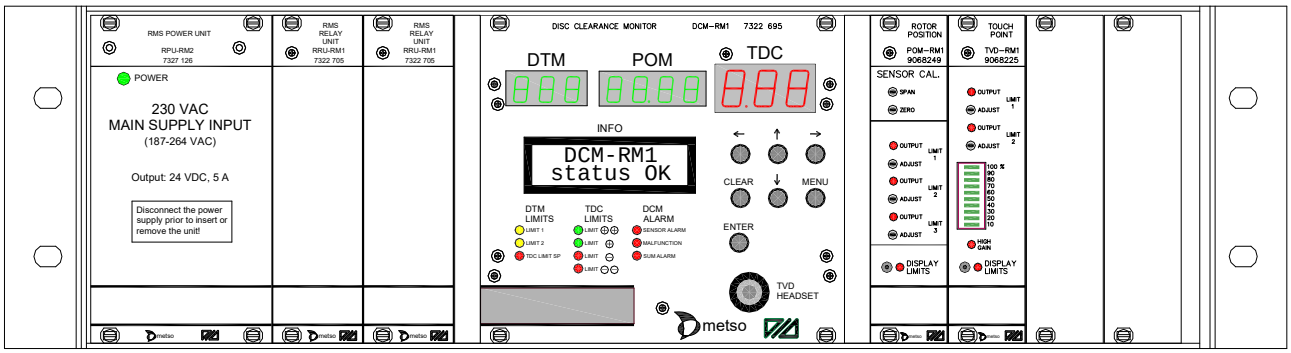
dametric

CALIBRATION
RMS–RS1



Valmet

Contents

1. CALIBRATION OF TDC SENSOR

1.1 GENERAL

The TDC sensor shall always be calibrated when changing segments or after attaching a new sensor. A coarse calibration shall be performed when first calibrating.

The sensor shall then be re-calibrated at intervals dictated by the grinding process. Re-calibration shall be carried out more often if major segment (and sensor) wear is present than in the case of low segment wear. Re-calibration must be performed due to the fact that sensor wear results in a slight change of the TDC value, but mostly because the disc segment rotor arms change shape. Rounded arm-edges result in reduced amounts of magnetic steel in front of the sensor, which is interpreted as a larger disc clearance.
When re-calibrating, one should never use a coarse calibration approach, since this erases the previous calibration. It is preferable to work from the previous calibration and in this way make a minor adjustment.
The sensor is calibrated with an unloaded machine and at a stable temperature. This means that the machine shall either be cold, that is with no steam pressure, or fully warmed up with steam pressure. The latter method is preferred.
Since both flat and conical segments are used, extra attention must be paid to the touch point during calibration. This is due to the fact that the touch points for loaded and unloaded machines are different. During contact, the actual distance in front of the sensor is 0.40 mm for a flat refiner, and 0.60 mm for a Conflo-refiner. This is according to measurements previously performed.
Zero calibration is therefore performed with a slit of 0.40 and 0.60 mm respectively in an unloaded refiner.
Calibration of the TDC sensor can be done in two ways:
In the basic version, the buttons on the DCM unit are used and this is selected by setting the digital input “DI-DCASE” to constant high (jumper to +24 VDC).
Optionally, external calibration switches can be used and then all four of the digital inputs are used. A selector switch activates one of the inputs “DI-DCASC” (coarse=coarse calibration), “DI-DCASS” (span=amplification calibration) or “DI-DCASZ” (zero=zero calibration) and a push button activates “DI-DCASE” (set=activating).
In this situation, the selector switch must always be activated before the push button.

1.2 CALIBRATION SWITCH

In the basic version, calibration is carried out with the help of buttons on the DCM unit as follows:

```
TDC Cal: Zero
0.50 mm TVD=50%
```

Press “MENU” and browse with “↑” and “↓” until the desired calibration type is shown, “TDC Cal Zero”, “TDC Cal Span” or “TDC Cal Coar.”.

```
TDC Cal: Zero
   Cal 0.50
```

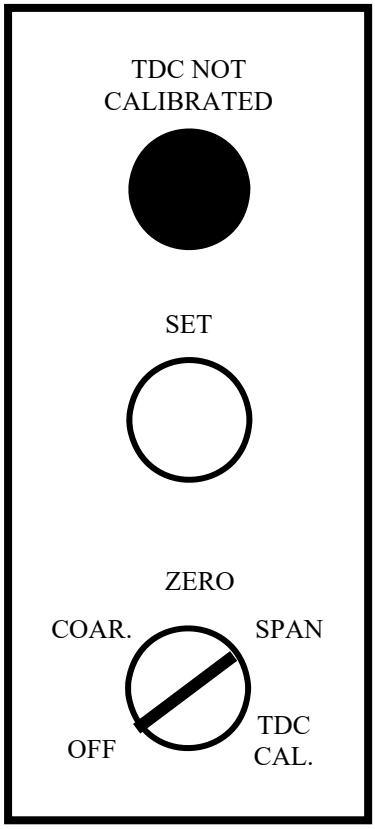
Press “ENTER” to carry out the calibration.
A dialogue screen asking if you wish to save the calibration will be shown and in order to eliminate the risk of involuntary calibration, “No” is the default.

```
TDC Cal: Zero
   Save?  No
```

Press “→” or “←” to change to “Yes” and press “ENTER” to save the calibration.

```
TDC Cal: Zero
   Save?  Yes
```

An external calibration switch can be connected as an accessory. If this function is chosen, calibration cannot be performed using the push buttons on the DCM unit.



Choose the calibration position with the knob and press “ENTER” to carry out the calibration.

When the calibration is saved, a message is shown on the DCM unit for about one second.

```
TDC Cal: Zero
Calibrated
```

If the calibration is not accepted, an error message is shown:

```
TDC Cal: Zero
Calibrate Error!
```

To acknowledge this message, press “ENTER” or if an external calibration switch is present, the error message is acknowledged by changing the knob position.
Calibration is not accepted in the event of abnormal signals or excessive amplification levels (if, for example, an amplification calibration is carried out in the same axial position as the zero calibration, which would result in an interminable amplification).

1.3 PRELIMINARY CHECK

Check that the TDC sensor is mounted in line with the segment surface and that it is tightened as indicated in the instructions. Note the torque for the sensor. If this is exceeded the segment can be pressed out or the sensor can extend into the disc area. In both cases, the result is a faulty display of the disc clearance with reduced operability as a consequence.

1.4 COARSE CALIBRATION

Coarse calibration shall only be carried out when a new TDC sensor is calibrated for the first time.
If the sensor is to be re-calibrated, go directly to zero calibration.

```
TDC Cal: Coarse
3.80mm (Sensor?)
```

Choose coarse calibration. The display shows a pre-set coarse calibration value of 3.80 mm and "(Sensor?)" which should remind you to only carry out this calibration on a new sensor.
The value is 5.00 mm for the 4.50 mm range.

Run the rotor to the rear end position, that is, a disc clearance greater than 8 mm.
If the rotor position value is lower than the "POM Coarse IL" parameter, the display will indicate "POM low". Move the rotor further apart and try again.

Carry out the coarse calibration and the DCM unit is calibrated to the pre-set calibration value.

1.5 ZERO CALIBRATION

```
TDC Cal: Zero
0.50mm TVD=50%
```

Choose zero calibration. The display shows a pre-set zero calibration value (normally 0.50 mm) and the chosen TVD limit for determining the touch point position.

```
TDC Cal: Zero
0.50 rPOM=-0.10
```

Run the grinding discs slowly together while rotating until the touch point is detected and the TVD level exceeds the set TVD limit. The display then changes to show a relative axial position on the lower row (–0.10 mm), which means that the discs are 0.10 mm inside the axial position for zero calibration.

Immediately move the discs apart until the relative POM shows 0.00 mm.

Carry out zero calibration and the DCM unit is calibrated to the pre-set calibration value.

1.6 SPAN CALIBRATION

```
TDC Cal: Span
1.50 rPOM=+1.00
```

Choose span calibration. The display shows a pre-set calibration value (normally 1.50mm) and the axial position relative to the touch point position.

Move the discs apart until the relative POM shows +1.00.

Carry out span calibration and the DCM unit is calibrated to the pre-set calibration value.

1.7 CALIBRATION TERMINATED (when an external calibration switch is present)

Turn the key switch for TDC Calibration to the "TDC CALIBRATE" position.

Turn the "TOUCH POS." key switch to the off position.

Press the "SET" switch. The indicator light "TDC NOT CALIBRATED" is turned off.

Turn the key switch for TDC Calibration to the "OFF" position.

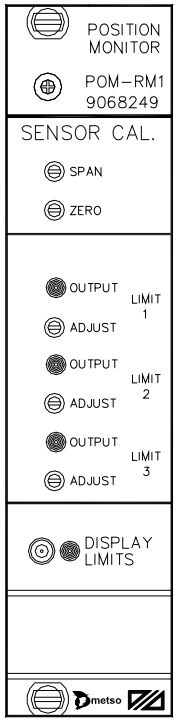
1.8 CALIBRATION VALUES

The result of the TDC calibration can be read from the parameter list.

Press MENU and step to the “DTM Cal: Zero” parameter.
Press the down button to view the “TDC Cal. Result Zero” and the “TDC Cal. Result Span” parameters.
The Zero value indicates the signal response between the coarse and the zero calibration.
A low value around or less than 1 indicates a segment material with good magnetic properties or a plate pattern with wide bars and narrow grooves. A high value indicates the opposite. The value is limited between 0.3 and 2.7 and if outside this range, a zero calibration error will occur.
This can happen with bad segment material or if the zero point is taken with a too large gap.
The Span value indicates the signal response between the zero and the span calibrations and is normally around 1.0.

2. CALIBRATION OF ROTOR POSITION SENSORS

The calibration of rotor position sensors is done in conjunction with installation and when changing sensors (POT-50) or measuring cards (POM-RM1). The sensor’s mechanical stroke is limited to 50.0 mm, which simplifies the calibration of sensors in relation to the current measurement card.



Remove the sensor from the holder on the rotor assembly.

Read the rotor position value “POM” on the DCM unit.

Press and hold the measuring tip in its innermost position

Adjust the “ZERO” potentiometer on the POM-RM1 card until a value of 0.00 mm is attained.

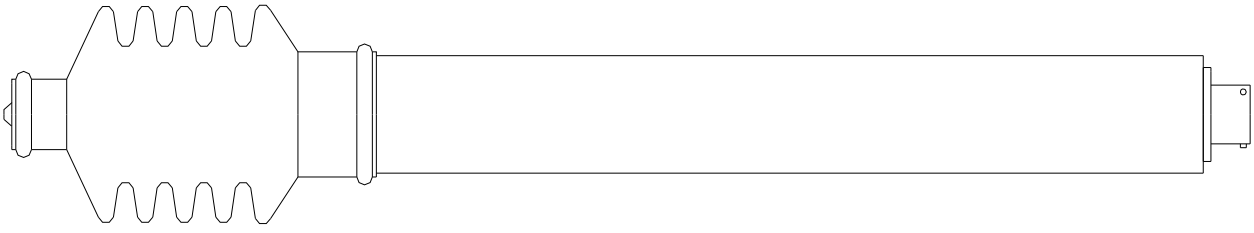
Release the measuring tip to its outermost position.

Adjust the “SPAN” potentiometer on the POM-RM1 card until a value of 50.00 mm is attained.

Run, with stationary grinding discs, until contact is made.

Mount the sensor in the holder and manually adjust until the desired rotor position is attained during stationary disc contact. Fix the sensor in this position.

The sensor is mechanically limited to a 50 mm stroke, which is why it is required that the inner end position is not forced during operation.



3. CALIBRATION OF DISC TEMPERATURE

The DCM unit is calibrated together with the KB-02 junction box. This is mounted in proximity to the sensor and contains precision resistors and switches for simple calibration. The resistors are connected via the switches and replace the PT-100 element inside the TDC sensor.
Calibration takes place via push buttons on the front of the DCM-RM1.

DCM-RM1:

Press "MENU" and browse with "→" until "DTM Cal Zero" is displayed. The lower row shows the measured temperature with the existing calibration values.

KB-02 junction box

Loosen the cover.
Place switch SW1 in the "CALIBRATION" position.
Place switch SW2 in the "0" position.

DCM-RM1:

Press "ENTER" to start the zero calibration and press "ENTER" again to save the calibration. Press "→" or "←" to change to "Yes" and press "ENTER" to confirm.
If "ENTER" is pressed while in the "no" position, no calibration is saved.

```
Dtm Cal: Zero
Cal 0 ºC
```

```
Dtm Cal: Zero
   Save?  Yes
```

KB-02 junction box

Place switch SW2 in the "225" position.

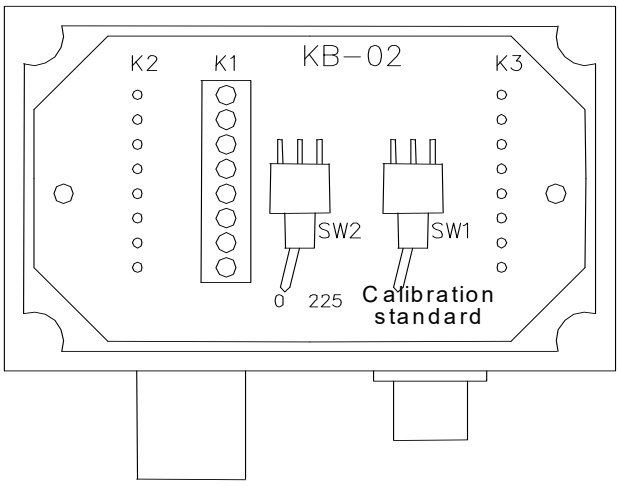
DCM-RM1:

Press "↓" to choose amplification calibration. Press "ENTER" to start the calibration and press "ENTER" again to save the calibration. Press "→" or "←" to change to "Yes" and press "ENTER" to confirm.
If "ENTER" is pressed while in the "no" position, no calibration is saved.
Press "CLEAR" to return to normal display.

```
Dtm Cal: Span
Cal 225 ºC
```

KB-02 junction box

Place switch SW1 in the "NORM" position.
Place switch SW2 in the "0" position.
Replace the cover.



4. ADJUSTMENT OF ALARM LIMITS FOR DCM UNIT

TDC MEASUREMENT

- Calibration takes place via push buttons on the front of the DCM-RM1.

Press "MENU" and then "→" until "DCM Lim. TDC ++" is displayed. The lower row shows the measured and set alarm limit.

```
DCM Lim: TDC++
     1.20 mm
```

Press "ENTER".
"Edit:" appears to show that the value can be adjusted. Move up or down with "↑" and "↓" to the desired value within the range from 0 to 3.00 mm.

```
DCM Lim: TDC ++
Edit: 1.20 mm
```

Press "ENTER" to save and a prompt asking if the value is to be saved is displayed.
Press "ENTER" if the value is not to be saved or first press "←" or "→" to change to "Yes" and then press "ENTER" to save.
"Saving…" is displayed for about one second.

```
DCM Lim: TDC ++
Save?      No
```

```
DCM Lim: TDC ++
Save?      Yes
```

Press "↑" or "↓" to choose the remaining alarm limits, "TDC +", "TDC-SP", "TDC -" and "TDC - -".

DTM MEASUREMENT (Disc Temperature)

- The same process as above.
- Browse with "↑" or "↓" between the alarm limits "DTM1" and "DTM 2". The parameter can be set within the range of 0 to 250 ºC.

```
DCM Lim: DTM1
     180 ºC
```

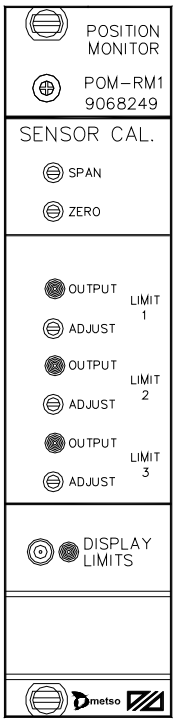
5. ADJUSTMENT OF ALARM LIMITS FOR RMS UNITS

- General
  Choose the RMS unit for the DCM display by pressing "DISPLAY LIMITS" on the desired unit. The display is activated approx. 10 min. after the "DISPLAY LIMITS" switch has been pressed, and is then automatically turned off. The function is also terminated if "CLEAR" or "MENU" is pressed.
  The display shows the unit's measurement values and alarm limits settings. However, only 2 alarm limits can be displayed simultaneously, so if the unit has more than 2 alarm limits there are two pages:
  ">" indicates that alarm limit 3 and possibly 4 are displayed when "→" is pressed,
  "<" indicates that alarm limits 1 and 2 are displayed when "←" is pressed.

  In the top right "D" or "E" is displayed.
  "E" means that the unit is connected (Enabled) to the DCM unit's sum alarm function,
  "D" means that unit does not affect the sum alarm (Disabled).

6. ADJUSTMENT OF THE POM-RM1

Select the POM unit on the DCM display by pressing “DISPLAY LIMITS” on the POM unit. The DCU display shows the measured value and set maximum limit values.




```
POM=50.00 mm    D
1=39.0 2=25.0   >
```

The measured value is indicated by “POM”

Adjustment, limit 1. Read the value at “1=” and adjust the ”LIMIT 1” potentiometer to the desired value.

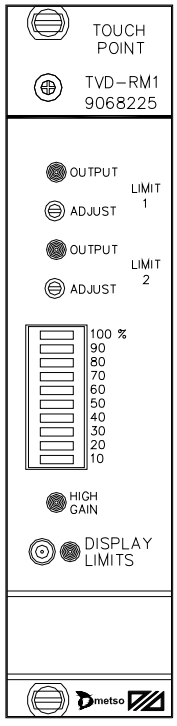
Adjustment, limit 2. Read the value at “2=” and adjust the “LIMIT 2” potentiometer to the desired value.

Adjustment, limit 3. Press “→” to show page 2. Read the value at “3=” and adjust the “LIMIT 3” potentiometer to the desired value.

Alarm limits can be adjusted within the range 0 to 50.0 mm.

7. ADJUSTMENT OF THE TVD-RM1

Select the TVD unit for the DCU display by pressing “DISPLAY LIMITS” on the TVD unit. The DCU display shows the measured value, and the set values for limit 1 and limit 2.




```
TVD= 0 %        D
1=50 2=25
```

The measured value is indicated by “TVD”

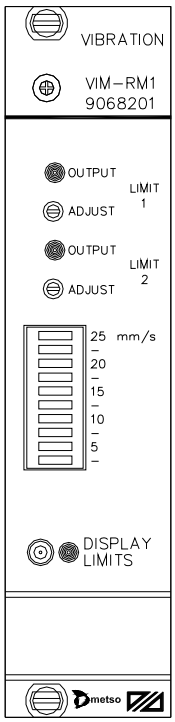
Adjustment, limit 1. Read the value at “1=”

and adjust the “LIMIT 1” potentiometer to the desired value.

Adjustment, limit 2. Read the value at “2=” and adjust the “LIMIT 2” potentiometer to the desired value.

Alarm limits can be adjusted within the range 0 to 100 %.

8. ADJUSTMENT OF THE VIM-RM1 (optional unit)



Select the VIM unit for the DCU display by pressing “DISPLAY LIMITS” on the VIM unit. The DCM display shows the measured value and set maximum limits.

The measured value is indicated by “VIM”

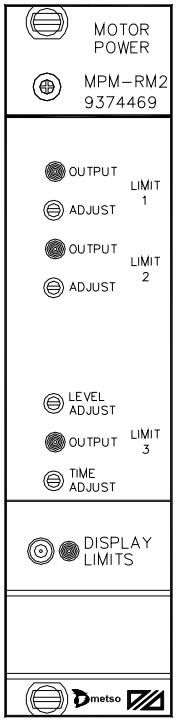
```
VIM= 2 mm/s     D
1=10 2=8
```

Adjustment, limit 1. Read the value at “1=” and adjust the ”LIMIT 1” potentiometer to the desired value. The value can be within the range 0 to 25 mm/s.

Adjustment, limit 2. Read the value at “2=” and adjust the “LIMIT 2” potentiometer to the desired value.

Alarm limits can be adjusted within the range 0 to 25 mm/s.

9. ADJUSTMENT OF THE MPM-RM2 (optional unit)



Select the MPM unit for the DCU display by pressing “DISPLAY LIMITS” on the MPM unit. The DCM display shows the measured value and the set maximum limits.
All displayed values are recalculated in relation to the pre-programmed nominal main motor power. (See also the RS system programming manual, PRO-RS1.)

The measured value is indicated by “MPM”.

```
MPM= 5.5 MW     D
1=4.0 2=2.0     >
```

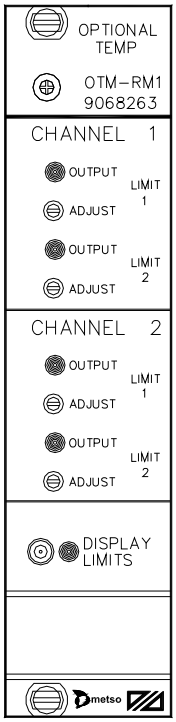
Adjustment, limit 1. Read the value at “1=” and adjust the “LIMIT 1” potentiometer to the desired value. The value can be within the range 0 to 100% of the nominal main motor power.

Adjustment, limit 2. Read the value at “2=” and adjust the “LIMIT 2” potentiometer to the desired value. The value can be within the range 0 to 100% of the nominal main motor power.

Adjustment, limit 3, Level. Press “→” to show page 2. Read the value at “3=” and adjust the “LEVEL ADJUST” potentiometer to the desired value. The value can be within the range 0 to the maximum main motor power.

Adjustment, limit 4, Time. Read the value at “4=” and adjust the “TIME ADJUST” potentiometer to the desired value. The value can be between 0 and 10.0 s.

10. ADJUSTMENT OF THE OTM-RM2 (optional unit)



Up to 2 units can be used in the RMS system.
Select the OTM unit for the DCU display by pressing “DISPLAY LIMITS” on the OTM unit.
The DCU display shows the measured value and set maximum limits. All displayed values are recalculated in relation to the pre-set nominal temperature, 100 or 200 °C. The nominal temperature for each OTM card is set with the DIP switch on the card.

```
OTM=55  =45°C  D
1=55 2=65      >
```

Measured value for channel 1 is indicated by “OTM 1”.
Measured value for channel 2 is indicated by “OTM 2”.

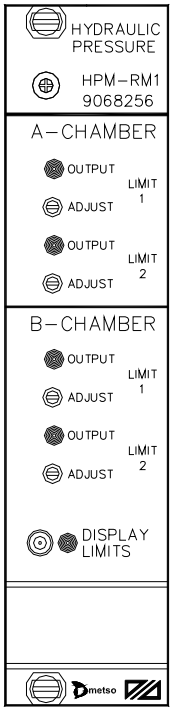
Channel 1, Alarm limit 1. Read the value at “1=” and adjust the “CHANNEL 1, LIMIT 1”potentiometer to the desired value. The value can be between 0 and 100% of the nominal temperature.

Channel 1, Alarm limit 2. Read the value at “2=” and adjust the “CHANNEL 1, LIMIT 2” potentiometer to the desired value. The value can be between 0 and 100% of the nominal temperature.

Channel 2, Alarm limit 1. Press “→“ to show page 2. Read the value at “3=” and adjust the ”CHANNEL 2, LIMIT 1” potentiometer to the desired value. The value can be between 0 and 100% of the nominal temperature.

Channel 2, Alarm limit 2. Read the value at “4=” and adjust the “CHANNEL 2, LIMIT 2” potentiometer to the desired value. The value can be between 0 and 100% of the nominal temperature.

11. ADJUSTMENT OF THE HPM-RM1 (optional unit)



Select the HPM unit for the DCU display by pressing “DISPLAY LIMITS” on the HPM unit. The DCM display shows the measured value and set maximum limits. All displayed values are recalculated in relation to the pre-programmed A and B chamber pressure. The nominal pressure for each chamber is programmed in the DCM unit. (See also the RS system programming manual, PRO-RS1.)

Measured value for channel 1 is indicated by “HPM 1”.

```
HPM=27 =37 ton D
1=55 2=65      >
```

Measured value for channel 2 is indicated by “HPM 2”.

Channel A, limit 1. Read the value at “1=” and adjust the “A-CHAMBER, LIMIT 1” potentiometer to the desired value. The value can be between 0 and 100% of the nominal pressure for chamber A.

Channel A, limit 2. Read the value at “2=” and adjust the “A-CHAMBER, LIMIT 2” potentiometer to the desired value.

Channel B, limit 1. Read the value at “3=” and adjust the “B-CHAMBER, LIMIT 3” potentiometer to the desired value. The value can be between 0 and 100% of the nominal pressure for chamber B.

Channel B, limit 2. Read the value at “4=” and adjust the “B-CHAMBER, LIMIT 4” potentiometer to the desired value.

12. REVISIONS

Aug. 27, 2007.	Updated for DCM-RM1 version 1.60 with higher measuring range.
Nov. 2, 2010.	The third DTM limit is replaced by a fifth TDC limit (TDC-SP).
April 5, 2014.	Valmet

13. CONTACT

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