

【DESCRIPTION】**Title of Invention: PNEUMATIC CONTROL MODULE AND ELEMENT
HANDLER HAVING SAME****【TECHNICAL FIELD】**

[0001] The present invention disclosed herein relates to a pneumatic control module, and more particularly, to a pneumatic control module, which controls air pressure for a pneumatic actuator that generates driving force by using negative pressure and positive pressure, and a device handler including the pneumatic control module.

【BACKGROUND ART】

[0002] A pneumatic actuator is a device that generates driving force by using positive pressure and negative pressure of air pressure, and is available for all of air pressure-driven devices such as valves and pickers.

[0003] The pneumatic actuator is characterized by being driven by selectively receiving the positive pressure and the negative pressure through a pneumatic control module.

[0004] One example of the pneumatic actuator as above includes a picker as in a patent document 1. The picker disclosed in the patent document 1 is installed in a device handler, which performs inspecting, sorting, etc. of semiconductor device, and performs functions of picking up the semiconductor device and placing the semiconductor device at a predetermined position.

[0005] The device handler needs increase in UPH, i.e., unit per hour, for productivity improvement.

[0006] Here, in UPH, operation time of the picker for transfer of devices has a great influence on improving the performance of the device handler, i.e., UPH, and thus improvement in operational performance of the picker is very important.

[0007] Particularly, for the improvement in UPH, pneumatic control needs to be efficiently performed in the picker that performs the functions of picking up and placing the devices by the air pressure.

[0008] (Patent document 1) KR 10-0921398 B1

[0009] (Patent document 2) KR 10-2016-0109363 A

[0010] (Patent document 3) KR 10-2000950 B1

[0011] (Patent document 4) KR 10-2019-0109044 A

[0012] (Patent document 5) KR 10-2187124 B1

[0013] (Patent document 6) KR 10-2019-0000477 A

【DISCLOSURE OF THE INVENTION】

【TECHNICAL PROBLEM】

[0014] In consideration of the necessity as above, an object of the present invention is to provide a pneumatic control module, which is capable of rapidly performing pneumatic control by providing a vacuum breaking valve for breaking vacuum pressure and a vacuum pressure generating valve for generating vacuum pressure as one module, and a device handler including the pneumatic control module.

【TECHNICAL SOLUTION】

[0015] The present invention has been devised to achieve the object as above, and in accordance with an embodiment of the present invention, a pneumatic control module includes: a main block 510 in which a positive pressure flow path 520 and negative pressure flow path 530 are formed to be parallel with each other, and a plurality of output flow paths 540 are formed to be perpendicular to each of the positive pressure flow path 530 and the negative pressure flow path 520; and a plurality of second valves 300 which are installed on the main block 510 to correspond to the plurality of output flow paths 540, respectively, and allow the output flow paths 540 to selectively communicate with one of the positive pressure flow path 520 and the negative pressure flow path 530.

[0016] The pneumatic control module may further include a control board 551 that is coupled to the main block 510 and provided to control the plurality of second valves 300.

[0017] The main block 510 may include: a first block portion 511 in which the positive pressure flow path 520 is formed; a second block portion 512 in which the negative pressure flow path 530 is formed and to which the plurality of second valves 300 are coupled; and a connection portion 513 which connects the first block portion 511 and the second block portion 512 as one body and in which the connection flow path 560 is formed.

[0018] At least a portion of a second solenoid part 310 of the plurality of second valves 300 may be installed to be disposed above the connection portion 513, and the control board 551 may be installed on an upper surface of the connection portion 513 and circuitally connected to the second solenoid part 310.

[0019] In the pneumatic control module, the upper surface of the connection portion 513 may be formed below an upper surface of each of the first block portion 511 and the

second block portion 512.

[0020] A pneumatic sensor 410 for measuring air pressure corresponding to each of the plurality of output flow paths 540 may be further installed in the main block 510 so as to control the air pressure output to the plurality of output flow paths 540.

[0021] The pneumatic sensor 410 may be installed to communicate with each of the plurality of output flow paths 540.

[0022] A sensor board 552 having an upper surface on which the pneumatic sensors 410 are installed may be installed in a lower portion of the second block portion 512.

[0023] The sensor board 552 and the control board 551 may be circuitally connected to each other so that the sensor board 552 transmits the air pressure sensed by each of the pneumatic sensors 410 to the control board 551.

[0024] In accordance with another embodiment of the present invention, a pneumatic control module includes: a main block 510 in which a positive pressure flow path 520 and negative pressure flow path 530 are formed to be parallel with each other, and a plurality of output flow paths 540 are formed to be perpendicular to each of the positive pressure flow path 530 and the negative pressure flow path 520; a plurality of first valves 200 which are installed on the main block 510 to correspond to the plurality of output flow paths 540, respectively, and allow the positive pressure flow path 520 and a connection flow path 560 formed in the main block 510 to selectively communicate with one of the positive pressure flow path 520 and the connection flow path 560; and a plurality of second valves 300 which are installed on the main block 510 to correspond to the plurality of output flow paths 540, respectively, and allow the output flow paths 540 to selectively communicate with one of the connection flow path 560 and the negative pressure flow path 530.

[0025] The pneumatic control module according to the present invention may further

include a control board 551 that is coupled to the main block 510 and provided to control the plurality of first valves 200 and the plurality of second valves 300.

[0026] The main block 510 may include: a first block portion 511 in which the positive pressure flow path 520 is formed and to which the plurality of first valves 200 are coupled; a second block portion 512 in which the negative pressure flow path 530 is formed and to which the plurality of second valves 300 are coupled; and a connection portion 513 which connects the first block portion 511 and the second block portion 512 as one body and in which the connection flow path 560 is formed.

[0027] At least a portion of a first solenoid part 210 of the plurality of first valves 200 and at least a portion of a second solenoid part 310 of the plurality of second valves 300 may be installed to be disposed above the connection portion 513, and the control board 551 may be installed on an upper surface of the connection portion 513 and circuitally connected to the first solenoid part 210 and the second solenoid part 310.

[0028] The upper surface of the connection portion 513 may be formed below an upper surface of each of the first block portion 511 and the second block portion 512.

[0029] A pneumatic sensor 410 for measuring air pressure corresponding to each of the plurality of output flow paths 540 may be further installed in the main block 510 so as to control the air pressure output to the plurality of output flow paths 540.

[0030] The pneumatic sensor 410 may be installed to communicate with each of the plurality of output flow paths 540.

[0031] A sensor board 552 having an upper surface on which the pneumatic sensors 410 are installed may be installed in a lower portion of the second block portion 512.

[0032] The sensor board 552 and the control board 551 may be circuitally connected to each other so that the sensor board 552 transmits the air pressure sensed by each of the

pneumatic sensors 410 to the control board 551.

[0033] In accordance with another embodiment of the present invention, a device handler includes: one or more transfer tools that include a plurality of pickers, which pick up a plurality of devices by air pressure, and pick up the devices at a pickup position and place the devices at a placing position; and a pneumatic control module that controls the air pressure for each of the pickers so that each of the pickers picks up the device, wherein the pneumatic control module is the pneumatic control module having the configuration as described above.

[0034] Each of the pickers may include a vertical movement module that vertically moves by the air pressure, and the pneumatic control module having the configuration as described above may be used as a pneumatic control module provide to control air pressure of the vertical movement module of each of the pickers.

【ADVANTAGEOUS EFFECTS】

[0035] The pneumatic control module and the device handler including the same according to the present invention have the advantage of being capable of rapidly performing the pneumatic control by providing the vacuum breaking valve for breaking the vacuum pressure and the vacuum generating valve for generating the vacuum pressure as one module.

【BRIEF DESCRIPTION OF THE DRAWINGS】

[0036] FIG. 1 is a pneumatic circuit diagram illustrating a configuration of a

pneumatic control module according to the present invention.

[0037] FIG. 2 is a perspective view illustrating the pneumatic control module in FIG. 1.

[0038] FIG. 3 is a plan view of the pneumatic control module in FIG. 2.

[0039] FIG. 4 is a right side view of the pneumatic control module in FIG. 2.

[0040] FIG. 5 is a front view of the pneumatic control module in FIG. 2.

[0041] FIG. 6 is a cross-sectional view in direction VII-VII in FIG. 5.

【MODE FOR CARRYING OUT THE INVENTION】

[0042] Hereinafter, a pneumatic control module and a device handler including the same according to the present invention will be described in conjunction with the accompanying drawings.

[0043] As illustrated in FIGS. 1 to 6, the pneumatic control module according to the present invention includes a main block 510, in which a positive pressure flow path 520 and negative pressure flow path 530 are formed to be parallel with each other, and in which a plurality of output flow paths 540 are formed to be perpendicular to each of the positive pressure flow path 530 and the negative pressure flow path 520, a plurality of first valves 200, which are installed on the main block 510 to correspond to the plurality of output flow paths 540, respectively, and which allow the positive pressure flow path 520 and a connection flow path 560 formed in the main block 510 to selectively communicate with each other, and a plurality of second valves 300 which are installed on the main block 510 to correspond to the plurality of output flow paths 540, respectively, and which allow the output flow paths 540 to selectively communicate with one of the connection flow path

560 and the negative pressure flow path 530.

[0044] The main block 510 is a component, in which the positive pressure flow path 520 and the negative pressure flow path 530 are formed to be parallel with each other, and the plurality of output flow paths 540 are formed to be perpendicular to each of the positive pressure flow path 530 and the negative pressure flow path 520, and may have various constructions.

[0045] The main block 510 may constitute a main body of the pneumatic control module according to the present invention, and have various materials such as aluminum, aluminum alloy, or synthetic resin.

[0046] In addition, the main block 510 may be formed by processing or injection molding by one member or may be provided in various combinations, for example, by coupling one or more members.

[0047] The main block 510 as a whole may have a rectangular parallelepiped shape.

[0048] The positive pressure flow path 520 is a flow path, through which air of a preset pressure is transmitted from a pneumatic generator (not shown) such as an air pump, and is characterized by being formed in the main block 510 so that the positive pressure is transmitted to the plurality of output flow paths 540 according to the operations of the first valves 200 and the second valves 300, which will be described later.

[0049] As one example, the positive pressure flow path 520 may be formed in a longitudinal direction of the main block 510 having a planar shape that is a square shape.

[0050] The negative pressure flow path 530 is a flow path, through which a preset vacuum pressure, i.e., suction pressure, is transmitted from vacuum pressure generator (not shown) such as a vacuum pump, and is characterized by being formed in the main block 510 so that the negative pressure is transmitted to the plurality of output flow paths 540

according to the operations of the first valves 200 and the second valves 300, which will be described later.

[0051] As one example, the negative pressure flow path 530 may be formed in the longitudinal direction of the main block (510) having a planar shape that is a square shape, particularly formed to be parallel with the positive pressure flow path 530.

[0052] The positive pressure flow path 520 and the negative pressure flow path 530 may be formed to extend from one end of the main block 510 having a block structure in the longitudinal direction, and connected to the air pump or a vacuum pump through a pneumatic transmission tube.

[0053] The plurality of output flow paths 540 are flow paths, which are formed in the main block 510 and perpendicular to each of the positive pressure flow path 530 and the negative pressure flow path 520, and may be formed as many as a preset number.

[0054] Here, the plurality of output flow paths 540 may be formed in a lateral direction of the main block 510, which is perpendicular to each of the positive pressure flow path 530 and the negative pressure flow path 520.

[0055] The output flow paths 540 may selectively receive the positive pressure or the negative pressure according to the operations of the first valves 200 and the second valves 300, and be connected to a pressure transmission line in order to transmit pressure to an object to be pneumatic controlled.

[0056] As an example, the object to be pneumatic controlled, which is connected to the output flow paths 540 through a pneumatic transmission line, is a picker that picks up a device by vacuum pressure, and may be a picker disclosed in each of the patent documents 1 to 6.

[0057] The plurality of first valves 200 are components which are installed on the

main block 510 to correspond to the plurality of output flow paths 540, respectively, and allow the positive pressure flow path 520 and the connection flow path 560 formed in the main block 510 to selectively communicate with one of the connection flow path 560 and the positive pressure flow path 520. Any member, such as a pneumatic solenoid 3 way valve that is a commercial product, may be provided as long as the member is capable of allowing the two flow paths, the connection flow path 560 and the positive pressure flow path 520, to selectively communicate with each other.

[0058] In addition, the first valves 200 may have various actuating structures such as a permanent magnet, like a latch type in addition to the solenoid type.

[0059] As an example, the plurality of first valves 200 may include a first valve part 220, which connects or blocks the two flow paths that are the connection flow path 560 and the positive pressure flow path 520, and a first solenoid part 210 which linearly actuates the first valve part 220 to connect or block the two flow paths that are the connection flow path 560 and the positive pressure flow path 520.

[0060] The first valve part 220 is a component which connects or blocks the two flow paths, the connection flow path 560 and the positive pressure flow path 520, by linear movement, and may have various constructions. Various constructions may be provided according to a liner actuator structure.

[0061] For connection of the connection flow path 560 with the positive pressure flow path 520, a main body of the first valve part 220 is connected to a connection flow path portion 561 and positive pressure flow path portion 521, which are formed in the block body 510.

[0062] The first solenoid part 210 is a component, which linearly actuates the first valve part 220 to connect or block the two flow paths that are the connection flow path 560

and the positive pressure flow path 520, and may implement the linear actuation of the first valve part 220 by electric drive.

[0063] Here, the first valve part 220 may return to an initial position through an elastic member.

[0064] The plurality of second valves 300 are components which are installed on the main block 510 to correspond to the plurality of output flow paths 540, respectively, and allow the output flow paths 540 to selectively communicate with one of the connection flow path 560 and the negative pressure flow path 530. Any member, such as a pneumatic solenoid 3 way valve that is a commercial product, may be provided as long as the member is capable of allowing the output flow paths 540 to selectively communicate with one of the connection flow path 560 and the negative pressure flow path 530.

[0065] In particular, the second valves 300 may have various actuating structures such as a permanent magnet, like a latch type in addition to the solenoid type.

[0066] That is, when the second valves 300 have an actuating structure with a permanent magnet, like a latch type in addition to the solenoid type, the second valves 300 may be actuated with low power during actuation.

[0067] In addition, as valves having the same structure as the first valves 200 are used as the plurality of second valves 300, control of each of the valves and parts inventory and management may be easily performed.

[0068] As an example, the plurality of second valves 300 may include a second valve part 320, which connects the output flow paths 540 to one of the two flow paths that are the connection flow path 560 and the negative pressure flow path 530, and a second solenoid part 310 which linearly actuates the second valve part 320 to connect the output flow paths 540 to one of the two flow paths that are the connection flow path 560 and the

negative pressure flow path 530.

[0069] In addition, when the first valves 200 are not installed, the second valve part 320 of the plurality of second valves 300 may connect the output flow paths 540 to one of the two flow paths, the positive pressure flow path 520 and the negative pressure flow path 530, instead of the connection flow path 560 and the negative pressure flow path 530.

[0070] The second valve part 320 is a component, which connects the output flow paths 540 to one of the two flow paths, the connection flow path 560 and the negative pressure flow path 530, by linear movement, and may have various constructions. Various constructions may be provided according to a liner actuator structure.

[0071] For connection of the output flow paths 540 with the connection flow path 560 and the negative pressure flow path 530, a main body of the second valve part 320 is connected to a connection flow path portion 562, negative pressure flow path portion 532, and an output flow path portion 542, i.e., three flow paths, which are provided in the block body 510.

[0072] The second solenoid part 210 is a component, which linearly actuates the second valve part 320 to connect the output flow paths 540 to one of the two flow paths that are the connection flow path 560 and the negative pressure flow path 530, and may implement the linear actuation of the second valve part 320 by electric drive.

[0073] Here, the second valve part 320 may return to an initial position through an elastic member.

[0074] The first valves 200 and the second valves 300 may adopt a solenoid valve actuated by electric drive, and for control thereof, the pneumatic control module according to the present invention may further include a control board 551 coupled to the main block 510 and provided to control the plurality of first valves 200 and the plurality of second

valves 300.

[0075] The control board 551 is a component, which is coupled to the main block 510 and provided to control the plurality of first valves 200 and the plurality of second valves 300, and may be provided as at least one PCB on which a control circuit for electrically controlling a solenoid, a circuit for receiving power from the outside, a wired or wireless communication circuit for receiving a control signal from the outside, and the like are installed.

[0076] As an example, the control board 551 may be provided as one PCB board that is electrically connected to the plurality of first valves 200 and the plurality of second valves 300 so as to control the same.

[0077] Here, the wired or wireless communication circuit may be provided as a wireless communication module such as EtherCAT, in order to wirelessly receive the control signal.

[0078] In an installation structure of the control board 551, the main block 510 may include a first block portion 511 in which the positive pressure flow path 520 is formed and to which the plurality of first valves 200 are coupled, a second block portion 512 in which the negative pressure flow path 530 is formed and to which the plurality of second valves 300 are coupled, and a connection portion 513 which connects the first block portion 511 and the second block portion 512 as one body and in which the connection flow path 560 is formed.

[0079] The first block portion 511 is a portion in which the positive pressure flow path 520 is formed and to which the plurality of first valves 200 are coupled. The first block portion 511 as a whole may have a rectangular parallelepiped shape, and may have an upper surface on which the first valve part 220 of the first valves 200 is coupled to and in

surface-contact with a pneumatic connection port (not shown).

[0080] The second block portion 512 is a portion in which the negative pressure flow path 530 is formed and to which the plurality of second valves 300 are coupled. The second block portion 512 as a whole may have a rectangular parallelepiped shape, and may have an upper surface on which the second valve part 320 of the second valves 300 is coupled to and in surface-contact with a pneumatic connection port (not shown).

[0081] The connection portion 513 is a portion, which connects the first block portion 511 and the second block portion 512 as one body and in which the connection flow path 560 is formed, and the control board 551 described above may be installed above the connection portion 513.

[0082] Here, at least a portion of the first solenoid part 210 of the plurality of first valves 200 and at least a portion of the second solenoid part 310 of the plurality of second valves 300 may be installed to be disposed above the connection portion 513.

[0083] The control board 551 may be installed on an upper surface of the connection portion 513 and circuitally connected to the first solenoid part 210 and the second solenoid part 310.

[0084] Here, the control board 551 may be preferably installed to be spaced apart from the upper surface of the connection portion 513 considering that a circuit is provided also on a bottom surface.

[0085] To this end, the upper surface of the connection portion 513 may be formed below an upper surface of each of the first block portion 511 and the second block portion 512.

[0086] In the pneumatic control module according to the present invention having the configuration as described above, a vacuum breaking valve (first valve) for breaking

vacuum pressure and a vacuum pressure generating valve (second valve) for generating vacuum pressure may be provided as one module to selectively supply the positive pressure and the negative pressure through the plurality of output flow paths. Accordingly, there are advantages that the module is enabled to have a compact configuration and capable of rapidly performing pneumatic control.

[0087] Furthermore, as the control board for controlling the first valves and the second valves is provided as one module, there are advantages that the module is simple in terms of configuration and is convenient in terms of maintenance and repair.

[0088] In a device handler in which a transfer tool that picks up and places a device by air pressure is installed, the pneumatic control module according to the present invention having the configuration as described above may be utilized in pickup control and vertical movement control of a picker constituting the transfer tool.

[0089] As an example, as disclosed in the patent documents 1 to 6, the device handler may include one or more transfer tools, which include a plurality of pickers that pick up a plurality of devices by air pressure, and pick up the devices at a pickup position and place the devices at a placing position, and a pneumatic control module which controls the air pressure for each of the pickers so that each of the pickers picks up the device.

[0090] Here, the pneumatic control module according to the present invention may be utilized as the pneumatic control module of the device handler.

[0091] Specifically, a typical device handler includes a transfer tool constituted by a plurality of pickers, and the pneumatic control module according to the present invention may be utilized as a pneumatic control module that controls air pressure of each of pickup heads of the plurality of pickers constituting the transfer tool.

[0092] In addition, the plurality of pickers constituting the transfer tool require vertical

movement upon actuation, and each of the pickers may include a vertical movement module that vertically moves by the air pressure.

[0093] Here, the pneumatic control module according to the present invention may be utilized as a pneumatic control module for controlling the air pressure of the vertical movement module of each of the pickers.

[0094] An orifice 590 may be installed on a flow path connected to a pickup head 540 for high pressure changes when the pneumatic control module according to the present invention controls the pickup of the picker.

[0095] In addition, for precise pressure control when the pneumatic control module according to the present invention controls the pickup of the picker, a pneumatic sensor 410 for measuring the air pressure corresponding to each of the plurality of output flow paths 540 may be further installed on the main block 510 so as to control the air pressure output to the plurality of output flow paths 540.

[0096] The pneumatic sensor 410 is a component, which corresponds to each of the plurality of output flow paths 540 and is provided to measure the air pressure in order to control the air pressure output to the plurality of output flow paths 540, and may have various constructions.

[0097] As illustrated in FIG. 6, the pneumatic sensor 410 may be installed to communicate with each of the plurality of output flow paths 540.

[0098] To this end, an insertion hole for connection with the output flow path 540 may be formed towards a bottom surface of the main block 510, particularly the second block portion 512.

[0099] The insertion hole is a hole, which is formed towards the bottom surface of the main block 510, particularly the second block portion 512, for the connection with the

output flow path 540, and is preferably sealed and coupled during installation of the pneumatic sensor 410 so that the pressure of the output flow path 540 does not leak.

[00100] A sensor board 552 having an upper surface on which the pneumatic sensors 410 are installed may be installed in a lower portion of the second block portion 512.

[00101] The sensor board 552 is a PCB board having the upper surface, on which the pneumatic sensors 410 are installed, and may have various constructions.

[00102] When the sensor board 552 is coupled to the bottom surface of the main block 510, particularly the second block portion 512, the sensor board 552 is preferably installed to be spaced apart from the bottom surface so as not to be electrically connected.

[00103] The sensor board 552 may be formed integrally with the control board 551 described above. Alternatively, the sensor board 552 as a separate board from the control board 551 as illustrated in FIGS. 1 to 6 may be circuitally connected to the control board 551 so that the sensor board 552 transmits the air pressure sensed by the pneumatic sensor 410 to the control board 551.

[00104] Here, the circuit connection between the sensor board 552 and the control board 551 may be implemented through a connection cable or the like.

[00105] Although embodiments are described in which the pneumatic control module according to the present invention is provided with both the second valves serving to generate the negative pressure for the pickup head of the picker and the first valves serving to generate the positive pressure for the pickup head, the pneumatic control module according to the present invention may be provided in a state in which the first valves are removed from the configuration of the module illustrated in FIGS. 1 to 6.

[00106] That is, the pneumatic control module according to the present invention may be provided in a state in which the first valves are removed from the physical configuration

illustrated in FIGS. 1 to 6.

[00107] Referring to FIG. 1 that is a pneumatic circuit diagram, the pneumatic control module according to the present invention may be provided in a state in which the first valves indicated by 200 in FIG. 1 are removed.

[00108] Due to the module configuration as described above, the pneumatic control module according to the present invention may be provided as various examples such as a model provided with both the first valves and the second valves, and a model provided only with the second valves, according to usage environments and needs.

[00109] Although not illustrated in the drawings, the transfer tool including the plurality of pickers may be provided as one transfer tool by utilizing the pneumatic control module according to the present invention as a pneumatic control module for at least one of pickup control or vertical movement control for the plurality of pickers.

[00110] In particular, the pneumatic control module according to the present invention is enabled to have a compact configuration, and thus a configuration including a transfer tool constituted by a plurality of pickers and one transfer tool module may be provided.

[00111] In addition, when each of the picker includes the vertical movement module that vertically moves by air pressure, the pneumatic control module according to the present invention may be used as a pneumatic control module for controlling the air pressure of the vertical movement module of each of the pickers.

[00112]

[00113] The above-disclosed subject matter is to be considered illustrative, and not restrictive, and the appended claims are intended to cover all such modifications, enhancements, and other embodiments, which fall within the true spirit and scope of the present invention. Thus, to the maximum extent allowed by law, the scope of the present

invention is to be determined by the broadest permissible interpretation of the following claims and their equivalents, and shall not be restricted or limited by the foregoing detailed description.

【CLAIMS】

1. A pneumatic control module comprising:

a main block (510) in which a positive pressure flow path (520) and a negative pressure flow path (530) are formed to be parallel with each other, and a plurality of output flow paths (540) are formed to be perpendicular to each of the positive pressure flow path (530) and the negative pressure flow path (520); and

a plurality of second valves (300) installed on the main block (510) to correspond to the plurality of output flow paths (540), respectively, and configured to allow the output flow paths (540) to selectively communicate with one of the positive pressure flow path (520) and the negative pressure flow path (530).

2. The pneumatic control module of claim 1, further comprising a control board (551) coupled to the main block (510) and configured to control the plurality of second valves (300).

3. The pneumatic control module of claim 2, wherein the main block (510) comprises:

a first block portion (511) in which the positive pressure flow path (520) is formed;

a second block portion (512) in which the negative pressure flow path (530) is formed and to which the plurality of second valves (300) are coupled; and

a connection portion (513) configured to connect the first block portion (512) and the second block portion (512) as one body and having the connection flow path (560)

formed therein.

4. The pneumatic control module of claim 3, wherein at least a portion of a second solenoid part (310) of the plurality of second valves (300) is installed to be disposed above the connection portion (513), and

the control board (551) is installed on an upper surface of the connection portion (513) and circuitally connected to the second solenoid part (310).

5. The pneumatic control module of claim 4, wherein the upper surface of the connection portion (513) is formed below an upper surface of each of the first block portion (511) and the second block portion (512).

6. The pneumatic control module of claim 3, wherein a pneumatic sensor (410) for measuring air pressure corresponding to each of the plurality of output flow paths (540) is further installed in the main block (510) so as to control the air pressure output to the plurality of output flow paths (540).

7. The pneumatic control module of claim 6, wherein the pneumatic sensor (410) is installed to communicate with each of the plurality of output flow paths (540).

8. The pneumatic control module of claim 7, wherein a sensor board (552) having an upper surface on which the pneumatic sensors (410) are installed is installed in a lower portion of the second block portion (512).

9. The pneumatic control module of claim 8, wherein the sensor board (552) and the control board (551) are circuitally connected to each other so that the sensor board (552) transmits the air pressure sensed by each of the pneumatic sensors (410) to the control board (551).

10. A device handler comprising:

one or more transfer tools comprising a plurality of pickers configured to pick up a plurality of devices by air pressure, and configured to pick up the devices at a pickup position and place the devices at a placing position; and

a pneumatic control module configured to control the air pressure for each of the pickers so that each of the pickers picks up the device,

wherein the pneumatic control module is the pneumatic control module of any one of claims 1 to 9.

11. The device handler of claim 10, wherein each of the pickers comprises a vertical movement module that vertically moves by the air pressure, and a pneumatic control module configured to control air pressure of the vertical movement module of each of the pickers is the pneumatic control module of any one of claims 1 to 9.

12. A pneumatic control module comprising:

a main block (510) in which a positive pressure flow path (520) and a negative pressure flow path (530) are formed to be parallel with each other, and a plurality of output flow paths (540) are formed to be perpendicular to each of the positive pressure flow path (530) and the negative pressure flow path (520);

a plurality of first valves (200) installed on the main block (510) to correspond to the plurality of output flow paths (540), respectively, and configured to allow the positive pressure flow path (520) and a connection flow path (560) formed in the main block (510) to selectively communicate with one of the positive pressure flow path (520) and the connection flow path (560); and

a plurality of second valves (300) installed on the main block (510) to correspond to the plurality of output flow paths (540), respectively, and configured to allow the output flow paths (540) to selectively communicate with one of the connection flow path (560) and the negative pressure flow path (530)

13. The pneumatic control module of claim 12, further comprising a control board (551) coupled to the main block (510) and configured to control the plurality of first valves (200) and the plurality of second valves (300).

14. The pneumatic control module of claim 13, wherein the main block (510) comprises:

a first block portion (511) in which the positive pressure flow path (520) is formed and to which the plurality of first valves (200) are coupled;

a second block portion (512) in which the negative pressure flow path (530) is formed and to which the plurality of second valves (300) are coupled; and

a connection portion (513) configured to connect the first block portion (511) and the second block portion (512) as one body and having the connection flow path (560) formed therein.

15. The pneumatic control module of claim 14, wherein at least a portion of a first solenoid part (210) of the plurality of first valves (200) and at least a portion of a second solenoid part (310) of the plurality of second valves (300) are installed to be disposed above the connection portion (513), and

the control board (551) is installed on an upper surface of the connection portion (513) and circuitally connected to the first solenoid part (210) and the second solenoid part (310).

16. The pneumatic control module of claim 15, wherein the upper surface of the connection portion (513) is formed below an upper surface of each of the first block portion (511) and the second block portion (512).

17. The pneumatic control module of claim 14, wherein a pneumatic sensor (410) for measuring air pressure corresponding to each of the plurality of output flow paths (540) is further installed in the main block (510) so as to control the air pressure output to the plurality of output flow paths (540).

18. The pneumatic control module of claim 17, wherein the pneumatic sensor (410) is installed to communicate with each of the plurality of output flow paths (540).

19. The pneumatic control module of claim 18, wherein a sensor board (552) having an upper surface on which the pneumatic sensors (410) are installed is installed in a lower portion of the second block portion (512).

20. The pneumatic control module of claim 19, wherein the sensor board (552) and the control board (551) are circuitally connected to each other so that the sensor board (552) transmits the air pressure sensed by each of the pneumatic sensors (410) to the control board (551).

21. A device handler comprising:

one or more transfer tools comprising a plurality of pickers configured to pick up a plurality of devices through air pressure, and configured to pick up the devices at a pickup position and place the devices at a placing position; and

a pneumatic control module configured to control the air pressure for each of the pickers so that each of the pickers picks up the device,

wherein the pneumatic control module is the pneumatic control module of any one of claims 12 to 20.

22. The device handler of claim 10, wherein each of the pickers comprises a vertical movement module that vertically moves by the air pressure,

wherein a pneumatic control module configured to control air pressure of the vertical movement module of each of the pickers is the pneumatic control module of any one of claims 12 to 20.