SCM-4

4 Components Volumetric Doser

Date: Aug. 2016

Version: Ver.B (English)

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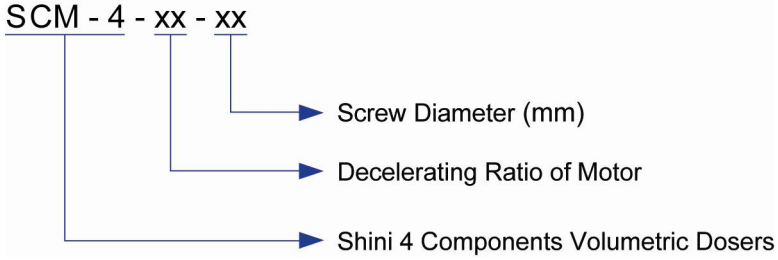
1. General Description

Please read this manual carefully before installation and using of the machine to prevent damage or personal injuries.

The SCM-4 series 4 Components Volumetric Doser are suitable for auto-proportional mixing of new materials, regrinds, master batch and additives. A brushless DC motor is used in this series and touch screen plus PLC control are used. The operator controls the precise dosing screw by setting its rotation speed to extrude materials with an accuracy of ±1%. A gear motor with deceleration ratio of 38:1 is coupled to a dosing screw of 12, 16 or 20mm diameter. Clients are free to choose different deceleration ratio and different screw diameters.

Model: SCM-F Doser

1.1 Coding Principle



1.2 Features

1) Standard configuration

- Dosing screws are chrome plated for durability.
- Unit is comprised of standard modules for ease of cleaning, disassembly and interchangeability.
- Three-tube hopper magnet is equipped at the base of single color doser to absorb metal impurities so to prevent screw of moulding machine from damage.
- Blender is a standard equipment for double color doser to make the material evenly mixed, while also a optional equipment for single color doser to do so.
- Main material hopper is a standard equipment for double color doser. It is optional for single color doser.
- External signals can be directly interfaced with control box.
- The current operation mode can be recorded, unaffected by power failure so operation would be returned to normal when power is on.
- Forced material cleaning is convenient to replace masterbatch.

2) Accessory option

- For collocating with SHD-100 or SHD-160U and above dryers, heavy base should be selected.
- SCM-4 is capable of fulfilling the adding of four varieties of masterbatch at most.

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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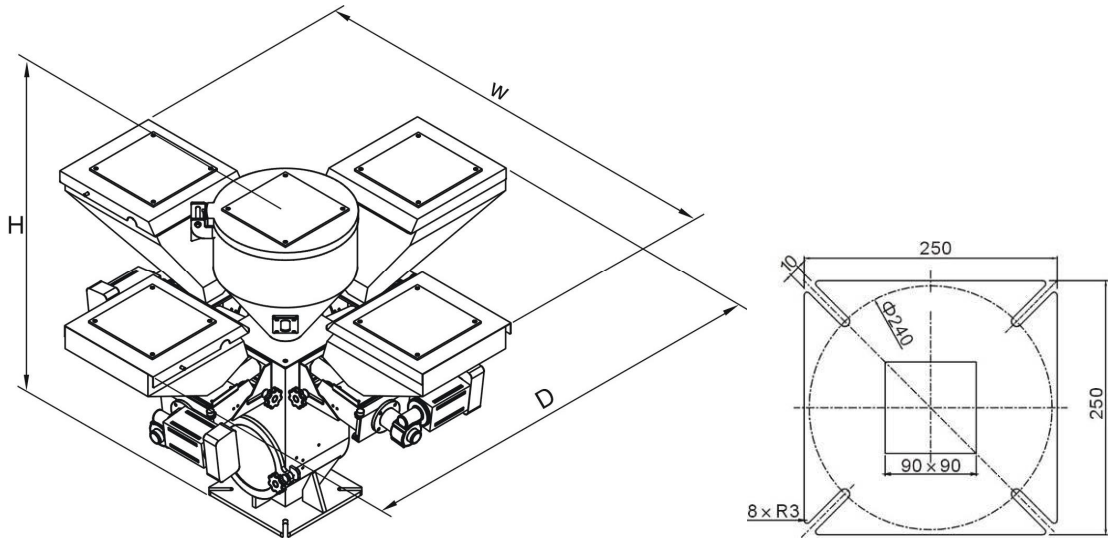
1.3 Specifications

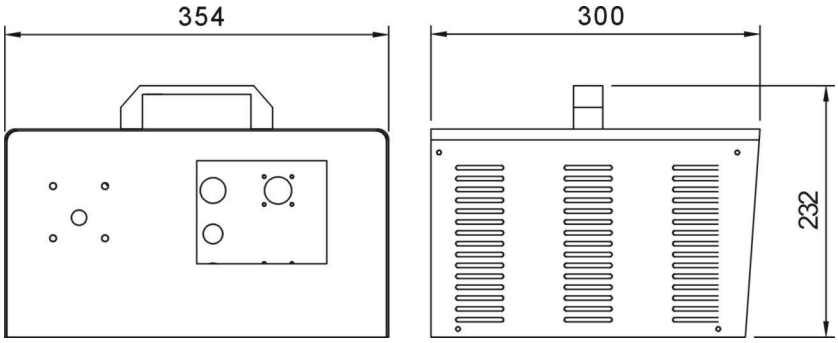
1.3.1 Dimensions of Fourfold-color Doser

1.3.1.1 Main Body



Picture 1-1: Dimensions of Fourfold-color Doser

1.3.1.2 Control Cabinet



Picture 1-2: Dimension of Control Cabinet

1.3.2 Specification List

Table 1-1: Specification List

Motor Power(kW)	0.06×4
Output Power of Mixer(kW)	0.09
Screw External Dia.(mm)	**
Output Capacity (kg/hr)	*
Storage Bin(L)	10
Gear Ratio	38:1
Main Material Hopper	Standard
Mixer	Standard
Dimension	
H (mm)	736
W (mm)	1125
D (mm)	1125
Weight (kg)	75

Note: 1) “R” in SCM-4-R means the gear ratio and screw external dia. are optional for client selection. Motor Gear includes two deceleration ratios of 38:1, Screw external dia. includes 12, 16, 20mm.

2) *means output capacity is depended on the model that clients selected, data of single color doser can be a reference;

3) **stands for the external dia. of the screw is up to client's model choice;

4) All the output capacity from above models is base on the data from density 1.2 ,dia.2~3mm master batch in a test criteria of continuous running.

5) Power supply: 1, 230V, 50/60Hz;

1.4 Safety Regulations

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

Safety regulations should be abided by while operating the machine.

1.4.1 Safety Signs and Labels

All the electrical components should be installed by qualified electricians. 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

1.5 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.

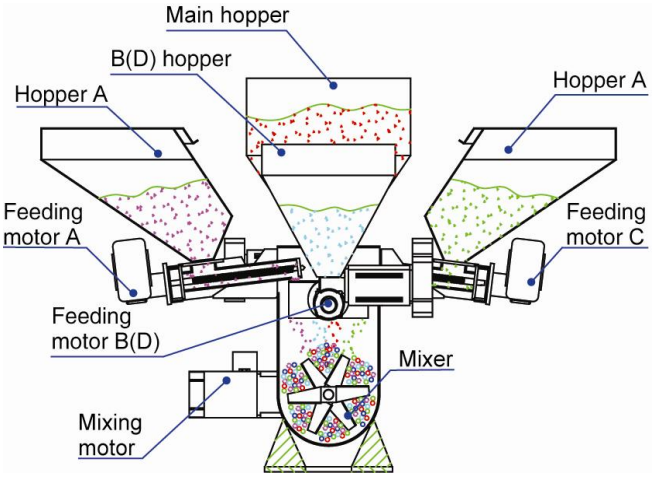
2. Structure Characteristics and Working Principle

2.1 Structure Characteristics and Working Principle

The SCM-4 series 4 Components Volumetric Doser are suitable for auto-proportional mixing of new materials, regrinds, master batch and additives. A brushless DC motor is used in this series and touch screen plus PLC control are used. The operator controls the precise dosing screw by setting its rotation speed to extrude materials with an accuracy of ±1%. A gear motor with deceleration ratio of 38:1 or 75:1 is coupled to a dosing screw of 12, 14 or 16mm diameter. Clients are free to choose gear motor with different deceleration ratio and different screw diameters.

2.2 Working Principle

2.2.1 Working Principle of Fourfold-color Doser



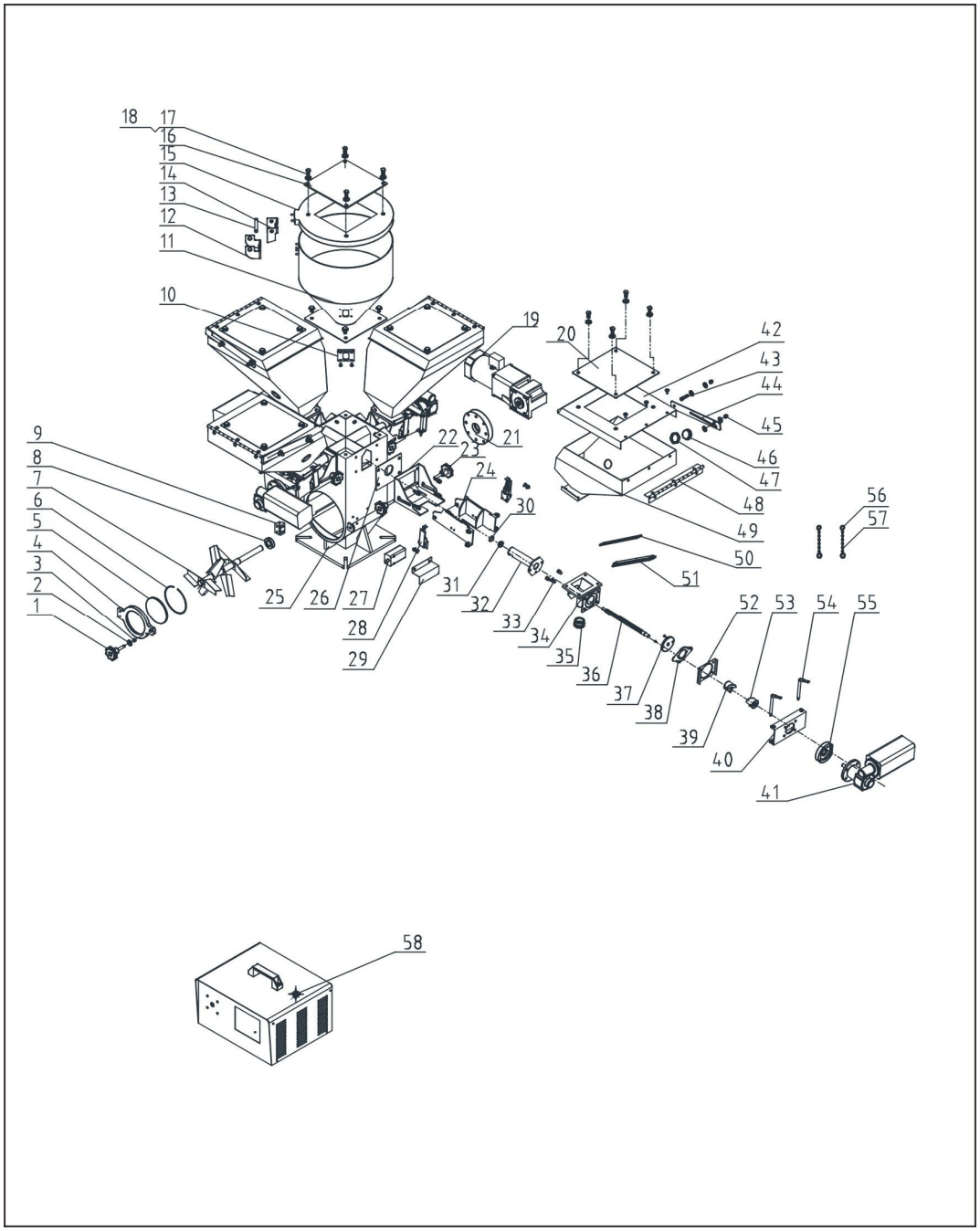
Picture 2-1: Working Principle of Fourfold-color Doser

It can be used to convey four color additives at the same time. Choose different kinds of dosing units according to different needs, this is choose different gear motor with deceleration ratio and screw diameter.

Signals from control cabinet will be sent to motor (A/B/C/D). Then it begins to work. The rotary force is transferred to the dosing screw through shaft connector. Color additives in hopper (A/B/C/D) will fall into thegroove of conveying screw, then be taken to hopper base by rotating action of the screw. Meanwhile materials in main hopper falls into base and is sent to IMM by evenly mixing to conveying color additives with accurate metering.

2.3 Assembly Drawing and Parts List

2.3.1 Assembly Drawing and Parts List of Fourfold-color Doser



Note: please refer to table 2.3.2 Past list about Numbers in the drawing.

Picture 2-3: Assembly Drawing and Parts List of Fourfold-color Doser

2.3.2 Parts List of Fourfold-color Doser

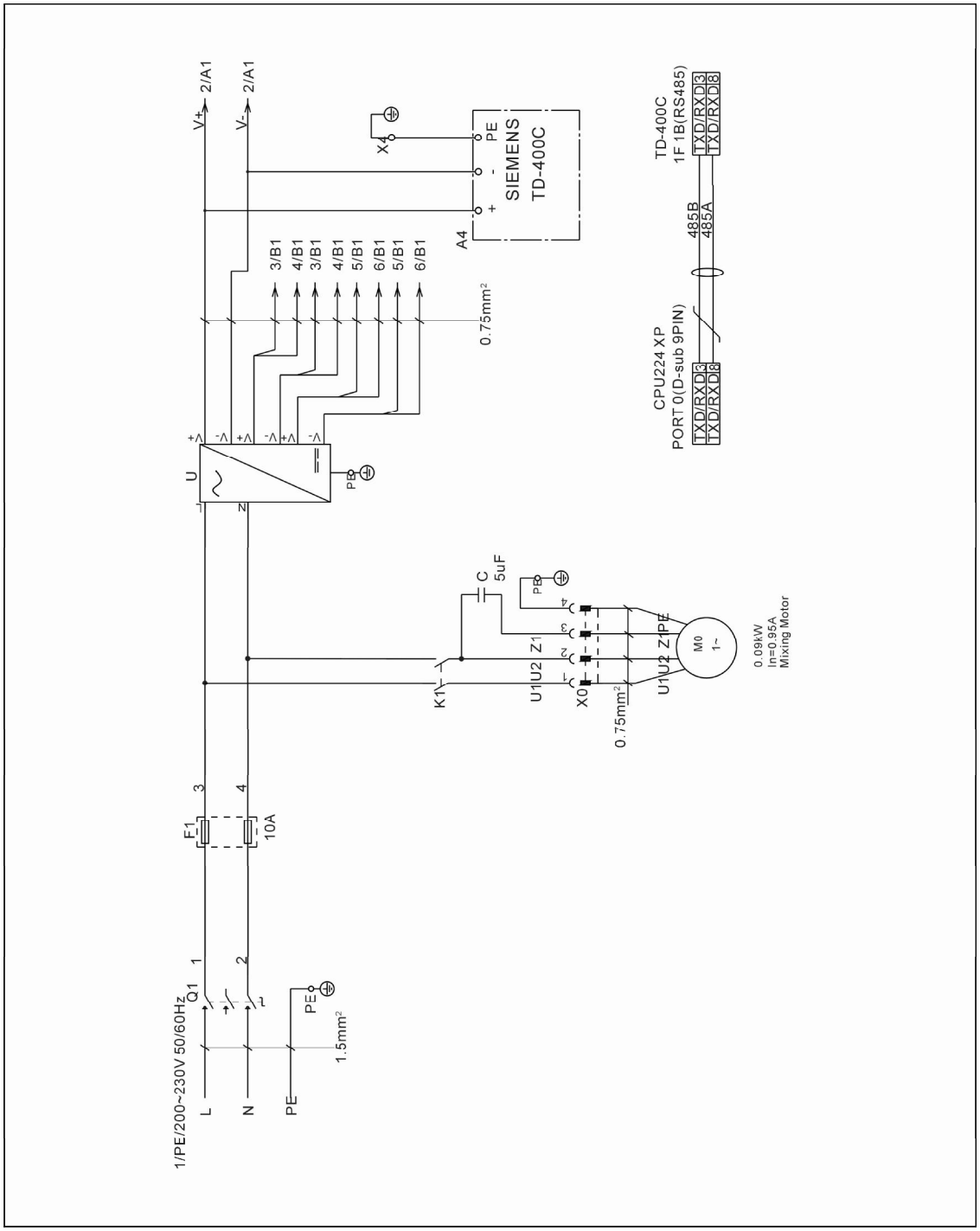
Table 2-1: Parts List of Fourfold Color Doser (SCM-4)

No.	Name	Part NO.	No.	Name	Part NO.
1	Star handle B M8×50	YR40084500000	31	Screw fittings 2	BR90240801410
2	Flat gasket 8	YW66081900000	32	⌀12 screw sleeve	BL31003802210
3	Hexagon nut M8	YW64000800100		⌀16 screw sleeve	BL31003802510
4	Base door	BL31387501520		⌀20 screw sleeve	BL31003802410
5	Tempered glass *	YW70406000000	33	Flat head screw M5x10	YW62051000100
6	Magnetic base spring	YW01040000000	34	Conveying pipe (for screw 12, 16 and 20)	BL31003804920
7	Mixing assembly	--		Material keeping rubber (for screw 30)	BL31003802110
8	Bearing 6003 VV	YW11600300000	35	Screw cap	BH10003800610
9	Magnetic base hinge	YW09050200000	36	⌀12 screw	YW09001200100
10	Visual window assembly four hole	BH90000400050		⌀16 screw	YW09001600100
11	Main hopper	--		⌀20 screw	YW09002000000
12	Lower hinge	BL32000600140		⌀30 screw	YW09003000000
13	Hinge pin	BH10006003110	37	Doser screw fittings 3	BR90387501510
14	Upper hinge	BL31000800040	38	Screw connection plate	--
15	Main hopper lid	--	39	Shaft coupler 1	BH13001100110
16	Hopper cover plate	BW09202000000	40	Body fixed bracket 2	-
17	Hex screw M8x16	YW60081600100	41	Gear motor	YM50652500000
18	Flat gasket 8	YW66081900000	42	Storage hopper cover	--
19	Mixing motor	YM50992200000	43	Inner hexagon screw M6x25	YW61062500000
20	Hopper lid plate	BW09202000000	44	Material connection plate	--
21	Blending fixed flange	BH10387500210	45	Cap nut M6	YW64006000100
22	Side fixed frame	--	46	Material sensor plug	BR30008400050
23	Star handle B M8x35	YR40083500000	47	Material sensor plug nut M30x1.5	YR30301500000
24	Body fixed bracket 1	--	48	Long hinge	YW06380300000
25	Base	--	49	Storage hopper	--
26	Material keeping rubber	YR10000000000	50	O-Type seal ring	YR20162600100
27	Safety switch	YE16921200000	51	Visual window	BR90380400010
28	Adjustable new spring buckle	YW02003000400	52	Conveying connection plate	--
29	Safety switch fixed plate	--	53	Shaft coupler 2	BH13001100210
30	Elastic ring for axes use GB/T 894.1 8	YW69008000200	54	Motor fixed rotation pin	BH11003800610
55	Conveying motor flange	BH13003200010	56	Stainless steel key ring 1.5x22	YW00151300000
57	Wire dia. 1.2 button **	YW90120000000	58	Control box	--

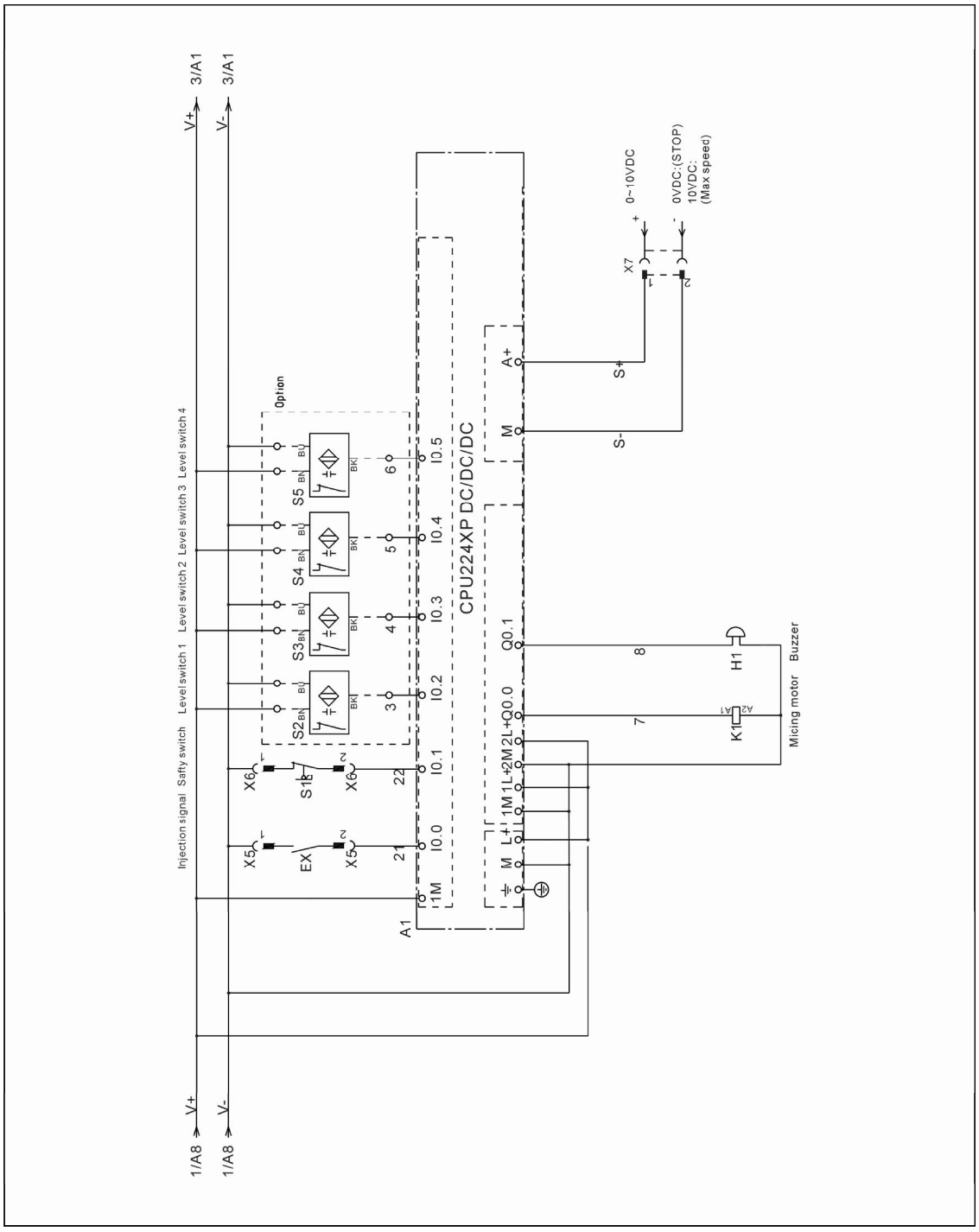
*Indicates latent wearing parts **Indicates latent wearing parts and it's suggested to back them up.
Before purchasing parts, the version of Brochure should be confirmed to accord part number with actual goods.

2.4 Electrical Circuit Descriptions

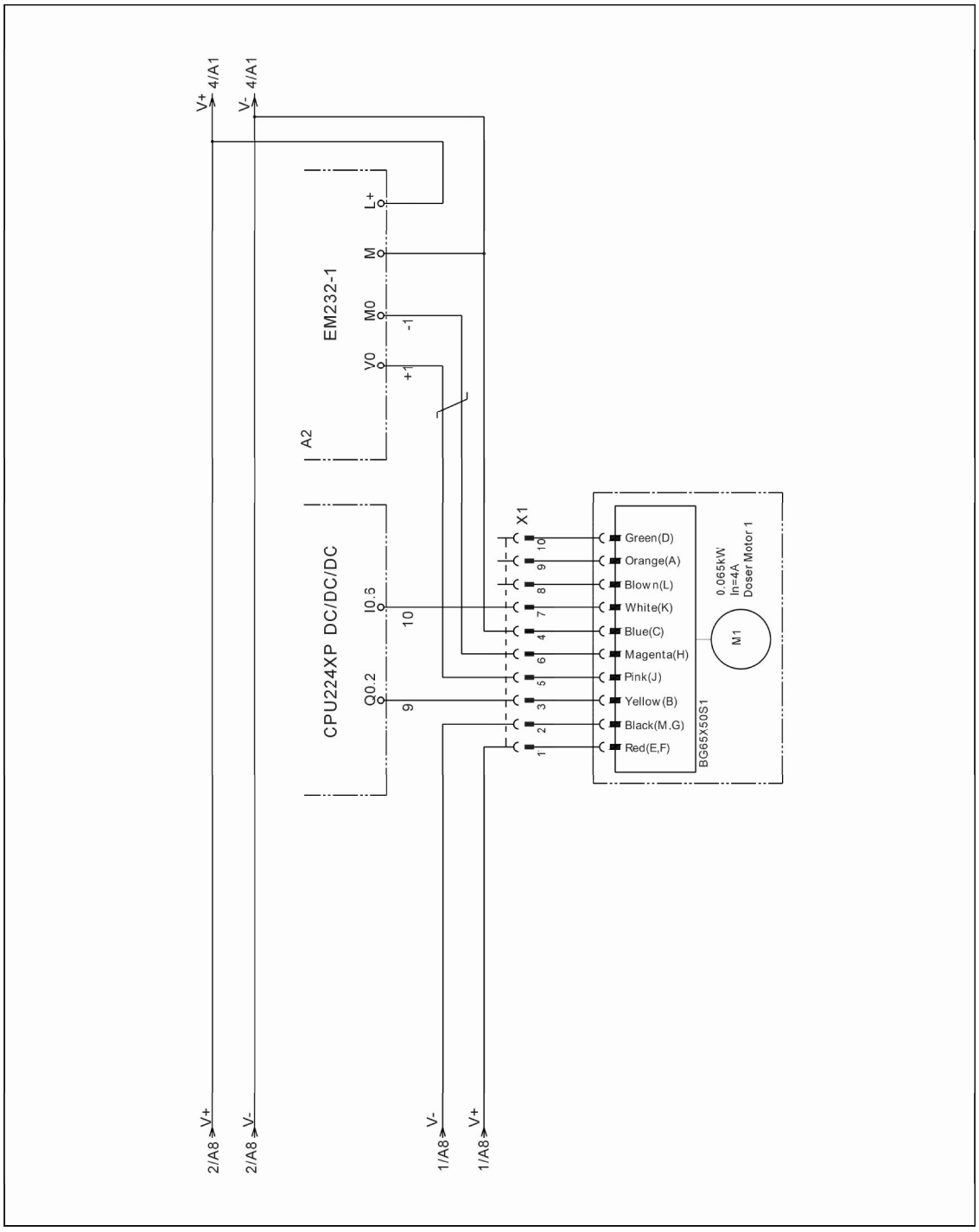
2.4.1 Electrical Circuit Descriptions



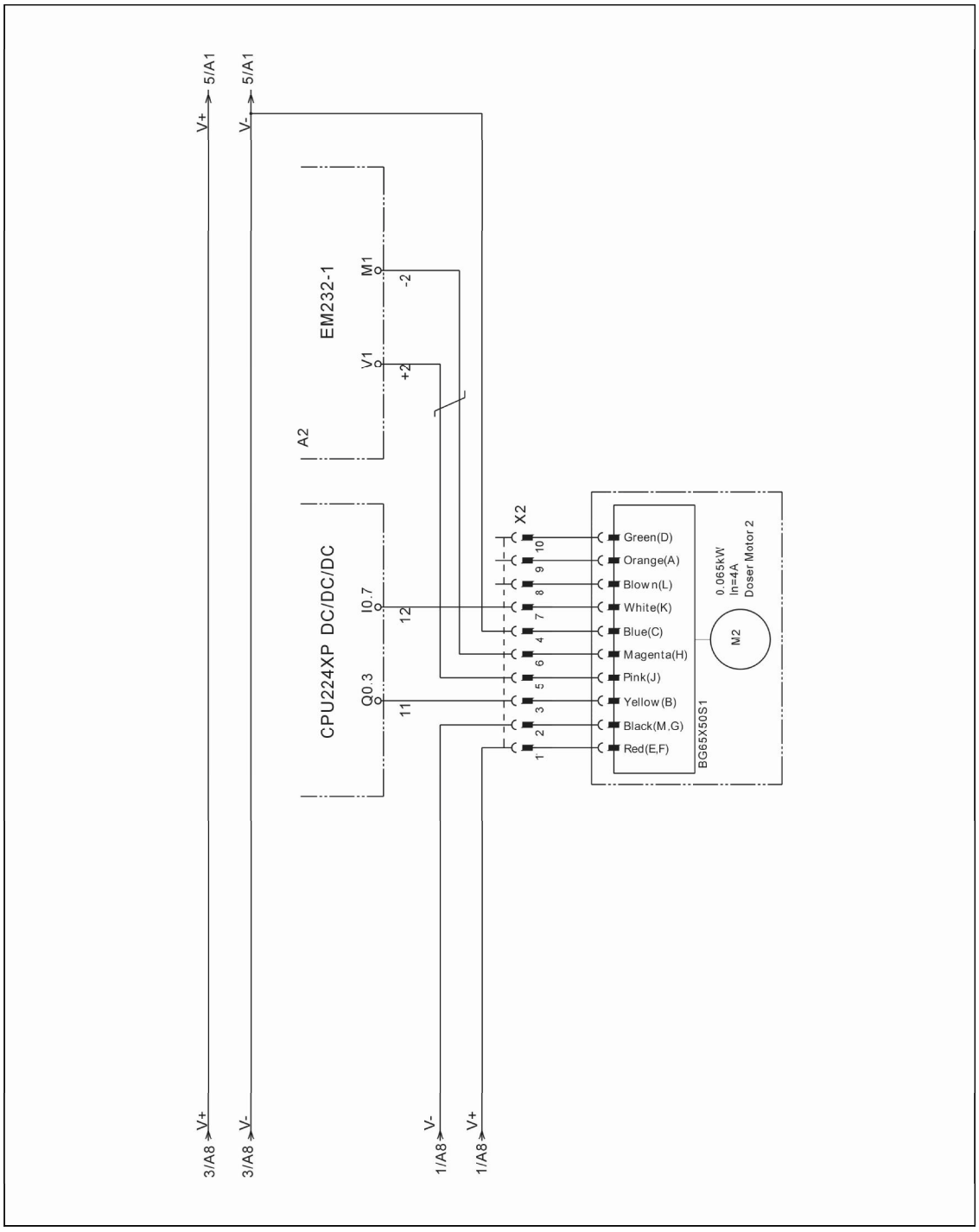
Picture 2-2: Electrical Circuit Descriptions 1



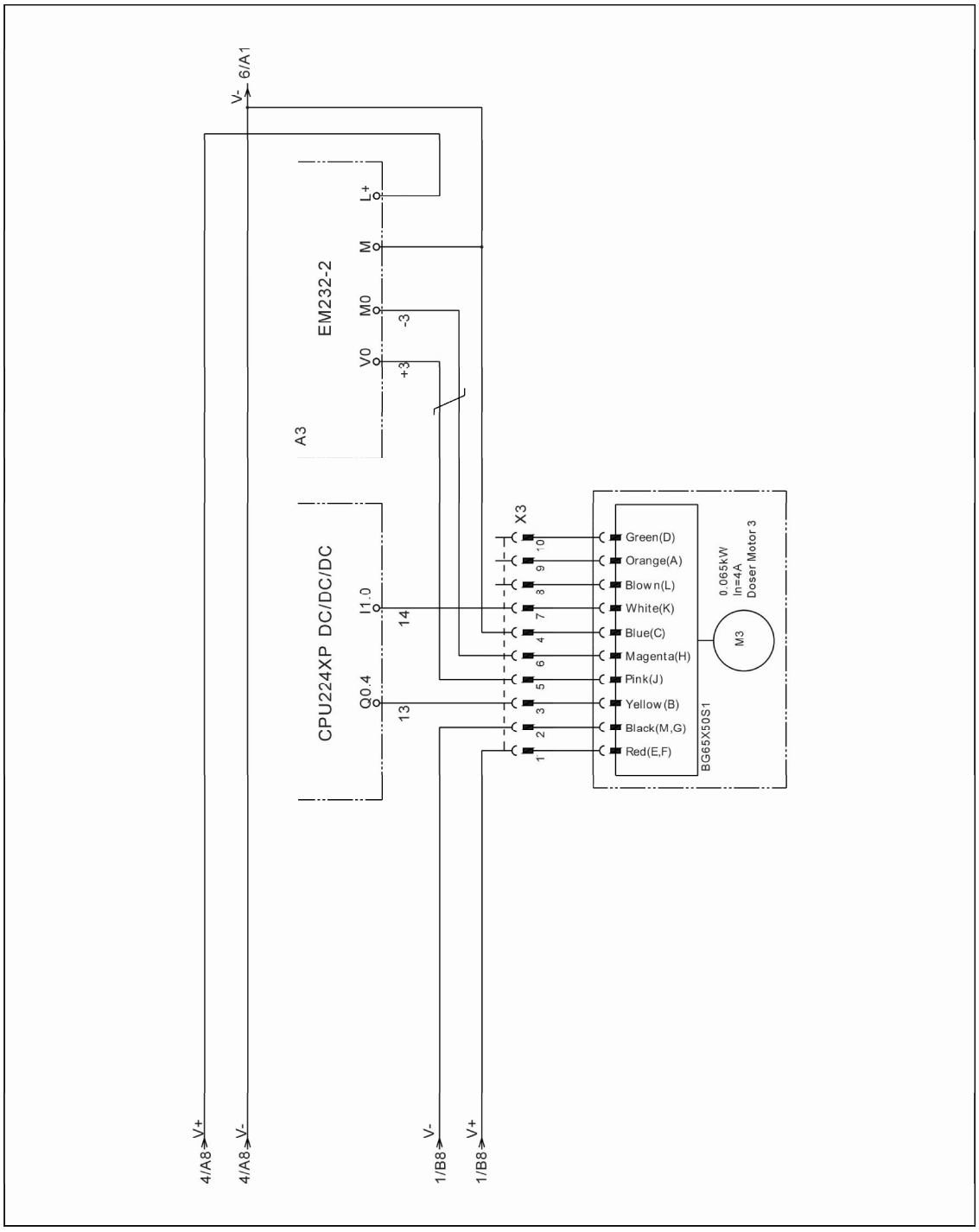
Picture 2-3: Electrical Circuit Descriptions 2



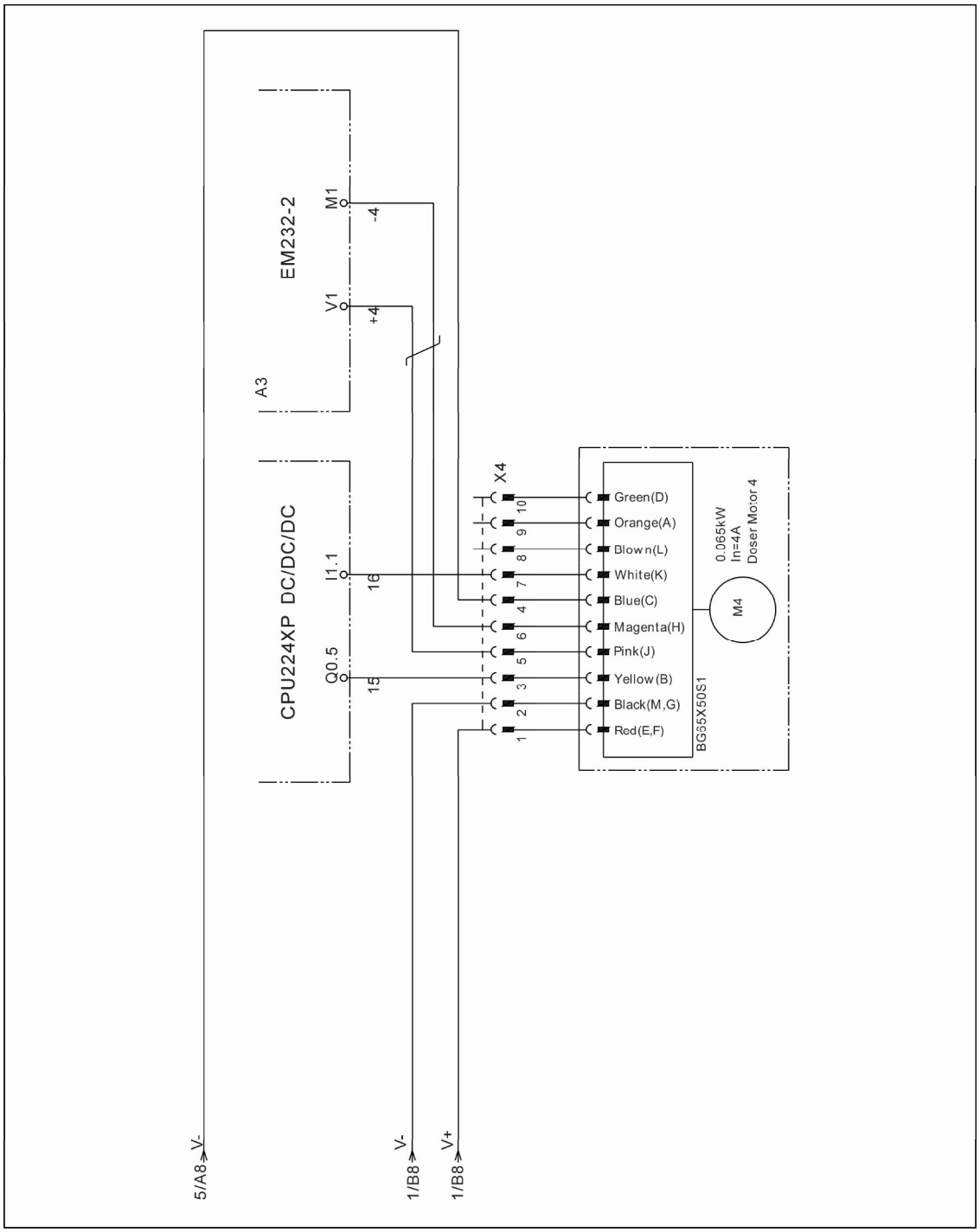
Picture 2-4: Electrical Circuit Descriptions 3



Picture 2-5: Electrical Circuit Descriptions 4

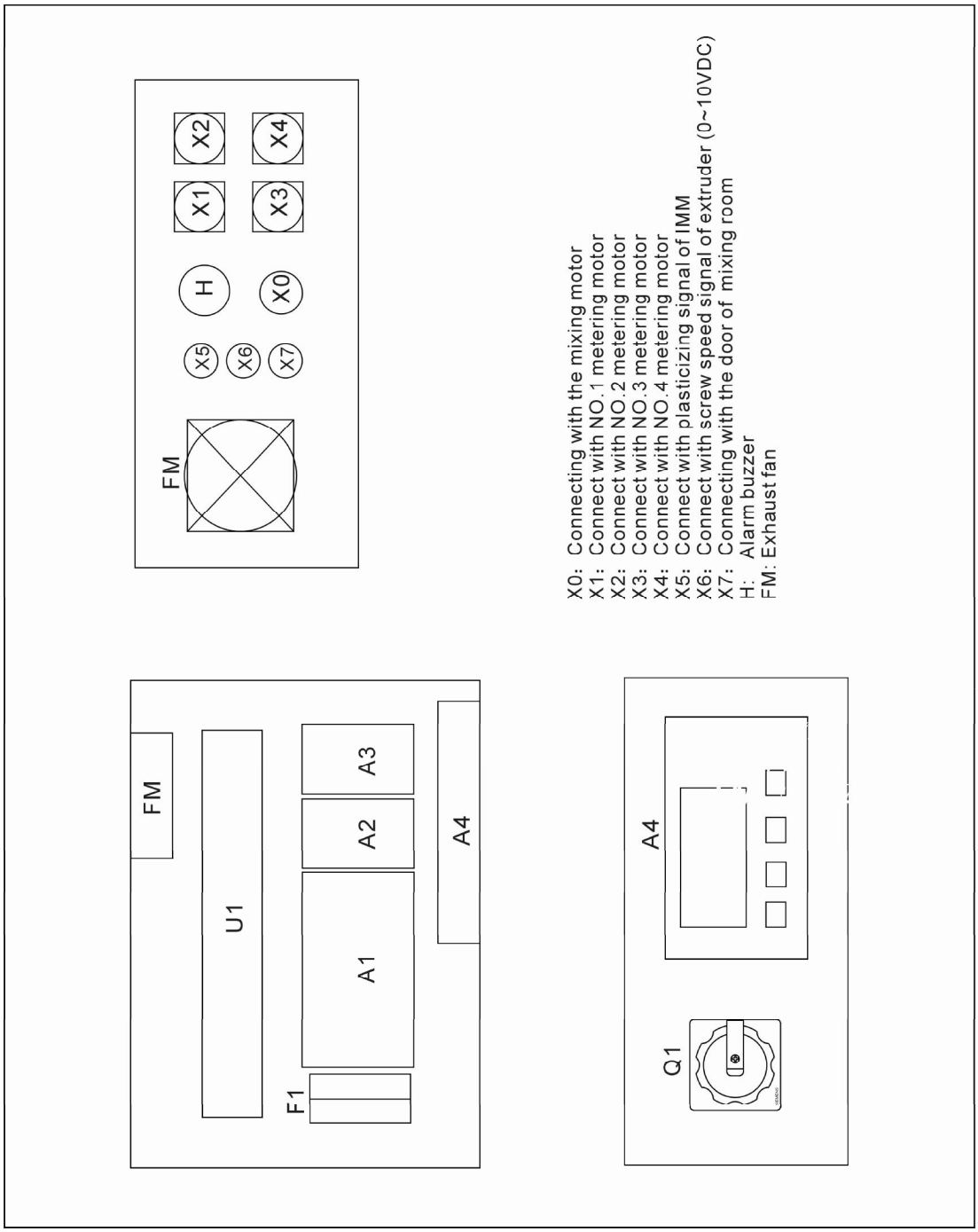


Picture 2-6: Electrical Circuit Descriptions 5



Picture 2-7: Electrical Circuit Descriptions 6

2.4.2 Electrical Components Layout



Picture 2-8: Electrical Components Layout

2.4.3 Bill of Electrical Components

Table 2-2: Bill of Electrical Components

No.	Symbol	Name	Specifications	Part number
1	Q1	Main power switch	16A	YE10200300000
2	F1	Fuse base	500V 2P 32A	YE41032200000
3	-	Fusible core**	10A Fuse	YE46010000100
4	S2	Safety switch*	250V~5(4)A	YE16310200000
5	S2~S5	Capacitance proximity switch	10~36VDC	YE15508200000
6	U	DC power	IN=24V OUT=24VDC 22A	-
7	X0	Metal joint	4P	YE68025400000
8	-	-	-	YE68025400100
9	X1~X4	Metal joint	10P	YE62241040000
10	X5~X7	Metal joint	2P	YE68016200100
11	-	-	2P	YE68016200000
12	M0	Mixing motor*	0.09kW 1/230V 50/60Hz	-
13	M1~M4	Metering motor*	65W 24VDC	YM50652500100
14	-	-	65W 24VDC	YM50652500000
15	K1	Relay	24VDC	YE03272400000
16	A1	PLC	24VDC	-
17	A2 A3	Output module of analog quantity	24VDC	YE82023200000
18	A4	Touch screen	24VDC 0.3A	-
19	H1	Buzzer	230VAC 50Hz	YE84003500000
20	FM	Exhaust fan	220~230VAC 50/60Hz	YM60121200400

*Indicates latent wearing parts **Indicates latent wearing parts and it's suggested to back them up.

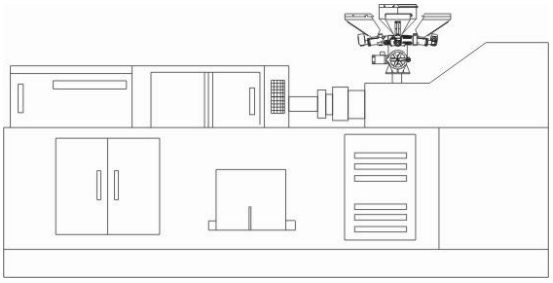
Before purchasing parts, the version of Brochure should be confirmed to accord part number with actual goods.

3. Installation and Debugging

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

Power supply of doser should be done by qualified electricians!

3.1 Install on Extrusion or Injection Moulding Machine



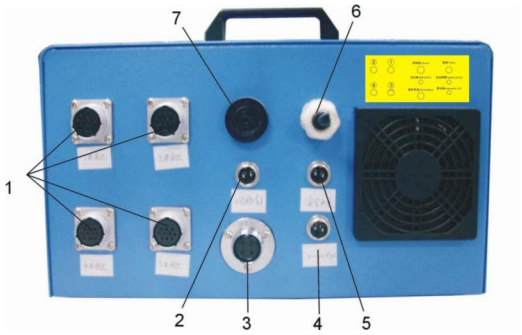
Picture 3-1: Installation of Fourfold-color doser

According to the specifications of mounting holes on the extruder or injection moulding machine, drill 4 screw holes on the base of SCM machine. Install the whole machine on the extruder or injection moulding machine by locking the 4 screw holes of mounting base. (see picture above)

3.2 Power Supply

Connect control box of standard doser with 1 ΦAC230V power supply and earth wire.

3.3 Sockets and Main Switch at the Back of Control Box



Name of parts:

1. Motor wire socket 2. Plasticizing signal 3. Mixing motor wire socket

4. 0~10V Signal wire connection 5. Safety switch 6. Main power socket

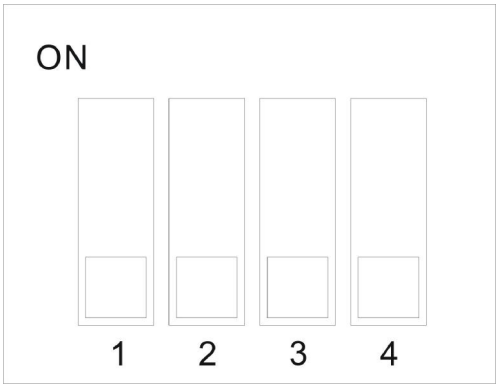
7. Buzzer

Picture 3-2: Control Box of Fourfold-color Doser

3.4 Safety Regulations for Touch Screen

1) Do not use sharp objects instead of hand to operate and prevent touch screen was strongly collided.
2) In the environment with dry air, touch screen may produce a lot of static electricity. Therefore, use grounding metal to release static before touch the screen.
3) Use economical alcohol or eleoptene to clear touch screen, other solvents lead touch screen to turn pale.
4) Do not take apart touch screen without authorization. And taking away any printed circuit board is not allowed because it may cause components damages.
5) If button on touch screen appears to be not sensitive, calibration of touch screen is necessary. The procedure is as follows:

Open the dial switch on the back of screen, 4 buttons will be shown below.

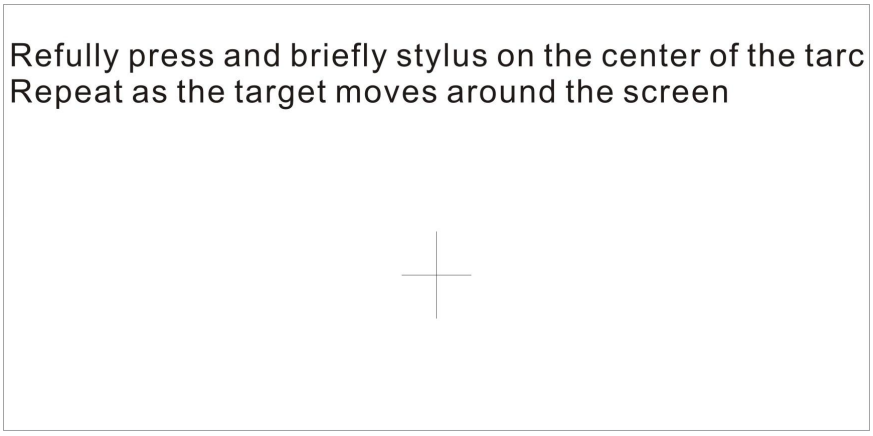


Picture 3-3: Dial Switch Screen

Table 3-1: Comparison between Switch Position and Mode

SW1	SW2	SW3	SW4	Mode
ON	OFF	OFF	OFF	Touch screen calibration
OFF	ON	OFF	OFF	EB8000 System Tool Bar
OFF	OFF	ON	OFF	System program loading
OFF	OFF	OFF	ON	Reserve
OFF	OFF	OFF	OFF	Normal operation

According to above table, turn switches to the position of “ON”, then screen below will be shown.



Picture 3-4: Calibration of Touch Screen

Calibration and password recovery mode: In this mode, when touch screen is powered on, a symbol of “+” will appear on the top left corner of screen. Use stylus or finger touch the center of “+”, it will move and appear on top left and right corner, as well as bottom left and right corner. “+” symbol will disappear after finishing five point calibration. Standard parameter will be saved in the program of touch screen.

Once finishing calibration, four switches need to be turned to position of “OFF” so that touch screen may restart to operate.

4. Application and Operation

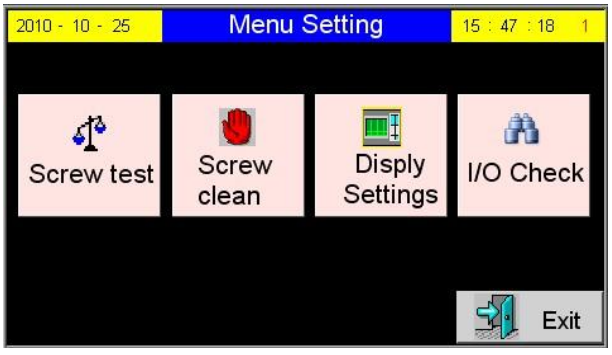
4.1 4.1 Operation Guide

Picture 4-1: Start-up Screen

1) Enter monitor screen after selecting language in start-up screen.

Picture 4-2: Monitor Screen

2) Press “setting” key to display setting screen.



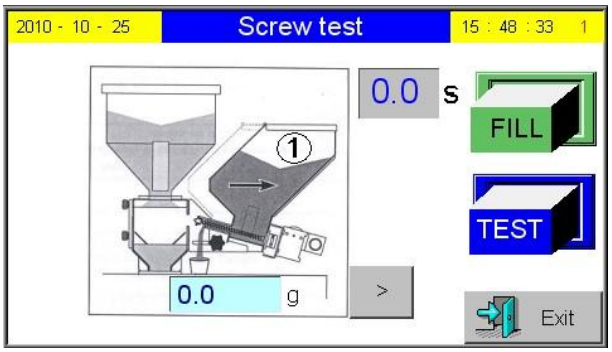
Picture 4-3: Setting Screen

3) Press “screw test”

Enter screw test screen

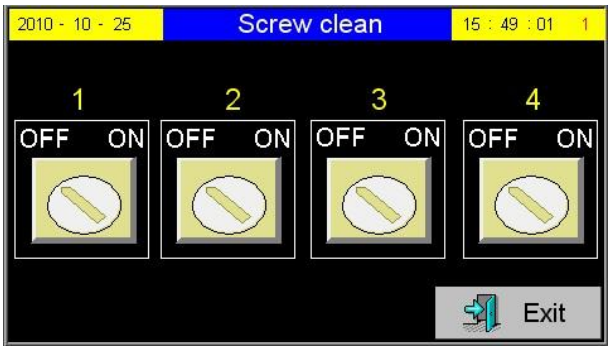
Test 50s output of 1~4 test components

Input test result



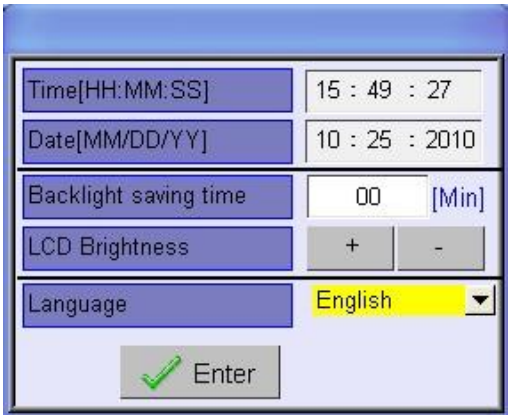
Picture 4-4: Screw test

4) If you need to change additives, just press “screw removing” to enter screw removing screen and turn screw to position of “ON”.



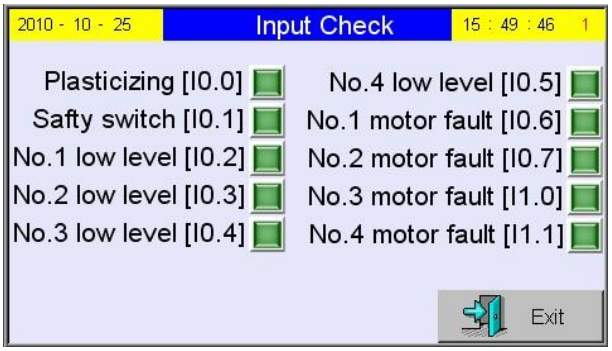
Picture 4-5: Screw Removing

5) If you need to set the time and date, enter display setting and modify items.



Picture 4-6: Setting Screen

6) I/O Check



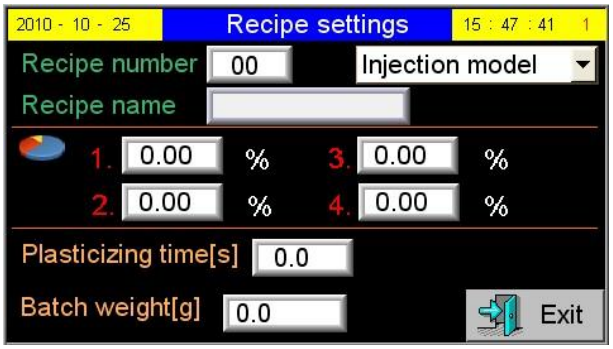
Picture 4-7: I/O Check

7) Firstly enter monitor screen after start-up and press “formula” to enter formula setting screen

Parameter setting for IMM

1. Input the weight of each module
2. Input the plasticizing time
3. Input the percentage of 1~4 components

According to parameters above and input volume of metering motor, motor speed value can be calculated.

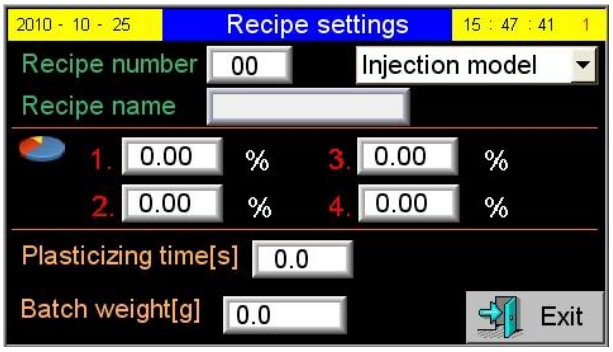


Picture 4-8: IMM Parameter Setting

Parameter setting for Extruder

1. Input max. throughput of extruder per hour
2. Input the percentage of 1~4 components

According to parameters above and input volume of metering motor, motor speed value can be calculated.



Picture 4-9: Extruder parameter setting

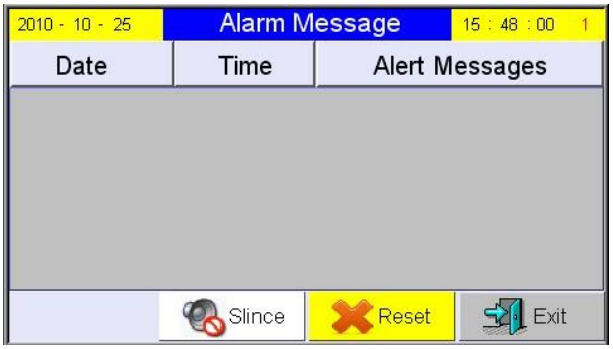
8) Select work pattern: after finishing formula setting, you may select IMM mode or extruder mode based on actual needs, then press “ON” to run the machine.

Picture 4-10: Monitor Screen

9) Alarm alert for fourfold-color doser

1. Alarm occurs and machine halts when there is lower material level.
2. Alarm occurs and machine halts when any metering motor breaks down.
3. Alarm occurs when calculated motor speed exceeds the Max. value.
4. Alarm of safety switch occurs and machine halts when opening safety door during operation.

If the alarm is sounding, press “mute” to shut down the Buzzer; if the alarm is canceled, press “reset” to re-start the operation.



Picture 4-11: Alarm screen

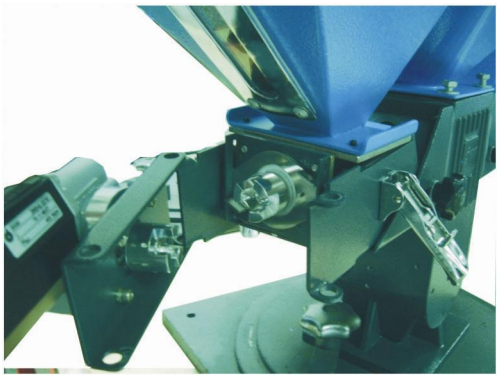
Table 4-1: 50 Seconds Test for the Screw

50 seconds test for the screw **of SCM38**		
Color additives	Screw diameter (mm)	Weight (g)
White color additives 7028B, bulk density about 1.6. Φ2~3mm particles, well-proportioned.	Φ12	131.6
	Φ14	228.2
	Φ16	456.3
White color additives 7018, bulk density about 1.4, Φ2~3mm particles, well-proportioned.	Φ12	113
	Φ14	205
	Φ16	442.2
Black color additives 2018B, bulk density about 1.2, Φ2~3mm particles, well-proportioned.	Φ12	78.1
	Φ14	138.9
	Φ16	228.9
50 seconds test for the screw of SCM75		
Color additives	Screw diameter (mm)	Weight (g)
White color additives 7028B, bulk density about 1.6. Φ2~3mm particles, well-proportioned.	Φ12	54.1
	Φ14	94.4
	Φ16	192.4
White color additives 7018, bulk density about 1.4, Φ2~3mm particles, well-proportioned.	Φ12	44.7
	Φ14	81.8
	Φ16	172.9
Black color additives 2018B, bulk density about 1.2, Φ2~3mm particles, well-proportioned.	Φ12	32.5
	Φ14	56.4
	Φ16	104.9

Note: the above data is the average value gained from 5 repeated tests.

4.2 Change Color Additives

1) Enter screw clearing screen and press switch to clear material compulsively. If there are still materials remaining, please loosen the snap hook of material hopper, draw out the conveying pipe together with the hopper, and use high pressure air to blow away the remained materials
2) Add color additives.

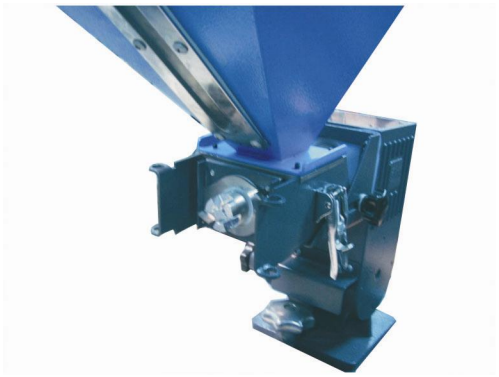


Picture 4-12: Change Color Additives

4.3 Replace Dosing Screws

1) Cut off power supply, loosen snap hook of hopper, draw out the hopper and screw. Unlock the screw fastening plate to remove the conveying screw for replacement.
2) Install the screw and hopper back to the machine.

Note: 12/14 screw is supplied with a sleeve.



Picture 4-13: Replace Dosing Screws

5. Trouble Shooting

Failures	Possible reasons	Solutions
No indicates on the control cabinet.	1. Power supply not connected.	1. Connect through power supply.
	2. Fuse burnt out or control board problems.	2. Replace the fuse or check control board.
Motor does not work.	1. Parameter mistakes.	1. Reset parameters.
	2. Motor overload.	2. Contact the manufacturer or local distributor.
	3. Motor damaged.	3. Replace the motor.
	4. Signal wire broken.	4. Replace motor signal wire.
	5. Signal wire connection wrong	5. Conduct Inspection
The buzzer sounds the alarm.	Parameter setting exceeds the limit.	Reset parameters.

6. Maintenance and Repair

6.1 Repair

All the repair work should be done by qualified technicians to prevent personal injuries and damage of the machine.

6.2 Maintenance

Keep the surface of machine clean.

6.3 Maintenance Schedule

6.3.1 About the Machine

Model _____ No. _____ Manufaturing date : _____

Voltage_____Φ_____ V Frequency_____ Hz Total power:_____ kW

6.3.2 Check after Installation

☐Check that dosing screws are fitted correctly.

☐Check the snap hook is tightly locked.

☐Check if the mounting base is firmly locked.

Electrical Installation

☐Voltage: _____ V _____ Hz

☐Fuse melt current: 1 Phase _____ A 3 Phase _____ A

☐Power supply and signal wire of control cabinet are correctly connected.

6.3.3 Daily Checking

☐Check the main switch.

☐Check fastening screws of mounting base.

6.3.4 Weekly Checking

☐Check if there damaged electrical wires.

☐Check snap hooks are loose or not.

☐Check if the side holding plate is loose or not.