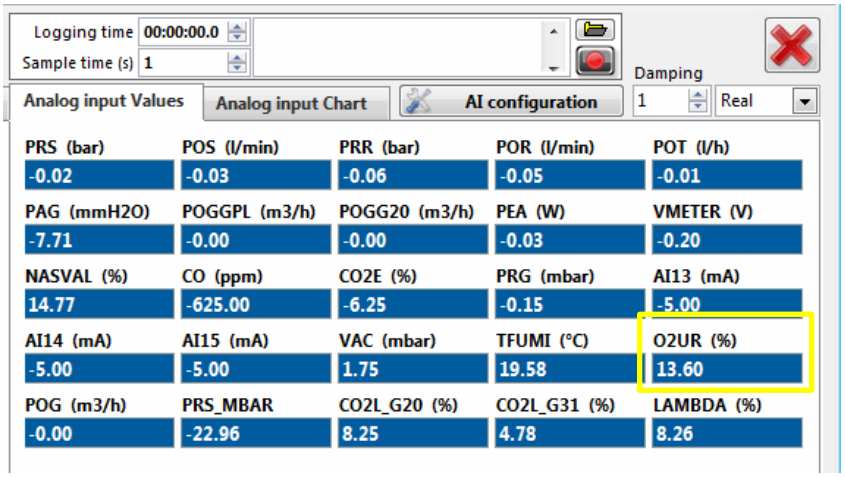
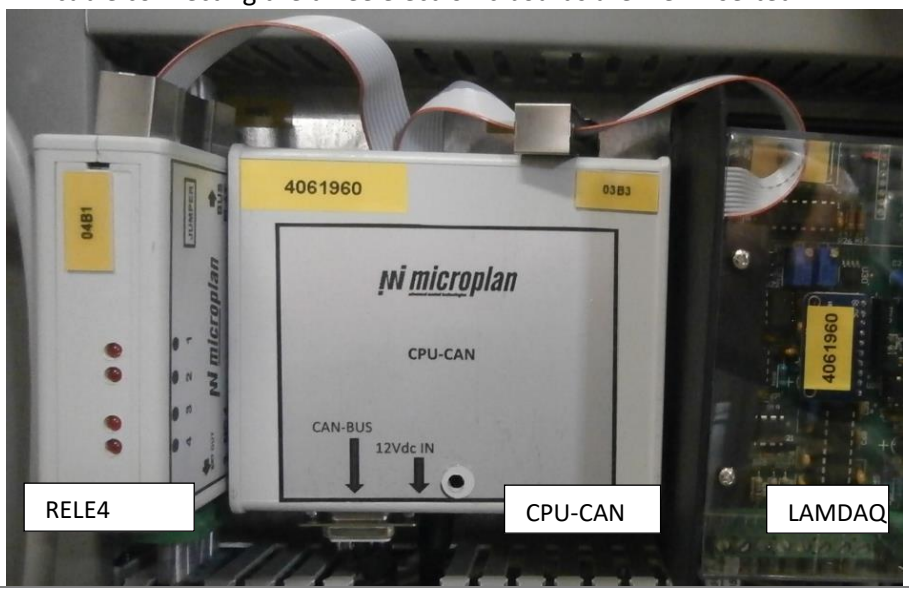
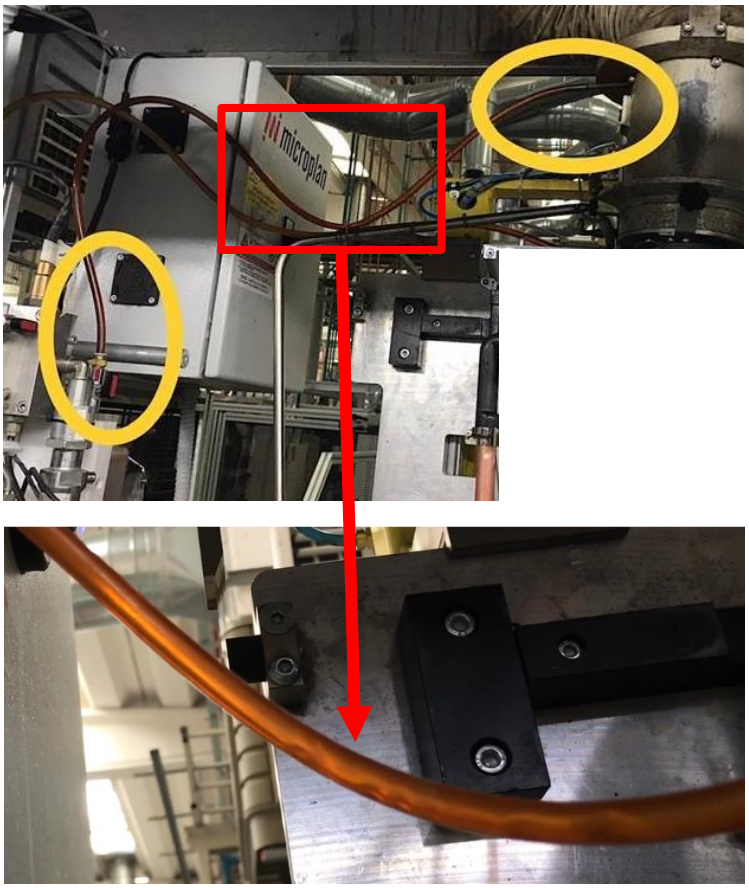
CO2WF and FFA troubleshooting

The following troubleshooting might help in case of problems with CO2WF and FFA systems from Microplan.

Possible problem	Possible solution
Lambda probe drift or measurement oscillation	• Use the diagnostic program, "Real" measures, and check the value displayed by 02UR. Since normal air contains 20.95% oxygen, a probe reading **below 19.0%**,in clean air, indicates that the sensor has failed and should be replaced.  • After lambda probe replacement execute "**tuning operation**" (read from page 5)
Broken lambda probe – probe doesn't heat up	• (when applicable) Check fuse • Replace the probe and execute "**tuning operation**" after replacement (read at page 3) • CO2WF – In the CO2WF combustion analysis system, the lambda probe is directly inserted into the exhaust pipe. The probe can be easily damaged by contact with wet combustion condensate. The probe should be mounted with an angle of at least 10° from the horizontal (electrical connection facing up). In addition, a condensate **shield** should be used inside the exhaust pipe to **prevent condensate from dripping on the sensor.**
Slow reading - Suction problem (for FFA only)	Execute the following checks in case the test sequence fails during the fumes suction phase: • Check that there are not impurities along the fume aspiration hose. • Disassemble the venturi (see picture) and clean it inside or replace it in case reading is too slow. • Check that the pressure set on RA9.1 is at least 6 bar (87 Psi). • Check that the pneumatic valves VP9.3 and VP9.4 are open • and the pilot "SUCT" is ON. • Check that the pneumatic valves VP9.2 and VP9.2B are both closed. • Check that the flow regulator RP9.1 is open enough. Otherwise, during the suction phase, turn its regulation knob until the depression, read by FSP, is about -**15 mbar** 

Possible problem	Possible solution
No value is read from the FFA, the electro-valves do not switch and the green led on the LAMBDAQ board is off	• Check fuses inside the electric cabinet of FFA unit.
No value is read from the FFA, the electro-valves do not switch, but the green led on the LAMBDAQ board is on	• Check the serial cable SUB9 that is connected between the connector on the side of the FFA and the USB converter.
The electro-valves of FFA do not switch correctly or remain always on	• Inside the electric cabinet of FFA check that the connectors of the flat cable connecting the three electronic boards are well inserted. 
The electro-valves of FFA do not switch or always remain off	• Inside the electric cabinet of FFA make sure that the SUB9 connector (on the low side of the CPU-CAN board) is well plugged to the board.
The value read by CO2WF or FFA is stuck to a single value (or oxygen value = zero)	• Make sure the connector of lambda probe is well plugged 
The electro-valves of FFA do not switch or always remain off or on, while the pressure- switch pressure and the suction temperature are read correctly	• RELE4 board is faulty.

Possible problem	Possible solution
The measures detected by the lambda probe (oxygen) are correct, while the pressure of the pressure switch and the suction temperature are not read; from the hole on the box of the CPU-CAN board I can see that the internal leds are on and flashing	• Board not configured, replace both CPU-CAN and LAMBDAQ checking that they have the same serial number
Oscillation in the measurement	• Make sure the fume aspiration pipe does not contain condensates as this may be a consequence of an incorrect installation. Avoid any bends where condensates could cumulate. Example of **wrong installation** (bend in the middle, within the red rectangle) (the two circles indicate the terminations of the aspiration pipe) As you can see there is a bend in the middle where condensates cumulate 

Example of **correct installation**
(the two circles indicate the terminations of the aspiration pipe)
As you can see there are no points in the way for condensates to cumulate

The measures detected by the lambda probe (oxygen) are correct, while the pressure of the pressure switch and the suction temperature are not read, from the hole on the container of the CPU-CAN board you can see that the internal LEDs do not flash	• Board faulty or not powered check the circular jack connector inserted on the low side, possibly replace both CPU-CAN and LAMBDAQ checking that they have the same serial number

Possible problem	Possible solution
The readings from Microplan CO2WF and FFA is not consistent with another flue gas analyzer	• Be sure the reference combustion gas analyzer is properly calibrated. • Be sure the sampling method is consistent between the analysis systems. The Microplan CO2WF combustion analysis system reads wet fumes (water vapor in the sample has not be extracted). The FFA system reads dry air free fumes (cooling system removes water vapor from the sample).

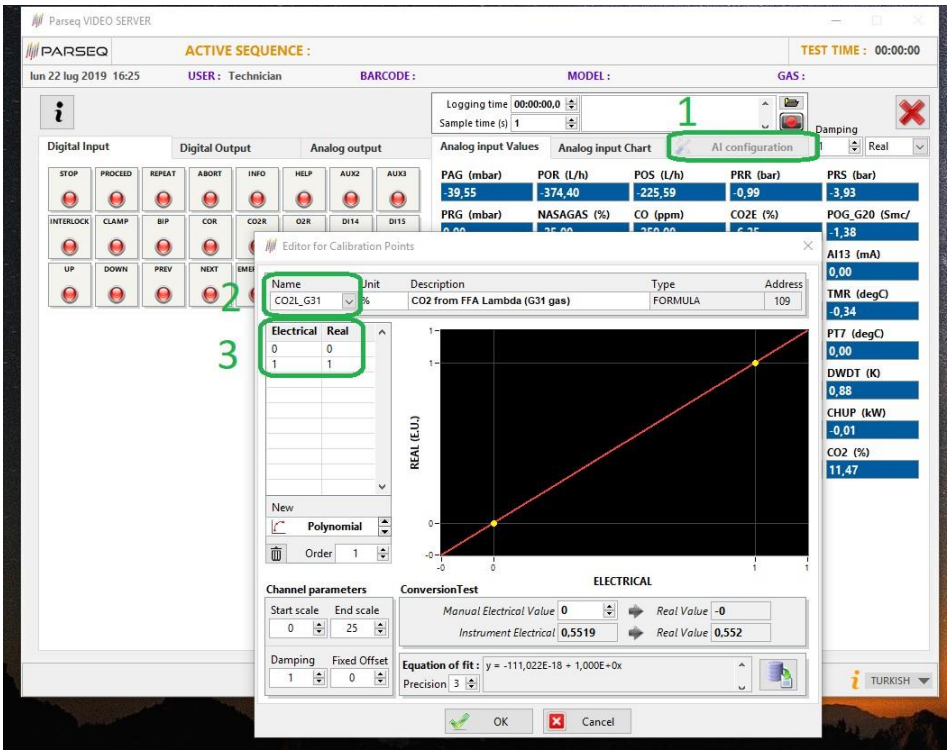
Measurem. condition	**Wet fumes**	**Wet fumes**	**Dry-air-free**	**Wet fumes**	**Dry-air-free**
					
TYPE	Hand held	Infrared without fumes refrigerator	Infrared with fumes refrigerator	**CO2WF** (Microplan)	**FFA** (Microplan)

- Execute "**tuning operation**". This is a comparison of the CO2 measured by CO2WF or FFA system, with the one measured by a reference flue gas analyzer. The purpose of the tuning is to let the CO2WF or FFA be able to reproduce, in a faster way, the same measurement of the reference analyzer. This operation has to be carried out **using the actual gas of the combustion**. In particular, when network gas is used, being its composition not stable, the tuning operation has to be **repeated with a frequency that could prevent from drifts** that could introduce significant errors in the CO2 measurement. The tuning consists in obtaining at least two points of CO2 measured by the fast analyzer (CO2WF or FFA) and the reference analyzer, better if these points are near to the limits of the regulation range of the customer's boilers. For example, if all the boilers that arrive to the bench at the end of the production line need to be adjusted in the range from 8.5% to 9.5%, the ideal points where to do the tuning would just be 8.5% and 9.5%. Nothing changes, however, if it they would be, for example, 8% and 10%: the important aspect is that the tuning points include the regulation range of the boilers. These points have to entered into the calibration editor of the test bench (usually Caled).

Possible problem	Possible solution

HOW TO DO: (example with G31)
click "AI configuration" Tab. The CalEd (Calibration Editor) pop-up window will appear.

In "Name" curtains menu select "CO2L_G31" (or the gas you are calibrating) and clean the existing calibration points if they are different from the "Identity" function:
Electric, Real
0, 0
1, 1

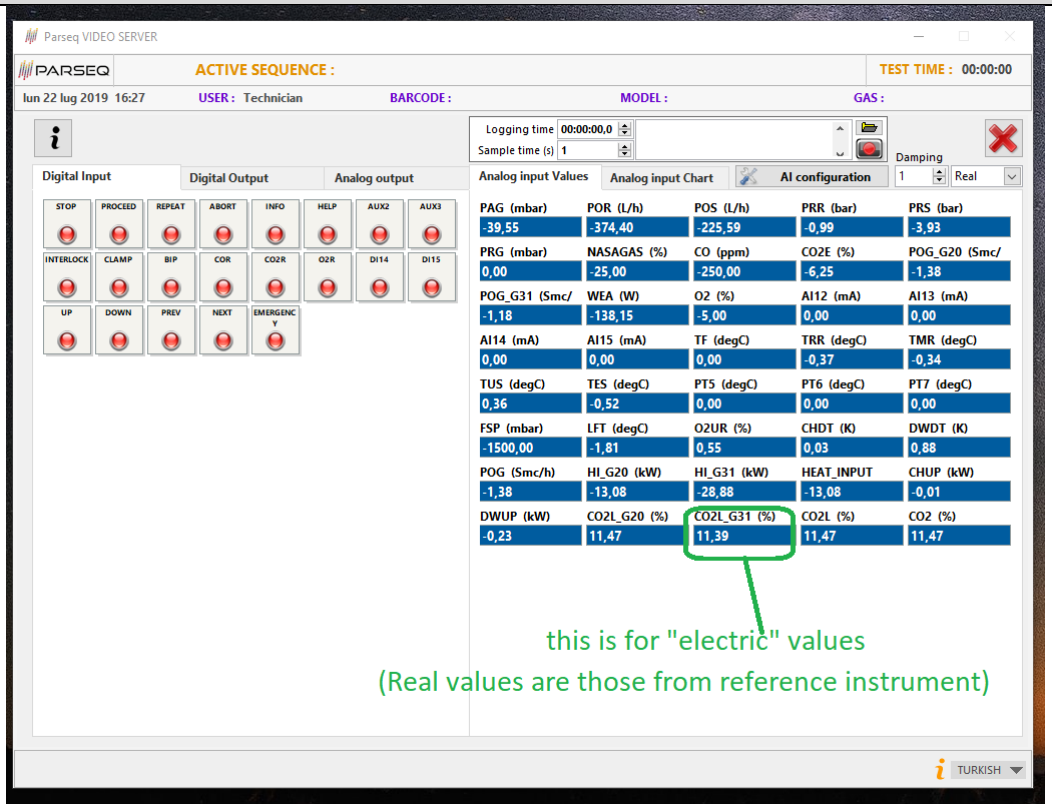


Then close CalEd

Once you have the boiler on and burning with G31 gas (or your specific gas), take note of some sampling points writing the reading of both reference instrument and CO2L_G31 values.

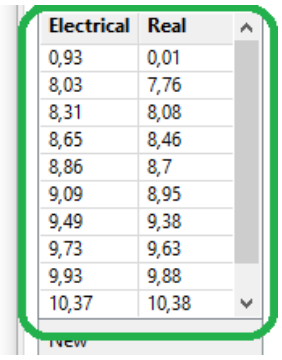
Electric = values read from Diagnostic (in our example CO2L_G31)
Real = values read from reference instrument

Possible problem	Possible solution



At the end of points gathering, open again CalEd and save above points.

Electric = values read from Diagnostic (in our example CO2L_G31)
Real = values read from reference instrument



Electrical	Real
0,93	0,01
8,03	7,76
8,31	8,08
8,65	8,46
8,86	8,7
9,09	8,95
9,49	9,38
9,73	9,63
9,93	9,88
10,37	10,38