

Discharge measurement
OTT cable way systems
Fixed systems with electrical or mechanical
double-drum winch

OTT Cable Way Systems

Safety in discharge measurement

For vertical method based discharge measurements, cable way systems are essential. Mobile measurements in water may be too dangerous and measurements cannot always be performed from bridges or survey vessels. Therefore, cable way systems have been used in numerous rivers and canals and proven to provide dependable service for many years. Their functional and rugged design ensures installation flexibility, smooth operation, and safe working.

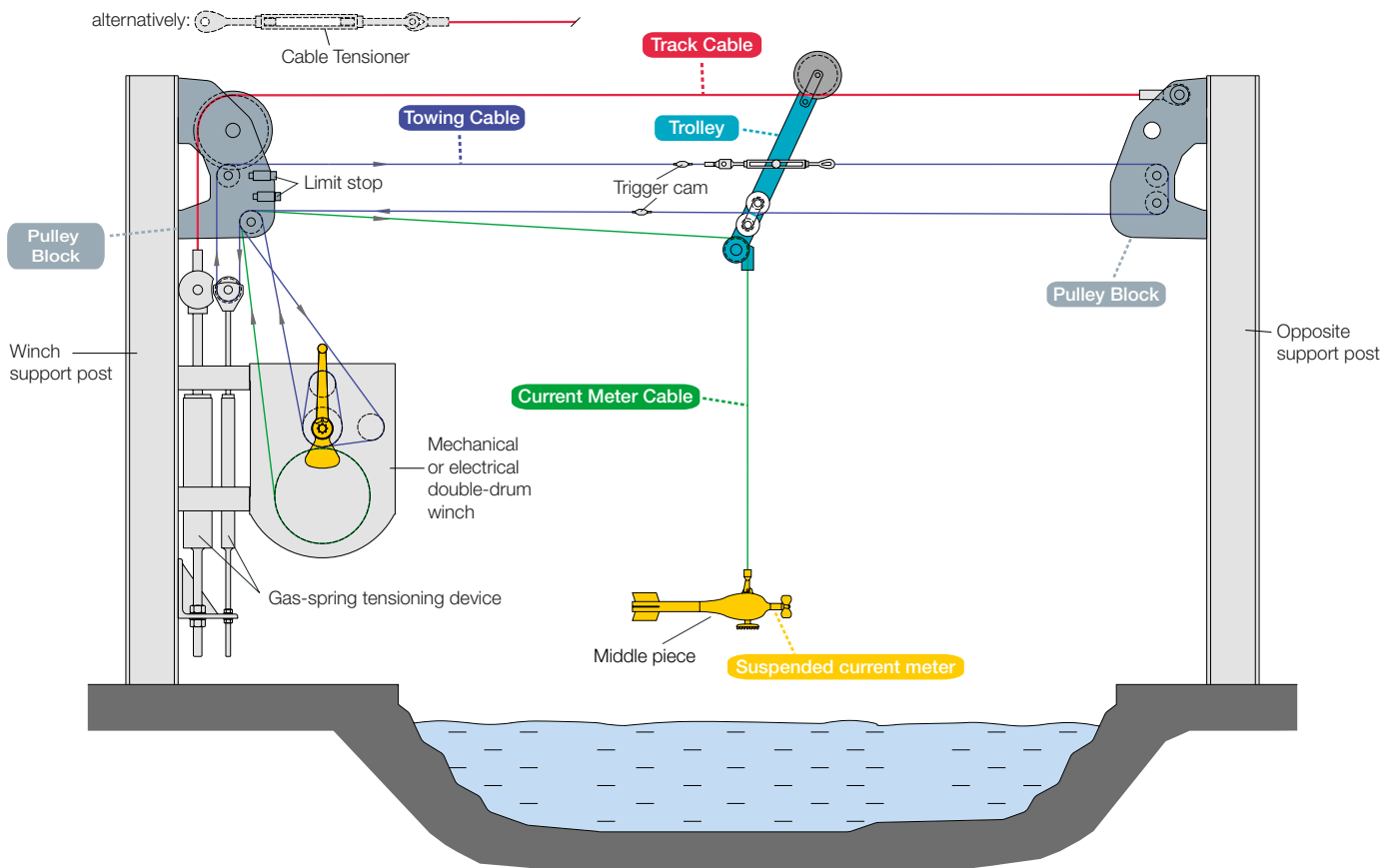
The new OTT cable way systems rely on well-tried technology. They are DEKRA type approved and meet all applicable safety requirements. In addition to the cables, the basic components include one or two pulley blocks, the tensioners, and the moving trolley. It carries the instruments, e.g. a floating current meter or a mobile river discharge measurement system across the water cross section.

The towing cable and current meter cable are driven by an electrical or optionally by a mechanical double-drum winch. An electronic distance and depth meter assists in correctly positioning the instrument. When the system is electrically driven, the winches are easily and safely controlled from a control unit that is fitted with a joystick, large display, and internal measuring feature. Of course, an external meter such as the OTT Z400 unit may be connected as well.

Quantitative
Hydrology

OTT cable way systems – major components

Overview: components of an OTT cable way system



Schematic of an OTT cable way system.

Pulley block

The sturdy cast aluminium pulley block is corrosion-resistant. Because of its slim design it requires only little space. In addition to guide pulleys for the various cables, the pulley block includes the attachment feature for the track cable (winch side).

Track cable

The track cable is a galvanised compacted and steel-reinforced special cable that acts as a "rail" for the trolley. It features a high breaking strength and is optimised with regard to track cable tension (pre-stretched). This helps minimise residual elongation so that re-tensioning will be required as an exception only. The round smooth surface minimises wear of the pulley and ensures silent operation.

Towing cable

The corrosion-protected towing cable is made of galvanised wires and used to move the trolley along the track cable to the desired vertical position. The strong towing cable is designed to be used for at least 10 years.

Trolley

The trolley features a single-arm design and has, in addition to the guide pulleys, only one single idler pulley. Thus, it will run silently and smoothly even after years of operation. When replacing the track or towing cable, the trolley may easily be removed and re-installed without the risk of bruising.

Current meter cable

The current meter cable (measurement cable) is a special cable that is made of galvanised steel wires and designed for long-term use. At its loose end, the centrepiece of the floating current meter/instrument is engaged to the cable. During measuring operation, an insulated conductor within the current meter cable transmits the electrical signals (current meter pulses, ground sensor).

Cable tensioner

Both track and towing cable have a cable tensioner. Cable way systems of up to 20 m span length have a turnbuckle tensioner. For larger span lengths, a gas pressure spring tensioner is used. It compensates for temperature effects by automatically increasing or decreasing the cable tension. This avoids slack caused by high temperatures or increased load to the support posts caused by cold temperatures. The gas pressure spring tensioner does not use oil. So there is no risk of water contamination by oil.

State-of-the-art drive, perfect service

Compact and functional – the double-drum winch

The compact double-drum winch is the primary item used to move the trolley in horizontal direction as well as to lower or raise the floating current meter. It has a multi-groove drive pulley for the towing cable and a cable drum for the current meter cable. Optionally, it may be driven electrically or mechanically. The gearbox is lifetime lubricated; thus, no lubricating or oil changes are required.

The smoothly operating brake/clutch combination facilitates changes between lowering/raising operations and horizontal travel. An electronic meter for both depth and distance indicates the current position of the instrument so that it may exactly be placed at the desired measuring location. Safety as well as protection against damage are provided by the overload clutch: In case of overload, e.g. when the instrument gets caught by flotsam, the current meter cable will be wound off automatically.

The double-drum winch was designed according to the LAWA recommendations for the safety of cable way systems and is type-tested. Depending on the requirements of the station, the winch may be supplied with horizontal or vertical cable exit. And because no gauge station is like another one, the winch is available with right-hand or left-hand side operation.

Mechanical double-drum winch

- The towing cable is driven by means of a hand crank – ergonomically designed and easily operated safety crank including a load-actuated brake for safely holding the load;
- Shift lever for easily switching between travelling and raising/lowering;
- Electronic meter – indicates both horizontal and vertical positions of the instrument;
- Electrical drive may be retrofitted.

Electrical double-drum winch

- Maintenance-free direct drive for the towing cable;
- Three-phase motor with state-of-the-art inverter technology for optimum start-up and speed performance;
- Travel speed (rotary speed) may be adjusted in 3 steps or infinitely up to 0.5 m/s;
- May be switched to manual operation with safety crank – operational also without electrical power.
- Optional: Uninterruptible power supply (UPS) – for reliably completing an active measurement in case of power failure;
- Towing cable fitted with trigger cams – for automatically disabling the drive when an end position has been reached;
- When the ground has been reached, the lowering movement will automatically be disabled.

Convenient and safe – the controller

- Portable wired unit that is used to intuitively control the electrical double-drum winch by means of a joystick;
- Large display – easily read indicators for velocity, position of trolley/current meter height, measuring activity, and measured value;
- Advanced and future-proof control concept based on the Siemens Simatic S7 PLC;
- Emergency Stop switch to ensure safe working in critical conditions;
- Fully automated low-noise shifting operation of the clutch;
- Single-handed operation, even when wearing protective gloves;
- Potentiometer for infinite speed setting;
- Internal measuring features for time/pulse and integrated measurements;
- An external signal counter set may be used such as the OTT Z400 unit that is easily parameterised via menu feature;
- Optical and audio alerts in case of ground contact;
- Easy switching to electronic control of a sample collector;
- Diagnostic features and alarm information.



Service from the beginning

Typically, OTT cable way systems are installed by our OTT Hydro-Service department. Our specialists are well-trained for this job, use the appropriate equipment and have many years of experience. This ensures careful and above all safe installation.

All components of the OTT cable way system do not require any maintenance. Neither lubrication nor oil changes are required. In case of cable way systems for hydrological service, regular inspections by authorised experts are useful. Many countries have exact regulations for this. OTT HydroService performs also these inspections in a reliable manner and does any service, replacement, or adjustment operations efficiently and professionally.



OTT cable way systems – sophisticated to detail

Designs

Depending on the different requirements of the stations, OTT cable way systems are available in five designs with optional mechanical or electrical double-drum winch. For the cable tensioner, a turnbuckle tensioner is used for smaller waters, while a gas pressure spring tensioner is used for larger waters. This ensures proper tension of both track and towing cables even when temperatures are varying. All OTT cable way systems are type-tested according to the LAWA recommendations "Safety of Cable Way Systems" and to the European Machinery Directive 2006/42/EC.

Model	Winch exit Towing/current meter cable	Cable tensioner	Installation of cable tensioner	Max. span length
SK-V-S/W	Vertical	Turnbuckle	Winch support post	20 m
SK-H-S/W	Horizontal	Turnbuckle	Winch support post	20 m
SK-V-G/W	Vertical	Gas pressure spring	Winch support post	160 m
SK-V-G/G	Vertical	Gas pressure spring	Opposite support post	160 m
SK-H-G/G	Horizontal	Gas pressure spring	Opposite support post	160 m

We will be pleased to help you to find the optimum system for your station. Also in case you have other questions, e.g. regarding required cable lengths, we will be on hand with help and advice for you.



Technical data

Cable Way System

Span Length

- Including turnbuckle tensioner: up to 20 m
- Including gas pressure spring tensioner: up to 160 m

Cable diameter

- Track Cable: 16 mm
- Towing Cable: 6 mm
- Current Meter Cable: 3.5 mm

Double-drum Winch

Installation

Right-hand side or left-hand side

Cable exit

Horizontal or vertical

Current meter cable drum

- Rated tension force: 1250 N
- Maximum tension force: 3000 N \pm 20 %
- Tripping force of safety friction clutch: 3000 N \pm 20 %
- Maximum useable cable length: 164 m
- Maximum number of cable layers: 6
- Minimum number of windings remaining: 3 (\approx 3.1 m)

Torque required on crank

11 N/m (for 100 kg of weight)

Crank length

0.3 m

Mechanical Double-drum Winch

Distance/depth meter

- Design: 5-digit LCD; incl. Reset keys
- Resolution: 1 cm
- Back-up battery: 9 V battery (alkaline type)

Dimensions (W x H x D)

- incl. hand crank: approx. 570 x 770 x 670 mm
- without hand crank: approx. 450 x 750 x 560 mm

Weight

approx. 100 kg
without current meter cable and hand crank

Operating temperature

-20 °C +60 °C

Storage temperature

-40 °C ... +85 °C

Air humidity

0 % ... 95 % RH (non-condensing)

Electrical Double-drum Winch

Electrical drive

- Supply voltage: 230 V / 50 Hz
- Control voltage: 24 V DC
- Motor power: 1.5 kW
- Degree of protection: IP 54
- Sound pressure level: 70 dB (A)

Dimensions (W x H x D)

- Electrical double-drum winch: approx. 570 x 900 x 670 mm
without hand-crank for emergency operation
- Control cabinet: 600 x 600 x 250 mm

Weight

- approx. 135 kg (incl. motor)
without current meter cable and hand crank
- Motor: 35 kg
- Control cabinet: approx. 30 kg

Operating unit including chest strap

- Dimensions (W x H x D): 280 x 200 x 130 mm
without joystick and chest strap
- Display: 5 rows, monochrome, incl. function key assignments
- Operating controls: Joystick, Emergency Stop pushbutton, 10 function keys (may also be used as numerical keys), cursor keys, permanent function keys, additional potential meter for speed setting
- Acoustic alert: internal buzzer sounds in case of ground contact

Operating temperature

- Standard: 0 °C ... +50 °C
- With opt. heater: -20 °C ... +50 °C
- With opt. cooler: 0 °C ... +60 °C

Storage temperature

-40 °C ... +85 °C

Air humidity

0 % ... 95 % RH (non-condensing)