

Analog Gauge Reader for Home Assistant

version 1.0.0 Home Assistant 2024.12+

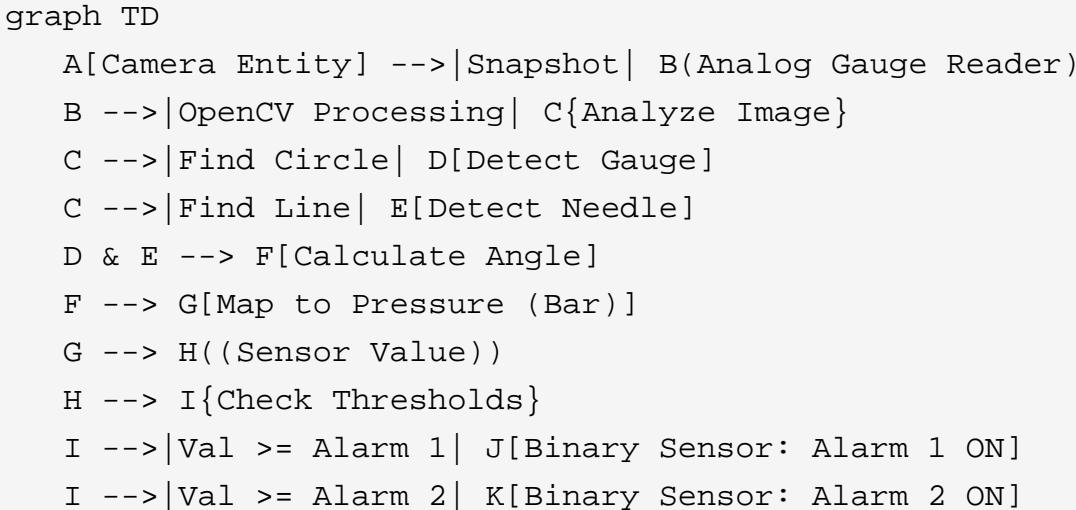
An advanced Home Assistant custom integration that uses Computer Vision (OpenCV) to read analog gauges (such as boiler pressure monitoring) from any camera stream and convert them into digital sensors.

■ Features

- **Universal Compatibility:** Works with any camera entity in Home Assistant.
 - **Intelligent Processing:** Uses OpenCV to detect gauge needle angle.
 - **Resource Efficient:** Configurable update intervals (1 min / 15 min) to save CPU.
 - **Integrated Alarms:** Built-in logic for multi-stage visual alarms (Warning, Critical).
 - **Easy Calibration:** Simple definition of min/max values.
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■■ How it Works

The integration captures snapshots from your existing camera and processes them to extract data.



■ Installation

1. **Download Source:** Copy the `analog_gauge_reader` folder into your `/config/custom_components/` directory.
`text /config/ └── custom_components/`
`└── analog_gauge_reader/` └── `__init__.py` └── `manifest.json` ...
 2. **Restart Home Assistant:** This is crucial to load the required `opencv-python-headless` libraries.
- Add Integration:**

- Navigate to **Settings > Devices & Services**.
 - Click **+ ADD INTEGRATION**.
 - Search for **Analog Gauge Reader**.
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■■ Configuration Parameters

Parameter	Description	Default
Camera Entity	The source camera to read from.	<i>Required</i>
Interval	How often to process the image.	15 minutes
Min Reading	The value at the start of the scale (usually bottom-left).	0.0
Max Reading	The value at the end of the scale (usually bottom-right).	3.0
Alarm 1, 2, 3	Threshold values for triggering binary alarm sensors.	<i>Optional</i>

■ Calibration & Troubleshooting

Best Practices for Camera Setup

- **Direct View:** The camera should face the gauge as directly as possible (90° angle) to avoid parallax error.
- **Lighting:** Ensure consistent lighting. Avoid direct glare or reflections on the glass face of the gauge.
- **Focus:** The needle must be clearly visible and sharp.

Common Issues

Problem: Sensor shows Unknown or Unavailable.

Solution: 1. Check the logs (Settings > System > Logs) for "Analog Gauge Reader". 2. Ensure the camera entity is streaming correctly. 3. Verify that the gauge takes up a significant portion of the image.

Problem: The value is inaccurate.

Solution: The algorithm assumes a standard ~270° gauge sweep starting from the bottom-left. If your gauge has a different layout (e.g., 180° sweep), the readings will be scaled incorrectly.

■ Expert Details

OpenCV Logic: The system uses `HoughCircleTransform` to find the gauge face and `HoughLineTransformP` (Probabilistic) to find the strongest line originating near the center of that circle.

Dependencies: - `opencv-python-headless` - `numpy`

These are installed automatically by Home Assistant upon the first run.