GOVERNMENT OF WESTERN AUSTRALIA

Landgate

MEDJIL

SURVEY
INSTRUMENTATION CALIBRATION PORTAL

Medjil User Guide

Version: 29-08-2024

1. Introduction

Medjil is a survey instrumentation calibration portal (Medjil Portal) developed by Landgate (the Western Australian Land Information Authority) in collaboration with the Intergovernmental Committee on Surveying and Mapping (ICSM). It allows rigorous calibration and reporting of:

- Barcode staff using staff calibration range facilities
- Staff ranges (only available to verifying authority[1] users)
- EDM Instrumentation (EDMI; EDM and prism) using standardised EDM Baselines
- EDM Baselines using standardised instruments (only available to verifying authority users)

establishing legal traceability of user's instruments to the national standard of length provided by the National Measurement Institute (NMI).

This user guide provides a quick reference on the functionality and operation of the Medjil Portal. For more detailed documentation refer to the following calibration guides and technical manuals:

- EDMI Calibration Guide
- Barcode Staff Calibration Guide
- Survey Instrumentation Calibration Technical User Manual
- Staff Calibration Technical User Manual

available under the Resources tab on Medjil's home page (cf. section 2). For information on Medjil development and contributions, please refer to the GitHub repository (https://github.com/Landgate/Medjil).

Access Medjil here: https://medjil0.lb.landgate.wa.gov.au

[1]Verifying authority users have additional permissions when using the Medjil portal. Please contact a Landgate staff member to enable these permissions. (email geodesy@landgate.wa.gov.au)

2. Medjil Home Page

The Medjil home page (see Figure 2.1) allows direct access to the portal's main functions enabling instrument calibrations and management of all related information. Before using the full functionality of Medjil, users need to sign up and login (see section 3).

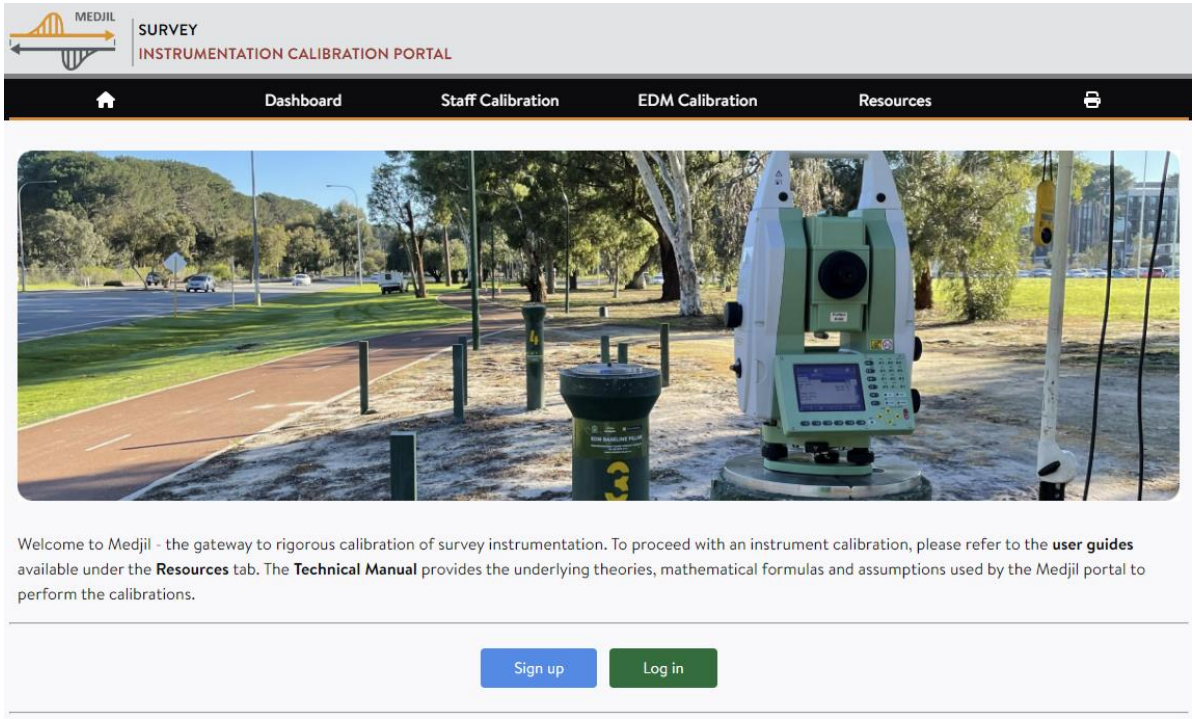


Figure 2.1: Medjil home page.

Main menu options on Medjil's home page

	Home button to return to Medjil's home page.
Dashboard	Access the *Instrument Register* and *Accreditation Calibrations* of your company and list of available *Calibration Sites* (see section 4).
Staff Calibration	Perform levelling *Staff Calibrations* and access the *Levelling Staff Registry* containing calibration records of your company (see section 5)
EDM Calibration	Perform *EDM Instrumentation Calibrations* and *Interlaboratory Comparisons* of calibration results, input *Uncertainty Budgets* and customise *Report Endnotes* included in calibration reports (see section 6).
Resources	Access *Calibration User Guides* and *Technical Manuals* (see section 7).
	Print the current screen view or reports.

3. Sign up, Login and User Profile

3.1. Sign up

Step 1:

New users of the Medjil Portal need to sign up (register) before being able to use its full functionality. Existing users of Medjil as well as users that previously signed up to Landgate's Online Staff Calibration portal can directly login (see section 3.2).

To sign up, select Sign up on Medjil's home page, which opens the interface shown in Figure 3.1 below.

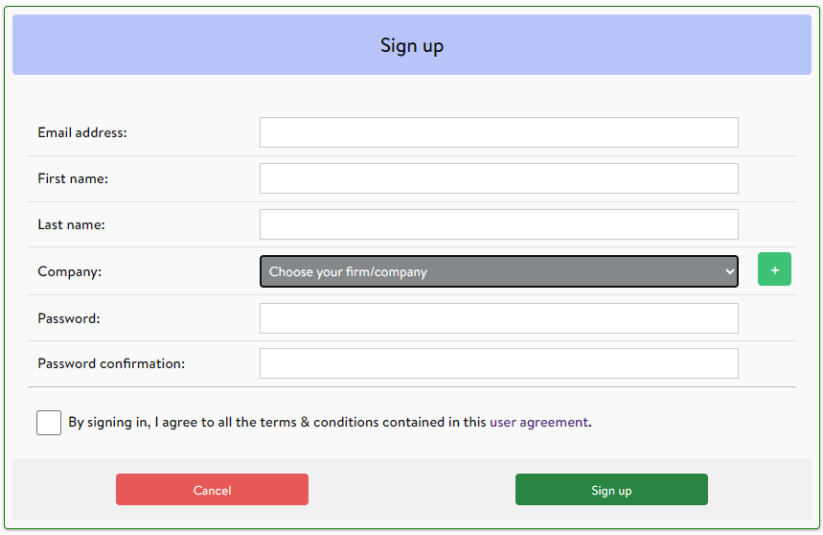


Figure 3.1: Sign up interface.

On the sign up interface compile the following information:

Email address:	Enter your e-mail address associated to your account.
First and last name:	Enter your first and last name.
Company:	Select your company from the drop-down list if already registered. You will need to enter your *Company Secret Key* issued at first sign up. Otherwise, select + and enter your company's name and a short abbreviation. Your *Company Secret Key* will automatically be generated for you.
Password & confirmation:	Select and confirm a password for your user account.

Before submission, confirm that you read and agree to the terms & conditions, which can be viewed following the *user agreement* link (see Figure 3.1).

Step 2:

After successful submission of your sign up details an e-mail is sent to the nominated e-mail address containing an activation link to confirm your registration. To complete the sign up click the link to activate your account. After successful activation you will be directed to the Login interface.

Note: During your first login you will need to setup Multi Factor Authentication (MFA) using the Authenticator App (see section 3.2).

3.2. Login

To login as a registered user select Login on Medjil's home page to open the interface shown in Figure 3.2 and enter your e-mail address and password used to sign up.

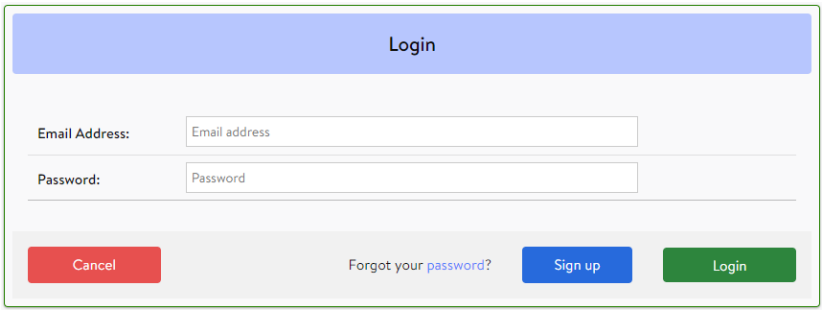


Figure 3.2: Login interface.

Use the *Forgot your password* link to reset your password. You will be prompted to enter the e-mail address used to sign up, which will sent an e-mail containing a link to reset your password.

First Time Login – Setting up MFA

During first time login you will be presented with a QR code and instructions to set up MFA (see Figure 3.3). For the setup, open an Authenticator App (either Microsoft Authenticator or Google Authenticator), select add a new account and scan the QR code. This will create a new account called Medjil – Survey Instrument Calibration linked to your nominated e-mail address. Important, do not scan the QR on your device camera and click the link but use the Authenticator App.

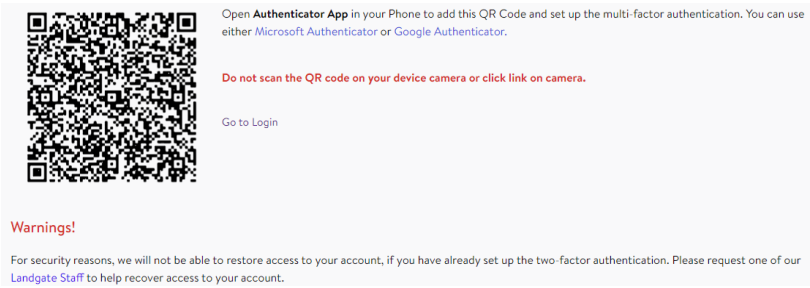


Figure 3.3: Example of QR code to setup MFA.

Once MFA has been setup go back to the login interface either selecting the link next to the QR code or Login on Medjil's home page for a normal login using MFA (see below).

Login – Using MFA

After submission of your user details through the login interface (see Figure 3.2) you will be prompted to enter a One Time Password (OTP) code (see Figure 3.4) created through the Authenticator App. To access the OTP code open the Authenticator App and select the Medjil account. Use the generated OTP code to complete your login.

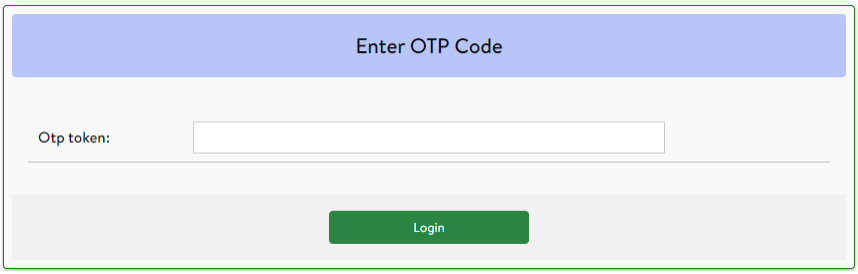


Figure 3.4: OTP input interface.

3.3. User Profile

Once logged in, your first name will be shown as the current user in the top-right corner of the webpage (see Figure 3.5). Expand the drop-down menu to view or edit your user profile details (e-mail and company) or view the list of all company users (see Figure 3.5 below). Use the action button to edit your user profile.

Note: Any change requires confirmation with the company secret key.

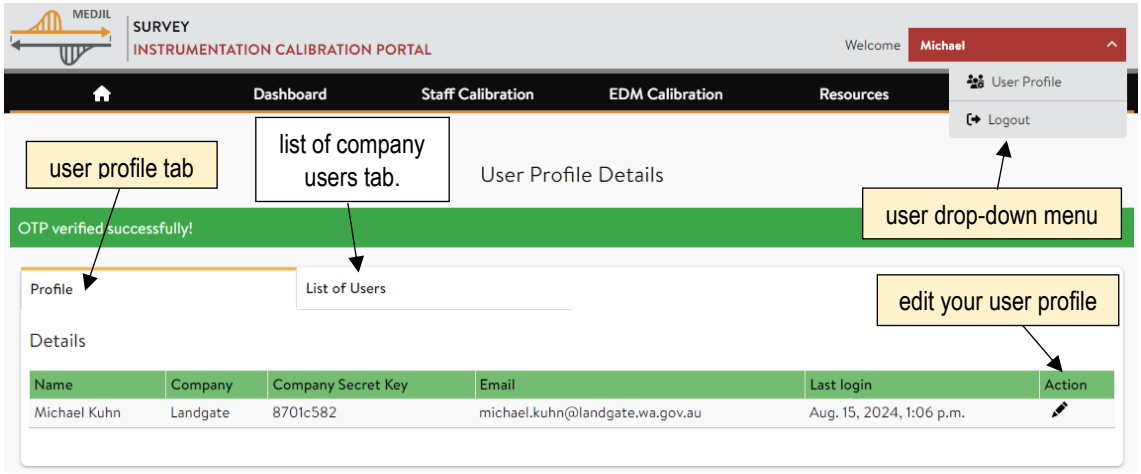


Figure 3.5: User profile details.

4. Dashboard

Figure 4.1: Dashboard drop-down menu

The *Dashboard* manages your company's instrument register, stores EDM accreditation certificates and provides information on available calibration sites. Any instrument used during a calibration must first be added to the instrument register and relevant specifications defined. Use the dashboard drop-down menu (see Figure 4.1) to access the following areas:

Instrument Register	Repository of your company's instrument records and related calibration certificates (see section 4.1).
Accreditation Certificates	Repository of EDM accreditation certificates for selection during EDM baseline calibrations (see section 4.2). This functionality is only utilised by verifying authority users.
Calibration Sites	Repository of information on all available EDM calibration baselines and staff range calibration sites (see section 4.3).

Transfer of existing records:

Users of Landgate's Online Staff Calibration portal will have records migrated to Medjil.

Records from the Baseline.exe suite of software can be transferred to the dashboard with the assistance of Landgate staff. Please contact one of our Landgate staff to request assistance. geodesy@landgate.wa.gov.au

4.1. Instrument Register

The *Instrument Register* menu allows the creation and management of the instrument types listed in the left-hand menu shown in Figure 4.2. For each instrument type up to three tabs can be selected to add or edit records of the model and its manufacturer specifications, instrument and related calibration certificate.

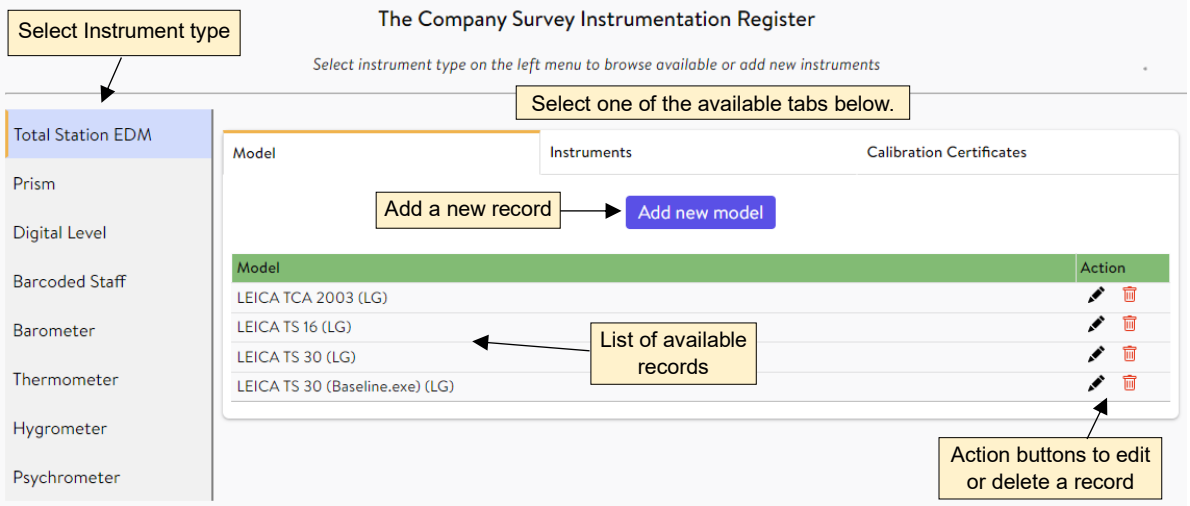


Figure 4.2: Example of a company total station EDM register.

To add or edit a record in the instrument register, select the instrument type from the left-hand menu, then select one of the available tabs and specify the following information.

Model — Use the Add new model button to open the input interface to create a new record. Specify make (manufacturer), model and owner (custodian). For each model provide the manufacturer specifications. Note, for EDM instruments a look-up table can be used to extract common manufacturer specifications. For more detailed information use the information button to refer to the technical manual.

Instruments — Use the Add new instrument button to open the input interface to create a new record. For each instrument select the model (once added), specify the instrument number (e.g. serial number) and owner (custodian). You can also upload a photo for each instrument. Note, if the model has not been specified you can use the add button + to directly go to the "Add new model" interface (see above).

Calibration Certificates — Once a successful calibration of an instrument has been performed the generated calibration certificate can be uploaded to the company's repository. Use the Add new certificate button to open the input interface to create a new record. Use the calibration certificate document to extract any relevant information and attach the certificate.

Under each tab a list of existing records is displayed (see Figure 4.2). Use the action buttons and to edit or delete a record.

4.2. Accreditation Certifications

The *Accreditation Certifications* menu allows to add, edit and view accreditation certifications (see Figure 4.3) issued to the verifying authority (Landgate) by the National Measurement Institute (NMI). The accreditation (appointment) of a verifying authority by NMI establishes a legal traceability to the national standard of length passed on to users that use a certified Baseline for calibration of EDM Instrumentation (EDMI).

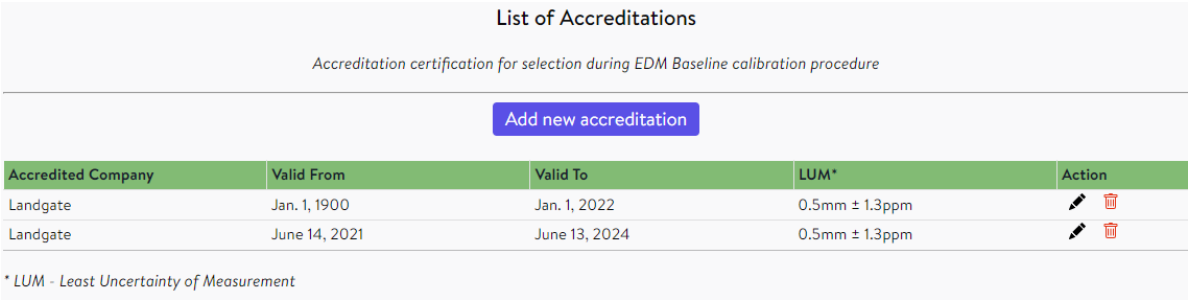


Figure 4.3: List of Accreditation Certifications issued to Landgate.

Use the Add new certificate button to open the input interface to create a new record. Specify the accredited company, validity period and Least Uncertainty of Measurement (LUM). Attach a copy of the accreditation certificate to the record.

4.3. Calibration Sites

The *Calibration Sites* menu provides information on all EDM Baselines and Staff Calibration Ranges currently available (see Figure 4.4).

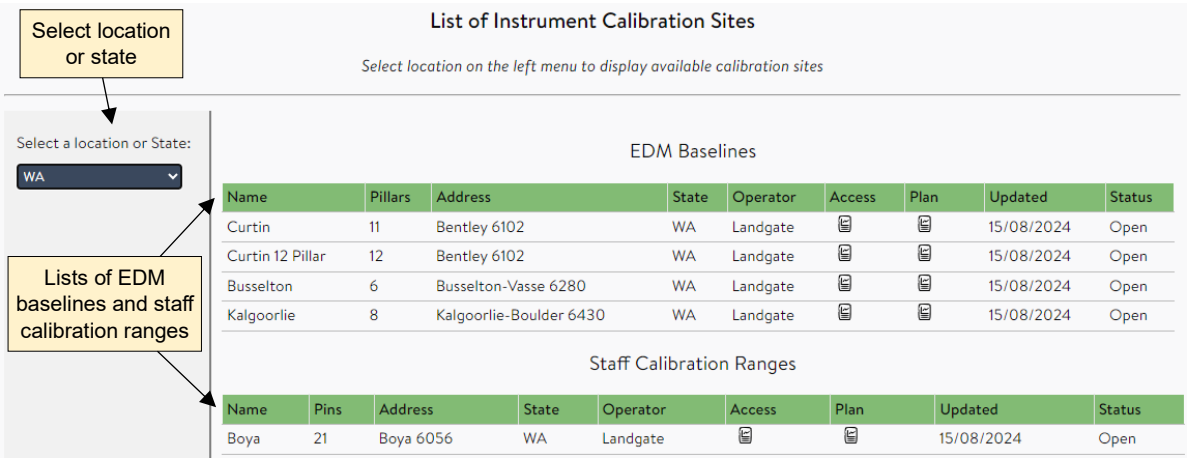


Figure 4.4: List of Instrument Calibration Sites.

Use the drop-down menu on the left-hand side to select a location or state to list all available calibration sites. For each calibration site an access sketch as well as detailed plan is provided. You should check the current status (see last column of the lists) before visiting any calibration site.

Note: Only verifying authority users can add, edit and delete calibration sites while ‘normal’ users can only view the details of each calibration site.

5. Staff Calibration

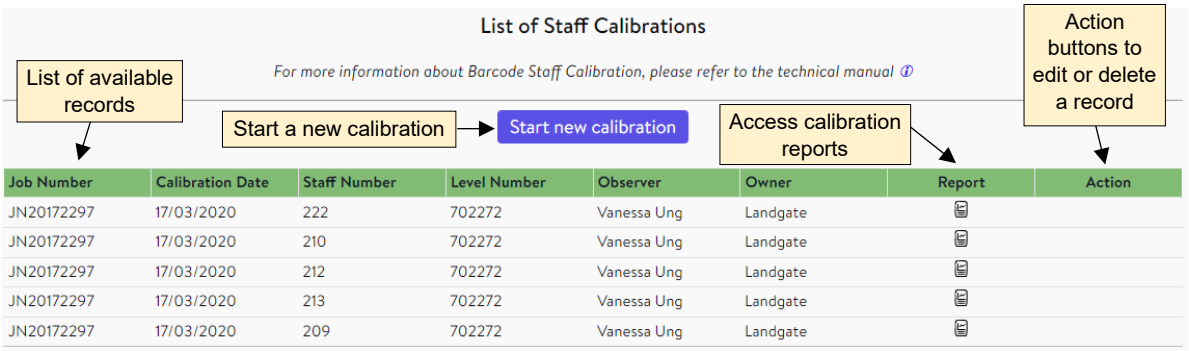
Figure 5.1: Staff Calibration drop-down menu

The *Staff Calibration* area is used to perform calibrations of barcoded leveling staffs and store company staff calibration certificates. Use the *Staff Calibration* drop-down menu (see Figure 5.1) to access the following areas:

Staff Calibration	Start a new barcoded leveling staff calibration or access your company's list of staff calibration records (see section 5.1).
Calibration Range Parameters	Repository of information on all available staff calibration ranges (see section 4.3). Note: This menu is only accessible to verifying authority users.
Leveling Staff Registry	Repository of your company's staff calibration certificates (see section 5.3).

5.1. Staff Calibration

The *Staff Calibration* menu allows to perform a new barcoded staff calibration and lists records of all successful calibrations together with the calibration reports (see Figure 5.2).



Job Number	Calibration Date	Staff Number	Level Number	Observer	Owner	Report	Action
JN20172297	17/03/2020	222	702272	Vanessa Ung	Landgate		
JN20172297	17/03/2020	210	702272	Vanessa Ung	Landgate		
JN20172297	17/03/2020	212	702272	Vanessa Ung	Landgate		
JN20172297	17/03/2020	213	702272	Vanessa Ung	Landgate		
JN20172297	17/03/2020	209	702272	Vanessa Ung	Landgate		

Figure 5.2: List of staff calibrations.

To perform a new staff calibration, use the Start new calibration button to open the *Barcode Staff Calibration Details* interface shown in Figure 5.3 and enter the following information:

Calibration Site	From the drop-down menu select the staff calibration range.
Job Number	Enter a job number to uniquely identify the calibration.

Staff Number	From the drop-down menu select the used staff by its number. If the staff is not available, use the + button to add it to your company's barcoded staff register (see instrument register in section 4.1).
Level Number	From the drop-down menu select the used digital level instrument by its instrument number. If the digital level is not available, use the + button to add it to your company's digital register (see instrument register in section 4.1).
Start and End Temperatures	Enter the start and end temperatures present during the field observations.
Field Data	Attach the ASCII file generated by the digital level instrument containing all observations.
Field Book	Attach the field book(s) created during the fieldwork.
Observer	Either confirm if you are the observer or enter the observer's name.
Calibration data	Enter the date when observations were taken.
Submit	Perform the calibration using the submit button.

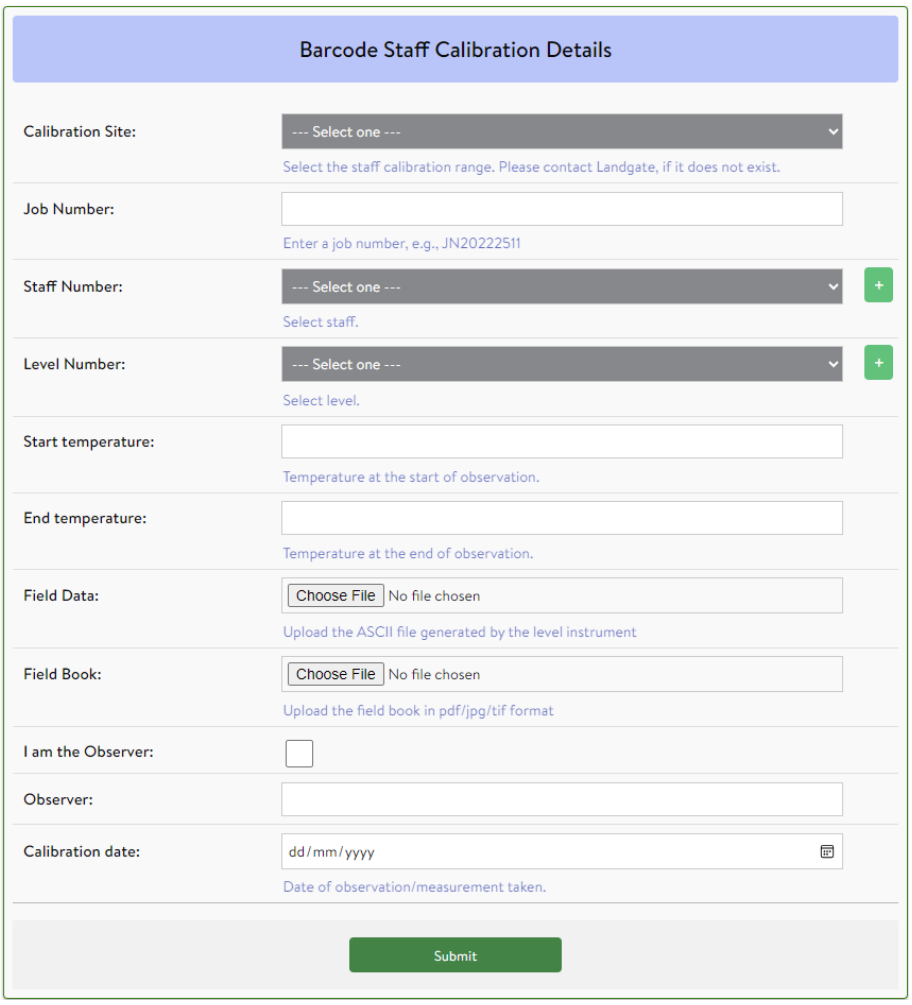


Figure 5.3: *Barcode Staff Calibration Details* interface

Use the Submit button to perform the calibration. After successful completion you will be presented with the calibration report. The report is also added to your company's list of

staff calibrations (see Figure 5.2). Use the action buttons and to edit or delete a record. If you edit a calibration record you will be able to change the input information and perform the calibration again. Note, the previous calibration report will be retained in the list while the new report will be added.

For detailed information on field procedures, mathematical models used and report outputs refer to the user guides and technical manuals available under the resources option on the home page or following information button .

5.2. Leveling Staff Registry

The *Leveling Staff Registry* provides all current (most recent) and historical barcoded staff calibration records including their certificates (calibration reports) (see Figure 5.4).

List of Levelling Staves Calibration Certificates

Contains the most recent calibration certificates

Add new certificate

Current Staff Calibration Certificates

Job Number	Instrument No	Model	Type	Scale Factor	Field Book	Calibration Date	Certificate	Action
JN20172297	209	GKNL4F (LEICA)	Fiberglass	0.999820		March 17, 2020		
JN001	210	GKNL4F (LEICA)	Fiberglass	0.999779		Aug. 15, 2024		
JN20172297	212	GKNL4F (LEICA)	Fiberglass	0.999900		March 17, 2020		
JN20172297	213	GKNL4F (LEICA)	Fiberglass	0.999920		March 17, 2020		
JN20172297	222	GKNL4F (LEICA)	Fiberglass	1.000030		March 17, 2020		

Figure 5.4: List of Current Staff Calibration Certificates.

Use the Add new certificate button to open the input interface to create a new barcoded staff certificate record.

6. EDM Calibration

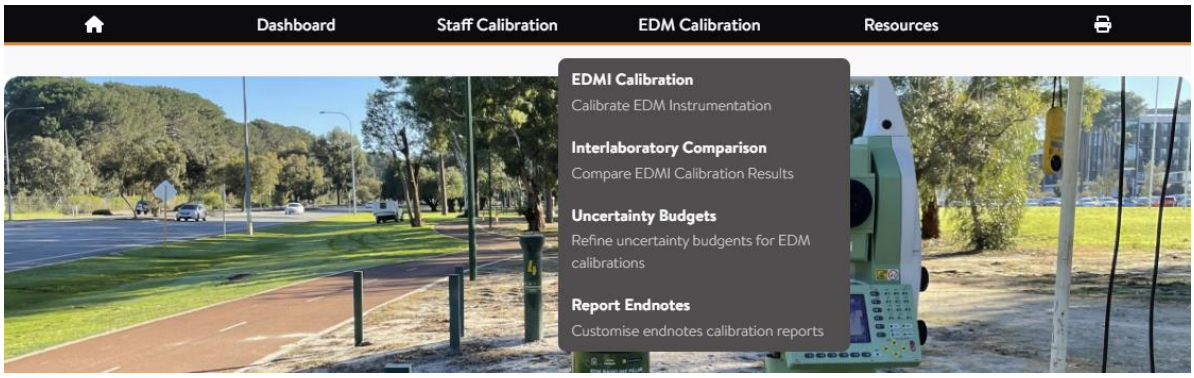


Figure 6.1: EDM Calibration drop-down menu

The *EDM Calibration* area is used to perform and manage calibrations of EDM Instrumentation (EDMI; EDM and Prism), refine uncertainty budgets and create customized calibration report endnotes. Use the *Staff Calibration* drop-down menu (see Figure 6.1) to access the following areas:

EDMI Calibration	Start a new EDMI calibration or access your company's list of EDMI calibration records (see section 6.1).
Interlaboratory Comparisons	Compare EDMI Calibration results (see section 6.2).
Uncertainty Budgets	Definition of a customised (e.g. instrument- or company-specific) uncertainty budget (see section 6.3).
Report Endnotes	Create a customised (e.g. company-specific) endnote to be included in calibration reports.

6.1. EDMI Calibration

The *EDMI Calibration* menu allows to perform a new EDMI calibration and lists records of all EDMI calibrations to either edit or delete. Successful EDMI calibrations will display as icon link to the html calibration report (see Figure 6.2).

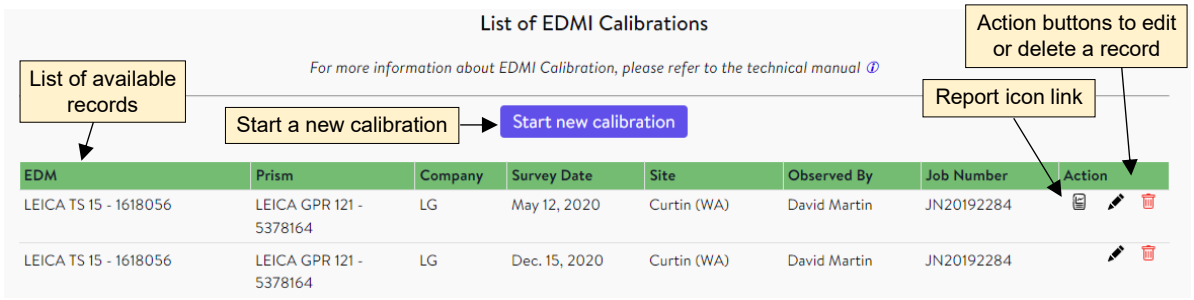


Figure 6.2: List of EDMI calibrations.

To perform a new EDMI calibration, use the Start new calibration button to open the *EDMI Calibration Details* interfaces shown in Figures 6.3 to 6.5 (input is done in three steps) and enter the following information:

Step 1 of 3:

Calibration Site	From the drop-down menu select the EDMI calibration site. Tick the *"Auto select corresponding calibration of this baseline"* box to automatically detect the calibration date of the baseline, e.g. commensurate with the observation date. Alternatively select the calibrated baseline.
Survey Date	Specify the date field observations were taken.
Observer	Specify the observer.
Weather	From the drop-down menu select the weather conditions during the field observations.
Job Number	Enter a job or reference number to uniquely identify the calibration.
Comment	Enter any comment.
Next	Click next to enter details in step 2.

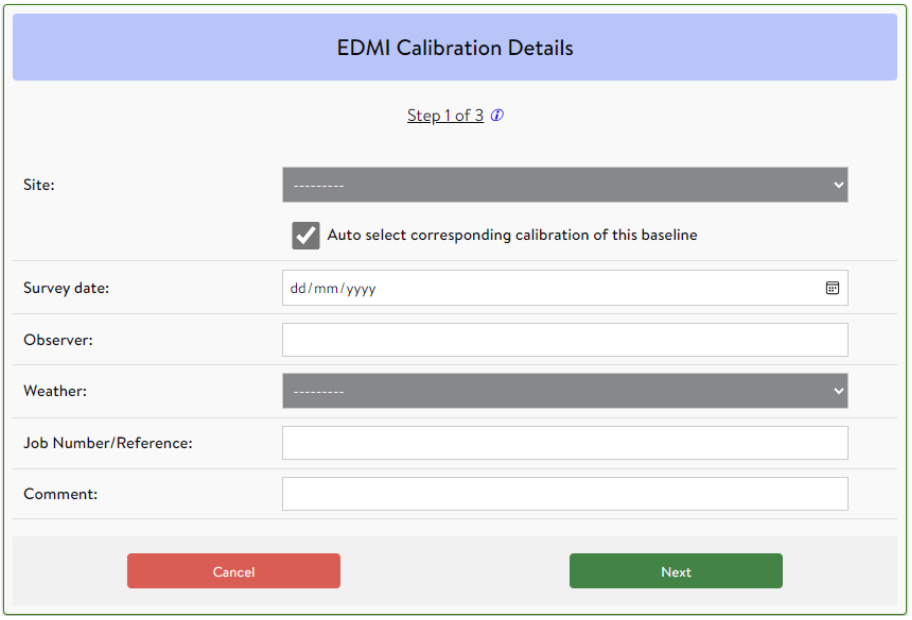


Figure 6.3: EDMI Calibration Detail interface (Step 1 of 3).

Step 2 of 3:

EDM — From the drop-down menu select the EDM instrument used. If the EDM instrument is not available, use the + button to add it to your company's Total Station EDM register (see instrument register in section 4.1).

Prism — From the drop-down menu select the prism used. If the prism is not available, use the + button to add it to your company's Prism register (see instrument register in section 4.1).

Atmospheric corrections — Tick if atmospheric corrections have been applied to the EDM observations prior to import. Unticking this box will make Medjil apply the first velocity correction to the imported data.

Thermometer, Barometer and Hygrometer — From the drop-down menus select the thermometer, barometer and hygrometer used. If the instruments are not available, use the + button to add them to your company's instrument register (see section 4.1).

Meteorological corrections — Tick the respective boxes if thermometer, barometer or hygrometer calibration corrections are applied. Unticking these boxes will result in calibration corrections being applied to the imported records.

Next — Click next to enter details in step 3 or click back to return to step 1.

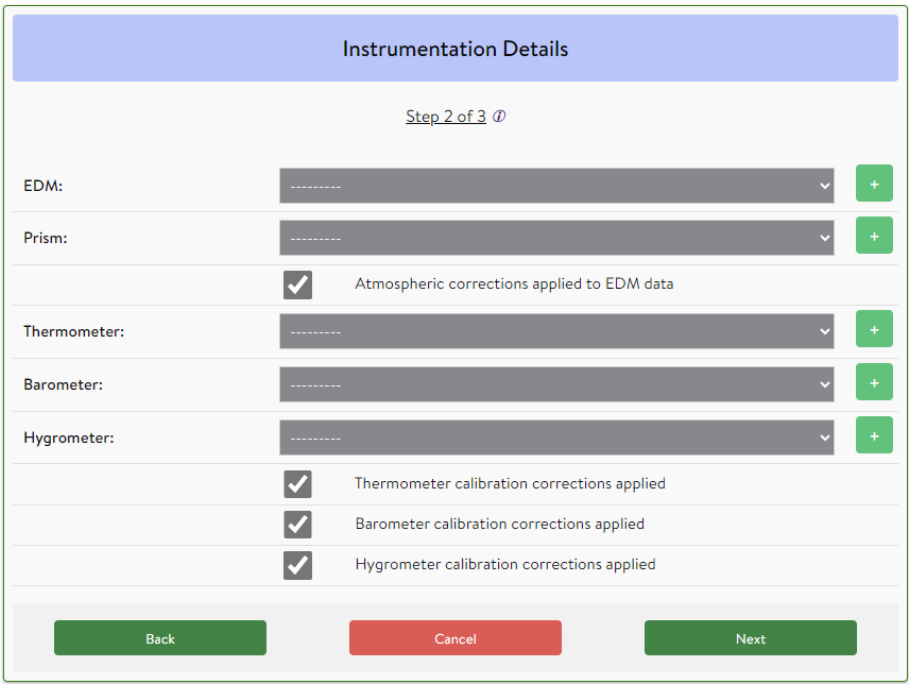


Figure 6.4: EDMI Calibration Detail interface (Step 2 of 3).

Step 3 of 3:

Uncertainty budget	From the drop-down menu select either the default uncertainty budget or a customised uncertainty. Use the + button to add a customised uncertainty budget (see section 6.3).
A-priori scalar	Specify the a-priori scalar (factor) or use the default of 1.0. Entering a value other than 1.0 will result in all a-priori uncertainties being multiplied by this factor.
Rejection criteria	Specify the rejection criteria for outlier detection or use the default of 2.0. Outliers based on this criterion will be flagged in the calibration report.
Cyclic errors	Tick if cyclic errors should be determined and tested for significance during the calibration processing.
Scanned fieldnotes	Attach any fieldnotes.
EDM File (*.csv)	Attach the total station generated observation file (*.csv).

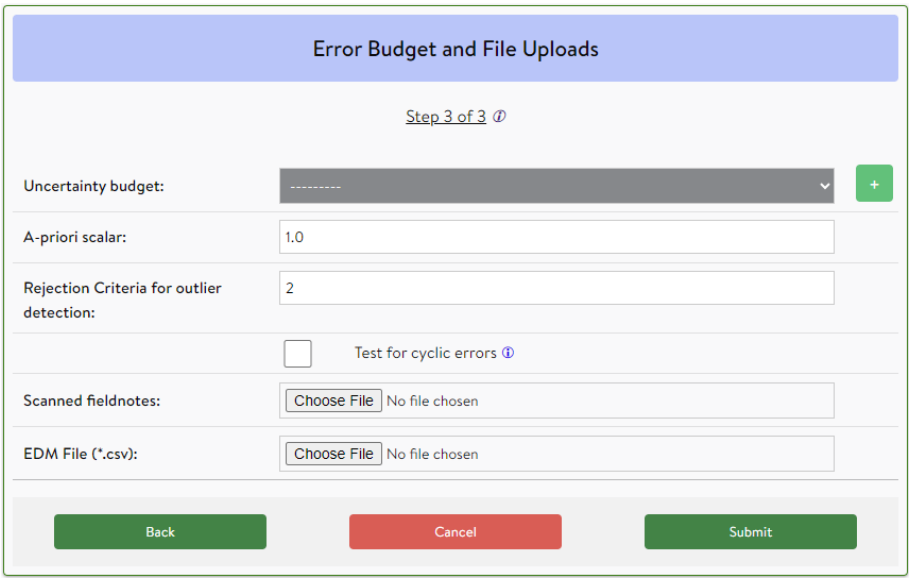


Figure 6.5: EDMI Calibration Detail interface (Step 3 of 3).

Use the Submit button to start the EDMI calibration. After the EDM observations have been successfully imported you will be presented with a list of all observations (see Figure 6.6). From the list select/deselect the observations to be used to estimate the EDM instrument corrections. See information button ⓘ for more information. Then use the Process button at the bottom of the observation list to perform the calibration. Alternatively use the Back button to change any of the input information (see steps 1 to 3) or cancel the calibration by using the Cancel button.

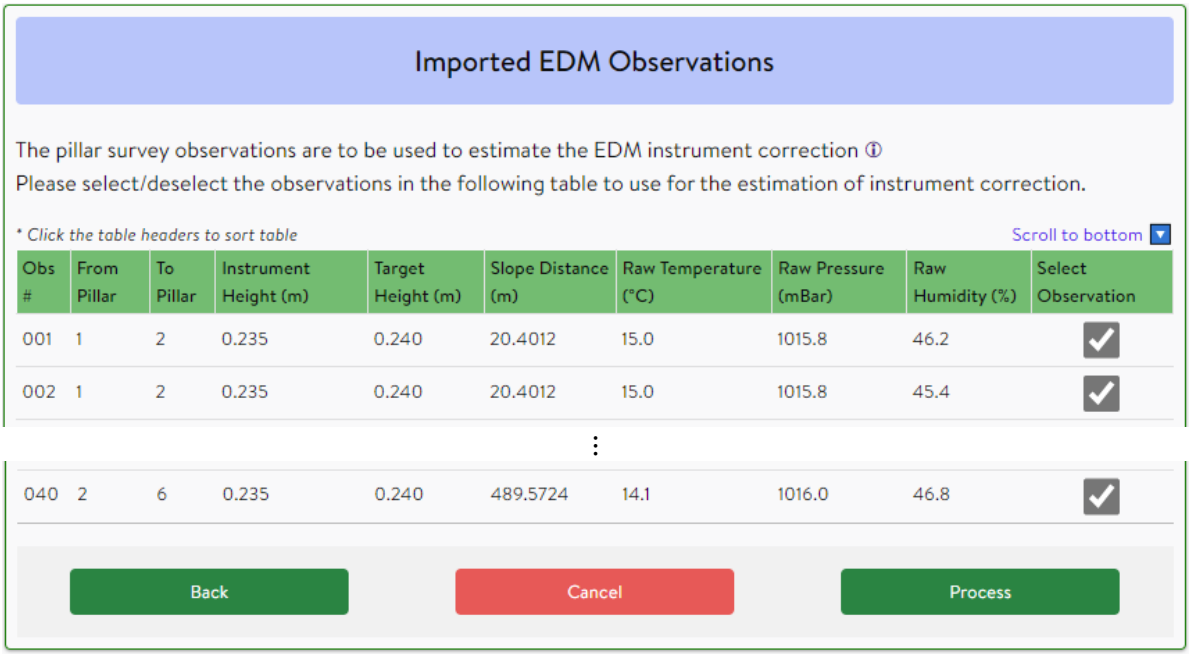


Figure 6.6: List of imported EDM observations (extract).

After a successful calibration you will be presented with the calibration report. At the bottom of the report enter the approval details. Once saved the report will be added to your company's list of EDMI calibrations (see Figure 6.2). To view the report, use the icon link . Use the action buttons and to edit or delete a record. If you edit a calibration record you will be able to change the input information and perform the calibration again. Note, the previous calibration report will be retained in the list while the new report will be added.

For detailed information on field procedures, mathematical models used and report outputs refer to the user guides and technical manuals available under the resources option on the home page or following information button .

6.2. Interlaboratory Comparisons

As a requirement in accordance with ISO 17025:2017, the *Interlaboratory Comparisons* menu allows to perform comparisons between calibrated baselines (reference laboratory) to confirm they deliver the same results. For more information follow the information button .

6.3. Uncertainty Budgets

Through the *Uncertainty Budgets* menu, you will be able to create and edit a customised (e.g. company specific) uncertainty budgets (see Figure 6.8) to be used for a calibration instead of Medjil's default values.

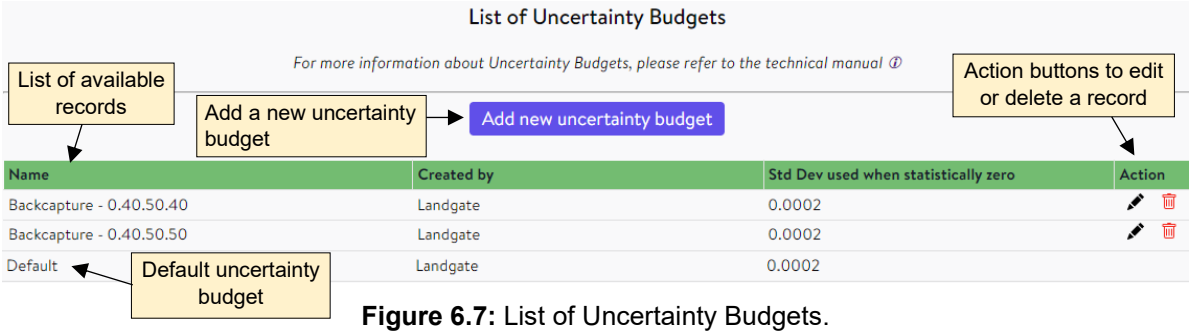


Figure 6.7: List of Uncertainty Budgets.

To create a new uncertainty budget, use the Add new uncertainty budget button to open the *Create Custom Uncertainty Budget* interface shown in Figures 6.8.

The uncertainty budget comprises of the following sources:

a.) **Instrument-related uncertainties** that are specified through the *Instrument Register* (see section 4.1) and will be sourced during computations.
b.) **Derived uncertainties** that are computed during the calibration based on observations.
c.) **Custom uncertainties** a user can define to be used for the calibration.

Use the drop-down menu to select one of the following custom uncertainty sources (see Figure 6.8).

- EDM scale factor
- EDMI measurement
- EDM LS zero offset
- Temperature
- Pressure
- Humidity
- Certified distances
- EDMI calibration
- Centring (instrument and prism)
- Heights (instrument and prism)
- Offsets

Use the + Add new uncertainty link to add a new uncertainty source or to delete an existing uncertainty source.

For each uncertainty source specify the unit, uncertainty type, statistical distribution type, uncertainty value, coverage factor K and degree of freedom. For more detailed information refer to the technical manual available under the resources option on the home page or follow the information button on the *Create Custom Uncertainty Budget* interface (see Figure 6.8).

Apart from the custom uncertainties listed above you can also specify the numerical value used when a standard deviation is statistically zero (default value is 0.0002).

Once completed, use the Save button to save your customized uncertainty budget which will be added to list of uncertainty budgets (see Figure 6.7). Use the action buttons and to edit or delete a record.

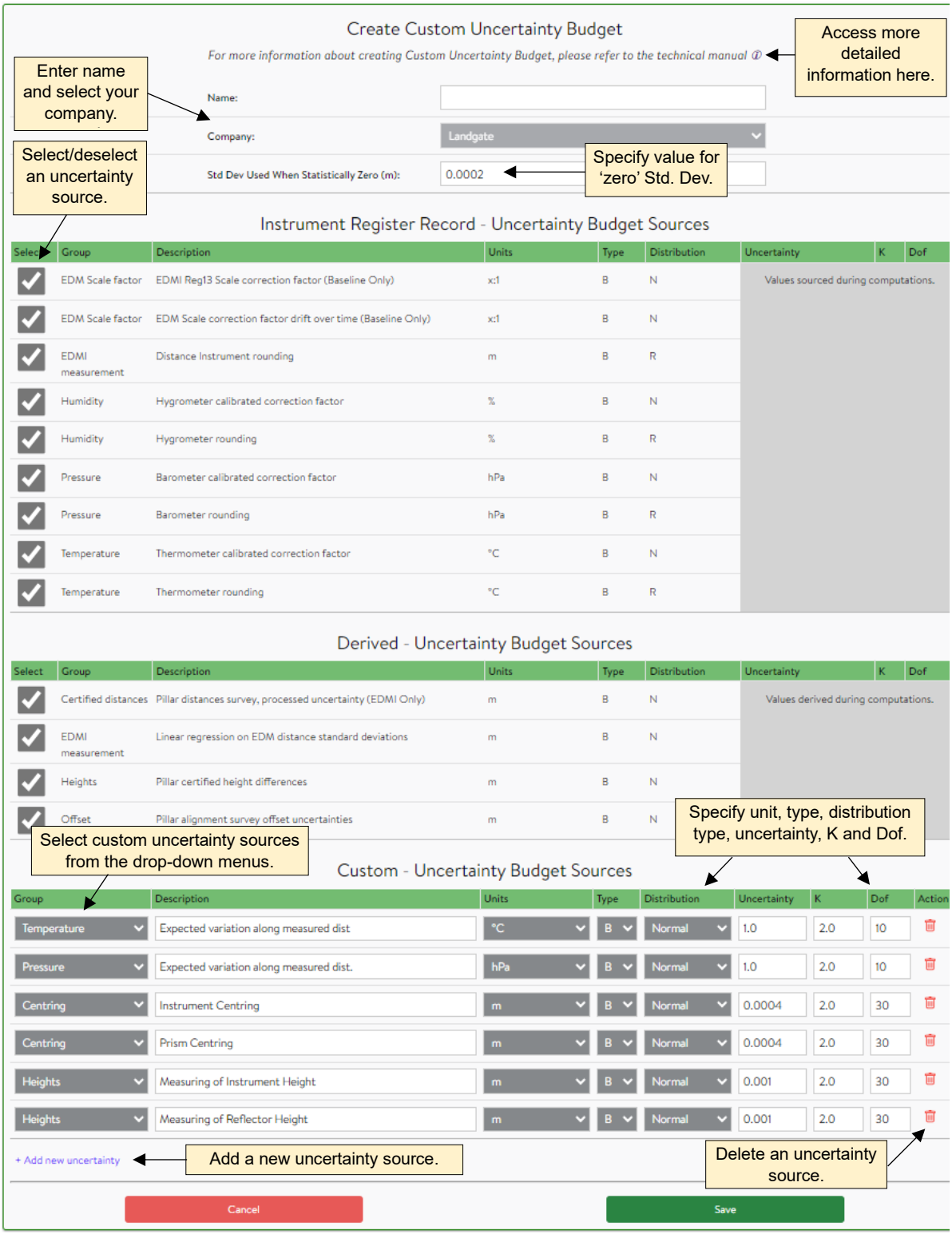


Figure 6.8: Custom Uncertainty Budget interface.

6.4. Report Endnotes

The *Report Endnotes* menu allows to create or edit customised endnotes and lists records of your company's existing endnotes (see Figure 6.9). These company specific endnotes will be included in addition to those created by the verifying authority in both EDMI and Baseline calibration reports.

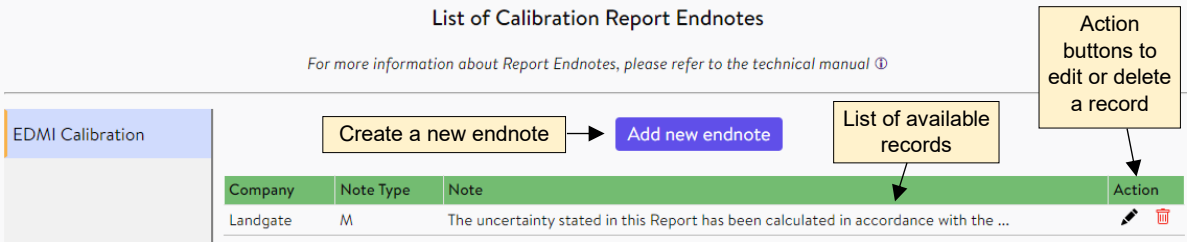


Figure 6.9: List of Calibration Report Endnotes.

To create a new customised endnote, use the Add new endnote button to open the *Create Report Endnote* interface shown in Figure 6.10.

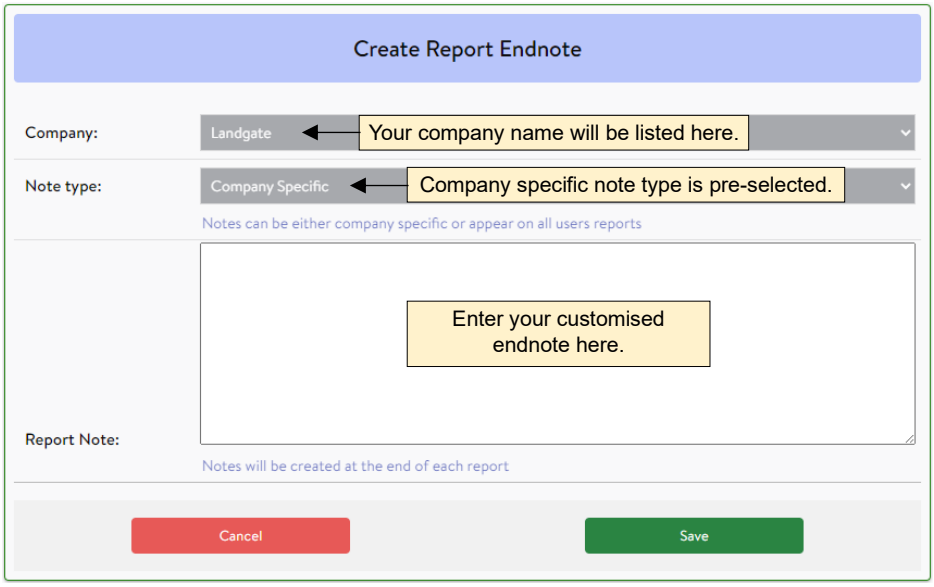


Figure 6.10: Create Report Endnote interface.

Once created, use the Save button to save your customized endnote which will be added to the list of calibration report endnotes (see Figure 6.9).

7. Resources

Figure 7.1: Resources drop-down menu

The *Resources* area provides access to all user guides and technical manuals. Use the *Resources* drop-down menu (see Figure 7.1) to access the following information:

User Guides	**Access to Staff and EDMI calibration user guides.**
Staff Calibration	*Provides information on the Boya (WA) staff calibration range, field procedures, sample data file and a short overview on the use of Medjil.*
EDMI Calibration	*Provides information on EDM baselines operated in Western Australia (Curtin University, Kalgoorlie and Busselton), observation and field procedures, a short overview on the use of Medjil and content of an EDMI calibration report.*
Technical Manuals	**Access to Staff and EDMI technical manuals.**
Staff Calibration	*Provides information on the Boya (WA) staff calibration range, mathematical models used for staff calibration including the computation of a correction factor for barcoded staff.*
EDMI Calibration	*Provides general information on baseline design, mathematical models used for baseline and EDMI calibrations, corrections, modelling of uncertainties, EDMI correction, least squares adjustment and statistical tests.*

Known Issues:

- In the lists of staff calibrations and staff calibration certificates the action buttons  and  to edits or delete a record are missing.
- In the *List of Leveling Staves Calibration Certificates* some error messages appear above the historical records.
- Cancelling the “Edit Barcoded Staff Certificate” interface (in the levelling registry) jumps to barcoded staff register in the dashboard. In the same interface there is a reference to “Step of “.
- To perform an EDMI calibration using the Default Error Budget, Medjil forces the user to enter calibration certificates for the Mets Instruments. This should be changed to a data warning rather than an error.
- There is an error when no hygrometer is specified for the calibration and the error budget requires the propagation of uncertainty based on the rounding of the instrument reading increment.