

Exhibit 2 - U.S. Patent No. 11,835,394 (“’394 Patent”)

Accused Instrumentalities: Google’s smart thermostats (e.g., Nest Learning Thermostat (all editions), Nest Thermostat E, and Nest Thermostat), its servers and data centers (including, e.g., cloud-based servers and backend support), its Google services or Nest services supporting the Nest-branded thermostats, its related online interfaces (including, e.g., mobile apps and web portals), and its related accessories (including, e.g., remote temperature sensors), and including device-side and cloud-based features thereof, and all versions and variations thereof since the issuance of the asserted patent.

Claim(s)	Identification in Accused Instrumentalities
1. A control system for an environment inside a structure, comprising:	To the extent the preamble is limiting, the Accused Instrumentalities are a control system for an environment inside a structure. The Accused Instrumentalities include Google’s smart thermostats, such as the Nest Thermostat. The Nest Thermostat, together with the supporting Google Nest functionality that comes with the Nest Thermostat, is a control system for controlling the environment inside the user’s structure where the thermostat is installed. The Nest Thermostat provides features that are supported by Google Nest services that are enabled by network connectivity with the Nest Thermostat, including connectivity to Google servers and data services, including, for example, Google services enabling various smart thermostat features of the Nest Thermostat. The climate control system can optionally include remote temperature sensors as well. <i>See, e.g.,</i> https://support.google.com/googlenest/answer/10116949?hl=en (Google Nest Help, What different HVAC monitoring alerts mean):

GOOGLE EXHIBIT 1027

Your heating system failed to heat your home

You'll receive this alert if Google Nest's software has identified a time when your heating system didn't appear to be working.

It identifies heating failures through data about how your reported indoor temperature changes while your thermostat is telling your heating system to heat your home. It also considers information about the outdoor temperature and time of day.

If your heater is on but your home isn't getting warmer, your heating system's fan may have a problem. Or, if you have a gas or oil furnace, you may have a dirty or faulty flame sensor that for safety reasons prevents the gas from burning.

Your A/C system failed to cool your home

You'll receive this alert if Google Nest's software has identified a time when your A/C system didn't appear to be working.

It identifies A/C failures through data about how your reported indoor temperature changes while your

<https://support.google.com/googlenest/answer/10116949?hl=en>

thermostat is telling your A/C to cool your home. It also considers information about the outdoor temperature and time of day.

If your air conditioner is on but your home isn't getting cooler, your A/C system's compressor, indoor fan, or outdoor fan may have a problem, or your startup capacitor may be broken. You may be able to check the capacitor by listening for clicking noises in the outdoor unit that indicate it's trying to start but doesn't succeed.

Your A/C ran longer than expected

You'll receive this alert if Google Nest's software has determined that your A/C system does not behave as expected while cooling your home to a comfortable temperature.

It identifies how your reported indoor temperature changes while your thermostat is telling your A/C to cool your home. It also considers information about the outdoor temperature and time of day.

If your A/C system does not behave as expected, it may have a problem. For example, your system may have low refrigerant levels, air flow problems, or frost building on the evaporator coils.

Your system may still work with these conditions, but it may cost you more than necessary to cool your home and may cause more damage in the long run.

See, e.g., Google Nest Help, "HVAC monitoring from Google Nest," accessed on Nov. 30, 2020, available at <https://support.google.com/googlenest/answer/9984225>

HVAC monitoring from Google Nest

HVAC monitoring is available in eligible regions in the US and Canada.

HVAC monitoring is a thermostat feature that can help you look after your home. Your Nest thermostat can help identify potential issues with eligible heating, ventilation and air conditioning (HVAC) systems. If a potential issue is detected, we'll send you an alert via email or a Google Home app notification.

[Learn what different HVAC alerts mean.](#)

[Learn how to get HVAC Pro assistance.](#)

How HVAC monitoring works

Sometimes, your HVAC system shows warning signs that it's having issues. For example, if it takes longer than normal to cool your home, there might be a problem with your cooling system (AC). If your Nest thermostat detects these unusual or unexpected patterns, we may send you an email alert or a Home app notification.

The alert email or notification will tell you what your thermostat noticed and which system (heating or cooling) may have been affected. You may also be shown contact information for a Pro, if you have one recorded in your thermostat or if you are in an eligible region.

Important: HVAC monitoring is not meant to replace the diagnosis of a qualified HVAC professional. We make no endorsement, representation, or warranty about the health of your HVAC system. You may still experience issues with your HVAC system that we don't alert you to.

Eligible HVAC systems

- HVAC monitoring is currently available for forced air HVAC systems, which use vents to move air through your house. Radiant systems, which have radiator or in-floor heating, are not eligible for HVAC monitoring at this time.
- HVAC monitoring is currently available in the US and parts of Canada.

Types of HVAC alerts

Urgent alerts

If your thermostat detects an issue that may require immediate attention, we will send you an urgent alert as soon as it detects the problem. For example, if you turned on your heating system but your home became colder, you may have a severe problem with your heating system.

We notify eligible users about these urgent alerts:

- Your heating system failed to heat your home
- Your A/C system failed to cool your home
- [Furnace shutdown / Heads-up](#)

Learn more about [how urgent alerts work](#).

Early warnings

If your thermostat detects an issue that should be fixed soon, we will send you an early warning alert within a week of detecting the problem. For example, if your gas furnace briefly stops heating several times during its operation, you may have a problem with the flame sensor. If this problem isn't fixed, it could cause your furnace not to heat at all in the future.

Note: To trigger an early warning alert, a detected issue must meet a threshold set by Nest.

We notify eligible users about these early warnings:

- Your heating system briefly stopped heating your home several times
- Your A/C system briefly lost power several times
- Your A/C ran longer than expected
- [Filter reminders](#) (based on run time)

Learn more about [how early warnings work](#).

Manage settings or opt out of HVAC monitoring

If you have an eligible Nest thermostat, you're automatically opted into HVAC monitoring.

- If you use a Google Account, you'll always get urgent alert notifications, but you can opt out of urgent email alerts and early warning email or Home app notifications by turning them off with the Home app.
- If you use a [non-migrated Nest Account](#), you can only get urgent or early warning emails. You can turn off early warning emails by opting out in the footer of those emails.
- You cannot opt out of HVAC urgent alerts because they let you know about serious issues that you need to be aware of.

Manage HVAC settings with the Home app

1. Open the Home app  > tap Settings .

2. Under “Features,” tap **Notifications** > **Thermostat** > **HVAC monitoring** > select your preferred settings.

Manage filter reminder settings with the Nest app

1. Open the Nest app  > select your thermostat.
2. In the top right corner, select Settings  > **Equipment** > **Air filter reminder** > choose your preferred settings.

Manage filter reminder settings with the Home app

1. Open the Home app  > tap your thermostat > Settings .
2. Select **Notifications** > **Air filter reminder**.

What to do if you get an alert

If you get an HVAC monitoring alert from Nest, you can choose what to do next. You may want to take some of these steps:

1. Check for issues outside your HVAC system. For example, if someone left the back door open while the air conditioner was on, your A/C system may have been unable to cool your home as expected.
2. Learn more about [what the alert may mean](#). In some cases, you may be able to identify and fix the problem yourself.
3. [Get HVAC Pro assistance](#). Some of our alerts will include a pro’s contact information or a way to book a pro on Handy.
 1. In some regions, if you want to get emails from us about Pro booking services that you are eligible for, you may need to sign up for [Nest marketing emails](#).

[ADD CITATION]

Upon information and belief, there are no differences between different versions of Accused Instrumentality (e.g., Nest Learning Thermostat 3rd Gen. versus Nest Thermostat E or Nest Thermostat) that are material for purposes of infringement of the claimed system.

Google directly infringes the asserted claim including each claim element of the claimed system. To the extent a customer act may be deemed required to form the claimed system, Google still directly infringes, and also infringes pursuant to theories of inducement or contributory infringement. As an example, HVAC Monitoring features describe above are automatically “on” and customers are automatically opted into these features in the ordinary, intended, and normal use and configuration of the Accused Instrumentalities. The Accused Instrumentalities are infringing “out of the box” and are configured as an infringing system. Google’s customers installation of the Accused Instrumentalities in the normal manner also automatically results in an infringing system. For example, Google’s customers connect the Accused Instrumentalities to the Internet and to Google’s cloud or back-end in the ordinary use of the Nest-branded thermostats, pursuant to instructions from Google. As another example, Google’s customers create a Nest account and register devices/structures with the customer’s Nest account. As another example, the Accused Instrumentalities are designed to be associated with the customer’s home and to connect to the customer’s HVAC system, including forced air systems with a compressor. Google’s making, using, selling, importing, and offering for sale the Accused Instrumentalities each constitutes infringement, regardless of the fact that Google may not sell the system in a state that is already plugged in and connected to the Internet and regardless of the fact that Google may not sell the heating, ventilation and air conditioning unit(s) (or the residence itself) to the customer which Accused Instrumentalities are designed to control (or operate within).

The Accused Instrumentalities infringe the claims directly and indirectly. Users actually use the Accused Instrumentalities in the United States, and the system infringes in its normal use. The Accused Instrumentalities are designed to operate using features that infringe in their normal and ordinary use. The normal and intended use of the Nest Learning Thermostat (3rd Gen.), Nest Thermostat E, and Nest Thermostat, and the design of same, and the instructions and encouragement of Google with respect to same, is to use these products as a smart thermostat system and smart HVAC system including one or more Google Nest Thermostat, Nest Thermostat E, or Nest Learning Thermostat (3rd Gen.) (each smart thermostat connected to the user’s HVAC equipment via wires, which HVAC system equipment includes a compressor) connected via a network to Google’s backend or cloud and to the Nest mobile application or Google Home mobile application and to optional Nest Temperature Sensors (as examples) as other components providing features for the smart thermostat system and smart HVAC system. The Nest-branded thermostats operate in the normal and intended manner by connecting to the user’s HVAC system via wires and connecting via a network to computer hardware in Google’s Nest cloud or backend and to other components of the Nest system including the Nest or Google Home mobile application and optional additional Nest temperature sensors, for example. The Nest-branded thermostats are designed to operate in an infringing

manner in a user's home, connected to the user's HVAC system, and connected to the Google Nest backend or cloud service, as well as the Nest or Google Home mobile application and optional temperature sensors as examples. Users are encouraged to use the Nest-branded thermostats with the Google Nest backend or cloud service in the normal and ordinary manner, which infringes the claims. Users are also specifically encouraged and incentivized to use the Nest-branded thermostats with HVAC equipment including a compressor. To the extent any user's action is deemed required, Google Nest encourages that action. For example, Google encourages the systems to be installed and used in the ordinary and infringing manner. Google also encourages the features at issue to be used. Users are encouraged to allow HVAC Monitoring to run as normal automatically and by default, and users are automatically enrolled in HVAC monitoring. The Nest-branded Thermostats are not staple goods, not suitable for substantial noninfringing use, and do form a material part of the inventions described in the claims. The Nest-branded Thermostats infringe each element of the claim when they are installed in the United States as Google intends and according to their design.

Google induces, encourages, and provides instructions and incentives to customers to engage the features described in the charts below with respect to each charted claim, which perform the claim limitations as more fully set forth below. Further, Google possessed knowledge that the underlying induced acts constitute patent infringement, at least since this case commenced, and potentially earlier. Google specifically intended to encourage the underlying acts constituting direct infringement, e.g., which occur pursuant to use of the features described above and below. Google specifically intended these acts because it provided instructions to its customers explaining how to use these features, encouraged its customers to use these features, sign up for and enroll in these features.

Plaintiff reserves the right to assert infringement as to any alternate or future versions or variations of Accused Instrumentalities.

See, e.g., <https://support.google.com/googlenest/answer/9249088?hl=en> (Learn how your Nest products connect to each other and the internet):

Learn how your Nest products connect to each other and the internet

Nest products are [designed to work together](#), so they can communicate with you and each other in a variety of ways. They use Bluetooth, NFC, Wi-Fi, and Thread which is a low-power wireless mesh network for device-to-device communications.

Nest products don't connect to each other through your Wi-Fi router. In most cases, they use Wi-Fi to send their status to the Nest service which then sends that information to other products in your home and the app. In other cases, they use Thread wireless networking to directly connect to each other.

See, e.g., <https://support.google.com/googlenest/answer/9703157?hl=en> (Troubleshoot connecting a Nest thermostat to the Nest app or Wi-Fi network)

General troubleshooting steps

1. Check the Nest app version

Make sure that you have the latest version of the Nest app on your phone or tablet. You can download it for free from the [Apple App Store](#) or [Google Play](#). To make sure you have the newest version, you can uninstall and reinstall the app.

2. Check the status of the Nest service

Click [here](#) to check the status of the Nest service.

If the Nest service is down, wait for the Nest service to resume to see if you can add your thermostat to the Nest app.

While the service is down, you may also see a message "The Nest service can't be reached right now" in the Nest app.

See, e.g., Thermostat Energy History on Google Nest Help website.

<https://support.google.com/googlenest/answer/9247300?hl=en>

Thermostat Energy History

Your Google Nest thermostat's Energy History shows you how often and for how long your system has run, so that you can make smart choices about your schedule and temperature preferences. If you use the Nest app, you may be able to [migrate your Nest Account to a Google Account](#) and connect your thermostat to the Home app.

Home app

Access your thermostat's history through the Energy Dashboard in your Home app. You can view usage and insights for a day, week, or month. For more detailed views, you can tap on data to see HVAC usage.

Note: To view your Energy Dashboard, your thermostat must be connected to Wi-Fi and added to your account in the Home app.

1. Open the Home app.
2. Tap your thermostat > Energy dashboard .
3. Select Day, Week, or Month.

The chart will update to show you how long your heating or cooling ran during the time period you've selected.

- Orange bars represent heating, blue ones represent cooling.
- If your thermostat was in Heat-Cool mode, or you recently switched between modes, both orange and blue bars will appear.
- Tap on one of the data bars to learn more details about your heating or cooling usage.

Energy History details

At the bottom of the screen, you can learn more about Leafs earned, total Heat & Cool time, [energy Rush hours](#), and compare use times between weeks or months.

Press Back < or Forward > to view previous or following time ranges. Press Quick jump 📅 to return to the current time range.

Energy History icons

Here are the icons you'll find in your Energy History, and what each one means.



The bars show when your system was heating or cooling.

- Orange: heating
- Blue: cooling

When you tap on one of the days on the chart, the number next to the bar is the total time your system was on during that timeframe.



The Leaf icon appears for the days when you saved energy and earned a [Nest Leaf](#).

	Save energy After some time, your Energy dashboard will display insights under your dashboard chart to help you save energy. For more on ways to save, go to Explaining Nest thermostat savings. Insights Cards will notify you when weather changes affect your energy usage and you can see how long you saved energy by enabling Home & Away. You may also get notifications here if your adjustments in temperature caused a change in your average energy usage. Change your Eco Temperatures Learn how to set your thermostat's Eco Temperatures Note: Energy efficient Eco Temperatures can help save you energy when you set them lower (for heating) and higher (for cooling) than your comfort temperatures. If you set your heating Eco Temperature too high or your cooling Eco Temperature too low, so that they won't make an impact on your energy savings, you may find an alert in your Home Report.
[1a] a climate control device in the structure that receives first temperatures from inside the structure;	The Accused Instrumentalities includes a climate control device in the structure that receives first temperatures from inside the structure. For example, each Nest-branded thermostat is a climate control device in the structure that receives first temperatures from inside the structure. For example, each Nest-branded thermostat is inside the structure, controls climate, and receives temperatures, such as inside temperatures. For example, Nest-branded thermostats receive inside temperatures, display inside temperatures, and store inside temperatures as digital values in degrees Celsius or Fahrenheit representative of the inside temperature of the structure. For example, Nest-branded thermostats receive temperatures from inside the structure using sensors, such as internal sensors or external sensors, such as Nest Temperature Sensor. As another example, each Nest-branded thermostat provides features such as HVAC Monitoring and Energy History that are supported by Google backend servers or data centers for the Nest-branded

	thermostats. These servers or data centers provide functionality of the climate control device and they also show there is a climate control device in the structure that is receiving first temperatures from inside the structure.
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	https://support.google.com/googlenest/answer/9248154 (Learn about the Nest Temperature Sensor):
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Learn about the Nest Temperature Sensor

The Google Nest Temperature Sensor lets you choose where your thermostat measures the temperature in your home to help keep you comfortable.



Why would I need a Nest Temperature Sensor?



A temperature sensor can help if you're consistently too cold or too warm in a room in your home. A thermostat only measures the temperature in the room that it's in. It heats or cools your entire home based on that temperature, even if it's different from the rooms where you spend the most time.

Most homes are not the same temperature in every room. The temperature can vary because of the number of windows, size of the room, amount of sunlight, and other factors. If you install a Nest Temperature Sensor in a room, the sensor measures that room's temperature and sends it to your thermostat. Your thermostat can then use the sensor temperature to keep you more comfortable.

For example, you might want a temperature sensor if you have a multi-story home. A temperature sensor can help your thermostat keep you comfortable on the floor you choose, at the time of day you choose.

Do I need a Nest Temperature Sensor to use my Nest thermostat?



The Nest thermostat works fine without a sensor, and you don't need a temperature sensor to use your thermostat. However, if your thermostat is in an out-of-the-way location, or if you spend a lot of time in a room other than the one your thermostat is in, a temperature sensor might help keep you more comfortable.

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Can I use a Nest Temperature Sensor without a Nest thermostat?

No. You can't use a Nest Temperature Sensor without a Nest thermostat. Your temperature sensor reports temperature data directly to a Nest thermostat in the same home.

Features

[How does it work?](#)



Everything about your system works the same as before, except now, instead of taking the temperature reading from the thermostat, it takes the reading from the sensor.

- You can add one or more temperature sensors to the Google Home app or Nest app and choose a thermostat for them to report to.
- The sensor tells your thermostat what temperature it is in the room where it's placed.
- You can also choose which sensor controls your thermostat and schedule your thermostat to use different sensors at different times of the day.
- Whenever the sensor is active, your thermostat uses your sensor's reading to control when your system turns on and off. Your thermostat ignores its own built-in temperature sensor during those times.

[Change your temperature sensor settings](#)

Can I check the temperature for all my sensors?

Yes. When you tap on a thermostat in the Google Home app or Nest app, you can check all the Nest Temperature Sensors that are connected to that thermostat.

You can also compare your sensor's temperature reading and the reading from your thermostat.

Your thermostat also shows if your sensor is usually warmer, usually colder, or about the same as your thermostat. This can help you learn a little more about your home, where you might want to move your temperature sensors, and when you want your thermostat to use them.

Nest Temperature Sensor

See, e.g., <https://support.google.com/googlenest/answer/10116949?hl=en> (Google Nest Help, What different HVAC monitoring alerts mean):

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Your A/C ran longer than expected

You'll receive this alert if Google Nest's software has determined that your A/C system does not behave as expected while cooling your home to a comfortable temperature.

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If your A/C system does not behave as expected, it may have a problem. For example, your system may have low refrigerant levels, air flow problems, or frost building on the evaporator coils.

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[Learn what different HVAC alerts mean.](#)

[Learn how to get HVAC Pro assistance.](#)

How HVAC monitoring works

Sometimes, your HVAC system shows warning signs that it's having issues. For example, if it takes longer than normal to cool your home, there might be a problem with your cooling system (AC). If your Nest thermostat detects these unusual or unexpected patterns, we may send you an email alert or a Home app notification.

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Learn more about [how urgent alerts work](#).

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- You cannot opt out of HVAC urgent alerts because they let you know about serious issues that you need to be aware of.

Manage HVAC settings with the Home app

3. Open the Home app  > tap Settings .

4. Under “Features,” tap **Notifications** > **Thermostat** > **HVAC monitoring** > select your preferred settings.

Manage filter reminder settings with the Nest app

3. Open the Nest app  > select your thermostat.
4. In the top right corner, select Settings  > **Equipment** > **Air filter reminder** > choose your preferred settings.

Manage filter reminder settings with the Home app

3. Open the Home app  > tap your thermostat > Settings .
4. Select **Notifications** > **Air filter reminder**.

What to do if you get an alert

If you get an HVAC monitoring alert from Nest, you can choose what to do next. You may want to take some of these steps:

4. Check for issues outside your HVAC system. For example, if someone left the back door open while the air conditioner was on, your A/C system may have been unable to cool your home as expected.
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6. [Get HVAC Pro assistance](#). Some of our alerts will include a pro’s contact information or a way to book a pro on Handy.
 1. In some regions, if you want to get emails from us about Pro booking services that you are eligible for, you may need to sign up for [Nest marketing emails](#).”

See, e.g., Thermostat Energy History on Google Nest Help website.

<https://support.google.com/googlenest/answer/9247300?hl=en>

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The chart will update to show you how long your heating or cooling ran during the time period you've selected.

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The Leaf icon appears for the days when you saved energy and earned a [Nest Leaf](#).

	Save energy After some time, your Energy dashboard will display insights under your dashboard chart to help you save energy. For more on ways to save, go to Explaining Nest thermostat savings. Insights Cards will notify you when weather changes affect your energy usage and you can see how long you saved energy by enabling Home & Away. You may also get notifications here if your adjustments in temperature caused a change in your average energy usage. Change your Eco Temperatures Learn how to set your thermostat's Eco Temperatures Note: Energy efficient Eco Temperatures can help save you energy when you set them lower (for heating) and higher (for cooling) than your comfort temperatures. If you set your heating Eco Temperature too high or your cooling Eco Temperature too low, so that they won't make an impact on your energy savings, you may find an alert in your Home Report.
[1b] a processor that: receives second temperatures from outside the structure from at least one source outside the structure; and compares the first	The Accused Instrumentalities include one or more processors that receives second temperatures from outside the structure from at least one source outside the structure; and compares the first temperatures and the second temperatures over time to calculate a current operating profile for the climate control device. For example, the Nest-branded thermostats and the Google servers that support the Nest-branded thermostat each comprise one or more processors. With features such as HVAC Monitoring or Energy History, one or more processors receives second temperatures from outside the structure from at least one source outside the structure (e.g., receiving outside temperature data from Google weather service or a third-party weather service) and compares the first temperatures and the second temperatures over time to calculate a current operating profile for the climate control device (e.g., HVAC Monitoring and/or Energy History compare inside temperatures and outside temperatures over time to calculate a current operating profile for the climate control device that is distinct

temperatures and the second temperatures over time to calculate a current operating profile for the climate control device; and	for that structure and thermostat, and that is based on the inside temperatures and outside temperatures applicable to that thermostat and structure in which it is installed). For example, HVAC Monitoring calculates the current operating profile as part of the process by which it monitors and evaluates for heating failures, cooling failures, or early warnings using temperature data. To the extent literal infringement is disputed, there would also be infringement under the doctrine of equivalents. HVAC Monitoring is insubstantially different from the claim limitations requiring comparing first temperatures and second temperatures over time to calculate a current operating profile for the climate control device. HVAC Monitoring also performs substantially the same function in substantially the same way to achieve substantially the same result, as described in the HVAC monitoring web pages (historical and current versions). <i>See, e.g.,</i> https://support.google.com/googlenest/answer/10116949?hl=en (Google Nest Help, What different HVAC monitoring alerts mean): Your heating system failed to heat your home You'll receive this alert if Google Nest's software has identified a time when your heating system didn't appear to be working. It identifies heating failures through data about how your reported indoor temperature changes while your thermostat is telling your heating system to heat your home. It also considers information about the outdoor temperature and time of day. If your heater is on but your home isn't getting warmer, your heating system's fan may have a problem. Or, if you have a gas or oil furnace, you may have a dirty or faulty flame sensor that for safety reasons prevents the gas from burning.
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Your A/C system failed to cool your home

You'll receive this alert if Google Nest's software has identified a time when your A/C system didn't appear to be working.

It identifies A/C failures through data about how your reported indoor temperature changes while your

<https://support.google.com/googlenest/answer/10116949?hl=en>

thermostat is telling your A/C to cool your home. It also considers information about the outdoor temperature and time of day.

If your air conditioner is on but your home isn't getting cooler, your A/C system's compressor, indoor fan, or outdoor fan may have a problem, or your startup capacitor may be broken. You may be able to check the capacitor by listening for clicking noises in the outdoor unit that indicate it's trying to start but doesn't succeed.

Your A/C ran longer than expected

You'll receive this alert if Google Nest's software has determined that your A/C system does not behave as expected while cooling your home to a comfortable temperature.

It identifies how your reported indoor temperature changes while your thermostat is telling your A/C to cool your home. It also considers information about the outdoor temperature and time of day.

If your A/C system does not behave as expected, it may have a problem. For example, your system may have low refrigerant levels, air flow problems, or frost building on the evaporator coils.

Your system may still work with these conditions, but it may cost you more than necessary to cool your home and may cause more damage in the long run.

See, e.g., Google Nest Help, "HVAC monitoring from Google Nest," accessed on Nov. 30, 2020, available at <https://support.google.com/googlenest/answer/9984225>:

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HVAC monitoring from Google Nest

HVAC monitoring is available in eligible regions in the US and Canada.

HVAC monitoring is a thermostat feature that can help you look after your home. Your Nest thermostat can help identify potential issues with eligible heating, ventilation and air conditioning (HVAC) systems. If a potential issue is detected, we'll send you an alert via email or a Google Home app notification.

[Learn what different HVAC alerts mean.](#)

[Learn how to get HVAC Pro assistance.](#)

How HVAC monitoring works

Sometimes, your HVAC system shows warning signs that it's having issues. For example, if it takes longer than normal to cool your home, there might be a problem with your cooling system (AC). If your Nest thermostat detects these unusual or unexpected patterns, we may send you an email alert or a Home app notification.

The alert email or notification will tell you what your thermostat noticed and which system (heating or cooling) may have been affected. You may also be shown contact information for a Pro, if you have one recorded in your thermostat or if you are in an eligible region.

Important: HVAC monitoring is not meant to replace the diagnosis of a qualified HVAC professional. We make no endorsement, representation, or warranty about the health of your HVAC system. You may still experience issues with your HVAC system that we don't alert you to.

Eligible HVAC systems

- HVAC monitoring is currently available for forced air HVAC systems, which use vents to move air through your house. Radiant systems, which have radiator or in-floor heating, are not eligible for HVAC monitoring at this time.

- HVAC monitoring is currently available in the US and parts of Canada.

Types of HVAC alerts

Urgent alerts

If your thermostat detects an issue that may require immediate attention, we will send you an urgent alert as soon as it detects the problem. For example, if you turned on your heating system but your home became colder, you may have a severe problem with your heating system.

We notify eligible users about these urgent alerts:

- Your heating system failed to heat your home
- Your A/C system failed to cool your home
- [Furnace shutdown / Heads-up](#)

Learn more about [how urgent alerts work](#).

Early warnings

If your thermostat detects an issue that should be fixed soon, we will send you an early warning alert within a week of detecting the problem. For example, if your gas furnace briefly stops heating several times during its operation, you may have a problem with the flame sensor. If this problem isn't fixed, it could cause your furnace not to heat at all in the future.

Note: To trigger an early warning alert, a detected issue must meet a threshold set by Nest.

We notify eligible users about these early warnings:

- Your heating system briefly stopped heating your home several times
- Your A/C system briefly lost power several times
- Your A/C ran longer than expected
- [Filter reminders](#) (based on run time)

Learn more about [how early warnings work](#).

Manage settings or opt out of HVAC monitoring

If you have an eligible Nest thermostat, you're automatically opted into HVAC monitoring.

- If you use a Google Account, you'll always get urgent alert notifications, but you can opt out of urgent email alerts and early warning email or Home app notifications by turning them off with the Home app.
- If you use a [non-migrated Nest Account](#), you can only get urgent or early warning emails. You can turn off early warning emails by opting out in the footer of those emails.
- You cannot opt out of HVAC urgent alerts because they let you know about serious issues that you need to be aware of.

Manage HVAC settings with the Home app

5. Open the Home app  > tap Settings .
6. Under "Features," tap **Notifications** > **Thermostat** > **HVAC monitoring** > select your preferred settings.

Manage filter reminder settings with the Nest app

5. Open the Nest app  > select your thermostat.
6. In the top right corner, select Settings  > **Equipment** > **Air filter reminder** > choose your preferred settings.

Manage filter reminder settings with the Home app

5. Open the Home app  > tap your thermostat > Settings .
6. Select **Notifications** > **Air filter reminder**.

What to do if you get an alert

If you get an HVAC monitoring alert from Nest, you can choose what to do next. You may want to take some of these steps:

7. Check for issues outside your HVAC system. For example, if someone left the back door open while the air conditioner was on, your A/C system may have been unable to cool your home as expected.
8. Learn more about [what the alert may mean](#). In some cases, you may be able to identify and fix the problem yourself.
9. [Get HVAC Pro assistance](#). Some of our alerts will include a pro's contact information or a way to book a pro on Handy.
 1. In some regions, if you want to get emails from us about Pro booking services that you are eligible for, you may need to sign up for [Nest marketing emails](#)."

See, e.g., Thermostat Energy History on Google Nest Help website.

<https://support.google.com/googlenest/answer/9247300?hl=en>:

Thermostat Energy History

Your Google Nest thermostat's Energy History shows you how often and for how long your system has run, so that you can make smart choices about your schedule and temperature preferences. If you use the Nest app, you may be able to [migrate your Nest Account to a Google Account](#)  and connect your thermostat to the Home app.

Home app

Access your thermostat's history through the Energy Dashboard in your Home app. You can view usage and insights for a day, week, or month. For more detailed views, you can tap on data to see HVAC usage.

Note: To view your Energy Dashboard, your thermostat must be connected to Wi-Fi and added to your account in the Home app.

1. Open the Home app.
2. Tap your thermostat > Energy dashboard .
3. Select Day, Week, or Month.

The chart will update to show you how long your heating or cooling ran during the time period you've selected.

- Orange bars represent heating, blue ones represent cooling.
- If your thermostat was in Heat•Cool mode, or you recently switched between modes, both orange and blue bars will appear.
- Tap on one of the data bars to learn more details about your heating or cooling usage.

Energy History details

At the bottom of the screen, you can learn more about Leafs earned, total Heat & Cool time, [energy Rush hours](#), and compare use times between weeks or months.

Press Back < or Forward > to view previous or following time ranges. Press Quick jump 📅 to return to the current time range.

Energy History icons

Here are the icons you'll find in your Energy History, and what each one means.



The bars show when your system was heating or cooling.

- Orange: heating
- Blue: cooling

When you tap on one of the days on the chart, the number next to the bar is the total time your system was on during that timeframe.



The Leaf icon appears for the days when you saved energy and earned a [Nest Leaf](#).

	Save energy After some time, your Energy dashboard will display insights under your dashboard chart to help you save energy. For more on ways to save, go to Explaining Nest thermostat savings. Insights Cards will notify you when weather changes affect your energy usage and you can see how long you saved energy by enabling Home & Away. You may also get notifications here if your adjustments in temperature caused a change in your average energy usage. Change your Eco Temperatures Learn how to set your thermostat's Eco Temperatures Note: Energy efficient Eco Temperatures can help save you energy when you set them lower (for heating) and higher (for cooling) than your comfort temperatures. If you set your heating Eco Temperature too high or your cooling Eco Temperature too low, so that they won't make an impact on your energy savings, you may find an alert in your Home Report.
[1d] a database that stores the current operating profile for the climate control device;	The Accused Instrumentalities includes a database that stores the current operating profile for the climate control device. For example, the Accused Instrumentalities includes the Google backend servers and data centers supporting and providing features of the Nest-branded thermostats, such as the HVAC Monitoring and Energy History features. Those features show that Google maintains a database that stores the current operating profile for the climate control device. The database may reside in one or more of the Nest-branded thermostats or the Google backend that supports the thermostat. Customers can access data from the database through Energy History, and HVAC Monitoring uses data stored in the database, including a current operating profile for the climate control device.

To the extent literal infringement is disputed, there would also be infringement under the doctrine of equivalents. HVAC Monitoring is insubstantially different from the claim limitation requiring a database that stores the current operating profile for the climate control device. HVAC Monitoring also performs substantially the same function in substantially the same way to achieve substantially the same result as the limitation requiring the database that stores the current operating profile for the climate control device, as described in the HVAC monitoring web pages (historical and current versions).

See, e.g., <https://support.google.com/googlenest/answer/10116949?hl=en> (Google Nest Help, What different HVAC monitoring alerts mean):

Your heating system failed to heat your home

You'll receive this alert if Google Nest's software has identified a time when your heating system didn't appear to be working.

It identifies heating failures through data about how your reported indoor temperature changes while your thermostat is telling your heating system to heat your home. It also considers information about the outdoor temperature and time of day.

If your heater is on but your home isn't getting warmer, your heating system's fan may have a problem. Or, if you have a gas or oil furnace, you may have a dirty or faulty flame sensor that for safety reasons prevents the gas from burning.

Your A/C system failed to cool your home

You'll receive this alert if Google Nest's software has identified a time when your A/C system didn't appear to be working.

It identifies A/C failures through data about how your reported indoor temperature changes while your

<https://support.google.com/googlenest/answer/10116949?hl=en>

thermostat is telling your A/C to cool your home. It also considers information about the outdoor temperature and time of day.

If your air conditioner is on but your home isn't getting cooler, your A/C system's compressor, indoor fan, or outdoor fan may have a problem, or your startup capacitor may be broken. You may be able to check the capacitor by listening for clicking noises in the outdoor unit that indicate it's trying to start but doesn't succeed.

Your A/C ran longer than expected

You'll receive this alert if Google Nest's software has determined that your A/C system does not behave as expected while cooling your home to a comfortable temperature.

It identifies how your reported indoor temperature changes while your thermostat is telling your A/C to cool your home. It also considers information about the outdoor temperature and time of day.

If your A/C system does not behave as expected, it may have a problem. For example, your system may have low refrigerant levels, air flow problems, or frost building on the evaporator coils.

Your system may still work with these conditions, but it may cost you more than necessary to cool your home and may cause more damage in the long run.

See, e.g., Google Nest Help, "HVAC monitoring from Google Nest," accessed on Nov. 30, 2020, available at <https://support.google.com/googlenest/answer/9984225>

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HVAC monitoring from Google Nest

HVAC monitoring is available in eligible regions in the US and Canada.

HVAC monitoring is a thermostat feature that can help you look after your home. Your Nest thermostat can help identify potential issues with eligible heating, ventilation and air conditioning (HVAC) systems. If a potential issue is detected, we'll send you an alert via email or a Google Home app notification.

[Learn what different HVAC alerts mean.](#)

[Learn how to get HVAC Pro assistance.](#)

How HVAC monitoring works

Sometimes, your HVAC system shows warning signs that it's having issues. For example, if it takes longer than normal to cool your home, there might be a problem with your cooling system (AC). If your Nest thermostat detects these unusual or unexpected patterns, we may send you an email alert or a Home app notification.

The alert email or notification will tell you what your thermostat noticed and which system (heating or cooling) may have been affected. You may also be shown contact information for a Pro, if you have one recorded in your thermostat or if you are in an eligible region.

Important: HVAC monitoring is not meant to replace the diagnosis of a qualified HVAC professional. We make no endorsement, representation, or warranty about the health of your HVAC system. You may still experience issues with your HVAC system that we don't alert you to.

Eligible HVAC systems

- HVAC monitoring is currently available for forced air HVAC systems, which use vents to move air through your house. Radiant systems, which have radiator or in-floor heating, are not eligible for HVAC monitoring at this time.
- HVAC monitoring is currently available in the US and parts of Canada.

Types of HVAC alerts

Urgent alerts

If your thermostat detects an issue that may require immediate attention, we will send you an urgent alert as soon as it detects the problem. For example, if you turned on your heating system but your home became colder, you may have a severe problem with your heating system.

We notify eligible users about these urgent alerts:

- Your heating system failed to heat your home
- Your A/C system failed to cool your home
- [Furnace shutdown / Heads-up](#)

Learn more about [how urgent alerts work](#).

Early warnings

If your thermostat detects an issue that should be fixed soon, we will send you an early warning alert within a week of detecting the problem. For example, if your gas furnace briefly stops heating several times during its operation, you may have a problem with the flame sensor. If this problem isn't fixed, it could cause your furnace not to heat at all in the future.

Note: To trigger an early warning alert, a detected issue must meet a threshold set by Nest.

We notify eligible users about these early warnings:

- Your heating system briefly stopped heating your home several times
- Your A/C system briefly lost power several times
- Your A/C ran longer than expected
- [Filter reminders](#) (based on run time)

Learn more about [how early warnings work](#).

Manage settings or opt out of HVAC monitoring

If you have an eligible Nest thermostat, you're automatically opted into HVAC monitoring.

- If you use a Google Account, you'll always get urgent alert notifications, but you can opt out of urgent email alerts and early warning email or Home app notifications by turning them off with the Home app.
- If you use a [non-migrated Nest Account](#), you can only get urgent or early warning emails. You can turn off early warning emails by opting out in the footer of those emails.
- You cannot opt out of HVAC urgent alerts because they let you know about serious issues that you need to be aware of.

Manage HVAC settings with the Home app

7. Open the Home app  > tap Settings .
8. Under "Features," tap **Notifications** > **Thermostat** > **HVAC monitoring** > select your preferred settings.

Manage filter reminder settings with the Nest app

7. Open the Nest app  > select your thermostat.
8. In the top right corner, select Settings  > **Equipment** > **Air filter reminder** > choose your preferred settings.

Manage filter reminder settings with the Home app

7. Open the Home app  > tap your thermostat > Settings .
8. Select **Notifications** > **Air filter reminder**.

What to do if you get an alert

If you get an HVAC monitoring alert from Nest, you can choose what to do next. You may want to take some of these steps:

10. Check for issues outside your HVAC system. For example, if someone left the back door open while the air conditioner was on, your A/C system may have been unable to cool your home as expected.
11. Learn more about [what the alert may mean](#). In some cases, you may be able to identify and fix the problem yourself.
12. [Get HVAC Pro assistance](#). Some of our alerts will include a pro's contact information or a way to book a pro on Handy.
 1. In some regions, if you want to get emails from us about Pro booking services that you are eligible for, you may need to sign up for [Nest marketing emails](#)."

See, e.g., Thermostat Energy History on Google Nest Help website.

<https://support.google.com/googlenest/answer/9247300?hl=en>

Thermostat Energy History

Your Google Nest thermostat's Energy History shows you how often and for how long your system has run, so that you can make smart choices about your schedule and temperature preferences. If you use the Nest app, you may be able to [migrate your Nest Account to a Google Account](#)  and connect your thermostat to the Home app.

Home app

Access your thermostat's history through the Energy Dashboard in your Home app. You can view usage and insights for a day, week, or month. For more detailed views, you can tap on data to see HVAC usage.

Note: To view your Energy Dashboard, your thermostat must be connected to Wi-Fi and added to your account in the Home app.

1. Open the Home app.
2. Tap your thermostat > Energy dashboard .
3. Select Day, Week, or Month.

The chart will update to show you how long your heating or cooling ran during the time period you've selected.

- Orange bars represent heating, blue ones represent cooling.
- If your thermostat was in Heat•Cool mode, or you recently switched between modes, both orange and blue bars will appear.
- Tap on one of the data bars to learn more details about your heating or cooling usage.

Energy History details

At the bottom of the screen, you can learn more about Leafs earned, total Heat & Cool time, [energy Rush hours](#), and compare use times between weeks or months.

Press Back < or Forward > to view previous or following time ranges. Press Quick jump 📅 to return to the current time range.

Energy History icons

Here are the icons you'll find in your Energy History, and what each one means.



The bars show when your system was heating or cooling.

- Orange: heating
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When you tap on one of the days on the chart, the number next to the bar is the total time your system was on during that timeframe.



The Leaf icon appears for the days when you saved energy and earned a [Nest Leaf](#).

	Save energy After some time, your Energy dashboard will display insights under your dashboard chart to help you save energy. For more on ways to save, go to Explaining Nest thermostat savings. Insights Cards will notify you when weather changes affect your energy usage and you can see how long you saved energy by enabling Home & Away. You may also get notifications here if your adjustments in temperature caused a change in your average energy usage. Change your Eco Temperatures Learn how to set your thermostat's Eco Temperatures Note: Energy efficient Eco Temperatures can help save you energy when you set them lower (for heating) and higher (for cooling) than your comfort temperatures. If you set your heating Eco Temperature too high or your cooling Eco Temperature too low, so that they won't make an impact on your energy savings, you may find an alert in your Home Report.
[1e] wherein the processor (a) compares a portion of the current operating profile for the climate control device with a stored temperature profile that	Each of the Accused Instrumentalities comprises one or more processors, wherein the one or more processors (a) compares a portion of the current operating profile for the climate control device with a stored temperature profile that represents a previous operating profile for the climate control device calculated at a different time to evaluate whether an operational efficiency of the climate control device has decreased over time, and (b) outputs a result of the evaluation, wherein: the portion of the current operating profile for the climate control device is limited to a specified first time interval, and the stored temperature profile is limited to a specified earlier second time interval. For example, each of the Accused Instrumentalities automatically supports HVAC Monitoring and Energy History, and HVAC Monitoring and/or Energy History compares a portion of the current operating profile for the Nest-branded thermostat (e.g., based on temperatures today) with a stored temperature profile that represents a

represents a previous operating profile for the climate control device calculated at a different time to evaluate whether an operational efficiency of the climate control device has decreased over time, and (b) outputs a result of the evaluation, wherein: the portion of the current operating profile for the climate control device is limited to a specified first time interval, and the stored temperature profile is limited to a specified earlier second time interval.	previous operating profile calculated at a different time (e.g., based on temperatures over the previous weeks or months) to evaluate whether an operational efficiency of the climate control device has decreased over time (e.g., evaluating a time or energy required to change inside temperatures given inside and outside temperature conditions and determining that there has been a decrease in its efficiency at maintaining or achieving inside temperatures, such as that corresponding to a Severe Alert or an Early Warning). HVAC Monitoring also outputs a result of the evaluation, and, for example, it does this when it determines that there is a heating failure, cooling failure, or an early warning when the A/C ran longer than expected, as examples. As an example, the HVAC Monitoring feature is using temperature data for the heating or cooling system in the present and comparing this to a temperature profile that was calculated using temperature data from earlier points in time to detect if there is anomalous performance indicating a severe failure or an early warning indicative of low refrigerant, air flow problems, or frost building up on the evaporator coils. To the extent literal infringement is disputed, there would also be infringement under the doctrine of equivalents. HVAC Monitoring is insubstantially different from the claim limitations. HVAC Monitoring also performs substantially the same function in substantially the same way to achieve substantially the same result, as described in the HVAC monitoring web pages (historical and current versions). See, e.g., https://support.google.com/googlenest/answer/10116949?hl=en (Google Nest Help, What different HVAC monitoring alerts mean): Your heating system failed to heat your home You'll receive this alert if Google Nest's software has identified a time when your heating system didn't appear to be working. It identifies heating failures through data about how your reported indoor temperature changes while your thermostat is telling your heating system to heat your home. It also considers information about the outdoor temperature and time of day. If your heater is on but your home isn't getting warmer, your heating system's fan may have a problem. Or, if you have a gas or oil furnace, you may have a dirty or faulty flame sensor that for safety reasons prevents the gas from burning.
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Your A/C system failed to cool your home

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It identifies A/C failures through data about how your reported indoor temperature changes while your

<https://support.google.com/googlenest/answer/10116949?hl=en>

thermostat is telling your A/C to cool your home. It also considers information about the outdoor temperature and time of day.

If your air conditioner is on but your home isn't getting cooler, your A/C system's compressor, indoor fan, or outdoor fan may have a problem, or your startup capacitor may be broken. You may be able to check the capacitor by listening for clicking noises in the outdoor unit that indicate it's trying to start but doesn't succeed.

Your A/C ran longer than expected

You'll receive this alert if Google Nest's software has determined that your A/C system does not behave as expected while cooling your home to a comfortable temperature.

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Your system may still work with these conditions, but it may cost you more than necessary to cool your home and may cause more damage in the long run.

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[Learn how to get HVAC Pro assistance.](#)

How HVAC monitoring works

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- Your heating system failed to heat your home
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- [Furnace shutdown / Heads-up](#)

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Early warnings

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Note: To trigger an early warning alert, a detected issue must meet a threshold set by Nest.

We notify eligible users about these early warnings:

- Your heating system briefly stopped heating your home several times
- Your A/C system briefly lost power several times
- Your A/C ran longer than expected
- [Filter reminders](#) (based on run time)

Learn more about [how early warnings work](#).

Manage settings or opt out of HVAC monitoring

If you have an eligible Nest thermostat, you're automatically opted into HVAC monitoring.

- If you use a Google Account, you'll always get urgent alert notifications, but you can opt out of urgent email alerts and early warning email or Home app notifications by turning them off with the Home app.
- If you use a [non-migrated Nest Account](#), you can only get urgent or early warning emails. You can turn off early warning emails by opting out in the footer of those emails.
- You cannot opt out of HVAC urgent alerts because they let you know about serious issues that you need to be aware of.

Manage HVAC settings with the Home app

9. Open the Home app  > tap Settings .
10. Under "Features," tap **Notifications** > **Thermostat** > **HVAC monitoring** > select your preferred settings.

Manage filter reminder settings with the Nest app

9. Open the Nest app  > select your thermostat.
10. In the top right corner, select Settings  > **Equipment** > **Air filter reminder** > choose your preferred settings.

Manage filter reminder settings with the Home app

9. Open the Home app  > tap your thermostat > Settings .
10. Select **Notifications** > **Air filter reminder**.

What to do if you get an alert

If you get an HVAC monitoring alert from Nest, you can choose what to do next. You may want to take some of these steps:

13. Check for issues outside your HVAC system. For example, if someone left the back door open while the air conditioner was on, your A/C system may have been unable to cool your home as expected.
14. Learn more about [what the alert may mean](#). In some cases, you may be able to identify and fix the problem yourself.
15. [Get HVAC Pro assistance](#). Some of our alerts will include a pro's contact information or a way to book a pro on Handy.
 1. In some regions, if you want to get emails from us about Pro booking services that you are eligible for, you may need to sign up for [Nest marketing emails](#)."

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<https://support.google.com/googlenest/answer/9247300?hl=en>

Thermostat Energy History

Your Google Nest thermostat's Energy History shows you how often and for how long your system has run, so that you can make smart choices about your schedule and temperature preferences. If you use the Nest app, you may be able to [migrate your Nest Account to a Google Account](#)  and connect your thermostat to the Home app.

Home app

Access your thermostat's history through the Energy Dashboard in your Home app. You can view usage and insights for a day, week, or month. For more detailed views, you can tap on data to see HVAC usage.

Note: To view your Energy Dashboard, your thermostat must be connected to Wi-Fi and added to your account in the Home app.

1. Open the Home app.
2. Tap your thermostat > Energy dashboard .
3. Select Day, Week, or Month.

The chart will update to show you how long your heating or cooling ran during the time period you've selected.

- Orange bars represent heating, blue ones represent cooling.
- If your thermostat was in Heat•Cool mode, or you recently switched between modes, both orange and blue bars will appear.
- Tap on one of the data bars to learn more details about your heating or cooling usage.

Energy History details

At the bottom of the screen, you can learn more about Leafs earned, total Heat & Cool time, [energy Rush hours](#), and compare use times between weeks or months.

Press Back < or Forward > to view previous or following time ranges. Press Quick jump 📅 to return to the current time range.

Energy History icons

Here are the icons you'll find in your Energy History, and what each one means.



The bars show when your system was heating or cooling.

- Orange: heating
- Blue: cooling

When you tap on one of the days on the chart, the number next to the bar is the total time your system was on during that timeframe.



The Leaf icon appears for the days when you saved energy and earned a [Nest Leaf](#).

	Save energy After some time, your Energy dashboard will display insights under your dashboard chart to help you save energy. For more on ways to save, go to Explaining Nest thermostat savings. Insights Cards will notify you when weather changes affect your energy usage and you can see how long you saved energy by enabling Home & Away. You may also get notifications here if your adjustments in temperature caused a change in your average energy usage. Change your Eco Temperatures Learn how to set your thermostat's Eco Temperatures Note: Energy efficient Eco Temperatures can help save you energy when you set them lower (for heating) and higher (for cooling) than your comfort temperatures. If you set your heating Eco Temperature too high or your cooling Eco Temperature too low, so that they won't make an impact on your energy savings, you may find an alert in your Home Report.
3. The control system of claim 1, wherein the evaluation of the operational efficiency of the climate control device detects a change in an overall operating profile	Each of the Accused Instrumentalities satisfies 3. The control system of claim 1, wherein the evaluation of the operational efficiency of the climate control device detects a change in an overall operating profile of the climate control device between the specified first time interval and the specified earlier second time interval. For example, each of the Accused Instrumentalities automatically supports HVAC Monitoring and Energy History, and HVAC Monitoring and/or Energy History evaluates operational efficiency and detects a change in an overall operating profile between the current operating profile for the Nest-branded thermostat (e.g., based on temperatures today) and a stored temperature profile that represents a previous operating profile calculated at a different time (e.g., based on temperatures over the previous weeks or months), as part of evaluating whether an operational efficiency of the climate control device has decreased over time (e.g., evaluating a time or energy required to change inside temperatures given inside and outside temperature conditions and determining that there

of the climate control device between the specified first time interval and the specified earlier second time interval.	has been a decrease in its efficiency at maintaining or achieving inside temperatures, such as that corresponding to a Severe Alert or an Early Warning). HVAC Monitoring also outputs a result of the evaluation, and, for example, it does this when it determines that there is a heating failure, cooling failure, or an early warning when the A/C ran longer than expected, as examples. As an example, the HVAC Monitoring feature is using temperature data for the heating or cooling system in the present and comparing this to a temperature profile that was calculated using temperature data from earlier points in time to detect if there is anomalous performance indicating a severe failure or an early warning indicative of low refrigerant, air flow problems, or frost building up on the evaporator coils. To the extent literal infringement is disputed, there would also be infringement under the doctrine of equivalents. HVAC Monitoring is insubstantially different from the claim limitations. HVAC Monitoring also performs substantially the same function in substantially the same way to achieve substantially the same result, as described in the HVAC monitoring web pages (historical and current versions). <i>See, e.g.,</i> https://support.google.com/googlenest/answer/10116949?hl=en (Google Nest Help, What different HVAC monitoring alerts mean): Your heating system failed to heat your home You'll receive this alert if Google Nest's software has identified a time when your heating system didn't appear to be working. It identifies heating failures through data about how your reported indoor temperature changes while your thermostat is telling your heating system to heat your home. It also considers information about the outdoor temperature and time of day. If your heater is on but your home isn't getting warmer, your heating system's fan may have a problem. Or, if you have a gas or oil furnace, you may have a dirty or faulty flame sensor that for safety reasons prevents the gas from burning.
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Your A/C system failed to cool your home

You'll receive this alert if Google Nest's software has identified a time when your A/C system didn't appear to be working.

It identifies A/C failures through data about how your reported indoor temperature changes while your

<https://support.google.com/googlenest/answer/10116949?hl=en>

thermostat is telling your A/C to cool your home. It also considers information about the outdoor temperature and time of day.

If your air conditioner is on but your home isn't getting cooler, your A/C system's compressor, indoor fan, or outdoor fan may have a problem, or your startup capacitor may be broken. You may be able to check the capacitor by listening for clicking noises in the outdoor unit that indicate it's trying to start but doesn't succeed.

Your A/C ran longer than expected

You'll receive this alert if Google Nest's software has determined that your A/C system does not behave as expected while cooling your home to a comfortable temperature.

It identifies how your reported indoor temperature changes while your thermostat is telling your A/C to cool your home. It also considers information about the outdoor temperature and time of day.

If your A/C system does not behave as expected, it may have a problem. For example, your system may have low refrigerant levels, air flow problems, or frost building on the evaporator coils.

Your system may still work with these conditions, but it may cost you more than necessary to cool your home and may cause more damage in the long run.

See, e.g., Google Nest Help, "HVAC monitoring from Google Nest," accessed on Nov. 30, 2020, available at <https://support.google.com/googlenest/answer/9984225>

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HVAC monitoring from Google Nest

HVAC monitoring is available in eligible regions in the US and Canada.

HVAC monitoring is a thermostat feature that can help you look after your home. Your Nest thermostat can help identify potential issues with eligible heating, ventilation and air conditioning (HVAC) systems. If a potential issue is detected, we'll send you an alert via email or a Google Home app notification.

[Learn what different HVAC alerts mean.](#)

[Learn how to get HVAC Pro assistance.](#)

How HVAC monitoring works

Sometimes, your HVAC system shows warning signs that it's having issues. For example, if it takes longer than normal to cool your home, there might be a problem with your cooling system (AC). If your Nest thermostat detects these unusual or unexpected patterns, we may send you an email alert or a Home app notification.

The alert email or notification will tell you what your thermostat noticed and which system (heating or cooling) may have been affected. You may also be shown contact information for a Pro, if you have one recorded in your thermostat or if you are in an eligible region.

Important: HVAC monitoring is not meant to replace the diagnosis of a qualified HVAC professional. We make no endorsement, representation, or warranty about the health of your HVAC system. You may still experience issues with your HVAC system that we don't alert you to.

Eligible HVAC systems

- HVAC monitoring is currently available for forced air HVAC systems, which use vents to move air through your house. Radiant systems, which have radiator or in-floor heating, are not eligible for HVAC monitoring at this time.

- HVAC monitoring is currently available in the US and parts of Canada.

Types of HVAC alerts

Urgent alerts

If your thermostat detects an issue that may require immediate attention, we will send you an urgent alert as soon as it detects the problem. For example, if you turned on your heating system but your home became colder, you may have a severe problem with your heating system.

We notify eligible users about these urgent alerts:

- Your heating system failed to heat your home
- Your A/C system failed to cool your home
- [Furnace shutdown / Heads-up](#)

Learn more about [how urgent alerts work](#).

Early warnings

If your thermostat detects an issue that should be fixed soon, we will send you an early warning alert within a week of detecting the problem. For example, if your gas furnace briefly stops heating several times during its operation, you may have a problem with the flame sensor. If this problem isn't fixed, it could cause your furnace not to heat at all in the future.

Note: To trigger an early warning alert, a detected issue must meet a threshold set by Nest.

We notify eligible users about these early warnings:

- Your heating system briefly stopped heating your home several times
- Your A/C system briefly lost power several times
- Your A/C ran longer than expected
- [Filter reminders](#) (based on run time)

Learn more about [how early warnings work](#).

Manage settings or opt out of HVAC monitoring

If you have an eligible Nest thermostat, you're automatically opted into HVAC monitoring.

- If you use a Google Account, you'll always get urgent alert notifications, but you can opt out of urgent email alerts and early warning email or Home app notifications by turning them off with the Home app.
- If you use a [non-migrated Nest Account](#), you can only get urgent or early warning emails. You can turn off early warning emails by opting out in the footer of those emails.
- You cannot opt out of HVAC urgent alerts because they let you know about serious issues that you need to be aware of.

Manage HVAC settings with the Home app

11. Open the Home app  > tap Settings .
12. Under "Features," tap **Notifications** > **Thermostat** > **HVAC monitoring** > select your preferred settings.

Manage filter reminder settings with the Nest app

11. Open the Nest app  > select your thermostat.
12. In the top right corner, select Settings  > **Equipment** > **Air filter reminder** > choose your preferred settings.

Manage filter reminder settings with the Home app

11. Open the Home app  > tap your thermostat > Settings .
12. Select **Notifications** > **Air filter reminder**.

What to do if you get an alert

If you get an HVAC monitoring alert from Nest, you can choose what to do next. You may want to take some of these steps:

16. Check for issues outside your HVAC system. For example, if someone left the back door open while the air conditioner was on, your A/C system may have been unable to cool your home as expected.
17. Learn more about [what the alert may mean](#). In some cases, you may be able to identify and fix the problem yourself.
18. [Get HVAC Pro assistance](#). Some of our alerts will include a pro's contact information or a way to book a pro on Handy.
 1. In some regions, if you want to get emails from us about Pro booking services that you are eligible for, you may need to sign up for [Nest marketing emails](#)."

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	Save energy After some time, your Energy dashboard will display insights under your dashboard chart to help you save energy. For more on ways to save, go to Explaining Nest thermostat savings. Insights Cards will notify you when weather changes affect your energy usage and you can see how long you saved energy by enabling Home & Away. You may also get notifications here if your adjustments in temperature caused a change in your average energy usage. Change your Eco Temperatures Learn how to set your thermostat's Eco Temperatures Note: Energy efficient Eco Temperatures can help save you energy when you set them lower (for heating) and higher (for cooling) than your comfort temperatures. If you set your heating Eco Temperature too high or your cooling Eco Temperature too low, so that they won't make an impact on your energy savings, you may find an alert in your Home Report.
4. The control system of claim 1, wherein the second temperatures comprise outside air temperatures for a geographic region	Each of the Accused Instrumentalities satisfies 4. The control system of claim 1, wherein the second temperatures comprise outside air temperatures for a geographic region surrounding the structure measured by one or more sensors positioned remotely from the structure. For example, each of the Accused Instrumentalities supports HVAC Monitoring and/or Energy History features and Weather features that involve outside air temperatures from Google Weather service or a third-party weather service which are for geographic region surrounding the structure (e.g., ZIP code) and which are measured by one or more sensors positioned remotely from the structure (e.g., weather stations with the weather service).

surrounding the structure measured by one or more sensors positioned remotely from the structure.	To the extent literal infringement is disputed, there would also be infringement under the doctrine of equivalents. Outside temperatures from a weather service is insubstantially different from the claim limitations. Outside temperatures from a weather service also performs substantially the same function of outside temperatures measured by sensors positioned remotely from the structure in substantially the same way of a weather service using one or more weather stations to determine outside air temperatures for a geographic region, even if multiple sensors are used together alone or in combination with processing or refinement to render more accurate measurements of the outside air temperature utilizing data originating from the weather stations, to achieve substantially the same result of outside temperatures for the region surrounding the structure. See, e.g., https://support.google.com/googlenest/answer/10116949?hl=en (Google Nest Help, What different HVAC monitoring alerts mean): Your heating system failed to heat your home You'll receive this alert if Google Nest's software has identified a time when your heating system didn't appear to be working. It identifies heating failures through data about how your reported indoor temperature changes while your thermostat is telling your heating system to heat your home. It also considers information about the outdoor temperature and time of day. If your heater is on but your home isn't getting warmer, your heating system's fan may have a problem. Or, if you have a gas or oil furnace, you may have a dirty or faulty flame sensor that for safety reasons prevents the gas from burning.
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Your A/C system failed to cool your home

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It identifies A/C failures through data about how your reported indoor temperature changes while your

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thermostat is telling your A/C to cool your home. It also considers information about the outdoor temperature and time of day.

If your air conditioner is on but your home isn't getting cooler, your A/C system's compressor, indoor fan, or outdoor fan may have a problem, or your startup capacitor may be broken. You may be able to check the capacitor by listening for clicking noises in the outdoor unit that indicate it's trying to start but doesn't succeed.

Your A/C ran longer than expected

You'll receive this alert if Google Nest's software has determined that your A/C system does not behave as expected while cooling your home to a comfortable temperature.

It identifies how your reported indoor temperature changes while your thermostat is telling your A/C to cool your home. It also considers information about the outdoor temperature and time of day.

If your A/C system does not behave as expected, it may have a problem. For example, your system may have low refrigerant levels, air flow problems, or frost building on the evaporator coils.

Your system may still work with these conditions, but it may cost you more than necessary to cool your home and may cause more damage in the long run.

See, e.g., Google Nest Help, "HVAC monitoring from Google Nest," accessed on Nov. 30, 2020, available at <https://support.google.com/googlenest/answer/9984225>

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HVAC monitoring is a thermostat feature that can help you look after your home. Your Nest thermostat can help identify potential issues with eligible heating, ventilation and air conditioning (HVAC) systems. If a potential issue is detected, we'll send you an alert via email or a Google Home app notification.

[Learn what different HVAC alerts mean.](#)

[Learn how to get HVAC Pro assistance.](#)

How HVAC monitoring works

Sometimes, your HVAC system shows warning signs that it's having issues. For example, if it takes longer than normal to cool your home, there might be a problem with your cooling system (AC). If your Nest thermostat detects these unusual or unexpected patterns, we may send you an email alert or a Home app notification.

The alert email or notification will tell you what your thermostat noticed and which system (heating or cooling) may have been affected. You may also be shown contact information for a Pro, if you have one recorded in your thermostat or if you are in an eligible region.

Important: HVAC monitoring is not meant to replace the diagnosis of a qualified HVAC professional. We make no endorsement, representation, or warranty about the health of your HVAC system. You may still experience issues with your HVAC system that we don't alert you to.

Eligible HVAC systems

- HVAC monitoring is currently available for forced air HVAC systems, which use vents to move air through your house. Radiant systems, which have radiator or in-floor heating, are not eligible for HVAC monitoring at this time.

- HVAC monitoring is currently available in the US and parts of Canada.

Types of HVAC alerts

Urgent alerts

If your thermostat detects an issue that may require immediate attention, we will send you an urgent alert as soon as it detects the problem. For example, if you turned on your heating system but your home became colder, you may have a severe problem with your heating system.

We notify eligible users about these urgent alerts:

- Your heating system failed to heat your home
- Your A/C system failed to cool your home
- [Furnace shutdown / Heads-up](#)

Learn more about [how urgent alerts work](#).

Early warnings

If your thermostat detects an issue that should be fixed soon, we will send you an early warning alert within a week of detecting the problem. For example, if your gas furnace briefly stops heating several times during its operation, you may have a problem with the flame sensor. If this problem isn't fixed, it could cause your furnace not to heat at all in the future.

Note: To trigger an early warning alert, a detected issue must meet a threshold set by Nest.

We notify eligible users about these early warnings:

- Your heating system briefly stopped heating your home several times
- Your A/C system briefly lost power several times
- Your A/C ran longer than expected
- [Filter reminders](#) (based on run time)

Learn more about [how early warnings work](#).

Manage settings or opt out of HVAC monitoring

If you have an eligible Nest thermostat, you're automatically opted into HVAC monitoring.

- If you use a Google Account, you'll always get urgent alert notifications, but you can opt out of urgent email alerts and early warning email or Home app notifications by turning them off with the Home app.
- If you use a [non-migrated Nest Account](#), you can only get urgent or early warning emails. You can turn off early warning emails by opting out in the footer of those emails.
- You cannot opt out of HVAC urgent alerts because they let you know about serious issues that you need to be aware of.

Manage HVAC settings with the Home app

13. Open the Home app  > tap Settings .

14. Under "Features," tap **Notifications** > **Thermostat** > **HVAC monitoring** > select your preferred settings.

Manage filter reminder settings with the Nest app

13. Open the Nest app  > select your thermostat.

14. In the top right corner, select Settings  > **Equipment** > **Air filter reminder** > choose your preferred settings.

Manage filter reminder settings with the Home app

13. Open the Home app  > tap your thermostat > Settings .

14. Select **Notifications** > **Air filter reminder**.

What to do if you get an alert

If you get an HVAC monitoring alert from Nest, you can choose what to do next. You may want to take some of these steps:

19. Check for issues outside your HVAC system. For example, if someone left the back door open while the air conditioner was on, your A/C system may have been unable to cool your home as expected.
20. Learn more about [what the alert may mean](#). In some cases, you may be able to identify and fix the problem yourself.
21. [Get HVAC Pro assistance](#). Some of our alerts will include a pro's contact information or a way to book a pro on Handy.
 1. In some regions, if you want to get emails from us about Pro booking services that you are eligible for, you may need to sign up for [Nest marketing emails](#)."

See, e.g., Thermostat Energy History on Google Nest Help website.

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Energy History details

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	Save energy After some time, your Energy dashboard will display insights under your dashboard chart to help you save energy. For more on ways to save, go to Explaining Nest thermostat savings. Insights Cards will notify you when weather changes affect your energy usage and you can see how long you saved energy by enabling Home & Away. You may also get notifications here if your adjustments in temperature caused a change in your average energy usage. Change your Eco Temperatures Learn how to set your thermostat's Eco Temperatures Note: Energy efficient Eco Temperatures can help save you energy when you set them lower (for heating) and higher (for cooling) than your comfort temperatures. If you set your heating Eco Temperature too high or your cooling Eco Temperature too low, so that they won't make an impact on your energy savings, you may find an alert in your Home Report.
6. The control system of claim 3, wherein: the database stores a plurality of separate diagnostic temperature profiles associated with a plurality of	Each of the Accused Instrumentalities satisfies 6. The control system of claim 3, wherein: the database stores a plurality of separate diagnostic temperature profiles associated with a plurality of potential defects identified by changes in the operational efficiency of the climate control device over time; and the processor identifies one or more of the potential defects based on the evaluation of the operational efficiency of the climate control device between the specified time interval and the specified earlier time interval. For example, each Accused Instrumentality supports HVAC Monitoring and Energy History, and HVAC Monitoring and/or Energy History maintains database storing separate diagnostic temperature profiles associated with a plurality of potential defects identified by changes in the operational efficiency of the climate control device over time, e.g., severe alerts corresponding to heating system failure or cooling system failure or early warning alerts corresponding to a degradation in the cooling system due to frost building on evaporator coils, air

potential defects identified by changes in the operational efficiency of the climate control device over time; and the processor identifies one or more of the potential defects based on the evaluation of the operational efficiency of the climate control device between the specified time interval and the specified earlier time interval.	flow problems, or low refrigerant levels. HVAC Monitoring identifies one or more of potential defects based on evaluating the efficiency of the climate control system at a more current time (e.g., today) compared to the earlier time (e.g., prior weeks or months). To the extent literal infringement is disputed, there would also be infringement under the doctrine of equivalents. HVAC Monitoring is insubstantially different from the claim limitations. HVAC Monitoring also performs substantially the same function in substantially the same way to achieve substantially the same result, as described in the HVAC monitoring web pages (historical and current versions). See, e.g., https://support.google.com/googlenest/answer/10116949?hl=en (Google Nest Help, What different HVAC monitoring alerts mean): Your heating system failed to heat your home You'll receive this alert if Google Nest's software has identified a time when your heating system didn't appear to be working. It identifies heating failures through data about how your reported indoor temperature changes while your thermostat is telling your heating system to heat your home. It also considers information about the outdoor temperature and time of day. If your heater is on but your home isn't getting warmer, your heating system's fan may have a problem. Or, if you have a gas or oil furnace, you may have a dirty or faulty flame sensor that for safety reasons prevents the gas from burning.
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Manage HVAC settings with the Home app

15. Open the Home app  > tap Settings .

16. Under "Features," tap **Notifications** > **Thermostat** > **HVAC monitoring** > select your preferred settings.

Manage filter reminder settings with the Nest app

15. Open the Nest app  > select your thermostat.

16. In the top right corner, select Settings  > **Equipment** > **Air filter reminder** > choose your preferred settings.

Manage filter reminder settings with the Home app

15. Open the Home app  > tap your thermostat > Settings .

16. Select **Notifications** > **Air filter reminder**.

What to do if you get an alert

If you get an HVAC monitoring alert from Nest, you can choose what to do next. You may want to take some of these steps:

22. Check for issues outside your HVAC system. For example, if someone left the back door open while the air conditioner was on, your A/C system may have been unable to cool your home as expected.
23. Learn more about [what the alert may mean](#). In some cases, you may be able to identify and fix the problem yourself.
24. [Get HVAC Pro assistance](#). Some of our alerts will include a pro's contact information or a way to book a pro on Handy.
 1. In some regions, if you want to get emails from us about Pro booking services that you are eligible for, you may need to sign up for [Nest marketing emails](#)."

See, e.g., Thermostat Energy History on Google Nest Help website.

<https://support.google.com/googlenest/answer/9247300?hl=en>

Thermostat Energy History

Your Google Nest thermostat's Energy History shows you how often and for how long your system has run, so that you can make smart choices about your schedule and temperature preferences. If you use the Nest app, you may be able to [migrate your Nest Account to a Google Account](#)  and connect your thermostat to the Home app.

Home app

Access your thermostat's history through the Energy Dashboard in your Home app. You can view usage and insights for a day, week, or month. For more detailed views, you can tap on data to see HVAC usage.

Note: To view your Energy Dashboard, your thermostat must be connected to Wi-Fi and added to your account in the Home app.

1. Open the Home app.
2. Tap your thermostat > Energy dashboard .
3. Select Day, Week, or Month.

The chart will update to show you how long your heating or cooling ran during the time period you've selected.

- Orange bars represent heating, blue ones represent cooling.
- If your thermostat was in Heat•Cool mode, or you recently switched between modes, both orange and blue bars will appear.
- Tap on one of the data bars to learn more details about your heating or cooling usage.

Energy History details

At the bottom of the screen, you can learn more about Leafs earned, total Heat & Cool time, [energy Rush hours](#), and compare use times between weeks or months.

Press Back < or Forward > to view previous or following time ranges. Press Quick jump 📅 to return to the current time range.

Energy History icons

Here are the icons you'll find in your Energy History, and what each one means.



The bars show when your system was heating or cooling.

- Orange: heating
- Blue: cooling

When you tap on one of the days on the chart, the number next to the bar is the total time your system was on during that timeframe.



The Leaf icon appears for the days when you saved energy and earned a [Nest Leaf](#).

Save energy

After some time, your Energy dashboard will display insights under your dashboard chart to help you save energy. For more on ways to save, go to [Explaining Nest thermostat savings](#).

Insights

Cards will notify you when weather changes affect your energy usage and you can see how long you saved energy by enabling Home & Away. You may also get notifications here if your adjustments in temperature caused a change in your average energy usage.

Change your Eco Temperatures

[Learn how to set your thermostat's Eco Temperatures](#)

Note: Energy efficient Eco Temperatures can help save you energy when you set them lower (for heating) and higher (for cooling) than your comfort temperatures. If you set your heating Eco Temperature too high or your cooling Eco Temperature too low, so that they won't make an impact on your energy savings, you may find an alert in your Home Report.
