Service and Repair Manual

EN 280

SC0407E、SC0610E

Mobile Elevating

Work Platforms

PART NO. SM-2537110011

Original Instructions

Instruction

Thank you for choosing to use the product from LGMG.

This manual introduces technical parameters and service debugging data of Scissor Mobile Elevating Work Platform, and provides troubleshooting and repair procedures for qualified service professionals. Please read, understand and obey these safety rules and operating instructions in this manual on your machine before attempting any procedures.

Basic mechanical, hydraulic and electrical skills are required to perform most procedures. Besides, several procedures require specialized skills, tools, lifting equipment and a suitable workshop. Therefore, in these instances, we strongly recommend that maintenance and repair be performed at an authorized LGMG dealer service center.

The information contained in this manual is correct at the time of publication. However, LGMG has endeavored to deliver the highest degree of accuracy possible. And continuous improvement of our product is a LGMG policy. Therefore, product specifications are subject to change without notice.

If there is any updated information uncontained herein, or any questions about this manual, please call LGMG industries, and we are welcome your kindly enquiry.

Readers are encouraged to notify LGMG of errors and send in suggestions for improvement. All communications will be carefully considered for future printings of this and all other manuals.

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Revision History

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Safety Rules

Danger

Nonobservance with instructions and safety rules in this manual and the operator's manual will lead to death or serious injuries.

During maintenance and repair operations, risks specified in the operator's manual form hidden safety hazards.

Before the machine is maintained, the following conditions must be met.

- ☑ **Relevant personnel have been trained on machine maintenance and meet relevant maintenance qualifications.**
- ☑ **Relevant personnel shall read, understand, and comply with:**
  - **Manufacture instructions and safety rules;**
  - **Employer safety rules and workplace regulations;**
  - **Applicable government regulations;**
- ☑ **Equipped with proper tools, lifting equipment, and proper workshop;**

Personal safety

Anyone who works on the machine or around it shall be careful of potential safety hazards of known dangerous operations. Personal safety and continuous & safe machine operations shall be considered as the first element.

Read each procedure carefully. Meanings of warning signs and symbol language are as follows:

Safety warning signs are used to indicate potential personal injuries. Comply with all prompt messages indicated by this sign to prevent possible personal injuries or death.

⚠ DANGER This sign is used to indicate emergent dangers. If this kind of danger cannot be prevented, serious personal injuries or death will be caused.

⚠ WARNING This sign is used to indicate potential dangers. If this kind of danger cannot be prevented, serious personal injuries or death may be caused.

⚠ CAUTION This caution sign with a safety warning mark is used to indicate potential dangers. If this kind of danger cannot be prevented, minor or moderate personal injuries may be caused.

NOTICE This sign is used to indicate potential dangers. If this kind of danger cannot be prevented, property loss may be caused.

Notice: Signs above are used to indicate operation or maintenance information.

If the condition requires, please wear safety goggles and protective clothing.

When an object is lifted or loaded, watch out moving parts, swing parts, unfixed parts, or other parts that may cause crushing risks. During work, always wear qualified protective shoes.

Workplace safety

Anyone who works on the machine or around it shall be aware of known safety hazards. Personal safety and continuous & safe machine operations shall be considered as the first element.

Keep sparks, flames, or burned cigarettes away from flammable substances, like battery gas and engine fuel. Place qualified fire extinguishers in accessible places.

Please maintain all tools and working areas to use. Keep the working surface clean to prevent damage caused by chippings entering the machines parts.

Ensure that all forklifts, cranes, and other lifting/supporting equipment can provide sufficient supporting strength, safety, and stability. Chains and belts with good working conditions and strength shall be used.

Ensure that disposable fasteners (cotter pin and self-locking nut) cannot be reused. Reuse of these parts may lead to failures.

Please dispose waste oil or other liquids well. Use qualified containers and ensure environment safety.

Ensure that the workshop is well ventilated and the lighting is bright.

Contents

Chapter 1 Safety

1.1 Observation

1. The repair shall be operated by qualified personnel who have accepted machine repair training.
2. Mark damaged or faulty machine in time and remove it from service equipment.
3. Before the machine is operated, repair all machine damage or faults.

1.2 Before Maintenance

1. Read, understand, and comply with safety rules and repair instructions in related manuals of the machine.
2. Check the tools and ensure that all necessary tools and parts are well prepared.
3. Please read each procedure carefully and comply with the instructions. Attempt to use easier ways may lead to dangers.
4. Please use safety goggles and other protective devices when necessary.
5. Wear insulating gloves and insulating steel protective shoes for good protection.
6. Please place a qualified fire extinguisher to an accessible place.
7. Keep the working place tidy and clean to prevent damage to parts caused by dirt entering the machine.
8. If possible, lower the platform to the lowest position. Otherwise, ensure that it is not lowered.
9. Place the safe supports as required.

1.3 Repair Safety Specifications

1. Unless otherwise specified, the following measures shall be taken before the machine is adjusted and repaired:
   - Park the machine on a piece of solid and flat ground.
   - Block non-steering wheels and ensure that the wheels will not rotate or move;
   - Disconnect the power supply, so the machine cannot be started.
   - All control devices shall be in the OFF status, preventing accidental starting of the operating system.
   - Before hydraulic elements are loosened or removed, ensure that the oil has been cooled to prevent scalding. Pressure of hydraulic oil in the hydraulic tubes shall be released.
   - All hydraulic part caps and plugs shall be taken when being installed. They shall not be removed in advance.
   - Before hydraulic components are installed, clean the junction surface using an oil-absorptive cloth to ensure the cleanness of the junction surface.
   - Please ensure that the forklift, crane, or other lifting or supporting equipment can support and stabilize weight to the lifted.
   - During repair, do not reuse disposable fasteners (like cotter pins and self-locking nuts) to prevent failures caused by reuse.
   - When an object is lifted or placed, pay attention to potential clamping risks from moving parts, swinging parts, or unstable parts.
2. Maintenance personnel training:

Maintenance personnel must check and maintain the machine according to requirements in this manual after being trained by qualified people. Attempt to use easier ways may lead to dangers.

3. Part replacement

This manual only applies to machines and components manufactured and sold by LGMG.

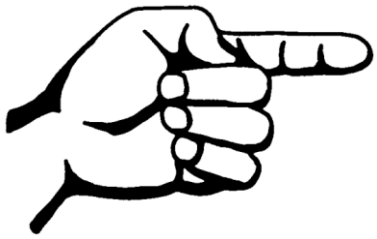
4. Service announcement

Users shall maintain and repair the machine according to service announcements released by LGMG.

5. Vehicle welding repair
   1) Stop the engine and disconnect the power supply.
   2) Staff shall be with work permits for special & dangerous operations.
   3) Clean flammable materials around the machine and apply for a hot work permit.
   4) Protect the vehicle body well and prevent splashing and fire.
   5) Operate the machine according to the welding process.
6. Cautions for battery maintenance
   1) Power loss is prohibited when the battery is stored. The battery shall be charged in time when power loss occurs.
   2) Know the charging time correctly. When the battery is used, control the charging time according to actual conditions and control the charging frequency according to the using frequency traveled distance.
   3) Prevent outdoor exposure. High temperature will increase pressure of system battery. Then, battery dehydration, battery activity declines, and polar plate ages. Therefore, the machine shall be parked in a shade place.
   4) Check the battery regularly. When the battery has a fault, it shall be delivered to the sales center or maintenance department of the agent for check and repair. In this way, the battery service life can be lengthened and the maintenance cost can be reduced maximally.

1.4 After Maintenance

1. Check the machine for part missing.
2. Check tightening of the fastener.
3. Check whether the oil is added to the corresponding position after the maintenance is completed.
4. Place the safety support to the original place.
5. Check whether the corresponding part is well repaired. Refer to the operator's manual for operating procedures of the machine.
6. Operate the machine to simulate the working condition and observe whether there is any other fault or oil leakage. Refer to the operator's manual for operating procedures of the machine.
7. Dispose waste oil correctly and take environmental protection measures on it.



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Chapter 2 Specifications

2.1 About This Chapter

This section includes technical parameters and functional parameters of the machine and provides repair technical parameters and debugging functional parameters after the machine is repaired.

This manual applies to:

SC0407E (S040700NDQ0CE8002),

SC0610E (S061000WDQ0CE8000)

2.1 Machine Parameters

2.1.1 Performance Parameters

SC0407E (S040700NDQ0CE8002)

Rated load	200 kg 442 lbs
Extending platform load	115 kg 254 lbs
Overall weight	800 kg 1768 lbs
Maximum number of working personnel Indoor Outdoor	 1 0
Maximum working height	6.5 m 21.3 ft
Maximum platform height	4.5 m 25.6 ft
Minimum turning radius	2.20 m 14.8 ft
Maximum travel speed (stored)	1.7±0.2 km/h 1.05±0.1 mph
Maximum travel speed (lifted)	0 km/h 0 mph
Maximum braking distance (stored with no load)	600 mm 23.6 in
Fork frame lifting time	20±2 s
Fork frame lowering time	20±2 s
Maximum manual power (indoor)	200 N
Maximum manual power (outdoor)	0 N
Theoretic maximum gradeability (no-load stored)	25%
Maximum allowable angle of chassis Direction X: left-right direction Direction Y: front-rear direction	 1.7° 1.7°
Maximum internal-wheel rotation angle	-
Maximum allowable wind speed	0 m/s 0 mph
Drive type	 Rear-wheel drive Rear-wheel steering

SC0610E (S061000WDQ0CE8000)

Rated load	250 kg 552.5 lbs
Extending platform load	120 kg 265 lbs
Overall weight	1600 kg 3536 lbs
Maximum number of working personnel Indoor Outdoor	 2 1
Maximum working height in out	 8.8 m 28.9 ft 6.5 m 21.3 ft
Maximum platform height in out	 6.8 m 22.3 ft 4.5 m 14.8 ft
Minimum turning radius	pivot steering
Maximum travel speed (stored)	2±0.2 km/h 1.24±0.1 mph
Maximum travel speed (lifted)	0 km/h 0 mph
Maximum braking distance (stored with no load)	600 mm 23.6 in
Fork frame lifting time	36±2 s
Fork frame lowering time	36±2 s
Maximum manual power (indoor)	400 N
Maximum manual power (outdoor)	200 N
Theoretic maximum gradeability (no-load stored)	30%
Maximum allowable angle of chassis Direction X: left-right direction Direction Y: front-rear direction	 2° 2.5°
Maximum internal-wheel rotation angle	-
Maximum allowable wind speed	12.5 m/s 28 mph
Drive type	 Rear-wheel drive Pivot steering

2.1.3 Main Dimensions

SC0407E (S040700NDQ0CE8002)

Overall length (with a ladder installed)	1475 mm 59 in
Overall length (with no ladder installed)	1325 mm 53 in
Overall width	780 mm 31.2 in
Overall height (guardrail high position)	1995 mm 79.8 in
Overall height (guardrail low position)	1795 mm 71.8 in
Working platform dimensions (LxW)	1290 mm * 700 mm 51.6 in * 28 in
Platform extension dimensions	600 mm 24 in
Wheel base	950±100 mm 38±4 in
Wheel track	630 mm 25.2 in
Minimum ground clearance (stored)	80 mm 3.2 in
Minimum ground clearance (lifted)	80 mm 3.2 in
Crawler specifications (width*pitch)	150 mm * 72 mm 6 in * 2.88 in

SC0610E (S061000WDQ0CE8000)

Overall length (with a ladder installed)	2052 mm 82 in
Overall length (with no ladder installed)	1907 mm 76 in
Overall width	990 mm 39.6 in
Overall height (unfolded guardrail)	2192 mm 87.7 in
Overall height (folded guardrail)	1992 mm 79.7 in
Working platform dimensions (LxW)	1895 mm * 730 mm 75.8 in * 29.2 in
Platform extension dimensions	900 mm 36 in
Wheel base	1550±20 mm 62±0.8 in
Wheel track	790 mm 31.6 in
Minimum ground clearance (stored)	115 mm 4.6 in
Minimum ground clearance (lifted)	115 mm 4.6 in
Crawler specifications (width*pitch)	200 mm * 72 mm 8 in * 2.88 in

2.1.4 Drive System

SC0407E (S040700NDQ0CE8002)

Travel reducer	
Rated output torque	47.5 N•m
Speed ratio	47.077:1

SC0610E (S061000WDQ0CE8000)

Travel reducer	
Rated output torque	330 N•m
Speed ratio	35:1

2.1.5 Hydraulic System

SC0407E (S040700NDQ0CE8002)

Function system	
Type	Open-type system
Pump displacement	1.6 ml/r
Maximum working pressure of the lifting system	21 MPa 3046 psi
Maximum working pressure of the steering system	-

SC0610E (S061000WDQ0CE8000)

Function system	
Type	Open-type system
Pump displacement	1.6 ml/r
Maximum working pressure of the lifting system	24 MPa 3480 psi
Maximum working pressure of the steering system	-

2.1.6 Electric System

SC0407E (S040700NDQ0CE8002)

Drive motor	
Rated voltage	16 V
Rated current	46 A
Rated power	0.7 kW
Rated speed	2400 r/min
Lifting motor	
Rated voltage	24 V
Rated current	145 A
Rated power	2 kW
Rated speed	3800 r/min
Battery	
Output voltage	12 V
Capacity	130 Ah (20-h discharge rate)
Charger	
Nominal AC input voltage	100 V - 240 V AC
Maximum AC input current	4.5 A
Nominal DC output voltage	24 V
Maximum DC output current	15 A
Control system voltage	24 V

SC0610E (S061000WDQ0CE8000)

Drive motor	
Rated voltage	16 V
Rated current	64 A
Rated power	1.8 kW
Rated speed	3000 r/min
Lifting motor	
Rated voltage	24 V
Rated current	145 A
Rated power	2 kW
Rated speed	3800 r/min
Battery	
Output voltage	12 V
Capacity	115 Ah (20-h discharge rate)
Charger	
Nominal AC input voltage	100 V - 240 V AC
Maximum AC input current	10.5 A
Nominal DC output voltage	24 V
Maximum DC output current	30 A
Control system voltage	24 V

2.1.7 Valve Coil Resistor Specifications

Coils working normally can provide electromagnetic force for solenoid valve operations. Coil accesses are important for normal operations. If the coil resistance is 0 or infinitely great, the coil has a fault.

Coil resistors have thermo-responsive characteristics. Therefore, once the resistance exceeds the regulated value, unstable operations can be caused. When the coil resistance is below the specified range, the current will increase. When it exceeds the specified range, the voltage will also increase.

When the coil resistance is beyond the specified range, the valve may work. Therefore, if the coil resistance is kept within the specified range, the valve can work normally within a wide working temperature range.

Specifications of the solenoid valve coil resistors:

30℃ cylinder valve-block assembly coil	5.38 Ω

2.2 Oil Filling Capacity

SC0407E (S040700NDQ0CE8002)

Hydraulic oil	4 L 0.88 gallons

SC0610E (S061000WDQ0CE8000)

Hydraulic oil	5.5 L 1.21 gallons

2.3 Torque Specifications

- Torque specifications shall meet the requirements when connectors and hose ends are removed or installed, or when new hoses or connectors are installed.
- For all hydraulic seals, important drive connectors, key procedures, etc. with definite torque tightening requirements, the torque tolerance range shall be 10%. For other parts, the reference torque range is 20%. If the tolerance range value is not an integer, record it through rounding off.
- When the seal leaks, the O-ring must be replaced. If the connector or the hose end tightening torque exceeds the specification range, the O-ring cannot be reused.
- Lubricate the O-ring before it is installed.
- Tighten the nut and connector to the corresponding torque values according to requirements listed in the table.
- Enable all machine functions and check the hose, connector, and related parts for leakage.

Table 1: Tightening torque table of Metric fitting bodies and plugs (unit: N•m)

Tube Diameter	Thread Specification (mm)	Connector		Plug
		E-type (N•m)	F-type (N•m)	VSTI-E (N•m)
6L	M10*1.0	27	22	16
8L	M12*1.5	37	32	27
10L	M14*1.5	58	48	37
12L	M16*1.5	75	58	58
15L	M18*1.5	95	75	70
18L	M22*1.5	140	115	95
22L	M27*2.0	190	160	140
28L	M33*2.0	325	220	235
35L	M42*2.0	470	295	380
42L	M48*2.0	565	380	/
6S	M12*1.5	42	37	/
8S	M14*1.5	53	48	/
10S	M16*1.5	75	58	/
12S	M18*1.5	95	75	/
14S	M20*1.5	130	85	/
16S	M22*1.5	140	105	/
20S	M27*2.0	190	180	/
25S	M33*2.0	325	325	/
30S	M42*2.0	470	345	/
38S	M48*2.0	565	440	/

Table 2 Tightening torque table of British fitting bodies and plugs (unit: N•m)

Tube Diameter	Thread Specification (Inch)	Connector Model		Plug
		E-type (N•m)	F-type (N•m)	VSTI-ED (N•m)
6L	G1/8A	22	16	16
8L	G1/4A	37	32	32
10L	G1/4A	37	32	/
12L	G3/8A	75	58	63
15L	G1/2A	120	95	85
18L	G1/2A	120	95	/
22L	G3/4A	190	160	140
28L	G1A	325	220	210
35L	G11/4A	470	315	470
42L	G11/4A	565	380	470
6S	G1/4A	42	37	/
8S	G1/4A	42	37	/
10S	G3/8A	85	63	/
12S	G3/8A	85	63	/
14S	G1/2A	120	95	/
16S	G1/2A	120	95	/
20S	G3/4A	190	160	/
25S	G1A	325	220	/
30S	G11/4A	470	315	/
38S	G11/2A	565	380	/

Table 3 Tightening torque table of American fitting bodies and plugs (unit: N•m)

Product Series	Thread UN/UNF	Direction-unadjustable Installation Torque (N•m)	Direction-adjustable Installation Torque (N•m)	Product Series	Thread UN/UNF	Direction-unadjustable Installation Torque (N•m)	Direction-adjustable Installation Torque (N•m)
EO-L	7/16-20 UN(F)	23	18	EO-S	7/16-20 UN(F)	20	20
	1/2-20 UN(F)	28	28		1/2-20 UN(F)	40	40
	9/16-18 UN(F)	34	34		9/16-18 UN(F)	46	46
	3/4-16 UN(F)	60	55		3/4-16 UN(F)	80	80
	7/8-14 UN(F)	115	80		7/8-14 UN(F)	135	135
	1-1/16-12 UN(F)	140	100		1-1/16-12 UN(F)	185	185
	1-5/16-12 UN(F)	210	150		1-5/16-12 UN(F)	270	270
	1-5/8-12 UN(F)	290	290		1-5/8-12 UN(F)	340	340
	1-7/8-12 UN(F)	325	325		1-7/8-12 UN(F)	415	415

Description:

1. Table 1 lists metric thread connectors, table 2 lists British thread connectors, and table 3 lists American thread connectors. Torque values allow＋10% of errors.
2. Torque values listed in tables 1, 2, and 3 are determined according to steel connecting materials. Torque values for aluminum connecting materials shall be 60% of values listed in tables 1, 2, and 3. non-integral values shall be recorded through rounding off.
3. Select torque values for Parker connectors according to names and specifications. Select torque values for common connectors according to thread specifications.

Examples are as follows:

1) GE 28 L M ED OMD A3C: GE refers to straight connectors. 28 refers to the tube diameter. L refers to common pressure. M refers to metric thread. ED refers to E-type elastic sealing. OMD indicates nut cutting ferrule is not equipped. A3C refers to surface galvanization. According to 28, L, M, and ED, torque value 325 N•m can be selected from table 1.
2) GE O 22 L R 3/4 OMD A3C: O refers to F-type O-seal. R refers to British thread. 3/4 indicates thread specification of G3/4. According to O, 22, L, and R3/4, torque value 160 N•m can be selected from table 2.
3) GE O 22 S R OMD CF: S refers to heavy-type pressure. According to O, 22, S, and R, torque value 160 N•m can be selected.

Table 4 Torque table of Metric thread swivel nut (unit: N•m)

Tube Diameter	Thread Specification	Tightening Torque (N.m)	Tube Diameter	Thread Specification	Tightening Torque (N.m)
06L	M12*1.5	16	06S	M14*1.5	27
08L	M14*1.5	22	08S	M16*1.5	42
10L	M16*1.5	32	10S	M18*1.5	53
12L	M18*1.5	42	12S	M20*1.5	63
15L	M22*1.5	58	14S	M22*1.5	80
18L	M26*1.5	90	16S	M24*1.5	85
22L	M30*2	115	20S	M30*2	125
28L	M36*2	135	25S	M36*2	180
35L	M45*2	220	30S	M45*2	260
42L	M52*2	345	38S	M52*2	370

Description:

1. Torque values listed in the table allows +10% of errors.
2. Torque values listed in the table are determined according to steel connecting materials. Torque values for aluminum connecting materials shall be 60% of values listed in table 1. Non-integral values shall be recorded through rounding off.
3. Select torque values for Parker rubber hoses, Right-angle connectors, and T-connectors according to names and specifications. Select torque values for common rubber hoses, Right-angle connectors, and T-connectors according to thread specifications.

Examples are as follows:

1) F481 CACF 2815 16: F481 refers to withhold type and rubber hose type; CACF indicates connectors at both ends; CA indicates 24° cone O-ring swivel nut; CF indicates 24° cone O-ring swivel nut 90 ° elbow; 2815 indicates the tube diameter of the connectors at both ends of the hose. Select torque values according to information above; 28 refers to end torque of 135 N•m and 15 refers to end torque of 58 N•m.
2) F412 SN CACF 1210 06: SN refers to heavy-type pressure hose; 12 refers to end torque of 63 N•m and 10 refers to end torque of 53 N•m.
3) EW 15 L OMD A3C: EW refers to right-angle combination connectors; select the torque of 58 N•m from table 1 according to 15 and L.
4) EL 10 L OMD A3C: EW refers to straight Tee combination connectors; select the torque of 32 N•m from table 2 according to 10 and L.

Table 5 Tightening torque table for common bolts (unit: N•m)

Bolt Strength Grade	Yield Strength (N/mm^2)	Nominal Bolt Diameter (mm)				
		6	8	10	12	14
		Tightening Torque (N.m)				
4.6	240	4~5	10~12	20~25	36~45	55~70
5.6	300	5~7	12~15	25~32	45~55	70~90
6.8	480	7~9	17~23	33~45	58~78	93~124
8.8	640	9~12	22~30	45~59	78~104	124~165
10.9	900	13~16	30~36	65~78	110~130	180~210
12.9	1080	16~21	38~51	75~100	131~175	209~278
Bolt Strength Grade	Yield Strength (N/mm^2)	Nominal Bolt Diameter (mm)				
		16	18	20	22	24
		Tightening Torque (N.m)				
4.6	240	90~110	120~150	170~210	230~290	300~377
5.6	300	110~140	150~190	210~270	290~350	370~450
6.8	480	145~193	199~264	282~376	384~512	488~650
8.8	640	193~257	264~354	376~502	521~683	651~868
10.9	900	280~330	380~450	540~650	740~880	940~1120
12.9	1080	326~434	448~597	635~847	864~1152	1098~1464
Bolt Strength Grade	Yield Strength (N/mm^2)	Nominal Bolt Diameter (mm)				
		27	30	33	36	39
		Tightening Torque (N.m)				
4.6	240	450~530	540~680	670~880	900~1100	928~1237
5.6	300	550～700	680~850	825~1100	1120~1400	1160~1546
6.8	480	714~952	969~1293	1319~1759	1694~2259	1559~2079
8.8	640	952~1269	1293~1723	1759~2345	2259~3012	2923~3898
10.9	900	1400~1650	1700~2000	2473~3298	2800~3350	4111~5481
12.9	1080	1606~2142	2181~2908	2968~3958	3812~5082	4933~6577

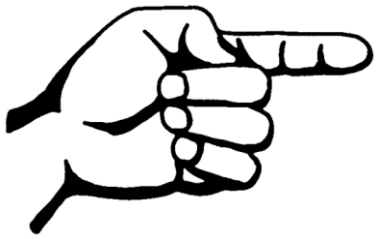
2.4 Key Procedure Table

SC0407E (S040700NDQ0CE8002)

No.	Part	Torque (N.m)	Remarks
1	Track roller assembly	90±9	
2	Motor fixing plate	300±30	
3	Lowering installation fork-frame assembly	52±5	
4	Lowering installation of platform assembly	28±3	

SC0610E (S061000WDQ0CE8000)

No.	Part	Torque (N.m)	Remarks
1	Track roller assembly	52±5	
2	Motor fixing plate	300±30	
3	Lowering installation fork-frame assembly	52±5	
4	Lowering installation of platform assembly	52±5	



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Chapter 3 Repair

3.1 About This Chapter

In this section, most procedures can only be performed by well-trained professional persons in proper workshops. Select proper repair procedures after faults are removed. Preform the dismantling procedure until the repair operation is completed. Reassemble the machine. The reassemble procedure is reverse to the disassembly procedure.

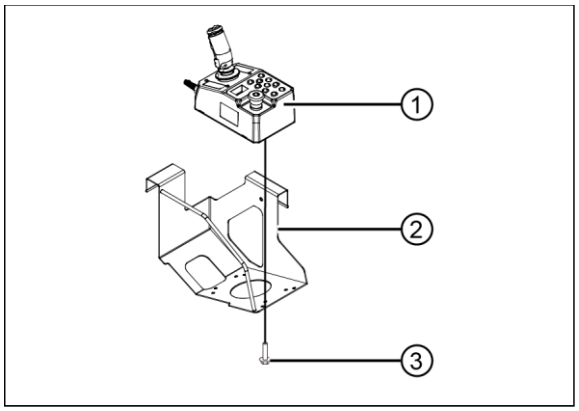
Please read and understand “safety rules” and “safety” carefully. Repair the machine as required. Attempt to use easier ways may lead to dangers.

The illustrations of the following repair procedures are examples.

- ✓ Indicates that specified results occur after a series of procedures are taken.
- × Indicates that incorrect results occur after a series of procedures are taken.

3.2 Platform Assembly

3.2.1 How to Replace the PCU



1. PCU assembly
2. Bracket
3. Bolt

1) Press the upper and lower red emergency stop buttons to make the machine stay in the open circuit position.
2) Disconnect the PCU harness and place them on one side.

NOTICE **If the cable harness or hose is twisted or squeezed, damage will be caused.**

3) Remove PCU fasteners and take down the PCU.
4) Install the PCU using a reversing way.

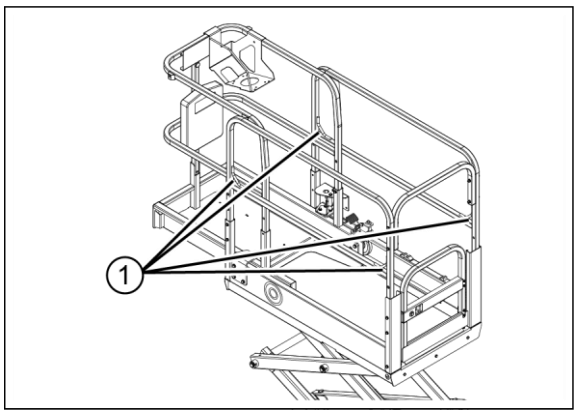
3.2.2 How to Dismantle the Platform Assembly

During the dismantling process, the extension platform is completely retracted and locked using a pedal.

⚠ WARNING **Special repair skills, lifting equipment, and proper workshops are required for procedures in this section. Death, serious injuries, or serious part damage may be caused when these skills and tools are unavailable.**

1) Drive the elevating work platform to the safe area (there is space for safe operations in the surrounding area).
2) Store the fork frame and rotate the key switch to the OFF position and unplug the key switch.
3) Press the red emergency stop switch to the OFF position.
4) Disconnect plugs connecting the platform controller assembly with the fork frame PCU harness and take the PCU controller from the platform.
5) Pull out PCU harness out from the platform and place it at the fork frame side (ensure that it will not be pressed when the platform is lifted).

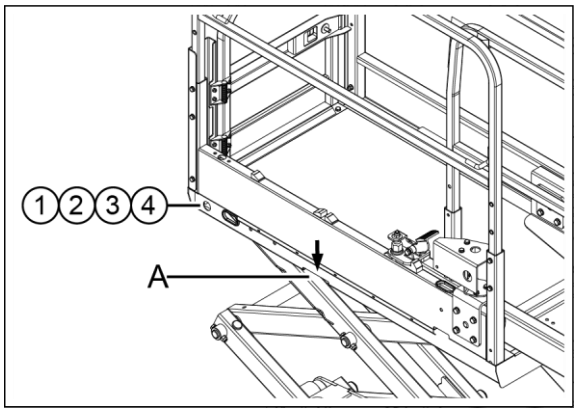
NOTICE **If the cable harness or hose is twisted or squeezed, damage will be caused.**



1. Lanyard fixing point

6) Connect the platform assembly to the traveling crane using lifting straps and ensure that the lifting straps are firm and reliable. The lifting straps shall be pulled out form the fixing point of the guardrail assembly cables.

NOTICE **When the platform is lifted, two anchor points on both sides of guardrails shall be used. Do not lift the platform using only one lifting strap.**



1. Bolt
2. Washer
3. Plug
4. Platform pin shaft

7) Remove fixed parts on both sides of the platform pin shaft.

8) Knock the platform pin shaft out using tools.

9) Adjust the traveling crane and remove platform sliding blocks from port A shown in the figure.

10) Adjust positions of the lifting straps, lift the platform steadily, and remove the platform from the place above the fork frame. Place it on the structure that supports the platform.

⚠ WARNING **When an object is lifted or placed, pay attention to potential clamping and smashing risks from moving parts, swinging parts, or unstable parts.**

11) Install the platform assembly according to procedures reverse to the dismantling ones.

Notice: Before the platform is lowered for installation, apply lithium-based grease on the contact surface between the bent plate under the platform assembly bottom and the sliding block. Ensure that clearance between the sliding block and the single side of the platform sliding rail is 1-2 mm. Control standard: The torque of the platform pin-shaft fixed bolt is 52±5 N.m.

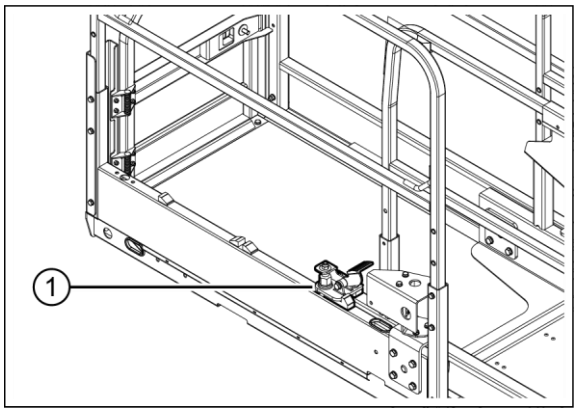
12) Check for clamping stagnation, abnormal sound, etc. after the installation process is finished.

3.2.3 How to Dismantle the Extension Platform Assembly

⚠ WARNING **Special repair skills, lifting equipment, and proper**

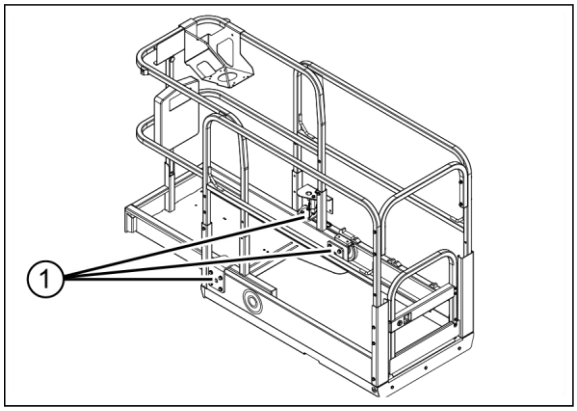
workshops are required for procedures in this section. Death, serious injuries, or serious part damage may be caused when these skills and tools are unavailable.

1) Remove the platform assembly and refer to “How to Dismantle the Extension Platform Assembly” for detailed dismantling procedures.



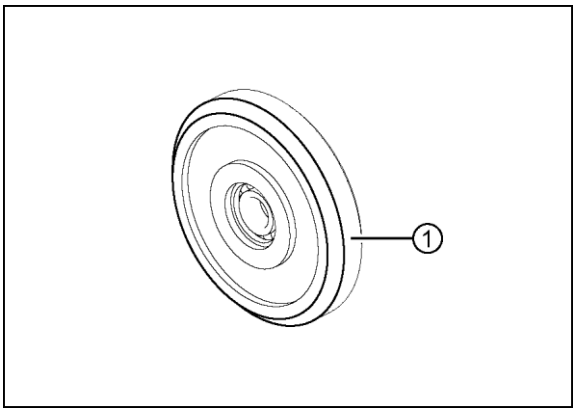
1. Pedal

2) Remove the pedal assembly.
3) Extend the extension platform completely.
4) Support the extension platform using the lifting equipment. Do not apply any lifting pressure.



1. Wheel carrier

5) Remove fasteners on the wheel carriers on both sides of the platform and remove the wheel carriers from the platform.
6) Remove the platform pulleys from the extension platform.
7) Make the extension platform slip out carefully and place it on the structure that supports the extension platform.
8) Install the extension platform through procedures reverse to the dismantling procedures.



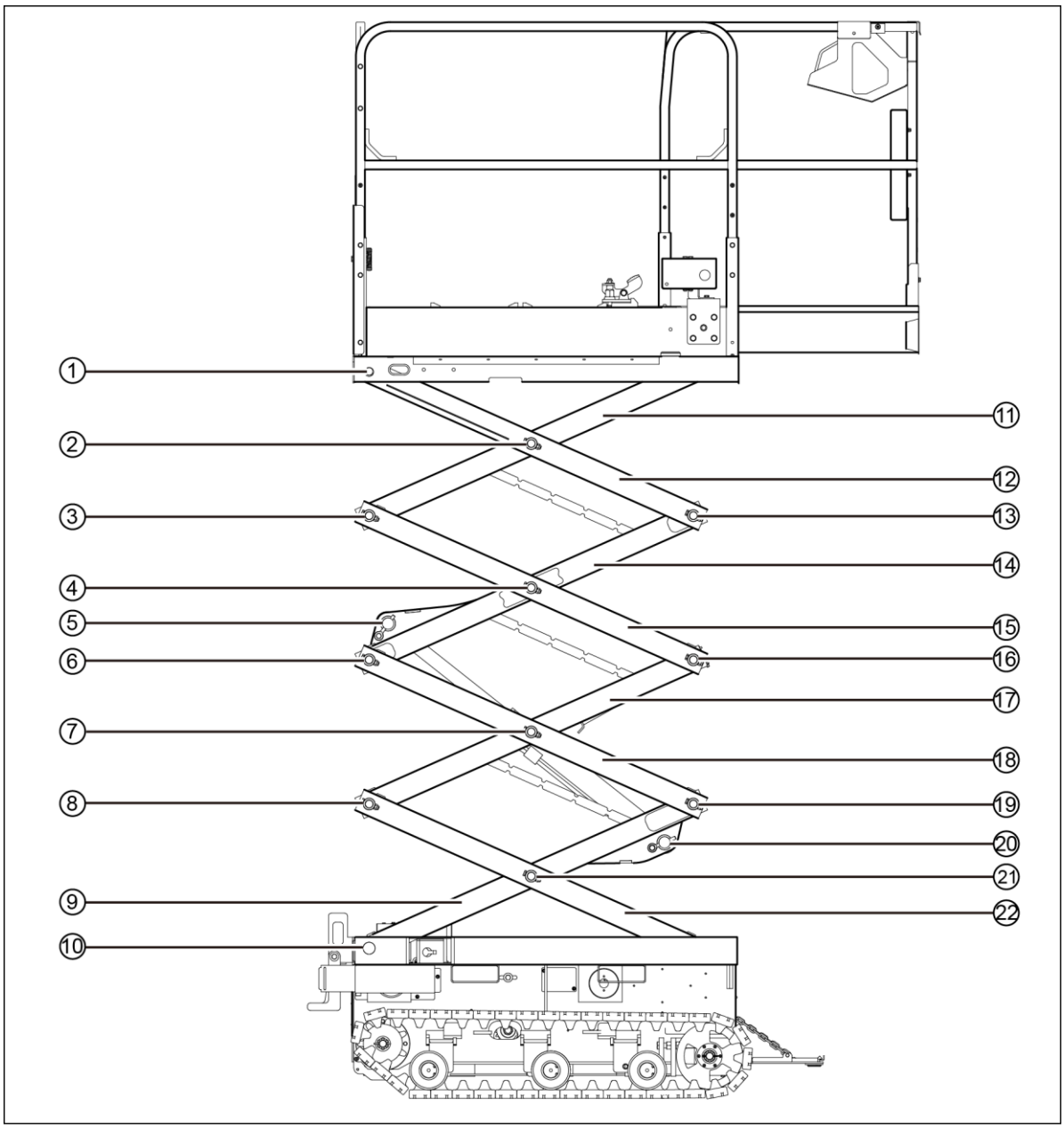
1. Wheel installation

Notice: The side of the main platform with a big wheel oblique angle is at the platform inside during installation. The side of the extension platform with a big wheel oblique angle is at the platform outside.

2. After the installation is completed, pull in and push out the extension platform. Test whether the spring pin has a function. Ensure that it does not interfere with the stopper.

9) Install the platform assembly to the fork frame and refer to “How to Dismantle the Extension Platform Assembly” for detailed procedures.

3.3 Fork-frame Assembly



No.	Name	No.	Name
1	Pin shaft 5 (non-steering end)	12	Weldment of the outer arm 4
2	Center pivot pin 4	13	Pin shaft 4 (steering end)
3	Pin shaft 4 (non-steering end)	14	Inner arm 3
4	Center pivot pin 3	15	Weldment of the outer arm 3
5	Cylinder-shaft at the upper-cylinder rod end	16	Pin shaft 3 (steering end)
6	Pin shaft 3 (non-steering end)	17	Inner arm 2
7	Center pivot pin 2	18	Weldment of the outer arm 2
8	Pin shaft 2 (non-steering end)	19	Pin shaft 2 (steering end)
9	Inner arm 1	20	Cylinder shaft at the lower lifting cylinder barrel shaft
10	Pin shaft 1 (non-steering end)	21	Center pivot pin 1
11	Inner arm 4	22	Weldment of the outer arm 1

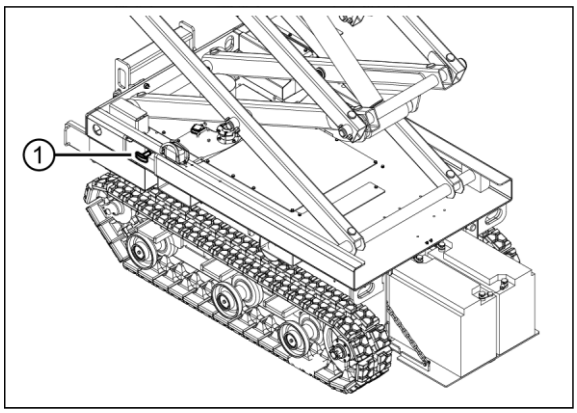
3.3.1 How to Dismantle the Fork Frame Assembly

After the fork frame is replaced, the platform load needs to be re-calibrated. Refer to “How to Conduct Full Load Calibration” for detailed load calibration.

⚠ WARNING **Special repair skills, lifting equipment, and proper workshops are required for procedures in this section. Death, serious injuries, or serious part damage may be caused when these skills and tools are unavailable.**

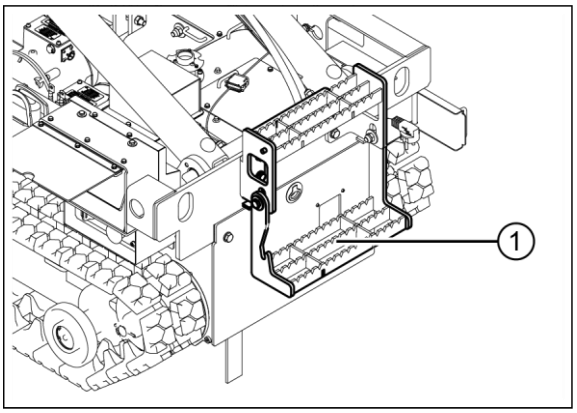
Notice: When hose components or connectors are removed, O-rings on the connectors/hoses must be replaced (if O-rings are equipped). All connections must be made according to specified torque values in the installation process. Refer to “Torque Specifications”.

1) Remove the platform assembly and refer to “How to Dismantle the Extension Platform Assembly” for detailed dismantling procedures.



1. Stay wire assembly

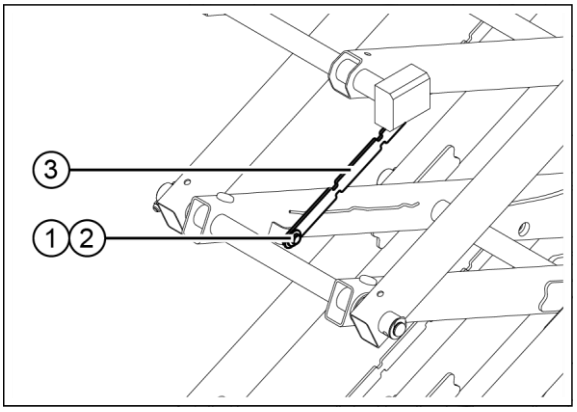
2) Release pressure from the oil cylinder using the stay wire assembly on the chassis.



1. Ladder

3) Remove the ladder at the non-steering end.

Notice: If the 1st-layer fork frame is not replaced or the ladder does not affect operation, this procedure can be omitted.



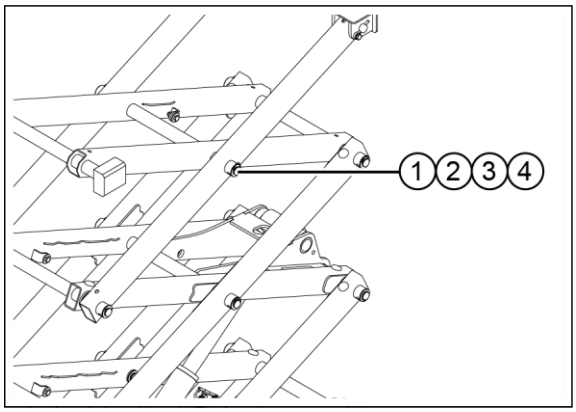
1. Bolt
2. Washer
3. Cable routing plate

4) Remove the cable routing plate and harness between the 3rd-layer fork frame and the 4th-layer fork frame.

NOTICE **If the cable harness or hose is twisted or squeezed, damage will be caused.**

5) Connect the lifting strap of the overhead

crane to weldment of the outer arm 4.



1. Bolt
2. Nut
3. Pin shaft
4. Shaft sleeve

6) Remove center pivot pins 4 on both sides of the fork frame.
7) Knock pin shaft 4 at the steering end using a soft metal hammer and remove weldment of the outer arm 4.

⚠ WARNING **When an object is lifted or placed, pay attention to potential clamping and smashing risks from moving parts, swinging parts, or unstable parts.**

8) Connect the lifting strap of the overhead crane to weldment of the inner arm 4.
9) Knock pin shaft 4 at the non-steering end using a soft metal hammer and remove the weldment of the inner arm 4.
10) Remove the cable routing plate and harness between the 2nd-layer fork frame and the 3rd-layer fork frame.
11) Connect the lifting strap of the overhead crane to the right weldment of outer arm 3.
12) Remove pin shaft 3 and center pivot pin 3 at the steering end and remove the right weldment of outer arm 3. Then, remove the left weldment of outer arm 3 using the same method.
13) Connect the lifting equipment straps to the lifting cylinder rod end. Do not apply the lifting force.

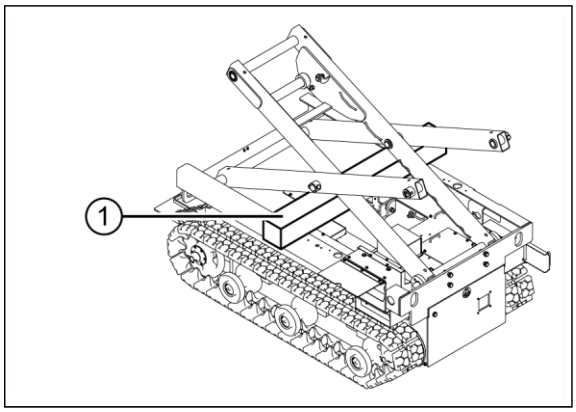
⚠ WARNING **Danger of smashing! If the support is improper, the oil cylinder may fall off and lead to crashing during lifting cylinder pin-shaft removal.**

14) Remove fasteners of the pin shaft at the lifting cylinder rod-end.
15) Knock the pin shaft out using a soft metal hammer.
16) Put down the lifting cylinder and remove the lifting straps.
17) Fix the lifting straps to the inner arm 3.
18) Remove the pin shaft 3 at the non-steering end and the inner arm 3.
19) Remove the cable routing plate and harness between the 1st-layer fork frame and the 2nd-layer fork frame.
20) Disconnect the lifting cylinder pressure-sensor harness.
21) Mark, disconnect, and block the hydraulic hose of the lifting cylinder. Install the cylinder connector.

⚠ WARNING **Danger of personal injury! Sputtered hydraulic oil will penetrate into or burn your skins, so the hydraulic connector**

shall be released slowly to release oil pressure. Oil injection or spraying is prohibited.

22) Remove the weldment of the outer arm 2. Refer to the method of removing the weldment of the outer arm 3 for the removing method.
23) Remove the weldment of the inner arm 2. Refer to the method of removing the weldment of the inner arm 4 for the removing method.
24) Connect the lifting strap of the lifting equipment to weldment of the inner arm 1 and lift the weldment by about 60 cm.



25) Place a cushion block (10cm*10cm*120cm) under the center pivot pin 1, which goes across both sides of the chassis.
26) Lower the fork frame to the cushion block.
27) Connect the lifting equipment strap to the lifting cylinder rod-end.
28) Lift the lifting cylinder to the vertical position.
29) Remove fixed parts at the barrel end of the lifting cylinder and then remove the lifting cylinder.

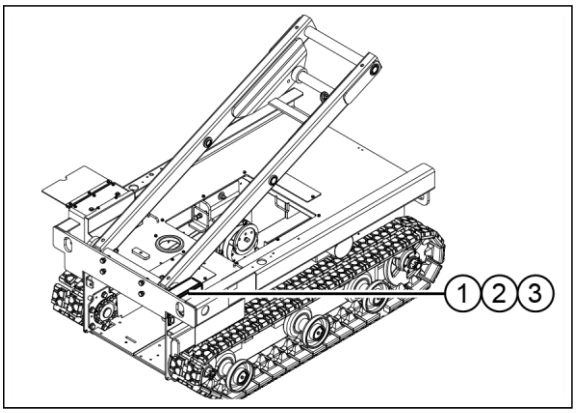
⚠ WARNING **Danger of smashing!**

During removal of the lifting cylinder pin shaft, falling and crashing may be caused if the support is not proper.

NOTICE **Danger of part damage!**

When the lifting cylinder is removed, do not damage the valve and sensor on the oil cylinder.

30) Connect the lifting equipment strap to the inner arm 1 at the steering end, lift the boom, and take the cushion block out.
31) Connect the lifting equipment strap to the weldment of the outer arm 1.
32) Remove the center pivot pin 1 and make the weldment of the outer arm 1 slip out.



1. Screw
2. Washer
3. Potentiometer shield

33) Remove the potentiometer shield.
34) Disconnect the angle sensor harness.
35) Remove the angle sensor from the potentiometer spacer.
36) Remove the potentiometer spacer fixed on the chassis potentiometer.
37) Fix the lifting equipment straps to the

weldment of the outer arm 1.

38) Remove the pin shaft 1 at the non-steering end and the weldment of the outer arm 1.

39) Install the fork frame according to procedures reverse to the dismantling procedures.

3.3.2 How to Replace the Fork Frame Sliding Block

⚠ WARNING **Special repair skills, lifting equipment, and proper workshops are required for procedures in this section. Death, serious injuries, or serious part damage may be caused when these skills and tools are unavailable.**

- **How to Replace the Platform Scissor-type Sliding Block**

1) Remove the platform assembly by referring to “How to Dismantle the Platform Assembly”.
2) Remove the sliding block and install a new one.

Notice: 1. Before the platform is lowered for installation, apply lithium-based grease on the contact surface between the bent plate under the platform assembly bottom and the sliding block.

2. After the platform is installed, ensure that the sum of clearances between the sliding blocks and both sides of the platform sliding rail is not greater than 1 mm.

3) Install the platform assembly.

Control standard: The torque of the platform pin-shaft fixed bolt is 52±5 N.m.

- **How to Replace the Chassis Scissor-type Sliding Block**

⚠ WARNING **Special repair skills, lifting equipment, and proper workshops are required for procedures in this section. Death, serious injuries, or serious part damage may be caused when these skills and tools are unavailable.**

1) Connect the lifting equipment lifting strap to the inner arm 1. Do not apply lifting power.
2) Remove the center pivot pin of the outer arm 1 and the pin shaft at the non-steering end. Make the weldment of the outer arm 1 slip out.
3) Replace the sliding block with a new one and re-install the weldment of the outer arm 1.

Notice: The sliding block opening faces upward when during block installation.

2. Apply lithium-based grease to the part from the sliding block at the fork frame rear end to the middle of the fork frame chassis.

Control standard: Sum of clearances between the sliding blocks and both sides of the platform sliding rail is not greater than 1 mm.

3.3.4 How to Replace the Lifting Cylinder

The lifting cylinder is equipped with a balance valve to prevent moving when the hydraulic system has a fault.

⚠ WARNING **Special repair skills, lifting equipment, and proper workshops are required for procedures in this section. Death, serious injuries, or serious part damage may be caused when these skills and tools are unavailable.**

Notice: When hose components or connectors are removed, O-rings on the connectors/hoses must be replaced (if O-rings are equipped). All connections must be made according to specified torque values in the installation process. Refer to "Torque Specifications".

1) Remove the platform assembly by referring to "How to Replace the Platform Assembly".
2) Remove the fork frame assembly by referring to "How to Dismantle the Fork Frame Assembly".

⚠ WARNING **Danger of personal injury!**
Sputtered hydraulic oil will penetrate into or burn your skins, so the hydraulic connector shall be released slowly to release oil pressure.
Oil injection or spraying is prohibited.

Notice: 1. Stress on the harness plug-connector is not allowed when the pressure sensor harness is bent.
2. The hydraulic hoses shall be fixed after being well arranged.
3. Fasten each oil tube and fork harness to the routing rail at the position 180-200 mm in rear of the valve block.

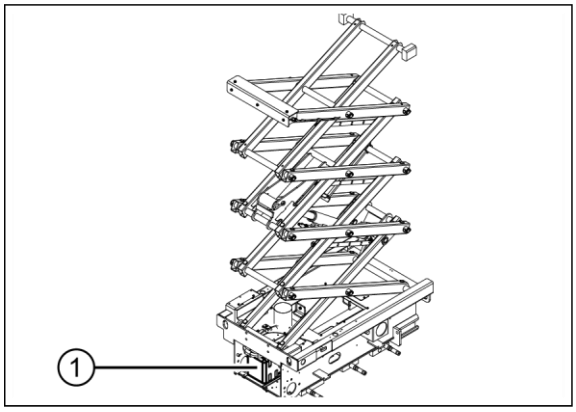
3.4 Chassis Assembly

3.4.1 How to Dismantle the Power Unit

After the power unit is replaced, conduct tests on the lifting pressure and steering pressure. If the pressure value is not within the standard value range, refer to “How to Debug the Steering Pressure” for the debugging methods.

⚠ WARNING **Danger of personal injury! Hydraulic oil injected will penetrate into or burn your skins. Release the hydraulic connector slowly to release oil pressure.**

Notice: When hose components or connectors are removed, O-rings on the connectors/hoses must be replaced (if O-rings are equipped). All connections must be made according to specified torque values in the installation process. Refer to “Torque Specifications”.



1. Power unit

1) Disconnect the power supply of the machine, press the upper/lower control emergency stop switch, and open the oil tank.
2) Disconnect the power unit harness.
3) Mark and disconnect the hydraulic hose. Block the hydraulic hose.

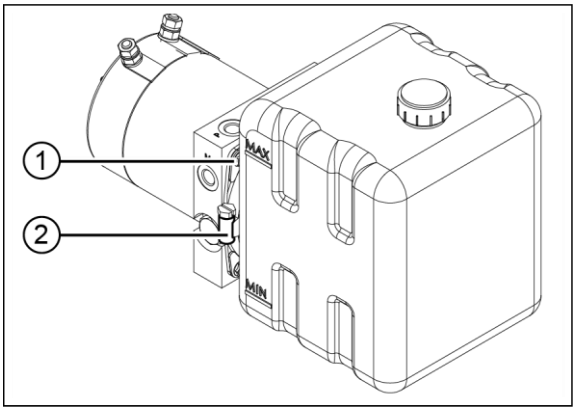
⚠ WARNING **Danger of part damage! Hydraulic oil injected will penetrate into or burn your skins. Release the hydraulic connector slowly to release oil pressure.**

4) Remove fixed parts below the power unit and remove the power unit.
5) Install the power unit according to procedures reverse to the dismantling procedures.

3.4.2 How to Dismantle the Hydraulic Oil Tank

1) Remove the power unit and refer to “How to Remove the Power Unit” for detailed dismantling methods.
2) Drain hydraulic oil in the hydraulic oil tank to a clean container.

Notice: If hydraulic oil needs to be replaced, add hydraulic oil of matched models after the installation is finished. Refer to the maintenance manual for detailed models.



1.Bolt

2.Hose clamp

3) Remove fasteners of the oil tank, release the hydraulic-oil tank hose clamp, and take the pump out from the hydraulic oil tank.

Notice: Remove the hydraulic oil tank carefully to prevent damage to the parts.

4) Install it according to procedures reverse to the dismantling ones. Fill hydraulic oil of matched models after the installation is finished.

5) Simulate operations on the machine to check for oil leakage after the tank is installed.

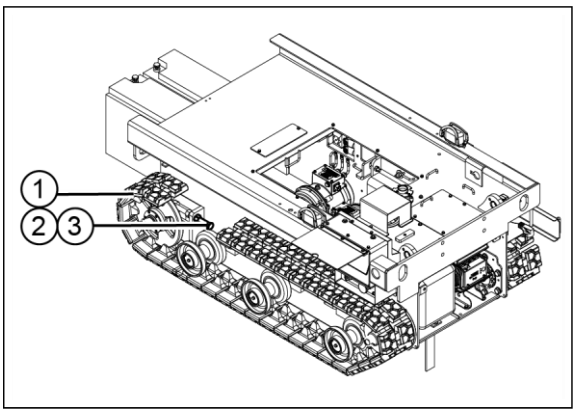
Notice: Dispose waste oil correctly and take environmental protection measures on it.

3.4.3 How to Replace the Crawler

1) Disconnect the machine power supply and press the emergency stop switch.

2) Connect the lifting equipment straps to lifting holes on the left and right of the chassis. Lift the chassis to proper height.

⚠ WARNING **Danger of tipping over! If the chassis is lifted too high, the machine has a risk of tipping over.**



1. Crawler assembly
2. Adjusting bolt
3. Nut

3) Unscrew the adjusting nut and adjusting bolt and move the idler backward until the crawler is loosened.

4) Remove the crawler assembly.

5) Install the crawler assembly according to procedures reverse to the dismantling procedures.

Notice: After the crawler assembly is installed, the tension must be adjusted using adjusting bolts.

Control standard: After the tension is adjusted, measure the distance from the tensioner to the sprocket pivot using a tape measure. Ensure that the distance

difference at both sides is ≤1mm.

3.4.4 How to Replace the Drive Motor

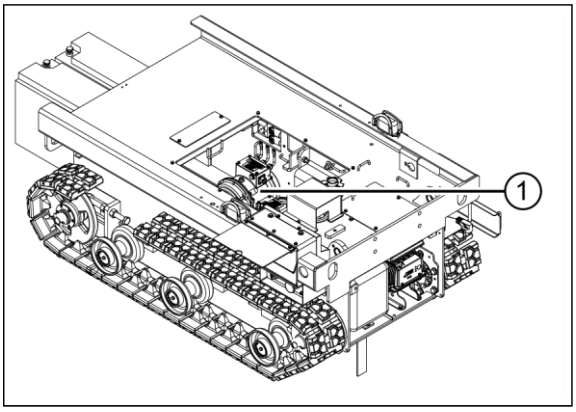
⚠ DANGER **Special repair skills, lifting equipment, and proper workshops are required for procedures in this section. Death, serious injuries, or serious part damage may be caused when these skills and tools are unavailable.**

NOTICE **Danger of part damage! Working area and device surface for this procedure must be clean. If any impurity enters the hydraulic system, serious part damage will be caused.**

1) Disconnect the machine power supply and press the emergency stop switch.
2) Dismantle the platform assembly by referring to “How to Dismantle the Platform Assembly”.
3) Dismantle the fork frame assembly by referring to “How to Dismantle the Fork Frame Assembly”.
4) Remove the fixed parts on the upper cover plate of the chassis. Take the upper cover plate down.
5) Mark and disconnect the drive motor harness.
6) Connect the lifting equipment straps to lifting holes on the left and right of the chassis. Lift the chassis to proper height.

⚠ WARNING **Danger of tipping over! If the chassis is lifted too high, the machine has a risk of tipping over.**

7) Fix the lifting strap to the drive motor using another lifting equipment.
8) Remove fixed parts of the motor mounting bracket and take the driven chain from the drive sprocket down.
9) Remove fixed parts of the drive sprocket and take the drive sprocket down.



1. Drive motor

10) Remove fixed parts of the reducer and motor mounting bracket; take the reducer and motor mounting bracket down.
11) Move the reducer and make it separated from the drive motor.

⚠ WARNING **Danger of smashing! When the reducer is moved, it may fall off due to insecure fixing.**

⚠ WARNING **Dangers of part damage! When the drive motor is removed, do not bump against the drive motor.**

12) Install the drive motor according to

procedures reverse to the dismantling procedures.

Notice: 1. The wiring terminal of the travel motor shall face upward when the motor is installed.

2. Before the motor is installed, you can installed the chain to the driver and pre-tighten the bolts. After the chain is tensioned, tighten all bolts.

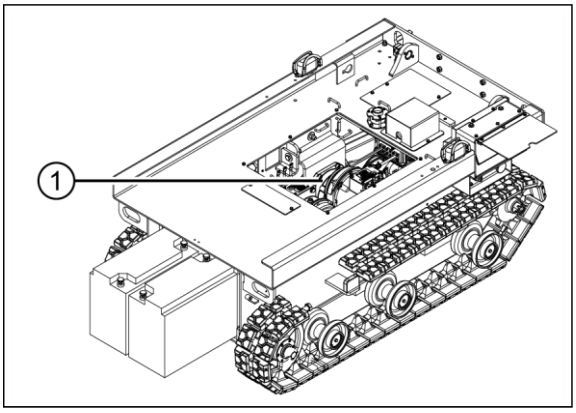
3. Ensure that the bracket is installed parallel to the chassis and there is no inclination.

3.4.5 How to Replace the Reducer

⚠ DANGER **Special repair skills, lifting equipment, and proper workshops are required for procedures in this section. Death, serious injuries, or serious part damage may be caused when these skills and tools are unavailable.**

NOTICE **Danger of part damage! Working area and device surface for this procedure must be clean. If any impurity enters the hydraulic system, serious part damage will be caused.**

1) Disconnect the machine power supply and press the emergency stop switch.
2) Remove the drive motor. Refer to “How to Replace the Drive Motor” for dismantling procedures.



1. Reducer assembly

3) Move the reducer and make it separated from the drive motor.

⚠ WARNING **Danger of smashing! When fasteners of the**

reducer assembly are moved, the reducer may fall off due to insecure fixing.

⚠ WARNING **Dangers of part damage!**

Do not bump against the reducer when the it is removed.

4) Install the reducer assembly according to procedures reverse to dismantling procedures.

Chapter 4 Debugging

4.1 About This Chapter

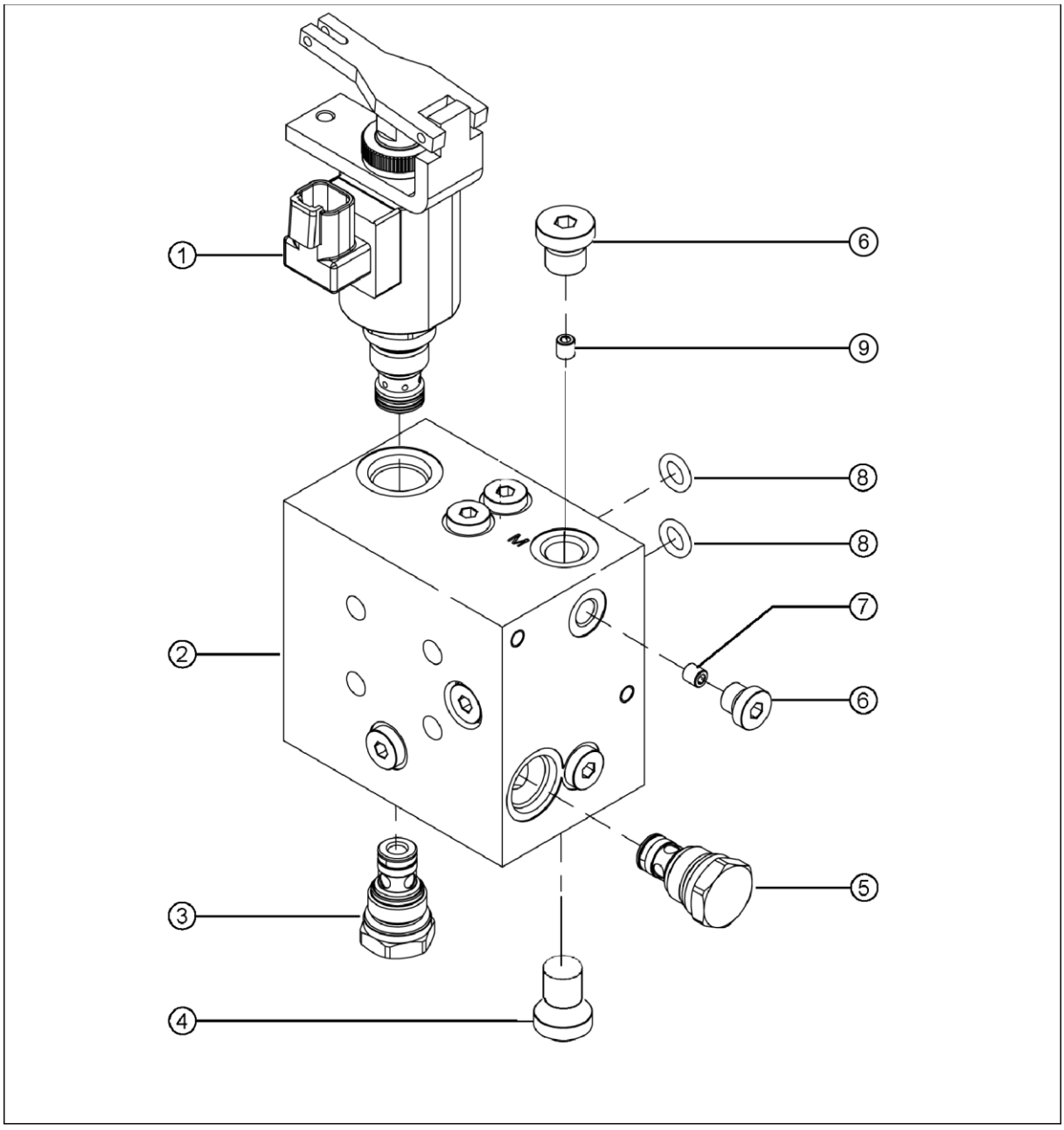
Before this machine is tested, please read and understand the operator's manual of this machine carefully to prevent mis-operations during the test. Store the fork and place it to a specified position after the test is finished.

Please read and understand sections "Safety Rules" and "Safety " carefully before the machine is debugged. Debug the machine as required. Attempt to use easier ways may lead to dangers.

Dedicated tool kit of LGMG is required: voltmeter, ohmmeter, pressure gauge, pressure measuring connector. Refer to the *Dedicated Test Tool Manual of Elevating Work Platforms*.

4.2 Valves

4.2.1 Cylinder Valve Block Assembly

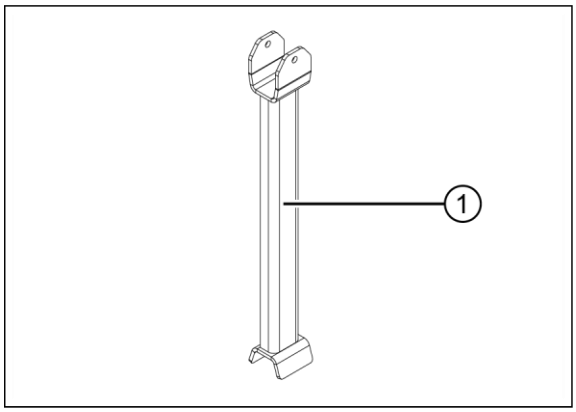


No.	Name	Function	Torque (N.m)
1	Proportional reversing valve	It controls the oil circuit ON/OFF and changes the flowing direction.	34-41
2	Valve block	-	-
3	One-way valve	It prevents the liquid from flowing in a reverse direction.	24.4-27.2
4	Plug		11-12
5	One-way valve	It prevents the liquid from flowing in a reverse direction.	40-45
6	Plug	-	25-28
7	Damper	It provides makes the valve works stably.	2
8	O-ring	-	-
9	Damper	-	2

4.2.2 How to Replace the Cylinder Valve Block Assembly

After the cylinder valve block is replaced, the valve block pressure needs to be debugged. Refer to “How to Debug the Lifting Pressure” for the method of debugging the lifting pressure.

1) Drive the machine to the safe area.



1. Safety protection arm

2) Lift the fork frame, place the protection arm downward vertically, store the fork frame, and make the protection arm to support the 1st inner arm assembly vertically.

⚠ WARNING **When the fork frame is lowered, your arms shall be away from the protection arm.**

3) Store the fork frame continuously for about 1 min and release pressure from the lifting cylinder.

Notice: Pressure in the hydraulic system may not be released completely using the stay wire assembly.

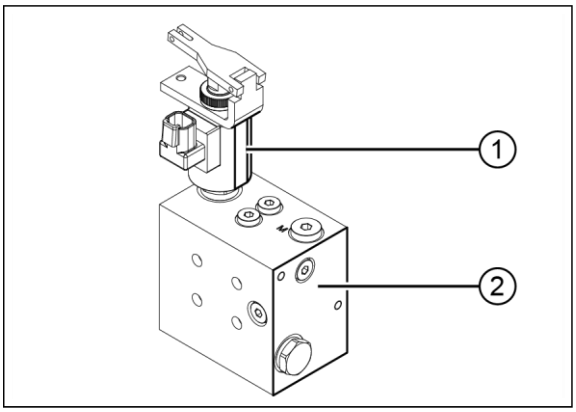
4) Remove the valve block guard assembly.

Notice: If this guard is not equipped, this procedure can be omitted.

5) Mark and disconnect the harness and hose. Block the hose.

⚠ WARNING **Danger of personal injury!**
Sputtered hydraulic oil will penetrate into or burn your skins, so the hydraulic connector shall be released slowly to release oil pressure. Oil injection or spraying is prohibited.

NOTICE **If the cable harness or hose is twisted or squeezed, damage will be caused.**



1. Proportional reversing valve
2. Lower cylinder valve block assembly

6) Remove the proportional reversing valve.

7) Remove fixed parts of the oil cylinder valve block and then the valve block.

8) Install the oil cylinder valve block according to procedures reverse to dismantling procedures.

Notice: 1. Before the lower oil cylinder valve block is installed, remove the valve block protective films and plugs, which shall not be removed in advance.
2. Before installation, clean the junction surface using an oil-absorptive cloth to

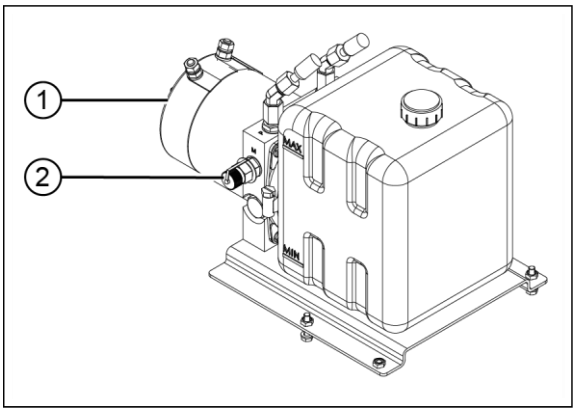
ensure the cleanness of the junction surface.

3. When the proportional reversing valve is installed, clearance between the pressure plate and fixed shaft shall be 1-2 mm.

4.2.3 How to Debug the Lifting Pressure

When the lifting pressure is tested, the angle sensor shall be short circuited.

1) Drive the complete machine to a piece of solid and level ground and ensure that there is no interference in the rear-upper after the machine is completely lifted.
2) Make the angle sensor short-circuited.



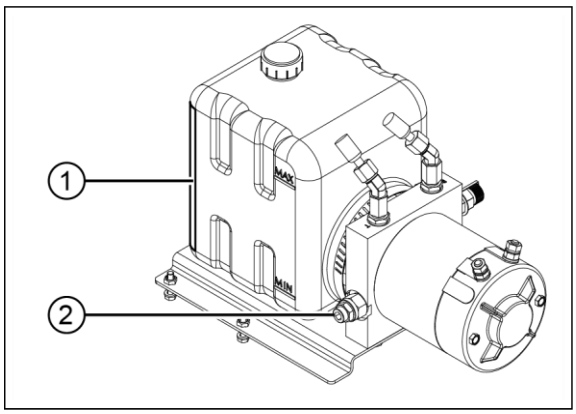
1. Power unit
2. Pressure measuring connector

3) Connect the pressure gauge to the power-unit pressure measuring connector.

Notice: Before the pressure measuring connector is replaced, clean the valve block to prevent pollution to the hydraulic system.

4) Lift the fork frame to the top and continue to lift it. Observe the value on the pressure gauge.

✓ Result: The maximum lifting pressure is 21±0.5 MPa.



1. Power unit
2. Overflow valve

5) If the lifting pressure is not within the standard value range, adjust the power unit overflow valve to make the lifting pressure reach the standard value.

4.3 How to Replace and Reset the Inclination Switch

The bubble-type inclination switch is used to measure changes in double-shaft inclination angles. When the chassis front-rear inclination or left-right inclination exceed the set maximum value, an inclination alarm will be reported. Refer the “Performance Parameters” for details.

⚠ WARNING **Danger of tipping over Nonstandard installation or calibration of the inclination switch can reduce the machine stability, leading to machine tipping over, death, or serious personal injuries. Unless otherwise specified, do not install or calibrate an inclination switch.**

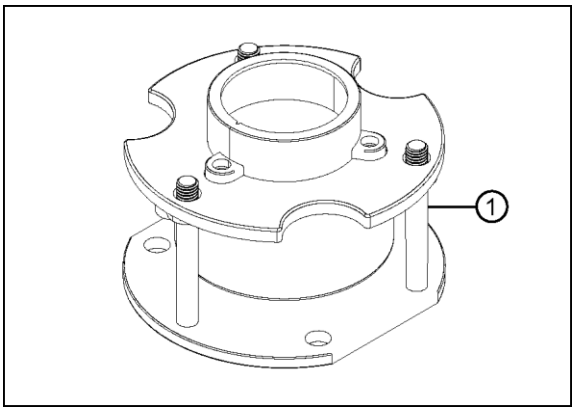
Notice: When an inclination switch is installed, the machine shall be parked on a piece of firm and flat ground. Check the levelness using a gradienter.

⚠ WARNING **An improperly calibrated switch may lead to tipping over.**

1) Drive the machine to a piece of solid and level ground and check whether it is horizontal using a gradienter.
2) Lift the fork frame until the safety protection arm is placed downward and vertically and lower the fork frame until it touches the assembly of the inner arm 1.

⚠ WARNING **When the fork frame is lowered, your arms shall be away from the protection arm.**

3) Disconnect the power supply and unplug the key switch.
4) Mark and disconnect the inclination switch harness from the chassis harness.



1. Inclination switch

5) Remove fixed parts of the inclination switch from the chassis. Remove the inclination switch.
6) Install the new inclination switch to the chassis.

Notice: During installation, ensure that the X-X shaft line of the inclination switch is vertical to the chassis center line (vertical to the chassis width direction) and the Y-Y shaft line is parallel to the chassis center line (vertical to the chassis width direction).

Notice: Keep the inclination switch mounting surface parallel with the measured target surface and reduce impacts of the dynamic condition and accelerated speed on the sensor when the inclination switch is installed.

⚠ WARNING **Nonstandard installation of the inclination switch can lead to machine tipping over, death, or serious personal injuries.**

7) Connect the inclination switch harness with the chassis harness.
8) Adjust fasteners for fixing the inclination switch until the bubble at the top of the inclination switch stays in the circle.
9) Zero setting:
   a) Press the reset key “ZERO” for 7s, release the key, and then press the reset key “ZERO” for three consecutive times.

Notice: During zero setting, press the key for three times within about 5s. Otherwise, the zero setting mode is exited. The machine returns to the normal working mode.

10) Rotate the key switch to the ground control mode and pull the upper-control and lower-control red emergency stop buttons out to the on-positions.

✓ Result: The inclination switch alarm is not reported.

11) Drive the machine until its left part reaches a slope with inclination lower than the maximum allowed value using the upper-control operating mode.

Notice: Refer to “Performance Test” for the maximum inclination angle.

✓ Result: The inclination alarm does not ring. All functions run normally.

12) Store the fork frame, operate the machine continuously, and drive the machine until its left part reaches a slope with the maximum inclination.

Notice: Refer to “Performance Test” for the maximum inclination angle.

✓ Result: The inclination alarm rings continuously, the inclination switch working indicator lamp turns red, and the lifting & driving are limited.

13) Store the fork frame. Drive the machine until its front part reaches a slope with inclination lower than the maximum allowed value using the upper-control operating mode.

Notice: Refer to “Performance Test” for the maximum inclination angle.

✓ Result: The inclination alarm does not ring. All functions run normally.

14) Store the fork frame. Drive the machine until its front part reaches a slope with the maximum allowed value using the upper-control operating mode.

Notice: Refer to “Performance Test” for the maximum inclination angle.

✓ Result: The inclination alarm rings continuously, the inclination switch working indicator lamp turns red, and the lifting & driving are limited.

15) Test the inclination switch on the other side using the same method.
16) After the debugging is completed, store the machine and parked it at a specified position.

4.4 How to Conduct No-load Calibration

For a machine with a platform overload system, correct calibration is quite important for machine safe operations. Improper calibration on the platform overload system may lead to the fact that the system cannot perceive the overload platform. The machine stability is reduced, leading to the tipping over.

Before the no-load calibration, clean loads inside the platform; any operation is not allowed during the calibration.

1) Drive the machine to a piece solid and level area.
2) Press the lower-control CONFIRMATION key and rotate the key switch to select the lower control mode.
3) Enter the 6-digit password “******” to enter the ECU system.
4) Select the “calibration” function and confirm it.
5) Select the “weighing” function and confirm it. Enable this function.
6) Select the “no-load calibration” for confirmation.
7) Press it for 5s to enter the calibration process. “No-load calibration” is displayed during this process. You just need to wait for the process is finished.
8) After the no-load calibration is finished, proceed with the full-load calibration.

4.5 How to Conduct Full-load Calibration

For a machine with a platform overload system, correct calibration is quite important for machine safe operations. Improper calibration on the platform overload system may lead to the fact that the system cannot perceive the overload platform. The machine stability is reduced, leading to the tipping over.

Before the heavy-load calibration, no-load calibration is required; any operation is not allowed during the calibration.

1) Drive the machine to a piece solid and level area.
2) Press the lower-control CONFIRMATION key and rotate the key switch to select the lower control mode.
3) Enter the 6-digit password “******” to enter the ECU system.
4) Select the “calibration” function and confirm it.
5) Select the “weighing” function and confirm it. Enable this function.
6) Select the “full-load calibration” and confirm it.
7) Press it for 5s to enter the calibration process. “Full-load calibration” is displayed during this process. You just need to wait for the process is finished.
8) After the calibration is finished, an overload alarm test shall be conducted. Test the alarm and operation stopping in the condition when the rated load can be lifted to the top while the overload cannot.

4.6 How to Conduct Upper/Lower Limit Calibration

Before the calibration is started, drive the machine to a solid and level area and keep the machine is not interfered when being lifted.

1) Place the test load to the platform center and fix it using the lifting equipment.

⚠ WARNING **Danger of smashing! When an object is lifted or placed, pay attention to potential clamping and smashing risks from moving parts, swinging parts, or unstable parts.**

Notice: Refer to "Performance Parameters" of corresponding models for detailed weight.

2) Lift the platform to the maximum limit height.

Notice: Refer to "performance parameters" of corresponding models for detailed lifting height.

3) Enable the angle simulation upper limit and angle simulation lower limit during ECU function configurations.
4) Find the angle simulation upper limit function according to the ECU weighing function. Press the upper limit function key for 5s to conduct upper limit calibration. Calibration completion will be displayed.
5) After the upper limit calibration is completed, measure the height again using a laser range finder. Check whether the height is within the standard range. If not, re-calibrate it to the standard range.

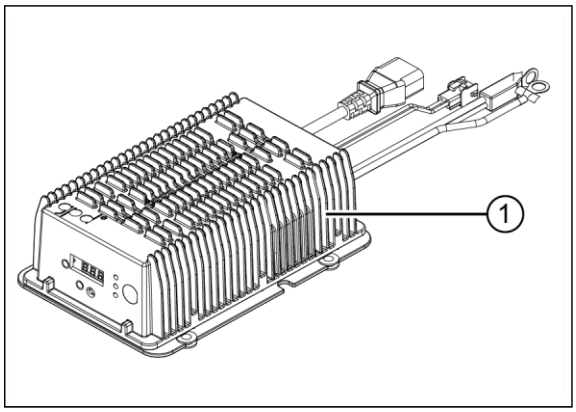
Notice: Refer to "performance parameters" of corresponding models for detailed lifting height.

6) After the upper limit calibration is completed, lift the machine until the distance between the 1st layer fork frame and the 2nd layer fork frame is 200-300 mm. conduct the lower limit calibration according to the upper limit calibration procedures.
7) Store the fork frame and remove the test load.

4.7 Charger Test

The charge is used for battery charging.

1) Drive the machine to the charging test area and charge the machine.



1. Charger

2) Check whether the machine can be normally charged. After the charger is connected with the power supply, the charger shows the voltage, current, battery percentage, and bns in sequence.

3) Check whether the charging program displays information correctly. “bns” indicates a communication fault, which shall be recorded and fed back.

Notice: The machine cannot work when being charged.

Chapter 5 Appendix

5.1 About this Chapter

When a fault occurs, the fault code table in this section can help the service personal to check the fault cause.

Dedicated tool kit of LGMG is required: voltmeter, ohmmeter, pressure gauge, pressure measuring connector. Refer to the *Dedicated Test Tool Manual of Elevating Work Platforms*.

5.2 Compliance and Obedience

1. Mark damaged or faulty machine in time and remove it from service equipment.
2. Before the machine is operated, repair all machine damage or faults.
3. Trained and qualified personnel shall remove the faults and execute the maintenance procedures.
4. Except as otherwise noted, please execute the maintenance procedures:
   - Park the machine on a piece of solid and flat ground.
   - Rotate the key switch to the open-circuit position and remove the key switch.
   - Press the red upper/lower control emergency stop switch.
   - Block non-steering wheels and ensure that the wheels will not rotate or move;
   - Disconnect the power supply, so the machine cannot be started.
   - The platform is stored.

5.3 Before Fault Removal

1. Read, understand, and comply with safety rules and operating instructions in related manuals of the machine.
2. Ensure that all necessary tools and testing equipment can be normally used.
3. Read each adaptive code carefully. Trying easier methods may lead to dangers.
4. Pay attention to the following dangers and comply with recognized safety workshop methods:

⚠ DANGER **Danger of smashing!**
When any hydraulic component is tested or replaced, keep the structure supported to prevent it from moving.

⚠ WARNING **Danger of electric shock/scalding!**
Touching energized circuits may lead to death or serious injuries. Take off all rings, watches, and other ornaments.

⚠ WARNING **Danger of personal injury!**
Sputtered hydraulic oil will penetrate into or burn your skins, so the hydraulic connector shall be released slowly to release oil pressure. Oil injection or spraying is prohibited.

✓ Indicates that specified results occur after a series of procedures are taken.

× Indicates that incorrect results occur after a series of procedures are taken.

5.4 Fault Code

In an alarm status, the alarm code flashes once a second on the PCU display screen and displays while does not flash on a ECU display screen.

Differences in configurations and software versions will affect some functions. The fault codes are displayed according to the actual functions.

5.4.1 Fault Code and Check Guidance

Indication	Description	Machine Response	Fault Check Guidance
01	System initialization error	All operations are prohibited.	Restart the equipment or replace the ECU.
02	System communication error	All operations are prohibited.	Check connections of the communication cables and other cables. If the fault cannot be removed, please replace the PCU or ECU.
03	Machine type error	All operations are prohibited.	Enter the parameter adjustment menu and modify the machine mode.
05	BMS communication fault	Lifting and traveling are prohibited.	Check whether the CAN bus is well connected or replace the lithium battery.
06	Prompt of successful remote-parameter sending	Only the alarm is displayed.	
08	Prompt of successful weighing- and calibration data sending	Only the alarm is displayed.	
09	Pedal failure alarm	Lifting and traveling are prohibited.	Release the foot switch. If the fault cannot be removed, check the harness connection (with short circuit or not).
10	Height restriction barrier triggered	Lifting and traveling are prohibited.	This alarm can be canceled if lowering occurs.
11	High/low limit exception	Only the alarm is displayed.	Re-calibrate the upper limit or the outdoor limit.
12	Chassis up/down key pressing error	All chassis control is stopped.	Check whether the chassis up/down key is pressed when the machine is energized or replace the ECU.
14	Motor controller 1 communication failure	Lifting and traveling are prohibited.	Check whether the CAN bus is well connected or change the electric drive type.
15	Motor controller 2 communication failure	Lifting and traveling are prohibited.	Check whether the CAN bus is well connected or change the electric drive type.
16	BMS sending fault	Refer to *BMS Fault Display and Description* for details.	Check whether the CAN bus is well connected or replace the lithium battery.
18	Pit protection error	Lifting and traveling are prohibited.	Pit protection error: Check whether the pit protection function is enabled; check the pit protection limit switch. Check the switch wiring and lower limit switch & wiring.
23	Triggering of traveling prohibited after lifting	Traveling is prohibited.	This prompt can be canceled if lowering occurs.
27	Lowering proportional valve fault	Lifting and traveling are prohibited.	Check or replace the lowering proportional valve.
31	Pressure sensor fault	Lifting and traveling are prohibited.	Check the sensor wiring and the sensor itself. Or, check and confirm whether the sensor is not installed while the weighing function is enabled.
32	Angle sensor fault	Lifting and traveling are prohibited.	Check the sensor wiring and the sensor itself. Or, check and confirm whether the sensor is not installed while the weighing function is enabled.
33	Light-load not calibrated	Lifting is prohibited.	Calibrate the light load or disable the double-load function.

Indication	Description	Machine Response	Fault Check Guidance
34	Lowering after overloading	With no response	This fault is not displayed and is used for reminding the operator only.
35	The no-load calibration and full-load calibration are reversed.	With no response	Conduct the no-load calibration again.
36	Low battery voltage	High-speed traveling is prohibited.	Charge the battery in time if the battery is low; if the battery is normal, check the wiring or replace the ECU.
38	Calibration error: Please recalibrate it.	Lifting is prohibited.	Re-calibrate
40	GPS communication fault	With no response	Check whether the CAN bus is well connected or replace the GPS equipment.
41	GPS level-1 locking	Lifting is prohibited.	Unlock or connect the GPS equipment.
42	The left key on the handle is pressed before the machine is started.	With no response	Ensure that the key on the handle is not pressed by any object. If the key is not pressed by any object, consider to replace the handle or the PCU.
43	The right key on the handle is pressed before the machine is started.	With no response	Ensure that the key on the handle is not pressed by any object. If the key is not pressed by any object, consider to replace the handle or the PCU.
44	ZAPI1 fault (AC pump motor-parameter setting fault)	With no response	Replace the motor driver or contact the manufacture.
45	ZAPI2 fault (AC pump motor-hardware fault)	With no response	Replace the motor driver or contact the manufacture.
46	The enabling key on the handle is pressed before the machine is started.	Any PCU operation is prohibited.	Ensure that the key on the handle is not pressed by any object. If the key is not pressed by any object, consider to replace the handle or the PCU.
47	The handle is not in the mid-position before the machine is started.	With no response	Confirm that the handle is in the mid-position and check the mid-position parameters. If the parameters are correct, try to replace the PCU or the handle.
49	AC pump motor: motor check fault	With no response	Replace the motor driver or contact the manufacture.
50	AC pump motor contactor-type fault	With no response	Replace the motor driver or contact the manufacture.
51	Wireless anti-collision alarm	Lifting is prohibited.	This alarm can be canceled if lowering occurs.
52	Forward valve fault	Lifting and traveling are prohibited.	Check connections of the coil and ensure that there is no problem. If there is no problem, check whether the coil is open-circuited or short-circuited.
53	Backward valve fault	Lifting and traveling are prohibited.	Check connections of the coil and ensure that there is no problem. If there is no problem, check whether the coil is open-circuited or short-circuited.
54	Lifting valve fault	Lifting and traveling are prohibited.	Check connections of the coil and ensure that there is no problem. If there is no problem, check whether the coil is open-circuited or short-circuited.
55	Lowering switch valve fault	Lifting and traveling are prohibited.	Check connections of the coil and ensure that there is no problem. If there is no problem, check whether the coil is open-circuited or short-circuited.
56	Left-steering valve fault	Lifting and traveling are prohibited.	Check connections of the coil and ensure that there is no problem. If there is no problem, check whether the coil is open-circuited or short-circuited.

Indication	Description	Machine Response	Fault Check Guidance
57	Right-steering valve fault	Lifting and traveling are prohibited.	Check connections of the coil and ensure that there is no problem. If there is no problem, check whether the coil is open-circuited or short-circuited.
58	Brake coil fault	Lifting and traveling are prohibited.	Check connections of the coil and ensure that there is no problem. If there is no problem, check whether the coil is open-circuited or short-circuited.
60	Motor controller fault	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
61	Motor controller current-sensor fault	With no response	Replace the motor driver or contact the manufacture.
62	Motor-controller hardware damage fault	With no response	Replace the motor driver or contact the manufacture.
63	Motor controller output fault	With no response	Replace the motor driver or contact the manufacture.
64	Motor controller SRO fault	With no response	Replace the motor driver or contact the manufacture.
67	Motor controller HPD fault	With no response	Replace the motor driver or contact the manufacture.
68	Low voltage fault	Lifting and high-speed traveling are prohibited.	Charge the battery in time; if the battery is normal, check the wiring or replace the ECU. Refer to table 2 for details.
69	High/neutral current fault of the motor controller	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
70	Motor-controller steering input out of range	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
71	Motor controller contactor fault	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
73	Motor controller overheating	With no response	Replace the motor driver or contact the manufacture.
74	Motor controller fault	With no response	Replace the motor driver or contact the manufacture.
75	Motor controller pump-motor fault	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
76	Motor controller left drive-motor fault	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
77	Motor controller right drive-motor fault	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
78	Motor controller pump-motor short-circuit	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
79	Left drive-motor short-circuit fault	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
80	80% weight alarm	With no response	Load on the platform approaches the load limit and load increase shall be considered prohibited.
81	Right drive-motor short-circuit fault	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
82	Left-brake coil fault	Lifting and traveling are prohibited.	Check connections of the coil and ensure that there is no problem. If there is no problem, check whether the coil is open-circuited or short-circuited.
83	Right-brake coil fault	Lifting and traveling are prohibited.	Check connections of the coil and ensure that there is no problem. If there is no problem, check whether the coil is open-circuited or short-circuited.

Indication	Description	Machine Response	Fault Check Guidance
84	Motor POST Short Fault	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
89	Motor excitation open-circuit fault	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
90	90% weight alarm	With no response	Load on the platform approaches the load limit and load increase shall be considered prohibited.
91	Motor excitation short-circuit error	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
92	Motor excitation short-circuit error	Lifting and traveling are prohibited.	Replace the motor driver or contact the manufacture.
93	AC pump fault: brake-type fault	With no response	Replace the motor driver or contact the manufacture.
94	AC pump fault: driver temperature fault	With no response	Replace the motor driver or contact the manufacture.
95	AC pump fault: motor temperature fault	With no response	Replace the motor driver or contact the manufacture.
96	AC pump fault: voltage or battery level exception	With no response	Replace the motor driver or contact the manufacture.
97	AC pump fault: CANBUS ANBUS communication fault	With no response	Replace the motor driver or contact the manufacture.
98	AC pump fault: speed-sensor fault	With no response	Replace the motor driver or contact the manufacture.
99	99% weight alarm	With no response	Load on the platform approaches the load limit and load increase shall be considered prohibited.
100~114	Three-phase AC motor driving-node 8 fault (display of 100-114)	With no response	Replace the motor driver or contact the manufacture.
115~128	Three-phase AC motor driving-node 9 fault (display of 115-128)	With no response	Replace the motor driver or contact the manufacture.
129~142	Three-phase AC motor driving-node A fault (display of 129-142)	With no response	Replace the motor driver or contact the manufacture.
LL	Machine inclination exceeding the safety limit	Lifting and traveling are prohibited.	If the machine is inclined, try to level it. If it is not inclined, check the level sensor wiring and the sensor and recalibrate the in-built inclination.
OL	Overload	Lifting, traveling, and lowering are prohibited.	Remove the overweighted load immediately.
dL	Handle line breaking fault	All operations in the upper-control mode are prohibited and all operations in the lower-control mode are normal.	PCU internal fault: Check whether the handle connecting line is loosened, damaged, or broken before the machine is energized or during machine operations. Display: PCU——dL ECU——144

5.4.2 Fault Display Description

BMS Sends Fault Data ID: 0X53 Fault Data Bit	ECU Actual Display	PCU Actual Display	Machine Response
Bit0: Excessive differential pressure 2	Excessive differential pressure 2	16	Machine operation is prohibited.
Bit1: Excessive temperature difference 2	Excessive temperature difference 2	16	Machine operation is prohibited.
Bit2: Ultra-high discharge temperature 1	Ultra-high/low discharge temperature 1	16	Lifting is prohibited. Limping is allowed
Bit3: Ultra-high discharge temperature 2	Ultra-high/low discharge temperature 2	16	Machine operation is prohibited.
Bit4: Ultra-low discharge temperature 1	Ultra-high/low discharge temperature 1	16	Traveling with low power and lifting with low power
Bit5: Ultra-low discharge temperature 2	Ultra-high/low discharge temperature 2	16	Machine operation is prohibited.
Bit6: Ultra-high discharge current 1	Ultra-high discharge current 1	16	(1) When the SOC is greater than 10%, the VCU displays a 16-digit fault code and an audible and visual alarm is displayed. Traveling with low power and lifting with low power (2) When the SOC is lower than 10%, the VCU displays a 68-digit fault code and an audible and visual alarm is displayed. Limping is allowed and the lifting is prohibited.
Bit7: Ultra-high discharge current 2	Ultra-high discharge current 2	16	Machine operation is prohibited.
Bit0: Ultra-low total voltage in normal temperature 1	68 low voltage fault	68	
Bit1: Ultra-low total voltage in low temperature 1	68 low voltage fault	68	
Bit2: Ultra-low total voltage in normal temperature 2	BMS fault: low total voltage in normal/low temperature 2	16	
Bit3: Ultra-low total voltage in low	BMS fault: low total voltage in normal/low	16	

BMS Sends Fault Data ID: 0X53 Fault Data Bit	ECU Actual Display	PCU Actual Display	Machine Response
temperature 2	temperature 2		
Bit4: Ultra-high unit battery voltage in normal temperature 1	68 low voltage fault	68	Limping
Bit5: Ultra-high unit battery voltage in low temperature 1	68 low voltage fault	68	Limping
Bit6: Ultra-low unit battery voltage in normal temperature 2	BMS fault: ultra-low unit battery voltage in normal/low temperature 2	16	Machine operation is prohibited.
Bit7: Ultra-low unit battery voltage in low temperature 2	BMS fault: ultra-low unit battery voltage in normal/low temperature 2	16	Machine operation is prohibited.
Bit0: voltage collection fault	BMS fault: voltage collection fault	16	
Bit1: temperature collection fault	BMS fault: current collection fault	16	
Bit2: Ultra-high feedback current fault 1	BMS fault: ultra-high feedback current fault 1	16	Machine operation is prohibited.
Bit3: Ultra-high feedback current fault 2	BMS fault: ultra-high feedback current fault 2	16	Machine operation is prohibited.
Bit4: Reserved, default value: 0			
Bit5: Reserved, default value: 0			
Bit6: Reserved, default value: 0			
Bit7: Reserved, default value: 0			

5.4.3 Controller fault codes

Error code	Effect	Condition	Restart procedure	MDI/LED CODE	CAN CODE	ZAPI CODE
WAITING FOR NODE	MC is opened, EB is applied, Traction/Pump stopped	Start-up, stand-by, running	Key re-cycle	0	0	224
BATTERY LOW	According to parameter BATTERY CHECK (SET OPTIONS listErrore.L'origine riferimento non è stata trovata.).	Start-up, standby, running	Battery recharge, key re-cycle	0	FF42	66
DATA ACQUISITION	Traction is stopped	Controller calibration	Traction request	0	0	247
CHECK UP NEEDED		Start-up	Check-up done, key re-cycle	0	0	249
RPM HIGH	MC is opened, Traction/Pump stopped	Start-up, standby, running		0	FFA1	161
BUMPER STOP	Traction is stopped	Start-up, standby, running		0	FFA2	162
WARNING SLAVE	It depends on the supervisor microcontroller			1	FF01	244
ACQUIRING A.S.		Sensor Acquiring	Key re-cycle	2	FFAB	171
ACQUIRE END		Sensor Acquiring	Key re-cycle	2	FFAD	173
ACQUIRE ABORT		Sensor Acquiring	Key re-cycle	2	FFAC	172
OFFSET SPD.SENS.	EB is applied, Traction/Pump, valves stopped.	Start-up	Perform ABS SENS. ACQUIRE	3	FF99	174
SPEED FB.ERR. XX	MC is opened , EB is applied, EVP stopped	Running	Valves or Traction/Pump request	3	FFA8	168
ED SLIP MISMATCH	MC is opened, EB is applied, Traction/Pump stopped	Running	Valves or Traction/Pump request	7	FFA3	163
WATCHDOG	MC is opened, EB is applied, Traction/Pump, valves stopped	Start-up, stand-by, running	Key re-cycle	8	6010	8
EVP DRIVER OPEN	MC is opened (the command is released), EB is applied, Traction/Pump, valves stopped	Start-up, stand-by, running	Valves request	9	FFF8	240
EVP COIL OPEN	Valves stopped	Start-up, stand-by, running	Valves or Traction/Pump request	9	5002	214

Error code	Effect	Condition	Restart procedure	MDI/LED CODE	CAN CODE	ZAPI CODE
EVP DRIV. SHORT.	MC is opened , EB is applied, EVP stopped	Start-up, stand-by, running	Traction/Pump request	9	5003	215
STALL ROTOR	Traction/Pump stopped	Start-up, stand-by, running	Valves or Traction/Pump request	11	FFD3	211
CONTROLL ER MISM.	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Install the correct software and Key re-cycle	12	FFEF	239
EEPROM KO	Controller works using default parameters	Start-up, stand-by, running	13	3610	208	
PARAM RESTORE	No effect	Start-up	Traction/Pump request	14	0	209
SP MISMATCH XX	MC is opened, EB applied, traction/pump stopped	Running	Key re-cycle	15	FF9B	155
OUT MISMATCH XX	MC is opened, EB applied, traction/pump stopped	Running	Key re-cycle	15	FF9A	154
HW FAULT EV.	MC is not closed, EB is applied, Traction/Pump stopped	Start-up	Key re-cycle	16	FFEE	238
LOGIC FAILURE #3	MC is opened, EB is applied, Traction/Pump, valves stopped	Start-up, stand-by	Valves or Traction/Pump request	17	FF11	17
LOGIC FAILURE #2	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up, stand-by,	Valves or Traction/Pump request	18	FF12	18
LOGIC FAILURE #1	MC is not closed, EB is applied, Traction/Pump, valves stopped	Stand-by, running	Valves or Traction/Pump request	19	5114	19
VKEY OFF SHORTED	MC is not closed, EB is applied, Traction/Pump stopped	Start-up	Key re-cycle	20	5101	220
CONT. DRV. EV	Valves stopped	Start-up, stand-by, running	Valves request	21	FFE8	232
DRV. SHOR. EV	Valves stopped	Start-up, stand-by, running	Valves or Traction/Pump request	21	FFF9	234
OPEN COIL EV.	MC remains closed, EB is applied, Traction/Pump, valves stopped (the command is released)	Start-up, Stand-by, running	Valves or Traction/Pump Request	21	FFF2	242

Error code	Effect	Condition	Restart procedure	MDI/LED CODE	CAN CODE	ZAPI CODE
COIL SHOR. EVAUX	Valves stopped	Start-up, Stand-by, running		21	FFF1	241
LC COIL OPEN	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up, stand-by, running	Valves or Traction/Pump request	22	FFE6	230
IQ MISMATCHED	Traction is stopped	Running	Valves or Traction/Pump request	24	FFF5	245
PEB NOT OK	Pump motor stopped, valves stopped	Start-up, stand-by, running	Valves request	25	FFDB	217
AUX BATT. SHORT.	None	Start-up, stand-by, running		27	5001	194
PUMP VMN LOW	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Valves or Traction/Pump request	28	FF1C	28
PUMP VMN HIGH	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Valves or Traction/Pump request	29	FF1D	29
INIT VMN LOW	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Valves or Traction/Pump request	30	3121	207
VMN LOW	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Valves or Traction/Pump request	30	3120	30
INIT VMN HIGH	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Valves or Traction/Pump request	31	3111	206
VMN HIGH	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up, stand-by	Valves or Traction/Pump request	31	3110	31
HW FAULT	MC is not closed, EB is applied, Traction/Pump stopped	Start-up	Key re-cycle	32	FFE3	227
PUMP VMN NOT OK	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Valves or Traction/Pump request	33	FFBE	190
HW FAULT EB.	MC is opened, EB is applied, Traction/Pump stopped	Start-up	Key re-cycle	34	FFE5	229
POSITIVE LC OPEN	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up, stand-by, running	Valves or Traction/Pump request	35	FFD5	213

Error code	Effect	Condition	Restart procedure	MDI/LED CODE	CAN CODE	ZAPI CODE
FIELD ORIENT. KO	MC is opened, EB is applied, Traction/Pump, valves stopped	Running	Valves or Traction/Pump request	36	FFFD	253
CONTACTOR CLOSED	MC is not closed (command is not activated), EB is applied, Traction/Pump stopped	Start-up	Valves or Traction/Pump request	37	5442	37
CONTACTOR OPEN	MC is opened, EB is applied, Traction/Pump, valves stopped	Start-up, stand-by, running	Valves or Traction/Pump request	38	5441	38
POWER MISMATCH	Traction is stopped, EB is applied, MC is opened	Running	Traction/Pump request	39	FFD4	212
EB. DRIV.SHRT.	MC remains closed, EB is applied (the command is released), Traction/Pump, valves stopped	Stand-by, running	Valves or Traction/Pump Request	40	3222	254
WRONG SET BAT.	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up		41	3100	251
WRONG KEY VOLT.	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up		41	3101	170
EB. DRIV.OPEN	MC remains closed, EB is applied (the command is released), Traction/Pump, valves stopped	Running	Valves or Traction/Pump Request	42	3224	246
EB. COIL OPEN	MC remains closed, EB is applied (the command is released), Traction/Pump, valves stopped	Start-up, Stand-by, running	Valves or Traction/Pump Request	43	FFD8	216
WAIT MOTOR STILL	MC is not closed, EB is applied, Traction/Pump stopped	Start-up		45	FFA9	169
WAIT MOT.P STILL	MC is not closed, EB is applied, Traction/Pump stopped	Start-up		45	FFBA	186
HANDBRAKE	Traction/Pump motor is stopped	Start-up, stand-by, running	Traction/Pump request	46	FFDD	221

Error code	Effect	Condition	Restart procedure	MDI/LED CODE	CAN CODE	ZAPI CODE
MOT.PHASE SH.	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Traction/Pump request	47	FFC4	196
THROTTLE PROG.	MC remains closed, EB is applied (the command is released), Traction stopped	Start-up, Stand-by, running	Valves or Traction/Pump Request	48	FFF3	243
LIFT+LOWE R	Pump is stopped	Start-up, stand running -by,	Pump request	49	FFBB	187
PUMP VACC NOT OK	Traction/Pump motor is stopped	Start-up, stand-by, running	Lift/lower potentiometer at rest	50	FFBF	191
TILLER OPEN	LC opens	Start-up, stand-by, running	Valves or Traction/Pump Request	51	0	228
PUMP I=0 EVER	MC is open, EB is applied (the command is released), DC pump stopped	Running	Pump request	52	2312	52
STBY I HIGH	MC is not closed, EB is applied, Traction/Pump stopped	Start-up, stand-by	Valves or Traction/Pump request	53	2311	53
IIC BUS ERROR				55	FF8E	152
PUMP I NO ZERO	MC is open, EB is applied (the command is released), DC pump stopped	Running	Pump request	56	FFE7	231
OVERLOAD	MC is not closed, EB is applied, Traction/Pump stopped	Running	Valves or Traction/Pump request	57	FFB4	180
INPUT MISMATCHX X	MC is opened, EB applied, Traction/Pump stopped	Start-up, standby, running	Key re-cycle	59	FF9D	157
CAPACITOR CHARGE	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Valves or Traction/Pump request	60	3130	60
THERMIC SENS. KO	Maximum current is reduced down to 50% and speed is reduced to a fixed value.	Start-up, stand-by, running		61	4211	250
TH. PROTECTIO N	Traction section reduces the max current linearly from Imax	Start-up, stand-by, running		62	4210	62

Error code	Effect	Condition	Restart procedure	MDI/LED CODE	CAN CODE	ZAPI CODE
	(85° C) down to 0 A (105° C)					
TH. PROT. PUMP	Pump section reduces the max current linearly from Imax (85° C) down to 0 A (105° C)	Start-up, stand-by, running		62	FF91	151
BRAKE RUN OUT	Traction is stopped	Start-up, stand-by, running	Traction/Pump Request	63	FFCC	204
TILLER ERROR	Traction stopped, EB applied	Stand-by, running	H&S input released	64	FFB9	185
MOTOR TEMPERAT.	Maximum current is linearly reduced (see paragraph 9.17) and speed is reduced to a fixed value.	Start-up, stand-by, running		65	4110	65
MOTOR TEMP. STOP	EB is applied, Traction/Pump, valves stopped	Start-up, stand-by, running		65	FFB2	178
NO CAN MSG.	MC is opened, EB is applied, Traction/Pump, valves stopped	Start-up, stand-by, running	Valves or Traction/Pump request	67	8130	248
INT. CANBUSKO	MC is opened, EB applied, Traction/Pump stopped	Start-up, standby, running	Key re-cycle	67	8131	188
SENS MOT TEMP KO	Maximum current is reduced down to 50% and speed is reduced to a fixed value.	Start-up, stand-by, running		68	4311	218
SMARTDRIVER KO	MC is not closed, Traction/Pump, valves stopped	Start-up	Traction request	69	3302	193
EPS RELAY OPEN	Traction/Pump motor is stopped	Start-Running up, stand-by,	Traction/Pump Valves or request	70	FFCD	205
WRONG RAM MEM.	MC is opened, EB is applied, Traction/Pump, valves stopped	Stand-by	Key re-cycle	71	FFD2	210
DRIVER SHORTED	MC is opened (the command is released), EB is applied, Traction/Pump, valves stopped	Start-up, stand-by, running	Valves or Traction/Pump request	74	3211	74
CONTACTOR DRIVER	MC is opened (the command is released), EB is applied, Traction/Pump,	Start-up, stand-by, running	Valves or Traction/Pump request	75	3221	75

Error code	Effect	Condition	Restart procedure	MDI/LED CODE	CAN CODE	ZAPI CODE
	valves stopped					
COIL SHOR. MC	MC is opened, EB is applied, Traction/Pump, valves stopped	Start-up (immediately after MC closing), stand-by, running	Valves or Traction/Pump request	76	2250	223
COIL SHOR. EB.	MC is opened, EB is applied, Traction/Pump, valves stopped	Start-up (immediately after MC closing), stand-by, running	Valves or Traction/Pump request	76	FFB1	177
VDC LINK OVERV.	MC is not closed, EB is applied, Traction/Pump, valves stopped	Stand-by, running	Valves or Traction/Pump request	77	FFCA	202
VACC NOT OK	Traction/Pump motor is stopped	Start-up, stand-by, running	Accelerator at rest	78	FF4E	78
POT MISMATCH	Traction/Pump motor is disabled	Start-up, stand-by, running	Accelerator at rest	78	FFA4	164
INCORRECT START	Traction/Pump motor is stopped	Start-up, stand-by	Traction request	79	FF4F	79
PUMP INC START	Pump motor is stopped	Start-up, stand-by, running	Pump request	79	FFBD	189
FORW + BACK	Traction is stopped	Start-up, stand-by, running	Traction request	80	FF50	80
SPEED OVERHEAD	MC is opened, EB is applied, Traction/Pump stopped	Running	Key re-cycle	81	FFAF	175
WRONG FBSENS.SET	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Key re-cycle	83	FF51	181
POS. EB. SHORTED	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Traction request	84	3223	195
POS.EB.SHORT PIN	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Key re-cycle	84	FF95	149
POS.EB.SHORT GND	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up	Key re-cycle	84	FF96	150
VACC OUT RANGE	Traction/Pump motor is stopped	Start-up, Stand-by, Running	Traction/Pump request	85	FFE2	226
PEDAL WIRE KO	Traction is stopped	Start-up, Stand-by, Running	Traction request	86	FF56	86

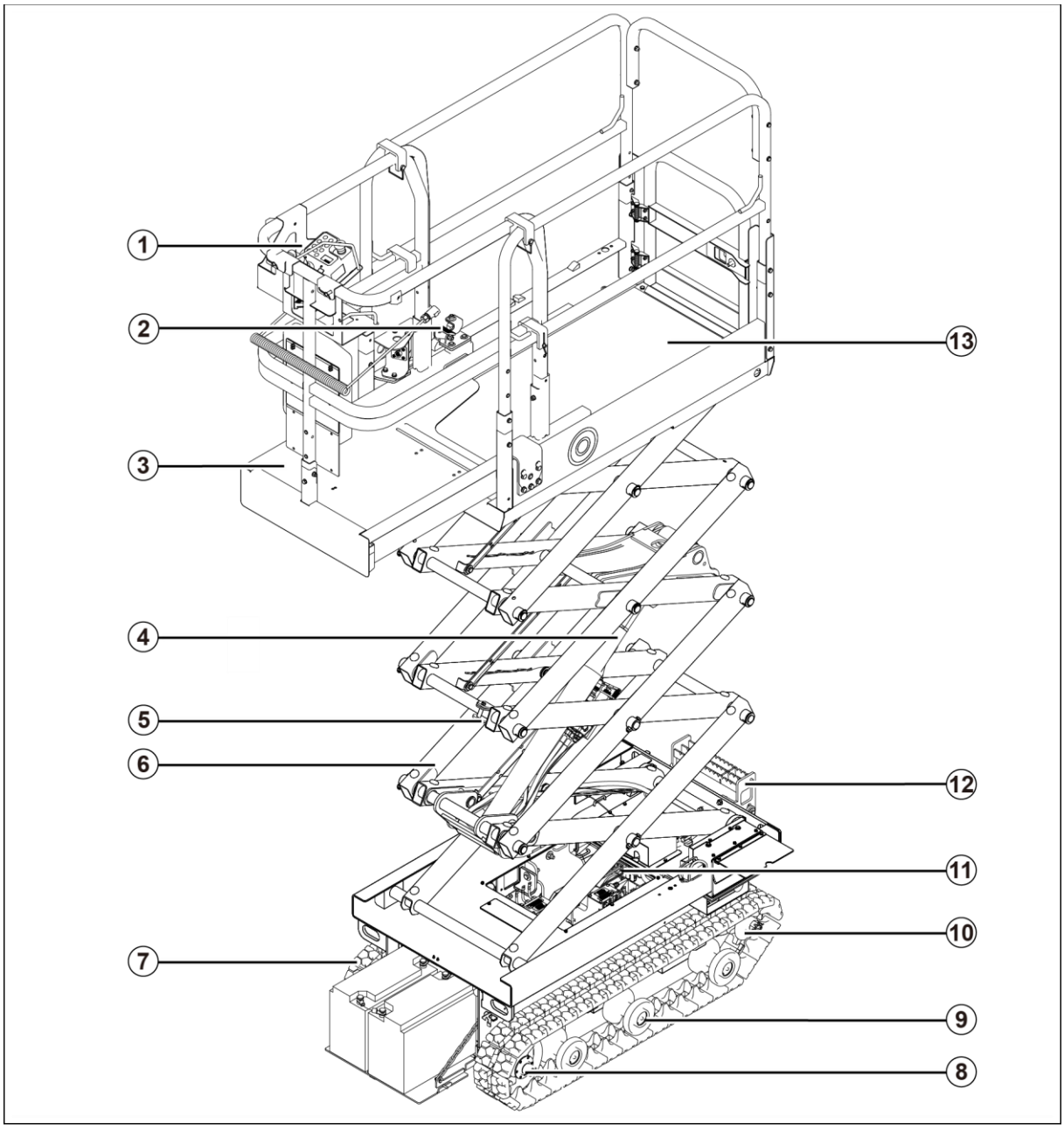
Error code	Effect	Condition	Restart procedure	MDI/LED CODE	CAN CODE	ZAPI CODE
VDC OFF SHORTED	MC is not closed, EB is applied, Traction/Pump, valves stopped	Start-up, Stand-by, Running	Key re-cycle	88	FFC8	200
POWERMOS SHORTED	MC is opened, EB is applied, traction/pump stopped	Start-up	Key re-cycle	89	FFE9	233
PUMP VACC RANGE	DC Pump motor is stopped	Start-up, stand-by	Pump request	90	FFC0	192
WRONG SLAVE VER.	MC opened, EB is applied, Traction/Pump, valves stopped	Start-up	Key re-cycle	91	FFC5	197
CURRENT GAIN	Controller works, but with low maximum current	Start-up, stand-by		92	6302	236
PARAM TRANSFER	MC stays closed, EB is applied, Traction/Pump, valves stopped	Start-up, stand-by, running	Key re-cycle	93	FFC7	199
STEER SENSOR KO	Speed is reduced according to parameter CTB. STEER ALARM (PARAMETER CHANGE list, paragraph 8.2.1)	Start-up, stand-by, running	Return into correct range	95	FFB3	179
ANALOG INPUT	MC is opened, EB is applied, traction/pump stopped	Stand-by, running	Key re-cycle	96	FFFA	237
M/S PAR CHK MISM	MC stays closed, EB is applied, Traction/Pump, valves stopped	Start-up	Save again the parameter and Key re-cycle	97	FFC6	198
CURRENT PROFILE	EB is applied, Traction/Pump motor is stopped	Start-up, stand-by	Valves or Traction/Pump request	98	FFC9	201
CTRAP THRESHOLD	MC is opened, EB is applied, Traction/Pump, valves stopped	Start-up, stand-by, running	Valves or Traction/Pump request	99	FFEB	235

5.5 Platform Overload Diagnosis

Fault Phenomenon	Fault Cause	Solution
Rated load lifting failure	1. Pressure of the power unit overflow valve is set to a low value.	Reset pressure of the overflow valve.
The alarm rings continuously when the lifting height reaches the maximum value in rated load.	1. The system needs to be reset.	Press the red emergency stop button and restart the machine after 3s.
	2. Angle sensor imbalance	Adjust the angle sensor or replace the angle sensor.
	3. Platform overload	Place the correct rated load to the platform.
	4. The battery is low.	Charge the battery.
	5. The platform load calibration is incorrect.	Re-calibrate the load.
	6. Channels of the upper and lower sliding blocks are not lubricated.	Lubricate channels of the upper and lower sliding blocks.
The alarm rings continuously when the machine is stored in rated load.	1. The system needs to be reset.	Press the red emergency stop button and restart the machine after 3s.
	2. Angle sensor imbalance	Adjust the angle sensor or replace the angle sensor.
	3. Platform overload	Place the correct rated load to the platform.
	4. The platform load calibration is incorrect.	Re-calibrate the load.

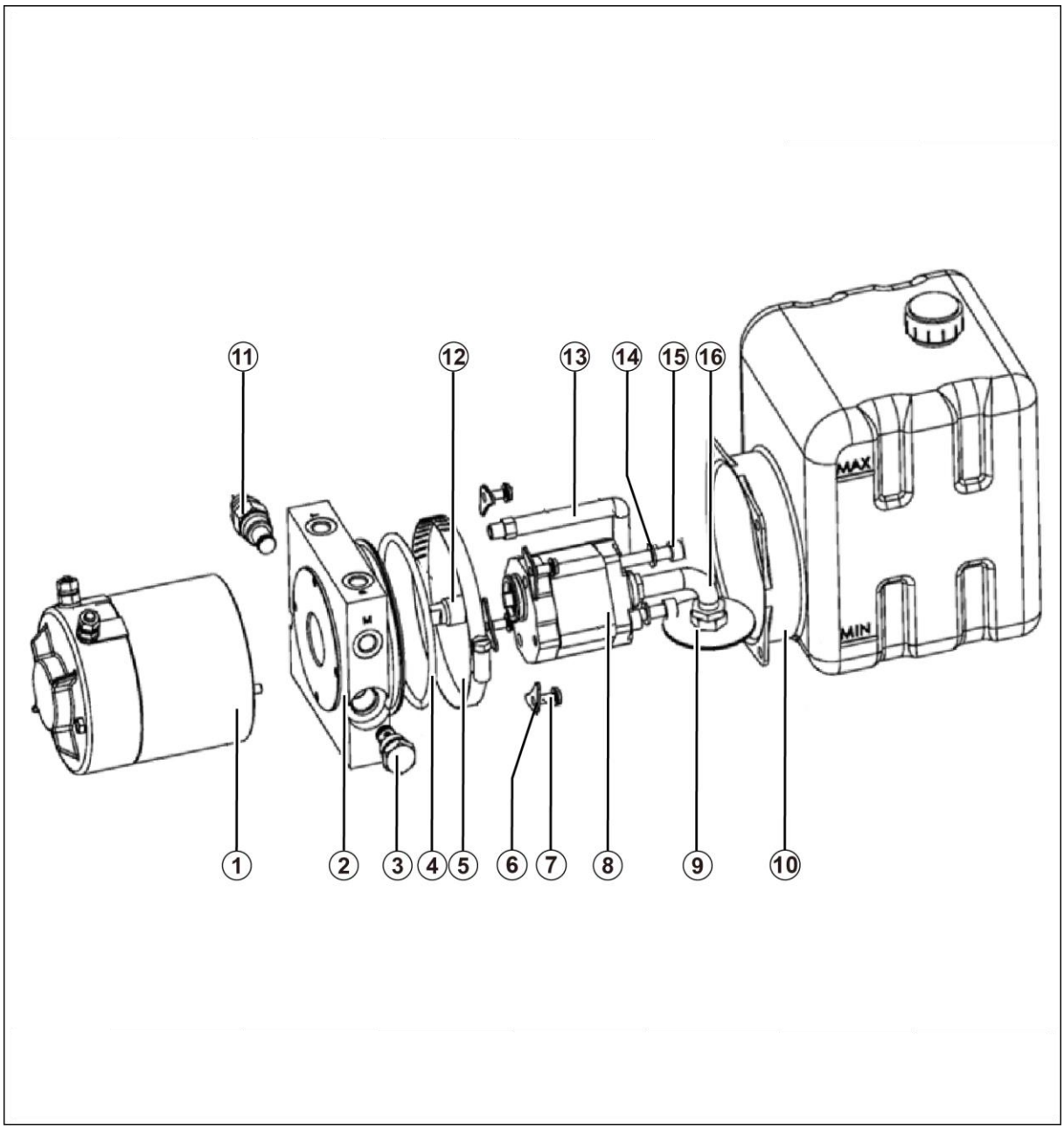
5.6 Schematic Diagrams

5.6.1 Machine Structure Diagram



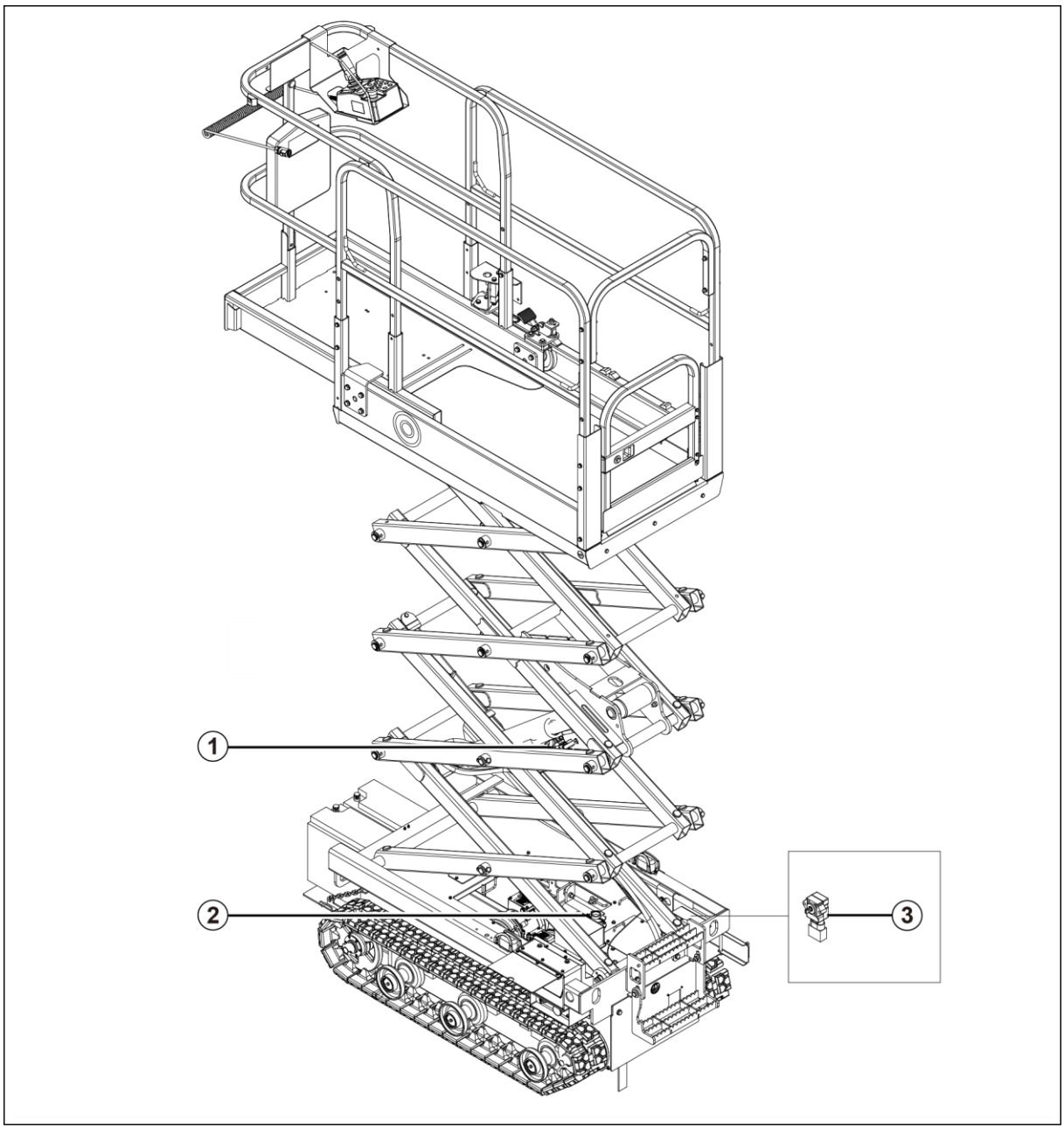
1	Platform control box	8	Idler
2	Pedal	9	Track roller
3	Extension platform	10	Sprocket
4	Lifting cylinder	11	Charger
5	Safety support	12	Ladder
6	Fork-frame assembly	13	Main working platform
7	Crawler assembly		

5.6.2 Power Unit Structure Diagram



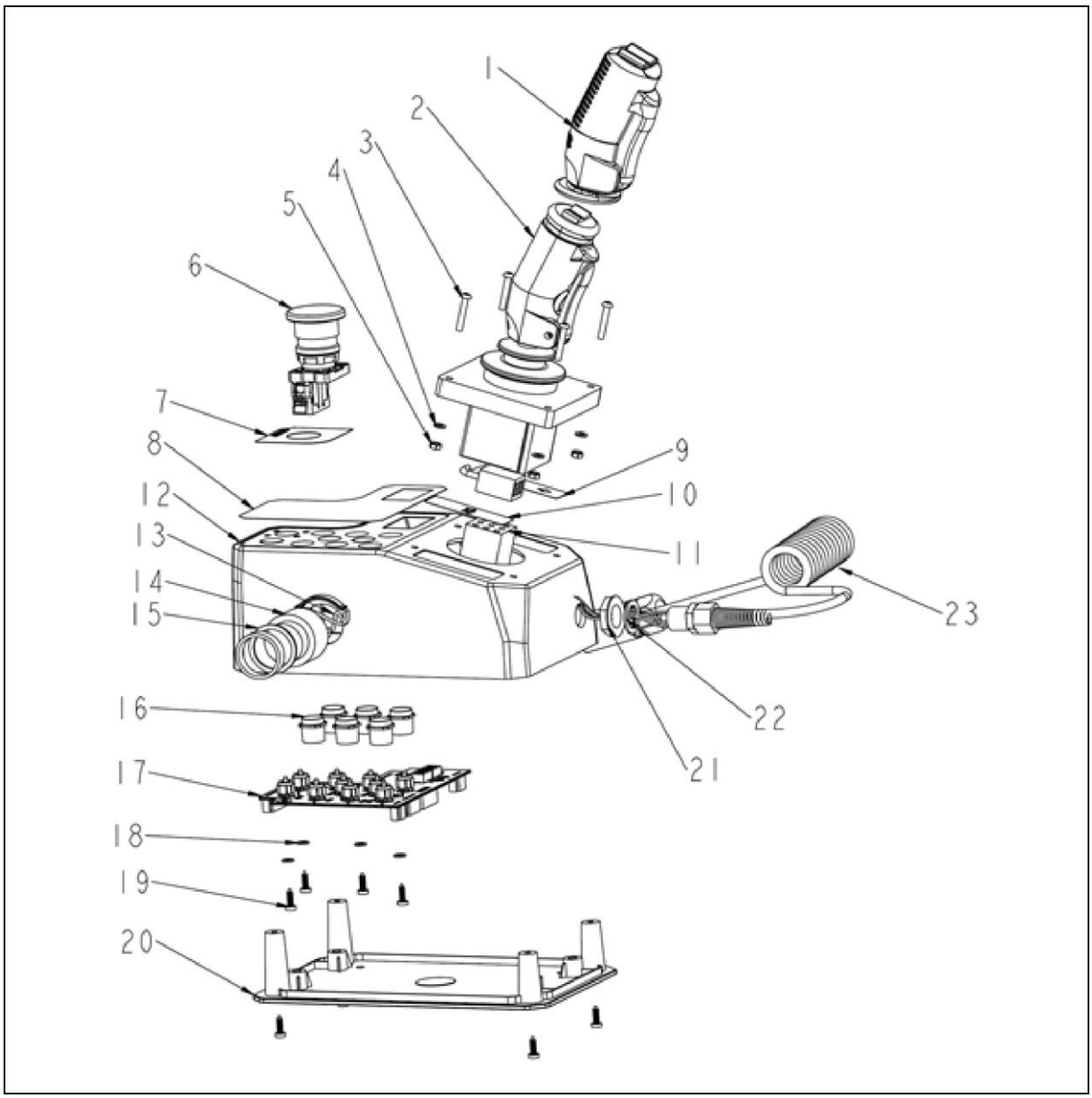
1	Motor	9	Filter screen
2	Center valve block E04	10	Plastic oil tank
3	One-way valve	11	Direct-acting relief valve
4	Sealing ring	12	Coupler
5	Hose clamp	13	Return tube
6	Plastic fuel-tank triangle gasket	14	Washer
7	Bolt	15	Screw
8	Gear pump	16	Connector

5.6.3 Schematic Diagram of Electric System Positions



1	Pressure sensor	3	Angle sensor
2	Inclination switch		

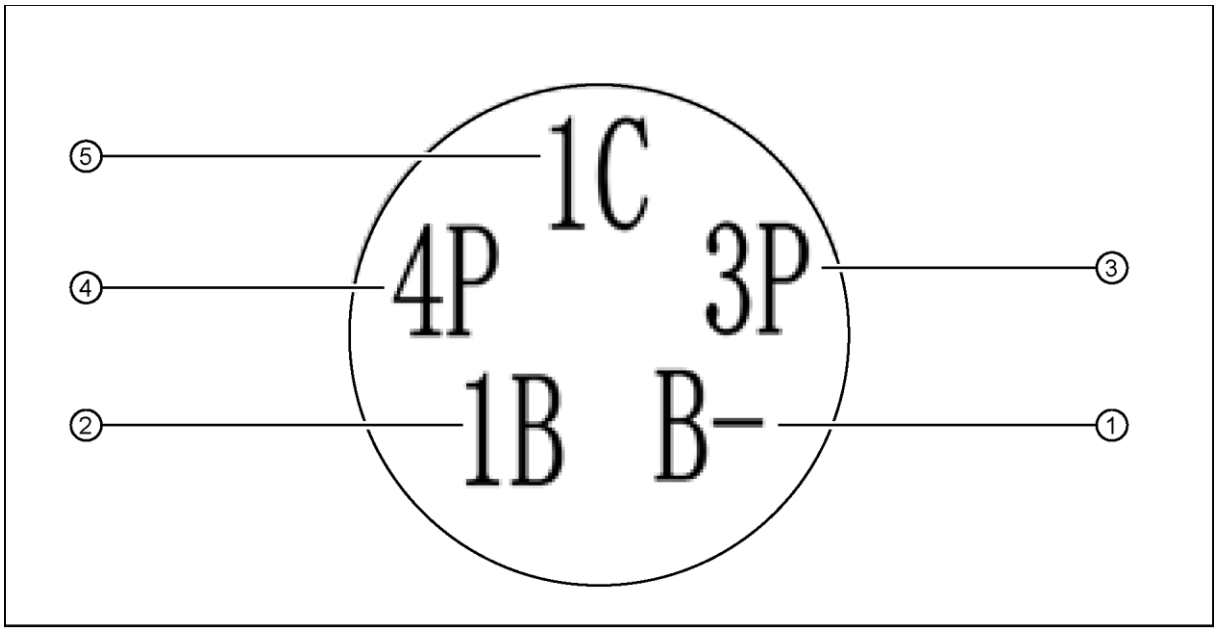
5.6.4 PCU Structure Diagram



1	Handle silicon rubber case	13	Buzzer harness
2	Lever	14	Buzzer
3	Bolt	15	Buzzer rubber seal washer
4	Black galvanized gasket	16	Switch key cap
5	Lock nut	17	PCBA
6	Emergency stop switch	18	Nylon spacer
7	Emergency stop indication panel	19	Wafer-head self-tapping screw
8	PCU6 key operation panel	20	Bottom cover
9	Front and rear indication marks	21	Spring wire plastic nut
10	Handle left and right indication marks	22	PCU spring harness sealing gasket
11	Handle switching harness assembly	23	Spring harness
12	PCU housing		

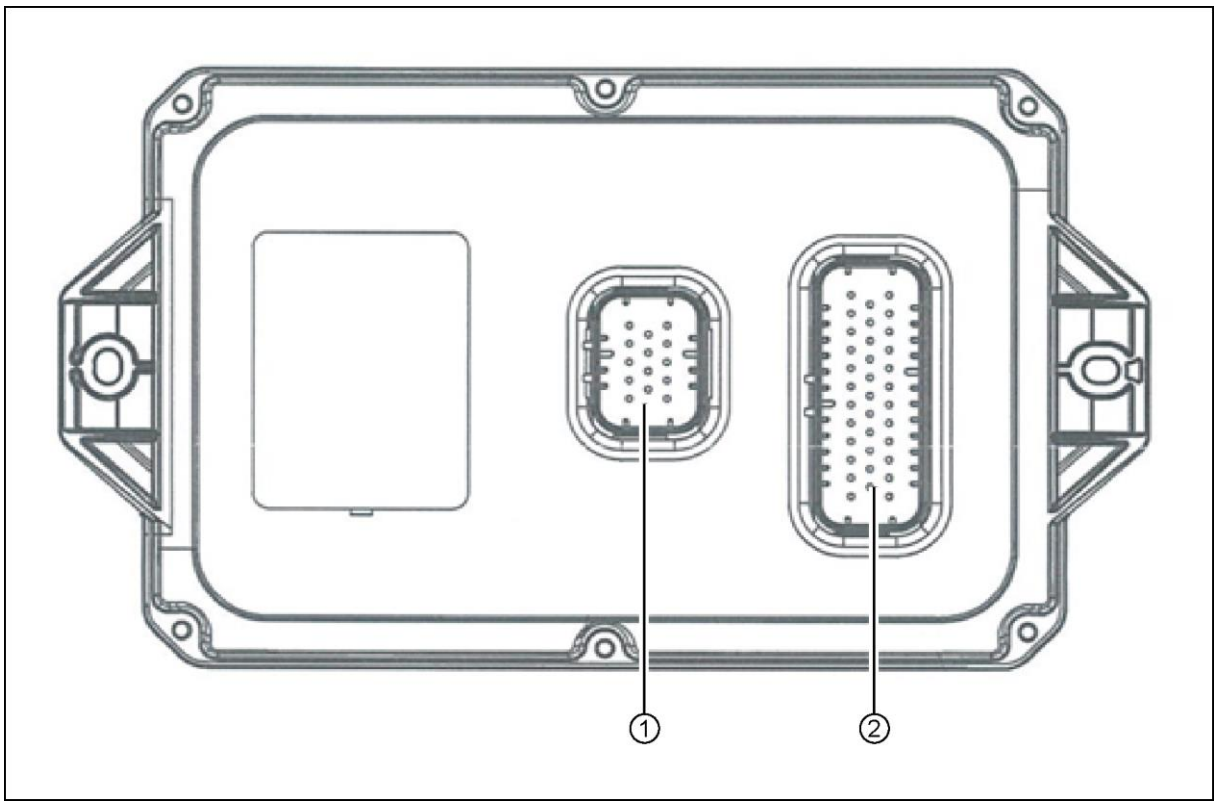
5.7 Pin No. Definition

5.7.1 PCU Pin No. Definition



1	Ground	4	PCU power supply -
2	Signal input +	5	Signal output -
3	PCU power supply +		

5.7.2 Lower-control Pin Definition



1. ECU2 interface 14-digit pin No.

Pin	Signal	Function	Pin	Signal	Function
J2-1	Output	Reserved	J2-8	Output - PWM	Lowering valve control
J2-2	Input	Reserved	J2-9	Output	Reserved
J2-3	Output	Reserved	J2-10	Output	Reserved
J2-4	Communication	CAN_H	J2-11	Input	Foot switch
J2-5	Communication	CAN_L	J2-12	Input	Reserved
J2-6	Input	Pressure sensor 2	J2-13	Input	Reserved
J2-7	Input	Reserved	J2-14	Output	Reserved

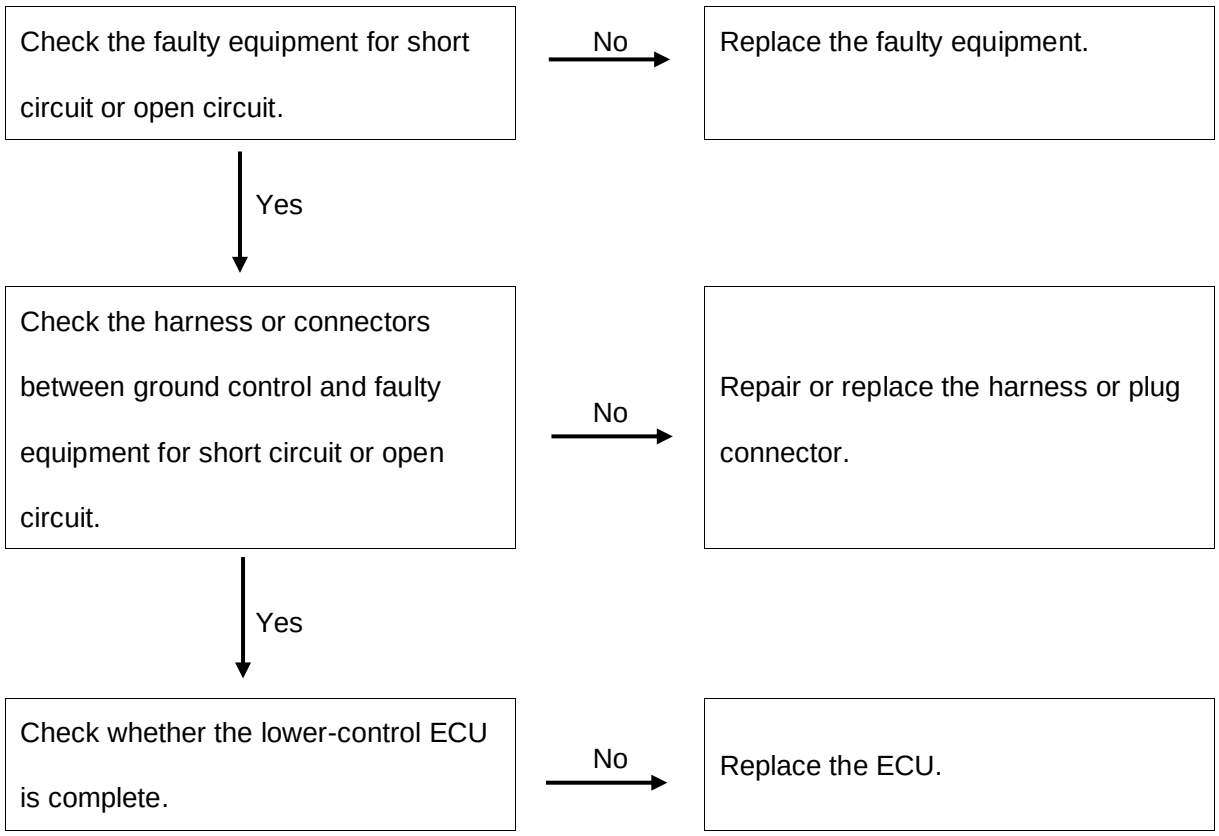
2. ECU1 interface 35-digit pin No.

Pin	Signal	Function	Pin	Signal	Function
J1-1	Input	Reserved	J1-19	Output	Reserved
J1-2	Input	Reserved	J1-20	Output	Reserved
J1-3	Output	Lifting control valve	J1-21	Output	Buzzer control
J1-4	Power supply	Valve-driven power supply	J1-22	Input	Reserved
J1-5	Power supply	Valve-driven power supply	J1-23	Input	Reserved
J1-6	Output	Motor controller enabling	J1-24	Communication	PCU communication -
J1-7	Output	Horn control	J1-25	Power supply	Working power supply
J1-8	Output	Reserved	J1-26	Input	Pressure sensor 1
J1-9	Output	Reserved	J1-27	Output	Reserved
J1-10	Input	Reserved	J1-28	Input	Reserved
J1-11	Input	Reserved	J1-29	Output	Reserved
J1-12	Input	Reserved	J1-30	Output	Reserved
J1-13	Communication	PCU communication +	J1-31	Output	Reserved
J1-14	Input	Chassis key switch	J1-32	Output	Reserved
J1-15	Power supply	Working power supply ground	J1-33	Input	Reserved
J1-16	Input	Angle sensor	J1-34	Input	Inclination switch
J1-17	Input	Reserved	J1-35	Input	Reserved
J1-18	Output	Reserved			

5.8 Electric System Fault Diagnosis

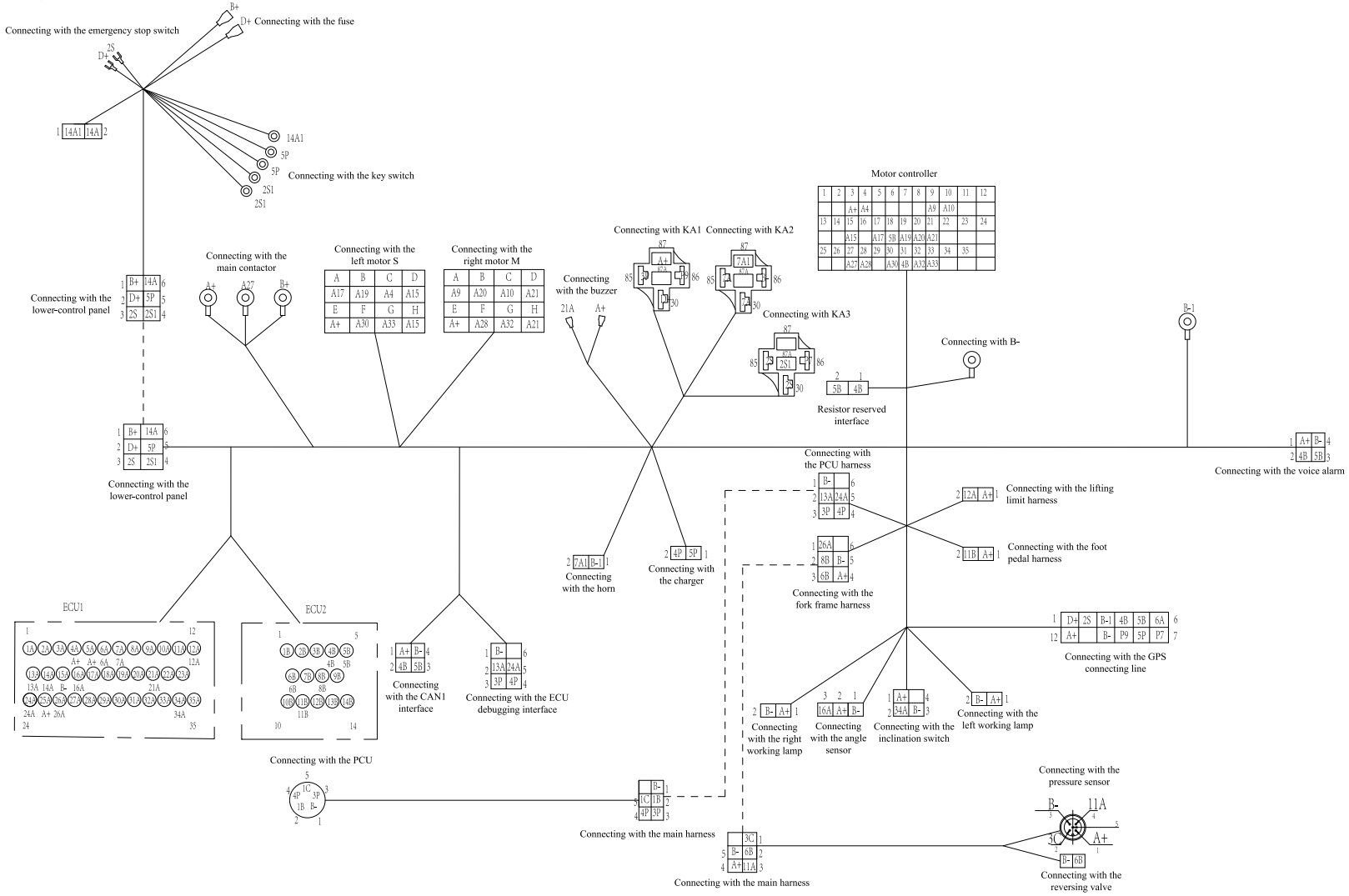
The following procedure describes how to diagnose and repair the electric system fault. Signals of this type of device come from the lower control system. At the same time, the lower control system is stopped.

5.8.1 Diagnostic Flow Diagram

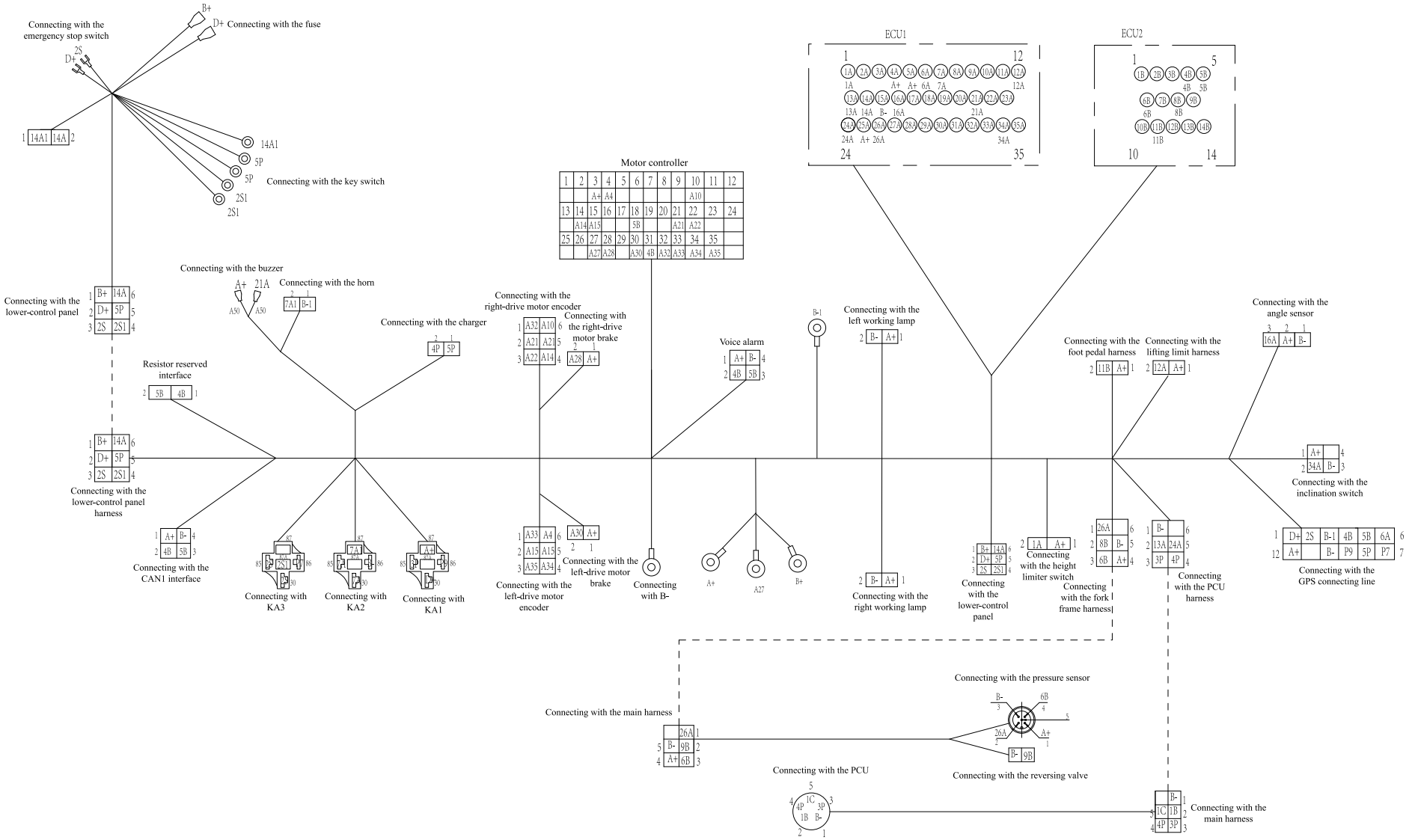


5.8.2 Wiring Diagram

S040700NDQ0CE8002



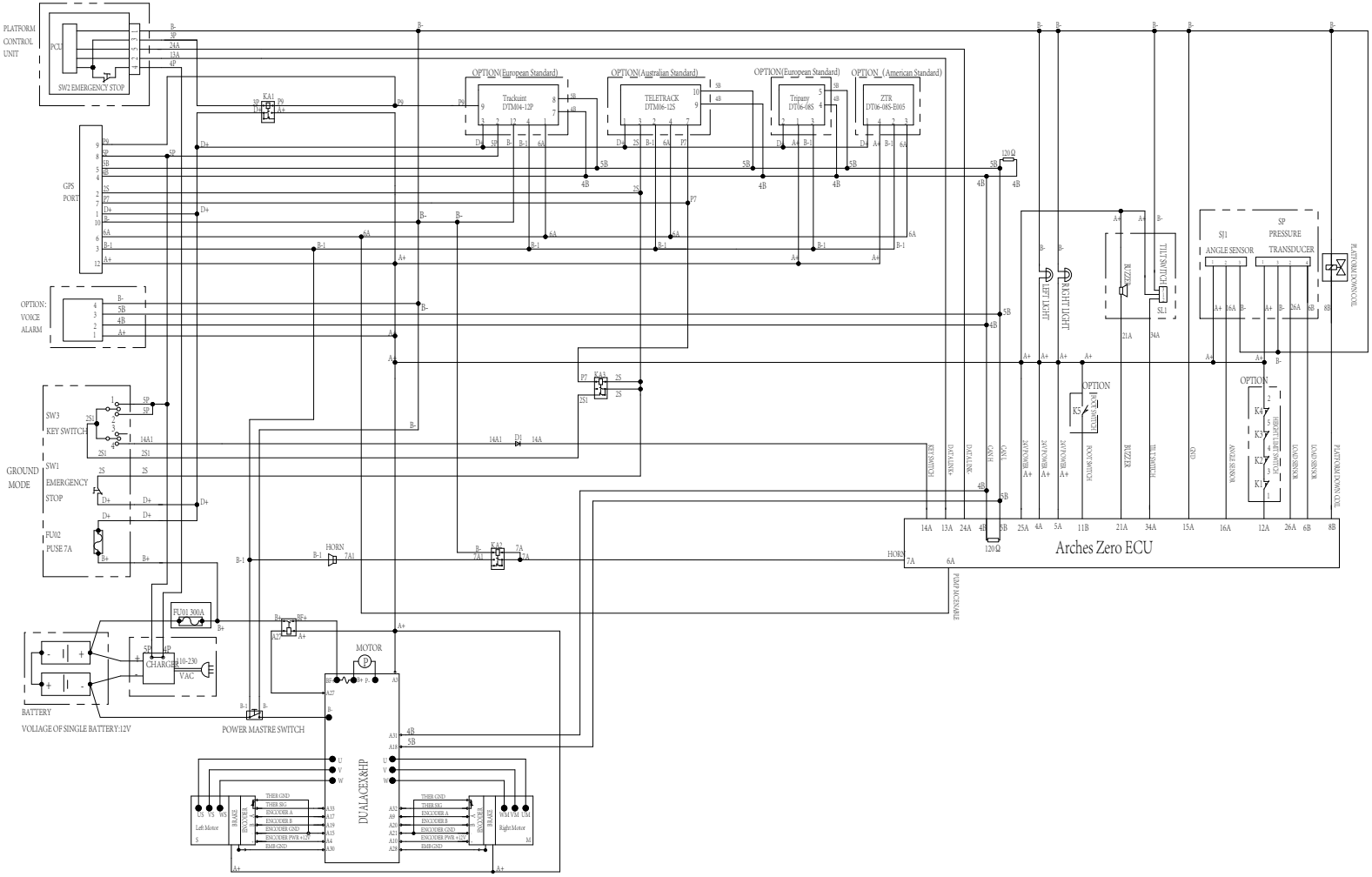
S061000WDQ0CE8000



5.9 Schematic Diagrams

5.9.1 Electric Schematic Diagram

S040700NDQ0CE8002



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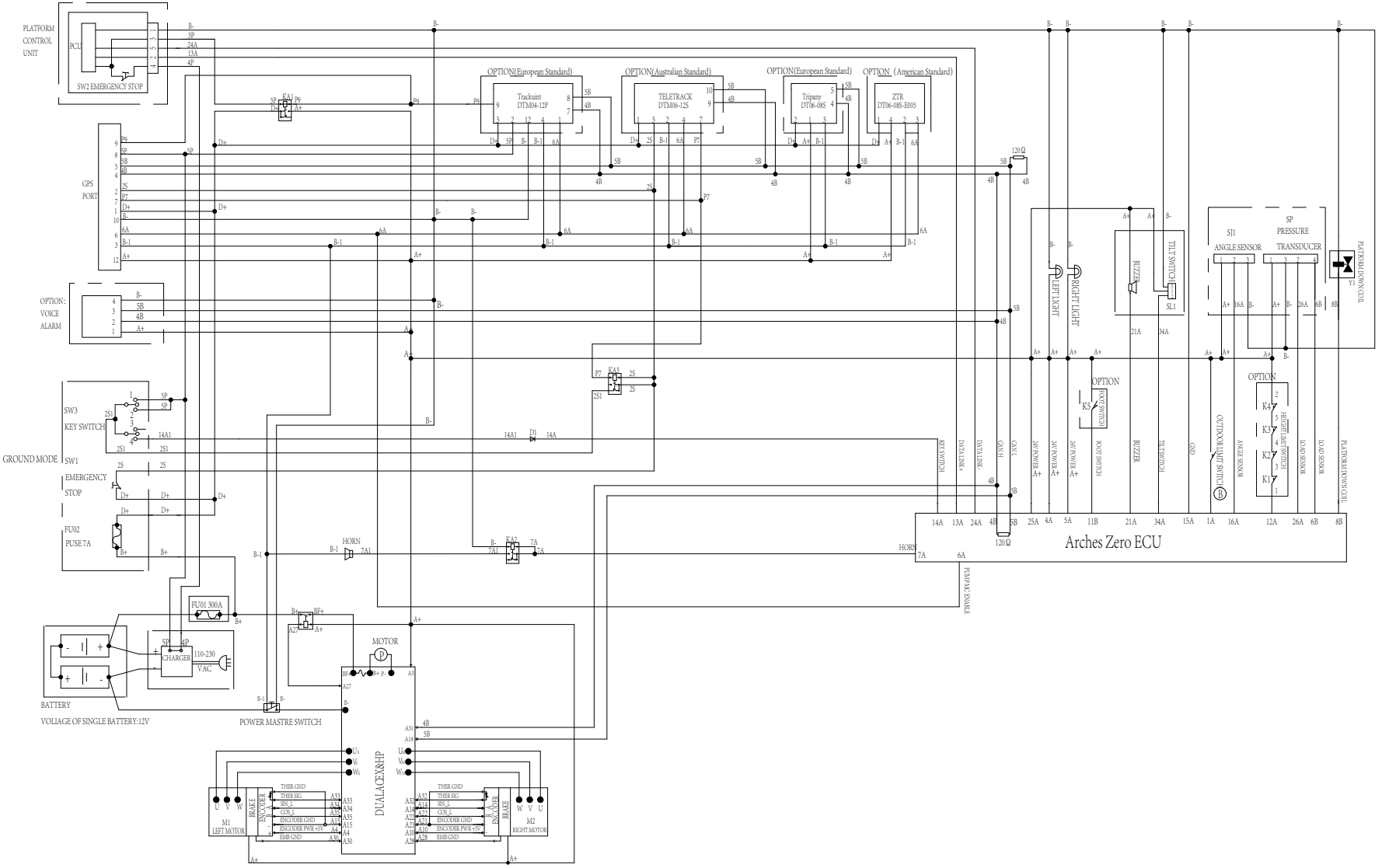
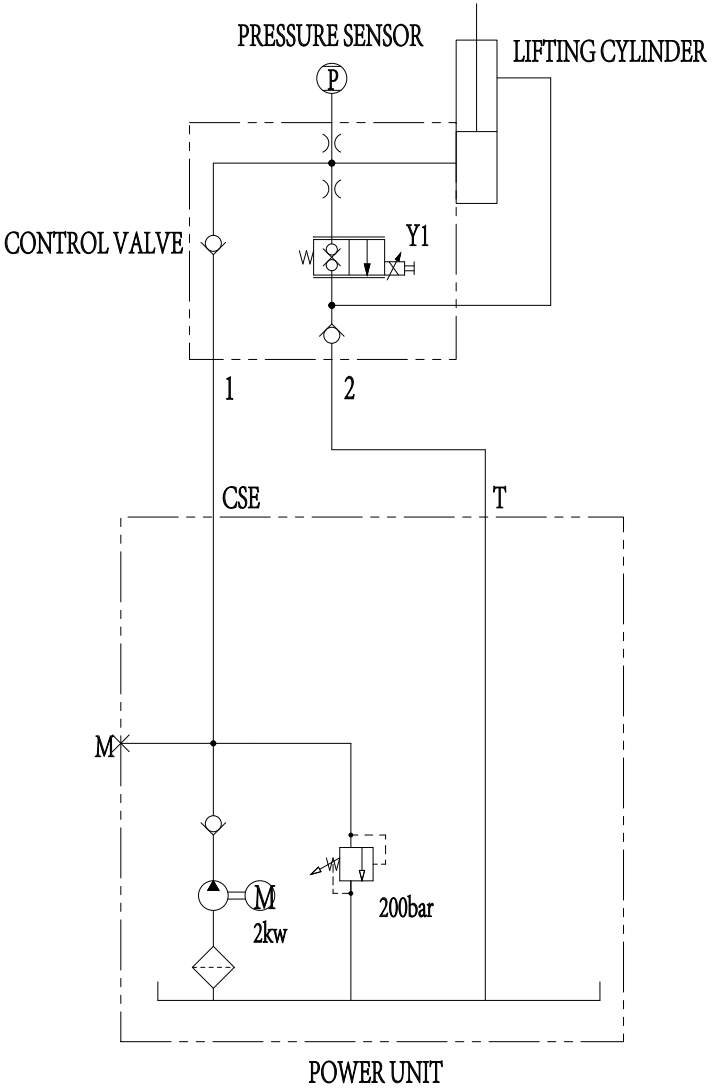


5.9.2 Hydraulic Schematic Diagram

S040700NDQ0CE8002



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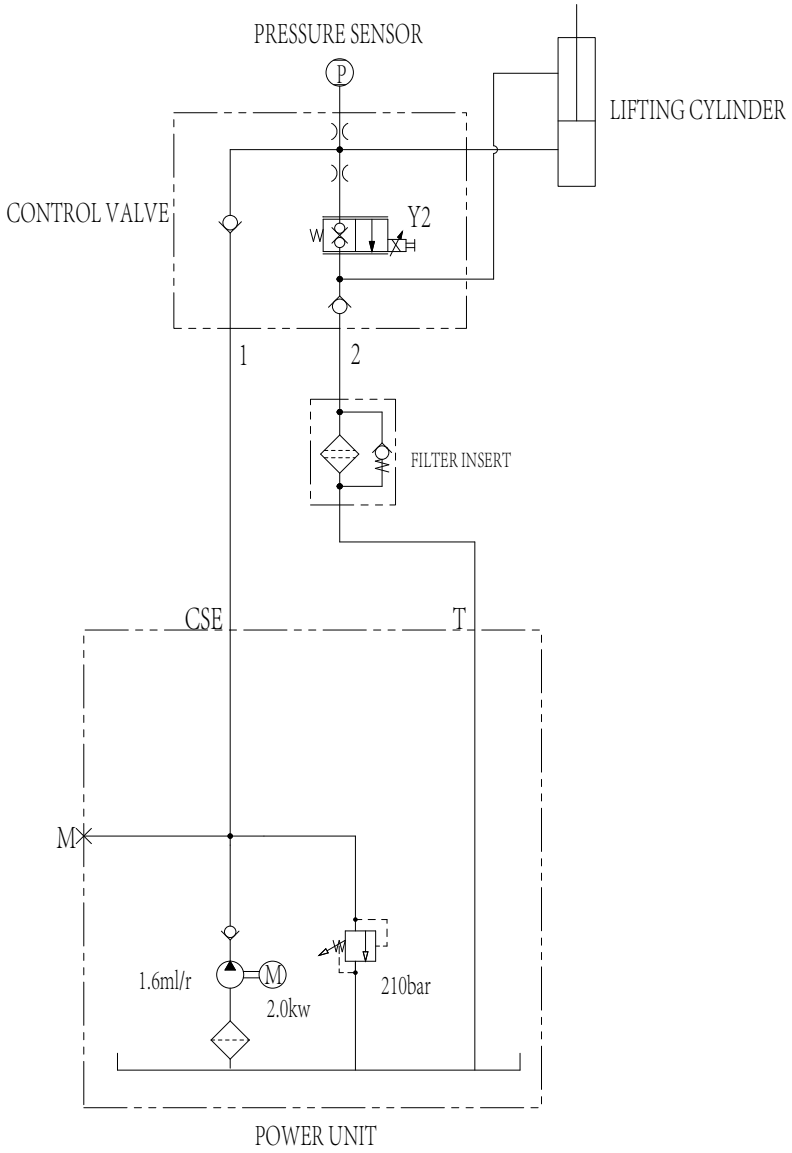
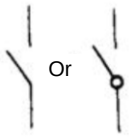
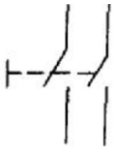
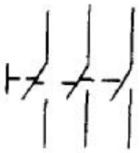
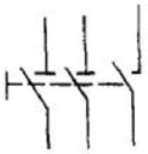
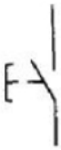
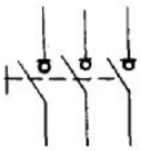
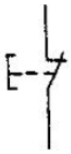
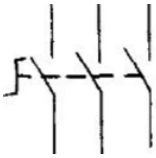
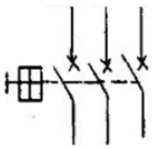
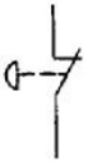
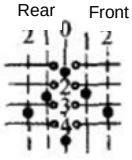
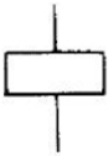
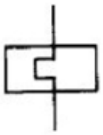
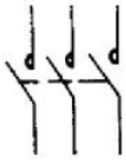
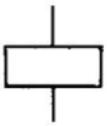
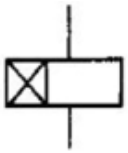
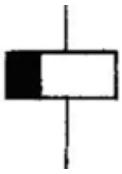
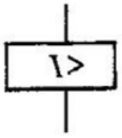
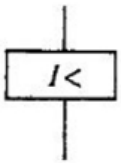
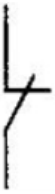
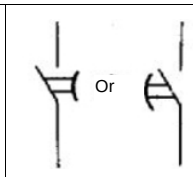
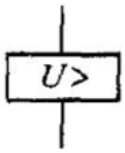
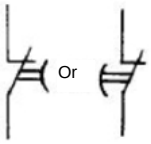
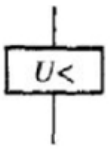
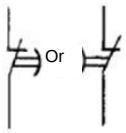
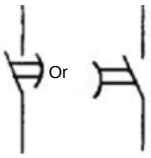
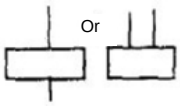
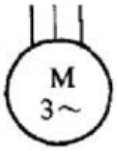
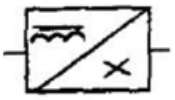
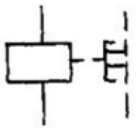
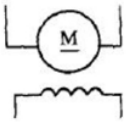
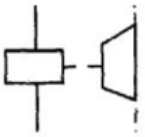
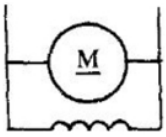
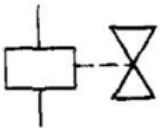
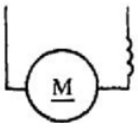


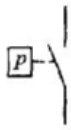
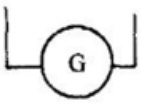
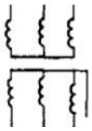
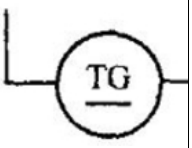
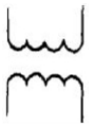
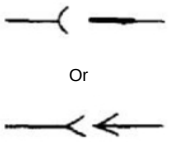
5.10 Schematic Diagrams of Common Symbols

5.10.1 Schematic Diagrams of Common Electronic Symbols

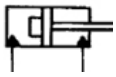
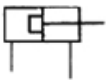
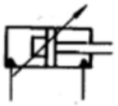
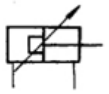
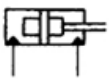
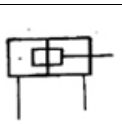
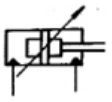
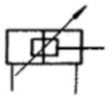
Socket	Name	Graphic Symbol	Letter Symbol	Type	Name	Graphic Symbol	Letter Symbol
Switch	Single-pole control switch		SA	Position switch	Normally-open contact		SQ
	Common symbol of hand switch		SA		Normally-closed contact		SQ
	Level-3 control switch		QS		Composite contact		SQ
	Level-3 isolation switch		QS	Button	Normally-on button		SB
	Level-3 load switch		QS		Normally-off button		SB
	Combination rotary switch		QS		Composite button		SB
	Low-voltage circuit breaker		QF		Emergency stop button		SB
	Controller or operating switch		SA		Key operating button		SB

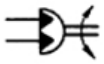
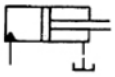
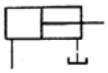
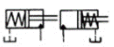
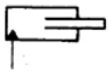
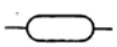
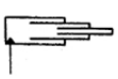
Contactor	Coil operating part		KM	Thermal relay	Thermal element		FR
	Main normally-open contact		KM		Normally-closed contact		FR
	Auxiliary normally-open contact		KM	Intermediate relay	Coil		KA
	Auxiliary normally-closed contact		KM		Normally-open contact		KA
Time relay	On-delay (slow-operate) coil		KT		Normally-closed contact		KA
	Off-delay (slow-release) coil		KT	Current relay	Overcurrent coil		KA
					Undercurrent coil		KA
	Instantaneous-closed normally-open contact		KT		Normally-open contact		KA
	Instantaneous-open normally-closed contact		KT		Normally-closed contact		KA

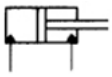
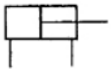
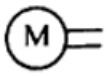
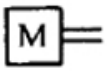
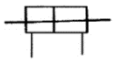
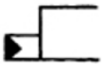
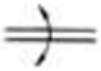
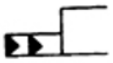
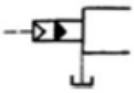
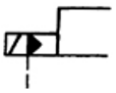
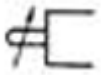
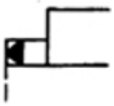
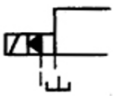
	Delayed-closed normally-open contact		KT	Voltage relay	Overvoltage coil		KV
	Delayed-open normally-closed contact		KT		Undervoltage coil		KV
	Delayed-closed normally-closed contact		KT		Normally-open contact		KV
	Delayed-open normally-open contact		KT		Normally-closed contact		KV
Electromagnetic manipulator	Common symbol of electromagnet		YA	Electric motor	Three-phase squirrel-cage asynchronous motor		M
	Electromagnetic chuck		YH		Three-phase wound-rotor asynchronous motor		M
	Electromagnetic clutch		YC		Separately excited DC motor		M
	Electromagnetic brake		YB		Shunting excited DC motor		M
	Solenoid valve		YV		Series excited DC machine		M
Relay not controlled by battery level	Speed relay normally-open contact		KS	Fuse protector	Fuse protector		FU

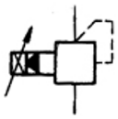
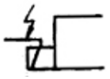
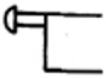
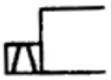
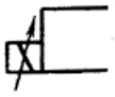
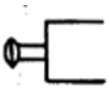
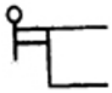
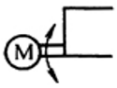
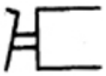
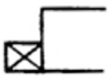
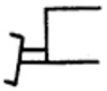
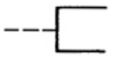
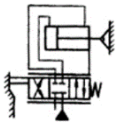
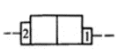
	Pressure relay normally-open contact		KP	Transformer	Single-phase transformer		TC
Generator	Generator		G		Three-phase transformer		TM
	DC tachometer generator		TG	Transducer	Voltage transformer		TV
Lamp	Signal lamp (indicator lamp)		HL		Current transformer		TA
	Lighting lamp		EL	Plug-in connector	Plug and socket	 Or	X Plug XP Socket XS

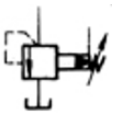
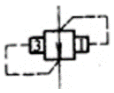
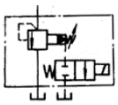
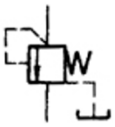
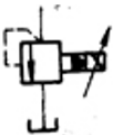
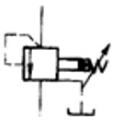
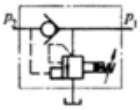
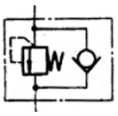
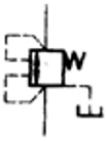
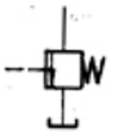
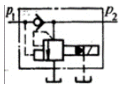
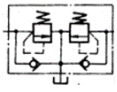
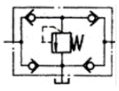
5.10.2 Schematic Diagrams for Common Hydraulic Symbols

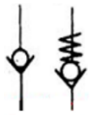
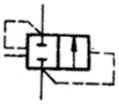
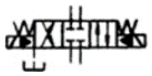
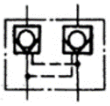
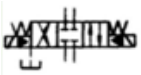
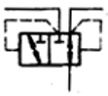
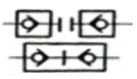
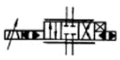
(1) Hydraulic pump, hydraulic motor, and hydraulic cylinder							
Name		Symbol	Description	Name		Symbol	Description
Hydraulic pump	Hydraulic pump		Common symbol	Double-acting cylinder	Non-adjustable one-way buffer cylinder		Detailed symbol
	One-way quantified hydraulic pump		One-way rotation, one-way flowing, and fixed displacement				Simplified symbol
	Two-way quantified hydraulic pump		Two-way rotation, two-way flowing, and fixed displacement		Adjustable one-way buffer cylinder		Detailed symbol
	One-way variable hydraulic pump		One-way rotation, two-way flowing, and variable displacement				Simplified symbol
	Two-way variable hydraulic pump		Two-way rotation, two-way flowing, and variable displacement		Non-adjustable two-way buffer cylinder		Detailed symbol
Hydraulic motor	Hydraulic motor		Common symbol				Simplified symbol
	One-way quantified hydraulic motor		One-way flowing, one-way rotation		Adjustable two-way buffer cylinder		Detailed symbol
	Two-way quantified hydraulic motor		Two-way rotation, two-way flowing, and fixed displacement				Simplified symbol
	One-way variable hydraulic motor		One-way flowing, one-way rotation, and variable displacement		Telescopic cylinder		
	One-way variable hydraulic motor		Two-way rotation, two-way flowing, and	Pressure converter	Gas-liquid converter		One-stroke works.

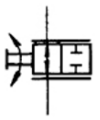
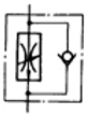
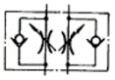
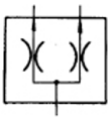
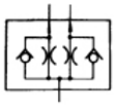
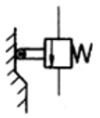
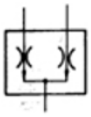
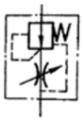
			variable displacement				
	Swing motor		Two-way swinging, fixed angle				Continuous working
Pump-motor	Quantified hydraulic pump - motor		One-way flowing, one-way rotation, and fixed displacement		Turbocharger		One-stroke works.
	Variable hydraulic pump - motor		Two-way rotation, two-way flowing, variable displacement, and external oil leakage				Continuous working
	Integral hydraulic transmission device		One-way rotation, variable displacement, and fixed displacement motor	Accumulator	Accumulator		Common symbol
Single-acting cylinder	Single-piston rod cylinder		Detailed symbol		Gas isolation		
			Simplified symbol		Heavy hammer type		
	Single-piston rod cylinder (with reset spring)		Detailed symbol		Spring type		
			Simplified symbol	Auxiliary gas cylinder			
	Plunger cylinder			Gas cylinder			
	Telescopic cylinder			Energy source	Hydraulic source		Common symbol

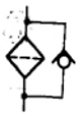
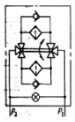
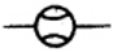
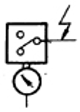
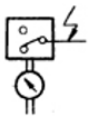
Double-acting cylinder	Single-piston rod cylinder		Detailed symbol		Air pressure source		Common symbol
			Simplified symbol		Electric motor		
	Double-piston rod cylinder		Detailed symbol		Original motor		Except motor
			Simplified symbol				
(2) Machine control unit and control method							
Mechanical control part	Rectilinear rod		Arrows can be omitted.	Pilot pressure control method	Hydraulic pilot pressurization control		Internal pressure control
	Rotationally moving shaft		Arrows can be omitted.		Hydraulic pilot pressurization control		External pressure control
	Fixing device				Hydraulic level-2 pilot pressurization control		Internal pressure control, internal oil leakage
	Locking device		* refers to control method of unlocking		Gas-liquid pilot pressurization control		Air pressure external control, hydraulic internal control, external oil leakage
	Jumping machine				Electric-liquid pilot pressurization control		Hydraulic external control, internal oil leakage
Mechanical control method	Post rod-type				Hydraulic pilot depressurization control		Internal pressure control, internal oil leakage
	Variable travel control mode						External pressure control (release port with remote control)
	Spring control mode				Electric-liquid pilot control		Electromagnet control, external pressure control, external oil leakage

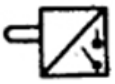
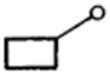
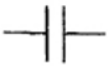
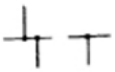
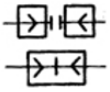
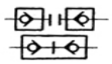
	Roller mode		Operations in both directions		Pilot pressure control valve		Adjusting spring with pressure, external oil leakage, and release port with remote control
	One-way roller mode		Operation in one direction. Arrows can be omitted.		Pilot proportional-electromagnetic type pressure control valve		The pilot level is controlled by proportional electromagnet. Internal oil leakage;
Manual control method	Manual control		Common symbol	Electric control method	Single-acting electromagnet		Electric leads can be omitted. The oblique lines can also be in the low right.
	Button type				Double-acting electromagnet		
	Button type				Single-acting adjustable electromagnetic operation (proportional electromagnet)		
	Push-pull type				Double-acting adjustable electromagnetic operation (proportional electromagnet)		
	Handle-type				Rotationally-moving electric control device		
	One-way pedal type			Feedback control method	Feedback control		Common symbol
	Two-way pedal type				Electric feedback		Performed by a potentiometer, transformer, etc.
Direction pressure control method	Pressurization or depressurization control				Internal mechanical feedback		Like follow-up valve square control circuit, etc.
	Differential control						
	Internal pressure control		Control path inside the part				

	External pressure control		Control path outside the part				
(3) Pressure controller							
Overflow valve	Overflow valve		General symbols or direct-acting overflow valve	Pressure reducing valve	Pilot proportional-electromagnetic overflow pressure reducing valve		
	Pilot overflow valve				Definite-proportion pressure reducing valve		Pressure reducing ratio 1/3
	Pilot electromagnetic overflow valve		(Normally-closed)		Uniform-pressure-drop valve		
	Direct-acting proportional overflow valve			Sequence valve	Sequence valve		General symbols or sequence valve
	Pilot proportional overflow valve				Pilot sequence valve		
	Unloading overflow valve		When p2>p1, unloading is performed.		One-way sequence valve (balance valve)		
	Two-way overflow valve		Direct-acting, external oil leakage	Unloading valve	Unloading valve		General symbols or direct-acting unloading valve
Pressure reducing valve	Pressure reducing valve		General symbols or direct-acting pressure reducing valve		Pilot electromagnetic unloading valve		p1>p2
	Pilot pressure reducing valve			Brake valve	Two-way overflow brake valve		
	Overflow pressure reducing valve				Overflow oil-axle brake valve		
(4) Direction control valve							

One-way valve	One-way valve		Detailed symbol	Reversing valve	Two-position five-way hydraulic valve		
			Simplified symbol (springs can be omitted)		Two-position four-way mechanical valve		
Hydraulic one-way valve	Hydraulic control one-way valve		Detailed symbol (control pressure shutoff valve)		Three-position four-way electromagnetic valve		
			Simplified symbol		Three-position four-way electro-hydraulic valve		Simplified symbol (internal leakage and external control)
			Detailed symbol (control pressure open valve)		Three-position six-way hand valve		
			Simplified symbol (springs can be omitted)		Three-position five-way solenoid valve		
	Double hydraulic-control one-way valve				Three-position four-way electro-hydraulic valve		External control and internal leakage (with hand emergency control device)
Shuttle valve or	Door type		Detailed symbol		Three-position four-way proportional valve		Throttle-type, mid-position positive cover
			Simplified symbol		Three-position four-way proportional valve		Mid-position negative cover
Reversing valve	Two-position two-way solenoid valve		Normally-off		Two-position four-way proportional valve		
			Normally-on		Four-way servo		
	Two-position three-way solenoid valve				Four-way electro-hydraulic servo valve		Level 2
	Two-position three-way solenoid ball valve						Level-3 feedback with electricity

	Two-position four-way solenoid valve						
(5) Flow control valve							
Throttle valve	Adjustable throttle valve		Detailed symbol	Speed control valve	Speed control valve		Simplified symbol
			Simplified symbol		By-pass speed control valve		Simplified symbol
	Nonadjustable throttle valve		Common symbol		Temperature compensation speed control valve		Simplified symbol
	One-way throttle valve				One-way speed control valve		Simplified symbol
	Double one-way throttle valve			Synchronous valve	Diverter valve		
	Shutoff valve				One-way diverter valve		
	Roller control throttle valve (deceleration valve)				Flow-collecting valve		
Speed control valve	Speed control valve		Detailed symbol		Flow distributing and collecting valve		
(6) Oil tank							
Ventilated	Tube end on the page			Oil tank	Tube end at the oil tank bottle		

	Tube end on the liquid level		With air filter		Partial oil leakage or return		
				Pressurized oil tank or closed oil tank			Two oil circuits
(7) Fluid regulator							
Filter	Filter		Common symbol	Air filter			
	Filter with pollution indicator			Temperatur e regulator			
	Magnetic filter			Cooler	Cooler		Common symbol
	Filter with bypass-valve				Cooler with coolant tube		
	Double filter		p1: Oil inlet p2: Oil return	Heater			Common symbol
Pressure detector	Pressure indicator			Flow detector	Galvanometer (liquid flow indicator)		
	Pressure gauge				Flow gauge		
	Electric-contact pressure gauge (pressure display controller)				Flow quantity recorder		
	Pressure difference controller			Temperatur e gauge			
Liquidometer				Tachometer			
				Torque meter			
(8) Other auxiliary components							

Pressure relay (pressure switch)			Detailed symbol	Differential pressure switch			
			Common symbol	Sensor	Sensor		Common symbol
Travel switch			Detailed symbol		Pressure sensor		
			Common symbol		Temperature sensor		
Coupler	Coupler		Common symbol	Amplifier			
	Elastic coupler						
(9) Tube, tube interface, connector							
Tube	Tube		Pressure tube and oil return tube	Tube	Crossed tube		Two tubes are crossed and are not connected.
	Control tube		Two tubes are crossed and connected.		Flexible tube		
	Control tube		It indicates tubes with oil leakage.		One-way exhaust device		
Quick coupler connector	Quick coupler with no one-way valve			Rotary connector	One-way rotary connector		
	Quick coupler with one-way valve				Three-way rotary connector		

5.11 Arches-Zero Display Menus

Level-1 Menu	Level-2 Menu	Level-3 Menu	Default Value	Remarks
Language Setting	Chinese			
	English			
Parameter adjustment	Machine mode	Large hydraulic drive	Default: large hydraulic drive	After the machine is energized, setting is required. “Crawler scissor” needs to be selected.
		Large electric drive		
		Small hydraulic drive		
		Small electric drive		
		Crawler check		
		SS small electric drive		
	Electric drive type	Common current	Default: common current	After the machine is energized, setting is required. Select a proper machine model as required.
		Two-in-one electric drive		
		Three-in-one electric drive		
		COBO electric drive		
		AC pump electric drive		
		Three-phase AC electric drive		
		Crawler SC0407E		
		Crawler SC0610E		
	Battery power-consumption alarm time	[Current value] min, [Maximum value]	0 (prohibited)	Adjustable range: 0~60
	Battery power-consumption off time	[Current value] min, [Maximum value]	0 (prohibited)	Adjustable range: 0~60
	Upper-control sleep mode	[Current value] sec, [Maximum value]	0 (prohibited)	Adjustable range: 0~60
	Audible alarm volume	[Current value], [Maximum value]	Default value: 28	Adjustable range: 0~28
	High-speed travel curve	High-speed travel speed [Current value], [Maximum value] Speed increase [Current value], [Maximum value] Speed decrease [Current value], [Maximum value] Slope time [Current value], [Maximum value]		Adjustable range: 0~100 Adjustable range: 1~255 Adjustable range: 1~255 Adjustable range: 1~100
	Low-speed travel curve	Low-speed travel speed [Current value], [Maximum value] Speed increase [Current value], [Maximum value] Speed decrease [Current value], [Maximum value] Slope time [Current value], [Maximum value]		Adjustable range: 0~100 Adjustable range: 1~255 Adjustable range: 1~255 Adjustable range: 1~100

Level-1 Menu	Level-2 Menu	Level-3 Menu	Default Value	Remarks
	Travel curve after lifting	Travel speed after lifting [Current value], [Maximum value] Speed increase [Current value], [Maximum value] Speed decrease [Current value], [Maximum value] Slope time [Current value], [Maximum value]		Adjustable range: 0~70 Adjustable range: 1~255 Adjustable range: 1~255 Adjustable range: 1~100
	Lifting curve	Lifting speed [Current value], [Maximum value] Speed increase [Current value], [Maximum value] Speed decrease [Current value], [Maximum value] Slope time [Current value], [Maximum value]		Adjustable range: 0~100 Adjustable range: 1~255 Adjustable range: 1~255 Adjustable range: 1~100
	Lowering curve	Lowering speed		Adjustable range: 0~100
	Pivot steering curve	[Current value], [Maximum value]		Adjustable range: 0~80
	Travel steering compensation value	[Current value], [Maximum value]		Adjustable range: 0~50
	Handle dead band value adjustment	[Current value], [Maximum value]		Adjustable range: 0~25
	Anti-pinch lowering speed	[Current value], [Maximum value]		Adjustable range: 0~100
	Battery parameter adjustment	Voltage for one bar of battery Voltage for two bars of battery Voltage for three bars of battery Voltage for four bars of battery Voltage for five bars of battery Level-2 low battery alarm		+100 is the battery threshold value. For example, if 126: is displayed on the screen, the actual voltage is (126+100)/10=22.6V.
	Pedal failure time	[Current value], [Maximum value] sec	0	Adjustable range: 0~600
	Sound volume percentage	[Current value]	100%	0-100%
	Crawler compensation	[Current value]	0%	-100~100 Speed value sent to the left motor driver by the ECU = Speed value sent to the left motor driver by the ECU (1+x‰)
	Indoor/outdoor switching lower limit	[Current value]	3s	Adjustable range: 0 - 100s
	Indoor/outdoor switching upper limit	[Current value]	5s	Adjustable range: 0 - 100s
	0407E brake delay	[Current value], [Maximum value]	10	Adjustable range: 0~-50 Delay time = parameter x0.1s, Unit: s SC0407E: 1s (default) SC0610E: 1.5s (default)
	0610E brake delay	[Current value], [Maximum value]	15	

Level-1 Menu	Level-2 Menu	Level-3 Menu	Default Value	Remarks
Function setting	18 lifting allowed with an alarm	18 lifting allowed with an alarm Prohibited/enabled	Prohibited	Prohibited/enabled
	Anti-pinch function	Anti-pinch function Prohibited/enabled	Enabled	Prohibited/enabled
	Operation alarm function	Operation alarm function Prohibited/enabled	Enabled	Prohibited/enabled
	Upper control lifting reversion	Upper control lifting reversion Prohibited/enabled	Prohibited	Prohibited/enabled
	Starting with a high speed	Starting with a high speed Prohibited/enabled	Enabled	Prohibited/enabled
	High speed with the parallel-connected valve energized	High speed with the parallel-connected valve energized Prohibited/enabled	Prohibited	Prohibited/enabled
	Lowering valve type	Lowering valve type Prohibited/enabled	Proportional valve	Switching valve/proportional valve
	Unified GPS function	Unified GPS function Prohibited/enabled	Enabled	Prohibited/enabled
	Angle simulation upper limit	Angle simulation upper limit Prohibited/enabled	Prohibited	Prohibited/enabled
	Angle simulation lower limit	Angle simulation lower limit Prohibited/enabled	Prohibited	Prohibited/enabled
	Angle simulation outdoor limit	Angle simulation outdoor limit Prohibited/enabled	Prohibited	Prohibited/enabled
	Anti-pinch lowering with a decreasing speed	Anti-pinch lowering with a decreasing speed Prohibited/enabled	Prohibited	Prohibited/enabled
	Battery type	Common lead acid battery Lithium Battery Hoppecke battery Sacred Sun battery	Common battery	1) Common lead acid battery 2) Lithium battery 3) Hoppecke battery 4) Sacred Sun battery
	Pressure sensor type	Pressure sensor type Two-channel current Voltage type Single-channel current	Two-channel current	1) Voltage type 2) Two-channel current 3) Single-channel current
	Height dual-area function	Height dual-area function Prohibited/enabled	Prohibited	Prohibited/enabled
	Weight dual-load function	Weight dual-load function Prohibited/enabled	Prohibited	Prohibited/enabled
	Lifting travel control function	Lifting travel control function Prohibited/enabled	Prohibited	Prohibited/enabled
	CAN communication baud rate	CAN communication baud rate 125K/250K	250K	125K/250K

Level-1 Menu	Level-2 Menu	Level-3 Menu	Default Value	Remarks
	Wireless anti-collision function	Wireless anti-collision function Prohibited/enabled	Prohibited	Prohibited/enabled
	Low battery alarm cycle	Prohibited/enabled	Prohibited	Prohibited/enabled This function is an audible alarm function.
	Angle sensor polarity	Angle sensor polarity Decrease progressively Increase progressively	Decrease progressive ly	
	Pedal function	Pedal function Prohibited/enabled	Prohibited	Prohibited/enabled
	Height permitted rod function	Height permitted rod function Prohibited/enabled	Prohibited	Prohibited/enabled
	Outdoor limit redundancy check	Outdoor limit redundancy check Prohibited/enabled	Prohibited	Prohibited/enabled
	Exchange the crawler left motor with the right one	Exchange the crawler left motor with the right one Prohibited/enabled	Prohibited	Prohibited/enabled
	Crawler PCU type	Crawler PCU type Single handle/dual handles	Single handle	Single handle/dual handles Single handle (default) When the crawler model is selected, any PCU type can be matched. When the crawler model and dual handles are selected, all functions like lifting, lowering, etc. shall be controlled by two handles. When the non-crawler model and dual handles are selected, the single handle is matched automatically.
	Buzzer type	Buzzer type Common buzzer White noise buzzer Adjustable sound buzzer	Common buzzer	1) Common buzzer 2) White noise buzzer 3) Adjustable sound buzzer
	Alarm of stepping on the pedal during machine starting	Alarm of stepping on the pedal during machine starting Prohibited/enabled	Enabled	Prohibited/enabled Prohibited -- If you make the machine energized before stepping on the pedal, there is no any alarm or prompt. Enabled -- If you step on the pedal and then make the machine energized, an alarm is reported.

Level-1 Menu	Level-2 Menu	Level-3 Menu	Default Value	Remarks
	Parameter modification confirmation	Parameter modification confirmation Prohibited/enabled	Prohibited	Enabled a. After each parameter is modified, click the Confirmation key to pop up a message of “Would you save the changes?” At this time, if you click the Confirmation key, a message of “Parameter modified successfully” is displayed (then you can click the Return key to return to the last-level menu); if you click the Return key, the changes will not be saved, the original parameter will be stored, and a message of “Parameter modification canceled” is displayed. B. After each parameter is modified, a message of “Would you save the changes?” will be displayed if you click the Return key directly. At this time, if you click the Confirmation key, a message of “Parameter modified successfully” is displayed and the interface jumps back to the last-level menu. If you click the Return key, the original parameter will be stored, a message of “Parameter modification canceled” is displayed, and the interface jumps back to the last-level menu. Prohibited: Modified parameters can be saved only after the Confirmation key is pressed. No pop-up window occurs. Changes will not be saved when you press the Cancel key or the machine is de-energized, and there is no any pop-up window prompt.
	Slope speed reduction	Prohibited/enabled	Prohibited	Prohibited -- When the fork frame is stored and below the lower limit, there is no any alarm and the speed is not limited. Enabled-- When the fork frame is stored and below the lower limit, an alarm is reported and the machine travels at a low speed.
	Alarm of the enabling key pressed during machine starting	Prohibited/enabled	Enabled	
	Dual handle lifting and lowering	Prohibited/enabled	Enabled	
	Pedal and enabling switch lifting	Prohibited/enabled	Prohibited	After the machine is started, lifting is allowed after the pedal and enabling switch are pressed.

Level-1 Menu	Level-2 Menu	Level-3 Menu	Default Value	Remarks
Weighing function calibration	Weighing function	Weighing function Prohibited/enabled	Prohibited	Prohibited/enabled
	No-load calibration	Long-press the CONFIRMATION key to enter the calibration process. The display screen shows “full-load calibration ...” during the calibration process. No-load calibration...		
	Light-load calibration	If the weight dual-load function is not enabled, Please enable this function. If the weight dual-load function is enabled, Long-press the CONFIRMATION key to enter the calibration process (5s). The display screen shows “full-load calibration ...” during the calibration process. Light-load calibration...		
	Full-load calibration	Long-press the CONFIRMATION key to enter the calibration process (5s). The display screen shows “full-load calibration ...” during the calibration process. Full-load calibration...		
	Dynamic overload percentage	Dynamic overload percentage Current value, Maximum value	5	Adjustable range: 0~100
	Static overload percentage	Static overload percentage Current value, Maximum value	30	Adjustable range: 0~100
	Cancel the alarm threshold value after OL.	Cancel the alarm threshold value after OL. Current value, Maximum value	9	Adjustable range: 0~50 Add based on the base of 60
	Differential pressure for the static function enabling	Differential pressure for the static function enabling Current value, Maximum value	30	Adjustable range: 0~200
	Overload stability delay setting	Overload stability delay setting Current value, Maximum value	20	Adjustable range: 0~200
	Overload lowering height value	Angle value: current value mV Press the CONFIRMATION key		When parameters are not set and overload is by default, lowering is not allowed.

Level-1 Menu	Level-2 Menu	Level-3 Menu	Default Value	Remarks
		for 5s.		
	Angle simulation upper limit	Angle value: current value mV Press the CONFIRMATION key for 5s.		
	Angle simulation lower limit	Angle value: current value mV Press the CONFIRMATION key for 5s.		
	Angle simulation outdoor limit	Angle value: current value mV Press the CONFIRMATION key for 5s.		
	Limit redundancy check threshold	Limit redundancy check threshold Current value, Maximum value	145·	0-255
Fault history				
About this machine	ECU test mode			
	Update the ECU program.	ECU upgrading...		
	Update the PCU program.	PCU upgrading...		
	Release brake	Press the CONFIRMATION key for 5s. If the machine is not an electric drive vehicle, only for electric drive vehicle is displayed.		The brake is released.
	Controller SN code	Direct display		
	ECU software version	Direct display		
	ECU software compiling time	Direct display		
Monitoring menu	Load percentage 0/100			0 is displayed when the calibration is not completed.
	Height percentage 0/100			0 is displayed when the calibration is not completed.
	Inclination status Inclined/not inclined			
	Overload status Overloaded/non-overloaded			
	Calibration status All calibrated Full-load calibrated No-load calibrated All not calibrated			
	Built-in inclination X (front-rear) [**°]			

Level-1 Menu	Level-2 Menu	Level-3 Menu	Default Value	Remarks
	Built-in inclination Y (left-rear) [**°]			
	ECU analog input	Angle value [0-5000] mV Pressure value 1 [0-5000]mV ([4-20]mA) Pressure value 2 [0-5000]mV ([4-20]mA) Battery voltage: [**.**]V		
	ECU analog output	Pump motor PWM [0-100] Travel motor PWM [0-100] Current of lowering valve proportional valve 1 [0]A Current of lowering valve proportional valve 2 [0]A		
	ECU on-off input	Upper limit switch ON/OFF Lower limit switch ON/OFF Left brake status ON/OFF Right brake status ON/OFF Key switch input platform/chassis Pit protection switch ON/OFF Inclination switch ON/OFF		
	ECU on-off output	Overload alarm lamp ON/OFF Lifting solenoid valve ON/OFF Lowering solenoid valve ON/OFF Forward solenoid valve ON/OFF Backward solenoid valve ON/OFF Left-turn solenoid valve ON/OFF Right-turn solenoid valve ON/OFF High/low speed valve ON/OFF Horn ON/OFF Buzzer ON/OFF Pump motor enabling output ON/OFF Travel motor enabling output ON/OFF		

Level-1 Menu	Level-2 Menu	Level-3 Menu	Default Value	Remarks
	Handle monitoring	Handle analog quantity: [-127~127] Enabling key ON/OFF Left-turn key ON/OFF Right-turn key ON/OFF Lifting key ON/OFF Travel key ON/OFF Horn key ON/OFF Tortoise speed key ON/OFF		
	TBOX monitoring	Temporary unlocking Passive machine locking TBOX No. TBOX time TBOX binding status TBOX locking status TBOX positioning antenna TBOX signal quality TBOX networking status TBOX switch cover status TBOX locating status ECU binding status ECU machine locking status		