

**TRINETICS® CSD SERIES
OIL SWITCH
INSTALLATION INSTRUCTIONS**

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**33220900
DECEMBER 2011**

Caution: The equipment covered by these installation instructions should be installed and serviced only by properly trained and qualified personnel. It is not the intent of these instructions to provide for every possible condition in connection with installation, operation or maintenance, nor to cover all details or variation in equipment options. Should problems arise which are not sufficiently covered herein or should further information be required, the matter should be directed to Trinetics.

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TRINETICS® CSD SERIES OIL SWITCH MANUAL OR MOTOR OPERATED

CSD, Rated Maximum Voltage, 15kV, 200 Amps
CSD 20, Rated Maximum Voltage, 20kV, 90 Amps



Introduction

The Trinetics® CSD oil switch is an oil-filled, single pole device designed in conformance with ANSI Standard C37.66. The product may be used to switch capacitor banks, control lighting circuits and sectionalize power.

The standard switch includes a power train and motor housing assembly. However, the switches can be supplied in a “Manual Only” configuration (without the motor housing assembly).

The oil switch can be operated electrically or by the manual lever. In the automatic mode, the electric motor output torque, amplified by a steel-to-steel gear train, rotates a double cam to throw the moving contact assembly and actuate the microswitch to prepare for the next half cycle demand signal. The neutral lead from the motor and the tank should be properly grounded for safety and to prevent damage from transient voltage surges.

Receiving, Handling and Storage

The switch should be examined as soon as possible after being received, as difficulty may be experienced in making a claim for damage not evident upon

receipt. Care should be used in unpacking to avoid damage to any parts. Clean off any dirt or particles of packing material that may have accumulated on the switch. Be sure that no loose parts are missing or left in the packing material. Two (2) wildlife protective boots for the insulator bushings are included in each carton and are recommended for optimal system performance.

The switch should be lifted at all times by the lifting bracket and not by the bushings.

Switches should be shipped and stored in the upright position. If the switch is not installed at once, it should be stored in a clean, dry location and kept in a vertical position. All switches are sealed and can be stored indefinitely in their original shipping carton. After a prolonged period of storage, it is advisable to check the oil level before placing in service.

Installation

Air-break isolating switches must be installed on the supply side of oil switches to provide a visible disconnect. Cutouts or fused disconnects are normally used for this purpose. Maintenance work should be undertaken only after maintenance personnel have established that the visible disconnects are open and the portion of the circuit to be worked on is grounded.

The CSD may be mounted directly to a pole, structure or cross arm. All CSD oil switches are provided with clamp type terminals on each bushing to accommodate wire sizes from No. 8 to 2/0 AWG. The switch cover may be rotated to place the bushings and operating handle in the most desirable position.

All CSD oil switches have a ground terminal located on the side of the tank. In all systems where a neutral or ground wire is carried through, it is recommended that the tank be solidly connected to the neutral wire as well as earth. In systems where a neutral or ground wire is not carried through, it is essential that all CSD tanks be connected solidly to earth.



CSD Series Oil Switch



Provision has been made in the mounting bracket for other ground terminal attachments as may be required. On the 120 VAC control circuit, the ground wire is identified as "B." A ground connection is required and a low voltage lightning arrestor, if not ordered as a built-in option, is recommended.

Operation

The operating mechanism is powered by a 120 VAC, 50/60 Hz, single-phase motor. The operating voltage range is 100 to 130 Volts. An optional 240 VAC, 50/60 Hz, single-phase motor provides an operating voltage range of 210 to 250 Volts.

The five-pin receptacle at the bottom of the motor housing mates with a five-pin molded or metal connector. The molded connector includes a six-foot 16/3 SO cable, reference Trinetics part number 33115400. The metal plug is an ITT/Cannon connector, part number MS3106F18-11S or equivalent that meets the MIL-C-5015 specification.

To operate the switch electrically, a close or open command (115 VAC) is placed on pin D or C of the connector on the bottom of the motor box (see wiring diagrams on page 8). The 115 VAC signal causes the motor to run, operating a mechanical linkage which causes a spring to be compressed. After a few seconds, this spring causes the over-center toggle mechanism to toggle. When this mechanism toggles, the compressed spring releases energy providing fast operating action on both make and break for long contact life. The motor runs until a microswitch interrupts the signal to the motor. At this time, the motor is ready to accept the next switching command.

Due to variables in the motor operating speed and components in the toggle mechanism, it is recommended that the close or open commands be applied to the respective pin for at least 10 seconds to insure complete travel of the motor cam. The microswitch internal to the motor housing will remove the power from the motor preventing any possible damage to the motor. If at any time, a switch or switches are opened manually, it (they) can be closed electrically; however, an open command must first be provided to the switch(es) to place the motor into the position to accept the close command.

Provisions are made to monitor the state of the switch via auxiliary switch contacts which are available as an option. This ground signal can be used to operate a counter or any other indicator device in the user's system.

In the event a momentary type switching command is desired, the CSD Series oil switch can be purchased with a "holding switch" option.

The motor-operated CSD oil switch can be operated manually by means of a handle located under the weather shield. When the handle is up under the weather shield, the contacts are closed; when the handle is all the way down, the contacts are open. The shaft of the handle has a one-way seal preventing moisture from entering the tank but allowing gases to escape from inside.

Note: *Do not force the handle to open or close the switch (normal force is less than 20 pounds). A loss of control power while the motor is operating could cause the operating cams to stop in a position that blocks the handle; thus excessive force on the handle could damage the mechanism. A motor-operated CSD switch should always be in a fully open or fully closed position before manual operation is attempted.*

Caution: *With this mechanism the operating handle is not directly connected to the contacts. Therefore, the handle must not be relied upon as a positive indicator of contact position. Loss of control power at or near dead-center position, damaged parts, or welded contacts could cause the handle to give an erroneous indication of contact position. After the switch is opened and before working on the equipment, visible disconnects on the source side of the switches must be opened and the equipment grounded.*

Maintenance

CSD oil switches require periodic inspection and maintenance if the maximum life of the device is to be realized. Frequency of inspection depends on the length of time in service, the number of duty operations and the load applied.

Inspection should be made once a year or every 1500 cycles, whichever occurs first. Careful visual inspection for detecting cracked porcelains, warped linings, damaged linkage, dirty oil or excessively eroded contacts is essential. A damaged switch should be withheld from service until repair or replacement can be made.

Contacts

The contact assembly consists of the four stationary fingers and a moving contact bar. If contact erosion is too severe for dressing, it is recommended that the mechanism assembly be replaced. The stationary contact spacing measured at the flat portion of the stationary contacts should be approximately ¼ inch.

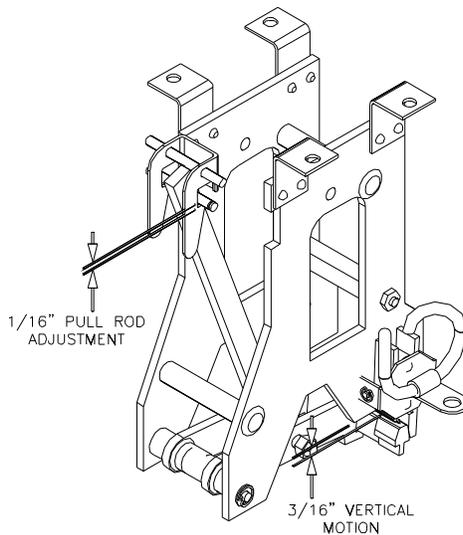
Contact Alignment

To check alignment, the switch should be in the upright-position. Move the manual operating handle to approximate the half-way position to further compress the main operating springs. Slowly push the moving contact bar up until it engages the tips of the stationary contacts.

Curved leading surfaces of the moving contact should engage all four stationary contacts at approximately the same time. Major misalignment is cause for service or parts replacement.

Latch Operation and Pull Rod Adjustment

Open and close the switch to insure that the latch inside the cover is engaging and releasing properly. Clearance between the latch surface and the underside of the pull rod pin should be approximately 1/16 inch. This should allow for approximately 3/16 inch vertical motion between the bottom of the side plate and the top surface of the moving contact when the latch is engaged. If vertical motion of the moving contact continues unrestricted when pulled open, this indicates the latch is not engaging and an adjustment to the pull rod is required.



Update Clearance and Pull Rod Adjustment

To adjust the pull rod, manually close the switch and push the moving contact to the fully closed position, stopping against the bottom of the side plates. Loosen the connection of the pull rod to the moving contact panels and place the pull rod in its full upward position (toward cover). This will cause the pull rod pin to engage the latch. Retighten the connection of the pull rod to the moving contact panels and recheck for approximately 3/16 inch vertical motion as noted previously.

Bushings

The bushings are porcelain and filled with oil. When removal of the bushing from the switch is necessary, the gaskets should be replaced. Outside surfaces of the bushings should be cleaned periodically depending on atmospheric conditions and load applied.

Insulating Oil

The CSD oil switch is supplied with mineral oil of high dielectric strength containing no PCB elements.

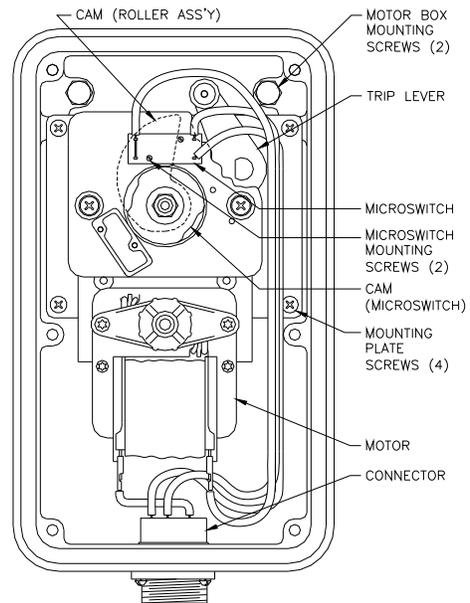
A representative number of switches on a given system should be checked yearly until adequate field experience is obtained on the life of the oil. When required, it is recommended that the old oil in the switch be replaced to maintain the proper dielectric strength. The used oil may be poured into a storage drum for later filtering.

The tank liner should be cleaned and the tank bottom insulator replaced prior to adding the new insulating oil. The oil level should be approximately 1½ inches from the top of the tank before lowering the switch into the tank.

Note: Install a new cover gasket O-ring (P.N. 33056100) into the groove in the cover before assembling to the tank.

Motor Housing Assembly

The motor housing assembly which houses the motor, gearing and control switch is mounted at the front of each motor-operated switch.



Motor Housing Assembly



Note: Before energizing, make certain that the housing is grounded and the circuit ground is connected to the “B” lead.

To inspect the housing assembly, remove the six cover screws and the cover. No internal adjustments or settings are required. The motor housing assembly may be replaced by first removing the four (4) screws from the mounting plate that attaches to the motor. Remove the two (2) screws that hold the microswitch mounting plate to the motor. Remove the two (2) wires from the motor terminals and remove the motor. Loosen the #8 setscrew on the trip lever and pull the trip lever off of the end of the shaft. Remove the two (2) ¼-20 screws near the top of the motor housing and pull the motor housing off.

The microswitch can be replaced by removing the two (2) mounting screws and unsoldering the two wires from the connector. When installing a new microswitch, care must be taken to insure that the wires are soldered to the correct connector terminals. Wire from switch terminal 1 is to be soldered to connector terminal C and wire from switch terminal 4 is to be soldered to connector terminal D.

The connector can be replaced by removing four (4) rivets and unsoldering wires from terminals B, C and D. When installing a new connector, care must be taken to solder wires to correct terminals as noted above for the microswitch.

The motor and gear train do not require lubrication under normal operating conditions. Apply a silicone grease, MIL-G-23827B or equivalent, to the roller assembly, cam and short bearings when the unit is undergoing shop service or maintenance.

Renewal Parts

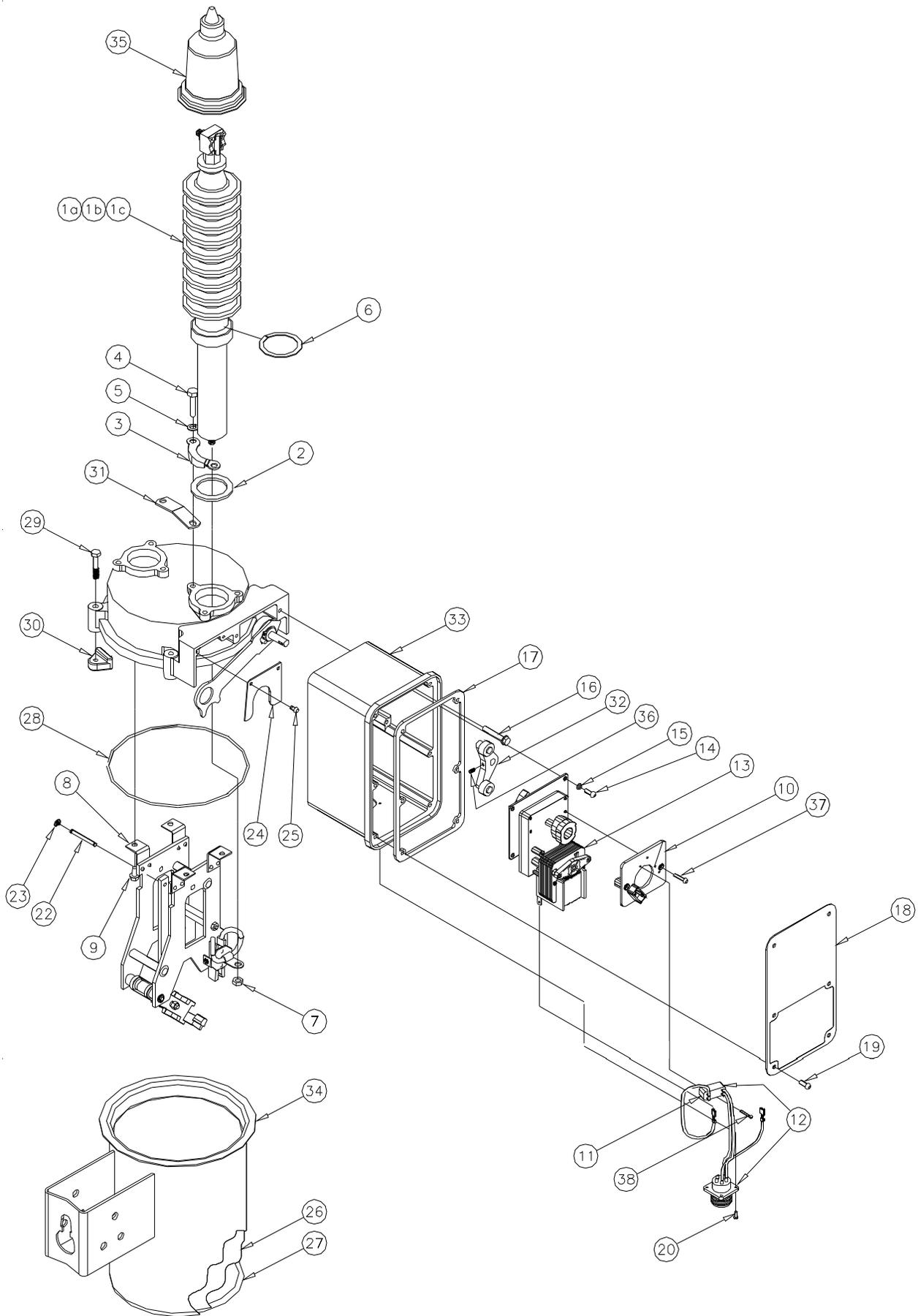
Order renewal parts from Trinetics specifying the part number, quantity, description of the part and complete nameplate data of the switch. Renewal parts furnished may not be identical with the original parts as design improvements are made from time to time.

Warranty: The seller warrants that its products shall be free from defects in workmanship and material for a period of one year from date of shipment and that its responsibility is limited to repair or replacement, at its sole discretion, of the defective part(s). The seller shall not be liable for consequential damages or related costs. The foregoing warranty is exclusive and in lieu of all other warranties of quality whether written, oral or implied, including any warranty of merchantability or fitness for purpose.



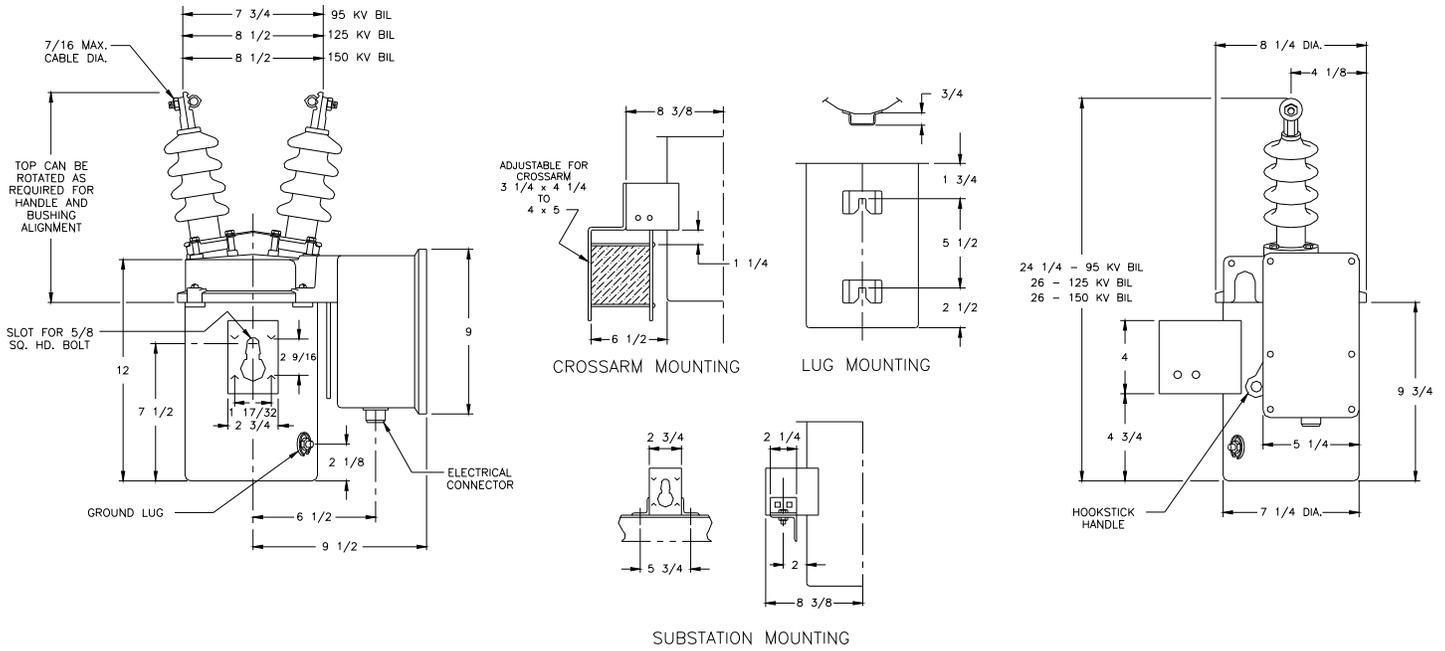
Specifications	CSD		CSD 20	
Rated Maximum Voltage, kV RMS	15.0		20.0	
Nominal Voltage Class, kV RMS	14.4		19.9	
Impulse Withstand Voltage, kV BIL	95/125		125/150	
Low Frequency Insulation Level Withstand Test, 60 Hz:				
1 Minute Dry, kV	35/45		45	
10 Seconds Wet, kV	30/40		40	
Continuous Current, Amps	200		90	
Capacitive Switching Current, Amps	200		90	
Momentary Current Rating, Amps Asymmetrical	9000		9000	
Short Time Current Ratings:				
½ Second, Amps Symmetrical	6000		6000	
1 Second, Amps Symmetrical	4500		4500	
High Frequency Transient Making Current, Amps Peak	12000		12000	
Nominal Operating Voltage, VAC 50/60 Hz	120	(240)	120	(240)
Operating Voltage Range, VAC 50/60 Hz	100 to 130	(210 to 250)	100 to 130	(210 to 250)
Motor Current Rating, Amps	2.8	(1.4)	2.8	(1.4)
Switch Operating Time, Seconds (Average/Max.)	2.5/4.0		2.5/4.0	
Weight with Oil, Pounds	37		39	
Oil Volume, Gallons	1.5		1.5	



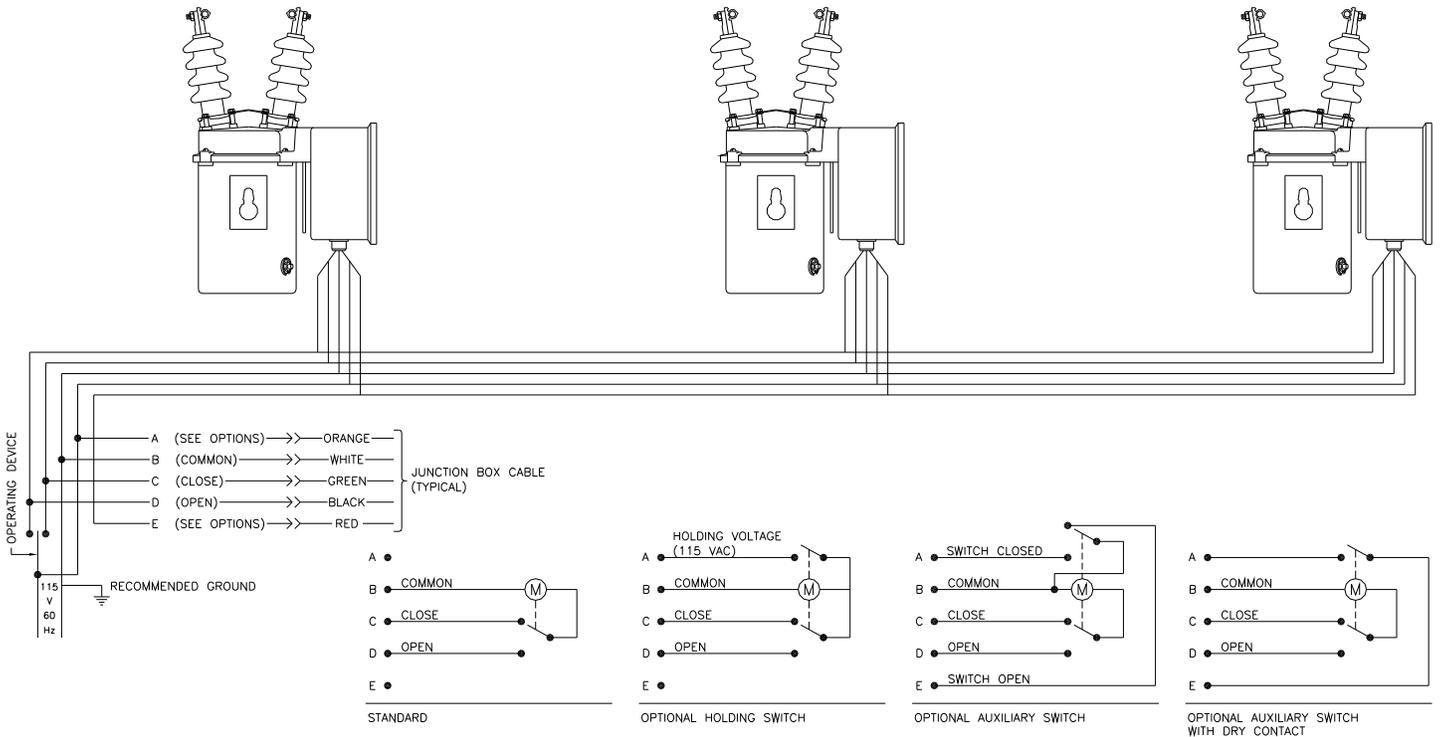


CSD SERIES PARTS LIST

Item	Part No.	Quantity per Switch	Description
1a	33078700	2	Assembly - Stud Bushing (95 kV BIL)
1b	33193000	2	Assembly - Stud Bushing (125/150 kV BIL)
1c	33159900	2	Assembly - Stud Bushing (150 kV BIL)
2	33056700	2	Gasket - Bushing
3	33060300	6	Retainer - Bushing
4	92078122	6	Hex Head Cap Screw 5/16 - 18 x 1 3/8
5	92630601	6	Split Lockwasher 5/16
6	33056800	2	Washer - Retainer
7	92280602	2	Hex Nut 5/16 - 24
8	33061500	1	Assembly - Mechanism
9	93108408	4	Hex Washer Head Screw 1/4-20 x 1/2
10	33182800	1	Mounting Plate - Switch
11	33061700	1	Microswitch
12	<i>consult factory</i>	1	Assembly - Microswitch and Connector (Includes 11)
13	<i>consult factory</i>	1	Assembly - Motor Group (Includes 10 and 37)
14	91924108	4	Screw #10-32 x 1/2
15	92620404	4	Split Lockwasher #10
16	91938124	2	Hex Washer Head Screw 1/4-20 x 1 1/2
17	33060200	1	Gasket - Motor Housing
18	33225601	1	Cover - Motor Housing
19	91924108	6	Screw #10-32 x 1/2
20	33235000	4	Rivet, 3/32 dia.
21	-	-	-
22	33058900	1	Pin - Pull Rod
23	31165900	2	Retaining Ring
24	33058100	1	Cover - Weather Shield
25	91914106	2	Screw #8-32 x 3/8
26	<i>consult factory</i>	1	Liner - Tank
27	33174800	1	Insulator - Tank Bottom
28	33056100	1	Gasket - Cover (O-ring)
29	92058124	4	Hex Head Screw 1/4-20 x 1 1/2
30	33124900	4	Clamp - Cover
31	33059100	1	Lifter Bar
32	33157300	1	Assembly - Trip Lever
33	<i>consult factory</i>	1	Assembly - Motor Housing (Includes 12, 17 and 20)
34	33136600	1	Assembly - Tank
35	33225400	2	Wildlife Protective Boots
36	92411206	1	#8 Setscrew
37	92024412	2	Screw #8-32 x 3/4
38	33182500	2	Screw #3-48 x 3/4



Outline dimensions for the CSD Series oil switch depicting pole, lug, cross arm or substation mounting.
All drawing dimensions are in inches.



Standard configurations and wiring for the CSD series oil switch.
 Consult factory for other configurations and wiring diagrams.

Trinetics, a division of Maysteel LLC • N88 W13901 Main Street • Menomonee Falls, WI 53051
Phone 877-219-9728 • Phone 262-251-1632 • Fax 262-251-0069 • Visit us at trinetics.com

