This provision of the permit requires the Permittee to operate backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

The Permittee must schedule any facility maintenance, which might require interruption of wastewater treatment and degrade effluent quality, during non-critical water quality periods and carry this maintenance out in a manner approved by Ecology.

S4.A. Treatment system operating plan

The Permittee must:

1. Submit a treatment system operating plan (TSOP) in accordance with 173-240-150 WAC, to Ecology by **March 15, 2023**.
2. Review the TSOP at least annually.
3. Submit to Ecology for review substantial changes or updates to the TSOP whenever it incorporates them into the manual.
4. Keep the approved TSOP at the permitted facility.
5. Follow the instructions and procedures of this TSOP.

In addition to the requirements of WAC 173-240-150(1) and (2), the TSOP must include:

1. A baseline operating condition, which describes the operating parameters and procedures, used to meet the effluent limits of S1 at the production levels used in developing these limits.
2. In the event of production rates, which are below the baseline levels used to establish these limits, the plan must describe the operating procedures and conditions needed to maintain design treatment efficiency. The monitoring and reporting must be described in the plan.
3. In the event of an upset, due to plant maintenance activities, severe stormwater events, startups or shut downs, or other causes, the plan must describe the operating procedures and conditions employed to mitigate the upset. The monitoring and reporting must be described in the plan.
4. A description of any regularly-scheduled maintenance or repair activities at the facility which would affect the volume or character of the wastes discharged to the wastewater treatment system and a plan for monitoring

and treating/controlling the discharge of maintenance-related materials (such as cleaners, degreasers, solvents, etc.).

5. Emergency procedures for plant shutdown and cleanup in event of wastewater system upset or failure.
6. Any directions to maintenance staff when cleaning, or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine.)
7. Wastewater sampling protocols and procedures for compliance with the sampling and reporting requirements in the wastewater discharge permit.

The Permittee must submit an updated TSOP to Ecology by **January 31, 2026**, with **the application for permit renewal**. This plan must be updated and submitted, as necessary, to include requirements for any major modifications of the treatment system.

S4.B. Bypass procedures

This permit prohibits a bypass, which is the intentional diversion of waste streams from any portion of a treatment facility.

Ecology may take enforcement action against a Permittee for a bypass unless one of the following circumstances (1, 2, or 3) applies.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

This permit authorizes a bypass if it allows for essential maintenance and does not have the potential to cause violations of limits or other conditions of this permit, or adversely impact public health as determined by Ecology prior to the bypass. The Permittee must submit prior notice, if possible, at least ten (10) days before the date of the bypass.

2. Bypass is unavoidable, unanticipated, and results in noncompliance of this permit.

This permit authorizes such a bypass only if:

- a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.
- b. No feasible alternatives to the bypass exist, such as:
 - The use of auxiliary treatment facilities.

- Retention of untreated wastes.
 - Stopping production.
 - Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass.
 - Transport of untreated wastes to another treatment facility or preventative maintenance, or transport of untreated wastes to another treatment facility.
- c. The Permittee has properly notified Ecology of the bypass as required in Special Condition S3.E of this permit.
3. If bypass is anticipated and has the potential to result in noncompliance of this permit.
- a. The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:
- A description of the bypass and its cause.
 - An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.
 - A cost-effectiveness analysis of alternatives including comparative resource damage assessment.
 - The minimum and maximum duration of bypass under each alternative.
 - A recommendation as to the preferred alternative for conducting the bypass.
 - The projected date of bypass initiation.
 - A statement of compliance with SEPA.
 - A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.
 - Details of the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.
- b. For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during preparation of the engineering report or facilities plan and plans and specifications and must include these to the extent practical. In cases where the Permittee determines the probable need to bypass early,

the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.

- c. Ecology will consider the following prior to issuing an administrative order for this type of bypass:
 - If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.
 - If feasible alternatives to bypass exist, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.
 - If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve or deny the request. Ecology will give the public an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Ecology will approve a request to bypass by issuing an administrative order under RCW 90.48.120.

S5. Solid wastes

S5.A. Solid waste handling

The Permittee must handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

S5.B. Leachate

The Permittee must not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment, nor allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality Standards, Chapter 173-200 WAC. The Permittee must apply for a permit or permit modification as may be required for such discharges to state ground or surface waters.

S6. Non-routine and unanticipated wastewater

1. Beginning on the effective date of this permit, the Permittee is authorized to discharge non-routine wastewater or unanticipated wastewater and therefore not listed on the permit application, on a case-by-case basis if approved by Ecology. Prior to any such discharge, the Permittee must contact Ecology and, **at a minimum**, provide the following information:
 - a. The proposed discharge location.

- b. The nature of the activity that will generate the discharge.
 - c. Any alternatives to the discharge, such as reuse, storage, or recycling of the water.
 - d. The total volume of water it expects to discharge.
 - e. The results of the chemical analysis of the water.
 - f. The date of proposed discharge.
 - g. The expected rate of discharge discharged, in gallons per minute.
2. The Permittee must analyze the water for all constituents limited for the discharge and report them as required by subpart 1.e, above. The analysis must also include any parameter deemed necessary by Ecology. All discharges must comply with the effluent limits as established in Special Condition S1 of this permit, water quality standards, and any other limits imposed by Ecology.
 3. The Permittee must limit the discharge rate, as referenced in subpart 1.g, above, so it will not cause erosion of ditches or structural damage to culverts and their entrances or exits.
 4. The discharge cannot proceed until Ecology has reviewed the information provided and has authorized the discharge by letter to the Permittee or by an Administrative Order. Once approved and if the proposed discharge is to a municipal storm drain, the Permittee must obtain prior approval from the municipality and notify it when it plans to discharge.

S7. Application for permit renewal or modification for facility changes

The Permittee must submit an application for renewal of this permit by **January 31, 2026**. The Permittee must submit a paper copy and an electronic copy (preferably as a PDF).

The Permittee must also submit a new application or supplement at least sixty (60) days prior to commencement of discharges, resulting from the activities listed below, which may result in permit violations. These activities include any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility.

S8. Annual groundwater quality evaluation

The Permittee must submit a groundwater quality report to Ecology by **May 15, 2024**, and annually thereafter. The report must contain discussion and evaluation of whether the treatment system is performing effectively to reduce the concentration of each of the contaminant as limited in the permit, in the contaminated groundwater plume. The report must include, but is not limited to, the following:

- A plan view of monitoring well locations.
- The TPH-gasoline and diesel, and benzene data collected during the previous calendar year, and discussion to evaluate long-term groundwater quality trends, and to support of future development of site remediation planning efforts.
- The volume of groundwater pumped through the groundwater treatment plant.
- The data should be presented on drawings by mapping the concentrations (sample date and measured concentration) measured in groundwater for each contaminant.

S9. Well construction details

The Permittee must construct all **new** wells, including Dual Vapor Extraction (DVE) wells, in accordance with Chapter 173-160 WAC, parts 1 and 3 (Minimum Standards for Construction and Maintenance of Wells). Figure 7 in Chapter 173-160 WAC illustrates the standards of well construction. The Permittee must submit a Well Design Report to Ecology within thirty (30) days after well construction. The final report must include, at a minimum:

1. The well construction details.
2. An identification of the name, company, and license number of the driller.
3. The method of drilling the wells.
4. An identification of the name and company of the supervising geologist or hydrogeologist.
5. A copy of the well log and construction details for the well.
6. A copy of material safety data sheets for all products used to construct the well, including well casing, grout, or sealant, filter pack material, and well screen.
7. A description of the method of well development, a summary of results, and geologic sampling frequency.
8. A copy of sample results.

All monitoring wells must: 1) be clearly labeled, 2) be capped, 3) be locked, 4) be identified with a unique well identification number, and 5) contain a vertical reference point which relates to the nearest vertical benchmark referencing a geodetic vertical datum. Ground water elevations must be recorded prior to purging. The report must be signed by a qualified hydrogeologist or a qualified engineer.

General Conditions

G1. Signatory requirements

1. All applications, reports, or information submitted to Ecology must be signed and certified.
 - a. In the case of corporations, by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
 - A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or
 - The manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
 - In the case of a partnership, by a general partner.
 - In the case of sole proprietorship, by the proprietor.
 - In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

Applications for permits for domestic wastewater facilities that are either owned or operated by, or under contract to, a public entity must be submitted by the public entity.

2. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
 - a. The authorization is made in writing by a person described above and submitted to Ecology.
 - b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to authorization. If an authorization under paragraph G1.2, above, is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph G1.2, above, must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.
4. Certification. Any person signing a document under this section must make the following certification:

"I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G2. Right of inspection and entry

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

1. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.
2. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.
3. To inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.
4. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. Permit actions

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the permittee) or upon Ecology's initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

1. The following are causes for terminating this permit during its term, or for denying a permit renewal application:

- a. Violation of any permit term or condition.
 - b. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.
 - c. A material change in quantity or type of waste disposal.
 - d. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination.
 - e. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or sludge use or disposal practice controlled by the permit.
 - f. Nonpayment of fees assessed pursuant to RCW 90.48.465.
 - g. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.
2. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:
- a. A material change in the condition of the waters of the state.
 - b. New information not available at the time of permit issuance that would have justified the application of different permit conditions.
 - c. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.
 - d. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.
 - e. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.
 - f. Ecology has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.
 - g. Incorporation of an approved local pretreatment program into a municipality's permit.
3. The following are causes for modification or alternatively revocation and reissuance:
- a. When cause exists for termination for reasons listed in 1.a through 1.g of this section, and Ecology determines that modification or revocation and reissuance is appropriate.
 - b. When Ecology has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G7) but will not be revoked and reissued

after the effective date of the transfer except upon the request of the new Permittee.

G4. Reporting planned changes

The Permittee must, as soon as possible, but no later than one hundred eighty (180) days prior to the proposed changes, give notice to Ecology of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in:

1. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b).
2. A significant change in the nature or an increase in quantity of pollutants discharged.
3. A significant change in the Permittee's sludge use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G5. Plan review required

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications must be submitted to Ecology for approval in accordance with chapter 173-240 WAC. Engineering reports, plans, and specifications must be submitted at least one hundred eighty (180) days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities must be constructed and operated in accordance with the approved plans.

G6. Compliance with other laws and statutes

Nothing in this permit excuses the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. Transfer of this permit

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee must notify the succeeding owner or controller of the existence of this permit by letter, a copy of which must be forwarded to Ecology.

1. Transfers by Modification

Except as provided in paragraph (2) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or

revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

2. Automatic Transfers

This permit may be automatically transferred to a new Permittee if:

- a. The Permittee notifies Ecology at least thirty (30) days in advance of the proposed transfer date.
- b. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.
- c. Ecology does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G8. Reduced production for compliance

The Permittee, in order to maintain compliance with its permit, must control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G9. Removed substances

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G10. Duty to provide information

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology upon request, copies of records required to be kept by this permit.

G11. Other requirements of 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. Additional monitoring

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. Payment of fees

The Permittee must submit payment of fees associated with this permit as assessed by Ecology.

G14. Penalties for violating permit conditions

Any person who is found guilty of willfully violating the terms and conditions of this permit is deemed guilty of a crime, and upon conviction thereof must be punished by a fine of up to ten thousand dollars (\$10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit may incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars (\$10,000) for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is deemed to be a separate and distinct violation.

G15. Upset

Definition – "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limits if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the Permittee can identify the cause(s) of the upset.
2. The permitted facility was being properly operated at the time of the upset.
3. The Permittee submitted notice of the upset as required in Special Condition S3.E.
4. The Permittee complied with any remedial measures required under S3.E of this permit.

In any enforcement action the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. Property rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. Duty to comply

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. Toxic pollutants

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. Penalties for tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment must a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than four (4) years, or by both.

G20. Reporting requirements applicable to existing manufacturing, commercial, mining, and silvicultural dischargers

The Permittee belonging to the categories of existing manufacturing, commercial, mining, or silviculture must notify Ecology as soon as they know or have reason to believe:

1. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in this permit, if that discharge will exceed the highest of the following "notification levels:"
 - a. One hundred micrograms per liter (100 µg/L).

- b. Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony.
 - c. Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7).
 - d. The level established by the Director in accordance with 40 CFR 122.44(f).
2. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in this permit, if that discharge will exceed the highest of the following "notification levels:"
- a. Five hundred micrograms per liter (500 µg/L).
 - b. One milligram per liter (1 mg/L) for antimony.
 - c. Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7).
 - d. The level established by the Director in accordance with 40 CFR 122.44(f).

G21. Compliance schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than fourteen (14) days following each schedule date.

Appendix D

Health and Safety Plan



This Level 2 HASP is intended to provide health and safety guidelines for project field work meeting the following criteria:

- **“Buddy System” in use (or communication plan implemented for “lone worker”**
- **Some likelihood of chemical and/or physical hazard exposure**
- **No supplied-air respirator use**

The Project Manager should review this Health and Safety Plan with all Apex project personnel. A copy of the HASP must be kept in the field with the project team as well as maintained in project files.

<p>Administrative Information</p> <p>This document is valid for a maximum time period of one year after initial completion and must be re-evaluated by the project team at that time.</p> <p>A minimum of two persons with appropriate training must be onsite or an appropriate communication plan must be implemented. A mix of Apex and other personnel can satisfy this requirement.</p>	Site Name and Location Overlake Retail Shops, Former Sears Auto Center #6119 – 2200 148 th Avenue NE, Redmond, WA		
	Client Contact and Phone		
	Project Name Overlake Retail Shops, Former Sears Auto Center		
	Health & Safety Plan Date 5/1/2020	Revision Number and Date Revision 2- 2/28/2023	
	Field Work Start Date 5/1/2020	Anticipated Field Work End Date Through December 2023	
	Project Manager (<i>responsible for implementing the site health and safety program on this project</i>) John Foxwell	Site Safety Officer (SSO) (<i>responsible for overall site health and safety performance on this project</i>). Corey Stout	

<p>Project Background and Scope of Work</p> <p>Include numbered list of tasks to be completed by Apex personnel during this project, and a separate list of tasks to be completed by any subcontractors at the site.</p> <p>JSA's are to be prepared for each task listed. Subcontractors are responsible for preparing JSA's for their activities.</p>	<p>Apex Scope of Work:</p> <ul style="list-style-type: none"> Remediation system operation Waste management Well gauging and development Groundwater sampling Well abandonment and installation
	<p>Subcontractor Scope of Work:</p> <p>As required by individual Job Safety Analysis (JSA).</p>

<p>Site/Project General Information</p> <p>An asterisk (*) indicates that additional checklists or permits are required and must be completed and attached to this document.</p> <p>A double asterisk (**) indicates that a Risk Review performed by a member of the Corporate Safety Committee must take place prior to beginning fieldwork on the project.</p>	<p>Site Type (check all applicable boxes)</p> <table border="0"> <tr> <td><input checked="" type="checkbox"/> Active Facility</td> <td><input type="checkbox"/> Remote Facility</td> <td><input type="checkbox"/> Inactive Facility</td> <td><input type="checkbox"/> Residential</td> </tr> <tr> <td><input type="checkbox"/> Mine</td> <td><input type="checkbox"/> Railroad</td> <td><input type="checkbox"/> Industrial</td> <td><input checked="" type="checkbox"/> Secured</td> </tr> <tr> <td><input type="checkbox"/> Uncontrolled</td> <td><input checked="" type="checkbox"/> Other (specify)</td> <td colspan="2">Former Sears Auto Center</td> </tr> </table>	<input checked="" type="checkbox"/> Active Facility	<input type="checkbox"/> Remote Facility	<input type="checkbox"/> Inactive Facility	<input type="checkbox"/> Residential	<input type="checkbox"/> Mine	<input type="checkbox"/> Railroad	<input type="checkbox"/> Industrial	<input checked="" type="checkbox"/> Secured	<input type="checkbox"/> Uncontrolled	<input checked="" type="checkbox"/> Other (specify)	Former Sears Auto Center																				
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<input type="checkbox"/> Uncontrolled	<input checked="" type="checkbox"/> Other (specify)	Former Sears Auto Center																														
<p>Main Site Hazards (check all applicable boxes)</p> <table border="0"> <tr> <td><input checked="" type="checkbox"/> Slip/Trip/Fall</td> <td><input type="checkbox"/> Cold Stress</td> <td><input type="checkbox"/> Heat Stress</td> <td><input type="checkbox"/> Extreme Weather</td> </tr> <tr> <td><input type="checkbox"/> Biological</td> <td><input checked="" type="checkbox"/> Organic/Inorganic Chemicals</td> <td><input checked="" type="checkbox"/> High Noise</td> <td><input type="checkbox"/> Construction Traffic</td> </tr> <tr> <td><input checked="" type="checkbox"/> Vehicular Traffic</td> <td><input checked="" type="checkbox"/> Respirable Particles</td> <td><input type="checkbox"/> Excavations</td> <td><input checked="" type="checkbox"/> Buried/Overhead Utilities</td> </tr> <tr> <td><input type="checkbox"/> Non-Ionizing Radiation</td> <td><input type="checkbox"/> Security</td> <td><input type="checkbox"/> ASTs/USTs</td> <td><input type="checkbox"/> Manlift/Cherry Picker Use</td> </tr> <tr> <td><input type="checkbox"/> Work Over 6' High*</td> <td><input checked="" type="checkbox"/> Hand/Portable Power Tools</td> <td><input type="checkbox"/> Oxygen Deficiency</td> <td><input type="checkbox"/> Demolition</td> </tr> <tr> <td><input type="checkbox"/> Blasting Agents</td> <td><input type="checkbox"/> Confined Spaces</td> <td><input type="checkbox"/> Welding or Hot Work</td> <td><input type="checkbox"/> Chemical Mixing**</td> </tr> <tr> <td><input type="checkbox"/> Lockout/Tagout</td> <td><input checked="" type="checkbox"/> Forklift Use – Possible</td> <td><input type="checkbox"/> Other (specify)</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Scaffold Use</td> <td><input type="checkbox"/> Portable Ladders</td> <td><input type="checkbox"/> Other (specify)</td> <td></td> </tr> </table>	<input checked="" type="checkbox"/> Slip/Trip/Fall	<input type="checkbox"/> Cold Stress	<input type="checkbox"/> Heat Stress	<input type="checkbox"/> Extreme Weather	<input type="checkbox"/> Biological	<input checked="" type="checkbox"/> Organic/Inorganic Chemicals	<input checked="" type="checkbox"/> High Noise	<input type="checkbox"/> Construction Traffic	<input checked="" type="checkbox"/> Vehicular Traffic	<input checked="" type="checkbox"/> Respirable Particles	<input type="checkbox"/> Excavations	<input checked="" type="checkbox"/> Buried/Overhead Utilities	<input type="checkbox"/> Non-Ionizing Radiation	<input type="checkbox"/> Security	<input type="checkbox"/> ASTs/USTs	<input type="checkbox"/> Manlift/Cherry Picker Use	<input type="checkbox"/> Work Over 6' High*	<input checked="" type="checkbox"/> Hand/Portable Power Tools	<input type="checkbox"/> Oxygen Deficiency	<input type="checkbox"/> Demolition	<input type="checkbox"/> Blasting Agents	<input type="checkbox"/> Confined Spaces	<input type="checkbox"/> Welding or Hot Work	<input type="checkbox"/> Chemical Mixing**	<input type="checkbox"/> Lockout/Tagout	<input checked="" type="checkbox"/> Forklift Use – Possible	<input type="checkbox"/> Other (specify)		<input type="checkbox"/> Scaffold Use	<input type="checkbox"/> Portable Ladders	<input type="checkbox"/> Other (specify)	
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<p>Chemical Products Apex will Use or Store Onsite</p> <p>For each chemical product identified, an SDS must be attached to this HASP</p>	<input checked="" type="checkbox"/> Alconox or Liquinox <input type="checkbox"/> Hydrochloric acid (HCl)* <input type="checkbox"/> Nitric acid (HNO ₃)* <input type="checkbox"/> Sodium hydroxide (NaOH)* <input type="checkbox"/> Other (specify)	<input type="checkbox"/> Calibration gas (Methane) <input checked="" type="checkbox"/> Calibration gas (Isobutylene) <input type="checkbox"/> Calibration gas (Pentane) <input type="checkbox"/> Calibration gas (4-gas mixture) <input type="checkbox"/> Other (specify)	<input type="checkbox"/> Isopropyl Alcohol <input type="checkbox"/> Household bleach (NaOCl)* <input type="checkbox"/> Sulfuric acid (H ₂ SO ₄)* <input type="checkbox"/> Hexane <input type="checkbox"/> Other (specify)
	<p>*NOTE: Eyewash solution shall be readily available on ALL projects where corrosive materials are used or stored, including sample preservatives.</p>		

<p>Safe Work Practices</p> <p>Place a checkmark by applicable SWPs and attach to this document</p> <p>For hazards not covered by SWPs listed in this section, ensure the hazard is addressed in the JSA for that task. Otherwise, the JSA may reference the SWP for that hazard.</p>	<p>SWPs Applicable To This Project (check all applicable boxes)</p>			
	<input checked="" type="checkbox"/> Hazard Communication <input type="checkbox"/> Cold Stress <input type="checkbox"/> Confined Space Entry <input type="checkbox"/> Forklift and Truck Operations <input type="checkbox"/> Wet Utilities – Maintenance, Inspection, Repair <input type="checkbox"/> Other Task (specify)	<input checked="" type="checkbox"/> Medical Services and First Aid <input type="checkbox"/> Natural Hazards <input checked="" type="checkbox"/> Drum Handling <input checked="" type="checkbox"/> Hand/Power Tool Use <input type="checkbox"/> Other Task (specify)	<input checked="" type="checkbox"/> Airborne Contaminants <input checked="" type="checkbox"/> Personal Protective Equipment <input type="checkbox"/> Excavation <input checked="" type="checkbox"/> Heavy and Material Handling Equipment <input type="checkbox"/> Other Task (specify)	<input type="checkbox"/> Heat Stress <input checked="" type="checkbox"/> Respiratory Protection <input checked="" type="checkbox"/> Fall Protection and Prevention <input type="checkbox"/> Ladder Safety <input type="checkbox"/> Other Task (specify)

<p>Levels of Protection Required for each Task</p> <p>Signature of the SSO on page 1 of this document signifies certification of PPE Hazard Assessment</p>	<p>Task Description</p>	<p>Level</p>			
		A	B	C	D
	Treatment system and groundwater sampling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Well gauging and development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Soil borings, well installation, well abandonment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	SVE System Monitoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Personal Protective Equipment Req=Required Rec=Recommended An asterisk (*) indicates that employees must be a participant in the respiratory program, including, annual training and fit testing.	Equipment	Req	Rec	NA	Equipment	Req	Rec	NA
	Steel Toe Boots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tyvek Suit	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Safety Glasses Shields	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outer Disposable Boots	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Hi Vis Vest (Specify Class 2/3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Indirect Vented Goggles	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Hi Vis Shirt	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Poly-Coated Tyvek	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Hard Hat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dust Mask*	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Fire Resistant Clothing (FRC)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Full-Face Respirator*	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Hearing Protection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Half-Face Respirator*	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Work Gloves – Type: Cut resistant/Nitrile	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inner Chemical Gloves	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outer Chemical Gloves	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Training and Medical Surveillance	Training	Req	Rec	NA	Medical Surveillance	Req	Rec	NA
Req=Required Rec=Recommended	40 Hour HAZWOPER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Medical Clearance (fit for duty)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Current 8 Hour HAZWOPER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Respirator Clearance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	8 Hour HAZWOPER Supervisor	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Blood Lead and ZPP	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	24Hour HAZWOPER	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Current CPR and First Aid	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	10 Hour Construction	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety Supplies	Supplies	Req	Rec	NA	Supplies	Req	Rec	NA
Req=Required Rec=Recommended	First Aid Kit	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fire Extinguisher	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Eyewash Solution	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Water/Sports Drink	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Air Horn	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Oral Thermometer (heat monitoring)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

	Noise Meter (Dosimeter)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Decontamination Supplies	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Work Zones If exclusion zones are necessary because of chemical hazards, describe the plan	Exclusion Zone: Exclusion zone for each activity are established using cones and caution tape as necessary. Exclusion zones work as a buffer to prevent vehicular and pedestrian traffic from entering work zone but require consideration so as to not increase danger for vehicles and pedestrians outside of the work area.
	Contamination Reduction Zone: N/A
	Support Zone: N/A

Site Access/Control How do we limit unauthorized entry to the site itself?	Access Control Procedures: Exclusion zones delineate work area and prevent unauthorized access. System enclosure and gate to remain locked at all times.
DECON Procedures	Decontamination Procedures Apex will decontaminate equipment between locations during sampling events.

Communication Plan In the event work must be completed alone by an Apex employee or work is performed in a rural area with limited communication, this Communication Plan must be completed.	The purpose of the communication plan is to provide a “What to Do” if the project manager/supervisor cannot contact field personnel. The field team and PM must coordinate a call in time daily. The check-in intervals will depend on the project setting and hazards. More importantly, if the field team does not check in, what is the requirement or actions of the PM.			
	Daily Check in Time	Responsible Person	Daily Check In Time	Responsible person
	1300	Corey Stout (714) 393-9795	1500	Molly Strain (253) 778-2833
	Plan of Action (in the event of no communication): Reattempt communication via phone at 1500. If still unable to establish communication, mobilize to site at 1800.			

Chemicals of Concern			
<p>In the section to the right, check any chemicals present onsite in any media (air, soil water).</p> <p>In the table below, list chemicals suspected or confirmed to be onsite, and provide requested information.</p>	<input type="checkbox"/> Friable Asbestos	<input type="checkbox"/> Vinyl chloride	<input checked="" type="checkbox"/> Toluene
	<input type="checkbox"/> RCRA Metals	<input type="checkbox"/> Inorganic Arsenic	<input type="checkbox"/> Ethylbenzene
<input type="checkbox"/> Lead	<input type="checkbox"/> Cadmium	<input checked="" type="checkbox"/> Xylene	
<input checked="" type="checkbox"/> Benzene	<input type="checkbox"/> Formaldehyde	<input checked="" type="checkbox"/> Polyaromatic hydrocarbons (PAHs)	
<input type="checkbox"/> Trichloroethylene (TCE)	<input type="checkbox"/> Fuel Oils	<input type="checkbox"/> Polychlorinated biphenyl (PCBs)	
<input type="checkbox"/> Tetrachloroethylene (PCE)	<input type="checkbox"/> Methylene chloride	<input type="checkbox"/> Chromium (VI)	
<input type="checkbox"/> Other	<input checked="" type="checkbox"/> Other TPH-G	<input type="checkbox"/> Other	
<input type="checkbox"/> Other	<input checked="" type="checkbox"/> Other TPH-Dx	<input type="checkbox"/> Other	
<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> Other	
	<input type="checkbox"/> No Apex exposure to these		

Materials Present or Suspected at Site	Highest Reported Concentration (specify units and sample medium)	Exposure Limit (specify ppm or mg/m ³)	IDLH Level (specify ppm or mg/m ³)	Primary Hazards of the Material (explosive, flammable, corrosive, toxic, volatile, radioactive, biohazard, oxidizer, or other)	Symptoms and Effects of Acute Exposure	Ionization Potential (eV)
Petroleum Hydrocarbons	NA	PEL = 500 REL = 350 TLV = Skin Hazard <input checked="" type="checkbox"/>	1,100 ppm	Flammable	Fatigue, headache, nausea, dizziness. Exposure to high levels can lead to coma or death.	
Benzene	NA	PEL = 1 REL = 0.1 TLV = Skin Hazard <input checked="" type="checkbox"/>	500 ppm	Flammable	Drowsiness, dizziness, rapid heart rate, headache, tremors, confusion, and unconsciousness. Exposure to very high levels can lead to death.	
Toluene	NA	PEL = 200 REL = 100 TLV = Skin Hazard <input checked="" type="checkbox"/>	500 ppm	Flammable	Causes mild to moderate skin irritation. Inhalation or ingestion may cause nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness	
Xylenes	NA	PEL = 100 REL = 100 TLV = Skin Hazard	900 ppm	Flammable	Causes mild to moderate skin irritation. Inhalation or ingestion may cause nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness	
Lead	NA	PEL = 0.05 mg/m ³ REL = 0.05 mg/m ³ TLV = 0.05 mg/m ³ Skin Hazard <input checked="" type="checkbox"/>	100 mg/m ³	Not Flammable, toxic	Lassitude (weakness, exhaustion); insomnia; facial pallor; anorexia; weight loss; malnutrition; constipation; abdominal pain; colic; gingival lead line; tremor; paralysis of wrist, ankles; encephalopathy; kidney disease, irritation eyes, hypertension	
PAHs	NA	PEL = 100 ppm REL = 100 ppm TLV = 20 ppm Skin Hazard <input type="checkbox"/>	500 ppm	Flammable Liquid, toxic	Exposure to vinyl chloride occurs mainly in the workplace. Breathing high levels of vinyl chloride for short periods of time can cause dizziness, sleepiness, unconsciousness, and at extremely high levels can cause death. Breathing vinyl chloride for long periods of time can result in permanent liver damage, immune reactions, nerve damage, and liver cancer.	
PEL = OSHA Permissible Exposure Limit REL = NIOSH Recommended Exposure Limit TLV = ACGIH Threshold Limit Value IDLH = Immediately Dangerous to Life or Health						

Monitoring Equipment: All monitoring equipment on site must be calibrated before and after each use and results recorded.				
Instrument (Check all required)	Task	Instrument Reading	Action Guideline	Comments
<input type="checkbox"/> Combustible gas indicator model:	<input type="checkbox"/> 1	0 to 10% LEL	Monitor; evacuate if confined space	
	<input type="checkbox"/> 2	10 to 25% LEL	Potential explosion hazard	
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4	>25% LEL	Explosion hazard; interrupt task; evacuate site	
	<input type="checkbox"/> 5			
<input checked="" type="checkbox"/> Oxygen meter model:	<input type="checkbox"/> 1	>23.5% Oxygen	Potential fire hazard; evacuate site	
	<input type="checkbox"/> 2	23.5 to 19.5% Oxygen	Oxygen level normal	
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4	<19.5% Oxygen	Oxygen deficiency; interrupt task; evacuate site	
	<input type="checkbox"/> 5			
<input type="checkbox"/> Radiation survey meter model:	<input type="checkbox"/> 1	Normal background	Proceed	Annual exposure not to exceed 1,250 mrem per quarter Background reading must be taken in an area known to be free of radiation sources
	<input type="checkbox"/> 2			
	<input type="checkbox"/> 3	Two to three times background	Notify SSO	
	<input type="checkbox"/> 4	>Three times background	Radiological hazard; interrupt task; evacuate site	
	<input type="checkbox"/> 5			
<input checked="" type="checkbox"/> Photoionization detector model: <input type="checkbox"/> 11.7 eV <input checked="" type="checkbox"/> 10.6 eV <input checked="" type="checkbox"/> 10.2 eV <input type="checkbox"/> 9.8 eV <input type="checkbox"/> ____ eV	<input checked="" type="checkbox"/> 1	Any response above background to 5 ppm above background	Level D is acceptable	Action levels must be determined based on the COCs and concentrations identified in the media sampled. If no COC concentrations are known, then use 5 ppm sustained within the breathing zone as your action level until the contaminants are identified.
	<input type="checkbox"/> 2			
	<input type="checkbox"/> 3	ppm above background	Level C (not anticipated)	
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5	ppm above background	Discontinue work	
<input type="checkbox"/> Flame ionization detector model:	<input type="checkbox"/> 1	Any response above background to ____ ppm above background	Level C is acceptable Level B is recommended	Action levels must be determined based on the COCs and concentrations identified in the media sampled. If no COC concentrations are known, then use 5 ppm sustained within the breathing zone as your action level until the contaminants are identified.
	<input type="checkbox"/> 2	____ ppm above background	Level B	
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4	above background	Level A	
	<input type="checkbox"/> 5			
<input type="checkbox"/> Detector tube models:	<input type="checkbox"/> 1	Specify:	Specify:	The action level for upgrading the level of protection is one-half of the contaminant's PEL. If the PEL is reached, evacuate the site and notify a safety specialist.
	<input type="checkbox"/> 2			
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5			
<input type="checkbox"/> Other (specify):	<input type="checkbox"/> 1	Specify:	Specify:	
	<input type="checkbox"/> 2			
	<input type="checkbox"/> 3			
	<input type="checkbox"/> 4			
	<input type="checkbox"/> 5			

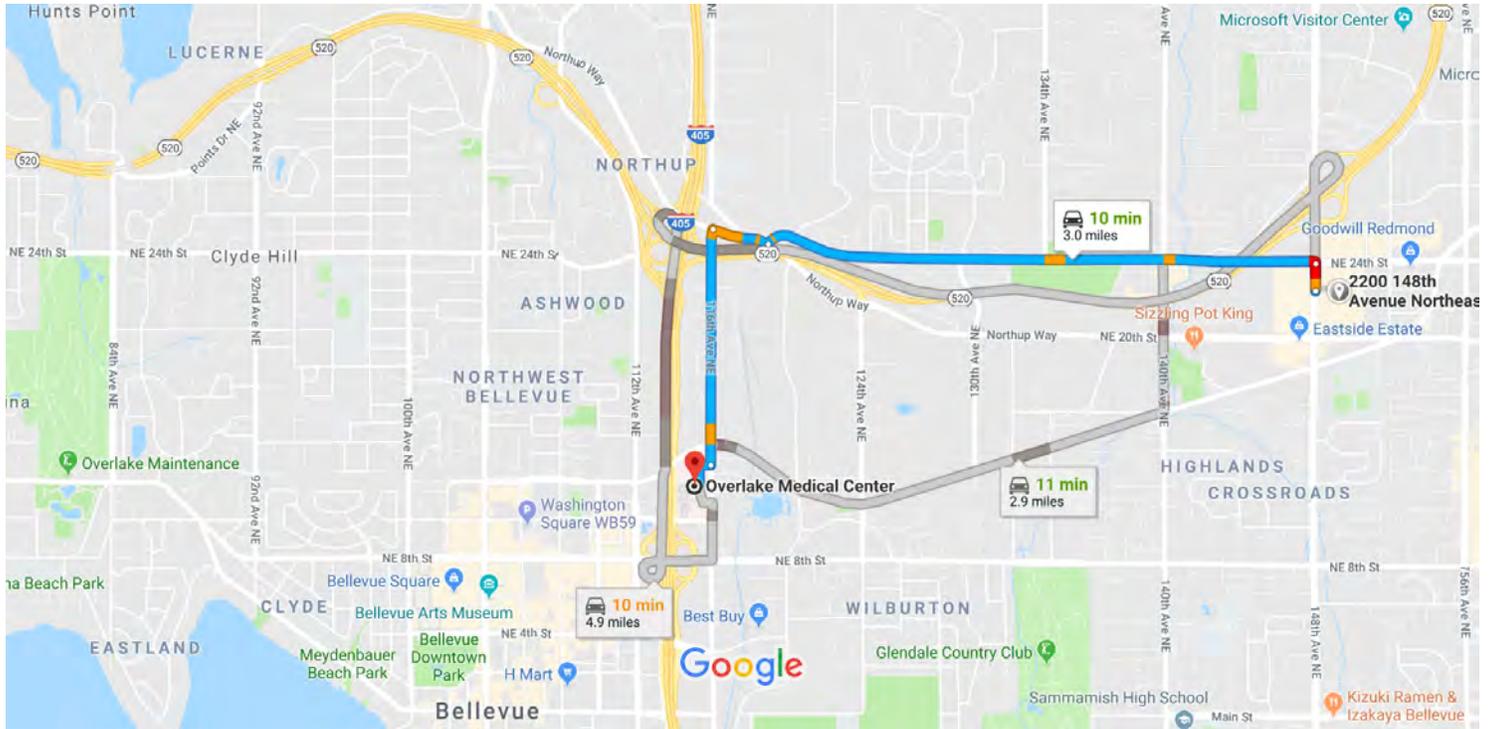
<p style="text-align: center;">Emergency Response Planning</p> <p>In the pre-work briefing and Daily Tailgate Safety meetings, all onsite employees will be trained in the provisions of emergency response planning, site communication systems, and site evacuation routes.</p> <p>Signal a site emergency or medical emergency with three blasts of a loud horn (car horn, fog horn, or similar device).</p> <p>To complete this section, attach a hospital route map to the HASP.</p>	<p>All work-related incidents must be reported. For all medical emergencies, call 911 or the local emergency number. For non-emergency incidents, you must:</p> <ul style="list-style-type: none"> • Give appropriate first aid care to the injured or ill individual and secure the scene. • Immediately call WorkCare at (888) 449-7787 (available 24 hours/7 days per week) if the injured person is an Apex employee. • Notify the Project Manager and/or SSO after calling WorkCare. • Enter the safety incident into the Apex Incident Report and submit to incidents@apexcos.com within 24 hours. <p>In the event of an emergency that necessitates evacuation of the work task area or the site as a whole, the following procedures shall occur:</p> <ul style="list-style-type: none"> • The Apex site supervisor or Project Manager will contact all nearby personnel using the onsite communications system to advise of the emergency. • Personnel will proceed along site roads to a safe distance upwind from the hazard source to a pre-determined assembly area. • Call 911 • Personnel will remain in that area until the site supervisor or Project Manager or other authorized individual provides further instruction. <p>In the event of a severe spill or leak, site personnel will follow the procedures listed below:</p> <ul style="list-style-type: none"> • STOP WORK • Evacuate the affected area and relocate personnel to an upwind, pre-determined assembly area. • Inform the Apex site supervisor or Project Manager, an Apex office, and a site representative immediately. • Locate the source of the spill or leak, and stop the source if it is safe to do so until appropriately trained personnel are onsite to do so. Begin containment and recovery of spilled or leaked materials. • Notify appropriate local, state, and federal agencies after obtaining client consent to do so. <p>In the event of severe weather, site personnel will follow the procedures listed below:</p> <ul style="list-style-type: none"> • Site work shall not be conducted during severe weather, including high winds and lightning. • In the event of severe weather, stop work, lower any equipment (drill rigs), and evacuate the affected area. • Monitor internet or other sources for severe weather alerts before resuming work. • In the event of lightning, outdoor work must be halted for a minimum of 30 minutes from the last lightning observation.
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Emergency Contacts	Name	Location	Phone	Cell Phone
Hospital (attach map)	Overlake Medical Center	1035 116 th Ave NE Bellevue, WA	(425)688-5000	
Police	Redmond Police Department	8701 160 th Ave NE Redmond, WA 98052	(425) 556-2500	911
Fire	Redmond Fire Station 12	4211 148 th Ave NE Bellevue, WA 98007	(425) 556-2200	911
Project Manager	John Foxwell	Portland, OR	(503) 924-4704 x1915	(503)312-0676
Field Manager (if not PM)	Corey Stout	Seattle, WA	(714) 393-9795	
Site Safety Officer (if not PM)	Corey Stout / Molly Strain	Seattle, WA	(714) 393-9795 / (253) 778-2833	
Division H&S Contact	Steve Misner	Portland, OR	(503) 924-4704 x1925	503-348-3906
Corporate H&S Contact	Jay Strauss	Rockville, MD	(406) 672-9357	
Incident Intervention	WorkCare	NA	888-449-7787	Form Revision 03/16



2200 148th Avenue Northeast, Redmond, WA to Overlake Medical Center

Drive 3.0 miles, 10 min



Map data ©2018 Google 2000 ft

2200 148th Ave NE

Redmond, WA 98052

- ↑ 1. Head north on 148th Ave NE toward NE 24th St 479 ft

- ↶ 2. Turn left onto NE 24th St
 ⓘ Pass by Burger King (on the right) 1.8 mi

- ↷ 3. Turn right onto Northup Way 0.2 mi

- ↶ 4. Turn left onto 116th Ave NE 0.8 mi

- ↷ 5. Turn right toward Felix Terry Swistak Dr NE 200 ft

- ↶ 6. Turn left onto Felix Terry Swistak Dr NE
 ⓘ Destination will be on the right 328 ft

Overlake Medical Center

1035 116th Ave NE, Bellevue, WA 98004

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you