

Paradigm's all electric e-Winch® technology is built upon the extensive smart conveyance product range and delivers the much-needed breakthrough in operational safety, winch performance and environmental impact reduction demanded in today's low-carbon operations.

The e-Winch® system uses the latest design in compact high-power inverters and permanent magnet motors. Sophisticated drive control software allows for precise and smooth control of the liquid cooled high torque electric motors. The direct electric drive system delivers the best winch control and automation available in the market today, providing rapid responses for fast stopping capability, instant torque delivery for fast acceleration and jarring, and ultra-slow stable logging speeds.

The software affords a high degree of safety functionality by operator defined parameters, to prevent overpulls, pull-offs at surface or other unsafe situations.



Applications

- Efficient wireline operations
- Jacketed wireline operations
- Heavy duty fishing operations
- Open and Cased hole logging services

Benefits

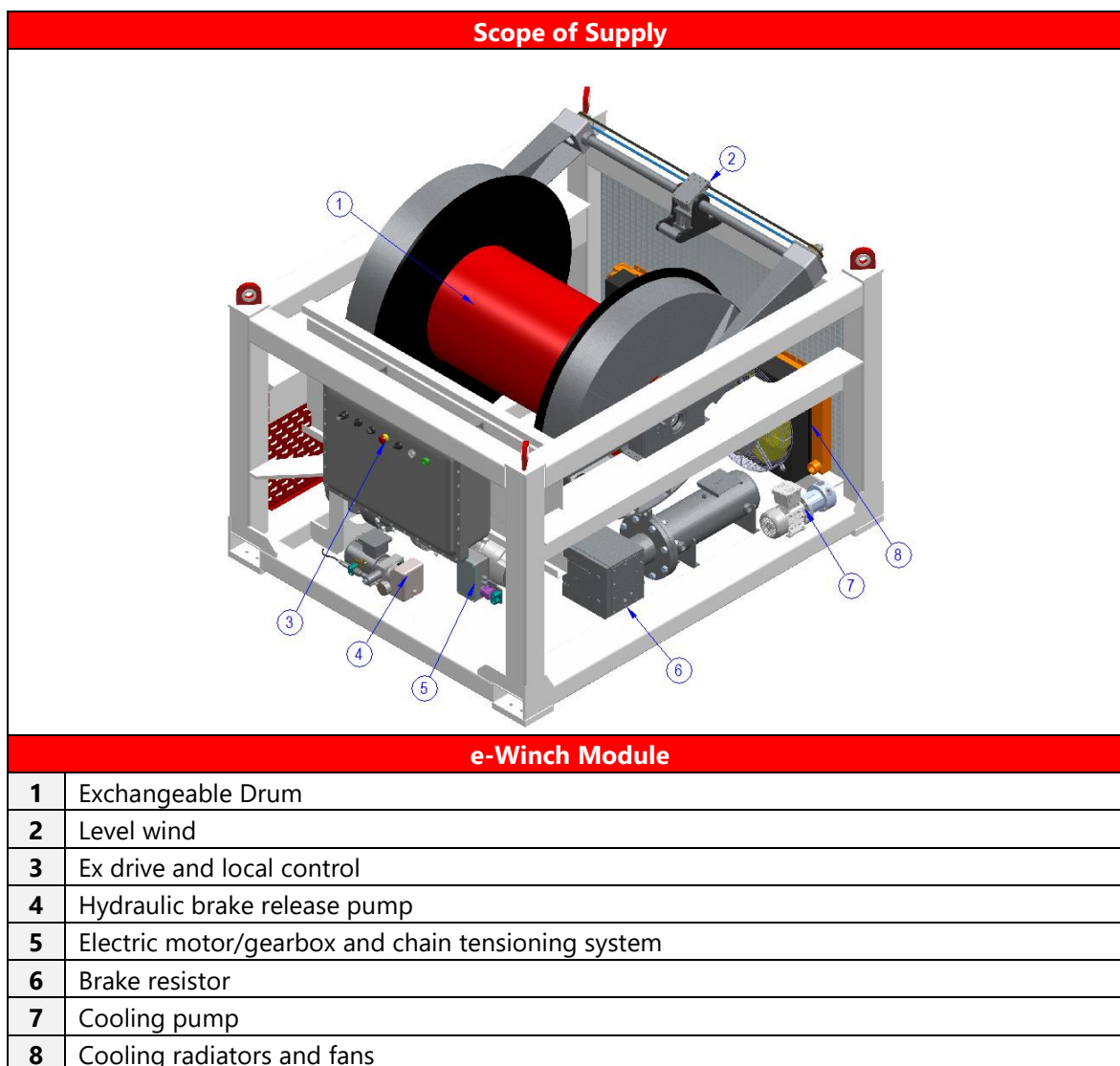
- Minimized crew requirements
- Ultra-slow logging speeds
- Unmatched jarring performance
- Energy efficient, no hydraulic system losses
- No emissions
- Reduced environmental risk
- Low cost of operation
- Maintenance free and high availability
- Low noise

Features

- Standard joystick control
- Electronic depth, tension and speed visualization
- Rig safe certified drive system
- Advanced safety functionality
- Continuous operation
- Automatic brake function test

Directives & Certifications

- Machinery directive 2006/42/EC
- ATEX directive 2014/34/EU
- Low voltage directive 2006/95/EC
- Electromagnetic compatibility 2004/108/EC
- DNVGL Offshore lifting
- Lower & Power regulations



The **E40 Single Drum e-Winch®** design is based on the latest standard in electric drive technology. Electric power from grid supply or generator is directly converted into winch motion by servo motor and inverter technology. The unit is a single lift winch unit and has a double drum winch arrangement with easy exchangeable drums. NOV Elmar ASEP style winch drums also fit in the winch unit.

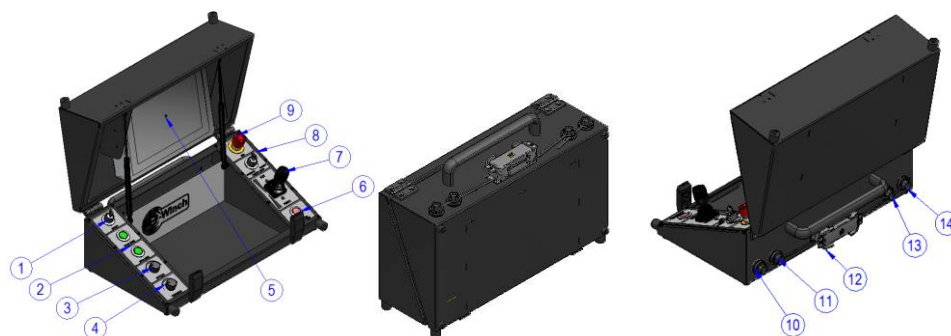
A liquid cooled electric motor drives the winch drums through a planetary gearbox, with a roller chain. The electric motor provides a precise control of speed, torque, and acceleration, either software controlled or by the operator. On the drum a band brake system is used as a parking brake. This band brake is fail-safe spring activated and electro-hydraulic released.

The Level Wind system is a software assisted feature which provides a controlled manner of wire spooling. The level wind is driven by a servomotor, lateral movement is provided by a maintenance free high strength timing belt. The cooling system pump circulates the cooling liquid through the drive electronics cold plate, servomotor, brake resistor and fan cooled radiator to provide cooling in the harshest environments.

Depth and tension are measured with a top eye nut hanging, fully electronic ParaSheave as a standard. Optional PM08, a 5-wheel straight through measuring head with 2 independent 8"/2ft measuring wheels and an integral 3-wheel tension device, can be integrated in the winch unit.

The winch is controlled with a removable winch control panel. This allows the winch to be controlled at the winch location or from another location near the winch.

Operator Control Panel Layout



Control Panel

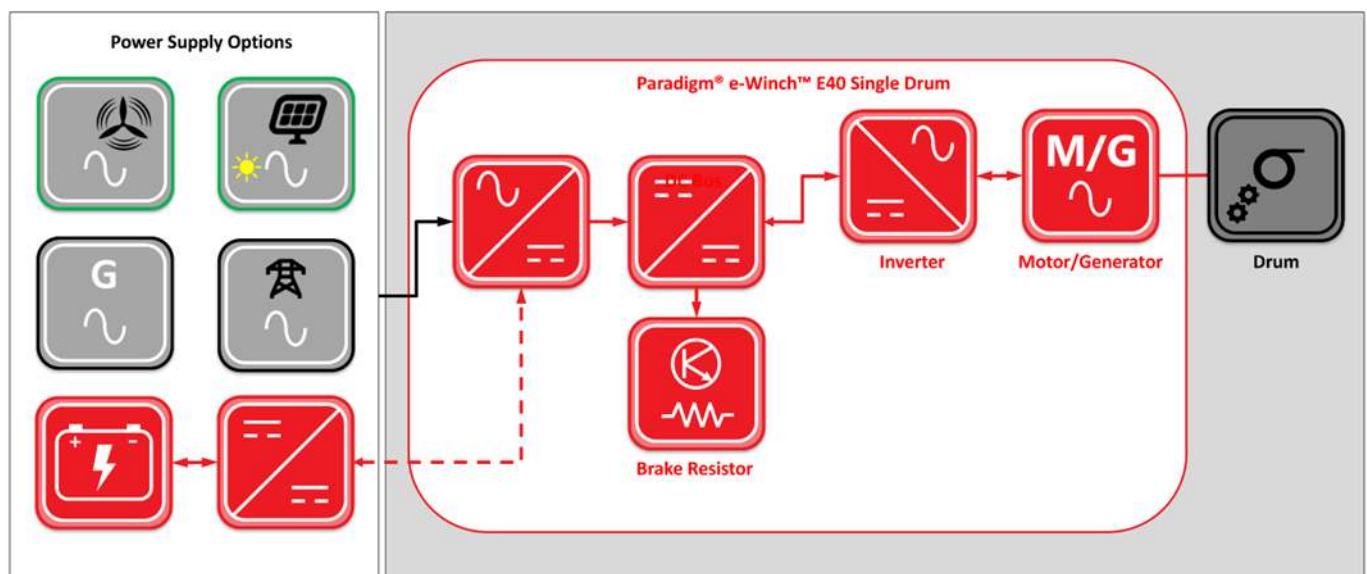
1	Enable / Release brake key switch
2	Winch rear / front drum selection (winch specific)
3	Winch speed range settings slow / normal / jarring
4	Winch torque control
5	12" Winch control HMI panel
6	Winch stop / Backup start
7	Joystick for winch speed and direction control
8	Winch control mode settings manual / automatic / rig-up remote (optional)
9	Emergency stop
10	Cat-5 Coupler local connection
11	Cat-5 Coupler external connection
12	Remote control multi connector
13	USB-A Plug
14	USB-A Plug external connection



Optional Hardware

- Rig-up remote radio winch control
- Integrated PM08 straight through measuring head
- ParaSheave top-sheave Depth & Tension
- Standalone foldable roof
- Rig connection cable ordered to length
- Client specific paint system and colour
- Light weight tarpaulin
- Lifting sling set
- Ambient temperature options, desert, arctic
- Offshore rated fully enclosed lifting frame
- ATEX/IECEX Zone 1 certified drive system
- ATEX/IECEX Zone 2 certified drive system
- Alternative supply voltages
- Well control functions
- Well control pressure sensors
- Bottom-Sheave
- Spare drum and chain
- Battery pack non-zone and zone 2
- Solar panel
- Portable diesel genset

e-Winch® Direct Electric Drive System Layout for Single Drum.



The e-Winch® system power supply can either be connected to the grid or a generator set. The power supply converts the AC supply to a DC voltage on the DC bus. The motor inverter connected to the common DC-bus converts the DC voltage to a controlled AC voltage and current to control the speed and torque of the motor driving the drum.

When the winch is running in hole, decelerating or stopping the motor acts as a brake generating power and feeding this brake power back to the drive system. This power is destroyed in a brake resistor or recovered. Energy recovery systems will be available on future versions of the direct electric winch drive system. This will maximize the energy efficiency of direct electric winch drive system.

Nominal Specifications – e-Winch®		
	Metric	Imperial
Electrical characteristics		
Rated Power	125 kW	
Electrical connection	380 – 480 V, 50 – 60 Hz, 180 A, 3 phases, 4 wires	
Mechanical characteristics		
Structural design acc.	DNVGL-ST-E271 / ISO 10855	
Noise level	< 75 dB(A) @ 1 m	< 75 dB(A) @ 3 ft
Corrosion protection	Hempel paint system, ISO 12944 C5-M	
Topcoat colour	Grey RAL 7030	
Dimensions & weights		
Dimensions (W x L X H)	1,990 x 2,400 x 1,580 mm	6.5 x 7.9 x 5.2 ft
Forklift pocket size	194 x 102 mm	7.6 x 4.0 inch
Weight (with empty drums)	3,400 kg	7,500 lbs
Environmental limitations		
Operating temperature range Standard	-20 to +50° C	-4 to +122° F
Operating temperature range Arctic	-40 to +40° C	-40 to +104° F
Humidity	100% at +50° C	100% at +122° F
Winch performance		
Drum and gearbox option		
Planetary gearbox ratio	1:22.62	
Drum type	PD15	
Drum outer diameter	1,400 mm	55.12 inch
Drum core diameter	550 mm	21.65 inch
Drum width	1,054 mm	41.50 inch
Maximum line speed at OD	259 m/min	851 ft/min
Maximum line speed at core	102 m/min	334 ft/min
Maximum line tension at OD	2,817 kg (5,030 kg)*	6,210 lbs (11,090 lbs)*
Maximum line tension at core	7,169 kg (12,802 kg)*	15,808 lbs (28,229 lbs)*
Minimum stable speed at OD	0.005 m/min	0.018 ft/min
Wire capacity 7/16" wireline	11,700 m	38,400 ft
Wire capacity 15/32" wireline	10,400 m	34,100 ft
* Maximum line tension performance in optional boost mode (drive system limits).		
All products, product specifications and data are subject to change without notice, to improve design, reliability, functionality or otherwise.		

The e-Winch® system can run at a reduced power supply. With a reduced power supply the e-Winch® winch system is still capable to reach maximum line tension at a reduced line speed or the maximum line speed at a reduced line tension. Depending on the power supply available the current/power limitation can be set in the e-Winch® machine control software. The e-Winch® system can work with variable grid voltage from 380 VAC up to 480 VAC at 50 or 60 hz. Depending on the available capacity it can be set between 32 A and 180 A.

Reduced power supply				
Input current at 400 V / 50 Hz	180 A	125 A	63 A	32 A
Power at the drum	99 kW	68 kW	36 kW	18 kW
Winch performance				
Drum type	PD15			
Planetary gearbox ratio	1:22.62			
Maximum line speed at OD	259 m/min (851 ft/min)			
Line tension OD at max. line speed	1986 kg 4378 lbs	1361 kg 3000 lbs	716 kg 1579 lbs	364 kg 802 lbs
Maximum line speed at core	102 m/min (334 ft/min) ²			
Line tension core at max. line speed	5054 kg 11144 lbs	4363 kg 7636 lbs	1822 kg 4018 lbs	926 kg 2041 lbs
Maximum line tension at OD	2817 kg (6210 lbs)			
Line speed at max. line tension OD	222 m/min 730 ft/min	152 m/min 500 ft/min	80 m/min 263 ft/min	41 m/min 134 ft/min
Maximum line tension at core	7169 kg (15808 lbs)			
Line speed at max. line tension core	87 m/min 287 ft/min	60 m/min 197 ft/min	32 m/min 103 ft/min	16 m/min 53 ft/min

Paradigm e-Winch® software is part of paradigm well intervention software suite for Smart Conveyance™. The basic e-Winch® software functionality can be extended with optional features and functions. These extra features and functions can be enabled with specific software licences and additional software products.

Basic control, visualization, safety and data recording functions.

- Depth, Tension and Speed Visualisation
- Job & Run data recording
- e-Winch® system data recording
- Configurable system alarms
- Brake test
- Level wind control
- Sound alarm
- Shutdown alarm
- Backup Mode
- Drums & Cables Database
- Manual Control
- Power supply settings

Optional safety functions.

- Tension and speed limits
- Differential tension safety
- Well section speed limits
- Dynamic braking

Optional control functions.

- Rig up radio remote
- Constant speed and cruise control
- Constant tension
- Automated Jarring
- Boost Power
- Stuffing Box Pressure Monitoring & Control
- Well Pressure Monitoring & PCE Control

Optional data recording, visualization, connection and integration functions.

- Third party logging system
- ParaView™ live data trending
- Fieldbus connectivity (customer system)
- Remote machine access
- Satellite Communication

Optional software products.

- ParaLife™ Line management
- ParaRun™
- Ai-Winch™ Autonomous Software
- Winch Simulator
- Slick-E-Line® integration
- ParaChart™
- ParaView™

Drive System - Technology Comparison		
	Hydraulic driven Diesel	e-Winch® Electric
Performance		
Installed power	130 kW	125 kW
Machine efficiency	65 %	85 %
Power at the drum	85 kW	99 kW
Energy supply efficiency	30 % (diesel engine)	60 % (grid supply)
Acceleration	1 m/s ²	3 m/s ²
Speed control	+/- 1 m/min	+/- 0.1 m/min
Noise (at the operator position)	<82 dB (A)	<75 dB (A)
Automatic jarring and logging	✗	✓
Constant Speed with Cruise Control	✗	✓
Indoor Unventilated Operation (shop spooling)	✗	✓
Advanced Tamperproof Safety & Data Recording	✗	✓
Energy Recovery System (RIH & Deceleration)	✗	✓
Energy consumption on demand	✗	✓
Full Remote Control	✗	✓
Reduced CO ₂ emissions	✗	✓
Reduced Daily Running Costs	✗	✓
Reduced Yearly Maintenance Costs	✗	✓
Guaranteed Zero Line Breakage	✗	✓
Increased Power at Drum	✗	✓
Improved Overall Efficiency	✗	✓
Lower Noise Pollution	✗	✓
Cost of Ownership (Maintenance)		
Fluid level checks	Daily	Daily
Exhaust gas cooler cleaning	Every 300 hours	Never
Exhaust flame arrester cleaning	Every 300 hours	Never
Exhaust spark arrester cleaning	Every 300 hours	Never
Air, fuel, oil filters change	Every 300 hours	Never
V-belt change	Yearly	Never
Air inlet safety valve service and calibration	Yearly	Never
Pneumatic air system service	Every 600 hours	Never
Diesel engine service (valves, fuel pump)	Every 600 hours	Never
System sensor calibration	Yearly	Yearly
Coolant pump service	Yearly	Yearly
Electrical System Check (CompEx or equivalent)	Yearly	Yearly
Yearly maintenance cost (Diesel engine, Zone 2 exhaust kit, hydraulic system)	\$ 25.000,00	\$ 0,00
Environmental Emissions & Impact[#]		
Direct machine exhaust CO ₂ emissions (nominal)	50 kg/hr	0 kg/hr
Direct machine exhaust CO ₂ emissions (per 8 year/5000 hour asset operating life)	240000 kg	0 kg
[#] Exhaust gas emissions		