

Device and Method for Abnormality Monitoring in Data Center Computer Room

Cross-Reference to Related Application

5 The present disclosure claims priority of Chinese patent application with the filing number 202111210204.4 filed on October 18, 2021 with the Chinese Patent Office, and entitled “Device and Method for Abnormality Monitoring in Data Center Computer Room”, the contents of which are incorporated herein by reference in entirety.

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Technical Field

The present disclosure relates to the technical field of data center computer rooms, and in particular, to a device and a method for abnormality monitoring in a data center computer room.

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Background Art

The computer room generally refers to a place where Telecom, Netcom, Mobile, dual-line, electric power, and government or enterprises etc., store servers and provide IT services for users and employees. Twenty to thirty
20 cabinets are generally placed in a small computer room of tens of square meters, and thousands of cabinets, or even more are placed in a big computer room of

tens of thousands of square meters, various servers and minicomputers are usually placed in the computer room, such as IBM minicomputers, HP minicomputers, SUN minicomputers, etc. The temperature and humidity of the computer room and anti-static measures have strict requirements, and non-
5 professional project personnel are generally not allowed to enter. The servers in the computer room run lots of businesses, such as multimedia message, short messages, and call services of Mobile. The computer room is very important. Without the computer room, work and life will be greatly affected. Therefore, each computer room must be managed by professionals to ensure the normal
10 operation of the businesses. As a computer room (computer learning room/data center), its physical environment is strictly controlled, mainly divided into several aspects, including temperature and humidity, power supply, floor, and fire protection system.

At present, when the existing abnormality monitoring device in the computer
15 room monitors the environment in the computer room, it is inconvenient to change the position where the environment monitoring device is located, thus the flexibility is poor, monitoring range is relatively single, and the existing monitoring device is not convenient to be disassembled or replaced, and the specific height position cannot be adjusted according to the needs, and the scope
20 of use is greatly limited. Therefore, a device and a method for abnormality monitoring in a data center computer room are proposed.

Summary

The main purpose of the present disclosure is to provide a device and a method for abnormality monitoring in a data center computer room, which can effectively solve the problems in the background art.

To achieve the above-mentioned purpose, embodiments of the present disclosure provide a device for abnormality monitoring in a data center computer room, specifically:

a device for abnormality monitoring in a data center computer room may comprise an installation plate, wherein four corners of a front end of the installation plate are all connected with fixed screws in a penetrating manner, four corners of the front end of the installation plate are all fixedly welded with support rods, front ends of the four support rods are jointly fixedly welded with a connecting plate, a rear end of the connecting plate is connected with a driving mechanism in a penetrating manner, and a front part of the driving mechanism is located at a front end of the connecting plate, and a lower part of the front end of the connecting plate is fixedly welded with a position-limit sleeve, the front end of the connecting plate is provided with two stabilizing grooves, and the two stabilizing grooves correspond to a position of the position-limit sleeve, a lifting mechanism is slidably installed in the position-limit sleeve, and a rear part of the lifting mechanism is slidably installed with the stabilizing grooves, and a positioner is fixedly installed on a right side of the front end of the connecting plate, a front end of an upper part of the lifting mechanism is connected with a transmission mechanism in a penetrating manner, the front end of the lifting mechanism is fixedly welded with a stabilizing frame, and a monitoring frame is slidably installed on the stabilizing frame, and the monitoring frame is fixedly

connected with the transmission mechanism, and a front end of the monitoring frame is in sequence detachably installed with a temperature sensor, a humidity sensor, a camera, a sound volume sensor and a gas smoke sensor from up to down; and

- 5 the lifting mechanism comprises a lifting plate, a lateral installation plate is detachably installed on an upper part of a front end of the lifting plate, and two sliding strips are fixedly welded at a rear end of the lifting plate, structures of the two sliding strips and structures of the stabilizing grooves are matched with each other and have corresponding positions, and middle parts of left and right
10 sides of the lifting plate are both integrally formed with several transmission teeth and two position-limit baffles, two position-limit baffles are symmetrically distributed up and down and are located on upper and lower sides of several transmission teeth, and the lifting plate is slidably installed in the position-limit sleeve and the sliding strips are slidably installed in the corresponding
15 stabilizing grooves to make the lifting mechanism slidably installed with the connecting plate.

- As an optional improvement of the above-mentioned scheme, the driving mechanism comprises a stepping motor and a transmission assembly, and the stepping motor is fixedly installed at a front end of the installation plate, a
20 rotating rod is fixedly installed at an output end of the stepping motor, a driving gear is fixedly installed at a front end of the rotating rod, and two transmission assemblies are provided, two transmission assemblies are both movably installed with the connecting plate through a bearing, and two transmission

assemblies are respectively located on two sides of the driving gear and are in a transmission connection with the driving gear.

As an optional improvement of the above-mentioned scheme, the transmission assembly comprises a connecting rod, and one end of the
5 connecting rod is fixedly installed with a transmission gear, other end of the connecting rod penetrates through the connecting plate and is fixedly installed with a transmission half-gear, and the connecting rod is movably installed with the connecting plate through the bearing.

As an optional improvement of the above-mentioned scheme, the
10 transmission gear is located at a rear end of the connecting plate and is located on a same plane as the driving gear, and the driving gear is meshed with the transmission gear to make the driving gear in a transmission connection with the transmission assembly.

As an optional improvement of the above-mentioned scheme, when a left
15 transmission half-gear is meshed with a left transmission teeth, the sliding strips are driven to slide down in the stabilizing grooves, so that the lifting plate drives the lateral installation plate to move down; when a right transmission half-gear is meshed with a right transmission teeth, the sliding strips are driven to slide up in the stabilizing grooves, so that the lifting plate drives the lateral installation
20 plate to move up.

As an optional improvement of the above-mentioned scheme, distances between two transmission half-gears and the lifting plate are same, and included angles between the two transmission half-gears and the horizontal plane are

same, and the transmission half-gears are meshed with the corresponding transmission teeth to make the driving mechanism in a transmission connection with the lifting mechanism.

As an optional improvement of the above-mentioned scheme, the transmission mechanism comprises a reversible motor and a driven wheel, wherein the reversible motor is fixedly installed at a rear end of the lateral installation plate, an output end of the reversible motor is movably installed with a driving wheel through a rotating shaft, the driven wheel is movably installed on a front end of the lateral installation plate through the rotating shaft, and the driving wheel and the driven wheel are located on a same plane and are jointly in a transmission connection with a conveyor belt.

As an optional improvement of the above-mentioned scheme, an upper part of the monitoring frame is provided with a left-right penetrating installation groove, and a rear end of the monitoring frame is provided with a moving groove, a front end of the monitoring frame is equidistantly provided with a plurality of left-right penetrating T-shaped grooves, and two clamping assemblies are slidably installed in the T-shaped grooves, and the two clamping assemblies located in a same T-shaped groove are symmetrically distributed from left to right, and the temperature sensor is fixed on the front end of the monitoring frame through two clamping assemblies in the same T-shaped groove, and an installation method of the humidity sensor, camera, sound volume sensor and gas smoke sensor with the monitoring frame is the same as that of the temperature sensor with the monitoring frame.

As an optional improvement of the above-mentioned scheme, the installation groove is sleeved on an upper part of the conveyor belt to make the monitoring frame fixedly installed with the transmission mechanism, a structure of the moving groove is matched with a structure of the stabilizing frame, and the monitoring frame is slidably installed with the stabilizing frame through the moving groove.

As an optional improvement of the above-mentioned scheme, the clamping assembly comprises a clamping block, and a rear end of the clamping block is integrally formed with a T-shaped block, a structure of the T-shaped block is matched with a structure of the T-shaped groove, a front end of the clamping block is connected with a positioning screw in a penetrating manner, and the clamping block is fixedly installed in the T-shaped groove through the positioning screw.

The embodiment of present disclosure further provides a method for using the device for abnormality monitoring in a data center computer room, the method may comprise following steps of:

- step 1, installing the device, wherein the installation plate is fixedly installed at a suitable position on a wall of the data center computer room through four fixing screws;
- step 2, fixing the monitoring device, wherein the two clamping assemblies slidably installed in the same T-shaped groove match with each other to make the temperature sensor fixed, and the humidity sensor, the camera, the sound

volume sensor and the gas smoke sensor are detachably installed by using the same method to realize multifunctional monitoring;

step 3, adjusting a position of the monitoring device, wherein the reversible motor is turned on, the driving wheel is driven to rotate through the reversible
 5 motor, and the driven wheel cooperates with the driving wheel to drive the conveyor belt to rotate, thereby driving the monitoring frame to slide left and right on the stabilizing frame until the monitoring frame is adjusted to a suitable position; and

step 4, monitoring by the device, wherein the driving mechanism is in a
 10 transmission connection with the lifting mechanism, and a left transmission assembly is meshed with the lifting mechanism to drive the lifting mechanism to slide down, and a right transmission assembly is meshed with the lifting mechanism to drive the lifting mechanism to slide upward, thereby realizing continuous lifting and lowering of the lifting mechanism, real-time monitoring
 15 of positions at different heights in the computer room is performed, and an alarm is given in time if abnormality is found, and the positions in the computer room are positioned through a positioner, which is convenient for operators to arrive in time and reduces losses.

As an optional improvement of the above-mentioned scheme, the step that the
 20 two clamping assemblies slidably installed in the same T-shaped groove match with each other to make the temperature sensor fixed comprises a step that: the T-shaped block slides in the T-shaped groove, so that the two clamping blocks match with each other to clamp the temperature sensor, and the positioning

screw is in a threaded connection with the T-shaped groove to make the clamping blocks fixed in the T-shaped groove, thereby fixing the temperature sensor.

As an optional improvement of the above-mentioned scheme, the step of
5 monitoring by the device further comprises a step of: driving the rotating rod to rotate through the stepping motor, and driving the driving gear to rotate through the rotating rod, and driving the transmission half-gears to rotate through the driving gear meshing with the transmission gears on two sides, wherein when the left transmission half-gear is meshed with the left transmission teeth, the
10 sliding strips are driven to slide down in the stabilizing grooves, so that the lifting plate drives the lateral installation plate to move down, and when the right transmission half-gear is meshed with the right transmission teeth, the sliding strips are driven to slide up in the stabilizing grooves, so that the lifting plate drives the lateral installation plate to move up.

15 Compared with the related art, the present disclosure has the following beneficial effects.

1. In the embodiments of present disclosure, a monitoring frame is driven to move by a conveyor belt, so that the monitoring frame slides left and right on the stabilizing frame, and the lateral position of the monitoring frame for
20 monitoring is precisely adjusted, the operation is convenient, the stability is stronger, and the transmission is stable.

2. In the embodiments of present disclosure, the driving gear is meshed with the transmission gears on two sides to drive the transmission half-gear to rotate,

when the left transmission half-gear is meshed with the left transmission teeth, the lifting plate is enabled to drive the lateral installation plate to move down; when the right transmission half-gear is meshed with the right transmission teeth, the lifting plate is enabled to drive the lateral installation plate to move up, 5 thereby achieving the lifting and lowering of the monitoring frame, monitoring at different heights can be achieved, and the monitoring range is wider, the transmission is more stable.

3. In the embodiments of present disclosure, the positioning screw is in a threaded connection with the T-shaped groove to make the clamping blocks 10 fixed in the T-shaped groove, so that the two clamping blocks cooperate with each other to make the temperature sensor, the humidity sensor, the camera, the sound volume sensor and the gas smoke sensor clamped and fixed rapidly, the fixation is firmer, stability is stronger, and the maintenance is convenient.

4. In the embodiments of present disclosure, the installation plate is fixedly 15 installed on a suitable position of the wall of the data center computer room through four fixing screws, and the distance between the connecting plate and the wall is increased by the arrangement of the support rod to avoid moisture regain and improve the service life of the monitoring device, the position in the machine room can be accurately positioned through the positioner, which saves 20 time for maintenance and repair, thereby reducing losses, and being safe and reliable.

Brief Description of Drawings

In order to more clearly illustrate the technical solutions of embodiments in the present disclosure, drawings which need to be used for description of the embodiments will be introduced briefly below, obviously, the drawings in the following description merely show some embodiments of the present disclosure,
5 and those ordinarily skilled in the art still could obtain other drawings in light of these drawings, without using any inventive efforts.

FIG. 1 is a schematic view of a lifting mechanism in a rising state of a device for abnormality monitoring in a data center computer room according to an embodiment of the present disclosure;

10 FIG. 2 is a schematic view of the lifting mechanism in a downward moving state of the device for abnormality monitoring in the data center computer room according to an embodiment of the present disclosure;

FIG. 3 is a connection structure view of an installation plate and a connecting plate of the device for abnormality monitoring in the data center computer room
15 according to an embodiment of the present disclosure;

FIG. 4 is a structural schematic view of the lifting mechanism of the device for abnormality monitoring in the data center computer room according to an embodiment of the present disclosure;

FIG. 5 is a structural schematic view of a driving mechanism of the device for
20 abnormality monitoring in the data center computer room according to an embodiment of the present disclosure;

FIG. 6 is a structural schematic view of a transmission assembly of the device for abnormality monitoring in the data center computer room according to an embodiment of the present disclosure;

FIG. 7 is a structural schematic view of a transmission mechanism of the device for abnormality monitoring in the data center computer room according to an embodiment of the present disclosure;

FIG. 8 is a structural schematic view of a monitoring frame of the device for abnormality monitoring in the data center computer room according to an embodiment of the present disclosure; and

FIG. 9 is a structural schematic view of a clamping assembly of the device for abnormality monitoring in the data center computer room according to an embodiment of the present disclosure.

Reference signs in drawings: 1. installation plate; 2. fixed screw; 3. support rod; 4. connecting plate; 5. driving mechanism; 6. lifting mechanism; 7. transmission mechanism; 8. stabilizing frame; 9. monitoring frame; 10. position-limit sleeve; 11. positioner; 12. stabilizing groove; 13. temperature sensor; 14. humidity sensor, 15. camera; 16. sound volume sensor; 17. gas smoke sensor; 51. stepping motor; 52. rotating rod; 53. driving gear; 54. transmission assembly; 55. connecting rod; 56. transmission gear; 57. transmission half-gear; 61. lifting plate; 62. lateral installation plate; 63. sliding strip; 64. transmission tooth; 65. position-limit baffle; 71. reversible motor; 72. driving wheel; 73. driven wheel; 74. conveyor belt; 91. installation groove; 92. moving groove; 93. T-shaped

groove; 94. clamping assembly; 95. clamping block; 96. T-shaped block; 97. positioning screw.

Detailed Description of Embodiments

5 In order to make the technical solutions, creative features, achievement goals and effects realized by the present disclosure easy to understand, the present disclosure will be further described below with reference to specific embodiments.

10 In the description of the present disclosure, it should be understood that orientation or positional relations indicated by terms such as "upper", "lower", "inner", "outer", "front end", "rear end", "two ends", "one end", and "the other end" are based on orientation or positional relations as shown in the drawings, merely for facilitating the description of the present disclosure and simplifying the description, rather than indicating or implying that related devices or
15 elements have to be in the specific orientation, or configured or operated in a specific orientation, therefore, they should not be construed as limitations on the present disclosure. Besides, terms "first", and "second" are merely for descriptive purpose, but should not be construed as indicating or implying importance in relativity.

20 In the description of present disclosure, it should be noted that, unless otherwise definitely specified and limited, the terms such as "mount", "provided with", and "connect" should be understood in a broad sense, for example,

"connect" can be fixed connection, detachable connection or integrated connection; it can be mechanical connection or electrical connection; it can be directly attached or indirectly attached by intermediate medium. Connection can be the internal communication between two components. For those ordinarily skilled in the art, the specific meaning of the above terms in the present disclosure can be understood according to the specific situation.

The technical solutions of the present disclosure will be further described below with reference to the drawings.

Embodiment

10 A device for abnormality monitoring in a data center computer room, as shown in FIG. 1- FIG. 2, which comprises an installation plate 1, wherein four corners of a front end of the installation plate 1 are all connected with fixed screws 2 in a penetrating manner, four corners of the front end of the installation plate 1 are all fixedly welded with support rods 3, front ends of the four support rods 3 are jointly fixedly welded with a connecting plate 4, a rear end of the connecting plate 4 is connected with a driving mechanism 5 in a penetrating manner, and a front part of the driving mechanism 5 is located at a front end of the connecting plate 4, and a lower part of the front end of the connecting plate 4 is fixedly welded with a position-limit sleeve 10, the front end of the connecting plate 4 is provided with two stabilizing grooves 12, and the two stabilizing grooves 12 correspond to a position of the position-limit sleeve 10, a lifting mechanism 6 is slidably installed in the position-limit sleeve 10, and a rear part of the lifting mechanism 6 is slidably installed with the stabilizing

grooves 12, and a positioner 11 is fixedly installed on a right side of the front end of the connecting plate 4, a front end of an upper part of the lifting mechanism 6 is connected with a transmission mechanism 7 in a penetrating manner, the front end of the lifting mechanism 6 is fixedly welded with a
 5 stabilizing frame 8, and a monitoring frame 9 is slidably installed on the stabilizing frame 8, a monitoring device is installed on the monitoring frame 9, specifically, the monitoring frame 9 is fixedly connected with the transmission mechanism 7, and a front end of the monitoring frame 9 is in sequence detachably installed with a temperature sensor 13, a humidity sensor 14, a
 10 camera 15, a sound volume sensor 16 and a gas smoke sensor 17 from up to down.

Refer to FIG. 3-FIG. 6, the driving mechanism 5 comprises a stepping motor 51 and a transmission assembly 54, and the stepping motor 51 is fixedly installed at a front end of the installation plate 1, a rotating rod 52 is fixedly
 15 installed at an output end of the stepping motor 51, a driving gear 53 is fixedly installed at a front end of the rotating rod 52, and two transmission assemblies 54 are provided, two transmission assemblies 54 are both movably installed with the connecting plate 4 through a bearing, and two transmission assemblies 54 are respectively located on two sides of the driving gear 53 and are in a
 20 transmission connection with the driving gear 53; the transmission assembly 54 comprises a connecting rod 55, and one end of the connecting rod 55 is fixedly installed with a transmission gear 56, the other end of the connecting rod 55 penetrates through the connecting plate 4 and is fixedly installed with a transmission half-gear 57, and the connecting rod 55 is movably installed with

the connecting plate 4 through the bearing; the transmission gear 56 is located at a rear end of the connecting plate 4 and is located on a same plane as the driving gear 53, and the driving gear 53 is meshed with the transmission gear 56 to make the driving gear 53 in a transmission connection with the transmission assembly 54, thus the transmission is stable, and the structure is compact; distances between two transmission half-gears 57 and the lifting plate 61 are same, it is realized that the two transmission half-gears 57 are both in a transmission connection with the lifting plate 61, and included angles between the two transmission half-gears 57 and the horizontal plane are same, and the transmission half-gears 57 are meshed with the corresponding transmission teeth 64 to make the driving mechanism 5 in a transmission connection with the lifting mechanism 6, when a left transmission half-gear 57 is meshed with a left transmission teeth 64, the sliding strips 63 are driven to slide down in the stabilizing grooves 12, so that the lifting plate 61 drives the lateral installation plate 62 to move down; when a right transmission half-gear 57 is meshed with a right transmission teeth 64, the sliding strips 63 are driven to slide up in the stabilizing grooves 12, so that the lifting plate 61 drives the lateral installation plate 62 to move up, thereby achieving the lifting and lowering of the monitoring frame 9.

Refer to FIG. 7-FIG. 9, the lifting mechanism 6 comprises a lifting plate 61, a lateral installation plate 62 is detachably installed on an upper part of a front end of the lifting plate 61, and two sliding strips 63 are fixedly welded at a rear end of the lifting plate 61, structures of the two sliding strips 63 and structures of the stabilizing grooves 12 are matched with each other and have corresponding

positions, and middle parts of left and right sides of the lifting plate 61 are both integrally formed with several transmission teeth 64 and two position-limit baffles 65, two position-limit baffles 65 are symmetrically distributed up and down and are located on upper and lower sides of several transmission teeth 64,

5 and the lifting plate 61 is slidably installed in the position-limit sleeve 10 and the sliding strips 63 are slidably installed in the corresponding stabilizing grooves 12 to make the lifting mechanism 6 slidably installed with the connecting plate 4; the transmission mechanism 7 comprises a reversible motor 71 and a driven wheel 73, the reversible motor 71 is fixedly installed at a rear

10 end of the lateral installation plate 62, an output end of the reversible motor 71 is movably installed with a driving wheel 72 through a rotating shaft, the driven wheel 73 is movably installed on a front end of the lateral installation plate 62 through the rotating shaft, and the driving wheel 72 and the driven wheel 73 are located on a same plane and are jointly in a transmission connection with a

15 conveyor belt 74; an upper part of the monitoring frame 9 is provided with a left-right penetrating installation groove 91, and a rear end of the monitoring frame 9 is provided with a moving groove 92, a front end of the monitoring frame 9 is equidistantly provided with a plurality of left-right penetrating T-shaped grooves 93, and two clamping assemblies 94 are slidably installed in the

20 T-shaped grooves 93, and the two clamping assemblies 94 located in a same T-shaped groove 93 are symmetrically distributed from left to right, and the temperature sensor 13 is fixed on the front end of the monitoring frame 9 through two clamping assemblies 94 in the same T-shaped groove 93, and an installation method of the humidity sensor 14, camera 15, sound volume sensor

16 and gas smoke sensor 17 with the monitoring frame 9 is the same as that of the temperature sensor 13 with the monitoring frame 9; the installation groove 91 is sleeved on an upper part of the conveyor belt 74 to make the monitoring frame 9 fixedly installed with the transmission mechanism 7, the monitoring frame 9 is driven to move through the conveyor belt 74, so that the monitoring frame 9 slides left and right on the stabilizing frame 8, and the monitoring position of the monitoring frame 9 is precisely adjusted, thus the operation is convenient, the stability is strong, and the transmission is stable. A structure of the moving groove 92 is matched with a structure of the stabilizing frame 8, and the monitoring frame 9 is slidably installed with the stabilizing frame 8 through the moving groove 92; the clamping assembly 94 comprises a clamping block 95, and a rear end of the clamping block 95 is integrally formed with a T-shaped block 96, a structure of the T-shaped block 96 is matched with a structure of the T-shaped groove 93, a front end of the clamping block 95 is connected with a positioning screw 97 in a penetrating manner, and the clamping block 95 is fixedly installed in the T-shaped groove 93 through the positioning screw 97, thus the structure is simple and fixation is firm.

In the specific use process of the embodiment, the installation plate 1 is first fixedly installed on a suitable position of the wall of the data center computer room through four fixing screws 2, and the distance between the connecting plate 4 and the wall is increased by the arrangement of the support rod 3 to avoid moisture regain and improve the service life of the monitoring device, the T-shaped block 96 slides in the T-shaped groove 93, so that the two clamping blocks 95 cooperate with each other to clamp the temperature sensor 13, and the

positioning screw 97 is in a threaded connection with the T-shaped groove 93 to make the clamping blocks 95 fixed in the T-shaped groove 93, thereby fixing the temperature sensor 13. The humidity sensor 14, the camera 15, the sound volume sensor 16 and the gas smoke sensor 17 may be all detachably installed at

5 the front end of monitoring frame 9 by using the same method, thereby achieving multifunctional monitoring, and then the reversible motor 71 is turned on, and the driving wheel 72 is driven to rotate by the reversible motor 71, the driven wheel 73 and the driving wheel 72 cooperate with each other to drive the conveyor belt 74 to rotate, thereby driving the monitoring frame 9 to move

10 through the conveyor belt 74, so that the monitoring frame 9 slides left and right on the stabilizing frame 8, and the monitoring position of the monitoring frame 9 is precisely adjusted, thus operation is convenient, stability is strong, and transmission is stable; when the monitoring frame 9 is adjusted to a suitable position, the reversible motor 71 is turned off, and the stepping motor 51 is

15 turned on at this time, the stepping motor 51 drives the rotating rod 52 to rotate, the rotating rod 52 drives the driving gear 53 to rotate, and the driving gear 53 is meshed with the transmission gears 56 on two sides to drive the transmission half-gear 57 to rotate. When the left transmission half-gear 57 is meshed with the left transmission teeth 64, the sliding strips 63 are driven to slide down in the

20 stabilizing groove 12, so that the lifting plate 61 drives the lateral installation plate 62 to move down; when the right transmission half-gear 57 is meshed with the right transmission teeth 64, the sliding strips 63 are driven to slide up in the stabilizing groove 12, so that the lifting plate 61 drives the lateral installation plate 62 to move up, thereby achieving the lifting and lowering of the

monitoring frame 9, and the humidity sensor 14, the camera 15, the sound volume sensor 16 and the gas smoke sensor 17 are driven by the monitoring frame 9 to move up and down smoothly, so that monitoring at different heights can be realized, and the monitoring range is wider, it can not only monitor
 5 different horizontal positions, but also monitor vertical positions, and the transmission is stable; and when abnormality is monitored, the problem will be fed back to the monitoring center in time. The position in the machine room can be accurately positioned through the positioner 11, which saves time for maintenance and repair, thereby reducing losses, and being safe and reliable.

10 A method for using the device for abnormality monitoring in a data center computer room, which comprises following steps of:

step 1, installing the device, wherein the installation plate 1 is fixedly installed at a suitable position on a wall of the data center computer room through four fixing screws 2, and the distance between the connecting plate 4
 15 and the wall is increased by the arrangement of the support rod 3 to avoid moisture regain and improve the service life of the monitoring device;

step 2, fixing the monitoring device, wherein the two clamping assemblies 94 slidably installed in the same T-shaped groove 93 match with each other to make the temperature sensor 13 fixed, the T-shaped block 96 slides in the T-
 20 shaped groove 93, so that the two clamping blocks 95 cooperate with each other to clamp the temperature sensor 13, and the positioning screw 97 is in a threaded connection with the T-shaped groove 93 to make the clamping blocks 95 fixed in the T-shaped groove 93, thereby fixing the temperature sensor 13,

and the humidity sensor 14, the camera 15, the sound volume sensor 16 and the gas smoke sensor 17 are detachably installed by using the same method to realize multifunctional monitoring;

step 3, adjusting a position of the monitoring device, wherein the reversible
 5 motor 71 is turned on, the driving wheel 72 is driven to rotate through the reversible motor 71, and the driven wheel 73 cooperates with the driving wheel 72 to drive the conveyor belt 74 to rotate, the monitoring frame 9 is driven to move through the conveyor belt 74, thereby driving the monitoring frame 9 to slide left and right on the stabilizing frame 8 until the monitoring frame 9 is
 10 adjusted to a suitable position, therefore, the monitoring position of the monitoring frame 9 is precisely adjusted, the operation is convenient, the stability is strong, and the transmission is stable; and

step 4, monitoring by the device, wherein the driving mechanism 5 is in a transmission connection with the lifting mechanism 6, and a left transmission
 15 assembly 54 is meshed with the lifting mechanism 6 to drive the lifting mechanism 6 to slide down, and a right transmission assembly 54 is meshed with the lifting mechanism 6 to drive the lifting mechanism 6 to slide upward, thereby realizing continuous lifting and lowering of the lifting mechanism 6, the stepping motor 51 drives the rotating rod 52 to rotate, the rotating rod 52 drives
 20 the driving gear 53 to rotate, and the driving gear 53 is meshed with the transmission gears 56 on two sides to drive the transmission half-gear 57 to rotate. When the left transmission half-gear 57 is meshed with the left transmission teeth 64, the sliding strips 63 are driven to slide down in the stabilizing groove 12, so that the lifting plate 61 drives the lateral installation

plate 62 to move down; when the right transmission half-gear 57 is meshed with the right transmission teeth 64, the sliding strips 63 are driven to slide up in the stabilizing groove 12, so that the lifting plate 61 drives the lateral installation plate 62 to move up, thereby achieving the lifting and lowering of the monitoring frame 9, thus real-time monitoring of positions at different heights in the computer room is performed, and the monitoring range is wide; and an alarm is given in time if abnormality is found, and the positions in the computer room are positioned through a positioner 11, which is convenient for operators to arrive in time and reduces losses.

10 The foregoing has shown and described the basic principles and main features of the present disclosure and advantages of the present disclosure. Those skilled in the art should understand that the present disclosure is not limited by the above-mentioned embodiments. The above-mentioned embodiments and descriptions in the specification only illustrate the principles of the present disclosure, there are also various changes and modifications in the present disclosure without departing from the spirit and scope of the present disclosure, such changes and modifications all fall within the claimed scope of the present disclosure. The claimed scope of the present disclosure is defined by the appended claims and equivalents thereof.

20

Industrial Applicability

The present disclosure provides a device and a method for abnormality monitoring in a data center computer room. In the present disclosure, a

monitoring frame is driven to move by a conveyor belt, so that the monitoring frame slides left and right on the stabilizing frame, thus the lateral position of the monitoring frame for monitoring is precisely adjusted, the operation is convenient, the stability is strong, and the transmission is stable; and the driving

5 gear is meshed with the transmission gears on two sides to drive the transmission half-gear to rotate, when the left transmission half-gear is meshed with the left transmission teeth, the lifting plate is enabled to drive the lateral installation plate to move down; when the right transmission half-gear is meshed with the right transmission teeth, the lifting plate is enabled to drive the lateral

10 installation plate to move up, thereby achieving the lifting and lowering of the monitoring frame, thus monitoring at different heights can be achieved, and the monitoring range is wide, the transmission is stable; and the positioning screw is in a threaded connection with the T-shaped groove to make the clamping blocks fixed in the T-shaped groove, so that the two clamping blocks cooperate with

15 each other to make the temperature sensor, the humidity sensor, the camera, the sound volume sensor and the gas smoke sensor clamped and fixed rapidly, thus the fixation is firm, stability is strong, and the maintenance is convenient; and the installation plate is fixedly installed on a suitable position of the wall of the data center computer room through four fixing screws, the distance between the

20 connecting plate and the wall is increased by the arrangement of the support rod to avoid moisture regain and improve the service life of the monitoring device, and the position in the machine room can be accurately positioned through the positioner, which saves time for maintenance and repair, thereby reducing losses, and being safe and reliable.

In addition, it can be understood that the device and method for abnormality monitoring in a data center machine room of the present disclosure are reproducible and can be used in various industrial applications. For example, the device and method for abnormality monitoring in a data center computer room
5 of the present disclosure can be used in the technical field of data center computer room.

Claims:

1. A device for abnormality monitoring in a data center computer room, comprising an installation plate (1), wherein four corners of a front end of the installation plate (1) are all connected with fixed screws (2) in a penetrating manner, the four corners of the front end of the installation plate (1) are all fixedly welded with support rods (3), front ends of four support rods (3) are jointly fixedly welded with a connecting plate (4), a rear end of the connecting plate (4) is connected with a driving mechanism (5) in a penetrating manner, and a front part of the driving mechanism (5) is located at a front end of the connecting plate (4), and a lower part of the front end of the connecting plate (4) is fixedly welded with a position-limit sleeve (10), the front end of the connecting plate (4) is provided with two stabilizing grooves (12), and the two stabilizing grooves (12) correspond to a position of the position-limit sleeve (10), a lifting mechanism (6) is slidably installed in the position-limit sleeve (10), and a rear part of the lifting mechanism (6) is slidably installed with the stabilizing grooves (12), and a positioner (11) is fixedly installed on a right side of the front end of the connecting plate (4), a front end of an upper part of the lifting mechanism (6) is connected with a transmission mechanism (7) in a penetrating manner, a front end of the lifting mechanism (6) is fixedly welded with a stabilizing frame (8), and a monitoring frame (9) is slidably installed on the stabilizing frame (8), and the monitoring frame (9) is fixedly connected with the transmission mechanism (7), and a front end of the monitoring frame (9) is in sequence detachably installed with a

temperature sensor (13), a humidity sensor (14), a camera (15), a sound volume sensor (16) and a gas smoke sensor (17) from up to down; and

the lifting mechanism (6) comprises a lifting plate (61), a lateral installation plate (62) is detachably installed on an upper part of a front end of the lifting plate (61), and two sliding strips (63) are fixedly welded at a rear end of the lifting plate (61), structures of the two sliding strips (63) and structures of the stabilizing grooves (12) are matched with each other and have corresponding positions, and middle parts of left and right sides of the lifting plate (61) are both integrally provided with several transmission teeth (64) and two position-limit baffles (65), two position-limit baffles (65) are symmetrically distributed up and down and are located on upper and lower sides of the several transmission teeth (64), and the lifting plate (61) is slidably installed in the position-limit sleeve (10) and the sliding strips (63) are slidably installed in corresponding stabilizing grooves (12) to make the lifting mechanism (6) slidably installed with the connecting plate (4).

2. The device for abnormality monitoring in a data center computer room according to claim 1, wherein the driving mechanism (5) comprises a stepping motor (51) and a transmission assembly (54), and the stepping motor (51) is fixedly installed at the front end of the installation plate (1), a rotating rod (52) is fixedly installed at an output end of the stepping motor (51), a driving gear (53) is fixedly installed at a front end of the rotating rod (52), and two transmission assemblies (54) are provided, the two transmission assemblies (54) are both movably installed with the

connecting plate (4) through a bearing, and the two transmission assemblies (54) are respectively located on two sides of the driving gear (53) and are in a transmission connection with the driving gear (53).

3. The device for abnormality monitoring in a data center computer room
5 according to claim 2, wherein the transmission assembly (54) comprises a connecting rod (55), and one end of the connecting rod (55) is fixedly installed with a transmission gear (56), other end of the connecting rod (55) penetrates through the connecting plate (4) and is fixedly installed with a transmission half-gear (57), and the connecting rod (55) is movably
10 installed with the connecting plate (4) through a bearing.
4. The device for abnormality monitoring in a data center computer room according to claim 3, wherein the transmission gear (56) is located at the rear end of the connecting plate (4) and is located on a same plane as the driving gear (53), and the driving gear (53) is meshed with the transmission
15 gear (56) to make the driving gear (53) in a transmission connection with the transmission assembly (54).
5. The device for abnormality monitoring in a data center computer room according to claim 4, wherein when a left transmission half-gear (57) is meshed with a left transmission teeth (64), the sliding strips (63) are driven
20 to slide down in the stabilizing grooves (12), so that the lifting plate (61) drives the lateral installation plate (62) to move down; when a right transmission half-gear (57) is meshed with a right transmission teeth (64), the sliding strips (63) are driven to slide up in the stabilizing grooves (12),

so that the lifting plate (61) drives the lateral installation plate (62) to move up.

6. The device for abnormality monitoring in a data center computer room according to claim 4 or 5, wherein distances between two transmission half-gears (57) and the lifting plate (61) are same, and included angles between the two transmission half-gears (57) and a horizontal plane are same, and the transmission half-gears (57) are meshed with corresponding transmission teeth (64) to make the driving mechanism (5) in a transmission connection with the lifting mechanism (6).
7. The device for abnormality monitoring in a data center computer room according to any one of claims 1 to 6, wherein the transmission mechanism (7) comprises a reversible motor (71) and a driven wheel (73), the reversible motor (71) is fixedly installed at a rear end of the lateral installation plate (62), an output end of the reversible motor (71) is movably installed with a driving wheel (72) through a rotating shaft, the driven wheel (73) is movably installed on a front end of the lateral installation plate (62) through a rotating shaft, and the driving wheel (72) and the driven wheel (73) are located on a same plane and are jointly in a transmission connection with a conveyor belt (74).
8. The device for abnormality monitoring in a data center computer room according to any one of claims 1 to 7, wherein an upper part of the monitoring frame (9) is provided with a left-right penetrating installation groove (91), and a rear end of the monitoring frame (9) is provided with a

moving groove (92), a front end of the monitoring frame (9) is equidistantly provided with a plurality of left-right penetrating T-shaped grooves (93), and two clamping assemblies (94) are slidably installed in the T-shaped grooves (93), and the two clamping assemblies (94) located in a same T-shaped groove (93) are symmetrically distributed from left to right, and the temperature sensor (13) is fixed on the front end of the monitoring frame (9) through the two clamping assemblies (94) in the same T-shaped groove (93), and an installation method of the humidity sensor (14), the camera (15), the sound volume sensor (16) and the gas smoke sensor (17) with the monitoring frame (9) is the same as that of the temperature sensor (13) with the monitoring frame (9).

9. The device for abnormality monitoring in a data center computer room according to claim 8, wherein the installation groove (91) is sleeved on an upper part of the conveyor belt (74) to make the monitoring frame (9) fixedly installed with the transmission mechanism (7), a structure of the moving groove (92) is matched with a structure of the stabilizing frame (8), and the monitoring frame (9) is slidably installed with the stabilizing frame (8) through the moving groove (92).

10. The device for abnormality monitoring in a data center computer room according to claim 9, wherein each of the clamping assemblies (94) comprises a clamping block (95), and a rear end of the clamping block (95) is integrally formed with a T-shaped block (96), a structure of the T-shaped block (96) is matched with a structure of a T-shaped groove (93), a front end of the clamping block (95) is connected with a positioning screw (97)

in a penetrating manner, and the clamping block (95) is fixedly installed in the T-shaped groove (93) through the positioning screw (97).

11. A method for using the device for abnormality monitoring in a data center computer room according to any one of claims 1-10, comprising following steps of:

step 1, comprising installing the device, wherein the installation plate (1) is fixedly installed at a suitable position on a wall of the data center computer room through four fixing screws (2);

step 2, comprising fixing a monitoring device, wherein two clamping assemblies (94) slidably installed in a same T-shaped groove (93) match with each other to make the temperature sensor (13) fixed, and the humidity sensor (14), the camera (15), the sound volume sensor (16) and the gas smoke sensor (17) are detachably installed by using the same method to realize multifunctional monitoring;

step 3, comprising adjusting a position of the monitoring device, wherein a reversible motor (71) is turned on, a driving wheel (72) is driven to rotate through the reversible motor (71), and a driven wheel (73) cooperates with the driving wheel (72) to drive a conveyor belt (74) to rotate, thereby driving the monitoring frame (9) to slide left and right on the stabilizing frame (8) until the monitoring frame (9) is adjusted to a suitable position; and

step 4, comprising monitoring by the device, wherein the driving mechanism (5) is in a transmission connection with the lifting mechanism (6), and a left transmission assembly (54) is meshed with the lifting mechanism (6) to drive the lifting mechanism (6) to slide down, and a right transmission assembly (54) is meshed with the lifting mechanism (6) to drive the lifting mechanism (6) to slide upward, thereby realizing continuous lifting and lowering of the lifting mechanism (6), real-time monitoring of positions at different heights in the computer room is performed, and an alarm is given in time if abnormality is found, and positions in the computer room are positioned through a positioner (11), which is convenient for operators to arrive in time and reduces losses.

12. The method according to claim 11, wherein the step that two clamping assemblies (94) slidably installed in a same T-shaped groove (93) match with each other to make the temperature sensor (13) fixed comprises a step that: a T-shaped block (96) slides in the T-shaped groove (93), so that two clamping blocks (95) match with each other to clamp the temperature sensor (13), and a positioning screw (97) is in a threaded connection with the T-shaped groove (93) to make the clamping blocks (95) fixed in the T-shaped groove (93), thereby fixing the temperature sensor (13).

13. The method according to claim 11 or 12, wherein the step of monitoring by the device further comprises a step of: driving a rotating rod (52) to rotate through a stepping motor (51), driving a driving gear (53) to rotate through the rotating rod (52), and driving transmission half-gears (57) to rotate through the driving gear (53) meshing with transmission gears (56) on two

sides, wherein when a left transmission half-gear (57) is meshed with a left transmission teeth (64), the sliding strips (63) are driven to slide down in the stabilizing grooves (12), so that the lifting plate (61) drives the lateral installation plate (62) to move down, and when a right transmission half-gear (57) is meshed with a right transmission teeth (64), the sliding strips (63) are driven to slide up in the stabilizing grooves (12), so that the lifting plate (61) drives the lateral installation plate (62) to move up.