Technical Notes - Portable Inclinometer

MEMS technology

Our Inclinometer system measures tilt using MEMS sensors the technology which has become the standard technology within the industry.

The benefits of MEMS sensors are that they offer faster more rugged systems than the old servo-accelerometer systems and are virtually unaffected by temperature.

Lightweight & rugged

The lightweight but rugged construction of all components means that a 100m system can easily be carried by one person.

Wireless communication

Data from the probe is transferred from the reel by Bluetooth connection to the Rugged Field PC handheld readout

On-board probe calibration

Calibration is embedded into the MEMS conditioning board in the probe which means that only the probe itself needs to be returned for re-calibration or calibration check unlike a system where the probe is attached to the reel where the complete system has to be re-calibrated. This has a significant saving on delivery costs especially from overseas.

Interchangeable probe

Any probe can be used with any cable reel and any Rugged Field PC handheld readout so that if you have an existing 50 metre system and now need a 100 metre system you only need to buy another cable and reel as you can use your existing probe and Rugged Field PC handheld readout.

The spiral probe can also be used with any reel and Rugged Field PC handheld readout.

Size

It is the slimmest probe system on the market with a smaller radius bend (1.93m) than all other inclinometers (3.12m).

Data visual at the borehole

The Rugged Field PC handheld readout allows data sets to be viewed and compared at the borehole.

Selection

Probe range

- Available in the following ranges:
- Vertical - ± 30º from vertical
- Inclined - ± 15º from 45º
- Horizontal - ± 30º from horizontal

Cable length

- Standard cable reels lengths are 30, 50, 75, 100, 125, 150, 200, 250, 300 metres.
- The cable weighs 2.3kg per 50 metre.

Operation

Cable gate

It is always recommended to use the cable gate supplied with the system as it not only protects the cable from damage it provides the most accurate and repeatable readings.

Spiral survey

On installations deeper than 40 metres it is recommended to carry out a spiral survey using a spiral probe. The data can then be inputted within Inclinalysis software to correct any spiral effects

Basic operation tips

The A axis is defined as the direction of expected movement. If it has not already been done identify the A axis on the casing and clearly mark it.

Always fit the cable gate onto the top of the casing.

Take the first set of readings is taken in the A+ direction. This is the orientation of the casing groove into which the leading wheel of the inclinometer probe is located.

Lower the probe to the bottom of the casing and allow it to stabilise for a few minutes.

Raise the probe at 500mm intervals resting the cable grips in the cable gate each time.

The readout has a visual stability scale on the left of the screen. Once the scale shows maximum stability the reading should then be confirmed on the PDA.

Once the probe has reached the top remove it from the groove and rotate it 180º and lower again to the base of the casing and repeat the survey.

Getting the data from your Inclinometer

Data is stored within the Rugged Field PC handheld readout and can be downloaded via the USB or RS232 ports. The data is in a simple CSV format which can either be manipulated using Excel or imported into Inclinalysis software.

Verifying your results

Checksums can be viewed on the Rugged Field PC handheld readout during the survey so that the quality of the data can be verified.

Do I need to use the same probe to survey the same hole?

We believe in being realistic and practical about the levels of accuracy that should be expected and can be achieved on a working construction site. Although every Inclinometer probe leaves the factory with the same accuracy specifications they are unique and acquire individual characteristics over time as a result of many factors.

Therefore we would concede to get the "perfect" results it would be "ideal" to use the same probe. However since this isn't always possible especially if they are hired so we support the practice of using different probes but having consistency in the taking of the readings.

Troubleshooting

Problems connecting to the probe

There could be a few reasons why you are unable to connect, we would advise the following steps to investigate the problem:

- Check you have chosen the correct Bluetooth device. The PDA not only shows all available devices it also shows the history of what it has connected to. Each reel has its own individual number that starts with DR.
- Check the connection between the cable and probe is OK.
- Check there is a blue flashing light on the reel – if the light isn't flashing press the button on the reel.
- If after pressing the button no light shows remove the battery cover and ensure the battery is the right way round (they are shipped with them back to front to avoid power usage during shipping)
- Try swapping or charging the battery.

Battery life of the system

The Field PC readout offers 20 hour battery life meaning you can work on site for a full day without fear of having to charge/replace the batteries. The reel offers a similar battery life and the system features a charger compatible with your car.

Compatibility with other manufacturers casing

Our probe can be used with casing from all other manufactures, from 48mm to 85mm.

Handling & Care

Taking care of the probe

The inclinometer probe is a sensitive measuring instrument. Handle it with care.

Lubricate the wheels regularly. Spray a small amount of lubricant or place a drop of oil on both sides of the wheel bearings. Check that the wheels turn smoothly.

Taking care of the cable

Since the cable acts to send the signal it is a very important component of the system. However it can be vulnerable to excessive twisting, knotting and kinking and should be treated with care.

To avoid these types of issues with your cable ensure you remove the probe before winding it back onto the reel after the survey is completed and remove any kinks immediately.

Never allow the probe to free fall or run quickly down the borehole by letting the cable slip through your hands. Feed the cable down with your hands or reel it off the cable reel slowly.

Any sudden stopping of the probe when lowering it down will cause high torsion within the cable and if done repeatedly will eventually cause damage to the cable.

Maintaining the connectors

- Ensure the keyway is aligned before threading the connector together.
- Never over-tighten the bulkhead connectors when mounting. Hand-tight is sufficient.
- Only twist the brass coupling on the connector, do not twist the signal cable itself.
- Avoid sharp bends at the cable entry to the connector.
- Clean the plugs and receptacles with a mild soap and fresh water on a regular basis. Do not allow the connectors to get excessively dirty.
- Rinse out with alcohol, allowing the connector to air dry. Replace dust caps, once the connector is dry.
- On a regular basis, lubricate the mating surfaces with the supplied silicone spray.
- DO NOT GREASE and avoid the use of any solvent based lubricants e.g. WD40.
- The system is supplied with a bottle of silicone spray and replacements are available for purchase
- Ensure the connector is clean and dry before applying the silicone spray.
- Always replace dust caps once the connector is clean and dry.