dametric

GmsWin
TDC Service

Description of how a
TDC sensor is calibrated

Content

1   TDC Service

The functions for the TDC service are reached from
the Menu form.

The current log-in level controls the appearance of
the buttons.

- **Information**
  A descriptive text is shown.
- **Log in / Log out**
  The log-in/ log- out and the actual TDC
  calibration status sets the appearance of this
  page.
  "*Operator*". This level is not allowed to
  calibrate the sensor.
  "*Service*" level permits the user to change
  parameters, replace and calibrate the sensor.
  There is a third level for the administrator which allows all functions. This level demands a
  higher degree of knowledge and understanding because some of the built-in interlockings are
  disabled.
- **Back**
  Tap to return to the main menu.
- **TDC-calibration**
  A tap on the button shows the page handling the TDC calibration. If the button is grey and a
  tap generates the message "TDC not coarse calibrated", then the sensor must be coarse
  calibrated.
- **Coarse calibration**
  The button shows the page handling the coarse calibration. If the button is grey, the sensor is
  already coarse calibrated.
  A coarse calibration can be repeated by navigating to the Service module. Select "TDC –
  Sensor" – "TDC" and tap the button for "Coarse calibration".
- **Calibration parameters**
  The button gives access to the parameters used during the calibration.
  To change a parameter – select a parameter by tapping the name and a descriptive text will
  appear in the top text field.
  Press **EDIT** and a window with buttons is shown. Enter a new value and press **SAVE.** The
  program will warn if the value is out of limits. A description of the parameters can be found
  under section 8.
- **Segment change**
  Use this function to step through a sequence to enter segment type and serial number of the
  sensor. This information is useful later when analyzing the logfiles.
- **Service**
  Tap to enter the service module for the GMS/RMS measuring system.

2   TDC calibration

2.1   General information

This chapter describes the calibration process.

The calibration is manual, meaning that the operator runs the plates together until the rotor and the stator plates touch and the touchpoint is established.

The operator then moves the plates apart approximately 0.10 mm.

The "Zero calibration" is activated in this position and thereafter the operator is asked to back the plates apart approximately 0.90 mm. The plates are now approximately 1.00 mm apart relative to the touchpoint.

The operator now performs the "Span calibration" and thereby the refiner is calibrated for use in production mode.

To complete the calibration, the operator turns off the key-switch from the calibration position and then presses the "TDC not calibrated" switch.

2.1.1   Reference edge

The stator refiner plate includes a hole with a reference edge that matches the tip of the TDC sensor. This makes sure that the tip of the sensor is aligned with the stator surface when a new sensor is mounted together with new segment plates.
A new sensor mounted together with worn plates will have the tip sticking out into the grinding zone. This must be dealt with – either grind the tip of the sensor or use a spacer on the reference edge.

Ref. edge

23

2.1.2   Operator

The operator runs the plates manually during the calibration. The critical part is when running the plates together in order to reach the touchpoint. The operator must run the plates apart quickly if an abnormal or a faulty condition is suspected.

2.1.3   Interlocking

The calibration sequence will be stopped if any of the basic measuring functions enters an error state. The logic inputs for "Feed Guard activated" and "Touch position" must be activated. The calibration will be stopped if any of these signals are deactivated.

2.1.4   Coarse calibration

The sensor must be coarse calibrated before it can be zero- and span-calibrated. The coarse calibration is normally done when a new sensor is installed into the refiner.
It is important that there is no magnetic material in front of the sensor during the coarse calibration. If the sensor is already installed in the refiner – make sure that the plates are more than 5 mm apart.
Use the function "Segment exchange" in the Service Panel when installing a new sensor. The sequence includes entering the serial number, the coarse calibration and the pre-setting of the internal interlocking signals.

No magnetic material in front of the sensor!

2.1.5 Touchpoint

The touchpoint means that the rotor and stator plates touch lightly. The touch will generate a vibration signal that is measured. There are three ways to determine that the plates touch enough to be able to calibrate the zero point.

TVD – Segment vibration. The signal is generated when the plates are touching each other. This is the normal way to determine the touchpoint.

DTM – Temperature measurement (inside the TDC-sensor). The sensor tip is heated during the plate touch and if the TVD measurement somehow does not detect the vibration, the temperature increase can be used to determine the touchpoint. There is a limit to set for the required temperature increase value.

Operator – The Operator can hear the segments scraping and backs off the plates more than 0.10 mm. This action will be used to determine the touchpoint.

2.1.6 Relative POM

Relative POM is a value indicating the current rotor position relative to the position from where the touchpoint was determined. The operator uses this signal to move the plates from the touchpoint-position to the point of zero- and span-calibration.

2.1.7 Zero calibration

The GMS measuring system saves TDC-value measured at the rotor position when the touchpoint is determined. This value is then used when the zero calibration is activated.
It is therefore not important to back off 0.10 or 0.20 mm from the touchpoint position (as was required in former versions of the calibration sequence) before doing the zero calibration - the TDC-value is already saved.
It is more important to back off the plates from this vulnerable position as soon as possible.
So – take the touchpoint, back off approximately 0.10 mm, do the zero calibration and then back off to the span position, and do it quickly.

2.1.8 Span calibration

After the zero calibration, the operator will be prompted to back off further to a Relative POM value of 1.00 mm. A button, "Span calibrate", will appear. Tap it and the span calibration is performed. The TDC-sensor is now calibrated for production.

Finish the sequence and set the internal interlocking signals:
- Set the "Touch-position" panel key switch to the off position.
- Push the "TDC not calibrated" panel button.

2.2 TDC-calibration

The calibrate button is activated (blue) if the signals for "FeedGuard" and "Touch Position" are active.
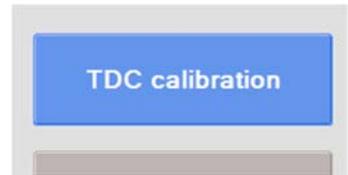
2.2.1 Start

Information panels – The larger, upper information panel shows the used parameter values and performed tasks.

The lower panel shows what the operator should do.

POM – Rotor position.

**TDC** – Measured gap between the TDC tip and the rotor.

TVD – Measured segment plate touch vibration.

DTM – Temperature in the zone measured inside the TDC sensor. The value "Δ DTM" indicates the change since the calibration started.

VIM – Refiner vibration.

Rel. POM – Actual rotor position relative to the rotor position at the touchpoint. Shown after the sequence is started.
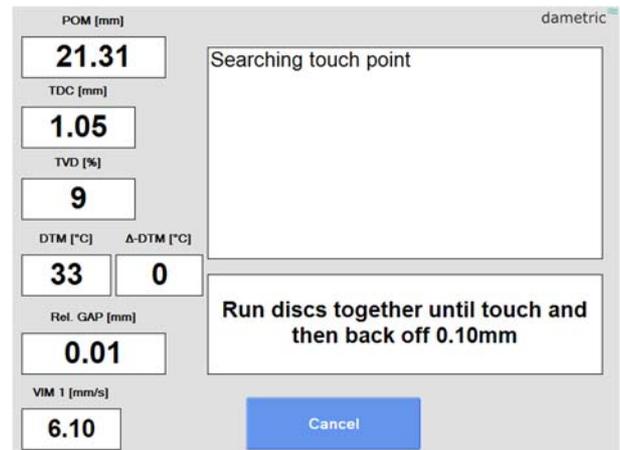
Start! – Press to start the sequence.
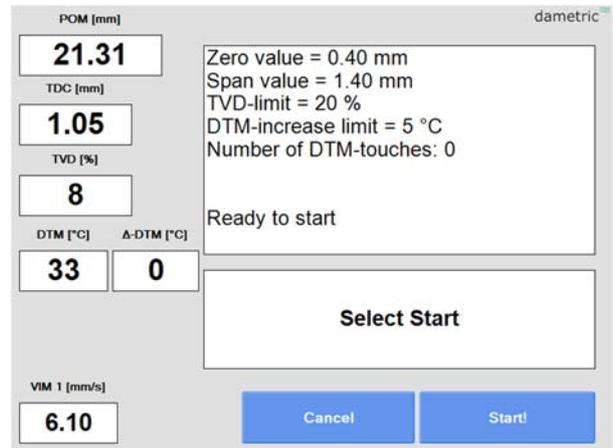
2.2.2 Search the touchpoint

The operator runs the plates slowly together until the touchpoint is detected.
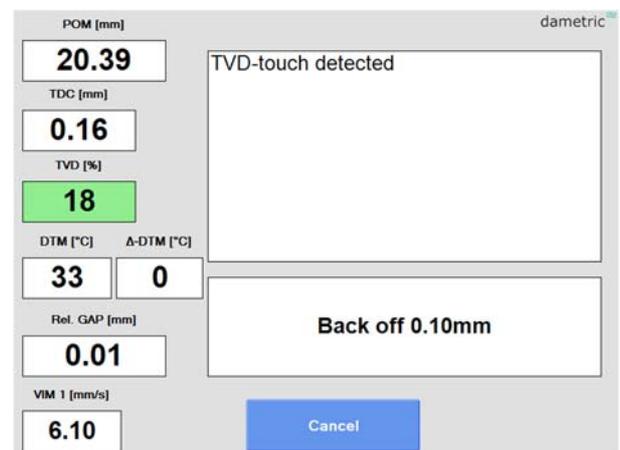
The operator must be alert for sounds and vibrations which can precede a plate clash.
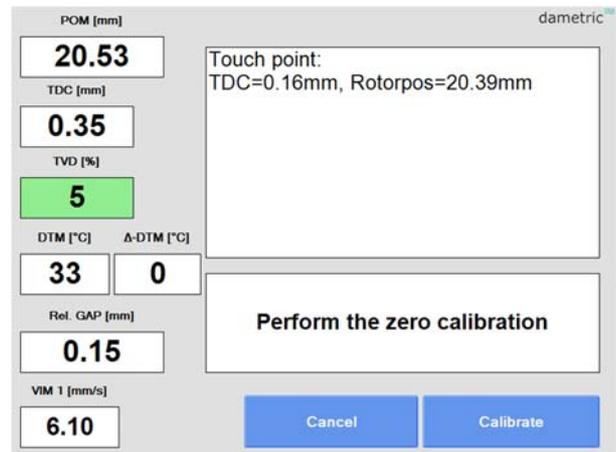
2.2.3 TVD-touch detected

Relative POM is preset to 0.00 mm.
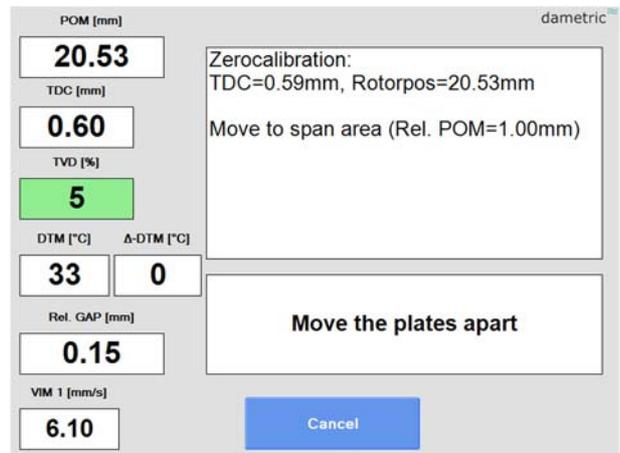Back off the plates 0.10 to 0.20 mm

2.2.4   Plates apart 0.10 to 0.20 mm

The plates have been backed off sufficiently.
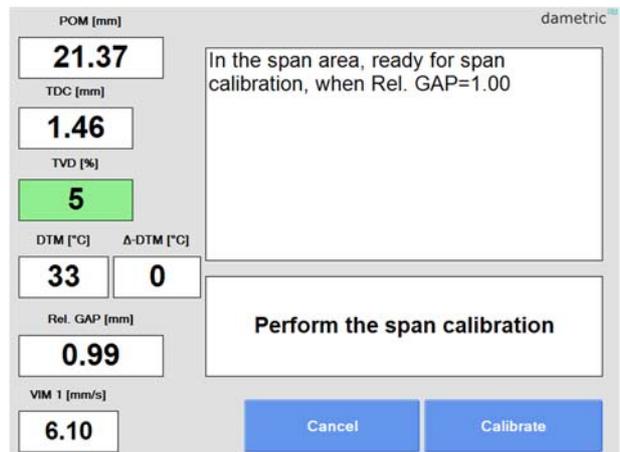The button for zero calibration is shown.
Press "Calibrate".

POM [mm]		dametric
20.53		
TDC [mm]	Touch point:	
0.35	TDC=0.16mm, Rotorpos=20.39mm	
TVD [%]		
5		
DTM [°C] Δ-DTM [°C]		
33 **0**		
Rel. GAP [mm]	**Perform the zero calibration**	
0.15		
VIM 1 [mm/s]		
6.10	Cancel	Calibrate

2.2.5   Zero calibration done

The zero calibration has been done and the operator must now back off the plates approximately 0.90 mm.

POM [mm]		dametric
20.53		
TDC [mm]	Zerocalibration:	
0.60	TDC=0.59mm, Rotorpos=20.53mm	
TVD [%]	Move to span area (Rel. POM=1.00mm)	
5		
DTM [°C] Δ-DTM [°C]		
33 **0**		
Rel. GAP [mm]	**Move the plates apart**	
0.15		
VIM 1 [mm/s]		
6.10	Cancel	

2.2.6   Back off the plates for the span calibration

Back off the plates until a 1.00 (±0.05) mm Rel. POM value.
Press "Calibrate".

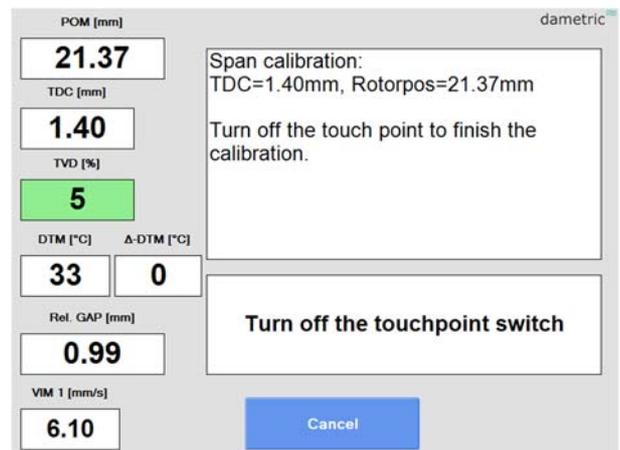| POM [mm]		dametric
21.37		
TDC [mm]	In the span area, ready for span calibration, when Rel. GAP=1.00	
1.46		
TVD [%]		
5		
DTM [°C] Δ-DTM [°C]		
33 **0**		
Rel. GAP [mm]	**Perform the span calibration**	
0.99		
VIM 1 [mm/s]		
6.10	Cancel	Calibrate

2.2.7   Span calibration done

The span calibration has been completed and the operator must preset the interlocking signals.
- Set the "Touch-pos" key switch to the off position.
- Press the button "TDC not calibrated" and make sure the warning lamp is turned off.

The refiner is now ready for production.

POM [mm]		dametric
21.37		
TDC [mm]	Span calibration:	
1.40	TDC=1.40mm, Rotorpos=21.37mm	
TVD [%]	Turn off the touch point to finish the calibration.	
5		
DTM [°C] Δ-DTM [°C]		
33 **0**		
Rel. GAP [mm]	**Turn off the touchpoint switch**	
0.99		
VIM 1 [mm/s]		
6.10	Cancel	

2.2.8 Calibration log

The measured values during the calibration sequence are saved in a log file.

The log file is useful if an issue occurs and the calibration must be analyzed.

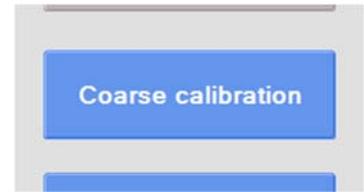From the main form, press "MENU", press "Calibration log" to view the log file.

3   Coarse calibration

Press the button to access the functionality.

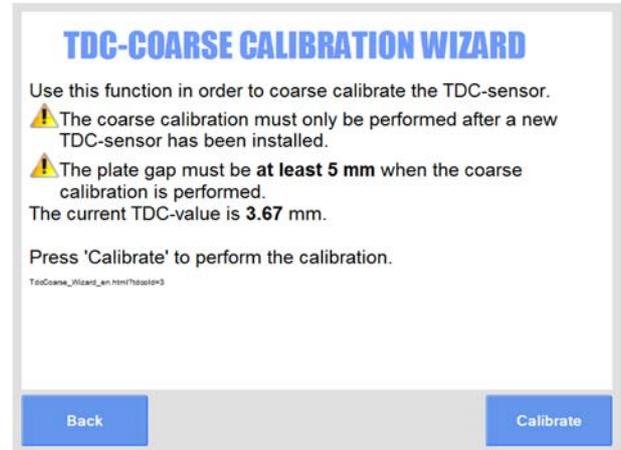The button is not active (grey) if the calibration is already done.

To do a coarse calibration, do the following:

- Open the Service-module
- Expand the TDC-function
- Expand the Sensor
- Press TDC
- Log in and press "Coarse calibrate".

Note the warning text of the basic prerequisites.

Press "Calibrate" to perform the calibration.

A faulty sensor or amplifier can cause the calibration to fail.

Note that the existing zero- and span calibration values are lost.

The coarse calibration must therefore be followed by a zero- and span calibration prior to bring the refiner into production.

Use this sequence only as an emergency. The coarse calibration should only be done during the segment change or a TDC sensor exchange.

The coarse calibration can be interlocked by the rotor position value being too low. This limit is set by a parameter.

No magnetic material in front of the sensor!

4   Calibration parameters

Press "Calibration parameters" form the TDC Service view.

Parameter descriptions:

DCA – DTM touch counter.
   This counter increments each time a DTM increase triggers a touchpoint detection. This counter is provided because it is useful when considering tip wear caused by the friction.

DTM – Temperature increase limit.
   A DTM temperature increase to trigger a touchpoint. Default value is 5.

POM – Distance, touch to zero point.
   The distance the plates must be backed off before the zero calibration.
   Default value is 0.10 mm.
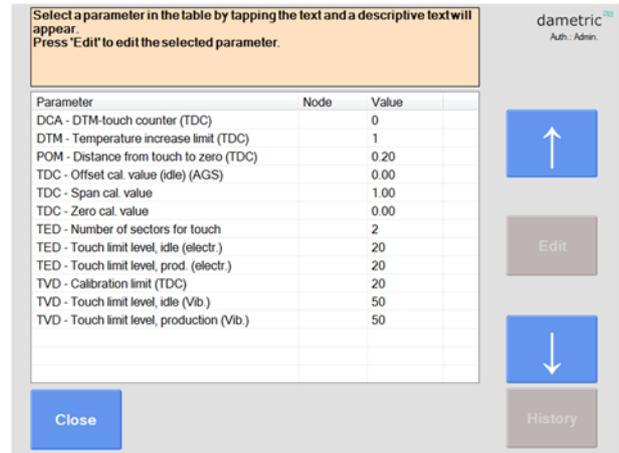
TDC – Span calibration parameter.
   The value used at the span calibration (should be 1.00 mm higher than the zero-calibration parameter). Default value is 1.30-1.50 mm.

TDC – Zero calibration parameter.
   The value used at the zero calibration. Default value is 0.30-0.50 mm.

TVD – Calibration limit
   TVD-limit to trigger a touchpoint. Default value is 20 %.

Note, the default values are suggestions and might have to be optimized for the refiner and process.

Parameter	Node	Value
DCA - DTM-touch counter (TDC)		0
DTM - Temperature increase limit (TDC)		1
POM - Distance from touch to zero (TDC)		0.20
TDC - Offset cal. value (idle) (AGS)		0.00
TDC - Span cal. value		1.00
TDC - Zero cal. value		0.00
TED - Number of sectors for touch		2
TED - Touch limit level, idle (electr.)		20
TED - Touch limit level, prod. (electr.)		20
TVD - Calibration limit (TDC)		20
TVD - Touch limit level, idle (Vib.)		50
TVD - Touch limit level, production (Vib.)		50

# 5   Segment exchange (or TDC exchange)

Press "Segment change" (or "TDC exchange") from the TDC Service view.

The sequence will guide the operator through some steps in order to register the type of segment used and to enter the TDC sensor serial number.
This data is used when the log files from the calibration are evaluated.

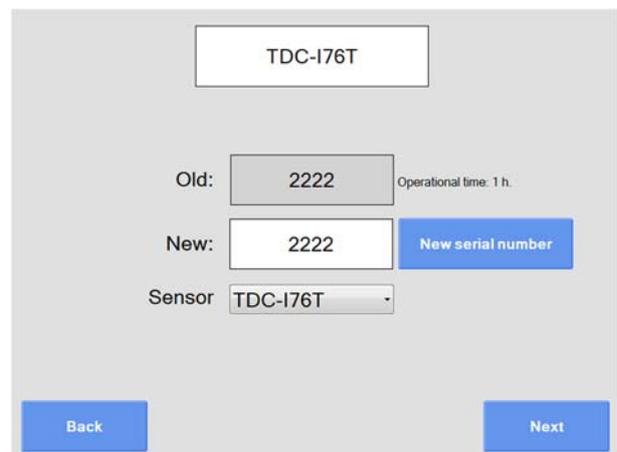Use this sequence when either, or both, a segment or a TDC sensor needs to be changed.
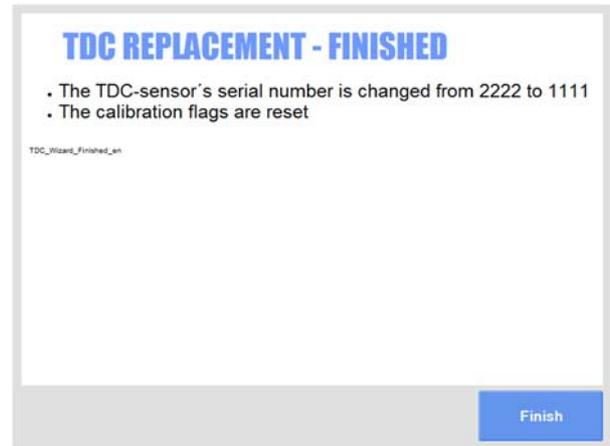
The steps of the guide are first presented.
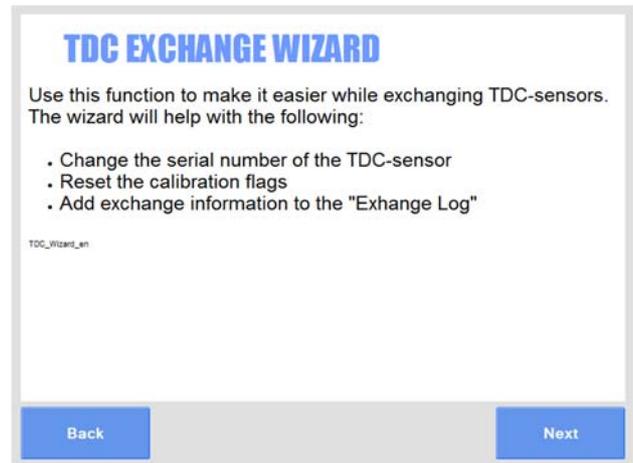
Enter the type or serial numbers of the segment plates. *(Not all systems have this page.)*

The number of used hours of the TDC sensor is shown.

Enter the type and serial number of the new sensor. The hours counter will be reset.

A report is shown.

Exchange log.

The exchanged products are shown in the "Exchanges log".

6   Contact

Sales, development, production and service:

Dametric AB

Jägerhorns Väg 19, SE 141 75 Kungens Kurva, Sweden
Phone: +46-8 556 477 00
E-Mail: service@dametric.se
Website: www.dametric.se