

Control Panels

Orenco Control Panels



Controls For Any Application

- Wastewater systems
- Irrigation
- Water Systems
- Process controls
- Industrial controls





Manufacturing

- Specifications
 - UL 508A U.S. and Canada standard panels
 - UL 698A Intrinsically-safe panels
 - CE (European) marking Available
- Capabilities
 - Engineering
 - Production Facility
 - Standard shop
 - Custom shop
 - OEM Panels





AM Series

- Does not operate a pump
- Alarm notification
- May include a pump independent of the alarm





A Series Panels

- 115V or 230V pumps
- MOA Manual-Off-Auto
- No motor contactor
- Motor rated float
- No timer
- No alternating relay





Standard Control Panel Features

- Contactor rated for 2.5 million cycles at FLA
- Separate circuits and breakers for pump and controls
- Touch-safe
- Elapsed-time meter and/or counter (optional)
- Intrinsically-safe control relay (optional)
- Heater (optional)
- Programmable timer (optional)
- Redundant off relay (optional)



Panel Nomenclature

 Orenco Control Panel Part Numbers





Standard Control Panel Options

Option	Benefit
IR (intrinsically safe relay)	The intrinsically safe relay option is required for systems with tanks in applications classified as hazardous locations (Class I, Division 1) (UL 698A). Intrinsically safe control panels are designed so that the energy delivered to the floats is insufficient to cause an ignition of a flammable gas in the tanks. One intrinsically safe relay is required for every two floats. The panel nomenclature indicates how many relays are included with the panel. For example, DAX1IR2PTRO would indicate two relays for use with up to four floats.
PT (programmable timer)	The programmable timer allows the system to be timed-dosed. Timed dosing provides superior wastewater treatment by delivering the effluent in discrete doses at regular intervals and can reduce the chances of saturated soil conditions due to hydraulic overloading. A properly set timer is matched to the design flow of the system and allows for early detection of system abuses, before major damage occurs. Recommended for all treatment systems.
RO (redundant off float)	The redundant off option uses a signal float to prevent pumps from operating when there is not enough iquid in the tank. This helps to prevent damage to pumps by activating an alarm during abnormally low level conditions. The redundant off option also detects leaky tanks or systems that are siphoning. In addition, the redundant off float acts as a backup in case another float gets stuck. Recommended for all pumping systems.
CS (current sensor)	Current sensors monitor pump operation and are used to detect a pump failure in systems where a pump failure will not necessarily lead to a high-water alarm condition. With a current sensor, an alarm will be activated if the pump is called to run, but pump current is not detected. Current sensors are highly recommended in systems in which it may be difficult to detect a pump failure, such as a duplex alternating system. Recommended for commercial systems .
DS (disconnect switch)	The disconnect switch option allows for a single shut-off point for all power entering a panel. This switch is an easy means to disconnect power when maintenance needs to be done or when there is an emergency.
RA (remote alarm)	The remote alarm option provides a dry contact closure in the panel for connection of external devices that might use voltages up to 240 VAC. (All Orenco control panels include a 120 VAC output to activate remote alarms.) The remote alarm option is especially useful for phone dialers and is recommended when voltage needs are unknown.
TS (test switch)	The test switch option provides a single switch that can be used to confirm the operation of the alarm light and audible alarm.
HT (heater)	The heater option keeps the panel warm in cold weather and reduces panel condensation. The heater automatically adjusts its output wattage with varying temperature. Recommended for all MVP, PLC, and telemetry control panels.
ETM (elapsed time meter)	The elapsed time meter option provides an electromechanical totalizing meter that records the total time that a pump has been called on to run by the controls. The run time can be used to calculate flow through a system. (An elapsed time meter function is built into MVP and telemetry panels as a standard.) Recommended for all pumping systems.
CT (counter)	The counter option provides an electromechanical totalizing meter that records the total number of cycles that a pump has been called on to run by the controls. When combined with the ETM option, variances in the counter activity can reveal problems with pumps or floats. (A counter function is built into MVP and telemetry panels as a standard.)
PRL (pump run light)	The pump run light option provides a green light on the front of the panel enclosure that will illuminate when the pump is called to run by the controls.
PL (power light)	The power light option provides a green light on the front of the panel enclosure that will illuminate when the control panel has power.
SA (surge arrestor)	The surge arrestor option reduces system performance problems caused by power irregularities, such as surges and spikes. Recommended for MVP, PLC and telemetry control panels.



S and **DAX** Control Panels

- Simplex or Duplex Pumps
 - Contactors included
- DAX series
 - Duplex alternating pumps
 - Contactor for Each Pump





MVP Control Panels

• S, DAX, AX

- ~ Single or Duplex Pumps
- ~ Demand or timer
- ~ Contactors included
- ~ Visual indicators of float position, fault indicators
- High- and low-level alarms differentiated
- ~ Lead and override timers





MVP Control Panels

- Silenced alarms automatically reactivate after 12 hours, if condition is not corrected
- Timed delays on float inputs to prevent chattering
- Can be reprogrammed with EEPROM card
- Multiple timer settings for varying levels





MVP-S1DM





MVP-S1DM

Digital Inputs





MVP-S1DM

• Setting Adjustable Parameters





MVP-S1DM (Dual Mode)

• Time Dose or Demand Dose





Click Tight Controls





Two Ways to Control Doses

- Demand dosing
- Timed dosing



Demand vs Timed Dosing

- Demand Dose Applications
 - Lift Stations
 - Step Collection Systems
 - Tank to Tank
- Timed Dosing Applications
 - Soil based systems
 - Biological based systems
 - Tank to Tank (flow equalization)



Demand Dosing

- The pump runs from the "on" to the "off" positions
- The pump runs when water is present to activate the float
- The dose volume varies if water enters the basin during the pump cycle
- The dose volume depends on the float drawdown or spacing



Non-Pressurized Distribution





Timed Dosing with Programmable Timer

- The pump runs when ...
 - The float is in the on position
 - The timer is activated
- Timed dosing requires surge volume in the tank
 - Minimum Surge volume equals actual daily flow
- The dose volume is controlled by ...
 - Pump Flow rate (must be calibrated)
 - Time
- Properly set.....time dosing prevents overloading (stuck toilet valve)



Pressure Dosing





Micro Dosing

- Improves Distribution of effluent
- Resting periods improve performance of aerobic processes
- Prevents saturation of soil dispersal systems
- Flow monitoring (ETM & CT)





Standard VeriComm[®] Panels The Basics



What is VeriComm[®]?

- VeriComm gives water/wastewater system operators and maintenance organizations the ability to remotely monitor, maintain, manage, and control each individual site
- VeriComm consists of two key components
 - ~ Telemetry-enabled control panel
 - ~ Web-based monitoring system



Web-Based Telemetry





VeriComm[®] Control Panel Features

- Standard components
 - VeriComm remote telemetry board (ATRTU-100)
 - Transformer
 - Pump and control circuit breakers
 - Motor-start contactors
 - Toggle switches
 - Fuse
 - Audio and visual alarms
 - Panel enclosure





Benefits of VeriComm[®] Monitoring System

- Visual indicators
- Verification of system performance
- Data collection
- Automatic notification of fault conditions
- Diagnosis of the problem
- Recommendations for action
- Ability to change settings <u>remotely</u>
- Advanced control capability
- Shared phone line
- Internet connection available
- Invisible to homeowner



VeriComm[®] Control Panel Features

Optional components

- Surge arresters
- Anti-condensation heater
- UV disinfection compatibility
- Battery backup for controls
- Drip irrigation headworks





VeriComm[®] Control Panel Features

- Basic control logic
- Advanced control logic
- Data collection and utilization
- Troubleshooting and diagnostic logic
- Communications



Communication Options

- Remote communication options
 - Built in modem
 - IP Adapter
 - Future Adapter (ex. cellular modem)
- There are two ways to access panel data in the field
 - Direct plug-in using your laptop
 - Wireless connection using Bluetooth®
 - BT-VCOM



VCOM-IP Panels

- VCOM-AX20B1IP
- VCOM-AX20B1IPPSA
- IP Upgrade Kit
- IP Retrofit Kit





Bluetooth® Overview

Kit and accessories

- A. Bluetooth device
- B. AC adapter
- Recommended hardware
 - Laptop
 - Android-based phones and tablets
 - Pocket PC[®] device with Windows Mobile[®] operating system and Bluetooth capabilities





• Each panel has a unique guide to test panel functionality.

VCOM-AX20B Panel Operation

Overview

Orenco

The VCOM-AX20B telemetry-enabled panel is used for remote monitoring and control of Advantex® treatment systems that utilize both a recirculation pump and a discharge pump.

Basic control logic manages the day-to-day functionality of the control panel. The VCOM-AX20B system recirculates the effluent an average of four to five times while the recirculating splitter valve (RSV) is open; once the RSV seats, small amounts of treated wastewater are pumped into the discharge tank. During peak flow conditions, the recirculation tank has more aggressive timer settings to manage the demand. As the discharge tank fills, effluent is removed using on-demand dosing.

Fault conditions are automatically reported to the VeriComm Monitoring System and not locally at the panel, making the system virtually invisible to the homeowner. However, if fault conditions are not responded to, or the system cannot communicate with the VeriComm Monitoring System, local alarms may then be activated.

To silence local alarms, press the "Hold-To-Silence" button until the audible alarm stops.

The procedures outlined in the remainder of this document are to verify proper installation; they should be conducted in the sequence outlined while in "Test Mode".

Inputs & Output Definitions

The following inputs and outputs are used with your control panel:



Note:

- 1. Digital inputs are the yellow LEDs horizontally aligned along the bottom of the controller.
- 2. Digital outputs are the red LEDs vertically aligned on the right side of the controller.
- Inputs and outputs are activated by various events (e.g., floats are activated when the float is in the up position, "Hold-To-Silence" is activated when the push button, located on the front of the panel is pressed).

Analog Input:

1. Analog Input #1 - Discharge bottom float (Green indicator light on the bottom float relay).





BT-VCOM Capabilities





Floats

- A float is a liquid level sensor
- Think of the float as a switch





Ratings: Signal vs. Motor Rated

- Signal
 - Low amperage passes through floats and provides signal to control panel
- Motor rated
 - Power that runs pump goes through float

Float Types

- Specs: contact normally open differential - no minimum power rating - signal
- 7

2" Mi

- Specs: contact normally open differential - 2" minimum power rating - signal
- Specs: contact normally closed differential - no minimum power rating - signal



Operation: Normally Open vs. Normally Closed

 Refers to state that the float contact is in when it is in the down position



- Specs: contact normally open differential - no minimum power rating - signal
- Specs: contact normally open differential - 2" minimum power rating - signal
- Specs: contact normally closed differential - no minimum power rating - signal



Drawdown

 Refers to the difference in liquid level between a float's activation and deactivation points





Floats

Orenco° *Technical Data Sheet*

Signal- and Motor-Rated Float Switch Matrix

Float	State ¹	Туре	IR ²	Volts	Amps	hp	Tether	X	Y	Drawdown ³
Signal-rated mechanical floats ⁴ (for control switch applications)										
P Model ^a	Normally open	Mechanical	Yes	n/a	n/a	n/a	2.00 in.	1.50 in.	0.50 in.	2.00 in.
N Model ^a	Normally closed	Mechanical	Yes	n/a	n/a	n/a	2.00 in.	1.50 in.	0.50 in.	2.00 in.
Motor-rated floats ⁴ (for pump switch applications)										
B Model	Normally open	Mechanical	No	120V	13A	1/2 hp	2.00 in.b	2.50 in.	1.50 in.	4.00 in.
				240V	13A	1 hp	3.00 in.	3.00 in.	1.50 in.	4.50 in.
							4.00 in.	3.25 in.	1.50 in.	4.75 in.
C Model	Normally open	Mechanical	No	120V	13A	1/2 hp	2.00 in.	3.00 in.	2.50 in.	5.50 in.
				240V	15A	2 hp	3.00 in. ^b	3.50 in.	3.00 in.	6.50 in.
							4.00 in.	4.00 in.	3.50 in.	7.50 in.
							5.00 in.	4.50 in.	4.00 in.	8.50 in.
							6.00 in.	5.25 in.	4.25 in.	9.50 in.
G Model	Normally open	Mercury	Yes	120V	15A	3/4 hp	2.00 in.	1.50 in.	3.00 in.	4.50 in.
				240V	15A	2 hp	3.00 in. ^b	1.75 in.	3.00 in.	4.75 in.
							4.00 in.	2.00 in.	3.50 in.	5.50 in.

a. Suitable for use with VCOM and MVP.

b. Standard tether length



Panel Wiring Diagram





Float Arrangement Diagram





Float Arrangement Diagram

Check the appropriate box for the float functions used in your system.





Splice Box Wiring Diagram





Control Panel Series

S RO

Float Function Color Code

Splice Box Model

Drawing No.

YGW

SB4

EDW-SB-S-11





Panel Wiring Diagram – Dual Voltage





Installation Guidelines and Recommendations

- Splice box installation
- Control panel installation





Splice Box

- Watertight connections
- Allows for fewer wires between panel and tank
- Allows for easier replacement of pump and/or floats
- Three types
 - ~ Standard
 - ~ External
 - ~ Explosion proof







Splice Box Installation



A clean installation.



Splice Box Installation



Standard wire nuts should not be used



Splice Box Installation

• Use an electrically approved sealant to plug the wires coming in through the conduit





- Mount the panel in a suitable location
 - ~ Install within view of tank
 - Fasten securely to a post, concreted into the ground
 - Mount away from living area, such as on a garage wall
- Use wire markers or different color wires
- Size the wire for the job





Wiring

Orenco Wire Tables

Table 1. Two-Wire, Single-Phase, 60 Hz, 4-in. Turbine Effluent Pumps

Pump Parameters

Maximum "Branch Circuit" Distance to Pump*, Feet

Cable Selection Chart - "Copper" Cable Sizes - AWG

Pump model number	Horse power	Actual voltage	Power factor (pf)	SFA max amps	14 gauge Z _e ** R = 3.1, X _L = 0.058	12 gauge <i>Z</i> °** <i>R</i> = 2, <i>X</i> ⁼ 0.054	10 gauge <i>Z</i> _e ** <i>R</i> = 1.2, <i>X</i> _L = 0.050
100511	1/2	120	0.73	12.7	62	95	156
100512	1/2	240	0.73	6.3	248	382	628
100712	3/4	240	0.74	8.3	186	286	471
101012	1	240	0.74	9.8	157	242	399
101512	11/2	240	0.80	13.1	109	168	278



- Connect ...
 - Incoming power
 - Pump wiring
 - Float wiring
- Leave extra wire







A completed panel installation.







Improper Installation





Testing

- Using meters
- Manual operation
- Jumper Test



Troubleshooting Tools

- Volt Meter
- Jumper Wires
- Screwdriver
- Wire Strippers
- Waterproof Wire Nuts
- 800 348 9843





Using a Voltmeter

- Probe between point of interest and neutral
- Ground is different than neutral





Using an Amp Meter

- Clamp meter around wire of interest
- One wire through meter at a time





Using an Ohmmeter

- Check continuity
- Check resistance





Troubleshooting When Alarm is Sounding

- Inspect tank to determine liquid level
- Low-level alarm indicates ...
 - ~ Siphoning or leaky tank
 - ~ Float problems
- High-level alarm indicates ...
 - ~ Pump disabled
 - ~ Float problems
- Faint or intermittent alarms may indicate water in the splice box or conduit



Troubleshooting Pump Problems

- Manual vs Auto
 - Does pump work in manual but not auto?
 - Perform Jumper Test
- If pump doesn't work in manual
 - Check RO
 - Follow voltage from panel to pump
 - Check pump with independent power source





Testing Automatic Panel Operation

- Verify panel operation with each float
- Lift floats from lowest to highest, as they would operate in the tank





Troubleshooting Using Jumper Test

 Use insulated wires to simulate floats





Troubleshooting Pump Problems

- Follow voltage from panel to pump
- Check pump in independent power source





Troubleshooting Contactor Problems

- Check coil voltage
- Check contacts for continuity









Troubleshooting

Orenco° Chart

Orenco Control Panel Troubleshooting

Symptom	Check For					
Pump does not operate with control panel toggle switch in "MANUAL" or "AUTO" position	Pump circuit breaker off/fuse blown Low-level alarm condition in tank High-level alarm condition at discharge pump Inadequate power supply to control panel Incorrect float switch wiring	(residential ASF or SSF control panels only)	 Incorrect pump wiring Incorrect model of "Redundant Off" float switch Failed "Redundant Off" float switch Failed connection in the pump wiring circuit Failed motor contactor 			
Pump operates with con- trol panel toggle switch in "MANUAL" position, but does not operate with switch in "AUTO" position	Demand-Dose or Timed-Dose Panels: • Low-level alarm condition in tank (VCOM and ' • High-level alarm condition at discharge pump • Incorrect float switch wiring • Incorrect float switch model(s) • Failed "On" float switch	TCOM panels only) (MVP and TCOM panels only)	 Timed-Dose Panels Only: "Off" time has not elapsed (the pump will start when the "Off" cycle is complete) Failed float switch 			
Audible alarm activated	Low-Level Alarm • Control panel toggle switch in "Manual," position, pump left running • Tank pumped out with no refill • Siphoning condition in tank • Leaking tank (exfiltration) • Clogged filter • Incorrect float switch wiring	Incorrect float switch settings Incorrect model of "Redundant Off" float switch Failed "Off" or "Redundant Off" float switch Water in splice box (low-decibel alarm)	High-Level Alarm • Control panel toggle switch in "Off" position • Pump circuit breaker in "Off" position • Closed discharge ball valve • Failed pump • Clogged pump • Incorrect float switch settings • Incorrect float switch wiring	 Incorrect model of "High-Level Alarm" float switch Failed "On" or "High-Level Alarm" float switch Power outage Leaking tank or fixures (infiltration) Water in splice box (low-decibel alarm) 		
Circuit breaker trips repeatedly or fuse blows repeatedly	Water in splice box Inadequate power supply to circuit breaker Loose wiring connections Corroded wires or wiring connections		 Bound pump Incorrect pump wiring Incorrect capacitor pack wiring Incorrect float switch wiring 			
Motor contactor "chatters"	Corroded contacts Inadequate voltage supply to motor contactor Failed "On" or "Off" float switch Incorrect float switch model(s)					
)renco Systems® Inc. , 814 Airwa	Failed "On" or "Off" float switch Incorrect float switch model(s) Y Ave., Sutherlin, OR 97479 USA • 800-348-9843 •	541-459-4449 • www.orenco.com		NCI Rev. 1.0. (Pagı		



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