

BONDERITE®

E-CO Level Control,
120 VAC, One, Two, Three, and Four Points

Operating Manual



Henkel

Table of Contents

1	Please Observe the Following.....	1
1.1	Emphasized Sections	1
1.2	For Your Safety	1
1.3	Unpacking and Inspection.....	2
1.4	Items supplied.....	2
1.5	Features.....	2
2	Description	3
3	Technical Data.....	4
3.1	Utilities.....	4
3.2	E-CO Level Control Unit Overall & Mounting Dimensions.....	4
3.3	General Arrangement.....	5
4	Installation	6
4.1	Electrical	7
4.2	Air Probe.....	8
4.2	Solenoid Valves.....	9
5	Operation.....	10
5.1	Indicator Light – color and function	10
5.2	Adjusting Master Air Pressure Switch.....	10
5.3	Adjusting Regulator Pressure on Master Level Control.....	11
5.3	Adjusting Flow Regulator	11
5.4	Adjusting Air Differential Pressure Switch for Level.....	13
5.5	One Point Level Control for Low Level Shut-Off for Drums, Totes, or Day Tanks.....	14
6	Troubleshooting	15
7	Care and Maintenance	16

7.1	Master Air Pressure Switch	16
7.2	Master Air Pressure Regulator/Filter	17
7.3	Flow Regulator	17
7.4	Differential Pressure Switch	18
8	Accessories and Spare Parts	19
9	Diagrams.....	20
9.1	2251341 REV - E-CO Level MSTR 1 PT - electrical.....	20
9.2	2250048 REV - E-CO Level STD 1 PT - electrical.....	20
9.3	2251340 REV - E-CO Level MSTR 2 PT - electrical	21
9.4	2251339 REV - E-CO Level STD 2 PT - electrical.....	22
9.5	8907225 Master Level Control Three Point - electrical.....	23
9.6	8907224 Standard Level Control Three Point - electrical	24
9.7	8907227 Master Level Control Four Point - electrical	25
9.8	8907226 Standard Level Control Four Point - electrical.....	26
9.9	Level Control Standard and Master Installation Drawing 8907228.....	27
10	Warranty.....	28

1 Please Observe the Following

1.1 Emphasized Sections

Warning!

Refers to safety regulations and requires safety measures that protect the operator or other persons from injury or danger to life.


Caution!


Emphasizes what must be done or avoided so that the unit or other property is not damaged.

Notice:

A notice gives recommendations for better handling of the unit during operation or adjustment as well as for service activities.

1.2 For Your Safety


 For safe and successful operation of the unit, read these instructions completely. If the instructions are not observed, the manufacturer can assume no responsibility.


 Do not expose the connecting cable to heat, oil, or sharp edges.


 Make sure the Unit is securely mounted in an operator accessible area.

 Use only original equipment replacement parts.

 Do not operate the Unit if it has damage.

 Always disconnect the power supply before servicing the unit.

 Observe general safety regulations for the handling of chemicals such as Bonderite® products. Observe the manufacturer's instructions as stated in the Safety Data Sheet.

 While under warranty, the unit may be repaired only by an authorized Henkel service representative.

1.3 Unpacking and Inspection

Carefully unpack the Bonderite® E-CO Level Control and examine the items contained in the carton. Inspect the unit for any damage that might have occurred in transit. If such damage has occurred, notify the carrier immediately. Claims for damage must be made by the consignee to the carrier and should be reported to the manufacturer.

1.4 Items supplied

- 1.4.1 E-CO Level Control
- 1.4.2 Equipment Manual, 8905238
- 1.4.3 Standard & Master Level Control Installation drawing 8907228

1.5 Features

- 1.5.1 E-CO Level Control MSTR – Master Level Control has air filter/regulator
- 1.5.2 E-CO Level Control MSTR – Master Level Control has master pressure switch for 8 to 25 psig.
- 1.5.3 Air differential flow regulator
- 1.5.4 differential pressure switch(s)
- 1.5.5 Circuit Breaker, internal, 5 Ampere
- 1.5.6 Indicator lamps

2 Description

The Bonderite® E-CO Level Controls are used to maintain liquid levels in operating chemical tanks. Working on factory air supply, these controls offer a fail-save technique of solution level control accurate within +/- ¼ inch.

- Each level control can be supplied in multi-point configurations for customized applications.
- The system is not affected by agitation in the tanks or by corrosive action of the contents. No ball floats, needle valves or hazardous electrodes are utilized. Only the chemically resistant air probe is in direct contact with the process solution.
- Batch operation may be accomplished by utilizing the "High-Low" option. A measured amount of liquid may be added, and chemical additions and/or agitation then provided. After chemical reaction, the vessel may then be emptied and the process repeated.
- Automatic tank heater and pump protection may also be controlled by the "High-Low" option.

Common Uses:

- Water Tank Level
- Liquid Process Tank Level
- E-Coat Paint Tank Level
- Dilution of Liquids by Volume
- Sump Pump Operation
- Emergency Low Level Alarm
- Chemical Bulk Tank and Day Tank
- Dirty Screen Alarm

Benefits:

- Provides reliable, accurate, simple and safe liquid level control.
- Eliminates Operator errors that result in dangerous and costly low levels or unnecessary overflows that often result in lost production.
- Assures an adequate and consistent concentration of operating chemicals when used as part of a Henkel Automatic Process Control System, aiding in uniform quality of coating and treatment.
- Saves in unnecessary use of water and excess manpower usage to perform the consistent checking and adjusting of solution levels.

The level is maintained by detecting slight variations in air pressure due to changes in the liquid level surrounding an immersed air probe. Immersion depth is typically a minimum

of 6" vertical immersion into the process solution. A properly mounted level control is affected little by wave motion and maintains liquid levels within ¼" at a depth of 1.5 to 5 inches. It is operated by purging a low volume of air (≈ 0.8 cu ft/hr). Clean plant air range of 30 to 150 psi must be supplied to the master pressure regulator of the system. A low air pressure switch, filter regulator, pressure regulator and gauge are incorporated into the master level control assembly. Each master assembly includes a circuit breaker, master pressure switch, and at least one point of level control. A shutdown or loss of sufficient plant air will cause an automatic shutdown of the Henkel Level Control System electrical circuit. The loss of plant air may easily be alarmed by a warning signal which can be supplied as an option.

The electrical and pneumatic components are housed in an enclosure. Each level control uses at least one flow control to limit the air volume used and a micro switch to sense the set-point and operate the load circuits.

3 Technical Data

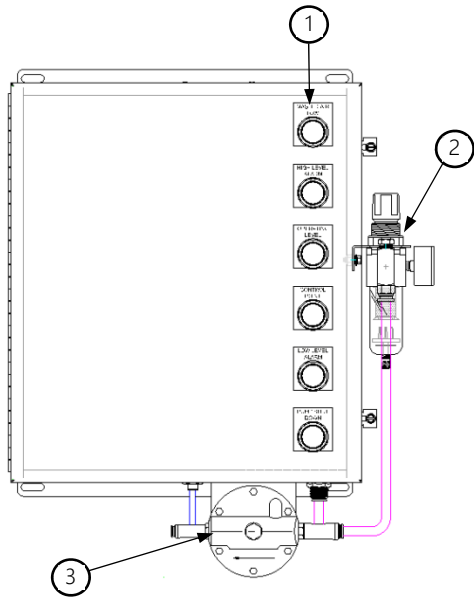
3.1 Utilities

Operating voltage : 110...120 VAC 50/60 Hz
 Air Supply to Master : 30...150 psig, clean shop air
 Air Flow Regulation : 0.9...2.1 SCFH

3.2 E-CO Level Control Unit Overall & Mounting Dimensions

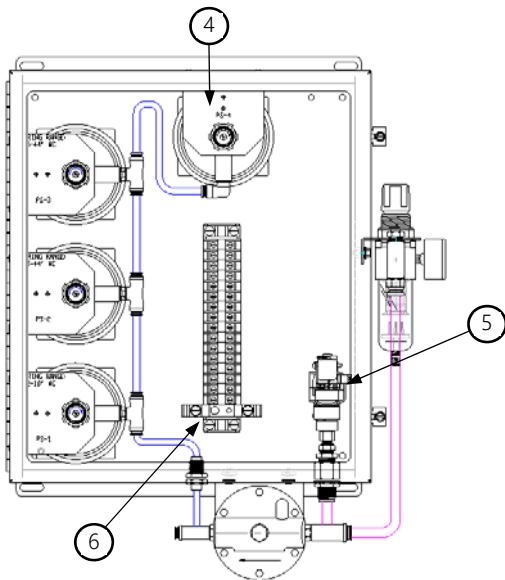
Level Control	Part Number	Overall W x H x D	Mounting W x H	Mounting Hole
E-CO Level MSTR 1 PT	2251341	11.7 x 14.8 x 7.0	6.5 x 10.75	0.31 x 0.94 slot
E-CO Level STD 1 PT	2250048	9.1 x 14.8 x 7.0	6.5 x 10.75	0.31 x 0.94 slot
E-CO Level MSTR 2 PT	2251340	13.6 x 16.8 x 7.0	8.5 x 12.75	0.31 x 0.94 slot
E-CO Level STD 2 PT	2251339	9.1 x 14.8 x 7.0	6.5 x 10.75	0.31 x 0.94 slot
Master Level Control 3 PT	8907225	17.5 x 20.8 x 7.0	12.5 x 16.75	0.31 x 0.94 slot
Standard Level Control 3 PT	8907224	15.1 x 20.8 x 7.0	12.5 x 16.75	0.31 x 0.94 slot
Master level Control 4 PT	8907227	17.5 x 20.8 x 7.0	12.5 x 16.75	0.31 x 0.94 slot
Standard level Control 4 PT	8907226	15.1 x 20.8 x 7.0	12.5 x 16.75	0.31 x 0.94 slot

3.3 General Arrangement




Depicted is a four-point master level control unit to show the general arrangement of the level control system features. Configurations and numbers of components will vary based on level controller model.


1. Indicator lights (lined up vertically)
2. Master Pressure Regulator (Master Level Controllers ONLY)
3. Flow Regulator
4. Differential Pressure Switch
5. Master Pressure Switch (Master Level Controllers ONLY)
6. Circuit Breaker & Electrical Terminal Blocks



4 Installation


 Before using the equipment for the first time check it carefully for signs of external damage. If any shipping damage is found DO NOT USE THE EQUIPMENT – return it to your supplier immediately.

A simple Henkel Level Control System would consist of a Master Level Control Assembly (required) on the first process tank, with each subsequent tank utilizing a Standard Level Control Assembly. Each tank would require its own individual normally closed water solenoid valve.

 With the use of multiple standard level control units; the master level control should be centrally located between standard units to minimize regulated supply air tubing length.

Installation of the level control system should be arranged by the purchaser and generally involves the following:

1. Mount the level control assembly.
2. Plumb the solenoid valve (available from Henkel Corporation) to desired water supply line.
3. Install the immersion air probe, typically 1" pipe (supplied by others).
4. Install plant air shut-off valve and connect plant air to the Master Level Control.
5. Install ¼" tubing, (supplied by others) from Master Control Regulator to all other Standard Level Controllers.
6. Install ¼" tubing (supplied by others) to all immersion probes.
7. Connect 120 VAC power to the Master Level Control and to downstream Standard Level Controllers.
8. Electrically connect the solenoid valve(s) to respective level controllers.

 Refer to the installation drawing at the end of section 10 of this manual for further installation details of the Level Control system.

Use with Henkel Automatic Process Control Systems.


If the Master Level Controller is being used in conjunction with a Henkel Automatic Control System, the power to the Master and Standard Level Controllers may be

supplied from the Automatic Control System Panel. Since all Henkel Automatic Control Systems are custom designed to meet specific customer needs, terminal wiring will vary. Please consult the system print package supplied to your company.

4.1 Electrical

Input Power Wiring

 Wiring the Level Control units must be performed by qualified personal.

 Refer to the level control wiring diagrams in Section 10 of this manual for wiring connections of the Level Control model to be installed.

The 120 VAC line, neutral, and ground wires are connected to the Master Level Control L1, N, and Ground terminals respectively. Power to the Standard Level Controls is supplied from the Master Level Control by “daisy chaining” and wiring the downstream controllers in parallel to terminals 2 and N in the Master Level Control.

Load Wiring

Each level control units have 1 to 4 pressure switches to control separate loads.

Terminal connections vary based on the unit being wired:

The single point controllers, the first “Load” (e.g. solenoid valve) is connected to terminals 4 and N.

The two and three point level controllers; the first “Load” is connected to terminals 6 and N, the second “Load” is connected to terminals 4 and N, and the third “Load” is connected to terminals 7 and N.

The four point level controllers; the first “Load” is connected to terminals 10 and N, the second “Load” is connected to terminals 6 and N, the third “Load” is connected to terminals 4 and N, and the forth “Load” is connected to terminals 7 and N.

4.2 Air Probe

Supplier

The immersion air probe, is to be supplied by the customer or installation contractor.

Diameter and Length

The immersion probe shall be at a minimum 1" NPT pipe and be of sufficient length to extend 6" below the minimum liquid level test point.

Material

The probes should be the same material as the treatment tanks.

Mounting

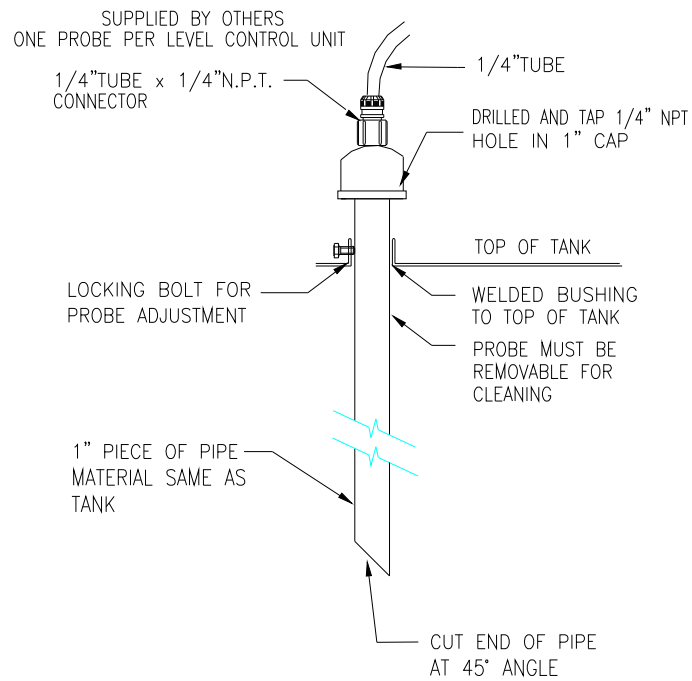
The air probes may enter from the top or side of the process tank. If entering from the side the top of the probe should be 6" below that minimum desired liquid level of the process tank. Installation should ensure that the probes remain firmly in place and be removable for cleaning if needed. Ensure that no overhead interferences are present so the probes may be fully removed vertically.

If the process tank accumulates sludge, the tip of the immersion probe must be at least 2" above the maximum expected sludge level.

Tubing Runs and Fittings

Tubing ($\frac{1}{4}$ ") is to be run by the installer from each controller to the respective level control immersion air probe. The tubing shall not be longer than 15 feet and must not have more than (4) four 90-degree bends. Each probe must be equipped with a $\frac{1}{4}$ " compression tube fitting for attaching the tube from the level controller. Tubing is typically copper or polyethylene. The fittings should be brass or polypropylene when used in corrosive atmospheres.

Level Control Probe Details



4.2 Solenoid Valves

Solenoid valves are electrically activated by the Henkel Level Control installed at each tank to maintain the desired level. A "Y" strainer shall be installed in the upstream side of the solenoid valve, and the discharge of the valve should not protrude below the liquid level of the tank. Valve construction should always be governed by the liquid passing through it. City water uses brass, De-ionized water or acidic material requires stainless steel or plastic.


5 Operation

5.1 Indicator Light – color and function

Indicator lights table below provides the list of which level control units have the indicator light. The list is in order of how the indicator lights appear on the level control panel. Top of the list is top of the panel; bottom of the list is bottom of the panel. List also shows the which level control units have the indicator light. Only master level control units have the Master Air Level pressure switch and indicator light. Standard level control units do not have this feature.

Indicator Label	Indicator Color	Indicator ON when	1 PT Level	2 PT Level	3 PT Level	4 PT Level
Mater Air Low	Red	no or low air out of regulator	X*	X*	X*	X*
High Level Alarm	Red	high level condition			X	X
Operating Level	Green	at operating level	X	X	X	X
Control Point	Amber	filling	X	X	X	X
Low Level Alarm	Red	low level condition		X	X	X
Pump Shut Down	Red	pump (or heater) shut down – server low level condition				X

* only Master Level Control units have a Master Air Low indicator and internal pressure switch. Standard Level Controls do not have the Master Air Low indicator.

 Two-point level control unit can be reconfigured as a special for operations requiring a “Control Point” and “High Level Alarm”. Inquire about this option with your Henkel representative.

5.2 Adjusting Master Air Pressure Switch

The master air pressure switch changes state based on the set and reset point adjustment. The pressure switch is adjustable from 8 to 25 psig. The set and reset points have a fixed difference of 1.8 psig.

! Adjustment of this pressure switch should be made with the power off and appropriate lock-out tag-out measures.

The adjustment is made using the adjustment wheel located in the center of the pressure switch. Approximate pressure setting can be determined by the markings on the pressure switch calibration scale. Adjustment of the setting is made by turning the wheel clockwise and counterclockwise.

A more accurate setting of the pressure switch can be made using a multi-meter.

- Set the multi-meter to continuity or resistivity and connect the probes to terminals 1 and 2 of the level control.
- Adjust the indicator toward the pressure connection or beyond the desired pressure set point by turn the adjustment wheel clockwise.
- Start with the regulator adjusted to zero. Multi-meter should have continuity or read 0 ohms.
- Adjust the regulator until the pressure gauge reads the desired set point of the pressure switch.
- Turn the adjustment wheel counterclockwise until the switch actuates. Multi-meter should not have continuity or read open circuit (infinite ohms).
- Adjust the regulator to lower the pressure until the switch actuates on from the decreasing pressure. Multi-meter should have continuity or read 0 ohms.
- For a more precise pressure setting; increase and decrease pressure setting to cycle the pressure switch a few times while making fine adjustments with the pressure switch wheel.

5.3 Adjusting Regulator Pressure on Master Level Control

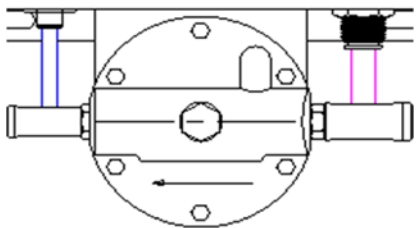
Each Master Level Control has a pressure regulator with filter mounted on the side of the enclosure. A 0...30 psig gauge provides pressure reading of the regulator outlet to the level controller flow regulators. Outlet pressure must be at least 5 psig greater than the maximum downstream pressure from the flow regulator.

5.3 Adjusting Flow Regulator

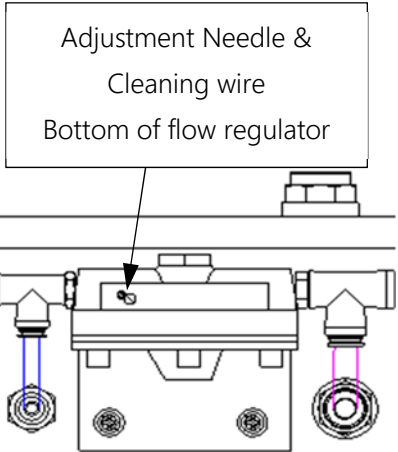
With supply air pressure on adjust the needle valve to produce the desired bubble rate. The bubble rate is dependent on the volume of air in the system and fluid

level responsiveness. The minimum flow rate of 0.9 SCFH (adjusting screw seated) can be satisfactory.

If the process tank can have rapid level fluctuations and/or there is much air volume in the system, the 0.9 SCFH may not have the desired speed of response. Increasing the bubble rate produces quicker responsiveness to the process tank level changes. When looking at the level control panel, the flow regulator adjusting screw is located on the bottom of the flow regulator assembly closest to the outlet. Other screw next to it is a cleaning wire, furthest from the outlet, is to the right of the adjusting needle.




Front of Level Control



Bottom of Level Control


Bubble Rate	Adjusting Needle
Increase	Counterclockwise
Decrease	Clockwise

It may take a couple of adjustments when setting the flow regulator to maintain a minimal bubble rate with an acceptable response to process tank level changes.

 Supply pressure to the flow regulator must be at least 5 psig greater than the maximum downstream pressure.

5.4 Adjusting Air Differential Pressure Switch for Level


The Henkel Level Controllers have one to four internal differential pressure switches, depending on model. Adjustment of the differential pressure switch set points are done the same. Internal springs of the pressure switches may vary for different process tank level depths.

 Consult with Henkel prior to modifying the internal springs. Springs may need to be replaced in one or more of the pressure switches to achieve the low or high level operations as required.


Differential pressure switches are not preset for specific process tank level control. The level settings must be performed on-site to ensure proper operation.

If present, remove the cover from the center of the differential pressure switch diaphragm housing. Slotted 10-turn adjusting screw will be visible.


- Clockwise rotation of the adjusting screw will increase the switch point; raise the process tank level.
- Counterclockwise rotation of the adjusting screw will decrease the switch point; lower the process tank level.

 **Before adjusting the differential pressure switches; the level control air probe must be installed and the bubble rate set.**

The process tank should be filled and drained manually during the level set point adjustment for each differential pressure switch. On recirculating tanks the settings should be based on the level obtained when the pump is running. The minimum level setting must be high enough to cover heating coils, and the maximum level setting must be low enough to prevent overflow when the pump is stopped.

 **Start adjustments with the differential pressure switch with the lowest fluid level setting. Work upward towards the pressure switch with the highest fluid level setting.**

Adjust the Level Set Point (General Procedure)


1. Turn the adjustment screw clockwise until seated.
 2. Turn the adjustment screw counterclockwise 5 complete turns.
 3. Fill tank to desired switch level (with recirculating pumps on, if present).
 4. Turn adjustment screw slowly until the lamp changes state:
 - a. If indicator is ON turn the adjustment screw slowly clockwise.
 - b. If indicator is OFF turn the adjustment screw slowly counterclockwise.
-  The "Green" and "Amber" indicators are on the Control Point switch. When one is ON the other is OFF. Adjusting the screw will toggle both lights.
5. Turn adjustment screw slowly in the opposite direction to change the indicator state back.
 6. Perform number 4 and 5 a couple times stopping with the indicator just turning OFF. For the Control Point switch, "Green" indicator will be ON and "Amber" indicator will be OFF.
 7. Check switch point by adjust the tank fluid level down and up to change indicator state. Note tank levels at the indicator state changes.
 8. For fine tuning switch point level, repeat steps 3 through 7.
 9. Repeat process for next highest process tank level.

5.5 One Point Level Control for Low Level Shut-Off for Drums, Totes, or Day Tanks


One point level control can be used with drums, totes, or day tanks for low level shutoff of mixers or pumps. The bottom of the probe should be located 1" up from the bottom of the container. The level control adjustment screw should be turned full counterclockwise.

Use tubing in place of the immersion air probe when inserting into drums due to the small drum openings. The tubing needs to be securely fastened to the foot valve assembly for the chemical feed pump prior to insertion.

6 Troubleshooting

 Before proceeding with any repair or maintenance operation disconnect and turn off electric and air supplies from the equipment, and discharge any stored energy.


Type of Malfunction	Possible Causes	Correction
No Bubbles Out of Air Probe	Main Air Supply Off	Turn on Main Air Supply
	Master Regulator pressure output too low	Check filter bowl for fluid – drain and clean
		Check filter and clean if necessary
		Adjust Master Regulator Pressure Higher
	Air lines blocked	Remove blockage
	Air lines collapsed	Replace air line
	Flow regulator blocked	Verify Master Regulator pressure setting – adjust if needed
Clean needle passage of flow regulator with cleaning wire		
Indicators not turning ON	No Power	Turn on power
	Tripped Circuit Breaker	Inspect loads and wiring for damage or short circuit – repair or replace any failed components before resetting circuit breaker.
	Blown Bulb	Replace Bulb
Differential Pressure Switch not switching	Set Point not set for proper fluid level	Adjust Set Point
	Switch Failed	Replace Switch

 Before proceeding with any repair or maintenance operation disconnect and turn off electric and air supplies from the equipment, and discharge any stored energy.

7.1 Master Air Pressure Switch

Ensure proper operation of the pressure switch, periodically cycle the switch by adjusting the air pressure.

Make sure pressure switch external surfaces are clean and free from foreign matter, corrosion, or other contamination.

 The master pressure switch is not a field repairable item. The entire pressure switch must be replaced if damaged or not functioning.

Causes of improper operation

- Incorrect electrical connection: check leads to switch. Be sure the leads are properly connected. Switch is marked NO for normally open, NC for normally closed, and C for common.
- Faulty Control Circuit: check the electrical power supply to the switch. Check for loose or blown fuses, open-circuited or grounded wires, loose connections at switch. See nameplate for electrical rating and range.
- Incorrect pressure: check pressure in system with suitable pressure gauge. Pressure must be within the range specified on nameplate.
- Incorrect Adjustment: check pressure scale to see approximate setting. Refer to section on Set Point Adjustment of Fixed Deadband Pressure switch.
- External Leakage or Snap Switch Failure: Replace pressure switch, see Ordering information.
- Excessive Vibration or Surges Causing Switch to Operate Undesirably: Check for pressure fluctuations in system and install pressure surge suppressor. Check switch mounting and be sure there is no excessive vibration.

If the operation of the pressure switch cannot be corrected by the above means, it should be replaced.

7.2 Master Air Pressure Regulator/Filter

Regulator

Loss of pressure or erratic regulation is due to dirt in the disk area of the regulator.

To clean the disk area, shut off and depressurize air then disassemble the regulator. Use household soap to clean the parts and use compressed air to blow out the body.

When reassembling, disc stem must fit into the diaphragm assembly center hole. Make sure the disk assembly is firmly in place. The cage should be tightened to approximately 50 inch/pounds (5.65 Newton meters) of torque.

Filter and Filter Cleaning

The filter must be kept clean to avoid excessive pressure drop and maximizing filtering efficiency. Bowl drainage is important. Make sure the bowl is kept drained. Excessive pressure drop is a sign that the filter may need cleaning. If the filter has a visible condensate or dirt on the surface, cleaning is necessary.

It is not necessary to remove the filter from the line for cleaning. Before disassembly, turn off air supply and depressurize the filter. Use household soap to clean the plastic bowl. Use alcohol to clean all other filter parts and element. Blow out the filter body and blow out the filter element from the inside before reassembly.

! *Clean metal bowl and sight glass only with household soap. Do not use denatured alcohol.*

7.3 Flow Regulator

The rate of bubbles from the flow regulator can be expected to remain constant over a long period. Any change in the bubble rate would most likely be caused by partial clogging of the needle valve and can easily be corrected by screwing the valve in, then resetting to the desired flow rate.

If there is sever clogging due to excessive dirt in the air supply line, it may be necessary to remove the needle valve for thorough cleaning. First try cleaning the blockage by removing the needle and use the cleaning wire (located next to the

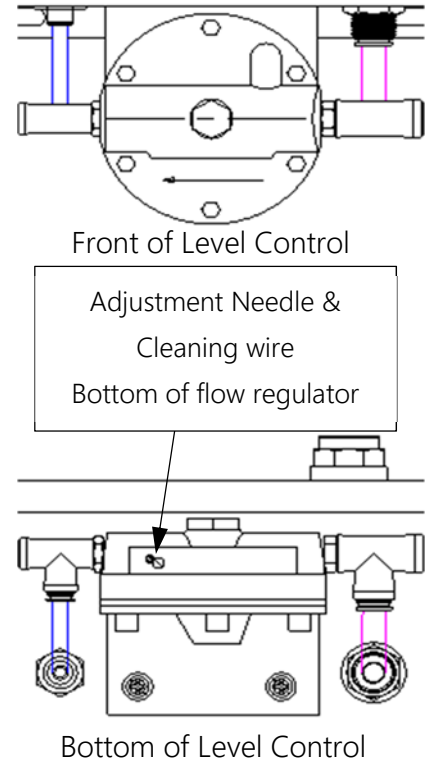
needle) to clean the needle port. Replace the needle and reset the desired flow rate. See image to right for location of cleaning wire.

If the clog persists, it may be necessary to perform a thorough cleaning.

No lubrication of any sort is required for the flow regulator.

When disassembling the unit, make sure all parts are clean and free of dirt and debris. Reassembly is in the reverse order of disassembly. Make sure not to damage the O-rings and diaphragm when reassembling the unit.

⚠ Before any service to the system, turn off power and air supply. Discharge any stored air.



7.4 Differential Pressure Switch

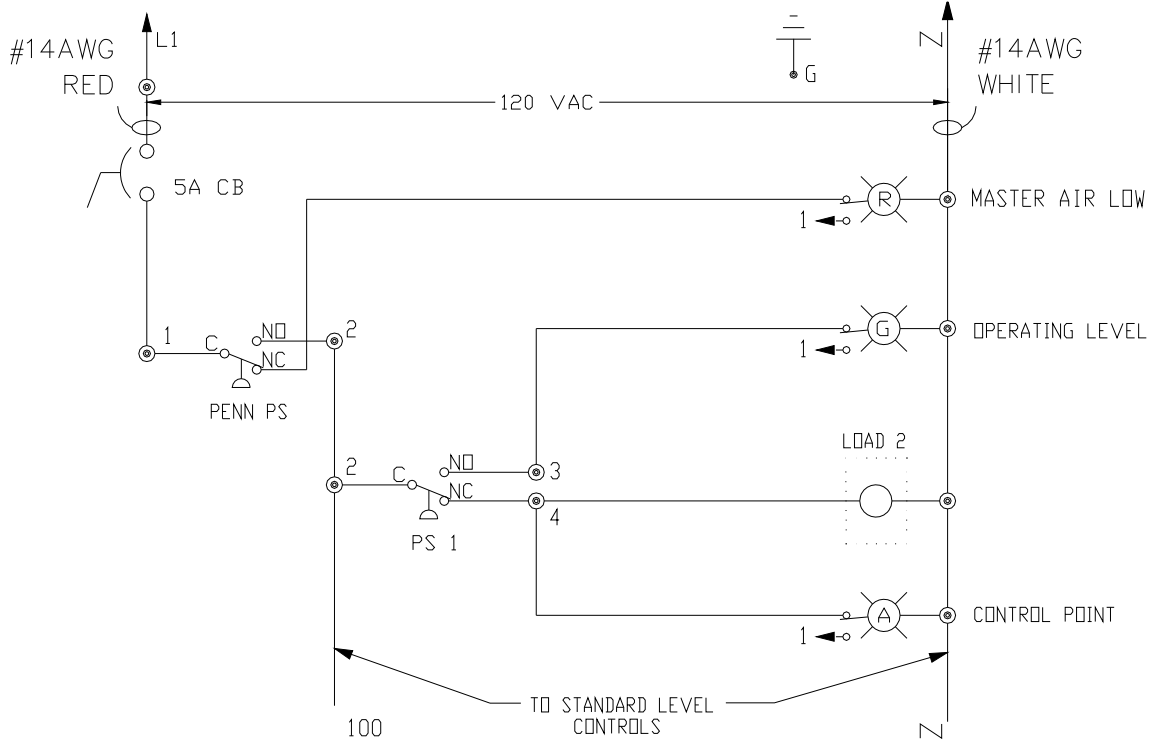
The differential pressure switch has an internal spring that can be replaced to change the fluid level switch point adjustment range, if necessary. Otherwise, the differential pressure switch is a non-serviceable item and should be replaced if it is not functioning.

8 Accessories and Spare Parts

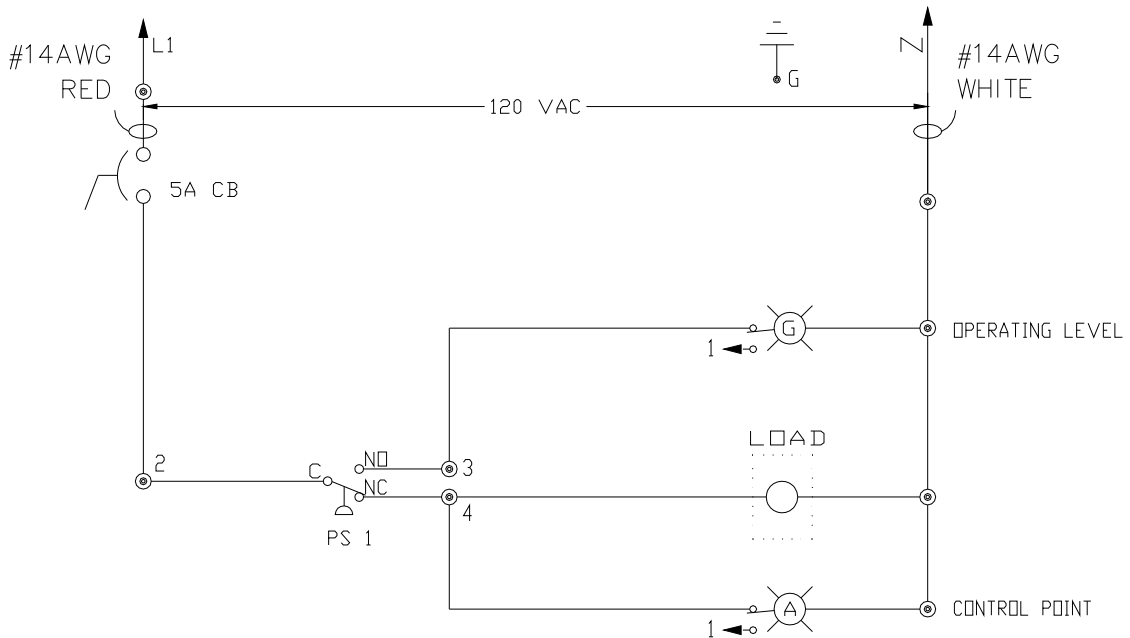
Part Number	Description	Operating range, Inches W.C.	Approximate Dead Band at MIN. Set point	Approximate Dead Band at MAX. Set Point
8907229	Level Control, Air Flow Pressure Switch, Differential	-	-	-
-	Not Specified Spring Color, Air Flow Pressure Switch, Differential	0.15 to 0.5	0.05	0.05
8907229-0	Blue Spring, Air Flow Differential Pressure Switch	0.15 to 0.5	0.06	0.06
8907229-1	Red Spring, Air Flow Differential Pressure Switch	0.3 to 1.0	0.08	0.08
8907229-2	Brown/Copper Spring, Air Flow Differential Pressure Switch	0.5 to 2.0	0.10	0.12
8907229-5	Yellow Spring, Air Flow Differential Pressure Switch	1.5 to 5.0	0.14	0.28
8907229-10	Green Spring, Air Flow Differential Pressure Switch	2.0 to 10.0	0.18	0.45
8907229-20	Dark/Black Spring, Air Flow Differential Pressure Switch	3.0 to 22.0	0.35	0.70
8907229-40	Orange Spring, Air Flow Differential Pressure Switch	5.0 to 44.0	0.56	1.10
8907229-80	Silver Spring, Air Flow Differential Pressure Switch	9.0 to 85.0	1.30	3.0
E22DL120W-X92	White LED Lamp Unit, 120VAC, Cutler Hammer	-	-	-
28-2468-7	Replacement Bulb -T3-1/4 (BA9) Bayonet Base Type 120V 2.4W (MFG No. W1121), Cutler Hammer	-	-	-

9 Diagrams

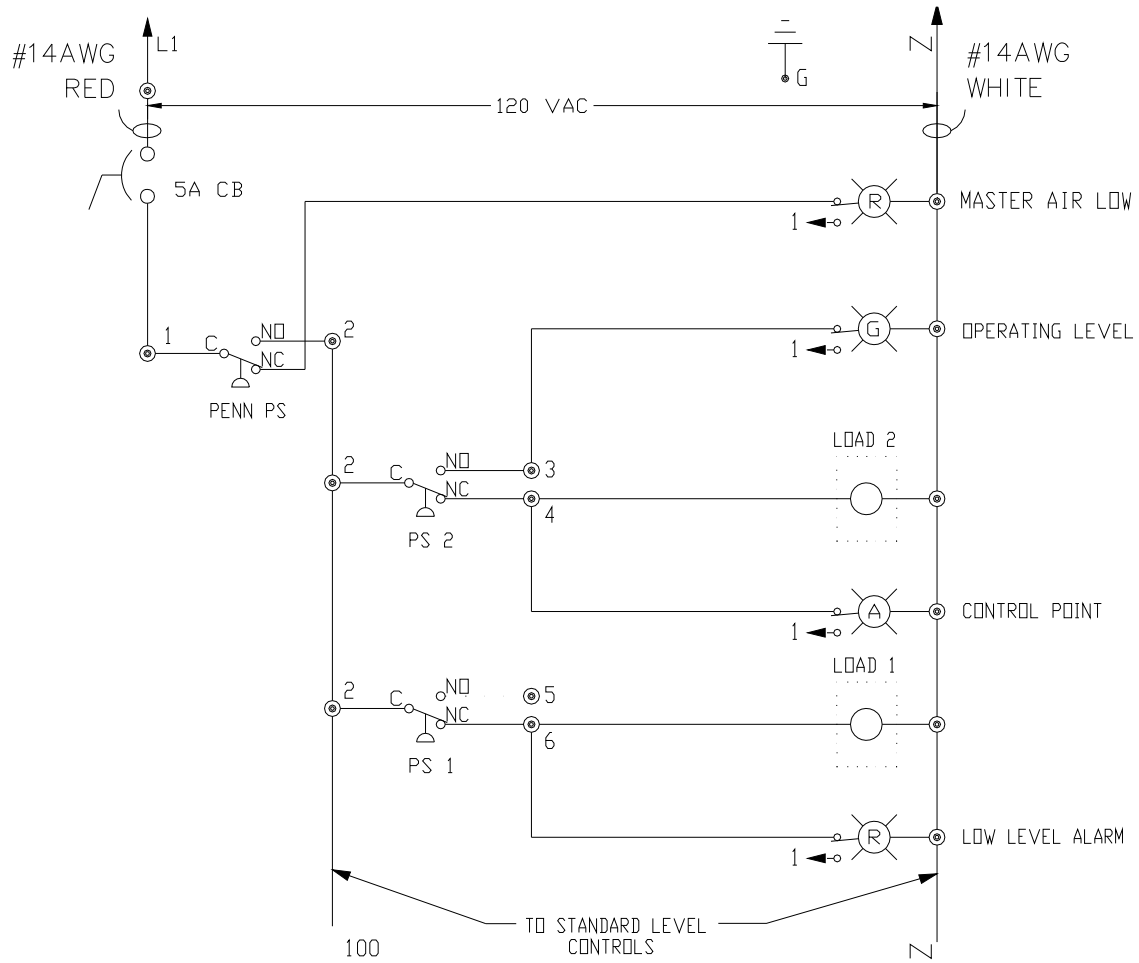
9.1 2251341 REV - E-CO Level MSTR 1 PT - electrical



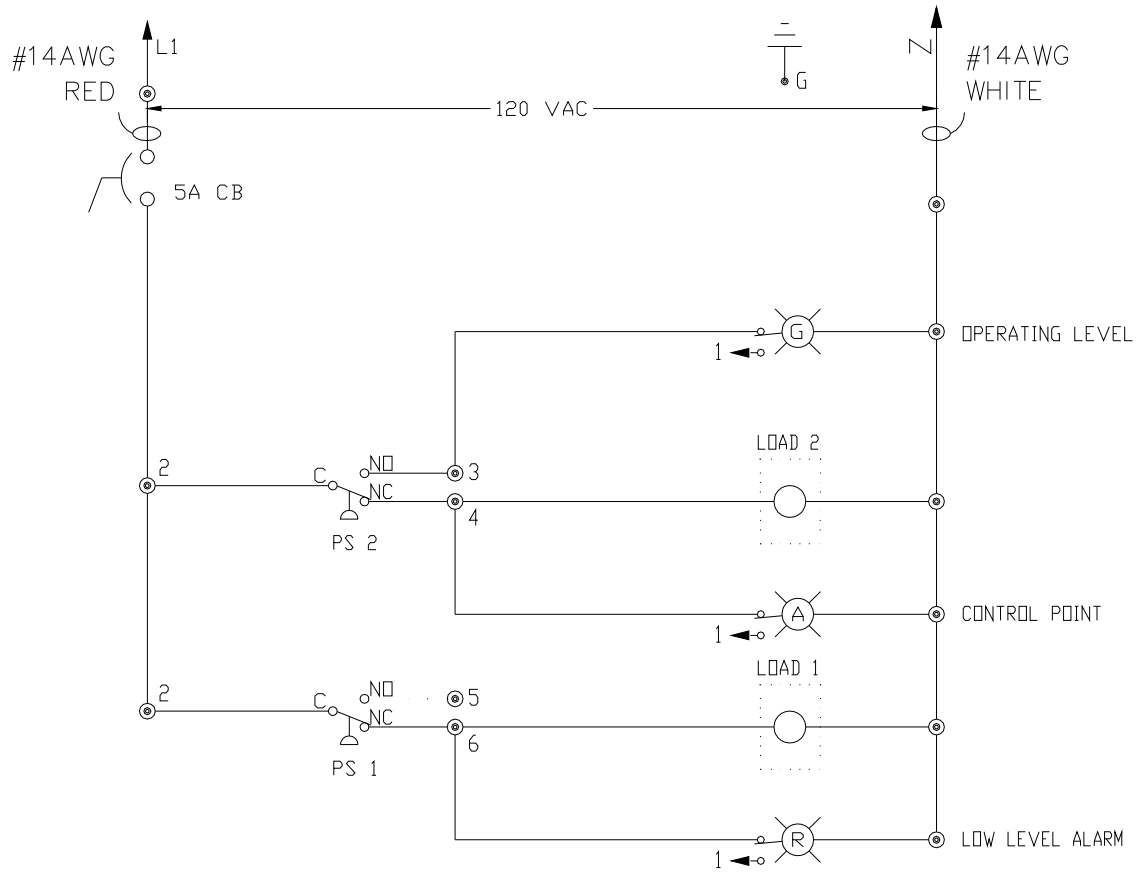
9.2 2250048 REV - E-CO Level STD 1 PT - electrical



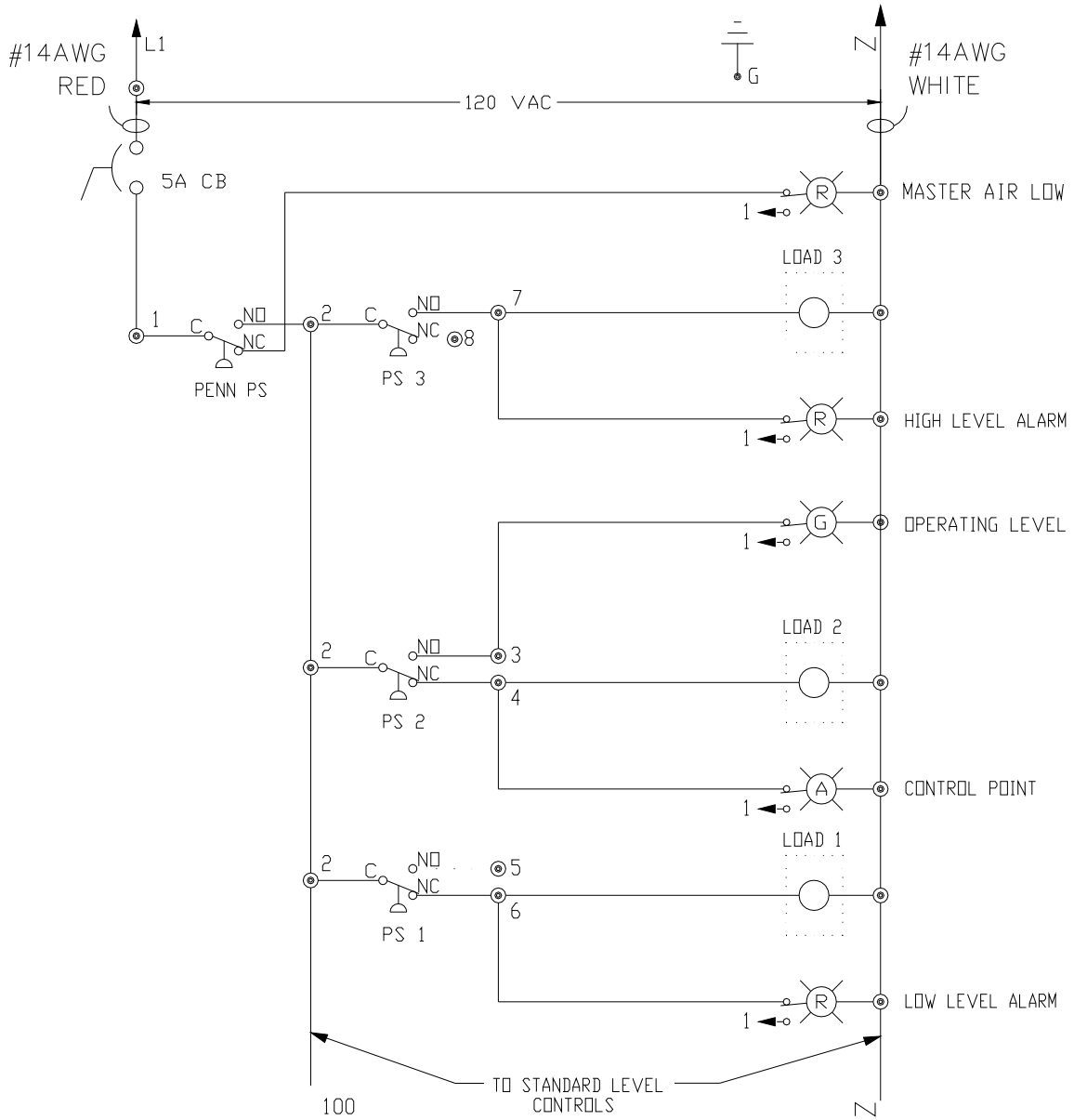
9.3 2251340 REV - E-CO Level MSTR 2 PT - electrical



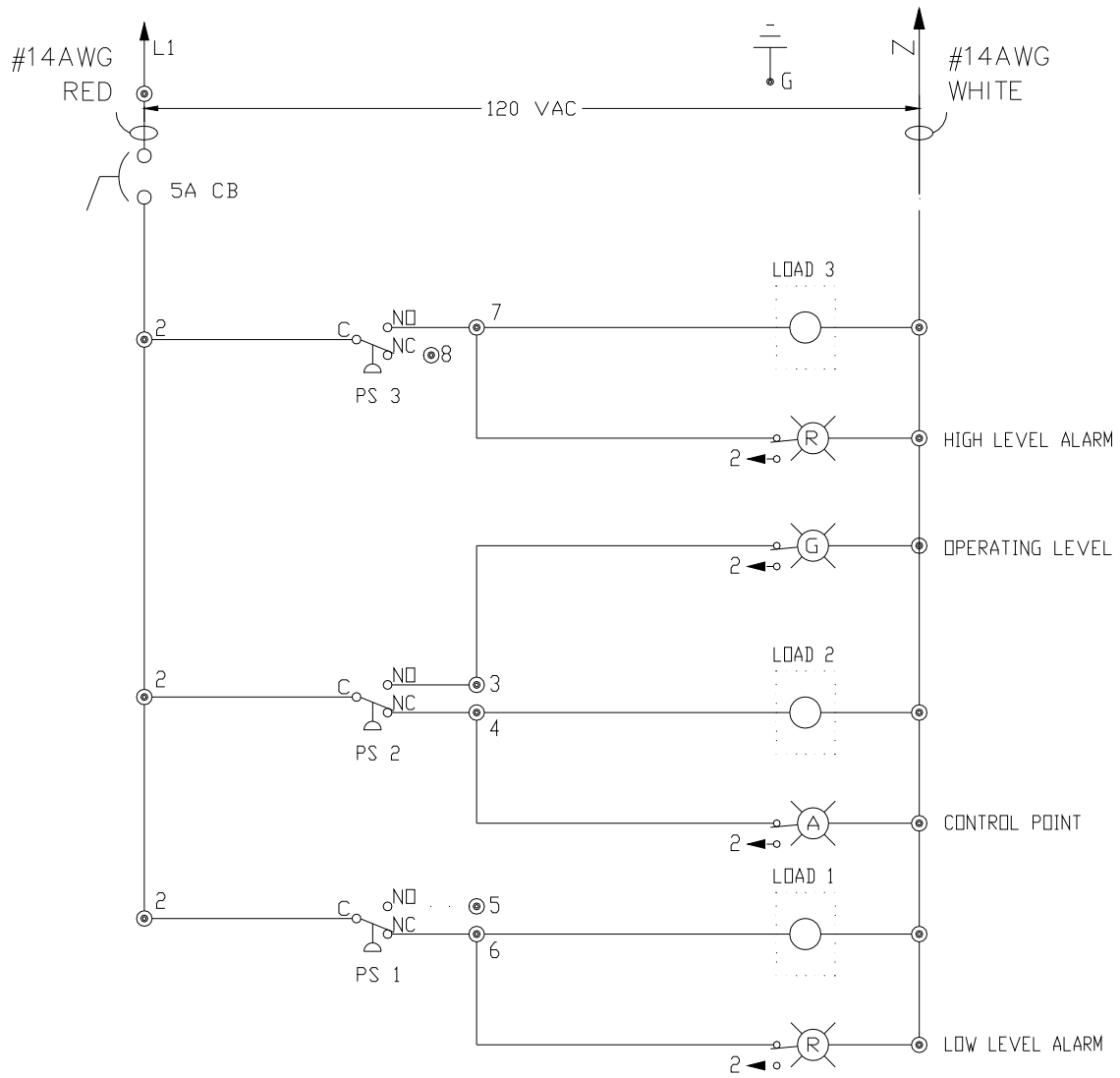
9.4 2251339 REV - E-CO Level STD 2 PT - electrical



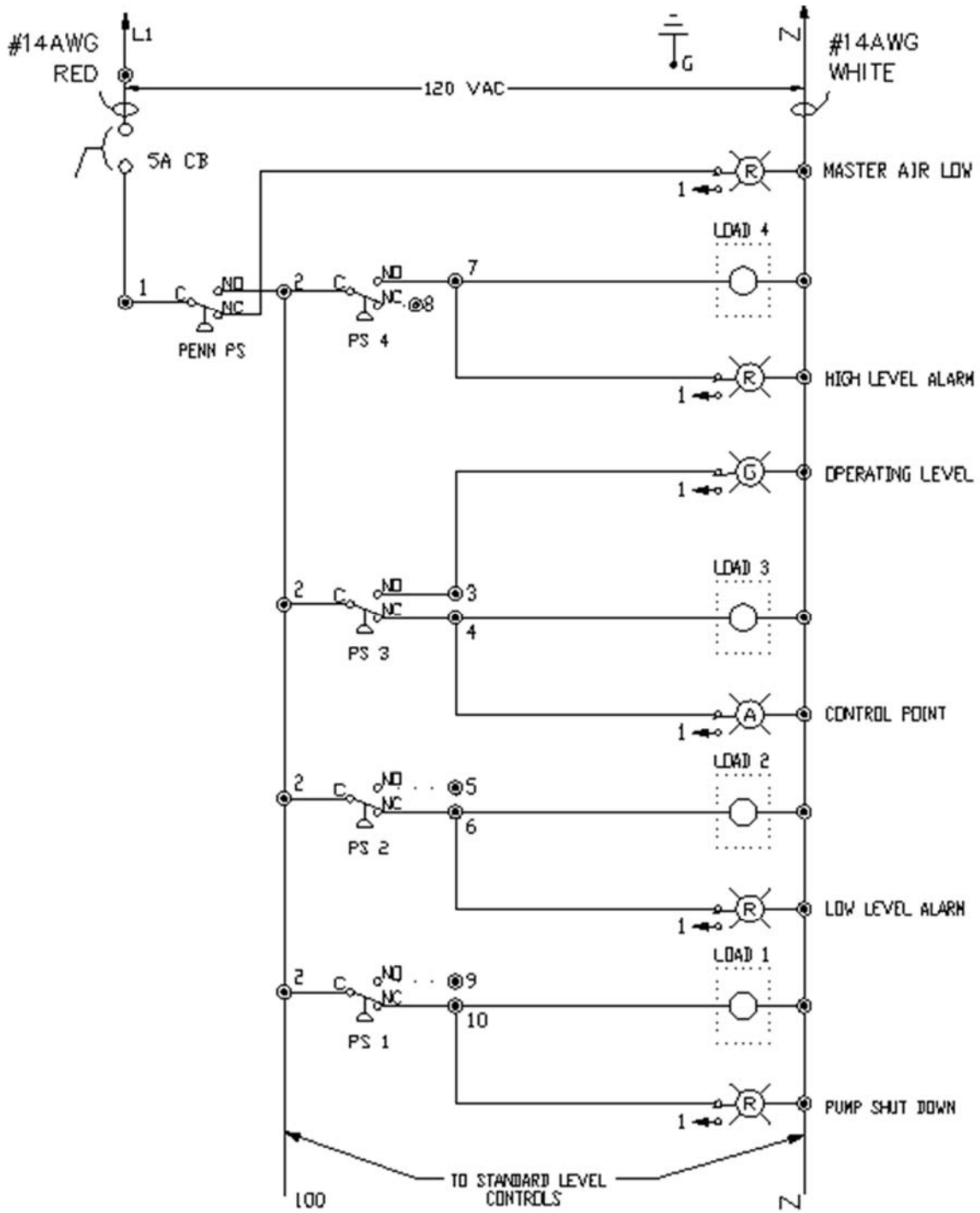
9.5 8907225 Master Level Control Three Point - electrical



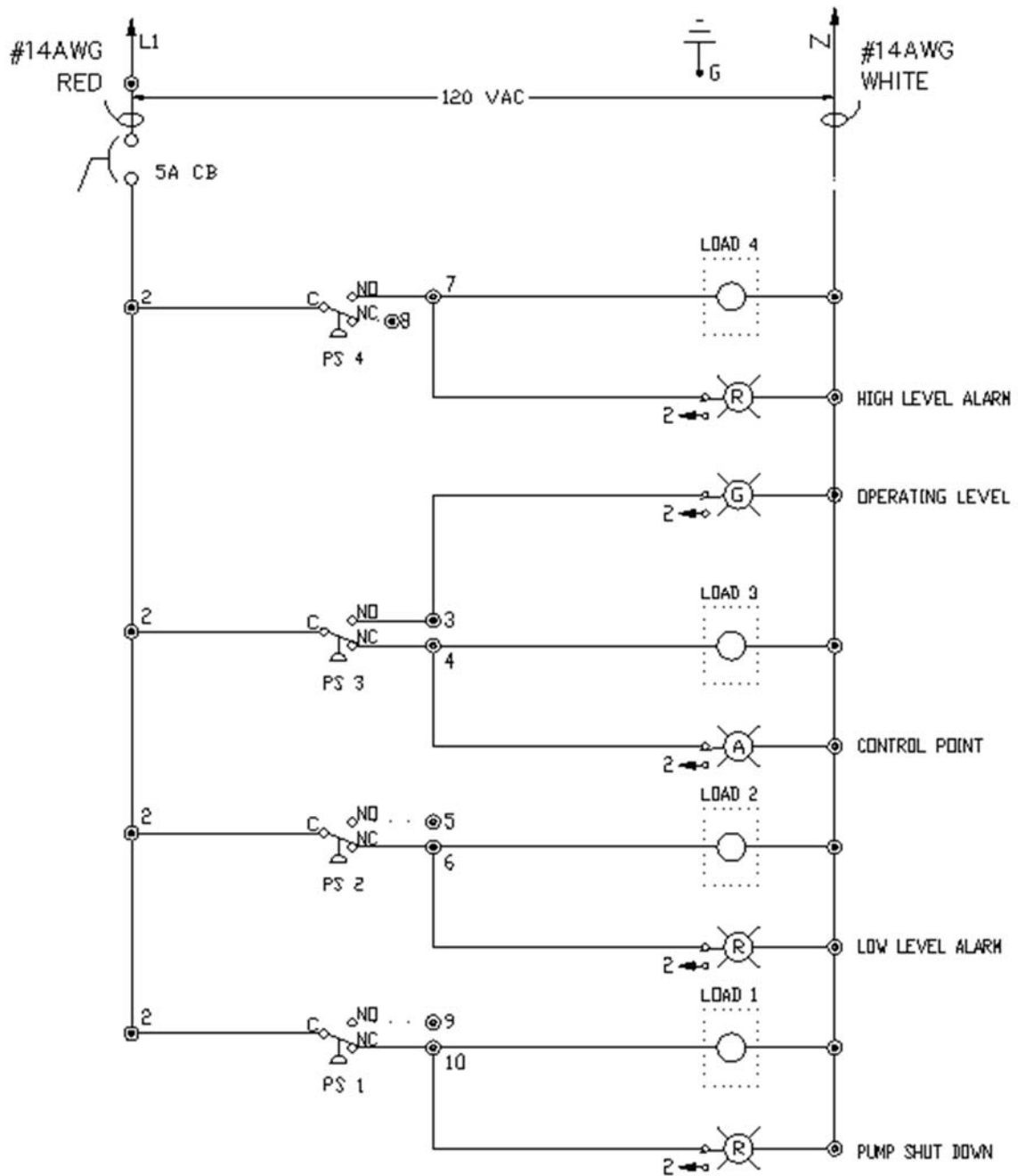
9.6 8907224 Standard Level Control Three Point - electrical



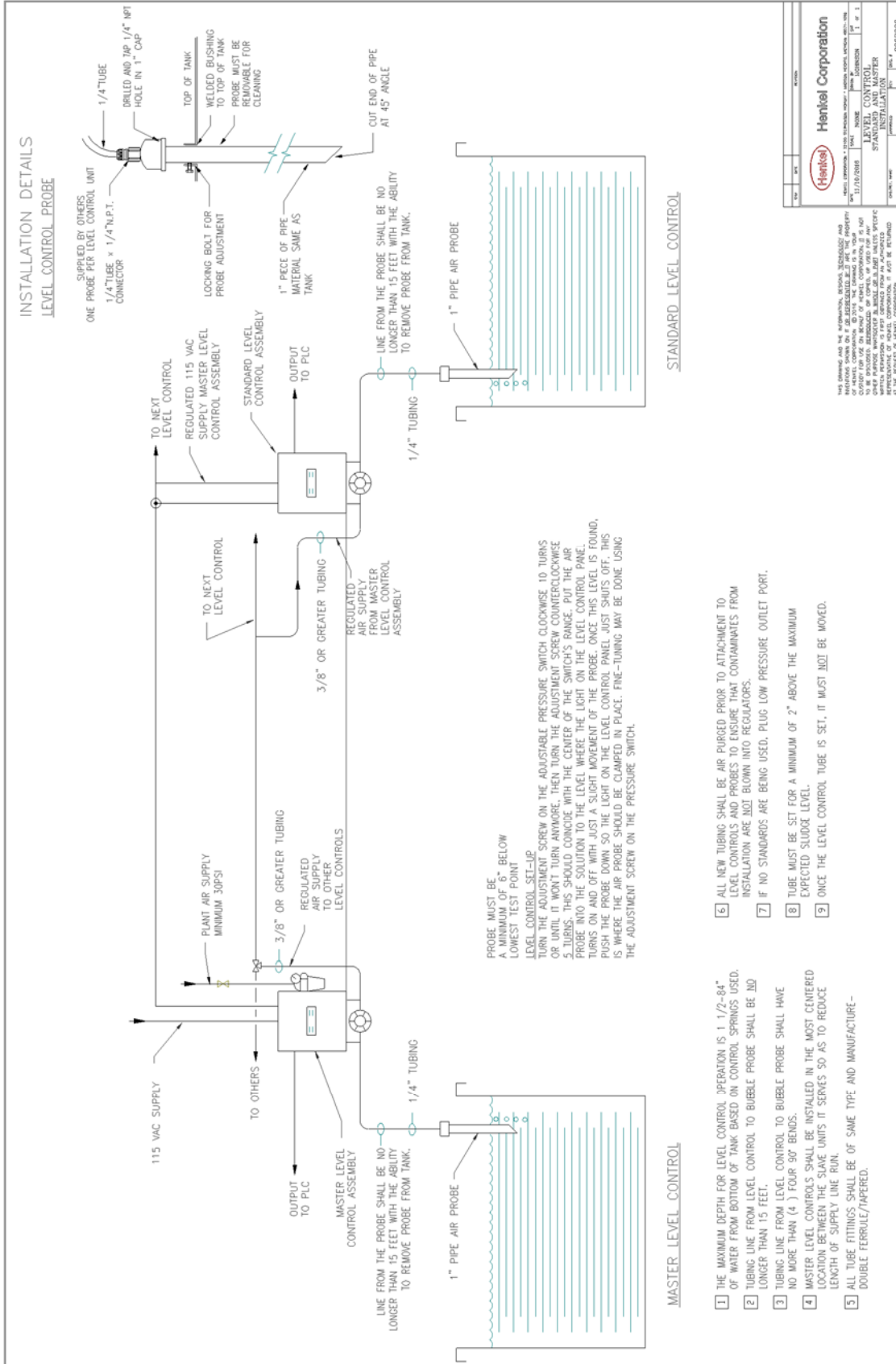
9.7 8907227 Master Level Control Four Point - electrical



9.8 8907226 Standard Level Control Four Point - electrical



9.9 Level Control Standard and Master Installation Drawing 8907228



10 Warranty

Henkel expressly warrants that all products referred to in this Instruction Manual for Bonderite® E-CO Level Control (hereafter called "Products") shall be free from defects in materials and workmanship. Liability for Henkel shall be limited, as its option, to replacing those Products which are shown to be defective in either materials or workmanship or to credit the purchaser the amount of the purchase price thereof (plus freight and insurance charges paid therefor by the user). The purchaser's sole and exclusive remedy for breach of warranty shall be such replacement or credit.

A claim of defect in materials or workmanship in any Products shall be allowed only when it is submitted in writing within one month after discovery of the defect or after the time the defect should reasonably have been discovered and in any event, within (12) months after the delivery of the Products to the purchaser. This warranty does not apply to perishable items, such as fuses, circuit breakers, and indicator lights. No such claim shall be allowed in respect of products which have been neglected or improperly stored, transported, handled, installed, connected, operated, used or maintained. In the event of unauthorized modification of the Products including, where products, parts or attachments for use in connection with the Products are available from Henkel, the use of products, parts or attachments which are not manufactured by Henkel, no claim shall be allowed.

No Products shall be returned to Henkel for any reason without prior written approval from Henkel. Products shall be returned freight prepaid, in accordance with instructions from Henkel.

NO WARRANTY IS EXTENDED TO ANY EQUIPMENT WHICH HAS BEEN ALTERED, MISUSED, NEGLECTED, OR DAMAGED BY ACCIDENT.

EXCEPT FOR THE EXPRESS WARRANTY CONTAINED IN THIS SECTION, HENKEL MAKES NO WARRANTY OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCTS.

ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND OTHER WARRANTIES OF WHATEVER KIND (INCLUDING AGAINST PATENT OR TRADEMARK INFRINGEMENT) ARE HEREBY DISCLAIMED BY HENKEL AND WAIVED BY THE PURCHASER.

THIS SECTION SETS FORTH EXCLUSIVELY ALL OF LIABILITY FOR HENKEL TO THE PURCHASER IN CONTRACT, IN TORT OR OTHERWISE IN THE EVENT OF DEFECTIVE PRODUCTS.

WITHOUT LIMITATION OF THE FOREGOING, TO THE FULLEST EXTENT POSSIBLE UNDER APPLICABLE LAWS, HENKEL EXPRESSLY DISCLAIMS ANY LIABILITY WHATSOEVER FOR ANY DAMAGES INCURRED DIRECTLY OR INDIRECTLY IN CONNECTION WITH THE SALE OR USE OF, OR OTHERWISE IN CONNECTION WITH, THE PRODUCTS, INCLUDING, WITHOUT LIMITATION, LOSS OF PROFITS AND SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER CAUSED BY NEGLIGENCE FROM HENKEL OR OTHERWISE.

Henkel Corporation

One Henkel Way
Rocky Hill, CT 06067-3910
USA

Henkel Capital, S.A. de C.V.

Calzada de la Viga s/n Fracc.
Los Laureles
Loc. Tulpetlac, C.P. 55090
Ecatepec de Morelos, MEXICO

Henkel Loctite Korea

8F, Mapo Tower, 418,
Mapo-dong, Mapo-gu,
Seoul, 121-734, KOREA

Henkel Canada Corporation

2515 Meadowpine Boulevard
Mississauga, Ontario L5N 6C3
Canada

Henkel Singapore Pte Ltd

401, Commonwealth Drive
#03-01/02 Haw Par Technocentre
SINGAPORE 149598

Henkel Japan Ltd.

27-7 Shin Isogo-cho, Isogo-ku
Yokohama, 235-0017
JAPAN

Henkel Corporation**Automotive/ Metals H.Q.**

32100 Stephenson Hwy,
Madison Heights 48071
USA

Henkel (China) Company Ltd.

No. 928 Zhang Heng Road,
Zhangjiang, Hi-Tech Park, Pudong,
Shanghai, China 201203

Henkel AG & Co. KGaA

Standort München
Gutenbergstraße 3
85748 Garching b. München
Deutschland

www.equipment.loctite.com

® and ™ designate trademarks of Henkel Corporation or its affiliates. ® = registered in the U.S. and elsewhere. © Henkel Corporation. All rights reserved. Data in this operation manual is subject to change without notice.

Manual P/N: 8905238 , Rev -, Date: 09/08/2017