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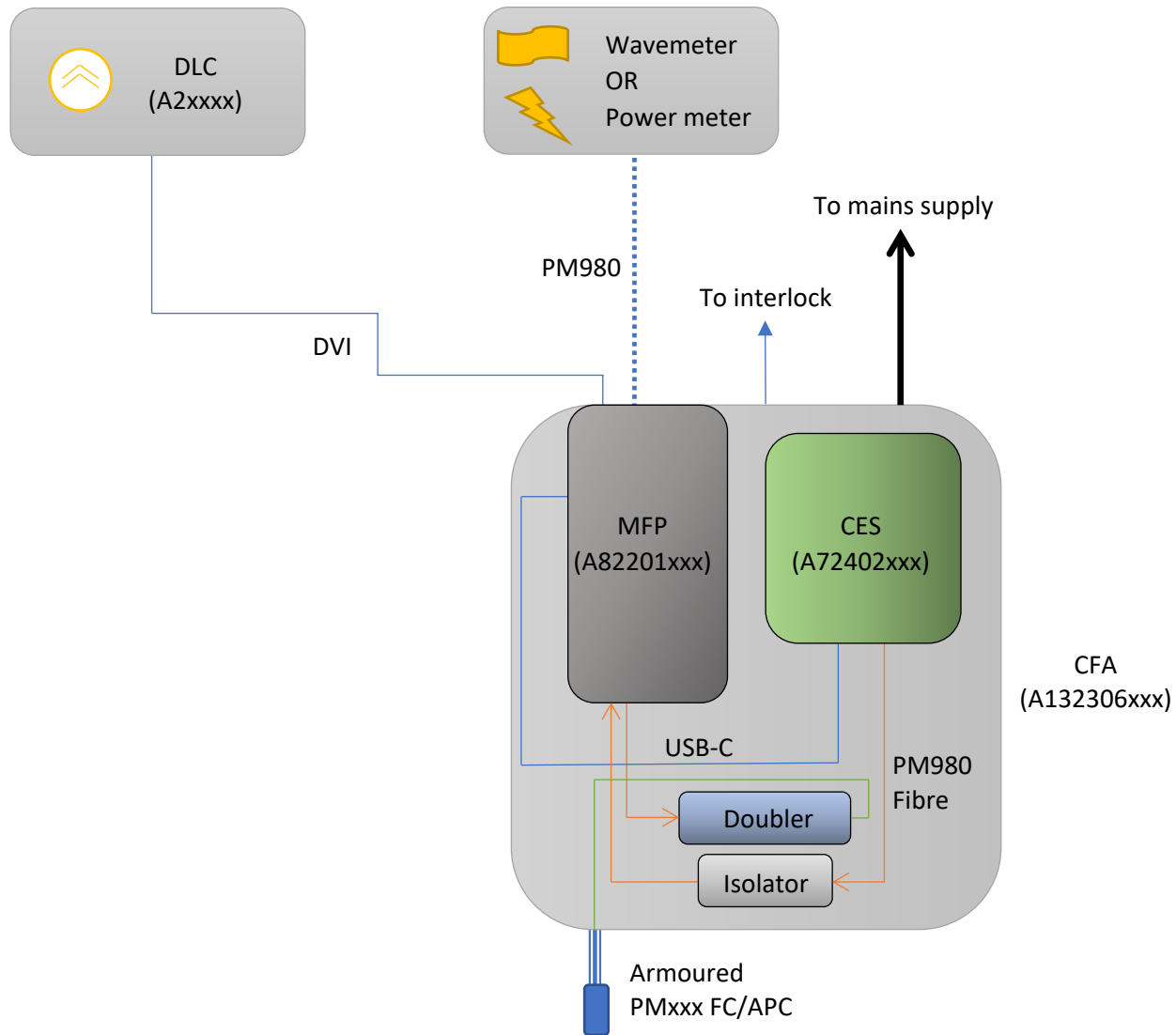
*MGPA (CFA) Mini Fibre Amplifier System*

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Quickstart guide

Rev.0 04/09/2024

### Fibre amplifier system block diagram



## Turn ON sequence

- 1) Connect the DLC to the DVI-DL input located in the rear of the CFA chassis. Note that, while this input appears to be embedded within the CFA chassis, it is *actually* connected to a headboard housed within the MFP; exiting this headboard is a USB-C cable which directly connects to, and hence operates, the CES seed laser.
- 2) Power on the DLC by flipping the switch on the rear of the DLC to its **ON** position.
- 3) On the front panel of the DLC, turn the keyswitch from the **STANDBY** position to the **RUN** position.
- 4) Turn the selector knob located immediately above the keyswitch on the front panel of the DLC to select the **Temp set** option, and verify that the temperature shown on the DLC display matches that of the Test Report (namely, 25.2°C).
- 5) Turn the selector knob to select the **Temperature** option and wait (for approximately 5-10 minutes) until the temperature shown on the DLC display both stabilises *and* matches the (25.2°C) temperature from the previous step.
- 6) Once the temperature has stabilised, ensure that the **Current** knob (located on the far left-hand side of the DLC front panel) is rotated fully counterclockwise, thus setting the current delivered to the seed laser to zero.
- 7) Flip the DLC power switch from the **OFF** position to the **ON** position.
- 8) Using the same selector knob from previous steps, select the **Voltage** option and verify that the voltage displayed on the DLC is approximately 1.1V.
- 9) Select the **Curr max** option using the selector knob and, using the appropriate trimpot located in the rear of the DLC, increase the maximum current to a value of 500mA.
- 10) From the pickoff port located above the DVI-DL input on the rear of the CFA chassis, remove the black fibre dust cap.
- 11) Retrieve a power meter, set to record 1064nm light, and place it at the just-uncovered pickoff output port.
- 12) Using the selector knob from previous steps, select the **Current** option. Then, slowly increase the current to the operational setpoint of 475mA. Verify that the power recorded by the power meter approximately matches that given in the Test Report (namely, 35uW). Note that the observed power here is dependent on the laboratory temperature (and in particular, the temperature of the fibres within the amplifier system). Should the power differ drastically from the expected value, refer to the Troubleshooting section below.
- 13) Inject the pickoff light into a wavemeter using a PM980 fibre, and verify that the wavelength of the seed laser is at 1064nm, or a given wavelength of interest. If this is *not* the case, refer to the Troubleshooting section below.
- 14) Once the seed laser wavelength has been verified, proceed to set up once more the power meter to record the pickoff output power.

**IMPORTANT: NEVER proceed to powering on the amplifier using the following steps without ensuring that the seed laser is ON. Failing to do so could result in significant damage to the amplifier and/or the waveguide doubler.**

- 15) With all seed-verification steps completed successfully, proceed to connect the CFA to the mains via an IEC cable; then, power on the CFA by flipping the switch on the rear of the CFA.
- 16) Turn the keyswitch on the front panel of the CFA to from the **STANDBY** position to the **RUN** position, ensuring that the **AMP** LED glows yellow. If the keyswitch was *already* in the **RUN** position, turn it into the **STANDBY** position and then *back* into the **RUN** position.

- 17) Using the selector knob and associated buttons on the front panel of the CFA, ensure that the **Current Setpoint** value for Stage 1 matches that of the Test Report (namely, 2A). Note that the setpoint can be set to 0A at this point and *then* changed later once the amplifier is powered on.
- 18) Press the **AMP** button on the front panel of the CFA and wait until the **AMP** LED glows green. At this point, the (MFP) amplifier will now amplify the seed light to produce approximately 450mW of 1064nm light at the output of the MFP (not directly measurable) and approximately 0.5mW at the pickoff output; the latter of these powers should now be verified using a power meter.
- 19) With the amplifier operating as expected, use the selection knob and associated buttons on the front panel of the CFA to verify that the **Tset C** value for the **Oven** matches that of the Test Report (namely, 44.6°C).
- 20) Insert the armoured PM480 FC/APC output fibre into a power meter, set to record 532nm light.
- 21) Press the **OVEN** button on the front panel of the CFA and wait until the **OVEN** LED glows green. At this point, the oven will begin the process of stabilising its temperature to that set via the front panel of the CFA.
- 22) Once the oven temperature has stabilised, observe the 532nm output power and verify that it matches that given in the Test Report (namely, approximately 115mW). Should the power differ from that given in the Test Report, refer to the Troubleshooting section below.

## Turn OFF sequence

- 1) Press the **AMP** button on the front panel of the CFA and wait until the **AMP** LED glows yellow. It is important to turn *off* the amplifier *before* powering off both the seed laser and oven.
- 2) Press the **OVEN** button on the front panel of the CFA and wait until the **OVEN** LED glows yellow. Note that this will, naturally, turn the oven *off*, and hence the observed oven temperature in the **OVEN** menu of the CFA will fall away from the oven setpoint temperature.
- 3) Turn the keyswitch on the front panel of the CFA to the **STANDBY** position. The LEDs should now glow red.
- 4) Power off the CFA.
- 5) Flip the switch on the front panel of the DLC from **ON** to **OFF**. This will cease the delivery of current to the seed laser, hence powering it off.
- 6) Turn the keyswitch on the front panel of the DLC from **RUN** to **STANDBY**. Note that, while no current is being delivered to the seed laser at this point, the temperature stabilisation of the seed laser is still active at this point.
- 7) Power off the DLC using the switch on its rear panel. This step will now cease the temperature stabilisation of the seed laser.

## Troubleshooting

### Low Non-Amplified Pickoff Power

- 1) Using a 2mm hex driver, remove the four M3x6 FHCS screws securing the CFA lid to the body of the chassis; then, remove the lid.
- 2) Using a 3mm hex driver, loosen the four M4x20 SHCS screws securing the CES lid to the body of the CES chassis, but do **not** remove the screws. Use **extreme** care whilst loosening the screws so as to avoid damaging the bare fibres that have been spooled within the CFA chassis.
- 3) **Gently** remove the CES lid from its chassis, again taking care to not damage any spooled fibres.
- 4) At the rear of the (now-visible) CES barrel is a hexagonally-shaped threaded end cap from which a red and black wire exit. Carefully and slowly proceed to rotate this end cap whilst observing the power recorded at the amplifier pickoff until the maximum power is observed.
- 5) Replace all lids to seal up the amplifier.

### Incorrect Wavelength

- 1) Follow the steps outlined in the [Low Non-Amplified Pickoff Power](#) section above to reveal the CES barrel.
- 2) Insert a 1.5mm right-angled Allen key into the head of the high TPI screw. Slowly and carefully tighten or loosen the screw whilst observing the wavelength recorded on a wavemeter until a single lasing mode at the desired target wavelength is obtained.
- 3) Disconnect the end of the PM980 fibre inserted into the pickoff butt-coupler and verify that the pickoff power observed is correct and appropriate, using the steps outlined in the [Low Non-Amplified Pickoff Power](#) section above to improve the power if necessary.
- 4) Replace all lids to seal up the amplifier.

### Low Amplified (and Doubled) Power

- 1) Ensure that the seed is lasing at the correct desired wavelength *and* that the amplified pickoff power is correct and appropriate, using the steps in the [Low Non-Amplified Pickoff Power](#) and the [Incorrect Wavelength](#) sections above to remedy if necessary.
- 2) Replace all lids to seal up the amplifier.
- 3) Whilst observing the 532nm output power, proceed to change the temperature setpoint of the oven in "coarse" 0.1°C increments, waiting 15-20 seconds after each new temperature setpoint for the output power to stabilise, until the maximum power is observed.
- 4) With the temperature setpoint of the oven set to its maximum "coarse" value, proceed to scan the temperature about this setpoint by changing the temperature setpoint of the oven in "fine" 0.01°C increments until the maximum power is observed.