Purway CH-4 UAV Laser Methane Leak Detector (Model III)
CSV Raw Data Field Definitions (Reference Document)

Version: Internal Reference

This document describes the structure and definitions of the CSV raw data fields generated by the Purway CH-4 UAV Laser Methane Leak Detector (Model III) payload. The information below is provided to support data interpretation, GIS integration, and automated processing workflows.

1. Time & Methane Measurement Core Fields

Field Name	Description	Unit / Notes
time	Timestamp of each recorded measurement	System timestamp
methane_concentration	Methane concentration measured by the TDLAS sensor core	ppm·m
light_intensity	Optical signal intensity from the methane sensor core	Relative value (unitless)
absorption_peak	Laser wavelength absorption peak reference	Unitless (internal reference value)
relativity	Linear fitting quality indicator for the methane absorption signal	Unitless
SNR	Signal-to-noise ratio reference value	Unitless

2. Sensor Thermal & Electrical Status Fields

Field Name	Description	Unit / Notes
pcb_temperature	PCB temperature of the methane sensor core	°C
laser_temperature	Internal laser temperature	°C
tec_current	TEC operating current	Relative current value
laser_housing_temperature	External laser housing temperature	°C

3. Sensor Status & Version Information

Field Name	Description	Unit / Notes

status	Reserved status field for the methane sensor module	Internal use
ver	Sensor firmware version number	-
err_code	Error code from the methane sensor core	0 = normal

4. UAV Flight & Positioning Data

Field Name	Description	Unit / Notes
flight_status	UAV flight status (0 ground / 1 unlocked / 2 airborne)	-
longitude	UAV longitude	WGS-84
latitude	UAV latitude	WGS-84
altitude	UAV altitude above mean sea level	meters
relative_altitude	UAV relative altitude from takeoff point	meters
home_distance	Distance from UAV to takeoff point	meters
speed	UAV ground speed	m/s

5. Laser Rangefinder & Target Localization

Field Name	Description	Unit / Notes
dis_code	Laser rangefinder validity flag (0 valid / 1 invalid)	-
distance	Laser rangefinder measured distance	meters
dest_longitude	Longitude of the detected target point	WGS-84
dest_latitude	Latitude of the detected target point	WGS-84

6. UAV & Gimbal Attitude Data

Field Name	Description	Unit / Notes

uav_pitch	UAV pitch angle	degrees
uav_roll	UAV roll angle	degrees
uav_yaw	UAV yaw angle	degrees
gimbal_pitch	Gimbal pitch angle	degrees
gimbal_roll	Gimbal roll angle	degrees
gimbal_yaw	Gimbal yaw angle	degrees

7. Camera & File Association Fields

Field Name	Description	Unit / Notes
camera_focal_length	Camera lens focal length	mm
camera_zoom	Current digital zoom ratio	×
file_name	Image or video file name recorded during automatic capture modes	Association field

8. General Notes

- All methane concentration values are generated by the onboard TDLAS sensor core.
- UAV telemetry fields are passed through from the flight controller.
- Some diagnostic and status fields are provided for completeness but are not required for methane quantification.
- Field availability may vary depending on firmware version and operational mode.