EB700G Troubleshooting…

"Field Assist Troubleshooting Guide"

Welcome to the Campo **"Field Assist Troubleshooting Guides".**

These guides were developed to assist the working technicians in the field. We've supplied issues and solutions to the most common problems encountered in the field. If you need assistance while troubleshooting on the job, they are easy to store in your smart phone, tablet or computer.

Getting Started is easy Just click on 'Page #' for information or the issue you are encountering

Resetting the control…

Before resetting the burner control, ensure …

1. …there is between 7-14" WC pressure supplied to the gas valve.
2. …the 'switchover valve' is in the proper position for LP *OR* NG
3. …the high-pressure gas switch is not off on reset

➢ **NOTE:** If the red status light is flashing rapidly (three time per second) the control is locked out on reset. To reset, push and release the reset button. (red flashing light)

➢ Warning! Continuous resetting of the burner control may cause an accumulation of gas in the heatexchanger, and this could lead to an Implosion of the heatexchanger or personal harm.

➢ Proceed to….Page 3

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Choose the issue you are encountering and click on the Page

- You reset the control and it goes through the 60 second purge, but doesn't ignite…… Page 4
- You Reset the burner Control, The Burner motor Did Not Start and Locks-out on Reset…Page 13
- You Reset the Burner Control, but the reset light is solid red during the pre-purge, and the control locks out on reset… Page 15
- You Reset the Burner Control and after the purge, the burner fires up , but the flame goes out after 5 to 10 seconds… Page 16

- Install your manometer in the outlet port of the manual valve between the gas valve and LP/NG switchover valve.
- Reset the burner control.
- After the 60 second purge, check to see if gas pressure is coming through the valve.
- Keep a close eye on the manometer, as the pressure will only register for 1 second after the 60 second pre-purge.

- If gas pressure is present… Page 5

- If gas pressure is NOT present… Page 9

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- ✓ Defective burner control
- ✓ Defective ignition cable
- ✓ Broken ignition electrode
- ✓ Defective igniter

➢ Test the components… Page 6

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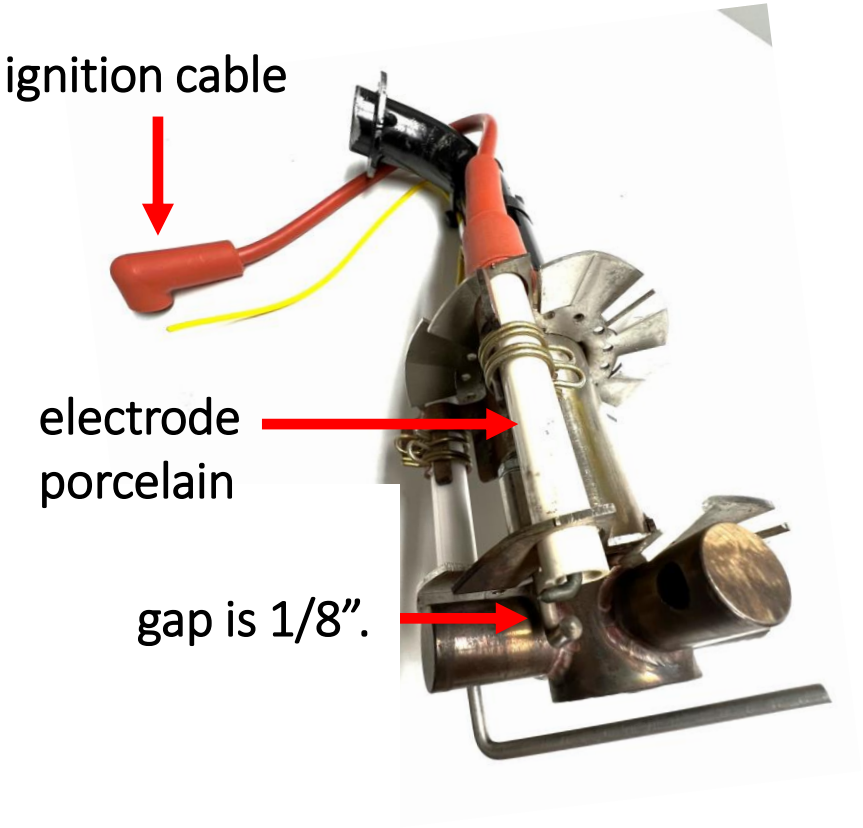
SHUT OFF the gas supply to the burner before testing!



Remove the burner gun from the burner housing.

- Inspect the ignition cable for cracks.
- Inspect the ignition electrode porcelain for cracks.
- Inspect the electrode gap, ensuring the gap is 1/8".

✓ Replace damaged pieces as appropriate.

➢ Testing the ignitor for spark…Page 7

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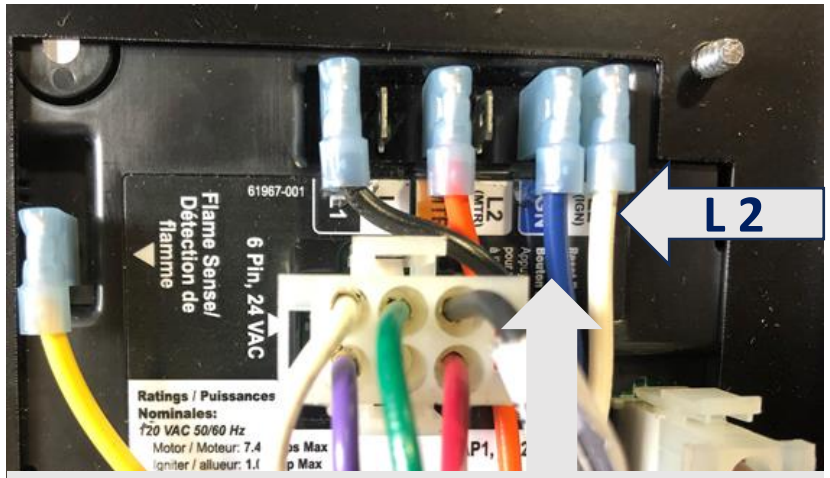
- With the gun still outside the burner casing, re-connect the ignition cable to the igniter and restore power to the burner.
- Ensure the gun is WELL GROUNDED to the burner housing when testing for spark.
- Reset the burner control and check for spark after the purge.
- Keep a close eye on the electrode as the spark will only appear for 1 or 2 seconds AFTER the 60 second purge.

➢ NO spark indicates…Defective burner control, or Defective igniter

➢ Testing the components…Page 8



Blue wire ignition terminal

- Reset burner control. After the 60 second purge, check for 120 volts on terminal 'IGN' and L2

✓ If 120 volts is NOT present after the 60 second purge, Defective burner control

✓ If 120 volts is present, defective igniter

Problem Solved

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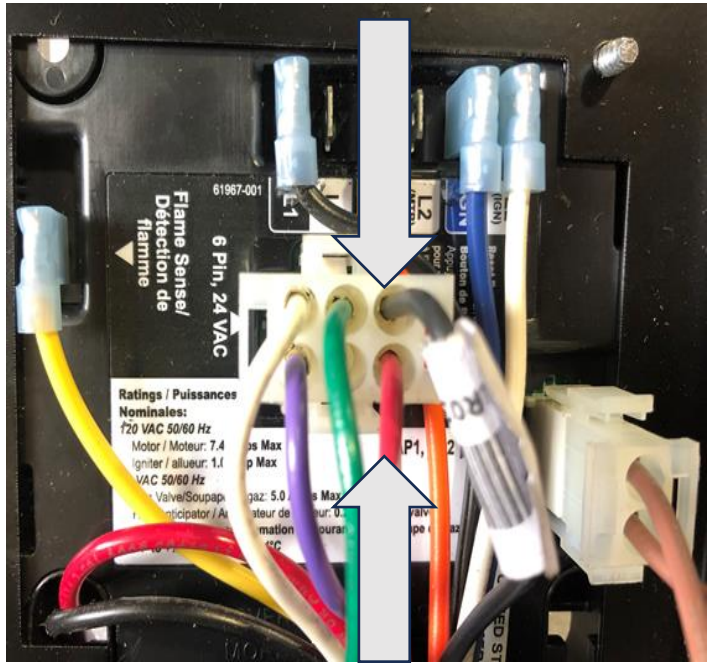
- ✓ Defective 24 volts transformer

- ✓ Defective burner control

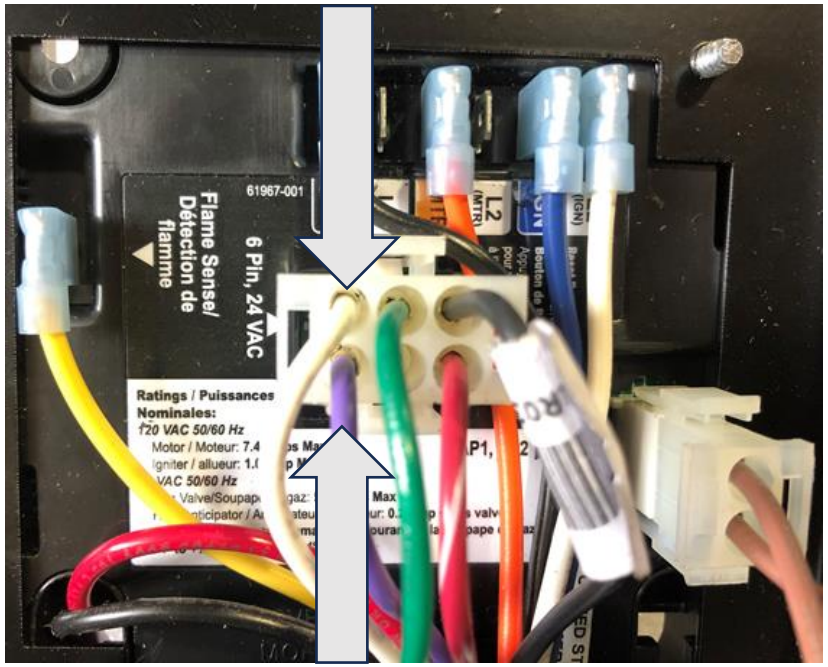
- ✓ Defective (one of the two) gas valve(s)

➢ Test the components…Page 10



Check for 24 volts on black and red stripe wires on 6 prong plug.

- ✓ If 24 volts is NOT present, the transformer is defective.
- If 24 volts is present… Page 11



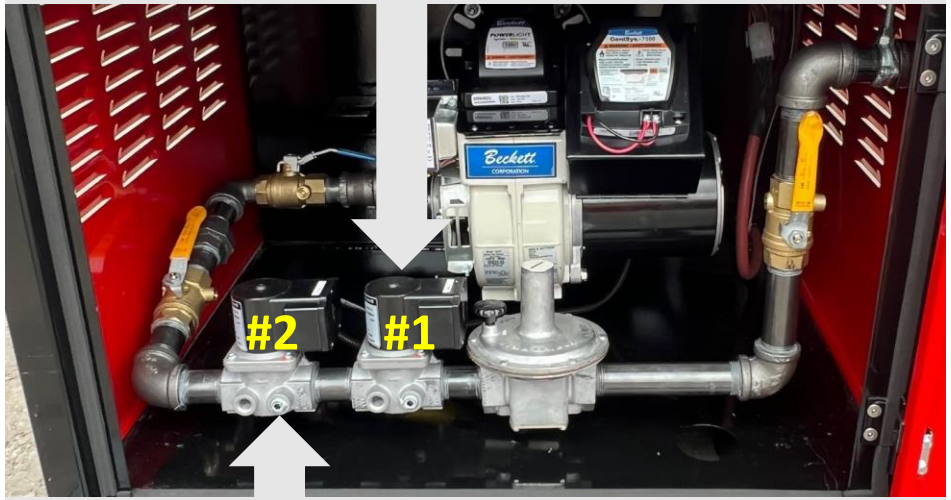
Reset the Burner Control. After the 60 second purge, check for 24 volts on the white and violet wires on the 6-prong plug.

- ✓ If 24 volts is NOT present after the purge, the burner control is defective.

- If 24 volts is present after the 60 second purge, ONE of the two gas valves is defective, continue checking gas valves... Page12

Checking the gas solenoid valves when 24 volts is present on the burner control…

Gas valve #1



Gas valve #2 test port

- Install manometer in gas valve #2 test port. Reset the Burner Control and check for gas pressure after the 60 second purge…

➢ NOTE: Keep a close eye on the manometer, as the pressure will only register for 1 or 2 seconds after the 60 second pre-purge.)

✓ If NO pressure is detected, the #1 valve is defective.
✓ If pressure IS detected, #2 valve is defective.

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Problem Solved

Light Flashing reset control

- ✓ Defective burner motor.

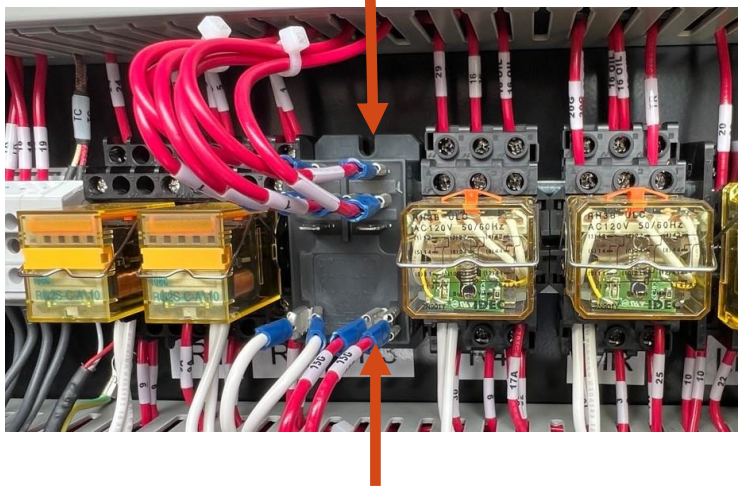
- ✓ Defective Burner Control

- ✓ Defective R3 relay

➢ Test the components…Page 14

Checking burner motor, motor relay, and burner control

R3 wire #19



R3 wire #15G

- Make sure the burner motor reset is not locked out.
  - Reset burner control, then check for 120 volts at R3 relay wire #15G

✓ If 120 volts is NOT present, defective burner control.

- If 120 volts is present, check for 120 volts on R3 relay # 19

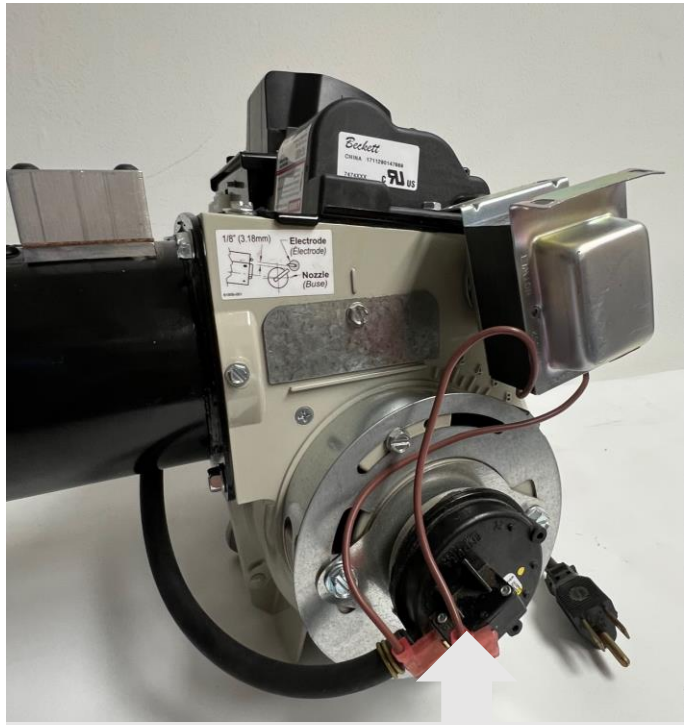
✓ If 120 volts is NOT present, defective relay R3

✓ If 120 volts is present, defective burner motor

Problem Solved

HOME

You reset the burner control, but the reset light is solid red during the purge, and the control locks out on reset…



air proven switch

- Note: The air proven switch contact must be open to start and close after the burner motor starts.

- ✓ The air proving switch is defective
- ✓ The air hose is cracked or busted

Problem Solved

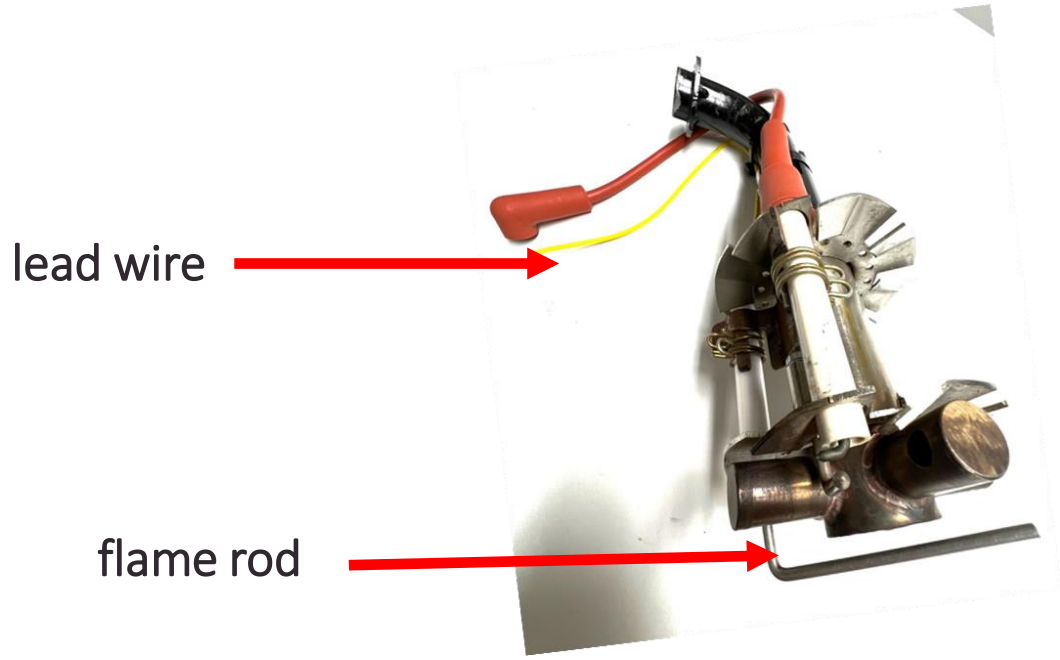
HOME

- Clean or replace flame rod and wire.

✓ Flame rod lead wire is defective

✓ The flame rod is defective or dirty

✓ If the flame rod and wire are good then the control is suspect.



➢ NOTE: do not use sandpaper to clean flame rod. A cloth will be sufficient.

control

Problem Solved

Choose the issue you are encountering and click on the Page

- Before Proceeding, It is important to check voltage from Line L1 and L2, "Not" to ground.

  - Turn the main power switch is in the ON position
  - Turn the 'gas/oil switch' to the gas position
  - Turn the 'controls' switch to the ON position
  - Turn the bypass toggle switch to on.
  - Turn the Heat/off/Fan switch to on heat
  - Check the high-pressure gas switch on the gas train to be sure it is NOT off on reset.

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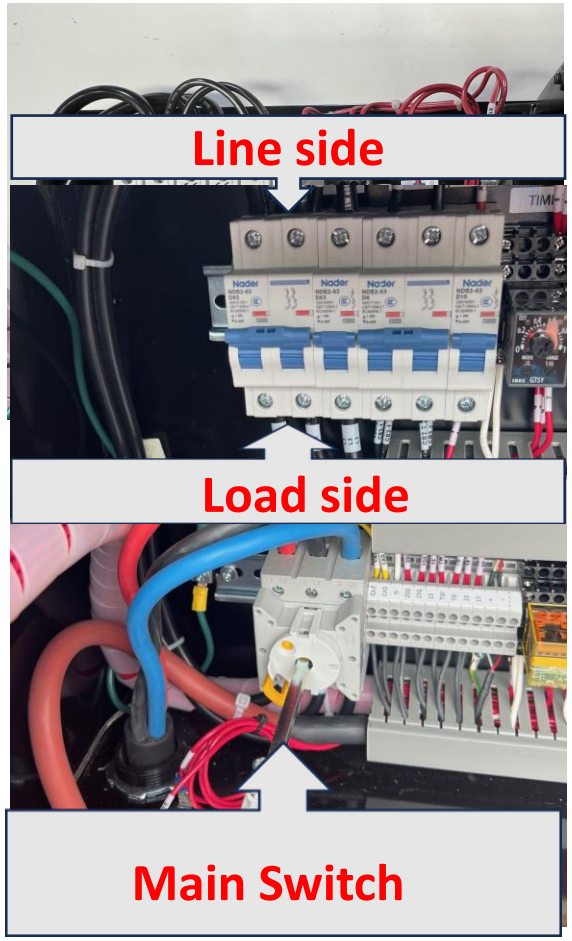
Proceed to….Page 19



- Check for 208 to 240 volts on the Top of the "Main Switch".

✓ If no voltage present on top of main switch, power supply issue.

- Check for 208 to 240 volts on CB3 Line side between L1 and L2.

✓ If no voltage between L1 and L2 line side, defective switch.

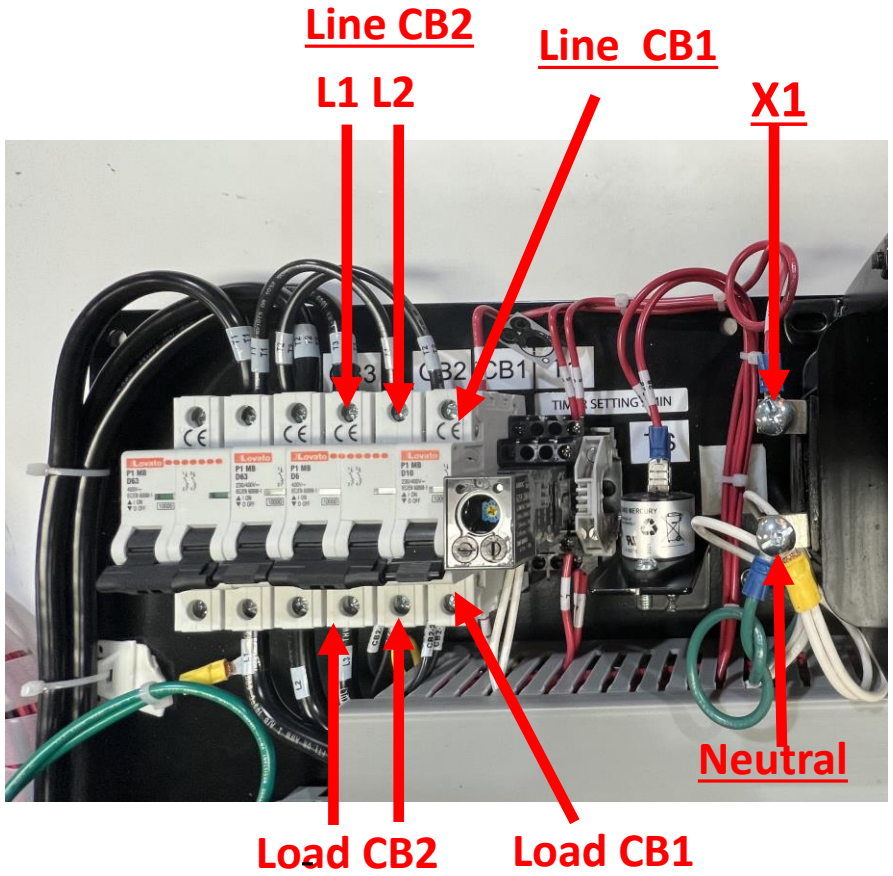
- If 208 to 240 volts is present, check for 208 to 240 volts on CB3 Load side between L1 and L2

✓ If 208 to 240 volts is not present, breaker is off or defective.

- If 208 to 240 volts is present, check for 208 to 240 volts between L1 and L2 on CB2 load side.

✓ If 208 to 240 volts is NOT present, defective breaker or tripped off.

➢ Continue to… Page 20



- Check for 120 volts on CB1 line side and Neutral

✓ If 120 volts is Not present, defective transformer.

- If 120 volts is present, check for 120 volts on CB1 Load side and Neutral.

✓ If 120 volts is NOT present, defective breaker or tripped off.

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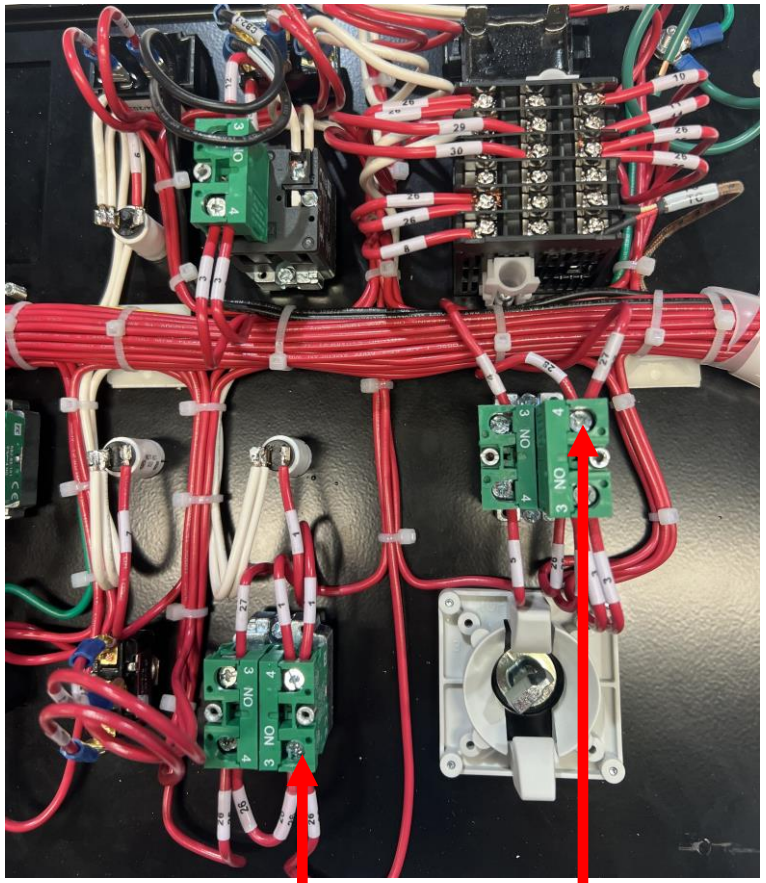

- Check for 120 volts at 'control switch' wire #26
- If 120 volts is NOT present, defective switch.

- If 120 volts is present, check for 120 volts on 'Heat/Fan switch' wire #28
- If 120 volts is NOT present, defective 'Heat/Fan switch.

- If 120 volts is present…Page 22

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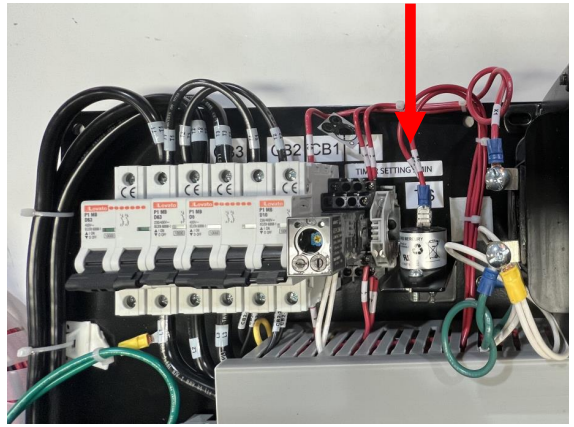
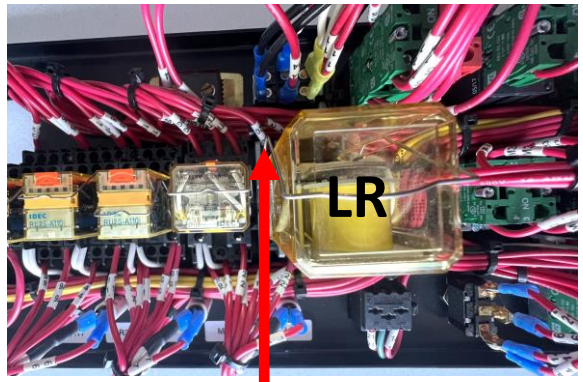
If the burner control is NOT locked out on reset and will not start…

Tilt SW
#22





LR #20G

- Check for 120 volts on 'tilt switch' wire #22.

✓ If 120 volts is NOT present, defective 'tilt switch'

- If 120 volts is present, check for 120 volts at LR relay wire #20G

✓ If 120 volts is NOT present, defective LR relay.

- If 120 volts is present…Page 23

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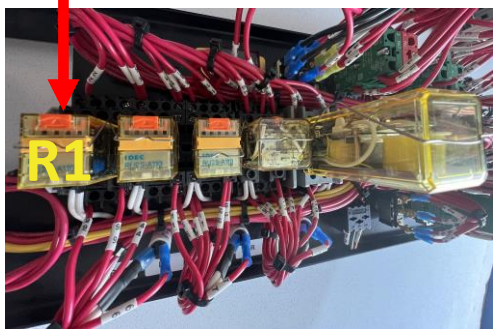
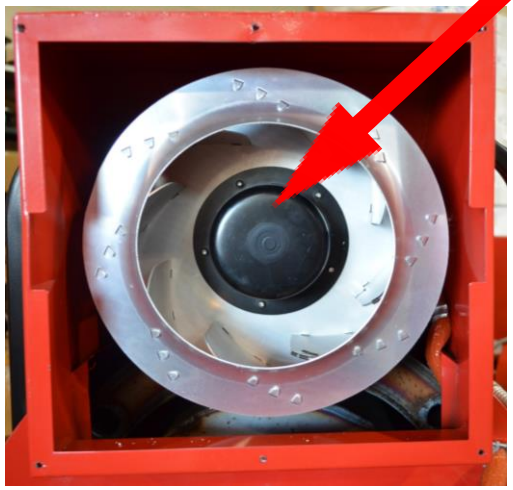
R1 #24





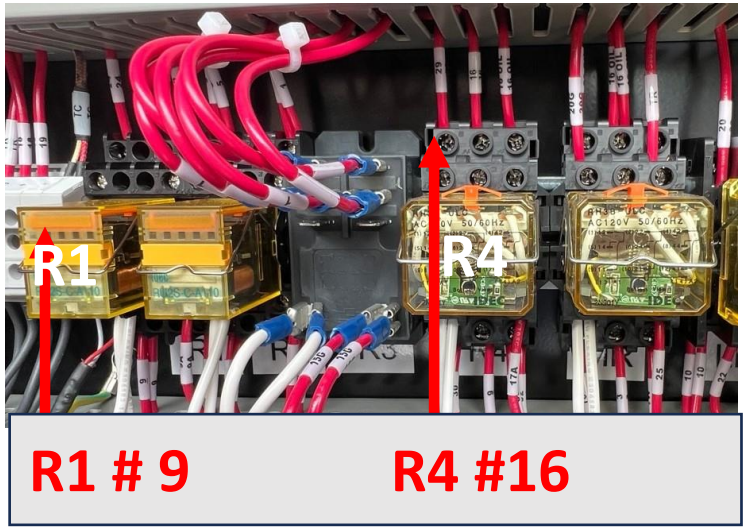
- Check for 120 volts on R1 relay wire #24
- If 120 volts is NOT present, defective fan motor thermostat.

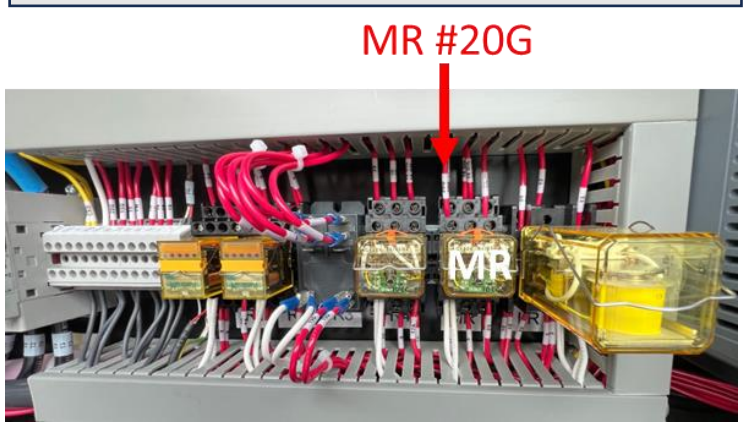
➢ Note: the fan motor thermostat is located inside the fan motor and is not field serviceable.

✓ Have the motor sent to a motor repair shop to replace the thermostat or replace with a new fan.

➢ If 120 volts is present…Page 24

If the burner control is NOT locked out on reset and will not start…





- If 120 volts is present, check for 120 volts at R1 wire #9
- ✓ If 120 volts is NOT present, defective R1 relay.

- If 120 volts is present, check for 120 volts at R4 wire #16
- ✓ If 120 volts is NOT present, defective R4 relay.

- If 120 volts is present, check for 120 volts at MR wire #20G
- If 120 volts is NOT present, defective MR relay.

Problem Solved

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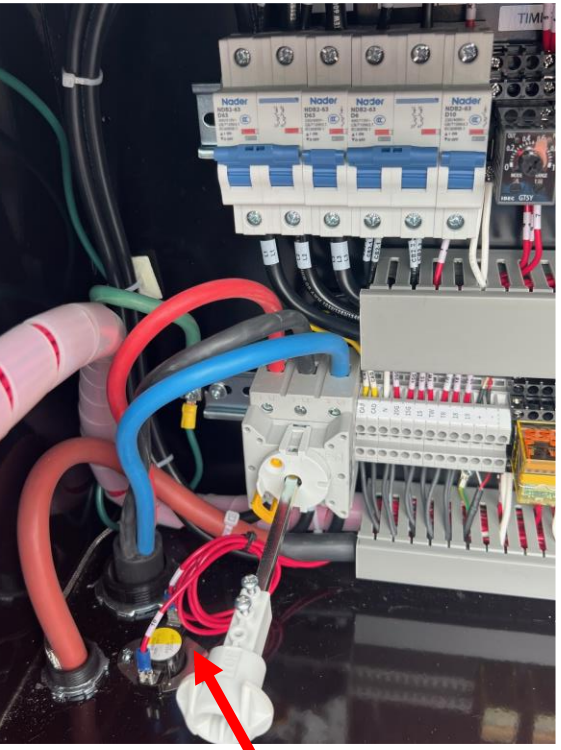
If the 'overheat reset' light is illuminated and will not reset…



#10
150°F thermal limit disc

Check for 120 volts on wire #10 on the 150°F thermal limit disc
If 120 volts is present…

- ✓ Defective 150°F thermal limit disc 
- ✓ Defective LR Relay 
- ✓ Defective temperature controller 
- ✓ Defective thermocouple 

➢ Testing the components… Page 27

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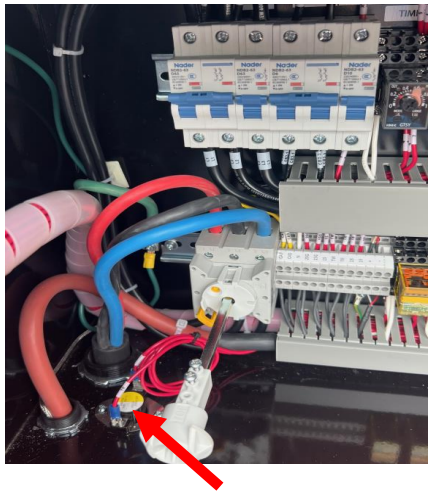
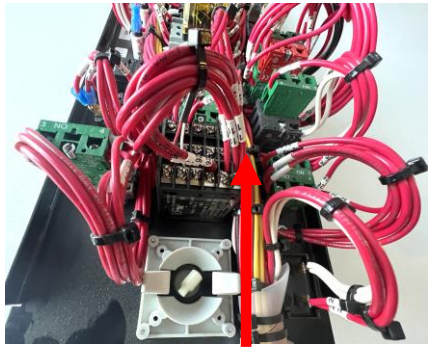


150°F disc #10



Wire #10

Temperature controller

Turn off power to the heater. Remove wire #10 from the 150°F thermal limit disc. Restore power to the heater. Reset the ‘overheat reset’ button If the burner starts, the 150°F thermal limit disc is defective.

If the overheat reset still stays illuminated. Turn off power to the heater. Remove the #10 wire from the temperature controller. Restore power to the heater. Reset the ‘overheat reset’ button.
If the burner starts, the temperature controller is defective.
If the ‘overheat reset’ remains illuminated, the LR relay is defective.

Problem Solved

HOME

If the circulating fan does not start…

- Check for 120 volts at R2 relay wire #11.
- If 120 volts is present, defective R2 relay
- If 120 volts is NOT present…

✓ Defective temperature controller.

✓ Defective thermocouple

✓ Defective timer

✓ Defective VFD

✓ Defective Fan speed switch.

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➢ Check the components…Page 29

If the circulating fan does not start…

- Note: The heater is equipped with multiple switches to insure positive start of the circulating fan. It is very unlikely that all switches would be defective.

Testing temperature controller. When the display temperature reaches 90° F check for 120 volts on wire # 11 on temperature controller.

✓ If no voltage present, defective temperature controller.

Testing thermocouple. If the display reads odd numbers….Page 52

Testing the fan timer. After the burner has run for 2 minutes, place a jumper between #4 and #5 wires. If the fan starts, defective timer.

Testing the fan speed switch. Place a jumper between #M1 and #M3 wires on the back of the switch. If the fan starts, defective speed switch.

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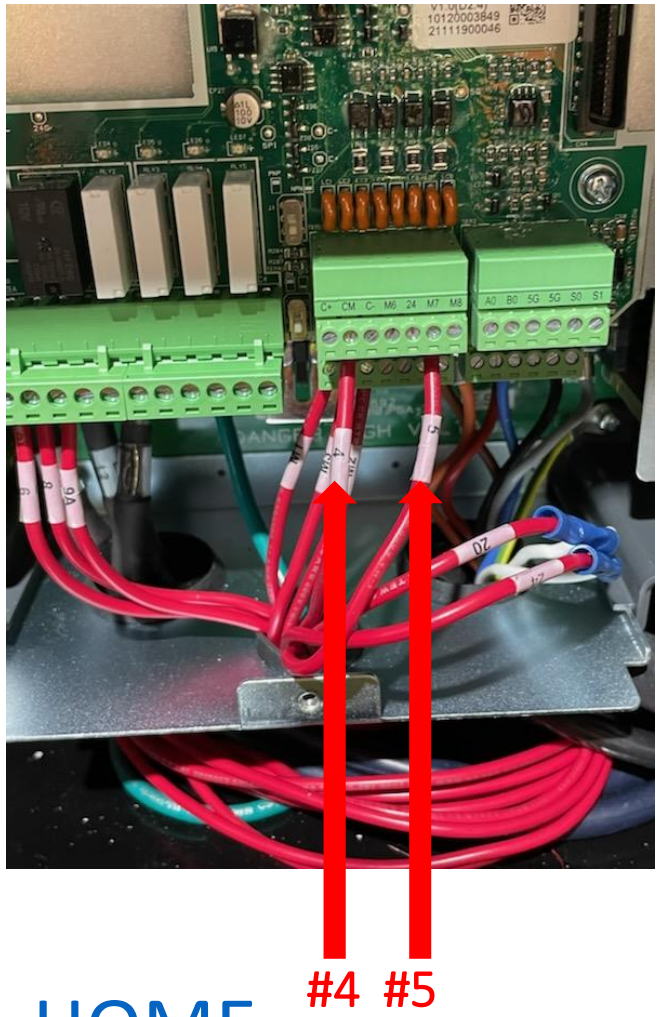
- If the fan doesn't start, check the VFD…Page 30

If the circulating fan fails to start or not stop
Testing the VFD (Variable Frequency Drive)



Make sure 208 to 240 volts is being supplied to the VFD

1. Turn off power to the heater.
2. Remove the cover of the VFD.
3. Ensure that all wires are secured to the terminals.
4. Ensure the terminal blocks are secured properly into place.
5. Restore power to the heater.
6. Place a jumper between CM #4 wire and M7 #5 wire.

✓ If the fan doesn't Start the VFD is Defective

- If fan doesn't stop running, remove wire #4

✓ If the fan stops the VFD is Defective

Problem Solved

HOME

If the circulating fan does not shut off automatically…

R2 wire #11

- Check for 120 volts at R2 relay wire #11.

✓ If 120 volts is Not present, defective R2 relay

- If 120 volts is present…

✓ Defective temperature controller.

✓ Defective thermocouple

✓ Defective timer

✓ Defective VFD

✓ Defective fan switch

➢ Check the components…Page 32

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If the circulating fan does not shut off automatically…

- Testing temperature controller. with the display temperature under 80° F check for 120 volts on terminal wire #11

✓ If 120 volts is present, defective temperature controller.

- Testing thermocouple. If the display reads odd numbers….Page 52

- Testing the fan timer. With the burner not running, check for 120 volts on terminal wire #4 and #5

✓ If 120 volts is present, defective fan timer.

✓ If 120 volts is not present, check the VFD…

- Testing the fan speed switch. Remove wire #M1 on the back of the switch. If the fan stops, defective speed switch.

➢ Checking the VFD…Page 30

Choose the information you are looking for and click on the Page

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1

The heater should be installed level, and on solid ground or base.

2

The heater should be installed on a noncombustible base (material).

3

The heater should not be installed in an area where combustible gases are circulating.

4

The heater must be equipped with vent (flue) pipes installed. See venting…Page 35

5

The heater should have the proper size wiring for voltage and amperage demand…Page 37

6

All gas piping and wiring cables should be routed so they are protected from water or traffic.

7

Ensure all piping and fittings are free from gas leaks.

8

Ensure proper ducting of heater respecting limitations…Page 51

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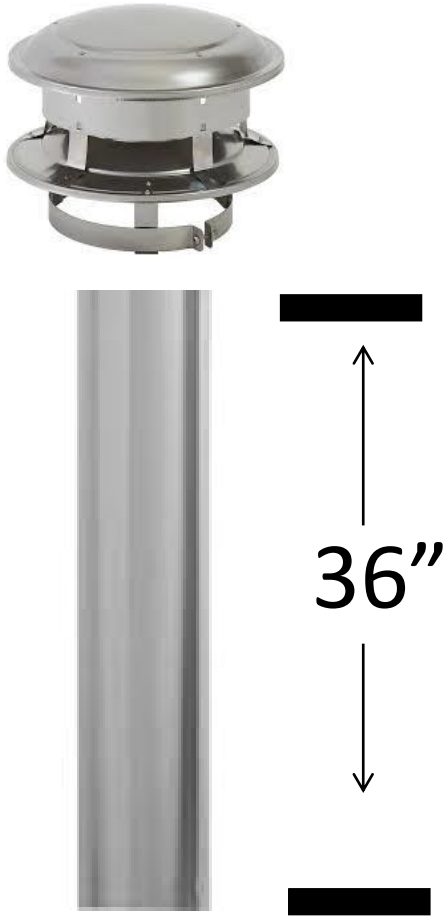
Venting heater outside a building.



- Make sure to install a stack minimum 30" on the flue.
- Make sure to install a rain cap on the flue pipe.
- Make sure that flue gases are not being recirculated into the blower fan and pushed into the space you are heating.

WARNING: The appropriate measures must be taken to ensure there will be no positive pressures on the exhaust flue of the heater.

➢ Venting from inside a building…Page 36

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Best practices for venting when heater is located inside a building

- Avoid using as many 90-degree elbows as possible
- Venting runs should be as short as possible
- Vertical rise minimum 3 feet, 5 feet is better outside the building.
- 20 feet maximum flue run and always install a rain cap.

- Never decrease diameter of flue piping.
- Horizontal runs ¼” per foot rise.
- Make sure all piping is properly secured.
- Make sure there is no negative pressure inside the building where the heater is placed.

➢ Note: where the vent pipe passes through a combustible wall a fireproof thimble must be used.

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- All wiring and connections to the heater should be calculated by a qualified electrician and approved by the local authorities having jurisdiction.

Note: The proper voltage and amperage draw is specified on the rating plate of the heater, failure to comply with electrical standards for wiring and amperage draw of the heater may cause damage to the heater. Consult a qualified electrician for assistance in wire sizing.

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Piping charts gas 0.6 specific gravity… "Field Assist Troubleshooting Guide"

1	2	3	4
.05 PSIG. Or less… Page 39	1 PSIG. With less than 10 % pressure drop… Page 40	2 PSIG. With less than 10 % pressure drop… Page 41	5 PSIG. With less than 10 % pressure drop… Page 42

➢ **Note**: All gas piping should be calculated and installed by a qualified Gas fitter. Gas fitters have charts for sizing gas pipes and proper regulators for different pressures and installations.

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➢ Start-up continued…Page 44

Maximum Capacity of Pipe in Cubic Feet of Gas per Hour for Gas Pressures of 0.5 Psig or Less and a Pressure Drop of 0.3 Inch Water Column

(Based on a 0.60 Specific Gravity Gas)

Nominal Iron Pipe Size, Inches	Internal Diameter, Inches	Length of Pipe, Feet													
		10	20	30	40	50	60	70	80	90	100	125	150	175	200
¼	.364	32	22	18	15	14	12	11	11	10	9	8	8	7	6
⅜	.493	72	49	40	34	30	27	25	23	22	21	18	17	15	14
½	.622	132	92	73	63	56	50	46	43	40	38	34	31	28	26
¾	.824	278	190	152	130	115	105	96	90	84	79	72	64	59	55
1	1.049	520	350	285	245	215	195	180	170	160	150	130	120	110	100
1¼	1.380	1,050	730	590	500	440	400	370	350	320	305	275	250	225	210
1½	1.610	1,600	1,100	890	760	670	610	560	530	490	460	410	380	350	320
2	2.067	3,050	2,100	1,650	1,450	1,270	1,150	1,050	990	930	870	780	710	650	610
2½	2.469	4,800	3,300	2,700	2,300	2,000	1,850	1,700	1,600	1,500	1,400	1,250	1,130	1,050	980

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Pipe Sizing Table for 1 Pound Pressure
Capacity of Pipes of Different Diameters and Lengths in Cubic Feet per Hour for an Initial Pressure of 1.0 Psig With a 10 Percent Pressure Drop and a Gas of 0.6 Specific Gravity

Pipe Size of Schedule 40 Standard Pipe (Inches)	Internal Diameter (Inches)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	1500	2000
1.00	1.049	717	493	396	338	300	272	233	206	142	114	97
1.25	1.380	1471	1011	812	695	616	558	478	423	291	234	200
1.50	1.610	2204	1515	1217	1041	923	836	716	634	436	350	300
2.00	2.067	4245	2918	2343	2005	1777	1610	1378	1222	840	674	577
2.50	2.469	6766	4651	3735	3196	2833	2567	2197	1947	1338	1075	920
3.00	3.068	11962	8221	6602	5650	5008	4538	3884	3442	2366	1900	1626
3.50	3.548	17514	12037	9666	8273	7332	6644	5686	5039	3464	2781	2381
4.00	4.026	24398	16769	13466	11525	10214	9255	7921	7020	4825	3875	3316
5.00	5.047	44140	30337	24362	20851	18479	16744	14330	12701	8729	7010	6000
6.00	6.065	71473	49123	39447	33762	29923	27112	23204	20566	14135	11351	9715
8.00	7.981	146849	100929	81049	69368	61479	55705	47676	42254	29041	23321	19960

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Pipe Sizing Table for 2 Pounds Pressure Capacity of Pipes of Different Diameters and Lengths in Cubic Feet per Hour for an Initial Pressure of 2.0 Psig With a 10 Percent Pressure Drop and a Gas of 0.6 Specific Gravity

Pipe Size of Schedule 40 Standard Pipe (Inches)	Internal Diameter (Inches)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	1500	2000
1.00	1.049	1112	764	614	525	466	422	361	320	220	177	151
1.25	1.380	2283	1569	1260	1079	956	866	741	657	452	363	310
1.50	1.610	3421	2351	1888	1616	1432	1298	1111	984	677	543	465
2.00	2.067	6589	4528	3636	3112	2758	2499	2139	1896	1303	1046	896
2.50	2.469	10501	7217	5796	4961	4396	3983	3409	3022	2077	1668	1427
3.00	3.068	18564	12759	10246	8769	7772	7042	6027	5342	3671	2948	2523
3.50	3.548	27181	18681	15002	12840	11379	10311	8825	7821	5375	4317	3694
4.00	4.026	37865	26025	20899	17887	15853	14364	12293	10895	7488	6013	5147
5.00	5.047	68504	47082	37809	32359	28680	25986	22240	19711	13547	10879	9311
6.00	6.065	110924	76237	61221	52397	46439	42077	36012	31917	21936	17616	15077
8.00	7.981	227906	156638	125786	107657	95414	86452	73992	65578	45071	36194	30977

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Pipe Sizing Table for 5 Pounds Pressure Capacity of Pipes of Different Diameters and Lengths in Cubic Feet per Hour for an Initial Pressure of 5.0 Psig With a 10 Percent Pressure Drop and a Gas of 0.6 Specific Gravity

Pipe Size of Schedule 40 Standard Pipe (Inches)	Internal Diameter (Inches)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	1500	2000
1.00	1.049	1989	1367	1098	940	833	755	646	572	393	316	270
1.25	1.380	4084	2807	2254	1929	1710	1549	1326	1175	808	649	555
1.50	1.610	6120	4206	3378	2891	2562	2321	1987	1761	1210	972	832
2.00	2.067	11786	8101	6505	5567	4934	4471	3827	3391	2331	1872	1602
2.50	2.469	18785	12911	10368	8874	7865	7126	6099	5405	3715	2983	2553
3.00	3.068	33209	22824	18329	15687	13903	12597	10782	9556	6568	5274	4514
3.50	3.548	48623	33418	26836	22968	20356	18444	15786	13991	9616	7722	6609
4.00	4.026	67736	46555	37385	31997	28358	25694	21991	19490	13396	10757	9207
5.00	5.047	122544	84224	67635	57887	51304	46485	39785	35261	24235	19461	16656
6.00	6.065	198427	136378	109516	93732	83073	75270	64421	57095	39241	31512	26970
8.00	7.981	407692	280204	225014	192583	170683	154651	132361	117309	80636	64745	55414

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Start-up procedure…

1	2	3	4
All heaters should be set up by a qualified gas fitter.	Make sure all piping and fittings are tight and free from gas leaks.	Purge all air from gas lines connected to the regulator.	Ensure all gas regulators are properly calculated for the burner pressure input and output.

- **Note**: If the heater is going to be connected to a generator, always have the heater shut off until the generator is operating steady and voltage is correct. Ensure the generator is properly sized to accommodate the heater voltage and amperage draw.

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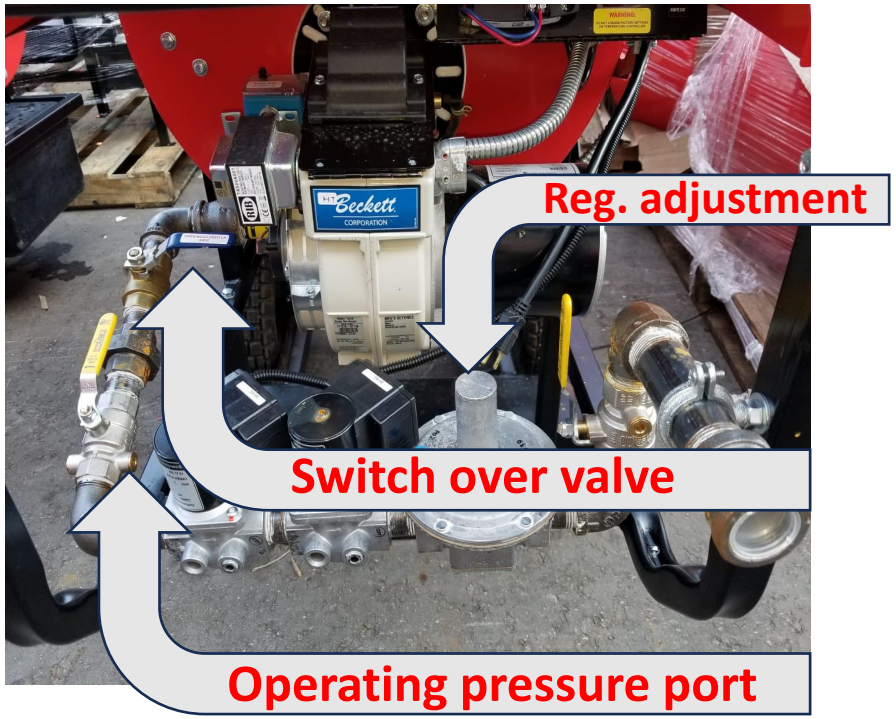
- Start-up continued…Page 44

Start-up procedure gas continued…



- Note: operating gas pressures LP 2.8" WC and NG 2.5" WC taking at the manual gas valve before the switchover valve.

  - 1. Determine if unit will be run on NG or LP. For NG operation make sure that NG/LP blue handle easy switchover valve located on the manifold side of the train is in the open position for NG operation ensure it is in the closed position for LP.

- Back to information menu…Page 33
- Start-up continued…Page 45

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2. Determine whether the unit will be powered with 3PH 208V or 1PH 240V and follow wiring instructions stipulated on the main serial number decal.

3. Tap control transformer located in control panel for 208V or 240V according to your power supply voltage.

4. Be sure to supply no more than 14" WC to the heater when the heater is OFF. When the burner is running supply pressure should be between 7" to 14" of WC.

5. Have a qualified gas fitter determine the correct regulators to use and the correct diameter hose to feed the unit with fuel according to pressure in the supply line and length of hose.

6. Be sure to fit the unit with a 36" stack on the flue with rain cap. Make sure your gas fitter assesses if there will be any negative air pressure and to take the appropriate measures to avoid negative pressures on the flue of the heater. Be sure to always terminate any flue stack set ups in a 3 - foot vertical position and follow the instructions on the decal/diagram located on the heater or manual for longer stack runs. Also, when running the unit for the first time make sure that flue gases are not being sucked in by the cooling fan and pushed into the space you are heating.

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➢ Continue start up procedure…Page 46

Start up procedure…

- 1. Power up heater. Turn main switch “ON” and controls “ON”. If running without a thermostat leave toggle switch in bypass position, if running with a thermostat then place toggle switch in thermostat position.
- 2. It is imperative to check control voltage when the unit’s cooling fan is running in high speed (Fan speed 3). With your voltmeter or using the heaters panel mounted voltmeter in the control voltage position ensure that the control voltage is not less than 108 Volts and not more than 132 Volts when fan is running at full speed.
- 3. Turn the switch to the “Heat” position. Burner will cycle on and purge the heat exchanger before ignition. If the burner fails to light, make sure all ball valves are open and that your manometer on the manifold side of the train is giving you a reading when the burner is attempting to light. If the burner does not light adjust your shutter and air band vents on the burner until it lights. Start by decreasing the air and if it doesn’t ignite then increase the amount of air until the burner ignites.

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➢ Continue start up procedure…Page 47

➢ **No installation** is complete until the combustion of the heater has been performed.

- 10. Once the burner is running adjust the manifold pressure to the pressure stipulated on the main serial number plate of the unit using the adjusting screw located on the pressure regulator located before the solenoid valves. For the Blaze 1000G for NG the manifold pressure must be 3.8" of WC and for LP operation it must be 5" of WC. When you have set the manifold pressure ensure that incoming pressure is between 7" to 13" of WC when the burner is running.
- 11. Once the burner has been running for 5 minutes insert your combustion analyzer probe into the flue stack. Adjust air settings on burner until you have an Oxygen reading of 3 % to 4% and then ensure that your CO levels are 0-50PPM.

➢ Using a Combustion analyzer...Page 48

➢ Gas train adjustment ports...Page 50

HOME

Clean & Reliable Combustion Natural Gas, Propane.

➢ **Note**: Be sure to set your analyzer for Gas, or Propane.

Set the air settings to manufacture's recommendations…Page 49 Start the burner and let it operate for 10 minutes. Adjust the air settings to achieve between 3% to 4% oxygen O_2 . Check the CO (Carbon Monoxide) level, it should not be higher than 50 PPM.

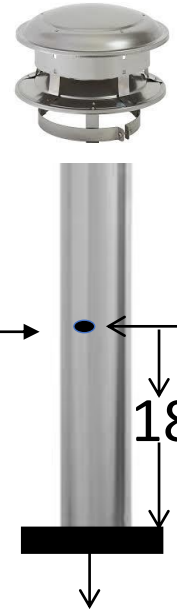
Carbon, smoke, cold flame
High C0 PPM
= blocked heatexchanger
Low efficiency

What happens when you don't use a Combustion Analyzer

Combustion

No Carbon, no smoke, hot flame
no C0 PPM
= clean heatexchanger
High efficiency

What happens When you use a Combustion Analyzer



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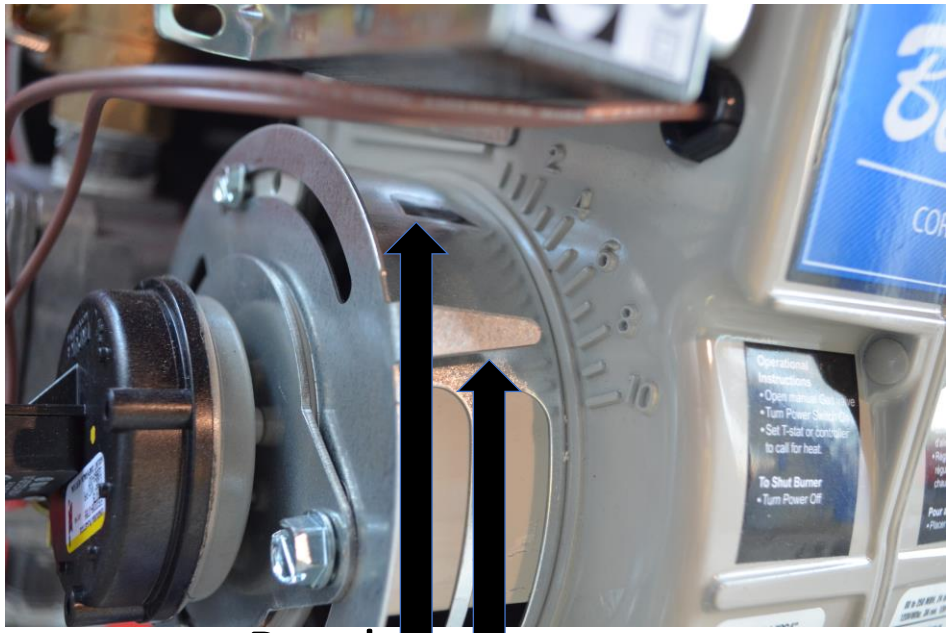
Start up complete

Back to information menu…Page 33

Combustion and adjusting the air settings.

Proper air adjustments must be preformed for reliable combustion



- Recommended air settings are indicated in manufactures instructions as 8/0 the first number being the shutter and the second number being the band.

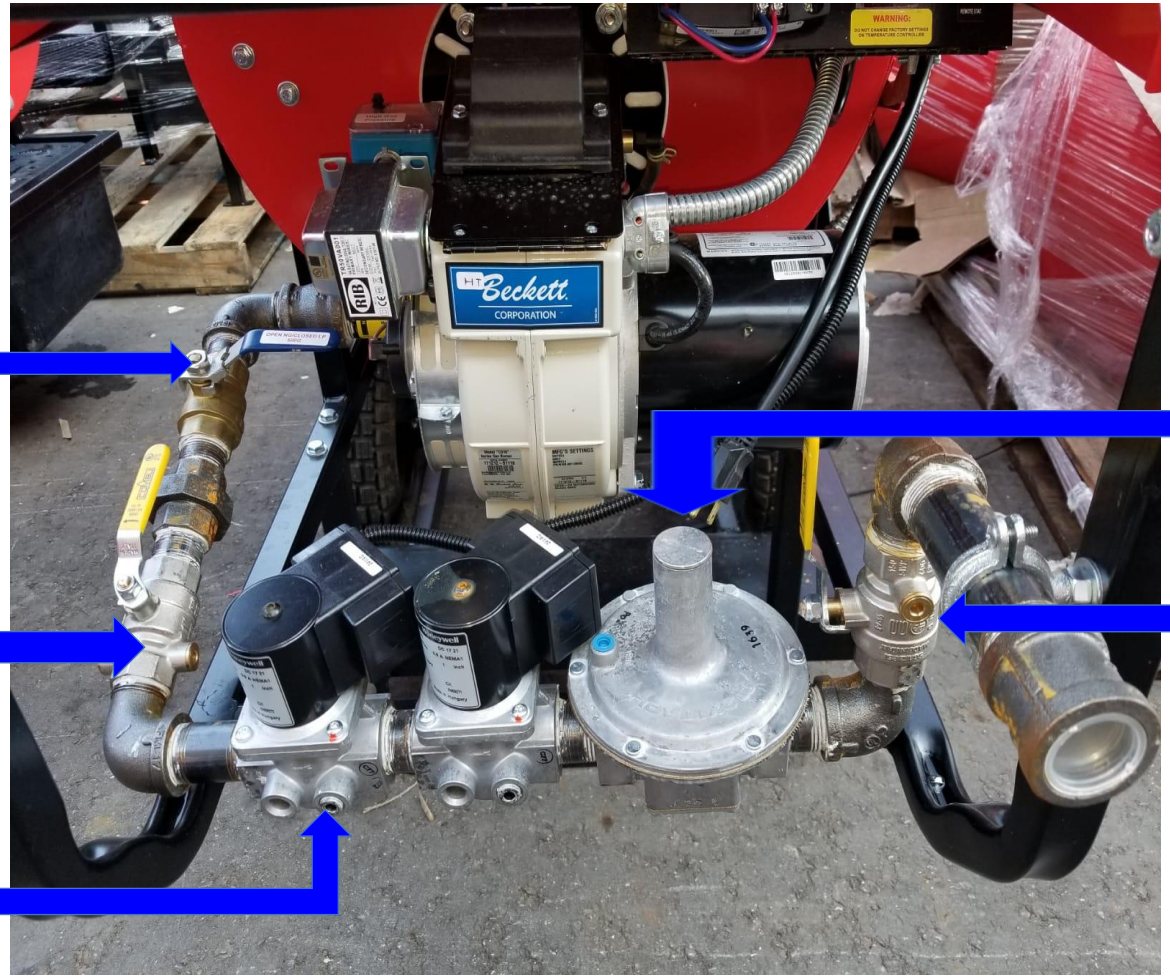
➢ Note: recommend air settings are approximate and will change with altitude, and air temperature.

➢ The Use of a combustion analyzer will ensure clean burning and maximum efficiency.

HOME ➢ Back to combustion…Page 48 ➢ Back to information menu…Page 33

Gas Train Blaze 600/700/1000G.

"Field Assist Troubleshooting Guide"



Switchover valve

Outlet pressure port

Gas solenoid valve test port

Pressure regulator adjustment under cap

inlet pressure port

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Back to startup…Page 45

The EB1000G can be used in most applications with ductwork.
The maximum outlet (supply air) is 400 feet. The maximum inlet (return air) is 50 feet.
Total ducting, Outlet plus Inlet not to exceed 400 feet.

- Best practices…
- ✓ Never exceed the 400 feet of total ducting and 50 feet of air inlet ducting.
- ✓ If flexible ducting is used, there should be no kinks in ductwork.
- ✓ Weather flexible or solid ducting is used, try to avoid sharp 90^{θ} turns.
- ✓ If ducting is split into 2 locations, use a TY not a T. and a maximum of 200 feet total ducting.
- ✓ If ducting is split into 2 locations, ensure the volume of air passing through is equal to or greater than the single outlet of the heater.
- ✓ Ensure all ducting is properly protected from water, traffic, and other obstructions.
- Note: Improper ducting will cause overheating and short cycling which will damage the heater.

Return to installation and start up menu… Page 33

Testing a thermocouple

- Note: Usually when the thermocouple if defective, the Temperature Controller will indicate odd readings in the display window.
  Example.. 0000 or high numbers, 700 or 800
  In this case….

Testing the thermocouple…

Remove the (small) red and white thermocouple wires from the terminal block located in the control panel on #11 white and #12 red. Place a jumper wire between the two terminals #11 And #12. on the temperature controller

- ✓ if now the display reads the ambient temperature, defective thermocouple
- ✓ If the display continues to read odd numbers, defective temperature controller

Tip on replacing the thermocouple…Page 53 Return to previous…Page29

Replacing the thermocouple

Tech Tip

With the side panels removed.

1. Remove thermocouple wire from the bottom of the terminal block in the panel.
2. Attach a string to the end of the wires using electrical tape insuring the knot is not too large.
3. Locate the chase that the thermocouple passes through in the heater casing.
4. Using a box cutter cut a 4 inch slit in the chase casing. (careful not to cut into wires inside).
5. Locate the thermocouple wire through the slit.
6. Pull the thermocouple wire through the slit while someone else pushes it from panel.
7. Once the string reaches the slit have someone pull the thermocouple from the burner end of the heater while someone pushes it through the slit.
8. With the old thermocouple removed attach the string onto the new thermocouple wires insuring electrical tape insuring the knot is not too large.
9. Now reverse the procedure and reinstall the wires to the terminal block, white to white, red to red.

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Natural Gas and Propane Burner	
Preform and Record combustion results:	**Check**
O2 PERCENTAGE (oxygen)	✓ done
CO parts per million (ppm carbon monoxide)	✓ done
Remove gas gun assembly adjust electrodes check for cracks and clean	✓ done
Lubricate o ring on gun assembly	✓ done
Clean flame rod	✓ done
Check ignition cable	✓ done
Start burner and check control safety lock-out	✓ done
Check and adjust gas pressure Hi fire and Low fire	✓ done
Clean blower wheel (remove dust)	✓ done
Check air switch hose for cracks	✓ done
Check gas train fittings for leaks	✓ done
Start heater and check operation of thermostat /bypass	✓ done
HOME Continue Page 57	

Heater controls	Check
Test temperature controller. Fan on at 90F / Fan off at 80F Burner off 30 F above set high limit / Burner back on at high set temp	✓ Done
Check circulating fan,(Fan timer, Fan relay, 110F disk)	✓ Done
Check wiring terminals inside control panel, tighten if lose	✓ Done
Clean heater casing and check for dents	✓ Done

➢ Note: Pre-season annual maintenance will save you time, money and service calls every time you rent the unit.

Back to previous menu…Page 33

Gas piping, and regulator sizing…

- **Note**: All gas piping should be calculated and installed by a qualified Gas fitter.

Gas fitters have charts for sizing gas pipes and proper regulators for different pressures and installations.

It is important to use the right sizing piping charts for your area. Code regulations vary from different States and Provinces.

- Regulator sizing example…Page 59

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Natural Gas and Propane Regulator Examples…

1. Obtain the specifications included with the operational instructions for gas heaters.
2. Size the gas regulator according to the gas inlet pressure available to the heater.
3. Read the outlet pressure required for the heater on the heater specification sheet.
4. Size the regulator according to both the inlet and outlet gas pipe diameter of the gas train.

Size the gas regulator and piping according to the gas Outlet pressure available

Outlet diameter → **Gas Train 1 ¼"**

Outlet pressure

Size the gas regulator according to the gas inlet pressure required for the heater →

➢ Note: The supplied pressure regulator with the heater on the gas train is used only to adjust the burner operating pressure. The only time a secondary regulator is not used is when the gas supplied on site from the meter is less than 14" WC.

Pipe sizing example…Page 60

Pipe sizing the job site…

- **WHAT YOU NEED TO KNOW**

Where the heater will be placed

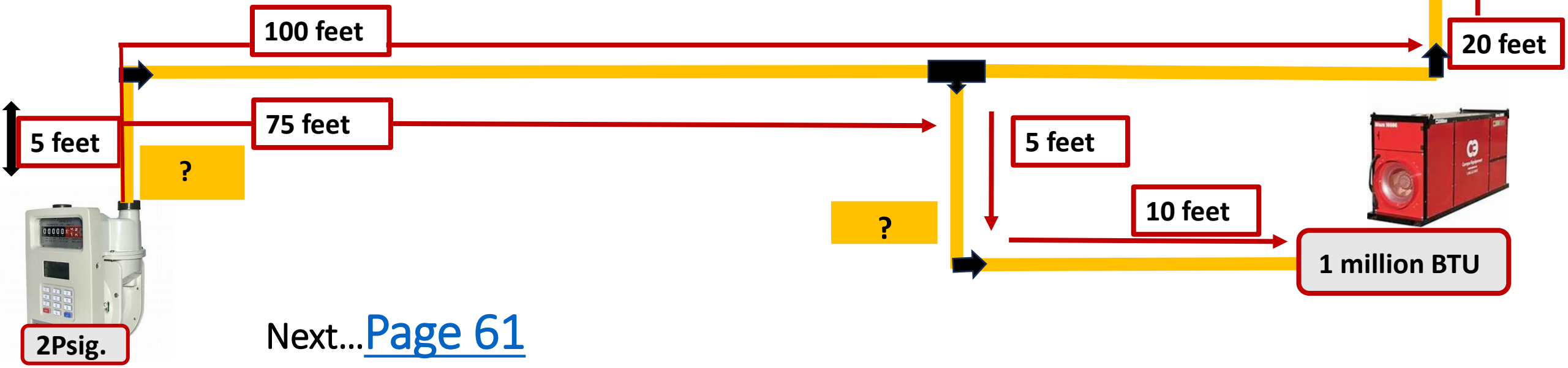
What Pressure is available 2 Psig

Gas type Natural Gas

Total BTUs of all units connected to gas piping 3 million

Length of longest run. 125 feet

- Steve's Job site requiring 1 heater - 1 million BTUs and 1 - heater 2 million BTUs.



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Pipe sizing…

Find size of pipe to the first branch using your 2 Psig chart for NG. and 125-foot run.

Next Consult Chart

Natural Gas

GAS: NATURAL
INLET PRESSURE: LESS THAN 2 psi
PRESSURE DROP: 0.5 in. w.c.
SPECIFIC GRAVITY: 0.60

PIPE SIZE (inch)

NOMINAL:	½	¾	1	1¼	1½	2	2½	3	4	5	6	8	10	12
ACTUAL ID:	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	4.026	5.047	6.065	7.981	10.020	11.938
LENGTH (feet)	CAPACITY IN CUBIC FEET OF GAS PER HOUR													
10	172	360	678	1390	2090	4020	6400	11 300	23 100	41 800	67 600	139 000	252 000	399 000
20	118	247	466	957	1430	2760	4400	7780	15 900	28 700	46 500	95 500	173 000	275 000
30	95	199	374	768	1150	2220	3530	6250	12 700	23 000	37 300	76 700	139 000	220 000
40	81	170	320	657	985	1900	3020	5350	10 900	19 700	31 900	65 600	119 000	189 000
50	72	151	284	583	873	1680	2680	4740	9660	17 500	28 300	58 200	106 000	167 000
60	65	137	257	528	791	1520	2430	4290	8760	15 800	25 600	52 700	95 700	152 000
70	60	126	237	486	728	1400	2230	3950	8050	14 600	23 600	48 500	88 100	139 000
80	56	117	220	452	677	1300	2080	3670	7490	13 600	22 000	45 100	81 900	130 000
90	52	110	207	424	635	1220	1950	3450	7030	12 700	20 600	42 300	76 900	122 000
100	50	104	195	400	600	1160	1840	3260	6640	12 000	19 500	40 000	72 600	115 000
125	44	92	173	355	532	1020	1630	2890	5890	10 600	17 200	35 400	64 300	102 000
150	40	83	157	322	482	928	1480	2610	5330	9650	15 600	32 100	58 300	92 300
175	37	77	144	296	443	854	1360	2410	4910	8880	14 400	29 500	53 600	84 900
200	34	71	134	275	412	794	1270	2240	4560	8260	13 400	27 500	49 900	79 000
250	30	63	119	244	366	704	1120	1980	4050	7320	11 900	24 300	44 200	70 000
300	27	57	108	221	331	638	1020	1800	3670	6630	10 700	22 100	40 100	63 400

2 million BTU

?

20 feet

100 feet

75 feet

5 feet

?

2Psig.

?

5 feet

1 million BTU

10 feet

Pipe sizing Table for 2 pounds Pressure with a 10% Pressure drop and a gas of…

0.6 Specific Gravity

Continue…Page 63

NO 125-foot then always use next highest ➘

Pipe Size of Schedule 40 Standard Pipe (Inches)	Internal Diameter (Inches)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	1500	2000
1.00	1.049	1112	764	614								
1.25	1.380	2283	1569	1260								
1.50	1.610	3421	2351	1888								
2.00	2.067	6589	4528	3636								
2.50	2.469	10501	7217	5796								
3.00	3.068	18564	12759	10246								
3.50	3.548	27181	18681	15002								
4.00	4.026	37865	26025	20899								
5.00	5.047	68504	47082	37809								
6.00	6.065	110924	76237	61221								
8.00	7.981	227906	156638	125786								
10.00	10.020	413937	284497	228461								
12.00	11.938	655315	450394	361682	309553	274351	248582	212751	188560	129596	104070	89071

➢ **WHAT YOU NEED TO KNOW**

What Pressure is available **2 Psig**

Gas type, **Natural Gas**

Total BTUs of all units connected to gas piping **3 million**

Length of longest run. **125 feet**

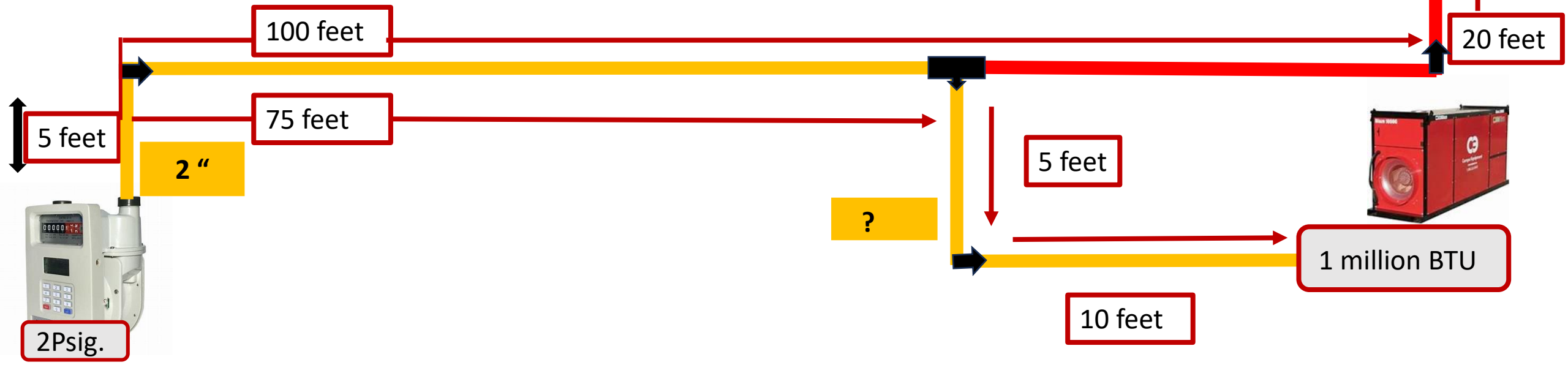
150 feet-3636 million BTU's = 2" pipe.

Pipe sizing…

Now you know a 2" is required from the meter to first branch

1. Next find out the size of the pipe on unit after the branch always using the total feet from the meter to that heater and the total of BTUs on branch. Total BTUs of all units connected Branch 2 Million BTUs
2. Total Length of Branch = 125 feet

Next Consult Chart



Pipe sizing Table for 2 pounds Pressure with a 10% Pressure drop and a gas of…

0.6 Specific Gravity

Continue…Page 65

Pipe Size of Schedule 40 Standard Pipe (Inches)	Internal Diameter (Inches)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	1500	2000
1.00	1.049	1112	764	614	525	466	422	361	320	220	177	151
1.25	1.380	2283	1569	1260	1079							
1.50	1.610	3421	2351	1888	1616							
2.00	2.067	6589	4528	3636	3112							
2.50	2.469	10501	7217	5796	4961							
3.00	3.068	18564	12759	10246	8769							
3.50	3.548	27181	18681	15002	12840							
4.00	4.026	37865	26025	20899	17887							
5.00	5.047	68504	47082	37809	32359							
6.00	6.065	110924	76237	61221	52397							
8.00	7.981	227906	156638	125786	107657							
10.00	10.020	413937	284497	228461	195533							
12.00	11.938	655315	450394	361682	309553	274351	248582	212754	188560	129596	104070	89071

Total BTUs on branch = 2000,000

Total length of run = 125 feet

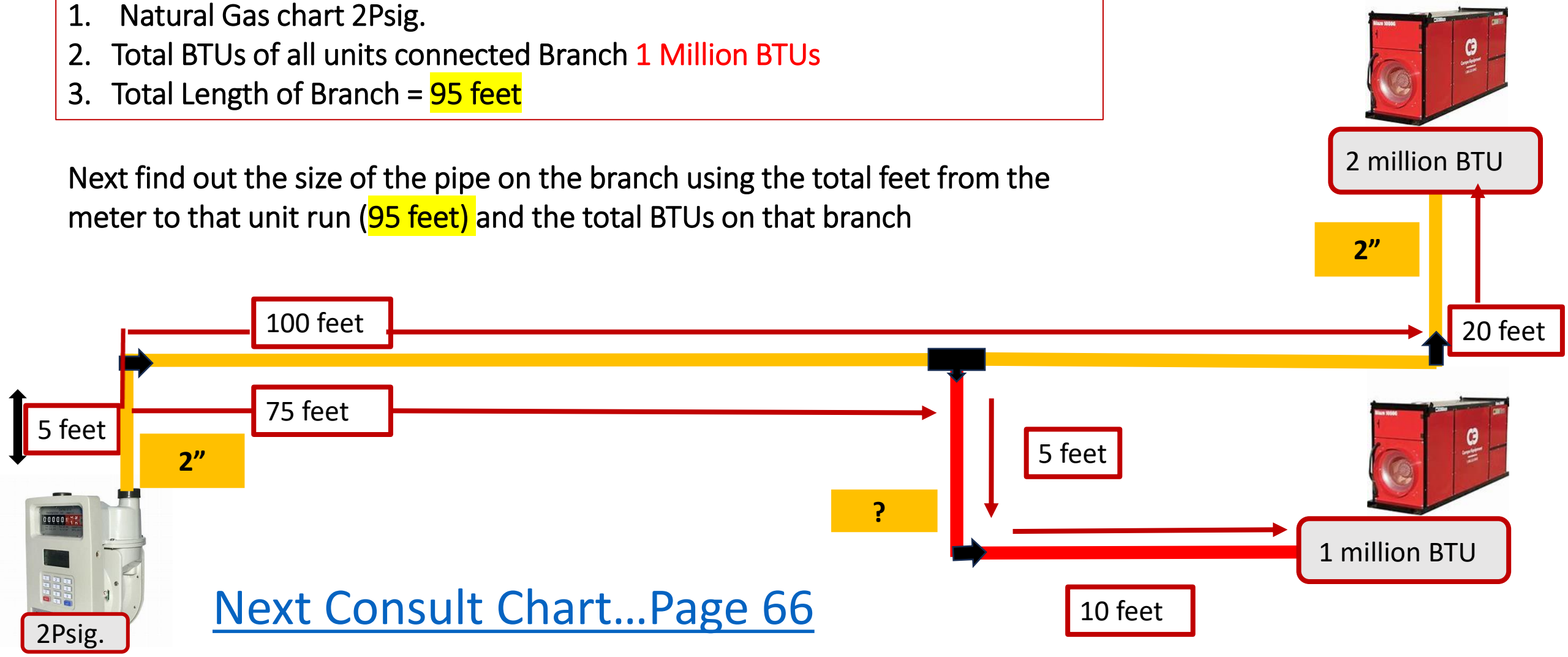
150 feet-3636 million BTU's = 2" pipe.

No 125 foot on chart must use next highest footage.

Pipe sizing…

1. Natural Gas chart 2Psig.
2. Total BTUs of all units connected Branch 1 Million BTUs
3. Total Length of Branch = 95 feet

Next find out the size of the pipe on the branch using the total feet from the meter to that unit run (95 feet) and the total BTUs on that branch



Next Consult Chart…Page 66

Pipe sizing Table for 2 pounds Pressure with a 10% Pressure drop and a gas of…

0.6 Specific Gravity.

Continue… Page 67

NO 95-foot then always use next highest

Pipe Size of Schedule 40 Standard Pipe (Inches)	Internal Diameter (Inches)	Total Equivalent Length of Pipe in Feet										
		50	100	150	200	250	300	400	500	1000	1500	2000
1.00	1.049	1112	764	614	525	466	422	361	320	220	177	151
1.25	1.380	2283	1569	1260								
1.50	1.610	3421	2351	1888								
2.00	2.067	6589	4528	3636								
2.50	2.469	10501	7217	5796								
3.00	3.068	18564	12759	10246								
3.50	3.548	27181	18681	15002								
4.00	4.026	37865	26025	20899								
5.00	5.047	68504	47082	37809								
6.00	6.065	110924	76237	61221	52397	46139	42077	36012	31917	21936	17616	15077
8.00	7.981	227906	156638	125786	107657	95414	86452	73992	65578	45071	36194	30977
10.00	10.020	413937	284497	228461	195533	173297	157020	134389	119106	81861	65737	56263
12.00	11.938	655315	450394	361682	309553	274351	248582	212754	188560	129596	104070	89071

1. Natural Gas chart 2Psig.
2. Total BTUs of all units connected Branch 1 Million BTUs
3. Total Length of Branch from meter = 95 feet

100 feet-1569 BTU's = 1 ¼"

Pipe sizing…

Piping for job complete

2 million BTU

2"

20 feet

100 feet

75 feet

5 feet

2"

5 feet

1 ¼"

1 million BTU

10 feet

2Psig.

Multiple units on a header

Pipe sizing multiple heaters one header…

Note: any other appliances operating off the same meter would have to be calculated in to piping.

400,000 BTU

20 feet

1" PIPE

650,000 BTU

20 feet

1" PIPE

2 million BTU

20 feet

2" PIPE

2 1/2" PIPE

30 feet

50 feet

100 feet

2 feet

2Psig.

40 feet

10 feet

1 1/4" PIPE

2 million BTU

Next example

Available pressure 2Psig.
Total BTU = 5.050 million
Longest length 122 feet

Pipe sizing multiple heaters one Main Line and multiple drops…

"Field Assist Troubleshooting Guide"

Available pressure 2Psig.

Total BTU = 4250,000

Longest length 165 feet

Note: any other appliances operating off the same meter would have to be calculated in to piping.

400,000 BTU

20 feet

1"

30 feet

30 feet

650,000 BTU

20 feet

1"

50 feet

2 million BTU

20 feet

2"

Branch A - 135 feet

3 feet

2 feet

2 ½"

2Psig.

Home

50 feet

1 ½"

1 million BTU

20 feet

1 ¼"

50 feet

50 feet

10 feet

200,000 BTU

1"

Branch B

165 feet