

PROCESS > POWER > LIGHT



The next generation of float.

TR2A

COX[®]
RESEARCH

THE OPTI-FLOAT[®] LEVEL DETECTOR

Combining new technology with a familiar device, the Opti-Float[®] level detector is a revolutionary innovation in discrete level detectors. The new float is made of safe, recyclable materials, is mercury and lead free, and is engineered for many years of service.

The design of the Opti-Float[®] level detector is amazingly simple. Using plastic fiber optic cable, a beam of light is transmitted from an LED in a remote transceiver down to the float, where the beam makes and breaks depending on the tilt of the float. When the transceiver detects the presence or absence of light, a relay is activated in the transceiver, which can then operate other devices. The transceivers are all dual, DIN rail mounted units, that can connect to two floats. Additional transceivers can be used for additional floats.

TECHNICAL DATA

DUAL TRANSCEIVER:

Operating voltage: 12 VDC +/- 10%

Power consumption: 1.2 VA max.

Output: Relay SPDT, 3 amp at 240 VAC each channel

Operating temperature: -25 to +55C

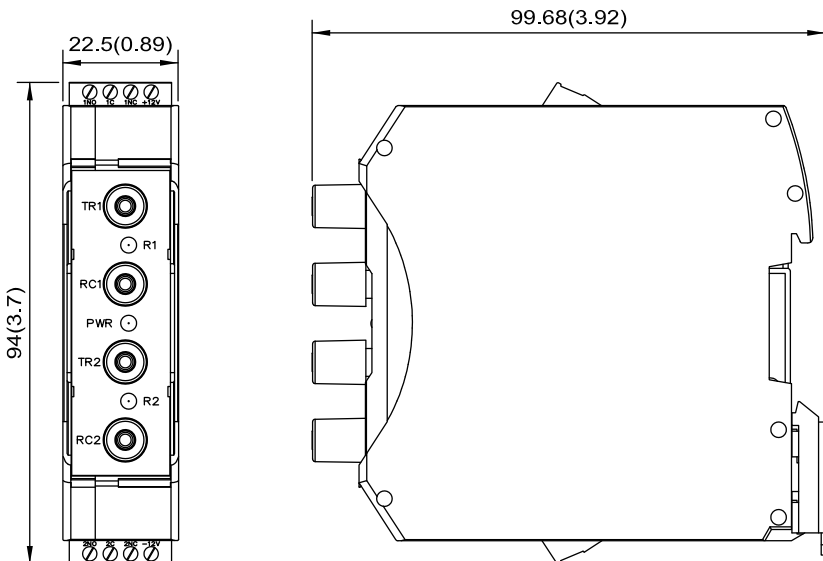
FLOAT:

Housing material: Polypropylene

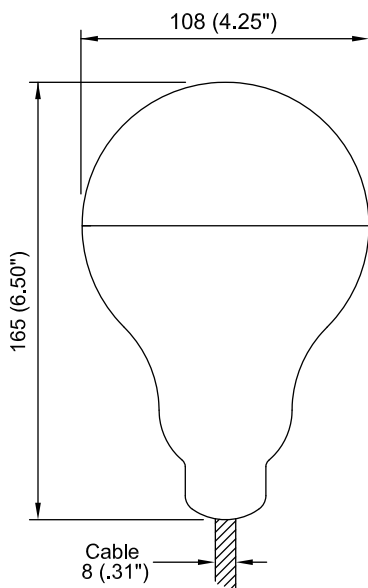
Cable: Polyurethane over dual plastic fibers
(.31" O.D.)

Operating wavelength: 400 to 1200 nm

Operating temperature: -25 to +70C



Transceiver



Float

INSTALLATION INSTRUCTIONS

1. Proper installation of Opti-Float® level detectors will insure long trouble free operation.
2. The transceivers are dual units capable of operating 2 floats. The transceivers have relay outputs both normally open and normally closed. The most common mode is normally open, floating tilted down, beam blocked, relay de-energized, relay contact open. Relay contacts close when the float is tilted up.
3. Install transceivers on a din rail mounting. Connect a 12 VDC, 10 watt power supply to the+ and - terminals. Connect the relay contacts, R1 and R2 to the control circuit.
4. The relays can be connected directly in the motor starter contactor coil circuit. For maximum relay life, it is recommended that interface relays be used on starters larger than NEMA size 2.
5. Strip off the outer sheath of the pair of fiber optic cables as far as necessary. Use care so as not to cut the fiber cables.
6. The fiber cables consist of a plastic light fiber with a thin polyethylene covering. Do not strip off this covering. Square cut the ends of the fiber cable using a sharp razor blade, box cutter, cigar cutter or a simple device available from Cox Research. Look at the cut end and verify that it is a clean cut with no polyethylene covering the light fiber. Re-cut if necessary. Polishing of the end is not required.
7. Completely loosen the cinch nuts on the transceiver but do not remove them. Insert the fiber cables into the ends until they bottom out. The fiber cables will insert approximately 16mm (5/8") from the end of the fully loosened cinch nut.
8. Hand tighten the cinch nuts. Do not use any tool for this operation. Verify that the fiber cables are securely in place. Also make sure that the cables enter the connector straight. Undue lateral tension will keep the fibers from mating with the transmitter and receiver devices inside the housing. The minimum recommended bending radius of the fiber cables is 25mm (1 ").
9. The blue connector is the light source and the black connector is the light receiver. It does not matter which fiber cable is inserted into which connector. Just make sure that they are matching pairs of the same float.
10. When in operation, a float that is tilted above horizontal will illuminate its respective red LED, R1 or R2, on the front of the transceiver. It does not matter whether the relay is connected normally open or normally closed. The green PWR light will illuminate when the transceiver has power.
11. Spare transmitter and receiver connectors should be covered with plastic dust covers shipped with each unit. This will not only prevent contaminants from getting into the device, it will also prevent ambient light from entering a spare receiver which may cause it to switch on and off.
12. It is recommended that float cables be ordered with the correct length of cable. However, in the event that a splice is necessary, the cable can be spliced with one pair of splices. Splices are tubular with cinch nuts on each end. Contact Cox Research for splice kits.
13. Standard cable lengths are 30, 60 and 100 feet. Maximum recommended splice lengths are 150' total.
14. When installing the cables make sure that they are not unduly kinked, stressed, rubbing against sharp objects or installed such that the bending radius of the cable is less than 25mm (1") in any location. Larger loops are recommended.

15. For optimum operation when attached to supports, tether the float with about 100mm (4") of cable slack.
16. Attach the floats to support cable, chain, rod or other devices using standard wire ties. Attach the float cable perpendicular to the support and make an additional parallel attachment about 100mm (4") above the first one. See instructions supplied with Cox Research cable attachment devices for proper installation.
17. Where float wires enter a junction or terminal box adjacent to a control panel, it is recommended that the float cable not be cut and spliced, but brought directly through the box to the control panel. Make a loop in the cable such that a splice could be installed at a later date if necessary. If desired, the sheath of the optical cable can be removed where individual fibers are needed to be installed through seal off fittings.
18. Although designed to take a large amount of abuse, for maximum life, it is recommended that the Opti-Float® level detectors not be abused by striking them against the walls of wet wells.
19. A complete fully assembled, UL listed, externally mounted Retro-Kit consisting of floats, transceivers, power supply and enclosure is available from Cox Research. An internally mounted kit without enclosure is also available. Contact us with your requirements.

Patented. Other U.S. and Foreign Patents Pending.

U.S. Pat. 8,334,501

U.S. Pat. 8,314,711

U.S. Pat. 7,902,989

U.S. Pat. 7,772,538

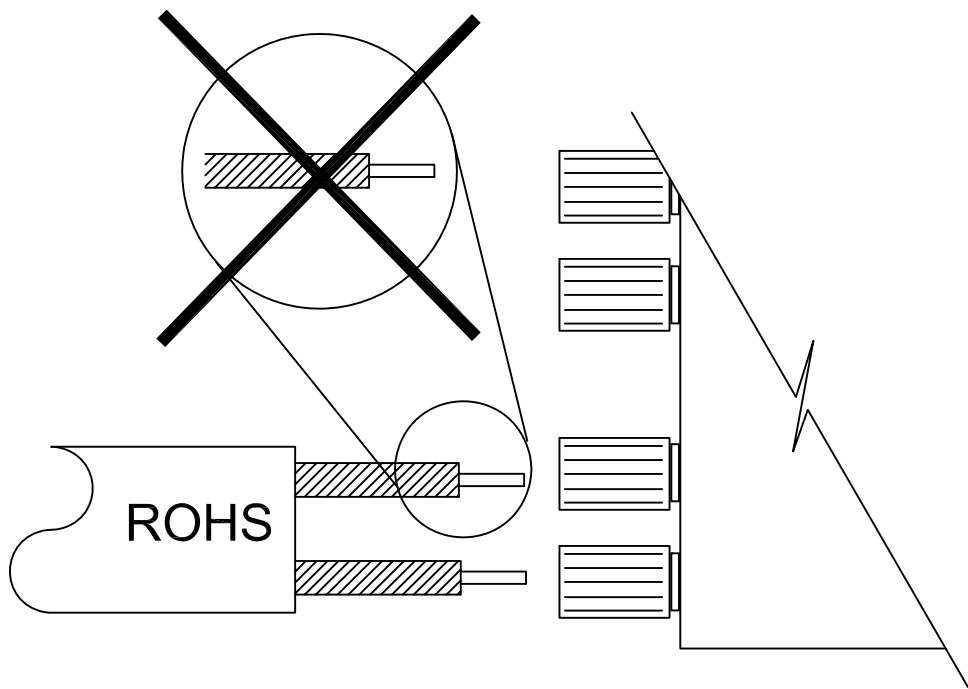
U.S. Pat. 7,714,732

U.S. Pat. 7,234,830

U.S. Pat. D627,738

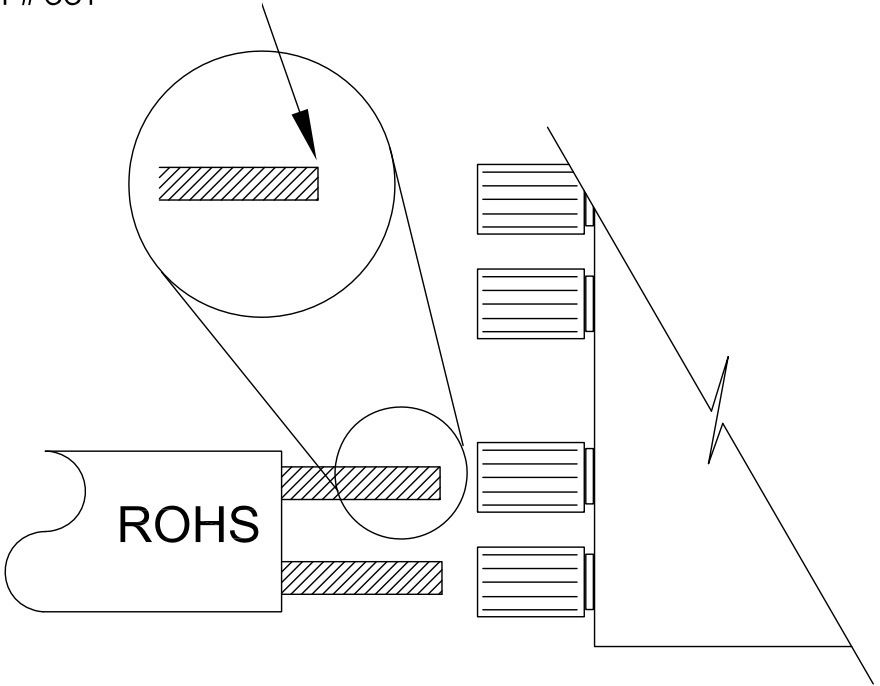
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WRONG

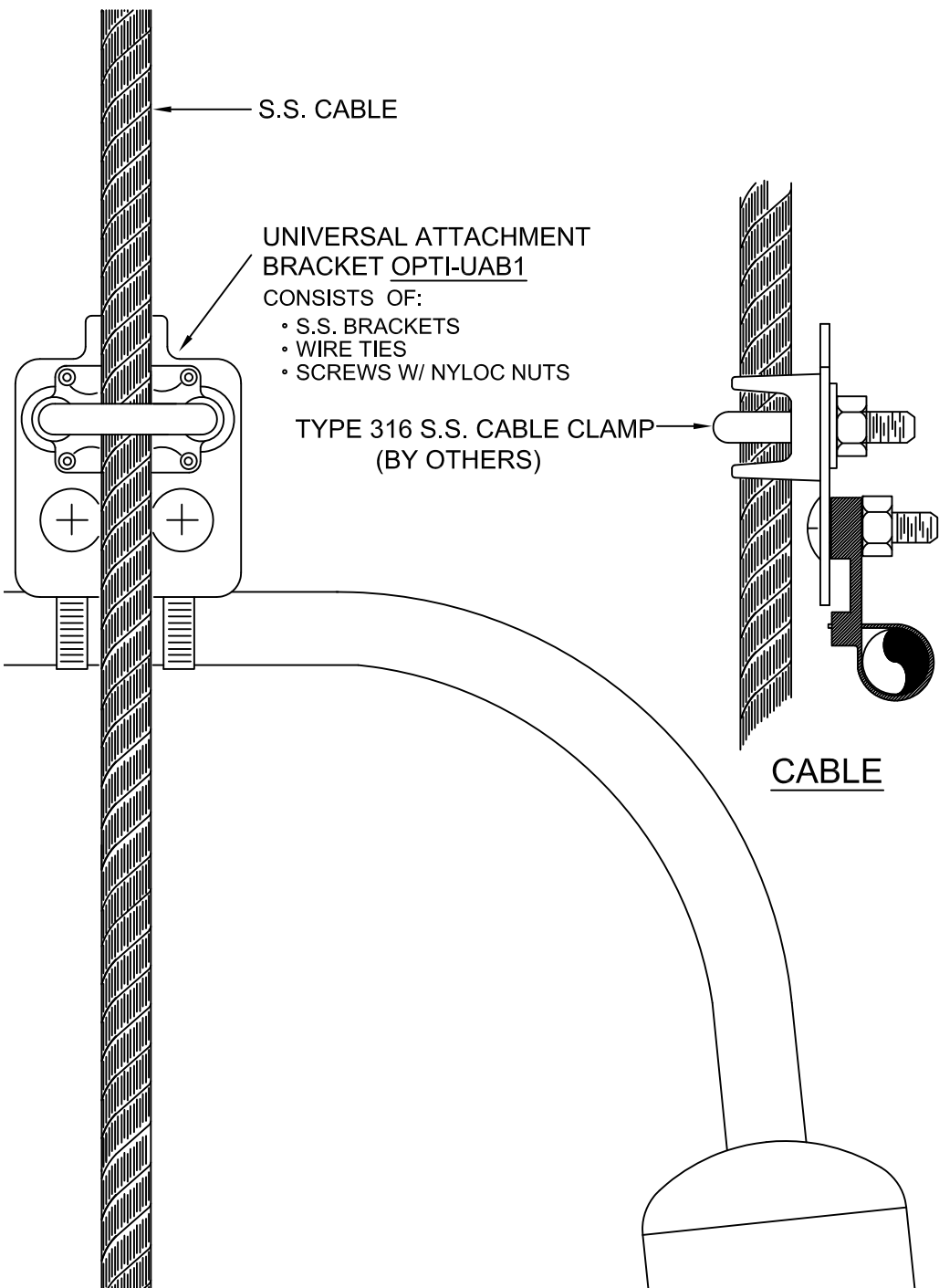


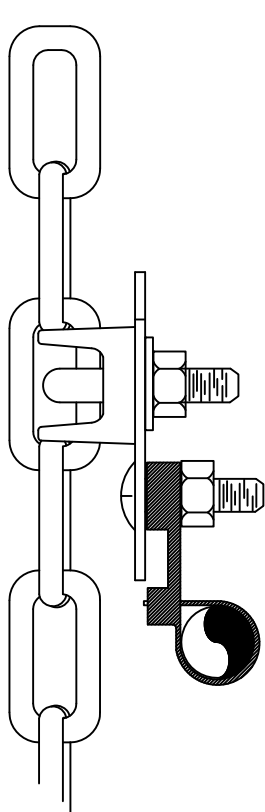
CORRECT

CUT WITH RAZOR CUTTER
PART # CC1

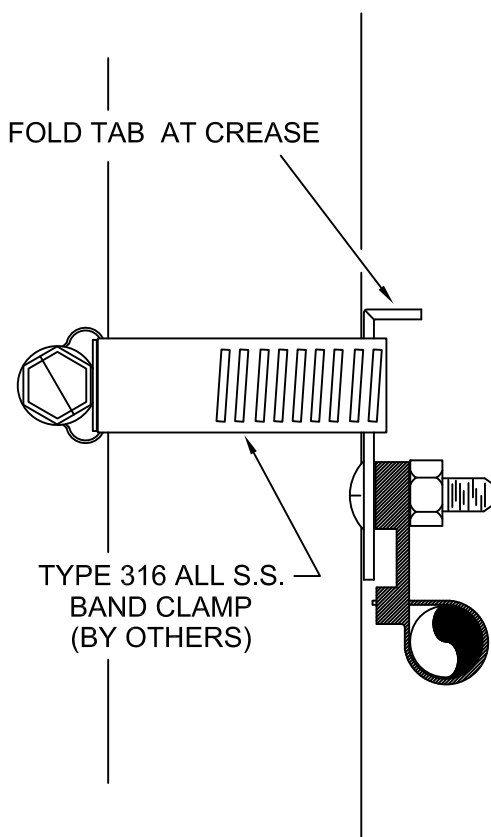


OPTI-FLOAT[®]
LEVEL DETECTOR
FIBER CONNECTION



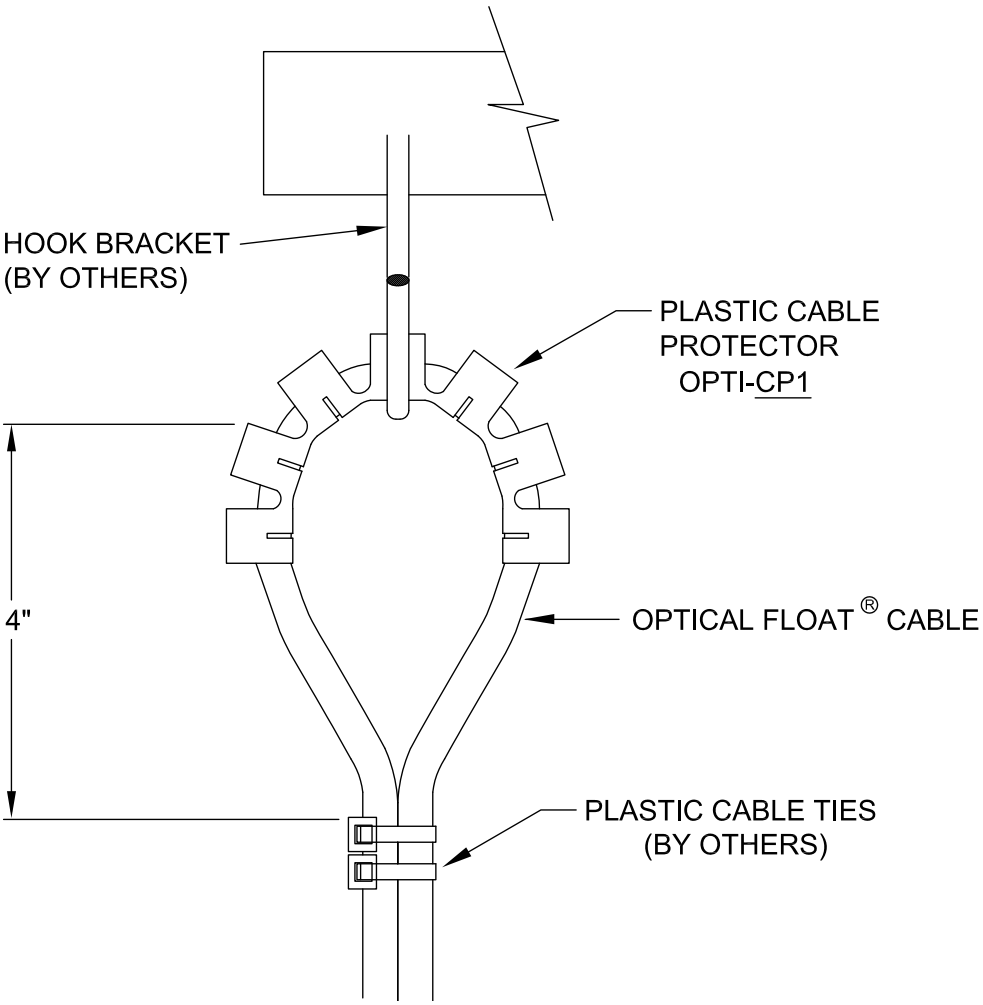


CHAIN

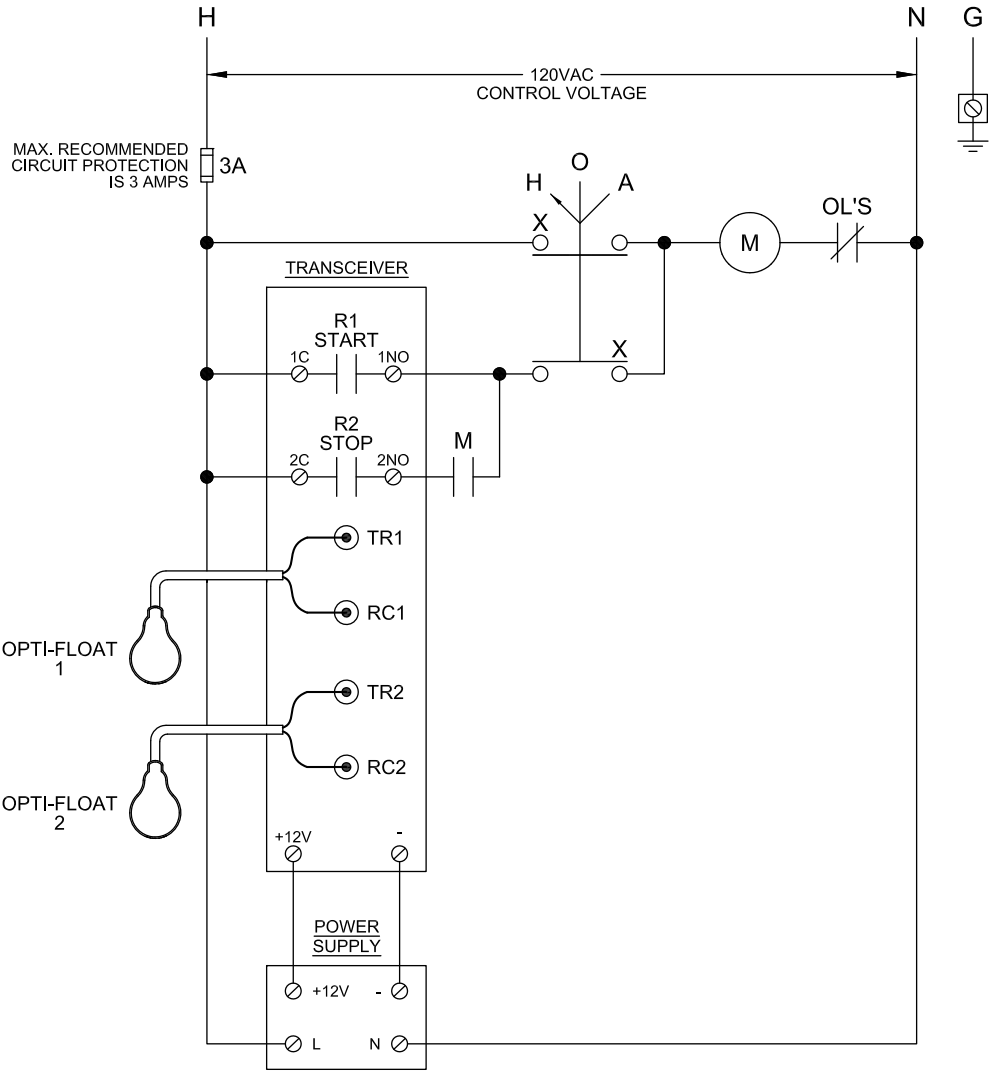


PIPE

OPTI-FLOAT[®]
ATTACHMENT FOR
CABLE, CHAIN OR PIPE



OPTI-FLOAT[®]
LEVEL DETECTOR
CABLE PROTECTOR
FOR WEIGHTED FLOATS

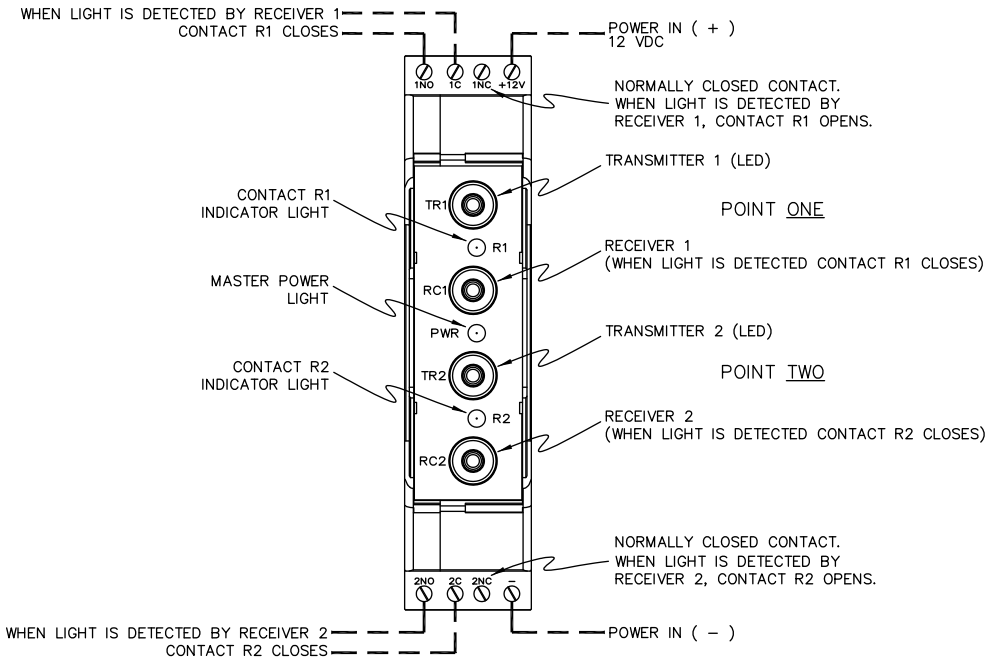


TYPICAL START-STOP
SCHEMATIC

The OPTI-FLOAT[®]

TR2A Transceiver

Release Date
January 2019



Frequently Asked Questions

1. Q. How long will the float last?
 - A. We have run extensive tests on them and found that the floats consistently last well over 15,000,000 operations without failure. Electrical floats consistently fail at the point of maximum repeated bending stress of the copper wires, which is near the float housing. Copper wire has a much higher modulus of elasticity and fatigues very quickly. The Opti-Float® level detector uses plastic fiber cable and is nearly indestructible in float switch applications. It was a life of 10 or more times that of conventional electrical floats.
2. Q. Having a fiber optic cable, are there any special precautions that we have to take to avoid problems?
 - A. No. The fiber optic cable used with the Opti-Float® level detector was custom designed for the application. The fibers are plastic, not glass, and can be tied in knots, although not recommended, without harm. The cable jacket can be stripped with standard coax cable strippers or simple strippers that we can supply. The ends of the fibers are not to be stripped. They are only to be cut with a sharp instrument such as a razor or a cutter that we can supply. The ends do not need to be polished, and push easily into the controller connector without tools.
3. Q. Are there any special requirements for hanging the floats in a wet-well?
 - A. No. Attach them as you would any other float. We do have recommendations as to the best methods of attachment to cables, chains and pipe that will give you the least amount of trouble with slippage, etc. These methods can be applied with any type of hanging cable, even with electrical floats. You can see them on our web site or call us and we will send you a booklet.
4. Q. Is the controller rated for use directly with motor starters or do we need to have interface relays in the circuit?
 - A. The controller has 10 amp relays on the circuit board. We conservatively rate them at 3 amps, 120 and 240 volts. We have tested the controller to over 15,000,000 operations, without failure, energizing and de-energizing a size 2 motor starter which will start a 25 HP, 480 volt motor. For size 3 and above we recommend the interface relays. We do not recommend connecting the controller directly to a motor where full motor current will pass through it.
5. Q. What is the maximum length of cables that are available?
 - A. We stock 30, 60, and 100 foot cables but can supply longer cables. Call us with your special requirements.
6. Q. In how deep of water has the float been tested?
 - A. It has been tested in a water filled pressure chamber with the optical cables exiting the chamber to 300 feet of water pressure without failure or deformation of the float or the cable. The unique shape of the float distributes the forces of compression equally around the float and produces its strength.

7. Q. How do you keep the float from chattering in turbulent water?
- A. We have designed it that way. The light eclipser inside of the float operates in a dampening fluid with a very wide operating temperature range. This dampening fluid slows the eclipser down using the same principle as shock absorbers on an automobile. Also the controller is designed with a small inherent time delay before operating the relays. These two features eliminate the problems associated with float chatter.
8. Q. Why is the Opti-Float® level detector two-tone in color?
- A. The 2 tone patented feature has a purpose. It is light in color on the dome so that you can easily see, by looking down into the water, if the float is tilted up or down.
9. Q. How rugged is the float from abuse.
- A. For testing purposes only, the Opti-Float® level detector has been tested with abuse with everything from sledge hammers to base ball bats to slamming them into concrete at high velocity, all without failure. However we do not recommend abuse and specifically caution against it.
10. Q. How do we convert an existing electrical float panel to optical floats?
- A. There are 3 ways to do this. First there is an external retro-fit package consisting of the controllers, power supply, circuit breaker and terminal strips all inside of an outdoor NEMA 4X non-metallic or stainless steel enclosure. Simply mount this enclosure adjacent to your existing control panel. Remove the existing floats and wire from the terminals in the retro-fit enclosure to the terminals in the existing control panel on which the electrical float wires were connected. Power with 120 vac from the existing control panel. Install the Opti-Float® level detectors and you are done. The second method is to use an open assembly consisting of the same components, except without the enclosure, all pre mounted on a small aluminum plate that may fit into existing space inside of your existing control panel. Connections are made similarly. The third method is to mount the individual components inside of your existing control panel and again wire similarly.
- Q. What types of accessories do you have?
- A. We have many accessories including external weights, cable strippers, cutters, splice kits and unique hanging devices. You can find our catalog and other information on these devices on our web site.
12. Q. Can the optical cable be spliced?
- A. Yes. Although it is best to order the floats with the correct length of cable, the cable can be easily spliced if necessary. See our web site for more information or give us a call.

13. Q. How much do they cost?
- A. Opti-Float® systems cost about the same and in many cases less than standard intrinsically safe systems with electric floats and interface relays. Nearly all waste water pump stations require compliance with NFPA Standard 820 which classifies most wet-wells as a Class 1, Division 1 hazardous area. Combining this with the extremely long life of 10 or more times that of conventional electrical floats, and even using them in less stringent Class 1, Division 2 or Unclassified areas, the cost of changing out conventional electrical floats makes the Opti-Float® level detectors by far the best value.
14. Q. Where do we purchase the floats and accessories?
- A. They can be purchased from our national distributors. Contact us with your requirements and we will direct you to your distributor.
15. Q. What is the warranty on the floats?
- A. Standard warranty is for 3 years. Longer warranties are available.
16. Q. Can we get quantity discounts.
- A. Yes. Contact us with your requirements.
17. Q. How can the Opti-Float® level detectors lower our maintenance cost?
- A. The Opti-Float® level detectors and accessories have been tested without failure to well over 15,000,000 operations. Most electrical floats will fail with less than 100,000 operations. This means that you will probably change out 10 or more electrical floats before you change out 1 optical float. This is due primarily to the use of the plastic fiber cable instead of metallic wires. The plastic fiber cable can be bent through full 180 degree cycles many times more than copper wires.
18. Q. Is the float RoHS compliant?
- A. Yes. It is considered "Green" technology. It is all recyclable and RoHS compliant. RoHS is the European Union "Restriction of Hazardous Substances Directive" which took effect July 1, 2006.
19. Q. What is the angle of operation of the float?
- A. The Opti-F1 is a narrow angle float. It will operate with as little as 1 degree of tilt from horizontal. However, due to the anti-chattering liquid in the activation device, there may be a slight time delay. Special floats are available that do not have the time delay. Contact Cox Research with your requirements.
20. Q. Are the floats sensitive to rotation?
- A. No. The activating device is on the center axis to the float and is thus independent of the rotation of the float.

WARRANTY

Cox Research and Technology, Inc. ("Cox") warrants to the original purchaser (the "Customer") that the Optical Float[®] systems and products will be free of defects in materials or workmanship, for a period of 3 years from the date of purchase. This warranty is void on products that have been, in our judgment, tampered with, abused, improperly stored, improperly wired, improperly installed, misused or subjected to high voltages either through negligence, power surges, lighting or other sources; modified, altered or adapted without Cox's written consent; or used with equipment not covered by this warranty, to the extent that problems are attributable to such use.

The Customer is required to obtain a return authorization number from Cox before returning any products. The Customer is responsible for all expenses including removal, re-installation and shipping necessary to deliver the returned products to the factory for evaluation, repair, or replacement. Cox's sole liability under this Limited Warranty is, at its option, to repair or replace any products that are found defective in materials or workmanship, or to refund the purchase price paid for the defective product.

Disclaimer of Further Warranties. THE LIMITED WARRANTY SET FORTH ABOVE IS THE EXCLUSIVE WARRANTY APPLICABLE TO THIS CONTRACT, AND COX EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES OR REMEDIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHETHER THE SAME ARE WRITTEN, VERBAL, IMPLIED, OR STATUTORY. THE CUSTOMER IS SOLELY RESPONSIBLE FOR DETERMINING THE SUITABILITY OF COX OPTICAL FLOAT SYSTEM PRODUCTS FOR THE CUSTOMER'S INTENDED PURPOSES, AND COX SHALL NOT BE LIABLE FOR THE SUITABILITY OF ITS OPTICAL FLOAT SYSTEM PRODUCTS FOR ANY PARTICULAR PURPOSE.

Limitation of Liability. Customer's rights and remedy are governed exclusively by the terms and conditions of this Limited Warranty and Customer expressly waives any claim based upon contract, tort, strict liability, or otherwise. Under no circumstances shall Cox be liable for any incidental, consequential, or special damages, losses, or expenses incurred by Customer or any third party arising from this offer of sale or performance of Optical Float systems hereunder. Under no circumstances shall the amount of any claim for damages or liability exceed the amount paid by Customer for products provided by Cox hereunder. This Limited Warranty may only be modified in writing by an officer of Cox, and is the entire agreement between the parties hereto. If any provision of this Limited Warranty is determined to be void, the remaining provisions are deemed valid and enforceable.

Cox Research and Technology, Inc.

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