

How to use the LaserHawk 360 Checklist (MS Word)

The LaserHawk 360 Installation Checklist with its active MS Word features may be completed, saved and submitted via email to TELEDYNE Monitor Labs at go_tml@teledyne.com. When submitting several checklists for multiple stack locations at a single site, please use a file-naming convention that provides some ability to discriminate between locations.

**** Your order cannot be scheduled for production until accurate information is provided for all fields marked with an asterisk.*** TML cannot provide an estimated delivery date until the necessary site specific information is provided.

<http://www.monitorlabs.com/drawings/360drawings.pdf>

1. CUSTOMER CONTACT INFORMATION:

Fill out your name, plant address, city, state, phone number, email address and other information. The Stack Identification should be a 10-character (maximum) name that describes the stack, duct or process on which the monitor will be located. Example: "UNIT1 STK", "KILN1 DUCT", etc.

2. MOUNTING FLANGES (Customer supplied)

The Standard mounting flanges are 4" 150lb ANSI flanges and must be supplied by the customer. The flanges are welded to 4" Sch. 40 pipe that is also customer supplied. The length of this pipe should be kept to a minimum and the factory should be consulted if it exceeds 8 inches in length (see drawing 1810-0013).

If you are adapting to an EXISTING flange or using mounting pipes other than 4" Sch. 40, select the "I wish to use something other" button and provide details in the text box provided. You may consult the TML factory to evaluate the use of available flange adapters.

3. MOUNTING TUBE LENGTH (PORT)

The typical length of the mounting tube is between 2 inches and 8 inches (5 to 20 cm) in length including the flanges and adapters (refer to drawing 1810-0013). If the process to be measured is 500 °F (260 °C) or above, we recommend using a Mounting Tube length of 6 inches (15 cm).

4. STACK DIAMETER OR DUCT WIDTH AT INSTALLATION LOCATION

This distance is to be measured from the inside of the stack or duct walls with an accuracy of +/- 1% of the distance. If the inside diameter is less than 6.5 feet (2 meters), then the light from the laser could reflect back from the far wall. This may cause the monitor to read artificially high and may require the use of an OPTIONAL Light Trap (refer to drawing 1810-0015).

A **LIGHT TRAP** is generally required only for stack diameters less than 6.5 feet (2 meters), but may be necessary at greater diameters based on mounting tube length, particulate mass range

and other factors. In general, the minimum possible stack diameter even with a LIGHT TRAP is 2 feet (0.6 meters), but this minimum value increases as particulate mass range decreases (consult factory).

5. TEMPERATURE OF PROCESS

Report the typical process temperature under normal conditions. Select the appropriate button for the maximum process temperature including upset conditions. This information is necessary to ensure the hardware configuration chosen is adequate for the user's application (high temperature seals, stainless steel nozzles and a heat shield may be required when the temperature exceeds 500 °F (260 °C)).

6. PROCESS PRESSURE

This information is necessary to ensure that the hardware configuration chosen is adequate for the user's application (*high positive pressure >5" H₂O may require alternative options*).

7. MOUNTING CLEARANCES

Review the proposed installation locations and reference the TML drawings. Check OK if sufficient clearances are available. Mark "I wish to use something other" and consult the factory if alternative installation configurations are required. Provide details in the text box provided.

- Stack Equipment: Be certain that there is sufficient clearance between the stack mounted equipment and any potential obstructions (i.e.: distance to floor, horizontal distance to catwalk rail). Weather hood is...20" W x 22 ¼" L x 33" H. (See drawing 1810-0015).

8. DATA CABLE LENGTH

DATA CABLE LENGTH with Direct Interface (*Not provided with standard system, available as option*)

The cost of the cables from the Optical Head to the output or display device has not been included in the base price. TML will provide the cable at additional cost to the customer.

The user must determine the length of the data cable measured from the Optical Head to their DAS/PLC or other output device. Minimum recommended conduit size is 1/2". A Direct Interface configuration requires two cables; a non-shielded 4-conductor / 20 AWG (Alpha 66-44) and a 6-shielded pair / 24 AWG (Alpha 6386/Belden 9991). Consult the TML factory for current price and delivery of data cable.

DATA CABLE LENGTH with Enhanced Remote (*Not provided with standard system, available as option*)

The cost of the cable from the Optical Head to the output or display device has not been included in the base price. TML can provide the cable at additional cost to the customer.

The user must determine the length of the data cable measured from the Optical Head to the Enhanced Remote Panel. Minimum recommended conduit size is 1/2". The Enhanced Remote Panel configuration requires only a single twisted pair, 16 AWG with shield (Alpha 5610B1601). Consult the TML factory for current price and delivery of data cable.

9. STACK POWER CIRCUIT REQUIREMENTS

Supply voltage and current capacity of the customer supplied circuits for the STACK equipment must meet the specified minimum requirements. Select the voltage option that most accurately represents what will power the Optical Head after installation.

Stack Equipment: Maximum power draw is:

- 30VA single phase for the Optical Head
- 414VA single phase for the Purge Blower

A minimum of one 115VAC single phase, 10A circuit is required. The customer is to hardwire 115VAC into the purge motor junction box of the Optical Head (See drawing 1810-0012). Blowers can also operate on a 230VAC single phase supply.

10. CORRECTION TO STANDARD CONDITIONS

Some sites may wish to correct the Particulate measurement to Standard Conditions by measuring the process temperature and pressure. The LaserHawk 360 can mathematically correct for temperature and pressure if they are supplied as inputs to the monitor. This requires the OPTIONAL Dual Analog Input Module.

- Indicate where the Dual Analog Input Module will be located.
- Provide the elevation above mean sea level for the monitor location and the control room location.
- Select the appropriate Barometric Pressure Transducer option. If you will be supplying your own transducer please indicate the Output Type and Output Scaling.
- Select the appropriate External Temperature option. If you will be supplying your own temperature sensor please indicate the Output Type and Output Scaling, or TYPE.

11. MAXIMUM PARTICULATE LIMIT

The user's operating permit includes a limit they must operate within (e.g. < 95 mg/Am³). We can configure this as an alarm set point in the monitor. This value also helps us determine if the full scale value and analyzer sensitivity is calibrated accurately. Provide the applicable emission limit and units in the space provided.

12. FULL SCALE DETERMINATION

The user's operating permit may require a specific full scale based on the classification of the emission source.

- Many different Units can be used. The form lists some of the more common units.
- Particulate Mass is the actual numerical value used for full scale of the monitor.
- Let us know if you have a particulate control device. If so, also let us know if the monitor will be Before or After the particulate control device.
- If we know what kind of particulate control device you have it can help us estimate the sensitivity you will need for your monitor. The two most common are an Electrostatic Precipitator (EP) or a Baghouse.
- Examples of Fuel Constants are: Bituminous Coal = 1800, Lignite = 1910, Oil = 1420 and Natural Gas = 1040.
- Examples of Fuel Types are Coal, Oil, Natural Gas, Wood, and Municipal Waste.
- We are asking for the typical CO₂ value you have when your process is running under normal operating conditions. The CO₂ value will be either a WET or a DRY measurement depending if you are getting this value from an Extractive, In-Situ or Dilution system.

13. USE AUTO CAL SEQUENCE

Check **YES** if the **Auto Cal** sequence is to be used to collect calibration data. Check **NO** if the user will be exclusively using External Mode control.

14. SYSTEM CONFIGURATION

(Select one) **Direct Interface** or **Enhanced Remote**

The LaserHawk 360 is available in two basic configurations.

- The Direct Interface configuration does not have the Enhanced Remote Panel. The Direct Interface requires more wires to be run from the stack or duct.
- The Enhanced Remote option gives the user more information down at the 'remote' location and offers more inputs and outputs than the Direct Interface. The Enhanced Remote option requires only one cable with two wires to be run from the stack or duct to the Enhanced Remote Panel's location.

This section is for a Direct Interface option:

SPECIFY OUTPUT UNITS:

Select the analog output units your monitor is to report in, **Backscatter Energy** (a raw percentage value of the energy measured by the monitor) or **Particulate Mass** (a correlation of the raw Backscatter Energy measurement to a particulate mass value representative of your emissions).

CURRENT OUTPUTS:

The Direct Interface has two analog outputs available. They are isolated from each other and circuit common.

- Channel 1 is always the Instantaneous value and usually does not carry calibration values.
- Channel 2 is always Selectable Average and usually carries calibration values.

If an output carries calibration values, the analog output will track the calibration values when it is commanded to go into calibration or when it is scheduled to go into calibration. If the output does not carry calibration values, the analog output will hold the last NORMAL mode value when the monitor is in a calibration mode.

Please select the output current configuration you want, **4 – 20 ma** or **0 – 20 ma**. Select only one. Standard default = **4 – 20 ma**.

RELAY OUTPUTS:

The Direct Interface uses 2 relays that can be configured to actuate on various output modes or monitor conditions. Select any two from the table below. These functions are set via jumper settings and can be easily modified at the site. Contacts are SPDT Form C. The two relays available can be configured as either Normally Open or Normally Closed via a jumper setting. The standard selections most commonly chosen are “Calibration Data on Analog Outputs” and “Instrument Malfunction”. The following table lists the available selections.

Calibration Data on Analog Outputs	UPSCALE data on Analog Outputs
Instrument Malfunction	ZERO data on Analog Outputs
Instantaneous Alarm 1 Actuated	Purge Failure
Selectable Average Alarm 1 Actuated	Excessive Dust Compensation

DIGITAL INPUT SELECTION

Digital Inputs

Two discrete inputs are provided to allow monitor output mode control by user supplied circuits. These optical isolators are activated by either dry contact closures or +5VDC signal from a user-supplied circuit. These signals are transmitted to the Optical Head via the Data cable. This configuration is field selectable and may be modified at the time of instrument start up. The following definitions apply to the selection of the External Mode control digital inputs:

Force Upscale = The instrument goes into calibration UPSCALE mode. The calibration mechanism moves to the UPSCALE position. Analog output #1 holds the last stack value read, analog output #2 follows the UPSCALE value

Force Zero = The instrument goes into calibration ZERO mode. The calibration mechanism moves to the ZERO position. Analog output #1 holds the last stack value read analog output #2 follows the ZERO value.

Dump Dust Comp = The calibration mechanism moves to NORMAL position. Real time stack data appears on the LED readout and on analog output #1. Analog output #2 follows the DUST COMPENSATION value.

Force Cal Cycle = The calibration mechanism moves to ZERO, UPSCALE, DUST COMPENSATION and then back to NORMAL. It remains in each mode for a configurable period of time.

This section is for the Enhanced Remote option:

DIGITAL INPUT SELECTION

The Enhanced Remote has 8 isolated inputs available. They are all available and no selection is required on this form. The location and designation of each are fixed. To use any of these inputs, merely connect wires to the appropriate input. A simple jumper setting on the Multi- I/O board determines if they are activated by a dry contact or +5 VDC input. Dry contact closure is the standard configuration. More information is provided on the Installation Drawings and in the Manual.

Input #1	Force Upscale
Input #2	Force Zero
Input #3	Not Used
Input #4	Dump Dust Comp
Input #5	Force Cal Cycle
Input #6	Not Used
Input #7	Test Zero Scale
Input #8	Test Full Scale

SPECIFY DESIRED ANALOG OUTPUTS:

The Analog Outputs can be easily changed at a later date through a list on the Enhanced Remote Panel. You may choose the desired Analog Outputs from the following table:

Parameters for Analog Output

Parameter Name	Functional description
Instant Backscatter	Instantaneous Backscatter. Update time is 6-8 seconds.
Minute Ave Backscatter	A one minute average of the instantaneous Backscatter reading. The period is minute to minute according to the real time clock in Optical Head.
Selectable Ave Backscatter	An average Backscatter reading whose time period is selectable in one-minute increments. The time selected should divide evenly into 60 minutes. 1, 2, 4, 6, 10, 12, 15, 30 and 60-minute averages are possible. Six minutes is the standard selection.
Instant Particulate Mass	Instantaneous Particulate Mass loading in mg/m ³ . Update time is 6-8 seconds. This is a mathematical correlation from the Backscatter reading by a curve that is developed through extractive testing. This is not available for output until the correlation testing is done and the results entered into the LaserHawk software.
Minute Ave Particulate Mass	A one minute average of the instantaneous Particulate Mass loading reading. Period is minute to minute according to the real time clock in the Optical Head. NOT available for output until testing results are entered.

Select Ave Particulate Mass	An average Particulate Mass loading reading whose time period is selectable one-minute increments. The time selected should divide evenly into 60 minutes. 2, 4, 6, 10, 12, 15, 30, and 60-minute averages are possible. Six minutes is standard selection. Not available for output until testing results are entered.
Dust Compensation Output	The amount of Dust Compensation build up. The Dust Compensation factor applied to the NORMAL and UPSCALE mode readings is limited to $\pm 4\%$ Backscatter. However, the Dust Compensation reading is unbounded.
Zero Backscatter	The calibration Zero value.
Upscale Backscatter Zero Drift Backscatter Upscale Drift Backscatter	The calibration Upscale value.

RELAY CONTACT OUTPUTS

There are eight relays (K1-K8) available on the LaserHawk Multi I/O Module to interface with user circuits. These relays can be configured as either NO or NC via jumper settings. Each relay is SPST with one normally open contact rated 3A max. The relays can also be easily changed at a later date through a list on the Enhanced Remote Panel. Select options for the relay configurations from the following table:

Parameters for Relay Assignment (Digital Output closure conditions)

Backscatter Exceedance	Particulate Mass Exceedance	System Trouble	Calibration Control
Inst. Backscatter Level #1	Inst. Particulate Mass Level #1	Cal Failure	Normal on AO
Inst. Backscatter Level #2	Inst. Particulate Mass Level #2	Excess Dust Compensation	Cal on AO
Min. Backscatter Level #1	Min. Particulate Mass Level #1	Fault	Dust Comp. A.O.
Min. Backscatter Level #2	Min. Particulate Mass Level #2	Data Valid	PLCF on AO
Ave Backscatter Level #1	Ave Particulate Mass Level #1	Purge Failure	Zero on AO
Ave Backscatter Level #2	Ave Particulate Mass Level #2	No Selection	Upscale on AO

ETHERNET MODULE SETUP

Choose whether or not you want the Ethernet Module configured with a Dynamic IP address or a Static IP address.

Consult your IT department. Many IT departments may want to assign a Static IP address. If this is the case, you will need to supply a Static IP address, a Subnet Mask and a Default Gateway.

ENHANCED REMOTE PANEL POWER CIRCUIT CAPACITY

Maximum power draw is 25 VA single phase for the remote equipment.

The Enhanced Remote Panel normally operates on a 115VAC, 60 HZ, single phase supply. The assembly is usually shipped with a standard straight 115VAC, 3-pronged molded power cord, 15' long. A different cable is available if you plan on operating the Enhanced Remote Panel on 230VAC.