Windlasses

Product line of windlasses includes single-drum windlasses type 1B2012, 1B2013, 1B2014, 1B2015, and double-drum winders 2B1609 and 2B2009. At clients request, the single-drum windlasses are supplied in a single-roped or double-roped design with a frictional disc bearing denotation 2K2012, 2K2013, 2K2014 and 2K2015. The single-drum version works on single-action basis with non-balanced pull, and the frictional disc version is either single-action with a counterweight or double-action type. These windlasses are destined to be assembled underground or in the tower-mounted machine hall, but their compact construction and the possibility of disassembling them into smaller units determines their use even in the underground machine hall. They find their use as emergency transport devices for transport of material and people, and they are also often used for auxiliary mining. In mining operations with lower volume of extraction they can easily double as the main winders and their high standard of operational safety and reliability enables them to entirely live up to the requirements as to the quality transport of people. A common characteristic of this product line of windlasses is the usage of asynchronous drive (alternatively, direct current drive) through the gear box, and also the placement of the mechanical part on one rigid frame by which the entire machine is anchored, and which is better for transport under the ground and enables its disassembly into smaller parts.

Basic technical parameters of single-drum windlasses type 1B2012, 1B2013, 1B2014, and 1B2015:

Maximum static force in the rope	55/ 80 / 100 / 130	kN
Maximum transport speed (order-dependent)	2 or 3	m/s
Rated diameter of the drum(frictional disc)	2000	mm
Rated winding width	700 ÷ 1255	mm
Number of winding layers	2 ÷ 7	---
Winding rope diameter	16 ÷ 34	mm
Maximum load capacity of the winding rope	918,6	kN
Engine power	70 ÷ 250	kW
Input of the independent cooling aggregate	1,5	kW
Engine revolutions	600 / 900	1/min
Amount of disc brake units	2 ÷ 4	---
Working pressure of the hydraulic brake system	14,5	MPa

The mechanical part of the windlasses in question includes:

- winding drum(s) with brake discs (alternatively, a drum adjusted as a frictional disc for one or two rope grooves)
- main spindle set in the anti-friction bearings
- mechanism for connection of the drums with the electro-hydraulic control (this is valid only for the drum machines)
- gear box
- torque-flexible clutch VPS
- brake pedestals with disc-brake units
- hydraulic distribution
- electro-hydraulic system for power supply and control of brake units type HR13K(alternatively, HR15K type)
- frames, cowlings and anchorages
- Air-conditioned cabin of the machinist for control panel placement.

Electrical part includes:

- asynchronous motor of the drive (alternatively, a fast-speed DC motor)
- +RM distributor for drive regulation
- +RA distributor for control and safeguard
- control panel of the machinist with depth gauge and operational faulty states visualization system (in the air-conditioned cabin).

INCO engineering s.r.o.
Thámova 13
186 00 Praha 8
Czech Republic
sale@incoengineering.cz
www.incoengineering.cz

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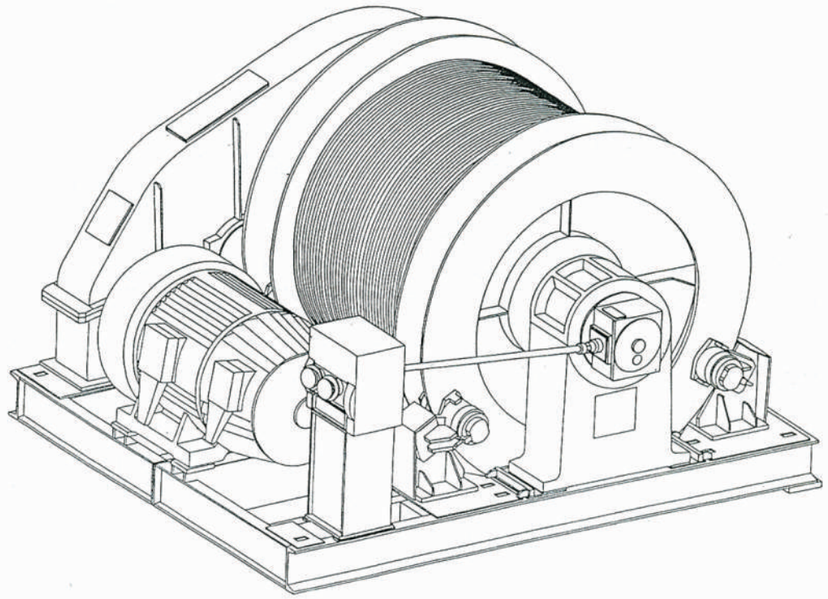
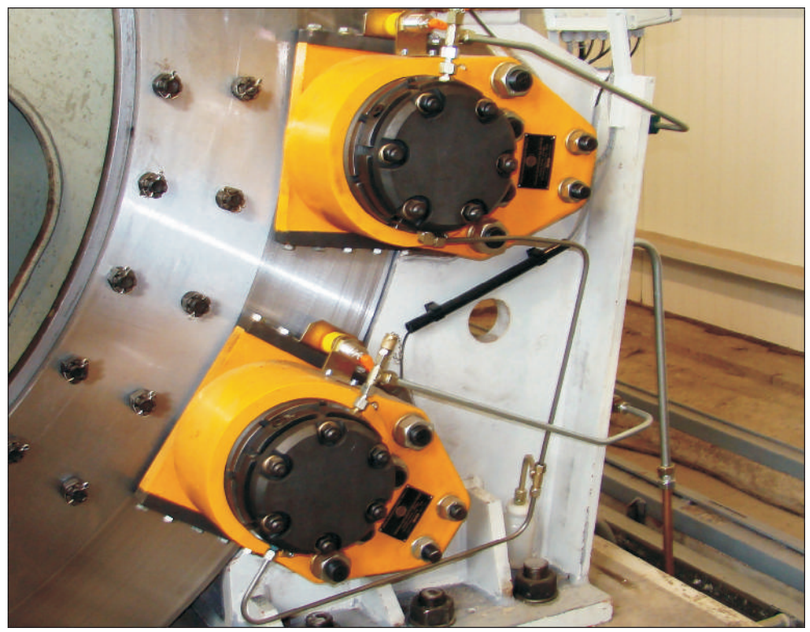
Winding drums are designed as an undivided welded construction. The casings of the drums are strengthened by the inner radial ribs. Adjustment of the drum into a single-rope or double-rope frictional disc is very simple as the drum coating is constructed ready for such an adjustment. On the front part of the drums brake discs are installed. The temperature and axial shimmy of each of the brake discs is controlled by the non-touch sensors the data of which are evaluated in the programmable automatic device of the electro-hydraulic system HR9K. The drum sheathing consists either of the alcamyde blocks with traditional helix, enabling rope winding into two or up to three layers, or Lebus sheathing is used, constructed for a safe a and tender (for the winding rope) multi-layer winding without the use of the sequence switch (up to 7 layers of winding rope). The spindle is formed by a worked forging from material type 12050.9, and is deposited in two spherical tilting bearings.



The gearbox is two-gear, or alternatively three-gear with frontal cogwheels. Fast-speed gearing has diagonal cogs, the slow-speed gearing has direct cogs. Cog and bearing lubrication is solved by wading (oil spraying).
Between the hoisting engine and the gearbox there is a torque-suspended clutch type VPS, which is equipped with a cover. The utilized asynchronous (alternatively) direct current fast-speed engines are in flange design with isolation class F. In the coil they are equipped with three heat probes PT100 for the heat monitoring, and they have an incremental sensor HOD 9D(1024 impulses a revolution) installed on the spindle. To ensure sufficient cooling in slow and medium revolutions, all engines are equipped with an aggregate of independent cooling (1,5 kW).



The power part of the brake system is formed by two brake stands each of which bears one or two brake units HPB200(see the separate catalogue sheet), depending on the type of the machine, or alternatively at customer's request, brake units Svendborg BSFG-408A or Zgoda SH100B. In disc brake units the braking power is created by sets of preloaded disc springs, while the brake release is ensured hydraulically.
The braking effectiveness can be sensitively controlled by controlling the pressure in the hydraulic cylinders. Each disc brake unit consists of two hydraulic cylinders, each of them controlling one brake shoe with replaceable brake shoe lining. Each of the hydraulic cylinders of the brake unit is equipped with a sensor indicating the state "brakes applied"/ "brakes released," and also by an indicator of brake shoe lining wear.

The power supply and control part of the brake system is further formed by the electro-hydraulic system HR13K, alternatively, HR15K; the hydraulic power supply part and the regulation part is controlled by a microprocessor system which cooperates with a microprocessor regulator and the main microprocessor control system of the winder.
The electrical part of windlasses is compactly designed and located in solely two distributors. The +RM regulation of the drive contains a four-quadrant frequency converter with a recuperation unit and integrated network filter, communication module of the redundant network ControlNet, as well as disconnecting and safety elements, control panel for visualization of operational reports, separatory transformer for auxiliary power supplies, UPS unit for back-up power-supply of the electronic circuits, as well as supplies of auxiliary voltages for control automation. In case the fast-speed DC motor is used, the regulation set Modulex Variant Compact with a thyristor converter is used.
The distributor +RA for control and safeguard contains a PLC for windlass and drive control, PLC for control of the electro-hydraulic braking system, PLC for safeguard and visualization, communication modules of the redundant network ControlNet, modules of the distributed system inputs-outputs, input-output relay, safety circuit of the windlass and a WD safekeeping units of the control systems.
Ergonomic control panel with a visualization touch screen, signaling and monitoring components, joystick controllers, and other equipment are all placed in a sound-proof insulated cabin to ensure comfort of the operating staff. The cabin is equipped by two lockable entry doors that are abundantly glazed in (total of 5 double glazed windows) and the front part of the cabin is doubly bent for better view of the machinist.
The use of the redundant communication network increases operational safety, while decreasing the assembly and maintenance requirements. This type of winders is usually controlled manually, but it is possible to adjust all the machines for fully automated operation.