Delta Dome Overtravel Monitor (Permanent Installation)

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User's Manual

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Delta-H Technology Ltd

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1. Support

Web: www.deltahtechnology.co.uk
Software updates can be downloaded from the website.

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2. About the Delta Dome Overtravel Monitor

The Delta Dome Overtravel Monitor provides safe and accurate measurement of dome (bottom former) overtravel. It is easy to fit on the bodymaker and measures every stroke at any bodymaker speed during normal continuous running.

There are two hardware variants available. The first is a portable device for use as a setup tool. One unit can be used for measuring dome overtravel on any bodymaker in the plant.

The other variant is a permanent installation on every bodymaker in the line. The electrical hardware including a touch screen computer can be installed in existing control cabinets or in a dedicated enclosure close to each bodymaker. Outputs from the device are linked to the bodymaker PLC to stop the bodymaker if the overtravel goes out of spec.

3. System requirements

Windows XP to 11 (32 or 64 bit)
1MB Ram
Compatible with touch screen devices

4. Software Installation

1. Run the install.bat file. This creates a folder named Delta Dome. The Delta Dome Overtravel Monitor application file (DD.exe) will be located here. Create a shortcut to the DD.exe file on the desktop for ease of use.

2. Run the icalsetup.exe file and follow on-screen instructions to install InstaCal. (Note, if installing on a computer that already has InstaCal, such as a computer that already has the Free Stroke Analyser software installed, this won't be necessary).

3. Connect the interface box to the computer using the USB cable supplied. Wait until the hardware is detected and installed by Windows (should take less than a minute).

4. Run InstaCal (select Start > All Programs > Measurement Computing > InstaCal). If another device has previously been used, such as the Free

Stroke Analyser, a message will appear that the device has not been detected. Click OK to delete that device. The Delta Dome interface box should be automatically detected and be listed as Board #0 – USB-1608FS. InstaCal can then be closed. If there are any communication problems between the computer and the interface board, InstaCal can be run again as described above.

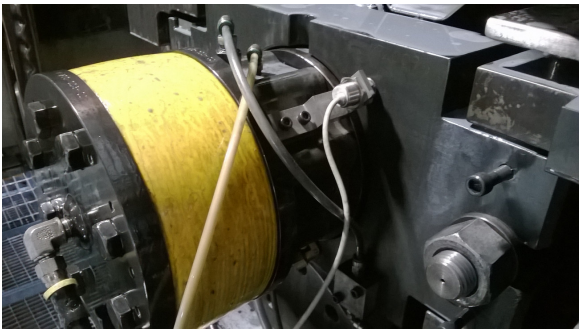
5. If the Delta Dome Overtavel Monitor is to be used on the same computer as the Free Stroke Analyser (bodymaker alignment software) which has a USB interface box similar to the Delta Dome interface box, the following instructions will ensure that both will work: With the Delta Dome interface box still connected, connect the Free Stroke Analyser interface box using another USB port. Run InstaCal and both interface boxes should be listed (the Free Stroke Analyser one being Board #1). InstaCal can then be closed. In the Free stroke Analyser software under *Options* change the board number to number 1.

5. Fitting the Sensor

Using the bracket provided, fit the sensor so that there is approximately a 2mm gap between the sensing face and the dome station housing. The bracket provided will be suitable for either a CMB Microdomer or a Pride dome station.



Fitted to CMB Microdomer



Fitted to Pride Domer

The exact position of the sensor needs to be set using the Delta Dome Overtravel Monitor software to check the output from the sensor.

While fitting the sensor, the software may make some false measurements of overtravel. These can be deleted before beginning the real measurements.

The sensor cable needs to be fed out of the bodymaker guarding. This should be done in such away that the cable will not get caught on any moving parts and also not damaged by trapping it between the guards.

6. Connection Instructions

The sensor cable is fitted with a water-tight connector which connects to the cable of the interface box. Prior to 2022 a push-pull connector with a spring loaded locking sleeve was used. The current connector uses threaded sleeves to attach the male and female parts.

The interface box connects to the computer (or tablet) using the USB cable provided.

7. Sensor Adjustment



The main screen of the Delta Dome Overtravel Monitor software shows the sensor output in volts (the dark blue bar on the right of the display). This will be 10V when

the gap between the sensor face and the dome station housing is more than about 5mm, and drops as the gap is reduced. With the bodymaker not running, the sensor position should be adjusted to give an output of between 1 and 3 volts (the top of the blue bar will then be within the green band). The gap will be approximately 2mm.

A red **Sensor Gap** alarm in the top right corner of the screen will be shown if the sensor is not positioned correctly. It will be shown in green when correctly set.

The sensor and bracket should then be locked in position by tightening the screws and locking nuts.

While fitting the sensor, the software may make some false measurements of overtravel. These can be deleted by using *Delete Data*.

The gauge is then ready to begin making overtravel measurements.

8. Main Display

Overtravel measurements are shown in the top trend graph, and the last measured overtravel is given numerically in the top left corner of the display. The bottom trend graph shows the bodymaker speed in cycles per minute. This is useful because dome overtravel is dependent on bodymaker speed. The speed in calculated from the time between successive overtravel

measurements. The speed for single strokes or if there is zero overtravel will therefore not be measured or displayed on the graph.

The green band in the overtravel graph represents values between the top and bottom specification limits set in *Setup*. If an overtravel measurement falls outside of these limits an alarm will be given at the top of the display. The possible overtravel alarms are: **Over Spec**, **Under Spec** or **Double Dome.** Once activated these alarms stay on for 20 strokes or until the bodymaker restarts after a stop.

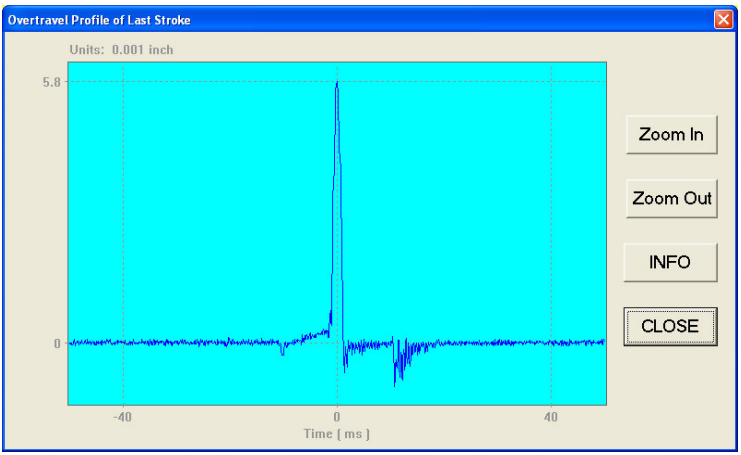
If **Display Zero Overtravel Measurements** in the *Setup* is selected, when no overtravel is detected over a period of about 1.5 seconds, and the bodymaker is running (indicated by the detection of vibration), an overtravel measurement of zero will be displayed. If the vibration is very low these zero measurements may not be detected. If there is excessive electrical noise on the sensor signal, zero measurements may be captured when the bodymaker is not running. In such cases **Display Zero Overtravel Measurements** should be deselected. Note, this has no effect on the Bodymaker Protection for permanent installation units. An output to stop the bodymaker will still be sent if no overtravel is detected.

The **Double Dome** alarm is given if the change in overtravel from the previous stroke is more than the value of **Double Dome Sensitivity** given in *Setup*.

The **Sensor Gap** alarm is explained in the Sensor Adjustment section. If this alarm is shown the gauge may not measure correctly and the sensor position should be re-adjusted.

9. Signature

The signature of the last measured overtravel can be viewed by selecting **Signature.** This shows the overtravel movement for the last stroke before and after the point at which maximum overtravel was obtained. If bodymaker speed was measured, the x-axis will be given in crank angle degrees. Otherwise it will be shown in milliseconds. A typical signature is shown in the picture.



The Delta Dome software automatically disregards any measurement where the *signature* is not consistent with

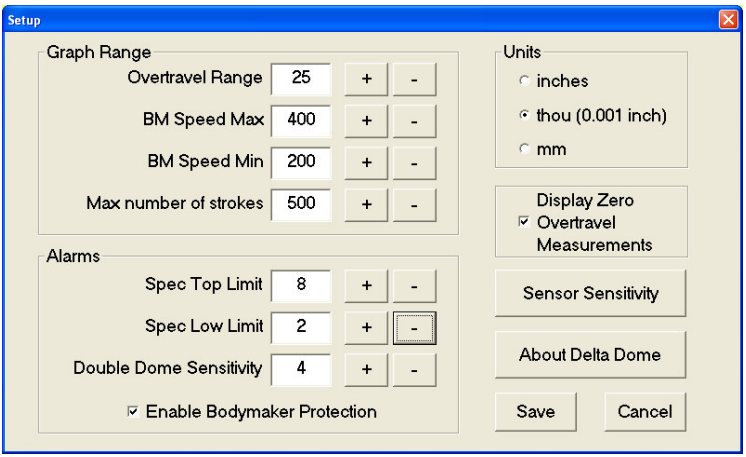
what should be obtained from dome overtravel. This can happen if there is noise on the signal or if there is vibration (caused by the impact of the redraw hold down or the overtravel itself for example). If the overtravel is very low (around 0.002" or 0.05mm or less), it is difficult to distinguish between real overtravel and noise or vibration, so it is worth checking the *signature* to make sure the measurement looks like a real overtravel measurement.

The *signature* should show the overtravel as a sharp spike at zero on the crank angle axis (or time axis, if bodymaker speed was not measured), approximately 2 to 15º (or 1 to 10 ms) wide, depending on the size of the overtravel (and the speed, if the x-axis is in ms). Any other movement shown on the *signature* may be caused by the outer domer, vibration or electrical noise on the signal.

If the *signature* shows movement that is not typical, this may indicate that there is a fault with the dome station.

If zero overtravel has been measured, instead of an overtravel spike the signature will show the vibration that indicated the bodymaker was running. Such vibration is usually due to the impact of the redraw hold down or the impact on the outer domer.

10. Setup



Max number of strokes can be changed to enable the data from more or less strokes to be seen in the graph. It can be set to anything between 50 and 100000. It does not affect the number of strokes that are held in the memory (which is 100000 strokes), only the number of strokes shown on the graphs**.** Therefore, it can be used to review the data from a few hours of running, or from just the most recent strokes. Note, the trend graph is initially sized to show 50 and this automatically increases as more strokes are measured until it reaches the value of *Max number of strokes*.

Double Dome Sensitivity is the amount the overtravel has to increase between consecutive strokes for the Double Dome Alarm to be activated. A double dome refers to the situation where the base of the can is not stripped off the punch or remains stuck in the dome die.

Sensor Sensitivity has a default setting of 2.6 V/mm and this should give reasonable accuracy. However, it should be checked and reset when the gauge is initially used. It will not require further resetting unless a different kind of sensor is used or there is a change in the material of the dome station housing. On-screen instructions are provided of how to reset the sensitivity. This involves moving the sensor a known distance.

Enable Bodymaker Protection is only available for units supplied as a permanent installation on the bodymaker where outputs are linked to the bodymaker PLC to provide protection (see Section 10).

Display Zero Overtravel Measurements should normally be selected. Zero overtravel will then be displayed when the bodymaker is running and there is no overtravel. It can be unselected if, due to excessive electrical noise on the signal, zero overtravel measurements are obtained when the bodymaker is not running.

11. Open/Save

Measurements can be saved onto the hard drive for future reference. When saving, all the measurements that are currently displayed in the graphs at the time of saving will be saved. The *signature* of the last stroke will also be saved. Saved measurements can be viewed on screen and also printed out in an A4 format.

The measurements are saved into a database on the hard drive. The database is a series of folders in the *C:\Delta Dome\Data Files* folder. There are folders for plants, lines and bodymakers. The measurements are saved into the bodymaker folders. The database can be setup using the *Database Setup* button from the *Open/Save* window.

12. Outputs

If enabled in the *Setup*, outputs from the device in the interface box provide signals for the bodymaker control software to, for example, stop the bodymaker when the overtravel is too high or too low.

The outputs switch between 0 and 24V. There are 2 outputs. Output 1 will be at 24V when running and the overtravel is in spec, or if the measurement is inactive (for example when *Setup*, *Open/Save* or *Signature* pages are open). It switches down to 0V when there is an overtravel alarm or if no overtravel is detected. Output 2

is 0V when the sensor is out of range or the measurement is inactive.

The bodymaker PLC can be programmed to stop the bodymaker if output 1 is 0V or if either output is 0V. If only using output 1 the bodymaker will only stop on an overtravel alarm, but not when the measurement is inactive. The output/s should be checked on every stroke except the first 2 or 3 strokes. This is to allow any alarms to be reset after the overtravel on the first stroke is measured. If not using output 2 to stop the bodymaker, it can be used to send a warning message on the bodymaker fault display, e.g. *Overtravel Monitor Inactive.*

13.Connection Details

Terminal Number	
1	Earth or –Supply Out on 24Vdc power supply (see note 1)
2	Output 2 for bodymaker PLC
3	+Supply Out on 24Vdc power supply
4	
5	-Supply Out on 24Vdc power supply
6	
7	Shield (sensor cable)
8	Output 1 for bodymaker PLC
9	Brown sensor cable (power)
10	
11	Green sensor cable (gnd)
12	White sensor cable (signal)

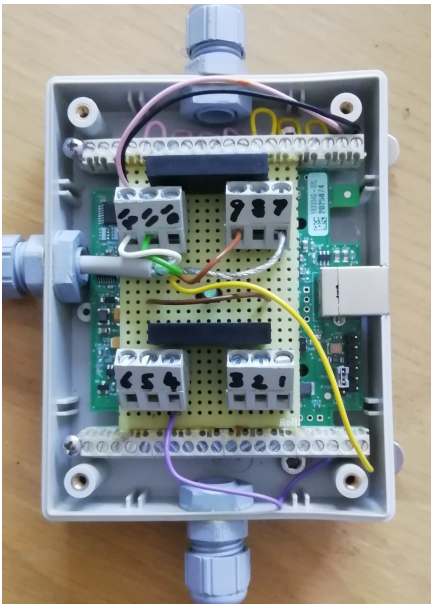


Photo showing sensor cable connections

Notes

1. Terminal 1 can be connected to earth, the –Supply Out, or left unconnected. All 3 can be tried to find which one results in the least noise on the signal, which can be observed on the signature trace. The sensor cable should be kept as short as possible and not routed close to sources of noise such as the bodymaker motor or motor cables.

2. When fitting the lid, the small cut out must align with the USB port.

3. The 24Vdc power supply should have a minimum of 50W power capacity and also be used to power the panel mount computer