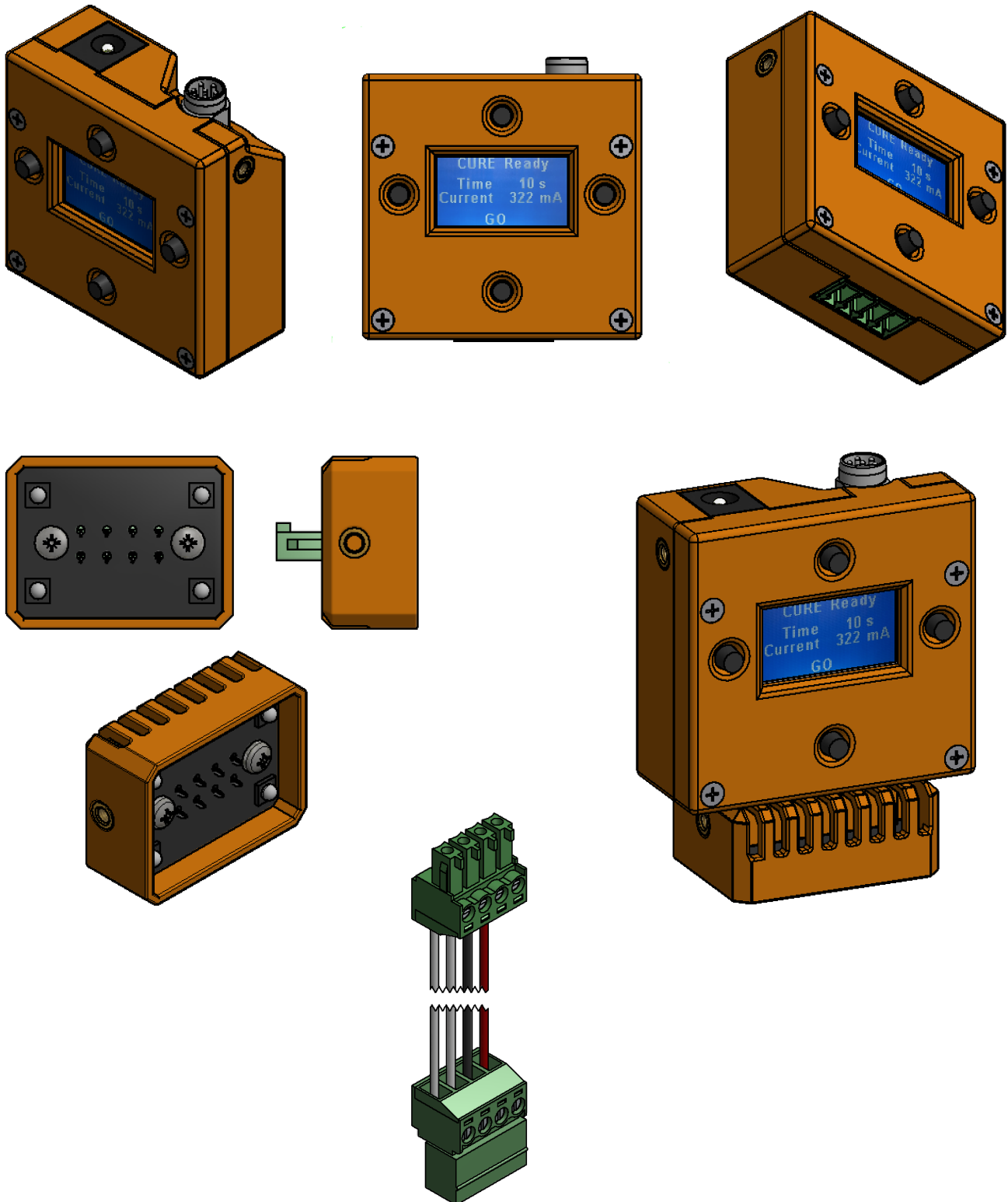
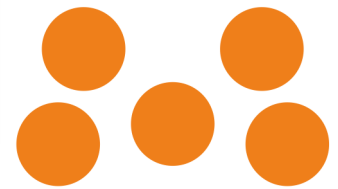


UV-cure USER MANUAL

UV curing controller with default UV lamp



UVcure	Version: 1.00
UV-curing system	Page: 2/13



Preface

Congratulations with your flexible and multi use LED UV curing system.

The SetupRobotics UV-curing system is compatible with ToolBase e-tools¹ which allows you to connect additional tools to a ToolBase as e-pendant. The UV-curing can also be run manual, from PLC and via data communication.

Highlights

- Ultra compact lightweight design
- Operated: ToolBase e-tool, Manually, PLC IO (PNP or NPN), I2C
- Adjustable constant current source with monitor up to 700mA.
- LED Temperature monitoring.
- Curing timer
- Curing status feedback.
- Embedded display for status and configuration.
- Hot swap interface

In the box

UVcure controller

Sample UV lamp

UV lamp extension cable 300mm

24V 600mA DC power adapter

M8 cable e-tool cable

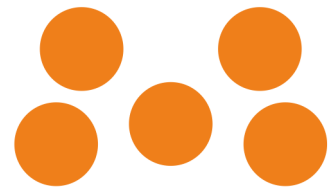
5ml sample UV glue.

Safety glasses

Safety gloves

¹ ToolBase e-tools has a M8 connector (6 pole) where an e-pendant tool can be connected as extra tool.

UVcure	Version: 1.00
UV-curing system	Page: 3/13



Important message.



The ToolBase and its attached Tools, e.g. UV curing system are part of a partly completed machinery. A risk assessment is required for each usage.

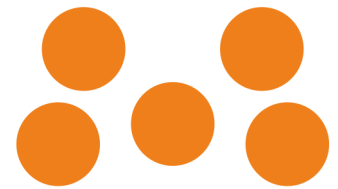
It is the responsibility of the robot integrator to make the risk assessment and that all safety requirements and local regulations are complied with.

UV lamps that emit UV radiation, predominantly UVA rays are linked to increased risk of skin cancer.

Never use a damaged UVcuring system.

The ToolBase is intended as industrial robotic end-effector. It is not to be used in potentially explosive environments or in life support applications.

Protect the ToolBase and its connected Tools from damaging chemical and physical effects including but not limited to: Corrosive substances, solvents, extreme temperatures, radioactive radiation, extreme magnetic fields, small objects as powder/dirt, extreme mechanical vibrations, electrical currents and discharge.



Installation

Manual operating

Prepare power adapter by mounting a suitable AC plug for the current country.

The adapter has universal input and can be connected to 90 - 264 VAC, 47 - 63 Hz

Plug UV-lamp and DC connector into UV-cure controller



ID 2.1 x OD 5.5

Outside $\ominus$ $\odot$ Inside

Adjust Curing time and press GO.

ToolBase e-tool operation

Mount a SetupRobotics e-tool on ToolBase. (ToolBase e-tools has a M8 6 pole e-pendant connector)

Plug UV-lamp into UV-curer and connect UV-cure controller to e-tool¹ using the M8 cable.

If single ToolBase the UV-curing system is operated as Black tool².

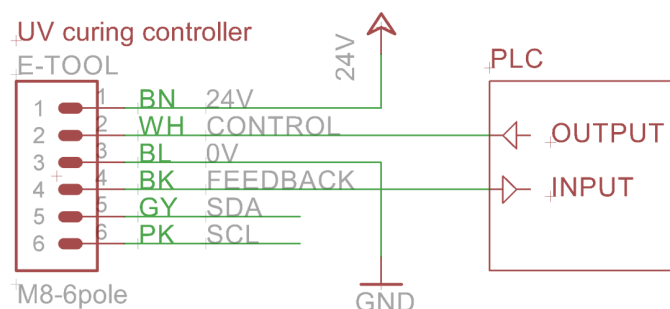
If dual ToolBase the UV-curing system is operated via MODBUS or e-serial³.

PLC IO operation

Connect DIN EN 61076-2-104 cable M8 6 pole female connector to UVcurer.

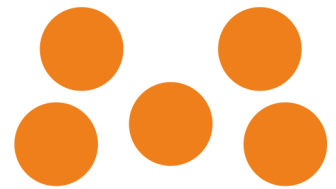
Connect as follows to PLC controller.

Pin	Color	Function
1	Brown	24V
2	White	Control
3	Blue	0V
4	Black	Feedback



See user interface section for setting up NPN/PNP of CONTROL and FEEDBACK signal

- 1 If UV-curer was previously used on a PLC switch control to OFF via display.
- 2 A dual ToolBase has a black and white tool. A single ToolBase has a white tool, the UV.cure pendant is operated as the black tool.
- 3 e-serial is a simple package for any non MODBUS robots.



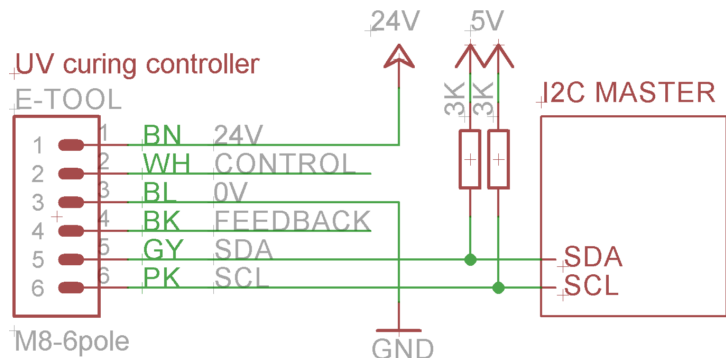
channels

I2C operation

Connect DIN EN 61076-2-104 cable M8 6 pole female connector to UVcurer.

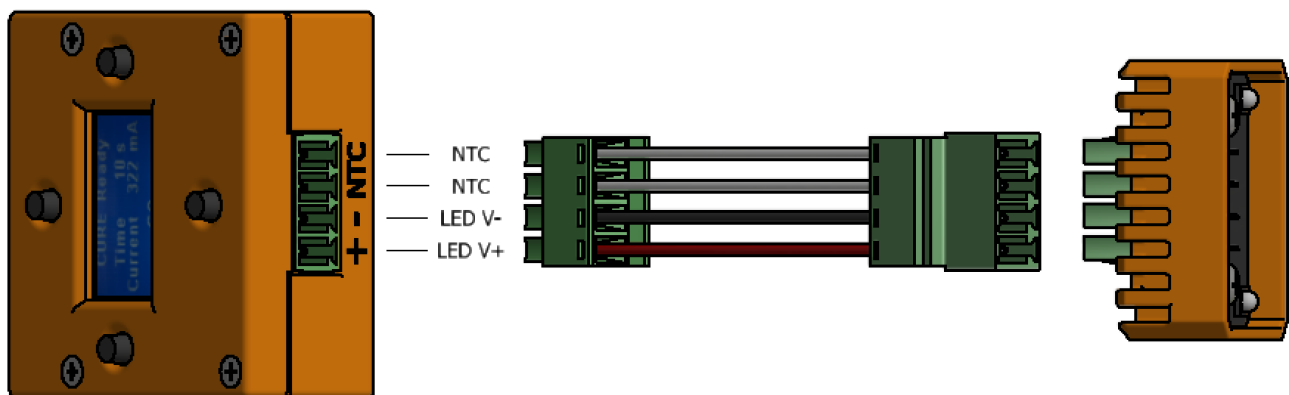
Connect as follows to I2C master controller.

Pin	Color	Function
1	Brown	24V
3	Blue	0V
5	SDA	I2C data
6	SCL	I2C clock



See user interface section for setting up NPN/PNP of CONTROL and FEEDBACK signal channels

UV Lamp connector

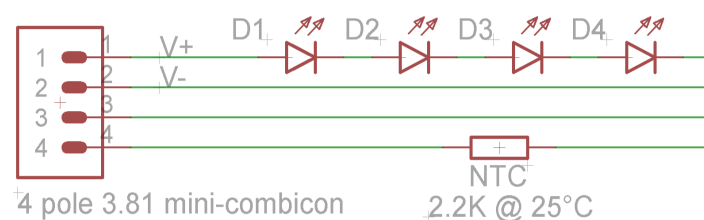


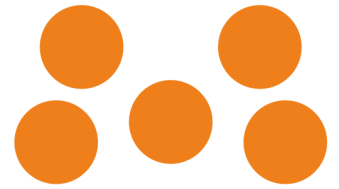
Below the UV curre is a standard 4 pole 3.81mm mini-combicon connector. The UV lamp can be connectet directly or using the extension cable. If curing application has speciel request other LED lamps can be connected. Contact sales if special lamp is needed.

Sample LED lamp

LED output is constant current type maximum 5 LED

The NTC resistor measures PCB temperature. Controller stops curing if above threshold.





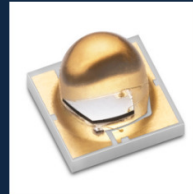
The PCB has 4 SST-08-UV-A40-D365 from LUMINUS in a 13x13 distance which produces 262mW/cm² in a distance of 25mm. Contact sales of other UV lamps are required.

SST-08-UV-A40-D365 PARAMETER



Led beam angle is 40°

>0.63 optical watts @500mA T_j=25°C, >**0.54** optical watts @500mA T_j=85°C



Binning Structure

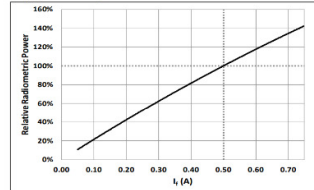
SST-08-UV LEDs are tested for radiometric flux and wavelength at a drive current of 500 mA, 20 ms single pulse at 25° C and placed into one of the following radiometric flux (F), wavelength (WWW) and forward voltage bins. The LEDs can also be driven at other drive currents, to achieve the correlated flux values listed in the table.

Radiometric Flux Bins

Flux Bin (F) ¹	Minimum Flux ¹ (mW) 500 mA, 25° C	Maximum Flux ¹ (mW) 500 mA, 25° C	Correlated Minimum Flux ² (mW) at 25° C		
			250 mA	350 mA	700 mA
D	630	720	315	440	875
E	720	810	360	500	1000
F	810	900	400	570	1125
G	900	990	450	630	1250
H	990	1080	495	700	1375

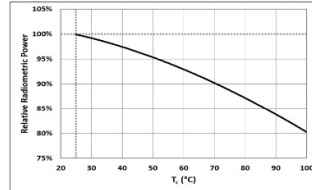
Relative Power vs. Forward Current

q/P_{500mA}, 20 ms pulse, T_j=25°C



Relative Power vs. Case Temperature

q/P_{500mA}, 20 ms pulse, 500 mA



CASE-1: LED ARRAY INSIDE 20A PIPE SIMULATION

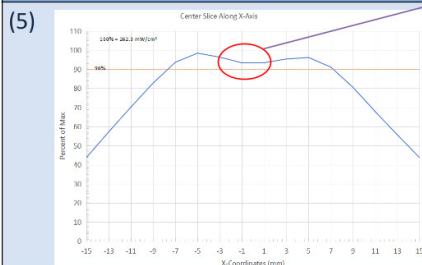
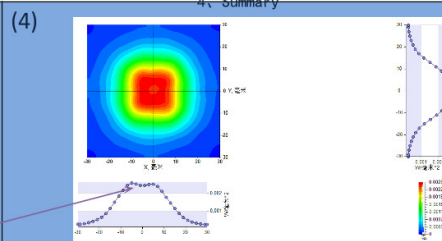
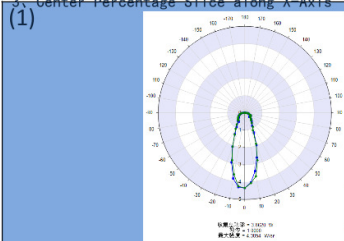


1. Ray visualization.
from 25mm distance.

2. Irradiance pattern on detector, 60*60mm area

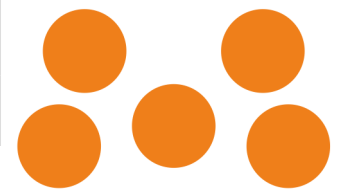
3. Center Percentage Slice along X-Axis

4. Summary



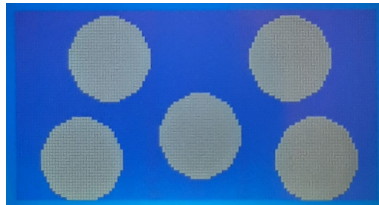
- (6) SST-08-UV-A40-D365
- >**0.54** optical watts per led@500MA T_j=85C
 - 2*2=4 leds, led center to center distance is 13mm
- At a distance of 25mm
- E_{max}=**262.3mw/cm²**
 - Center area Uniformity (E_{min}/E_{max})>**90%**

UVcure	Version: 1.00
UV-curing system	Page: 7/13



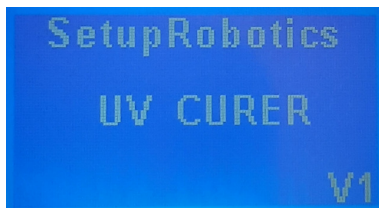
User interface

The controller has a user interface with four push buttons around a graphical screen.



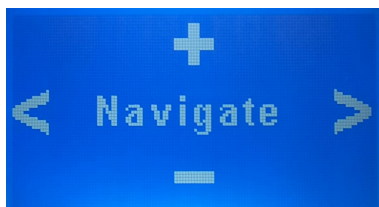
LOGO

The SetupRobotics logo is showed at power on.



Product

Short after product type and firmware version is showed.



Navigate

Menu change is achieved with *RIGHT* and *LEFT* push button.

Parameter value change is achieved with *UP* and *DOWN* push button.

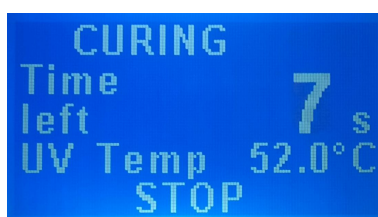


CURE Ready

From this menu UV curing can be activated.

Curing time and LED current is showed.

UP or *DOWN* activates curing.



CURING

During curing time left and UV PCB temperature is showed.

The curing can be stopped by pressing *UP* or *DOWN*.

Press right to show actual current.

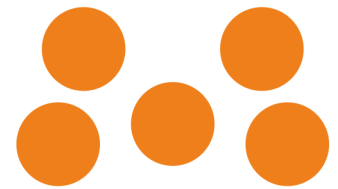


Curing time

Curing time can be set 0..250s pressing *UP* or *DOWN*

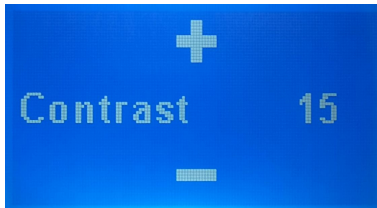
If set to 0 momentary curing is activated

UVcure	Version: 1.00
UV-curing system	Page: 8/13



POWER

The LED current can be set 0..100% (0..570mA) The LED current is also showed. If *UP* is pressed at 100% UV-curer goes into BOOST mode 700mA



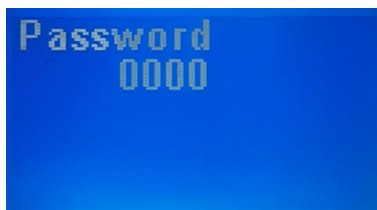
Contrast

The graphic display contrast can be adjusted 8..24



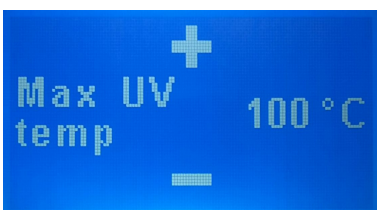
Backlight

The graphic display back-light can be adjusted 0..50



Password

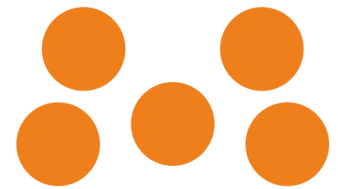
Enter password 9876 to get access menus following.



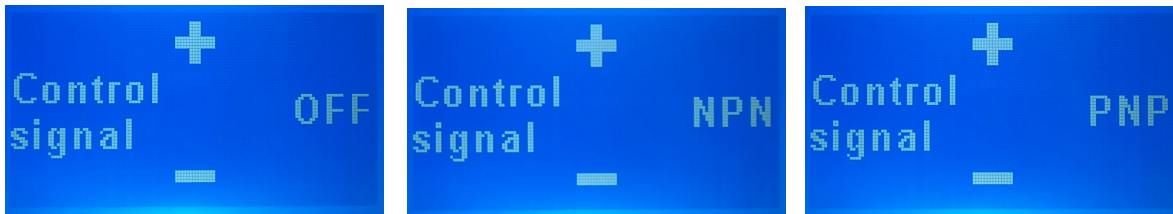
Max UV temperature

The maximum UV pcb temperature can be set 40..100°C

If the temperature becomes greater than this threshold during a cure the curing is stopped and error message showed. If *UP* is pressed at max temperature monitor is set to off.

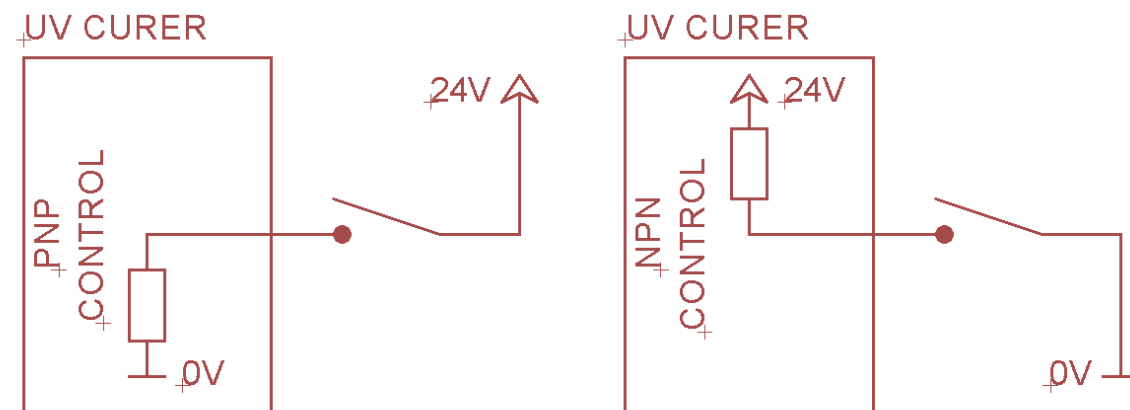


Control signal

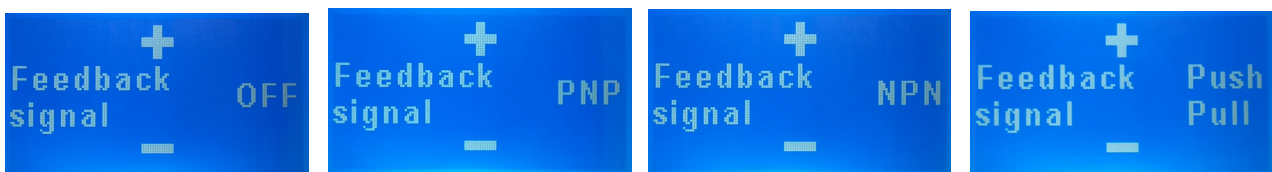


Select NPN / PNP / OFF for UV curing CONTROL signal.

When connected to a e-tool CONTROL must be set to OFF.

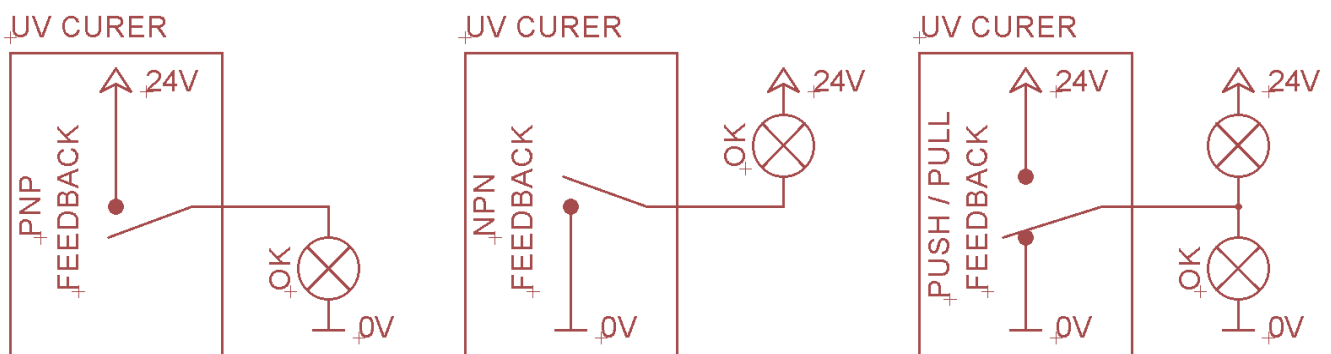


FEEDBACK signal



Select NPN / PNP / PUSH-PULL / OFF for UV curing FEEDBACK signal.

Feedback is activated when success after curing.





Communication

It is possible to operate the UV-curer via MODBUS or I2C data communication.

MODBUS

When the UV-curer is attached to a ToolBase as pendant it can be controlled via MODBUS commands sent to the ToolBase. See table for corresponding R/W functions and registers for Black and White side.

MODBUS				I2C	BIT	Field	Description
White	Black	R	W				
31000	32000	4	-	00	8	Status	0:Running, 1:Success, 2:Stopped user, 3:Hot, 4:LowCurrent
31001	32001	4	-	01	8	State	0:Init, 1:Running, 2:Success, 3:Stopped, 5:Hot, 6:LowCurrent 7:NoSensor
31008	32008	4	-	08	16	Temperature	Temperature on LED pcb.
31016	32016	4	-	10	32	Product	0x00100708, XXXX:Product, YY:SW, ZZ:HW
31032	32032	4	-	FC	32	Unique number	32 bit number to check what unique tool is mounted.
41024	42024	3	6	18	8	Command	0:De-activate, 1:Activate
41025	42025	3	6	19	8	Power	0..100% of 570mA, 101=BOOST=700mA
41026	42026	3	6	1A	8	Max UV temp	Maximum UV-LED pcb temperature 40..100 °C, 0=monitor off
41027	42027	3	6	1B	8	Feedback	PLC feedback 0:OFF, 1:NPN, 2:PNP, 3:PUSH PULL
41028	42028	3	6	1C	8	Control	PLC control 0:OFF, 1:NPN, 2:PNP
41032	42032	3	6	20	16	Curing time	Curing time s*10 0..2500 (0.250 s)
41054	42054	10	6	2F	32	Test 32 bit	32 bit variable R/W, at power cycle set to 0x12345678

I2C

The UV-curer can also be operated via I2C commands.

The I2C address is 0x32 for controller and 0x51 when reading the unique number.

See above table for I2C register numbers and register lengths.

I2C unique number read

The e-pendant unique number is read from a 24AA025 microchip IC.

The number can be read using following format.

START 0x51<<1 REG START 0x51<<1|1 READ READ READ READ STOP

I2C controller read

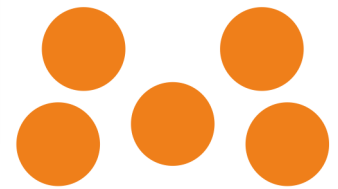
Registers are read using following format where N is the number of bytes read.

START 0x32<<1 REG CRC START 0x32<<1|1 READxN READ_CRC STOP

I2C controller write

Registers are read using following format.

START 0x32<<1 REG WRITExN WRITE_CRC STOP



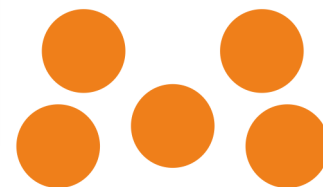
I2C controller CRC

8 bit CRC is calculated using following table. C pseudo function below.

```
static unsigned char const crc8_table[] = {
0x00, 0x83, 0x85, 0x06, 0x89, 0x0A, 0x0C, 0x8F, 0x91, 0x12, 0x14, 0x97, 0x18, 0x9B, 0x9D, 0x1E,
0xA1, 0x22, 0x24, 0xA7, 0x28, 0xAB, 0xAD, 0x2E, 0x30, 0xB3, 0xB5, 0x36, 0xB9, 0x3A, 0x3C, 0xBF,
0xC1, 0x42, 0x44, 0xC7, 0x48, 0xCB, 0xCD, 0x4E, 0x50, 0xD3, 0xD5, 0x56, 0xD9, 0x5A, 0x5C, 0xDF,
0x60, 0xE3, 0xE5, 0x66, 0xE9, 0x6A, 0x6C, 0xEF, 0xF1, 0x72, 0x74, 0xF7, 0x78, 0xFB, 0xFD, 0x7E,
0x01, 0x82, 0x84, 0x07, 0x88, 0x0B, 0x0D, 0x8E, 0x90, 0x13, 0x15, 0x96, 0x19, 0x9A, 0x9C, 0x1F,
0xA0, 0x23, 0x25, 0xA6, 0x29, 0xAA, 0xAC, 0x2F, 0x31, 0xB2, 0xB4, 0x37, 0xB8, 0x3B, 0x3D, 0xBE,
0xC0, 0x43, 0x45, 0xC6, 0x49, 0xCA, 0xCC, 0x4F, 0x51, 0xD2, 0xD4, 0x57, 0xD8, 0x5B, 0x5D, 0xDE,
0x61, 0xE2, 0xE4, 0x67, 0xE8, 0x6B, 0x6D, 0xEE, 0xF0, 0x73, 0x75, 0xF6, 0x79, 0xFA, 0xFC, 0x7F,
0x02, 0x81, 0x87, 0x04, 0x8B, 0x08, 0x0E, 0x8D, 0x93, 0x10, 0x16, 0x95, 0x1A, 0x99, 0x9F, 0x1C,
0xA3, 0x20, 0x26, 0xA5, 0x2A, 0xA9, 0xAF, 0x2C, 0x32, 0xB1, 0xB7, 0x34, 0xBB, 0x38, 0x3E, 0xBD,
0xC3, 0x40, 0x46, 0xC5, 0x4A, 0xC9, 0xCF, 0x4C, 0x52, 0xD1, 0xD7, 0x54, 0xDB, 0x58, 0x5E, 0xDD,
0x62, 0xE1, 0xE7, 0x64, 0xEB, 0x68, 0x6E, 0xED, 0xF3, 0x70, 0x76, 0xF5, 0x7A, 0xF9, 0xFF, 0x7C,
0x03, 0x80, 0x86, 0x05, 0x8A, 0x09, 0x0F, 0x8C, 0x92, 0x11, 0x17, 0x94, 0x1B, 0x98, 0x9E, 0x1D,
0xA2, 0x21, 0x27, 0xA4, 0x2B, 0xA8, 0xAE, 0x2D, 0x33, 0xB0, 0xB6, 0x35, 0xBA, 0x39, 0x3F, 0xBC,
0xC2, 0x41, 0x47, 0xC4, 0x4B, 0xC8, 0xCE, 0x4D, 0x53, 0xD0, 0xD6, 0x55, 0xDA, 0x59, 0x5F, 0xDC,
0x63, 0xE0, 0xE6, 0x65, 0xEA, 0x69, 0x6F, 0xEC, 0xF2, 0x71, 0x77, 0xF4, 0x7B, 0xF8, 0xFE, 0x7D};

unsigned char crc8(unsigned char const *data, unsigned char len)
{
    unsigned char const *end = data + len;
    unsigned char crc;
    crc = 0x00;
    crc &= 0xff;
    while (data < end)
        {crc = crc8_table[crc ^ *data++];}
    return crc;
}
```

UVcure	Version: 1.00
UV-curing system	Page: 12/13



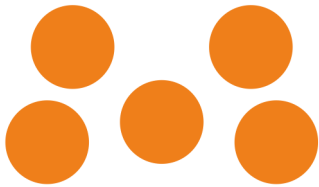
Technical data

Size LxWxH	46x44x20	[mm]
Weight	30	[g]
LED current	0..700	[mA]
Operating voltage	12 -24	[VDC]
Ambient operating temperature, non condensing	5..50	[°C]
Storage temperature, non condensing	0..60	[°C]

Contact

Web: www.setuprobotics.com
 Support: support@setuprobotics.com
 Sales: sales@setuprobotics.com

UVcure	Version: 1.00
UV-curing system	Page: 13/13



EC Declaration of conformity

Manufacturer: SetupRobotics EU ApS
Industrivaenget 6B
3320 Skaevinge
Denmark

Hereby is certified that the following product: UV-curer
Description: Industrial UV-curing system
Type: UV1
Production year: 2024

is partly completed machinery according to 2006/42/EC.

The complete machine must be in full compliance with all essential requirements of 2006/42/EC before the toolbase and its connected accessories are put into service. A comprehensive risk assessment must be carried out for each application as part of ensuring that all essential requirements are fulfilled. All essential requirements must be assessed. Instructions and guidance provided in the manual must be followed.

The product is in conformity with the following directives:

- 2014/30/EU — Electromagnetic Compatibility Directive (EMC)
- 2011/65/EU — Restriction of the use of certain hazardous substances (RoHS)
- 2014/35/EU — Low Voltage Directive (LVD)


Uffe Safeldt
COO, CTO
Hillerød 2024.07.01