SCAL Series

Central Vacuum Loader

Date:Mar., 2023

Version：Ver.A (English)

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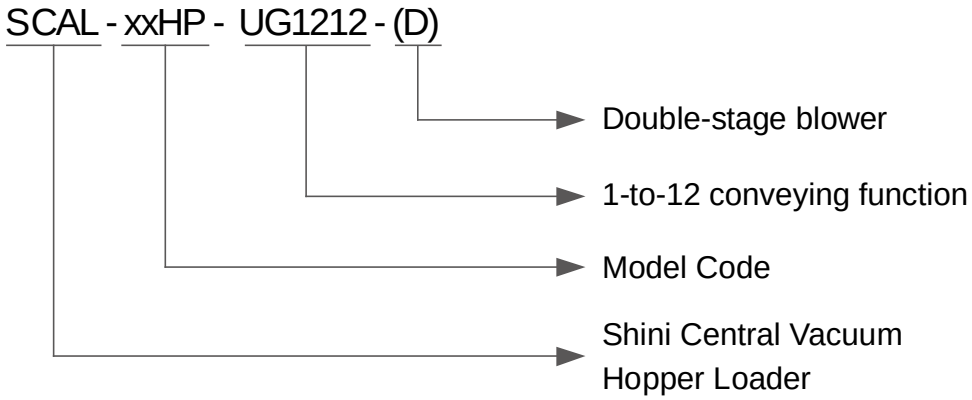
1. General Description

Read this manual carefully before operation to prevent damage of the machine or personal injuries.

Collocated with twelve SHR-U-S European vacuum hoppers, it is suitable for multiple dehumidifying dryers to convey different kinds of plastic materials; which can achieve material conveying to different injection molding machines or storage hoppers, and be used as small central conveying system.

Fig. 1-1：SCAL-10HP-UG1212-D Main Unit+ SHR-24U-S Hoppers

1.1 Coding Principle



1.2 Feature

1) Adopt cyclone filter design that effectively reduces the filter load.
2) 7”touch screen+PLC control for direct status display and easy operation.
3) Independent shut-off output function can control max. 12 SBU shut-off valves directly.
4) The host unit has auto purge device that enables continuous cleaning.
5) Collocated with Euro stainless steel central hopper ensures no material contamination.
6) With vacuum breaking separator, it can prolong the blower’s life span.
7) RS485 interface and audible alarm device.

All service work should be carried out by a person with technical training or corresponding professional experience. The manual contains instructions for both handling and servicing. Chapter 6, which contains service instructions intended for service engineers. Other chapters contain instructions for the daily operator.

Any modifications of the machine must be approved by SHINI in order to avoid personal injury and damage to machine. We shall not be liable for any damage caused by unauthorized change of the machine.

Our company provides excellent after-sales service. Should you have any problem during using the machine, please contact the company or the local vendor.

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Shinden Precision Machinery (Chongqing), Inc.:
+86 (0)23 6431 0898

1.3 Loading Capacity (SCAL)

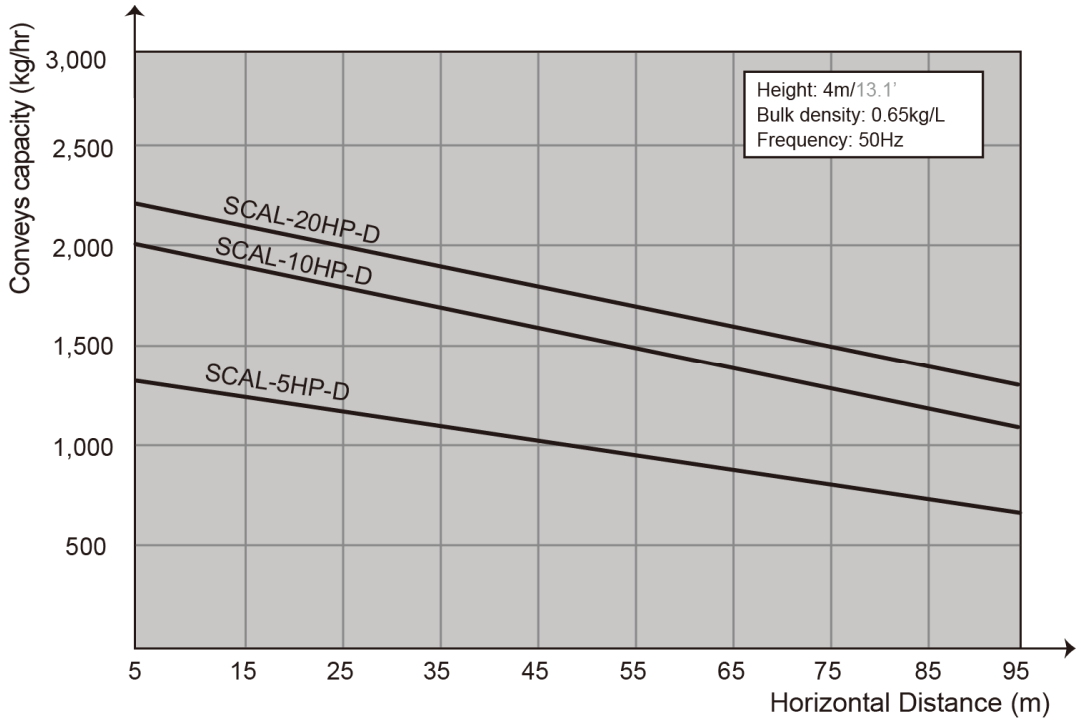

Fig. 1-2：Loading Capacity Curve

1.4 Safety Regulations

Strictly abide by the following safety regulations to prevent damage of the machine or personal injuries.

1.4.1 Safety Signs and Labels

All the electrical components should be installed by professional technicians.

Turn off the main switch and control switch during maintenance or repair.

Warning! High voltage!

This sign is attached on the cover of control box!

Warning! Be careful!

Be more careful at the place where this sign appears!

Attention!

No need for regular inspection because all the electrical parts in the control unit are fixed tightly!

1.4.2 Label Description

Table 1-1：Label Description

Label	Description
	1. Clean the air filter regularly to prevent the conveying capacity decreased and service life shortened from blocking. 2. This filter is consumables, please clean it carefully. This filter is not included in the warranty period.

1.5 Exemption Clause

The following statements clarify the responsibilities and regulations born by any buyer or user who purchases products and accessories from Shini (including employees and agents).

Shini is exempted from liability for any costs, fees, claims and losses caused by reasons below:

1. Any careless or man-made installations, operation and maintenances upon machines without referring to the Manual prior to machine using.
2. Any incidents beyond human reasonable controls, which include man-made vicious or deliberate damages or abnormal power, and machine faults caused by irresistible natural disasters including fire, flood, storm and earthquake.
3. Any operational actions that are not authorized by Shini upon machine, including adding or replacing accessories, dismantling, delivering or repairing.
4. Employing consumables or oil media that are not appointed by Shini.

2. Structure Characteristics and Working Principle

2.1 Working Principle

After a suction hopper is switched on, the blower starts and corresponding hopper's diaphragm valve opens. The high-pressure vacuum will be generated in the hopper, and the check valve will be closed. Then, the material enters the hopper through the pipe due to air pressure difference. After the suction is complete, the motor will stop running, and the vacuum breaking diaphragm valve will open. Materials drop because of the gravity, and when no material is detected by the reed switch, the motor will start again. When the materials can't be sucked for three times, the red alarm light on corresponding hopper of the control box will alarm. When all suction switches are turned on, the system will work from hopper 1 to hopper 12 circularly.

2.1.1 Working Principle

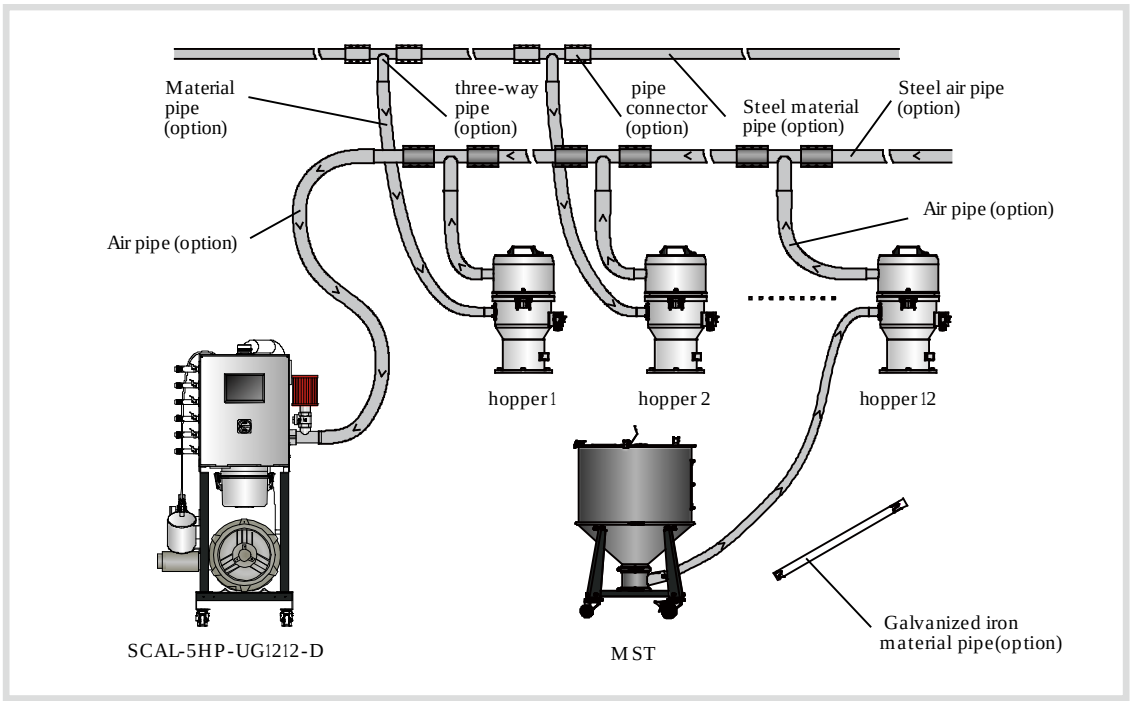

Fig. 2-1：Working Principle

2.1.2 Options

Table 2-1：SCAL Options Specification

Model	Air suction steel wire hose	Material suction steel wire hose	Air suction steel tube	Material suction steel tube	T-type stainless steel three-way	Pipe connector	Material suction galvanized iron tube
5HP-UG1212-D	2” (Φ50.8)	1.5” (Φ38.1)	2” (Φ50.8)	1.5”(Φ38.1)	1.5” (BH80035000020)	1.5” (Φ38.1)	1.5”(Φ38.1)
					2” (BH80035100020)	2” (Φ50.8)	
10HP-UG1212-D	2.5” (Φ63.5)	2” (Φ50.8)	2.5”(Φ63.5)	2” (Φ50.8)	2” (BH80035100020)	2” (Φ50.8)	2”(Φ50.8)
					2.5” (BH80035200020)	2.5” (Φ63.5)	
20HP-UG1212-D	3” (Φ76.2)	2.5” (Φ63.5)	3” (Φ76.2)	2.5”(Φ63.5)	2.5” (BH80035200020)	2.5” (Φ63.5)	2.5”(Φ63.5)
					3” (BH80035300020)	3” (Φ76.2)	

3. Installation and Debugging

This series of models can only be used in environment with good ventilation.

Read this chapter carefully before installation of the machine. Install the machine by following steps.

Power supply should be fixed by qualified technicians!

3.1 Installation Space

Notices for installation positioning

1) The machine can only be installed in a vertical position, and ensure that there are no pipes, fixed structures or other objects above and adjacent to the selected installation place that may hinder machine installation or cause danger to human body.
2) It's suggested to leave 1m space around the machine and keep 2m distance between the machine and inflammable substance to make it convenient for maintenance.

   Notes: Make sure to keep 2m distance between the machine and inflammable substance.
3) The machine shall be placed on a flat surface to ensure the balance and make it possible to remove the accumulated condensate water. If it is to be installed on a raised surface (scaffolding, and interlayer, etc.), make sure to ensure its structure and size are enough to bear machine weight and size.

Fig. 3-1：Installation Space

3.2 Power Connection

1) Make sure that the power voltage and frequency match the indication on the manufacturer's nameplate.
2) The connection of power wire and ground wire should comply with local rules and regulations.
3) Use independent cable and power switch, the wire diameter should not be less than that of control box.
4) Wire terminals should be safe and firm.
5) This series of power adopts three-phase four wire, and the power (L1, L2, L3) is connected to the power live wire and ground wire (PE).
6) Power requirement：Main power voltage：±5%; Main power frequence：±2%
7) ***Specific power specification refers to the circuit diagram of each model.***

Note: Please make sure the power switch is off before power wire connection!

3.3 Compressed Air Connection

Table 3-1: Specification of Req. Compressed Air

Items	Range	Remarks
Quality grade	335	According to the national standard GB/T 13277-1991, the concentration of the solid particle is not more than 5mg/m^3, the dew point temp. is about -20℃, and the oil content is not more than 25mg/m^3.
Air source pressure (bar)	3~5	--
Air flow(L/hr)	~10	--
Pipe specification	φ8	Quick coupler (L-type screw joint APL8 1/8-φ8)

Fig. 3-2：Compressed Air Connecting Point

4. Application and Operation

4.1 Use Notices

1) Please avoid strong collision when operating the touch screen.
2) The touch screen will generate static electricity in dry environment. Therefore, use a grounded metal to release static electricity before touching the panel.
3) Use economical alcohol or eleoptene to scrub the touch screen, and other solvents may cause the color loss of the touch screen.
4) Don’t disassemble the touch screen without authorization, and it is not allowed to take away any printed circuit board in the touch screen, otherwise the components may be damaged.

4.2 Operator Interface

After the system is powered on, the touch screen will display the initialization screen, as shown in the below figure:

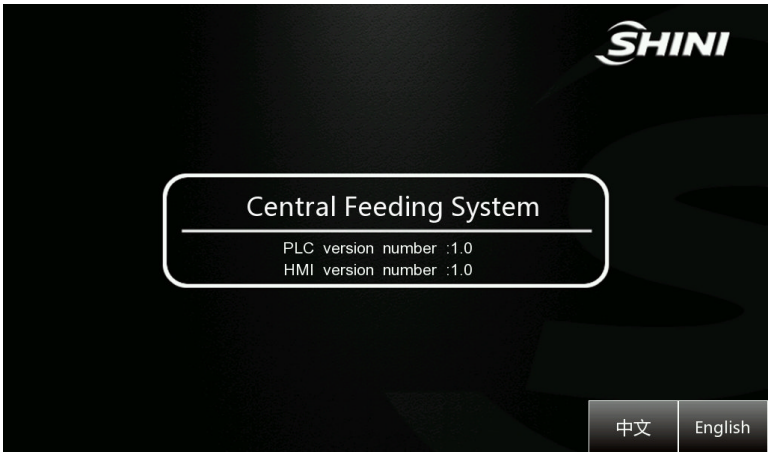

Fig. 4-1：Initialized Screen

After the system is powered on, select the language on the initialization screen of the touch panel to enter the monitoring screen.

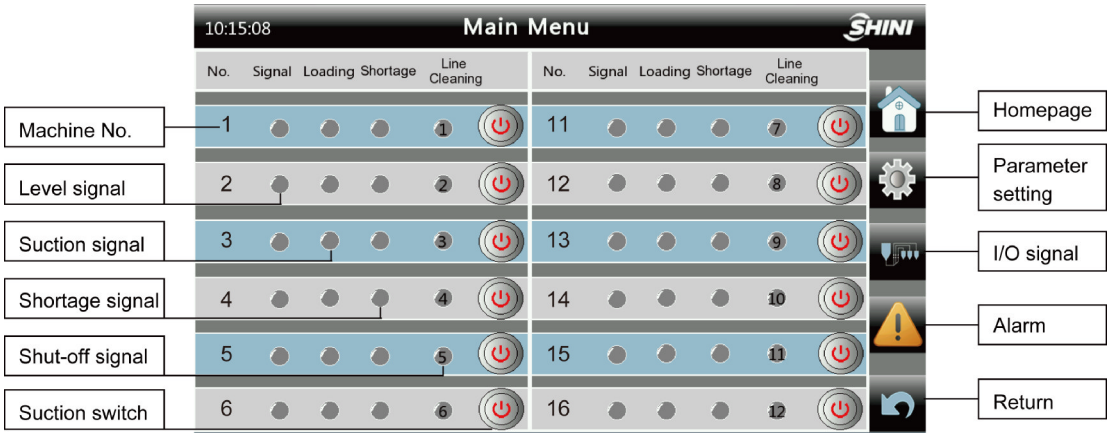

Fig. 4-2：Monitoring Screen

When the hopper is connected to the main unit, the level signal light at the corresponding position will be on; press the corresponding suction switch to start working, and the corresponding suction signal indicator will be on; When the shut-off valve works, corresponding shut-off signal indicator is on; when the hopper is short of material, corresponding shortage indicator will be on. Click the < Parameter Setting > button to enter password input screen and input the correct password (parameter setting password: 3588)

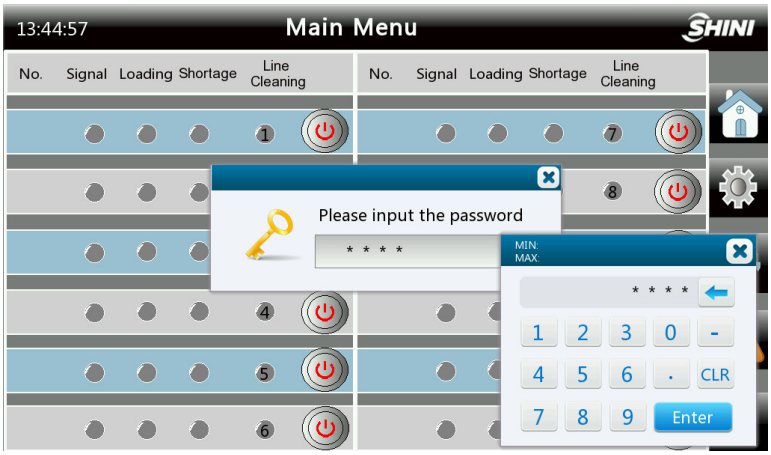

Fig. 4-3：Password Input Screen

Enter the parameter setting screen, click the corresponding parameter to modify, and click < Enter > to confirm the modification.

Fig. 4-4：Password Setting Screen

Click < Communication Settings > to enter the screen and select corresponding communication addresses.

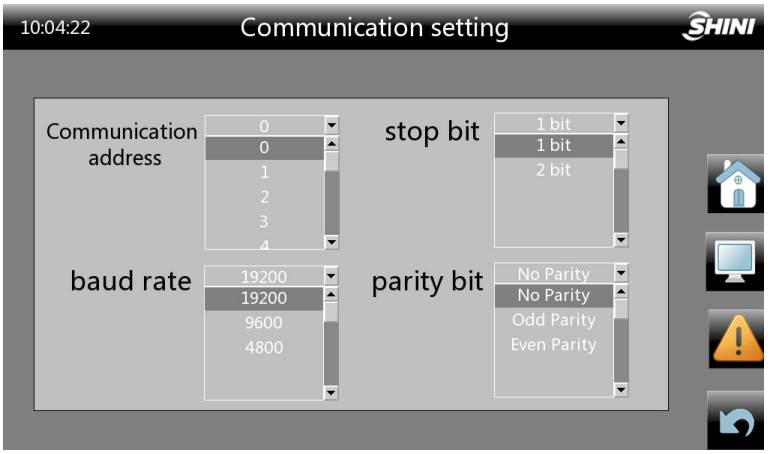

Fig. 4-5：Comm. Setting Screen

Click the < I / 0 signal > button to enter. When the indicator is grey, it indicates no input, and when it is green, it indicates input signal. Click the < monitoring screen >to enter the monitoring screen, and check the input information and click the <next page >button to check the output.

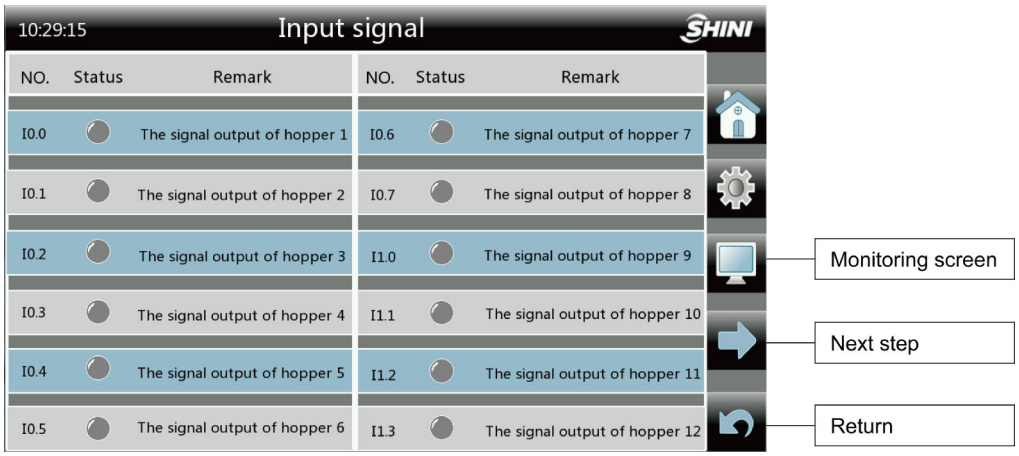

Fig. 4-6：Input Signal Screen

When the indicator is grey, it indicates no input, and when it is green, it indicates output. Click the < Monitoring screen >to enter the monitoring screen,

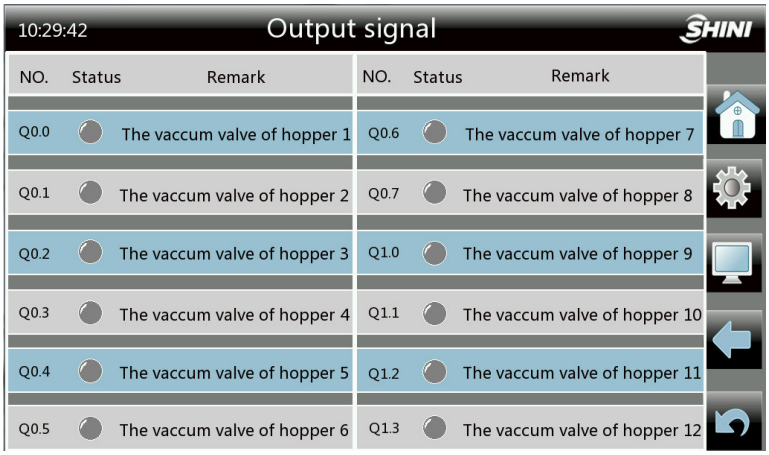

Fig. 4-7： Output signal screen

When an alarm appears on the machine, click the < Alarm > button to check the alarm information, and click < Troubleshoot > to check corresponding failures and troubleshooting methods. After troubleshooting, click the < Reset > button to reset the alarm, and click the < Mute > button to turn on/off the buzzer.

Fig. 4-8：Alarm Screen

4.3 Three-color Alarm Description

Table 4-1：Three-color Alarm Light Description

The Color Status Description of the Three-color Alarm Light	
Color	It indicates the status
Yel. light	Standby status (It means the machine is powered on, please be noted!)
Gre. light	Running status（It means the machine starts up, and is running.）
Red light	Alarm status (It indicates that the machine is in fault alarm, please check the corresponding alarm description or code for specific failures). Remarks: Some models have mute function. Click the mute button on the controller's screen. At this time, the machine only lights up the red light. After clicking the mute button again, the machine will resume the buzzer output.
Buzzer	

4.4 Communication Address（Protocol Modbus-RTU）

Comm. address 1

Baud rate 19200

Check bit no parity

Stop bit one stop bit

Table 4-2：Modbus-RTU Protocol

D-Map（40000+i)	Parameter Contents	Default Parameters	Read R / write W	Unit
1	Station 1 switch	/	R/W	/
2	Station 2 switch	/	R/W	/
3	Station 3 switch	/	R/W	/
4	Station 4 switch	/	R/W	/
5	Station 5 switch	/	R/W	/
6	Station 6 switch	/	R/W	/
7	Station 7 switch	/	R/W	/
8	Station 8 switch	/	R/W	/
9	Station 9 switch	/	R/W	/
10	Station 10 switch	/	R/W	/
11	Station 11 switch	/	R/W	/
12	Station 12 switch	/	R/W	/
13	Number 1	1	R/W	/
14	Number 2	2	R/W	/
15	Number 3	3	R/W	/
16	Number 4	4	R/W	/
17	Number 5	5	R/W	/
18	Number 6	6	R/W	/
19	Number 7	7	R/W	/
20	Number 8	8	R/W	/
21	Number 9	9	R/W	/
22	Number 10	10	R/W	/
23	Number 11	11	R/W	/
24	Number 12	12	R/W	/

25	Station 1 shut-off time	10	R/W	secs.
26	Station 2 shut-off time	10	R/W	secs.
27	Station 3 shut-off time	10	R/W	secs.
28	Station 4 shut-off time	10	R/W	secs.
29	Station 5 shut-off time	10	R/W	secs.
30	Station 6 shut-off time	10	R/W	secs.
31	Station 7 shut-off time	10	R/W	secs.
32	Station 8 shut-off time	10	R/W	secs.
33	Station 9 shut-off time	10	R/W	secs.
34	Station 10 shut-off time	10	R/W	secs.
35	Station 11 shut-off time	10	R/W	secs.
36	Station 12 shut-off time	10	R/W	secs.
37	Station 1 suction times	3	R/W	times
38	Station 2 suction times	3	R/W	times
39	Station 3 suction times	3	R/W	times
40	Station 4 suction times	3	R/W	times
41	Station 5 suction times	3	R/W	times

42	Station 6 suction times	3	R/W	times
43	Station 7 suction times	3	R/W	times
44	Station 8 suction times	3	R/W	times
45	Station 9 suction times	3	R/W	times
46	Station 10 suction times	3	R/W	times
47	Station 11 suction times	3	R/W	times
48	Station 12 suction times	3	R/W	times
49	Station 1 suction time	20	R/W	secs.
50	Station 2 suction time	20	R/W	secs.
51	Station 3 suction time	20	R/W	secs.
52	Station 4 suction time	20	R/W	secs.
53	Station 5 suction time	20	R/W	secs.
54	Station 6 suction time	20	R/W	secs.
55	Station 7 suction time	20	R/W	secs.
56	Station 8 suction time	20	R/W	secs.
57	Station 9 suction time	20	R/W	secs.
58	Station 10 suction time	20	R/W	secs.

59	Station 11 suction time	20	R/W	secs.
60	Station 12 suction time	20	R/W	secs.
61	Dedusting times	3	R/W	times
62	Discharge time	3	R/W	secs.
63	Motor delay	30	R/W	secs.
64	Station 1 shut-off	/	R	/
65	Station 2 shut-off	/	R	/
66	Station 3 shut-off	/	R	/
67	Station 4 shut-off	/	R	/
68	Station 5 shut-off	/	R	/
69	Station 6 shut-off	/	R	/
70	Station 7 shut-off	/	R	/
71	Station 8 shut-off	/	R	/
72	Station 9 shut-off	/	R	/
73	Station 10 shut-off	/	R	/
74	Station 11 shut-off	/	R	/
75	Station 12 shut-off	/	R	/
76	Station 1 shortage	/	R	/
77	Station 2 shortage	/	R	/
78	Station 3 shortage	/	R	/
79	Station 4 shortage	/	R	/
80	Station 5 shortage	/	R	/
81	Station 6 shortage	/	R	/
82	Station 7 shortage	/	R	/
83	Station 8 shortage	/	R	/
84	Station 9 shortage	/	R	/
85	Station 10 shortage	/	R	/
86	Station 11 shortage	/	R	/
87	Station 12 shortage	/	R	/
88	Station 1 suction	/	R	/
89	Station 2 suction	/	R	/

90	Station 3 suction	/	R	/
91	Station 4 suction	/	R	/
92	Station 5 suction	/	R	/
93	Station 6 suction	/	R	/
94	Station 7 suction	/	R	/
95	Station 8 suction	/	R	/
96	Station 9 suction	/	R	/
97	Station 10 suction	/	R	/
98	Station 11 suction	/	R	/
99	Station 12 suction	/	R	/
100	Station 1 signal	/	R	/
101	Station 2 signal	/	R	/
102	Station 3 signal	/	R	/
103	Station 4 signal	/	R	/
104	Station 5 signal	/	R	/
105	Station 6 signal	/	R	/
106	Station 7 signal	/	R	/
107	Station 8 signal	/	R	/
108	Station 9 signal	/	R	/
109	Station 10 signal	/	R	/
110	Station 11 signal	/	R	/
111	Station 12 signal	/	R	/

Notes：R means only writing
W means only reading
R/W means writing/reading

5. Trouble-shooting

Table 5-1：Trouble-shooting

Failures	Possible reasons	Solutions
The controller has no response after the power is turned on.	The power is off. The power switch is broken. Power circuit failure. The control circuit breaker trips. The control transformer is damaged. The controller is broken.	Connect the power. Replace the power switch. Check the power wire. Check the cause of tripping and connect the circuit breaker. Replace the transformer. Replace the controller.
Material shortage for a long time, and the loader doesn't suck.	Circuit failure, and the reed switch is broken.	Check the circuit and replace the reed switch.
The material is full and the blower continues to work.	The reed switch is powered on. Signal wire short circuit. Mechanical failure of contactor or contact bonded. The controller failure.	Adjust or replace. Repair the signal wire. Repair or replace. Check and replace.
The suction motort doesn't work.	Motor damaged. Contactor broken. Loader damaged. Controller broken. Circuit failure.	Check and replace. Check and replace. Check and replace. Check and replace.
The liquidity in the material pipe is not good.	Insufficient or too much supplement air flow.	Adjust the position of the air outlet of the Euro suction box to avoid the small bending angle of the material pipe.

6. Maintenance and Repair

All the repairs work should be done by professionals in order to prevent personal injuries and damage of the machine.

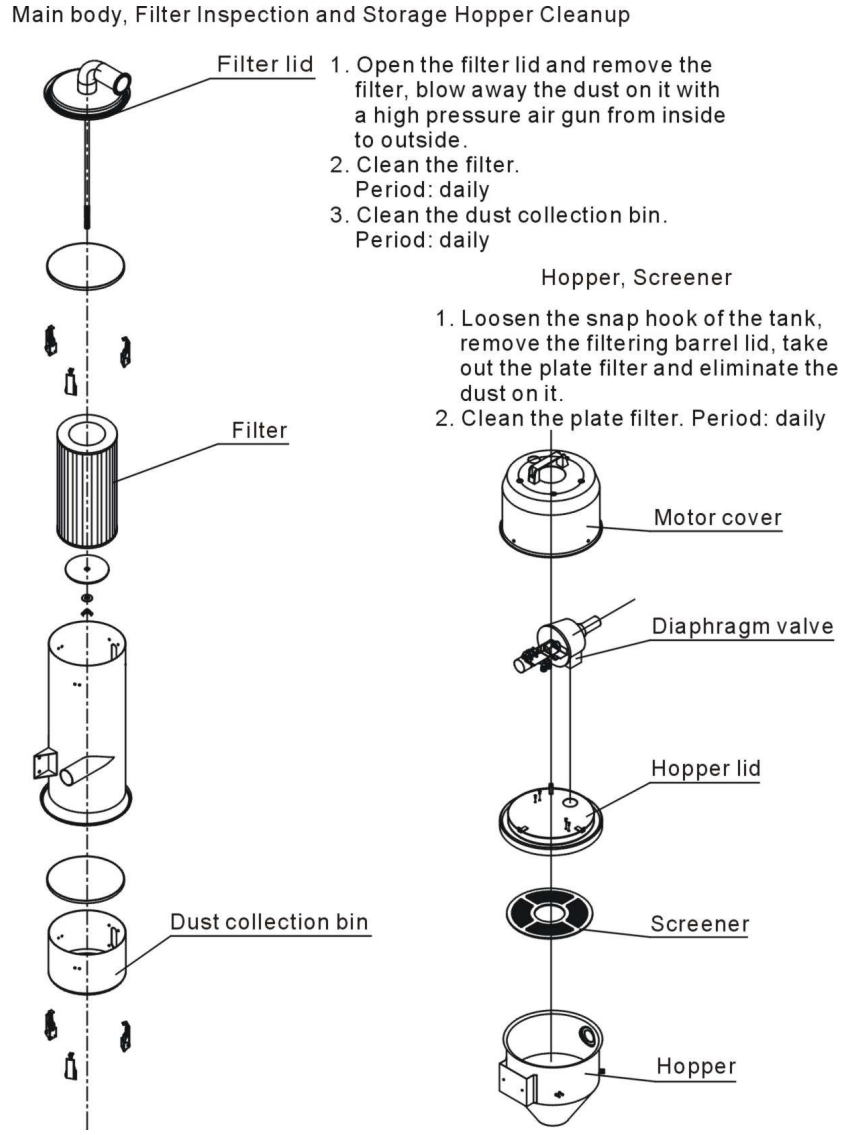

Fig. 6-1：Maintenance and Repair

6.1 Material Hopper

Hopper cleaning: The filter screen is installed in the storage hopper, please check it regularly or when it is found that the suction volume is reduced, loose the snap hook on the storage hopper, disassemble the hopper lid, remove the filter screen, clean the dust attached, and make it have good ventilation to enhance the suction power.

6.2 Main Body

Take out the air filter to make it clean periodically or when you find conveying capacity reduced. Always keep smooth air flow through air filter to maintain good conveying capacity.

Cleaning steps:

1) Loosen spring clips of filter cover and butterfly screws, and take out the filter.
2) Remove the dusts adhering to the filter to keep good suction power.

6.3 Reed Switch and Photoelectric Switch

6.3.1 Reed switch

When the indicator of the reed switch doesn't work, check the switch contact and replace with a new one if it doesn't work well.

1) Unscrew the outer box of the sensor.
2) Adjust the depth or move position the sensor inserted into the box, the indicator lamp lights means that magnetism has been detected and the swith is well worked.
3) If magnetism cannot be detected by magnets, please check whether the switch is bad contacted or damaged.

6.3.2 Photoelectric Switch

When the indicator of the photoelectric switch doesn't work, check the switch contact and replace with a new one if it doesn't work well.

1) Check whether the wires are bad contacted.
2) Please replace with a new one if the switch is damaged.

6.4 Weekly Checking

1) Check if there are broken electrical wires or not. Replace the broken wires immediately.
2) Check the function of the keys on the control panel.
3) Check if conveying hose connections at material inlet are loose or not, and if the seal ring is sealed up.

Notes: Cut off power supply when you check electrical wires.

6.5 Monthly Checking

1) Check if the clips of hopper lid are loose or not.
2) Check if the stopping flap is out of shape. If it is, please replace it.
3) Check the performance of magnetic proximity switch or photo sensor. If there is poor contact, adjust or replace it.

6.6 Maintenance Schedule

6.6.1 About the Machine

Model _____ SN _____ Manufacture date _____

Voltage_____Φ_____V Frequency _____ Hz Power _____ kW

6.6.2 Installation & Inspection

☐Check if the takeover pipe has been correctly connected.

☐Check if that pipe is locked up by clips.

☐Check if mounting base is locked tightly.

Electrical Installation

☐Voltage: _____ V _____ Hz

☐Fuse melting current: One-phase: A _____ Three-phase: _____ A

☐Check phase sequence of power supply.

6.6.3 Daily Checking

☐Check main power switch.

☐Check filter mesh.

☐Check working status of the motor.

6.6.4 Weekly Checking

☐Check all the electrical cables.

☐Check if there are loose connections of electrical components.

☐Check the screw of the feed-in pipe's flange is loosed or not.

☐Check the air filter.

6.6.5 Monthly Checking

☐Check the spring lock on the hopper cover is loosed or not.

☐Check the reversal stop piece is deformed or not.

☐Check the function of the magnetic proximity switch.