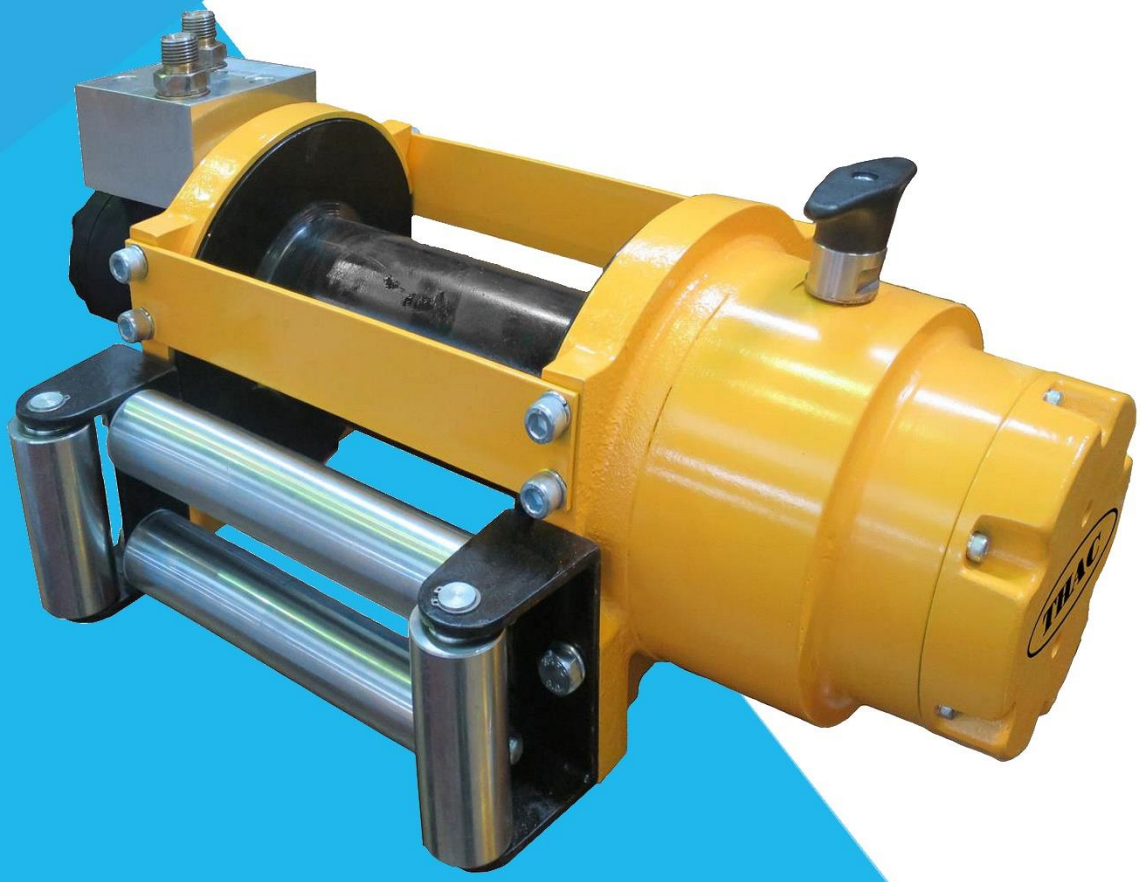
THAC

Hydraulic Planetary Winch



Comply with the requirements of the Machinery Directive 2006/42/EC and also applied to the standards of EN 14492-1 Power Driven Winches and of SEA J706_2003.08 Rating of Winches for intermittent duty winches

Company Profile

Founded in 1996, Taiwan Hoist and Crane Co., Ltd located in Zhongli Dist, Taoyuan City, Taiwan is specializing in the design, manufacturing and marketing a wide range of lifting and pulling equipment including Electric Wire Rope Winch, Hydraulic Planetary Winch and Hydraulic Lifting Winch.

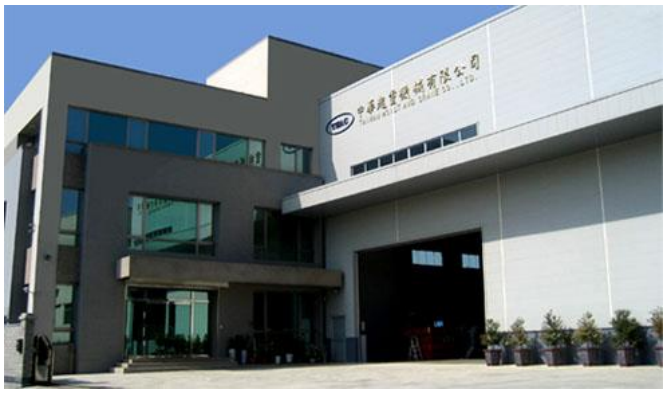
THAC Hydraulic Recovery Winches, hydraulic PTO (power takeoff) driven, planetary geared unit designed for pulling application. The PTO winch is driven by a drive shaft that is driven by a PTO adapter that bolts to the transfer case of a vehicle, so the vehicle power can be used to winch or unwind the winch. The output from an externally mounted by a hydraulic orbital motor is transmitted through to the gear trains.

The winch have both a dynamic (over-center valve) and a mechanical brake. The actuation of brakes in a winch is automatic and occurs when you let off the hydraulic control switch

Over center valves were used to perform load holding of preventing the movements of a load, load control of preventing the actuator running of ahead of the pump and load safety preventing uncontrolled movement of the load purposes.

Comply with the requirements of the Machinery Directive 2006/42/EC and also applied to the standards of EN 14492-1 Power Driven Winches and of SEA J706_2003.08 Rating of Winches for intermittent duty winches

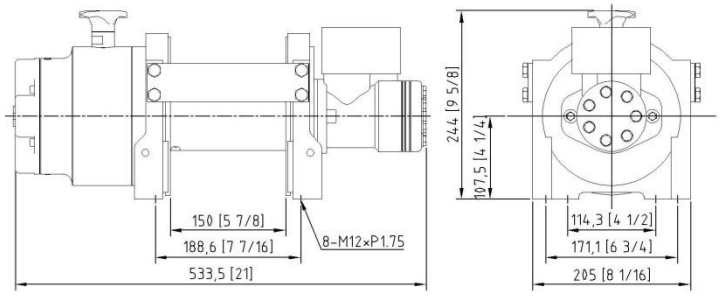
An industrial winch is a robust and reliable device to be used in a variety of industrial applications for example towing and recovery, heavy hauling etc.



TD60

EN 14492-1 Ratings 2,700 kgf
SAE J706 Ratings 6,000 lbf

* Powered by a PTO (power take-off) driven pump with variable speeds and adjustable line pull output functions
* Rugged cast iron gear box and steel frame construction
* Enclosed drum flanges prevent rope from becoming trapped
* Dependable orbital hydraulic motor offer high torque and high efficiency at low speed
* Inside the winch is the 2 stage high efficiency planetary gear trains developing for maximum mechanical efficiency
* The winch have both a dynamic (over-center valve) and a mechanical spring applied brake . The actuation of brakes in a winch is automatic and occurs when you let off the hydraulic control switch
* Minimum 10:1 drum diameter to rope diameter, 2:1 wire rope breaking strength for EN ratings
* A given amount of freeboard prevents rope from inadvertently coming off the drum during use
* Always keep at least 5 wraps of rope on the drum for safety operation



Specification	Comply with EN 14492-1	Comply with SAE J706
Rated Pulling Force	2,700 kgf	6,000 lbf
Hydraulic Motor	Orbital, 156 cm^3/rev	Orbital, 3.1 in^3/rev
Maximum oil flow	40 l/min	10.6 g/min
Minimum oil flow	10 l/min	2.64 g/min
Operation pressure	150 bar	2,175 psi
Max. back pressure on return line	5 bar	73 psi
Gear Train	2 stage planetary gear with a gear ratio of 16:1	
Brake	Spring applied disc brake and over-center valve	
Clutch	Rotating ring gear	
Drum Barrel Diameter	90 mm	3.54”
Drum Flange Diameter	205 mm	8.07”
Distance Between Flanges	150 mm	5.9”
Recommended Wire Rope	9 mm x 25 , 1960 N/mm^2, minimum breaking strength of 56.5 KN	11/32” x 108 ft, EIPS, minimum breaking strength of 12,700 lbf
Standard Accessories	Roller fairlead and over-center valve	
Winch Weight		

Comply with EN 14492-1 : Performance by layer with 9 mm dia. wire rope

Rope layer		1(1)	2	3	4(2)
Pull by layer at 150 bar	kgf	2,700	2.298	1,989	1,754
Speed by layer at 60l/min	m/min	14	17	19	22
Cumulating rope winding length	m	5	11	17	25

(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least1.5 times of rope diameter

Comply with SAE J706 : Performance by layer with 11/32” dia. wire rope

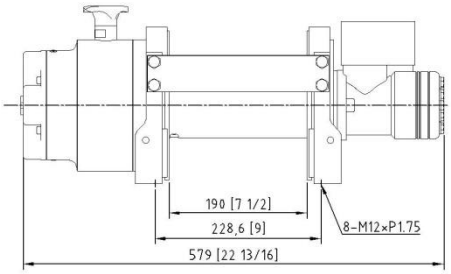
Rope layer		1(1)	2	3	4	5(2)
Pull by layer at 2,175 psi	lbf	6,000	5,068	4,387	3,867	3,457
Speed by layer at 10.6 g/min	ft/min	46	55	63	71	80
Cumulating rope winding length	ft	16	35	56	81	108

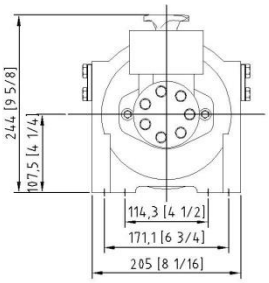
(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least 0.7 times of rope diameter

TD80

EN 14492-1 Ratings 3,500 kgf
SAE J706 Ratings 8,000 lbf

* Powered by a PTO (power take-off) driven pump with variable speeds and adjustable line pull output functions
* Rugged cast iron gear box and steel frame construction
* Enclosed drum flanges prevent rope from becoming trapped
* Dependable orbital hydraulic motor offer high torque and high efficiency at low speed
* Inside the winch is the 2 stage high efficiency planetary gear trains developing for maximum mechanical efficiency
* The winch have both a dynamic (over-center valve) and a mechanical spring applied brake . The actuation of brakes in a winch is automatic and occurs when you let off the hydraulic control switch
* Minimum 10:1 drum diameter to rope diameter, 2:1 wire rope breaking strength for EN ratings
* A given amount of freeboard prevents rope from inadvertently coming off the drum during use
* Always keep at least 5 wraps of rope on the drum for safety operation





Specification	Comply with EN 14492-1	Comply with SAE J706
Rated Pulling Force	3,500 kg	8,000 lb
Hydraulic Motor	Orbital, 78 cm^3/rev	Orbital, 4.7 in^3/rev
Maximum oil flow	60 l/min	15.9 g/min
Minimum oil flow	10 l/min	2.64 g/min
Operation pressure	150 bar	2,175 psi
Max. back pressure on return line	5 bar	73 psi
Gear Train	2 stage planetary gear with a gear ratio of 16:1	
Brake	Spring applied disc brake and over-center valve	
Clutch	Rotating ring gear	
Drum Barrel Diameter	90 mm	3.54”
Drum Flange Diameter	205 mm	8.07”
Distance Between Flanges	190 mm	7.48”
Recommended Wire Rope	10 mm x 30 m, 1960 N/mm^2, minimum breaking strength of 69.8 KN	3/8” x 133 ft, EIPS, minimum breaking strength of 15,663 lbf
Standard Accessories	Roller fairlead and over-center valve	
Winch Weight		

Comply with EN 14492-1 : Performance by layer with 10 mm dia. wire rope

Rope layer		1(1)	2	3	4(2)
Pull by layer at 150 bar	kgf	3,500	3,018	2,583	2,258
Speed by layer at 60 l/min	m/min	13	15	18	20
Cumulating rope winding length	m	6	13	21	30

(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least1.5 times of rope diameter

Comply with SAE J706 : Performance by layer with 3/8” dia. wire rope

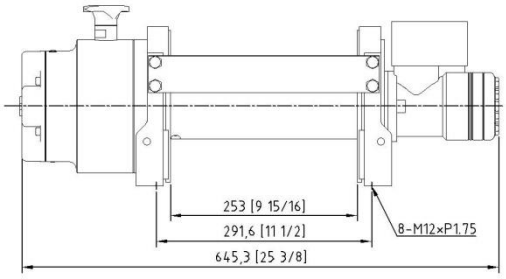
Rope layer		1(1)	2	3	4	5(2)
Pull by layer at 2,175 psi	lbf	8,000	6,654	5,696	4,979	4,423
Speed by layer at 15.9 g/min	t/min	42	50	58	67	75
Cumulating rope winding length	t	19	42	69	99	133

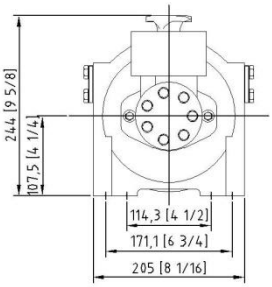
(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least 0.7 times of rope diameter

TD100

EN 14492-1 Ratings 4,300 kgf
SAE J706 Ratings 10,000 lbf

* Powered by a PTO (power take-off) driven pump with variable speeds and adjustable line pull output functions
* Rugged cast iron gear box and steel frame construction
* Enclosed drum flanges prevent rope from becoming trapped
* Dependable orbital hydraulic motor offer high torque and high efficiency at low speed
* Inside the winch is the 2 stage high efficiency planetary gear trains developing for maximum mechanical efficiency
* S The winch have both a dynamic (over-center valve) and a mechanical spring applied brake . The actuation of brakes in a winch is automatic and occurs when you let off the hydraulic control switch
* Minimum 10:1 drum diameter to rope diameter, 2:1 wire rope breaking strength for EN ratings
* A given amount of freeboard prevents rope from inadvertently coming off the drum during use
* Always keep at least 5 wraps of rope on the drum for safety operation





Specification	Comply with EN 14492-1	Comply with SAE J706
Rated Pulling Force	4,300 kgf	10,000 lb
Hydraulic Motor	Orbital, 97.3 cm^3/rev	Orbital, 5.9 in^3/rev
Maximum oil flow	60 l/min	15.9 g/min
Minimum oil flow	10 l/min	2.64 g/min
Operation pressure	150 bar	2,175 psi
Max. back pressure on return line	5 bar	73 psi
Gear Train	2 stage planetary gear with a gear ratio of 16:1	
Brake	Spring applied disc brake and over-center valve	
Clutch	Rotating ring gear	
Drum Barrel Diameter	102 mm	4.0”
Drum Flange Diameter	205 mm	8.07”
Distance Between Flanges	253 mm	10”
Recommended Wire Rope	11 mm x 29 m, 1960 N/mm^2, minimum breaking strength of 84.4 KN	7/16” x 135 ft, EIPS, minimum breaking strength of 18,939 lbf
Standard Accessories	Roller fairlead and over-center valve	
Winch Weight		

Comply with EN 14492-1 : Performance by layer with 11 mm dia. wire rope

Rope layer		1(1)	2	3 (2)
Pull by layer at 150 bar	kgf	4,300	3,794	3,261
Speed by layer at 60 l/min	m/min	12	15	17
Cumulating rope winding length	m	8	18	29

(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least1.5 times of rope diameter

Comply with SAE J706 : Performance by layer with 7/16” dia. wire rope

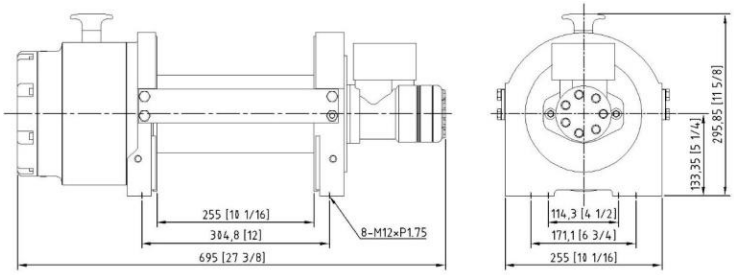
Rope layer		1(1)	2	3	4 (2)
Pull by layer at 2,175 psi	lbf	10,000	8,366	7,190	6,305
Speed by layer at 15.9 g/min	ft/min	40	48	56	63
Cumulating rope winding length	ft	26	57	94	135

(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least 0.7 times of rope diameter

TD120

EN 14492-1 Ratings 5,100 kgf
SAE J706 Ratings 12,000 lbf

* Powered by a PTO (power take-off) driven pump with variable speeds and adjustable line pull output functions
* Rugged cast iron gear box and steel frame construction
* Enclosed drum flanges prevent rope from becoming trapped
* Dependable orbital hydraulic motor offer high torque and high efficiency at low speed
* Inside the winch is the 2 stage high efficiency planetary gear trains developing for maximum mechanical efficiency
* The winch have both a dynamic (over-center valve) and a mechanical spring applied brake. The actuation of brakes in a winch is automatic and occurs when you let off the hydraulic control switch
* Minimum 10:1 drum diameter to rope diameter, 2:1 wire rope breaking strength for EN ratings
* A given amount of freeboard prevents rope from inadvertently coming off the drum during use
* Always keep at least 5 wraps of rope on the drum for safety operation



Specification	Comply with EN 14492-1	Comply with SAE J706
Rated Pulling Force	5,100 kgf	12,000 lb
Hydraulic Motor	Orbital, 125 cm^3/rev	Orbital, 7.6 in^3/rev
Maximum oil flow	60 l/min	15.9 g/min
Minimum oil flow	10 l/min	2.64 g/min
Operation pressure	150 bar	2,175 psi
Max. back pressure on return line	5 bar	73 psi
Gear Train	2 stage planetary gear with a gear ratio of 19:1	
Brake	Spring applied disc brake and over-center valve	
Clutch	Rotating ring gear	
Drum Barrel Diameter	114 mm	4.5”
Drum Flange Diameter	253mm	9.96”
Distance Between Flanges	255 mm	10.03”
Recommended Wire Rope	12 mm x 42 m, 1960 N/mm^2, minimum breaking strength of 100.5 KN	15/32” x 185 ft, EIPS, minimum breaking strength of 22,552 lbf
Standard Accessories	Roller fairlead and over-center valve	
Winch Weight		

Comply with EN 14492-1 : Performance by layer with 12 mm dia. wire rope

Rope layer		1(1)	2	3	4(2)
Pull by layer at 150 bar i	kgf	5,100	4,573	3,944	3,466
Speed by layer at 60 l/min	m/min	9	11	13	14
Cumulating rope winding length	m	8	18	29	42

(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least1.5 times of rope diameter

Comply with SAE J706 : Performance by layer with15/32” dia. wire rope

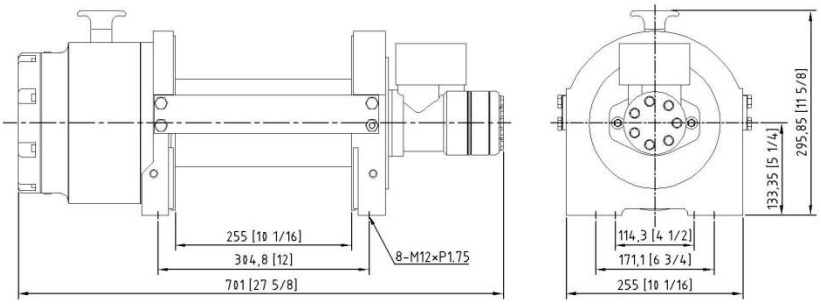
Rope layer		1(1)	2	3	4	5(2)
Pull by layer at 2,175 psi	lbf	12,000	10,084	8,695	7,643	6,818
Speed by layer at 15.9 g/min	ft/min	30	36	42	47	53
Cumulating rope winding length	ft	27	59	96	138	185

(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least 0.7 times of rope diameter

TD150

EN 14492-1 Ratings 6,000 kgf
SAE J706 Ratings 15,000 lbf

* Powered by a PTO (power take-off) driven pump with variable speeds and adjustable line pull output functions
* Rugged cast iron gear box and steel frame construction
* Enclosed drum flanges prevent rope from becoming trapped
* Dependable orbital hydraulic motor offer high torque and high efficiency at low speed
* Inside the winch is the 2 stage high efficiency planetary gear trains developing for maximum mechanical efficiency
* The winch have both a dynamic (over-center valve) and a mechanical spring applied brake . The actuation of brakes in a winch is automatic and occurs when you let off the hydraulic control switch
* Minimum 10:1 drum diameter to rope diameter, 2:1 wire rope breaking strength for EN ratings
* A given amount of freeboard prevents rope from inadvertently coming off the drum during use
* Always keep at least 5 wraps of rope on the drum for safety operation



Specification	Comply with EN 14492-1	Comply with SAE J706
Rated Pulling Force	6,000 kgf	15,000 lbf
Hydraulic Motor	Orbital, 156.cm³/rev	Orbital, 9.5 in³/rev
Maximum oil flow	60 l/min	15.9 g/min
Minimum oil flow	10 l/min	2.64 g/min
Operation pressure	150 bar	2,175 psi
Max. back pressure on return line	5 bar	73 psi
Gear Train	2 stage planetary gear with a gear ratio of 19:1	
Brake	Spring applied disc brake and over-center valve	
Clutch	Rotating ring gear	
Drum Barrel Diameter	127 mm	5”
Drum Flange Diameter	253mm	9.96”
Distance Between Flanges	255 mm	10.03”
Recommended Wire Rope	13 mm x 29 m, 1960 N/mm²(EIPS), minimum breaking strength of 118 KN	1/2” x 137 ft, EIPS, minimum breaking strength of 26,500 lbf
Standard Accessories	Roller fairlead and over-center valve	
Winch Weight		

Comply with EN 14492-1 : Performance by layer with 13 mm dia. wire rope

Rope layer		1(1)	2	3(2)
Pull by layer at 150 bar i	kgf	6,000	5,738	4,961
Speed by layer at 60 l/min	m/min	8	9	11
Cumulating rope winding length	m	8	18	29

(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least1.5 times of rope diameter

Comply with SAE J706 : Performance by layer with 1/2” dia. wire rope

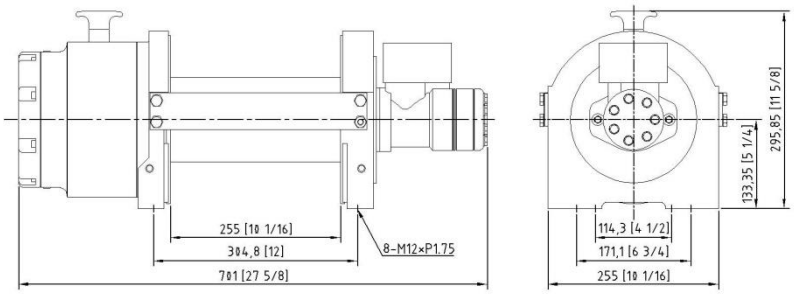
Rope layer		1(1)	2	3	4(2)
Pull by layer at 2,175 psi	lbf	15,000	12,651	10,938	9,633
Speed by layer at 15.9 g/min	/min	26	31	36	41
Cumulating rope winding length	t	27	59	96	137

(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least 0.7 times of rope diameter

TD200

EN 14492-1 Ratings 9,000 kgf
SAE J706 Ratings 20,000 lbf

* Powered by a PTO (power take-off) driven pump with varial
* Rugged cast iron gear box and steel frame construction
* Enclosed drum flanges prevent rope from becoming trapped
* Dependable orbital hydraulic motor offer high torque and high efficiency at low speed
* Inside the winch is the 2 stage high efficiency planetary gear trains developing for maximum mechanical efficiency
* The winch have both a dynamic (dual directional over-center valve) and a mechanical multi-disc brake. The actuation of brakes in a winch is automatic and occurs when you let off the hydraulic control switch
* Dual directional over-center valve supplied is designed to operate in either direction, which allows flexibility in the rope winding direction.
* Minimum 10:1 drum diameter to rope diameter, 2:1 wire rope breaking strength for EN rating
* A given amount of freeboard prevents rope from inadvertently coming off the drum during use
* Always keep at least 5 wraps of rope on the drum for safety operation



Specification	Comply with EN 14492-1	Comply with SAE J706
Rated Pulling Force	9,000 kgf	20,000 lbf
Hydraulic Motor	Orbital, 156 cm^3/rev	Orbital, 9.5 in^3/rev
Maximum oil flow	60 l/min	15.9 g/min
Minimum oil flow	10 l/min	2.64 g/min
Operation pressure	150 bar	2,175 psi
Max. back pressure on return line	5 bar	73 psi
Gear Train	2 stage planetary gear with a gear ratio of 30:1	
Brake	Multi-disc brake and dual directional over-center valve	
Clutch	air clutch	
Drum Barrel Diameter	146 mm	5.75”
Drum Flange Diameter	330mm	13.19”
Distance Between Flanges	200 mm	7.87”
Recommended Wire Rope	16 mm x 31 m, 1960 N/mm^2, minimum breaking strength of 179 KN	5/8” x 137 ft, EIPS, minimum breaking strength of 40,200 lbf
Standard Accessories	Roller fairlead and dual directional over-center valve and air clutch	
Winch Weight		

Comply with EN 14492-1 : Performance by layer with 16 mm dia. wire rope

Rope layer		1(1)	2	3	4(2)
Pull by layer at 150 bar	kgf	9,000	7,575	6,502	5,696
Speed by layer at 60 l/min	m/min	6	7	8	9
Cumulating rope winding length	m	6	13	22	31

(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least1.5 times of rope diameter

Comply with SAE J706 : Performance by layer with 5/8” dia. wire rope

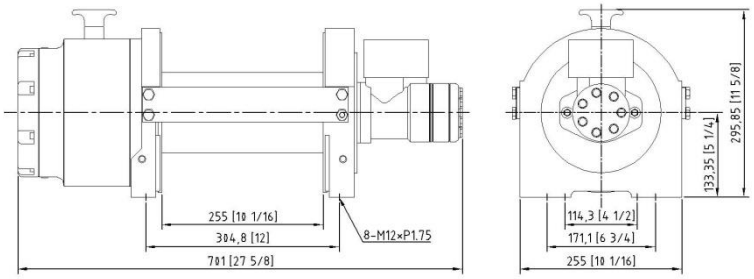
Rope layer		1(1)	2	3	4	5(2)
Pull by layer at 2,175 psi	bf	20,000	16,701	14,336	12,558	11,172
Speed by layer at 15.9 g/min	t/min	19	23	27	30	34
Cumulating rope winding length	ft	20	43	71	102	137

(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least 0.7 times of rope diameter

TD300

SAE J706 Ratings 30,000 lbf
SAE J706 Ratings 13600 kgf

* Powered by a PTO (power take-off) driven pump with variable speeds and adjustable line pull output functions
* Rugged cast iron gear box and steel frame construction
* Enclosed drum flanges prevent rope from becoming trapped
* Dependable orbital hydraulic motor offer high torque and high efficiency at low speed
* Inside the winch is the 2 stage high efficiency planetary gear trains developing for maximum mechanical efficiency
* The winch have both a dynamic (dual directional over-center valve) and a mechanical multi-disc brake .The actuation of brakes in a winch is automatic and occurs when you let off the hydraulic control switch * Minimum 10:1 drum diameter to rope diameter, 2:1 wire rope breaking strength for EN rating
* A given amount of freeboard prevents rope from inadvertently coming off the drum during use
* Always keep at least 5 wraps of rope on the drum for safety operation
* Comply with J706_2003.08 Rating of Winches for intermittent duty winches only



Specification	Comply with SAE J706	
Rated Pulling Force	30,000 lbf	13,600 kgf
Hydraulic Motor	Orbital, 9.5 in^3/rev	Orbital, 156 cm^3/rev
Maximum oil flow	60 l/min	15.9 g/min
Minimum oil flow	10 l/min	2.64 g/min
Operation pressure	150 bar	2,175 psi
Max. back pressure on return line	5 bar	73 psi
Gear Train	2 stage planetary gear with a gear ratio of 42:1	
Brake	Multi-disc brake and dual directional over-center valve	
Clutch	Air clutch	
Drum Barrel Diameter	152 mm	6”
Drum Flange Diameter	330 mm	13.19”
Distance Between Flanges	200 mm	7.87”
Recommended Wire Rope	16 mm x 43 m, 1960 N/mm^2, minimum breaking strength of 179 KN	5/8” x 141 ft, EIPS, minimum breaking strength of 40,200 lbf
Standard Accessories	Roller fairlead and dual directional over-center valve and air clutch	
Winch Weight		

Comply with SAE J706 : Performance by layer with 5/8” (16 mm) dia. wire rope

Rope layer			1(1)	2	3	4	5(2)
Pull by layer	at 2,175 psi	lbf	30,000	25,210	21,738	19,107	17,045
	At 150 bar	kgf	13,600	11,435	9,860	8,665	7,730
Speed by layer at 15.9 g/min	at 15.9 g/min	ft/min	14	17	20	22	25
	At 60 l/min	m/min	4.3	5.2	6.1	6.7	7.6
Cumulating rope winding length		ft	20	45	73	105	141
		m	6.1	13.7	2.3	32	43

(1) Rated line pull is based on the first layer of wire rope around the drum
(2) Wire rope is tightly wound on the drum with a freeboard of at least 0.7 times of rope diameter

Custom Made Winch

THAC concept is based on what our customers want: the best quality, proven designs, short delivery time, low maintenance and after-sales service.

● The best price-quality ratio

We offer our customers well-proven and thoroughly tested design and technology, competitively priced and innovative custom made winch by listening carefully to client specific requirements and feedback.

● Short delivery time and independent advice

To reduce delivery times substantially, we build a wide variety of standard gear train and drum configurations on our own account and keep them in stock. However, the various options can be configured so they are tailor-made to suit customer demands. We can deliver our winches with this wide variety of options and we are able to give independent advice.

● Innovation

THAC thinks innovation is the key to success and to stay at the top. The research and development (R&D) teams at THAC are continuously improving our winches, making them more effective in their operations, more cost-efficient and more environmentally friendly. We not only create new designs, but also keep improving our existing products and parts by listening closely to our customers and by taking current technological trends into account.

Different Drum Configurations

1. **Winch with plain drum (Fig 1)**
   This is the most commonly used configuration.
   The rope is anchored at the drum and travels the barrel.
2. **Winch with Grooved drum (fig 2)**
   Parallel grooving evenly distributes the load between and show to increases the life of the wire rope.
   Reduction of rope damage benefits the safety operation.
3. **Winch with two ropes in opposite winding (fig 3)**
   For example, it can be used as a traversing winch to move a carriage forwards and backwards in two direction on a level. The drum Is grooved for one rope, with a second rope fastening attachment on the drum.
4. **Winch with several ropes (fig 4)**
   The winch is grooved for two or several ropes with additional wire rope fastening attachment. Rope pays in and out together.
5. **Winch with Extended drum (fig5)**
   The winch with extended drum to suit a wide variety of application.

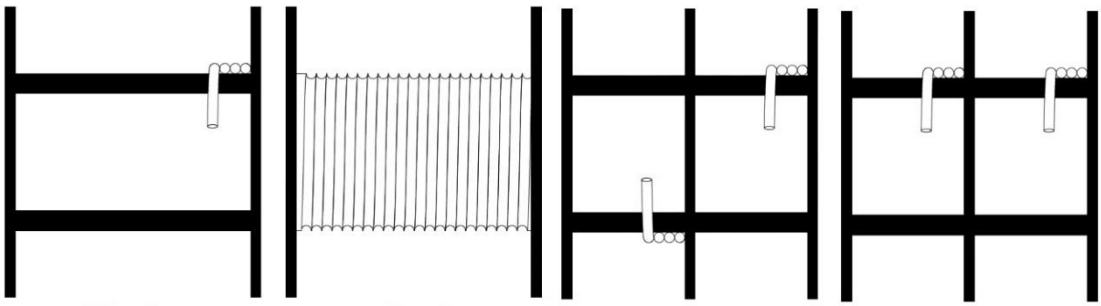


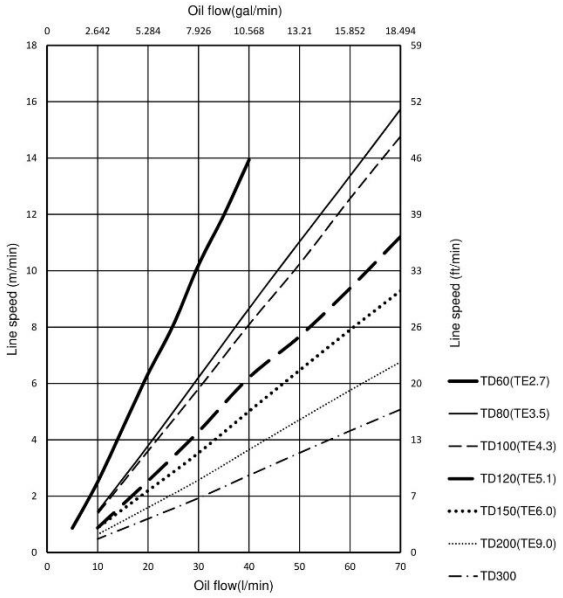
Fig 1 Fig 2 Fig 3 Fig 4

Engineering Data

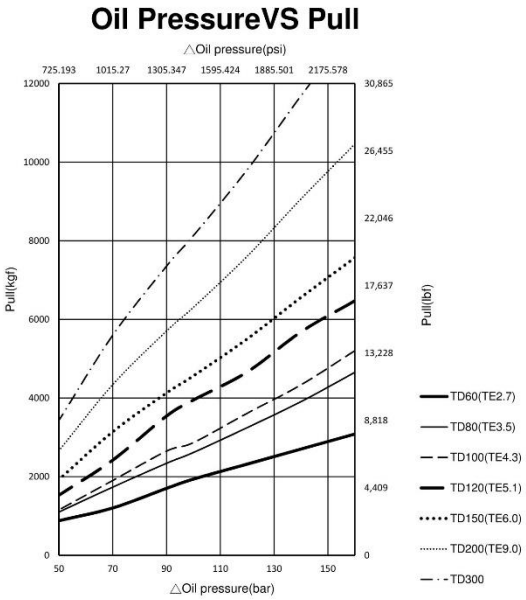
Motor

A orbital motors convert hydraulic energy of pressure and oil flow into mechanical energy of torque and speed. For a given displacement (size of motor) the line speed is determined by the oil flow rate and the pull capacity is influenced by oil pressure

Oil Flow VS Line Speed

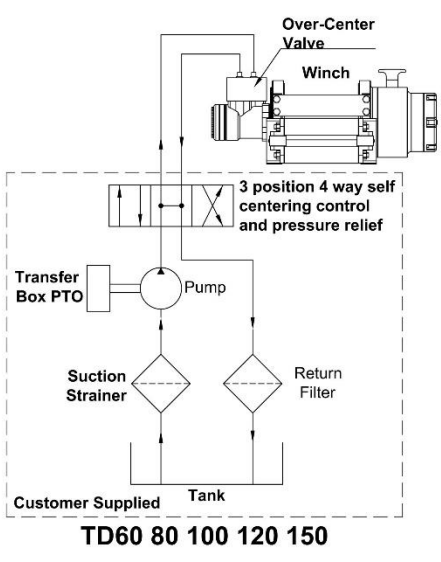


Oil PressureVS Pull

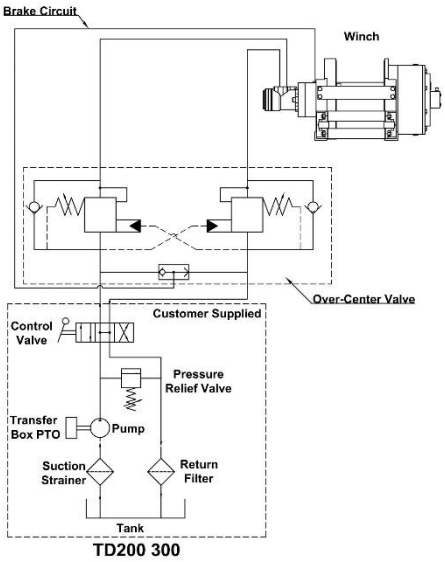


Hydraulic System Schematic

The hydraulic system shown below must contain 3 position 4 way self-centering control valve with motor spool and pressure relief valve in order for the winch to operate correctly.



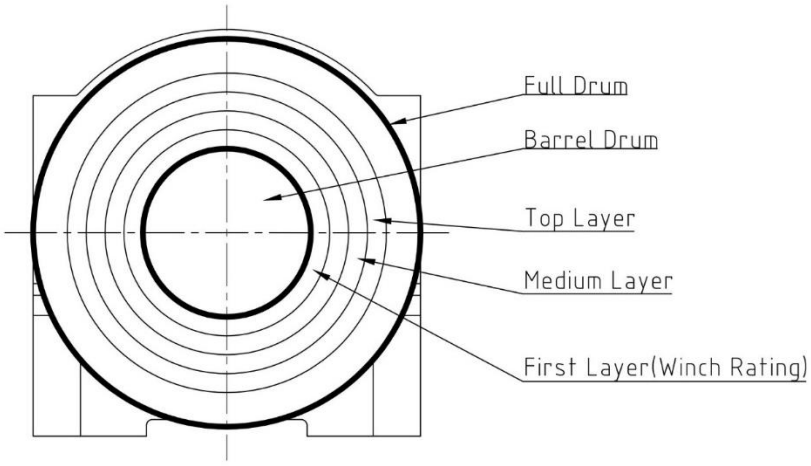
TD60 80 100 120 150



TD200 300

Winch Ratings

As a general guide, increasing the drum core diameter will increase line speed with a proportionately equal decrease in line pull. The first layer of wire rope on the drum delivers the slowest speed and the maximum line pull, but a full drum delivers the maximum speed and minimum line pull. All hydraulic planetary winch is rated at their first layer of wire rope.

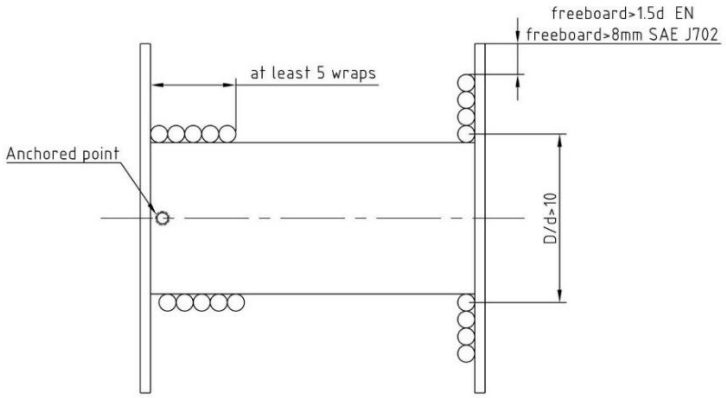


D/d ratio and rope working

The drum is generously dimensioned to obtain a minimum D/d ratio (first layer pitch diameter/rope diameter) of 10:1 with a rope safety factor of 2 times for pulling or hauling applications. Wire rope fatigue and irregular wear caused by using a smaller than recommended D/d ratio.

Freeboard

A given amount of freeboard of at least 1.5 layers of rope diameter for EN ratings or 8 mm for SAE J702 ratings at the top of drum flange to prevent the wire rope from inadvertently coming off the drum.



Winching Principles

A basic knowledge of hydraulic winching relates to three(3) factors for a vehicle to overcome the possible resistances.

Gross weight (W)– **A vehicle total veight**

Gradient Resistance (G) – A gradient of 10% is a rise (Height) of one meter in ten meters (Distance)

Surface Dra (S) – **The reisstance of the surface to be traversed**

Winch Effect Required = (Vehicle gross weight x Gradient value) + (Vehicle gross weight x Surface drag) = (W x G) + (W x S)

General speaking, the winch ratings shall be at least 1.5 times greater than the gross vehicle weight.

TAIWAN HOIST AND CRANE CO., LTD.
No. 88,Ln.157, Shandong Rd., Zhongli Dist,
Taoyuan City 32053, Taiwan (R.O.C.)
Tel: +886-3-4984188 Fax: +886-3-4984198
E-mail: thac@thacwinch.com
www.thacwinch.com

Version: 201706-1000