Sensing the Future: On-Board HVAC Diagnostics

2019 Residential New Construction Partner Meeting
September 11, 2019
Alternative Compliance Paths

• Primary goal of working group is to define a standard for Raters to assess HVAC design and installation.
• There’s a placeholder in Std. 310 for alternative compliance paths in addition to the Rater-verification path.
• One possible pathway is on-board diagnostics. For example, an on-board diagnostic system might assess any or all of the following:
  – Actual system airflow
  – Actual fan wattage
  – Non-invasive data points or equivalent
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Agenda

- My odd perspective
- Industries are changing, and fast!
- Trades are important
- Sensors in HVAC and why it matters
- The future of HVAC installation and maintenance
The industry today.

- **HVAC TECH SHORTAGE**
  Conservative estimates put the industry HVAC tech shortage at 20,000

- **OVER 40%** of newly installed residential systems are not installed correctly

- **OVER 70%** of home systems are inefficient or heading for a breakdown

- **UNDER 10%** of maintenance agreement systems are properly serviced

A smarter solution.

**SMART HVAC WITH 24/7 MONITORING.**

**How it works**

- **SMART SENSORS OFFER A TOTAL SENSE OF COMFORT.**
  Custom sensors gather vital, never before seen information every time a system runs. The data is sent to our monitoring center’s secure cloud over your customer’s home Wi-Fi network.

- **24/7 MONITORING FOR UNPRECEDEDENT INSIGHT.**
  Our team carefully monitors data every time a system runs. In most cases, we detect an issue before it becomes a problem.

- **STAY IN THE KNOW AND KNOW WHAT TO DO.**
  By sending you and your customers timely communications including system reports, actionable alerts and repair verifications, you differentiate yourself from your competition.
The Install Problem Is Real

- **PROBLEM DETECTED AT INSTALL**
  - 30% Refrigerant Loop
  - 20% Incorrect Fan Speed
  - 5% Wiring Issues

- **PROBLEM DETECTED OVER TIME**
  - 5% Refrigerant Loop Leak
  - 5% Equipment Performance

- **PROBLEM FREE INSTALL**
  - 50%
Hardware Consists of 10 Sensors Plus Data Hub

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© 2016 Guy Medaris – VP, Sales & Marketing
© 2016 Tom Koby – Product Manager
© 2016 Scott Valentine – User Experience
What the Technician Sees – At the Installation
Performance Check

Runtime & Cost

Desktop Version

Welcome to your smart maintenance report.

Summary definitions

1. PASS: System is fully operational
2. CAUTION: System not performing at peak efficiency. Check all relevant input sources.
3. WARNING: System is performing poorly and may require a service visit. Contact your maintenance provider.
4. EXCESSIVE: Insufficient data to run performance test.
Jim Fisher

Director – Product Marketing - Residential Controls
Goodman / Amana
ComfortBridge™ Controls System
CoolCloud™ Bluetooth® Application
EXPANDABLE SIMPLICITY
APPLICATION FLEXIBILITY
$ FRIENDLY SOLUTIONS
Two Unique Characteristics

ONE

Staging

Stages Equipment
- Modulating Furnaces
- 2-Stage Furnaces
- Variable Speed Inverter Air Conditioners and Heat Pumps
- 2-Stage Air Conditioners and Heat Pumps
New Control Arrangements

Thermostat

*The contractor chooses the control.*
Unrivalled Thermostat Compatibility

Give people what they want!
New Control Arrangements

**Thermostat**
"The contractor chooses the control."

**Accessories**
"No limitations to what can be connected."

**Zoning**
"Your choice is our choice."
Two Unique Characteristics

User Interface

- Access to Advanced Menu
- Advanced User Menus
- Configuration and Diagnostic Menu Access
Onboard Bluetooth - CoolCloud

Integrated Bluetooth

2-wire comm. link

Download our free app

EPA ENERGY STAR. The simple choice for energy efficiency.
THE FUTURE
Thermostat Lifespan

The Future of Thermostats
- 5 years?
- 10 years?
- 15 years?

What Will Replace?
- Sensors?
- Algorithms?
- Home automation?
- Voice activated devices?
Sensors

Robots and Sensors
• Connectivity
• Video
• Home automation hub
• Touch
• Voice
• Indicator LEDs

Sensor Options?
• Internal?
  • Onboard / integrated
  • Return air based
• External?
  • Supply air
  • Room sensors
    • Temperature
    • Humidity
    • IAQ
• Both?
Algorithms

- A computer procedure a lot like a recipe.
- Tells hardware (via a computer) precisely what steps to take to solve a problem or reach a goal.

Good Algorithms

- Should produce the correct outputs.
- Should execute efficiently.
- Should be understandable.
- Should be modifiable.
Smart Home

Home Automation

Temperature Control
• Is it pulled into the smart home?
• Thermostat companies are smart.
• Will they control the next wave of temperature control?
• Will there be new players?
Voice Technology

How Voice-User Interfaces (VUI) Work
• A VUI makes interaction with computers possible.
• Speech recognition understands spoken commands and questions.
• VUIs will provide input through home automation using sensor and algorithm data outputs.

Voice / Speech Activated Control
• Voice recognition provides speech-enabled technology interaction.
• We have the ability to receive and interpret spoken commands.
Future Path

• How will the change occur?
  • All at one time?
    • Killer app
  • Incrementally?
    • Sensors and algorithms added over time.
    • May even be happening now!
What is the Impact?

Equipment Manufacturers

Contractors

Thermostat Manufacturers

Consumers
Equipment Manufacturers

Equipment is OK

- Big Question: How to cover the cost?
  - Technology driven (A2L Implementation / FER / ULN)?

Controls Portfolio Expansion

- Recurring Revenue
  - Equipment monitoring (sensor integration)
    - EOL opportunities
  - Owned by the consumer
    - Pushed to contractor with homeowner’s permission

- Equipment Leasing
  - Prominent in Canada
    - US utilities dipping their toes in the water
    - Could be managed by utilities, OEMs or private leasing
Thermostat Manufacturers

Portfolio Expansion Likely
• Move away from hardware?

Hardware Alternatives
• Will thermostat manufacturers command software superiority?
• Will they create strength through their experience with sensors, algorithms and data management?

Other Product Opportunities
• Thermostat manufacturers have already shown interest in other areas like home automation.
• Hard to dethrone the kings
  • Google / Amazon

Google.com
What is the Impact?

Contractors

The Future is Change
- Market pressures will dictate changes in the commerce chain.
- Economy could accelerate or impede changes.
- There will always be a need for qualified installers / technicians.

Consumers

More In Charge
- The consumer is the home gatekeeper.
- The consumer owns the data.
- They provide permission allowing for data collection outside of the home.
The Future is Interesting!

Thank You