DONLY TRANSMISSION

东力齿轮箱

蜗轮螺杆升降机

WORMWHEEL SCREW HOISTS

型号 Type SWL

版本 Edition 2021

DONLY

驱 动 无 限 可 能

SWL
蜗轮螺杆升降机
Wormwheel Screw Hoists

DONLY

产品说明

1.1 概述

SWL 系列蜗轮螺杆升降机，是通过蜗轮传动螺杆完成提升、下降、推进、翻转等功能，是一种基础起重部件，已列为 JB/T8809-1998 标准。广泛用于机械、冶金、建筑、水利、化工、医疗、文化、卫生等各个行业，具有结构紧凑、体积小、重量轻、安装方便、使用灵活、可靠性、稳定性高、使用寿命长等优点，可以用电动机或其他动力直接带动、也可以手动。本系列蜗轮螺杆升降机可以自锁，承载能力 2.5t~120t，最高输入转速 1500r/min，最大提升速度 2.7m/min，有不同的结构型式和装配方式，工作环境温度在 -20~100℃之间，提升高度按用户要求制造。

为提高 SWL 系列蜗轮螺杆升降机的效率和承载能力，采用具有国内先进水平的圆弧齿圆柱蜗杆，制定了特殊的、先进的工艺来提高升降机的综合性能，以满足广大客户的要求。

1.2 型式

1.2.1 结构型式

1 型—螺杆同时作旋转运动和轴向移动 (见图 1)；

2 型—螺杆作旋转运动．螺杆上的螺母作轴向移动 (见图 2)

1.2.2 装配型式

升降机每种结构型式又分为两种装配型式

A 型—螺杆 (或螺母) 向上移动 (见图 1 和图 2)；

B 型—螺杆 (或螺母) 向下移动 (见图 1 和图 2)。

1.2.3 螺杆头部型式

—1 型结构型式的螺杆头部分为 I 型 (圆柱型)、II 型 (法兰型)、III 型 (螺纹型) 和 IV 型 (扁头型) 四种型式 (见图 1)

—2 型结构型式的螺杆头部分为 I 型 (圆柱型) 和 III 型 (螺纹型) 两种型式 (见图 2)

1.2.4 传动比

升降机分为两种传动比，即普通 (P) 和慢速 (M)。

1.2.5 螺杆的防护

1 型升降机螺杆的防护分为：基本型、防旋转型 (F) 和带防护罩型 (Z)；

2 型升降机螺杆的防护分为：基本型和带防护罩型 (Z)；

Product Description

1.1 General notes

SWL series wormwheel screw hoists is a basic hoisting component. It achieves functions such as ascension, fall, propulsion, inversion through the worm screw. It has been listed as the JB/T8809-1998 standard and widely used in machinery, metallurgy, construction, water conservancy, chemical, medical, cultural, health and other industries. It has the advantages of compact structure, small volume, light weight, convenient installation, flexible use, reliability, high stability, long service life. It can be used in motor or other power driven directly, also manually. This series of wormwheel screw hoists can be self-locking, bearing capacity of 2.5t~120t; the maximum input speed is 1500r/min, maximum speed of 2.7m/min, has different structural patterns and assembling method. The working environment temperature ranges from -20 to 100℃ . The hoisting height can be made according to the user demand.

In order to improve the efficiency of SWL series wormwheel screw hoists and carrying capacity, the circular arc tooth cylindrical worm with the domestic advanced level, the advanced technology special, to improve the overall performance of elevator to meet the requirements of our customers.

1.2 Type

1.2.1 Structure type

Type 1—Rotation and axial movement of screw at the same time (see Figure 1);

Type 2—Rotation of screw, the nuts of screw shift axial (see Figure 2).

1.2.2 Assembly type

Hoists each structure types are divided into two kinds of assembly type:

Type A—screw(or nuts) to move up (see Figure 1 and Figure 2);

Type B—screw (or nuts) to move down (see Figure 1 and Figure 2).

1.2.3 The head of the screw type

—The screw head part of type 1 structure types are I (cylindrical), type II (flange type), type III (thread) and type IV (flat type) of four types (see Figure 1)

—The screw head part of type 2 structure types are I (cylindrical) and type III (thread) of two types (see Figure 2).

1.2.4 Transmission ratio

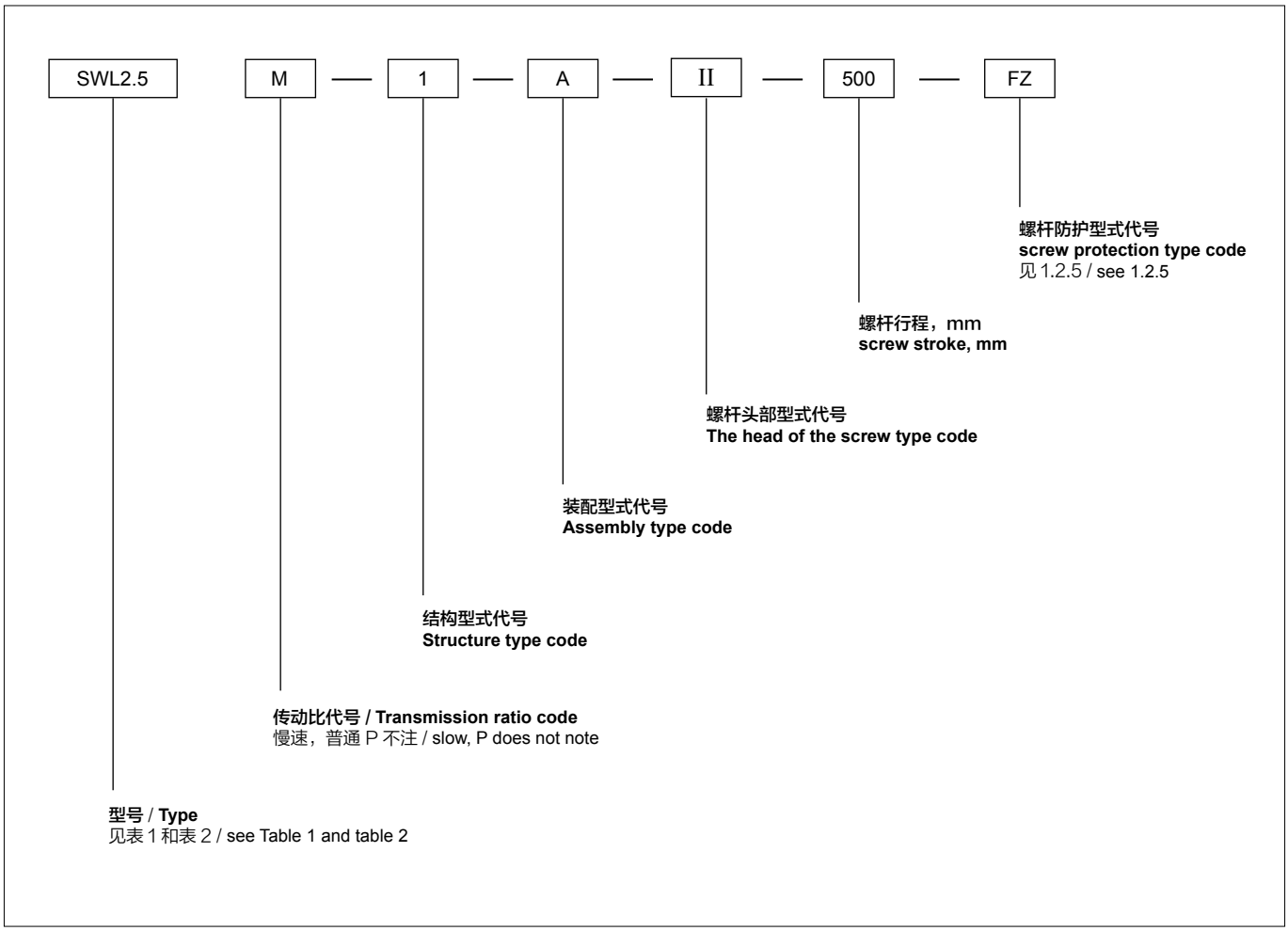
The hoists is divided into two kinds of transmission ratio, namely the ordinary (P) and slow (M).

1.2.5 Protection of the screw

The protection of type 1 screw type hoists is divided into: the basic type, anti rotation transformation (F) and with protective cover type (Z);

The protection of type 2 screw type hoists is divided into: the basic type and with protective cover type (Z);

1.3 标记示例 1.3 Mark example



2.1 外形及安装尺寸

1 型升降机的外形结构尺寸见图 1 和表 1
2 型升降机的外形结构尺寸见图 2 和表 2
可摆动式蜗轮螺杆升降机的外形示意图见图 3，螺杆摆动角度≤ 2°，可在圆周上摆动。

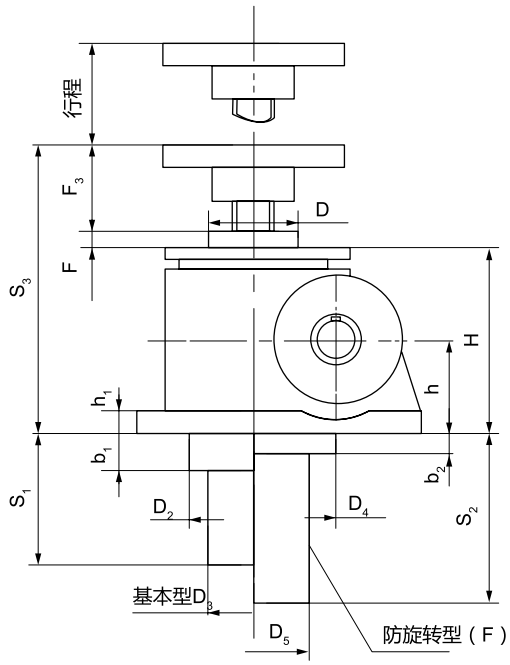
2.1 Outline and mounting

The structure dimensions of type 1 hoists, see Figure 1 and table 1
The structure dimensions of type 2 hoists, see Figure 2 and table 2
Swing type wormwheel screw hoists profile is shown in Figure 3, screw swing angle ≤ 2°, can swing on the circumference.

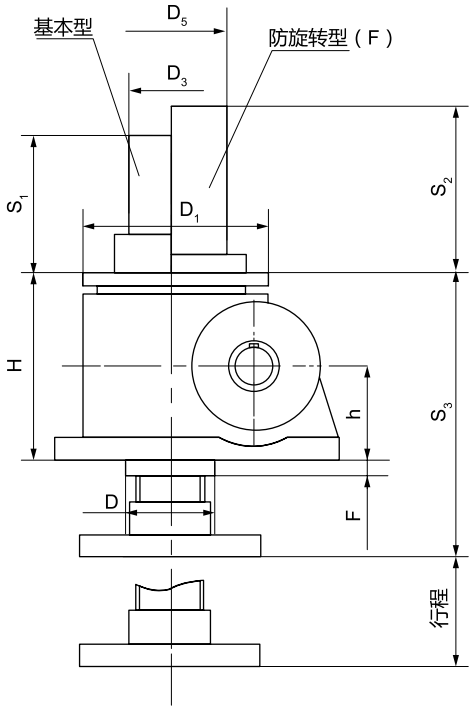
外形尺寸 Dimensions

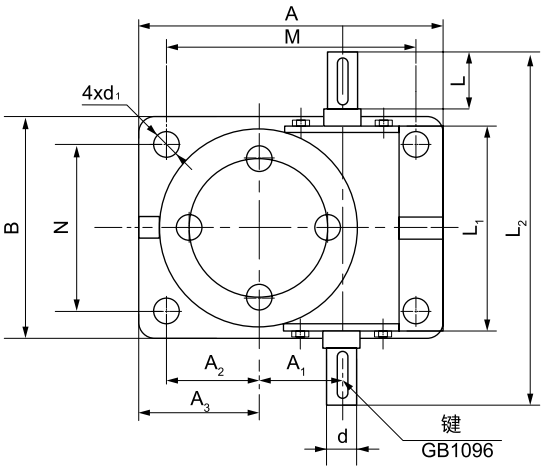
2.1 外形及安装尺寸 2.1 Outline and mounting dimensions

装配形式 A
Assembly form A

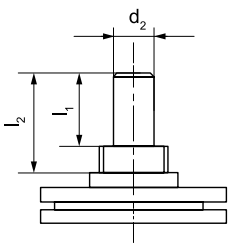


装配形式 B
Assembly form B

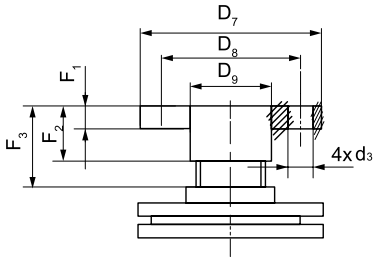




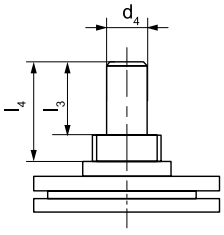
Ⅰ型



Ⅱ型



Ⅲ型



Ⅳ型

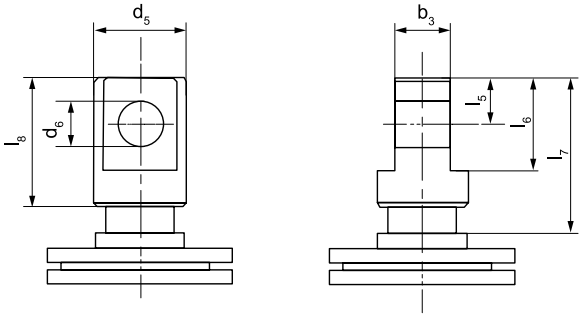


图1 1型结构型式
The 1 type of structure

外形尺寸 Dimensions

表1 mm

型号 Model			SWL2.5	SWL5	SWL10 SWL15	SWL20	SWL25	SWL35
S_1			行程 (Trip)+20	行程 (Trip)+20	行程 (Trip)+20	行程 (Trip)+20	行程 (Trip)+20	行程 (Trip)+20
S_2			行程 (Trip)+110	行程 (Trip)+110	行程 (Trip)+150	行程 (Trip)+190	行程 (Trip)+205	行程 (Trip)+250
S_3			150.5	193	230	262	317	350
A			165	212	235	295	350	430
B			120	155	200	215	260	280
M			135	168	190	240	280	360
N			90	114	155	160	190	210
H			97	130	150	176	217	240
h			45	61.5	70	87	102	115
h_1			12	14	16	20	25	30
d(k6)			16	20	25	28	34	38
d_1			14	17	21	28	35	35
L			30	35	42	42	58	80
L_1			110.5	132	172	213.5	221	265
L_2			190	228	280	322	355	430
D			48	65	80	100	130	150
D_1			98	122	150	185	205	260
D_2			70	90	100	120	150	180
D_3			45	60	76	83	114	121
D_4			98	110	130	170	200	210
D_5			60	70	95	108	133	139
A_1			45	57	67	72	97	120
A_2			50	58	63.5	95	95	135
A_3			65	80	86	122.5	130	170
b_1			20	25	17	35	30	35
b_2			20	18	18	31	40	40
F			8.5	12	6.5	6	8	10
螺杆头部型式 The head of the screw type	I	d_2(k6)	20	25	40	50	70	80
		l_1	30	40	50	60	63	80
		l_2	45	51	73.5	80	92	100
	II	D_7	98	122	150	185	205	260
		D_8	75	85	105	140	155	200
		D_9	40	50	65	90	100	130
		d_3	14	17	21	26	27	33
		F_1	12	18	20	20	25	30
		F_2	30	40	50	60	63	80
		F_3	45	51	73.5	80	92	100
	III	d_4	M22x1.5-6g	M30x2-6g	M42x2-6g	M48x2-6g	M72x3-6g	M80x3-6g
		l_3	30	39	50	60	63	80
		l_4	45	51	73.5	80	92	100
	IV	d_5	50	65	90	110	130	150
		d_5(H8)	25	35	50	60	70	80
		b_3	30	42	60	75	90	105
		l_5	25	37.5	50	60	70	80
		l_6	50	75	100	120	140	160
		l_7	85	117	153.5	170	204	240
		l_8	70	105	130	150	175	220

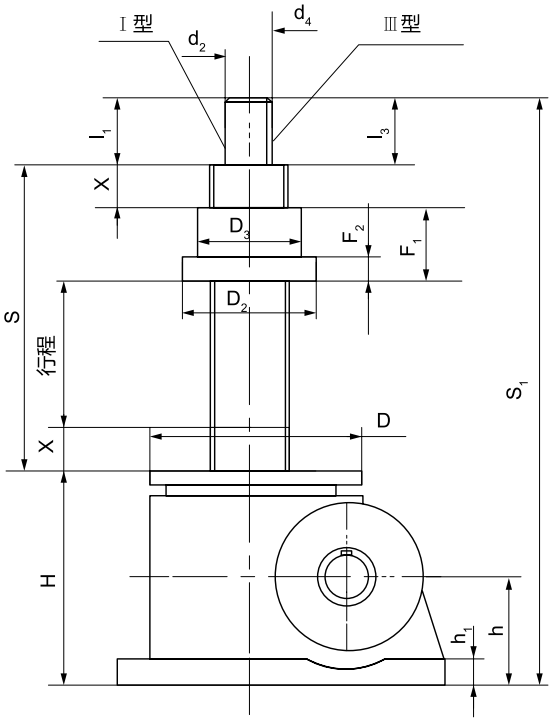
注：SWL2.5−25t 安装外型尺寸与 QWL2.5−25t 安装外型尺寸相同

Note: the SWL2.5-25t installation dimensions and installation dimensions the same QWL2.5-25t.

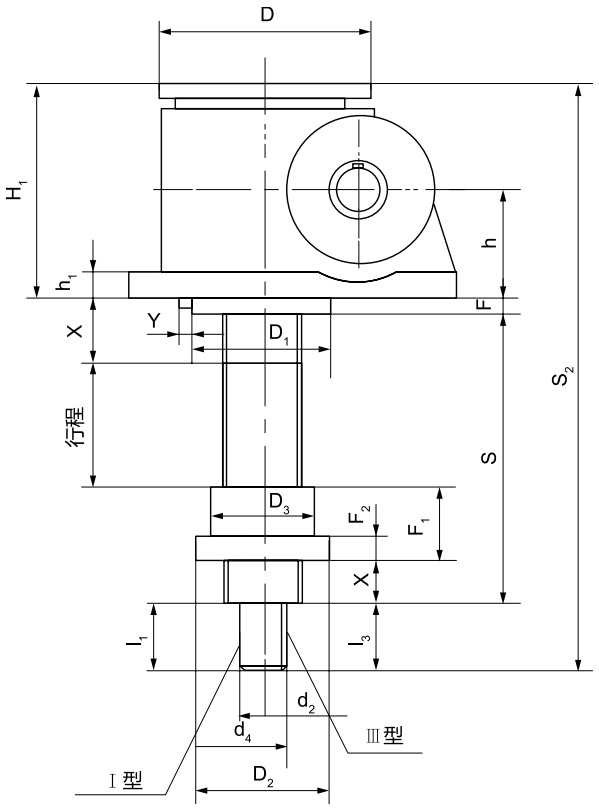
2.1 外形及安装尺寸

2.1 Outline and mounting dimensions

装配形式 A
Assembly form A



装配形式 B
Assembly form B



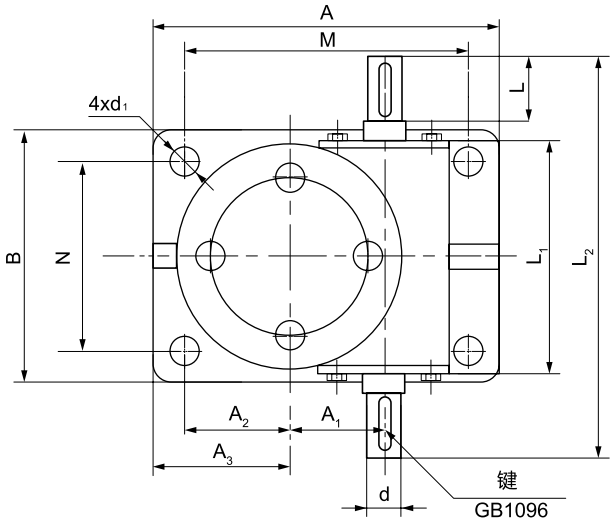


图2　2型结构型式
The 2 type of structure

外形尺寸 Dimensions

表 2 mm

型号 Model			SWL2.5	SWL5	SWL10 SWL15	SWL20	SWL25	SWL35
S			行程 (Trip)+85	行程 (Trip)+100	行程 (Trip)+125	行程 (Trip)+150	行程 (Trip)+170	行程 (Trip)+205
S_1			行程 (Trip)+215	行程 (Trip)+270	行程 (Trip)+335	行程 (Trip)+401	行程 (Trip)+476	行程 (Trip)+535
S_2			行程 (Trip)+238.5	行程 (Trip)+300	行程 (Trip)+359	行程 (Trip)+430	行程 (Trip)+513	行程 (Trip)+580
A			165	212	235	295	350	430
B			120	155	200	215	260	280
M			135	168	190	240	280	360
N			90	114	155	160	190	210
H			100	131	160	194	226	250
H_1			97	131	150	181	211	250
h			45	61.5	70	87	102	115
h_1			12	14	16	20	25	30
d(k6)			16	20	25	28	34	38
d_1			14	17	21	28	35	35
L			30	35	42	42	58	80
L_1			110.5	132	172	213.5	221	265
L_2			190	228	280	322	355	430
D			98	122	150	185	205	260
D_1			68	83	110	140	160	180
A_1			45	57	67	72	97	120
A_2			50	58	63.5	95	95	135
A_3			65	80	86	122.5	130	170
F			26	30	34	39	52	45
安全礼裕度 x			20	20	25	25	25	30
Y			3	3	1	3	3	4
活动螺母 The movable nut	D_2		80	87	110	120	155	190
	D_3(h9)		50	70	90	90	130	150
	F_1		45	60	75	100	120	145
	F_2		15	18	25	30	35	35
螺杆头部型式 The head of the screw type	I	d_2(k6)	20	25	40	50	70	80
		l_1	30	40	50	60	80	80
	III	d_4	M22x1.5-6g	M30x2-6g	M42x2-6g	M48x2-6g	M72x3-6g	M80x3-6g
		l_3	30	39	50	60	63	80

性能参数及选型 **Performance Parameters And Selection**

3.1 升降机的主要性能参数

表 3

3.1 The main performance parameters of lifts

Table 3

型号 Model	SWL2.5	SWL5	SWL10/15	SWL20	SWL25	SWL35
最大起升力 kN Maximum hoists	25	50	100/150	200	250	350
最大拉力 kN The maximum tension	25	50	99	156	250	350
螺杆螺纹尺寸 Screw thread size	Tr30x6	Tr40x7	Tr58x12	Tr65x12	Tr90x16	Tr110x16
蜗轮蜗杆传动比（P） Worm gear ratio	6:1	6:1	7 2/3:1	8:1	10 2/3:1	10 2/3:1
蜗杆每转行程 mm Worm every stroke	1.0	1.167	1.565	1.5	1.5	1.5
蜗轮蜗杆传动比（M） Worm gear ratio	24:1	24:1	24.1	24:1	32:1	32:1
蜗杆每转行程 mm Worm every stroke	0.250	2.292	0.5	0.5	0.5	0.5
蜗杆扭矩 Nm Worm torque	见附表 A See table A					
拉力负荷时螺杆的最大伸长 mm Maximum stretching screw tensile load	1500	2000	2500	3000	3500	4000
压力负荷时螺杆的最大伸长 mm Maximum stretching screw pressure load	见附表 B See table B					
侧向力负荷时螺杆的最大伸长 mm Maximum stretching screw lateral loads	见附表 C See table C					
最大许用功率 kW The maximum allowable power	0.55	1.1	2.6	3.7	4.8	6.0
普通比 (P) 总功率 % The common ratio (P) of total power	23	21	23	21	19	18
慢速比 (M) 总功率 % Slow than (M) total power	14	12	15	13	11	11
润滑油量 kg Lubricating oil	0.1	0.25	0.5	0.75	1.1	1.9
不加行程的质量 kg Quality without stroke	7.3	16.2	25	36	70.5	87
螺杆每 100mm 的重量 kg The weight of each 100mm screw	0.45	0.82	1.67	2.15	4.15	5.20

注：

1. 最大许用功率是在环境温度为 20℃ . 工作持续率为 20% /h 的条件下的参数。
2. 总效率为油脂润滑条件下的参数。
3. 工作环境温度 -20~+80℃。
4. 在静止状态一般可以自锁。

Note:

1.The maximum allowable power at an ambient temperature of 20C. Work continued rate as parameters to the 20%/h conditions
2.The total efficiency of parameters of oil lubricated condition
3.The working environment temperature is -20~+80℃ .
4. It can generally be self-locking in the stationary state.

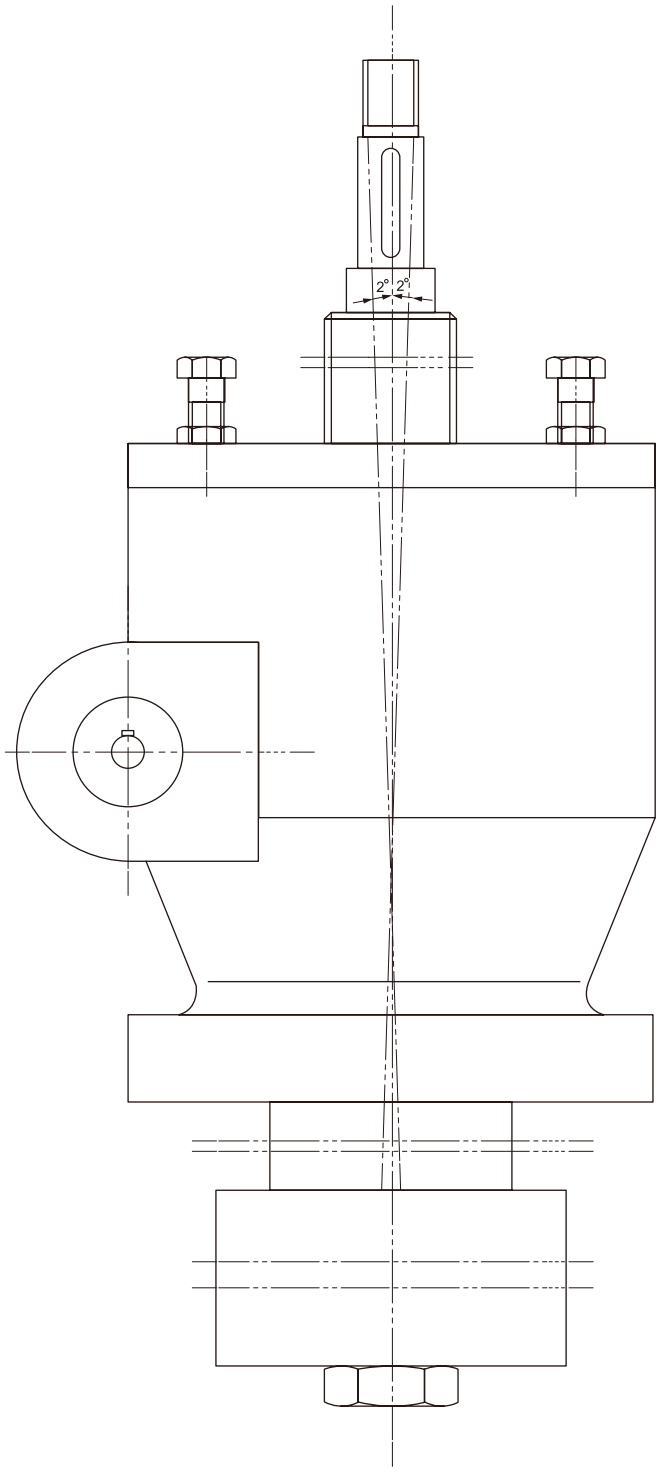


图 3 可摆动式蜗轮螺杆升降机
Swing type wormwheel screw hoists

3.2 螺杆传动参数

注：表 4 ~表 10 中的参数适用于环境温度为 20℃、工作持续率为 20% /h 或 30% /10min 的条件下；对粗线范围的参数，使用时螺杆会产生过热，应严加注意。

3.2 Screw transmission parameters

Note: Table 4 to table in parameter 10 is suitable for the environmental temperature is 20°C, work continued rate of 20%/h or 30%/10min conditions; parameters of thick line range, use the screw will cause overheating, should be careful.

3.3 产品选型

3.3.1 升降机的选型

升降机的选择参数

提升负荷（kN）

螺杆行程 mm

提升速度 m/min

附录 B 中图 B2 ~图 B4 给出了在允许弯曲力矩下，螺杆长度与极限负荷的关系。根据螺杆行程和提升负荷，查图 B2~ 图 B4，查出所需升降机的型号。再根据查出的升降机型号和提升负荷查表 4（表 4 是各种型号在不同的提升负荷下所允许的提升速度），若查出的提升速度满足不了要求，建议选用型号大一些的升降机，直至满足要求。

示例：

已知：提升负荷为 F=20kN，螺杆行程为 200mm，提升速度 V=0.45m/min，试求所需的升降机。

选择升降机：根据 F=20kN，行程 200mm，查图 B2，选择 SWL2.5 升降机，查表 4 提升速度 V=0.3m/min，满足不了要求。若选择 SWL5 升降机，提升速度 V=0.7m/min，满足要求。应选择 SWL5 型升降机。

3.3 Project planning

3.3.1 Hoists selection

Parameter selection of hoists

The increase of load (kN)

Screw stroke mm

Hoisting speed m/min

In appendix B, figure B2 to B4 is given in the allowable bending moment, the screw length and ultimate load relationship. According to the screw travel and the hoisting load, reading B2~B4, found the hoists model. Then according to the detected hoists models and enhance the load table 4 (Table 4 is allowed in the various types of hoisting load under different hoisting speed), if found to enhance the speed can not meet the requirements, suggested the use of hoisting size larger, until the meet the requirements.

Example:

Known: hoisting load is F=20kN, screw stroke is 200mm, speed V=0.45m/min, try to find the hoists required.

Select the hoists: according to F=20kN, travel 200mm, along B2, SWL2.5 hoists, table 4 hoisting speed can not meet the requirements of V=0.3m/min. If you choose SWL5 hoists, hoisting speed V=0.7m/min, meet the requirements. You should choose the SWL5 type hoists.

表 4（SWL2.5） Table 4 (SWL2.5)

蜗杆转速 Worm speed n r/min				1500	1000	750	500	300	200	100	50
提升速度 Hoisting speed v m/min			P	1.500	1.000	0.750	0.500	0.300	0.200	0.100	0.050
			M	0.395	0.250	0.188	0.125	0.075	0.050	0.025	0.013
提升力 Hoisting force kN	25	P	Nm	18	18	18	18	18	18	18	18
			kW	2.7	1.8	1.4	0.91	0.54	0.36	0.19	0.09
		M	Nm	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
			kW	1.2	0.74	0.56	0.37	0.22	0.15	0.07	0.05
	20	P	Nm	14	14	14	14	14	14	14	14
			kW	2.2	1.5	1.1	0.72	0.43	0.29	0.14	0.07
		M	Nm	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
			kW	0.89	0.60	0.45	0.30	0.18	0.12	0.06	0.05
	15	P	Nm	11	11	11	11	11	11	11	11
			kW	1.7	1.1	0.82	0.54	0.33	0.22	0.11	0.05
		M	Nm	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
			kW	0.67	0.45	0.33	0.22	0.13	0.09	0.05	0.05
	10	P	Nm	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
			kW	1.10	0.72	0.54	0.36	0.22	0.14	0.07	0.05
		M	Nm	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
			kW	0.45	0.30	0.22	0.15	0.09	0.06	0.05	0.05
	5	P	Nm	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
			kW	0.54	0.36	0.27	0.18	0.11	0.07	0.05	0.05
		M	Nm	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
			kW	0.22	0.15	0.11	0.07	0.05	0.05	0.05	0.05
	2.5	P	Nm	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
			kW	0.27	0.18	0.14	0.09	0.05	0.05	0.05	0.05
		M	Nm	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
			kW	0.11	0.07	0.06	0.05	0.05	0.05	0.05	0.05
	1	P	Nm	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
			kW	0.11	0.07	0.05	0.05	0.05	0.05	0.05	0.05
		M	Nm	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
			kW	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

表 5（SWL5） Table 5 (SWL5)

蜗杆转速 Worm speed n r/min				1500	1000	750	500	300	200	100	50
提升速度 Hoisting speed v m/min			P	1.750	1.167	0.875	0.583	0.350	0.233	0.117	0.058
			M	0.438	0.292	0.219	0.146	0.088	0.058	0.029	0.015
提升力 Hoisting force kN	50	P	Nm	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2
			kW	6.9	4.6	3.5	2.3	1.4	0.9	0.5	0.2
		M	Nm	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3
			kW	3.0	2.0	1.5	1.0	0.6	0.4	0.2	0.1
	40	P	Nm	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4
			kW	5.6	3.7	2.8	1.9	1.1	0.7	0.4	0.2
		M	Nm	15.5	15.5	15.5	15.5	15.5	15.5	15.5	15.5
			kW	2.4	1.6	1.2	0.8	0.5	0.3	0.2	0.1
	30	P	Nm	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
			kW	4.2	2.8	2.1	1.4	0.8	0.6	0.3	0.1
		M	Nm	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
			kW	1.8	1.2	0.9	0.6	0.4	0.2	0.1	0.1
	20	P	Nm	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7
			kW	2.8	1.9	1.4	0.9	0.6	0.4	0.2	0.1
		M	Nm	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
			kW	1.2	0.8	0.6	0.4	0.2	0.2	0.1	0.1
	10	P	Nm	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
			kW	1.4	0.9	0.7	0.5	0.3	0.2	0.1	0.1
		M	Nm	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
			kW	0.6	0.4	0.3	0.2	0.1	0.1	0.1	0.1
	5	P	Nm	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
			kW	0.7	0.5	0.3	0.2	0.1	0.1	0.1	0.1
		M	Nm	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
			kW	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1
	2.5	P	Nm	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
			kW	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1
		M	Nm	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
			kW	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1

表 6（SWL10） Table 6 (SWL10)

蜗杆转速 Worm speed n r/min				1500	1000	750	500	300	200	100	50
提升速度 Hoisting speed v m/min			P	2.348	1.565	1.174	0.783	0.470	0.313	0.157	0.078
			M	0.750	0.500	0.375	0.250	0.150	0.100	0.050	0.025
提升力 Hoisting force kN	100	P	Nm	108	108	108	108	108	108	108	108
			kW	17	12	8.5	5.7	3.4	2.3	1.1	0.6
		M	Nm	53	53	53	53	53	53	53	53
			kW	8.3	5.6	4.2	2.8	1.7	1.1	0.6	0.3
	80	P	Nm	87	87	87	87	87	87	87	87
			kW	14	9.1	6.8	4.5	2.7	1.8	0.9	0.5
		M	Nm	43	43	43	43	43	43	43	43
			kW	6.7	4.4	3.3	2.2	1.3	0.9	0.4	0.2
	60	P	Nm	65	65	65	65	65	65	65	65
			kW	11	6.8	5.1	3.4	2.0	1.4	0.7	0.3
		M	Nm	32	32	32	32	32	32	32	32
			kW	5.0	3.3	2.5	1.7	1.0	0.7	0.3	0.2
	40	P	Nm	44	44	44	44	44	44	44	44
			kW	6.8	4.5	3.4	2.3	1.4	0.9	0.5	0.2
		M	Nm	22	22	22	22	22	22	22	22
			kW	3.3	2.2	1.7	1.1	0.7	0.5	0.2	0.1
	20	P	Nm	22	22	22	22	22	22	22	22
			kW	3.4	2.3	1.7	1.1	0.7	0.5	0.2	0.1
		M	Nm	11	11	11	11	11	11	11	11
			kW	1.7	1.1	0.8	0.6	0.3	0.2	0.1	0.1
	10	P	Nm	11	11	11	11	11	11	11	11
			kW	1.7	1.1	0.9	0.6	0.3	0.2	0.1	0.1
		M	Nm	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
			kW	0.8	0.6	0.4	0.3	0.2	0.1	0.1	0.1
	8	P	Nm	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
			kW	0.9	0.6	0.4	0.3	0.2	0.1	0.1	0.1
		M	Nm	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
			kW	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1

表 7（SWL15） Table 7 (SWL15)

蜗杆转速 Worm speed n r/min				1500	1000	750	500	300	200	100	50
提升速度 Hoisting speed v m/min			P	2.348	1.565	1.174	0.783	0.470	0.313	0.157	0.078
			M	0.750	0.500	0.375	0.250	0.150	0.100	0.050	0.025
提升力 Hoisting force kN	150	P	Nm	163	163	163	163	163	163	163	163
			kW	26	17	13	8.5	5.1	3.4	1.7	0.9
		M	Nm	92	92	92	92	92	92	92	92
			kW	15	9.6	7.2	4.8	2.9	1.9	1.0	0.5
	100	P	Nm	108	108	108	108	108	108	108	108
			kW	17	12	8.5	5.7	3.1	2.3	1.1	0.6
		M	Nm	53	53	53	53	53	53	53	53
			kW	8.3	5.6	4.2	2.8	1.7	1.1	0.6	0.3
	80	P	Nm	87	87	87	87	87	87	87	87
			kW	14	9.1	6.8	4.5	2.7	1.8	0.9	0.5
		M	Nm	43	43	43	43	43	43	43	43
			kW	6.7	4.4	3.3	2.2	1.3	0.9	0.4	0.2
	60	P	Nm	65	65	65	65	65	65	65	65
			kW	11	6.8	5.1	3.4	2.0	1.4	0.7	0.3
		M	Nm	32	32	32	32	32	32	32	32
			kW	5.0	3.3	2.5	1.7	1.0	0.7	0.3	0.2
	40	P	Nm	44	44	44	44	44	44	44	44
			kW	6.8	4.5	3.4	2.3	1.4	0.9	0.5	0.2
		M	Nm	22	22	22	22	22	22	22	22
			kW	3.3	2.2	1.7	1.1	0.7	0.5	0.2	0.1
	20	P	Nm	22	22	22	22	22	22	22	22
			kW	3.4	2.3	1.7	1.1	0.7	0.5	0.2	0.1
		M	Nm	11	11	11	11	11	11	11	11
			kW	1.7	1.1	0.8	0.6	0.3	0.2	0.1	0.1
	10	P	Nm	11	11	11	11	11	11	11	11
			kW	1.7	1.1	0.9	0.6	0.3	0.2	0.1	0.1
		M	Nm	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
			kW	0.8	0.6	0.4	0.3	0.2	0.1	0.1	0.1

表 8 (SWL20) Table 8 (SWL20)

蜗杆转速 Worm speed n r/min				1500	1000	750	500	300	200	100	50
提升速度 Hoisting speed v m/min			P	2.250	1.500	1.125	0.750	0.450	0.300	0.150	0.075
			M	0.750	0.500	0.375	0.250	0.150	0.100	0.050	0.025
提升力 Hoisting force kN	200	P	Nm	228	228	228	228	228	228	228	228
			kW	36	24	18	12	7.1	4.8	2.4	1.2
		M	Nm	123	123	123	123	123	123	123	123
			kW	20	13	9.6	6.4	3.8	2.6	1.3	0.6
	160	P	Nm	182	182	182	182	182	182	182	182
			kW	29	19	15	9.5	5.7	3.8	1.9	1.0
		M	Nm	98	98	98	98	98	98	98	98
			kW	16	11	7.7	5.1	3.1	2.1	1.0	0.5
	120	P	Nm	137	137	137	137	137	137	137	137
			kW	22	15	11	7.1	4.3	2.9	1.4	0.7
		M	Nm	74	74	74	74	74	74	74	74
			kW	12	7.7	5.8	3.8	2.3	1.5	0.8	0.4
	100	P	Nm	114	114	114	114	114	114	114	114
			kW	18	12	8.9	6.0	3.6	2.4	1.2	0.3
		M	Nm	62	62	62	62	62	62	62	62
			kW	9.6	6.4	4.8	3.2	1.9	1.3	0.6	0.3
	75	P	Nm	86	86	86	86	86	86	86	86
			kW	14	8.9	6.7	4.5	2.7	1.8	0.9	0.4
		M	Nm	46	46	46	46	46	46	46	46
			kW	7.2	4.8	3.6	2.4	1.4	1.0	0.5	0.2
	50	P	Nm	57	57	57	57	57	57	57	57
			kW	8.9	6.0	4.5	3.0	1.8	1.2	0.6	0.3
		M	Nm	31	31	31	31	31	31	31	31
			kW	4.8	3.2	2.4	1.6	1.0	0.6	0.3	0.2
	25	P	Nm	29	29	29	29	29	29	29	29
			kW	4.5	3.0	2.2	1.5	0.9	0.6	0.3	0.1
		M	Nm	16	16	16	16	16	16	16	16
			kW	2.4	1.6	1.2	0.8	0.5	0.3	0.2	0.1

表 9 (SWL25) Table 9 (SWL25)

蜗杆转速 Worm speed n r/min				1000	750	500	400	300	200	100	50
提升速度 Hoisting speed v m/min			P	1.500	1.125	0.750	0.600	0.450	0.300	0.150	0.075
			M	0.500	0.375	0.250	0.200	0.150	0.100	0.050	0.025
提升力 Hoisting force kN	250	P	Nm	314	314	314	314	314	314	314	314
			kW	33	25	17	14	9.9	6.6	3.3	1.6
		M	Nm	181	181	181	181	181	181	181	181
			kW	19	15	9.5	7.6	5.7	3.8	1.9	0.9
	200	P	Nm	252	252	252	252	252	252	252	252
			kW	27	20	14	11	7.9	5.3	2.6	1.3
		M	Nm	145	145	145	145	145	145	145	145
			kW	16	12	7.6	6.1	4.5	3.0	1.5	0.8
	160	P	Nm	201	201	201	201	201	201	201	201
			kW	22	16	11	8.4	6.3	4.2	2.1	1.1
		M	Nm	116	116	116	116	116	116	116	116
			kW	13	9.1	6.1	4.8	3.6	2.4	1.2	0.6
	120	P	Nm	151	151	151	151	151	151	151	151
			kW	16	12	7.9	6.3	4.7	3.2	1.6	0.8
		M	Nm	87	87	87	87	87	87	87	87
			kW	9.1	6.8	4.5	3.6	2.7	1.8	0.9	0.5
	100	P	Nm	126	126	126	126	126	126	126	128
			kW	14	9.9	6.6	5.3	3.9	2.6	1.3	0.7
		M	Nm	73	73	73	73	73	73	73	73
			kW	7.6	5.7	3.8	3.0	2.3	1.5	0.8	0.4
	75	P	Nm	95	95	95	95	95	95	95	95
			kW	9.9	7.4	4.9	3.9	3.0	2.0	1.0	0.5
		M	Nm	55	55	55	55	55	55	55	55
			kW	5.7	4.3	2.8	2.3	1.7	1.1	0.6	0.3
	50	P	Nm	63	63	63	63	63	63	63	63
			kW	6.6	4.9	3.3	2.6	2.0	1.3	0.7	0.3
		M	Nm	37	37	37	37	37	37	37	37
			kW	3.8	2.8	1.9	1.5	1.1	0.8	0.4	0.2

表10（SWL35） Table 10 (SWL35)

蜗杆转速 Worm speed n r/min				1000	750	500	400	300	200	100	50
提升速度 Hoisting speed v m/min			P	1.500	1.125	0.750	0,600	0.450	0.300	0.150	0.075
			M	0.500	0.375	0.250	0.200	0.150	0.100	0.050	0.025
提升力 Hoisting force kN	350	P	Nm	464	464	464	464	464	464	464	464
			kW	49	37	25	20	15	9.8	4.9	2.5
		M	Nm	253	253	253	253	253	253	253	253
			kW	27	20	14	11	8.0	5.3	2.7	1.3
	300	P	Nm	398	398	398	398	398	398	398	398
			kW	42	32	21	17	13	8.4	4.2	2.1
		M	Nm	217	217	217	217	217	217	217	217
			kW	23	17	12	9.1	6.8	4.5	2.3	1.1
	250	P	Nm	332	332	332	332	332	332	332	332
			kW	35	26	18	14	11	7.0	3.5	1.8
		M	Nm	181	181	181	181	181	181	181	181
			kW	19	15	9.5	7.6	5.7	3.8	1.9	0.9
	200	P	Nm	266	266	266	266	266	266	266	266
			kW	28	21	14	12	8.3	5.6	2.8	1.4
		M	Nm	145	145	145	145	145	145	145	145
			kW	16	12	7.6	6.1	4.5	3.0	1.5	0.8
	150	P	Nm	199	199	66	199	199	199	199	199
			kW	21	16	11	8.3	6.3	4.2	2.1	1.0
		M	Nm	109	109	109	109	109	109	109	109
			kW	12	8.5	5.7	4.5	3.4	2.3	1.1	0.6
	100	P	Nm	133	133	133	133	133	133	133	133
			kW	14	11	6.9	5.6	4.2	2.8	1.4	0.7
		M	Nm	73	73	73	73	73	73	73	73
			kW	7.6	5.7	3.8	3.0	2.3	1.5	0.8	0.4
	50	P	Nm	67	67	67	67	67	67	67	67
			kW	6.9	5.2	3.5	2.8	2.1	1.4	0.7	0.3
		M	Nm	36	36	36	36	36	36	36	36
			kW	3.8	2.8	1.9	1.5	1.1	0.8	0.4	0.3

3.3.2 升降机驱动功率的计算

驱动功率：

$$P=\frac{FaV}{60\eta}$$

式中：P — 驱动功率，kW；
Fa — 起升力（或拉力），kN；
V — 起升速度，m/min；
η — 传动总效率（见表 11 和表 12）。

驱动扭矩：

$$Mt=9550\times\frac{p}{n}$$

式中：Mt — 驱动扭矩，Nm；
P — 驱动功率，kW；
n — 转速，r/min。

3.3.2 The hoisting drive power calculation

Driving power:

$$P=\frac{FaV}{60\eta}$$

Formula: P — Driving power, kW;
Fa — hoisting (or pull), kN;
V — Hoisting speed, m/min;
η — Transmission efficiency (see table 11&12)

Driving torque:

$$Mt=9550\times\frac{p}{n}$$

Formula: Mt — Driving torque, Nm;
P — Driving power, kW;
n — speed of revolution, r/min

表 11 油脂润滑时的总功率 η

Table 11 The total power of grease lubrication η

型号 Model	SWL											
	2.5	2.5M	5	5M	10/15	10M/15M	20	20M	25	25M	35	35M
η	0.23	0.14	0.21	0.12	0.23	0.15	0.21	0.13	0.19	0.11	0.18	0.11

表 12 蜗杆副采用稀油润滑时的总功率 η（仅用于 2 型）

Table 12 The total power of worm pair when oil lubrication η (Only for type 2)

蜗杆转速 Worm speed r/min	型号 / Model SWL											
	2.5	2.5M	5	5M	10/15	10M/15M	20	20M	25	25M	35	35M
1500	0.283	0.214	0.257	0.188	0.290	0.236	0.273	0.275	0.262	0.210	0.248	0.204
1000	0.279	0.206	0.252	0.180	0.285	0.227	0.268	0.217	0.257	0.200	0.243	0.195
750	0.276	0.201	0.249	0.175	0.282	0.222	0.266	0.212	0.253	0.194	0.240	0.189
500	0.272	0.194	0.245	0.168	0.277	0.215	0.262	0.205	0.249	0.187	0.236	0.183
300	0.267	0.187	0.241	0.161	0.272	0.207	0.257	0.198	0.243	0.179	0.231	0.175
100	0.257	0.172	0.231	0.146	0.261	0.191	0.247	0.183	0.233	0.164	0.222	0.160
50	0.251	0.164	0.225	0.138	0.255	0.183	0.242	0.175	0.226	0.155	0.216	0.152

附录 A

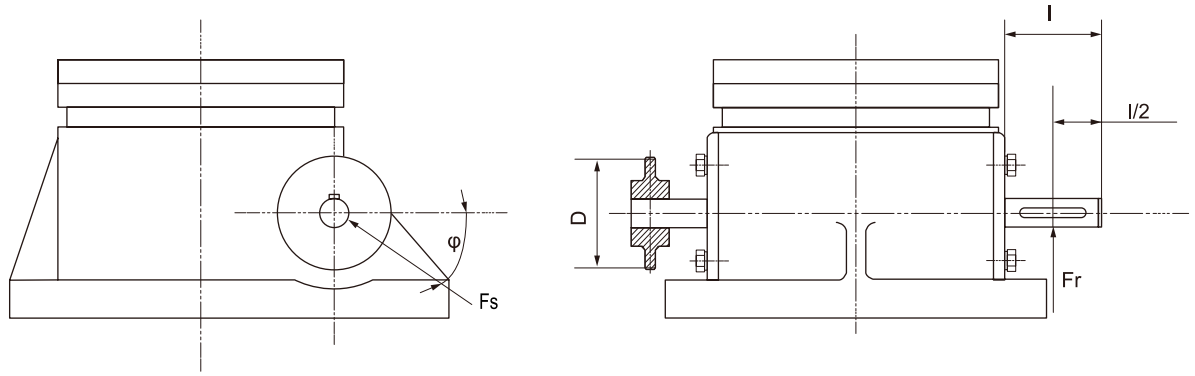
螺杆轴伸的许用径向力

A1 螺杆轴伸上，由于安装齿轮、链轮或带轮所产生的径向力 Fr，其最大许用力与提升力和型号有关。在 1/2 处所用的最大径向力和扭矩见图和表

Appendix A

Screw shaft extension permissible radial force

A1 screw shaft, gear, sprocket or due to the installation of belt wheel radial force produced by the Fr, the maximum force and the hoisting force and the models about. In the 1/2 places the maximum radial force and torque figure and table



型号 Model	Fr_{max} N	Mr_{max} Nm
SWL2.5/2.5M	350	18
SWL5/5M	750	44.2
SWL 10/10M/15/15M	1000	108
SWL20/20M	1300	182
SWL25/25M	2000	314
SWL35/35M	2300	398
注：表中参数是按 ø≈30° 或 330° 计算的。Note: the table parameters by≈30°or 330° calculation		

A2 齿轮或带轮的最小直径

A2 gear or belt pulley minimum diameter:

$$D_{min}=19100\times\frac{P}{Fr_{max}n}=\frac{2Mt}{Fr_{max}}$$

式中：D_{min} — 齿轮或带轮的最小直径，m；
P — 驱动功率，kW;
Fr_{max} — 最大径向力，N;
n — 蜗杆转速，r/min;
Mt — 驱动扭矩，Nm。

Formula: D_{min} —Gear or belt pulley minimum diameter, m;
P —Drive power, kW;
Fr_{max} —The maximum radial force, N;
n —Worm speed, r/min;
Mt —Drive torque, Nm.

附录 B

螺杆长度与极限负荷的关系

在欧拉负荷 I 和 II 情况下 , 螺杆长度与极限负荷的关系见图 B1~ 图 B4

Appendix B

Relationship between the screw length and ultimate load

In the Euler load Ⅰ and Ⅱ case, the relationship between screw length and ultimate load, see figure B1~B4.

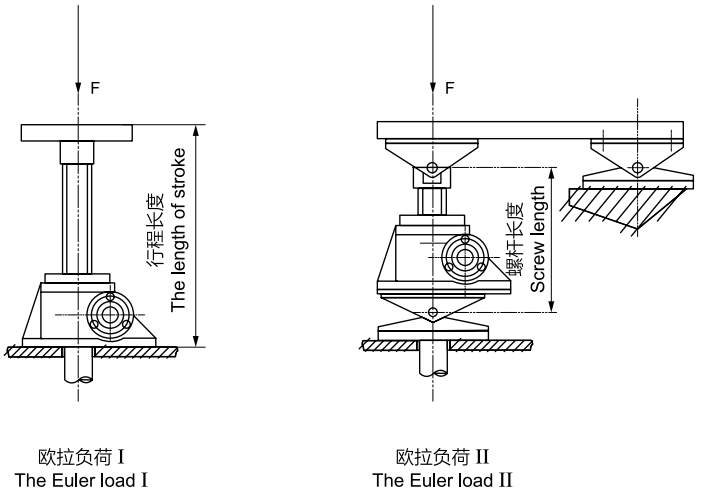


图 B1

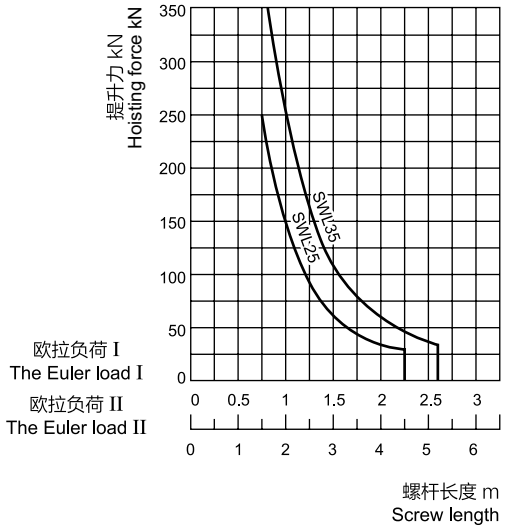


图 B4

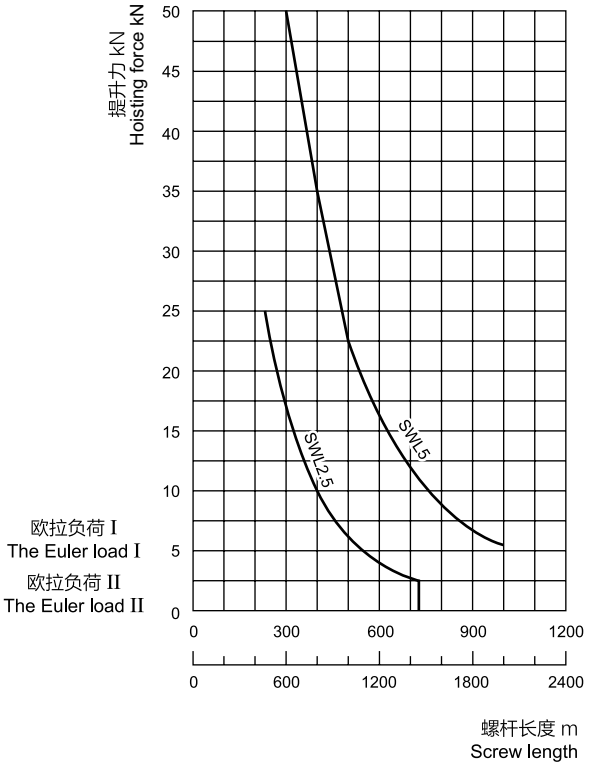


图 B2

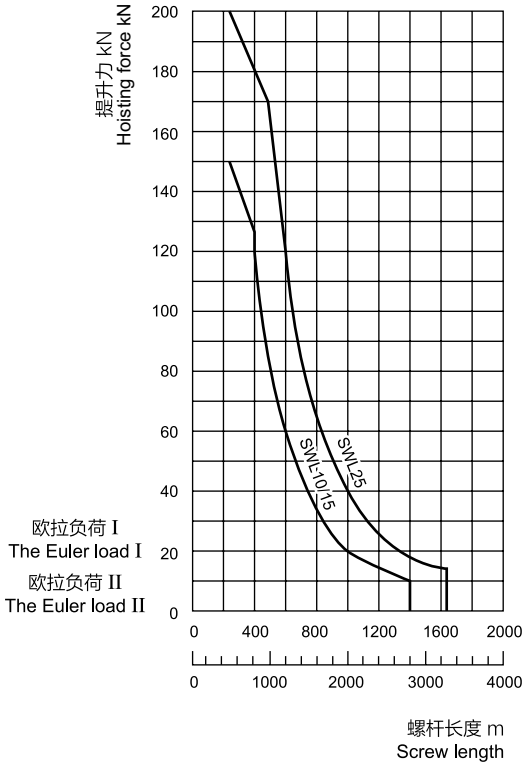


图 B3

附录 C

螺杆许用侧向力 Fs 和轴向力 Fa 与行程的关系

Appendix C

The relationship between the screw allowable radial force Fs and axial force Fa and stroke

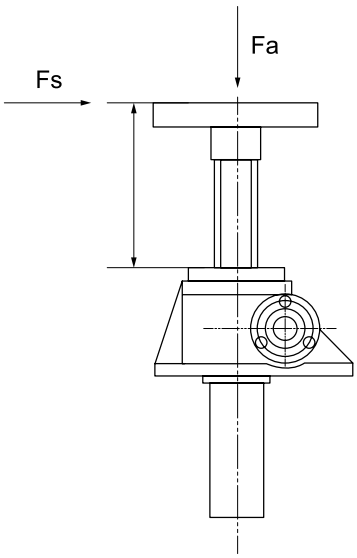


图 C1

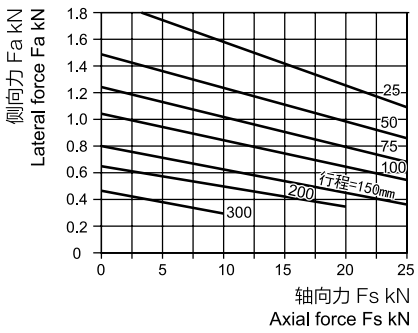


图 C2 SWL2.5

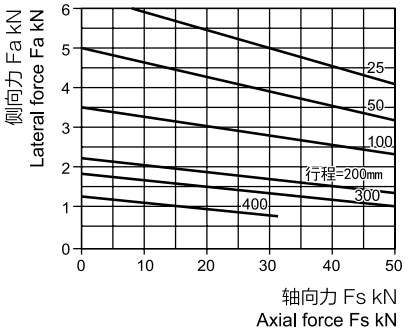


图 C3 SWL5

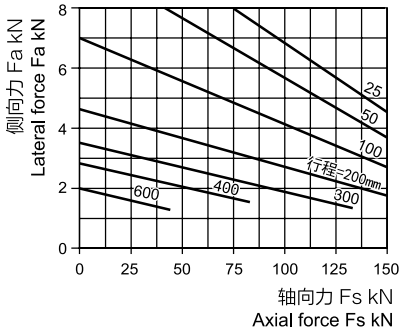


图 C4 SWL10/15

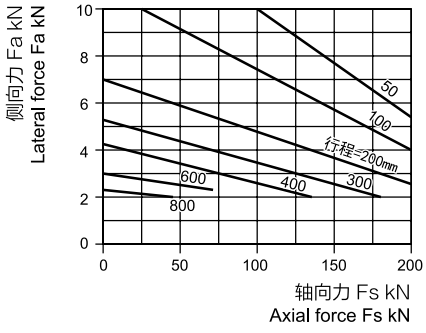


图 C5 SWL20

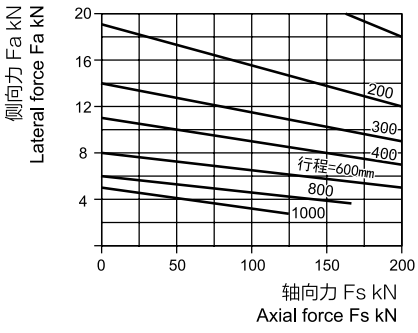


图 C6 SWL25

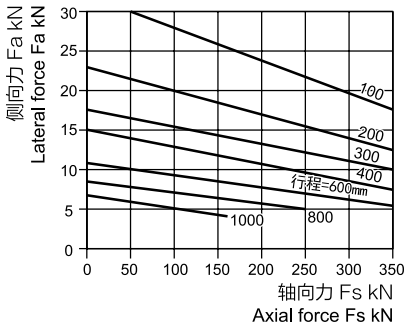


图 C7 SWL35

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