

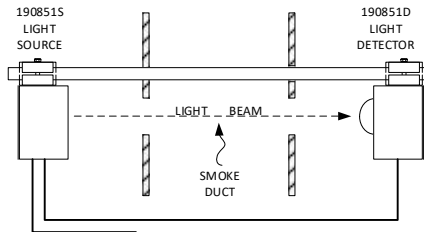
Preferred Utilities Mfg Corp

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JC-30D2-EZ Smoke Opacity Monitor Package

Includes: JC-30D2 Monitor,
190851S Light Source and 190851D Light Detector
NYC DEP Accepted

Installation & Operation Instructions



The **JC-30D2-EZ** Light Source and Light Detector are mounted on opposite sides of the smoke duct. Smoke passing through the light beam reduces the light intensity sensed at the Detector. The intensity signal is transmitted to the **JC-30D2** Monitor where it is converted into Opacity for display and alarming.

Light Source and Sensor

The 190851S Light Source uses a long life LED Lamp.

The 190851D Detector has a large lens that reduces inaccuracies due to ambient light and misalignment.

Calibration

Calibration is automated, there are no manual adjustments.

During every Calibration, the Lamp brightness is automatically adjusted to suit the soot/dust build-up, alignment changes, and stack width.

Auto-Cal

The JC-30D2-EZ can be configured to automatically do a calibration after the burner fan cycles Off. Calibration cancels out soot build-up on the optics and thus reduces the need to frequently clean the Source window and the Detector lens.

Auto-Cal significantly reduces false alarms and nuisance shutdowns caused by typical burner light-off and shutdown soot deposits.

JC-30D2 Monitor / Alarm

At a glance, the bargraph indicates when maintenance is required...before burner shutdown occurs. Intuitive Menu navigation makes setup and adjustments easy. RS-485 and Ethernet Modbus makes remote monitoring easy.

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SAFETY



DANGER

Electric Shock Hazard

Multiple power sources may be present.

Disconnect all electric power sources, local and remote, before servicing



WARNING

This product is intended for use in Commercial and Industrial installations,
it is NOT intended for Residential use.

This product is intended to be used by Trained Operators.

Installation, start-up, and troubleshooting is intended to be done by
Experienced Technicians familiar with Industrial Safety Codes
and all Safety Codes specific to burners and boilers.

This product is NOT perform a Primary Safety Interlock rated device.
The Shutdown Relay Output should only be used as an
additional auxiliary Operating limit and should not replace or bypass
any Primary Safety Interlock devices required by Safety Codes.

**Incorrect wiring connections to burner/boiler Flame Safeguard controls
can cause Equipment Damage, Injury, or Death**

Standard Alarm Sequence

See the SEQUENCE section for additional details on the field selectable sequences: NYC-BAR and WOOD-COAL.

The hash mark to the right of the bargraph indicates the Alarm Setpoint. The Alarm contacts will close and the bargraph will blink if the Opacity has been above the Setpoint continuously for 20 seconds (adjustable from 0-120 sec.).

Press the **Silence** button to stop the blinking and to de-energize the Alarm Relay (typically wired to an external bell, horn, or strobe).

When the opacity drops below the Setpoint, the bargraph will stop blinking and the Alarm relay will de-energize (if it hadn't already been Silenced).

If the Opacity is continuously above the Alarm Setpoint for more than 120 seconds (adjustable from 0-180 sec.), the Shutdown relay will de-energize and display the message SHUTDOWN. Typically, the Shutdown relay N.O. contacts are wired in series with the burner Operating Limits circuit and this will cause the burner to shutdown.

After the opacity has dropped below the Alarm Setpoint, you must press the RESET button to re-energize the Shutdown before the burner can re-start (assuming the shutdown contacts are wired to shutdown the burner). The Shutdown Relay remains de-energized, the burner will not re-start, and SHUTDOWN is displayed until the JC-30D2 has been RESET.

If the AC power has cycled Off and then ON, the JC-30D2 cannot be RESET until after the Lamp has completed WARM UP.

Operation

Home Screen

The current % Opacity is displayed at the top. The Bargraph height varies in proportion to the Opacity. The line on the right side of the bargraph is the Warning/Shutdown Alarm setpoint.

The lower left button on all screens indicates one of these three words:

Silence or **Alarms** or **History**

When a new Alarm occurs, **Silence** and the bargraph blink, and the Common Alarm Relay Output energizes. Touch **Silence** to stop the blinking and to de-energize the Alarm Relay.

Alarms is displayed after silencing (if an Alarm is still active).

History is displayed when there are no active Alarms.

A Shutdown Alarm latches and requires a manual reset after the temperature has dropped below the Shutdown setpoint. The **RESET** button is only displayed when a reset is required.

Active Alarms Screen

From any other screen, touch the **Alarms** button to display the Active Alarms Screen.

If there are no active Alarms, **Alarms** will not be displayed on the Home or Menu screens.

All active Alarms are displayed on this screen: Warning Alarm, Shutdown Alarm, Hardware Faults, etc....

The Alarm Opacity and time/date shown occurred when the Alarm time delay expired and the Alarm triggered.

When the Alarms screen is displayed, **History** and **Back** are displayed.

Touch **History** to display the History screen.

Touch **Home** return to the Home screen.

History Screen

Touch **History** to display the History screen.

The History screen displays the Time/Date of the most recent 50 Alarms and Events.

Events include: peak Opacity, when an Alarm Clears, a Shutdown Reset, JC-30D2 power-up, etc..

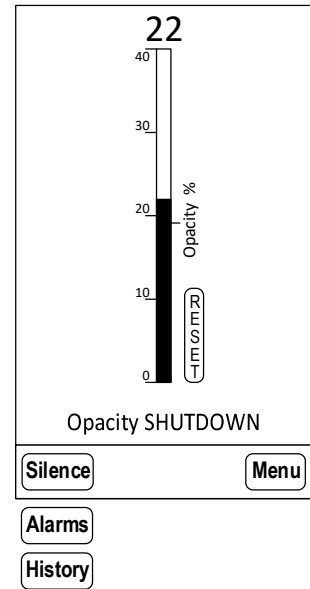
Touch the **Up** or **Down arrow** to advance to the next page of History. Touch **Date** to enter a time/date and then to jump to the nearest History records.

The **Hide Events** and **Show Events** removes or displays Events.

The History memory is retained when powered down. The History can be extracted via the USB port using the free JC_TG_Edit Windows App.

Menu Screens

To set clock, Alarm Setpoints, and other initial Setup.....See pages 9 and 10



Active Alarms		
High Opacity. SHUTDOWN	27 % RESET REQ'D	16:30:02 8/17
High Opacity Warning	16 % WARNING	16:23:59 8/17

History	▲	▼	Date
16:33:07 High Opacity. SHUTDOWN			
27 % RESET REQ'D			16:30:02 8/17
Peak Opacity			
33 %			16:29:13 8/17
High Opacity Warning			
16 % WARNING			16:23:59 8/17
Peak Opacity			
23 %			11:03:22 8/17
High Opacity Warning			
15 % WARNING			10:59:31 8/17

Operation (Continued)

Window-Lens Cleaning

- The Light Source window, Light Detector lens, and any Purge Cap windows should be cleaned periodically. Use a soft, lint free cloth dampened with "Windex".
- **Re-calibrate after every cleaning** (from the CALIBRATE Menu) .
- If cleaning the windows/lens and re-calibrating doesn't clear the "LENS IS DIRTY" message, then the Source and Detector might need to be re-aligned.

The message "LENS IS DIRTY" is displayed after a calibration when:

0% Opacity mA is less than 15 and Detector Gain = High and Lamp Brightness =17.

Re-calibration fails when 0% Opacity ("0 mA") is less than 8.

↑	↓	DATE
CALIBRATION HISTORY		
Before-After-Lamp-Gain-0 mA-100 mA		
16	0 17	H 17.24 3.96
10/20/20 07:03 18 Fan Starts		
15	0 16	H 22.93 3.92
10/15/20 21:03 1 Fan Starts		
Calibration Failed:		
Calibration Aborted by Fan		
10/15/20	14:10	22 Fan Starts
10	0 14	H 22.03 3.96
10/11/20 13:32 20 Fan Starts		
12	0 12	H 22.73 3.90
10/07/20 13:01 24 Fan Starts		
14	0 10	H 21.58 3.95
10/03/20 12:32 21 Fan Starts		

The **Calibration History** screen (Menu/Calibrate Opacity/Calibration History) shows the results of the last 60 calibrations. The trend of increasing Lamp values, then decreasing 0 mA values, allows you to anticipate a nuisance Opacity shutdown.

"Before" is the Opacity (due to dirt/soot) just before a calibration.. If these values are consistently near the Alarm setpoint, increase Purge air flow or service the burner or re-calibrate more frequently, to prevent nuisance shutdowns.

"Fan Starts" is the number of starts since the last calibration. If a small number of starts increases "Before" opacity, consider cleaning the oil nozzles or changing the burner light-off settings to reduce the initial puff of soot.

If the AutoCal is enabled (see page 10), the time interval between Lens cleanings will be much longer because AutoCal calibrates out the normal dust build-up on the optical surfaces. AutoCal can prevent nuisance Lockouts due to soot buildup.

Calibration

Calibration is required After Installing; After cleaning the windows & Lens; After Source or Detector re-alignment; or After the LED Lamp has been replaced.

How to Start a Calibration:

- The burner fans must be OFF during the entire calibration.
- Once started by the User, Calibration is fully automated and takes approximately 3 minutes.
- From the Home screen, touch **Menu**, then **Calibrate Opacity**, then **Calibrate Now**
- **Wait: For Stack to Clear** displays and counts down to 0 after the burner Fan stops to allow dust to settle.
- **Wait: Lamp Warming Up** displays and counts down to 0 when initially powered up, or whenever the Lamp has been Off.
- When both Waits are done, the **Start** button appears. Press **Start** to begin the Calibration. Press **Back**, **Home**, **Silence**, **Alarms**, or **History** on any of the Calibration screens to abort the Calibration process.
- During the first phase of calibration, the 190851x Light Source "Auto Ranging" occurs, as follows:
 - The Lamp brightness (2-17) and Detector Gain (Low/High) are automatically varied to find the maximum Detector mA signal.
 - The Wait timer counts down from 180 seconds, but can complete Auto Ranging in as short as 120 sec. (depending on distance, alignment, etc...)

Calibrate Opacity

Detector: xx.xx mA
Opacity: xxx.xx %

Waiting for Warm Lamp
sec

OR

Waiting for Burner Fan OFF

OR

Waiting for Clear Stack
sec

OR

Press Start to Proceed

To Exit: Press BACK or HOME
...Status MESSAGE...

Silence
Back
Home

Alarms

History

Calibrate Opacity

Detector: xx.xx mA
Auto Range in Progress

Auto Range Waiting for Complete

Cal Auto Range
180 Sec

To Exit: Press BACK or HOME
...Status MESSAGE...

Calibration (continued)

- After a successful AutoRanging is completed, Opacity Calibration begins with ON to find the 0% Opacity mA signal.
- 10 second Wait for the mA signal to start to settle down.
- After that, every 5 seconds the Detector mA signal is checked.
- When two successive mA vales are within 0.3% of each other, the Opacity value is saved.
- Then the Lamp is turned OFF to find the 100% Opacity mA signal.
- When two successive mA vales are within 0.3% of each other, the 100% value is saved.

Calibrate Opacity	the Lamp
Detector: xx.xx mA Calibration in Progress	
Auto Range Successful	
0% Opacity Cal Settling 10 Sec 0.020 % Change Light Source ON	0% Opacity
To Exit: Press BACK or HOME ...Status MESSAGE...	
Calibrate Opacity	data is
Detector: xx.xx mA Opacity: xxx.xx %	
Auto Range Successful Lamp Brightness: 10 Detector Gain: LOW	
Calibration Successful 0% Opacity, Detector mA: 22.31 100% Opacity, Detector mA: 4.03	display
Auto Range Successful	Silence,
Calibration Successful	
To Exit: Press BACK or HOME Waiting for Warm Lamp	

- After a successful Calibration is completed, the Auto Ranging and Calibration displayed and is also stored in the Calibration History Log.
- The Lamp turns back ON and the Warm Up delay counts down.
- **If an Error occurs** during Auto Ranging or Opacity Calibration, this screen will with the Error Message (see Trouble Shooting section)
- This screen will continue to be displayed (forever) until the **Back, Home, Alarms,** or **History** button is touched.

- If **CLEAN LENSE** is displayed on the Status line, the Detector mA signal is very weak. Opacity has been successfully Calibrated. However, if the Optics aren't cleaned and/or re-aligned, the next Calibration might not be successful.

AutoCal After Burner Shutdown

The main reason for Opacity drift and/or nuisance burner trips is soot/dust build-up on the windows or the Detector lens. A calibration cycle cancels out the normal dust/soot build-up on the optical surfaces. The **JC-30D2-EZ** can initiate an unattended fully **Automated Calibration (AutoCal)** cycle after the burner fan stops running.

The calibration screens above are not displayed during AutoCal. The normal bargraph screen is displayed with the status message **Auto Calibration in Progress**. After a successful AutoCal has completed **Calibration Successful** is displayed and the data is saved in the Calibration Log. If AutoCal is not successful, the last successful calibration data will continue to be used.

To enable this feature: In the Configure/Setup menu, enable the AutoCal Option, and Wire terminal 8 to the 120 Vac fan starter coil as shown in the Wiring section.

See the Menu section (page 10) for additional AutoCal settings.

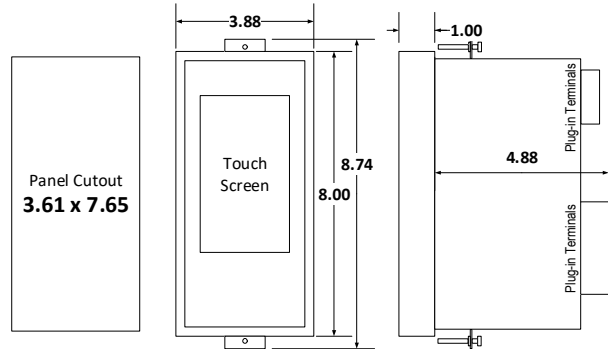
Installation

JC-30D2 Indicator Mounting:

The JC-30D2 Indicator is designed for flush mounting in an enclosure located in an indoor NEMA 12 environment.

The JC-30D2 should not be subjected to excessive vibration. Continuous operation is guaranteed over the 32-131 F (0-55C) ambient operating range.

See Full Size Cutout Template on the last page

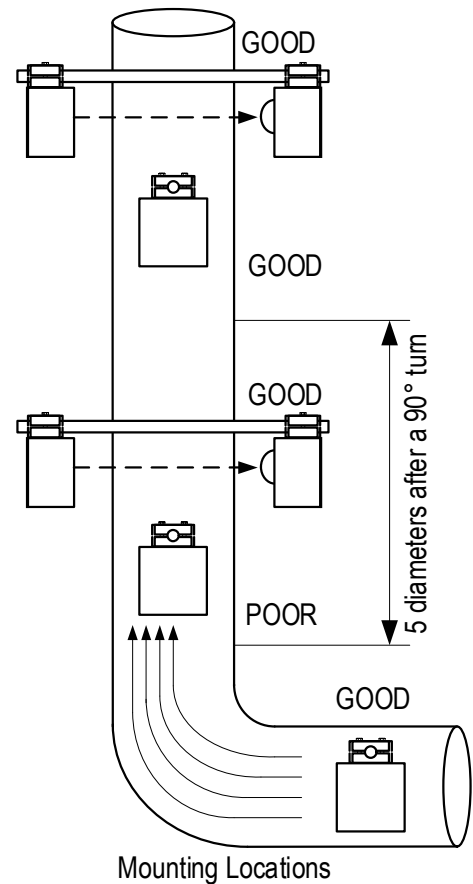


Light Source & Detector Mounting

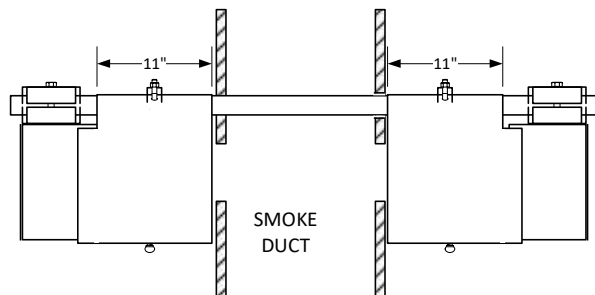
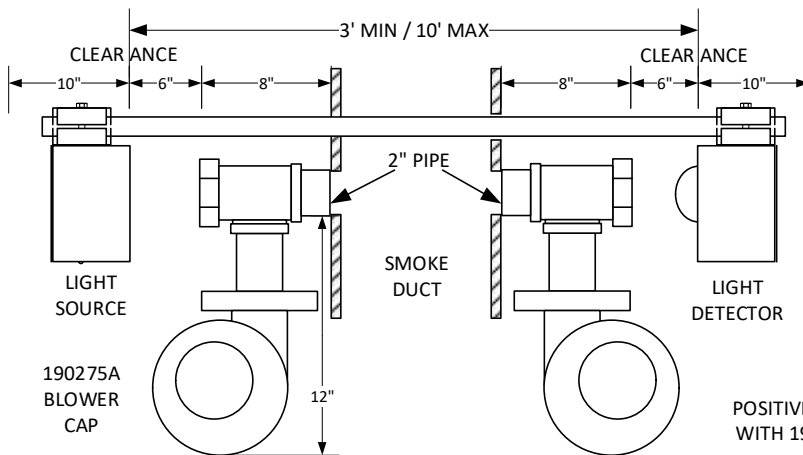
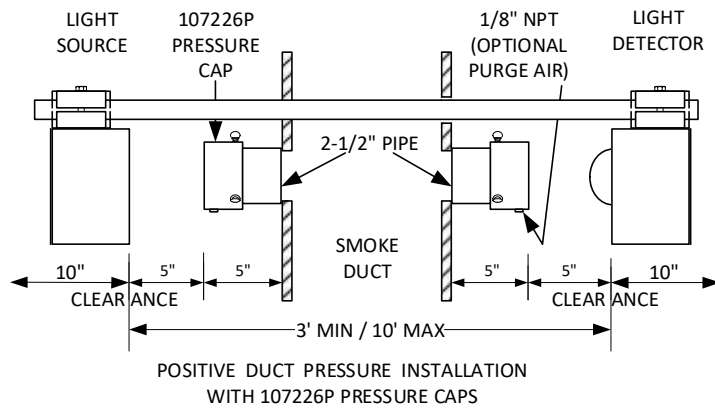
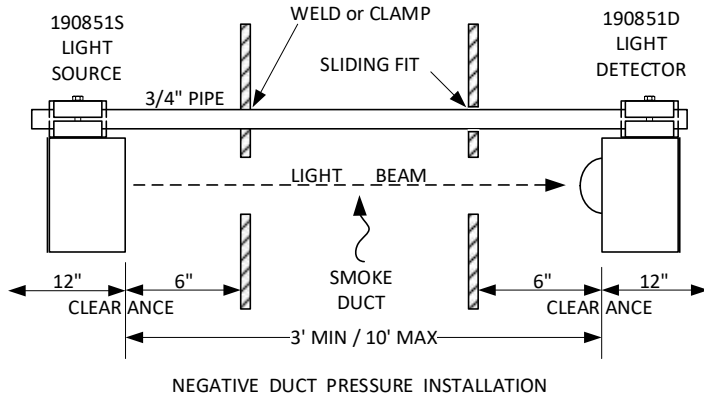
The Light Source and Detector are designed for mounting in an indoor NEMA 1 environment, with 32-149F (0-65C) ambient, and without excessive vibration.

- **See last page for Full Size Cutout Template.**

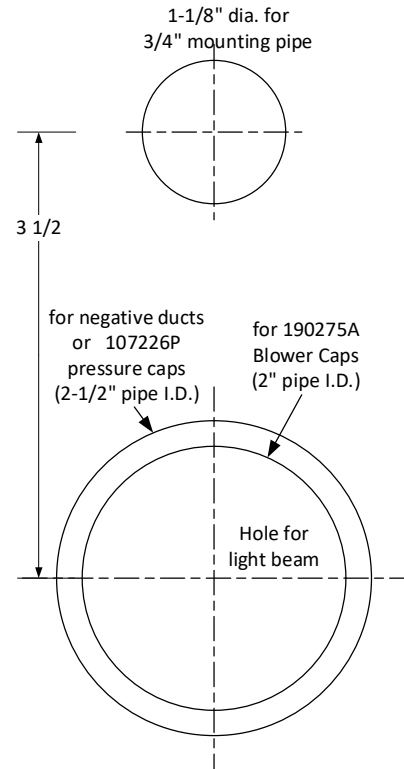
- Locate such that the light beam passes through the complete smoke profile at all flow rates. See the sketch at right for locations after an Elbow, T, Fan, Damper, or other uneven flow profile.
- Do NOT locate the Light Source and Detector near any sources of bright light (outside windows, light fixtures, ...). If this is not possible, 190713 Light Shields may be required.
- Do NOT locate the Light Source and Detector upstream from an Oxygen Analyzer. Air entering the duct would give a false stack Oxygen indication.
- Locate the Source and Detector where it is accessible for routine cleaning.
- The distance from the face of the Light Source to the face of the Light Detector must be greater than 3 ft. and less than 10 ft.
- The 3/4" mounting pipe should be horizontal.
- The 3/4" mounting pipe maintains the optical alignment from the Source to the Detector. The flue gas heat expands and contracts the pipe length.
 - One end of the mounting pipe should be welded, or clamped, to the duct.
 - The other end of the mounting pipe must be free to move.
 - Do NOT connect BOTH ends of the mounting pipe to the duct.
 - Do NOT use 2 stubs on opposite sides of the duct to mount the Source and Detector because the alignment will shift as the duct heats and cools.
- For positive pressure ducts, install a pressure cap (ie, window) to prevent flue gas and dust from exiting the duct. The 107226P pressure caps can be used without purge air for low soot installations. For high soot applications, clean dry compressed air should be connected to 107226P pressure caps. See SDI-107226P instructions for further details.
- If Clean, dry compressed air is not available, the 190275A Blower Caps are suitable for duct pressures less than +1.0" wc. See the 190275A instructions for further details.



Light Source and Light Detector Dimensions



Duct Penetration Dimensions for Light Source and Detector



**See last page for
Full Size Cutout Template**

Wiring

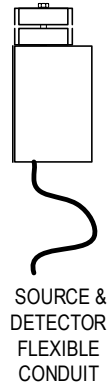


Warning

Disconnect all sources of power before installing or servicing this equipment. Multiple Disconnects may be required. Burner interface wiring must be performed by an experienced burner service technician.

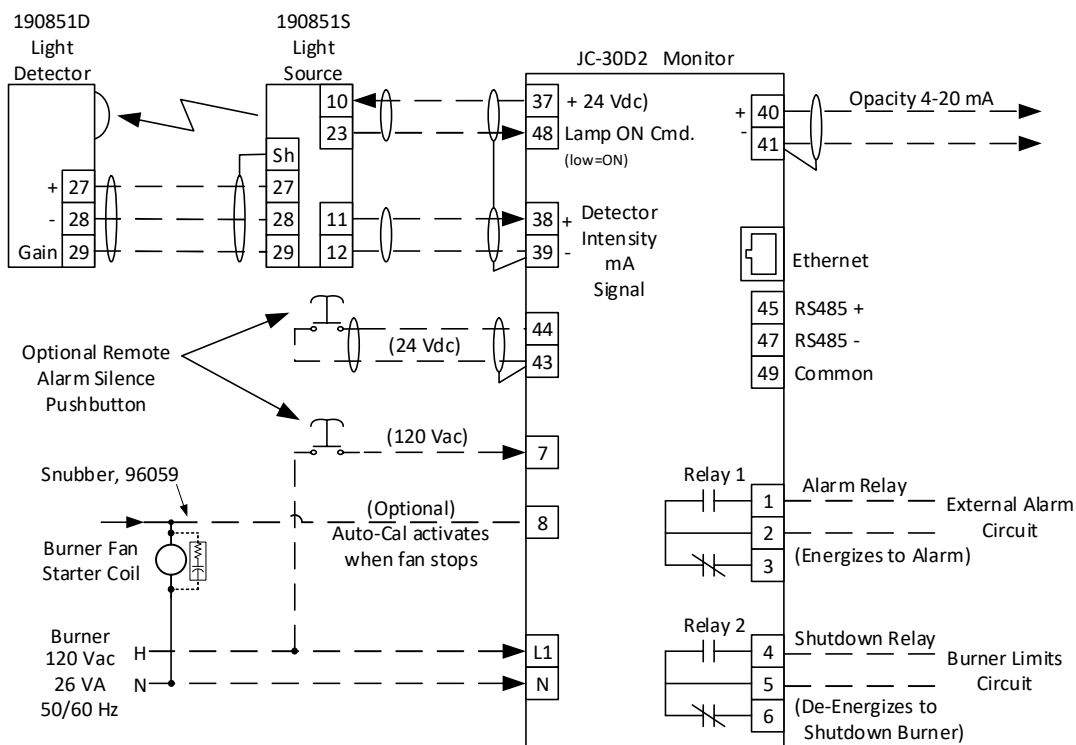
All wiring must comply with all local and national electrical codes. Tighten all terminals to 4.4 in-lb. Wire must be stranded copper, 12-24 ga., 150V / 75 C insulation minimum. AC and DC wiring must be separated and must not be run in the same conduit to prevent electrical noise coupling. Use shielded cables where shown, connect shields only where shown, insulate all other shields to prevent accidental grounding. Ignition transformer and motor VFD wiring are particularly noisy and should be kept away from all Opacity Monitor AC and DC wiring.

- The Light Source and Light Detector final connection wiring must be installed with flexible conduit to allow the light beam to be aimed/aligned and for cleaning.
- Inside the Light Source, insulate the bare shield wires so that they do not short to the enclosure or to any of the components on the circuit board.
- Relay contacts are shown with power removed from the JC-30D2. In normal operation Relay 2 is energized. Relay 2 de-energizes to shutdown the burner.
- Relay contacts are rated: 10 A resistive, 9 FLA / ½ Hp / 120 Vac
- If the 4-20 mA output will not be used, jumper terminal 39 to 40 to prevent the OUTPUT FAILURE error message.
- RS485 is electrically Isolated from all other DC and AC wiring.
- All DC wiring and shields must be isolated from Ground.
- All DC wiring '-', shield, and 'Common' terminals are connected together internally.
- Terminals 1-9 are Line Voltage AC. Terminals 31-50 are low voltage DC.
- An external Line Voltage supply switch or circuit breaker, marked as the disconnect for this instrument, suitably located and easily reached, and complying with IEC 60947-1 and -3 must be provided.



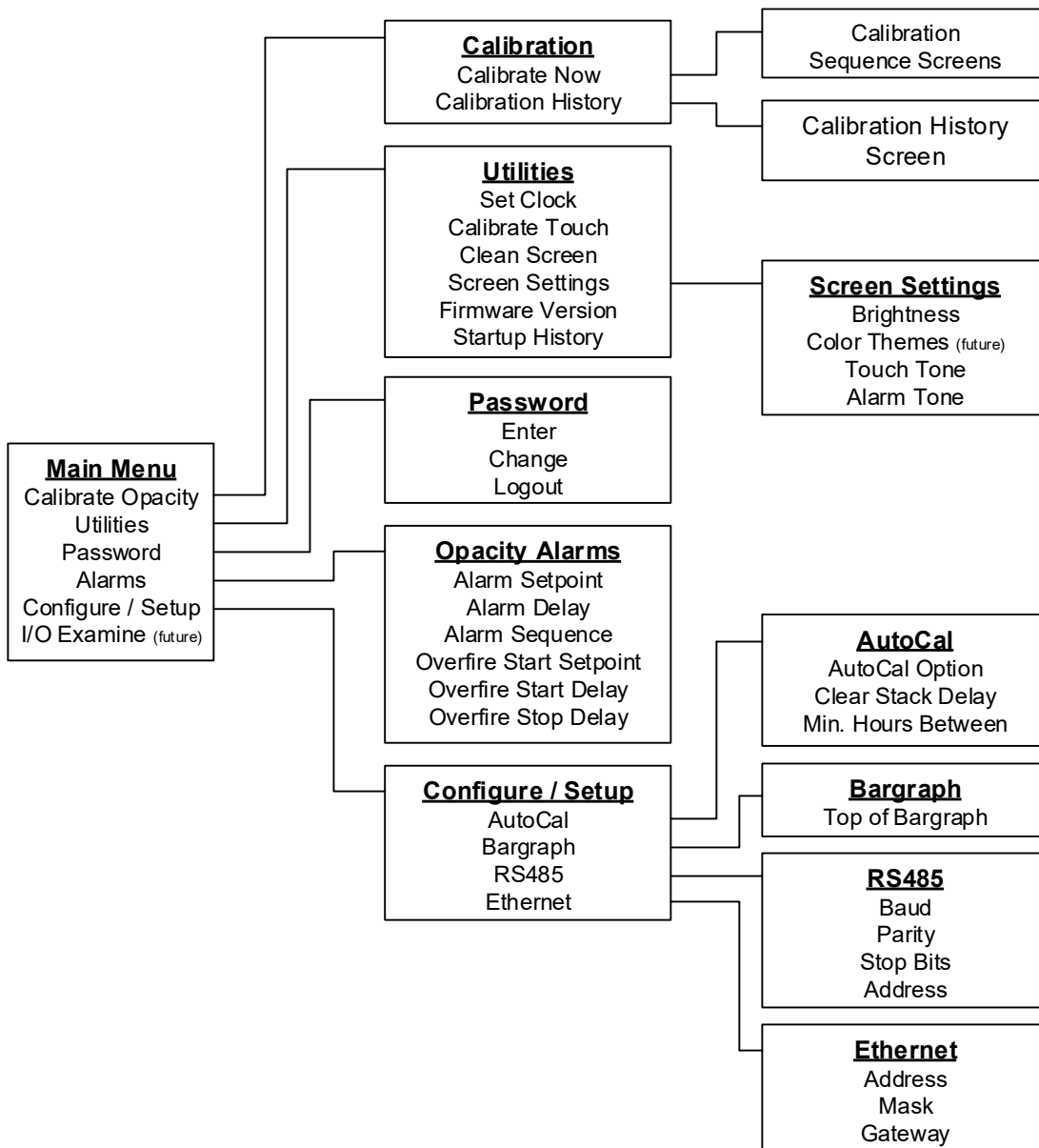
Fuse: 3.15 amp Slo-Blo, 250 V, 5x20mm (Littlefuse 02393.15HXP, Belfuse 5TT 3.15-R, Preferred Utilities 16740-3.15S)

Caution: To reduce the risk of fire, only replace fuse with the same type.



Parameters / Menu Map

From the Home screen, touch **Menu** to display the Main Menu.



Screen Settings

Parameter	Default	Max.	Min.	Goto: Menu > Utilities > Screen Settings	
1	Disable	Enable	Disable	Touch Buzzer Enable	Activates faceplate Tone when a screen item is touched
2	Disable	Enable	Disable	Alarm Buzzer Enable	Activates faceplate Tone when an Alarm is triggered.

Opacity Alarms

Parameter	Default	Max.	Min.	Goto: Menu > Opacity Alarms	
20	20	50	5	Alarm Setpoint (% Opacity) This Setpoint is used for the Warning Alarm logic. Note: In the NYC-BAR Sequence, the Setpoint can be greater than 20%.	
21	20	120	0	Warning Delay (seconds) The Common Alarm relay energizes when the Opacity has been above the Alarm Setpoint for more than 'Warning Delay' seconds. Once the Warning Alarm has been triggered, the Opacity must drop 1% below the Setpoint before the Warning Alarm de-activates. Note: In the NYC-BAR Sequence, this Delay is forced to 0 seconds.	
22	120	180	0	Shutdown Delay (seconds) The Shutdown relay de-energizes when the Opacity has been above the Shutdown Setpoint for more than 'Shutdown Delay' seconds. The Opacity must drop 1% below the Shutdown Setpoint and the Operator must press the RESET button in order to re-energize the Shutdown relay. Note: In the NYC-BAR Sequence, this Delay can be greater than 120 seconds.	
23	Std.	Wood	Std.	Alarm Sequence (Standard, NYC-BAR, Wood-Coal) See Alarm Sequence descriptions on page 2 and 11	
24	12	50	1	Overfire Start Setpoint (% Opacity) Only used in the Wood/Coal Sequence, see Sequence description on page 11	
25	10	120	1	Overfire Start Delay (seconds) Only used in the Wood/Coal Sequence, see Sequence description on page 11	
26	180	600	1	Overfire Stop Delay (seconds) Only used in the Wood/Coal Sequence, see Sequence description on page 11	

Configure/Setup

AutoCal

Parameter	Default	Max.	Min.	Goto: Menu > Configure / Setup > AutoCal	
27	Enable	Enable	Disable	AutoCal Option Enable See description on pages 4-5 If the fan starter energizes when an AutoCal is in progress, the AutoCal aborts.	
28	30	600	30	Clear Stack Delay (seconds) Seconds from Fan Starter de-energizing and start of Auto-Cal. Allows time for fan to coast down, Dampers to close, and for dust in ducts to settle in order to provide an accurate 0% Opacity Calibration.	
29	24	168	0	Min Hours Between AutoCal's (hours) 0-168 hours. 0 hrs means an AutoCal attempt will occur every time the burner fan starter de-energizes. 1 hr means an AutoCal will occur at most once per hour. However, if after the clear stack delay, the Opacity (soot) is greater than 1/2 of the Alarm Setpoint value, an AutoCal (if enabled) will occur regardless of the "Min Hours Between AutoCal's setting". This avoid nuisance Opacity Alarms and Shutdowns.	

Bargraph Range

Parameter	Default	Max.	Min.	Goto: Menu > Configure / Setup > Bargraph	
30	40	100	20	Top of Bargraph (% Opacity) This is the % Opacity value at the top of the bargraph.	

Other Alarm Sequences

STANDARD Sequence

This sequence is described in the Operation section, see page 2

NYC-BAR Sequence

The NYC-BAR Sequence is the same as the STANDARD Sequence described above with two differences:

The **Alarm Time Delay** is fixed at 0 seconds and cannot be adjusted. This means that the Alarm Relay will activate as soon as the Opacity is greater than the Alarm Setpoint.

The **Shutdown Time Delay** is fixed at 120 seconds and cannot be adjusted.

A **30% Opacity Test Filter** is attached to the Light Source. You can clean the windows/Lens and then hang the filter on the screw to verify that the Alarm Setpoint is set correctly and that the calibration is reasonable. The 30% Opacity value of the filter is approximate.

WOOD-COAL Sequence

The WOOD-COAL sequence is intended for use on solid fuel stoker fired furnaces. The **Alarm Relay** and **Alarm Silence** operation is the same as the STANDARD Sequence described above.

The JC-30D2 WOOD-COAL logic for **Relay 2** can be used to add **Overfire Air** (above the stoker) to reduce smoke caused by clinkers and other stoker problems. Relay 2 is typically wired to an Overfire Air fan starter, or motorized damper. The WOOD-COAL Sequence does not include any burner Shutdown logic.

The **Overfire Start Setpoint** controls Relay 2, and is independent from the Alarm Setpoint. Typically, the Overfire Alarm Setpoint is set to a lower Opacity level than the Alarm Setpoint. If the Opacity is above the Overfire Start Setpoint for more than the 10 second **Overfire Start Delay** (adjustable 10-120 sec.), Relay 2 energizes and OVERFIRE ON is displayed on the message line. The Overfire Start Delay prevents nuisance starts due to momentary smoke puffs.

Once Relay 2 is energized, the Opacity must be below the Overfire Start Setpoint for more than the 120 second **Overfire Stop Delay** (adjustable 0-600 sec) before Relay 2 will de-energize. The Stop Delay helps prevent re-occurrence due to incomplete burn-out.

Troubleshooting

Normal Operation:

Lamp is ON, and NOT blinking

190851S Light Source power input, terminals 10(+) to 12(-): 17 - 26 Vdc range

190851S Lamp On/Off command input, terminal 23(+) to 12(-):

Lamp ON command: approx. 1.5 Vdc. Lamp OFF command: Greater than 2.7 Vdc

Detector to Light Source 4-20mA, terminal 28, meter in-series: 3.8 – 22 mA
3.8-4.3 mA with Detector lens totally blocked.

Light Source to JC-30D2 Monitor mA, Terminal 38 meter in series 3.8 – 22 mA
Should exactly match mA signal into Light Source Terminal 28

Light Source Lamp is Blinking

These following errors are detected by the Light Source processor during the Auto Ranging portion of the Calibration cycle. Correct the problem and then start another Calibration cycle to stop the Lamp Blinking.

1 Blink

Detector output (terminal 28) is near 0 mA, should be approx. 4 mA when Lamp is Off.

Check Light Source to Light Detector Wiring, Terminals 27 and 28. Wires might be swapped.

2 Blinks

Detector output (terminal 28) is greater than 20 mA, should be approx. 4 mA when Lamp is Off.

Check Light Source to Light Detector Wiring, Terminals 28 and 29. Wires might be swapped.

Light Source Lamp is Blinking (continued)

3 Blinks

The AutoRanging data in the Light Source is invalid. Do a Calibration to correct the data.
Either this light source has never been AutoRanged/calibrated before or Electrical noise corrupted the data.

4 Blinks

The Lamp Brightness command is Out of Range. Do a Calibration to correct the data.
Electrical noise could cause this.

5 Blinks

The Detector Gain setting is invalid. Do a Calibration to correct the data.
Electrical noise could cause this.

Light Source Auto Ranging Error Messages

Wiring Detector Plus: See **1 blink** above

Wiring Gain: See **2 blinks** above

Bad CRC: See **3, 4, 5 blinks** above

Source Too Close: With the Lamp at the lowest Brightness setting, the Detector Intensity was higher than 22.6 mA.
The Light Source is too close to the Light Detector or the Detector is seeing Ambient Light.

Gain Relay: The Light Source changed the Detector Gain relay command (term. 29), but Detector mA didn't change.
Terminal 29 wire is open circuit, or the Detector is defective, or the Source is defective.

Bad Monitor: The Lamp Brightness sensor signal is too low when the Lamp is at max brightness.
Could be a dim LED Lamp, a dirty sensor, or a bad Light Source

Low Detector: With max Lamp brightness and High Det. Gain, the Detector signal is below 8.1 mA.
Windows/lens are very dirty, or bad alignment, or Detector is too far from Source.

Timeout: Auto Ranging did not complete in less than 3 minutes

Opacity Calibration Error Messages

Calibration Aborted by Fan: The burner fan energized during Calibration.

Clear Stack Failed to Settle: With the Lamp ON, Detector mA signal never stabilized. Fan running without starter wired to JC-30D2, Soot/dust in optical path, vibration shaking Source/Detector, or Electrical Noise.

Clear Stack Over 23 mA Too Much Light: Ambient light sensed by the Detector drove the Detector too high.
A 190713 Light Shield over the Detector might be needed to block nearby bright lights or bright sun light.

Clear Stack Under 8 mA Not Enough Light: Detector signal was very low. Very dirty windows or lens or Source/Detector got knocked out of alignment.

Opaque Stack Failed to Settle: With the Lamp OFF, Detector mA signal never stabilized. A 190713 Light Shield over the Detector might be needed to block nearby bright lights or bright sun light or Electrical Noise.

Opaque Over 4.7 mA Too Much Light: Lamp is OFF. A 190713 Light Shield over the Detector might be needed to block nearby bright lights or bright sun light.

Opaque Under 3.3 mA: Wiring Error, or possible bad Detector.

Other

If Pressure Caps are installed; Warming up a Natural Gas fired boiler can cause nuisance alarms due to condensate on the window. Use purge air that is below the dew point to prevent this nuisance alarm

LED Lamp Replacement

- Remove 120 Vac power from the JC-30D2 (Note: This will cause the burner Shutdown relay to de-energize).
- Remove the 190851S Light Source rear cover plate.
- Remove the 4 screws that hold the 190799 Lamp PC Board in place.
- Un-plug the old Lamp board, plug-in the new 190799 Lamp, and re-install the 4 screws and the rear cover.
- Apply 120 Vac power to the JC-30D2.
- Wait for Lamp Warmup to complete.
- The new LED Lamp will not have the same optical alignment, or brightness, as the old LED Lamp.
- Re-calibrate the JC-30D2 from the CALIBRATE Menu as described above in the Calibration section.

Parts List

JC-30D2	Opacity Monitor/Indicator	96059	RC Noise Snubber
190851S	Light Source	90434	Mounting Gasket
190851D	Light Detector	90437-KIT	Panel Mounting Clips (2)
190799	LED Lamp	107226P	Pressure Caps (2) with Purge Air Ports
16740-3.15S	3.15 A slow-blow fuse	190275A	Pressure Caps (2) with 1" wc 120V Blowers
92794	5 pt Term. Block	SDA-VB	Audible/Visual Ext. Alarm
92791	8 pt Term. Block	SDA-B6	6" Alarm Bell, 120V, 85 db
92795	10 pt Term. Block		

Specifications

Mechanical:

Enclosure: Nema 12 Faceplate, Indoor Locations
Bezel: 3 7/8 w x 8 h x 1 d
Rear Case: 3 1/2 w x 7 9/16 h x 4 7/8 d
Panel Cutout: 3.61 w x 7.65 h
Weight: 2 lbs
Ambient: 32-131 F (0-55 C)
Altitude: 6560 feet (2000 meters)

Electrical:

Input Power: 120Vac +/-15%, 50/60 Hz, 26 VA
Output Power: 24 Vdc, 300mA max combined load
Terminals: 31,35,37,40,42

Inputs

Light Intensity: 3.7 - 23 mAdc
Remote Silence (2): Dry Contact, 24 Vdc / 1 mA
120Vac, 10 mA, opto isolated
Burner Fan Running: 120Vac, 10 mA, opto isolated

Outputs

Opacity (0-100%): 4-20 mA, 650 ohm load
Relay Outputs: 10 A Resistive, 8 FLA, 1/2 Hp, 120 Vac

Light Source and Detector

Calibration: Automatic, Off-Line
Spectral: Photopic, peak and mean
within 500-600 nm
Response Time: < 10 seconds for 95% change
Sighting Distance: 3 - 10 ft optical path length
Wiring Distance: 500 ft max.
Ambient Temp.: +32° to 149° F
Enclosure NEMA 1
Size: 6w x 5d x 8.5h
Mounting: 3/4" pipe, 3.5" centers

Communications

USB: JC_TG_Edit config & Firmware Flashing
RS485: Isolated, 4.8 - 57.6k baud, Modbus RTU
Ethernet: 10/100 Mb/s, Modbus/TCP

Modbus Communications

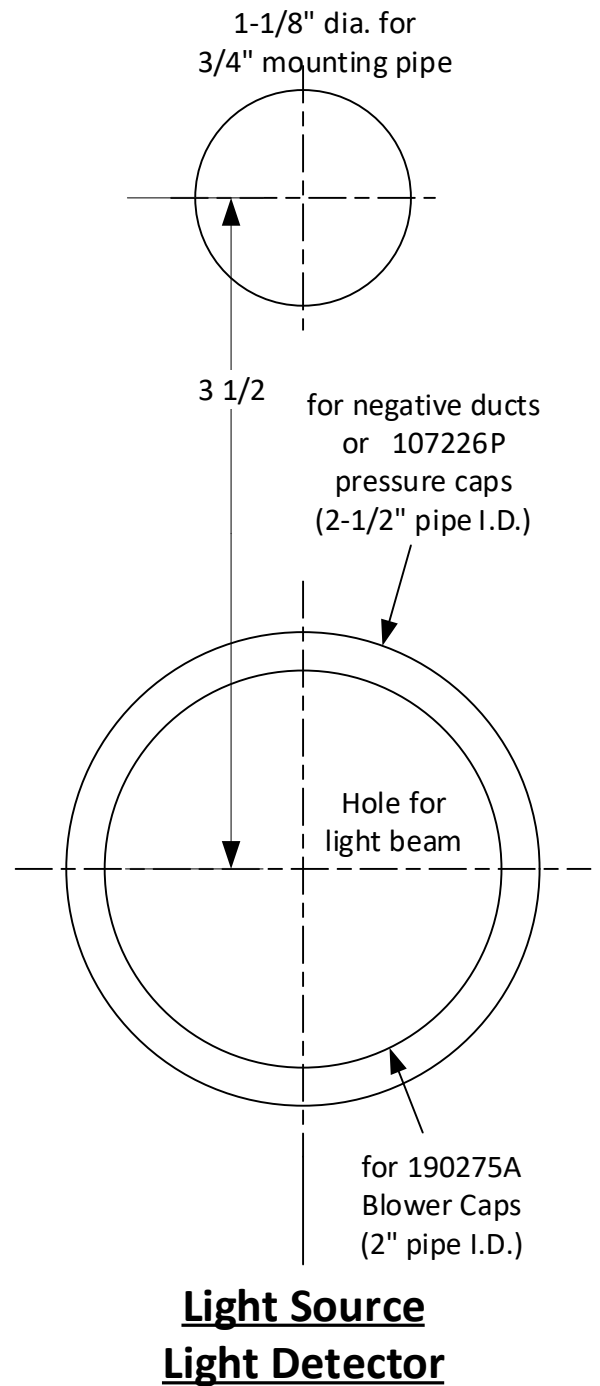
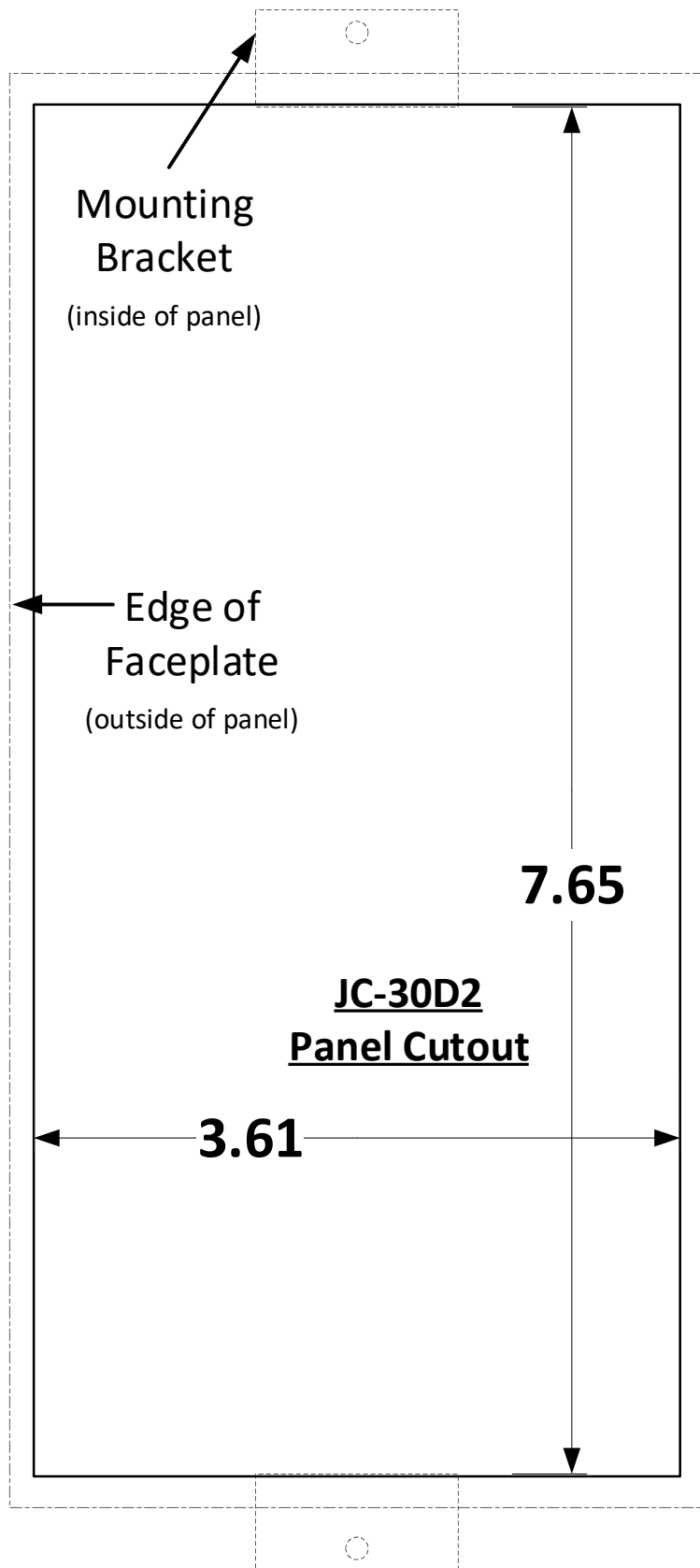
RS485: Baud: 4800, 9600, 19200, 38400, 57600 Parity: Odd, Even, None Stop Bits: 1, 2
 Ethernet: 10/100 Mb/s
 Protocol: RTU, TCP/IP
 Address: 1-247
 Register Formats: 16 bit Signed Integer
 32 bit Floating Point (register below = High bytes (exponent), register+1 = Low bytes (mantissa))
 Modbus Commands: 01 Read Coils, 03 Read Registers, 05 Write Single Coil, 06 Write Single Register,
 16 Write Multiple Registers (2 registers max)
 Max Poll Size: 120 coils or registers (except Code 16)

Coil		0 =	1 =	Description
98	WO		Alarm Silence	Remote Alarm Silence
99	RO	No Alarm	Alarm	Common Alarm
102	RO	No Alarm	Alarm	High Opacity Alarm
103	RO	No Alarm	Alarm	High Opacity Shutdown
104	RO	Not Dirty	Dirty	Lens is Dirty
105	RO		Stray Light	Stray Light
106	RO		Offline	Measurement Offline
107	RO	Cal. Inactive	Cal. Active	Calibration In Progress
108	RO	Overfire Inactive	Overfire Active	Opacity Overfire Air
109	RO	Fan OFF	Fan ON	Burner Fan Starter

Register	F / I		Description
40116	F	RO	Opacity
40118	S16	RO	Alarm Setpoint

F = Floating Point, S32 =Signed Integer 32 bit, S16=Signed Integer 16 bit
 STR=String, RW*=Tech. Password Required

Full Size Cutout Templates



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