Propuesta de proyecto de vinculación y cooperación internacional: Construcción de dispositivo CPAP en Ecuador

CPAP (presión positiva continua en las vías respiratorias) para pacientes con COVID19+

CPAP es un dispositivo de respiración mecánica no invasiva

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Antecedentes

CPAP = Continuous positive airway pressure
presión positiva continua en las vías respiratorias

Un dispositivo CPAP proporciona a los pacientes aire enriquecido con oxígeno a una presión ligeramente más alta que la presión atmosférica normal.

En otros términos, esto mantiene abiertas las vías respiratorias y les permite respirar mejor.

Medicina Interna, Neumología, Emergencia

NO EN UCI

UCL – University College London Hospital, Dep Ing. Mecánica de UCL y Mercedes-AMG High Performance Powertrains (F1)

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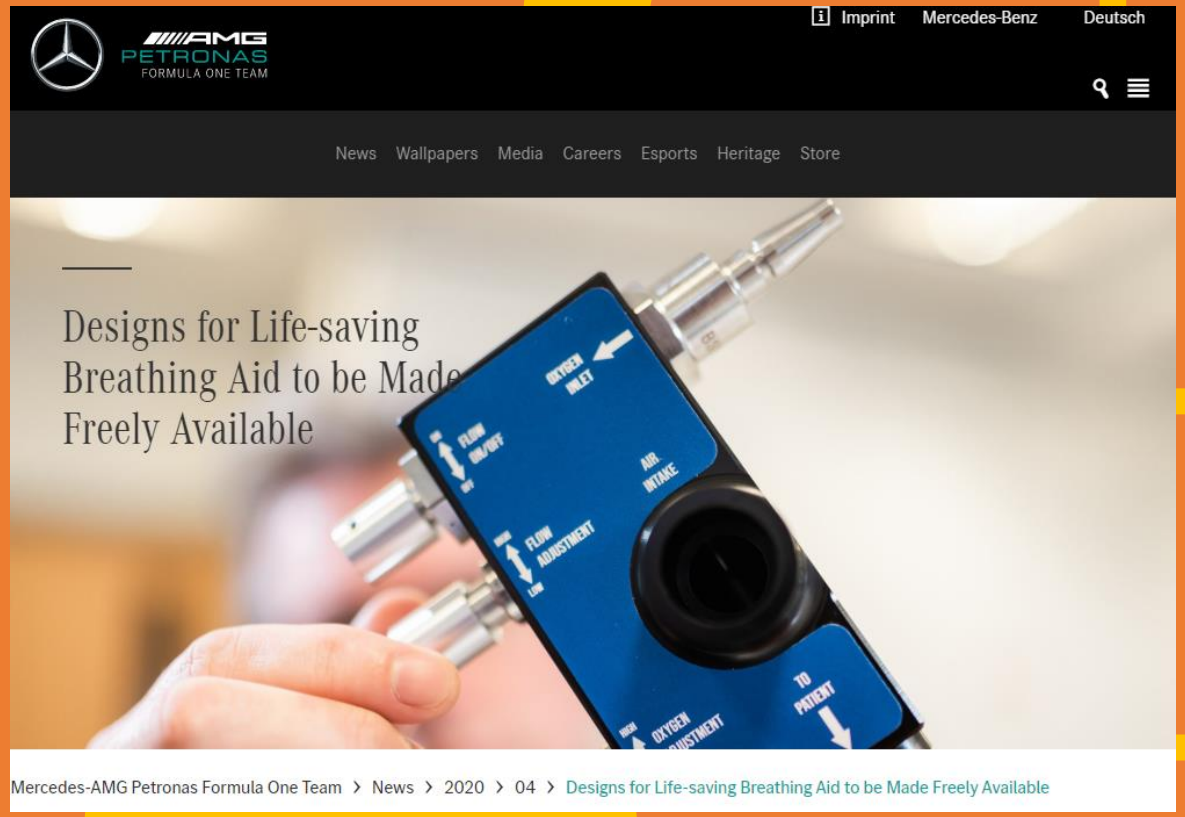
Coronavirus: Mercedes F1 team to start delivering 10,000 breathing aid devices to hospitals this week

Reigning F1 world champions have developed and produced a Continuous Positive Airway Pressure device with up to 1,000 being built each day at their High Performance Powertains technology centre using machines that build their race-winning engines

Jack de Menezes | @JackdeMenezes | 6 days ago |

The Mercedes Formula One team will start to deliver up to 10,000 breathing devices to the National Health Service this week after receiving a bulk order from the Government.

The reigning F1 world champions have transformed their Brixworth High Performance Powertrains technology centre into a fully-functioning factory that is building up to 1,000 Continuous Positive Airway Pressure (CPAP) devices each day, named the UCL-Ventura, with trials in London hospitals proving successful.



UCL – University College London Hospital, Dep Ing. Mecánica de UCL y Mercedes-AMG High Performance Powertrains (F1)

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Designs for life-saving breathing aid are made freely available

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Designs for life-saving breathing aid are made freely available

7 April 2020

The designs of a new breathing aid developed by engineers at UCL and Formula One working with clinicians at UCLH have been made freely available to support the global response to Covid-19.

Package 1 (now at version 3, released 11th April)

- Manufacturing drawings.
- System schematics and characteristics.
- Bill of materials and type of manufacturing machines used for CPAP production.

Package 2 (now at version 2, released 11th April)

- Development tests information.
- Assembly procedures, including build tooling requirements.
- Test procedure and pass-off protocol.

Package 3 (version 1, released 11th April)

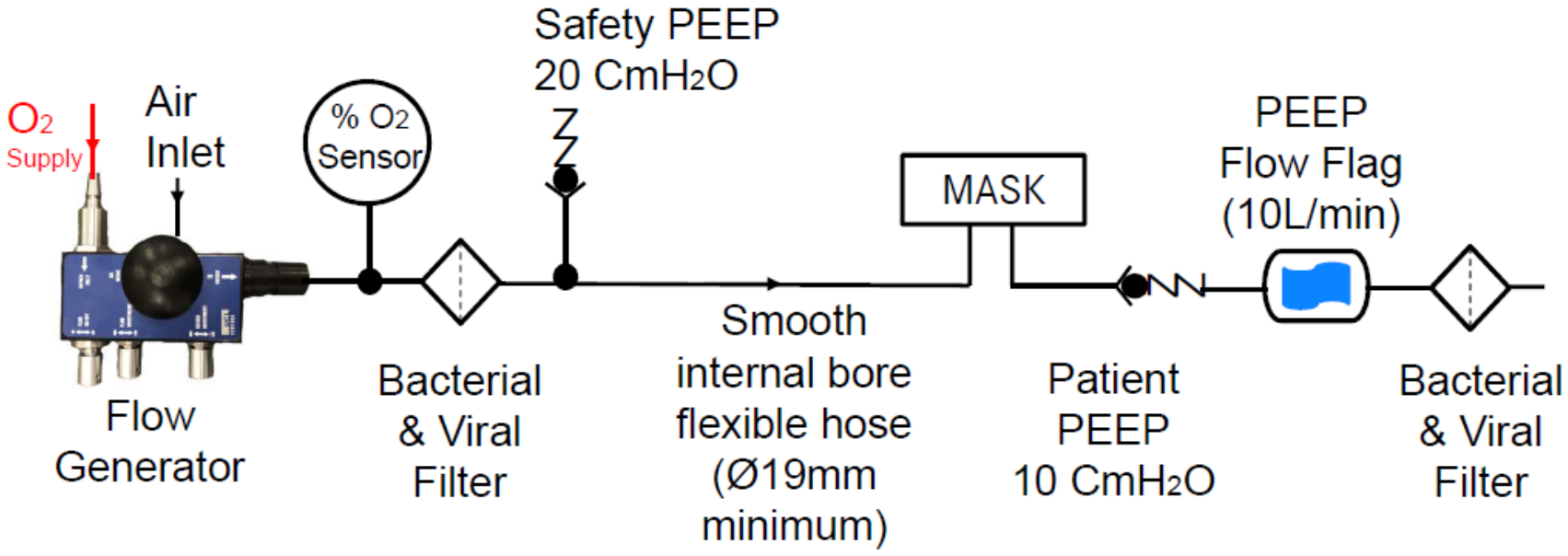
- Frequently Asked Questions (FAQ)
- Test Work instructions
- CPAP - Assembly Process Flow and timing
- User leaflet

Tenemos la Licencia por 2 años y colaboración directa con UCL

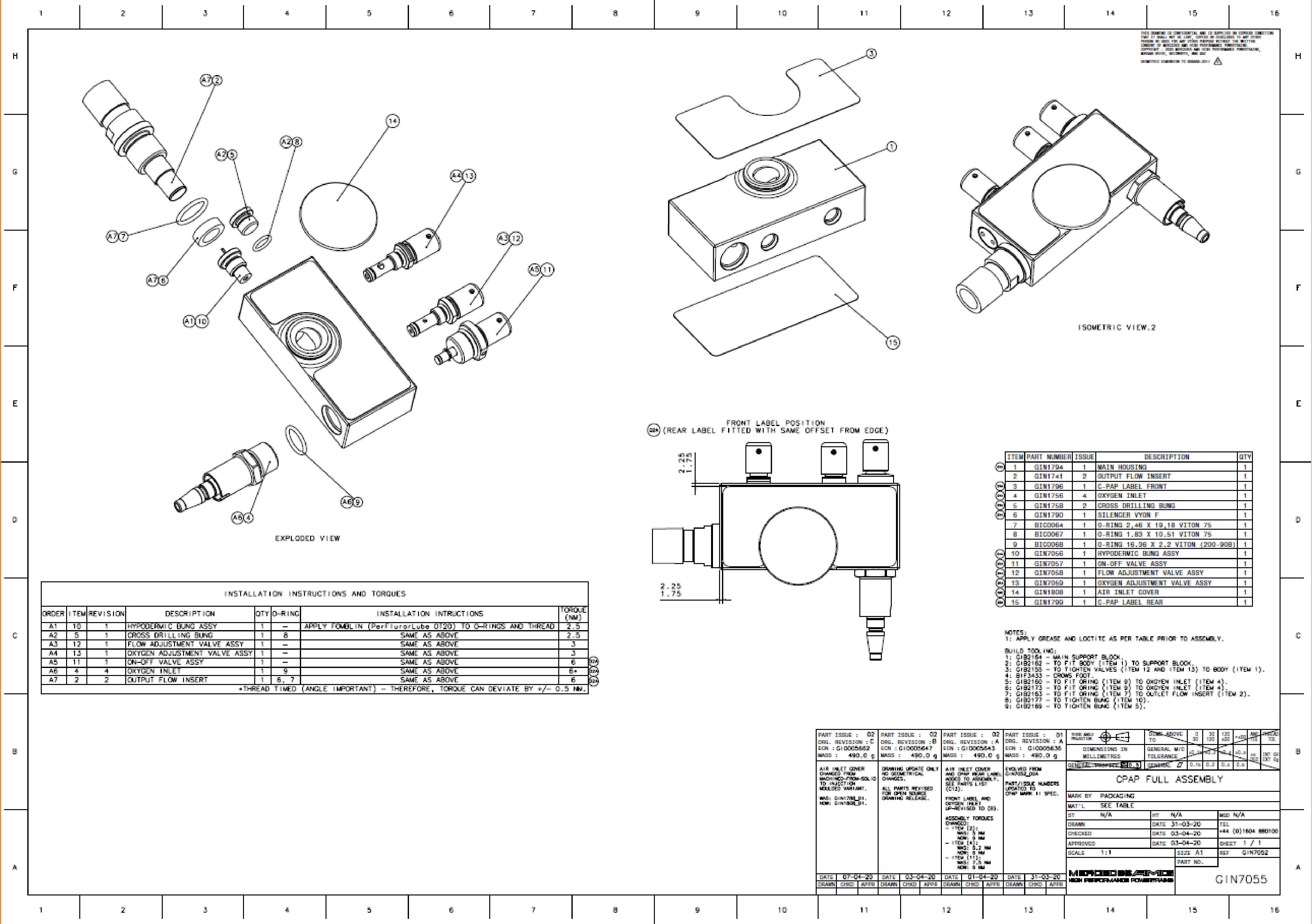
CPAP MKII

System Schematic and Characteristics

Iss 06



Ensamblaje



INSTALLATION INSTRUCTIONS AND TORQUES

ORDER	ITEM	REVISION	DESCRIPTION	QTY	O-RING	INSTALLATION INTRUCTIONS	TORQUE (NM)
A1	10	1	HYPODERMIC BUNG ASSY	1	–	APPLY FOMBLIN (PerFlurorLube OT20) TO O-RINGS AND THREAD	2.5
A2	5	1	CROSS DRILLING BUNG	1	8	SAME AS ABOVE	2.5
A3	12	1	FLOW ADJUSTMENT VALVE ASSY	1	–	SAME AS ABOVE	3
A4	13	1	OXYGEN ADJUSTMENT VALVE ASSY	1	–	SAME AS ABOVE	3
A5	11	1	ON-OFF VALVE ASSY	1	–	SAME AS ABOVE	6
A6	4	4	OXYGEN INLET	1	9	SAME AS ABOVE	6*
A7	2	2	OUTPUT FLOW INSERT	1	6, 7	SAME AS ABOVE	6

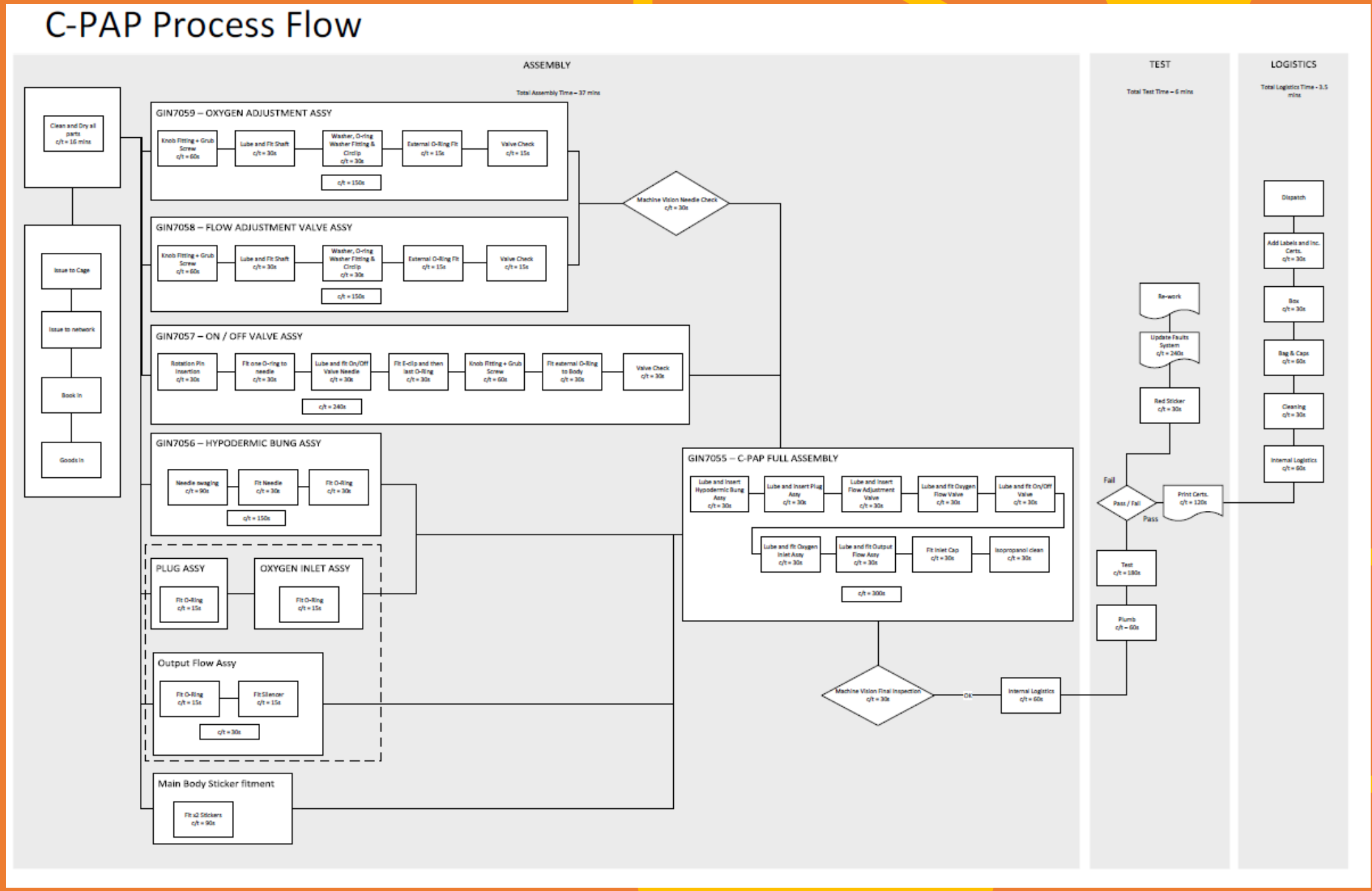
*THREAD TIMED (ANGLE IMPORTANT) – THEREFORE, TORQUE CAN DEVIATE BY +/- 0.5 NM.

ITEM	PART NUMBER	ISSUE	DESCRIPTION	QTY
1	GIN1794	1	MAIN HOUSING	1
2	GIN1741	2	OUTPUT FLOW INSERT	1
3	GIN1796	1	C-PAP LABEL FRONT	1
4	GIN1756	4	OXYGEN INLET	1
5	GIN1758	2	CROSS DRILLING BUNG	1
6	GIN1790	1	SILENCER VYON F	1
7	BIC0064	1	O-RING 2,46 X 19,18 VITON 75	1
8	BIC0067	1	O-RING 1.83 X 10.51 VITON 75	1
9	BIC0068	1	O-RING 16.36 X 2.2 VITON (200-908)	1
10	GIN7056	1	HYPODERMIC BUNG ASSY	1
11	GIN7057	1	ON-OFF VALVE ASSY	1
12	GIN7058	1	FLOW ADJUSTMENT VALVE ASSY	1
13	GIN7059	1	OXYGEN ADJUSTMENT VALVE ASSY	1
14	GIN1808	1	AIR INLET COVER	1
15	GIN1799	1	C-PAP LABEL REAR	1

NOTES:
1: APPLY GREASE AND LOCTITE AS PER TABLE PRIOR TO ASSEMBLY.

BUILD TOOLING:
1: GIB2164 – MAIN SUPPORT BLOCK.
2: GIB2162 – TO FIT BODY (ITEM 1) TO SUPPORT BLOCK.
3: GIB2155 – TO TIGHTEN VALVES (ITEM 12 AND ITEM 13) TO BODY (ITEM 1).
4: BIF3433 – CROWS FOOT.
5: GIB2160 – TO FIT ORING (ITEM 9) TO OXGYEN INLET (ITEM 4).
6: GIB2173 – TO FIT ORING (ITEM 9) TO OXGYEN INLET (ITEM 4).
7: GIB2163 – TO FIT ORING (ITEM 7) TO OUTLET FLOW INSERT (ITEM 2).
8: GIB2177 – TO TIGHTEN BUNG (ITEM 10).
9: GIB2169 – TO TIGHTEN BUNG (ITEM 5).

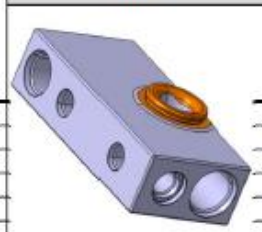
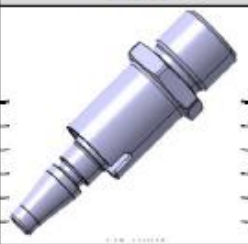
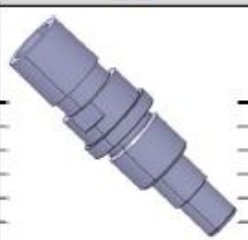
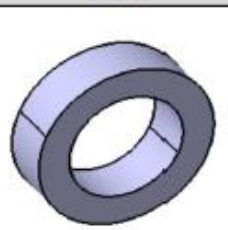
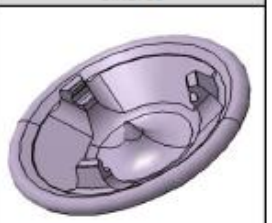
Ensamblaje


C-PAP Process Flow
ASSEMBLY
TEST
LOGISTICS
Total Assembly Time – 37 mins
Total Test Time – 6 mins
Total Logistics Time - 3.5 mins
Clean and Dry all parts c/t = 16 mins
Issue to Cage
Issue to network
Book In
Goods In
GIN7059 – OXYGEN ADJUSTMENT ASSY
Knob Fitting + Grub Screw c/t = 60s
Lube and Fit Shaft c/t = 30s
Washer, O-ring Washer Fitting & Circlip c/t = 30s
External O-Ring Fit c/t = 15s
Valve Check c/t = 15s
c/t = 150s
GIN7058 – FLOW ADJUSTMENT VALVE ASSY
Knob Fitting + Grub Screw c/t = 60s
Lube and Fit Shaft c/t = 30s
Washer, O-ring Washer Fitting & Circlip c/t = 30s
External O-Ring Fit c/t = 15s
Valve Check c/t = 15s
c/t = 150s
Machine Vision Needle Check c/t = 30s
GIN7057 – ON / OFF VALVE ASSY
Rotation Pin Insertion c/t = 30s
Fit one O-ring to needle c/t = 30s
Lube and fit On/Off Valve Needle c/t = 30s
Fit E-clip and then last O-Ring c/t = 30s
Knob Fitting + Grub Screw c/t = 60s
Fit external O-Ring to Body c/t = 30s
Valve Check c/t = 30s
c/t = 240s
GIN7056 – HYPODERMIC BUNG ASSY
Needle swaging c/t = 90s
Fit Needle c/t = 30s
Fit O-Ring c/t = 30s
c/t = 150s
PLUG ASSY
Fit O-Ring c/t = 15s
OXYGEN INLET ASSY
Fit O-Ring c/t = 15s
Output Flow Assy
Fit O-Ring c/t = 15s
Fit Silencer c/t = 15s
c/t = 30s
Main Body Sticker fitment
Fit x2 Stickers c/t = 90s
GIN7055 – C-PAP FULL ASSEMBLY
Lube and Insert Hypodermic Bung Assy c/t = 30s
Lube and Insert Plug Assy c/t = 30s
Lube and Insert Flow Adjustment Valve c/t = 30s
Lube and Fit Oxygen Flow Valve c/t = 30s
Lube and fit On/Off Valve c/t = 30s
Lube and fit Oxygen Inlet Assy c/t = 30s
Lube and fit Output Flow Assy c/t = 30s
Fit Inlet Cap c/t = 30s
Isopropanol clean c/t = 30s
c/t = 300s
Machine Vision Final Inspection c/t = 30s
OK
Internal Logistics c/t = 60s
Re-work
Update Faults System c/t = 240s
Red Sticker c/t = 30s
Fail
Pass / Fail
Pass
Print Certs. c/t = 120s
Test c/t = 180s
Plumb c/t = 60s
Dispatch
Add Labels and Inc. Certs. c/t = 30s
Box c/t = 30s
Bag & Caps c/t = 60s
Cleaning c/t = 30s
Internal Logistics c/t = 60s

GIN7055_01A CPAP FULL ASSEMBLY	1 off	Cycle time	Material	Machines required
MAIN HOUSING PARTS	1 off			
BIC0064_01A O-RING 2,46 X 19,18 VITON 75	1 off	-	Rubber -VITON	Standard Catalogue part
BIC0067_01A O-RING 1.83 X 10.51 VITON 75	1 off	-	Rubber -VITON	Standard Catalogue part
BIC0068_01A O-RING 16.36 X 2.2 VITON (200-908)	1 off	-	Rubber -VITON	Standard Catalogue part
GIN1741_02A OUTPUT FLOW INSERT	1 off	7 mins	Plastic - Tecaform AH black	CNC Lathe 32mm or larger spindle bore - ideally with driven tooling
GIN1756_04A OXYGEN INLET	1 off	7.5 mins	Stainless Steel 303L	CNC Lathe 32mm or larger spindle bore - ideally with driven tooling
GIN1758_02A CROSS DRILLING BUNG	1 off	1.5 mins	Plastic - Tecaform AH black	CNC Lathe 19.05mm or larger spindle bore - ideally with driven tooling
GIN1790_01A SILENCER VYON F	1 off	6 mins	Porous platic - Vyon F	CNC Mill then small Lathe
GIN1794_01A MAIN HOUSING ANGLED INLET AIR	1 off	23 mins	Plastic - Tecaform AH black	4 or 5 axis CNC Mill & Laser part marker part 115 x 55 x 35
GIN1796_01A C-PAP LABEL FRONT	1 off	0.25 mins	Lexan	Lexan 8B35 label printer
GIN1799_01A C-PAP LABEL REAR	1 off	0.25 mins	Lexan	Lexan 8B35 label printer
GIN1808_01A AIR INLET COVER - INJECTION MOULDED	1 off	0.5 min	Plastic - LUPITAL F20-03	Injection moulding
HYPODERMIC BUNG ASSY	1 off			
BIC0067_01A O-RING 1.83 X 10.51 VITON 75	1 off	-	Rubber -VITON	Standard Catalogue part
GIN1759_03A HYPODERMIC BUNG	1 off	2 mins	Plastic - Tecaform AH black	CNC Lathe 19.05mm or larger spindle bore - ideally with driven tooling
GIN1771_02A HYPODERMIC TUBE SWAGED GIN1760	1 off	-	Hypodermic tube (SS 304L)	Standard Catalogue part
GIN1760_02A HYPODERMIC TUBE	1 off	0.3 mins	Hypodermic tube (SS 304L)	Grind / cutter & flame deburr
ON-OFF VALVE ASSY	1 off	-		
BIC0054_01A E CLIP 6MM SHAFT 4MM GROOVE SS	1 off	-	Stainless Steel	Standard Catalogue part
BIC0059_01A GRUB SCREW M3 X 5 KNURLED POINT	1 off	-	Steel	Standard Catalogue part
BIC0060_01A DOWEL SOLID 1.5 X 6	1 off	-	Steel	Standard Catalogue part
BIC0068_01A O-RING 16.36 X 2.2 VITON (200-908)	1 off	-	Rubber -VITON	Standard Catalogue part
BIC0071_01A O RING 1.6 X 3.1 VITON	2 off	-	Rubber -VITON	Standard Catalogue part
GIN1736_05A ON-OFF VALVE BODY	1 off	12 mins	Stainless Steel 316L	CNC Lathe 32mm or larger spindle bore - ideally with driven tooling
GIN1761_02A OXYGEN ADJUSTMENT KNOB	1 off	2.5 mins	Aluminium 2014 T6	CNC Lathe 19.05mm or larger spindle bore - ideally with driven tooling
GIN1762_02A ON-OFF VALVE NEEDLE	1 off	3 mins	Stainless Steel 316L	Precision CNC Mill turn lathe or sliding head lathe must have driven tooling / or 2nd op on 4 or 5 axis mill

Maquinaria y materiales

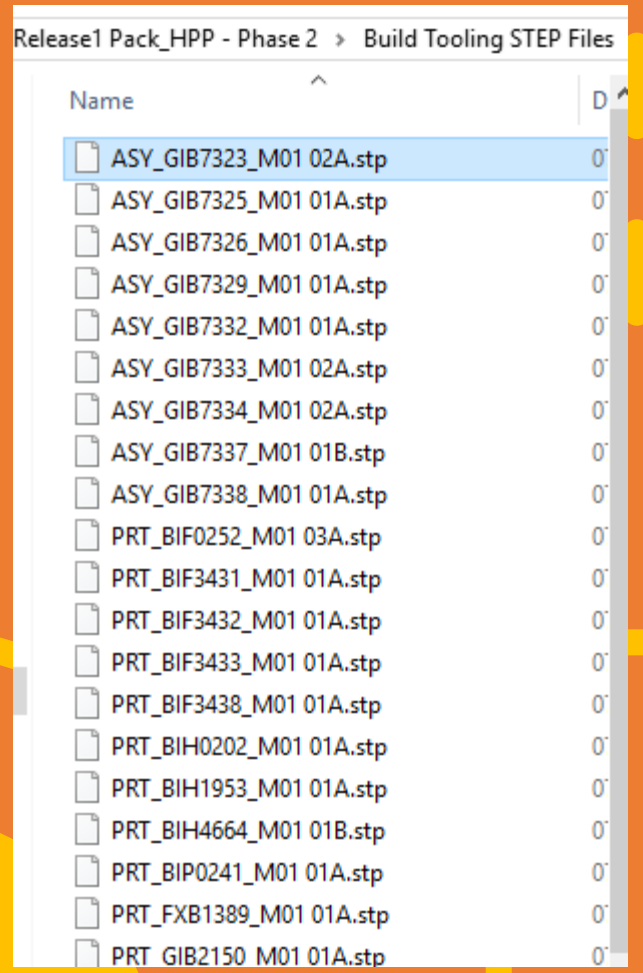
Ensamble principal

	GIN1794	GIN1756	Iss 05	GIN1758	GIN1790	GIN1788
						
Material	Plastic - Tecaform AH black	1.5 mins	Plastic - Tecaform AH black	Plastic - Tecaform AH black	Porous platic - Vyon F	LUPITAL F20-03
Manufacturing	5 axis milling	6 mins	Turning + milling op	Turning + milling op	Turning	Injection moulded
GIN1796_01A C-PAP LABEL FI	GIN1762	0.25 mins	GIN1761			
GIN1799_01A C-PAP LABEL R	GIN1762	GIN1736	GIN1761			
ON/OFF Valve (GIN7057)		0.5 min				
						
Material	Stainless Steel 316L	Stainless Steel 316L	Aluminium 2014 T6			
Manufacturing	Turning + milling op	Turning + milling op	Turning + milling op			
		2.5 mins				
Flow Control Valve (GIN7058)		3 mins				
	GIN1791	GIN1767	GIN1761			
						
		3 mins				
Material	Stainless Steel 431	Stainless Steel 316L	Aluminium 2014 T6			
Manufacturing	Turning + milling op	Turning + milling op	Turning + milling op			
Oxygen Valve (GIN7059)						
	GIN1792	GIN1768	GIN1761			
						

Hypodermic Bung (GIN7056)

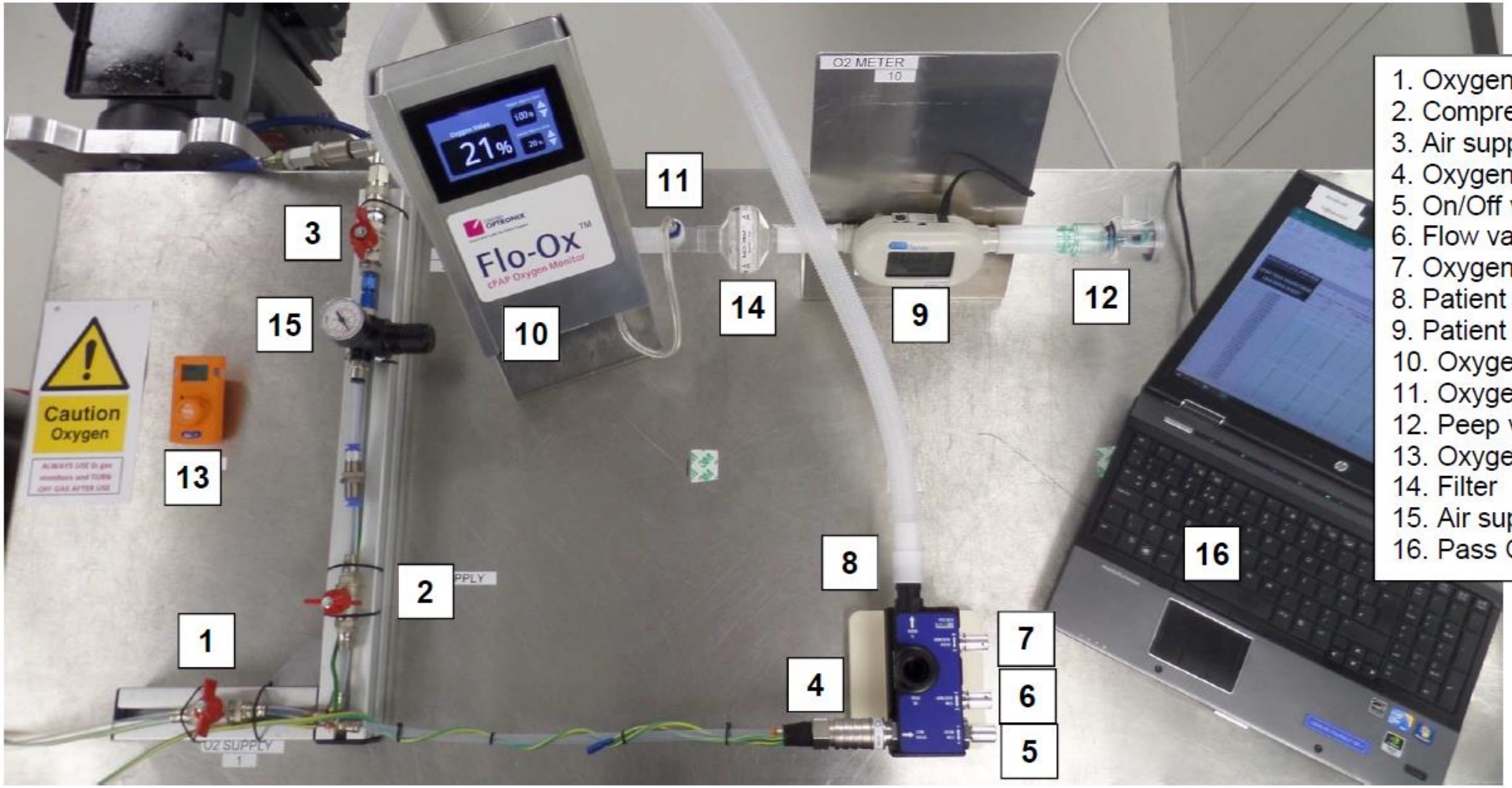
GIN1794	GIN1771 (GIN1760)
	

.stp files – CATIA importar a ANSYS, CAD software



Pruebas

CPAP TEST RIG LAYOUT (V4)



1. Oxygen supply valve
2. Compressed air supply
3. Air supply isolation val
4. Oxygen connection
5. On/Off valve
6. Flow valve
7. Oxygen flow valve
8. Patient flow tube
9. Patient flow meter
10. Oxygen meter
11. Oxygen sensor
12. Peep valve 10CmH2
13. Oxygen alarm
14. Filter
15. Air supply pressure s
16. Pass Off Laptop

Aprobación por agencia regulación UK

www.gov.uk/government/news/mhra-approves-new-life-saving-breathing-aid-to-help-keep-coronavirus-co

Press release

MHRA approves new life-saving breathing aid to help keep coronavirus (COVID-19) patients out of intensive care

Adapted breathing aid developed by UCL, UCLH and Mercedes Formula One provides vital technology to NHS.

Published 31 March 2020
From: Medicines and Healthcare products Regulatory Agency

Not secure | uclh.nhs.uk/News/Pages/Designsforlife-savingbreathingai

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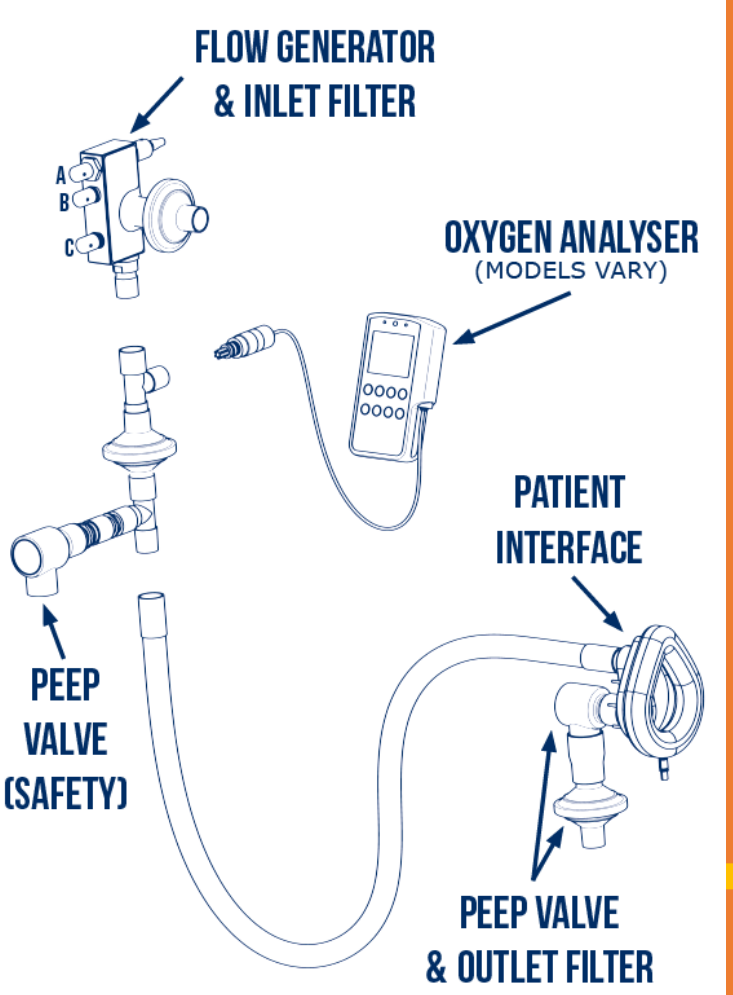
06 Apr 2020

The designs of a new breathing aid developed by engineers at UCL and Formula One working with clinicians at UCLH have been made freely available to support the global response to Covid-19.



ONLY TO BE USED WITH THE PATIENT CIRCUIT PROVIDED

Asociación de médicos de cuidados intensivos de UK

Existe una creciente base de evidencia de que el uso de CPAP en pacientes con COVID-19 tiene un papel importante, más de lo que inicialmente se entendió. Los primeros informes de China sugirieron que la intubación y la ventilación tempranas eran preferibles a la introducción de demoras por el uso de CPAP. Sin embargo, ahora es más claro que la CPAP puede ser beneficiosa para los pacientes antes en el proceso de la enfermedad de lo que se pensaba y puede prevenir el deterioro de algunos pacientes en la medida en que no necesiten ventilación invasiva.

ficm.ac.uk/news-events-education/news/letter-regarding-use-continuous-positive-airway-pressure-cpap-covid-19

Letter regarding the Use of Continuous Positive Airway Pressure (CPAP) for COVID-19 positive patients

Posted 28 March 2020

The Faculty of Intensive Care Medicine

intensive care society since 1970 50 YEARS

Use of Continuous Positive Airway Pressure (CPAP) for COVID-19 positive patients

Dear colleagues,

As more information regarding critical care treatment for COVID-19 is gathered from around the world, especially from our colleagues in Italy, it is important to constantly review all guidance that has been issued.

There is a growing evidence base that there is a significant role for the use of CPAP in COVID-19 positive patients, more so than was initially understood. First reports from China suggested that early intubation and ventilation was preferable to introducing delay by the use of CPAP. However, it is now clearer that CPAP may be of benefit to patients earlier on in the disease process than first thought and may prevent deterioration of some patients to the extent of them not going on to need invasive ventilation.

Propuesta

- Un dispositivo CPAP estándar a nivel nacional
- Un único registro sanitario de ARCSA
- Trabajo colaborativo entre los involucrados
- Resolución de posibles problemas en ensamblaje, prueba y puesta en marcha de forma colaborativa
- Sostener a otras ciudades/equipos que puedan unirse a hacer lo mismo
- Dos contactos directos en Londres con UCL e Imperial: Sara Abad hace su postdoctorado en el Dep. de Ingeniería Mecánica de UCL que abrió la licencia del dispositivo CPAP y Diego Moya hace su doctorado en Imperial College. Ambos ayudan en colaboraciones con estas universidades para resolver preguntas que puedan surgir.
- Por favor escríbenos y únete al equipo en:

https://bit.ly/2VfrGoB

Propuesta de proyecto de vinculación y cooperación internacional: Construcción de dispositivo CPAP en Ecuador

CPAP (presión positiva continua en las vías respiratorias)

CPAP es un dispositivo de respiración mecánica no invasiva

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