


	Document Name	P21-0008-MDF-16-FIRMWARE-FLOWCHART
	Version Number	V3
	Version Date	2021-NOV-19



1. Signatures QMS Location

	Owner	Approved by
Function	Electrical & Firmware Engineer	Project Engineer
Name	Stefan van den Heuvel	Bas van Hoek
Signature	<p>DocuSigned by:</p>  <p>Signer Name: Stefan van den Heuvel Signing Reason: I am the author of this document Signing Time: 2022-Feb-15 11:05:46 AM CET 63353C8158F540DCB053D44E44B74F5A</p>	<p>DocuSigned by:</p>  <p>Signer Name: Bas van Hoek Signing Reason: I approve this document Signing Time: 2022-Feb-10 7:50:50 AM PST 725D645F6CF34AFE9B6477DDCFF549FA</p>

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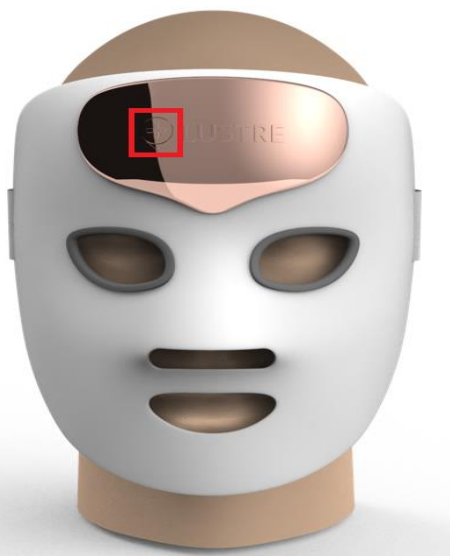
V	Revision History	Revision Page	Revision Date
1	Launch of version 1	All	2021-JUL-02
2	Adjusted the firmware flowchart, 3 treatment options reduced to 2, added 3 fast blinks after charger is connected	2, 4, 6, 9	2021-JUL-27
3	Adjusted what happens after 10 treatment min. Changed battery indication led behaviour when charger connected and play button is pressed < 1s (item 8). Changed item 12 to battery indication blink when $3.3 < V < 3.5$ during treatment. Item 27, I removed 'previous'. As we now use a single string to command, it also should specify which zones should be turned on again. Changed BLE commands list and UUID table.	3 3 4 5 7	2021-NOV-19

Term explanation

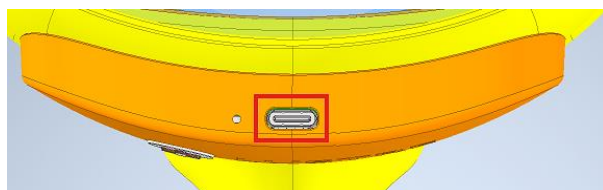
Treatment LEDs



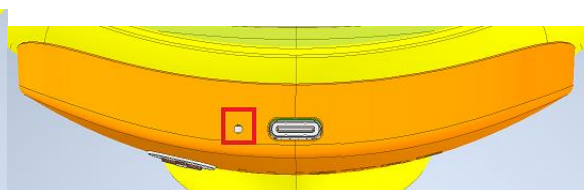
Play button



USB-C port



Battery indication LED




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Manual controls

Number	Part	Action	Device ON/OFF	Treatment started Yes/No	Charger connected Yes/No	Result
1	General	Battery charge below 3.3V	ON	No	No	Device OFF
2	General	Treatment is going on for 10 minutes	ON	Yes	No	Light therapy LEDs Blink twice and go OFF, Battery indication LED ON, device ON (waiting 5 min for activity).
3	General	5 minutes of inactivity (No button or BLE interactions and no ongoing treatments)	ON	No	No	Battery indication LED OFF, Device OFF
4	General	Connect charger	ON	Yes	Yes	Battery indication charging protocol, Light therapy LEDs OFF
5	Play Button	Long press [>1s]	OFF	No	No	Device ON, Battery indication LED ON according to protocol, No other components may turn ON or blink
6	Play Button	Long press [>1s]	ON	No	No	Battery indication LED OFF, Device OFF
7	Play Button	Short press [< 1s]	OFF	No	No	Nothing happens, treatment LEDs and Battery indication LED remains OFF, nothing may blink
8	Play Button	Short press [< 1s]	OFF	No	Yes	Nothing happens, treatment LEDs may not go ON or blink. Battery indication LED does according to charging protocol.
9	Play Button	Short press [< 1s]	ON	No	No	Light therapy LEDs turn ON according to the following cycle: - Anti-Ageing - Anti-Acne - OFF

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10	Battery Indication LED	Battery charge 3.3V till 3.5V	ON	No	No	Battery indication LED blinks at 350ms ON & OFF
11	Battery Indication LED	Battery charge 3.5V or above	ON	No	No	Battery indication LED ON
12	Battery Indication LED	Battery charge 3.3V till 3.5V	ON	Yes	No	Battery indication LED blinks at 350ms ON & OFF
13	Battery Indication LED	Battery charge 3.5V or above	ON	Yes	No	Battery indication LED ON
14	Battery Indication LED	Battery charge below 4.0V	ON	No	Yes	Battery indication LED blinks at 1750ms ON & OFF
15	Battery Indication LED	Battery charge 4.0V or above	ON	No	Yes	Battery indication LED OFF

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BLE controls

The firmware and app are communicating via the specified UUID list that is added below.

Nr.	Function	Action	Device ON/OFF	Treatment started Yes/No	Charger connected Yes/No	Result
16	Device name	Test connect option	ON	No	No	The name of the device in the BLE scanner is 'Lustre Mask'
17	Connect device	Select device in BLE scanner	ON	No	No	The user gets redirected to the app
18	Show Battery level	Time before the app receives the first battery level signal after the BLE connection is made	ON	No	No	The user can see the '!' symbol in the app
19	Show Battery level	Firmware sends a battery level below 3.4V to the app	ON	No	No	The user can see the '!' symbol in the app
20	Show Battery level	Firmware sends a battery level of 3.4V till 3.5V to the app	ON	No	No	The user can see the 1 bar symbol in the app
21	Show Battery level	Firmware sends a battery level of 3.5V till 3.7V to the app	ON	No	No	The user can see the 2 bar symbol in the app
22	Show Battery level	Firmware sends a battery level of 3.7V till 3.9V to the app	ON	No	No	The user can see the 3 bar symbol in the app
23	Show Battery level	Firmware sends a battery level of 3.9V or higher to the app	ON	No	No	The user can see the 4 bar symbol in the app
24	Show Battery level	Firmware sends signal that the charger is connected	ON	No	Yes	The user can see the charging icon in the app
25	Light therapy LEDs	Send desired treatment configuration to the firmware	ON	No	No	Light therapy zones turn ON or OFF according to the specified treatment configuration

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26	Light therapy LEDs	Pause treatment	ON	Yes	No	Light therapy zones turn OFF
27	Light therapy LEDs	Un-Pause treatment	ON	Yes	No	Light therapy zones turn ON according to the specified configuration

After testing the above mentioned items the device needs to be tested according the specified flowchart on the next page. Errors are hard to predict with these type of devices so try to 'break' the firmware by misusing the device to figure out errors or bugs. The production can start when the Dutch team approves the QC document during a videocall. The first 5 products should be tested according to the above specified list and videos needs to be shared for every point mentioned in this list for at least 1 device. After this went successful a smaller QC list can be used where only the BLE communication and working of the LEDs is tested.

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P21-0008 Lustre Mask BLE UUID list

Service Characteristics Name	UUID Handle	Properties	Value to read/write					Size	Data Type																				
Device info	0000fffa-0000-1000-8000-00805f9b34fb	Notify	The device sends over 8 digits according to the following protocol: <table><tr><th>1st & 2nd</th><th>3rd & 4th</th><th>5th & 6th</th><th>7th</th><th>8th</th></tr><tr><td>00 = Not Charging</td><td rowspan="2">Timer: remaining minutes</td><td rowspan="2">Timer: remaining seconds</td><td rowspan="2">Battery level: [Volts]</td><td rowspan="2">Battery level: [0.1 Volts]</td></tr><tr><td>01 = Charging</td></tr></table>					1 st & 2 nd	3 rd & 4 th	5 th & 6 th	7 th	8 th	00 = Not Charging	Timer: remaining minutes	Timer: remaining seconds	Battery level: [Volts]	Battery level: [0.1 Volts]	01 = Charging	8 hexadecimal digits	uint32 or 4 x uint8									
1 st & 2 nd	3 rd & 4 th	5 th & 6 th	7 th	8 th																									
00 = Not Charging	Timer: remaining minutes	Timer: remaining seconds	Battery level: [Volts]	Battery level: [0.1 Volts]																									
01 = Charging																													
Device controls	0000fffb-0000-1000-8000-00805f9b34fb	Write	The device sends over 8 digits according to the following protocol: <table><tr><th>1st</th><th>2nd</th><th>3rd</th><th>4th – 7th Zones= 1 – 2 – 3 – 4</th><th>8th</th></tr><tr><td rowspan="6">-</td><td>0 = run timer</td><td rowspan="6">-</td><td>0000 = off-off-off-off</td><td rowspan="6">-</td></tr><tr><td>1 = pauze</td><td>1000 = age-off-off-off</td></tr><tr><td>2 = stop</td><td>2000 = acne-off-off-off</td></tr><tr><td>3 = (re)start</td><td>0120 = off-age-acne-off</td></tr><tr><td></td><td>1111 = age-age-age-age</td></tr><tr><td></td><td>2222 = acne-acne-acne-acne</td></tr></table>					1 st	2 nd	3 rd	4 th – 7 th Zones= 1 – 2 – 3 – 4	8 th	-	0 = run timer	-	0000 = off-off-off-off	-	1 = pauze	1000 = age-off-off-off	2 = stop	2000 = acne-off-off-off	3 = (re)start	0120 = off-age-acne-off		1111 = age-age-age-age		2222 = acne-acne-acne-acne	8 hexadecimal digits	uint32 or 4 x uint8
1 st	2 nd	3 rd	4 th – 7 th Zones= 1 – 2 – 3 – 4	8 th																									
-	0 = run timer	-	0000 = off-off-off-off	-																									
	1 = pauze		1000 = age-off-off-off																										
	2 = stop		2000 = acne-off-off-off																										
	3 = (re)start		0120 = off-age-acne-off																										
			1111 = age-age-age-age																										
			2222 = acne-acne-acne-acne																										
Device Name	00002a00-0000-1000-8000-00805f9b34fb	Read	Read Device Name as: “Lustre Mask”					Max length:30	UFT-8 String																				
Firmware Revision String	00002a26-0000-1000-8000-00805f9b34fb	Read	Read Firmware Version as: “Firmware VX.X.X”					Max Length:20	UFT-8 String																				

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Hardware Revision String	00002a27-0000- 1000-8000- 00805f9b34fb	Read	Read Hardware Revision as: "Hardware VX.X"	Max Length:30	UFT-8 String
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Flowchart

