



CAL5000™

Crimp Press Examiner Kit - User Manual -



ISO 9001 2008
FM64157

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Overview

The CAL5000 Examiner is a test and measurement device that validates the crimp press performance and capability to produce quality crimps. The CAL5000 is also an effective tool to set the crimp presses to a specific shut height under dynamic load.

The CAL5000 captures the peak force and shut height position of the press under dynamic load, simulating the working condition of the press in the production environment. The data is compiled into performance reports that confirm the press characteristic performance and capability. The CAL5000 is an absolute measurement device that includes a feature to calibrate certain models of crimp force monitors.

Crimp Press Analysis - Crimp press components wear and degrade for various reasons including high usage, type of use, and level of maintenance. Degrading press conditions may go unnoticed and lead to crimp quality problems, unnecessary scrap material, and material rework. The CAL5000 Examiner is an effective tool that can be used to confirm if the press is capable to produce quality crimps, isolate crimp press problems, and support maintenance activities, while providing management with clear understanding for their crimp press capability. Press analysis is a procedure that should be performed on all crimp presses at regular time intervals, and following any press maintenance or repair to ensure a minimum CPK performance prior to releasing the crimp press back into production.

Crimp Force Monitor Calibration – Crimp Force Monitors analyze the crimp force signature relative to the learned reference signature for discriminating crimp defects. Certain applications require that the crimp force monitor is calibrated to provide an absolute peak force. The CAL5000 offers this feature.

The CAL5000 Examiner includes a Load Simulator, which has a precision force sensor and shut height sensor that are connected to the CAL5000 Controller. The CAL5000 Examiner can be installed and setup within minutes, and provide a clear understanding of the press capability supported by performance reports, empirical data, and statistical results.

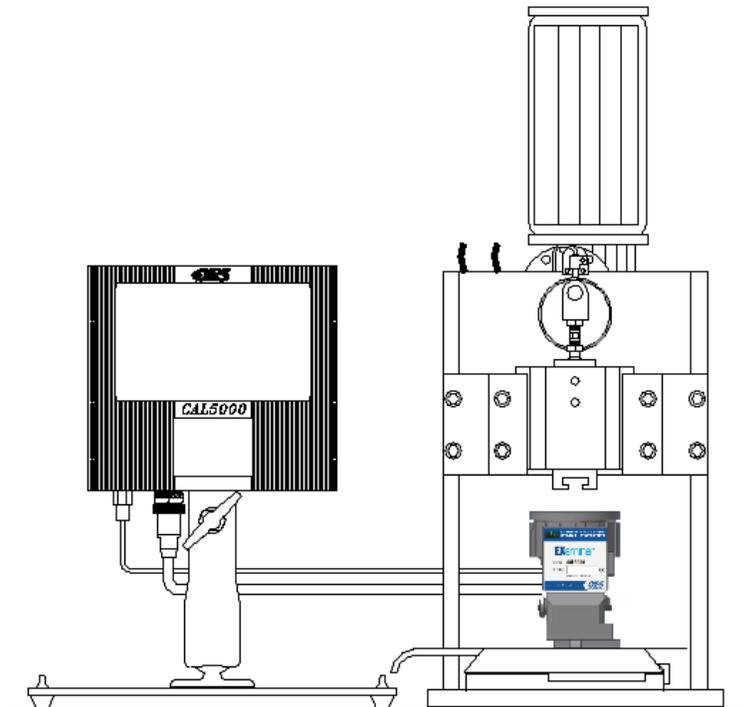
The CAL5000 Examiner Kit is a calibrated system performed by an independent and accredited lab. The recommended frequency for re-inspection, re-calibration, and re-certification is annually, conforming to most manufacturing quality systems.

Components



The CAL5000 Kit Includes:

- Load Simulator (LS)
- Controller c/w mtg. stand
- Mini Keyboard
- Connecting Cables (power cord, sensor cables, serial cable)
- Carrying/Shipping Case
- User Manual



Installation & Setup – Press Shut Height

1. Ensure the Press is switched to the OFF position and install the CAL5000 Load Simulator (LS) into the crimp press.



Note that CAL5000 Load Simulator has a spacer block, which is installed for crimp presses with shut height of 135.78mm. Remove this spacer block for crimp presses with 119.20mm shut height.

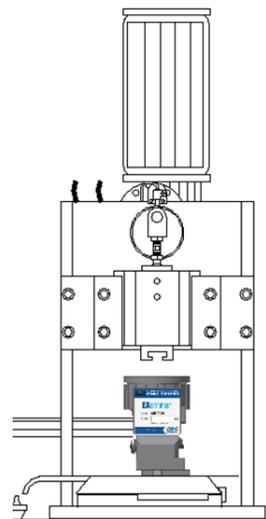
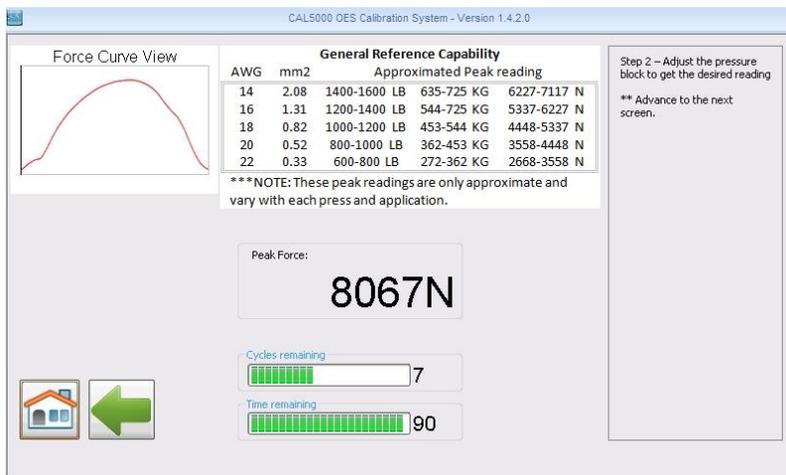
2. Ensure the LS is properly aligned with the ram of the press, secure the LS in place with locking mechanism or magnetic base. Manually cycle the press to ensure that the press will cycle through 360 degrees without jamming. Some resistance is normal as the press cycles through bottom of the press shut height cycle. The crimp press ram will contact the LS, which compresses through the bottom of the press stroke. Adjust the press shut height as required to achieve the desired load through the bottom of the press stroke.

3. Lower the crimp press protective safety shields.



Do not apply power to the Press until the safety shields are in place. Failure to do so is a safety hazard to the operator.

4. Connect the CAL5000 Examiner Unit to the LS, plug in, turn ON the CAL5000, and select Press Analysis.
5. Apply power and cycle the crimp press automatically and under power. Adjust the press shut height to a peak force between 8000 to 8100 N within 20 cycles in 100 seconds. If the shut height is not set, return home and repeat until complete. This will result in a shut height of 135.78mm with spacer block installed (119.20mm without spacer block installed).
6. Lock the press shut height adjustment on the press and cycle it 20 times ensuring the peak force is between 8000 to 8100 N. The press is now calibrated to a shut height of 135.78mm.



Crimp Press Analysis

1. Following installation of the Load Simulator into the crimp press, and applying power to the CAL5000, the following screen will appear:



2. Select Press Analysis.



3. Enter the appropriate information into the chart for your crimp press report requirements.

CAL5000 OES Calibration System - Version 1.4.2.0

<p>Rep Name: Rep Company</p> <p>Rep Contact: City Name Address email and phone number</p> <p>Inspector's Name: John Rep</p> <p>Press Calibration Variation Limits:</p> <p>Force:</p> <p>Lower Limit (%): 5</p> <p>Upper Limit (%): 5</p> <p>Force units: Newtons</p> <p>Distance:</p> <p>Lower Limit (µm): 30</p> <p>Upper Limit (µm): 30</p>	<p>Company</p> <p>Name: Test Company</p> <p>Info (Address): Somewhere Someplace</p>	<p>CFM Monitor</p> <p>TYPE: OES</p> <p>ID: CFM4100</p> <p>SERIAL NUMBER: 123456789</p>
<p>Machine</p> <p>TYPE: Brand name</p> <p>ID: name</p> <p>SERIAL NUMBER: 123456789</p>	<p>Crimp Press</p> <p>TYPE: Brandname</p> <p>ID: name</p> <p>SERIAL NUMBER: 123456789</p>	<p>Sensor</p> <p>TYPE: 240M03</p> <p>SERIAL NUMBER: 123456789</p>

Step 1 - Fill out all appropriate information.

** Advance to the next screen.



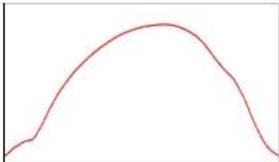
The Press Calibration Variation Limits have default settings of +/- 5% with Force Units in Newtons, and +/- 30 micrometers of distance. Adjustment of these settings will affect the CPK.

The Contact Information (Rep Name, Company) will be saved automatically on initial set-up. The additional information will be deleted in the event of power interruption in which case the test would need to be restarted.

Press Analysis - Set-up

CAL5000 OES Calibration System - Version 1.4.2.0

Force Curve View



General Reference Capability

AWG	mm2	Approximated Peak reading		
14	2.08	1400-1600 LB	635-725 KG	6227-7117 N
16	1.31	1200-1400 LB	544-725 KG	5337-6227 N
18	0.82	1000-1200 LB	453-544 KG	4448-5337 N
20	0.52	800-1000 LB	362-453 KG	3558-4448 N
22	0.33	600-800 LB	272-362 KG	2668-3558 N

***NOTE: These peak readings are only approximate and vary with each press and application.

Step 2 – Adjust the pressure block to get the desired reading

** Advance to the next screen.

Peak Force:

8067N

Cycles remaining



7

Time remaining



90



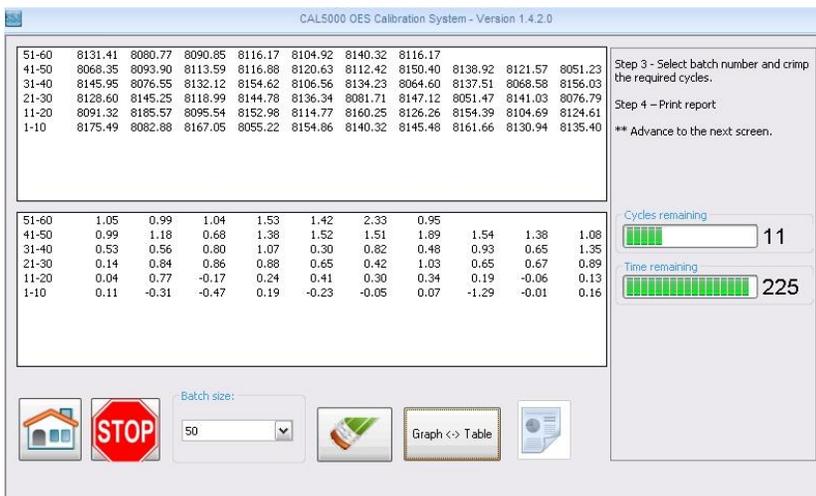

It is recommended to perform the press analysis tests within the peak force range that is typical of the wire size to simulate the conditions as close as possible to the crimping process. The Load Simulator peak force range can be adjusted from 2.67kN to 8.89kN (272-906kg) with the adjustment dial. A reference chart provides typical crimp force range relative to wire size. For example, .52mm (20 AWG) wire will typically have a force range of 3.55–4.44kN (362-453kg). To simulate this force range, cycle the press and observe the peak force. Adjust the Load Simulator to increase or decrease the peak force to achieve the desired peak force for the press analysis tests.



*It is recommended to only automatically cycle the press with the safety shield in place. Failure to do so may cause damage to the **CAL5000** or the operator.*

Press Analysis – Data Capture

Select the desired batch size (number of press cycles) for the press analysis tests.

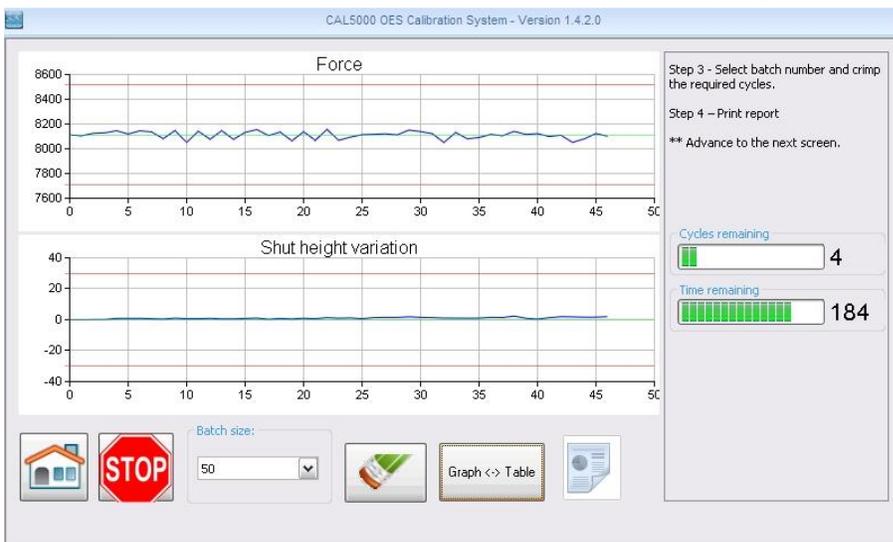


The CAL5000 Unit is now setup and ready to perform the press analysis. Begin to cycle the press continuously and at a consistent time interval (recommended 2 second delay between press cycles). The CAL5000 requires 50 cycles within 2 minutes as a “warm up” before the press analysis and data collection process starts.

Press analysis will start automatically following the warm up process. The peak force and shut height are captured and logged by the CAL5000 following each press cycle. Crimp press process trend is updated following each press cycle.

- Process Trend for peak force and shut height
- Data displaying the absolute value of the peak force and shut height

These charts display the data during the test. Press the <-> button to switch between charts. The data collection will continue until the batch size is reached. A progress bar provides a visual indication of the press analysis test progress.



Data Capture Finished

Number of cycles reached.
Press the report button to create a report.

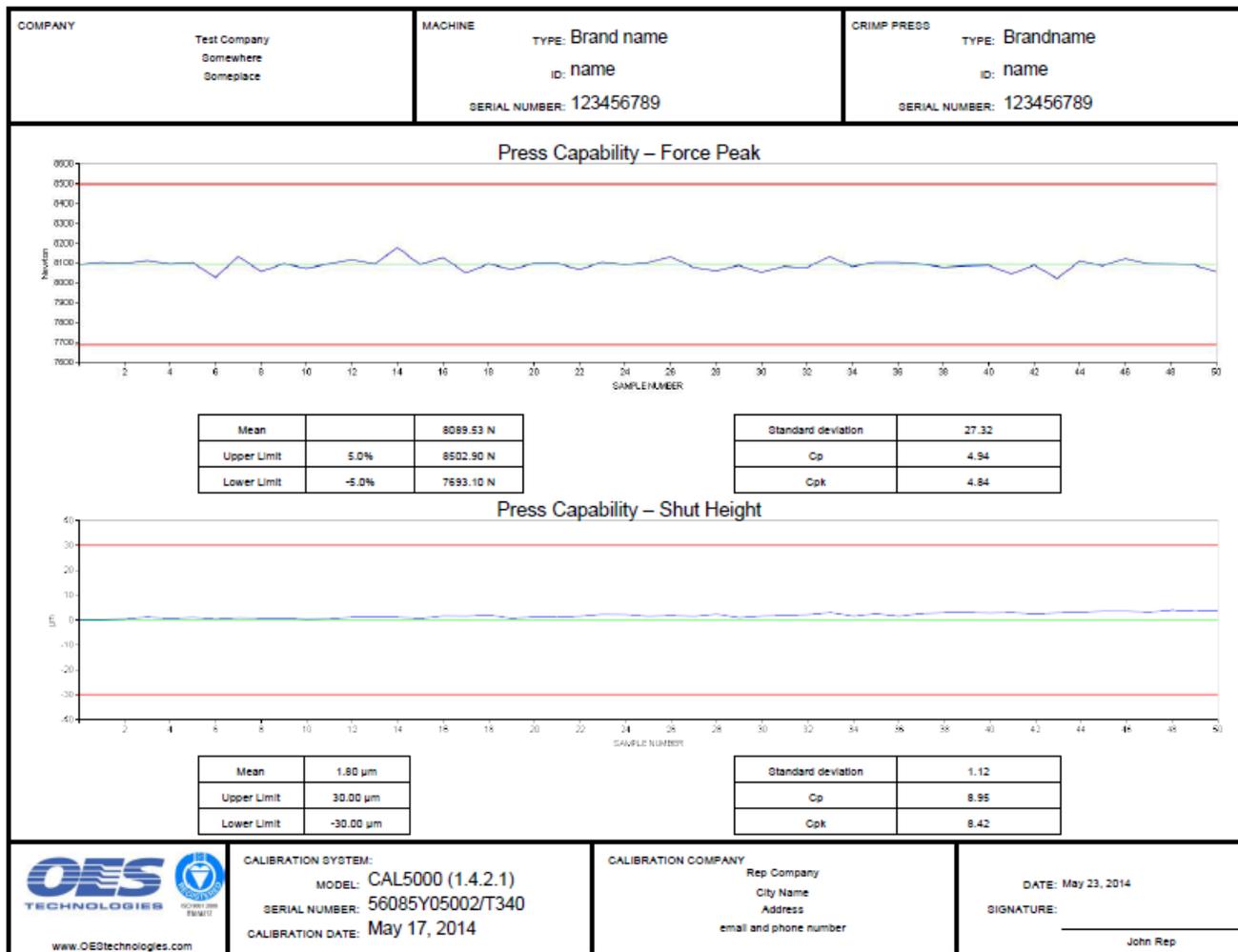
Press Analysis - Reports

Three reports are automatically generated following completion of the crimp press cycle performance test under simulated load. The reports are automatically compiled into PDF format and accessed by pressing the report ICON (bottom right).

- The trend report displays the process confirming the characteristics of the press – repeatability, drift, variation, and stability relative to the control limits.
- The data report provides the absolute values in engineering units (peak force and shut height) captured from each press cycle that formulate the press analysis reports.
- The histogram report confirms the press analysis results relative to the control limits.

Each report includes the statistical data confirming the press capability for peak force and press shut height – Mean, Standard Deviation, CP, & CPK.

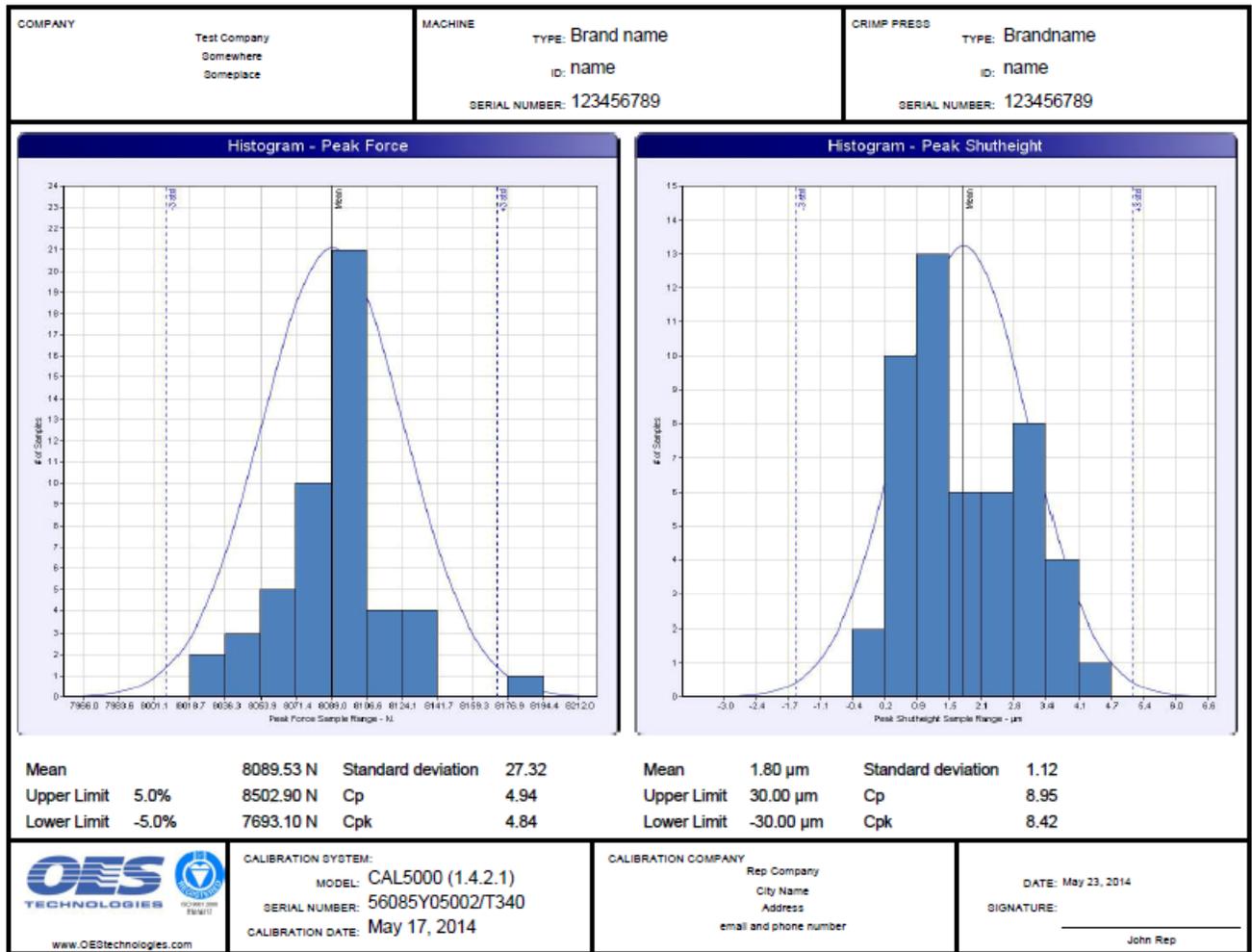
Press Analysis – Trend Report



Press Analysis - Data Report

<p>COMPANY</p> <p>Test Company Somewhere Someplace</p>	<p>MACHINE</p> <p>TYPE: Brand name ID: name SERIAL NUMBER: 123456789</p>	<p>CRIMP PRESS</p> <p>TYPE: Brandname ID: name SERIAL NUMBER: 123456789</p>																																																																
<p>Machine Capability Data - CAL5000</p> <p>Press Capability – Force (N)</p>																																																																		
<table style="width: 100%; border-collapse: collapse;"> <tr> <td>1 - 15</td><td>8101.64</td><td>8095.78</td><td>8110.55</td><td>8093.67</td><td>8101.17</td><td>8025.91</td><td>8132.59</td><td>8056.39</td><td>8095.07</td><td>8072.80</td><td>8094.60</td><td>8115.70</td><td>8093.67</td><td>8177.36</td><td>8090.62</td> </tr> <tr> <td>16 - 30</td><td>8127.66</td><td>8049.12</td><td>8094.37</td><td>8067.88</td><td>8096.01</td><td>8097.89</td><td>8066.94</td><td>8102.34</td><td>8089.45</td><td>8099.76</td><td>8131.65</td><td>8078.19</td><td>8059.44</td><td>8086.87</td><td>8052.17</td> </tr> <tr> <td>31 - 45</td><td>8082.65</td><td>8075.38</td><td>8132.12</td><td>8081.01</td><td>8101.64</td><td>8101.64</td><td>8093.43</td><td>8078.43</td><td>8084.76</td><td>8087.10</td><td>8043.26</td><td>8089.21</td><td>8020.52</td><td>8108.67</td><td>8084.29</td> </tr> <tr> <td>46 - 60</td><td>8121.57</td><td>8094.37</td><td>8093.20</td><td>8090.38</td><td>8055.69</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>			1 - 15	8101.64	8095.78	8110.55	8093.67	8101.17	8025.91	8132.59	8056.39	8095.07	8072.80	8094.60	8115.70	8093.67	8177.36	8090.62	16 - 30	8127.66	8049.12	8094.37	8067.88	8096.01	8097.89	8066.94	8102.34	8089.45	8099.76	8131.65	8078.19	8059.44	8086.87	8052.17	31 - 45	8082.65	8075.38	8132.12	8081.01	8101.64	8101.64	8093.43	8078.43	8084.76	8087.10	8043.26	8089.21	8020.52	8108.67	8084.29	46 - 60	8121.57	8094.37	8093.20	8090.38	8055.69										
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<p>Press Capability – Shut Height (µm)</p>																																																																		
<table style="width: 100%; border-collapse: collapse;"> <tr> <td>1 - 15</td><td>0.01</td><td>0.25</td><td>1.10</td><td>0.44</td><td>0.96</td><td>0.27</td><td>0.79</td><td>0.63</td><td>0.53</td><td>0.19</td><td>0.33</td><td>1.06</td><td>1.15</td><td>1.03</td><td>0.50</td> </tr> <tr> <td>16 - 30</td><td>1.57</td><td>1.47</td><td>1.96</td><td>0.55</td><td>1.15</td><td>1.00</td><td>1.44</td><td>2.27</td><td>2.17</td><td>1.42</td><td>1.75</td><td>1.40</td><td>2.34</td><td>0.82</td><td>1.52</td> </tr> <tr> <td>31 - 45</td><td>1.80</td><td>2.11</td><td>3.07</td><td>1.48</td><td>2.51</td><td>1.47</td><td>2.62</td><td>3.01</td><td>3.08</td><td>2.86</td><td>3.08</td><td>2.42</td><td>2.98</td><td>3.17</td><td>3.66</td> </tr> <tr> <td>46 - 60</td><td>3.64</td><td>3.21</td><td>4.08</td><td>3.64</td><td>3.90</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>			1 - 15	0.01	0.25	1.10	0.44	0.96	0.27	0.79	0.63	0.53	0.19	0.33	1.06	1.15	1.03	0.50	16 - 30	1.57	1.47	1.96	0.55	1.15	1.00	1.44	2.27	2.17	1.42	1.75	1.40	2.34	0.82	1.52	31 - 45	1.80	2.11	3.07	1.48	2.51	1.47	2.62	3.01	3.08	2.86	3.08	2.42	2.98	3.17	3.66	46 - 60	3.64	3.21	4.08	3.64	3.90										
1 - 15	0.01	0.25	1.10	0.44	0.96	0.27	0.79	0.63	0.53	0.19	0.33	1.06	1.15	1.03	0.50																																																			
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46 - 60	3.64	3.21	4.08	3.64	3.90																																																													
<p>www.OESTechnologies.com</p>	<p>CALIBRATION SYSTEM:</p> <p>MODEL: CAL5000 (1.4.2.1) SERIAL NUMBER: 56085Y05002/T340 CALIBRATION DATE: May 17, 2014</p>	<p>CALIBRATION COMPANY</p> <p>Rep Company City Name Address email and phone number</p>	<p>DATE: May 23, 2014</p> <p>SIGNATURE: _____ John Rep</p>																																																															

Press Analysis - Histogram



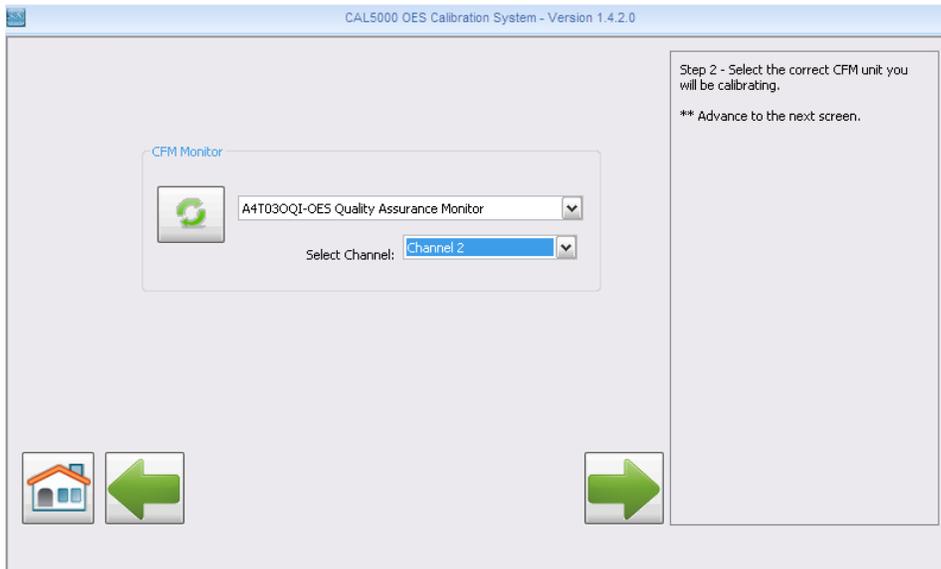
CFM Calibration



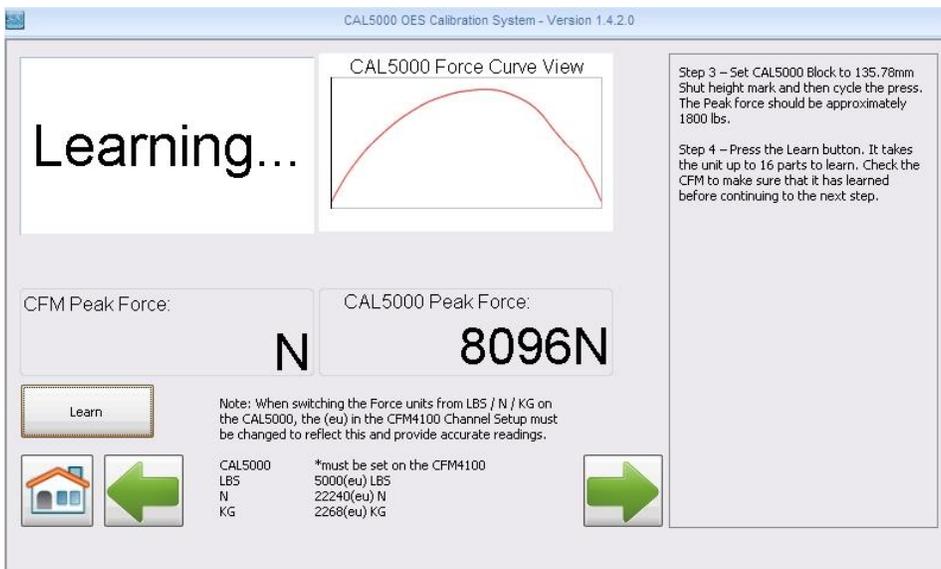
The CAL5000 Unit has capability to calibrate OES Crimp Force Monitors to absolute peak force. To perform this calibration procedure the CFM must be installed and operational on the crimping press.

1. Install the CAL5000 Unit and the LS.
2. Connect the CFM to the CAL5000 with the serial communication cable supplied with the CAL5000. (The CFM will automatically recognize the CAL5000 and default to the calibration mode).
3. Cycle the press at different peak force loads starting with high range (7.1kN-8.8kN) and then reduce the peak force by approximately .5kN and cycle the press again. The CAL5000 Unit will capture the absolute peak force following each crimp press cycle. Repeat this process to a lower limit of 1.76kN-2.7kN (180-275kg). The CAL5000 communicates this force data to the CFM, which automatically computes an offset for each force sample. The process of cycling the press at different loads will result in a multi-point calibration of the CFM to the CAL5000 Unit.

CFM Calibration – Setup



CAL5000 Unit connection with CFM is confirmed by display of model. Select CFM channel that is to be calibrated (CFM4200 has 2 channels). Advance to the next screen/step.



Adjust the CAL5000 LS to the upper force of the calibration range and then cycle the press. The CAL5000 will display the peak force. Place the CFM into Learn mode and cycle press to complete the CFM process.

CAL5000 OES Calibration System - Version 1.4.2.0

CFM Force Curve View

CAL5000 Force Curve View

CFM Peak Force: **4257N**

CAL5000 Peak Force: **8092N**

Note: When switching the Force units from LBS / N / KG on the CAL5000, the (eu) in the CFM4100 Channel Setup must be changed to reflect this and provide accurate readings.

<table border="0"> <tr> <td>CAL5000</td> <td>*must be set on the CFM4100</td> </tr> <tr> <td>LBS</td> <td>5000(eu) LBS</td> </tr> <tr> <td>N</td> <td>22240(eu) N</td> </tr> <tr> <td>KG</td> <td>2268(eu) KG</td> </tr> </table>	CAL5000	*must be set on the CFM4100	LBS	5000(eu) LBS	N	22240(eu) N	KG	2268(eu) KG	<input type="button" value="Home"/> <input type="button" value="←"/> <input type="button" value="→"/>
CAL5000	*must be set on the CFM4100								
LBS	5000(eu) LBS								
N	22240(eu) N								
KG	2268(eu) KG								

Step 3 – Set CAL5000 Block to 135.78mm Shut height mark and then cycle the press. The Peak force should be approximately 1800 lbs.

Step 4 – Press the Learn button. It takes the unit up to 16 parts to learn. Check the CFM to make sure that it has learned before continuing to the next step.

The CFM force range must be manually set to the following chart before starting the calibration process.

CAL5000 eu	*must be set on the CFM4100/CFM4200
N	22.24KN
KG	2268 KG
LBS	5000 LBS

CFM Calibration – Capture Data

CAL5000 OES Calibration System - Version 1.4.2.0

Reference Force - Actual Force

Sample	CAL5000	CFM
1	1796	1361
2	1657	1268
3	1551	1195
4	1453	1130
5	1351	1057
6	1254	994
7	1170	937
8	1074	870
9	989	812
10	890	741
11	813	686
12	727	628
13	644	569
14	563	512
15	479	451
16	402	392

Step 5 – Previous calibration data must be cleared from the CFM

Step 6 – Now cycle through a scale starting at 1800 lbs down to 400 lbs. This will give you approximately 16 readings.

To do this adjust the CAL5000 block in 2 click increments counter clockwise.

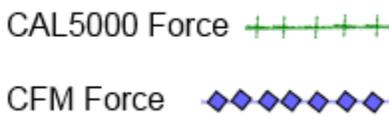
See the offset of the readings from the CFM currently versus the readings from the CAL5000.

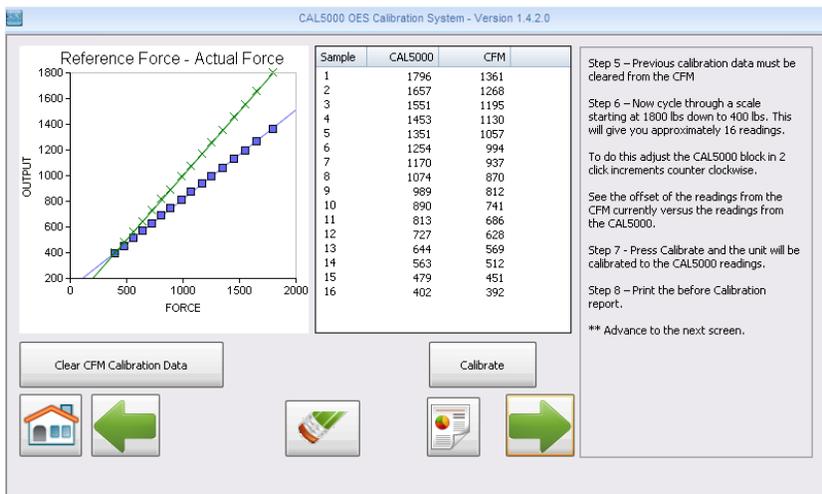
Step 7 - Press Calibrate and the unit will be calibrated to the CAL5000 readings.

Step 8 – Print the before Calibration report.

** Advance to the next screen.

Cycle the press at the high force range (1800lbs/8000N/816KG). Then reduce force (typically 2 click increments counter clockwise on the LS) for small reduction in the peak force. Continue this step of cycling the press once then reducing the force. A calibration is typically 8-16 samples through the force range to a low force range (400lbs/1780N/180KG) as shown.



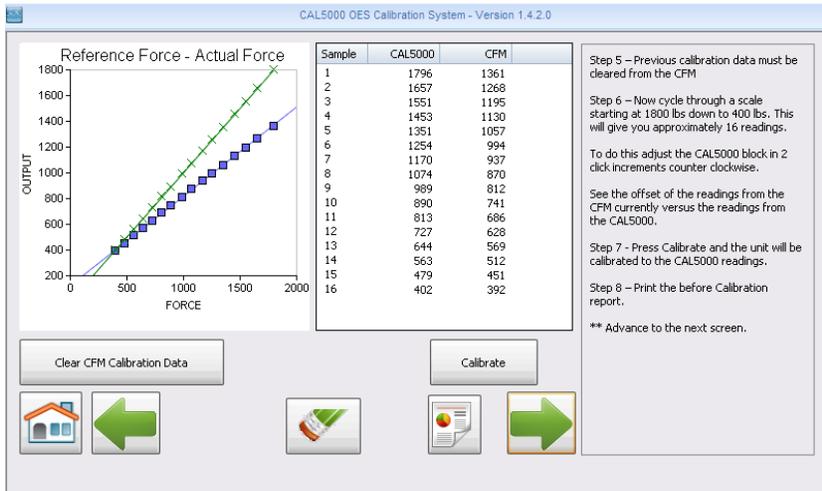


The chart displays the force data result difference between CAL5000 Unit and CFM before calibration.

Press **Calibrate** and the CFM will be calibrated to the CAL5000 unit readings.

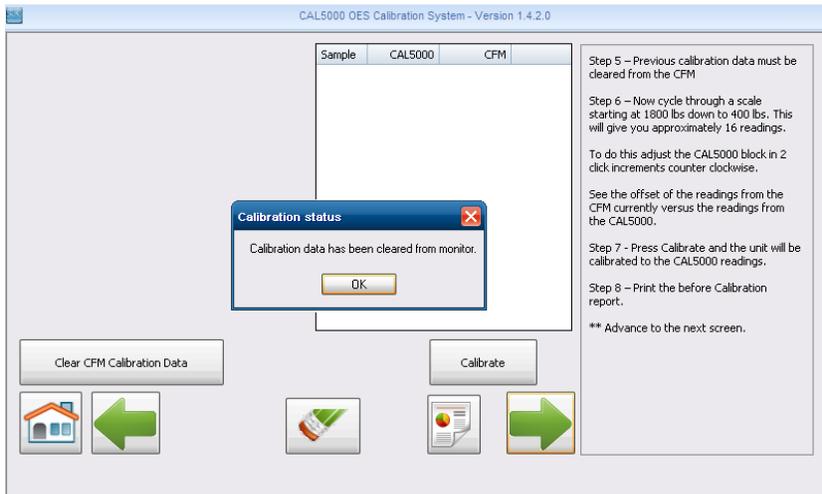
CAL5000 Force

CFM Force



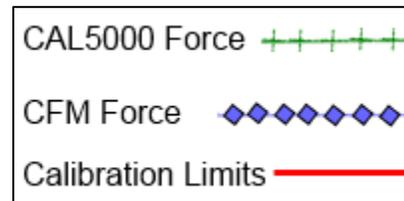
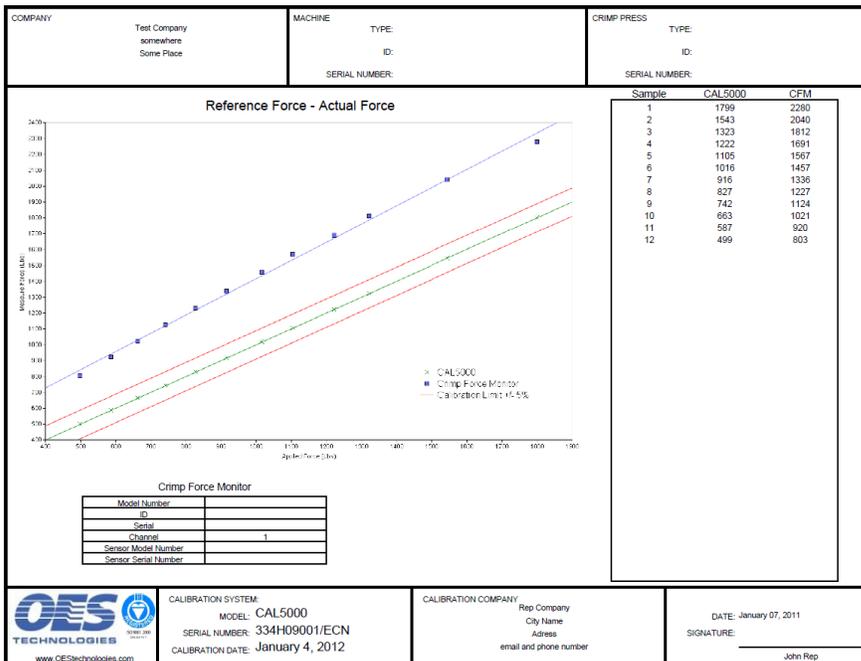
CFM calibration can be validated by repeating the process, adjusting the LS to increase the force from 400 to 1800lb while observing the results of the CAL5000 and the CFM.

The charts and samples from the CAL5000 Unit and the CFM should be linear and near equal. If necessary, repeat the process to achieve this result.

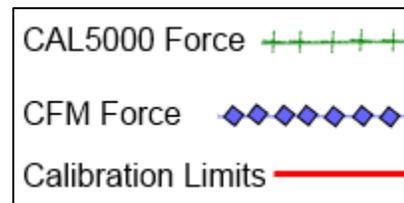
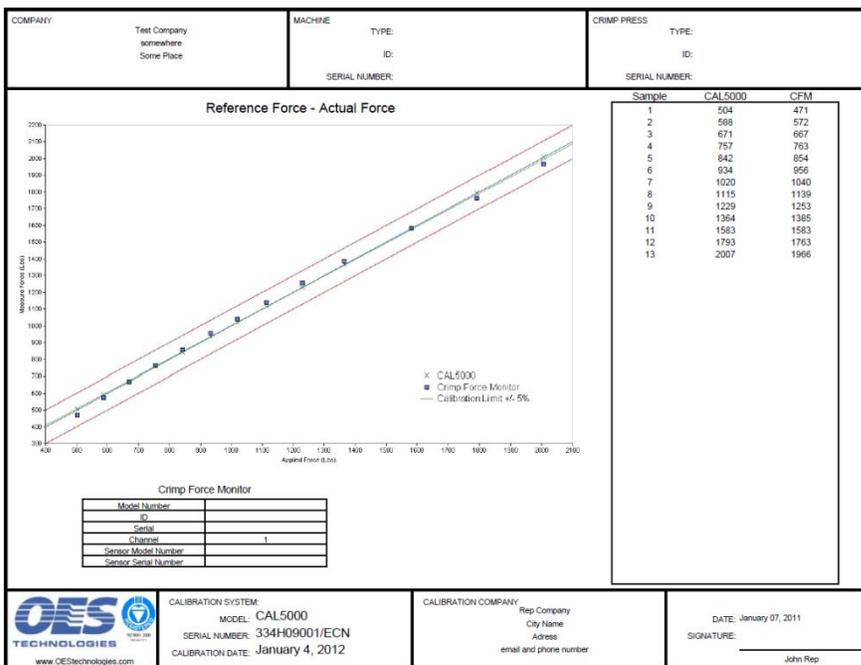


To repeat the CFM calibration procedure, the “Clear CFM Calibration Data” step must be done and then the calibration can be repeated.

Example Reports Before Calibration



After Calibration



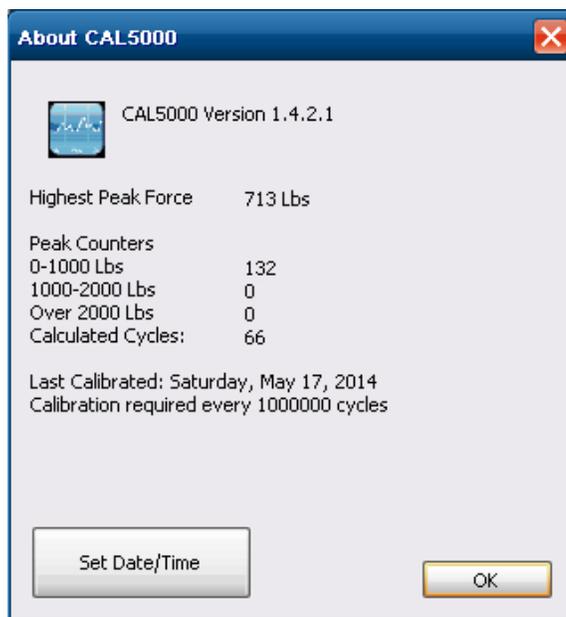
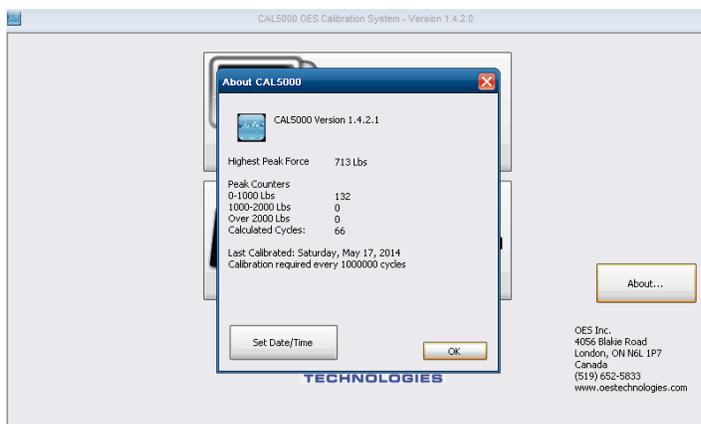
CAL5000 Service and Re-Calibration

This CAL5000 service and re-calibration is performed at time intervals consistent with the customer's quality system which is typically on an annual basis, or after the maximum number of cycles has been reached. The CAL5000 is return shipped to OES, Canada following standard Return Material Authorization (RMA) procedures. The CAL5000 service involves two steps:

1. OES inspection and replacement of wearing components, lubrication and testing, and installation of any software revisions.
2. System re-calibration performed by a third party accredited lab. The recalibration procedure involves a 4 point calibration for shut height and peak force.

Following re-calibration, the CAL5000 is returned to the customer with a new calibration sticker attached to the LS and with the re-calibration documentation.

The CAL5000 automatically tracks the accumulated cycle counts and also count of the peak impact force. This information supports OES service and maintenance.



For additional information, please contact:

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CAL5000 Specifications

CAL5000 CONTROLLER	
Dimensions	185mm(H) x 198mm(W) x 76mm(D)
Weight	2.04kg
Display	Color Touch Screen 94mm(H) X 152mm(W)
Supply Voltage	Ext. Converter 100-240VAC, 50-60Hz / 24VDC
CAL5000 SIMULATOR BLOCK	
SHUT HEIGHT	
Without spacer	119.20mm @ 8kN (816kg)
With spacer	135.78mm @ 8kN (816kg)
Measurement Range	+/- 0.500mm
Resolution	1.0µm
FORCE	
Calibration Range	2.67kN – 8.89kN (272kg – 907kg)
Max. Range	22.2kN (2264kg)
Resolution	1.3N (0.1kg)

CAL5000 Examiner Kit - Parts List

Description	Part Number	Photo/Illustration
CAL5000 Examiner Unit	CAL-CNTRL	
Load Simulator	CAL-AU107E	
Cable – Connect	CAL-INT	
Power Supply	CPM5-DC	
Power Cord - Europe	HW179D+	
Keyboard – Mini USB	AU604A+	
Carry Case	HW186H	
Mounting Bracket	CAL-EN014E	

Product Warranty

1. The warranty coverage is for materials and labor for a period of one year from the date of purchase.
2. The warranty excludes re-calibration service.
3. The warranty is limited to the repair of **OES, Inc. PRODUCTS** only.
4. Any warranty repair performed during the two year period does not extend the warranty period.
5. **OES** warrants the products to be free from defects in materials and workmanship under normal use and service, but **OES'** obligations are limited to repair and replacement of the part(s) shown to be defective at the time of shipment. **OES'** liability shall not exceed the contract price for the goods claimed to be defective and **OES** shall not be liable for any special or consequential damages.
6. **OES PRODUCTS** returned for repair that are damaged by dropping, misuse, abuse, negligence, water damage, disassembly or accident (all determined by **OES**) will have the warranty voided and repair charges will be paid by the customer.
7. **OES** return policy for warranty and non-warranty repairs is as follows:

All goods claimed as warranty repair shall be returned by the customer to **OES** or a **OES** sales representative prepaid by the customer, including customs brokerage charges, complete with all necessary customs documentation.



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