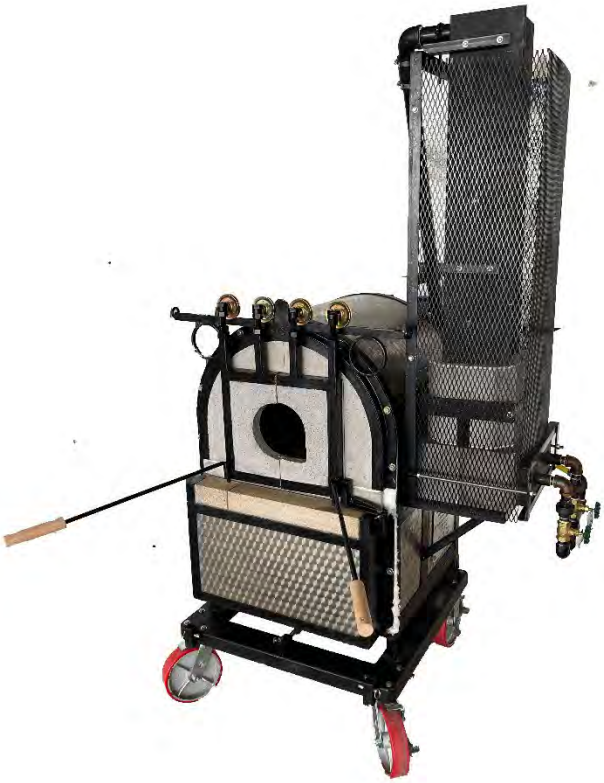
Mobile Glassblowing Studios'
Owner's Manual
Recuperated Phoenix Furnace
Proof of Air & Proof of Flame Safety Systems



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Recuperated Phoenix Furnace Owner's Manual
Proof of Air & Proof of Flame Safety Systems

These instructions are guidelines for use of the **Phoenix Glassblowing furnaces**. Please read this manual and all supporting documents carefully prior to using your equipment. Should any questions arise, please contact a representative of Mobile Glassblowing Studios IMMEDIATELY. **844-452-7246 EXT 3** or **229-352-9988 EXT 3**. You can also reach us at mobileglassblowingstudios@gmail.com. We offer complimentary initial support in setting up and operating your MGBS furnace and related equipment. More information about ongoing support is on our website at www.mobileglassblowingstudios.com/customersupport. You can also refer to the FAQ and Resources pages on our website for more information.

Mobile Glassblowing Studios, LLC, for a period of one year from date of shipment, warrants each system or product of its own manufacture, with the exception of burner tips, crucibles and other refractory materials, to the original Purchaser to be free from defects in material and workmanship under normal use, service and maintenance. Normal use, service and maintenance means: (1) Not exceeding the maximum temperatures, volumes, and other parameters specified in the Company's instructions and/or Owner's Manuals. (2) Using only the fuels specified in the Company's instructions and/or Owner's Manuals. (3) Operation and maintenance in compliance with the Company's instructions and/or Owner's Manuals. Products or goods not manufactured by the Company and supplied in piece, or as components to a system designed or supplied by the company, are not covered by this warranty. Components and parts of the equipment that are not manufactured by the Company are not covered by the Company's warranty, and the Company does not warrant the performance, use and operation of those parts. For complete details, please refer to your Terms, Conditions, and Limited Warranty document or visit www.mobileglassblowingstudios.com/warranty.

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Contents

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System Specifications: Recuperated Phoenix Furnace

General Specifications:

- Electrical: Blower is 120V AC, 10A (240V version available)
- Fuel Type: Propane or Natural Gas, recommended 7” - 14” W.C. / 35 mb pressure
- Fuel Consumption: Propane: +/- 1 gallon or +/- 2 kg per hour; Natural gas: +/- 93 cubic ft or 2.8 cubic meters per hour
- Btu/H range: 50,000 – 150,000
- Maximum Temp: 2400° F (1315° C)
- Dimensions (disassembled): 49” D x 34” W x 56” H (125cm D x 86cm W x 143cm H)
- Dimensions (assembled furnace with yoke - not including bench, annealer, marver, etc.): 70” D x 46” W x 86” H (178cm D x 117cm W x 218cm H)
- Curb Weight (approx.): 850 pounds (249 kg)
- Capacity: Varies, up to 95 pounds (43 kg)

Unpacking

The shipping crate should be disassembled starting with the lid, followed by the top half of each narrow side.

Unpack all parts before removing the furnace.

Look around the crate for any loose hardware, sometimes thumbscrews can come loose during shipping.

The handle including pins was shipped assembled. Make sure to have the pins installed any time you move the furnace by the handle. The handle can be moved to either the front or the back of the furnace. It should be located to the back or completely removed when firing your furnace.

Once all loose parts are removed from the crate, you can remove the furnace from the pallet. Be aware that the Phoenix furnaces weighs around 850 pounds. Be extremely cautious when moving the furnace. You will need to fashion a small ramp or use a forklift to remove it from the pallet.

The standard casters were shipped with the brakes “ON”. The brakes will need to be placed in the “OFF” position prior to moving the furnace. The spring loaded casters are not equipped with brakes, you will need to use a chock system once furnace is in position.

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Set-up (before lighting up for the first time)

The initial light-up sequence should take place outdoors or with adequate ventilation, without glass in the crucible. The furnace has been cooked out at the factory but will need an additional firing to finish the process. The furnace should be brought up to glowing orange slowly for the first time, and then allowed to cool before using. There are some noxious fumes that will be emitted during this initial firing, which is why we recommend doing it outdoors for the first time.

Before assembling ANY components to the Phoenix, move it into the position where you will be firing it.

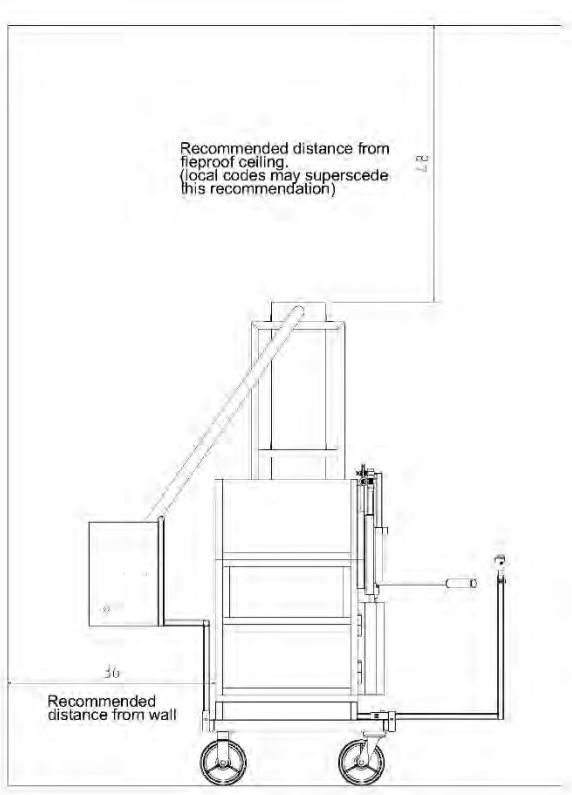
The Furnace reaches internal temperatures over 2000 degrees. Extremely hot air and flame come out of the front opening of the furnace.

The outside skin of the furnace, when in operation, will reach high temperatures. DO NOT TOUCH THE OUTSIDE OF THE FURNACE WITH BARE HANDS ONCE IT HAS BEEN TURNED ON.

Set the furnace up in an open outside or well-ventilated area.

Set up away from flammable materials.

Below is a diagram of recommended clearance minimums. Please note that local codes may supersede these recommendations:



If setting up underneath a covering, the covering must be fire-proof.

Allow for plenty of ventilation, as the exhaust fumes from propane combustion can be harmful if allowed to build up. Refer to the Installation Spec document on the following page.

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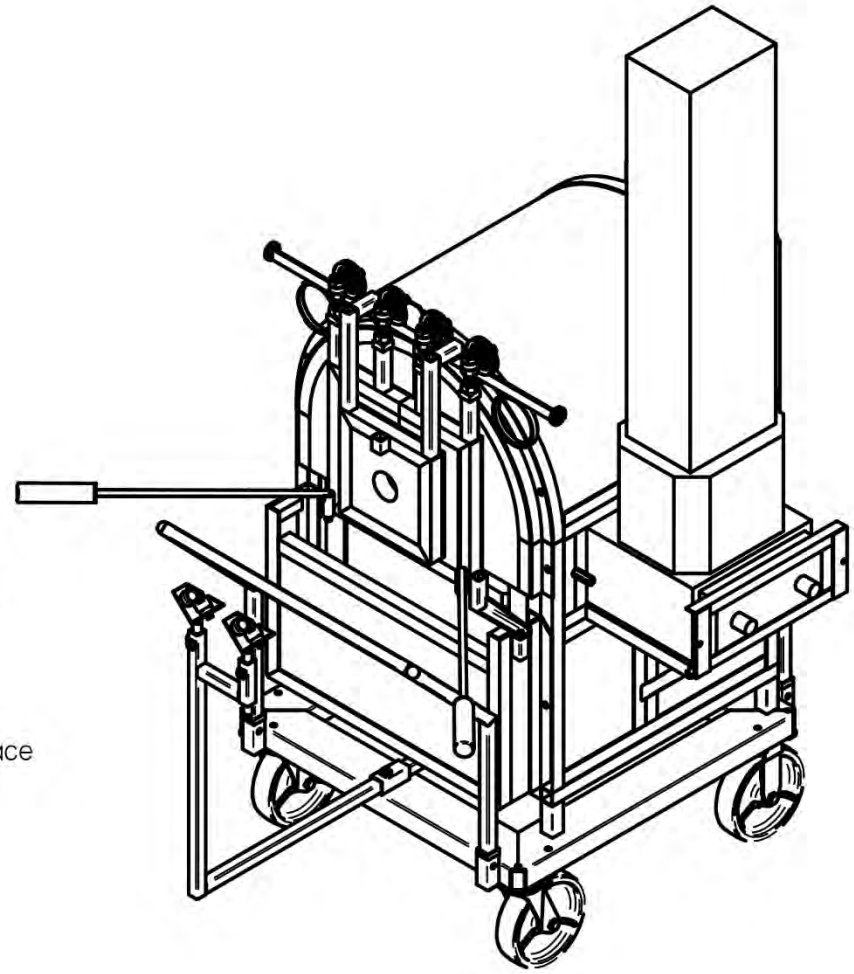
Model- Phoenix, Recuperated
Interior Volume-2.38 cubic feet
Fuel-Propane/Natural Gas
Fuel Pressure-7"-14" w.c.
Combustion System-150k Btu/hr
Air Supply- Variable Speed Blower
Power Supply-0.60kW @ 120V
Max Temperature-2400 F
Temp Exhaust-2098 F
Equipment Weight-1050 lbs
Shipping Weight-1350 lbs

Technical/ Installation Specifications
Passive Air: 1 sq inch per 4,000 btu/hr
Forced Air: 1000 cfh (18.4 CFM) per 100k btu/hr
Ventilation/ Exhaust Requirements:- Hood opening velocity of 50-100fpm, based on final exhaust temperature, exhaust must be diluted with fresh air to the point that the final exhaust temperature should not exceed the temperature rating of the ventilation components
Studio Space: Minimum of 4 air changes per/hr. in studio space
Electrical Installation: NEC compliant or jurisdiction
Plumbing Installation: NFPA compliant or jurisdiction



Mobile Glassblowing Studios, LLC	TITLE: PX Recuperator Install Specs	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	ANGLES ±0.25° ±0.033 ON HOLE PLACEMENT ±0.125 ON WELDMENTS	FILE NAME: PX Recup Install Specs.dft PMV | REV 3/7/2022 | SHEET 1 OF 1

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For the initial firing, there will be some smoke and fumes.

We recommend that the furnace is monitored while in operation, however the burner system is equipped with safety systems allowing for continued use.

Once the furnace is set up in a safe location, put the caster brakes to the “ON” position and secure with wheel chocks. Assembly for the initial firing can begin.

The recuperated burner system is shipped in several pieces, and will need careful assembly prior to hooking up and gas or electrical lines.

The recuperator assembly will require some room to do. A 10’ x 10’ space would be minimum recommended.

Keep in mind that once assembled the height of the flue will require a minimum 86” high x 46” wide opening, if moving in and out of a space.

Assembly tools needed:

- Philips Screwdriver
- 5/16 nut driver
- Minimum 6’ ladder
- 2: 7/16” box wrenches, ratchet, or adjustable wrench
- 9/16” socket

Carefully unpack all components and lay them out in such a way that they are easily accessible.

The furnace was shipped with the burner blocks and bottom recuperator block in place as shown below.

Take a moment to check that nothing shifted during shipping, and that the nuts and bolts holding the pieces in place are secure and tight.

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The next piece to go on is the flue support bracket. There are 4 bolts that hold it to the furnace frame.

Next, place the high temp gasket on the top of the recuperator block, lining up the registration marks. Ensure that the three rectangular openings in the recuperator block are not blocked by the gasket.

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Carefully place the Insulated Flue Stack on top of the Recuperator Block. Again, make sure that the three holes in the Recuperator black are clear. You will likely need to ascend a ladder and look down with a flashlight to make sure it is in the proper location.

Secure the Insulated Flue Stack to the support bracket using the ¼" bolts, lock washers and nuts on all four flue arms.

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With the Insulated Flue Stack in place, it's time to install the heat exchanger. Place the included high temp gasket on the end as shown. A small piece of painter's tape might be useful to hold the gasket in place – if you use the tape method, make sure the rectangular opening is clear.

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This next move requires a steady hand and is done while on a ladder. Be extremely careful while doing this next step. If you are not comfortable on a ladder, have vertigo, etc., call in someone who is comfortable. It is vital that this step is done correctly in order for the proper operation of the recuperator.

While positioned above the furnace, gently lower the heat exchanger. The intake pipe should be furnace-side. The rectangular flange on the bottom of the Heat Exchanger (with gasket), slots into the center rectangular opening of the Recuperator Block. Use a flash light to peer down into the Flue Stack to make sure this has been done correctly.

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Secure the Heat Exchanger to the support bracket via the pipe hanger bracket located at the top center of the support bracket frame.

Slide the intake air tube (painted PVC with two rubber connectors) to the Intake pipe on the Heat Exchanger AND the blower output on the blower box located on the rear of the furnace.

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Use a socket or wrench to tighten the connections.

Carefully insert the expanded metal heat shield so that it rests inside the flue support bracket frame.

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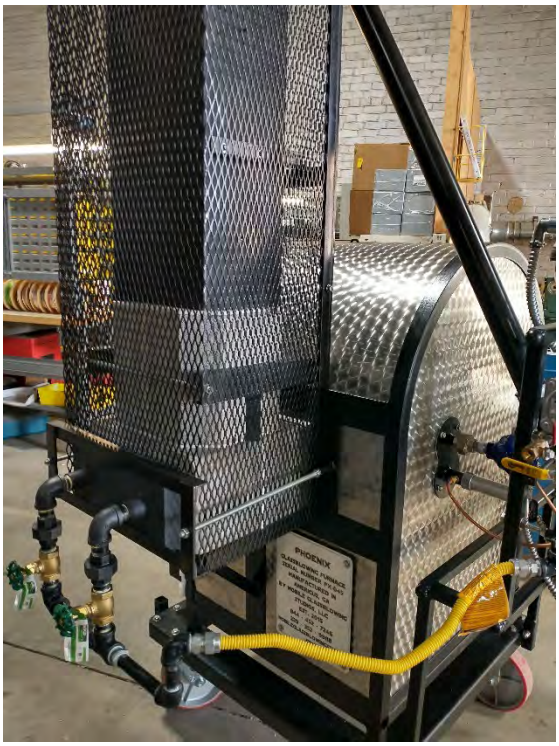
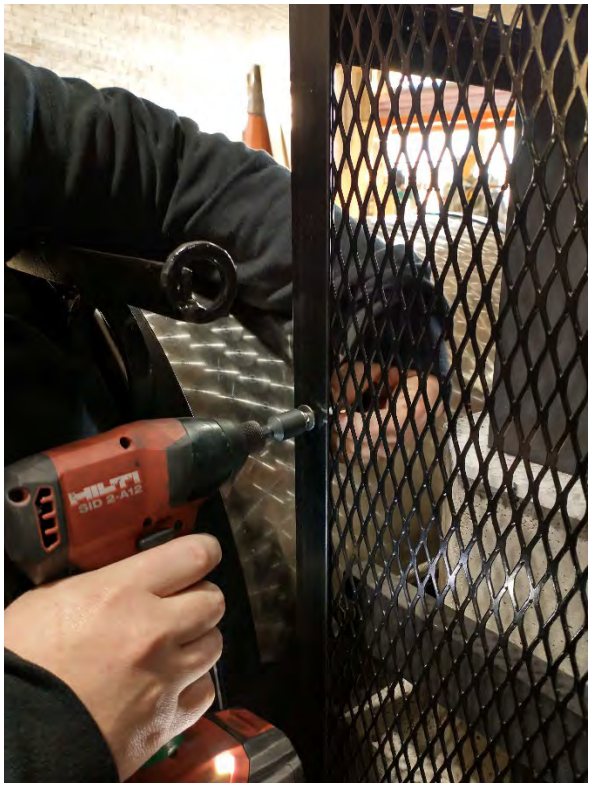


Secure the heat shield with the ¼” bolts, lock washers and nuts.



The recuperator, heat exchanger and heat shield are now properly installed

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Vacuum the inside of the furnace.

Attach the sliding doors. Leave the heat up door off for lighting.

Attach the yoke bar as pictured. Tighten thumb screws either by hand or with an adjustable wrench.

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Pre Light-Up Info

The burner system uses a combination of gas and forced air for combustion. The ratio of the gas to air mixture changes the dynamic of the flame. This proportion is changed manually by adjusting the amount of air & gas that enters the system. There are two adjustments for the air, the gross adjustment being the potentiometer dial on the blower box, the fine adjustment being the blue and silver butterfly valve. The gas is adjusted by the red knob on the globe valve (gas).

Please note that the gas ball valve is for off/on only and not for regulating flow.

The burner system is set up for low pressure, either propane or natural gas. Do not exceed 14 water column inches of pressure on the output of the regulator. Introduction of higher pressure will result in permanent damage to the gauge and other safety components.

The burner has an output range of 50,000-150,000 BTU/hr. We recommend a minimum of ½" inside diameter for the gas delivery hose. Smaller diameter may impede the flow and cause the burner to underperform.

The safety system is composed of two individual safety components wired in series on a circuit that opens the gas solenoid valve, allowing gas to travel to the burner, mix with forced air from a powered blower and combust inside the furnaces to heat the interior to over 2100 degrees F. The job of the safety components is to open that electrical circuit if any of the prescribed parameters of the components are violated, thus shutting off the gas flow to the burner. These components include:

Manual Switch

Air Low Pressure Switch

Flame Safety Switch

Once the furnace is lit, the components work as follows.

The Manual Switch, as well as aiding in the light up procedure, also acts as an emergency switch to open the electrical circuit to the solenoid valve, shutting down the gas flow to the burner.

If the pressure from the blower drops below a preset value, the Air Low Pressure Switch will open the electrical circuit to the solenoid valves, shutting down the gas flow to the burner.

If the burner loses flame for any reason, a flame scanner will read No Flame and send a signal to the Flame Safety System causing it to open the electrical circuit to the solenoid valves, shutting down the gas flow to the burner.

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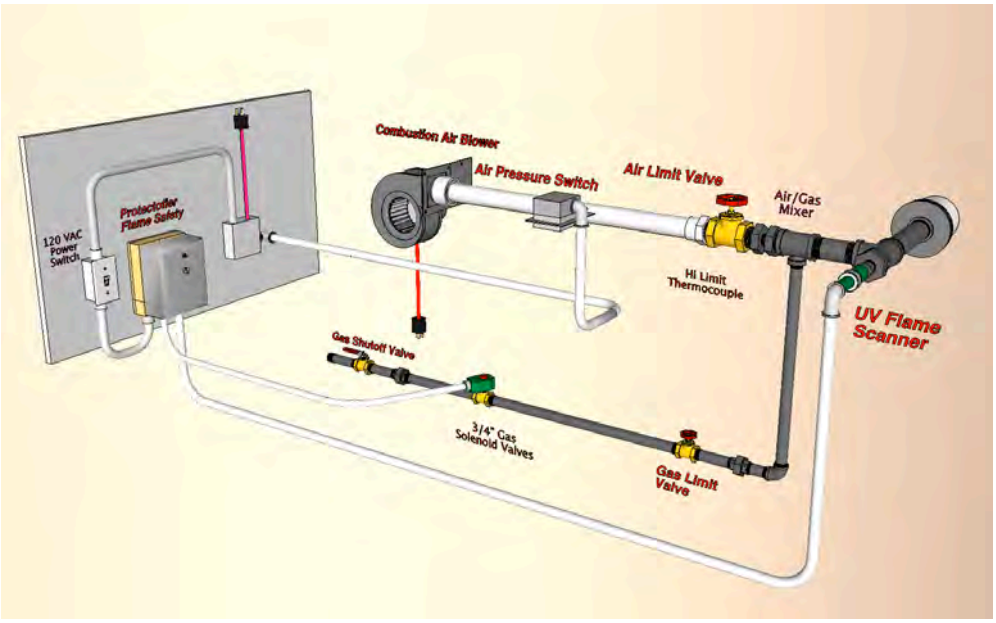
The illustration below outlines the safety components and their relationships to each other in the system.



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Light-up & Firing Guidelines

When lighting up, it is a good idea to have a spray bottle with a soap & water mixture for checking for gas leaks at the field connection points. All factory assembled plumbing has been pressure checked prior to shipment. When the system is pressurized, spray the field connection areas with the mixture: if there is a leak, foam will form around the joint. If a leak is detected, shut the gas off at the source and release the gas from the lines (called “bleeding the line”). Once the system has been bled, wrench-tighten the joint that was leaking. Re-test. DO NOT CHECK FOR LEAKS USING A FLAME.

Light up procedure is a specific sequence that must be followed in order to successfully start the furnace. If a step is missed or skipped, the burner system will not ignite, and you must start the sequence from the beginning.

When lighting the burner (we recommend using a Mapp gas hand torch – similar to the style pictured above), the flame will need to cross the burner tip prior to opening the gas globe valve.

Always have the furnace door open when lighting, as this will prevent gas from building up inside the furnace.

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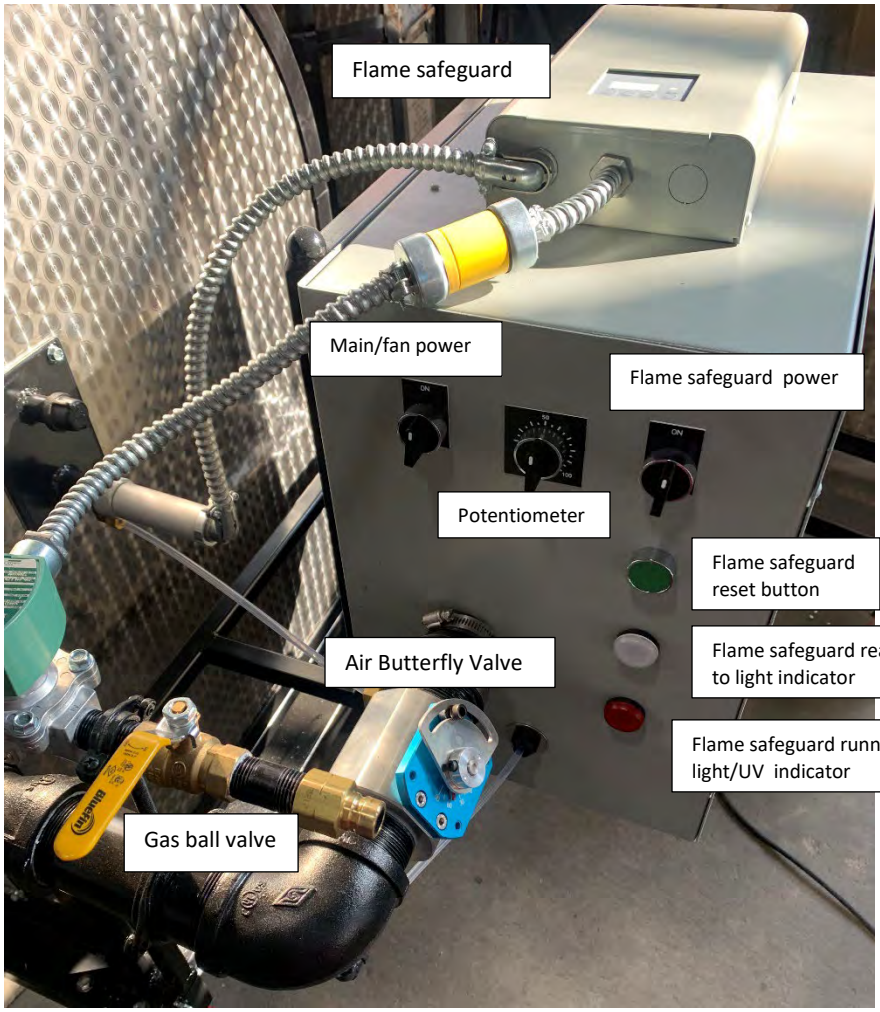
Lighting the Furnace

1. Attach the gas delivery hose to your regulated fuel source (propane or natural gas) and the burner train in accordance with local regulations.
2. Before opening the gas valve at the fuel source, make sure the ball valve is in the “off” position.
3. Check that the main power and Flame Safeguard power switches are all in the “off” positions.
4. Plug in the power cord.
5. Turn the main power switch to the “on” position.
6. Turn the potentiometer to about 50%.
7. Open the blue and silver butterfly valve that controls your air to about 30 degrees. If there is not enough air, the air switch will disengage.
8. Turn on the gas valve at the fuel source. The line will have gas in it up to the ball valve.



9. Open your gas ball valve. Note that gas will not flow through the solenoid valve until the entire system is engaged.
10. Turn the Flame Safeguard power switch to the “on” position.
11. Press the green Flame Safeguard Reset button. This will clear any errors and start the Flame Safeguard in its program. The screen on the top will read “P-30” which indicates it is doing its 30 sec gas line purge.
12. While the line is purging, open your globe valve that fine tunes your gas flow slightly.
13. Once the white indicator light comes up, ignite your Mapp gas torch to light the furnace.

    * If the system fails to light, the solenoid will close, allowing the chamber of the furnace to “purge” any gas before a second attempt can be made. It is common for the first attempt to result in non-ignition.

14. If the furnace does not ignite, the flame safeguard will flash a fault code. In this case, repeat steps 11-15.
15. Once the furnace is lit, use the globe valves and air valve to adjust the mixture to your desired settings. There will be long blue flames dancing from the two burner ports across the interior of the furnace.

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For the Initial Firing

1. For the initial light up, do not put any glass in the crucible.
2. Once lit, warm up at lower output for about an hour.

Please note: The heat up door now comes with a hole in the middle. This is an updated design to improve function.

3. After it has been warming up, place the heat up door over the opening (keep an eye on the flame – the back pressure caused by sealing the opening can change the flame dynamic).
4. Once it is glowing inside, you can increase the output.
5. When you are finished, shut the furnace off by turning the ball valve to the "off" position.
6. Close the valve at the fuel source.
7. Shut off the power switch to the Flame Safeguard.
8. Leave the blower running – this helps to keep the burner tip cool, overnight if possible.

Regular Use & Light Up

The instructions for regular use are very similar to those for the initial firing as far as furnace placement and set-up sequence.

Once you have vacuumed the inside of the furnace, place cullet into the crucible, mounding it up to the top. Another method is to place 15-20 pounds of glass in the bottom & charge 15-20 pounds at a time once the furnace is up to temperature.

Refer to the "Initial light-up" sequence to light the furnace. Once lit, you can close up the furnace using the heat up door.

Be sure to empty the crucible completely when finished, this can be accomplished by either gathering, or using a casting ladle to scoop the molten glass out.

Once empty, shut the furnace off by turning the ball valve to the "off" position and close the valve at the fuel source.

Leave the blower running overnight; this helps to keep the burner tip and other sensitive components cool.

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Things to Note

Quick on and off is abusive to the refractory materials. Though the crown has been cured and cooked carefully, the rapid heat up and cool down may cause the crown to develop cracks, this is normal. These cracks do not adversely affect the functionality, or the longevity of the furnace. This is true for the door as well, small cracks may develop, but the door will stay intact.

The crucible will crack. This is also normal. It is backed up by castable refractory (semi-invested) and will last years after small cracks develop.

The best practice is to allow for a long, slow heat-up and draining as much glass out of the crucible as possible each time before shut down.

The paint around the door will burn away – there is no paint that will withstand the temperatures we are dealing with.

Transport

Do not travel with any components loose in a trailer or back of a truck.

Make sure the furnace is tied down with multiple tie down points. It is much better to over secure than under secure.

The burner tip is ceramic and can break. Use care when moving.

Flame Adjustment

The flame is adjusted by changing the ratio of air and gas.

Too much gas results in a bushy (or lazy) flame, whereas too little gas can result in the flame blowing out.

The desired mix will give you a nice solid (but quiet) roar and a flame with a blue core.

If the sound is sputtering, too much air.

If there is a big yellow flame coming out of the door and or top of the furnace, not enough air.

Once you have an even mix, you can adjust it up or down, to control the speed at which the furnace heats up.

When adjusting the flame, do so in small increments.

To adjust the furnace up (bigger flame, hotter – faster), first increase the gas, then the air. If the air is increased first, the flame could potentially blow out.

To adjust the furnace down, first decrease the amount of air, then the amount of gas.

The burner system is manual and will require some getting used to. This takes time and experience. We recommend documenting your firings, to refer to later.

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Flame Safeguard

The following is the Phase and Fault Code Key:

SIEMENS www.sccombustion.com

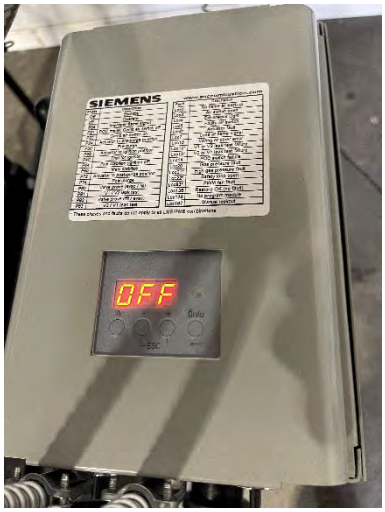
Phase	Description
Off	Standby
oP	Operate
P04	Improper flame signal
P21	POC made; Comb air switch off
P22	Comb air switch on
P24	Actuator to pre-purge position
P30	Pre-purge
P36	Actuator to ignition position
P40	Trial for ignition
P44	Pilot stabilize (ignition off)
P50	Main stabilize
P72	Actuator to post-purge position
P74	Post-purge
P80	Valve prove (evac / fill)
P81	V1 / V2 leak test
P82	Valve prove (fill / evac)
P83	V2 / V1 leak test
P90	Gas switch open

Fault	Description
Loc2	No flame at start-up
Loc3	Air switch open
Loc4	Extraneous Light
Loc5	Faulty air switch
Loc6*	Actuator fault
Loc7	Loss of flame signal
Loc10	Wiring or other error
Loc12*	V1 or V2 leak test failure
Loc13*	V2 or V1 leak test failure
Loc14	POC switch failure
Loc20	Gas pressure fault
Loc21*	High gas pressure fault
Loc22*	Safety loop open
Loc83*	PWM fan fault
Loc138	Restore OK (no fault)
Loc139	No program module
Loc167	Manual lockout

These phases and faults do not apply to all LME/PME combinations

The following is a photographic representation of the sequence on the digital readout of the Flame Safeguard. Match the Phase and Fault Codes to the above Key to determine the definition. Further explanation of specific Fault Codes and their causes can be found in the troubleshooting section after the photos of the sequence.

- Main Power is On, but Flame Safeguard Burner Switch is OFF:



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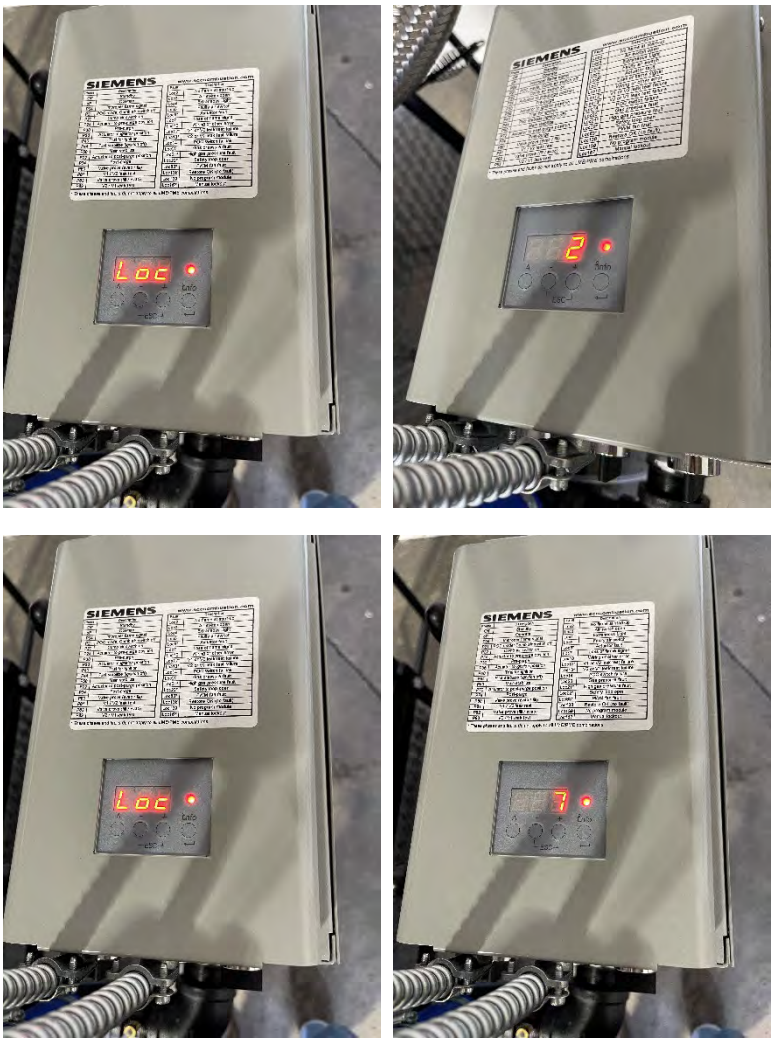
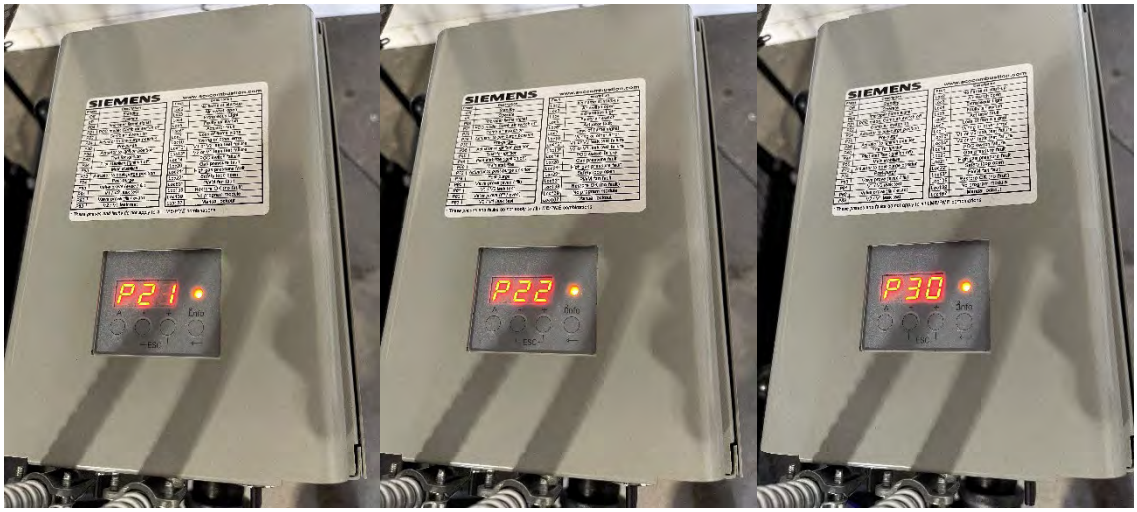
- Flame Safeguard Burner Switch is On, with a fault code present (Display flashes between LOC and a Number):



- Fault has been cleared by pressing and releasing the Ignition Sequence Reset Pushbutton (Green)
- The "P" prefix indicates the Phase in the sequence.



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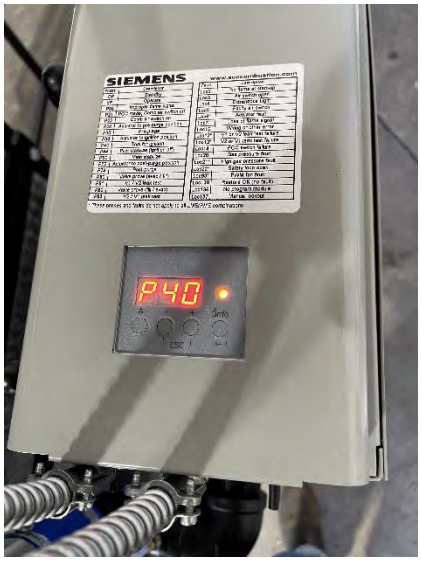
- Trial for Ignition. This Phase Code indicates that the solenoids are open, and the burner is ready to be lit.
- At the same time, the White Indicator light will turn on.
- This Phase lasts for approximately 10 seconds.



- If Ignition was successful, The Phase will shift to P44 briefly, then to P50.

Once the flame is stable, the readout will show a number between 0-100, indicating the strength of the flame signal that the UV Sensor is picking up, with 100 being the strongest.

When the flame goes out, either by intentionally turning off the system, or from some other reason, the Flame Safeguard will show a Fault Code. You can cross reference that code in the troubleshooting guide below in order to determine possible causes.

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Troubleshooting Introduction: LME Series

The LME7 has an extensive list of fault codes to help clarify the nature of any fault. Section 7-2 describes every fault code in detail and gives guidance on how to correct it.

When a fault occurs, the LME7 will alternate between displaying “Loc” and the fault number.

The fault history is stored in the 700 set of parameters. These are only accessible with an AZL23 remote display or through the ACS410 software. To access the 700 set of parameters on the AZL23, press and hold the info button until “SEr” is displayed, then let go. The LME7 stores the last 11 fault codes:

Parameter 701 displays information about the current status of the LME7.
Parameter 702 displays information about the most recent fault.
Parameter 703 displays information about the second most recent fault.
…

Parameter 711 displays information about the 10th most recent fault.

Each fault code listed has indexes that provide additional information about the fault: Index

00 = Fault code
Index 01 = Start number Index
02 = Phase
Index 03 = Load

Index 01 will display a value of “._._”. This means that the AZL23 display ran out of room to display the start number. When this happens, hold down the info button to display the value.

An example of how the AZL23 displays a fault code in the fault history is shown below:

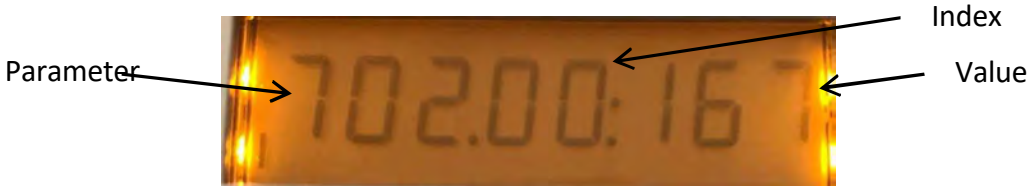

Figure 7-1: LME7 Fault History Example with Indexes

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Navigating the Fault History

To navigate the fault history, use the following key strokes on the AZL23.

- When the parameter number is flashing, press the "+" or "-" button to cycle through the list of faults (parameters 701-711).
- When the parameter number is flashing, press and hold the info button to move the cursor from the parameter number to the index number. This will cause the index number to begin flashing.
- When the index number is flashing, press the "+" or "-" button to cycle through the list of indexes (00-03).
- When the index number is flashing, press the "+" and "-" buttons together to escape and move the cursor from the index number to the parameter number. This will cause the parameter number to begin flashing.

Resetting Faults on the LME7 Burner Control

Faults can be reset in one of three ways on the LME7… burner control:

1. Pressing the info button on the LME7 burner control for 1-3 seconds.
   Note: Pressing the info button for less than one second has no effect. Pressing the info button for more than three seconds places the LME7 into diagnostic mode.

2. Pressing the info button on the AZL23 remote display until the word "rESET" appears, then releasing.
   Note: Releasing the info button before the word "rESET" appears has no effect. Pressing the info button too long accesses the "InFo" menu.

3. Connecting neutral to reset terminal X2-03.1 for more than one second. This is typically done with the use of a push button connected between neutral and X2-03.1.
   Note: Connecting neutral to X2-03.1 for less than one second has no effect.

Accessing the Service (SEr) Menu

The service (SEr) menu contains the fault history as well as the 900 series of parameters that are used for diagnostic purposes, such as flame signal (954) and incoming voltage (951).

1. From the home screen (OFF), press and hold the info button until the word "SEr" is displayed, then release. The word "InFo" will briefly be displayed before "SEr".

2. Press the + or - button to navigate through the parameters in the "SEr" menu.

3. When finished, press the "+" and "-" buttons together to escape.

`

Complete Fault Code List

Fault Code	Description of the Fault	Corrective Action
2	No flame at start-up	A flame failure occurred during lightoff. 1. Check the wiring of the ignition transformer, pilot valve, and main valve(s). 2. Ensure manual shutoff valves on the pilot gas line and main gas line are open. 3. Check the fuel / air ratio at lightoff. 4. Check the flame detector signal in the presence of a known flame source. Replace the flame detector if it does not produce the anticipated signal.
3	Air pressure switch open	The air pressure switch connected to terminal X3-02.1 is open, causing a fault. Ensure the setpoint of the switch is set to an appropriate value. Check the wiring of the air pressure switch. If no air pressure switch is being used, place a jumper from terminal X2-01.3 to X3-02.1.
4	Extraneous light	An extraneous light (flame signal present when there should be none) fault occurred. 1. Ensure that the source of light is not a flame. If it is, take corrective action immediately. 2. Ambient light can cause an extraneous light fault. Ensure the flame scanner is viewing a dark area. 3. UV scanners typically fail on, giving a false flame signal. Remove UV scanner and cover the bulb to ensure it is not seeing any light. Look inside the bulb and see if any purple arcs of electricity are occurring between the electrodes in the bulb. If there are, replace the UV scanner.
5	Air pressure switch closed	The air pressure switch connected to terminal X3-02.1 is closed before the blower output is energized in phase 22, causing a fault. Ensure the setpoint of the switch is set to an appropriate value. Check the wiring of the air pressure switch. If no air pressure switch is being used, place a jumper from terminal X2-01.3 to X3-02.1.
6	Actuator position fault	The required position feedback from the connected SQM… actuator was not received. 1. Ensure the potentiometer on the SQM… actuator is wired correctly. -For counter-clockwise actuators (SQM40…, SQM50…), terminal "c" on the potentiometer should be wired to terminal X66.1 on the LME7, and terminal "a" on the potentiometer should be wired to terminal X66.3 on the LME7. -For clockwise actuators (SQM41..., SQM50...R), terminal "a" on the potentiometer should be wired to terminal X66.1 on the LME7, and terminal "c" on the potentiometer should be wired to terminal X66.3 on the LME7. 2. Ensure the SQM... actuator is wired properly to the LME7, especially the position feedback on terminal X2-09.4 of the LME7. 3. Ensure no mechanical stops are preventing the actuator from reaching its expected position. 4. While not common, heavy vibration on the actuator can wear a track in the position feedback potentiometer. If the fault always occurs at the same actuator position, the actuator may need to be replaced, and the vibration needs to be reduced to avoid having a similar issue with the new actuator.

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Fault Code	Description of the Fault	Corrective Action
7	Loss of flame	A flame failure occurred during normal operation. 1. Check the fuel / air ratio. 2. Check the flame detector signal in the presence of a known flame source. Replace the flame detector if it does not produce the anticipated signal.
10	Wiring or other error	This fault is a catchall and can be caused by a variety of issues. See Section 7-3 for a list of all known causes of this fault. If none of the causes listed in Section 7-3 appears to be the cause, review all wiring on the LME7 and check to see if a wire is landed on an incorrect terminal.
12	Fuel valve V2 leaking (PME73.840A1) Fuel valve V1 leaking (all other PME7s)	On PME73.840A1, the downstream gas valve V2 failed valve proving. On all other PME7 program modules, the upstream gas valve V1 failed valve proving. 1. Bubble test the gas valve to ensure the valve is not leaking. If the valve is leaking, replace the valve. 2. Ensure that the setpoint of the valve proving pressure switch is set to 50% of the inlet pressure to the upstream gas valve.
13	Fuel valve V1 leaking (PME73.840A1) Fuel valve V2 leaking (all other PME7s)	On PME73.840A1, the upstream gas valve V1 failed valve proving. On all other PME7 program modules, the downstream gas valve V2 failed valve proving. 1. Bubble test the gas valve to ensure the valve is not leaking. If the valve is leaking, replace the valve. 2. Ensure that the setpoint of the valve proving pressure switch is set to 50% of the inlet pressure to the upstream gas valve.
14	Proof-of-closure (POC) switch failure	The POC switch is not in the expected state. If a POC switch exists, ensure it is wired to terminal X2-02.4 on the LME7. On an LME75 burner control, the source of power to the common side of the POC switch must come from terminal X2-02.3. If no POC switch exists, either set parameter 237 to 0 or install a jumper between terminals X2-02.3 and X2-02.4. If the POC input is deactivated, there must be nothing connected to terminal X2-02.4.
20	Gas pressure fault	One of the gas pressure switches wired to terminal X5-01.2 opened, causing a fault. It is common for both the high and low gas pressure switches to be wired to terminal X5-01.2, so the fault could be either a high gas or low gas event. Check the gas supply and open any manual shutoff valves. Check the wiring of all gas pressure switches. Check the setpoint of any gas pressure switches to ensure the setpoint is set to an appropriate value.
21	High gas pressure fault	The high gas pressure switch wired to terminal X2-02.4 (PME75.811A1) or X9-04.2 (PME75.812A1) opened, causing a fault. Check the wiring of the high gas pressure switch. Check the setpoint of the high gas pressure switch and ensure it is set to an appropriate value. Check pressure regulators for ruptured diaphragms or incorrect setpoints. If the high gas pressure switch input is deactivated, there must be nothing connected to terminal X2-02.4 (PME75.811A1) or X9-04.2 (PME75.812A1).

`

Fault Code	Description of the Fault	Corrective Action
22	Safety loop open	Check all of the switches wired into the safety loop on terminal X3-04.1. One of the switches opened, causing the fault. Fix the condition that caused the switch to open and reset the fault.
60	Analog input out of range	The 4-20 mA input connected to terminal X65 is out of range. This input determines the position of the actuator or speed of the PWM blower. Check the wiring of the analog input. If a fault is not desired when the input drops below 4 mA, set parameter 654 to a 5.
83	PWM blower speed fault	The speed of the PWM blower does not match the expected speed. More specifically, the blower speed fell outside of tolerance band 1 (parameter 650.00) for a time longer than the maximum speed deviation allowed (parameter 660), or the blower speed fell outside of tolerance band 2 (parameter 650.01). There are many possible corrective actions: 1. Increase ramp time up (parameter 522) and/or ramp time down (parameter 523) to allow the blower more time to achieve the expected speed. 2. Increase the setting of tolerance band 1 (parameter 650.00) and/or tolerance band 2 (parameter 650.01). 3. Ensure that the maximum fan speed (parameter 519) and the number of pulses per revolution (parameter 644) are set correctly for the blower being used. 4. Inspect wiring from PWM blower to LME7 to ensure the tachometer speed feedback signal is wired correctly.
138	Restore process successful	There is no fault. This fault occurs when a parameter set was successfully restored from the PME7 program module to the LME7 base unit. Reset the fault.
139	No program module detected	This fault occurs when no PME7 program module is plugged into the LME7 base unit. Insert a PME7 program module into the LME7 base unit and reset the fault.
167	Manual lockout	A manual lockout is caused by pressing the info button and any other button, either on the LME7 base unit or on the AZL23 remote display. Reset the fault.
206	Inadmissible combination of units (LME7 / AZL23)	Reset the LME7. If the fault occurs continuously, replace the LME7 and / or AZL23.
225	PWM blower speed fault	The speed of the PWM blower dropped below the minimum prepurge speed (parameter 675.00) during prepurge, or the speed of the PWM blower exceeded the maximum ignition speed (parameter 675.01) during ignition. Adjust parameter 675.00 or 675.01, or adjust purge speed (503.01) or ignition speed (403.00).
226	PWM blower parameterization error	The following parameter settings are not allowed. Correct the parameter setting that is incorrect and reset the fault. 1. Speed low-fire (P1) > speed high-fire (P2) 2. Speed low-fire (P0) = 0 3. Maximum blower speed (parameter 519) = 0

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Fault Code	Description of the Fault	Corrective Action
227	PWM blower parameterization error	One or more PWM blower settings are not compatible. Make sure the following three conditions on the minimum and maximum speed settings are met. 1. 516.00 ≤ P0 ≤ 516.01 2. 517.00 ≤ P1 ≤ 517.01 3. 518.00 ≤ P2 ≤ 518.01
rSt Er1	Incompatible PME7 and LME7	The PME7 program module and LME7 base unit being used are incompatible. PME71 program modules are only compatible with LME71 base units, PME73 program modules are only compatible with LME73 base units, and PME75 program modules are only compatible with LME75 base units.
rSt Er2		
rSt Er3	Fault during restore process	The PME7 program module was removed during the restore process. Re-install the PME7 program module and reset the fault to complete the restore process.
bAC Er3	Fault during backup process	The PME7 program module was removed during the backup process. Re-install the PME7 program module and reset the fault. Perform the backup process again.
Err PrC	No program module detected	This fault occurs when no PME7 program module is plugged into the LME7 base unit. Insert a PME7 program module into the LME7 base unit and reset the fault.

`

Other Common Faults

Known Causes of Loc 10

Loc 10 is a catchall fault that can be caused by a variety of issues. All known causes of Loc 10 are listed below in Table 7-1.

Table 7-1: All Known Causes of Loc 10

Cause #	LME71/73/75	Description	Phase	Corrective Action
1	All	Line power is directly connected to safety loop input X3-04.1	OFF	Power to the safety loop must be sourced from terminal X3-04.2
2	LME73/75 only	PV jumper missing	40	Add a jumper between terminals X2-09B.7 and X2-09B.8
3	All	Line power directly connected to blower output terminal X2-01.3	OFF	Correct feedback/wiring error
4	All	K4 relay contacts welded	21	With no power on the LME7, check continuity across pins X2-01.3 and X2-02.3. If there is continuity, replace the LME7. See Note 1 below.
5	All	Line power directly connected to POC source terminal X2-02.3	OFF	Correct feedback/wiring error
6	All	Line power directly connected to SV output terminal X6-03.3	OFF	Correct feedback/wiring error
7	All	Ambient temperature exceeds 140°F	OFF	Adjust the temperature back within the controller's acceptable range. Add enclosure cooling if necessary.
8	All	Flame failure incorrectly being logged as Loc 10	44, 50	Adjust combustion to avoid flame failures during light-off
9	LME75 only	Parameter 560 set incorrectly	oP	Set parameter 560 to any value besides 1.
10	LME75 only	Failed self-check sequence	oP	Check wiring of scanner. Replace scanner.

Notes:

1. It is likely that the rating on the blower motor output X2-01.3 was exceeded. Output X2-01.3 has a 2 Amp rating at 120 V, 50/60 Hz.

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LME7 LED is Flashing Red

When the LED on the front of the LME7 is flashing red very quickly, this indicates that the LME7 has been placed into Diagnostic Mode. While being in Diagnostic Mode does not prevent successful operation of the burner, it does remove the status that is typically displayed by the LED, as well as causes operators to incorrectly conclude that the LME7 is damaged.

There is no practical use for Diagnostic Mode. To exit Diagnostic Mode, simply press and hold the info button until the LED flashes yellow, then release the info button.

LME7 Stuck in Standby (OFF) / LME7 Faults Won't Reset

Ensure that neutral is not directly connected to terminal X2-03.1, the remote reset input. To remotely reset the LME7, neutral is momentarily applied to input X2-03.1. If neutral is applied to X2-03.1 permanently, an LME7 fault cannot be reset and the LME7 will not start the burner even when a call for heat signal is applied to input X5-03.1.

LME7 Stuck in Phase 90 (P90)

This indicates there is no power on input terminal X5-01.2. Typically, the low gas pressure switch and/or high gas pressure switch are connected to terminal X5-01.2. Check for appropriate gas pressure, and reset pressure switches if they are manual reset. Once power is restored to terminal X5-01.2, the LME7 will exit Phase 90 automatically.

LME75 Does a Power Cycle During the Operating (oP) Phase

This could be caused by one of two scenarios:

1. Parameter 560 is set to a value of 1. If this is the case, change parameter 560 to a value of 0 or 2 instead.
2. The self-check flame scanner failed the self-check sequence. Check the wiring of the flame scanner. If the wiring looks correct and the issue persists, replace the flame scanner.

LME7 Displays P04 (Phase 04)

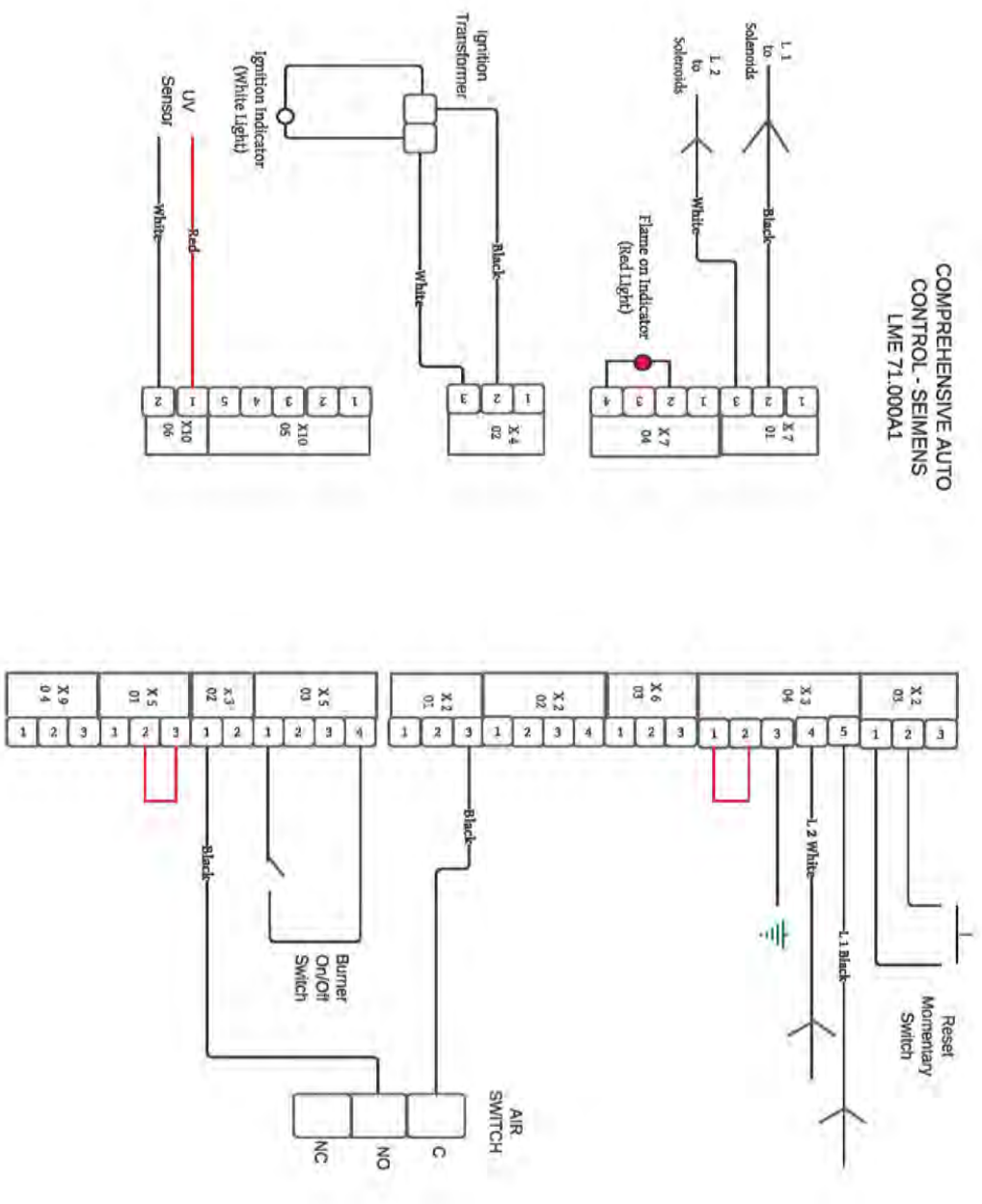
This indicates the LME7 is detecting a flame signal when one should not be present (extraneous light). Eventually if the flame signal does not go away, the LME7 will go into Loc 4.

`

Wiring Diagrams

The diagram below represents the wiring connections INSIDE the Seimens LME71 Flame Safety Control.

It is recommended that should any problems arise, do not attempt to repair or modify the wiring. Contact Mobile Glassblowing Studios at 229-352-9988 ext 3 for troubleshooting advice first before hiring a certified electrician for repairs.



are the wiring diagrams for the burner safety systems for your reference.

Component Spec Sheets:

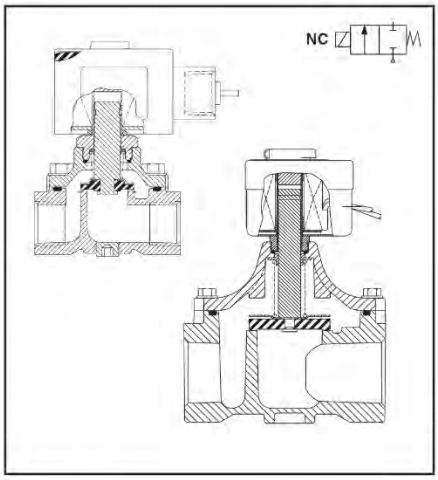
ASCO® RedHat®

Direct Acting
Gas Shutoff Valves
3/8" to 1 1/4" NPT

2/2 SERIES 8040

Features

- 2-way normally closed operation
- For gas pilot or main control of commercial and industrial gas burners
- Valves provided with 1/8" NPT upstream and downstream pipe taps with plugs for routine testing
- Mountable in any position



Construction

Valve Parts in Contact with Fluids	
Body	Aluminum
Seals and Disc	NBR
Core Tube	305 Stainless Steel
Core Guide	Acetal
Rider Ring	PTFE
Core and Plugnut	430F Stainless Steel
Springs	302 Stainless Steel
Shading Coil	Copper
Pipe Plug	Zinc-Plated Steel

Electrical

Standard Coil Class of Insulation	Watt Rating and Power Consumption AC Watts	AC VA Holding	AC VA Inrush	Ambient Temp.°F	Spare Coil Family General Purpose AC	Spare Coil Family Explosionproof AC
F	10.1	25	70	-40 to 125	238610	238614
F	15.4	27	160	-40 to 125	099257	-
Standard Voltages: 24, 120, 240 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz).						

Solenoid Enclosures

Valves with the letter "G" in their catalog numbers, e.g. 8040G021, have RedHat II molded epoxy Types 1, 2, 3, 3S, 4, and 4X combinations General Purpose and Watertight solenoid enclosures with 1/2" conduit hub as standard.

Valves with the letter "C" in their catalog numbers, e.g. 8040C004, have RedHat metal Type 1 General Purpose enclosures with 7/8" hole for 1/2" conduit connection.

Valve Response Time

Opening Time: Less than 1 second; **Closing Time:** Less than 1 second

Approvals

UL listed to standard 429 "Electrically Operated Valves," Guide YIOZ, File MP618 Safety Valves.

FM Approved to Class 7400 "Liquid and Gas Safety Shutoff Valves" (3/8" thru 3/4" only).

CSA Certified to:

1) Standard C22.2 No. 139 "Electrically Operated Valves," File 010381.
2) Automatic Gas Valves Z21.21 (6.5), File 112872.
3) Automatic Gas Safety Shutoff Valves C/I (3.9), File 112872.

COMBUSTION

ASCO®

Specifications (English units)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Gas Capacity ① Btu/hr.	Operating Pressure Differential (psi) Min.	Operating Pressure Differential (psi) Max.	Max. Fluid Temp.°F	Catalog Number	Const. Ref.	Agency UL	Agency FM	Agency CSA	Wattage	Approx. Shipping Weight (lbs)
COMBUSTION (Fuel Gas) - NORMALLY CLOSED													
3/8	3/4	3.9	210,000	0	2	125	8040G021	1	❍	❍	❍	10.1	2.8
1/2	3/4	5.4	291,000	0	2	125	8040G022	1	❍	❍	❍	10.1	2.8
3/4	3/4	9.5	512,000	0	2	125	8040G023	2	❍	❍	❍	10.1	2.8
1	1 5/8	16.8	900,000	0	0.5	125	8040C004	3	❍	-	❍	15.4	4.3
1 1/4	1 5/8	19.6	1,100,000	0	0.5	125	8040C005	3	❍	-	❍	15.4	4.3

❍ = Safety Shutoff Valve. ① 1" W.C. Drop @ 2" W.C. Inlet Pressure, 1,000 Btu/cu.ft. or more, 0.64 Specific Gravity Gas.

Specifications (Metric units)

Pipe Size (ins.)	Orifice Size (mm)	Kv Flow (m^3/hr)	Gas Capacity ① Btu/hr.	Operating Pressure Differential (bar) Min.	Operating Pressure Differential (bar) Max.	Max. Fluid Temp.°C	Catalog Number	Const. Ref.	Agency UL	Agency FM	Agency CSA	Wattage	Approx. Shipping Weight (kgs)
COMBUSTION (Fuel Gas) - NORMALLY CLOSED													
3/8	19	3.3	210,000	0	0.1	52	8040G021	1	❍	❍	❍	10.1	1.3
1/2	19	4.6	291,000	0	0.1	52	8040G022	1	❍	❍	❍	10.1	1.3
3/4	19	8.1	512,000	0	0.1	52	8040G023	2	❍	❍	❍	10.1	1.3
1	41	14.3	900,000	0	0.03	52	8040C004	3	❍	-	❍	15.4	2.0
1 1/4	41	16.7	1,100,000	0	0.03	52	8040C005	3	❍	-	❍	15.4	2.0

❍ = Safety Shutoff Valve. ① 1" W.C. Drop @ 2" W.C. Inlet Pressure, 1,000 Btu/cu.ft. or more, 0.64 Specific Gravity Gas.

Capabilities Chart

Solenoid Options				Base Catalog Number	Resilient Materials	Standard Rebuild Kit
NEMA Type 3-9	High Temp.	Junction Box	Wiring Box Screw Terminal	Aluminum	NBR	AC
EF	HT	-	JKF	8040G021	●	306633
EF	HT	JB	JKF	8040G022	●	306633
EF	HT	JB	JKF	8040G023	●	306633
-	HT	JB	JKF	8040C004	●	304079
-	HT	JB	JKF	8040C005	●	304079

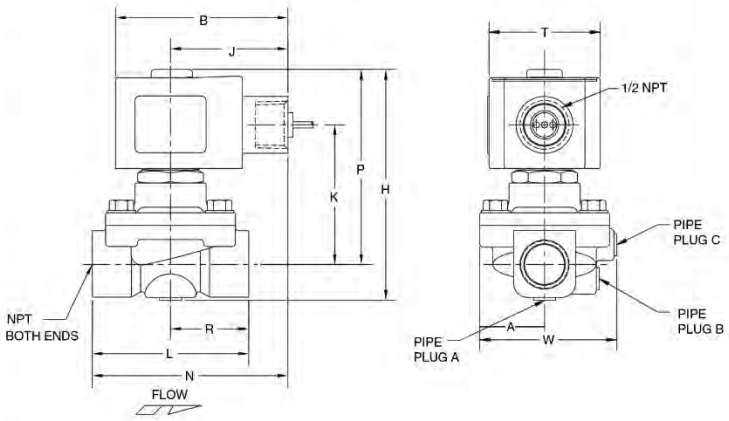
● = Standard. Other options may be available. All option combinations may not be available.

COMBUSTION

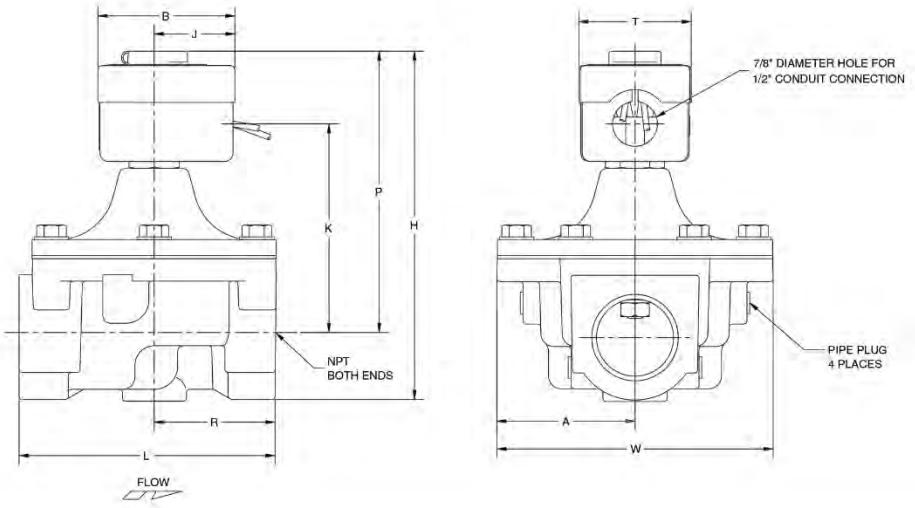
Dimensions inches (mm)

Const. Ref.		1	2	3
A	ins.	1.66	1.66	2.69
	mm	42	42	68
B	ins.	3.03	3.03	2.69
	mm	77	77	68
H	ins.	4.05	4.49	6.81
	mm	103	11405	173
J	ins.	2.04	2.04	1.59
	mm	52	52	40
K	ins.	2.46	2.65	4.09
	mm	62	67	104
L	ins.	2.75	3.31	5.00
	mm	70	84	127
N	ins.	3.42	3.70	-
	mm	87	94	-
R	ins.	1.38	1.66	2.38
	mm	35	42	60
P	ins.	3.44	3.63	5.50
	mm	87	92	140
T	ins.	1.95	1.95	2.22
	mm	50	50	56
W	ins.	2.42	2.39	5.38
	mm	61	61	137
Pipe Plug		B & C	A & C	-

Const. Ref. 1, 2



Const. Ref. 3



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COMBUSTION

Cleveland Controls
Division of UniControl Inc.

Model AFS–222

AIR PRESSURE SENSING SWITCH WITH ADJUSTABLE SET POINT RANGE

APPLICATION

Model AFS-222 Air Pressure Sensing Switch is a general purpose proving switch designed for HVAC and Energy Management applications. It may be used to sense positive, negative, or differential air pressure.

GENERAL DESCRIPTION & OPERATION

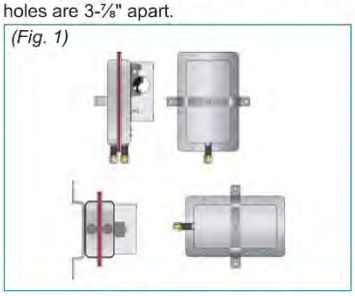
The plated housing contains a diaphragm, a calibration spring and a snap-acting SPDT switch.The sample connections located on each side of the diaphragm accept ¼" OD metallic tubing via the integral compression ferrule and nut.

An enclosure cover guards against accidental contact with the live switch terminal screws and the set point adjusting screw. The enclosure cover will accept a ½" conduit connection.

MOUNTING (SEE FIGURE 1)

Select a mounting location which is free from vibration. The **AFS-222** must be mounted with the diaphragm in any vertical plane in order to obtain the lowest specified operating set point. Avoid mounting with the sample line connections in the "up" position. Surface mount via the two 3⁄16" diameter holes in the integral mounting bracket. The mounting holes are 3-⅞" apart.

(Fig. 1)



AIR SAMPLING CONNECTION (SEE FIGURE 2)

The **AFS-222** is designed to accept firm-wall sample lines of ¼" OD tubing by means of ferrule and nut compression connections. For sample lines of up to 10 feet, ¼" OD tubing is acceptable. For lines up to 20 feet, use ¼" ID tubing. For lines up to 60 feet, use ½" ID tubing. A ¼" OD adapter, suitable for slip-on flexible tubing is available: order part number 18311.

Locate the sampling probe a minimum of 1.5 duct diameters downstream from the air source. Install the sampling probe as close to the center of the airstream as possible. Refer to Figure 2 to identify the high pressure inlet (H) and the low pressure inlet (L). Select one of the following five application options, and connect the sample lines as recommended.

POSITIVE PRESSURE ONLY: Connect the sample line to inlet H; inlet L remains open to the atmosphere.

NEGATIVE PRESSURE ONLY: Connect the sample line to inlet L; inlet H remains open to the atmosphere.

TWO NEGATIVE SAMPLES: Connect the higher negative sample to inlet L. Connect the lower negative sample to inlet H.

TWO POSITIVE SAMPLES: Connect the higher positive sample to inlet H. Connect the lower positive sample to inlet L.

ONE POSITIVE AND ONE NEGATIVE SAMPLE: Connect the positive sample to inlet H. Connect the negative sample to inlet L.

Cleveland Controls
DIVISION OF UNICONTROL INC.
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Cleveland OH 44109

Tel: **216-398-0330**
Fax: **216-398-8558**
Email:**saleshvac@unicontrolinc.com**
Web page: **http://www.clevelandcontrols.com**

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Bulletin LTAFS222-08

ELECTRICAL CONNECTIONS (SEE FIGURE 3)

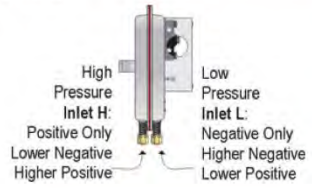
Before pressure is applied to the diaphragm, the switch contacts will be in the normally closed (NC) position. The snap switch has screw top terminals with cup washers. Wire alarm and control applications as shown in Figure 4.

FIELD ADJUSTMENT

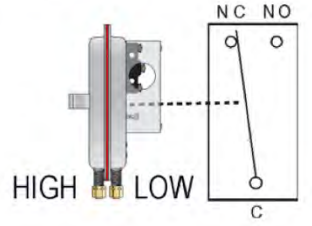
The adjustment range of an **AFS-222** Air Switch is 0.05±.02" w.c. to 12.0" w.c. To adjust the set point, turn the adjusting screw counterclockwise until motion has stopped. Next, turn the adjusting screw 4 complete turns in a clockwise direction to engage the spring. From this point, the next ten turns will be used for the actual calibration. **Each full turn represents approximately 1.2" w.c.**

Please note: To properly calibrate an air switch, a digital manometer or other measuring device should be used to confirm the actual set point.

(Figure 2)

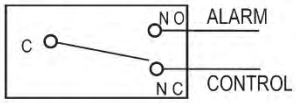


(Figure 3)

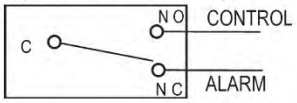


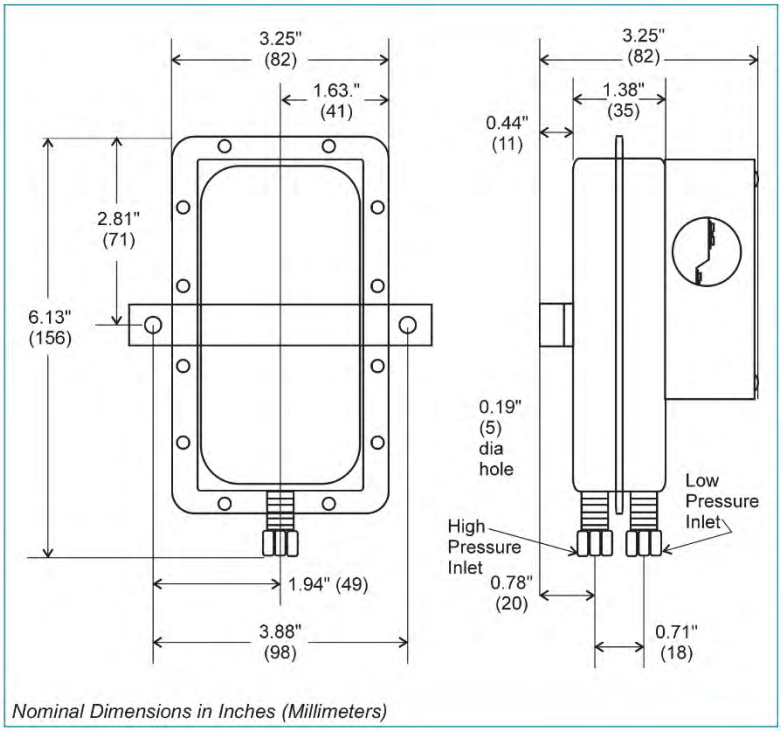
(Figure 4)

To prove excessive air flow or pressure:



To prove insufficient air flow or pressure:





Nominal Dimensions in Inches (Millimeters)

SPECIFICATIONS

MODEL AFS-222 AIR PRESSURE SENSING SWITCH WITH ADJUSTABLE SET POINT RANGE

Mounting Position:
Mount with the diaphragm in any vertical plane.

Set Point Range:
0.05 ± 0.02" w.c. to 12.0"w.c.

Field Adjustable "Operate Range":
0.07"w.c. to 12.0" w.c.

Field Adjustable "Release Range":
0.04"w.c. to 11.2" w.c.

Approximate Switching Differential:
Progressive, increasing from 0.02 ± 0.01"w.c. at minimum set point to approximately 0.8 " w.c. at maximum set point.

Measured Media:
Air, or combustion by-products that will not degrade silicone.

Maximum Pressure:
½ psi (0.03 bar).

Operating Temperature Range:
-40F to 180F (-40 to 82C).

Life:
100,000 cycles minimum at ½ psi maximum pressure each cycle and at maximum rated electrical load.

Electrical Rating:
300 VA pilot duty at 115 to 277 VAC, 15 amps noninductive to 277 VAC, 60Hz.

Contact Arrangement: SPDT.

Electrical Connections:
Screw-type terminals with cup washers.

Conduit Opening:
⅞" diameter opening accepts ½" conduit.

Sample Line Connectors:
Male, externally threaded 7/16" -24 UNS 2A thread, complete with nuts and self-aligning ferrules.

Sample Line Connections:
Connectors will accept ¼" OD rigid or semi-rigid tubing.

Approvals: UL, FM, CSA.

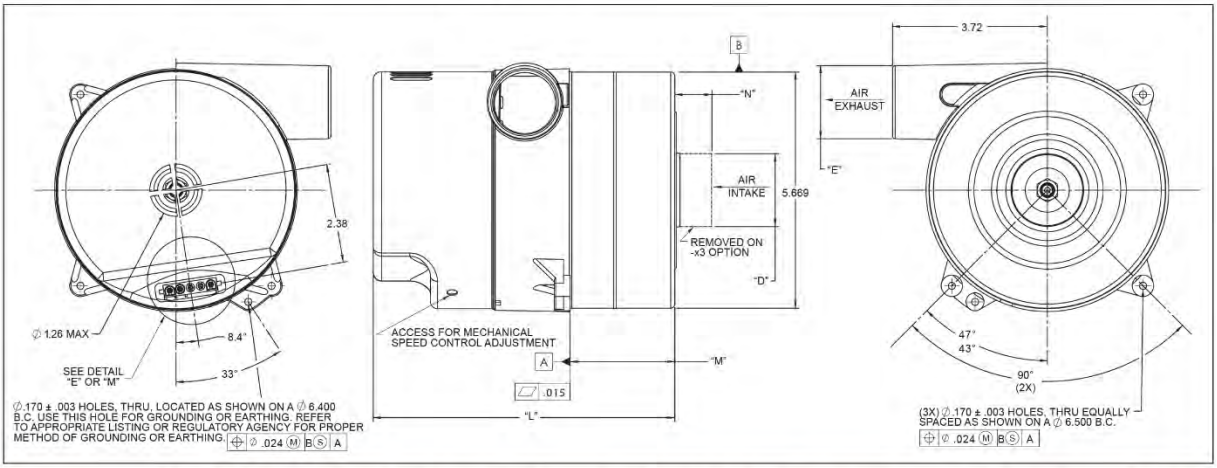
Shipping Weight: 1.2 lbs.

Accessories:

- P/N 18311 Slip-on ¼" OD Tubing Adapter, suitable for slipping on flexible plastic tubing.
- Sample line probes.
- Orifice plugs (pulsation dampers).

BBA14-11 Series - Brushless DC Blower
120 Volt AC Input, Multistage Bypass

MERCURY Brushless Blowers



MODEL	AIR INLET AND OUTLET DIAMETER mm / inches	LENGTH (L) mm / inches	LENGTH (M) mm / inches	LENGTH (N) mm / inches	VACUUM (MAX) mBar / in H_2O	PRESSURE (MAX) mBar / in H_2O	FLOW (MAX) m^3/h / sCFM	PERFORMANCE CONTROL TYPE
BBA14-111SMB	31.8 / 1.25	127 / 5.0	7.1 / 0.28	19.1 / 0.75	72.3 / 29.0	73.4 / 29.5	113.8 / 67	Built in Potentiometer
BBA14-111SEB	31.8 / 1.25	127 / 5.0	7.1 / 0.28	19.1 / 0.75	72.3 / 29.0	73.4 / 29.5	113.8 / 67	1.5-10VDC signal
BBA14-112SMB	31.8 / 1.25	150 / 5.9	29.5 / 1.16	19.1 / 0.75	118.0 / 47.4	113.0 / 53.4	109.6 / 64.5	Built in Potentiometer
BBA14-112SEB	31.8 / 1.25	150 / 5.9	29.5 / 1.16	19.1 / 0.75	118.0 / 47.4	113.0 / 53.4	109.6 / 64.5	1.5-10VDC signal
BBA14-113SMB	31.8 / 1.25	173 / 6.8	52.6 / 2.07	19.1 / 0.75	171.0 / 68.7	191.0 / 76.7	78.3 / 46.1	Built in Potentiometer
BBA14-113SEB	31.8 / 1.25	173 / 6.8	52.6 / 2.07	19.1 / 0.75	171.0 / 68.7	191.0 / 76.7	78.3 / 46.1	1.5-10VDC signal
BBA14-111HMB	44.5 / 1.75	130 / 5.1	10.4 / 0.41	22.6 / 0.89	62.9 / 25.2	70.3 / 28.2	191.1 / 112.5	Built in Potentiometer
BBA14-111HEB	44.5 / 1.75	130 / 5.1	10.4 / 0.41	22.6 / 0.89	62.9 / 25.2	70.3 / 28.2	191.1 / 112.5	1.5-10VDC signal
BBA14-112HMB	44.5 / 1.75	158 / 6.1	37.1 / 1.46	22.6 / 0.89	118.4 / 47.6	129.8 / 52.1	159.9 / 94.1	Built in Potentiometer
BBA14-112HEB	44.5 / 1.75	158 / 6.1	37.1 / 1.46	22.6 / 0.89	118.4 / 47.6	129.8 / 52.1	159.9 / 94.1	1.5-10VDC signal
BBA14-113HMB	44.5 / 1.75	185 / 7.3	64.0/2.52	22.6 / 0.89	169.0 / 67.8	194.2 / 78.0	154.7 / 91.0	Built in Potentiometer
BBA14-113HEB	44.5 / 1.75	185 / 7.3	64.0/2.52	22.6 / 0.89	169.0 / 67.8	194.2 / 78.0	154.7 / 91.0	1.5-10VDC signal

SPECIFICATIONS

1. Input Voltage: 120 Volts AC ± 10%
2. Working Environment: 0°C to 50°C, clean working air.
3. Storage Temperature: -40°C to 80°C
4. Refer to Northland Terms and Conditions for our standard conditions of sales

OPTIONS (model suffix)

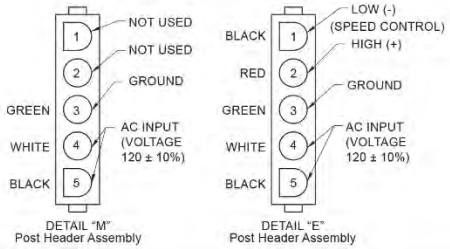
x0 Standard product (with working air inlet tube)
x1 Without working air inlet tube
x2 With working air inlet tube, with inlet tube for cooling air
x3 Without working air inlet tube, with inlet tube for cooling air
0x Standard control type (1.5 - 10 VDC signal)
1x 0.75 - 5 VDC signal
2x 4 - 20 mA signal

ACCESSORIES

BBA14-F125:
Air inlet filter for use with 1.25" inlet pipes
BBA14-F175:
Air inlet filter for use with 1.75" inlet pipes

WIRING DETAILS

Blower connector mates with AMP connector housing PN 1-480763 populated with pins AMP PN 35055-1.



NOTICES AND CAUTIONS

- This document is for informational purposes only. Northland, a Scott Fetzer Company accepts no liability for the accuracy of the information contained in this document. Northland reserves the right to modify, revise or discontinue products without prior notice.
- All test data was obtained in laboratory conditions, using a laminar flow element. Performance will vary depending on environment conditions and by application.
- The Improper application of voltage will damage this product. Refer to wiring diagram above.
- Refer to Mercury User Guide (NMT part no. 25377) for proper installation, and use.

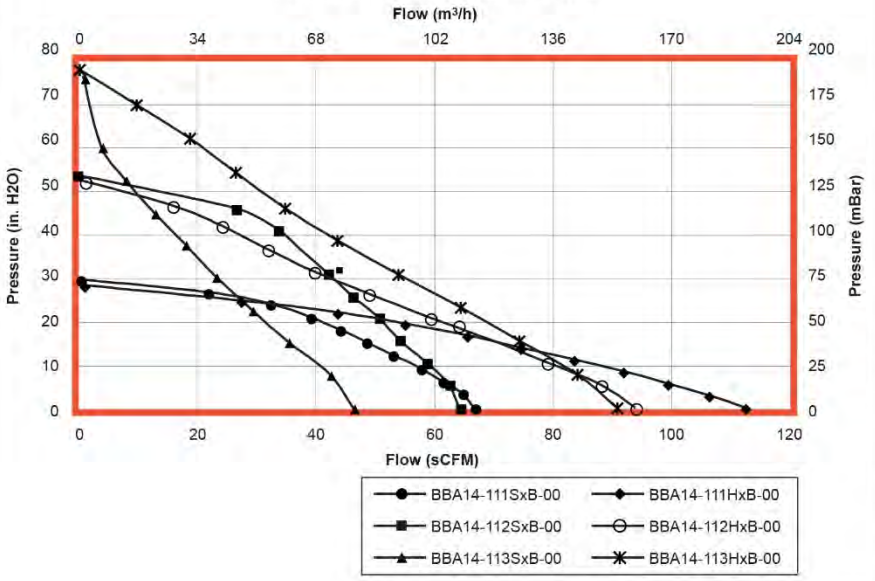
Northland MOTOR TECHNOLOGIES
Putting concepts in motion
968 BRADLEY STREET | WATERTOWN, NEW YORK 13601 USA
315.782.2350 | fax: 315.788.1180 | www.northlandmotor.com

Sept. 16, 2008, Rev B

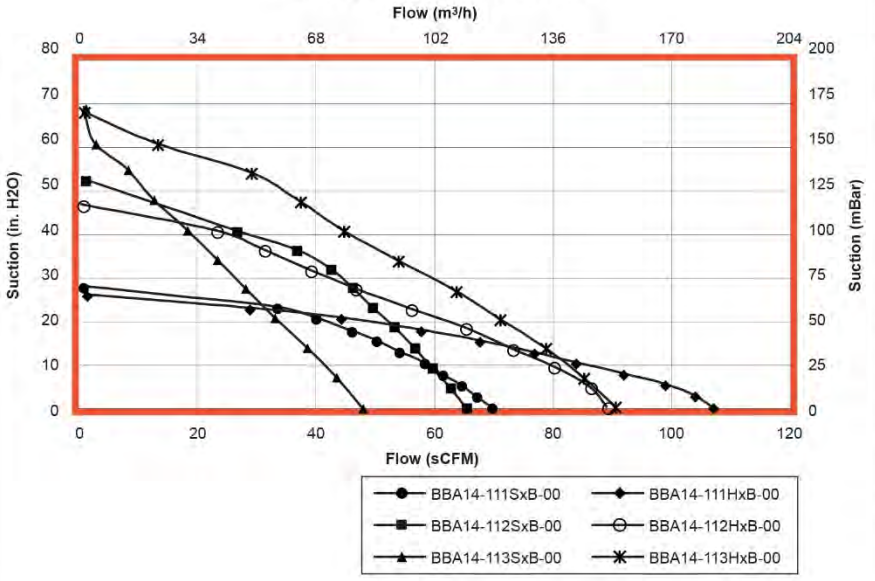
BBA14-11 Series - Brushless DC Blower
120 Volt AC Input, Multistage Bypass

MERCURY Brushless Blowers

TYPICAL PRESSURE PERFORMANCE



TYPICAL VACUUM PERFORMANCE



NOTES

- Product selection should be based on a performance curve that will supply at least 5% greater pressure (or suction) at the flow point for the application.
- Please contact your local factory Sales Representative for additional models and features.
- Refer to Mercury User Guide (NMT part no. 25377) for proper installation, and use.
- For pressure applications NMT recommends that blower should be installed in a manner that clamps the fan shell cover to the blower casting.
- NMT recommends that customer wiring to the blower as a minimum be 18AWG.

EMISSIONS

- This product may require a line filter or power factor correction module to meet specific emissions requirements. Please consult your local factory Sales Representative with the specific requirements for guidance and selection of the proper filter.

TEST METHODOLOGY

- CFM = SCFM.
- Standard air = clean, dry air.
- Density is corrected to 0.075 pounds mass per cubic foot.
- Barometric pressure is corrected to sea level of 29.92 inches of mercury.
- Temperature = 68°F.
- Measurement Device – Laminar Flow Element.

AGENCY

- UL 507 RECOGNIZED COMPONENT – ELECTRONICALLY CONTROLLED MOTORS (XDNW2, XDNW8)
- UL Standard for Overheating Protection for Motors UL 2111, First Edition, revised January 27, 2006 and UL Standard for Electric Motors, UL 1004, Fifth Edition, revised March 10, 2006.
- Canadian Standard for Motors and Generators, C22.2 NO. 100-04 and Canadian Standard for Motors with Inherent Overheating Protection, C22.2 77-95
- These motors were tested with controllers evaluated to the applicable requirements of UL 60730-1A and CAN/CSA-E60730-1:02
- Northland continuously submits products to various agencies for certification. For a complete list of agency certifications, or for specific requirements for your application, please contact your local factory Sales Representative.

Northland MOTOR TECHNOLOGIES
Putting concepts in motion

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315.782.2350 | fax: 315.788.1180 | www.northlandmotor.com

Sept. 16, 2008, Rev B

■ Features :

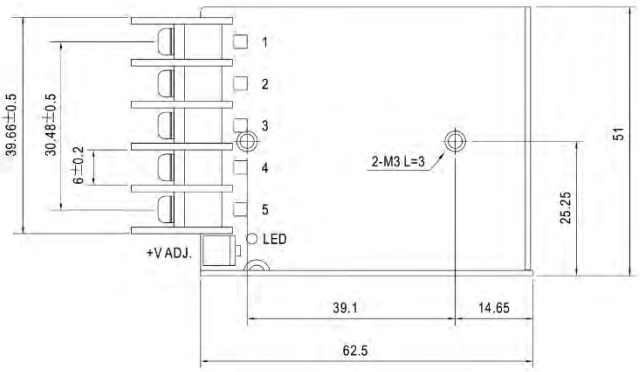
- Universal AC input / Full range
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Cooling by free air convection
- LED indicator for power on
- 100% full load burn-in test
- No load power consumption<0.5W
- All using 105℃ long life electrolytic capacitors
- Withstand 300VAC surge input for 5 second
- High operating temperature up to 70℃
- Withstand 5G vibration test
- High efficiency, long life and high reliability
- 3 years warranty

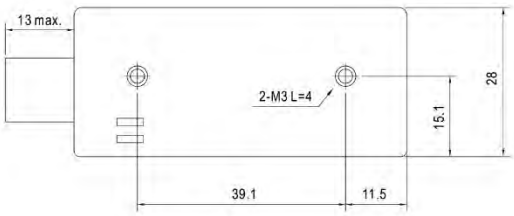
SPECIFICATION

MODEL		RS-15-3.3	RS-15-5	RS-15-12	RS-15-15	RS-15-24	RS-15-48
OUTPUT	DC VOLTAGE	3.3V	5V	12V	15V	24V	48V
	RATED CURRENT	3A	3A	1.3A	1A	0.625A	0.313A
	CURRENT RANGE	0 ~ 3A	0 ~ 3A	0 ~ 1.3A	0 ~ 1A	0 ~ 0.625A	0 ~ 0.313A
	RATED POWER	9.9W	15W	15.6W	15W	15W	15.024W
	RIPPLE & NOISE (max.) Note.2	80mVp-p	80mVp-p	120mVp-p	120mVp-p	200mVp-p	200mVp-p
	VOLTAGE ADJ. RANGE	2.9 ~ 3.6V	4.75 ~ 5.5V	10.8 ~ 13.2V	13.5 ~ 16.5V	22 ~ 27.6V	43.2 ~ 52.8V
	VOLTAGE TOLERANCE Note.3	±3.0%	±2.0%	±1.0%	±1.0%	±1.0%	±1.0%
	LINE REGULATION Note.4	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	LOAD REGULATION Note.5	±2.0%	±1.5%	±0.5%	±0.5%	±0.5%	±0.5%
	SETUP, RISE TIME	1000ms, 30ms/230VAC 1000ms, 30ms/115VAC at full load					
	HOLD UP TIME (Typ.)	70ms/230VAC 12ms/115VAC at full load					
INPUT	VOLTAGE RANGE	85 ~ 264VAC 120 ~ 370VDC					
	FREQUENCY RANGE	47 ~ 63Hz					
	EFFICIENCY (Typ.)	72%	77%	81%	81%	82%	82%
	AC CURRENT (Typ.)	0.35A/115VAC 0.25A/230VAC					
	INRUSH CURRENT (Typ.)	COLD START 65A / 230VAC					
	LEAKAGE CURRENT	<2mA / 240VAC					
PROTECTION	OVERLOAD	Above 105% rated output power					
		Protection type : Hiccup mode, recovers automatically after fault condition is removed					
	OVER VOLTAGE	3.8 ~ 4.45V	5.75 ~ 6.75V	13.8 ~ 16.2V	17.25 ~ 20.25V	28.4 ~ 32.4V	55.2 ~ 64.8V
		Protection type : Shut off o/p voltage, clamping by zener diode					
	OVER TEMPERATURE	Shut down o/p voltage, recovers automatically after temperature goes down					
ENVIRONMENT	WORKING TEMP.	-20 ~ +70℃ (Refer to "Derating Curve")					
	WORKING HUMIDITY	20 ~ 90% RH non-condensing					
	STORAGE TEMP., HUMIDITY	-40 ~ +85℃, 10 ~ 95% RH					
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)					
	VIBRATION	10 ~ 500Hz, 5G 10min./1cycle, period for 60min. each along X, Y, Z axes					
SAFETY & EMC (Note 6)	SAFETY STANDARDS	UL60950-1, TUV EN60950-1 , CCC GB4943 approved					
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:0.5KVAC					
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃/ 70% RH					
	EMC EMISSION	Compliance to EN55032 (CISPR32) Class B, EN61000-3-2,-3,GB9254 class B,GB17625.1					
	EMC IMMUNITY	Compliance to EN61000-4-2, 3, 4, 5, 6, 8,11, EN55024, EN61000-6-1, light industry level, criteria A					
OTHERS	MTBF	1608.8Khrs min. MIL-HDBK-217F (25℃)					
	DIMENSION	62.5*51*28mm (L*W*H)					
	PACKING	0.13Kg; 108pcs/15Kg/0.71CUFT					
NOTE	1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature. 2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor. 3. Tolerance : includes set up tolerance, line regulation and load regulation. 4. Line regulation is measured from low line to high line at rated load. 5. Load regulation is measured from 0% to 100% rated load. 6. The power supply is considered a component which will be installed into a final equipment. All the EMC tests are been executed by mounting the unit on a 230mm*230mm metal plate with 1mm of thickness. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies."						

■ Mechanical Specification

Case No.971A Unit:mm



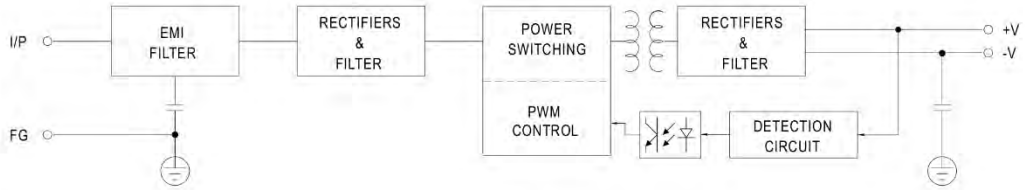


Terminal Pin No. Assignment

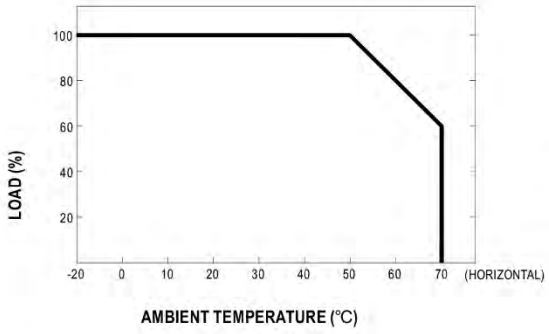
Pin No.	Assignment	Pin No.	Assignment
1	AC/L	4	DC OUTPUT -V
2	AC/N	5	DC OUTPUT +V
3	FG ⏚		

■ Block Diagram

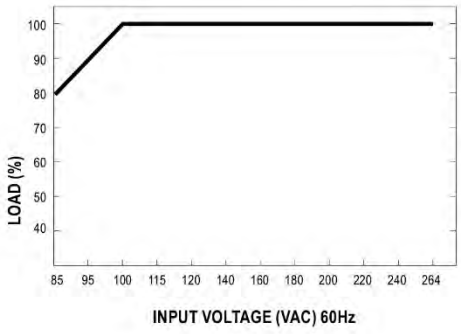
fosc : 132KHz



■ Derating Curve



■ Output Derating VS Input Voltage



File Name:RS-15-SPEC 2017-05-11

Introduction

The LME7 burner control is ideally suited for use in industrial thermal process applications. The LME7 is extremely flexible, and encompasses the following features:

- Accepts standard UV, self-check UV, or self-check IR scanners and/or flame rods
- Integral LED display
- Programmable purge times and safety times
- Programmable actuator positions for purge, ignition, and low fire
- Adjustable time overlap of spark ignition and pilot valve
- Adjustable time overlap of pilot and main gas valves
- Proof-of-closure (POC) switch monitoring
- Modbus RTU or BACnet MS/TP communication
- Optional gas valve proving function
- Password-protected access to OEM parameters
- Integrated actuator control
- Integrated PWM blower control

Figure 1-1: The Main Components of an LME7 System

LME7 System Builder

The LME7 burner control system is comprised of many components. Use the following pages to choose the components needed for your specific application.

Control Panel Components

Base Unit – Qty (1) Required

Choose one of the following LME7 base unit options. See page 10 for mounting information.

LME71.000A1	Flame safeguard, without actuator control, without self-check scanner capability, 110V
LME73.000A1	Flame safeguard, with actuator control, without self-check scanner capability, 110V
LME75.000A1	Flame safeguard, with actuator control, with self-check scanner capability, 110V

Program Module – Qty (1) Required

Choose one of the following PME7 program modules. The program module contains the program sequence used to operate the burner.

	Base Unit	Controls Actuator	Actuator Control Can Be Disabled	Controls PWM Blower	Flame Rod	Non-Self-Checking UV Scanner	Self-Checking UV or IR Scanner	Valve Proving	Purge	Independent Ignition Position	Analog Input for Fire Rate
PME71.111A1	LME71.000A1				•	•			•		
PME71.112A1					•	•					
PME71.901A1				•	•	•		•	•		•
PME73.811A1	LME73.000A1	•			•	•		•	•		•
PME73.812A1		•			•	•			•	•	•
PME73.840A1		•	•		•	•		•	•		
PME75.811A1	LME75.000A1	•	•		•		•	•	•		•
PME75.812A1		•	•		•		•		•	•	•

Mounting

LME7 Controller

The LME7 must be mounted inside an enclosure that will protect it from dirt and moisture. The unit should be mounted with three #8 screws (not provided). The panel, which the unit sits on, should be drilled and tapped to accommodate these screws.

During the mounting process, consideration should be given to the various plugs and wires that must be attached to the LME7. Electrical connections are made via plugs that are located in the face of the unit with wires coming out to the top, left side, and right side of the unit. A space of at least one inch is recommended above, to the left, and to the right of the LME7. The recommended total space to leave for the LME7 is 8" x 6.75" x 3" because the overall dimensions of the LME7 are 7.09" x 4.72" x 2.07".

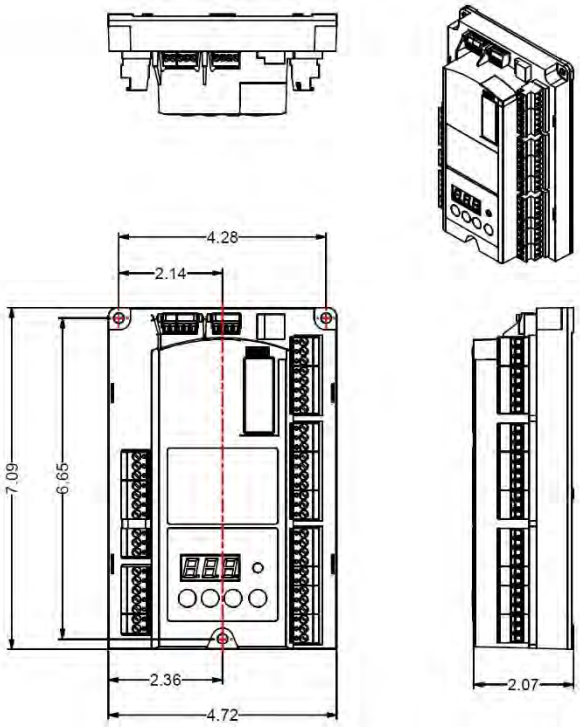


Figure 1-2: LME7 Dimensions (inches)

Important Safety Notes

- The LME7 is a safety device. Under no circumstances should the unit be modified or opened. SCC Inc. will not assume responsibility for damage resulting from unauthorized modification of the unit.
- All activities (mounting, installation, service work, etc.) must be performed by qualified staff.
- Before performing any work in the connection area of the LME7, disconnect the unit from the main supply (all-polar disconnection).
- Protection against electrical shock hazard on the LME7 and all other connected electrical components must be ensured through good wiring and grounding practices.
- Fall or shock can adversely affect the safety functions of an LME7. Such units must not be put into operation, even if they do not exhibit any apparent damage.
- Condensation and the entry of water into the unit must be avoided.

Approvals

The LME7 has the following standards and approvals:

Applied directives:

• Low-voltage directive	2014/35/EC
• Directive for pressure devices	2014/68/EC
• Gas Appliances Regulation	(EU) 2016/426
• Electromagnetic compatibility EMC (immunity) *)	2014/30/EC

*) The compliance with EMC emission requirements must be checked after the burner control is installed in equipment

Compliance with the regulations of the applied directives is verified by the adherence to the following standards / regulations:

• Automatic burner control systems for burners and appliances burning gaseous or liquid fuels	DIN EN 298
• Safety and control devices for gas burners and gas burning appliances	DIN EN 13611
• Automatic electrical controls for household and similar use Part 2-5: Special requirements on automatic electric burner control and monitoring systems	DIN EN 60730-2-5
• Safety and control devices for gas burners and gas burning appliances - Valve proving systems for automatic shut-off valves	DIN EN 1643

The relevant valid edition of the standards can be found in the declaration of conformity!

Note on **DIN EN 60335-2-102**
Household and similar electrical appliances - Safety - Part 2-102:
Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections. The electrical connections of the LME7 and the PME7 comply with the requirements of EN 60335-2-102.

EAC Conformity mark (Eurasian Conformity mark)

ISO 9001:2015
ISO 14001:2015
OHSAS 18001:2007

China RoHS
Hazardous substances table:
http://www.siemens.com/download?A6V10883536

Only AC 120 V versions

SIEMENS

7711

Flame detector QRA4...

UV flame detector for use with burner controls from Siemens for the supervision of gas or oil flames.

The QRA4... and this Data Sheet are intended for use by OEMs which integrate the flame detectors in their products.

Use

The flame detector is used for the supervision of gas flames, yellow- or blue-burning oil flames and for ignition spark proving in intermittent operation.

The QRA4... is for use with the following types of burner control:

QRA4.U	QRA4M.U	Burner control	Data Sheet
•	---	LFL...	N7451
•	---	LFE1...	N7461
•	---	LFE10...	N7781
•	---	LGB2... / LGB4... with AGQ1...	N7435
•	---	LME21...C2 / LME22...C2 with AGQ3...	N7101
•	---	LME39...C2 with AGQ3...	N7106
•	---	LME41...C2 / LME44...C2 with AGQ3...	N7101
•	---	LME7...	N7105
•	•	LMV26.300... with AGM60.1...	N7547
•	•	LMV27.100...	N7541
•	•	LMV36.520... with AGM60.4...	N7544
•	•	LMV37.4...	N7546
•	---	LMV5... with AGQ1...	N7550

Other burner controls on request.

Warning notes

To avoid injury to persons, damage to property or the environment, the following warning notes must be observed!

Do not open, interfere with or modify the flame detector! Siemens will not assume responsibility for damage resulting from unauthorized interference!

- All activities (mounting, installation and service work, etc.) must be performed by qualified personnel
- Before making any wiring changes in the connection area, completely isolate the plant from mains supply (all-polar disconnection). Ensure that the plant cannot be inadvertently switched on again and that it is indeed dead. If not observed, there is a risk of electric shock hazard.
- Ensure protection against electric shock hazard by providing adequate protection for the connection terminals. If this is not observed, there is a risk of electric shock
- Each time work has been carried out (mounting, installation, service work, etc.), check to ensure that wiring is in an orderly state. If this is not observed, there is a risk of loss of safety functions and a risk of electric shock
- Halogen lamps, welding equipment, special lamps or ignition sparks may produce sufficient radiation for the detector's UV cell to ignite. X-rays and gamma radiation can also generate erroneous flame signals. If this is not observed, there is a risk of loss of safety functions
- Fall or shock can adversely affect the safety functions. Such detectors must not be put into operation, even if they do not exhibit any damage. If this is not observed, there is a risk of loss of safety functions and a risk of electric shock

Mounting notes

- Ensure that the relevant national safety regulations are complied with

Installation notes

- Always run the high-voltage ignition cables separate while observing the greatest possible distance to the detector and to other cables

Electrical connection of the flame detector

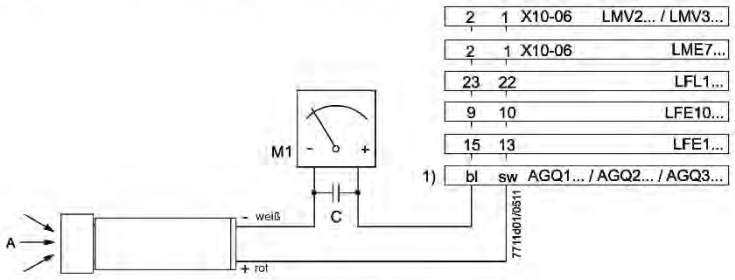
It is important to achieve practically disturbance- and loss-free signal transmission:

- Never run the detector cable together with other cables
  – Line capacitance reduces the magnitude of the flame signal
  – Use a separate cable
- Observe the permissible lengths of the detector cable (refer to «Technical data» of burner control / basic documentation used)
- The connecting wires must be run through protective tubing (made of plastic or earthed metal)

Commissioning notes

Trouble-free burner operation is ensured only when the intensity of UV radiation at the detector's location is high enough for the detector's UV cell to ignite during each half wave. The **intensity of UV radiation** at the detector's location is **checked by measuring the detector current** (refer to Data Sheet of the respective burner control)

Measuring circuit for QRA4...



Legend

1) Connection of microammeter across adapter AGQ1... / AGQ2... / AGQ3... and flame detector
A Incidence of radiation
M Microammeter (DC), internal resistance ≤5,000 Ω
C Electrolytic capacitor 100...470 µF, DC 10...25 V

Standards and certificates

Note!
Only in connection with burner controls!

EAC Conformity mark (Eurasian Conformity mark)

ISO 9001:2008
ISO 14001:2004
OHSAS 18001:2007

China RoHS
Hazardous substances table:
http://www.siemens.com/download?A6V10883536

Service notes

The UV cell is glued inside the housing and cannot be removed. When the end of the UV cell's service life is reached, the complete flame detector must be replaced.

Disposal notes

The flame detector contains electrical and electronic components and must not be disposed of together with domestic waste.
Local and currently valid legislation must be observed.

Mechanical design

Flame detector QRA4... UV flame detector for frontal illumination. Housing made of aluminum, with ¾"-14NPSM connecting thread for fitting the detector to the burner or boiler. Connecting wires of about 1.8 m length for the electrical connection. ½"-14NPSM thread for a fitting, required for the connection of a Menzel tube for protecting the connecting wires (½" conduit).

Ordering

Article no.	Type	Sensitivity
BPZ:QRA4.U	QRA4.U	Normal
BPZ:QRA4M.U	QRA4M.U	High

When ordering, please give the complete type reference according.

Accessories

Product no.	Designation
AGG02	**Heat insulation glass** with spring washer and O-ring
AGG04	**Mounting coupling**

Adapter of QRA4...-NPSM thread for a European pipe thread (G1").

AGG15	**Heat insulating piece** between QRA4... and mounting coupling AGG04.

Heat insulating piece

AGG04

AGG15

`

Technical data

General detector data	Average life of UV cell	Approx. 10,000 hours at max. +50 °C; higher ambient temperatures reduce considerably the cell's life
	Perm. combustion chamber pressure	Max. 150 mbar
	Degree of protection	IP54 (to be ensured through mounting)
	Mounting position	Optional
	Weight	Approx. 180 g
	Device safety class	II (double-insulated)
	Length of connecting wires	
	- QRA4...	Approx. 180 g
	- AGG02	Approx. 10 g
	- AGG04	Approx. 270 g
	- AGG15	Approx. 100 g
	Conduit for protective sleeve (Menzel sleeve)	½"-14NPSM thread
Environmental conditions	**Storage**	IEC 60721-3-1
	Climatic conditions	Class 1K3
	Mechanical conditions	Class 1M2
	Temperature range	-20...60 °C
	Humidity	<95% r.h.
	Transport	IEC 60721-3-2
	Climatic conditions	Class 2K3
	Mechanical conditions	Class 2M2
	Temperature range	-20...60 °C
	Humidity	<95% r.h.
	Operation	IEC 60721-3-3
	Climatic conditions	Class 3K5
	Mechanical conditions	Class 3M5
	Temperature range	-20...60 °C
	Humidity	<95% r.h.
	Installation altitude	Max. 2,000 m above sea level

Caution!
Condensation, formation of ice and ingress of water are not permitted!
If this is not observed, there is a risk of loss of safety functions and a risk of electric shock.

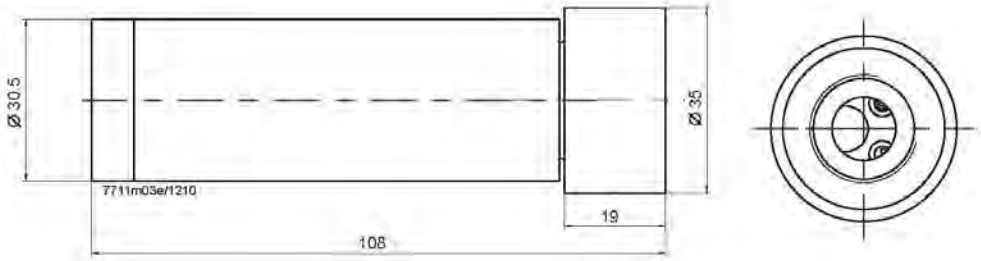
Function

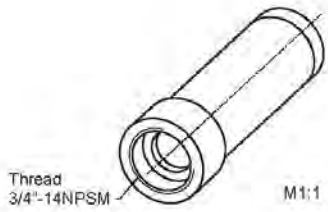
With this type of flame supervision, the UV radiation emitted by gas or oil flames is used to generate the flame signal.
The radiation detector is a UV-sensitive cell with 2 electrodes, which ignite when illuminated with radiation in the 190...270 nm range of the spectrum, thereby triggering a current in the flame detector circuit.
The UV cell does not respond to glowing firebrick in the combustion chamber or to daylight.

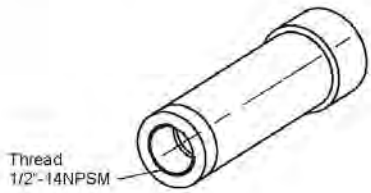
Dimensions

Dimensions in mm

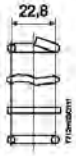
Flame detector QRA4...



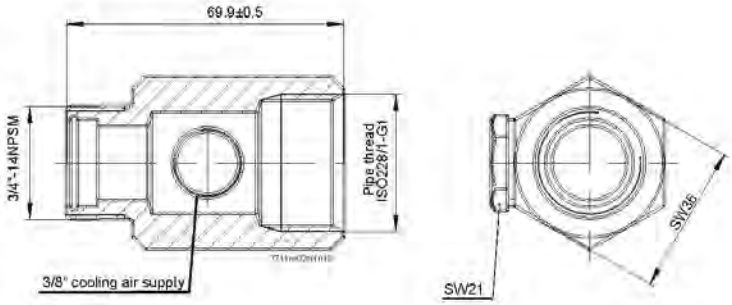




Heat insulation glass
AGG02



Mounting coupling
AGG04



SCC Inc.

Technical Instructions

Document No. CVLV-2000

August 30, 2021

VKG... Series

VKG... Butterfly Valves

Description

VKG... series threaded butterfly valves control the flow of natural gas, propane, butane, or air.

Features

- Exclusive, patented technology*
- UL approved, ½" to 4" NPT threaded
- CE approved, ½" to 3" Rp threaded
- Full, medium, or reduced port versions available to optimize pressure drop and flow control
- Shaft supported by precision bearings for repeatable performance
- Low leakage rate at full closed position without a beveled disc
- Low pressure drop at the full open position
- Corrosion-resistant for outdoor applications
- Clear position indication on a 2" laser-etched, anodized dial
- 90° clockwise or counterclockwise rotation
- Manual kits available for fixed position adjustment
- Crank arm kits available for linkage applications
- Valve actuator assemblies available (Document No. VA-1000)
- Flow in either direction

*Patented under US Patent No. 9,915,352

Application

VKG... series butterfly valves control the flow of natural gas, propane, butane, or air. Valves are positioned using either a manual kit, crank arm kit, or rotary actuator. VKG... series butterfly valves are not intended for use as shutoff valves. The valve body contains (2) identical female pipe threads for a gas tight seal with piping. Full, medium, and reduced port sizes are offered to optimize control.

Product Part Numbers

The part number structure includes port size, pipe size, and thread type. The example part number is a VKG... series full port, 2" NPT butterfly valve.

VKG 10 . 050 U

Model

Port Size

10 = Full port
20 = Medium port
30 = Reduced port

Pipe Size

(mm)	(inches)	
014	1/2"	→ Full port only (high turndown)
015	1/2"	→ Full port only
020	3/4"	→ Full port only
025	1"	→ Full port & medium port only
032	1-1/4"	→ Full port & medium port only
040	1-1/2"	
050	2"	
065	2-1/2"	
080	3"	
100	4"	→ NPT only

Thread Type

U = NPT
E = Rp

Product Part Numbers (continued)

UL approved and non-approved butterfly valve part numbers, ratings, and port diameters are tabulated below. The VKG...U butterfly valves are NPT thread type.

Table 1: UL Approved Butterfly Valve Part Numbers

Port Type	Part Number	Max Operating Pressure	Max Surge Pressure	Temperature Range	Pipe Size inch	Port Diameter inch [mm]
Full	VKG10.014U	80 psig [550 kPa]	240 psig [1650 kPa]	-40 to 160°F [-40 to 70°C]	1/2	0.61 [15.5]
	VKG10.015U	25 psig [170 kPa]	75 psig [510 kPa]		1/2	0.61 [15.5]
	VKG10.020U				3/4	0.87 [22.1]
	VKG10.025U				1	1.10 [27.9]
	VKG10.032U				1-1/4	1.46 [37.1]
	VKG10.040U				1-1/2	1.65 [41.9]
	VKG10.050U				2	2.13 [54.1]
	VKG10.065U				2-1/2	2.64 [67.1]
	VKG10.080U				3	3.23 [82.0]
	VKG10.100U	15 psig [100 kPa]			4	4.17 [105.9]
Medium	VKG20.025U	25 psig [170 kPa]	75 psig [510 kPa]	-40 to 160°F [-40 to 70°C]	1	0.87 [22.1]
	VKG20.032U				1-1/4	1.10 [27.9]
	VKG20.040U				1-1/2	1.46 [37.1]
	VKG20.050U				2	1.65 [41.9]
	VKG20.065U				2-1/2	2.13 [54.1]
	VKG20.080U				3	2.64 [67.1]
	VKG20.100U				4	3.23 [82.0]
Reduced	VKG30.040U	25 psig [170 kPa]	75 psig [510 kPa]	-40 to 160°F [-40 to 70°C]	1-1/2	1.10 [27.9]
	VKG30.050U				2	1.46 [37.1]
	VKG30.065U				2-1/2	1.65 [41.9]
	VKG30.080U				3	2.13 [54.1]
	VKG30.100U				4	2.64 [67.1]

Product Part Numbers (continued)

CE approved butterfly valve part numbers, ratings, and port diameters are tabulated below. The VKG...E butterfly valves are Rp thread type.

Table 2: CE Approved Butterfly Valve Part Numbers

Port Type	Part Number	Max Operating Pressure	Max Surge Pressure	Temperature Range	Pipe Size inch	Port Diameter inch [mm]
Full	VKG10.015E	25 psig [170 kPa]	75 psig [510 kPa]	-40 to 160°F [-40 to 70°C]	1/2	0.61 [15.5]
	VKG10.020E				3/4	0.87 [22.1]
	VKG10.025E				1	1.10 [27.9]
	VKG10.032E				1-1/4	1.46 [37.1]
	VKG10.040E				1-1/2	1.65 [41.9]
	VKG10.050E				2	2.13 [54.1]
	VKG10.065E				2-1/2	2.64 [67.1]
	VKG10.080E				3	3.23 [82.0]
Medium	VKG20.025E	25 psig [170 kPa]	75 psig [510 kPa]	-40 to 160°F [-40 to 70°C]	1	0.87 [22.1]
	VKG20.032E				1-1/4	1.10 [27.9]
	VKG20.040E				1-1/2	1.46 [37.1]
	VKG20.050E				2	1.65 [41.9]
	VKG20.065E				2-1/2	2.13 [54.1]
	VKG20.080E				3	2.64 [67.1]
Reduced	VKG30.040E	25 psig [170 kPa]	75 psig [510 kPa]	-40 to 160°F [-40 to 70°C]	1-1/2	1.10 [27.9]
	VKG30.050E				2	1.46 [37.1]
	VKG30.065E				2-1/2	1.65 [41.9]
	VKG30.080E				3	2.13 [54.1]

Accessories

VA... Valve Actuator Assemblies

Valve actuator assemblies ensure proper shaft alignment and engagement. A VKG... valve, SQM... actuator, coupling, and bracket are built, tested, and shipped as a VA... assembly. Valve actuator assemblies are available with the following Siemens actuators:

- SQM45...
- SQM33...
- SQM40/41...
- SQM5...

For additional information see Document No. VA-1000.

AGA92.1

A manual kit with fine adjustment can be added to any VKG... butterfly valve for use as a flow restrictor. The kit allows for precision position adjustment by turning a hex coupling; (14) revolutions make a 90° stroke. Locking nuts maintain the precise position at all rated pressures. To order AGA92.1 premounted on a VKG... butterfly valve, add a "-921" to the end of the VKG... valve part number. For example, the part number to order AGA92.1 premounted to a VKG10.050U valve is VKG10.050U-921.

AGA92.2

A manual kit with coarse adjustment can be added to any VKG... butterfly valve. To order AGA92.2 premounted on a VKG... butterfly valve, add a "-922" to the end of the VKG... valve part number. For example, the part number to order AGA92.2 premounted to a VKG10.050U valve is VKG10.050U-922.

CA-M10R...

A crank arm kit can be added to any VKG... series butterfly valve for use with a linkage system. Three crank arm kits are available. For more information, see Document No. CPBK-8000.

Accessories (continued)

AGA93.1

Bracket/coupling kit to connect any standard (NEMA 12) SQM33... or SQM45... actuator and all SQM40... or SQM41... actuators with a 10mm D shaft to any VKG... butterfly valve.

AGA93.1-N4

Bracket/coupling kit to connect any NEMA 4 SQM33... or SQM45... actuator to any VKG... butterfly valve.

AGA93.1E

Bracket/coupling kit to connect any SQM40... or SQM41... actuator with a 10mm keyed shaft to any VKG... butterfly valve.

AGA93.2

Bracket/coupling kit to connect any SQM5... actuator with a 3/8" square shaft to any VKG... butterfly valve.

AGA93.3

Bracket/coupling kit to connect any Gxx... actuator to any VKG... butterfly valve.

Materials

Below is a typical valve cross-section that identifies the materials used in the VKG... product line.

Table 3: VKG... Parts

Item	Description	Material
A	Valve body	Aluminum 6061
B	Seal	Buna-N
C	Shaft	Stainless steel (300 series)
D	Dial	Aluminum 6061
E	Shim	Teflon
F	Bearing (ball)	Steel
G	Shim	Stainless steel
H	Fastener	Steel (zinc plated)
I	Disc	Stainless steel (300 series)
J	Bearing (sleeve)	Acetal
K	Bearing (thrust)	Acetal
L	Spring	Stainless steel (17-4 PH)
M	Plug	Aluminum 6061
N	Cover	Aluminum 5052

VKG10.014U | **All VKG... valves except for VKG10.014U**

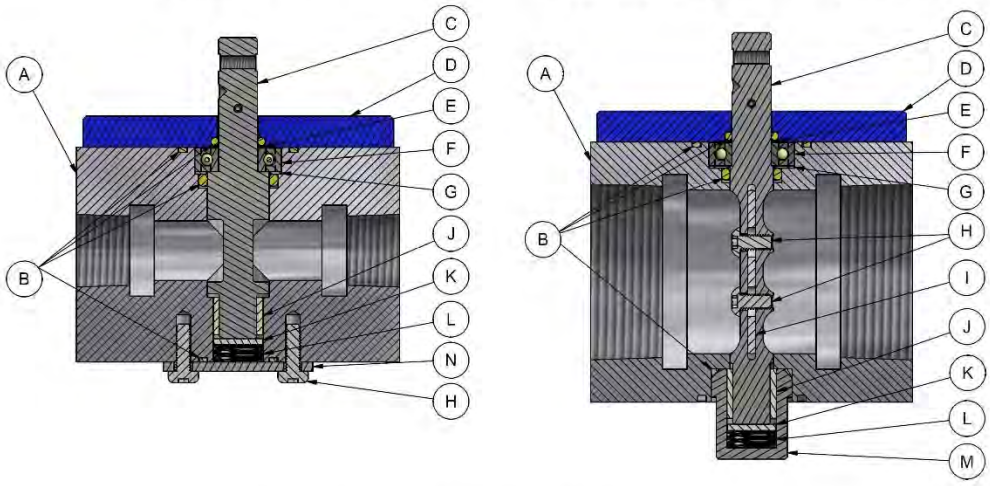


Figure 1: VKG... Valve Cross-Sectional Views

Installation

- Use suitable pipe thread sealant on all piping connections.
- **DO NOT** use the "plug" or "shaft" as a wrench grip. **ALWAYS** use a wrench on the provided valve body wrench flats when piping.
- Valve can be mounted in any orientation.
- Do not interfere with or modify the butterfly valve.
- All activities (mounting, installation, service work, etc.) must be performed by qualified staff.
- Fall or shock can adversely affect the function of these valves. Such valves must not be put into operation, even if they do not exhibit any damage.
- No special tools are required.
- Ensure the installation complies with relevant local and national codes.
- VKG... butterfly valves do not require maintenance.
- From the 0° full closed position, disc may turn in either direction to increase flow.
- Accommodates flow in either direction.

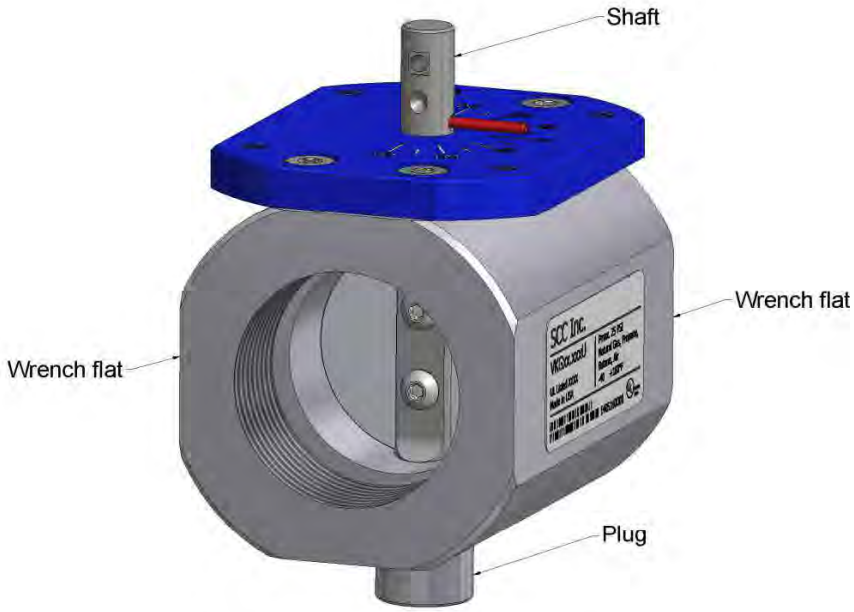


Figure 2: Isometric View of a VKG10.040U

Flow Data

Natural gas flow (SCFH) through the valve body and the corresponding boiler horsepower (BHP) are tabulated at common differential pressures. Calculated values assume a boiler efficiency of 85% and a natural gas heating value of 1000 BTU/SCF. Valve data is sorted by ascending Cv value for ease of selection. Cv values can be utilized to calculate flow at any operating condition (see page 13).

Flow is calculated with an inlet pressure of 15" wc at a media temperature of 60°F.

Multiplier from natural gas flow (SCFH) to: Air = 0.80, Propane = 0.65, Butane = 0.57
Multiplier from boiler horsepower (BHP) to: Propane = 1.62, Butane = 1.81

Table 4: Flow Rates of Natural Gas at Full Open Position (0.5-3" wc Differential Pressure)

Part Number	Thread Size	Port**	Cv	0.5" wc		1" wc		1.5" wc		2" wc		3" wc	
				SCFH	BHP*	SCFH	BHP*	SCFH	BHP*	SCFH	BHP*	SCFH	BHP*
VKG10.015x	1/2	FULL	5	195	5	276	7	338	9	391	10	478	12
VKG10.014U	1/2	FULL	7	274	7	387	10	474	12	547	14	669	17
VKG20.025x	1	MED.	19	743	19	1,050	27	1,286	33	1,484	38	1,817	46
VKG10.020x	3/4	FULL	20	782	20	1,105	28	1,353	34	1,562	40	1,912	49
VKG30.040x	1-1/2	RED.	30	1,173	30	1,658	42	2,030	52	2,343	60	2,868	73
VKG10.025x	1	FULL	31	1,212	31	1,713	44	2,098	53	2,421	61	2,964	75
VKG20.032x	1-1/4	MED.	41	1,603	41	2,266	58	2,774	70	3,203	81	3,920	100
VKG30.050x	2	RED.	62	2,424	62	3,427	87	4,195	107	4,843	123	5,928	151
VKG10.032x	1-1/4	FULL	75	2,932	74	4,145	105	5,075	129	5,858	149	7,171	182
VKG30.065x	2-1/2	RED.	76	2,971	75	4,200	107	5,143	131	5,937	151	7,266	185
VKG20.040x	1-1/2	MED.	81	3,166	80	4,477	114	5,481	139	6,327	161	7,745	197
VKG20.050x	2	MED.	97	3,792	96	5,361	136	6,564	167	7,577	192	9,274	235
VKG10.040x	1-1/2	FULL	100	3,909	99	5,527	140	6,767	172	7,811	198	9,561	243
VKG30.080x	3	RED.	147	5,746	146	8,124	206	9,947	253	11,483	292	14,055	357
VKG20.065x	2-1/2	MED.	170	6,645	169	9,395	239	11,503	292	13,279	337	16,254	413
VKG10.050x	2	FULL	180	7,036	179	9,948	253	12,180	309	14,060	357	17,210	437
VKG30.100U	4	RED.	204	7,975	202	11,274	286	13,804	351	15,935	405	19,505	495
VKG10.065x	2-1/2	FULL	255	9,968	253	14,093	358	17,255	438	19,919	506	24,381	619
VKG20.080x	3	MED.	275	10,750	273	15,198	386	18,609	473	21,481	545	26,293	668
VKG20.100U	4	MED.	431	16,848	428	23,820	605	29,165	741	33,667	855	41,208	1,046
VKG10.080x	3	FULL	438	17,122	435	24,207	615	29,638	753	34,213	869	41,878	1,063
VKG10.100U	4	FULL	828	32,367	822	45,761	1,162	56,029	1,423	64,677	1,642	79,166	2,010

* BHP calculated at 85% boiler efficiency
** MED. = Medium RED. = Reduced

Flow Data (continued)

Flow is calculated with an inlet pressure of 1 psig at a media temperature of 60°F.

Multiplier from natural gas flow (SCFH) to: Air = 0.80, Propane = 0.65, Butane = 0.57
Multiplier from boiler horsepower (BHP) to: Propane = 1.62, Butane = 1.81

Table 5: Flow Rates of Natural Gas at Full Open Position (4-12" wc Differential Pressure)

Part Number	Thread Size	Port**	Cv	4" wc		6" wc		8" wc		10" wc		12" wc	
				SCFH	BHP*	SCFH	BHP*	SCFH	BHP*	SCFH	BHP*	SCFH	BHP*
VKG10.015x	1/2	FULL	5	560	14	685	17	790	20	882	22	965	25
VKG10.014U	1/2	FULL	7	784	20	959	24	1,106	28	1,236	31	1,352	34
VKG20.025x	1	MED.	19	2,128	54	2,603	66	3,002	76	3,353	85	3,668	93
VKG10.020x	3/4	FULL	20	2,240	57	2,740	70	3,160	80	3,529	90	3,862	98
VKG30.040x	1-1/2	RED.	30	3,360	85	4,110	104	4,740	120	5,294	134	5,792	147
VKG10.025x	1	FULL	31	3,472	88	4,247	108	4,898	124	5,470	139	5,985	152
VKG20.032x	1-1/4	MED.	41	4,592	117	5,617	143	6,479	165	7,235	184	7,916	201
VKG30.050x	2	RED.	62	6,943	176	8,494	216	9,797	249	10,941	278	11,971	304
VKG10.032x	1-1/4	FULL	75	8,399	213	10,275	261	11,851	301	13,234	336	14,481	368
VKG30.065x	2-1/2	RED.	76	8,511	216	10,412	264	12,009	305	13,411	341	14,674	373
VKG20.040x	1-1/2	MED.	81	9,071	230	11,097	282	12,799	325	14,293	363	15,639	397
VKG20.050x	2	MED.	97	10,863	276	13,289	337	15,327	389	17,117	435	18,728	476
VKG10.040x	1-1/2	FULL	100	11,199	284	13,700	348	15,801	401	17,646	448	19,308	490
VKG30.080x	3	RED.	147	16,463	418	20,139	511	23,228	590	25,940	659	28,382	721
VKG20.065x	2-1/2	MED.	170	19,039	483	23,290	591	26,862	682	29,998	762	32,823	833
VKG10.050x	2	FULL	180	20,159	512	24,661	626	28,443	722	31,763	807	34,754	882
VKG30.100U	4	RED.	204	22,846	580	27,949	710	32,235	819	35,998	914	39,388	1,000
VKG10.065x	2-1/2	FULL	255	28,558	725	34,936	887	40,294	1,023	44,997	1,143	49,235	1,250
VKG20.080x	3	MED.	275	30,798	782	37,676	957	43,454	1,103	48,526	1,232	53,096	1,348
VKG20.100U	4	MED.	431	48,268	1,226	59,048	1,499	68,104	1,729	76,054	1,931	83,216	2,113
VKG10.080x	3	FULL	438	49,052	1,246	60,007	1,524	69,210	1,757	77,289	1,963	84,568	2,147
VKG10.100U	4	FULL	828	92,729	2,355	113,438	2,880	130,836	3,322	146,109	3,710	159,868	4,059

* BHP calculated at 85% boiler efficiency
** MED. = Medium RED. = Reduced

Flow Data (continued)

Flow is calculated with an atmospheric outlet pressure at a media temperature of 60°F.

Multiplier from natural gas flow (SCFH) to: Air = 0.80, Propane = 0.65, Butane = 0.57

Table 6: Leakage Rate (SCFH) of Natural Gas at Full Closed Position (1-16" wc Inlet Pressure)

Part Number	Thread Size	Port	1" wc	2" wc	4" wc	8" wc	16" wc
			SCFH	SCFH	SCFH	SCFH	SCFH
VKG10.015x	1/2	FULL	7.3	13.7	25.7	39.6	61.3
VKG10.014U	1/2	FULL	1.3	1.9	2.6	3.7	5.3
VKG20.025x	1	MEDIUM	5.3	10.0	19.0	31.2	49.4
VKG10.020x	3/4	FULL	4.7	8.3	15.8	27.8	43.9
VKG30.040x	1-1/2	REDUCED	7.8	15.1	27.7	44.7	68.8
VKG10.025x	1	FULL	4.7	8.5	16.3	28.5	44.9
VKG20.032x	1-1/4	MEDIUM	6.3	12.0	23.1	36.4	57.2
VKG30.050x	2	REDUCED	9.7	20.6	35.3	57.3	87.8
VKG10.032x	1-1/4	FULL	5.3	10.4	21.0	34.9	55.8
VKG30.065x	2-1/2	REDUCED	6.5	13.8	27.8	46.8	73.0
VKG20.040x	1-1/2	MEDIUM	8.6	17.6	31.0	49.5	75.7
VKG20.050x	2	MEDIUM	9.9	20.7	35.1	57.0	87.2
VKG10.040x	1-1/2	FULL	7.4	15.2	28.3	45.7	70.0
VKG30.080x	3	REDUCED	12.3	24.9	41.2	65.7	103.6
VKG20.065x	2-1/2	MEDIUM	10.3	21.9	38.2	62.2	98.6
VKG10.050x	2	FULL	8.7	17.8	32.6	54.3	84.4
VKG30.100U	4	REDUCED	11.3	23.4	40.5	65.4	106.5
VKG10.065x	2-1/2	FULL	8.7	19.8	36.9	61.5	99.8
VKG20.080x	3	MEDIUM	9.8	22.1	39.5	65.3	106.7
VKG20.100U	4	MEDIUM	20.7	37.6	62.6	99.4	155.7
VKG10.080x	3	FULL	14.8	29.5	52.0	81.7	131.2
VKG10.100U	4	FULL	16.5	31.6	55.5	90.0	145.4

Flow Data (continued)

Approximate pressure drops for a valve at a given flow rate may be determined using the chart below.

Note: When the pressure drop is more than 50% of the inlet pressure (P_1), choked flow occurs and the chart is no longer accurate.

Flow is calculated with an inlet pressure of 1 psig at a media temperature of 60°F.

Multiplier from natural gas flow (SCFH) to: Air = 0.80, Propane = 0.65, Butane = 0.57

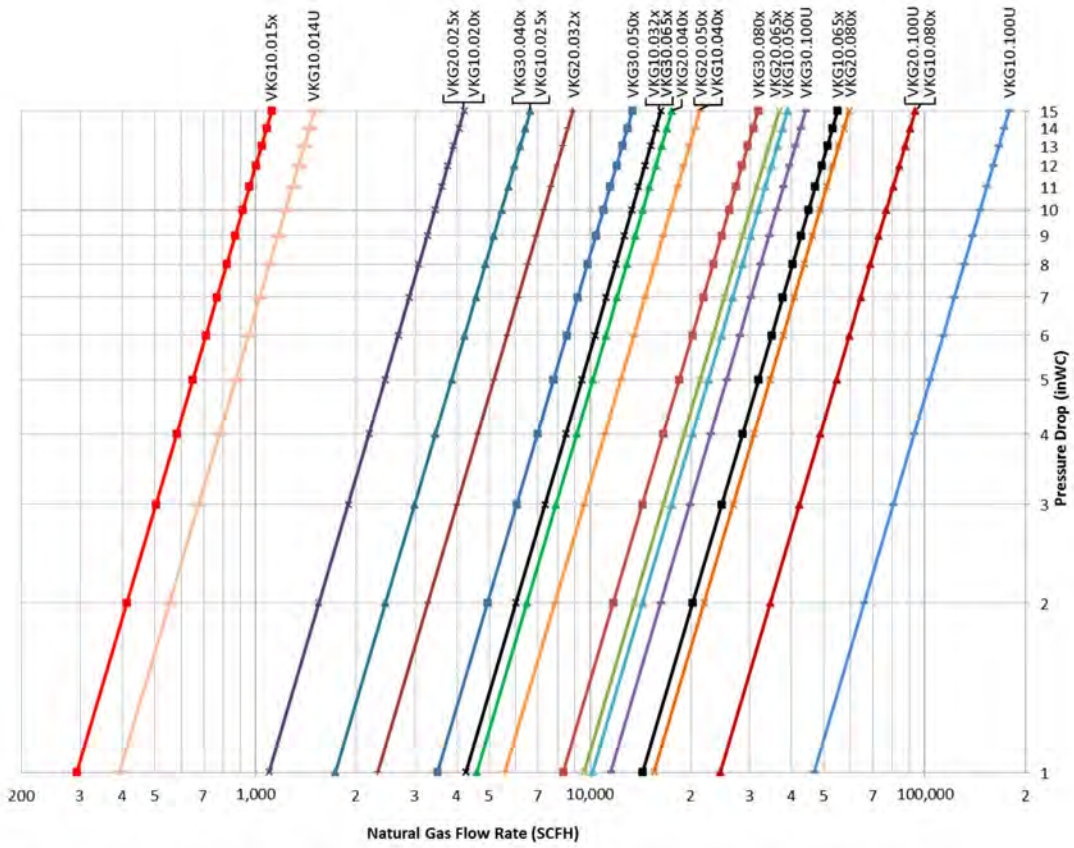


Figure 3: Logarithmic Scale Plot of VKG... Natural Gas Flow Capacities at Full Open Position

Flow Data (continued)

Flow rate (SCFH) through the valve body at the full open position can be estimated using the equation below and the C_v values from Table 4.

$$Q = 1360 \times C_v \times \left(\sqrt{\frac{P_1 + P_2}{GT_f}}\right) \times \left(\sqrt{\frac{P_1 - P_2}{2}}\right)$$

...where...

C_v = Flow coefficient (see Table 4)
G = Specific gravity of gas (see Table 7)
P_1 = Absolute inlet pressure in psia (psig + 14.7)
P_2 = Absolute outlet pressure in psia (psig + 14.7)
Q = Flow rate in SCFH
T_f = Media temperature in degrees Rankine (°F + 460)

Boiler horsepower is calculated using the equation below.

$$Boiler\ hp = Q \times (HHV) \times \eta \times \frac{1\ Boiler\ hp}{33{,}475\ BTU/HR}$$

...where...

Q = Flow rate (SCFH)
HHV = Higher Heating Value (BTU/SCF)
η = Boiler efficiency (assume: 85% efficiency or 0.85)

Table 7: Constants for Boiler Horsepower Calculations by Applicable Gases

Type of Gas	Specific Gravity	Higher Heating Value (BTU/SCF)
Natural Gas	0.64	1000
Air	1.00	-
Propane	1.52	2500
Butane	2.00	3200

Actuator Torque

Torque requirements for the 4" full port valve (VKG10.100U) are tabulated at various differential pressures to ensure proper actuator selection. The VKG10.100U valve requires more torque than all other models. Maximum torque occurs at approximately the 60 degree position at high flow rates. A maximum of 20 in-lbs is required to modulate any VKG... valve.

Table 8: Maximum Torque Values at Various Pressure Differentials

Differential Pressure		Torque	
psi	kPa	in-lbs	N-m
6	41	10	1.13
10	69	15	1.69
15	100	20	2.26

Dimensions

Dimensions in inches [mm]

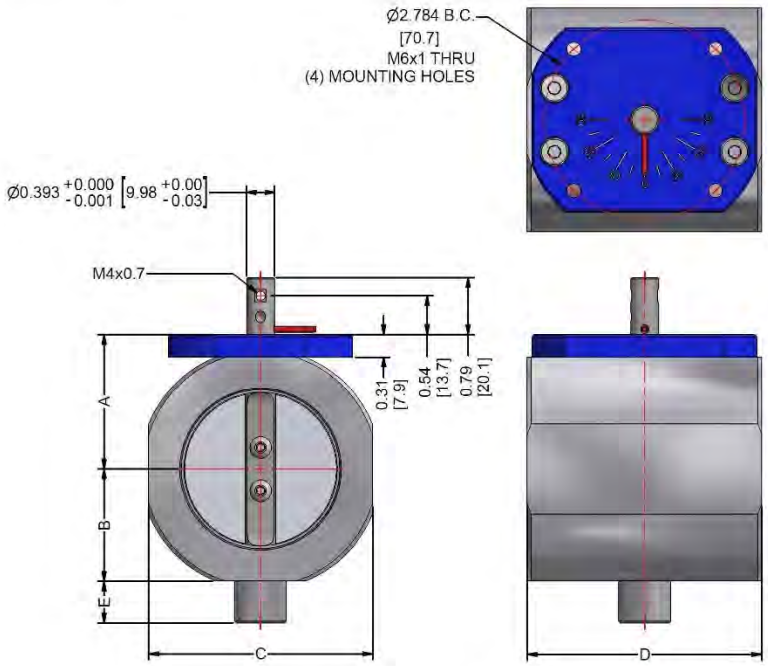


Figure 4: Dimensions of the VKG... Valve Shown on a VKG10.050U

Table 9: VKG... Valve Dimensions

Part Number	A	B	C	D	E
VKG10.014U	1.35 [34]	1.12 [29]	2.08 [53]	3.25 [83]	0.21 [5]
VKG10.015x	1.35 [34]	1.04 [26]	2.08 [53]	3.25 [83]	0.58 [15]
VKG10.020x	1.35 [34]	1.04 [26]	2.08 [53]	3.25 [83]	0.58 [15]
VKGx0.025x	1.35 [34]	1.04 [26]	2.08 [53]	3.25 [83]	0.58 [15]
VKGx0.032x	1.53 [39]	1.22 [31]	2.44 [62]	3.25 [83]	0.58 [15]
VKGx0.040x	1.63 [41]	1.31 [33]	2.63 [67]	3.25 [83]	0.58 [15]
VKGx0.050x	1.87 [47]	1.55 [39]	3.11 [79]	3.25 [83]	0.58 [15]
VKGx0.065x	2.18 [55]	1.87 [47]	3.74 [95]	4.38 [111]	0.58 [15]
VKGx0.080x	2.44 [62]	2.13 [54]	4.26 [108]	4.38 [111]	0.58 [15]
VKGx0.100U	2.96 [75]	2.64 [67]	5.28 [134]	5.00 [127]	0.58 [15]

Dimensions (continued)

Dimensions in inches [mm]

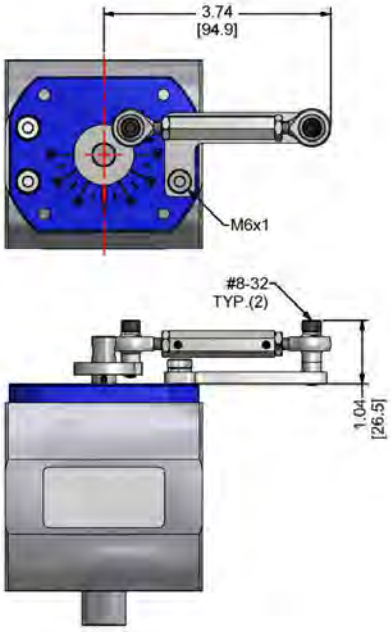


Figure 5: Dimensions of the AGA92.1 or VKG...-921 Manual Kit

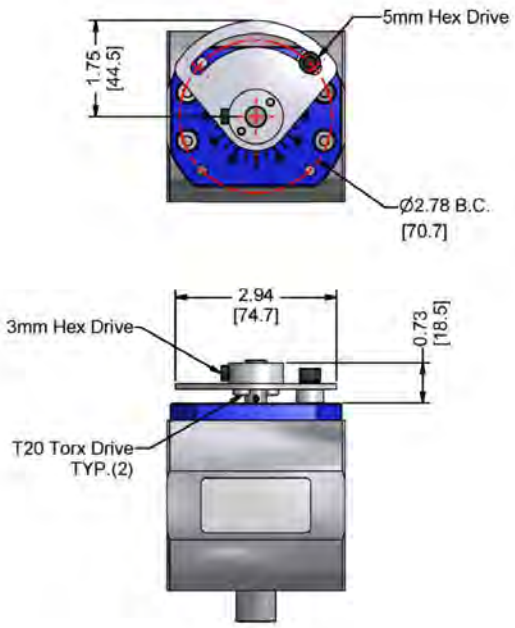


Figure 6: Dimensions of the AGA92.2 or VKG...-922 Manual Kit

Dimensions (continued)

Dimensions in inches [mm]

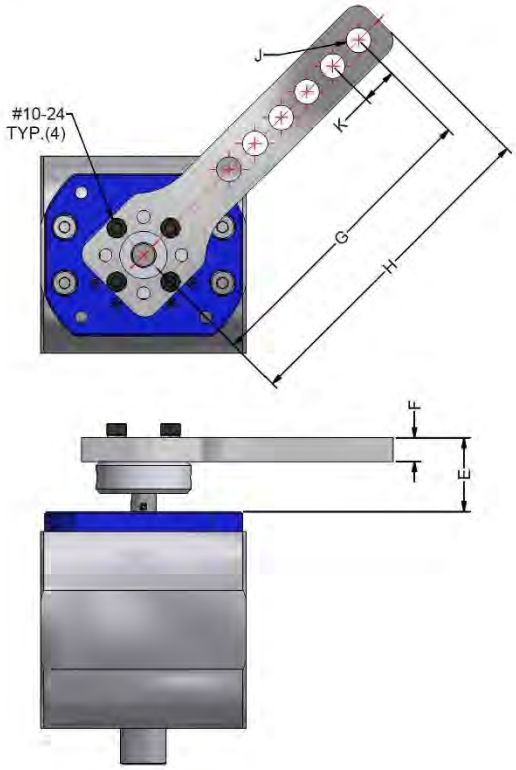


Figure 7: Dimensions of the CA-M10R... Crank Arm Kits

Table 10: CA-M10R... Crank Arm Kit Dimensions

Part Number	E	F	G	H	J	K
CA-M10R-1	1.17 [30]	0.38 [10]	4.80 [122]	5.25 [133]	0.39 [10] x6	0.58 [15]
CA-M10R-2	0.93 [23]	0.14 [3]	4.50 [114]	5.00 [127]	0.26 [7] x9	0.38 [10]
CA-M10R-3	0.93 [23]	0.14 [3]	4.50 [114]	5.00 [127]	0.26 [7] slot	3.00 [76] slot

NEMA 1 Screw Cover Wall-Mount

WIEGMANN®

SC080806NK

SC080806

Applications

This style is designed for use as a junction box and pull box in commercial and general industrial applications.

Construction

- Bodies and doors fabricated from 16 , 14 , or 12-gauge steel
- Flat, removable covers fastened with plated steel screws
- Cover design permits easy removal without extracting cover screws
- Mounting holes on back of enclosure
- Available with or without knockouts
- Removable concentric knockouts on all four sides of standard enclosures with knockouts

Finish

- ANSI 61 gray polyester powder light texture inside and out over phosphatized surfaces

Listings

- UL 50, 1 [UL File E23553]
- Meets NEMA/EEMAC 1 requirements

c UL us

Shipping Schedule

Same day | 1 - 5 days | 1 - 7 days | 1 - 15 days | 1 - 20 days

Color indicates shipping lead time in business days.

NEMA 1 Screw Cover Wall-Mount

Painted		Without Knockouts	Price	Body/Door Steel Gauge	Enclosure SizeHxWxD	Knockout Pattern	
With Knockouts	Price					Width Side	Height Side
SC040404*	$9.75	SC040404NK*	$9.75	16/16	4.13 x 4.13 x 4.47 [105 x 105 x 114]	A	A
SC040604*	$11.75	SC040604NK*	$11.75	16/16	6.13 x 4.13 x 4.47 [156 x 105 x 114]	A	A-B-A
SC060604	$14.00	SC060604NK	$14.00	16/16	6.13 x 6.13 x 4.47 [156 x 156 x 114]	A-B-A	A-B-A
SC060606	$17.00	SC060606NK	$17.00	16/16	6.13 x 6.13 x 6.47 [156 x 156 x 164]	A-B-A	A-B-A
SC060804	$16.50	SC060804NK	$16.50	16/16	8.13 x 6.13 x 4.47 [207 x 156 x 114]	A-B-A	A-B-A
SC060806	$19.00	SC060806NK	$19.00	16/16	8.13 x 6.13 x 6.47 [207 x 156 x 164]	A-B-A	A-B-A
SC061204	$22.00	SC061204NK	$22.00	16/16	12.13 x 6.13 x 4.47 [308 x 156 x 114]	A-B-A	B-A-F-F-A-B
SC061206	$24.00	SC061206NK	$24.00	16/16	12.13 x 6.13 x 6.47 [308 x 156 x 164]	A-B-A	B-A-F-F-A-B
SC080804	$19.25	SC080804NK	$19.25	16/16	8.13 x 8.13 x 4.47 [207 x 207 x 114]	A-B-A	A-B-A
SC080806	$23.00	SC080806NK	$23.00	16/16	8.13 x 8.13 x 6.47 [207 x 207 x 164]	A-B-A	A-B-A
SC080808	$26.50	SC080808NK	$26.50	16/16	8.00 x 8.13 x 8.13 [203 x 207 x 207]	A-B-A	A-B-A
SC081004	$22.00	SC081004NK	$22.00	16/16	10.13 x 8.13 x 4.47 [257 x 207 x 114]	A-B-A	B-A-F-F-A
SC081006	$26.50	SC081006NK	$26.50	16/16	10.13 x 8.13 x 6.47 [257 x 207 x 164]	A-B-A	B-A-F-F-A
SC081204	$25.00	SC081204NK	$25.00	16/16	12.13 x 8.13 x 4.47 [308 x 207 x 114]	A-B-A	B-A-F-F-A-B
SC081206	$28.50	SC081206NK	$28.50	16/16	12.13 x 8.13 x 6.47 [308 x 207 x 164]	A-B-A	B-A-F-F-A-B

Notes: Dimensions in inches [millimeters]
Not UL listed.
A WGNDKT must be ordered with each SC enclosure to meet the CSA standard.

Table continued on next page

NEMA 1 Screw Cover Wall-Mount

WIEGMANN®

Shipping Schedule				
Same day	1 - 5 days	1 - 7 days	1 - 15 days	1 - 20 days
Color indicates shipping lead time in business days.				

Table continued from previous page

NEMA 1 Screw Cover Wall-Mount

Painted				Body/Door Steel Gauge	Enclosure SizeHxWxD	Knockout Pattern	
With Knockouts	Price	Without Knockouts	Price			Width Side	Height Side
SC101004	$25.50	SC101004NK	$25.50	16/16	10.13 x 10.13 x 4.47 [257 x 257 x 114]	B-A-F-F-A	B-A-F-F-A
SC101006	$30.00	SC101006NK	$30.00	16/16	10.13 x 10.13 x 6.47 [257 x 257 x 164]	B-A-F-F-A	B-A-F-F-A
SC101204	$29.00	SC101204NK	$29.00	16/16	12.13 x 10.13 x 4.47 [308 x 257 x 114]	B-A-F-F-A	B-A-F-F-A-B
SC101206	$34.00	SC101206NK	$34.00	16/16	12.13 x 10.13 x 6.47 [308 x 257 x 164]	B-A-F-F-A	B-A-F-F-A-B
SC121204	$32.50	SC121204NK	$32.50	16/16	12.13 x 12.13 x 4.47 [308 x 308 x 114]	B-A-F-F-A-B	B-A-F-F-A-B
SC121206	$38.50	SC121206NK	$38.50	16/16	12.13 x 12.13 x 6.47 [308 x 308 x 164]	B-A-F-F-A-B	B-A-F-F-A-B
SC121208	$40.50	SC121208NK	$40.50	16/16	12.00 x 12.13 x 8.13 [305 x 308 x 207]	B-A-F-F-A-B	B-A-F-F-A-B
SC121210	$43.50	SC121210NK	$43.50	16/16	12.00 x 12.13 x 10.13 [305 x 308 x 257]	B-A-F-F-A-B	B-A-F-F-A-B
SC121212	$66.00	SC121212NK	$66.00	16/16	12.00 x 12.13 x 12.13 [305 x 308 x 308]	B-A-F-F-A-B	B-A-F-F-A-B
SC121504	$37.50	SC121504NK	$37.50	16/16	15.13 x 12.13 x 4.47 [384 x 308 x 114]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC121506	$44.00	SC121506NK	$44.00	16/16	15.13 x 12.13 x 6.47 [384 x 308 x 164]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC121608	$54.00	SC121608NK	$54.00	16/16	16.00 x 12.13 x 8.13 [406 x 308 x 207]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC121804	$44.00	SC121804NK	$44.00	16/16	18.13 x 12.13 x 4.47 [461 x 308 x 114]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC121806	$51.00	SC121806NK	$51.00	16/16	18.13 x 12.13 x 6.47 [461 x 308 x 164]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC121808	$53.00	SC121808NK	$53.00	16/16	18.00 x 12.13 x 8.13 [457 x 308 x 207]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC121810	$71.00	SC121810NK	$71.00	16/16	18.00 x 12.13 x 10.13 [457 x 308 x 257]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC122404	$56.00	SC122404NK	$56.00	16/16	24.12 x 12.13 x 4.47 [613 x 308 x 114]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC122406	$65.00	SC122406NK	$65.00	16/16	24.12 x 12.13 x 6.47 [613 x 308 x 164]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC122408	$77.00	SC122408NK	$77.00	16/16	24.00 x 12.13 x 8.13 [610 x 308 x 207]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC122410	$65.00	SC122410NK	$65.00	16/16	24.00 x 12.13 x 10.13 [610 x 308 x 257]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC122412	$68.00	SC122412NK	$68.00	16/16	24.00 x 12.13 x 12.13 [610 x 308 x 308]	B-A-F-F-A-B	A-B-A-F-F-A-B-A
SC151504	$45.50	SC151504NK	$45.50	16/16	15.13 x 15.13 x 4.47 [384 x 384 x 114]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC151506	$51.00	SC151506NK	$51.00	16/16	15.13 x 15.13 x 6.47 [384 x 384 x 164]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC151804	$56.00	SC151804NK	$56.00	16/16	18.13 x 15.13 x 4.47 [461 x 384 x 114]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC151806	$59.00	SC151806NK	$59.00	16/16	18.13 x 15.13 x 6.47 [461 x 384 x 164]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC181804	$59.00	SC181804NK	$59.00	16/16	18.13 x 18.13 x 4.47 [461 x 461 x 114]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC181806	$68.00	SC181806NK	$68.00	16/16	18.13 x 18.13 x 6.47 [461 x 461 x 164]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC181808	$77.00	SC181808NK	$77.00	16/16	18.00 x 18.13 x 8.13 [457 x 461 x 207]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC181810	$99.00	SC181810NK	$99.00	16/16	18.00 x 18.13 x 10.13 [457 x 461 x 257]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC181812	$85.00	SC181812NK	$85.00	16/16	18.00 x 18.13 x 12.13 [457 x 461 x 308]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC182404	$91.00	SC182404NK	$91.00	16/16	24.12 x 18.13 x 4.47 [613 x 461 x 114]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC182406	$107.00	SC182406NK	$107.00	16/16	24.12 x 18.13 x 6.47 [613 x 461 x 164]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC182408	$115.00	SC182408NK	$115.00	16/16	24.00 x 18.13 x 8.13 [610 x 461 x 207]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC182410	$177.00	SC182410NK	$177.00	16/16	24.00 x 18.13 x 10.13 [610 x 461 x 257]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC182412	$192.00	SC182412NK	$192.00	16/16	24.00 x 18.13 x 12.13 [610 x 461 x 308]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC183004	$112.00	SC183004NK	$112.00	16/16	30.12 x 18.13 x 4.47 [765 x 461 x 114]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC242404	$119.00	SC242404NK	$119.00	14/14	24.12 x 24.13 x 4.49 [613 x 613 x 114]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A

Notes: Dimensions in inches [millimeters]
Not UL listed.
A WGNDKT must be ordered with each SC enclosure to meet the CSA standard.

Table continued on next page

NEMA 1 Screw Cover Wall-Mount

WIEGMANN®

Shipping Schedule				
Same day	1 - 5 days	1 - 7 days	1 - 15 days	1 - 20 days
Color indicates shipping lead time in business days.				

Table continued from previous page

NEMA 1 Screw Cover Wall-Mount							
Painted				Body/Door Steel Gauge	Enclosure SizeHxWxD	Knockout Pattern	
With Knockouts	Price	Without Knockouts	Price			Width Side	Height Side
SC242406	$138.00	SC242406NK	$138.00	14/14	24.12 x 24.13 x 6.49 [613 x 613 x 165]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC242408	$153.00	SC242408NK	$153.00	14/14	24.00 x 24.15 x 8.15 [610 x 613 x 207]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC242410	$217.00	SC242410NK	$217.00	14/14	24.00 x 24.15 x 10.15 [610 x 613 x 258]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC242412	$235.00	SC242412NK	$235.00	14/14	24.00 x 24.15 x 12.15 [610 x 613 x 309]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC243006	$166.00	SC243006NK	$166.00	14/14	30.00 x 24.15 x 6.15 [762 x 613 x 156]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC243008	$218.00	SC243008NK	$218.00	14/14	30.00 x 24.15 x 8.15 [762 x 613 x 207]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC243010	$257.00	SC243010NK	$257.00	14/14	30.00 x 24.15 x 10.15 [762 x 613 x 258]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC243012	$288.00	SC243012NK	$288.00	14/14	30.00 x 24.15 x 12.15 [762 x 613 x 309]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC243608	$212.00	SC243608NK	$212.00	14/14	36.00 x 24.15 x 8.15 [914 x 613 x 207]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC243610	$293.00	SC243610NK	$293.00	14/14	36.00 x 24.15 x 10.15 [914 x 613 x 258]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
SC243612	$315.00	SC243612NK	$315.00	14/14	36.00 x 24.15 x 12.15 [914 x 613 x 309]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
—	—	SC303008NK	$283.00	12/12	30.00 x 30.19 x 8.19 [762 x 767 x 208]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
—	—	SC303010NK	$335.00	12/12	30.00 x 30.19 x 10.19 [762 x 767 x 259]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
—	—	SC303012NK	$368.00	12/12	30.00 x 30.19 x 12.19 [762 x 767 x 310]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
—	—	SC303608NK	$324.00	12/12	36.00 x 30.19 x 8.19 [914 x 767 x 208]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
—	—	SC303610NK	$335.00	12/12	36.00 x 30.19 x 10.19 [914 x 767 x 259]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
—	—	SC303612NK	$378.00	12/12	36.00 x 30.19 x 12.19 [914 x 767 x 310]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
—	—	SC363608NK	$307.00	12/12	36.00 x 36.19 x 8.19 [914 x 919 x 208]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
—	—	SC363610NK	$340.00	12/12	36.00 x 36.19 x 10.19 [914 x 919 x 259]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A
—	—	SC363612NK	$437.00	12/12	36.00 x 36.19 x 12.19 [914 x 919 x 310]	A-B-A-F-F-A-B-A	A-B-A-F-F-A-B-A

Notes: Dimensions in inches [millimeters]
Not UL listed.
A WGNDKT must be ordered with each SC enclosure to meet the CSA standard.

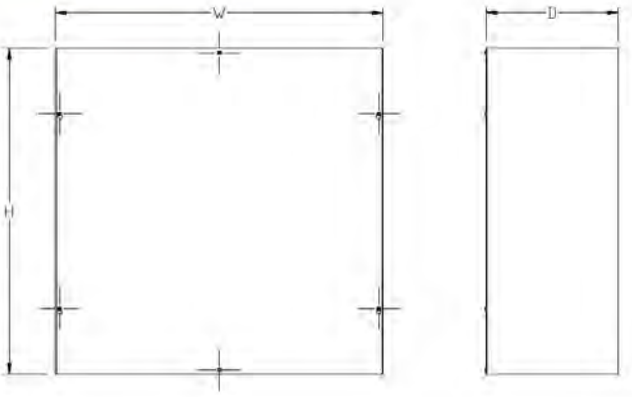
NEMA 1 Screw Cover Wall-Mount

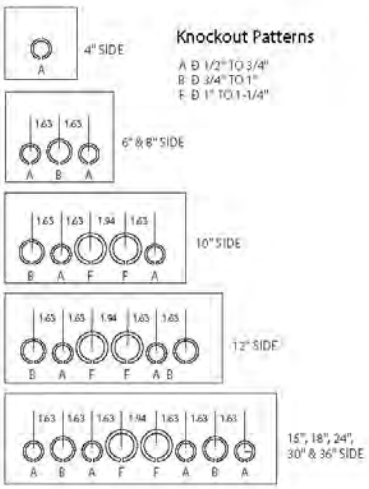
WIEGMANN®

Shipping Schedule				
Same day	1 - 5 days	1 - 7 days	1 - 15 days	1 - 20 days
Color indicates shipping lead time in business days.				

Grounding Kit		
Part Number	*Description*	*Price*
WGNDKT	Grounding Kit	$2.75
Note: Field grounding kit includes necessary parts to properly ground enclosure..		

Dimensions





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HUBBELL® **WIEGMANN®**

A Division of Hubbell Incorporated (Delaware)

QUANTITY	CATALOG NUMBER	1917712F
1	SC181812NK	

SIZE HxWxD

18x18x12

CODE

7 86725 84679 5

PRODUCT DESCRIPTION

N1, SCREW COVER PULL BOX-W/O KNOCKOUTS, ANSI-61 GRAY POLYESTER POWDER

⚠ **WARNING:** Cancer and Reproductive Harm-
www.P65Warnings.ca.gov

COUNTRY OF ORIGIN: ASSEMBLED IN U.S.A. 34428

SIM*pull* THHN®

Copper THHN Wire & Cable

600 Volts. Copper Conductor. Thermoplastic Insulation/Nylon Sheath, Heat, Moisture, Gasoline and Oil Resistant II. All Sizes Rated Both THHN and either THWN (sizes 14, 12, and 10 AWG) or THWN-2 (sizes 8 AWG and larger). Also Rated MTW and AWM (See Below). SIMpull® Technology for Easier Pulling.

APPLICATIONS

Southwire® SIM*pull* THHN® copper conductors are primarily used in conduit and cable trays for services, feeders and branch circuits in commercial or industrial applications as specified in the National Electrical Code. Voltage for all applications is 600 volts. SIM*pull* THHN® copper conductors are designed to be installed without application of a pulling lubricant.

These conductors have multiple ratings. Depending upon the product application, allowable temperatures are as follows:

- THHN or T90 Nylon- Dry locations not to exceed 90° C
- THWN-2- Wet or dry locations not to exceed 90° C or locations not to exceed 75° C when exposed to oil
- THWN- Wet locations not to exceed 75° C or dry locations not to exceed 90° C or locations not to exceed 75° C when exposed to oil
- TWN75- Wet locations not to exceed 75° C
- MTW- Wet locations or when exposed to oil at temperatures not to exceed 60° C or dry locations not to exceed 90° C (with ampacity limited to that for 75° C conductor temperature per NFPA 79)
- AWM- Dry locations not to exceed 105° C only when rated and used as appliance wiring material

STANDARDS & REFERENCES

Southwire® SIM*pull* THHN® copper conductors comply with the following:

- ASTM - B3, B8, and B787 (19 Wire Combination Unilay-Stranded)
- UL Standards 83, 758, 1063, and 1581
- CSA C22.2 No. 75, T90 Nylon/TWN75 Sizes through 1000 kcmil
- NOM-ANCE 90° C
- Federal Specification A-A-59544
- NEMA WC-70 (ICEA S-95-658) Construction Requirements
- National Electrical Code, NFPA 70
- CT Rated in Sizes 1/0 AWG and larger
- VW-1 - Sizes 14 through 1 AWG
- FT1 - All Sizes
- Sunlight Resistant – Sizes 2 AWG and larger
- AWM - Sizes 14 through 6 AWG
- MTW - Stranded Constructions Only
- RoHS/REACH Compliant

CONSTRUCTION

Southwire® SIM*pull* THHN® copper conductors are made with soft drawn copper. Sizes 14 through 4/0 AWG use a combination-unilay stranding while 250 kcmil and larger sizes use a compressed copper stranding. The wire is covered with a tough heat and moisture resistant PVC insulation with an overall nylon jacket utilizing SIM*pull*® Technology. Available in black, white, red, blue, purple, green, yellow, orange, brown, and gray. Also available in striped configurations. Some colors are subject to economic order quantity. Marked as THHN in all sizes. Also marked as THWN-2 in sizes 8 AWG and larger or marked as THWN in sizes 14, 12, and 10 AWG. Marked sunlight resistant in sizes 2 AWG and larger. Sizes 14, 12, and 10 AWG are available with SIM*pull*® Technology only in SIM*pull* BARREL™ cable drum or SIM*pull*® *Coil*PAK™ configurations.

The Power of Connections.™

Southwire®

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Alflex™

Type SWA Standard Wall Aluminum Flexible Metal Conduit

Aluminum Flexible Metal Conduit. High Strength Aluminum Alloy Strip. UL and CSA Listed.

APPLICATIONS

Alflex™ Type SWA (Standard Wall Aluminum) Flexible Metal Conduit is suitable for the following installations:

- Environmental air-handling spaces per NEC 300.22(C)
- Power and lighting branch circuit conductors and cables for connecting receptacles, luminaires, equipment, office partitions, etc.
- Metal raceway for wires and cables per NEC 348
- Motor feeder, branch, and control circuit conductors and cables
- Class 1, Class 2, Class 3 Remote-control, signaling, and power-limited circuit conductors and cables
- Fire alarm system conductors and cables of power-limited or non-power-limited fire alarm circuits
- Voice, data, communications and video cables including CATV and optical fiber cables
- Concealed or exposed installations per NEC 348 and the applicable NEC provisions
- Elevators, hoistways, and escalators per NEC 620.21
- As a grounding conductor for lengths up to 6 feet (20A max) as per NEC 250.118(5)
- Electric signs and outline lighting per NEC 600.7, 600.31 (1000 volts or less), and 600.32 (>1000 volts)
- Listed wired fixtures per NEC 410.77(C)
- Raised floors for connection of information technology per NEC 645.5(D)(2) and 645.5(D)
- Places of assembly and theaters per NEC 518 and 520
- Cranes and hoists per NEC 610.11(C)
- Hazardous location, Class 1, Div. 2, for flexible connectors only per NEC 501.104(B)(2) & 501.30(B)
- UL 1, 2, & 3 Hour Through-Penetration Firestop Systems: C-AJ-1462, C-AJ-1463, C-AJ-1464, W-L-1308, and W-L-13099

STANDARDS & REFERENCES

Alflex™ Type SWA (Standard Wall Aluminum) Flexible Metal Conduit meets or exceeds the following requirements:

- UL Listed per UL 1, Standard for Safety for Flexible Metal Conduit, ANSI/UL-1
- CSA Listed per CSA 22.2 No. 56 per Canadian Electrical Code C22.1 Section 12-1000
- Meets federal specification WW-C-566C
- NFPA 70 (National Electrical Code), Article 348 - Type FMC (flexible metal conduit)
- REACH/RoHS-2 (Chemical Limit) Compliant

CONSTRUCTION

The Power of Connections.™

Southwire