

Descentometer

Definitions

Target Altitude- The value targeted to be the altitude to which the aircraft will descend. By default, this value equals the runway elevation of destination airport plus 2000-feet, but other values can be input into gauge as needed.

Target Distance- An imaginary point that is a set distance from the destination airport. Using the VS calculated by Descentometer, the aircraft will arrive at this point as it simultaneously reaches the Target Altitude.

Destination airport- The place you land before you land.

Buttons

1. PWR- Turns gauge ON and OFF. Also clears (CLR) screen and data from gauge.
2. ENT- Enters ICAO airport codes and custom altitude data into the gauge.
3. RW- Places gauge into Runway mode.
4. AUTO- Allows gauge to connect to autopilot for the purpose of updating AP with current vertical speed information. This will initiate the descent and the updating process will continue until the aircraft reaches the Target Altitude.
5. ALT- Allows pilots the option of inputting custom altitude information into gauge instead of using the default altitude calculated by Descentometer.
6. TD- This button will increase or decrease the Target Distance indicated by the orange needle.

Gauge Screen

The Descentometer uses a three-line screen display.

Line 1, left (white text): ICAO identifier. Line 1, left (orange text): TD text letters.

Line 1, right (white text): NM distance to destination airport. Line 1, right (orange text): NM to TD.

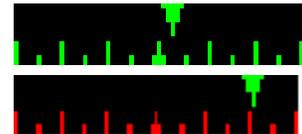


Line 2, left: Target Altitude.

Line 2, right: Slope angle to the Target Distance.

Line 3 has multiple displays:

- a) KIAS scale, in green- This scale appears when the gauge is placed in AUTO mode. It shows the current KIAS in relation to the KIAS that was in effect when the gauge was placed in AUTO. This allows pilot to monitor the aircraft for increases or decreases in airspeed up to 60 Knots. Such changes will affect the calculated VS values, i.e., speed increase will result in a higher VS value being sent to the autopilot. This in turn results in a further increase in airspeed. This can have a snowballing effect unless controlled by the pilot.



- KIAs scale, in red- Visual warning that KIAs has increased above 40 knots.

- b) Pertinent messages, displayed in orange text:

- (0) Blank- ENT button should be pressed to enter data that was input.
- (1) Dashed line- Gauge is in standby. It has all necessary data to compute and update VS and other screen information. Gauge is awaiting further input from the pilot.
- (2) NEAR TD- Aircraft is approaching the Target Distance.
- (3) END DESCENT- This message confirms the aircraft is at the Target Distance and at the Target Altitude. Gauge will disconnect from the autopilot at this time.
- (4) RW MODE- If this mode is activated; it will normally be done in the vicinity of the airport. The RW Mode resets the Target Distance to zero miles (the airport itself). It also resets the Target Altitude to that of the runway elevation. These values allow the pilot to monitor the VS and slope during an approach into the runway.

(5) ALT. ERROR (Appears only when airborne)- Custom altitude value entered into gauge via the ALT button was higher than the current altitude of the aircraft. This gauge is a Descentometer, not an Ascentometer.

Note: In order to make the keyboard available for ICAO and custom altitude entry, this gauge places the keyboard under its control when it sees a value is about to be entered. The gauge then captures key presses as the data is input **and the ENT key has been pressed** (see illustration below). During this brief time, the keyboard cannot be used for other purposes.

For example, if you have activated the ALT button and the gauge is waiting for an altitude value to be entered, you cannot respond to ATC using the numerical keys or press P to pause Flight Simulator. If you do, the key press will be sent to Descentometer instead. These periods of time are normally so short that it does not interfere with other keyboard needs. After the ENT key is pressed, the keyboard is placed back under the control of Flight Simulator. While the gauge is awaiting altitude data to be entered, the 3rd line of the display screen will appear blank as shown at right. While awaiting ICAO data to be entered, the 3rd line will appear with the name of the airport (see next illustration).



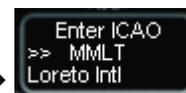
Operation

1. Turn ON Battery power. Gauge is inoperative without power on the aircraft.

2. Turn ON gauge using PWR button.

3. Prior to takeoff, Input the ICAO of the destination airport.

4. The gauge will confirm the ICAO by displaying the name of the airport. →



5. Press ENT button. This will input the ICAO data into gauge.

6. The gauge will enter the Operational mode. This mode outputs data to the Descentometer's screen as detailed above under "Gauge Screen".

7. Using the TD button, select the desired Target Distance from the destination airport.

8. Line 1 on the display screen is mouse-clickable. When white text is displayed on this line, mileage value shown is to the destination airport. When orange text is shown, mileage is to the Target Distance point.



9. After takeoff, the gauge will continuously calculate and display the VS and slope to the Target Distance point.

10. When these numbers reach acceptable values (depends on VS speeds desired for a particular aircraft), the pilot can make the decision to begin the descent. There are two choices:

a) The pilot may enter altitude data and VS computed by Descentometer manually into the autopilot and allow that instrument to control the descent. This likely will not place the aircraft at the Target Distance when reaching the Target Altitude, but may be within acceptable limits.

b) The pilot may choose to place the Descentometer gauge in AUTO mode and allow the gauge to control the descent by keeping the autopilot updated with current VS information. This will place the aircraft at the Target Distance when reaching the Target Altitude.

11. In order to use the AUTO mode, the autopilot must be ON and the altitude HOLD must be active.

12. When the AUTO button is pressed, the gauge inputs the Target Altitude and current computed VS into the autopilot. This automatically initiates the descent.



13. The on-screen display will then show a green KIAS scale. This should be monitored for any significant increase (20 kts. or more) in airspeed. If so, take action as necessary. If KIAS rises above 40-knots, scale will switch to red. **DESCENTOMETER DOES NOT CONTROL KIAS** even when autopilot is equipped with speed/hold function.

14. When aircraft approaches within 1 NM from Target Distance, the on-screen display will alert pilot with message, "NEAR TD".

15. As the aircraft approaches the Target Distance location, Descentometer will disengage from the autopilot. The autopilot will take over the function of leveling aircraft as the Target Altitude is reached. Level flight will resume at whatever Target Altitude is set into gauge.

16. After leveling, the gauge will display END DESCENT. The VS needle will go to zero because it is no longer monitoring vertical speeds to a Target Distance point.

17. After reaching a Target Distance near the airport, the pilot has the option of placing gauge in Runway mode by pressing RW button. This mode switches the Target Altitude to the height ASL of the runway. It also sets the Target Distance to zero miles which is the location of the airport.

18. RW MODE monitors the VS and slope into the airport. For those airports without glideslope, the gauge can be placed in AUTO mode when on final leg.

AUTO mode will allow gauge to update the autopilot with VS data which is useful for glideslope assistance. As aircraft nears the runway, AUTO mode should manually be disconnected as the situation requires. See note below.

Note: Descentometer is not a landing system. When in RW MODE, the gauge calculates slope information based on the latitude/longitude of the airport. This is not the location of the landing zone on any individual runway. At airports with a single runway, airport coordinates are at the center length of runway. At airports with multiple runways, the lat/long coordinates may be an average of all runway coordinates. Flying these slopes closer to runway than 1NM with Descentometer on AUTO will likely cause aircraft to miss the landing zone.

A previous gauge, SALS, provides accurate glide path guidance into any airport in the FS world regardless of ILS availability. When SALS and Descentometer are teamed, both glide path and glideslope information is provided into any airport. Roughly 1 - 2 NM from runway, pilot should manually take control of the aircraft for the touchdown.

Customizing Target Altitudes

The ALT button will permit custom altitude values to be entered into the gauge. This allows the pilot to choose an altitude for descent other than the default value (airport elevation plus 2000-feet). Customizing the altitude will be helpful in those situations where terrain around the airport demands an approach at a height other than the default altitude.

To set custom altitude data:

1. Press ALT button. Button diode will illuminate.
2. The Target Altitude value that is displayed on the screen will change to 00000 →
3. USING THE NUMERICAL KEYS ON THE KEYBOARD (not the keypad), input the desired altitude value up to 5 digits.
4. Press ENT key to input the new altitude value into gauge. All computations will then be based on the new value and not the default value.
5. If a customized altitude value is entered incorrectly, press the ALT key a second time to clear the error, then re-enter correct data.
6. When airborne, if a value larger than the current altitude is entered, the screen message will read, "ATT. ERROR". Press the ALT button to clear message and enter altitude value lower than current altitude. This message does not activate when setting gauge with aircraft on the ground.
7. Turning ALT button OFF when in AUTO descent will cause descent to be cancelled. Altitude value in gauge will be reset to the previous value that was used for VS computations.

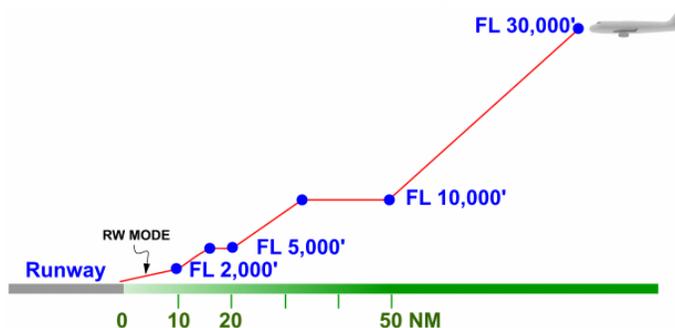


Step Descents

Setting custom altitude values is also helpful if the pilot wishes to step down from altitude rather than using one continuous descent.

1. Set Target Distance and custom altitude value for the first descent step into gauge.

For example, from a flight level of 30,000-feet, you may wish to descend and arrive at TD 50 when reaching a custom altitude of 10,000 feet. With these values set into gauge, monitor the VS until it shows a desirable value for the descent. At that time, place gauge on AUTO. This will cause the aircraft to descend toward the TD 50 point. After arriving, follow step #2.



2. Set second Target Distance and custom altitude value into gauge.

Continuing the above example: After arriving at TD 50, the aircraft is 50 NM from the destination airport and at an altitude of 10,000-feet. A new TD of 20 NM is set into gauge and a new custom altitude of 5,000 is entered.

Again, monitor the VS until it reaches a desirable value for the second descent. At that time, again place gauge on AUTO. When arriving at TD 20, the aircraft will be at 5 K ft.

3. If desired, gauge can be reset for a third descent. This might be a TD of 10 NM and custom altitude of 2000-feet.

4. Upon reaching TD 10, gauge can then be placed in RW MODE for a descent into the airport.

AUTO Mode: When operating with this mode active, new VS data is constantly sent to the autopilot. If this mode is turned OFF, the gauge resets the autopilot to an altitude value that is 200-feet below the altitude at which the mode was deactivated. This will allow the pilot to stop a descent when desired.

This technique is also helpful for controlling step descents manually without using custom altitudes.

For example, the gauge is set to the ICAO of destination airport. This will automatically set the airport elevation plus 2000-feet as the Target Altitude. During flight, set Target distances as desired. The VS will be calculated using these Target Distances and the airport elevation. Pressing AUTO will cause aircraft to descend based on these VS values. When the aircraft is 200-feet above a preferred altitude, disconnect the AUTO mode. Aircraft will level off at the desired altitude. Stepping down from altitude can be repeated using this technique; however, altitudes have to be more closely monitored and vertical speeds will be shallower.

Slope: This angle is displayed on the screen of Descentometer and updated as needed. The numbers show the slope toward the Target Distance point. They are an indicator of how steep the descent will be at any given time if the associated VS value were used for the descent.



As a reference, glideslope angles for many ILS systems are set around the 3-degree value. Terrain around an airport could cause this value to vary; however, a 3-degree slope works very well for most aircraft under normal conditions. As the drawing below shows, a 3-degree slope (blue line) is very shallow allowing airspeed to be more easily contained.



Input errors: This gauge allows two types of data to be entered using the keyboard.

a) The first is the ICAO code. If a mistake is made when entering this code, press the PWR/CLR key. This will clear the entry and allow the correct code to be entered. The gauge does not check the number of letters entered and will accept entries past four. Use only 4-letter ICAO codes.

b) The second type of entered data is custom altitude values. If a mistake is made when entering these numbers (up to 5 digits), press the ALT key. This will clear your entry and reset the altitude value back to the default value.

Press the ALT key again and enter the correct altitude value.

This error can also be corrected by pressing the PWR/CLR key; however, this method is not recommended because ICAO data will also be cleared from gauge and would require reentry.