I Applicable scope

Model CD1 is a kind of electric rope hoist of light and minitype hoisting equipment. It can be used on single beam crane in I -shaped bridge type or straight /curved single rail I-beam bridge suspension for lifting heavy objects. The foot-mounted type of CD1 can be fixed on immovable underprop to lift vertically or with any angle rolling.

With its compact structure, legerity and convenient use/reparation, model CD1 is one of the daily use hoisting equipment in factories, mines, ports and warehouses. Its structure is shown in pic.1 and basic parameters are in Table 1.

Working environmental temperature : -20℃ to +40℃

It is not used in places where the relative humidity is over 85% or where there is risk of fire and explosion or where there is much erosive gas.

Carrying human being is forbidden. Please operate it strictly in term of GB067 and ZBJ80013.7.

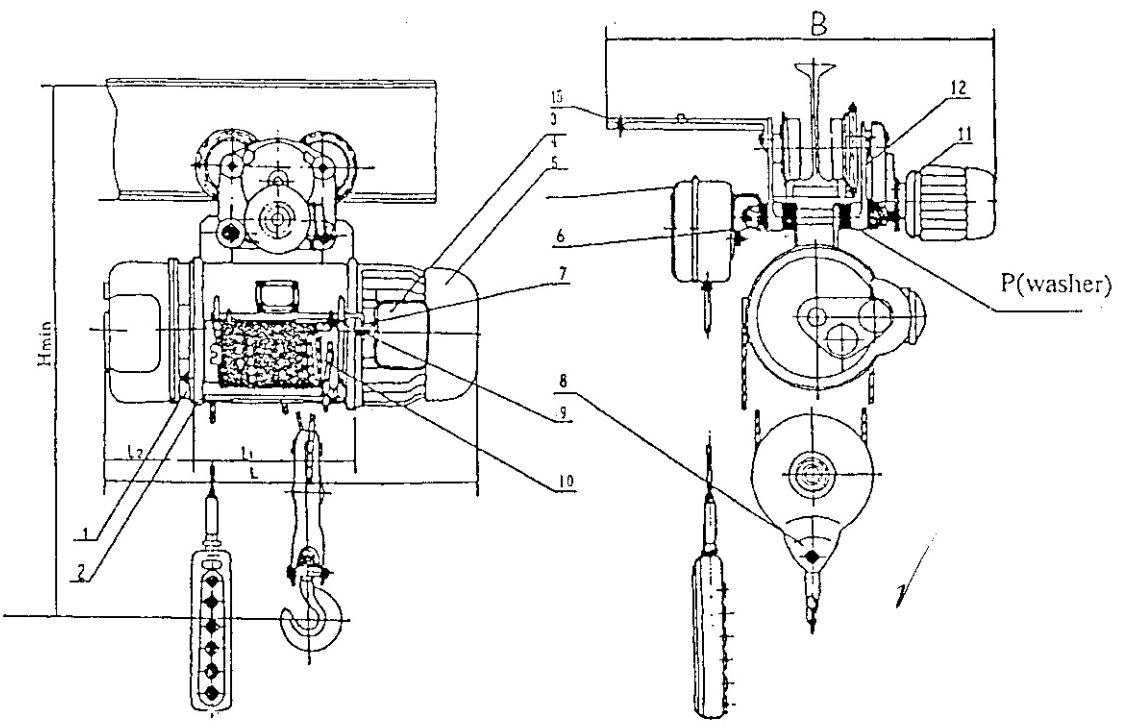
When it's used outdoors, shelter is needed to keep away wetness.

Loading persisting rate: FC 25%

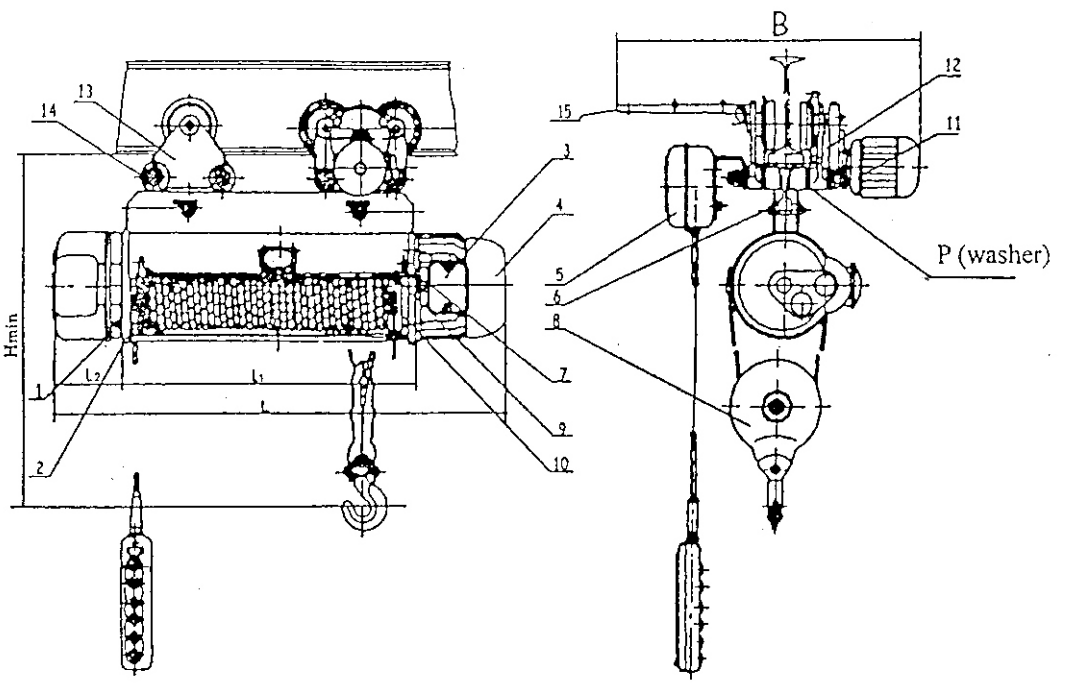
Time of lifting in an hour: 120 times/ h

The name of this series of products can be expressed as below:

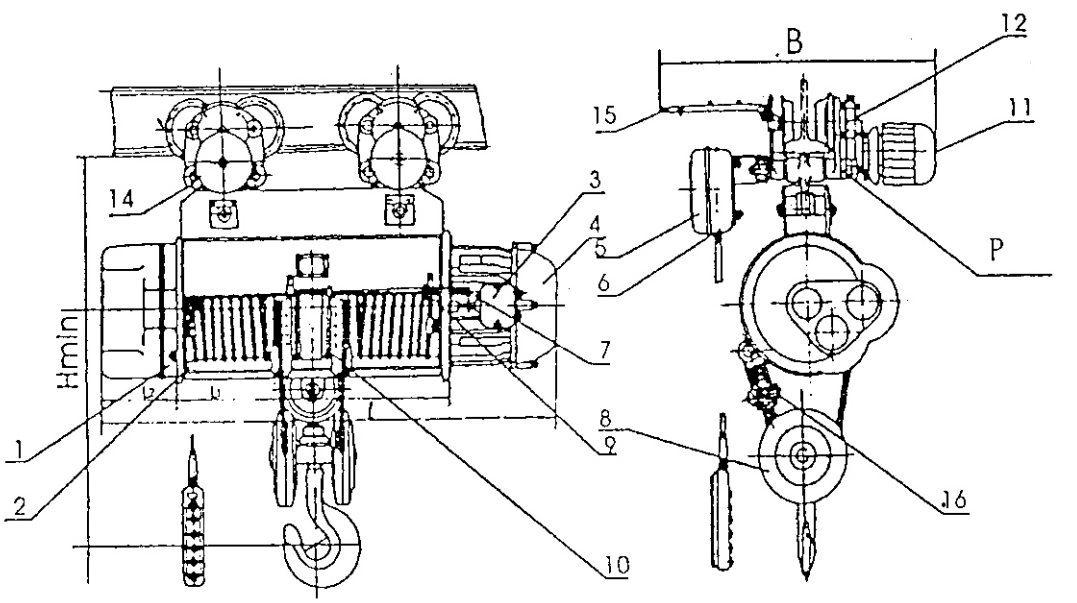
Model + lifting capacity + lifting height (m) + structure (type A =stationary type. According to the direction of rope outlet. it is subdivided into A1, A2, A3 and A4; type D =electric trolley type)



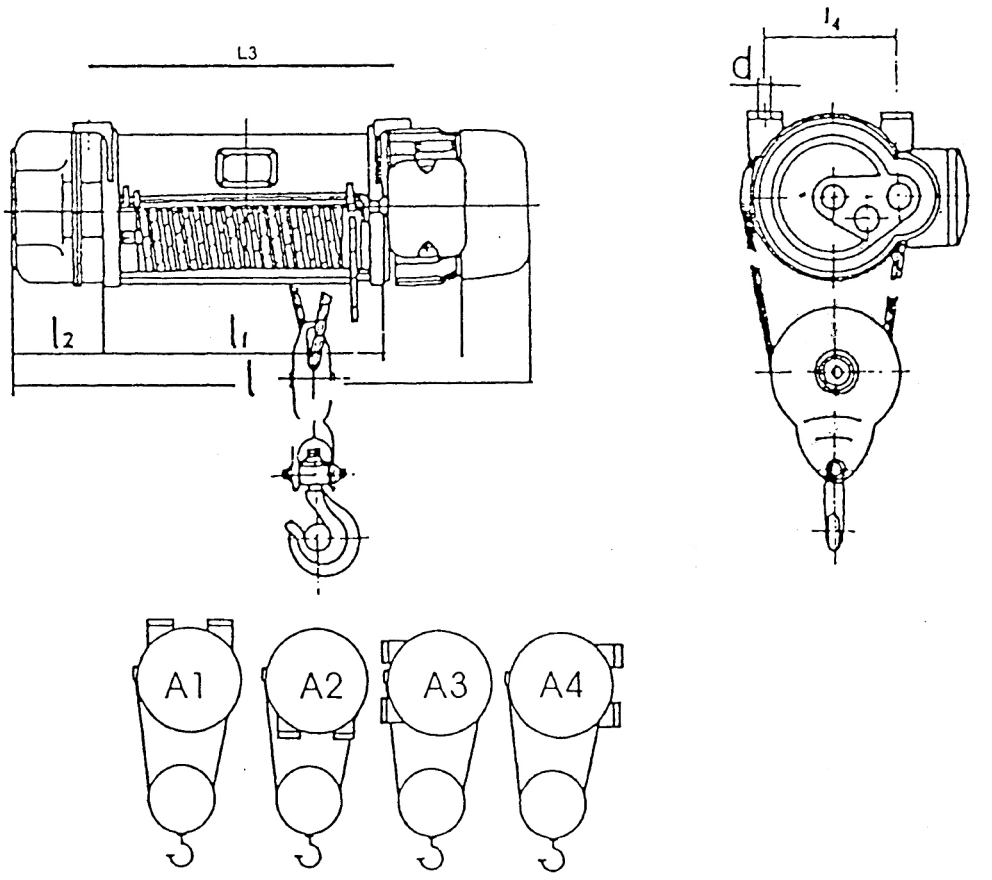
Picture 1a: Model CD1 1~5t H=6-9m
Model CD1 0.5t H=6-12m



Picture 1b: Model CD1 1~5t H=12-30m



Picture 1c: Model CD1 10t H=9-30m



Picture 1d: structure of Model CD1 type A

1. reduction gear
2. drum
3. cut-off limiter
4. lifting motor
5. control box
6. electric trolley
7. limiter level
8. lifting hook
9. stopper
10. rope guide
11. travelling motor
12. reduction gear of the electric trolley
13. double-wheel trolley
14. connecting frame/ balance frame
15. guide for flexible cable
16. balance wheel set

II Structure and operating principle

The structure of Model CD1 includes lifting framework,travellingframework (not for stationary hoists) and electric apparatus control system.

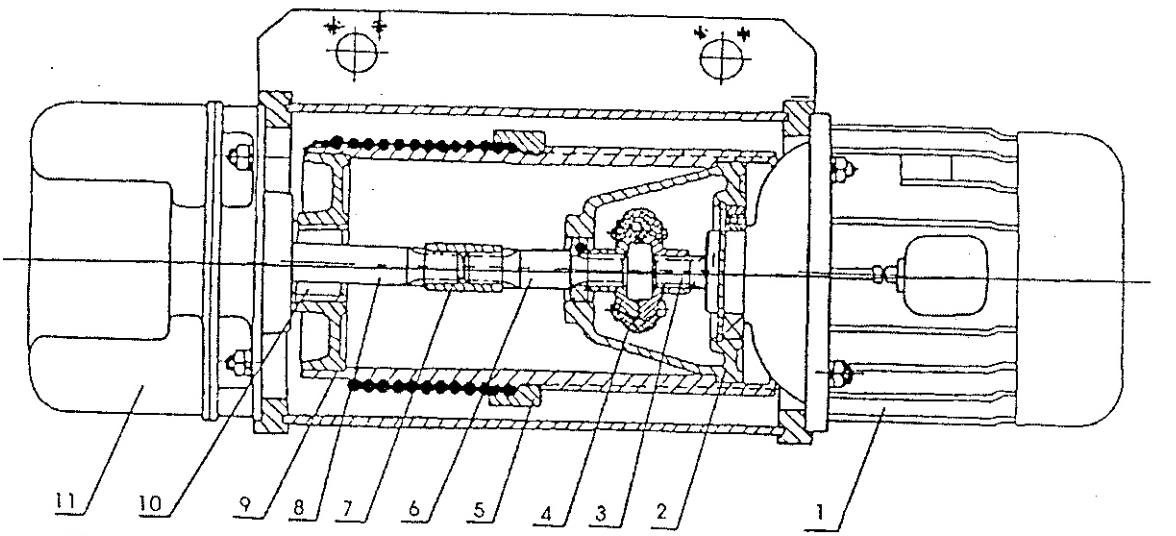
1. Lifting framework

As shown in pic.2, when the hoist is energized, through the spring coupling(4), the lifting motor(1) drives directly the gear shaft in the reduction gear(11) to the quill shaft with conical brake. Then the quill shaft causes the rolling of the drum as to rotate and wind the rope, making the lift hook moves up and down.

Hoists with the lifting height of 6m: it uses a spring coupling(4) to connect the motor gear shaft(3) with the intake shaft of reduction gear(8). This kind of coupling is made up of a high strength rubber tyre loop and two half-coupling with spline in order to absorb the impact and reduce the fixing error. The rope guide(5) can prevent the rope winding randomly.

Hoists with the lifting height >9m: adding a jackshaft(6) and a solid coupling(7).

Hoists with the lifting height >18m: a holder(2)(combined with the right cover) is needed in order to keep the jackshaft steady and rolling reposefully.



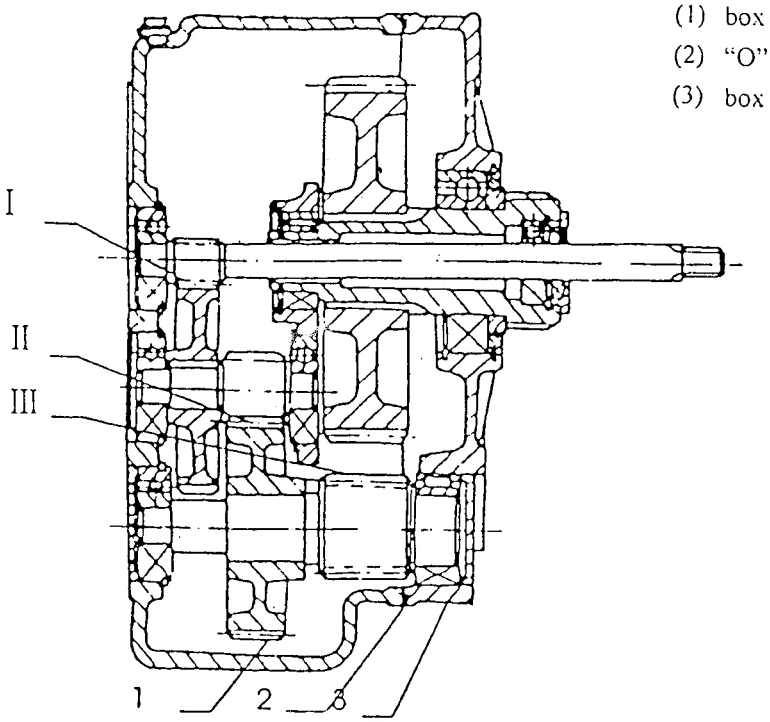
Picture 2:

(1) lifting motor
(2) right cover
(3) motor gear shaft
(4) spring coupling
(5) rope guide
(6) jackshaft
(7) solid coupling
(8) intake shaft of reduction gear
(9) drum
(10)quill shaft
(11)reduction gear

Reduction gear (pic.3) adopts triple bevel gear drive mechanism. The gear and shaft are made of treated alloy steel. The mating bearings are all rolling bearings. The box body and cover are well sealed with "O" shape oil proof rubber loop.

Picture 3: lifting reduction gear

(1) box cover
(2) "O" shape oil proof rubber loop
(3) box body



Lifting motor(pic4/5) is conical rotor motor with brake. When the motor is energized, the action of axial magnetic pulling force causes the rotor pressing the brake spring, and the fan brake wheel leaves off the back cover. Then the motor starts to rotate.

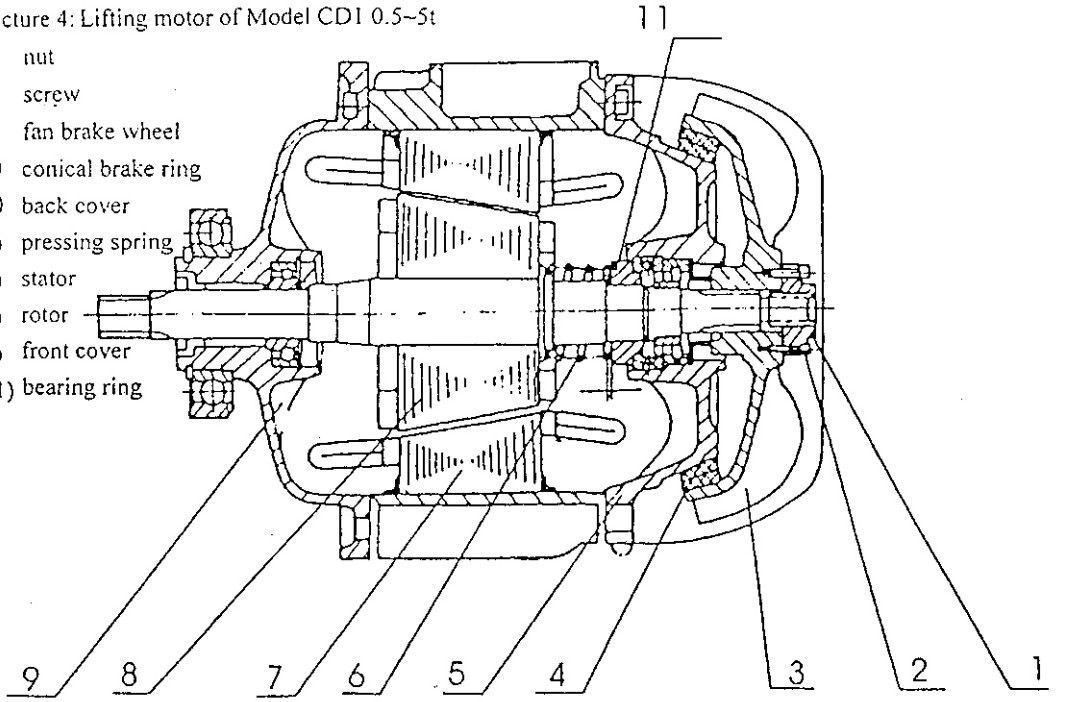
When the motor is cut off electricity, the magnetic pulling force disappears. The back cover due to the action of pressing spring stops the fan brake wheel. The conical brake ring which is pressed on the fan brake wheel is made of asbestos rosin with good wearability. There are vanes fixed on the fan brake wheel in order to ventilate duly. When the rated load falls, the sliding distance "S" caused by braking should be as follows:

For 0.5~5t hoist, S<80mm; 10t, hoist, S<70mm. If S is more than this regulation, the hoist should be adjusted.

Adjusting method: As shown in pic.4. Loosen the screw(2) and tight the latch nut(1) to raise the pressure on the spring(6) to get large brake moment. Tight the screw(2) and make sure the axial sliding around 1.5 is proper. (The data can be observed by repeated starting.) If this method doesn't work, please make the adjustment in term of Item 2, Table 7 (Common troubles and troubleshooting).

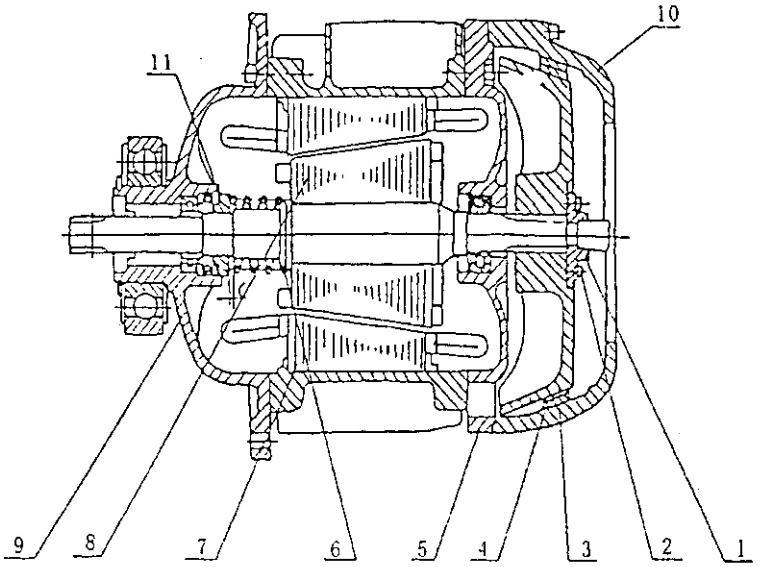
Picture 4: Lifting motor of Model CD1 0.5~5t

(1) nut
(2) screw
(3) fan brake wheel
(4) conical brake ring
(5) back cover
(6) pressing spring
(7) stator
(8) rotor
(9) front cover
(11) bearing ring



The principle of adjustment for the hoist shown in pic.5 is the same as above, but the direction of tightening the nut is opposite.

If the brake ring has worn out, replace it and make sure to impact the ring into the fan brake wheel. After grinding, the conical face of brake ring can contact well with the back cover to insure the hoist working normally.



Picture 5: Lifting motor of Model CD1 10t

(1)~(9) same as pic.4

(10) back cover

(11) bearing ring

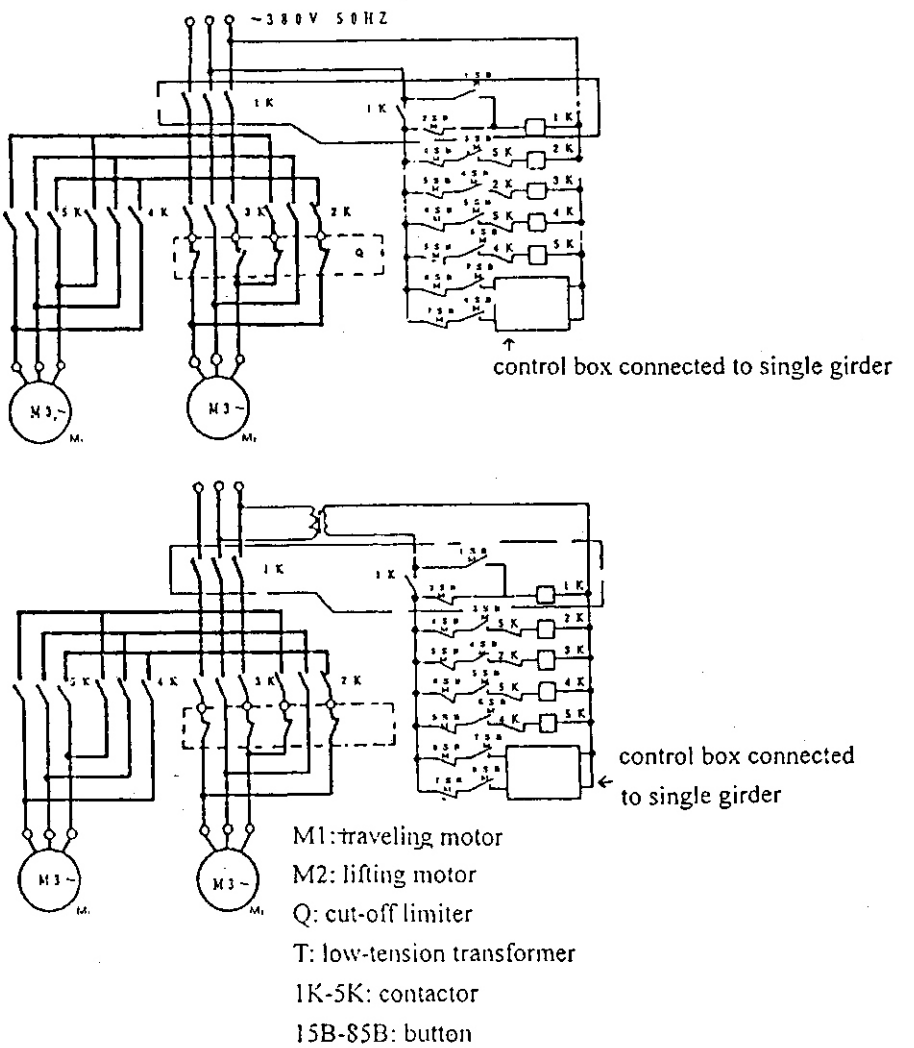
2. Travelling framework

When the motor is energized, the reduction gear works, causing the pair of drive wheels rolling. Hence, the hoist is moving along the I -shaped track.

Travelling motor is also a kind of conical rotor motor. It is plane braking and has small moment so it brakes slowly to prevent the object shaking from parking. The method of adjustment is the same as 0.5~5t hoist but too much tightness is not needed.

3. Electric apparatus control system (pic.6)

Model CD1 is composed of the contactor box, control button and cut-off limiter. The working voltage of control button is 380V and 36V(safety voltage). The button includes up, down, left, right, forward; backward(forward and backward are use for bridge hanging), turn-on and turn-off. The cut-off limiter is a kind of safety measure used to prevent possible accidents when the lift hook goes up or down beyond the limit. When the hook reaches the limit, axially moving rope guide will hit the stopper on the level, and the level will push or pull the rod to cut off the electricity. Hence, the object stops moving.



Picture 6: The diagram of wiring of the mating control box

Table 1: Main technical parameters for CD1 electric hoist

Type			CD_1 0.5 -6D	CD_1 0.5 -9D	CD_1 0.5 -12D	CD_1 -6D	$CD_1$1 -9D	$CD_1$1 -12D	$CD_1$1 -18D	$CD_1$1 -24D	$CD_1$1 -30D	$CD_1$2 -6D	$CD_1$2 -9D	$CD_1$2 -12D	$CD_1$2 -18D	$CD_1$2 -24D	$CD_1$2 -30D	$CD_1$3 -6D	$CD_1$3 -9D	$CD_1$3 -12D	$CD_1$3 -18D	$CD_1$3 -24D	$CD_1$3 -30D	$CD_1$5 -6D	$CD_1$5 -9D	$CD_1$5 -12D	$CD_1$5 -18D	$CD_1$5 -24D	$CD_1$5 -30D	CD_1 10 -9D	CD_1 10 -12D	CD_1 10 -18D	CD_1 10 -24D	CD_1 10 -30D
Lifting capacity		T	0.5			1						2						3						5						10				
Lifting height		m	6	9	12	6	9	12	18	24	30	6	9	12	18	24	30	6	9	12	18	24	30	6	9	12	18	24	30	9	12	18	24	30
Lifting speed		m/min	8			8						8						8						8						7				
Running speed		m/min	20(30)			20(30)						20(30)						20(30)						20(30)						20(30)				
Steel wire	Rope diameter	mm	4.8			7.4						11						13						15						15				
	Length	m	14.43	20.43	26.43	14.65	20.65	26.65	38.65	50.65	62.65	15.4	21.4	27.4	39.4	51.4	63.4	15.85	21.85	27.85	39.85	51.85	63.85	16.43	22.43	28.43	40.43	52.43	64.43	43	55	79	103	127
	Structure		D-6×37+1			D-6×37+1						D-6×37+1						D-6×37+1						D-6×37+1						D-6×37+1				
Type of I-steel (GB706—65)			16-28b			16-28b						20a-32c						20a-32c						25a-63c						25a-63c				
Min. radius of circular track		M		1		1		1.2	1.8	2.5	3.2	1.2		1.5	2.0	2.8	3.5	1.2		1.5	2.0	2.8	3.5	1.5		2	2.5	3.0	4.0	3.0	3.5	4.5	6.0	7.2
Lifting motor	Type		ZD_121-4			ZD_122-4						ZD_131-4						ZD_132-4						ZD_141-4						ZD_151-4				
	Power	Kw	0.8			1.5						3						4.5						7.5						13				
	Specified speed	r/min	1380			1380						1380						1380						1400						1400				
	Phase		3			3						3						3						3						3				
	Voltage	V	380			380						308						380						380						380				
	Current	A	2.4			4.3						7.6						11						18						30				
	Frequency	Hz	50			50						50						50						50						50				
Travelling motor	Type		ZDY_111-4			ZDY_111-4						ZDY_112-4						ZDY_112-4						ZDY_121-4						ZDY_121-4				
	Power	Kw	0.2			0.2						0.4						0.4						0.8						0.8				
	Specified speed	r/min	1380			1380						1380						1380						1380						1380				
	Phase		3			3						3						3						3						3				
	Voltage	V	380			380						380						380						380						380				
	Current	A	0.72			0.72						1.25						1.25						2.4						2.4				
	Frequency	Hz	50			50						50						50						50						50				
Times of lifting		/h	120			120						120						120						120						120				
Loading persisting rate		FC/%	25%			25%						25%						25%						25%						25%				
Basic specification	Hmin	mm	~650			~667		~767				~840		~950				~954		~1058				~1120		~1283				~1350				
	l_2	mm	125			158						187						229						267						301				
	l_1	mm	274	346	418	345	443	541	737	933	1129	352	452	552	752	952	1152	380	483	586	792	998	1204	415	536	625	835	1045	1255	875	1056	1418	1780	2142
	l	mm	616	618	760	758	856	954	1150	1346	1542	820	920	1020	1220	1420	1620	932	1035	1138	1344	1550	1756	1047	1168	1257	1467	1677	1877	1602	1783	2145	2507	2869
	B	mm	~884			~884						~930						~930						~1055						~1055				
	l_3	mm	318	390	462	401	499	597	793	989	1185	418	518	618	818	1018	1218	448	551	654	860	1066	1272	485	606	695	905	1115	1325	949	1130	1492	1854	2216
*	l_4	mm	190			196						240						264						320						376				
*	d	mm	16.5			19						25						25						31						37				
Weight		Kg	121	125	130	137	145	172	188	204	220	221	232	285	309	332	353	281	297	354	390	420	451	473	495	597	646	686	726	1048	1098	1209	1310	1411

P.S. *13, 14, d are fixed specifications.

Table 2: Main technical parameters of the reduction gears

Cap.(t)	Drive grade	Modulus	Teeth No. Direction of spiral left	right	Speed ratio	Pitch angle	Direction of spiral
0.5	I	1.5	14	55	42.4	8° 6′ 34″	20°
	II	2	14	44			
	III	3	14	48			
1	I	1.5	16	62	47.7		
	II	2	15	48			
	III	3	13	50			
2	I	2	12	59	60.5		
	II	3	12	44			
	III	4	14	47			
3	I	2	15	67	69		
	II	3	13	56			
	III	5	12	43			
5	I	2.5	12	68	81.2		
	II	4	12	42			
	III	6	11	45			
10	I	2.5	14	90	113.3		
	II	5	12	47			
	III	6	12	54			

III Installation

1. Check the hoist when it is transported to the worksite.
2. On the purpose of using in different kinds of I-steel rails, when installing the hoist, the space between the wall plates is required to be adjusted with washer P (pic.1) to ensure 4-5mm space between the lower flange side face of the I-steel and the rim of the travelling wheels. (See Table 3)
3. To prevent the hoist from getting off the rail or colliding, elastic buffer should be equipped at the ends of the rail.
4. Safe and reliable ground wire is needed for the I-steel rail. Generally Φ4-5mm bare copper wire or flat steel with section area $\geqslant 25mm^2$ are adopted.
5. When electric apparatus have been installed, the resistance to ground of the alive circuits in all power loops and control loops should not be less than 1000Ω working voltage.

Table 3: Adjustment for the quantity of washers P

Type of I-steel rail (GB 706-65)	Capacity (t)		
	0.5~1	2~3	5~10
16	0		
18	2		
20a	3	0	
20b	4	1	
22a	6	3	
22b			
25a	7	4	0
25b	8	5	1
28a	9	6	2
28b			
32a		8	4
32b			
32c		9	5
36a			
36b			6
36c			
40a			7
40b			
40c			8
45a			9
45b			
45c			10
50a			11
50b			
50c			12
56a			13
56b			
56c			14
63a			15
63b			16
63c			

P.S. the quantity above expresses how many washers are needed in one end inboard of a bolt. The thickness of one washer is 2mm. If it is changed, the quantity should change accordingly.

IV Test

1. Whether all the parts that should be lubricated are lubricated according to the requirements of Table 4.
2. Whether the joint surface of mono-bridge rails is appropriate.
3. Make sure the power source is not less than 342V in the worksite. Especially, don't let the voltage dropping too much because of the over-small of cable section.
4. Start the motor and make it run clockwise and counter clockwise under no load. Check the control buttons, limiter and rope guide. Make sure whether the control wiring is correct and everything works normally.
5. If the rope is loose or tangled, put it in order and tighten it.
6. The place of the stopper of the limiter equipment should be adjusted after installation. Method: start the motor under no load, when the hook reaches the peak, the rope guide hits the stopper on the right and pushes the limiter level to cut off the electricity. Hence, the hook stops rising. At this time, the distance between the top of block cover and the end of drum cover should be 50 to 150mm. In the same way, when the hook reaches the bottom, the hook stops and there are should be 2 to 3 rounds (safety round) rope left on the drum.
7. Start the motor under the rated load and check if it works normally. Check whether the sliding distance is proper and the limiter is leaking oil.

Table 4: Lubrication instructions

NO.	PART	METHOD	GREASE TYPE	QUANTITY	INTERVAL
1	Reduction gear	Fill in from the top screws.	Machine oil GB443-89-L-AN 46	For lifting reduction gear: 0.5t-1litre, 1t-1.5l, 2t-2l, 3t-3l, 5t-3l, 10t-4l For travellinggear: 0.5~3t-0.6l, 5~10t-1l	3 months
2	Rope and drum	Coat the surface	Rope grease		1 month
3	Bearings in the parts of the hook, block, travelling wheels, drum and motor.	Coat the surface or squeeze in.	Lime grease ZG-3(or ZG-1,ZG-2)		1 year

V Common troubles and troubleshooting

1. The hoist should be operated by a sole operator who is familiar with the regulations for safe operation.
2. The limiter is a kind of safety measure used to prevent possible accidents when the hook goes up or down beyond the limit, which should not be used as often as travelling button.
3. It is not advisable to suspect the object in the are for a long time in order to prevent working parts from permanent distortion or causing accident.
4. When the hoist is not used, lift the hook 2m up the ground and cut off the electricity.
5. Don't lift sideways or dragging along as to protect the rope guide. Don't lift over load.
6. Check the hoist termly and lubricate it on the basis of Table 4.
7. In case the object goes down rapidly due to ineffective brake during operation, immediately press the downward button to cause the object going down at normal speed. Check it after the object reaching the ground safely.
8. Replacement of the rope: The rope should be replaced when broken steel wires reach a certain quantity within one length of lay (entwisting) in terms of Table 5.

Table 5: Replacement of the rope.

safety factor of steel wires: 5.5	Structure of the wire			
	6×19=114		6×37=222	
	Cross entwisting	Single direction entwisting	Cross entwisting	Single direction entwisting
	12 pcs	6 pcs	22* pcs	11 pcs

* 22pcs is used commonly. When the broken wires reach 22pcs, the rope should be discarded. If there is any abrasion or erosion on the rope, the quantity of replacement should be reduced according to the Table 6.

Table 6: The rope should be replaced when the cases listed in this table occur.

Quantity of diametric surface abrasion or erosion of wires	Percentage of the quantity of broken wires within one length of lay based on Table 5(%)
10	84
15	76
20	68
25	60
30~40	50

When the diametric surface abrasion of broken wires reach 40%, the rope should be discarded.

Check the rope termly and make sure whether the end of it is fastness.

Keep the rope with enough lubricating to prevent rapid abrasion.

The structure of wire for the hoist is 6×37. It is allowed to use 6×19 but it will cause tangle and has short life because of its low flexibility.

Table 7: Common troubles and troubleshooting

Troubles	Main causes	Troubleshooting
1.the motor doesn't lift	Overloaded; Voltage is 10% lower than rated voltage; Lead breaks or in bad contact; Brake wheel adheres to back cover because of rust.	Overloaded is not allowed. Adjust the voltage. Repair the lead. Clean out the rust.
2.sliding distance is overrun	The pressure of spring reduces because of abrasion of brake ring; Brake ring has bad contact with back cover; Brake surface is smeary; Brake ring is loose; Pressured spring is useless; Coupling breaks or is locked	Increase the pressure of spring according to Pic.4 and 5. Take out the ring and grind it. Take out the surface and clean it. Replace the ring. Replace the spring. Check and repair it.
3.temperature of motor is too high	Overloaded; Using frequently; Space of the brake is too small so that the brake ring can't work normally.	Overloaded is not allowed. Duty of load should be JC25% and times of lifting are 120/h. Adjust the space.
4.reduction gear causes strong noise	Poor lubrication; Gear or bearing has worn out.	Lubricate enough oil. Replace the broken parts.
5.motor makes noise	Power source voltage is too low; Lead breaks or in bad contact.	Adjust the voltage. Repair the lead.
6.hoist lifts the object in the air and can't restart to go on to lift	Low voltage.	Adjust the voltage.
7.hook can't stop to move even it reaches the peak	The head of contactor is broken; Limiter is ineffective.	Cut off the electricity immediately and replace the broken parts.
8.oil leakage at the reduction gear	Oil seal is ineffective; Blots are not properly tightened.	Check the seal and bolts.

Table 9: List of rolling bearings for electric hoist

part of hoist	kind of bearing	Standard code	0.5t		1t		2t		3t		5t		10t	
			type	QTY	type	QTY	type	QTY	type	QTY	type	QTY	type	QTY
reduction gear	single row radial bearing with stopping slot on the outer ring	Gb277—82	50302 50202 50205	4 1 1	50303 50202 50205	4 1 1	50303 50305 50202 50205	1 3 1 1	50305 50306 50202 50205	1 3 1 1	50405 50406 50204 50206	1 3 1 1	50407 50408 50409 50204 50206	1 2 1 2 2
	needle roller bearing	Jb3588—84	4074105 4084105	1 1	4074105 4084105	1 1	4084106	1	4074109	1	4074106 4074111	1 1	4074113	2
	single row radial bearing sealed in both faces	Gb279—88 Gb276—82	180510 (210)	1	180510 (210)	1	180512 (212)	1	180515 (215)	1	180516 (216)	1		
	single row radial bearing sealed in one face	Gb279—88 GB276—82	160504 (204)	1	160504 (204)	1	160505 (205)	1	160506 (206)	1	160505 (206)	1	160507 (207)	1
electric trolley	single row radial bearing	Gb276—82	305	4 *6	204 305	**1 4 *6	206 407	**1 4 *6	206 407	**1 4 *6	208 408 221	**1 4 *6	208 408 221	**1 8 1
lifting motor	single row thrust ball bearing	Gb301—84	8204 8105 8109	1 1 1	8204 8105 8109	1 1 1	8205 8105 8112	1 1 1	8206 8105 8112	1 1 1	8208 8113 8107	1 1 1	8311 8112 8107	1 1 2
	single row radial bearing with dustproof cover on one face	Gb278—82	60212 60305	1 2	60212 60305	1 2	60213 60307	1 2	60213 60308	1 2	60218 60313	1 2	60319 60313	1 4
travelling motor	single row radial short cylindrical roller bearing	Gb283—87	32206 32203 32204	1 2 1	32206 32203 32204	1 2 1	42307 32203 32206 32208	1 2 1 1	42308 32203 32206 32208	1 2 1 1	32207 32204 32209	1 2 1	32208 32204 32211	1 4 1
drum	knuckle bearing	Gb304—81			Ug30	*2	Ug40	*2	Ug40	*2	Ug50	*2	Ug50	2

P.S. *these QTY are used for the hoist H>12m except 0.5t hoist.

**these QTY are used for hoist H>18m.

MD1 series of electric hoist specification

specification			MD1 0.5-6	MD1 0.5-9	MD1 0.5-12	MD1 1-6	MD1 1-9	MD1 1-12	MD1 1-18	MD1 1-24	MD1 1-30	MD1 2-6	MD1 2-9	MD2 2-12	MD2 2-18	MD2 2-24	MD2 2-30
capacity		T	0.5			1						2					
implemental		m	6	9	12	6	9	12	18	24	30	6	9	12	18	24	30
lifting speed		m/dm	8/0.8			8/0.8						8/0.8					
running speed		m/dm	20			20						20					
wire-rope	colt-pathway	mm	4.8			7.7						11					
	spec (GB359-64)		6×19×1			6×19×1						6×37×1					
	extent	m	15.5	21.5	27.5	16	22	28	40	52	64	16	22	28	40	52	64
orbiting	I -shaped steel model (GB706-65)		16-28b			16-28b						20a-32c					
	the minimum of curvature radius	m	1.5			1.5			2.0	2.8	3.5	2.0			2.5	3.0	4.0
power	normal tension	volt-ampere	380V			380V						380V					
	normal frequency	hz	50			50						50					
operating system			JC25%			JC25%						JC25%					
the number of assemble		degree/hour	120			120						120					
running electric machinery	specification		ZD21-4			ZD22-4						ZD31-4					
	normal rated power	KW	0.8/0.2			1.5/0.2						3.0/0.4					
	the normal rotational speed	turn/minute	1380			1380						1380					
	normal electric current	A	2.2			4						7					
lifting assist electric machinery	specification		ZD11-4			ZD11-4						ZD12-4					
	normal rated power	KW	0.2			0.2						0.4					
	the normal rotational speed	turn/minute	1380			1380						1380					
	normal electric current	A	0.7			0.7						1.3					
running electric machinery	specification		ZDY11-4			ZDY11-4						ZDY12-4					
	normal rated power	KW	0.2			0.2						0.4					
	the normal rotational speed	turn/minute	1380			1380						1380					
	normal electric current	A	0.7			0.7						1.3					
fundamental	L′	mm	~650	~722	~794	~789	~887	~985	~1181	~1377	~1537	~838	~938	~1083	~1238	~1438	~1638
	fixed (A model) 1′	mm	318	390	462	393	491	589	786	981	1177	408	508	608	808	1008	1208
	F′	mm	~484			~645						~754					
	B′	mm	190			196						240					
	Φ	mm	14.5			20						22					
	δ	mm	7			12						25					
dimension	Electric trolley (D model) 11	mm	185			185						205					
	12	mm	——		280	——		316	512	708	904	——		350	550	750	950
	F	mm	~556		~647	~719		~810				~837		~940			
	Bmax	mm	~897			~897						~935					
fixed (A model) gross weight		kg	~83	~93	~98	~138	~148	~165	~180	~194	~211	~184	~200	~218	~242	~270	~294
Electric trolley (D model) gross weight		kg	~123	~128	~148	~173	~183	~215	~230	~244	~261	~234	~250	~298	~322	~350	~374

MD1 series of electric hoist specification

MD1-6	MD1-9	MD1-12	MD1-18	MD1-24	MD1-30	MD1-6	MD1-9	MD1-12	MD1-18	MD1-24	MD1-30	MD1-9	MD1-12	MD1-18	MD1-24	MD1-30	MD1-9	MD1-12	MD1-18
3						5						10					16		
6	9	12	18	24	30	6	9	12	18	24	30	9	12	18	24	30	9	12	18
8/0.8						8/0.8						7/0.7					3.5/0.35		
20						20						20					20		
13						15						15					18		
6×37+1						6×37+1						6×37+1					6×37+1		
17	23	29	41	53	65	18	24	30	42	54	66	44	56	72	104	128	43	55	79
20-32b						25a-63c						25a-63c					45a-63c		
2.0			2.5	3.0	4.0	2.0			2.5	3.5	4.0	2.5	3.5	4	6	7.5	3	3.5	4.6
380V						380V						380V					380V		
50						50						50					50		
JC25%						JC25%						JC25%					JC25%		
120						120						120					120		
ZD32-4						ZD41-4						ZDS151-4					ZDS151-4		
4.5/0.4						7.5/0.8						13.0/1.5					13.0/1.5		
1380						1400						1400					1400		
11/2.4						18/2.4						30/4.3					30/4.3		
ZDY112-4						ZDY121-4						ZDY121-4					ZDY121-4		
0.4						0.8						0.8					0.8		
1380						1380						1380					1380		
1.3						2.2						2.2					2.2		
ZDY112-4						ZDY121-4						ZDY121-4					ZDY121-4		
0.4						0.8						0.8×2					0.8×2		
1380						1380						1380					1380		
1.3						2.2						2.2×2					2.2×2		
-954	-1057	-1160	-1366	-1572	-1778	-1071	-1176	-1281	-1491	-1701	-1911	-1969	-2150	-2512	-2874	-3236	同10t		
451	554	657	863	1069	1275	485	590	695	905	1116	1325	949	1130	1492	1854	2216	949	1130	1492
-866						-1014						-1058							
264						320						1068					1334		
24						32						376					376		
15						20						37					41		
205						228						243							
——		350	556	762	968	——		402	612	822	1032	-1602	-1783	-2145	-2507	-2869	同10t		
-939		-1044				-1107		-1252											
-935						-1067													
-244	-260	-286	-320	-354	-384	-417	-435	-456	-501	-530	-570	-759	-807	-900	-987	-1032			
-294	-310	-366	-400	-434	-464	-507	-525	-606	-651	-680	-720	-849	-897	-990	-1077	-1122			