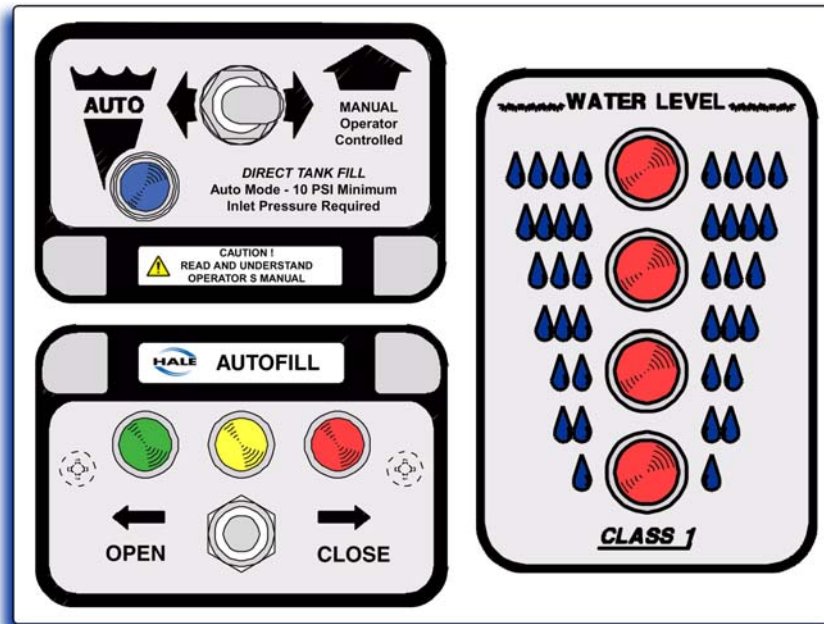




AutoFill-E Tank Refill Control System Installer / User Guide



Hale Products Inc. ♦ A Unit of IDEX Corporation
700 Spring Mill Avenue ♦ Conshohocken, PA 19428 U.S.A.
Telephone: 610-825-6300 ♦ FAX: 610-825-6440
Web.....www.haleproducts.com






NOTICE !

Hale Products, Inc. (Hale) cannot assume responsibility for product failure resulting from improper maintenance or operation. Hale is responsible only to the limits stated in the product warranty. Product specifications contained in this manual are subject to change without notice.

All Hale products are quality components -- ruggedly designed, accurately machined, precision inspected, carefully assembled and thoroughly tested. In order to maintain the high quality of your unit, and to keep it in a ready condition, it is important to follow the instructions on care and operation. Proper use and good preventive maintenance will lengthen the life of your unit.

**ALWAYS INCLUDE THE UNIT SERIAL NUMBER
IN YOUR CORRESPONDENCE.**

ECO NO	REV	CHANGE FROM	BY	DATE	APVD				
0023	A	Initial Release	LwH	01/31/2005	MAL		HALE PRODUCTS, INC. A Unit of IDEX Corporation Conshohocken, PA 19428 USA		
252	B	Separate Power Feed	LwH	11/07/2005	MAL				
						DRAWN BY	LwH	ISSUE DATE	COPYRIGHT © NOT TO BE REPRODUCED OR USED TO MAKE OTHER DRAWINGS OR MACHINERY.
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1 Safety Precautions



IMPORTANT !

THE HALE “**AUTOFILL - E**” TANK REFILL CONTROL SYSTEM IS DESIGNED FOR OPTIMUM SAFETY OF ITS OPERATORS. FOR ADDED PROTECTION AND BEFORE ATTEMPTING INSTALLATION OR OPERATION PLEASE FOLLOW THE SAFETY GUIDELINES LISTED IN THIS SECTION AND ADHERE TO ALL WARNING, DANGER, CAUTION AND IMPORTANT NOTES FOUND WITHIN THIS GUIDE.

THIS SECTION ON SAFETY MUST BE CAREFULLY READ, UNDERSTOOD AND ADHERED TO STRICTLY BY ALL INSTALLERS AND OPERATORS BEFORE ATTEMPTING TO INSTALL OR OPERATE THE AUTOFILL - E TANK REFILL CONTROL SYSTEM.

WHEN DEVELOPING DEPARTMENTAL APPARATUS OPERATING PROCEDURES, INCORPORATE THE WARNINGS AND CAUTIONS AS WRITTEN.

AutoFill is a trademark of Hale Products, Incorporated. All other brand and product names are the trademarks of their respective holders.

1.1 GUIDELINES



NOTICE !

THE PROCEDURES IN THIS MANUAL ARE GENERAL OPERATING PROCEDURES. THEY DO NOT REPLACE THE PROCEDURES, POLICIES, GUIDELINES ESTABLISHED BY THE AUTHORITY HAVING JURISDICTION, NOR DO THEY REPLACE THE RECOMMENDATIONS AND PROCEDURES PROVIDED IN THE APPARATUS MANUFACTURER'S MANUAL.

REFER TO THE PROCEDURES PROVIDED BY THE AUTHORITY HAVING JURISDICTION ON SETTING WHEEL CHOCKS, AS WELL AS LAYOUT AND CONNECTION OF HOSES, VALVES AND DRAIN COCKS.



Read all instructions thoroughly before beginning any installation or operation process.

- Installation should be performed by a trained and qualified installer, or your authorized Hale Products service representative. Be sure the installer has sufficient knowledge, experience and the proper tools before attempting any installation.

□ Safety Precautions

- The installer is responsible for observing all instructions and safety precautions in his or her daily routine as dictated by regional safety ordinances or departmental procedures.
- DO NOT permanently remove or alter any guarding or insulating devices, or attempt to operate the system when these guards are removed.
Make sure all access/service panels and covers are installed, closed and latched tight, where applicable.
- DO NOT remove or alter any hydraulic or pneumatic connections, electrical devices, etc. DO NOT tamper with or disconnect safety features or modify protective guards (such as covers, or doors). DO NOT add or remove structural parts.

WARNING !



NO MODIFICATIONS OR ADDITIONS MAY BE MADE TO THE AUTOFILL-E TANK REFILL SYSTEM WITHOUT PRIOR WRITTEN PERMISSION FROM:

Hale Products, Incorporated

Fire Suppression Division

700 Spring Mill Avenue

Conshohocken, PA 19428 U.S.A.

Telephone:610-825-6300

Fax:610-825-6440

- Before connecting the wiring harnesses, inspect the seals and seal washer in the connectors. There are seals on the male and female conductors and on the tower.
If a seal washer is missing or damaged, water can enter the connector causing pin and terminal corrosion. This could result in possible system failure.
- Rotating drive line parts can cause injury.
Any valve operated by an electric motor causes the associated hand wheel to turn. Be extremely careful that NO part of your body (head, feet, arms, legs, fingers, hair, clothing, jewelry, etc.) is in an area of rotating parts where you could be subject to injury.
- Make sure everyone is clear of the apparatus. Verify the parking brake is set and the wheels are chocked to prevent any movement of the apparatus.



- To prevent electrical shock always disconnect the primary power source before attempting to service any part of the Hale AutoFill-E system.
- All electrical systems have the potential to cause sparks during service. Take the necessary precautions to eliminate explosive or hazardous environments during any installation/service.
- Relieve all system pressure, then drain all foam concentrate and water from the system before servicing any of its component parts. Lockout the system in accordance with the manufacturer's recommendations.
- Use only tubing which is rated at or above the maximum discharge pressure of the fire pumping system, i.e., 50 PSI (34 BAR) minimum.
- Fasteners used for the installation of the Hale AutoFill - E System are Grade 5, and some are stainless steel. NEVER substitute with a lesser grade fastener or quality. Failure to do so could cause equipment malfunction or damage and/or personal injury.
- Use only approved lubricants on the Hale AutoFill-E System. Hale recommends using: Never-Seez®, White Food Grade with PTEE

Never-Seez is available from:

Bostik Findley, Inc
211 Boston Street
Middletown, MA 01949-2128
Web.....www.bostikfindley-us.com

Notes

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2 Description

The Hale **AUTOFILL-E (Electric) Tank Refill Control System** is a completely integrated and engineered system comprising of both **Class 1** and **Hale Products**. The Class 1 “Driver Module” (p/n: 106877) is designed to output a “Fill Required” signal when the tank drops to 75% of FULL and to shut down the fill when the tank is within one-eighth of full capacity. The Intelli-Tank 4-LED Light Gauge and Alarm notify the operator of the tanks condition. The light gauge displays the liquid volume to one-eighth of a tank level accuracy, through 180° viewable ultra-bright LEDs.

2.1 HALE VALVE ACTUATOR SYSTEM (SVS)

(See Figure 2-1: “SVS Valve Control.”)

This system automatically (or manually) OPENS and CLOSES the SVS control valve. When engaged, a gear driven motor operates the valve to activate flow through the AUTO-FILL System.

When the system reaches an optimum level, the Hale Valve Actuator System engages the motor to CLOSE the valve.

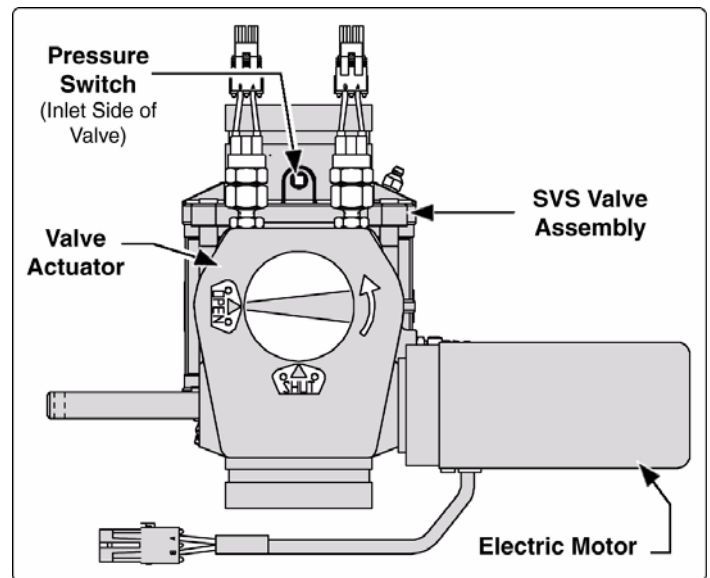


Figure 2-1: SVS Valve Control

Also see separate manual, Hale p/n: 029-0020-90-0, for additional SVS valve information.

Pressure Switch (10 PSI / 0.7 BAR)

Also see Figure 3-1: “Pressure Switch Mounting” on page 13.

The pressure switch ensures that 10 PSI (0.7 BAR) is available from the suction or INLET source for AutoFill operation. Pressure less than 10 PSI disables the AutoFill system and causes the SVS valve to CLOSE.

2.2 CLASS 1 (INTELLI-TANK) LEVEL INDICATOR (HALE P/N: 106299)

Four (4) illuminating lights (RED) indicate the water level in the tank. (See Figure 2-2: “Intelli-Tank 4-Light Indicator.”)

When the tank level drops to 75% of FULL, the AutoFill System engages to refill the tank(s) back to an optimum or FULL level. The Intelli-Tank Level Indicator shows the entire process by cycling through these four lights.

Also see Intelli-Tank Water/Foam Level Gauge Manual, p/n: 106759 for more detailed information. This manual is provided as a separate attachment, located at the back of this manual.

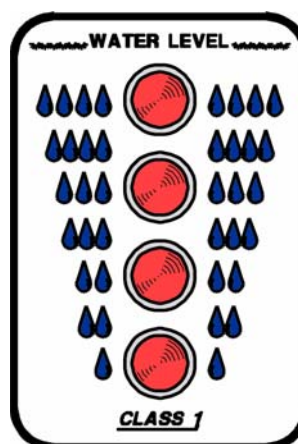


Figure 2-2: Intelli-Tank 4-Light Indicator

2.3 DRIVER MODULE, HARNESSSES AND RELAYS

The control center of the AutoFill system lies in the Class 1 Driver Module, interconnecting harnesses and control relay assembly. Information on the water level in the tank(s) is received from the Intelli-Tank 4-Light Level Indicator. Signals are then sent out to activate the Hale SVS Valve Actuator System and allow water flow to refill the tank(s).

“Fill Required Signal” – Driver Module

Information on the water level in the tank is received from the Intelli-Tank 4-Light Level Indicator (p/n: 106299). This information is received by the Driver Module (p/n: 106877).

A “FILL” required signal is then generated in the Class 1 Driver Module to begin the FILL process. The driver module incorporates an auto-fill function that, when activated, OPENS the SVS valve at less than 75% tank level and CLOSES the valve when the tank reaches the FULL point (approximately 1/8 of volume from FULL).

An *optional* alarm is available and activates when the tank drops to 1/4 FULL, or if data is lost for more than ten seconds.

Also see High Current 4-Light Remote Driver Module Manual, p/n: 107451, for more detailed information. This manual is provided as a separate attachment, located at the back of this manual.

Relay Assembly

The relay assembly (Hale p/n: 513-0545-00-0) reads the toggle switch setting on the AutoFill select panel, placing the system in either the AUTO or MANUAL mode.

- In **AUTO**, the relay assembly receives the FILL required signal from the driver module and controls the SVS valve accordingly.
- In **MANUAL**, the SVS valve is controlled by the manual control panel. Also see heading “MANUAL Control Panel” on page 12.

2.4 AUTOFILL CONTROL PANELS

AUTOFILL Control Panel

(See Figure 2-3: “AutoFill Control Panel AUTO / MANUAL.”)

Toggle Switch

The toggle switch places the AUTOFILL system in either the AUTO or MANUAL mode of operation.

Note: When placed in the MANUAL mode, this panel operates in conjunction with the Manual Control Panel - see heading “MANUAL Control Panel” on page 12.



Figure 2-3: AutoFill Control Panel
AUTO / MANUAL

Indicator Light

The BLUE indicator illuminates when the toggle switch is in the AUTO position **AND** there is a minimum of 10 PSI (0.7 BAR) inlet pressure. (See Figure 2-3: “AutoFill Control Panel AUTO / MANUAL” on page 11.)

If the toggle switch is in the AUTO position and the minimum inlet pressure of 10 PSI (0.7 BAR) is not available, the BLUE indicator does not illuminate and the AutoFill system does not function.

The SVS valve returns to the CLOSED position, or remains in the CLOSED position, when inlet pressure falls below 10 PSI (0.7 BAR). Also see Section 5.1 “Auto Mode” on page 19.

Note: The system continues to operate in the MANUAL mode when inlet pressure is below 10 PSI (0.7 BAR).

MANUAL Control Panel

Toggle Switch, Three-Position

(See Figure 2-4: “MANUAL Control Panel.”)

When the AutoFill select panel toggle switch is in the MANUAL mode position this switch toggles the SVS valve actuator between the OPEN and CLOSE positions, allowing the operator to manually FILL the tank(s).

The switch is spring-return to a NEUTRAL position; therefore, releasing the switch STOPS valve movement at its present position.

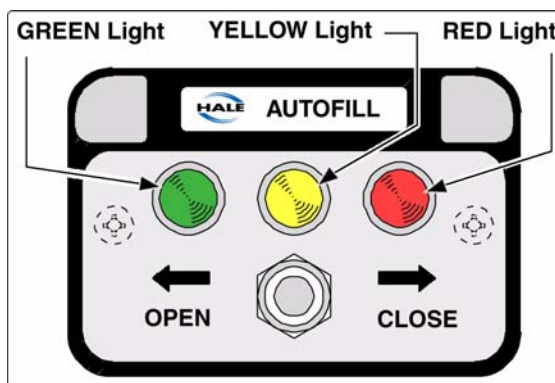


Figure 2-4: MANUAL Control Panel

Indicator Lights

The three lights, green, amber and red, illuminate to indicate the position of the valve. (See Figure 2-4: “MANUAL Control Panel.”) These indicator lights operate in both the MANUAL and the AUTO modes to indicate the condition of the SVS valve.

3 Installation

Refer to drawings Plate #: 1024A and Plate #: 1048A for additional installation, wiring and layout information. Both drawings are located at the back of this manual.

3.1 SVS VALVE ACTUATOR

Detailed SVS Valve Actuator System installation instructions are found in a separate manual (Hale p/n: 029-0020-90-0). This manual is packaged with the Valve Actuator and is also available on the Hale web site: www.haleproducts.com/literature/manuals. Before installing this valve, review this manual in its entirety.

3.2 PRESSURE SWITCH MOUNTING

(See Figure 3-1: "Pressure Switch Mounting.")

The pressure switch (Hale p/n: 200-2560-00-0) provided with the AutoFill system is mounted to one of the plugged ports of the suction or INLET side of the SVS Actuator Valve. A 1/4" FNPT (6.4mm) x 1/8" NPT (3.2mm) adapter (Hale p/n: 082-0272-02-0) is provided to assist with installation.



IMPORTANT !

THE PRESSURE SWITCH MUST BE MOUNTED "UP" (VERTICALLY) FOR PROPER OPERATION. SELECT A PORT ON THE SVS VALVE THAT ENSURES THE PRESSURE SWITCH IS MOUNTED CORRECTLY.

3.3 CONTROL PANELS

Refer to Plate #: 1048AA for the suggested panel installation and cutout dimensions for the three controllers. Plate # 1048AA is located at the back of this manual. Also see Figure 3-2: "Control Panel Cutouts - Manual, AutoFill and Water Level Gauge" on page 14.

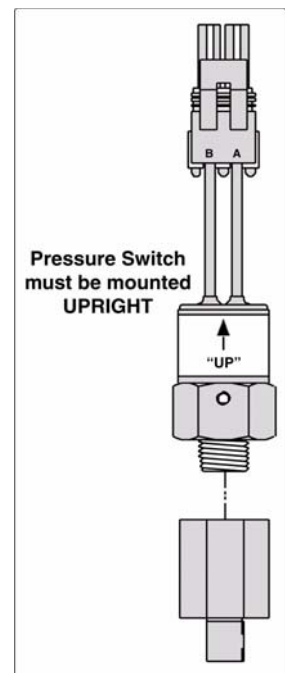


Figure 3-1: Pressure Switch Mounting

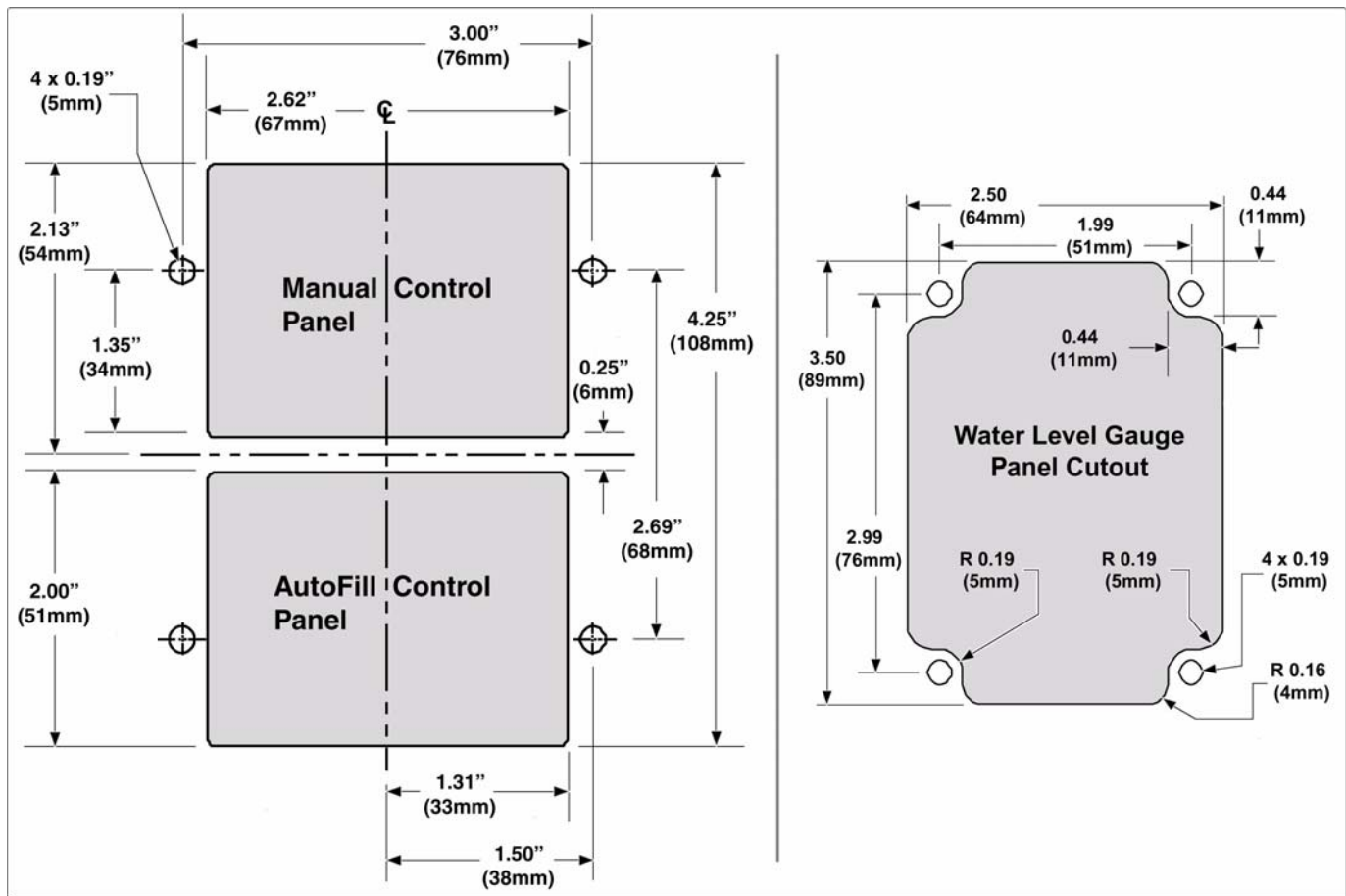


Figure 3-2: Control Panel Cutouts - Manual, AutoFill and Water Level Gauge

AutoFill Control Panels (2)

The two AutoFill control panels are mounted on the apparatus pump panel, with the supplied placards, as shown in Figure 3-2: “Control Panel Cutouts - Manual, AutoFill and Water Level Gauge.”

Water Level LED Gauge

The 4-light water level gauge is also mounted on the apparatus pump panel, with the supplied placard, as shown in Figure 3-2: “Control Panel Cutouts - Manual, AutoFill and Water Level Gauge.”

Before mounting the display and adhering the label, insure that the unit is positioned correctly (TOP is up). Refer to separate manual “Intelli-Tank Water/Foam Tank Level Display,” p/n: 106759 (021502), located at the back of this manual and packaged with the unit. Before installation and operation, review this manual in its entirety.

Relay Assembly and Power Distribution/Lighting Module

Both units must be mounted within proximity of the apparatus main pump panel. The hole mounting pattern of each unit enables piggyback mounting, using the appropriate standoffs, if necessary.

Refer to separate manual “Intelli-Tank High Current 4-Light Remote Driver Module,” p/n: 106759 (12-15-03), located at the back of this manual and packaged with the unit. Before installation and operation, review this manual in its entirety.

Wire Harness

Standard industry-type harnesses are provided for:

- Power Distribution/Lighting Module, 8’ (2.4 meters) length, p/n: 513-0550-00-0
- 12VDC Power Source, 18” (0.5 meters) length, p/n: 513-0270-04-0, two (2) Units
- Water Level LED Gauge, 10’ (3 meters) length, p/n: 513-0560-00-0
- Relay Electrical Valve Control, approximate 30” (0.8 meters) length, p/n: 107777
- Electrical Valve Extension, 8’ (2.4 meters) length, p/n: 107776
- AutoFill Extensions, 8’ (2.4 meters) length, p/n: 513-0570-00-0

Note: When connecting the Manual Select Control Panel (p/n: 107720), make certain the connectors are matched to the appropriate relay assembly and valve connectors. See Plate #:1024AA located at the back of this manual.

If additional harness extensions are required, contact Hale Products at **610-825-6300**.

AutoFill Selector Power Harness

- Power Harness, 18" (0.5m) length, p/n: 513-0270-04-0

Before connecting this cable, inspect the seals in the connectors. If the seals are missing or damaged water can enter the connector causing pin and terminal corrosion, resulting in possible system failure. (See Figure 3-3: "AutoFill Selector Harness Connection.")

This line must be fused, connected to a 12VDC power, and minimum 20 amp circuit to meet NFPA specifications.

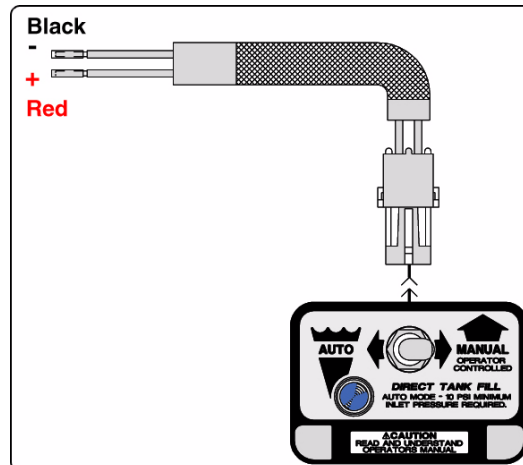


Figure 3-3: AutoFill Selector Harness Connection

IMPORTANT !

DO NOT CONNECT POWER SUPPLY HARNESS TO A "LOAD SHEDDING SYSTEM."



Relay Assembly Power Harness

- Relay Assembly Power Harness, 18" (0.5m) length, p/n: 513-0270-04-0

Before connecting this harness, inspect the seals in the connectors. If the seals are missing or damaged, water can enter the connector causing pin and terminal corrosion, resulting in possible system failure. (See Figure 3-4: "Relay Assembly Power Connection," on page 17.)

This line must be fused, connected to a 12VDC power, and minimum 20 amp circuit to meet NFPA specifications.

To reduce RF / EM interference, the relay assembly power harness must be connected to a “clean” power source with NO other electrical equipment attached. (See Figure 3-4: “Relay Assembly Power Connection,” on page 17.)



IMPORTANT !

DO NOT CONNECT POWER SUPPLY HARNESS TO A “LOAD SHEDDING SYSTEM.”

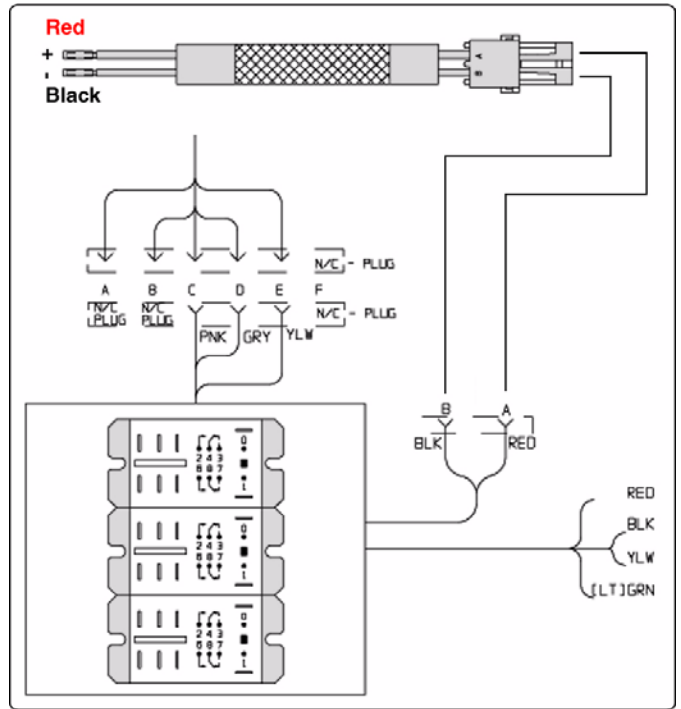


Figure 3-4: Relay Assembly Power Connection

3.4 DRIVER MODULE

The driver module is water tight and can be mounted any place away from large RF noise generators. However, it is imperative to mount the unit with the connector at the bottom. (See Figure 3-5: “Driver Module Layout.”)

Refer to separate manual “Intelli-Tank High Current 4-Light Remote Driver Module,” p/n: 106759 (12-15-03), located at the back of this manual and packaged with the unit. Before installation and operation, review this manual in its entirety.

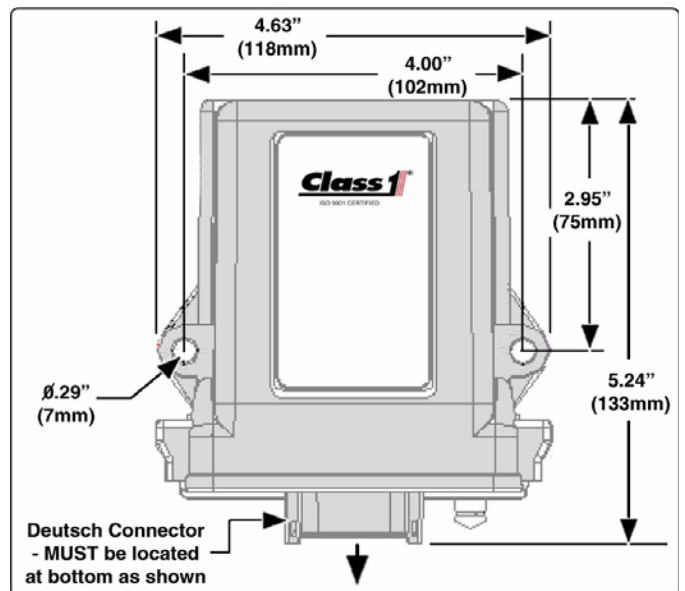


Figure 3-5: Driver Module Layout

4 Calibration

Before placing the AUTOFILL System into service, it must be calibrated in accordance with the supplied manuals. The Intelli-Tank 4-Light Level Gauge requires calibration as detailed in the manual, p/n: 106759 (021502), packaged separately with the unit.

The manual includes Calibration, Self-Test and Troubleshooting. Review this manual in its entirety before placing the system into operation.



IMPORTANT !

THE AUTOFILL CONTROL SYSTEM WILL NOT OPERATE PROPERLY IF THE INTELLI-TANK 4-LIGHT LEVEL GAUGE IS NOT PROPERLY CALIBRATED.

Notes

5 Operation

The AUTOFILL system should receive its power from the down side of the main disconnect of the apparatus and is always operable while power is supplied to the pump panel.

5.1 AUTO MODE

1. Set the AutoFill select toggle switch to AUTO. The blue LED illuminates, providing there is at least 10 PSI (0.7 BAR) available.

Note: If the minimum inlet pressure of 10 PSI (0.7 BAR) is not available, the BLUE indicator does not illuminate and the AutoFill system does not function. The SVS valve immediately CLOSES, if opened...*or*... if closed, remains CLOSED.

The manual select panel is also inoperative forcing the operator to place the auto mode toggle switch in the MANUAL mode to continue. Also see heading “Manual Mode” on page 19.

2. On the manual control panel, an LED illuminates to indicate the position of the SVS valve - fully opened (GREEN)-partially opened (AMBER)-fully closed (RED).

Note: These LEDs operate when the AutoFill select toggle switch is in both the AUTO or MANUAL position.

3. The system automatically controls tank FILL requiring that you only periodically check its operation via the 4-light level gauge.

Note: See the Intelli-Tank manual, p/n: 106759, for sequencing of the LEDs as related to tank capacity.

4. At the end of operation, the setting of AutoFill (AUTO or MANUAL) is determined by your departmental regulations or processes.

5.2 MANUAL MODE



CAUTION !

IN THE “MANUAL” MODE, AN OPERATOR MUST ALWAYS BE AVAILABLE TO MONITOR THE CAPACITY OF THE TANK TO AVOID BOTH A “LOW LEVEL” OR AN “OVERFILL” CONDITION.

CAUTION ! - continued

A “LOW LEVEL” CONDITION CAUSES INSUFFICIENT WATER FLOW FOR CAFSPRO OPERATION; IN TURN, REDUCING THE EFFECTIVENESS OF THE FOAM CONCENTRATE. AN “OVERFILL” (TANK OVERFLOWS) IS VERY HAZARDOUS IN FREEZING WEATHER CONDITIONS.



1. Set the AUTOFILL select toggle switch to MANUAL (Operator Control). The BLUE LED turns OFF.
2. Switching to MANUAL mode during operation could cause the SVS valve to stop somewhere during its opening or closing movement, in which case one of the three LEDs on the panel illuminates to indicate the position of the SVS valve.
3. To generate a starting point for this valve and/or to complete an operation that was interrupted, set and hold the toggle switch to the appropriate position, either OPEN or CLOSE until the appropriate LED illuminates (GREEN or RED).
4. Carefully monitor the capacity of the tank using the Intelli-Tank 4-light level gauge to avoid an OVERFILL or a “LOW LEVEL” condition.

Note: See the Intelli-Tank manual, p/n: 106299, for sequencing of the LEDs as related to tank capacity.

IMPORTANT !

IN THE MANUAL MODE, THE PRESSURE SWITCH IS NOT MONITORING INLET PRESSURE. IT IS UP TO THE OPERATOR TO ENSURE THAT THE INLET (SUCTION) SOURCE IS AT 10 PSI (0.7 BAR) MINIMUM.



5. When tank refill is needed, hold the toggle switch in OPEN to begin filling the tank. The LEDs on the panel illuminate to indicate the position of the valve, fully opened (GREEN)-partially open (AMBER)-fully closed (RED).

Releasing the switch immediately STOPS the valve movement at its present position.

6. When the Intelli-Tank 4-light level gauge indicates the tank is FULL, CLOSE the SVS valve via the toggle switch. The red LED illuminates to indicate the valve is fully CLOSED.
7. At the end of the operation, the setting of AutoFill (AUTO or MANUAL) is determined by your departmental regulations or processes.

6 Routine Maintenance



WARNING!

BEFORE BEGINNING ANY INSPECTION OR MAINTENANCE OF THIS EQUIPMENT, VERIFY THAT THE PRESSURE HAS BEEN RELEASED FROM THE SYSTEM.

LOCK OUT THE EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND YOUR DEPARTMENTAL REGULATIONS / PROCEDURES.

OPEN THE DISCHARGE VALVES AND REMOVE THE SUCTION TUBE CAPS AND DISCHARGE VALVE CAPS TO RELEASE ANY RESIDUAL PRESSURE.

The unique design of the Hale AutoFill-E Control System makes it virtually maintenance free. However, as with any electromechanical system, periodic inspection and lubrication is required to ensure a long, trouble-free life (minimal downtime). See heading 6.1 "Procedures" on page 21.

6.1 PROCEDURES

The SVS Valve Assembly requires periodic maintenance, which is explained in detail in the Installation, Maintenance and Operation Manual provided with the unit (Hale p/n: 029-0020-90-0).

Review this manual for all maintenance, troubleshooting or repair that may be required to the SVS Valve.

The Intelli-Tank 4-Light Level Gauge and the Driver Module each have their own manuals (see below). Refer to the following for maintenance and troubleshooting procedures.

Intelli-Tank Manual..... p/n: 106759 (021502)

Driver Module Manual p/n: 106759 (12-15-03)

AutoFill Control System p/n: 546-2730-00-0
(No maintenance required)

7 Troubleshooting

7.1 TROUBLESHOOTING

Troubleshooting is described in the following separate manuals for the Intelli-Tank high Current 4-Light Driver Module and the Intelli-Tank Water/Foam Tank Level Display. A copy of these manuals is located at the back of this manual and an additional copy is packaged separately with the units.

Intelli-Tank Water/Foam Tank Level Display p/n: 106759 (021502)
Intelli-Tank Driver Module p/n: 106759 (12-15-03)

Express Warranty

EXPRESS WARRANTY: Hale Products, Inc. (HALE) hereby warrants to the original Buyer that products manufactured by Hale are free of defects in material and workmanship for one (1) year. The “Warranty Period” commences on the date the original Buyer takes delivery of the product from the manufacturer.

LIMITATIONS: Hale’s obligation is expressly conditioned on the Product being:

- Subjected to normal use and service.
- Properly maintained in accordance with Hale’s Instruction Manual as to recommended services and procedures.
- Not damaged due to abuse, misuse, negligence, or accidental causes.
- Not altered, modified, serviced (non-routine) or repaired other than by an Authorized Service Facility.
- Manufactured per design and specifications submitted by the original Buyer.

THE ABOVE EXPRESS LIMITED WARRANTY IS EXCLUSIVE. NO OTHER EXPRESS WARRANTIES ARE MADE. SPECIFICALLY EXCLUDED ARE ANY IMPLIED WARRANTIES INCLUDING, WITHOUT LIMITATIONS, THE IMPLIED WARRANTIES OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR PURPOSE OR USE; QUALITY; COURSE OF DEALING; USAGE OF TRADE; OR PATENT INFRINGEMENT FOR A PRODUCT MANUFACTURED TO ORIGINAL BUYER’S DESIGN AND SPECIFICATIONS.

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- HALE reserves the right to physically inspect the Product and require Buyer to return same to HALE’s plant or other Authorized Service Facility.
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AutoFill-E Tank Refill Control System Installer / User Guide

Drawing and Manual Package

Hale Products Inc. ♦ A Unit of IDEX Corporation
700 Spring Mill Avenue ♦ Conshohocken, PA 19428 U.S.A.
Telephone: 610-825-6300 ♦ FAX: 610-825-6440
Web.....www.haleproducts.com



Contents


8 Drawings / Manuals.....Plate Number

Drawings

AutoFill “E” Control System 1024A
 AutoFill “E” Control System Installation Drawing..... 1048A

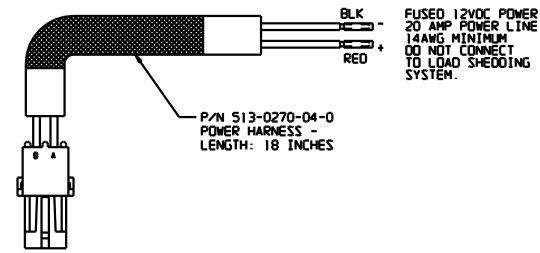
Manuals

Torrent SVS Valve, under separate cover 029-0020-90-0
 Intelli-Tank 4-Light Tank Level Gauge,
 under separate cover 106759 (021502)
 Intelli-Tank 4-Light Remote Driver Module
 under separate cover 106759 (12-15-03)

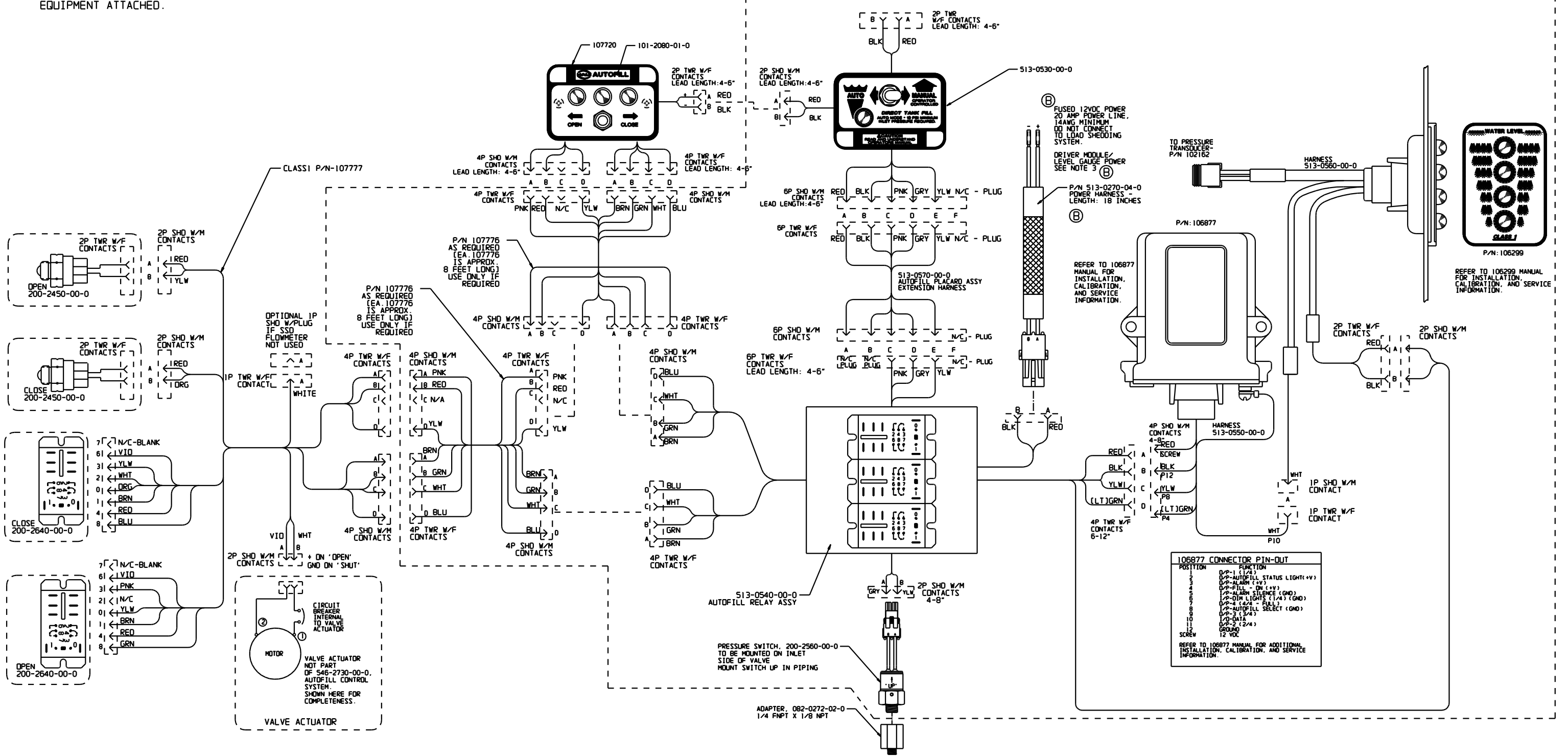
ECN No	REV	CHANGE FROM	BY	DATE	APVD				
0023	A	Initial Release	LwH	01/31/2005	MAL		HALE PRODUCTS, INC. A Unit of IDEX Corporation Conshohocken, PA 19428 USA		
252	B	Separate Power Feed	LwH	11/07/2005	MAL				
						WRITTEN BY	LwH	ISSUE DATE	COPYRIGHT © NOT TO BE REPRODUCED OR USED TO MAKE OTHER DRAWINGS OR MACHINERY.
						CHECKED BY	TG	11/07/2005	

NOTES:

- 1- REFER TO 106877 MANUAL FOR INSTALLATION, CALIBRATION, AND SERVICE INFORMATION FOR 106877.
- 2- REFER TO 106299 MANUAL FOR INSTALLATION, CALIBRATION, AND SERVICE INFORMATION FOR 106299.
- 3- DRIVER MODULE/LEVEL GAUGE POWER SHALL BE WIRED DIRECT TO A CLEAN POWER POINT, WITH NO OTHER ELECTRICAL EQUIPMENT ATTACHED.



546-2730-00-0 - AUTOFILL-E CONTROL SYSTEM,
OTHER COMPONENTS SHOWN ARE INCLUDED IN UPPER LEVEL BOMs, 546-2730-xx-0, SHOWN HERE FOR COMPLETENESS



POSITION	FUNCTION
1	D/P-1 (12V)
2	D/P-AUTOFILL STATUS LIGHT (+V)
3	D/P-ALARM (+V)
4	D/P-FILL - ON (+V)
5	D/P-ALARM SILENCE (GND)
6	D/P-LOW LIGHTS (1/4) (GND)
7	D/P-4 (2/4 - FULL)
8	D/P-3 (3/4)
9	D/P-AUTOFILL SELECT (GND)
10	D/P-2 (2/4)
11	D/P-DATA
12	D/P-2 (2/4)
SCREW	GROUND 12 VDC

REFER TO 106877 MANUAL FOR ADDITIONAL INSTALLATION, CALIBRATION, AND SERVICE INFORMATION.

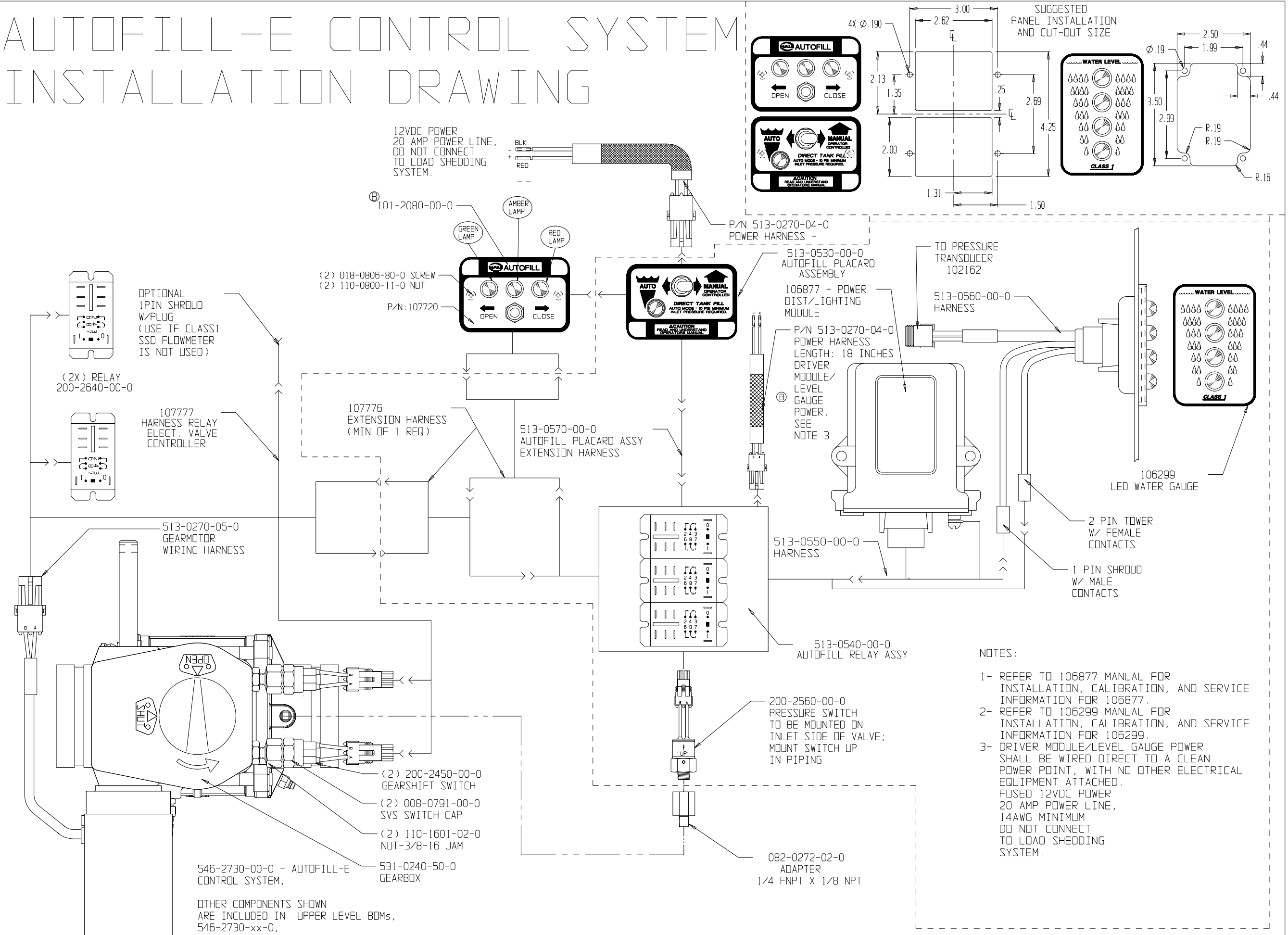
PL1024AB AUTOFILL-E CONTROL SYSTEM

ECD NO	REV	CHANGED FROM	BY	DATE	APVD
04-010	A	RELEASED FOR PRODUCTION	AB	01-13-04	MAL
04-281	B	ADDED TO ENSURE "CLEAN" POWER TO ELECTRONIC COMPONENTS (106299, 106877)	AB	11-17-04	MAL

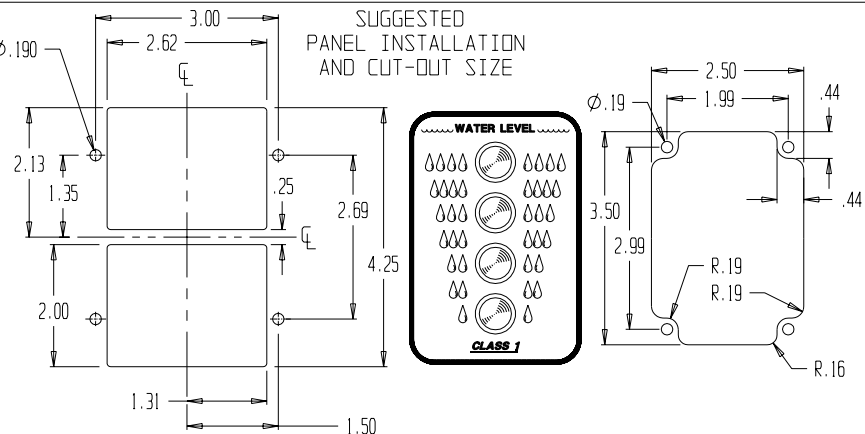
HALE PRODUCTS, INC.
A Unit of IDEX Corporation
Conshohocken, PA 19428 USA

DATE 12-19-03
SCALE: NTS

AUTOFILL-E CONTROL SYSTEM INSTALLATION DRAWING



12VDC POWER
20 AMP POWER LINE,
DO NOT CONNECT
TO LOAD SHEDDING
SYSTEM.



- NOTES:
- 1- REFER TO 106877 MANUAL FOR INSTALLATION, CALIBRATION, AND SERVICE INFORMATION FOR 106877.
 - 2- REFER TO 106299 MANUAL FOR INSTALLATION, CALIBRATION, AND SERVICE INFORMATION FOR 106299.
 - 3- DRIVER MODULE/LEVEL GAUGE POWER SHALL BE WIRED DIRECT TO A CLEAN POWER POINT, WITH NO OTHER ELECTRICAL EQUIPMENT ATTACHED. FUSED 12VDC POWER 20 AMP POWER LINE, 14AWG MINIMUM DO NOT CONNECT TO LOAD SHEDDING SYSTEM.

OTHER COMPONENTS SHOWN
ARE INCLUDED IN UPPER LEVEL BOMs,
546-2730-xx-0,
SHOWN HERE FOR COMPLETENESS

PL1048AB

ECCO NO	REV	CHANGED FROM	BY	DATE	APVD
04-155	A	RELEASED FOR PRODUCTION	RR	7-7-04	MAL
04-281	B	ADDED "101-2080-00-0" NOTE, ADDED TO ENLURE "CLEAN" POWER TO ELECTRONIC COMPONENTS, (106299, 106877)	ADB	11-17-04	MAL

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CHECKED: MAL
DATE: 7-2-04
SCALE: -

Contents

Intelli-Tank

Water/foam tank level display utilizing a 0-5 PSI transducer

Contents	1
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Installation	5
Wiring	7
Calibration	9
Dim function	11
Self test	11
Passwords	12
Troubleshooting	13

Overview

The Intelli-Tank 4 light tank level is designed to display a liquid's volume to an eighth of a tank level accuracy through 180-degree viewable ultra-bright LEDs. The unit set as a Master uses a 0 – 5 PSI pressure transducer to obtain tank level information and then relays that information along the data line to units set as Remotes. Multiple Remote units can be linked to the Master tank level unit.

Tank Level Gauge	C1 – PN	106299 – 12V 106296 – 24V
Pressure Transducer	C1 – PN	102162
Installation Harness	C1 – PN	106690 – Master 106691 – Remote
User Manual	C1 – PN	106759

Modes of Operation:

Master When the unit is calibrated with a proper pressure signal it automatically becomes a Master Unit and will send tank level information along the 1-wire data transfer line to all other Remote units on the line.

Remote Units are initially shipped as Remote units. A Remote unit only requires power, ground and the 1-wire data transfer line. The Remote unit mimics the Master unit's display by reading the appropriate information on the 1-wire data transfer line.

Self Test When the self test password is entered the unit will perform a self test and display the results on the display. A Master unit will command all Remote units to perform the self test also.

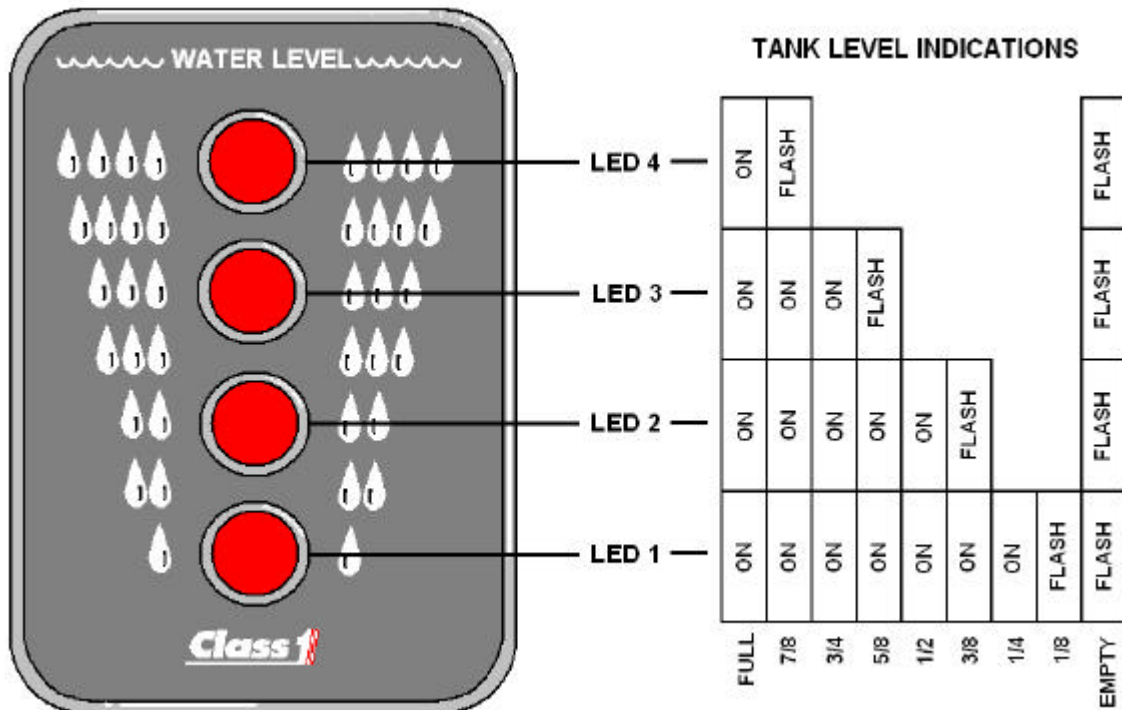
Note: All units are shipped as Remote units. A valid calibration will set the unit as a Master. A Master can be reset as a Remote by entering a password.

Operation

When the unit is first powered up the LEDs will cycle on individually starting with the EMPTY (bottom) LED and then the LEDs will show current status.

- A **Master** unit properly connected to a functioning transducer will display current tank level information.
- A **Master** unit not connected to a pressure transducer will alternately flash the bottom two LEDs.
- A **Remote** unit connected to a Master unit (through the 1-wire data line) will mimic the Master unit's LED condition and flash rate.
- A **Remote** unit not connected to a Master unit will alternately flash the upper two LEDs and the lower two LEDs. This indicates a "no data" condition.

Level indications:



Miscellaneous indications:

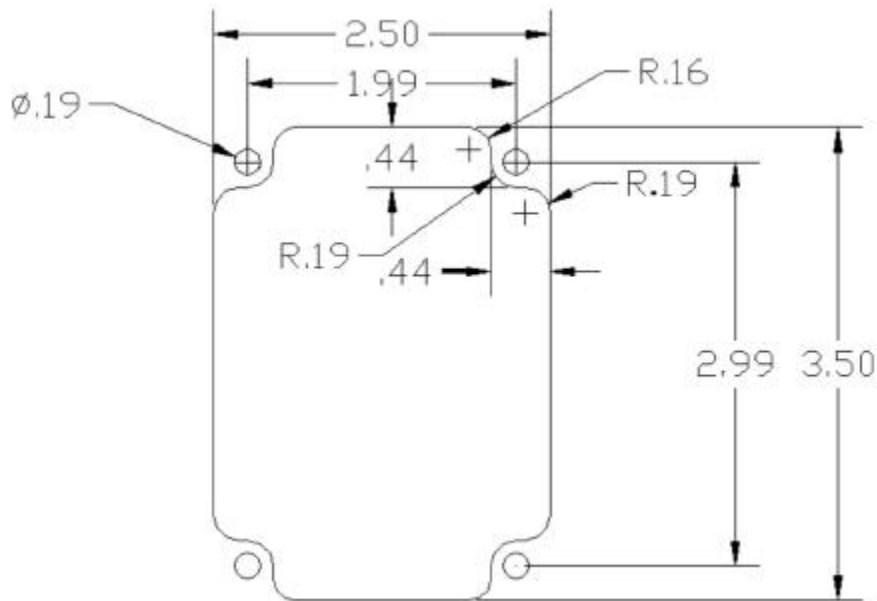
Condition	LED 4	LED 3	LED 2	LED 1
Invalid calibration	AlternFLASH			AlternFLASH
EEPROM error		AlternFLASH	AlternFLASH	
Signal voltage above 4.8V	AlternFLASH	AlternFLASH		
Signal voltage below .4V			AlternFLASH	AlternFLASH
Remote "NO DATA"	AlternFLASH		AlternFLASH	
User Error (wave off)		ON	ON	
4 quick cycles	ON			ON

The tank level has two flash rates: FAST (1.6Hz) and SLOW (.8Hz). AlternFLASH flashes two lights alternately at the SLOW flash rate.

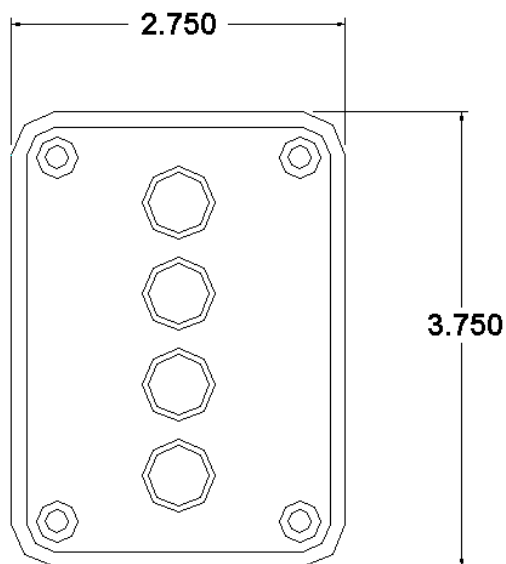
"Wave off" pattern : two center LEDs, two outer LEDs flashing quickly for 4 cycles.

Installation

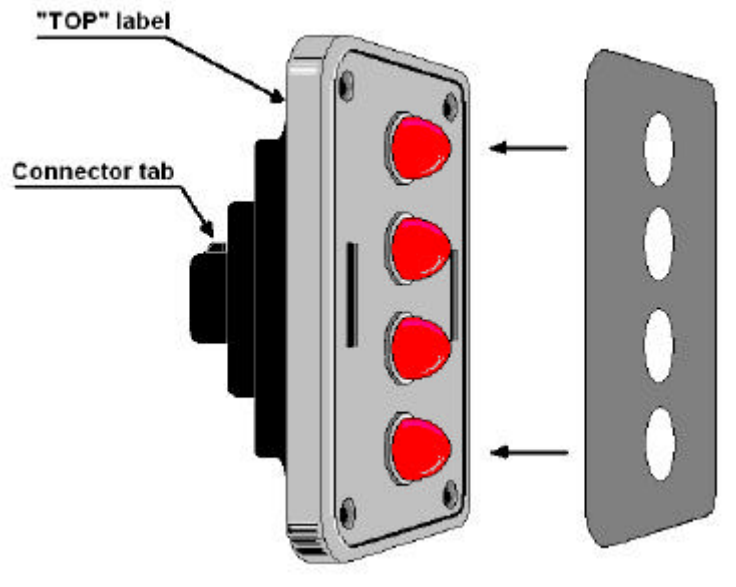
Intelli-Tank display The display requires a cutout as shown. The unit is water tight and may be mounted in any location on the operator's panel.



Outer bezel dimensions.

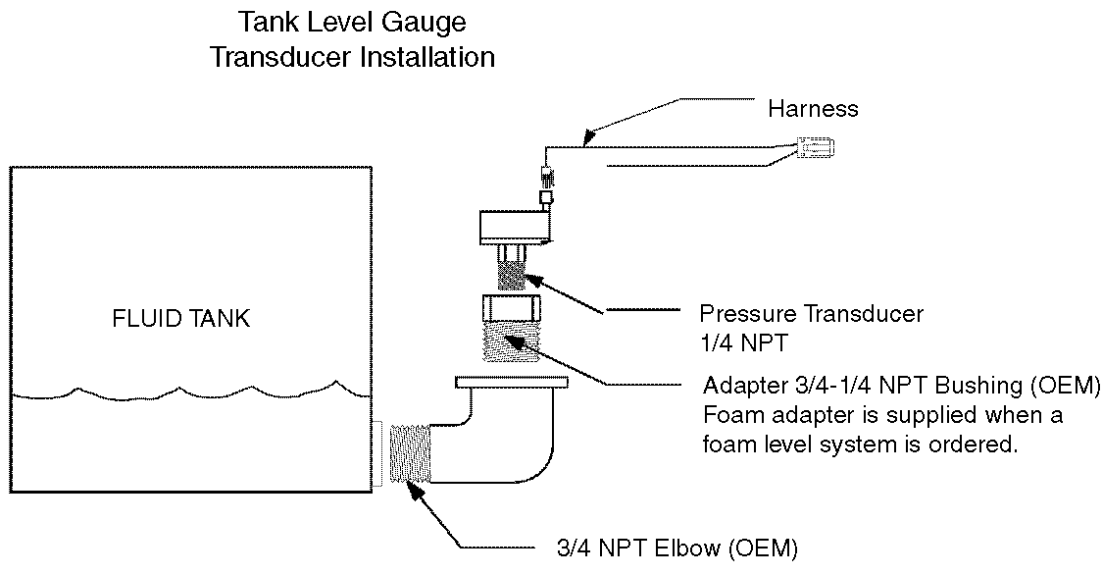


Before mounting the display and adhering the label insure that the unit is situated correctly (TOP is UP). Refer to the drawing for orientation.



Pressure Transducer

The transducer has a 1/4" NPT mount and must be mounted vertically as depicted to insure an accurate reading.



Wiring

Power and Ground

It is imperative that a system utilizing Master and Remote tank level units connected by the 1-wire data line have a common ground.

- Pin 1 Vehicle power
- Pin 2 Ground

Dim Function

The LEDs on the tank level unit can be dimmed to a user selectable dim setting by applying vehicle voltage to the Dim display Input.

- Pin 3 Dim display input (VIGN)

Transducer Connection

- Pin 6 Sensor power (+5)
- Pin 7 Sensor signal
- Pin 8 Sensor ground

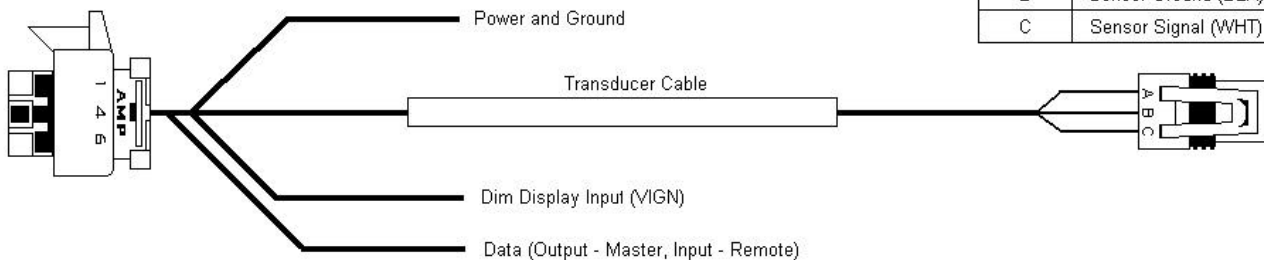
1-Wire Data Line

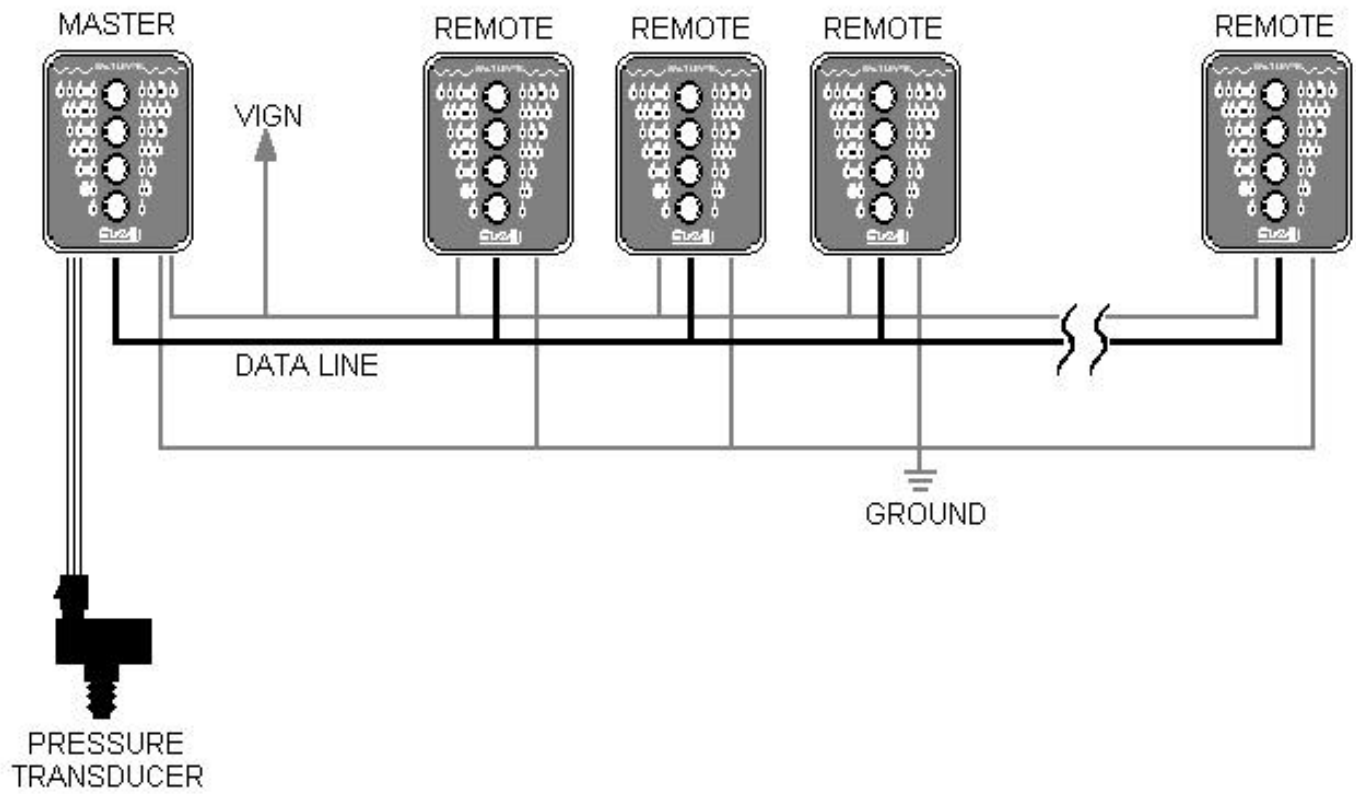
- Pin 4 Master to Remote data transfer line

CONNECTOR: AMP PINS: AMP
776286-1 770520-1

POS	WIRE DESCRIPTION	
1	Power	(input)
2	Ground	(input)
3	Dim Display (VIGN)	(input)
4	Data	(I/O)
5	PLUG	
6	Sensor Power (+5V)	(output)
7	Sensor Signal	(input)
8	Sensor Ground	(output)

POS	WIRE DESCRIPTION
A	Sensor Power +5V (RED)
B	Sensor Ground (BLK)
C	Sensor Signal (WHT)





Typical installation layout.

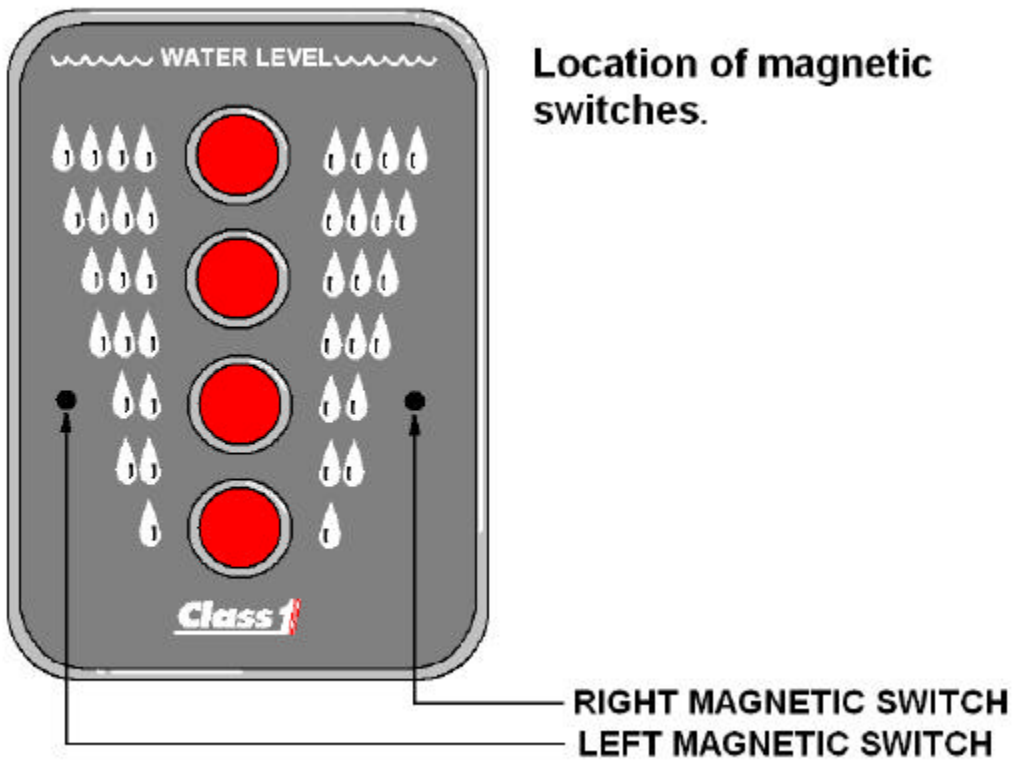
Calibration

The Intelli-Tank display can be calibrated three different ways: 2-point (level calibration), 5-point and 9-point (volume calibration).

To enter calibration mode use a magnet and activate the magnetic switches in the order of the appropriate password.

When a magnetic switch is activated the display will indicate which switch was activated (Left = upper two LEDs, Right = lower two LEDs) for approximately half a second and then the display will go blank. There is a limit of 2 seconds between switch activation's before the the unit reverts to normal operation.

Entering an invalid password will initiate a "wave off" pattern on the display. (Two center LEDs, two outer LEDs flashing quickly for 4 cycles.)



Calibrate the unit by entering the desired point calibration –

2 point	RLLR LLRL
5 point	RLLR LRLR
9 point	RLLR RLLR

The unit will respond by flashing the two center LEDs the same number of times as the desired calibration. The unit will then indicate the level to be calibrated by lighting the proper LEDs for that level starting with empty (*see page 3, tank level indications*). When the tank is filled to the proper level for calibration (dictated by the LEDs) activate the **RIGHT** switch to store that point. The unit will flash the top LED and then set the LEDs for the next calibration point. Continue filling the tank to the proper level dictated by the LEDs and storing that point with the **RIGHT** switch until finished (*after the FULL point has been calibrated*). The unit will respond to a completed calibration procedure by lighting the two center LEDs and then reverting to normal operation by displaying the proper tank level, which at this point should indicate FULL (all LEDs on) because the tank level is full.

To get out of calibration mode at any time without saving, activate the **LEFT** switch.

Calibration data is saved in non-volatile EEPROM so the unit does not need power to retain calibration data.

Calibration automatically makes the unit a master if the calibration is valid. An invalid calibration is determined if any point is not at a higher level than the previous, or if the transducer voltage falls outside of the valid minimum (.4V) or maximum (4.8V) range. An invalid calibration is acknowledged by giving the “wave off” and if this was a master unit previously will alterna-flash the outer two LEDs, while a Remote will revert to Remote operation.

Calibration in a nutshell.

1. Enter the password for the desired calibration (wait for center LEDs to flash back the calibration number).
2. Ensure tank level is at proper level for calibration point as indicated by the LEDs.
3. Activate the **RIGHT** switch to store point (Top LED flashes).
4. Continue steps 2 and 3 until finished (Full has been calibrated).

Self test and Dim

Dimming the Display

The display can be dimmed by applying VIGN to pin 3 (Dim Display input). To select the dim level of the display use the magnetic switches to enter the password

RLLR LLLR

all of the LEDs will come on. Hold the magnet against the **RIGHT** switch and the display will either brighten or dim. Release the magnet and again hold it against the **RIGHT** switch and the display's brightness will move in the opposite direction. When the dim level is at the desired point activate the **LEFT** switch. Each unit has its own calibrated dim level and dim input.

Self Testing the Unit

The Tank Level can check its hardware for proper operation by entering the password

RLLR LLRR

the unit will then cycle each LED on individually starting with the bottom LED and then all LEDs will come on and begin flashing between full bright and the calibrated dim level for 5 seconds. The display will then show the condition of the self test for 5 seconds.

A **PASS** condition is indicated when only the top LED (LED 4) is on.

A **FAIL** condition exists if LED 4 is off and any other LED is on.

LED 3 ON	Memory failure.
LED 2 ON	Data line error.
LED 1 ON	Transducer signal line out of tolerance or shorted to +5V.
LED 1 Flashing	Transducer signal shorted to ground (too low).

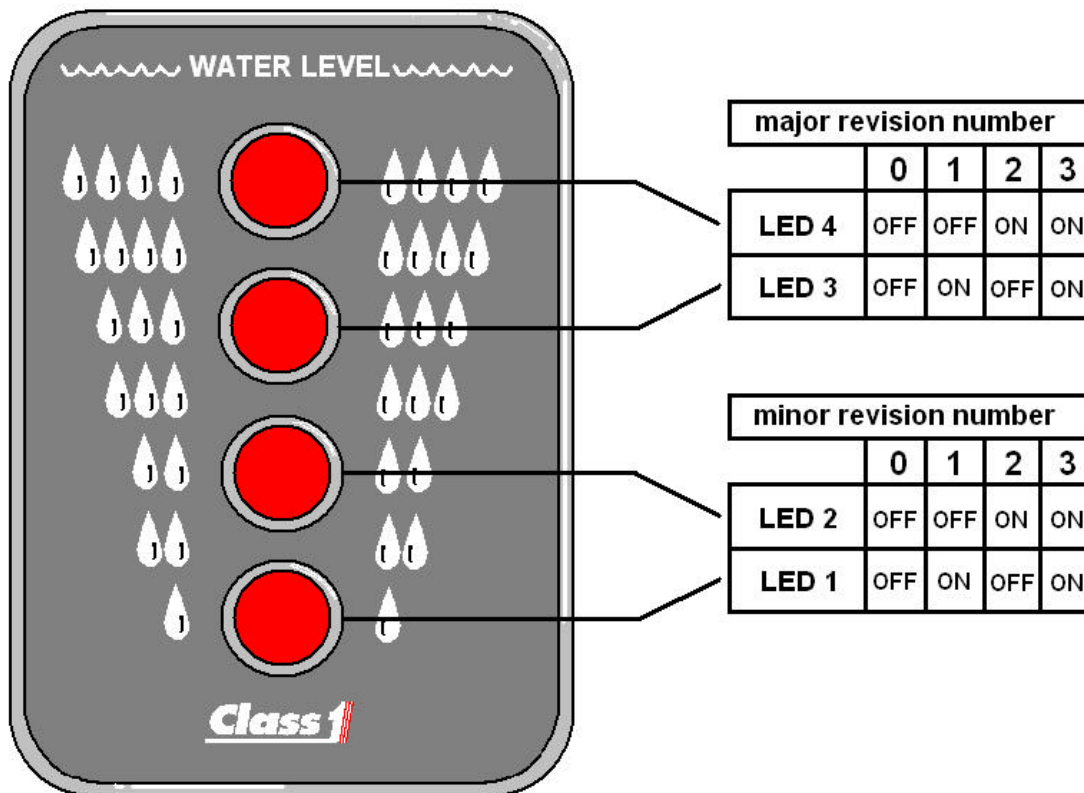
If the self test password is used on a Master unit all Remote units will also perform their self test.

Passwords

RLLR LLRL	2 point calibration
RLLR LRLR	5 point calibration
RLLR RLLR	9 point calibration
RLLR LLRR	Self test
RLLR LLLL	Configure unit as Remote unit
RLLR LLLR	Configure dim level

Software revision check

Hold a magnet on the **LEFT** magnetic switch while powering the unit. The LEDs will display the software revision. (Use the chart below to decipher).



Example. (LED 4 – OFF, LED 3 – ON, LED 2 – OFF, LED 1 – ON) = Ver 1.1

Troubleshooting

Condition	Evaluate
Bottom two LEDs alternate flashing. Unit fails self test, LED 1 flashing.	Check transducer wiring. Ensure +5V at pin A, ground at pin B and at least .4V at pin C (Signal).
Top two LEDs alternate flashing. Unit fails self test, LED 1 on.	Check transducer wiring. Ensure +5V at pin A, ground at pin B and no more than 4.8V at pin C (Signal).
Middle two LEDs alternate flashing.	Perform self test. If it fails with LED 3 on replace unit.
Outer two LEDs alternate flashing.	Try to recalibrate. If condition remains, check if transducer signal voltage (pin C) changes as tank level increases. If it doesn't, replace transducer. If it does, verify depth of tank. It may be impossible to calibrate a tank with a depth of less than 6 inches.
Bottom two and Upper two LEDs alternate flashing.	The unit is configured as a Remote. If it required to be a Master then recalibrate. If the unit is required to be a Remote check Data line (Pin 4) continuity and insure line is not grounded.
No LEDs on.	Check power (Pin 1) and ground (Pin 2) connection.
Master Tank level display does not change when actual tank level is changing.	Check transducer wiring. Ensure transducer signal voltage (Pin C) is varying. If it does, check for same signal changes at Pin 6 of tank level connector (if it is not the same repair wiring). If signal is good at both locations try re-calibrating.
Remote Tank level display does not follow Master display.	Perform self test. If self test is good, check pin 4 (data line) for continuity and insure it is not shorted to ground or power. Insure data line is not routed near noisy power or RF sources.
Unit fails self test, LED 2 on.	Check pin 4 (data line) for continuity and insure it is not shorted to ground or power.
No passwords are accepted.	If the display issues the "wave off" after entering a password, insure the unit is installed upright. During power-up the display should cycle on each LED individually starting with the bottom LED. Check that the left and right magnetic switches are recognized by activating each switch and verifying that the associated LEDs illuminate.

Condition	Evaluate
<p>The bottom two LEDs are on and occasionally they go out and the top two flash and then return to the bottom two LEDs on (or vice-versa). (REMOTE).</p>	<p>Check for large noise spikes on the data line.</p> <p>Insure that the unit's ground potential is the same as the Master's.</p> <p>Insure that the data line is not chaffed and making contact with other electrical wires.</p>
<p>The points calibrated seemed to have changed.</p>	<p>Self test the unit to check for any malfunctions.</p> <p>Check the pressure transducer for problems.</p> <p>Recalibrate the unit and take a voltage reading from the transducer (pin 7 on the unit's connector) at each calibration point. When the calibration points again look wrong check the voltages at those points and determine if they are the same as the voltage reading taken during calibration.</p>
<p>Unit will not dim display.</p>	<p>Insure the Dim input voltage on Pin 3 is at least 9V. Recalibrate dim setting (RLLR LLLR). If unit does not dim LEDs while in dim calibrate mode, replace unit.</p>

Contents

Intelli-Tank

High current 4 light remote driver module with auto refill and alarm

Contents	.....	1
Overview	.....	2
Operation	.....	3
Installation and		
Wiring	.....	5
Specifications	.....	8
Troubleshooting	.....	9

Overview

The Intelli-Tank Driver module utilizes the 1-wire data line to receive tank level information from a Master 4 light tank level display (C1-PN 106299 or 106296) and then mimics the Master's display with its high current outputs. The module also incorporates an auto-refill function that, when activated, turns on the fill output at less than $\frac{3}{4}$ tank level and turns it off when the tank reaches the FULL point. An alarm output activates when tank level reaches $\frac{1}{4}$ or if data from the Master is lost for over 10 seconds.

Basic parts:

Driver module	C1 – PN	106877	12/24V
Installation Harness	C1 – PN	106692	
User Manual	C1 – PN	106759	

Prerequisite parts:

Master 4 light tank level display	C1 – PN	106299	12V
		106292	24V

Accessories:

Remote dash indicator	C! – PN	106878	
-----------------------	---------	--------	--

Modes of Operation:

- Normal** The module receives tank level data from the Master and mimics the Master's display with the high current outputs.
- Auto-Fill** When the level of the tank is below $\frac{3}{4}$ the fill output comes on and remains on until the Master display indicates FULL.

Operation

When the unit is first powered up the lights will cycle on individually starting with the EMPTY (output 1) light and then the lights will show the current status.

- A Module connected to a Master unit (through the 1-wire data line) will mimic the Master unit's LED condition and flash rate.
- A Module not connected to a Master unit will alternately flash the upper two lights and the lower two lights. This indicates a “no data” condition.

Level indications:

LEVEL	output 4	output 3	output 2	output 1
7/8 < LVL <= F	ON	ON	ON	ON
3/4 < LVL <= 7/8	FLASH .8Hz	ON	ON	ON
5/8 < LVL <= 3/4		ON	ON	ON
1/2 < LVL <= 5/8		FLASH .8Hz	ON	ON
3/8 < LVL <= 1/2			ON	ON
1/4 < LVL <= 3/8			FLASH .8Hz	ON
1/8 < LVL <= 1/4				ON
1/16 < LVL <= 1/8				FLASH .8Hz
E <= LVL <= 1/16	FLASH 1.6Hz	FLASH 1.6Hz	FLASH 1.6Hz	FLASH 1.6Hz

Auto-Fill Function

Auto-fill mode is active when the auto-fill select input (pin 8) is grounded. The auto-fill status light output (pin 2) indicates the current status of this mode and is capable of driving positive voltage to 250mA.

Status Light	Condition
On	Auto-fill mode selected and is in standby
Flashing	Auto-fill mode selected and is currently filling (refill output is active).
Off	Auto-fill mode de-selected or error condition is present.

The auto-fill function will energize the fill output when the tank level is at or below $\frac{3}{4}$ and de-energize when the Master display reads FULL. Auto-fill will also de-energize the fill output and turn off the auto-fill status light if there is no data being received on the data line from the Master display (serial error) or if a transducer error high or low (range error) is encountered.

4 Outputs for the level lights

Four outputs are available to drive external lights to indicate tank level. These are positive voltage outputs are capable of 7.5A each (Full light is output 4).

Alarm and alarm silence

The alarm output (pin 3) activates when the tank level falls to below $\frac{1}{4}$ tank or 10 seconds after a data line problem exists. The alarm output is a positive voltage output capable of 250mA. The alarm silence input (pin 5) will turn the alarm off during any alarm circumstance. The alarm silence activated by a momentary ground input.

1-wire serial interface

The 1-wire serial interface is the link between the master tank level module and any other remote modules. If the output driver module loses the serial link all outputs will be deactivated and then the output lights will alternate flashing the upper two lights and the lower two lights, and the auto-fill function will be deactivated. After 10 seconds in this serial failure condition the alarm will sound (it can be turned off with the alarm silence switch).

Dim level light outputs

The output lights are set to the dim condition (50% duty cycle) when a ground is input on pin 6.

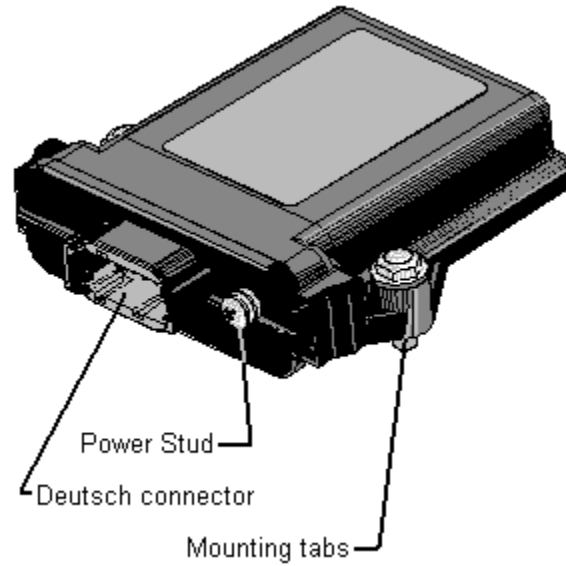
Module LED indicators

There are 3 LEDs on the front of the remote driver module. The RED LED indicates that the circuit board has power. The YELLOW LED indicates the power stud has power. The GREEN LED indicates the condition of auto-fill mode and will react the same as the auto-fill status light output (pin 2).

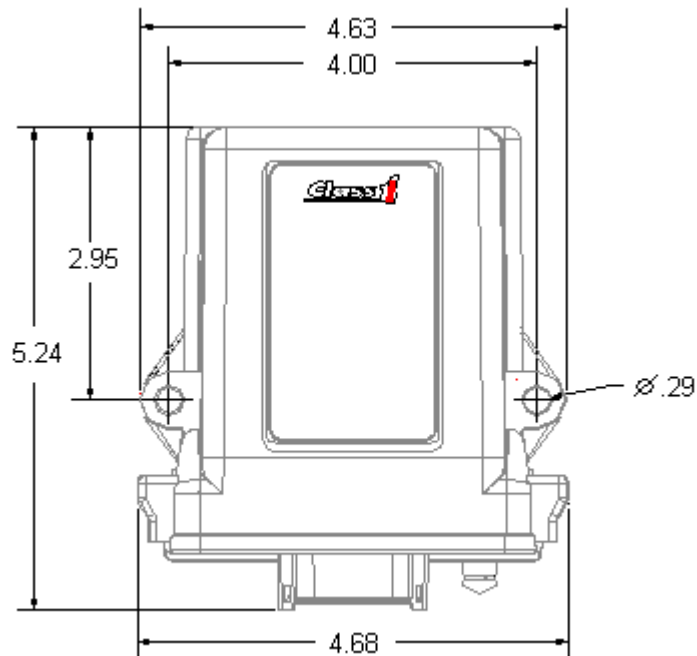
Installation and Wiring

Driver Module

The module is water tight and can be mounted any place away from large RF noise generators.

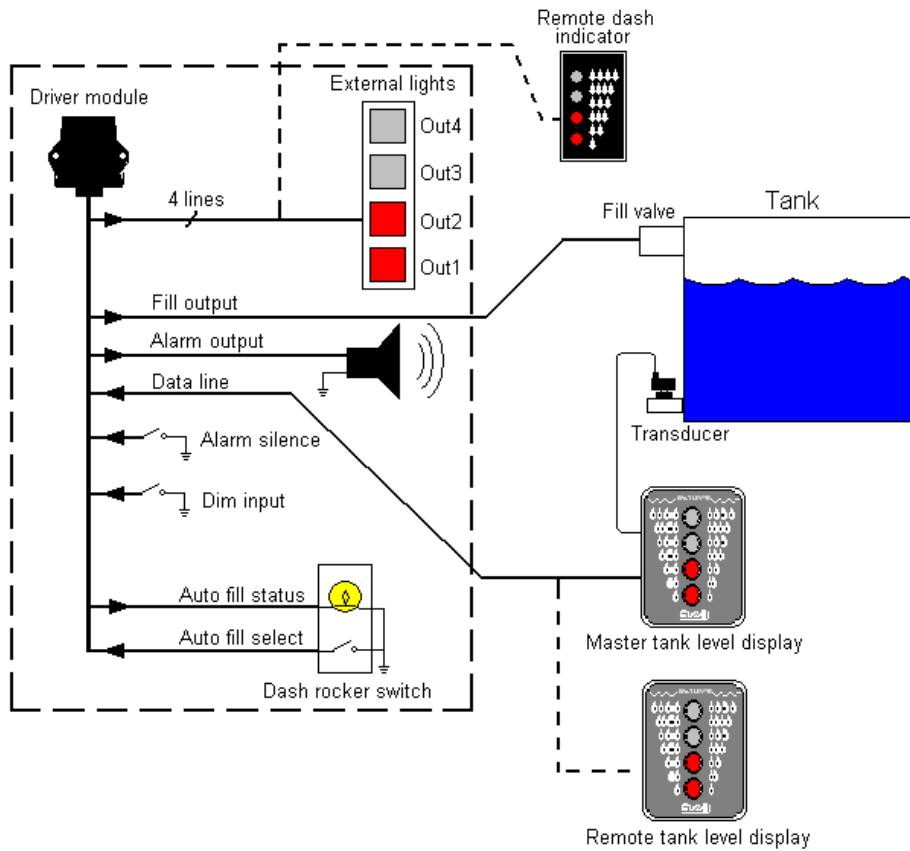


Mounting dimensions (inches)



Typical installation

Remote driver module features

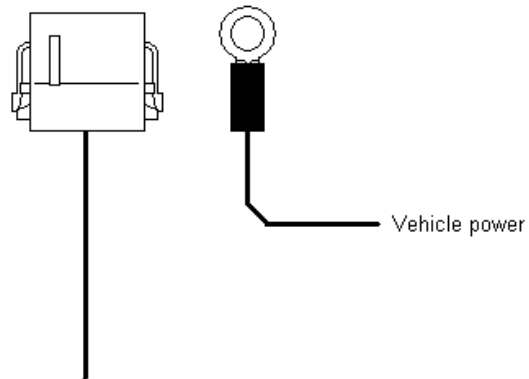


Connector detail

CONNECTOR: Deutsch
DTM06-12S

PINS: Deutsch 20 gauge female
0462-201-20141

POS	WIRE DESCRIPTION
1	Output 1 (1/4)
2	Auto-fill status light output (+V)
3	Alarm output (+V)
4	Fill output (+V)
5	Alarm silence input (GND)
6	Dim lights input (GND)
7	Output 4 (FULL)
8	Auto-fill select input (GND)
9	Output 3 (3/4)
10	Data
11	Output 2 (1/2)
12	Ground



Power and Ground

It is imperative that the driver module and the Master tank level have a common ground.

Stud	Vehicle power (12/24VDC)
Pin 12	Ground

High Current Outputs (7.5A)

Pin 1	Output 1	(1/4)
Pin 11	Output 2	(1/2)
Pin 9	Output 3	(3/4)
Pin 7	Output 4	(FULL)

Auto-Fill components

Pin 2	Auto-Fill status light output (+V)
Pin 4	Fill output (+V)
Pin 8	Auto-Fill select input (ground = auto-fill ON)

1-Wire Data Line

Pin 10	Data transfer line
--------	--------------------

Alarm functions

Pin 3	Alarm output (+V)
Pin 5	Alarm silence (ground = silence active)

Dim lights

Pin 6	Dim lights input (ground = dim active)
-------	--

Specifications

Parameter	Value	Unit
Input voltage	+10 to +32	VDC
Current nominal: <i>No outputs active</i>		
@ 13.8VDC	44	mA
@ 27.6VDC	55	mA
Operating temperature	-40 to 85	°C
Maximum current:		
Alarm output	250	mA
Auto-fill status light output	250	mA
Fill output	250	mA
External light outputs	7.5	A
Maximum difference of potential between grounds (master and remote driver)	1	V

Troubleshooting

Condition	Evaluate
Bottom two lights alternate flashing.	Master tank level display's transducer signal voltage is below .4VDC. Check transducer wiring to master tank level display.
Top two lights alternate flashing.	Master tank level display's transducer signal voltage is above 4.80VDC. Check transducer wiring to master tank level display.
Bottom two and Upper two lights alternate flashing.	Remote driver module is not receiving data from the master tank level display. Check for continuity on the data line (pin 10) to the master tank level display and that the grounds are common between units (there should be less than 1V difference of potential). Insure the master tank level display is functioning properly.
Bottom and top lights alternate flashing (center two are off)	Master tank level display has an invalid calibration. Recalibrate Master display.
No lights are on.	Unit is not powered or external lights are not connected properly. Check power (Stud) and ground (Pin 12) connection for proper voltage.
Unit will not dim lights.	Check for proper ground input signal to pin 6 when activating the dim input switch.
Alarm will not silence.	Check for proper ground input signal to pin 5 when activating the alarm silence switch.
Auto fill not functioning	Check for proper ground input signal to pin 8 when activating the auto-fill select switch. Insure remote driver is displaying same information as master tank level display.