Nordson
MEASUREMENT & CONTROL

Snack Foods

InfraLab Series 9

Best Practice Guidelines

Publication Reference : 126/17139-01

Issue A

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Proprietary Notice

InfraLab Series 9 Snack Foods – Best Practice Guidelines

Part Number: 126/17139-01

Issue: A

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Contact NDC

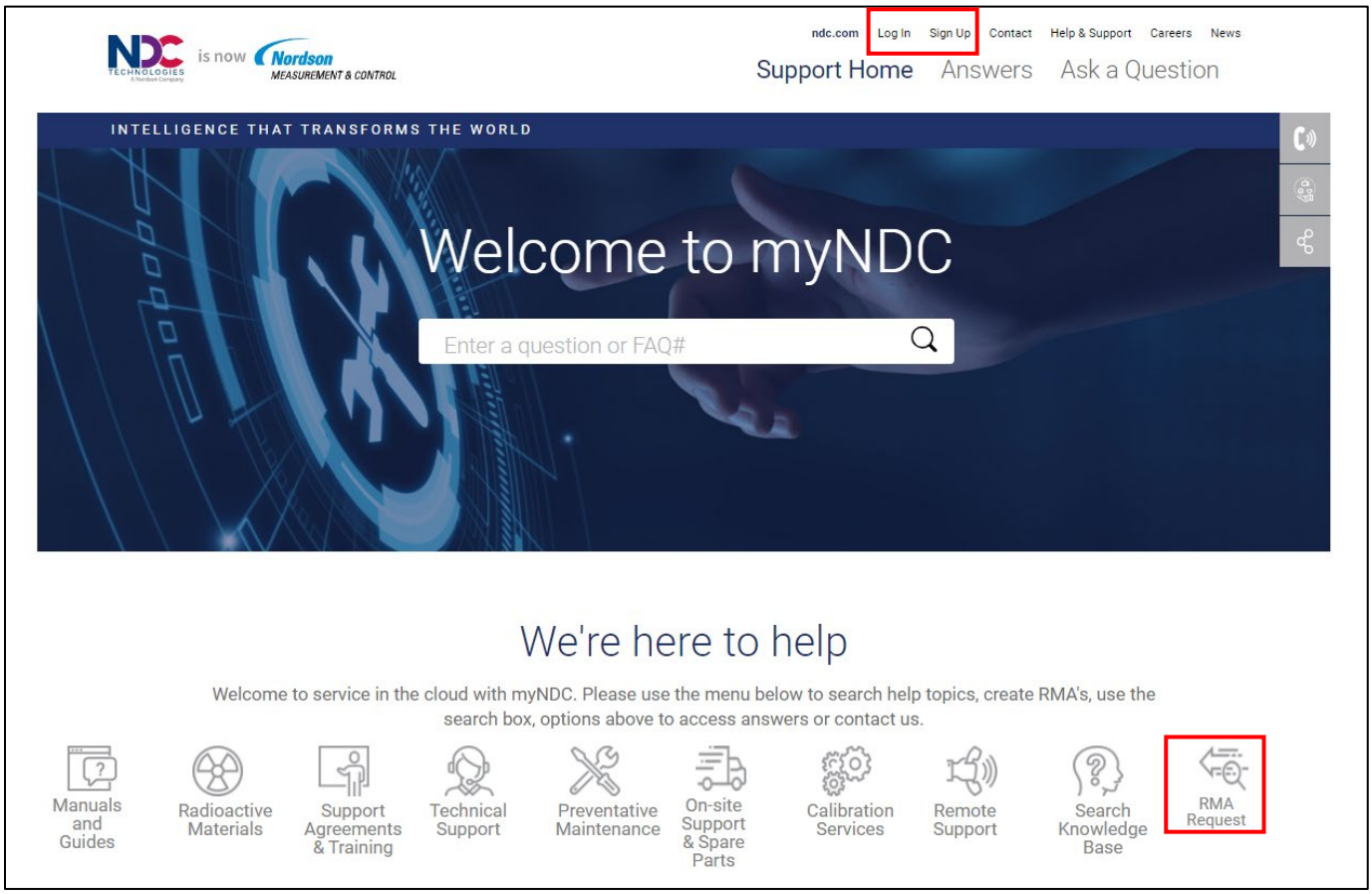
Online Support

You can access the NDC Customer Support portal, my**NDC** at https://ndc.custhelp.com.

myNDC is a cloud-based portal that allows you to get product support by phone, ask a question, provide feedback, submit an RMA request or access information in our on-line knowledge database. You can browse the myNDC site or create a myNDC account.

- To create a myNDC account, click **Log In** or **Sign Up**. After creating the account, you will be immediately logged in. To log in on subsequent visits to myNDC, click **Log In**, enter your user name and password, and then click **LOG IN**.

- To submit an RMA, click on **RMA Request** and follow the on-screen instructions.



NDC Contact Numbers

Please have your sales order number at hand before contacting NDC.

Americas	+1 626 939 3855
Asia Pacific	NDC Asia Pacific Customer Service Toll-free contact numbers: • Thailand: 1800 012 048 • Indonesia: 00 1803 016 4969 • Korea: 00 7981 420 30749 • Malaysia: 1800 81 9290 • Taiwan: 00 801 128 027 • India: 000 800 0402 514 Singapore non toll-free number: +65 6579 2411 Email ID: osc-apac@ndc.com
Japan	+81 (0)3 3255 8157
China	+86 21 61133609
EMEA (Europe, Middle East, Africa)	Germany: 0800 1123194
	Italy: +39 0331 454 207
	All other countries (English speaking): +44 1621 852244 Please select option 2 to be connected to the service team

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CHAPTER 1

1 Introduction

All NDC InfraLabs are delivered with algorithms that respond in a linear manner to a change in whatever component is being measured for a defined category of products. As an example, the Fried Snack Food algorithms respond in a linear manner to change in Moisture and Oil in both Baked and Potato based products at the exit of a fryer.

Calibration adjustment is required for the InfraLab, when installed close to the customer's production line, to read the same as the result of the local reference method.

It relies on the following:

- Both measurement ranges and Upper & Lower specification limits are clearly defined.
- Product can be provided at the target values and at the specification limits to test that the InfraLab responds correctly.
- Suitable Reference method(s) is(are) available.

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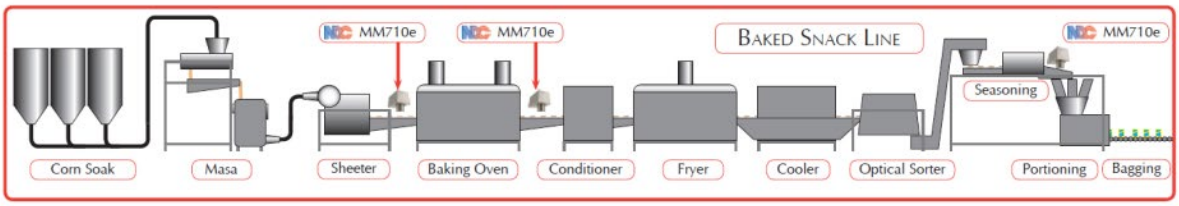
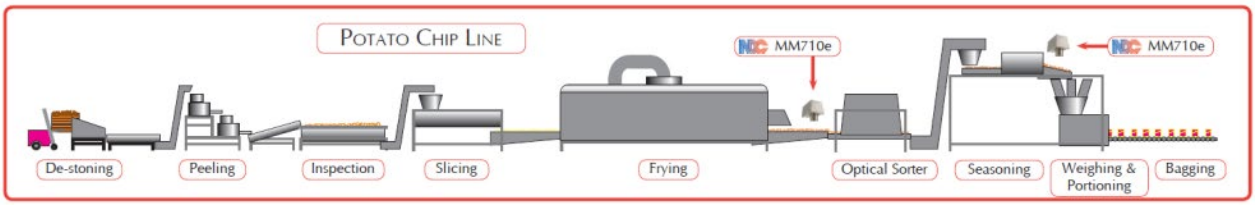
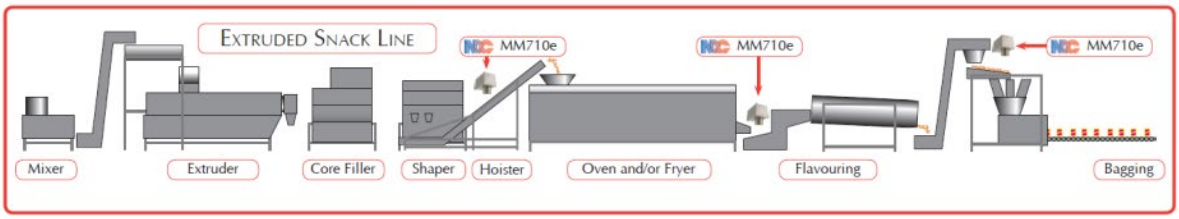
CHAPTER 2

2 Sample Grab Locations and Procedure

- The Potential Sample Grab Locations for Moisture and Oil Measurement are shown in the diagrams below.

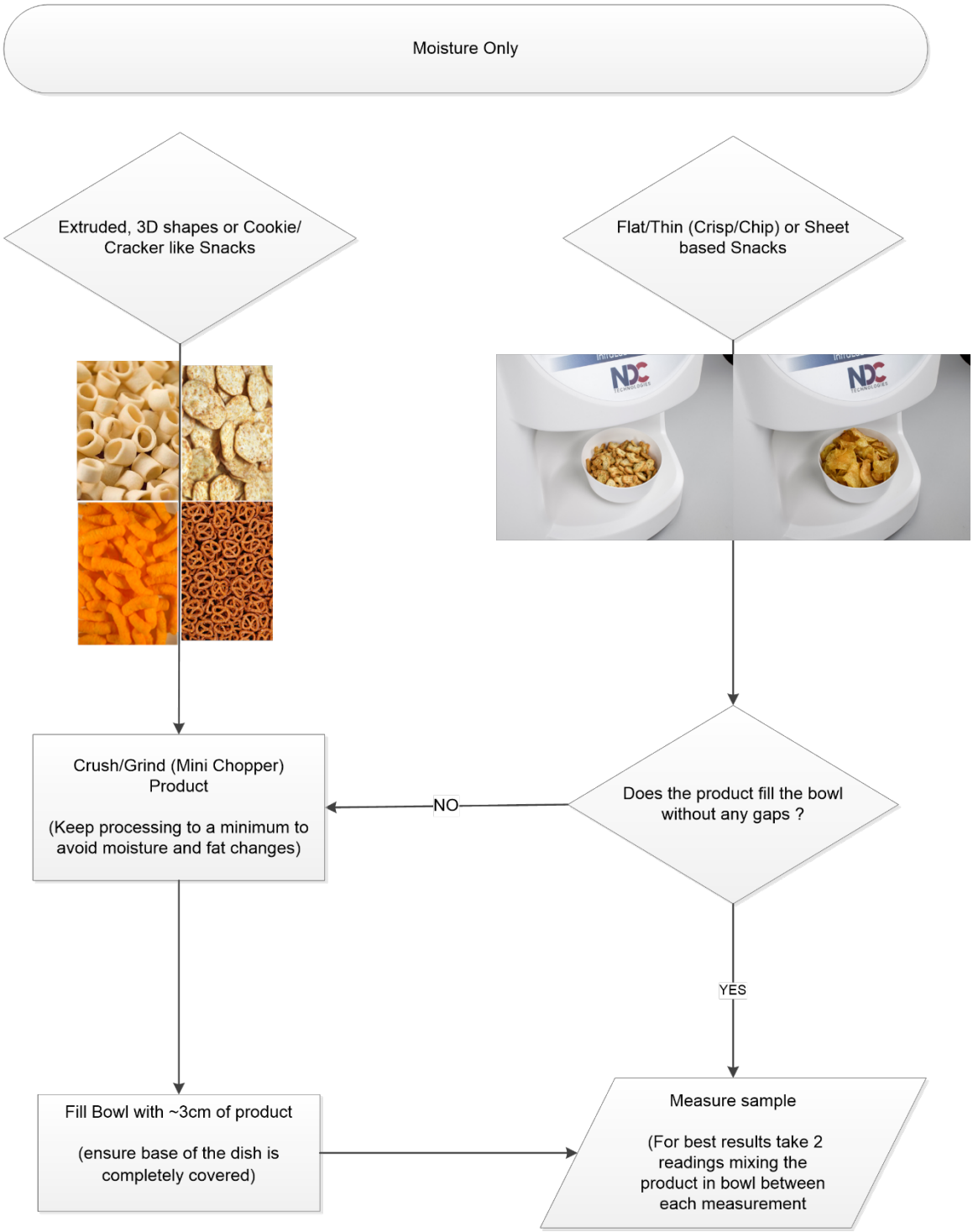


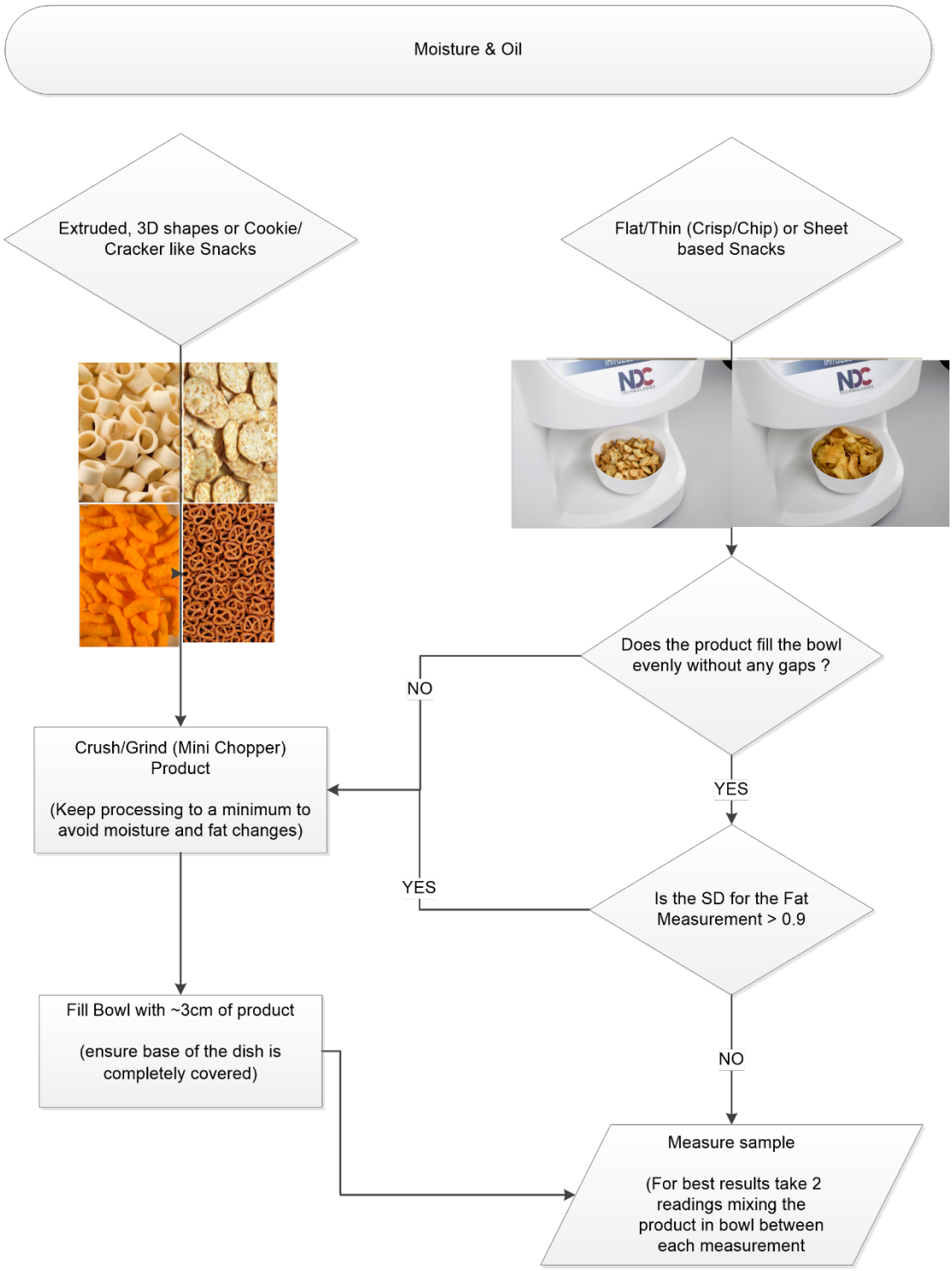




- Samples taken after the fryer or oven need a few minutes to equilibrate before a measurement should be taken. Therefore it is advisable to enough sample to fill 1.5 trays into a sealed bag.
- Allow the moisture to equilibrate for a few minutes, shake the bag to mix.
- Care should also be taken that the moisture content of the sample is not changed by external influences, especially when handling finished products which readily absorb moisture unless stored quickly in an air tight container.

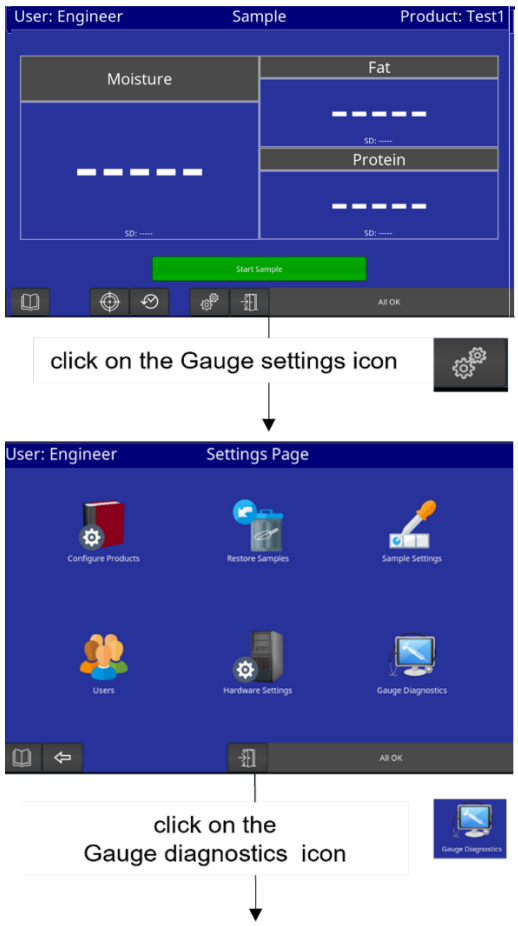
2.1 InfraLab Sample Preparation Protocol

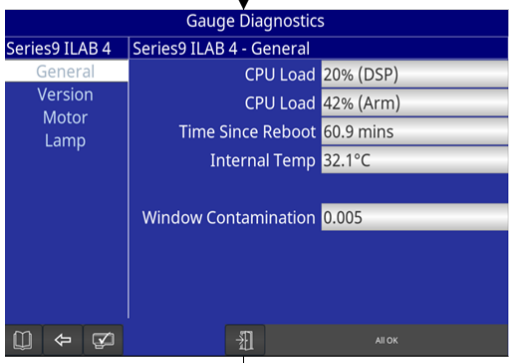



Moisture & Oil
Extruded, 3D shapes or Cookie/ Cracker like Snacks
Flat/Thin (Crisp/Chip) or Sheet based Snacks
Does the product fill the bowl evenly without any gaps ?
NO
YES
Crush/Grind (Mini Chopper) Product
(Keep processing to a minimum to avoid moisture and fat changes)
YES
Is the SD for the Fat Measurement > 0.9
NO
Fill Bowl with ~3cm of product
(ensure base of the dish is completely covered)
Measure sample
(For best results take 2 readings mixing the product in bowl between each measurement

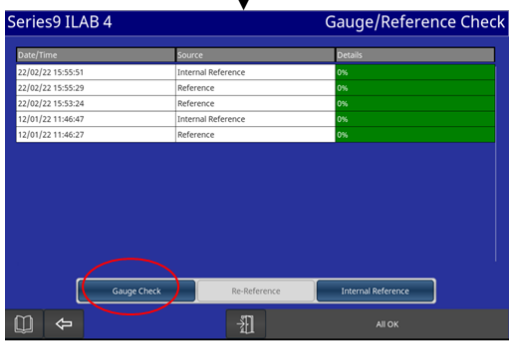
2.2 InfraLab Calibration Adjustment Overview

2.2.1 Instrument Check

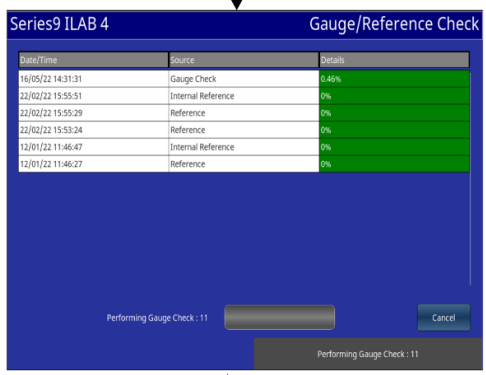




click on the Gauge check icon



click on the
Gauge check button
to perform the gauge check



Reference check ok

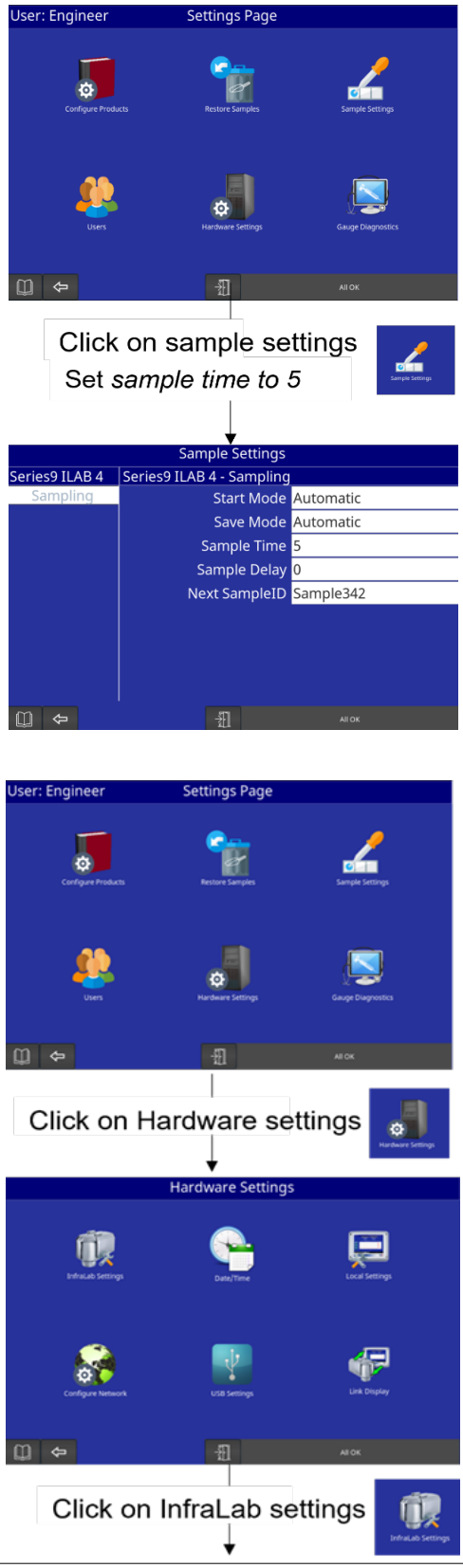
Yes

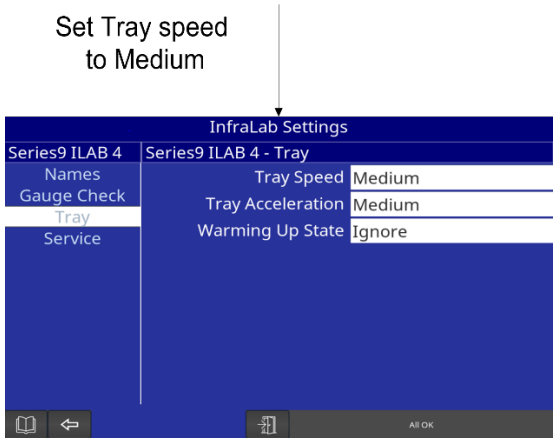
No changes detected
Collect sample data

No

Consult NDC

2.2.2 Essential Configuration





NOTE: Configure Sample ID and Collection as required.

CHAPTER 3

3 InfraLab Calibration Adjustment Process

It is common for the InfraLab Series 9 to measure a greater diversity of product than a single on-line gauge which is fixed at a specific location in the process. Furthermore, as an at-line measurement, it can be easier to generate a greater range of component values within a product to adjust the instrument calibration over the desired range. In particular,

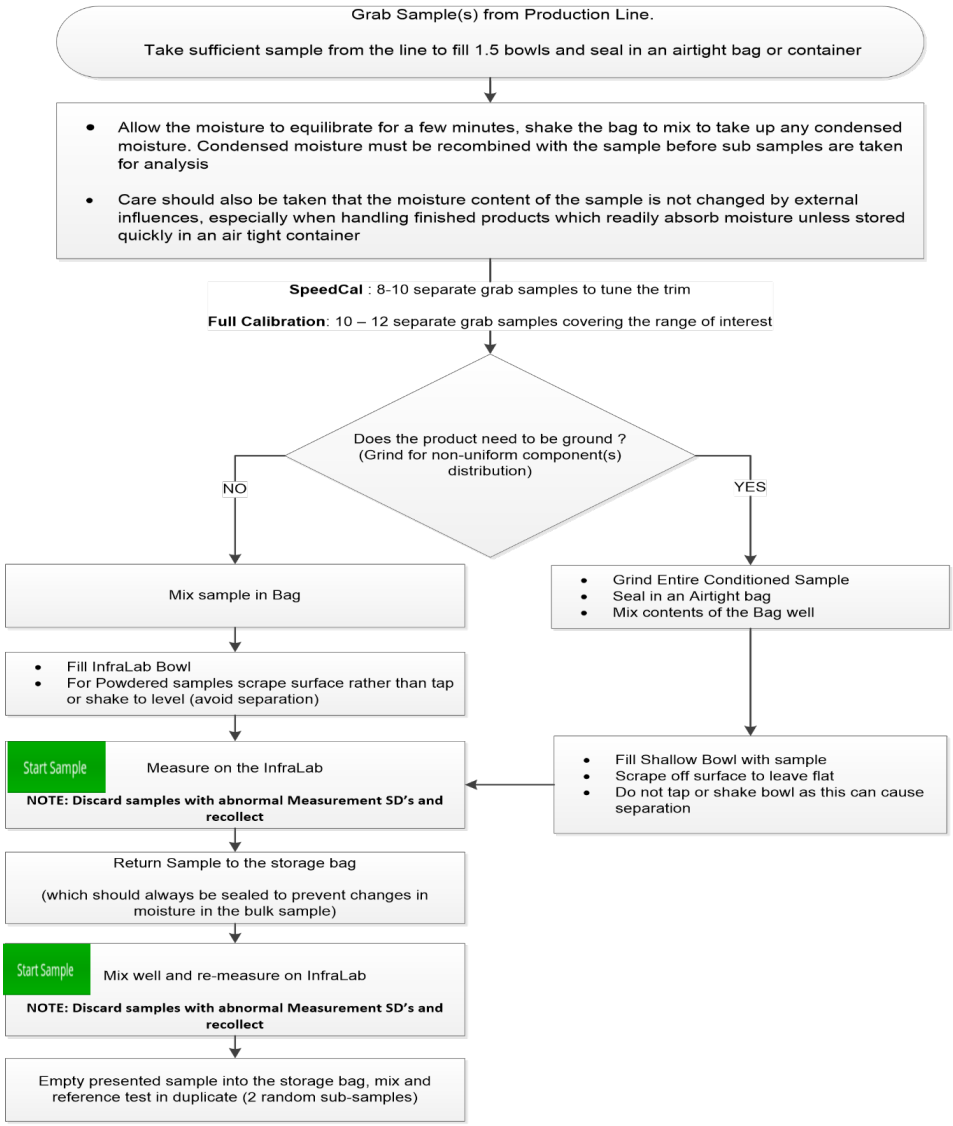
- Taking identical product from different production lines
- Grabbing representative scrap product
- Artificially conditioning samples across the desired range

For products that have been well-characterised by NDC, it can be expected that the Span will be close to 1 and the SpeedCal approach should be attempted to adjust the InfraLab to match the reference method for each product.

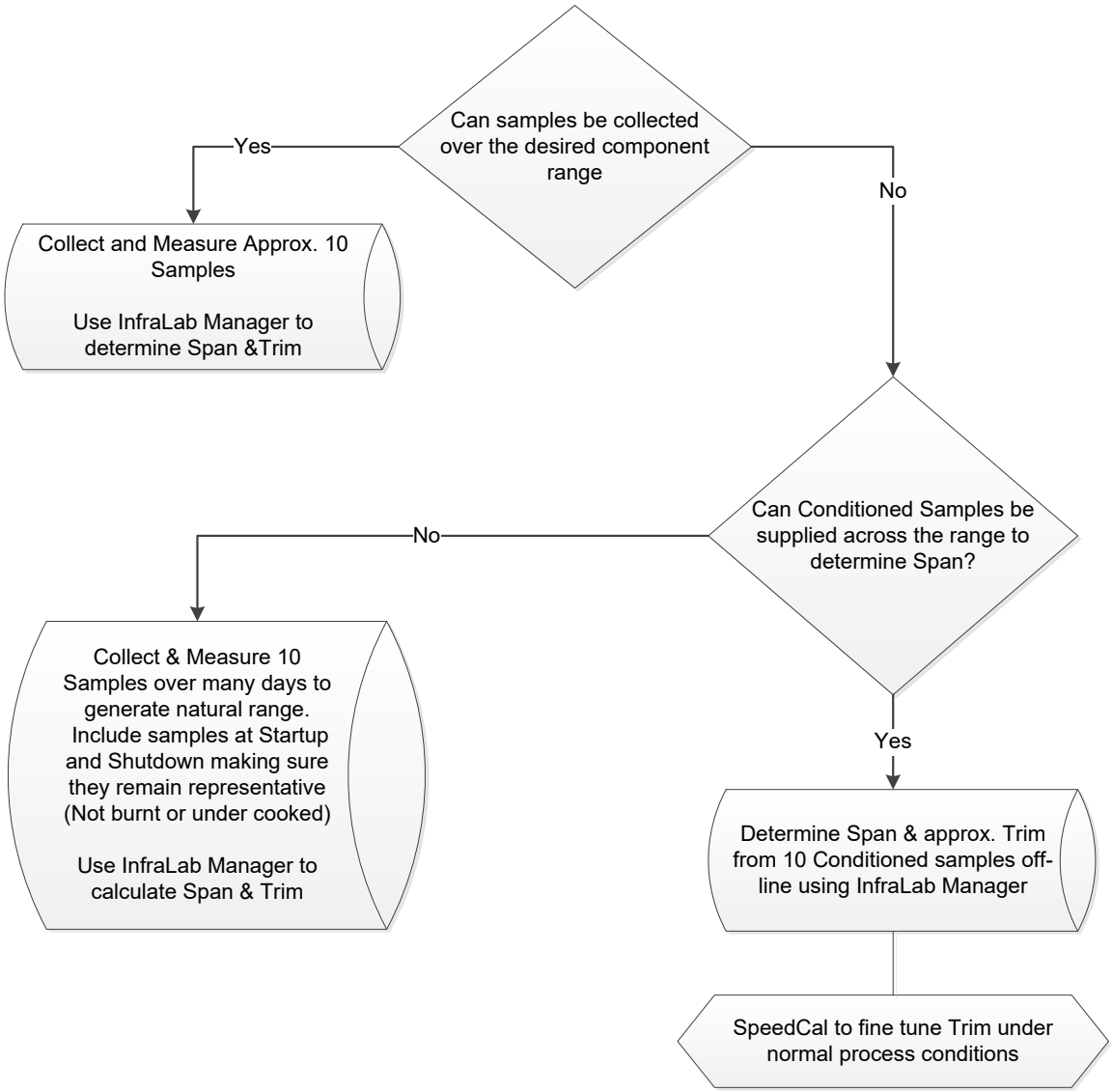
For all other products, please follow the Full Calibration Protocols shown below.

3.1 Calibration Protocol

SpeedCal – For well-characterised products

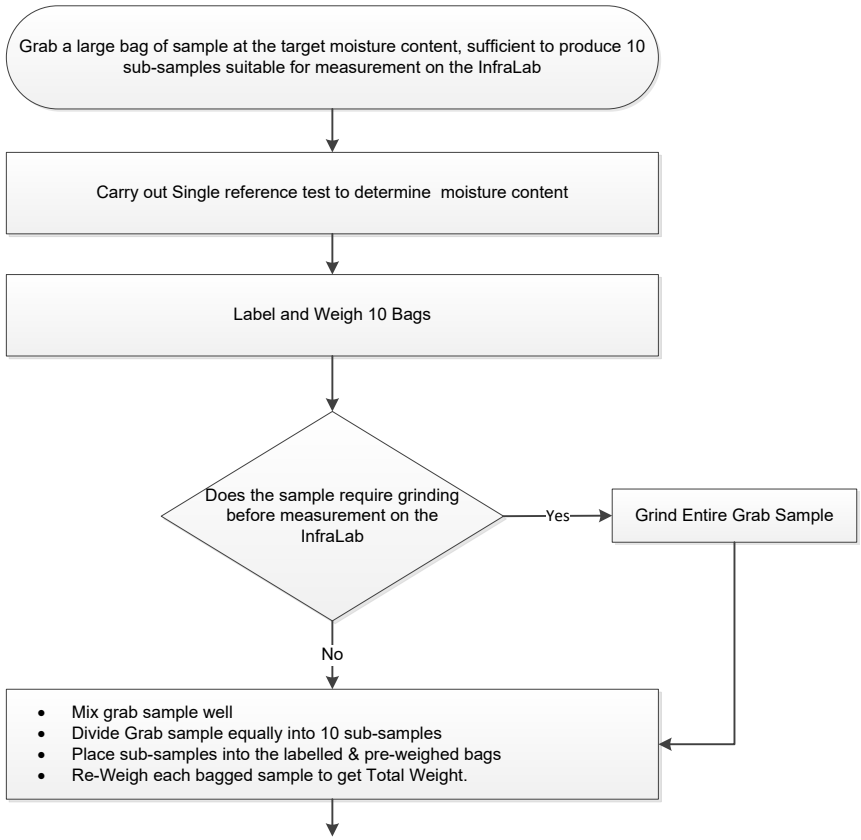


Full Range Study – For less well-characterised products



3.2 Protocol for Producing Conditioned Samples Over a Range of Moisture Content

If it is not possible to change the process to achieve the range of moisture values in the product, then the recommended protocol to produce conditioned samples to derive the product Span is detailed below.



Sample Conditioning Spreadsheet

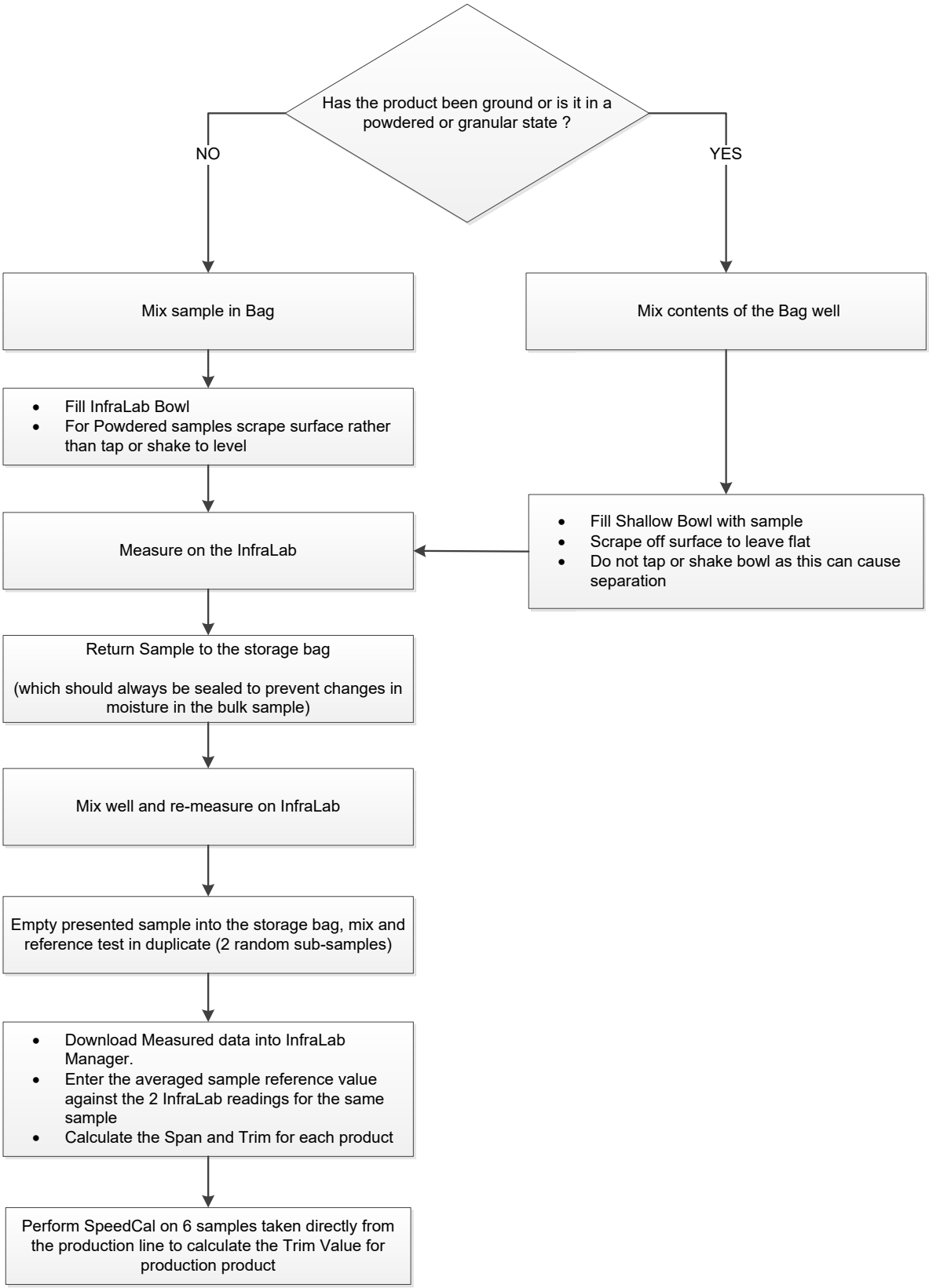
Sample Number	Bag Number	Ambient Moisture	Bag weight	Bag & sample	Target moisture	Final weight
1	1-1	4.55	6.8	354.73	3	349.17
	1-2	4.55	6.74	349.57	3	344.09

- Populate Conditioning Excel Spread sheet with weights and target moisture values for each sub-sample (Populate the Ambient moisture filed with the value from the single reference test)
- The Target Final Weight will be automatically calculated

Either heat the sample at 80° C or use a fine water spray to reach the Calculated Final weight for each sub-sample

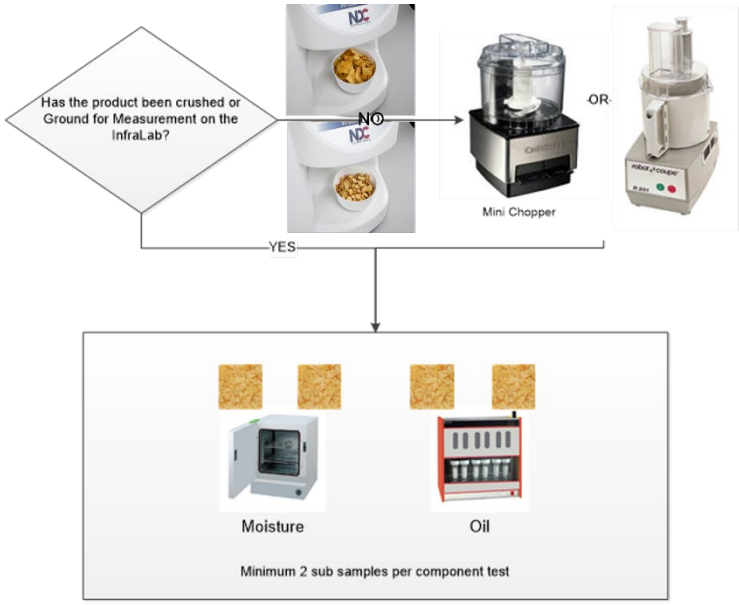
NOTE: For products that dissolve or undergo surface changes when moisture is added (such as Coffee), allow the samples to pick up moisture naturally from ambient air in the laboratory

Leave each sub-sample for a period of at least 24 hours in the sealed bags to allow the moisture to equilibrate through the product.


Has the product been ground or is it in a powdered or granular state ?
NO
YES
Mix sample in Bag
Mix contents of the Bag well
Fill InfraLab Bowl
For Powdered samples scrape surface rather than tap or shake to level
Fill Shallow Bowl with sample
Scrape off surface to leave flat
Do not tap or shake bowl as this can cause separation
Measure on the InfraLab
Return Sample to the storage bag
(which should always be sealed to prevent changes in moisture in the bulk sample)
Mix well and re-measure on InfraLab
Empty presented sample into the storage bag, mix and reference test in duplicate (2 random sub-samples)
Download Measured data into InfraLab Manager.
Enter the averaged sample reference value against the 2 InfraLab readings for the same sample
Calculate the Span and Trim for each product
Perform SpeedCal on 6 samples taken directly from the production line to calculate the Trim Value for production product

3.3 Referencing

(Take the sample measured on the InfraLab)

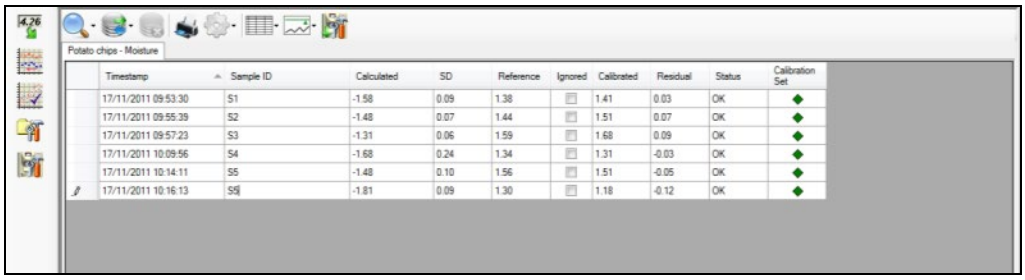


- If there are significantly large difference between the duplicate tests, exclude these results or increase the number of replicates
- Referencing should take place as soon as possible to avoid loss of moisture for example
- The accuracy and repeatability of the reference method is very important in order to be able to statistically compare readings with the gauge
- The method does have associate errors and it is useful to review the duplicate/triplicate reference data to best possible accuracy and precision

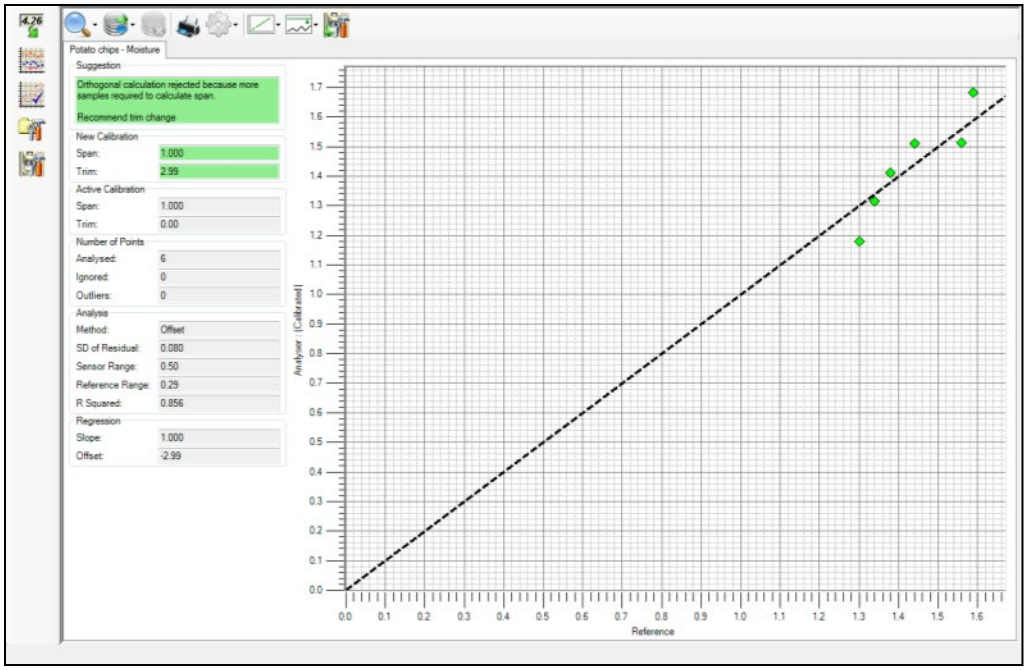
3.4 Determining New Calibration Adjustment Settings

Please reference the best practice Calibration notes and the GaugeToolsXL User Manual.

- Enter reference values into InfraLab Manager



- InfraLab Manager will inform you



- if there are insufficient number samples to perform an analysis
- what the new setting should be (take care to review the data to look for potential outliers that may influence the analysis)
- if a Span change is required (however, be wary of isolated data points that may unduly influence a slope change)

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CHAPTER
4

4 Validating InfraLab Settings Over Time

After calibration adjustment, periodically add samples to the InfraLab Manager database to monitor calibration performance over time.

To remove unnecessary bias changes associated with short term variations (such as product and referencing, etc.), only make changes if statistically justified and ensure that data from several days production are included.

The minimum number of samples that should be included within a validation set depends on the RSD (standard deviation of the residuals) between the Laboratory and the InfraLab.

For a typical RSD of 0.25 then

- ~7+ samples are required to detect a calibration bias (or adjustment accuracy) < ±0.2%
- ~25+ samples are required to detect a calibration bias (or adjustment accuracy) < ±0.1%

If the RSD is lower than 0.25, then fewer samples are required and if higher, then more samples will be required. Please avoid making Trim changes based on too few samples.

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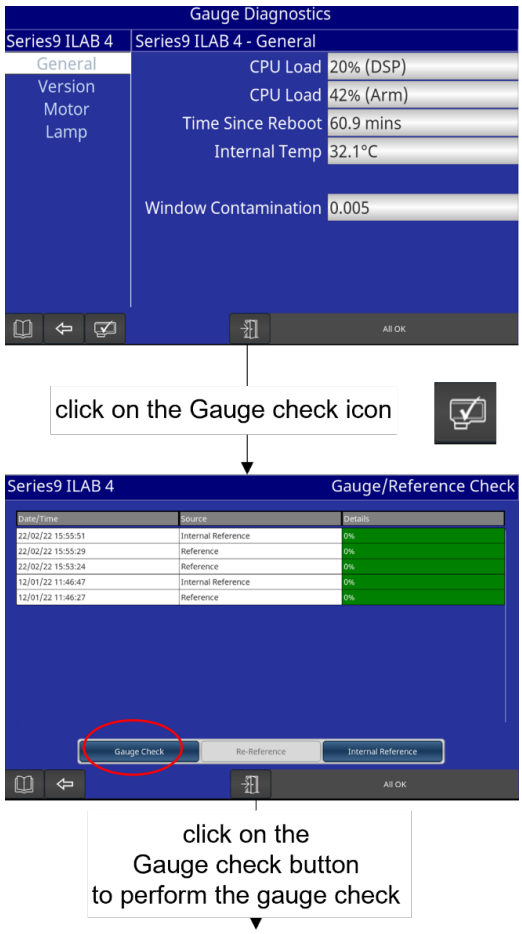
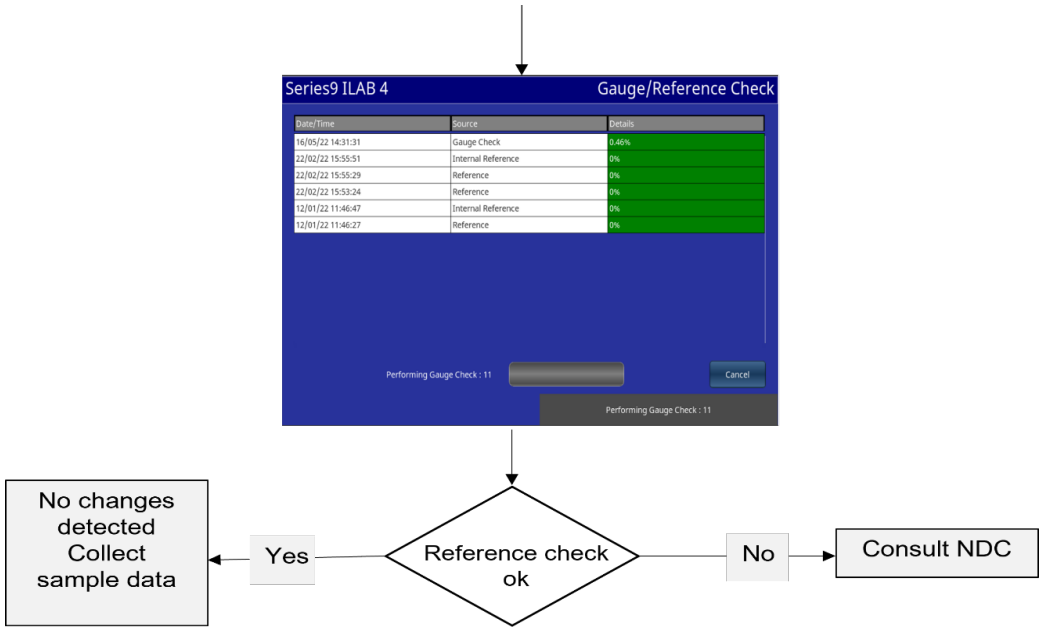
CHAPTER
5

5 InfraLab Stability Checking

The InfraLab is designed to be highly stable in the long term. To achieve this, and to obviate the need for operators to perform any routine checking, there is an integral optical arrangement that moves a neutral spectral target into the light path to confirm that the analyser has not changed since last use. In the event of a component failure or deterioration, this system would display an alarm. The frequency of the check is either to factory setting or can be adjusted by the user.

However, in some instances, the operator may wish to determine for themselves that the analyser condition has not changed. For this, a Reference Checking function is available in the InfraLab that checks for any instrument changes, as shown below.




Series9 ILAB 4
Gauge/Reference Check
Date/Time
Source
Details
16/05/22 14:31:31
Gauge Check
0.46%
22/02/22 15:55:51
Internal Reference
0%
22/02/22 15:55:29
Reference
0%
22/02/22 15:53:24
Reference
0%
12/01/22 11:46:47
Internal Reference
0%
12/01/22 11:46:27
Reference
0%
Performing Gauge Check : 11
Cancel
Performing Gauge Check : 11
No changes detected Collect sample data
Yes
Reference check ok
No
Consult NDC

CHAPTER
6

6 Servicing, Returns and Recycling

6.1 Servicing and Returning your Equipment

Your instrument was carefully inspected electrically and mechanically prior to shipment. It should be free of surface defects and scratches, and it should be in perfect working order upon receipt. If any indication of damage is found, file a claim with the carrier immediately, prior to using the instrument. If no damage is apparent, proceed by using this manual to install and setup this instrument.

Save the shipping carton and packing material for future storing or shipment of the instrument. If, at some future time, the instrument must be returned to the factory for service, include a full description of the instrument failure and the mode of operation the instrument was in at the time of failure. Also include a contact person to discuss the instrument failure.

When returning equipment for service, it is important to first obtain a Return Material Authorization (RMA) number. The RMA number is needed for proper handling of returned equipment.

- To obtain an RMA, go to https://ndc.custhelp.com/.
- To create a myNDC account, click the **Log in or Sign up** button. After creating the account, you will be immediately logged in. To log in on subsequent visits to myNDC, click the **Log in or Sign up** button, enter your username and password, and then click **Log in**.
- To submit an RMA, click on the **RMA Request** link and follow the on-screen instructions.

Ship the instrument in the original carton, or, if the original carton is unavailable, ship in a carton providing sufficient protection. Send the instrument to the Asia, Europe, or USA office, whichever is closest to you or to the office indicated by your sales engineer. Place the RMA number on the outside of the carton and include a purchase order number and any other information specific to your instrument. Field warranty service is available if the customer pays travel expenses by advance purchase order. All service operations should be performed by skilled electronics technicians, who have been trained by NDC Technologies.

6.2 Recycling, Disposal and Sustainability

NDC Technologies provides intelligent measurement and control solutions to help you focus on your unique mission in a more sustainable way. Better for your people. Better for your bottom line. Better for the planet. For this reason, NDC Technologies encourages its customers to recycle and dispose of equipment in a way which is responsible and encourages sustainability.

Please check the following before disposing of your equipment:

- Is the equipment worth repairing? If in doubt, contact NDC Service.
- If you are aware of any hazardous materials in your equipment, ensure qualified personnel take responsibility for its disposal. Some examples of hazardous substances include lead, mercury, cadmium, chromium VI, flame retardants, plasticizers, fluorescent tubes, monitors containing cathode ray tubes and products containing capacitors. NDC is compliant with the European WEEE and the most current RoHS Directive.
- Can you re-use or recycle any constituent parts? For example, if the housing/chassis is made of metal, it can be recycled by your local authority. Ensure qualified personnel take responsibility for dismantling the equipment.

If the equipment does need to be disposed of, please dispose of it in a way that does not harm the environment.

Warranty

1. All sales of NDC Technologies products are subject to the contractual terms and conditions of the Order pursuant to which they were sold to Buyer, including Warranty terms. The following terms are a general summary of the contractual Warranty terms, NOT a revision or alternative to the contractual terms, and are presented as merely a point of reference for your information. The contractual Warranty is the complete and exclusive statement of all NDC Technologies warranties to Buyer. In the event the following terms are in conflict with any of the contractual Warranty terms, the contractual Warranty terms shall be deemed to control.

   The warranty terms contained herein are expressly in lieu of any and all other warranties, expressed or implied, including any warranty of merchantability or fitness for a particular purpose. In no event shall NDC Technologies be liable for any incidental, consequential or special damages, including but not limited to, any loss of business, income or profits, expenses incurred for time when the system is not in operation, and any labor costs relating to or arising out of the performance, functioning or use of the system.

   Purchaser assumes the risk for use of this product and agrees to indemnify and hold NDC Technologies harmless for any and all damage to person or to property resulting therefrom.

   NDC Technologies grants no license under any patent rights except the right, under only such patents as may be owned or acquired by NDC Technologies, to use the product sold hereby for the purpose for which it is sold. NDC Technologies does not warrant that the product or its use does not infringe any patent owned by persons other than NDC Technologies.

2. NDC Technologies guarantees all products to be free from defects in material and workmanship for the following periods[1]:

   - Product and peripherals – 2 years from shipment
   - Source lamp – 5 years from shipment
   - Filter wheel motor – 5 years from shipment
   - Spare parts – 1 year from shipment
   - Replacement lamps and motors supplied under warranty – 1 year or up to the original 5 year warranty from shipment of the sensor, whichever is longer

   [1] Refer to the contractual terms and conditions of the Order for usage of the warranty.

   During this period, NDC Technologies will repair or at its option replace, free of all charges for parts and labor, any NDC Technologies parts determined by it to have been broken or damaged due to causes other than improper application, abuse or negligence. NDC Technologies' obligation to repair or replace shall not extend to expendable parts which are subject to normal operating wear.

   Nothing in this paragraph 2 will require NDC Technologies to make repairs or replacements where:

A. The product has been repaired, other than by an authorized NDC Technologies dealer or an NDC Technologies employee, or altered in any way without the prior written consent of NDC Technologies; or

B. The product has not been properly maintained in accordance with any operating and maintenance manual supplied therewith; or

C. The product has been damaged as a result of fire, flood, war, insurrection, civil commotion, acts of God or any other cause beyond the control of NDC Technologies or Buyer.

3. NDC Technologies' liability shall be limited to the obligations set forth in Paragraph 2. These shall be the Buyer's sole and exclusive remedies, whether in contract, tort or otherwise, provided, however, that in lieu thereof, NDC Technologies at its option may replace the entire product on an exchange basis or refund the purchase price against the return of the defective product.

4. NDC Technologies will not be responsible for failure to provide service or parts due to shortage of materials, labor or transportation strikes or delays, or any causes beyond NDC Technologies' control.

5. Unless otherwise specified by NDC Technologies, all warranty repairs will be made at NDC Technologies' facility. The customer shall be responsible for all expenses of packing, freight and insurance in connection with the shipment of products to NDC Technologies for repair. NDC Technologies will pay the cost of returning the equipment to customer.

   If it is mutually determined by the buyer and NDC Technologies that the examination, replacement or repair takes place at the buyer's facility, then the buyer will be responsible for NDC Technologies' travel and living expenses incurred in traveling to and from the buyer's facility, and during the time of the visit, as well as the cost of field labor and replacement parts unless the parts being repaired or replaced are determined to have been defective, in which event the cost of said repaired or replacement parts shall be borne by NDC Technologies. These travel and living expenses will be billed to the buyer at actual cost to NDC Technologies.

6. No person, including any NDC Technologies distributor, agent or representative, is authorized to assume any liability on behalf or in the name of NDC Technologies, and NDC Technologies shall not be bound to any understandings, representations, or agreements with respect to warranties except as set forth in this policy.

7. NDC Technologies requests immediate notification of any claims arising from damage in transit in order to determine if carrier responsibility exists. If damaged equipment arrives, save the shipping container for inspection by the carrier and telephone NDC Technologies as soon as possible.