

levelok®

levelok® interlock options, cage mounted system

There are various options available to interlock the cage mounted system.

Below is a system description which we believe will apply to most installations:

Terminology

- **“Clamp on”** - Indicates the clamps are on;
- **“Clamps off”**: indicates that the clamps have retracted completely. It is safe to hoist the cage;
- **“Fly hose”**: flexible hose to connect air pressure to the cage, normally equipped with quick couplers and/or a check valve;

The air service panel

The panel contains a water filter combination, shut off valve, pressure switch and a solenoid valve that will allow use of levelok® only if certain conditions are met.

These conditions normally ensure that:

- Only authorized personnel use the system;
- Enough air pressure is available for the system to function safely;
- Winder or “hoist block”;
- Cage is in position.

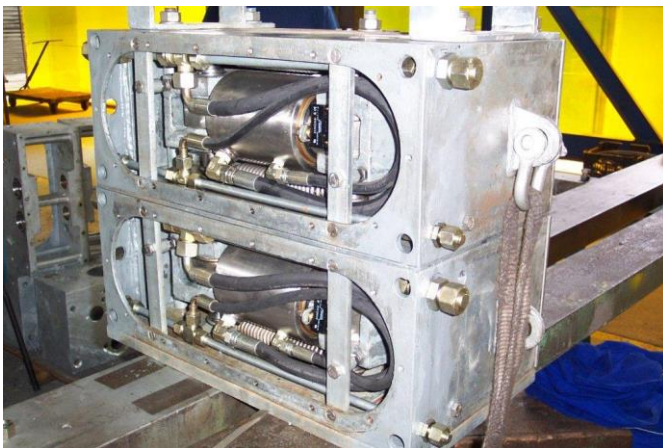
Interlocking signals from the cage

The slack and tight rope leaky feeder system carries the signals to the hoist control system. The pressure & position switches and solenoid valve are connected directly to the slack and tight rope or leaker feeder panel on the cage. Pressure switch on the power pack confirms that safe clamping pressure has been reached and activates the “Clamps On” signal.

A green light “Clamps Applied” then indicates to the cage attendant that it is safe to transfer load.

Position switches in clamps

Used to activate “Clamps Off” signal. Normally connected in series as each clamp is fitted with a position switch. The switch can be a micro or proximity switch.



Inside a levelok® clamp



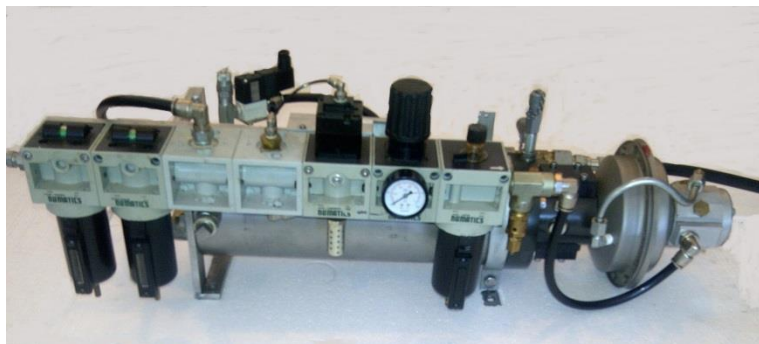
levelok[®]

levelok[®] interlock options, cage mounted system

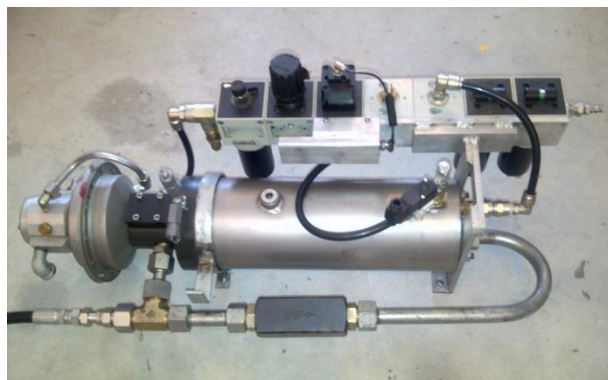
Solenoid valve on Power Pack

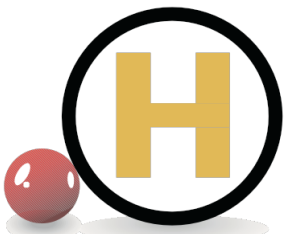
This is used to allow only authorized release of the clamps by a qualified person, and to maintain clamping force during an interruption of the compressed air supply.

- ✓ A solenoid valve is installed on the power pack to lock the air pressure into the power pack tank. Air is allowed to enter the power pack through a check valve for normal operation.
- ✓ The solenoid valve is mounted directly onto the tank to reduce any potential air leaks to the absolute minimum.
- ✓ If there is any accidental loss of air pressure the system will remain clamped until the solenoid valve is energized to re-lease the clamps.
- ✓ A clamp release signal is required to release the system. The signal must be maintained for 20 seconds. The signal will be 12 volt DC (4.8 watt).



Close view of a levelok[®]
power pack





levelok®

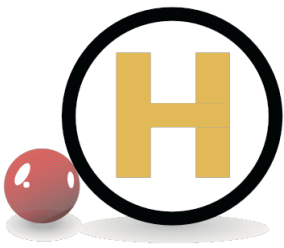
levelok® interlock options, cage mounted system

Sequential clamping process for the levelok® cage system

1. Cage arrives at the level;
2. Solenoid valve in air panel opens only if the available line pressure is greater than 4 bar, “Hoist Block” is activated and cage is in position;
3. A quick coupler connects the fly hose to the cage;
4. Turn the “levelok® ON/OFF” switch to the “ON” position on the panel;
5. For the first 4 seconds line pressure will close the clamp arms onto the guides. After 4 seconds the intensifier in the power pack will start and raise the hydraulic pressure to safe clamping pressure;
6. The green light on the cage or panel will illuminate as the pressure switch on the power pack indicates safe clamping pressure reached. The same pressure switch will indicate “clamps on” to the hoist control system;
7. Loading and unloading can now take place;
8. After loading is complete, cage doors are closed. (some mines interlock the cage doors as well);
9. The fly hose is removed from the cage;
10. Turning the “levelok® switch to the OFF position energizes the solenoid valve for at least 20 seconds. After about 4 seconds the cage will start to move and slide in a controlled manner to its new position in the shaft;
11. Clamps position switches indicate “clamps off” to the Hoist Control system and “Hoist Block” can be deactivated.
12. Emergency fall arrest under slack rope conditions can easily be added into a standard cage holding system. This is achieved by incorporating accumulators into the system.



levelok® clamp on steel guide
with power pack



levelok®

Summary of interlocking signals used on the levelok® system

Signal	Generated by	Setting	Type of signal	Used for
Clamps on	Pressure switch	Set at 20 to 24 MPa	Potential free normally open	Confirms system in use
Clamps off	Micro or Proximity switch	On clamp cylinder	Potential free normally closed	Safe to wind cage after use
Green Light	Pressure switch (same switch used for "clamps on")	Set at 20 to 24 MPa	Potential free normally open	Safe to load, indication to cage tender
Clamps release Maintain for 20 seconds	levelok® On/Off Switch on levelok® panel.		12 volts, 4.8 watt Solenoid available in a range of voltages	To release the clamps

Signals located in the levelok® panel

Signal	Generated by	Setting	Type of signal	Used for
Air pressure good	Pressure switch energizes the Solenoid valve when: <ol style="list-style-type: none"> 1. Hoist block on; 2. Cage in position; 3. Air pressure above 4 bar. 	Set at 4 bar	Potential free Normally open Solenoid: 12 watt at 12 volts Available to suit many voltages	Allow system to be used conditionally

Maintenance programme

Daily inspection (5 minutes required)	Weekly inspection (15 minutes required)	Annually
<ol style="list-style-type: none"> 1. Activate system; 2. Check clamping time; 3. Listen for high-pressure leak (intensifier will pump occasionally after clamping pressure has been reached); 4. Confirm clamping pressure reached, green light on; 5. Release clamps; 6. Check release time; 7. Confirm all clamps released. 	As per daily inspection plus: <ol style="list-style-type: none"> 1. Check oil level; 2. Check for oil leaks on pipe work and clamps visually; 3. Check shoe wear; 4. Use oil pressure gauge to confirm clamping pressure is good; 5. Check oil in lubricator on power pack; 6. Check condition on all pipes and hoses. 	<ol style="list-style-type: none"> 1. Clamps and Power Pack are reconditioned 2. System is audited by Horne