Laser Levels Online

3rd Generation

Fukuda FRE-205 DUO

User Guide

KEY INFORMATION

Specification

Brand	Fukuda
Product Type	Rotating Laser Level
Levelling Type	Fully Self Levelling
Detector Range	Up to 500m Diameter (250m either side of Laser)
Accuracy	±3mm at 30m (100ft)
Beam Colour	Red Beam
Beam Type	Rotating Dot
Levelling Axis	Horizontal Levelling
Usage	Indoor & Outdoor
Battery	Rechargeable Battery Pack or use Alkaline Batteries
Runtime	Up to 25 Hours (Approx) / 27hrs on Alkaline (Approx)
Slope / Gradient	Dual Grade using included Remote Control
Mounting Thread	⅝" Standard Surveying
Laser Rating	Class 2
Durability	Good
IP Rating	IP54 - Protected against dust / Protected against splashing water from any direction
Warranty	Automatic 3 Year Warranty

1st Generation *(2012 - 2015)*

2nd Generation *(2016 - early 2021)*

NEW 3rd Generation

INTRODUCTION

Thank you for purchasing the Fukuda FRE-205 DUO rotary laser kit.
These instructions are intended to explain the general basics of operating this equipment.
Please read them carefully.

For any more information, or if the laser requires calibration or repair; then please contact our Service Department by Telephone: **08000 869 769** or Email: **sales@laser-level.co.uk**

Overview

The FRE-205 is a horizontal levelling laser which has been designed specifically for outdoor Groundworks but at a very affordable price. It is constructed with a rugged housing and has an automatic drift system (bump sensor), together with the facility to Dual Grade; making this the laser of choice for Groundworks Contractors working to a budget.

Included in this special DUO kit is an EK-112R Cross line laser to cover most indoor work. Its auto levelling has very bright red beams & is supplied with an "L" shaped, magnetic mounting bracket (for wall mounting etc). This combination has proved to be very popular even for Ground-workers who have found the Cross-line laser useful for other indoor tasks.

This "2 in 1" DUO package covers both indoor & outdoor groundworks applications, for the General builder.

All in all, its a very versatile & popular kit.

SAFETY

Read the following safety instructions before attempting to operate this Laser Level Kit.
Keep these instructions in a safe place or store in the Laser's carry case for future reference.

- Do not remove warning labels from the product.
- The FRE-205 is a class 2 laser product (<1 mW; 635nm)

WARNING

Never look into the laser beam or direct it to the eyes of other people.
Always operate the Laser Level in a way that prevents the beam from getting into people's eyes.
Using the FRE-205 differently than described in the user guide, may result in unsafe operation.

WHAT'S INCLUDED IN THE KIT

The Fukuda FRE-205 Kit includes the following items. Your contents may vary if the kit was customised at point-of-purchase to upgrade or remove items.

Fukuda FRE-205

Horizontal & Dual Grade

FRD300R-205 Detector

Laser Detector / Receiver
With Staff Mounting Clamp

RC205 Remote Control

Infrared Remote Control For
Setting Gradients & Slopes

EK-112R Cross Line

Cross Line (1 Horizontal &
1 Vertical) With "L" shaped,
Magnetic Mounting Bracket

Red Target & Charger

Red Laser Target & UK Mains
Charger

Tripod & Staff

Surveying Tripod &
Measuring Staff
(Colours / Brand may vary)

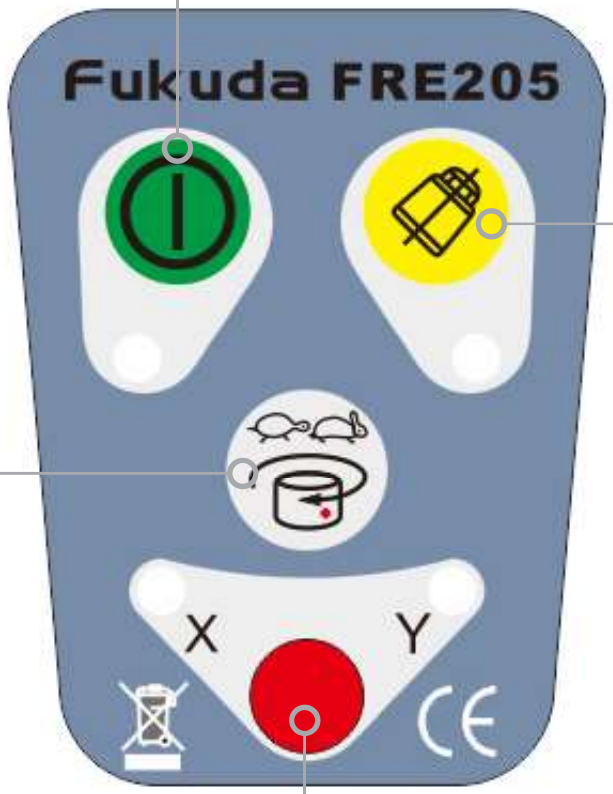
Carry Case

Foam Lined Carry Case

LASER OVERVIEW

KEY PAD OVERVIEW

ON/OFF Button
This Button will turn the Laser On and Off.
When turned on, the Laser will auto self level within 15-20 seconds and start spinning a level datum.
No other button needs to be pressed for the laser to self level.



Rotational Speed Control - Tortoise/ Hare. Zero (Stop Dot), 60, 120, 300 & 600rpm

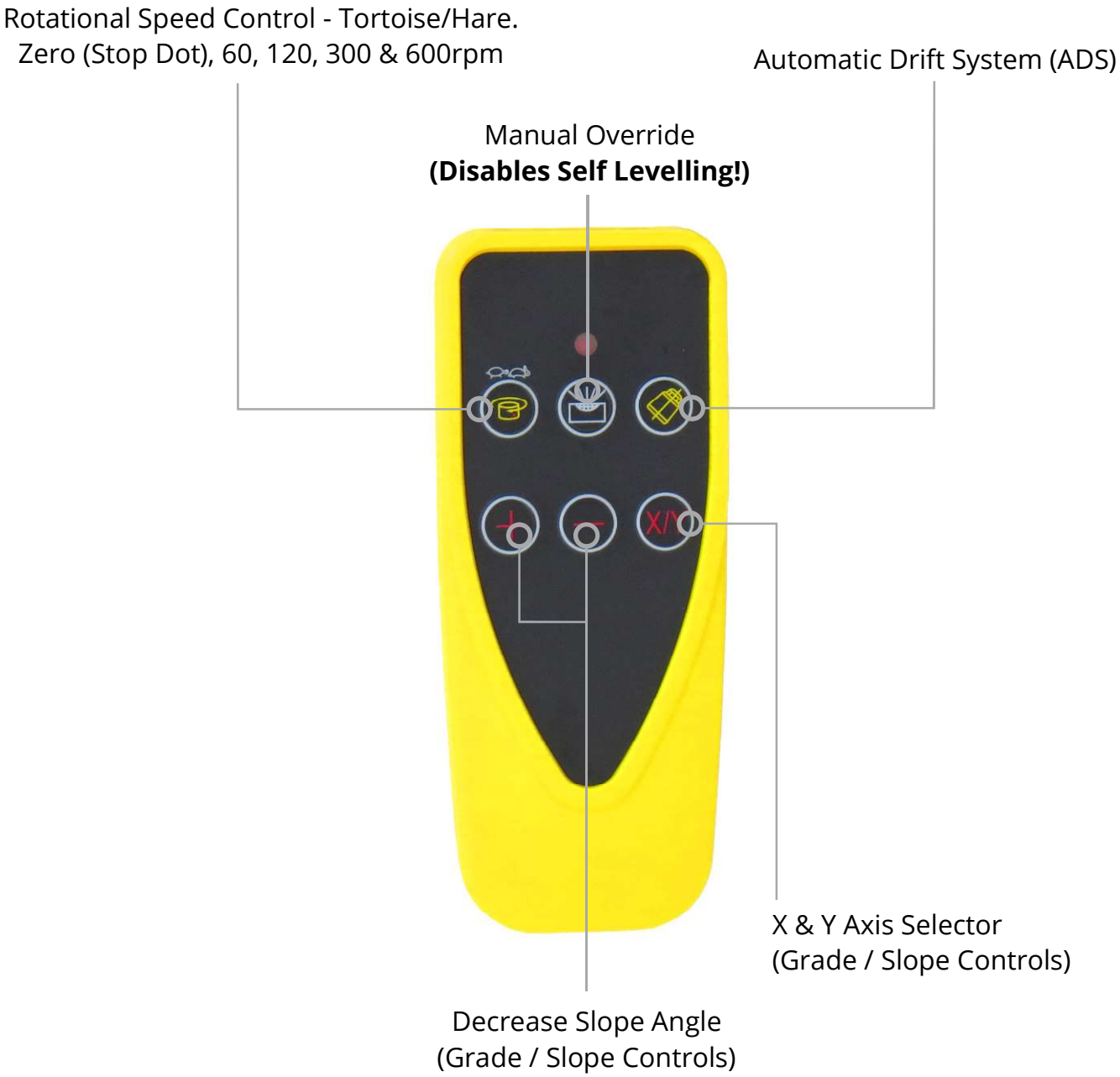
Automatic Drift System (ADS)

IR Remote Pickup Window

REMOTE CONTROL OVERVIEW

The Fukuda RC205 Infrared Remote Control enables the user to remotely (up to 20m), adjust the following settings: Rotational speed, Manual Override (for single or dual-axis grade/slope control) and Automatic Drift System (ADS). ***It cannot be used to turn the Laser ON or OFF (a feature not available on any Fukuda laser level system).***

TIP - it is often better to use the Remote Control rather than the FRE-205's keypad, to avoid disturbing the laser's sensitive self levelling mechanism.



Power Supply & Battery Replacement

- The RC205 remote is powered by 2 x AAA alkaline batteries which will be pre-installed.
- When required, open the rear battery compartment and fit 2 x AAA alkaline replacement batteries, taking care to ensure correct polarity.

LASER DETECTOR OVERVIEW

The FRE-205 Kit is available with either the standard FRD300R-205 Detector or the upgraded FRD800R Detector with mm/inch display. The overview below shows the standard FRD300R-205.

Power Supply & Battery Replacement

- The FRD300R-205 Detector is powered by 1 x 9v PP3 alkaline battery which will be pre-installed.
- When required, open the rear battery compartment and fit 1 x 9v PP3 alkaline replacement battery, taking care to ensure correct polarity.

LASER DETECTOR OVERVIEW (CONTINUED)

Using The Detector

- Press the **ON/OFF** button once and the FRD300R-205 will power on.
- Clamp the Detector onto the front face of the measuring staff and face towards the Laser. If you are above the horizontal datum, a down arrow will be shown. Below the horizontal datum an up arrow will be shown and when you are completely level or on the same datum, a horizontal line will be shown on the display. When you have established the horizontal datum, you can then use the mm scale on the rear of the measuring staff (which is zero mm at ground level) to either measure a uniform distance down or a uniform distance up, to then set your base level, deck level, ground level etc.

CHARGING & BATTERIES

The FRE-205 is supplied with 4 x type AA high capacity (2,600mAh) Ni-MH rechargeable batteries and a 5.6 Volt UK Plug, 700mA charger. Although the FRE-205 is designed to use AA rechargeable batteries, it is also possible to use 4 x type AA Alkaline batteries instead.

Mains Charger

The 5.6 Volt UK Plug, 700mA charger (Input 100-240V AC 50/60Hz Output DC 5.6V 700mA, centre pin + polarity) is for indoor use only. If the charger becomes damaged, stop using immediately and purchase a replacement. ***Never use a generic charger with this laser.***

- The general procedure to adopt is use the laser during the day & charge-up overnight. You cannot damage the system by "over-charging" the batteries.
- When the charger is plugged into a 230V mains supply (but not connected to the Laser), the red LED on the charger will flash once per second, when operating correctly.
- Plug the charger into the charging port located on the side wall of the laser.
- When charging, the red LED on the charger will stop flashing and be illuminated continuously.
- The LED will change to green when there is sufficient charge in the battery.
- The FRE-205 can be operated with the charger connected to the mains supply. Use this method if required, ***but only if it is safe to do so and approved on site***.
- The Mains Charger will charge most batteries in around 6-8 hours to give approximately 25 hours of continuous use. It takes 4 to 5 charge/discharge cycles for these battery packs to reach their maximum capacity.

AA Rechargeable Batteries (included)

- Prior to first use, we recommend that you fully charge the batteries for around 6-8 hours.
- The FRE-205 uses 2,600mAh Ni-MH rechargeable batteries. Do not use batteries which have a rating lower than 2,100mAh Ni-MH.
- The AA rechargeable batteries are located in the battery compartment in the side wall of the FRE-205. The compartment can be opened by unscrewing the silver screw. No tools required.
- **Important:** Do **NOT** allow the batteries to go completely flat before recharging.

AA Alkaline Batteries (not included)

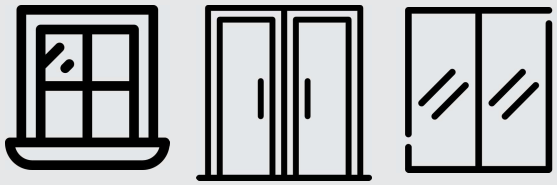
- The FRE-205 is designed to use AA rechargeable batteries, but it is also possible to use 4 x type AA Alkaline batteries instead.
- These are readily available from all good hardware stores / supermarkets.
- **Important:** Do **NOT** attempt to recharge the FRE-205 when Alkaline batteries are being used, otherwise serious damage will occur.

INSTRUCTIONS

Horizontal Levelling

WARNING

Never operate Laser in front of glazing or any shiny surfaces!
See page 24 for further details.



1. Position Laser

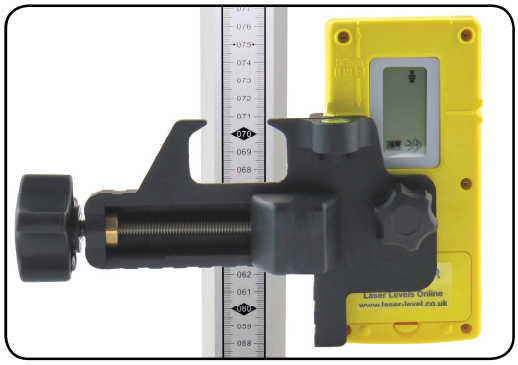
Place the FRE-205 on a firm, generally level surface or screw onto the 5/8" thread of the surveying tripod. You do not need to independently level the surface or tripod, but is does need to be within ±5 deg of true horizontal.

2. Power On

Press the **ON/OFF** button once and the FRE-205 will power on and begin automatically self-levelling horizontally. This process takes around 15-20 seconds.
When the levelling process is complete, the laser beam will start spinning at 600rpm, indicating a level datum.
No other button needs to be pressed for the laser to self level.

3. Pick Up The Levels

Clamp the Detector onto the front face of the measuring staff and face towards the Laser. If you are above the horizontal datum, a down arrow will be shown. Below the horizontal datum an up arrow will be shown and when you are completely level or on the same datum, a horizontal line will be shown on the display.
There is also a corresponding audible tone for high / low and level.



4. Read The Levels

When you have established the horizontal datum, you can then use the mm scale on the rear of the measuring staff (which is zero mm at ground level) to either measure a uniform distance down or a uniform distance up, to then set your base level, deck level, ground level etc.

USING THE LASER

Power On

- Press the ON/OFF button once and the FRE-205 will power on and begin automatically self-levelling. This process takes around 15-20 seconds. When the levelling process is complete, the laser will start spinning at 600rpm, indicating a level datum.
- ***No other button needs to be pressed for the laser to self level.***

Power Off

- Press the OFF button once and the FRE-205 will power off.
- If the Laser has been put into grade mode, or the rotational speed set at zero, switching off the laser and turning it back on again will automatically return the laser to the default fully self levelled state, running at 600rpm.

Rotational Speed Control - Tortoise/Hare

- Press the Rotational Speed Control button on the face of the laser or on the remote to cycle through the 5 rotational speeds.
- The rotational speeds are Zero (Stop Dot), 60rpm, 120rpm, 300rpm & 600rpm.
- For Indoor work, we suggest using slower speeds, where the laser beam is easier to see by eye; but for Outdoor Groundworks – run the FRE-205 at its maximum speed of 600rpm; which gives the best working range when used with the supplied Laser Detector.
- The default rotational mode is 600rpm when the laser self levels after being turned on.

Manual Override (Using Remote Only)

- Press the Manual Override button on the Remote Control once and the self levelling system will be turned off. The Laser will continue to rotate but the laser will no longer be outputting a level datum.
- This mode is typically enabled when the laser is being used to do Gradients and Slopes (See Gradients & Slopes section on page **17** for further details).
- Pressing the Manual Override button once more will turn the self levelling system back on. The Laser head will stop and adjust to a level datum and then begin rotating at 600rpm. The laser is now running in self levelling mode once more.

USING THE LASER (CONTINUED)

Plus & Minus Buttons (Using Remote Only)

- When the FRE-205 is in manual mode (Self levelling system has been turned off), the Plus & Minus buttons are used to increase or decrease the slope angle of the laser prism in either the X or Y axis to set a progressive fall or gradient. (See Gradients & Slopes section on page **17** for further details).

Automatic Drift System (ADS)

- If the FRE-205 is running in self levelling mode, press the Automatic Drift System (ADS) button on the face of the laser to turn on the Automatic Drift System.
- Once activated the red LED will flash slowly. ADS is now ON.
- If for example, the FRE-205 is knocked or caught by a gust of wind, the laser prism will stop rotating and the red ADS LED will flash quickly to show an alarm condition. Check that your datums have not altered and if all is ok; press the ADS button again & the laser will reset to AUTO level. This function is used to alert users that the laser has been disturbed. If this mode has not been turned on and the laser is disturbed, it is possible that although a level datum will be continue to be produced it may be at a different height than before.
- ***The ADS function cannot be activated when in manual mode doing Gradients or Slopes.***

Grading

- The FRE-205 is a DUAL GRADE facility laser level. This means that the FRE-205 can be switched to “Manual” (to override the self levelling system) allowing the user to set a grade (incline/slope) in the X axis only, Y axis only or both together. The maximum settable slope is an approx. fall of 1m over 10m.
- For X & Y alignment, please see the case markings on the TOP of the laser head where sights point in the direction of the axis being set.

Setting Single Axis Slope

- This example sets a grade in the X axis.
- Press the ON/OFF button once and the FRE-205 will power on and begin automatically self-levelling.
- Press the Manual Override button on the remote once and the self levelling system will be turned off & the green LED for the X axis will illuminate.
- Using the red **Plus & Minus** buttons on the remote, set the % slope (fall) required - as measured on your staff.
- When complete, press the Manual Override button once on the more and this will turn the self levelling system back on. The Laser head will stop and adjust to a level datum and then begin rotating at 600rpm. The laser is now running in self levelling mode once more.

USING THE LASER (CONTINUED 2)

Setting Y Axis Slope

- This example sets a grade in the Y axis.
- Press the ON/OFF button once and the FRE-205 will power on and begin automatically self-levelling.
- Press the Manual Override button on the remote once and the self levelling system will be turned off & the green LED for the X axis will illuminate.
- Press the **X/Y** button on the remote to change the axis control to the Y axis. The green LED for the Y axis will illuminate and the green LED for the X axis will turn off.
- Using the red **Plus & Minus** buttons on the remote, set the % slope (fall) required - as measured on your staff.
- When complete, press the Manual Override button once more and this will turn the self levelling system back on. The Laser head will stop and adjust to a level datum and then begin rotating at 600rpm. The laser is now running in self levelling mode once more.

Setting Both X & Y Axis Slopes (Dual Grade)

- Proceed as above, setting the X axis first followed by the Y axis - as required.

HOW TO SET-OUT A SITE

Working Example

The following description in this guide, explains the general principles of how to set-out a site using a rotary laser level like the FRE-205.

Equipment
Outdoors you will need the FRE-205 rotary laser level, a detector (receiver), a surveying tripod and a measuring staff. However indoors, accessories like wall brackets, interior tripods or floor to ceiling pillar kits are more useful and replace the surveying tripod / staff.

Basic Outdoor Procedure
In a convenient, safe place, position the tripod with its top face generally level (within +/-5 degrees) and about 1.3m above ground level. This ensures the laser beam is generally below eye level. Securely attach the FRE-205 via the 5/8" fixing screw. Press the **ON/OFF** button once and the FRE-205 will power on and begin automatically self-levelling horizontally. This process takes around 15-20 seconds. When the levelling process is complete, the laser beam will start spinning at 600rpm, indicating a level datum. This gives a truly horizontal spinning beam of laser light across the work-site. A reference DATUM.

The FRE-205 will automatically default to 600RPM. This will give the best range and stability when using the laser detector.
The laser detector which is also referred to as: a receiver, rod eye, laserometer, scouts, bleepers, sounders and that "thing you stick on a staff", is basically a battery powered device, designed to find the middle of the laser beam that you cannot see outdoors, by eye.

Loosely attach the detector to the measuring staff via its bracket, so that the pick-up window faces the laser's beam and the rear of the detector reads the mm scale on the staff. Move the detector up & down the staff to receive a continuous tone on the sounder and a set-level bar on the LCD. Clamp it securely in place. (Not over tight).
It is often better to stand behind the staff, to read both the detector's rear display and the staffs' mm scale.

Now, if you move to a second site position and the detector gives the same level signal (with a continuous tone) then you know that the base of the staff is LEVEL with the initial position. Any deviation can be measured by un-clamping the detector and moving it up or down the staff to find the laser beam again, noting the change in vertical distance on the staff.

This technique can be used for laying concrete bases, pads or strip foundations etc.

HOW TO SET-OUT A SITE

Working Example (Continued)

Basic Indoor Procedure

The FRE-205 needs to be positioned in a convenient, safe place and onto a firm, horizontal surface within +/-5 degrees. Different types of accessories are available to suit all Trades, namely wall brackets, interior elevator tripods or floor to ceiling pillar kits. Securely attach the rotary laser via the 5/8" fixing screw.

Press the **ON/OFF** button once and the FRE-205 will power on and begin automatically self-levelling horizontally. This process takes around 15-20 seconds. When the levelling process is complete, the laser beam will start spinning at 600rpm, indicating a level datum. This gives a truly horizontal spinning beam of laser light across the work-site.
Its a reference DATUM to which measurements can be taken both above & below.

As mentioned previously, a useful feature to have on a rotary laser level is the Rotational Speed Control - Tortoise/Hare. The slower the rotational speed, the brighter the beam appears by eye without the need to use a detector in most applications.

User Tips

If laser will not spin, check that mounting surface is within +/-5 degrees horizontally.

Outdoors, set the fastest rotational speed.

Indoors, run the laser slower by changing the Rotational Speed.

For long distance measuring staff use, fit & centre the bubble level to ensure its held vertically.

HOW TO SET SLOPES (FALLS/GRADES)

Working Example 1

The following description in this guide, explains the general principles of setting a Slope (Fall/ Grade) when using the FRE-205.

Equipment
You will need the FRE-205 laser level, a surveying tripod, measuring staff (rod) with mm scale and a laser detector/receiver and the remote control.

Site Conditions
There are many different work site scenarios. As an example, we are assuming that you are outside on a site with a clear field of view and planning to set drainage falls.

All above ground and below ground drainage pipes should be laid to an adequate gradient. The fall in a pipe is defined as the vertical height by which the pipe drops over a known distance. e.g. a 2.5% gradient is a fall of 1m over 40m or 1:40. (1 in 40).
Typically, surface water or foul water drainage pipes are set between 1:40 to 1:80.

If a gradient is too steep i.e. steeper than 1 in 40, the liquid may run faster than the solids in a foul water pipe thus leaving the solids stranded, which could then block the pipe. Conversely, if a gradient is not steep enough (usually less than 1 in 110), then the pipe may still block, if the solids slow down and become stranded.

Procedure
Place the FRE-205 horizontally on the surveying tripod, switch it ON and allow it to auto (self) level. Note the X-axis / Y-axis markings on the top cover of the laser.

Setting a 1:40 gradient:
Position the surveying tripod at the top of the gradient, then screw onto the 5/8" thread the FRE-205 with its keypad facing exactly in line with the 1:40 gradient to be set. Press the **ON/OFF** button once and the FRE-205 will turn on.

Position the measuring staff at 10m away from the laser, hold it vertically and move the laser detector (receiver) on the staff to find the set level position of the laser beam, where a continuous audible tone is heard. Carefully note this position on the mm scale of the staff.

By proportion, a 1m fall at 40m (1:40) is only 250mm at 10m.

Un-clamp the detector and move it down the staff by 250mm. Clamp securely.

Using the remote control (from the staff location), press the Manual Override button to illuminate the X axis LED. Press **X/Y** button once on the remote control, to change to the Y axis.

HOW TO SET SLOPES (FALLS/GRADES)

Working Example 1 (Continued)

Note: The Y axis is in line with the laser's keypad & in the direction of the gradient to be set.

On the remote control, press & hold the **PLUS** button to move the laser beam down the staff, until a continuous tone is heard again at the new detector position. Fine align the laser beam by pressing **PLUS** or **MINUS** buttons, as appropriate. This has now set a 1:40 fall.

Note: If the laser level is turned off & on again, it will revert back to auto level.

Return the detector to the original (set level) position on the staff & clamp securely. Dig out ground & lower staff until the detector picks up the laser beam again. This "cut & fill" process will follow the 1:40 gradient both back towards the laser & extending away from the 10m distance, as required.

Once this 1:40 fall is set, the User can use this inclined laser beam as a datum to set the depth of either the crown of the drainage pipe or the Invert level, anywhere in range of the laser – along that same axis.

Invert level of a pipe – is the level taken from the bottom of the inside of the pipe.
Crown of a pipe – is the Invert level plus the internal diameter of the pipe plus the pipe wall thickness. It may be necessary to use this in calculations when level measurements are taken from the crown of a pipe.

Manhole / Access Chambers:
A manhole or access chamber is required to gain access to a drainage system for un-blocking, cleaning, rodding or inspection. (Land drainage systems excluded). They can be manufactured in PVC, masonry or pre-cast concrete.

When setting appropriate drainage gradients it is important to allow for the depth down to either the crown of the pipe (or the Invert level) from ground level, when using these manholes.

Dual Grading:
A rotary laser level with dual grading facility can be used for setting out driveways, car-parks or areas with slopes (falls) in BOTH the X & Y axis.

The same procedure is adopted as above for drainage runs, except a second step in the process is undertaken to set the laser to a fall in the other axis, to complete the dual grade setting-out.

Cut & Fill Machine control work:
If slopes of more than 10% (1:10) are required, which is outside the range of electronic adjustment of the rotary laser's prism; then simply switch the laser to Manual & fit a "Laser Grade Adapter" between the top face of the tripod & the base of the laser. Then set the required slope. Search our website for more details.

HOW TO SET SLOPES (FALLS/GRADES)

Working Example 2 (when you do NOT know the grade to set)

Use diagrams in conjunction with written example on page 20.

Diagram 1

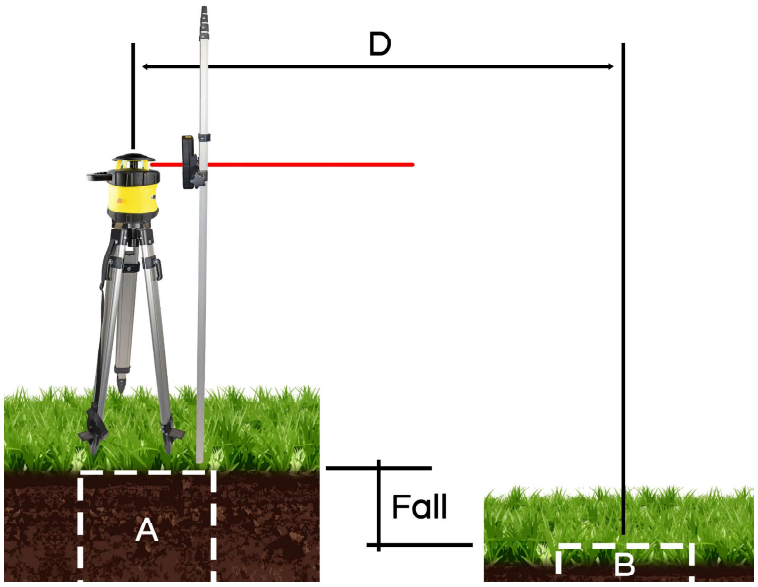


Diagram 2

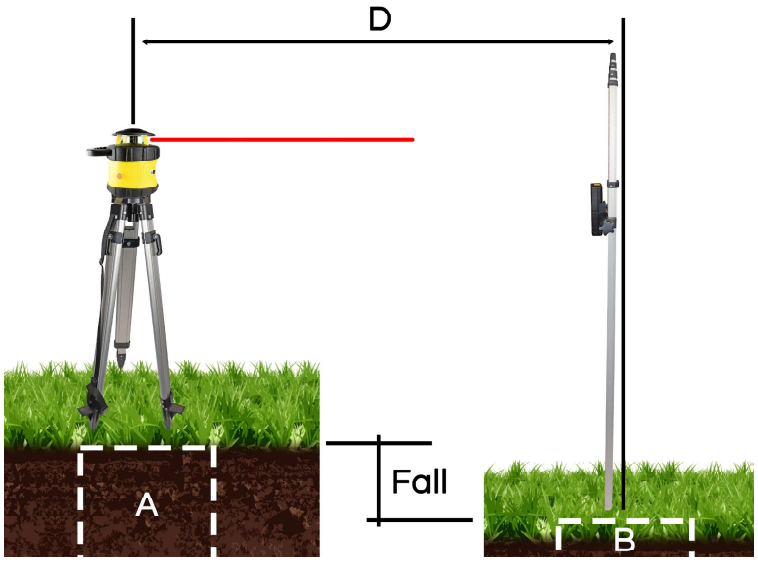
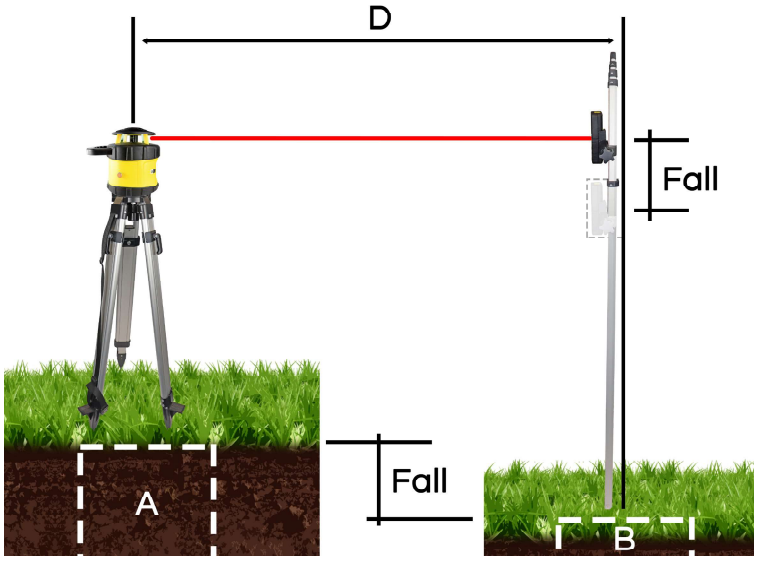


Diagram 3



HOW TO SET SLOPES (FALLS/GRADES)

Working Example 2 (when you do NOT know the grade to set)

The following description explains the general principles of setting a Slope (Fall/Grade) using the FRE-205, when you do NOT know the grade to set.

Equipment
You will need the FRE-205 laser level, its remote control, a surveying tripod, measuring staff (rod) with mm scale and a laser detector/receiver.

Site Conditions
There are many different work site scenarios. As an example, we are assuming that you are outside, on a site with a clear field of view and planning to set drainage falls.

See Diagram 1

A is a manhole cover with surveying tripod and attached FRE-205 laser level.
B is a second manhole cover at a lower position, located the distance of "**D**" apart and by a fall of "**F**".

The planned sitework is to set a slope on the laser level to assist in digging a drainage channel to join **A** to **B**.

Procedure
First measure distance "**D**".
Next, attach the FRE-205 onto the surveying tripod, switch ON and allow it to auto level. The tripod height is unimportant. Face keypad (in the Y axis) towards cover **B**.
Position your extended measuring staff on the ground next to the laser & clamp the detector to pick-up the red rotating beam with a continuous tone on the detector.
Note & record the mm height from the measuring staff. (**See diagram 1**).

To determine & set fall F:

Before moving position from cover **A**, press the Manual Override button on the remote control to disable the auto (self) levelling.
Do NOT un-clamp detector. Move position and place extended measuring staff over the centre of cover **B**, holding it vertically. (**See diagram 2**). Un-clamp detector and move it up the measuring staff to pick-up the laser beam with a continuous tone. (**See diagram 3**). Record the new height value. The site Fall "**F**" is this value minus the value taken previously at cover **A**.

Return the detector down to the lower position again & clamp tight. (See diagram 2).

HOW TO SET SLOPES (FALLS/GRADES)

Working Example 2 (when you do NOT know the grade to set)

To make the next adjustment, use the remote control if distance "**D**" is less than 20m; or a colleague closer to the laser with the remote control, if "**D**" is more than 20m. (Please note that the remote control range outdoors is a maximum of 20m).

Press X/Y button once to change the axis to Y, then press and hold the + button to move the laser beam down the measuring staff until a continuous tone is heard.
The laser is now set at the desired Fall.

Note: If the laser is switched OFF and ON again, this value is lost; as the laser reverts back to auto level.

Keep the detector clamped in place on the measuring staff & by moving between covers **A** & **B**, keeping a continuous tone on the detector, the ground can be cut away at the base of the staff, following the grade set by the laser.

Obviously, allowance must be made for the actual depth of the pipes' exit & entry positions in each manhole.

Grade Ratio
As an example, if distance "**D**" is 20m (20,000mm) & fall "**F**" is 250mm, the formula shown below determines the Grade ratio:

Distance "**D**" in mm / Fall "**F**" in mm = Grade ratio.
i.e. 20,000/250 = **80**

A **1:80** Grade (fall) is used typically for a foul drain run.

CHECKING THE CALIBRATION

Controlled Test

If you believe the FRE-205 is not giving accurate datums (after ensuring you have completely ruled out refraction of the laser beam explained on page **24**), please carry out the following controlled test in your office, or another indoor location.

- Position the FRE-205 laser on it's tripod in the **middle** of your office, garage, workshop etc... somewhere where you have space (10m or similar).
- Ensure there is no glazing or reflective surfaces in line of sight of the laser beam. This is to prevent the Refraction of the laser beam (See Refraction Issues section on page **24** for further details).
- Turn off all the lights and and press the **ON/OFF** button once and the FRE-205 will power on and begin automatically self-levelling horizontally.
- ***No other button needs to be pressed for the laser to self level.***
- This self levelling process takes around 15-20 seconds and then the prism will start spinning and will project a red beam 360 degrees around the room.
- With the laser level keypad facing your chest (towards you) walk to the left hand wall and mark the position of the laser beam on the wall.
- With the laser level keypad facing your chest (towards you) walk to the right hand wall and mark the position of the laser beam on the wall.
- Walk back to the laser and carefully twist the laser level round so the laser keypad now faces the left wall.
- ***Be extremely careful not to overly disturb the laser when twisting it round to the point the tripod position moves or is kicked.***
- The laser will momentarily stop and re-start when turned round. This is normal. The laser will then self level again and project a red beam 360 degrees around the room.
- Walk to the datum marks on both the left and right wall. You should see that the beam is hitting these marks.
- **If it is hitting the datum marks then the laser is operating correctly.**

If it's not hitting the datum mark's...
(and you have 100% ruled out Refraction and have not pressed Manual override)
Please contact the Service Department: **08000 869 769** who will be able to advise how to send it for repair / calibration.

FACTORY RESET PROCEDURE

Fukuda FRE-205 Factory Reset Procedure

The following procedure is a possible cure for the following fault:
"Laser Prism tilted over to one side and it will not rotate"

Prior to starting, please ensure that the batteries in the FRE-205 are fully charged and the Remote Control is operating (the red LED will illuminate when of any of its six buttons are pressed). If not, replace the remote control batteries.

- Place the FRE-205 on a firm surface (within ±5 degrees of true level).
- Press the ON/OFF button once and the FRE-205 will power on. The red LED beneath the green button should be ON. Due to the fault, the laser beam will be flashing ON & OFF, but the prism head will not be rotating.
- Point the Remote Control towards the FRE-205 and press the Manual Override button (middle top button) once on the remote. *This changes the operating mode of the laser from Auto to Manual levelling.*
- The "X" axis green LED should illuminate, and the laser will rotate. Press the Rotational Speed Control - Tortoise/Hare on the Remote Control (top left hand button), if necessary.
- Whilst watching the Laser Prism (avoiding direct eye contact with the actual laser beam) hold down the **Plus** button until the Laser prism tilts fully over to one side and then stops and the beam starts flashing.
- Hold down the **Minus** button until the Laser prism tilts over fully to the other side and then stops and the beam starts flashing.
- Then hold down the **Plus** button, but this time until the laser head returns to the centre. When the laser prism is back to the centre, release the **Plus** button.
- Press the **X/Y** button once on the Remote Control and the the "Y" axis green LED should now illuminate.
- The Laser Prism will continue to rotate.
- Whilst watching the Laser Prism (avoiding direct eye contact with the actual laser beam) hold down the **Plus** button until the Laser prism tilts fully over to one side and then stops and the beam starts flashing.
- Hold down the **Minus** button until the Laser prism tilts over fully to the other side and then stops and the beam starts flashing.
- Then hold down the **Plus** button, but this time until the laser head returns to the centre. When the laser prism is back to the centre release the **Plus** button.
- *These steps have made the control motors move over their full range and in most instances, will rectify the levelling fault.*
- Finally, press ON/OFF button once and the FRE-205 will turn off. Wait a couple of seconds and then press Press the **ON/OFF** button once again and the FRE-205 will power on and begin automatically self-levelling horizontally. The FRE-205 should now be operating correctly.

REFRACTION ISSUES

Product types: All Rotary and Cross line laser levels

Although there will always be the 0.1% of products that develop a fault, 99.9% of the technical enquiries we receive relating to “incorrect levels”, “random positions”, “out-of-level” or “Detector not picking up the beam correctly” transpire to being Refraction of the laser beam.

Laser levelling equipment is used by many different industries in various work-site environments. Users should be aware of the possibility of refraction problems, when using this type of equipment.

“Refraction” is the phenomenon where light is transmitted but moves direction when it passes from one medium to another e.g. through air then glass or water. This is why a pond of water appears shallower than it actually is or when you shine a torch at a window and the beam bounces off to another position. In the same way, this refraction can affect the correct setting-out, when using laser beams.

An easy example to understand is if, for example, a rotary laser is operated with a double-glazed window behind it. The true level position can be refracted and the deviation can be appreciable, even over small distances. In some instances, a double beam position can occur and the wrong level marked.

Our advice is to be aware of this and take appropriate care when setting out with your laser level, **both** indoor & outdoors.

A simple *fix* (if the laser cannot be moved or lowered) is to position a simple brown cardboard cover over the laser level on the side towards the refraction surface.

The following surfaces can potentially be problematic:
All glazing - single, double or treble glazed units. Patio / Bi-fold glass doors etc.
Glazed office partitioning.
Vehicle or Site Plant - glass windows & windscreens. (Curved windows are the worst)
Panel van sides - wet surfaces.
Mirrors & mirrored surfaces.
Stainless steel, shiny aluminum panels & reflective Celotex panels
Water – fountains, water displays, rivers, dams and weirs etc.

In addition, please be aware of the effects of amber & green warning beacons on plant & equipment. This “strobe effect” is a known problem and can affect all types of laser detectors to give erratic readings.

Our main advice is just to be site-aware when using laser levelling equipment, to ensure the reliable and accurate setting-out of your jobs.

It’s also important to understand that refraction of the beam, occurs with all lasers regardless of cost and or brand purchased.

TROUBLE SHOOTING

Error	Cause & Solution
Will Not Power On	**Check Batteries** Often lasers are sent to Service Centres with the following User battery mistakes: Standard batteries that are dead / Rechargeable batteries that are flat and need charging and Polarity errors i.e. batteries of either type that have been fitted incorrectly. Always double-check. It's well worth trying another set of new batteries and do not mix different types nor mix old batteries with new. Sometimes even new sealed batteries are faulty, so always try two sets. Bare in mind that new lasers with rechargeable batteries will not have been fully charged. Follow the User Manual to give them a full charge, before assuming the laser is defective.
Not Charging	**Incorrect Charger** It's common for Service Centres to receive lasers in for repair with either no charger or the wrong charger. Using a non-original charger can cause serious damage to the batteries, internal charge circuit or the laser itself. We always recommend contacting us to purchase the correct OEM charger, if yours has been mislaid. Do not risk buying an often cheaper equivalent to find it causes problems. Its false economy. Ensure that all users are aware of which batteries are fitted so that in error, a charger is not plugged into a laser level fitted with standard batteries, which could cause serious damage.
Random Or Incorrect Levels	**Site Refraction** Not every user is aware that laser levels, both Rotary and Line lasers can be affected by reflective surfaces on the work site. Customers report to the Service Centre that the detector (laser receiver) is faulty because it is picking up the laser beam in random positions. 99.9% of the time this is due to site Refraction. It's too easy to conclude the laser is faulty rather than understanding what site conditions can cause this phenomenon. However, it is very easy to eliminate the problem by making sure that laser beam reflections cannot be bounced back to the detector. As an example, if your site has large glass windows (Bi-fold doors / UPVC Windows) make sure you set-up the laser level so that when you hold the detector, the glass is behind you and the detector , so it cannot reflect on to it. Basically look out for & position your laser, being aware of all reflective surfaces like glass and shiny wet surfaces. It is also important to understand that the laser has a range of 500m diameter and spins 360 degrees. As such the refraction can be being caused by something outside the boundaries of your location.

TROUBLE SHOOTING (CONTINUED)

Error	Cause & Solution
Laser Will Not Self-Level	**<u>Outside Levelling Range Or Impact Damage</u>** If the FRE-205 is positioned outside of it's self levelling range of ±5 degrees the rotating laser prism will tilt over to one side (to try and locate a level position) and then time-out. Re-position the FRE-205 so that is is within ±5 degrees of level and try again. If it's within ±5 degrees of level and the prism remains tilted over to one side, turn the laser OFF and On again and try again. If the laser will still not self level, it may have received an impact which has affected the self levelling system. Try the Factory Reset procedure on page **23**. If that also fails, please contact the Service Department: **08000 869 769** who will be able to how to send it for repair.
Laser Not Holding It's Charge	**<u>Battery Issue</u>** Check the rechargeable batteries. The rechargeable batteries may require charging or need to be replaced due to age and/or a high number of charging cycles. Check the battery compartment for signs of damage and ensure that the compartment is clean and that the battery terminals are not corroded.
Detector Not Detecting The Laser Beam	**<u>Multiple Causes</u>** Check the battery in the detector. They may be low and need replacing. Check the FRE-205 is spinning and producing a visible red beam. You will be able to see the beam on your hands when placed in front of the protective lighthouse. Check the line of sight and ensure there is no obstructions. Check that the laser level and detector are within the operating range. If you are too close to the laser it may not pickup the beam. You need to be at least 3m away. Check that the protective lighthouse glass is clean and free of dust and dirt at all times.

CARE & MAINTENANCE

Protecting The FRE-205 Kit

- The Fukuda FRE-205 is precision levelling equipment and should be treated as such. Always handle with care and transport within the carry case provided.
- Always turn the laser level off when transporting or moving around the job site.
- Ensure the laser & accessories are clean and dry before storing in the case.
- If wet, dry well before storing and store the case and contents at room temperature. Failure to do so may void warranty.
- ***NEVER store the Fukuda FRE-205 Kit in a van, car or an unheated location (workshop / shed / garage / lockup etc.) overnight. The Fukuda FRE-205 Kit is designed to work in cold and wet conditions but it's the storage of the product when not in use that is critical. Keeping it in a secure heated building increases the usable life of the product and reduces the possibility of theft.***
- When the laser level is not in use or is being stored long term, it is highly recommended to remove the battery pack from the base of the laser as well as the batteries in the remote control and detector.
- Ensure the protective lighthouse glass is clean and free of dust and dirt at all times.
- Only use the supplied charger with the laser. The 5.6 Volt UK Plug, 700mA charger (Input 100-240V AC 50/60Hz Output DC 5.6V 700mA, centre pin + polarity) is for indoor use only. If the charger becomes damaged, stop using immediately and purchase a replacement. ***Never use a generic charger with this laser.***
- Always check the accuracy of the laser level before precision levelling is attempted. Failure to do so may result in inaccurate levels. See page **22** for further details.
- If the FRE-205 has received a heavy impact or has been dropped, please ensure the calibration is checked.
- There are no user serviceable parts inside the FRE-205. Warranty void if tampered.

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