



Intel® RealSense™ Product Family

D400 Series Calibration Tools and API

Release Notes

August 2022

Version 2.12.0.0



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Revision History

Document Number	Revision Number	Description	Revision Date
	2.5.2.0	First Calibration Tools and API release	Jan 2018
	2.6.4.0	Support RGB calibration/ Updated kernel patching instructions for Linux	July 2018
	2.6.8.0	Support D435i Custom Calibration Data R/W API Support hardware sync in RGB calibration Support calibration raw data read/write Support Win10 RS4	December 2018
	2.8.0.0	Calibration improvements for robotics UI dynamic adjust to image aspect ratio	March 2019
	2.11.0.0	Support Intel® RealSense™ Depth Camera D455 New DC algo compatible with production calibration algo v5.1 Support Linux (Ubuntu 16.04 and Ubuntu 18.04) on ARM platforms (Nvidia Jetson TX2, Xavier, and Firefly RK3399) Fix libpng dependency issue on Ubuntu 18.04 Supports Ubuntu 18.04 kernel 5.x Calibration API is combined into Calibration Tool package	May 2020
	2.11.1.0	Support D455 Thermal Compensation	April 2021
	2.12.2.0	Support Intel® RealSense™ Depth Camera D405 Support Ubuntu 20.04 Detect device USB types and add warnings on USB2 devices Enhancements in custom calibration API and sample app	August 2022

1 **What's New**

1.1 Release 2.12.0.0

- Support Intel® RealSense™ Depth Camera D405
- Support Ubuntu 20.04
- Detect device USB types and add warnings on USB2 devices
- Enhancements in custom calibration API, sample app, and white paper

1.2 Release 2.11.1.0

- Support Thermal Compensation on Intel® RealSense™ Depth Camera D455

1.3 Release 2.11.0.0

- Support Intel® RealSense™ Depth Camera D455
- New DC algo compatible with production calibration algo v5.1
- Support Linux (Ubuntu 16.04 and Ubuntu 18.04) on ARM platforms (Nvidia Jetson TX2, Xavier, and Firefly RK3399)
- Fix libpng dependency issue on Ubuntu 18.04
- Supports Ubuntu 18.04 kernel 5.x
- Support Vision Calibration data in CustomRW
- Calibration API is combined into Calibration Tool package

1.4 Release 2.8.0.0

- Hybrid calibration process and API for robotics
- UI dynamic adjust to image aspect ratio

1.5 Release 2.6.8.0

- Support D435i
- Custom Calibration Data R/W API including IMU
- Support hardware sync in RGB calibration when it's available
- Implemented DSO-10178 (Need to support Fisheye in Calibration Read/Write API)

What's New

- Implemented calibration raw table data read/write in Calibration Read/Write API and CustomRW app
- Support multiple camera devices in CustomRW app
- Fixed DSO-10304 ([DC] brightness sometimes out of sync in IR and RGB streams)
- Migrate exposure sweep logic away from gain control to brightness control
- Enable user to switch exposure sweeps and change brightness at runtime (to accommodate difficult lighting condition where user will have to manually adjust left/right and RGB brightness)
- Disabled manual exposure in Dynamic Calibrator
- Support Win10 RS4
- Support librealsense 2.16.5 and FW 5.10.15.0 and later
- Support iPhone 8, 8+ and iPhone X phone target
- Other improvements

1.6 Release 2.6.4.0

- Removed target-less mode from Intel® RealSense™ Dynamic Calibrator
- UI improvements
- New feature to calibrate RGB for accurate UV mapping on devices with RGB.
- Support Depth-RGB calibration on Intel® RealSense™ Depth Cameras D415 and D435.
- Improved on-screen instruction with embedded demo in Dynamic Calibrator for better user experience.
- Support devices that were previously recalibrated with OEM Calibration Tool for Intel® RealSense™ technology versions 0.1.0, 0.2.0, 0.2.1, 0.3.0, 1.0.2.0, and 1.1.0.0.

1.7 Release 2.5.2.0

New Calibration Tool API product for Intel® RealSense™ D400 series 3D depth camera devices.

- Support Intel® RealSense™ Depth Module in the D400 series including D400, D410, D415, D420, D430, and D435
- Calibration with printed target
- Calibration with target displayed on iPhones and Android phones through Intel® RealSense™ Dynamic Target Tool app on Apple App Store and Google Play

What's New

- Calibration without target
- Support Calibration API with Intel proprietary algorithms and user custom algorithms
- Support calibration parameter read/write/restore
- Includes source code for sample calibrator application with Intel proprietary algorithms
- Includes source code for custom calibration sample app with OpenCV algorithm and white paper demonstrate how to calibrate with user custom algorithms
- Support Windows and Linux

2 *Issues Resolved*

This section lists issues resolved in this release:

Issue	Description

3 Known Issues and Limitations

This section lists known product limitations.

Issue	Description
DSO-2592	<p>Impact of reflections from environment lighting</p> <ul style="list-style-type: none"> Lighting reflection on phone screens severe impacts targeted calibration effectiveness. When a phone target is used where lighting reflection on phone glass screen presents, for example, outdoor under bright sunlight, or indoor with lots of lights surrounded, calibration performance degrade. In severe cases, calibration may not converge (as the impacted images thrown away) and it takes longer to complete or no result may be reached. In case this issue happens, try to move the phone to another location or a different direction to avoid reflections.
DSO-4182	<p>Impact of rolling wave bands in images with wide angle devices and phone targets on Samsung displays</p> <ul style="list-style-type: none"> Images from wide angle devices (D420/D430/D435/D435i) and phone targets on Samsung displays have rolling wave bands, and in some cases this would affect effectiveness of calibration since its algorithm looking for accurate patterns in target. Only D420/D430/D435/D435i devices are impacted. D400/D410/D415 no impact. Only AOS Samsung target phones impacted. IOS phones no impact. Impact should be limited to performance. Accuracy should not be impacted based on existing tests. The issue was worked around in dynamic calibration by automatically adjust auto exposure brightness to minimize the impact from the wave bands.

Known Issues and Limitations

DSO-5731	Target on Galaxy S5 phone not accurate. Avoid use this phone as target.
DSO-12290	<p>FW 5.11.5.0 and 5.11.6.100 regression caused degradation in calibration</p> <p>Use FW 5.11.4.0 and earlier or FW 5.11.6.200 and later. Do not use FW 5.11.5.0 and 5.11.6.100. The issue is fixed in FW 5.11.6.200.</p>

4 Installation and Additional Documentation

For installation and other information, please refer to the User's Guide and Programmer Guide available online:

- Intel® RealSense™ Product Family D400 Series Calibration Tools User Guide
- Intel® RealSense™ Product Family D400 Series Calibration Tools API Programmers Guide