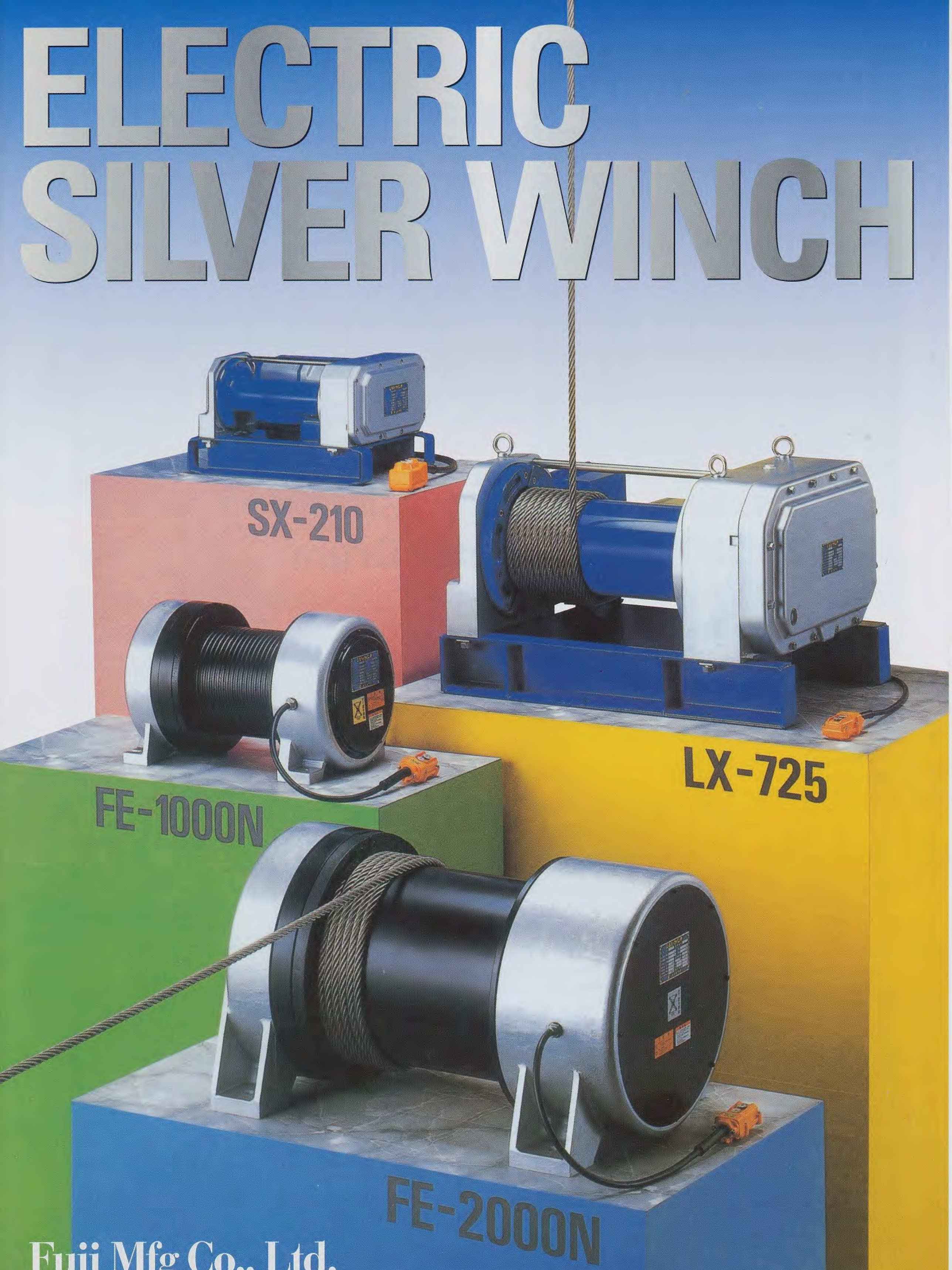
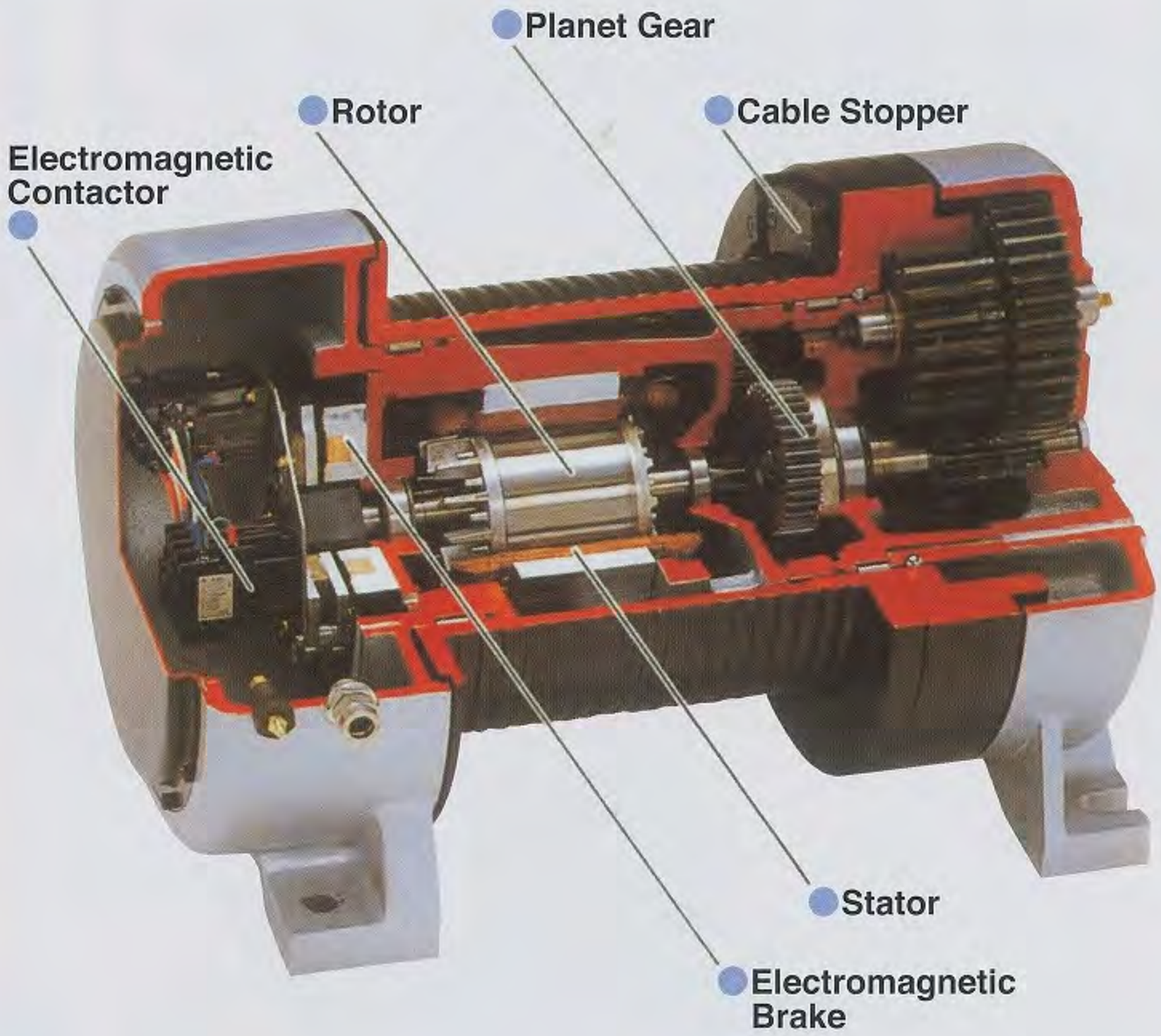
ELECTRIC SILVER WINCH



Fuji Mfg Co., Ltd.

FE Series
Three Phases



ALL-IN-ONE Big Diameter Drum

Features

■Big Diameter Drum
Cleared Drum D/d more than 20 times (equal to Construction Code for Cranes M6)

■All-in-One Type
Control Circuit is equipped, so extension of operating code will be available.
Electric parts such as motors, electromagnetic contactors, and lift control device (at option) are installed inside of the sturdy main frame for drip-proof and dustproof. These winches are the most compact type and designed to protect cables by grooved drums of big diameter and unique cable stoppers. The direction of winding cables is 360-degree.

■Speed Reduction by Planet Gear
Because a planet gear has been installed, the structure of speed reduction is very small and efficient.

■Advanced Type of Electric Components
The motor is made of F-type insulation (maximum allowable temperature 155°C), therefore the range of heat-resistance is much larger than general motors made of E-type insulation (120°C).
Because the control of motor is indirectly operated with an electromagnetic brake, connections to a limit-switch and so on can be easily done. Furthermore, Thermal Relay has fitted as a standard equipment to prevent motor burnout. Winches for different voltage such as 400V are also available.

■Equipped a High Efficient Electromagnetic Brake
The electromagnetic brake had passed in-house durable tests 300,000 times. The maintenance of winches consequently has become easier. A brake disc is made of non-asbestos material, environmental clean. These winches can be used with Mechatoro-FA, and changing speed by inverters is also possible.

■Lift Control Device (at option)
Setting a very unique lift control device is very easy. This device is designed to stop winches without fail at the position required (top/bottom positions) within the cable winding extent of 1st layer. This device is installed in the main frame of winches as well as other electric components.

●Cable Stopper·Guide Side Plate

●Planet Gear

●Lift Control Device (at Option)

●Setting Base (at Option)

●Middle Layer Middle Layer means the nearest layer on which cables are winded and pressed tightly to each other in alignment (Drum Dia. + Drum Flange Dia.) ／2.

●Top Layer Top Layer means the outermost layer on which maximum cable winding length are winded and pressed tightly to each other in alignment within the outer circumference of the drum flange.

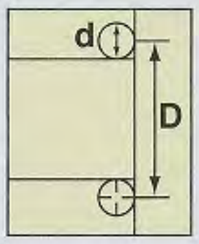
●JIS (6×37) Wire Rope is recommended.

●Load hour factor means the total operating hours of a motor with loads against the operating hours of the motor, including hours not being operated. It is indicated in parts per hundred.
Load hour factor is calculated by the following formula.

$$\text{Load hour factor } (\%ED) = \frac{Tb}{Tb+Ts} \times 100(\%)$$

Tb:Total load operating time Ts:Total resting time
Tb + Ts = Approximately 1 to 10 minutes should be set

●The class of winches and D/d of drums
D:The diameter of cable pitch circle on the 1st layer
d:The diameter of cable



Class	M1	M2	M3	M4	M5	M6	M7	M8
D/d	11.2	12.5	14.0	16.0	18.0	20.0	22.4	25.0

Excerpt from Construction Code for Cranes

■Specifications (FE Series)

Remark: The numbers in parenthesis indicate the layer of winding cable.

Model			FE-150N	FE-300N	FE-250H	FE-500N	FE-1000N	FE-1000W	FE-2000N
Max load on cable (kgs)	50Hz	1st Layer	180	360	300	600	1200	1200	2400
		Standard Layer	(3) 161	(2) 334	(4) 254	(3) 522	(2) 1102	(2) 1102	(2) 2217
		Top Layer	(5) 146	(4) 294	(7) 220	(5) 462	(4) 948	(4) 948	(3) 2061
Winding speed of Cable (m/min)	50Hz	1st Layer	18.5	9.0	30.5	16.0	9.0	9.0	13.0
		Standard Layer	(3) 20.6	(2) 9.6	(4) 36.0	(3) 18.3	(2) 9.7	(2) 9.7	(2) 14.0
		Top Layer	(5) 22.7	(4) 11.0	(7) 41.5	(5) 20.7	(4) 11.3	(4) 11.3	(3) 15.1
Cable Winding Length in Total(m)		1st Layer	19.6	15.1	22.9	18.5	15.7	23.0	31.3
		Standard Layer	(3) 62.3	(2) 31.3	(4) 99.8	(3) 59.6	(2) 32.8	(2) 48.0	(2) 65.2
		Top Layer	(5) 109.0	(4) 67.0	(7) 189.0	(5) 106.0	(4) 71.0	(4) 104.0	(3) 101.0
Cable Dia, in Use			ϕ6	ϕ8	ϕ8	ϕ10	ϕ12	ϕ12	ϕ18
Motor	Type		Fully-Sealed and Self-Cooling Type						
	Output		0.75 kW	2.2 kW					7.5 kW
	Number of Poles		4 P						6 P
	Rated Voltage and Current		Three phases 380V/50Hz 1.9 A	Three Phases 380V/50Hz 4.9 A					Three Phases 380V/50Hz 19.0 A
	Insulation		Type F						
Load Hour Factor			25%ED						20%ED
Braking Ratio			over 150%						
Operation			with 2 or 4 Button Switches (Indirect Operation), Operating at 24 VAC						
D/d			35.0	26.7	33.2	26.8	22.6		24.3
Reduction Ratio			50.77	106.45	38.18	72.11	130.49		102.09
Winch Weight (kgs)			74	81	158	159	180	209	720

※FE-2000N: Smooth Drum

Accessories

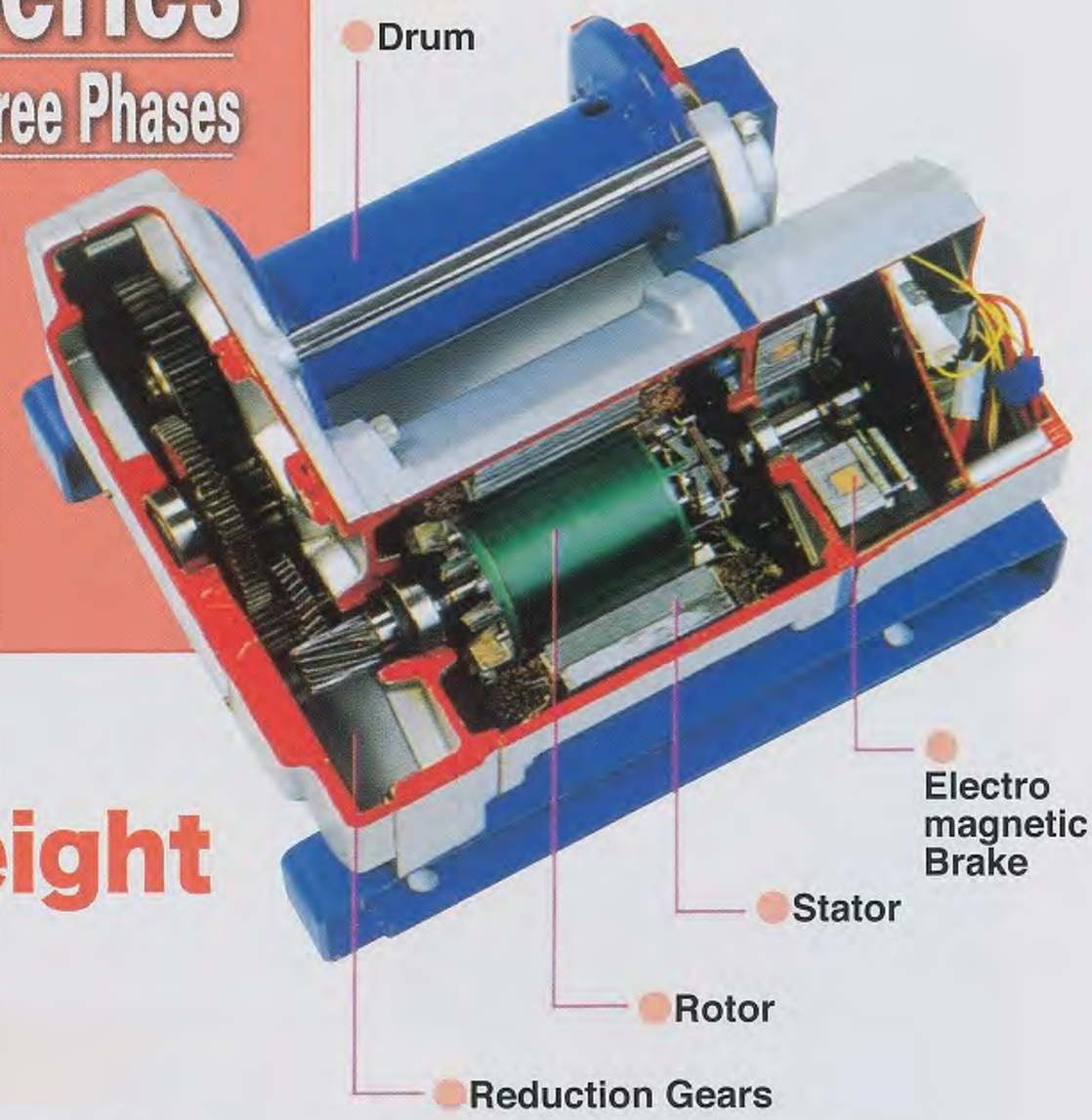
Electromagnetic Switch	Electromagnetic Contactor & Thermal Relay (Klixon Relay only for FE-2000N)		
Power Cord	2CT 0.75mm²×4plys×3m	2CT 2mm²×4plys×3m	2CT 14mm²×4plys×3m
Operating Cord	2CT 0.75mm²×4plys×5m	2CT 2mm²×4plys×5m	
Operating Switch	2 or 4 Waterproof Button Switches for Indirect Operation(250V×5A)		

Remark: Winding Length has the length of 20m in extra.

■Dimensions

Model	A	B	b1	b2	C	c1	c2	D1	D2	E	F	G	H	I	J
FE-150N	278	452	208.5	243.5	356	185.5	170.5	ϕ204	ϕ275	216	140.5	270	220	ϕ14	18
FE-300N	278	470	229.5	240.5	375	206.5	168.5	ϕ206	ϕ275	212	140.5	270	220	ϕ14	18
FE-250H	375	561	275	286	450	249	201	ϕ258	ϕ370	256	190	360	300	ϕ18	27
FE-500N	375	561	276.5	284.5	450	250.5	199.5	ϕ258	ϕ370	253	190	360	300	ϕ18	27
FE-1000N	375	600	315.5	284.5	471	271.5	199.5	ϕ260	ϕ370	253	190	360	300	ϕ18	27
FE-1000W	375	710	370.5	339.5	581	326.5	254.5	ϕ260	ϕ370	363	190	360	300	ϕ18	27
FE-2000N	555	976	457	519	741	378	363	ϕ420	ϕ540	450	285	600	500	ϕ27	35

SX Series Single Phase
TX Series Three Phases



Achieved Super Lightweight and Compact Winches

Features

■Super Lightweight and Parallel Structure

Motors and reduction gears are installed in aluminum cast cases, and electric components are in engineering plastic cases: which resulted in making the winches very light, resistant well against dust, drip and rust.
Furthermore, the winches are designed to be compact with unique winding drums and driving motors assembled in parallel. The winches can be installed in very narrow spaces.

■Grease Lubrication

An urea grease of high quality lasts for so long time that frequent lubrications is not needed. It is free to install the winches at any position, such as on floors, on walls or even upside down. The winches were designed to be quiet and compact mobility.

■High Quality Built-in Motor

Built-in motors are installed in aluminum cast cases and supplied with F-Type insulation (durable up to max. 155°C) and B-Type insulation (durable up to max. 130°C).

■Safe and High Efficiency Electromagnetic Brake

As well as FE Series, the winches had passed in-house durable tests 300,000 times. Despite of their small sizes, these winches have been improved for strong braking power, operating accuracy and a longer life span. A brake plate is made of earth friendly materials of non-asbestos.

■Easy to Attach Cables

Attaching cable can be done easily, i.e. insert a cable to a cable hole of a drum and tighten a locking bolt.

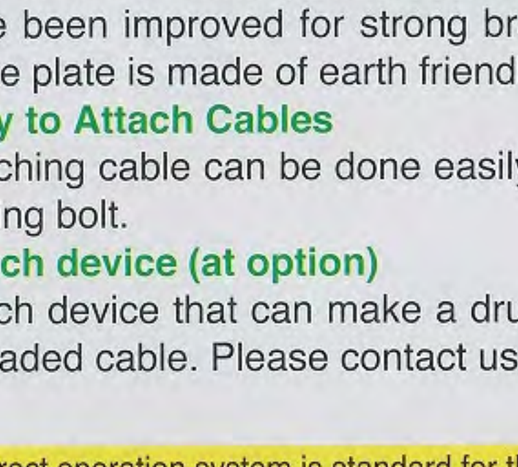
■Clutch device (at option)

Clutch device that can make a drum free is available. It is convenience device to pull out the unloaded cable. Please contact us in advance (cable winding length is subject to change).

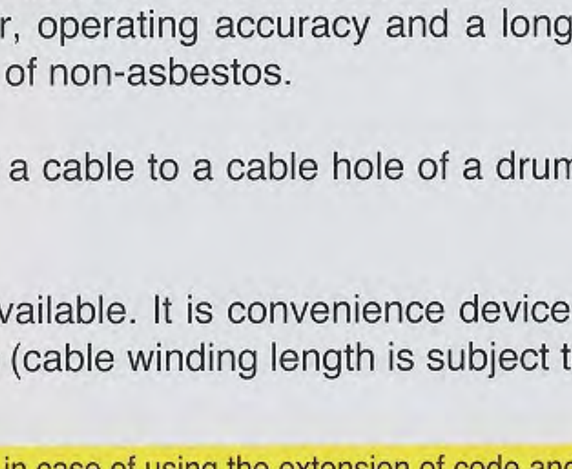
Note Direct operation system is standard for this product, so in case of using the extension of code and external limit switch, the control circuit is required separately. Except the case of installing on floors, please contact us in advance due to the problems such as weep holes and grease quantity.

■Dimensions

(Top) SX—101／103／201／203 TX—301／303								(Bottom) SX—205／210 TX—305／310／403／405／410／503／505／510										
A	B	b_1	b_2	C	D	E	F	G	H	I	J	K	L	M	N	X	Y	Z
415	270	80	65	200	φ76.3	φ142	φ15	140.5	240	75	84	φ10	430	285	80	240	17.5	40
538	335	82.5	120.5	300	φ89.1	φ190	φ18	174.5	315	100	109	φ15	500	345	105	290	22.5	50



Front View



Possible to pull out cables inside diagonal lined part
Right Side View

Top View

■Specifications (SX Series)

Remark: The numbers in parenthesis indicated the maximum winding layers.

Model			SX-101	SX-103	SX-201	SX-203	SX-205	SX-210
Max load on cable (kgs)	50Hz	1st Layer	180	300	180	300	600	1,000
		3rd Layer	180	300	180	300	600	1,000
		Top Layer	(5) 145	(5) 291	(5) 145	(5) 291	(5) 437	(5) 931
Winding speed of Cable (m/min)	50Hz	1st Layer	8.7	4.2	14.8	7.1	4.0	1.6
		3rd Layer	11.4	5.5	19.3	9.3	5.4	2.3
		Top Layer	(5) 14.1	(5) 6.8	(5) 23.8	(5) 11.5	(6) 7.4	(5) 3.0
Cable Winding Length in Total (m)		1st Layer	7.5	7.5	7.5	7.5	10.5	8.5
		3rd Layer	26.1	26.1	26.1	26.1	36.9	30.8
		Top Layer	(5) 49.4	(5) 49.4	(5) 49.4	(5) 49.4	(6) 89.6	(5) 60.6
Cable Dia, in Use			ϕ6				ϕ8	ϕ10
Motor	Type		Capacitor Activated		Capacitor Activated & Operated			
	Output		0.4kW		0.75kW			
	Number of Poles		4 P					
	Rated Voltage & Current		Single Phase 220V 50Hz, 4.1A		Single Phase 220V/50Hz 5.0A			
	Insulation		Type B					
Load Hour Factor			25%ED					
Braking Ratio			over 150%					
Operation			with 2 or 4 Button Switches (Indirect Operation), Operating at 24 VAC					
Reduction Ratio			42.19	86.85	25.05	51.57	107.14	261.91
Winch Weight (kgs)			42	42	45	45	70	72

Accessories

Power Cord ／ Operating Cord	2mm^2×2 plys×2m with plug ／ 0.75mm^2×4 plys×3m
Operating Switch ／ Ground	2 or 4 Waterproof Push Button Switches for Direct Operation／2mm^2×1mm with clip

■Specifications (TX Series)

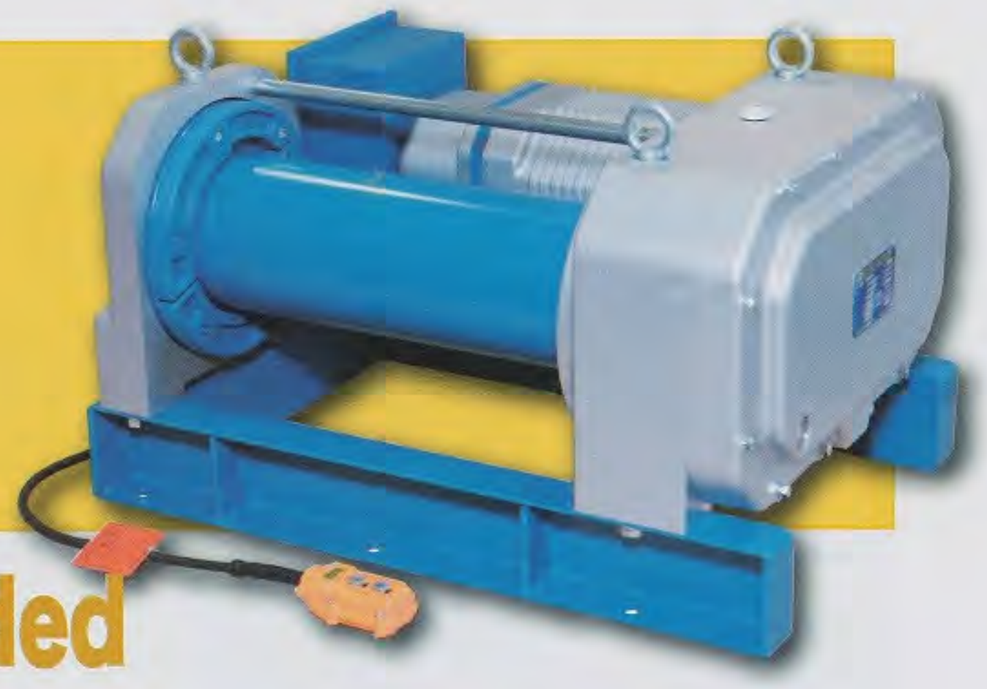
Remark: The numbers in parenthesis indicated the maximum winding layers.

Model			TX-301	TX-303	TX-305	TX-310	TX-403	TX-405	TX-410	TX-503	TX-505	TX-510
Max load on cable (kgs)	50 Hz	1st Layer	180	300	600	1,000	360	600	1,000	360	600	1,000
		3rd Layer	180	300	600	1,000	360	600	1,000	360	600	1,000
		Top Layer	(5) 145	(5) 291	(6) 437	(5) 931	(8) 236	(6) 437	(5) 931	(8) 236	(6) 437	(5) 931
Winding speed of Cable (m/min)	50 Hz	1st Layer	14.8	7.1	4.0	1.6	12.8	7.8	4.0	18.0	11.1	5.7
		3rd Layer	19.3	9.3	5.4	2.3	16.2	10.4	5.7	22.8	14.7	8.0
		Top Layer	(5) 23.8	(5) 11.5	(6) 7.4	(5) 3.0	(8) 24.7	(6) 14.4	(5) 7.3	(8) 34.8	(6) 20.2	(5) 10.3
Cable Winding Length in Total (m)		1st Layer	7.5	7.5	10.5	8.5	13.2	10.5	8.5	13.2	10.5	8.5
		3rd Layer	26.1	26.1	36.9	30.8	45.0	36.9	30.8	45.0	36.9	30.8
		Top Layer	(5) 49.4	(5) 49.4	(6) 89.6	(5) 60.0	(8) 155.2	(6) 89.6	(5) 60.0	(8) 155.2	(6) 89.6	(5) 60.0
Cable Dia, in Use			ϕ6		ϕ8	ϕ10	ϕ6	ϕ8	ϕ10	ϕ6	ϕ8	ϕ10
Motor	Type		Fully-Sealed and Self-Cooling Type									
	Output		0.75kW				1.5kW			2.2kW		
	Number of Poles		4P									
	Rated Voltage & Current		Three Phases 380V 50Hz, 1.9A				Three Phases 380V 50Hz, 3.5A			Three Phases 380V 50Hz, 4.7A		
	Insulation		Type B				Type F					
Load Hour Factor			25%ED									
Braking Ratio			over 150%									
Operation			with 2 or 4 Button Switches (Indirect Operation), Operating at 24 VAC									
Reduction Ratio			25.05	51.57	107.14	261.91	32.74	54.28	107.14	23.28	38.59	76.18
Winch Weight (kgs)			43	43	68	70	75	75	77	77	77	78

Accessories

Power Cord ／ Operating Cord	0.75 mm^2×4 plys×2m ／ 0.75 mm^2×4 plys×3m	2 mm^2×4 plys×2m ／ 0.75 mm^2×4 plys×3m
Operating Switch	2 or 4 Waterproof Push Button Switches for Direct Operation	

LX Series
Three Phases



Versatile Application in Upgraded TX Series
Functional for Heavy Duty Work of 1.5 Ton-2.5 Ton

Features

■Cleared Drum D/d more than 14 times (equal to Construction Code for Cranes M3) ■Super lightweight with motors and drums in parallel arrangement ■Soundless operation by helical gears and lubrication grease ■Low-Cost Direct operation system (only 400 and 500 models) ■Duplex protection of motor by Klixon Relay and Thermal Relay,and indirect operation(only 600 and 700 Models) ■Clutch device is available at option. Please contact us in advance.

■Specifications (LX Series)

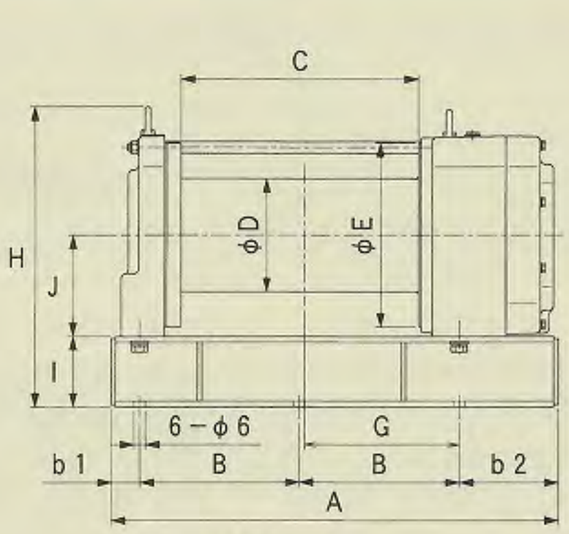
Remark: The numbers in parenthesis indicate the layer of winding cable.

Model			LX-415	LX-420	LX-425	LX-515	LX-520	LX-525	LX-615	LX-620	LX-625	LX-715	LX-720	LX-725
Max load on cable (kgs)	50 Hz	1st Layer	1,500	2,000	2,500	1,500	2,000	2,500	1,500	2,000	2,500	1,500	2,000	2,500
		Standard Layer	(3)1,500	(3)2,000	(3)2,500	(3)1,500	(3)2,000	(3)2,500	(3)1,500	(3)2,000	(3)2,500	(3)1,500	(3)2,000	(3)2,500
		Top Layer	(4)1,353	(4)1,818	(4)2,254	(4)1,353	(4)1,818	(4)2,254	(4)1,353	(4)1,818	(4)2,254	(4)1,353	(4)1,818	(4)2,254
Winding speed of Cable (m/min)	50 Hz	1st Layer	2.5	1.9	1.5	3.6	2.7	2.2	6.5	4.8	3.9	9.3	6.9	5.7
		Standard Layer	(3) 3.2	(3) 2.4	(3) 2.0	(3) 4.7	(3) 3.4	(3) 2.9	(3) 8.3	(3) 6.1	(3) 5.1	(3) 11.9	(3) 8.7	(3) 7.3
		Top Layer	(4) 3.5	(4) 2.6	(4) 2.2	(4) 5.2	(4) 3.7	(4) 3.2	(4) 9.1	(4) 6.7	(4) 5.6	(4) 13.1	(4) 9.5	(4) 8.0
Cable Winding Length in Total(m)		1st Layer	21.0	23.1	20.6	21.0	23.1	20.6	21.0	23.1	20.6	21.0	23.1	20.6
		Standard Layer	(3) 71.7	(3) 78.0	(3) 70.4	(3) 71.7	(3) 78.0	(3) 70.4	(3) 71.7	(3) 78.0	(3) 70.4	(3) 71.7	(3) 78.0	(3) 70.4
		Top Layer	(4) 101.4	(4) 109.8	(4) 99.6	(4) 101.4	(4) 109.8	(4) 99.6	(4) 101.4	(4) 109.8	(4) 99.6	(4) 101.4	(4) 109.8	(4) 99.6
Cable Dia, in Use			φ14	φ16	φ18	φ14	φ16	φ18	φ14	φ16	φ18	φ14	φ16	φ18
Motor		Output	1.5kW			2.2kW			3.7kW			5.5kW		
		Rated Voltage & Current	3 Phases 380V 50Hz 3.5A			3 Phases 380V 50Hz 4.7A			3 Phases 380V 50Hz 7.9A			3 Phases 380V 50Hz 12A		
Operation			Electromagnetic contactor with 2 or 4 Button Switches, Operating at 24 VAC											
Circuit Protection			Thermal Relay						Thermal Relay and Klixon Relay					
Power and Switch Cords			2mm²×4 plys×2m ／ 0.75 mm²×4 plys×3m						5.5mm²×4 plys×2m ／ 0.75mm²×4 plys×3m					
Winch Weight (kgs)			230	330	337	233	333	340	260	360	367	262	362	369

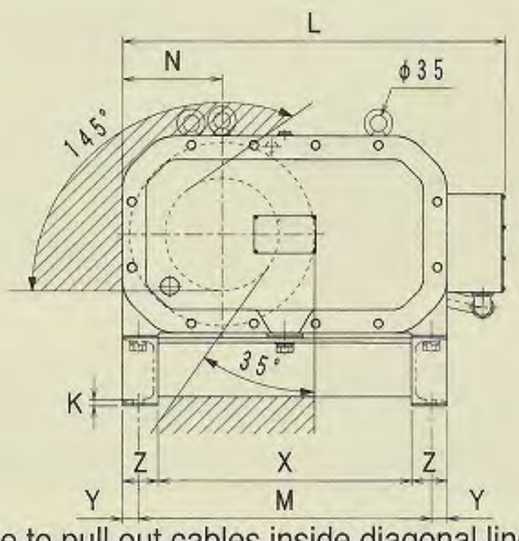
Note Direct operation system is standard for LX-400,500 models, so in case of using the extension of code and external limit switch, the control circuit is required separately.
Except the case of installing on floors, please contact us in advance due to the problems such as weep holes and grease quantity.

■Dimensions

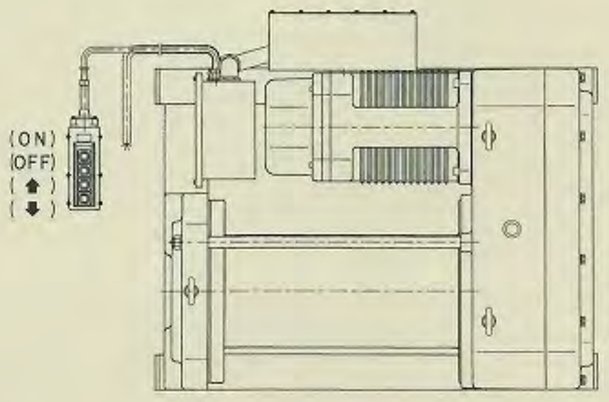
1……LX—415／515 2……LX—615／715 3……LX—420／520／425／525 4……LX—620／720／625／725																			
	A	B	b_1	b_2	C	D	E	F	G	H	I	J	K	L	M	N	X	Y	Z
1	875	326.5	53	169	500	φ189	φ305	φ18	331	551	125	186	8	670	538	167	468	30	65
2	875	326.5	53	169	500	φ189	φ305	φ18	331	551	125	186	8	719	538	167	468	30	65
3	940	336	60	208	500	φ240	φ390	φ24	335	637	150	215	12.5	760	619	210	535	33	75
4	940	336	60	208	500	φ240	φ390	φ24	335	637	150	215	12.5	809	619	210	535	33	75



Front View

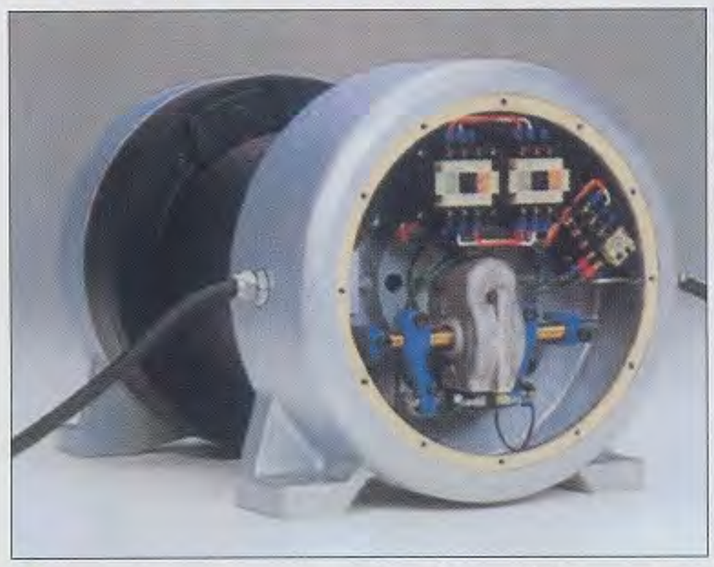


Possible to pull out cables inside diagonal lined part
Right Side View



Top View

Can provide consultation for a variety of devices with special specifications!



■We recommend attach a lift control device in case setting the upper limit/lower limit is required.

■A winch without electric components at special specification of setting a terminal block is available for connecting the winch to clients, control circuits. In FE series, the main frame of winches can be used as a terminal box.

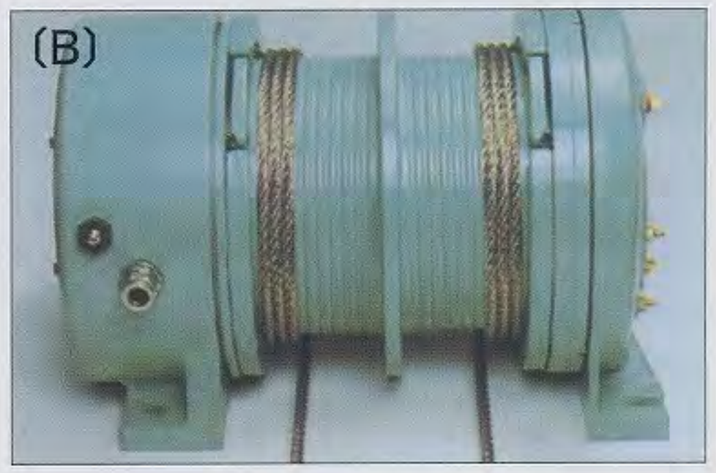
■The Inverter Control is recommended for variable speed control. However, the range of speed and cable winding capacity are limited, so please contact us in advance.

■ The winches can be converted to different voltages.

Model	Frequency (Hz)	Voltage
SX (Single Phase)	50 60	100・110・115・120 200・230・240
FE TX (Three Phases) LX	50	200・220・400・415 420・440
	60	200・220・400・420 440・460・480

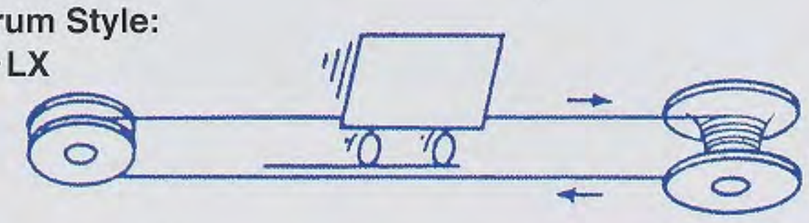
■For winding 2 cables at a time, a modified model of lead drum to left-right reversal is recommended. It has a patition and 2 cable stoppers.

■Specified paint color coating is also available. Salt-proof painting is recommended to use at places where have salt pollution.



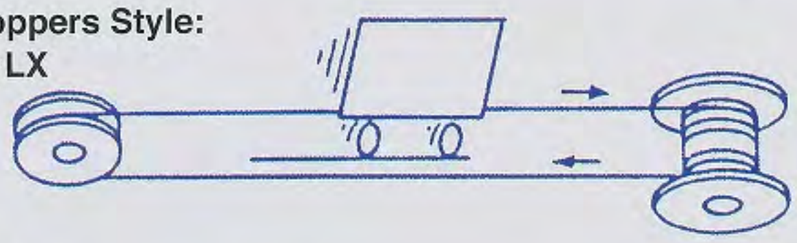
■ For moving 2 dollies broadwise, there are following means:

(A) Capstan Drum Style:
FE・TX・SX・LX



○ Needs tensions
○ Can not use a lift control device

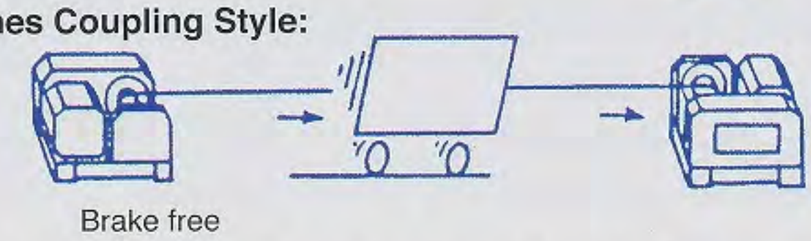
(B) 2 Cable Stoppers Style:
FE・TX・SX・LX



○ Can use a lift control device
○ Winding length in the 1st layer is limited.

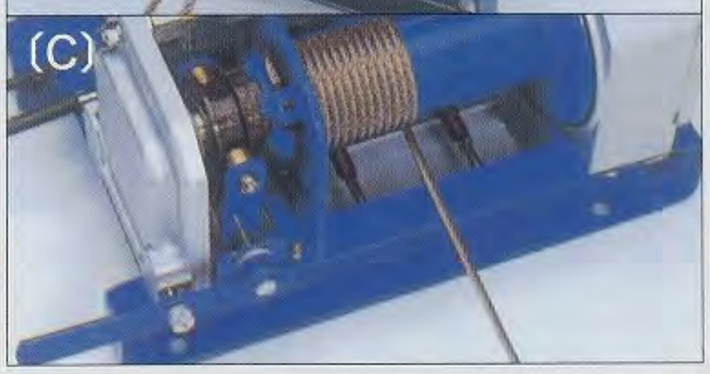
(C) Clutch Style:
TX・SX・LX

(D) Two Winches Coupling Style:
FE・TX・SX・LX



Brake free

○ Can use a lift control device

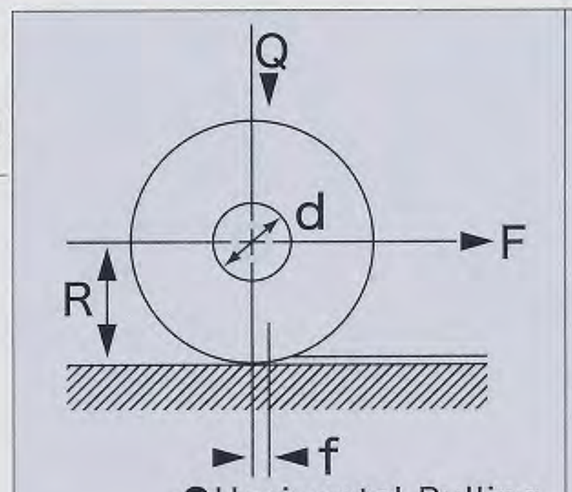


Reference: The tension is calculated by the following formula.

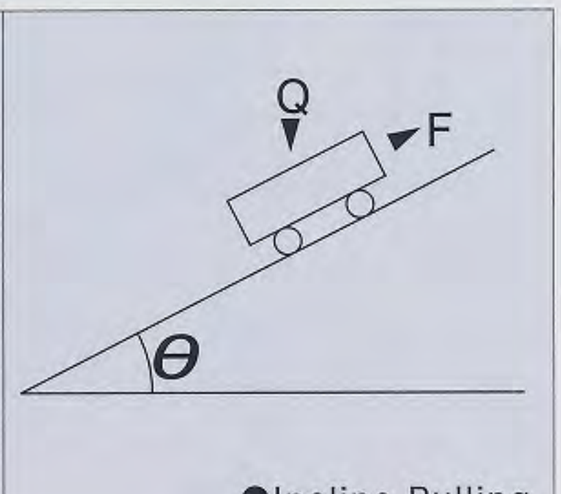
(Horizontal Pulling) $F = Q \cdot \frac{(\mu \times \frac{d}{2} + f)}{R} \times \frac{1}{\eta}$

(Incline Pulling) $F = Q(\sin\theta + \cos\theta \cdot \tan\phi) \times \frac{1}{\eta}$ $\tan\phi = \frac{(\mu \times \frac{d}{2} + f)}{R}$

Q : Dolly's weight + Load's weight (kg)
R : Radius of Wheel (cm) d : Dia. of Wheel axis (cm)
f : Turn of Wheel & Rail Dimension of Adding Friction f=0.05 (cm)
μ : Friction coefficient of Axle's circumference
Sliding bearing μ=0.1 Roller bearing μ=0.015
η : Pulley Efficiency ・ Wheel Efficiency ・ Driving Resistance
Normal η =0.85



●Horizontal Pulling



●Incline Pulling

■The various types of traverser can be designed and manufactured.

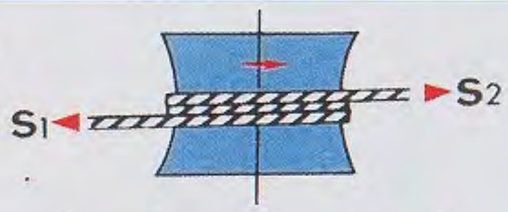
■For winding longer cable, a flange with big diameter is available for FE series and a drum with wide width is available for SX, TX, LX series.

■The electric winches can be used as hoists together with the electric trolley, gear trolley, and plane trolley.
Please note that Construction Code for Cranes will be applied depending on the type of usage.

■For pulling out cables, one-bracket-capstan drum is convenient.

〈Reference〉The tension (S2) is calculated by the following formula.

$$S_2 = \frac{S_1}{e^{\mu\alpha}} = \frac{S_1}{e^{\mu 2\pi n}}$$



S_1: Tension at the side of winding in (under load)
S_2 : Tension required at the side of pulling out
$e^{\mu\alpha}$: Damping ratio of tension
n : Winding times of the wire rope around the drum
α: Rope winding angle (rad) α=2πn
μ: Friction coefficient of the drum and the wire rope
e : Natural log base e=2.718

The damping ratio of tension has been caluculated based on the friction coefficient at μ=0.1 of the drum and the wire rope

Winding times n	3 turns	4 turns	5 turns
Damping ratio of tension $e_{\mu\alpha}$	6.58	12.34	23.14

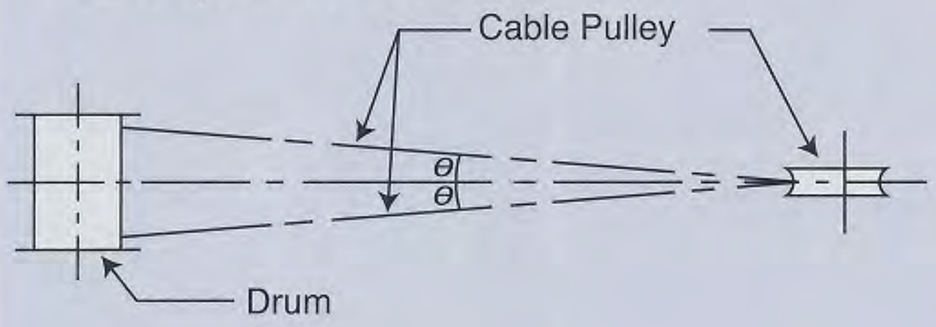
■Precautions when using

●Fleet Angle

When using a drum with a groove, keep the fleet angle within 4°(only for the first layer of the drum).

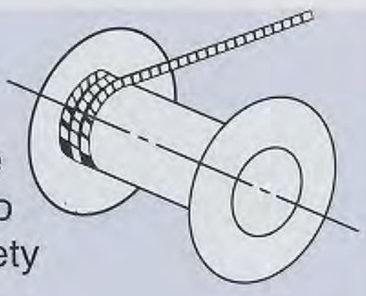
When using a drum without a groove, keep the fleet angle within 2°

※Reference : Distance between the drum and the wheel is to be more than 15 times as long as the drum width.



◎The technical training is required for operating the winches.

●Wind the three turns or more the extra maintenance winding.



The Japanese Industrial Standard specify that the extra maintenance winding is to be at least two turns, but please keep it at least three turns for safety (If possible, more than five turns).

The relationship between the number of times in extra maintenance winding and the pressure to wire rope stopper based on the friction coefficient at μ=0.1 of the drum and the wire rope.

Extra winding	0	1	2	3	4	5
Pressure to wire rope stopper	1	0.53	0.28	0.15	0.08	0.04

●Please be careful about the voltage drop (especially for the diameter of operation cord).

Especially for the direct operation system (models : SX, TX, LX series), the voltage drop is affected by the length and diameter of power supply cord and also operation cord.
Please read operator manuals to check the maximum allowable length/diameter of power supply cord and operation cord. (Maintain voltage drop within 2 %)

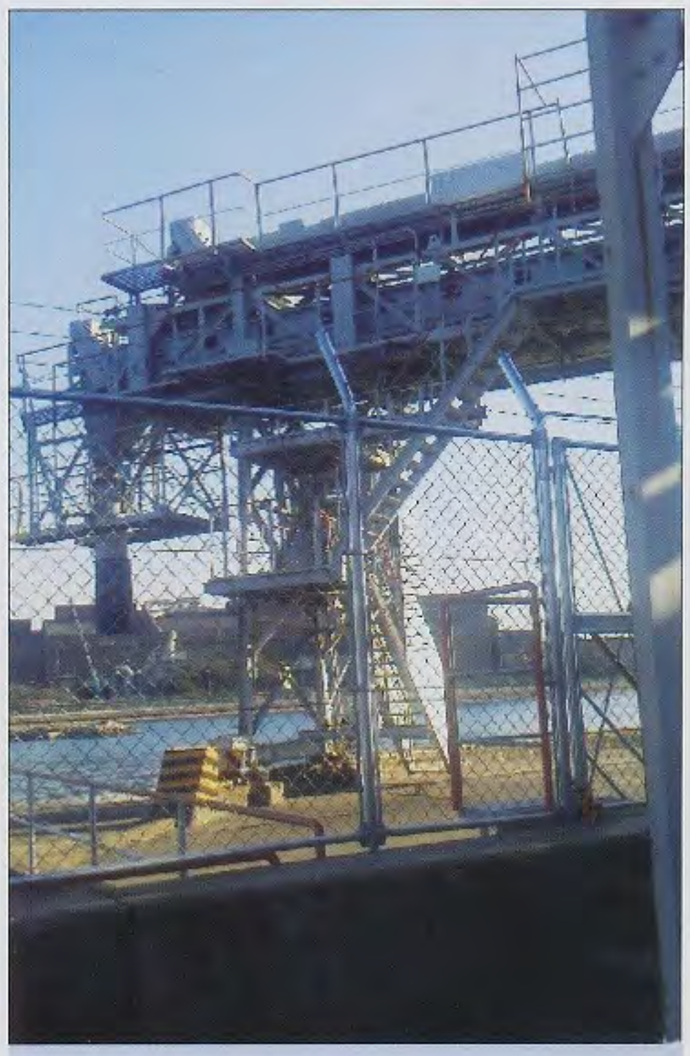
●About the use of electric generator, when the motor start-up, the 6 times larger current will flow as the rated current, then need large electric power.
Please select the electric generator having enough capacity.

Please contact the manufacture of electric generator for details.

※Please refer to the operation manuals about the formula of diameter of both codes.

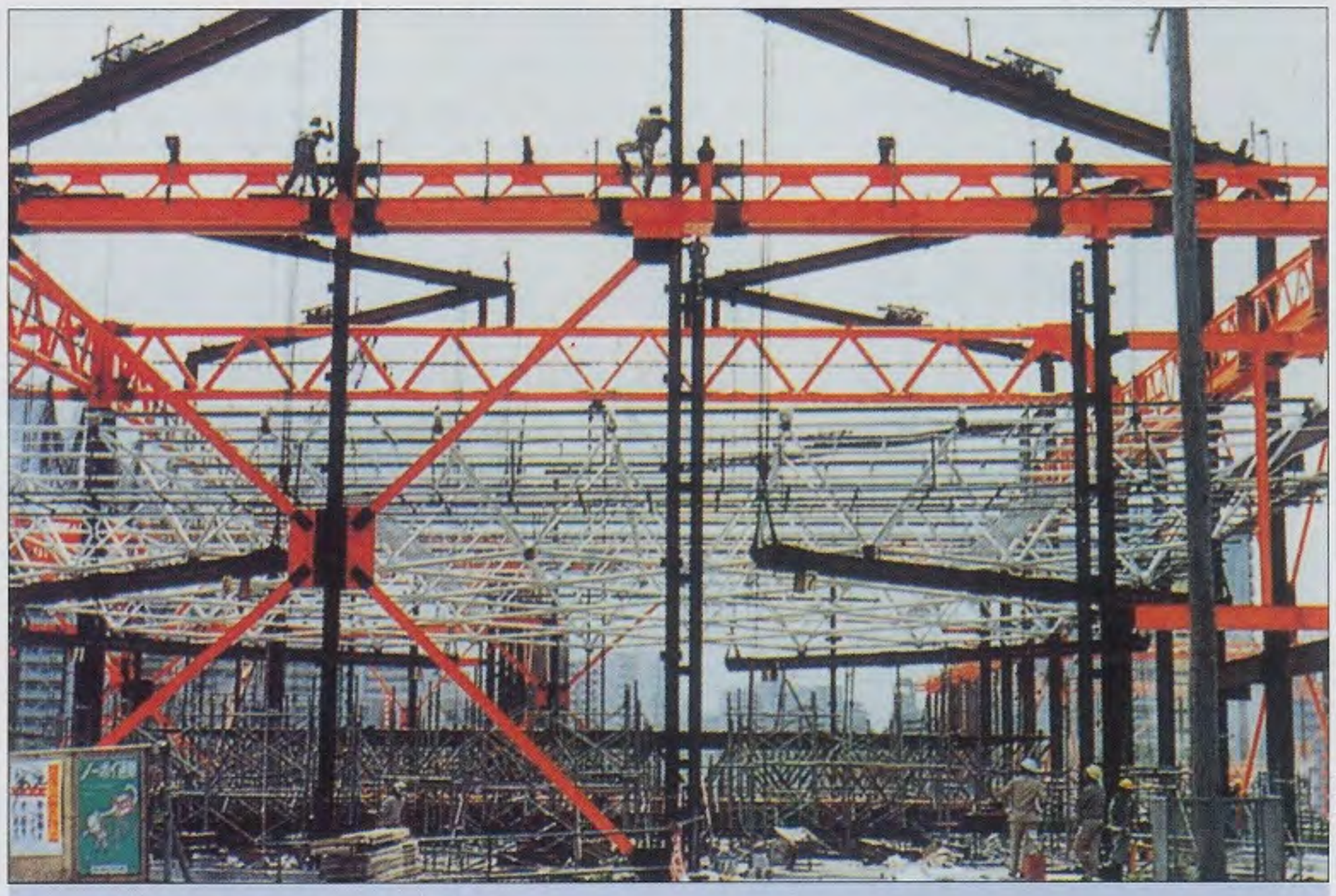
Plenty of Uses in Acco

For hoisting national flags in the Nagano Olympics

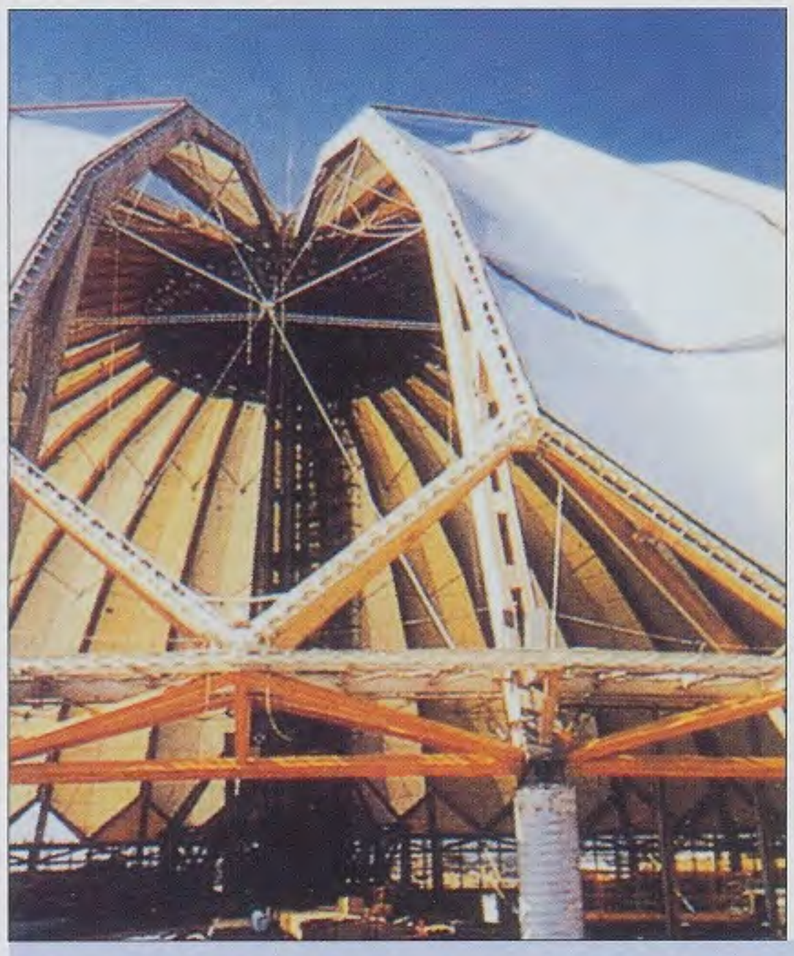


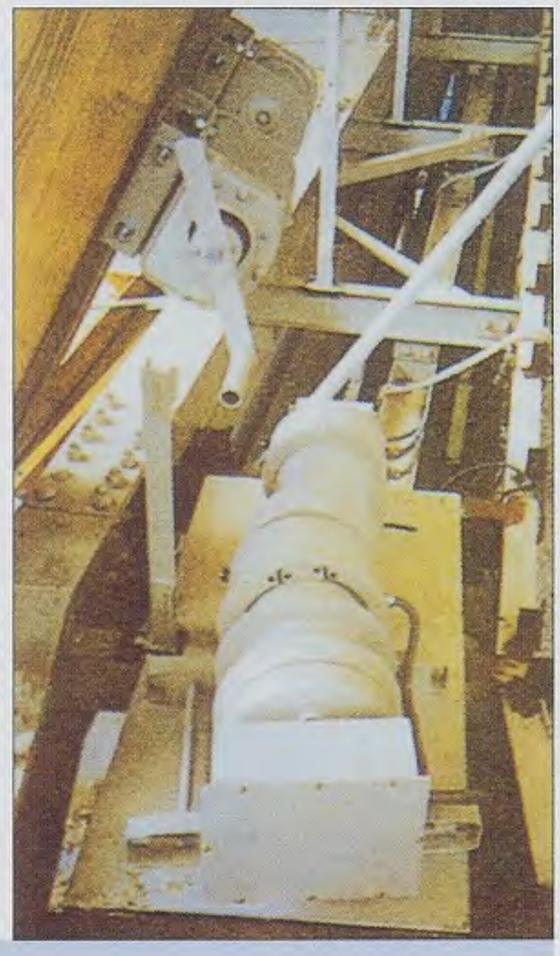
Unloader is used

For drying a fire-fighting hose



For lifting a special scaffold

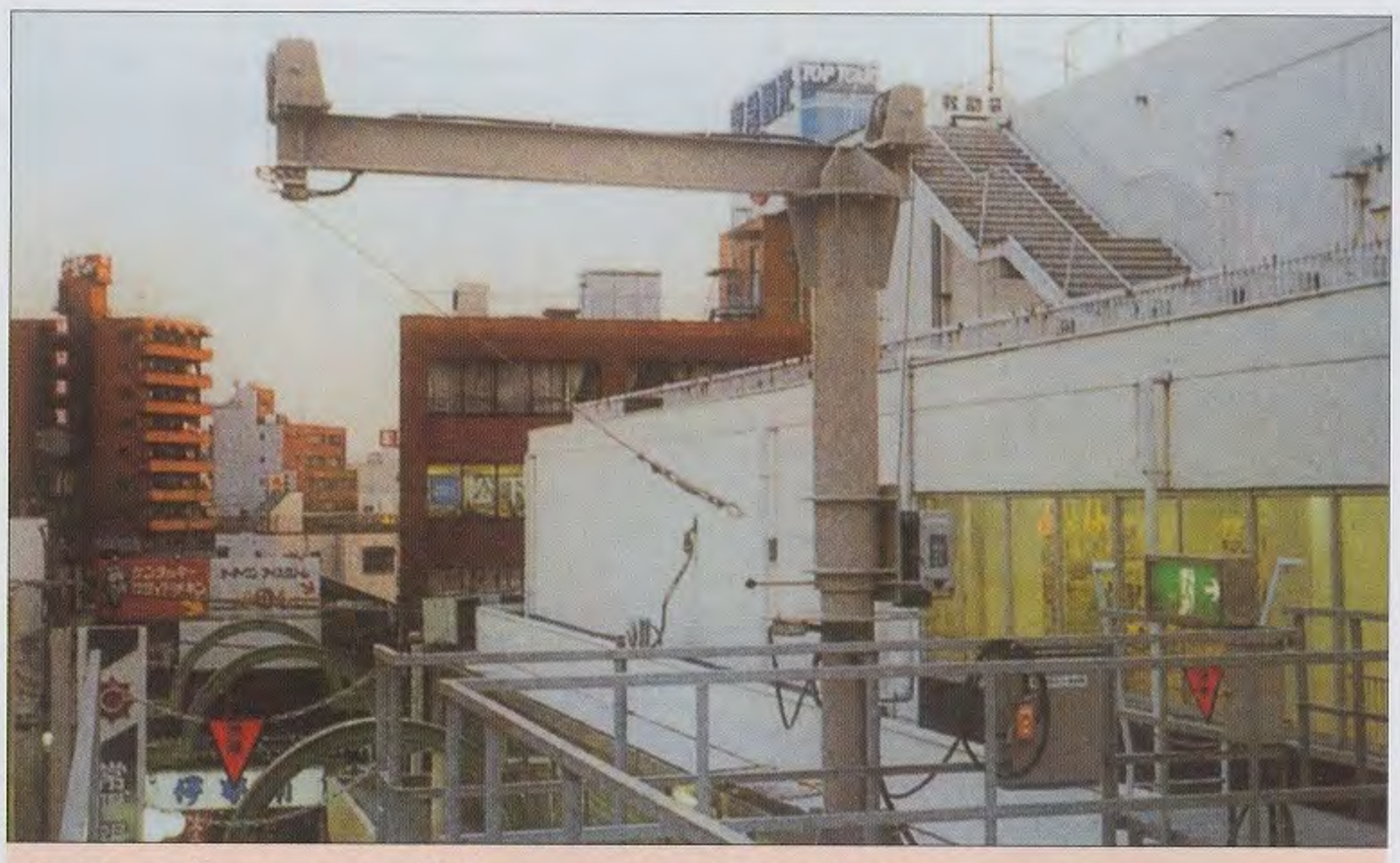




For hoisting equipment and nets in the dome

rdance with Purposes

For hoisting a shock-absorbing material



Set to a jib crane for lifting a extinguishing fire equipment

Mooring facility of Dam Lake

For lifting a fish boat (with Clutch device)

Golf practice range

Archery hall

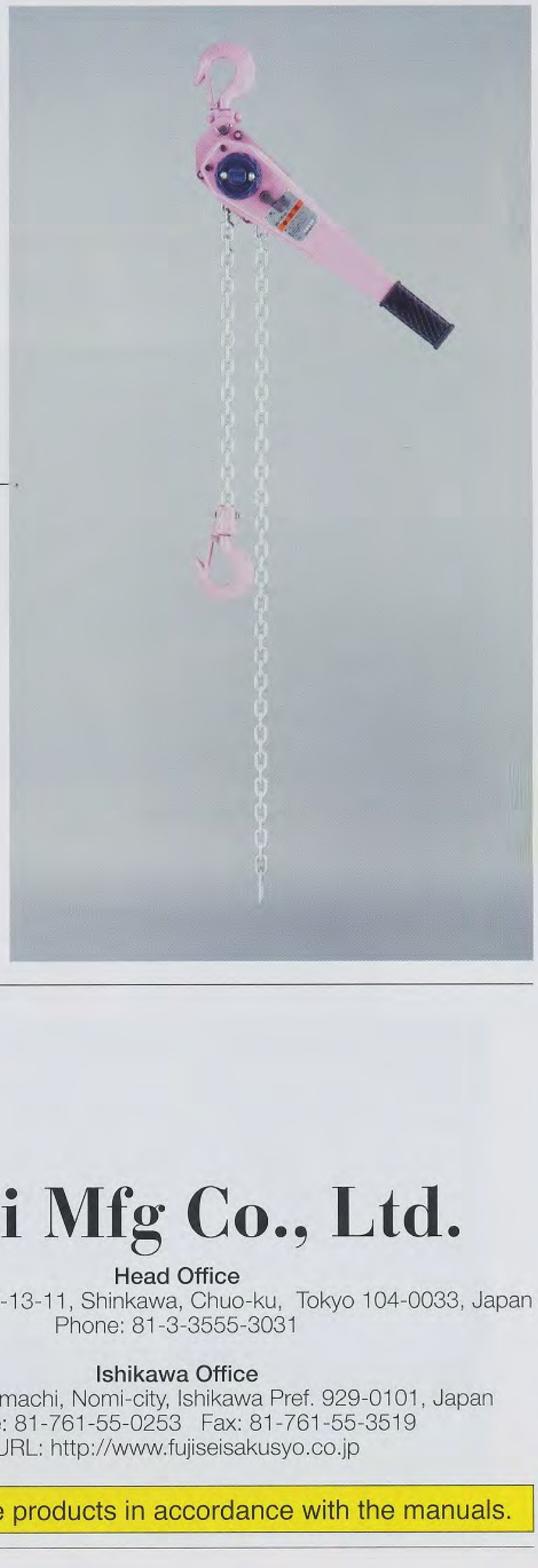
Other Products for Users' Needs. Your consideration is invited.

MANUAL WINCH

PNW series

SSW series
(Stainless steel)

FUJI PULLER



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Attention: Please read operator manuals before use of products and use the products in accordance with the manuals.