

## Inclinometer casings

### Description

**Inclinometer casing** is used for the portable inclinometer or in place inclinometer, comprised of three meters lengths of ABS pipe with four internal grooves spaced 90° degrees apart and running along the entire casing length. Inclinometer casing is typically installed in bore holes, but may also be embedded in fills, cast into concrete, or attached to a structure. The internal groove of inclinometer casing controls the orientation of inclinometer probe or in place inclinometer. The deflection or deformation of the surrounding soil or structure causes change in tilt angle of the casing from vertical. These changes in tilt angle are measured by the readout. Inclinometer casing is affected by causes; the diameter of casing, appreciate strength, flexibility and spiral. Ace's casing is made for being fit for them.

### Consideration of casing selection

#### ○ Casing diameter

| Casing O.D    | Application  |
|---------------|--|
| Ø60~<br>Ø64mm | <ul style="list-style-type: none"> <li>Attaching to surface of structures or being embedded in cast into concrete</li> <li>Installing in borehole surrounded by rock</li> <li>Installing in area acting large deformation or distributed load</li> </ul> |
| Ø70mm         | <ul style="list-style-type: none"> <li>Installing in field which large displacements is expected.</li> <li>Most appreciate for most structures and fills</li> </ul>  |
| Ø85mm         | <ul style="list-style-type: none"> <li>Installing for long term monitoring</li> <li>Installing in area, that depth is more than 40 meters deep or much shearing exist</li> <li>Installing a horizontal inclinometer</li> </ul>                           |

#### ○ Spiral angle

Guide grooves are aligned in orientation of inclinometer probe. If grooves are twisted during transport, installation and storage, the direction of inclinometer probe or in place inclinometer will alter during measurement so it will be impossible to determine the direction of ground behavior. Inclinometer casing manufactured by ACE INSTRUMENT has within spiral of 0.3° degree and a protrusion outer surface of it for coupling between casings.

#### ○ Casing material

Inclinometer casing extruded by ABS resin in ACE INSTRUMENT is used in ground water, grouts, all types of soils and soft ground that large deformation or deflection is expected. It is designed to be easy to assemble and to retain flexibility over a wider temperature range.

Inclinometer casing provides better conformance to be flexible than aluminum casing.

ABS casing can be formed with greater precision than aluminum casing and does not corrode. It is also more flexible than aluminum casing and is unaffected by electrical noise. Inclinometer casing has strength and flexibility over a wider temperature range than PVC casing.

#### ○ Collapse strength

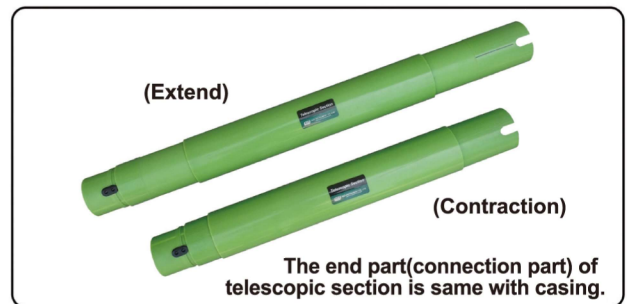
In installation in borehole, the annular space between the casings is filled with grout or a granular material.

To avoid collapse caused by high pressure during grouting, ACE INSTRUMENT manufactures strong couplings and thick-walled casing. Also the depth of guide grooves is precisely controlled to keep within the limits of weakening of the casing wall.

### Component

#### ○ Telescopic section

When settlement is happened at the field where inclinometer casing was installed, the horizontal displacement is inevitably happened with settlement. If the connection part of casing is not extended when the horizontal displacement is happened, the casing is damaged. If you connect telescopic section that have 150mm extension capacity at the 1~3 point between connect part of casing, you can protect the damage of casing because it is extended about 1~3% and it absorbs the horizontal displacement.

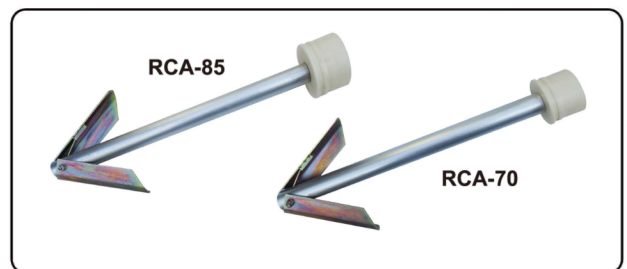


[Telescopic section for RC casing]

| Extension capacity | Casing   |
|--------------------|--|
| 150mm              | RC 70, RC 85, SC 70, SC 85<br>DC 70, DC 85, WC 70, WC 85 |
| 75mm               | FC 64, FC 85   |
| 70mm               | FC 70  |

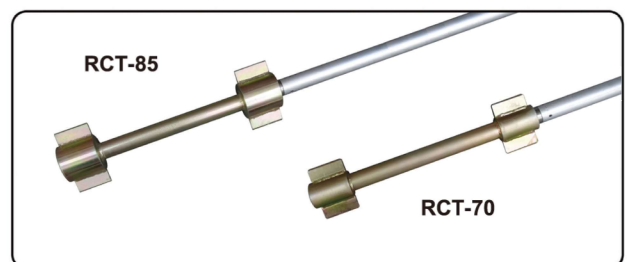
#### ○ Spring anchor

When inclinometer casing is installed after drilling, the grout that water is mixed as material for filling up is used. Water of grout make the buoyancy, so it lifts up Inclinometer casing or it makes to change the direction. In case taking down it to the bottom of hole after connecting spring anchor at end part of casing, Spring anchor is spread so you can protect to buoy casing.



#### ○ Casing connection tool

Inclinometer casing was processed by machine, if the casing is damaged after installing, to connect casing is difficult. So you can use the casing connection tool for easy and correctly connecting.



## RC type inclinometer casings



### Description

**RC type inclinometer casing** is the high-precision casing which coupling (sleeve) is not required. And also four internal guide grooves inside of inclinometer casing are proceeding by a broaching machine.

Both end surface of RC inclinometer casings are proceed by CNC lathe machine, and the connection part is manufactured in a precision structure not to come out because the casing is connected as a snap-in type.

To improve the waterproof and the strength of connection, ABS solvent bond should be pasted on the connection part of casings.

After RC inclinometer casing is connected each other, it doesn't require riveting, and taping

And there are two types of RC inclinometer casing such as  $\varnothing 59\text{mm}$  and  $\varnothing 73\text{mm}$  according to internal diameter. And if the big displacement is expected, the telescopic section should be used.

In case of using RC 70, it can be installed with NX drill, and in case of RC 85,  $\varnothing 100\text{mm}$  drill should be used to install it.

The length of connection for RC type inclinometer casing are designed at 1.5m and 3.0m.

### Features

- Available to quick installation
- Proceeded casing by CNC lathe machine with high precision, and high sincerity
- Two types of cutting length (1.555m and 3.055m)
- Mechanical structure that the coupling is not necessary
- More than  $600\text{kg} \cdot \text{f}$  for load test
- Flush type without projection part at the outside diameter

### Specification

| Model              | RC 70                 | RC 85   |   |
|--------------------|-----------------------|---|---|
| Casing             | ID, OD                | $\varnothing 59 \times \varnothing 70\text{mm}$ | $\varnothing 73 \times \varnothing 85\text{mm}$ |
|                    | Groove depth          | 1.5mm   |   |
|                    | Thickness             | 5.5mm   | 6mm   |
|                    | Weight                | 3.6kg/3m  | 4.5kg/3m  |
|                    | Spiral                | Less than $0.3^\circ / 3\text{m}$               |   |
|                    | Connecting length     | 1.5m / 3m                                       |   |
|                    | Cutting length        | 1,555mm / 3,055mm                               |   |
|                    | Load rating           | More than $600\text{kg} \cdot \text{f}$         |   |
|                    | Collapse rating       | 15bar   | 12bar   |
|                    | Operating temperature | $-30 \sim 80^\circ\text{C}$                     |   |
| Material           | High impact ABS resin |   |   |
| Bottom cap         | Dimensions            | $\varnothing 70 \times 50\text{mm}$             | $\varnothing 85 \times 50\text{mm}$             |
|                    | Material              | High impact ABS resin                           |   |
|                    | Weight                | 45g   | 60g   |
| Top cap            | Dimensions            | $\varnothing 70 \times 35\text{mm}$             | $\varnothing 85 \times 35\text{mm}$             |
|                    | Material              | High impact ABS resin                           |   |
|                    | Weight                | 36g   | 46g   |
| Telescopic section | Expendable length     | 150mm   |   |
|                    | Material              | High impact ABS resin                           |   |
|                    | Dimensions            | $\varnothing 75 \times 555\text{mm}$            | $\varnothing 90 \times 555\text{mm}$            |
|                    | Weight                | 1.0kg   | 1.4kg   |
| Accessories        | Protection cap 2nos   |   |   |

### Component

- ABS solvent bond
- Spring anchor
  - RCA-70 : for  $\varnothing 70\text{mm}$  casing
  - RCA-85 : for  $\varnothing 85\text{mm}$  casing
- Casing connection tool
  - RCT-70 : for  $\varnothing 70\text{mm}$  casing
  - RCT-85 : for  $\varnothing 85\text{mm}$  casing

### Keeping

Direct sunlight and heat can be caused of twist of ABS casing, so it should be stored in bows during transport and before installation.

Also it should be kept flat and horizontally supported during long term storage in filed.

### Package

RC 70, RC 85 casings are packed 8pcs in a carton box.

## SC type inclinometer casings



### Description

**SC type inclinometer casing** is processed mechanically to operate the portable inclinometer set for measuring the displacement in a slope, and displacement in borehole, settlement in embankment etc. It is installed to get a data with rapidity, and precision, so it is normally used in various weather conditions.

SC inclinometer casing has got four internal grooves spaced 90 degrees apart which is processed by a broaching machine. Spiral is less 0.3° degree. And the connection part on casing that should be connected to the coupling manufactured by CNC lathe machine.

And there are two types of SC inclinometer casing such as  $\varnothing 59\text{mm}$  and  $\varnothing 73\text{mm}$  of internal diameter. And if the big displacement is expected, the telescopic section should be used.

Model SC 70 can be installed with NX drill, because the casing and coupling has got the same outer diameter.

### Features

- Proceeded casing by CNC lathe machine with high precision and high sincerity
- Two types of cutting length (1.5m and 3m)
- Flush type without projection part at the outside diameter
- Possibility for the installation depth to install in deep place
- Moderation to the place that the water condition is various

### Specification

| Model              | SC 70                 | SC 85   |   |
|--------------------|-----------------------|---|---|
| Casing             | ID, OD                | $\varnothing 59 \times \varnothing 70\text{mm}$ | $\varnothing 73 \times \varnothing 85\text{mm}$ |
|                    | Groove depth          | 1.5mm   |   |
|                    | Thickness             | 5.5mm   | 6mm   |
|                    | Weight                | 3.6kg/3m  | 4.5kg/3m  |
|                    | Spiral                | Less than 0.3° / 3m                             |   |
|                    | Connecting length     | 1.5m / 3m                                       |   |
|                    | Cutting length        | 1,500mm / 3,000mm                               |   |
|                    | Load rating           | More than 320kg · f                             |   |
|                    | Collapse rating       | 15bar   | 12bar   |
|                    | Operating temperature | -30~80°C  |   |
|                    | Material              | High impact ABS resin                           |   |
| Sleeve             | Dimensions            | $\varnothing 70 \times 115\text{mm}$            | $\varnothing 90 \times 115\text{mm}$            |
|                    | Material              | High impact ABS resin                           |   |
|                    | Weight                | 70g   | 120g  |
| Bottom cap         | Dimensions            | $\varnothing 70 \times 52\text{mm}$             | $\varnothing 85 \times 52\text{mm}$             |
|                    | Material              | High impact ABS resin                           |   |
|                    | Weight                | 50g   | 70g   |
| Top cap            | Dimensions            | $\varnothing 70 \times 35\text{mm}$             | $\varnothing 85 \times 35\text{mm}$             |
|                    | Material              | High impact ABS resin                           |   |
|                    | Weight                | 36g   | 46g   |
| Telescopic section | Expendable length     | 150mm   |   |
|                    | Material              | High impact ABS resin                           |   |
|                    | Dimensions            | $\varnothing 75 \times 555\text{mm}$            | $\varnothing 90 \times 555\text{mm}$            |
|                    | Weight                | 1.0kg   | 1.4kg   |
| Accessories        | Protection cap 2nos   |   |   |

### Component

- ABS solvent bond
- Pop rivet
- Pop rivet gun
- Mastic tape
- Pipe chain clamp
- Drill and drill bit
- Protect cover
- Silicone

### Keeping

Direct sunlight and heat can be caused of twist of ABS casing, so it should be stored in bows during transport and before installation.

Also it should be kept flat and horizontally supported during long term storage in filed.

### Package

SC 70, SC 85 casings are packed 8pcs in a carton box.

## DC type inclinometer casings



### Description

**DC type inclinometer casing** is the high-precision casing which the guide grooves inside of inclinometer casing and the connecting parts of the coupling are proceed by a broaching machine.

Both end surface of DC casing is proceeding by CNC turning center, and it is finished by O-ring.

DC casing was designed as snap-in type. So after taking off the protective tube of O-ring, it can be directly inserted. DC casing is possible to install quickly.

ABS bond is unnecessary. And to rivet and to tape is unnecessary because DC casing is waterproof by O-ring.

To improve the waterproof and the strength of connection, ABS solvent bond should be pasted on the connection part of casings.

After DC inclinometer casing is connected each other, it doesn't require riveting, and taping

And there are two types of DC inclinometer casing such as  $\varnothing 59\text{mm}$  and  $\varnothing 73\text{mm}$  according to internal diameter. And if the big displacement is expected, the telescopic section should be used.

In case of using DC 70, it can be installed with NX drill, and in case of DC 85,  $\varnothing 100\text{mm}$  drill should be used to install it.

The length of connecting for DC casing is designed at 1.5m and 3.0m.

### Features

- Proceeded casing by CNC lathe machine with high precision and high sincerity
- Two types of cutting length (1.555m and 3.055m)
- Mechanical structure that the coupling is not necessary.
- Available to quick installation.
- Flush type without projection part at the outside diameter
- Simple installation (unnecessary solvent, rivet, and taping)

### Specification

| Model              | DC 70                 | DC 85   |   |
|--------------------|-----------------------|---|---|
| Casing             | ID, OD                | $\varnothing 59 \times \varnothing 70\text{mm}$ | $\varnothing 73 \times \varnothing 85\text{mm}$ |
|                    | Groove depth          | 1.5mm   |   |
|                    | Thickness             | 5.5mm   | 6mm   |
|                    | Weight                | 3.6kg/3m  | 4.5kg/3m  |
|                    | Spiral                | Less than $0.3^\circ / 3\text{m}$               |   |
|                    | Connecting length     | 1.5m / 3m                                       |   |
|                    | Cutting length        | 1,555mm / 3,055mm                               |   |
|                    | Load rating           | More than $320\text{kg} \cdot \text{f}$         |   |
|                    | Collapse rating       | 16bar   | 13bar   |
|                    | Operating temperature | $-30 \sim 80^\circ\text{C}$                     |   |
| Bottom cap         | Material              | High impact ABS resin                           |   |
|                    | Dimensions            | $\varnothing 70 \times 64\text{mm}$             | $\varnothing 85 \times 64\text{mm}$             |
|                    | Weight                | 70g   | 100g  |
| Top cap            | Material              | High impact ABS resin                           |   |
|                    | Weight                | 36g   | 46g   |
| Telescopic section | Expendable length     | 150mm   |   |
|                    | Material              | High impact ABS resin                           |   |
|                    | Dimensions            | $\varnothing 75 \times 555\text{mm}$            | $\varnothing 90 \times 555\text{mm}$            |
|                    | Weight                | 1.0kg   | 1.4kg   |
| Accessories        | Protection cap 2nos   |   |   |

### Component

- Pipe chain clamp
- Spring anchor
  - RCA-70 : for  $\varnothing 70\text{mm}$  casing
  - RCA-85 : for  $\varnothing 85\text{mm}$  casing
- Casing connection tool
  - RCT-70 : for  $\varnothing 70\text{mm}$  casing
  - RCT-85 : for  $\varnothing 85\text{mm}$  casing

### Keeping

Direct sunlight and heat can be caused of twist of ABS casing, so it should be stored in bows during transport and before installation.

Also it should be kept flat and horizontally supported during long term storage in filed.

### Package

DC 70, DC 85 casings are packed 8pcs in a carton box.

## WC type inclinometer casings

(5/6P)



### Description

**WC type inclinometer casing** is the high-precision casing which the guide grooves inside of inclinometer casing and the it is connected by band strap that put inside of casing

There are 4 guide grooves inside and their twisting angle is less than  $0.3^\circ$  in order to keep  $90^\circ$  equally between each guide groove.

There are two type of length as 1555mm and 3055mm. Also, there is extension connection as telescopic section

Both end surface of WC casing is proceeding by CNC turning center, and it is finished by O-ring and provided band strap for connecting.

### Features

- Proceeded casing by CNC lathe machine with high precision and high sincerity
- Two types of cutting length (1.555m and 3.055m)
- Available to quick installation.
- Flush type without projection part at the outside diameter
- Simple installation (unnecessary solvent, rivet, and taping)

### Specification

| Model              | WC 70                 | WC 85   |   |
|--------------------|-----------------------|---|---|
| Casing             | ID, OD                | $\varnothing 59 \times \varnothing 70\text{mm}$ | $\varnothing 73 \times \varnothing 85\text{mm}$ |
|                    | Groove depth          | 1.5mm   |   |
|                    | Thickness             | 5.5mm   | 6mm   |
|                    | Weight                | 3.6kg/3m  | 4.5kg/3m  |
|                    | Spiral                | Less than $0.3^\circ / 3\text{m}$               |   |
|                    | Connecting length     | 1.5m / 3m                                       |   |
|                    | Cutting length        | 1,555mm / 3,055mm                               |   |
|                    | Load rating           | More than $320\text{kg} \cdot \text{f}$         |   |
|                    | Collapse rating       | 16bar   | 13bar   |
|                    | Operating temperature | $-30 \sim 80^\circ\text{C}$                     |   |
| Bottom cap         | Material              | High impact ABS resin                           |   |
|                    | Dimensions            | $\varnothing 70 \times 64\text{mm}$             | $\varnothing 85 \times 64\text{mm}$             |
|                    | Weight                | 70g   | 100g  |
| Top cap            | Material              | High impact ABS resin                           |   |
|                    | Weight                | 36g   | 46g   |
| Telescopic section | Expendable length     | 150mm   |   |
|                    | Material              | High impact ABS resin                           |   |
|                    | Dimensions            | $\varnothing 75 \times 560\text{mm}$            | $\varnothing 90 \times 560\text{mm}$            |
|                    | Weight                | 1.0kg   | 1.4kg   |
| Accessories        | Protection cap 2nos   |   |   |

### Component

- Pipe chain clamp
- Spring anchor
  - RCA-70 : for  $\varnothing 70\text{mm}$  casing
  - RCA-85 : for  $\varnothing 85\text{mm}$  casing
- Casing connection tool
  - RCT-70 : for  $\varnothing 70\text{mm}$  casing
  - RCT-85 : for  $\varnothing 85\text{mm}$  casing

### Keeping

Direct sunlight and heat can be caused of twist of ABS casing, so it should be stored in bows during transport and before installation.

Also it should be kept flat and horizontally supported during long term storage in filed.

### Package

WC 70, WC 85 casings are packed 8pcs in a carton box.

## FC type inclinometer casings



### Description

**FC type inclinometer casing** is cut 3m and it is packed 12pcs in a carton box

It is advantages to install in shallow depth less than 20m.

It is suitable to apply at embedded into concrete, installed in borehole surrounded by rock, installed in field which has displacement is expected, installed in area acting small deformation, and distributed load.

The extruded casing has less than 0.5°/3m spiral and has more than 250kg stiffness. It is high reliability products.

The **FC-64 casing** is made of the outer diameter  $\varnothing 70\text{mm}$  with connected to the sleeve, so it is easy to install because it fits into the normal borehole drill NX( $\varnothing 76\text{mm}$ ) drill inner diameter.

And it is relatively large inner diameter  $\varnothing 64\text{mm}$ , so even if displacement has occurred, it can prevent jam of probe without breakage.

### Features

- The less than 0.5°/3m of spiral
- High precision and high quality extruded casing
- Lower price
- Easy and quick installation
- Enable to install by NX drill because the FC-64 sleeve diameter is  $\varnothing 70\text{mm}$



[Protect cover]



[Picture of connecting]



[Casing section]

### Specification

| Model               | FC-64                 | FC-70   | FC-85   |   |
|---------------------|-----------------------|---|---|---|
| Casing              | ID, OD                | $\varnothing 53,6 \times \varnothing 60,6 \times \varnothing 64\text{mm}$ | $\varnothing 58 \times \varnothing 66 \times \varnothing 70\text{mm}$ | $\varnothing 72,2 \times \varnothing 80,8 \times \varnothing 85\text{mm}$ |
|                     | Groove depth          | 59mm  | 62mm  | 76.4mm  |
|                     | Thickness             | 4.0mm (Average)   |   |   |
|                     | Weight                | 2.2kg/3m  | 2.6kg/3m  | 3.3kg/3m  |
|                     | Spiral                | Less than 0.5° / 3m   |   |   |
|                     | Cutting length        | 3,000mm   |   |   |
|                     | Load rating           | More than 250kg · f   |   |   |
|                     | Collapse rating       | 10bar   |   |   |
|                     | Operating temperature | -20~60°C  |   |   |
|                     | Material              | High impact ABS resin   |   |   |
| Sleeve              | Dimensions            | $\varnothing 70 \times 180\text{mm}$                                      | $\varnothing 80 \times 180\text{mm}$                                  | $\varnothing 95 \times 180\text{mm}$                                      |
|                     | Material              | High impact ABS resin   |   |   |
|                     | Weight                | 150g  | 240g  | 305g  |
| End cap             | Dimensions            | $\varnothing 69 \times 63\text{mm}$                                       | $\varnothing 75 \times 70\text{mm}$                                   | $\varnothing 90 \times 63\text{mm}$                                       |
|                     | Material              | High impact ABS resin   |   |   |
|                     | Weight                | 55g   | 70g   | 75g   |
| Tele-scopic section | Expendable length     | 75mm  | 70mm  | 75mm  |
|                     | Material              | High impact ABS resin   |   |   |
|                     | Dimensions            | $\varnothing 70 \times 378\text{mm}$                                      | $\varnothing 75 \times 368\text{mm}$                                  | $\varnothing 95 \times 378\text{mm}$                                      |
|                     | Weight                | 0.5kg   | 0.5kg   | 0.9kg   |

### Component

- ABS solvent bond
- Pop rivet
- Pop rivet gun
- Mastic tape
- Protect cover
- Silicone
- Pipe chain clamp
- Drill and drill bit

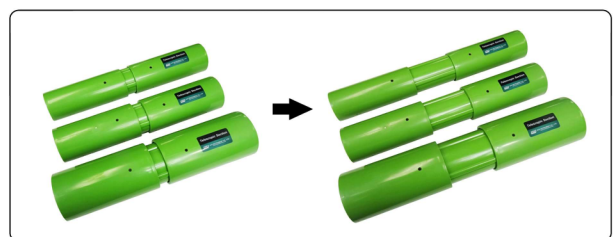
### Keeping

Direct sunlight and heat can be caused of twist of ABS casing, so it should be stored in bows during transport and before installation.

Also it should be kept flat and horizontally supported during long term storage in filed.

### Package

The extruded casings are packed 12pcs in a carton box.



[Telescopic section]