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TEST REPORT

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SUMMARY

PO Number
4574

Date Received
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Description
LintAlert System

Three LintAlert Systems (Figure 1) were received to validate the customer stated claims for its use and function. The units were received in two batches, Unit 1 by itself and Units 2A and 2B at a later date after a modification by the client to the firmware regarding the respective upper level set points.

Procedure, interpretations, customer claims, results, figures, and appendix are on the following page(s).



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PROCEDURE

The systems were installed on a standard clothes dryer in accordance with the supplied instructions (see Appendix) with the following modifications. First, we tee'd off the 1/8" ID tubing to display the analog pressure levels with an industry standard Inclinator that quickly indicates low air pressures up to 2.2 inches of water column (and less precise up to 22 inches of total water column) (see Figures 2 and 3). We also took standard metal flexible dryer venting hose and placed a restricting valve in line to simulate lint buildup (see Figure 4).

We then checked the test unit's functionality at five different conditions.

- The first was validating that the LintAlert would not allow calibration when the dryer is not running. This was achieved by holding the button in for 5 seconds. If this was the real life case; since the dryer is not running, the LED light bar will display LED's 1 and 2 (error code) which indicate "no pressure found", and will not allow a calibration.
- The second was to calibrate to our particular system at a "like new" or very clean state. In technical terms, a "clean value" must be recorded to memory in order to determine the proper interval proportions. These "intervals" will then progressively illuminate over time through the LED light bar. To accomplish this, we performed a calibration with a typical or likely home environment. (Note: Pressure levels in this group should range from 0.2 to 0.8 inches of water column pressure.) Depending on what the LintAlert sensor finds will determine what pressure intervals the microprocessor will use to illuminate the LED blockage indicator lights (i.e., the lower the initial "clean value" pressure found, the larger the intervals, and on conversely, the higher initial "clean value" pressure found, the smaller the intervals).
- Third, we performed a simulated lint build up test. After performing the calibration in condition two and after a slight pause we observed the first green LED was illuminated indicating the dryer is ON and that about the same amount of back pressure exists as when initially calibrated. As we choke the airflow by slowly closing the valve, we observed in some unison that as the static pressure rises, so does the blockage indicator light bar until we hit the preset pressure (0.81 to 1.15 inches of water column) and the red light and audible alarm goes off, indicating a severe reduction in air flow. We performed this test with both cool (ambient) and heated air.
- Fourth, we attempted a calibration with a simulated clogged duct. In this case the LED light bar displays LED's 4 and 5 error code which indicates excessive back pressure and the unit will not allow a calibration. The LintAlert requires a clean starting point. The LintAlert device is not capable or marketed to identify a presently clogged duct system but to display over time the likely increases in back pressure due to typical or commonplace lint build-up in the dryers' exhaust conduit system. Other factors of increased back pressure include compressed or kinked transition hoses and vent hoods that are inoperable or blocked.
- Fifth and last, once the back pressure has been relieved (most likely accomplished by cleaning out the exhaust conduit or vent hood in actual use) the LintAlert can be recalibrated.

INTERPRETATIONS

Although the initial unit (Test Unit 1) allowed itself to be calibrated while the lint simulation valve was fully closed, it performed the rest of the testing as predicated by the customer. After a modification by the client to the firmware regarding the respective upper level set points, Test units 2A and 2B were evaluated and met all the test conditions as expected with no issues.

CUSTOMER CLAIMS

The LintAlert is a smart, easy-to-install home safety device that monitors and displays the back pressure levels found in the exhaust conduit of the dryer. Pressure levels found in the dryer duct typically increase over time due to lint build-up, animal nests or vent hoods that become inoperable.

The LintAlert features an innovative and responsive digital pressure sensor. Coupled with a programmable integrated microprocessor, the device can determine if your dryer is ON, and what levels of pressure exist. When the pressure reaches an unsafe level, the alarm state will activate, indicating maintenance is required. The alarm state is displayed as: LED light bar flashes on and off alternating with blue logo, with buzzer beeping. Prior to the alarm state, a slow progression of the LED Blockage Indicator will display fractional build-up.

Disguised as a simple night light and pass through plug, the LintAlert exhibits a steady blue light under normal operation.

The included tap fitting is installed in the dryers' transition hose at or near the dryers exhaust port. The SmartTap™ fitting is connected to the alarm module by a 1/8" tube and allows the pressure differential switch to monitor the pressure in the flex transition hose and the balance of the exhaust conduit.

Because electrical outlets are generally at a minimum in the laundry room, a convenient pass through terminal is provided and is sufficient to carry a maximum of 15 amps.

RESULTS

Unit 1

Test	Description	Rep	Cold Air		Notes
			Result	Data (in. water)	
1	Can not calibrate when dryer is off	---	Pass	---	---
2	Calibrates when dryer is running	---	Pass	0.25	---
3	Unit signals a constriction	1	Pass	0.76	---
		2	Pass	0.70	---
		3	Pass	0.68	---
		4	Pass	0.65	---
		5	Pass	0.66	---
4	Can not calibrate when constricted	---	Fail	0.94	Dead head pressure

RESULTS - CONTINUED

Unit 2A

Test	Description	Rep	Cold Air		Hot Air		Notes
			Result	Data (in. water)	Result	Data (in. water)	
1	Can not calibrate when dryer is off	---	Pass	---	Pass	---	---
2	Calibrates when dryer is running	---	Pass	0.34	Pass	0.30	---
3	Unit signals a constriction	1	Pass	0.76	Pass	0.74	---
		2	Pass	0.82	Pass	0.76	---
		3	Pass	0.81	Pass	0.80	---
		4	Pass	0.80	Pass	0.80	---
		5	Pass	0.81	Pass	0.78	---
4	Can not calibratec when constricted	---	Pass	0.94	---	---	Dead head pressure
5	Reset after high calibration fail	---	Pass	0.34	---	---	---

RESULTS - CONTINUED

Unit 2B

Test	Description	Rep	Cold Air		Hot Air		Notes
			Result	Data (in. water)	Result	Data (in. water)	
1	Can not calibrate when dryer is off	---	Pass	---	Pass	---	---
2	Calibrates when dryer is running	---	Pass	0.32	Pass	0.28	---
3	Unit signals a constriction	1	Pass	0.77	Pass	0.76	---
		2	Pass	0.76	Pass	0.80	---
		3	Pass	0.84	Pass	0.81	---
		4	Pass	0.80	Pass	0.81	---
		5	Pass	0.84	Pass	0.80	---
4	Can not calibrate when constricted	---	Pass	0.94	---	---	Dead head pressure
5	Reset after high calibration fail	---	Pass	0.35	---	---	---



Figure 1: Sample as received – typical.



Figure 2: Test setup – installed pressure top.



Figure 3: Test setup - Inclinometer



Figure 4: Photo showing standard metal flexible dryer venting hose and restricting valve in line to simulate lint buildup.

APPENDIX

Installing the LintAlert®

Installation and calibration is a fairly quick and straight forward process.

1 Step One
Confirm that the in-the-wall duct system has been completely cleaned and in like-new condition (read Notice on reverse side). We at LintAlert, as well as the leading dryer manufactures, strongly recommend the use of the semi rigid aluminum flex. Wire-bound flex will create more internal turbulence versus the recommended aluminum flex. If you have white vinyl flex on your dryer, please take this opportunity to replace it, as it's been well documented to be extremely unsafe and associated with many dryer fires.

2 Step Two
 Disconnect the new or existing exhaust hose from where it connects to the exhaust port on the back of the dryer. Favoring the middle to outside radius of the first bend, **carefully poke a ¼" hole in the hose, close to where the exhaust port connects.** (Figure 1). Be sure to leave room for the flex hose to re-secure to the dryers' exhaust terminal.

3 Step Three
 Take the umbrella shaped tap fitting, (Figure 3 - A) and slide it up inside the exhaust hose and through the hole you just made. It is important to rotate the fitting so that the curved contour of the fitting matches that of the transition hose. The felt adhesive washer (B) will go on next, followed by the curved washer (C). Finally, twist the nylon thumb-nut on and firmly tighten to ensure that no air can escape (Figure 4). Connect one end of the clear vinyl tubing to the tap fitting (while supporting it from within the flex hose) and reattach the existing exhaust hose to the dryer's exhaust port.




4 Step Four
 Move the dryer back into place and plug the alert module into the nearest un-switched 110v AC power outlet. Important Note: Cut the length of the clear vinyl tubing to minimize any sag or droop in the tubing, as this could allow condensation build-up within the tubing to puddle thus creating an air block (Figure 5).







5 Step Five [Calibration]
 Clean the dryer's lint screen. Begin a drying cycle with a typical load of clothes, at your usual temperature setting. **While the dryer is running, press and hold the LintAlert button for about 6 seconds, until all five LEDs progressively light up and you hear a chime tone (records "clean value" pressure level).** After about 2 seconds, you should observe that the first green LED is illuminated and the logo lens, "LintAlert," is steady blue. Note: Any subsequent calibration attempts will require an approximate 12 second press of the button. The LintAlert should now be in a normal monitoring mode. Refer to the troubleshooting section of this manual or online if this normal state is not observed.

Troubleshooting Section:
Tubing does not reach: The tubing can be extended or replaced with similar diameter tubing. We offer longer tubing lengths in our online store, but the same tubing (1/8" ID 1/4" OD) is usually available at aquarium or pet outlets. Results with lengths up to 24 feet were shown to be consistent. It is important that the tubing placement and type of tubing prohibit being pinched or kinked. Also, a positive slope with no sagging is necessary in preventing any "in-line" condensation within the clear vinyl tubing. Although not common, condensation build-up within the tubing could puddle thus creating an air block.

No 110v outlet near my dryer: In most cases, the washer and dryer reside side by side, and the washer uses 110v. If the washer outlet is hidden or too far from the dryer's location, then the first suggestion is to extend the tubing (see above). The second alternative would be to purchase and mount a multi outlet power bar above the dryer for the LintAlert to plug into.

LED Display Indicators and proper calibration confirmation:
First Power Up: LED array turns on for 1 second, Alarm Beeps, then BLUE logo turns on, then  then  then , then the LED bar will flash with blue logo lens until user records an initial "clean value" while dryer is running.

During Calibration:
 means no pressure was observed, likely dryer is not running or tubing not connected.
 means too much pressure was present, likely the exhaust duct was never cleaned or there still exists blockage of some sort.
 means calibration was successful and after 2 seconds the first LED will illuminate.

Monitoring Mode:
 dryer not ON, tubing detached, or a very recent calibration
 normal (recent calibration),  approximately 20%
 blocked, approximately 32%  blocked, approximately 45%
 blocked, approximately 60% blocked, time to clean out the exhaust duct.

Restore to Original Calibration Level: Unplug the unit for 3 seconds and insert back into plug.

Factory Reset: Unplug unit then plug unit into wall outlet while pressing button and continue to hold till chime is heard (approximately 2 seconds).

Additional troubleshooting guides and revised manuals can be found online. See FAQs online and on the product packaging.
 Version 1.11.10

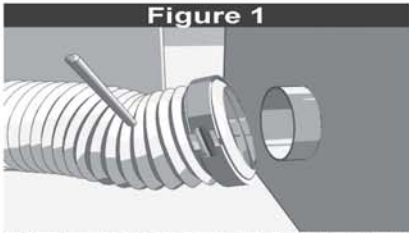


Figure 1
 Poke hole in flex near dryer connection.

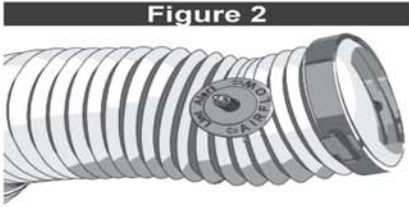


Figure 2
 Insert tap fitting and assemble related parts.

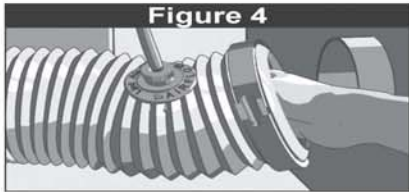
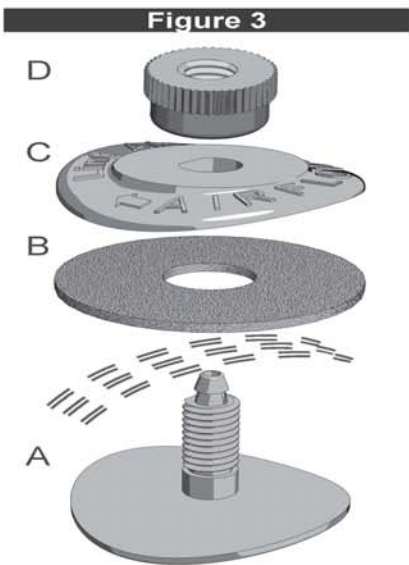


Figure 4
 Connect tubing between tap fitting and alarm module.

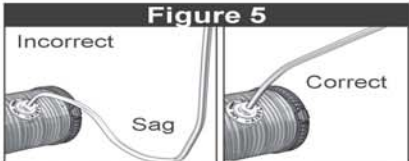


Figure 5
 Cut tubing length to minimize any sag. Proceed to calibrate unit (step 5).