HyCon 0520

User Manual

2018

General Discription

The intermittent hypoxia system **HyCon** (model **0520)** is a powerful research tool for researchers and scientists who do hypoxia research and perform experiments in rodents involving exposure of the animals to intermittent and sustained hypoxia and oxygen sensitive work. The system provides exceptional opportunities to set up maintain and precisely control oxygen profile in closed environment. The **HyCon** has a user-friendly interface and makes experiments easy to perform.

Using **HyCon** allows the control of oxygen profiles with two set points anywhere from 5 to 21% (5 to 90% if infusing oxygen) of oxygen and adjustable steps between Hi and Low set point. The **HyCon** works with four animal cages. Two cages are experimental (H1 and H2) and two cages are control (C1 and C2). Every experimental cage jointly works with the control cage (H1 and C1; H2 and C2). The system allows operation all of experimental cages simultaneously, or each independently of the others. The **HyCon** can maintain and control different profiles, or use the same profile in every cage. The system can start all cages at the same time, or each at different times.

The **HyCon** works by remotely sensing oxygen inside each experimental cage, infusing nitrogen to reduce oxygen, and infusing air(oxygen) to raise or restore oxygen. A continuous supply of both gases is required. The **HyCon** connects to the cages via flexible tubing. The **HyCon** can be operate from the front panel, or via optional PC software allowed for real-time trend charting, data logging, and remote operation.

The **HyCon** have remote access for monitoring, operating and store data archive via internet (Ethernet access).

Specification

ELECTRICAL POWER: 115VAC/60Hz or 240VAC/50Hz @ 6.3A.

DISPLAY: 2.4" Graphic LCD

COMMUNICATIONS: 1 serial communication RS232/RS485 port; 1 Ethernet TCP/IP port

CONTROL RANGE: 0 - 95% oxygen.

ACCURACY: 2% full scale.

RESOLUTION: to 0.1% oxygen, display and set point.

OXYGEN SENSOR: Maxtec (USA), Model Max-23 (p/n R116P06).

GAS SOURCE: compressed nitrogen and air (or oxygen) tanks or generators.

GAS SUPPLY: pressurized gas.

GAS SUPPLY LINE: 1/4 inch O.D.

GAS SUPPLY LINE PRESSURE: 40-60 PSI.

GAS INFUSION RATE: 1-80 L/Min. each control gas into each cage.

ALARM OUTPUT: visible screen.

ALARM MODES: Air (oxygen) pressure is low (<25 PSI).

WEIGHT: 20 lbs.

DIMENSIONS: 8.5"H x 21"W x 15.5"D.

HyCon Front and Back panels

Front panel
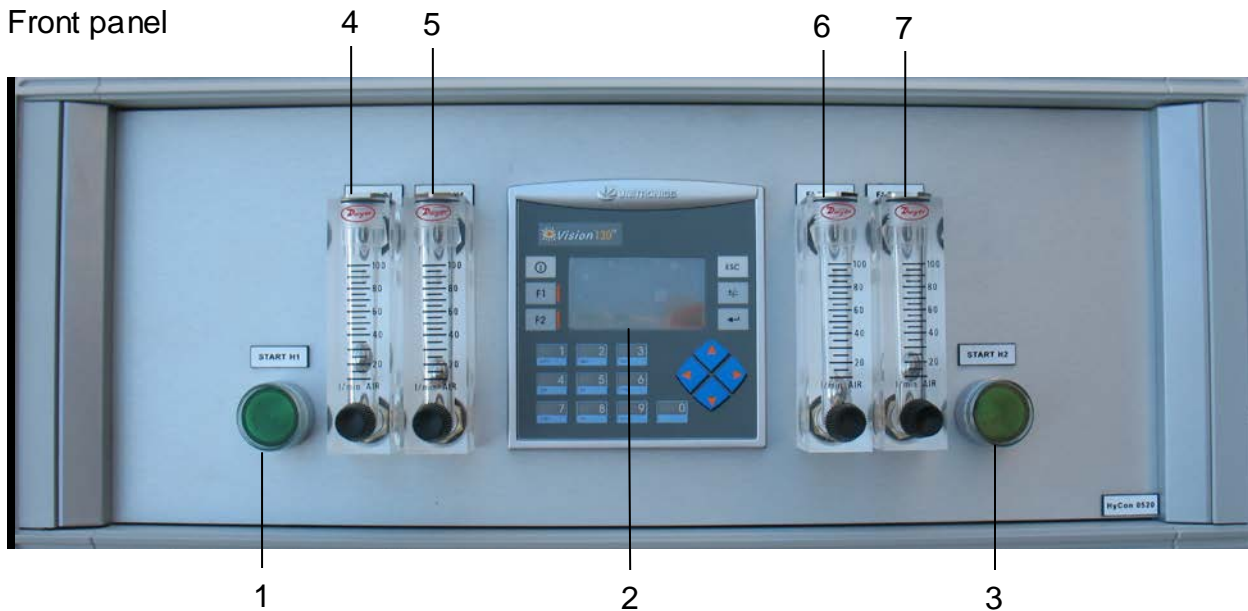
1. Start button H1
2. PLC with built-in Operator Panel
3. Start button H2
4. Flow meter C1

5. Flow meter H1
6. Flow meter H2
7. Flow meter C2

Back panel
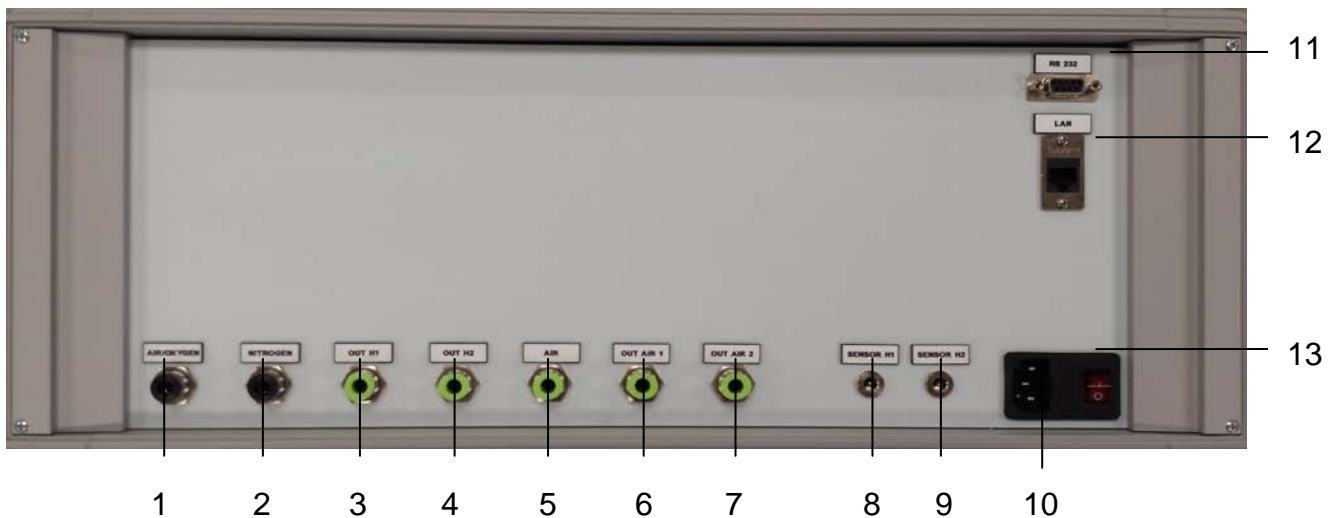
1. Air/Oxygen supply
2. Nitrogen supply
3. Out H1
4. Out H2
5. Gas/Air supply for C1(2)

6. Out Gas/Air C1
7. Out Gas/Air C2
8. In sensor H1
9. In Sensor H2
10. Power supply

11. RS 232 port
12. Ethernet port
13. Power on/off switch

HyCon screens

Info screen

Alarm screen 1

Alarm screen 3

Alarm screen 2

Alarm screen 4

Alarm screen 5

Run screen

General Settings H1

General Settings H2

Settings H1 screen

Settings H2 screen

Trend H1 screen

Trend H2 screen

Calibration screen

Installation

1. Set the **HyCon** only on a firm space, flat and dry surface with necessary distance of cages.
2. Assembly H1 (H2) cage according the following pictures:
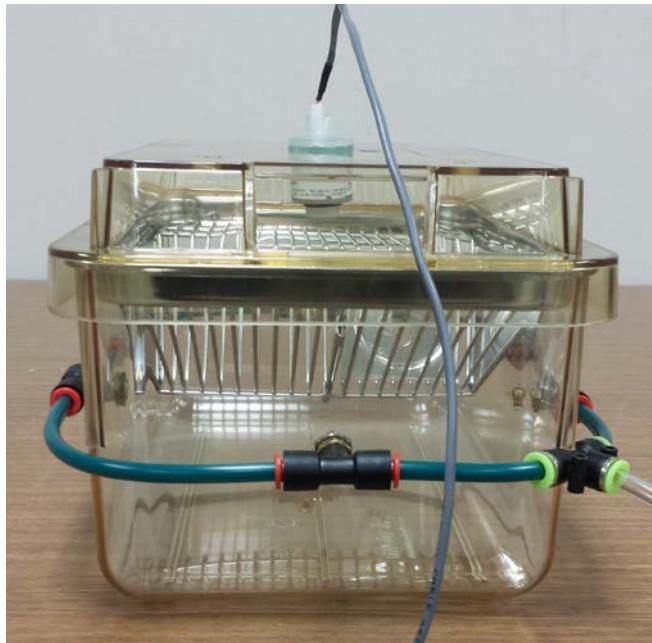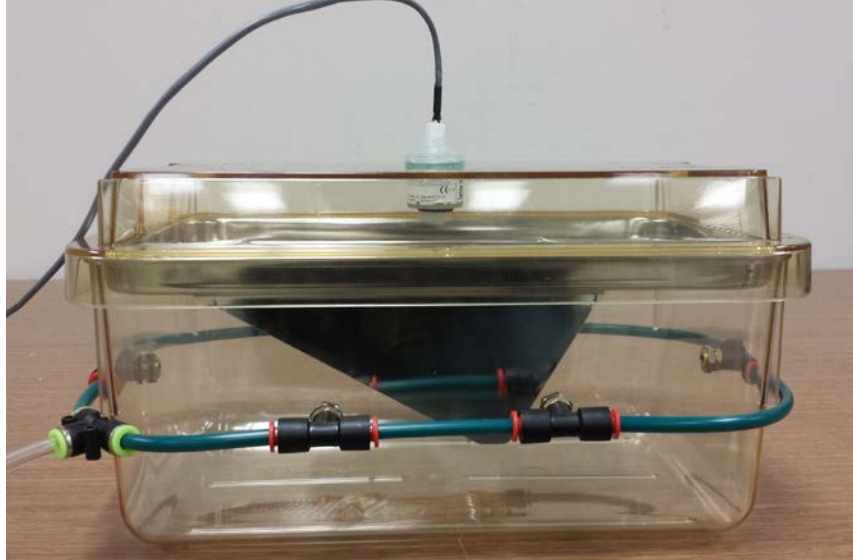
3. Connect tubing from cages to the corresponding outlets on rear panel of the **HyCon**.
4. Hook up tubing of air(oxygen), nitrogen and gas supplies to corresponding quick-connectors on the rear panel.
5. Set up desirable gas pressure in lines (60 PSI) using pressure gauges.
6. Plug in **HyCon** into 115VAC/60Hz or 240VAC/50Hz outlet.

Operation

Turning on the **HyCon**

1. Use power switch on the rear panel to turn the **HyCon** on. The Info screen will illuminate. Info screen shows system name, supplied gas (air or oxygen), date and time.

Supplied gas, Time and Date

1. To change current supplied gas, date and time press [ESC]. Changing parameter is marked by cursor.
Note: Use [◄►] for navigation between date and time.
2. Press [↵] and changing value is marked by blinking cursor.
3. Use Up or Down buttons to switch between air and oxygen. When finished, press [↵] again.
4. Use digit buttons to enter date and time. When finished, press [↵] again.
5. For exit from change supplied gas, date and time mode press [ESC] again.
6. Press button:
   - [↵] to exit to Run screen;
   - [F1] to exit to General Settings H1 screen;
   - [F2] to exit to General Settings H2 screen;

Programming H1 or H2

1. Press [F1] or [F2] any time for move to General Settings H1 or General Settings H2 screen.
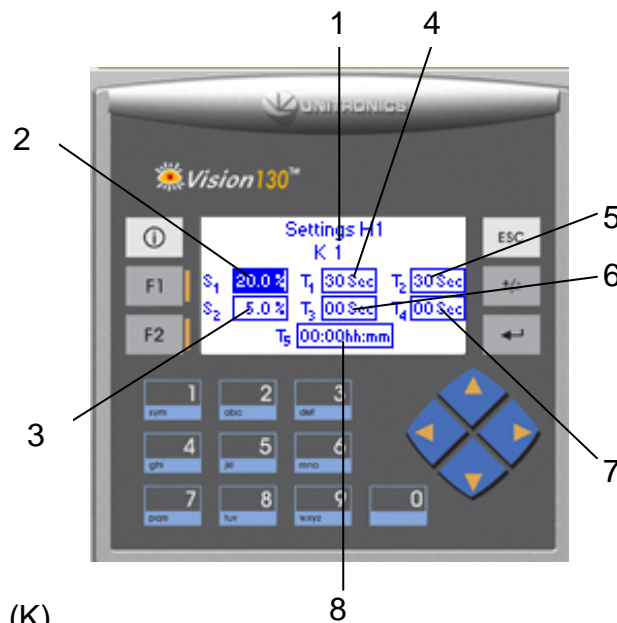
   Note: Use [✣] for navigation between variable parameters.
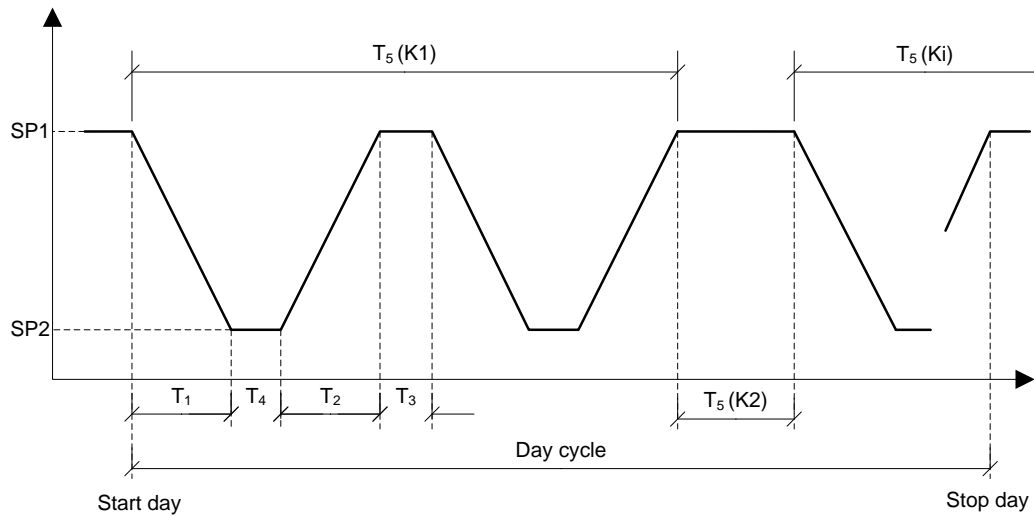2. When variable parameter is selected, press [↵] to change the value marked by the blinking cursor.

Note: K is number of profiles

3. Use digit buttons to enter value.
4. When finished, press ↵ again.
5. Press button:
   - F1 to move to Settings H1 screen
   - F2 to move to Settings H2 screen;
6. Parameters description

1. Profile number (K).
2. High set point in % of oxygen concentration (SP1).
3. Low set point in % of oxygen concentration (SP2).
4. Time to reach Low set point (T_1).
5. Time to reach High set point (T_2).
6. Time of Plateau (T_3).
7. Time of Nadir (T_4).
8. Time of Profile K_i (T_5).

Note: Use ⬦ for navigation between variable parameters.

7. When variable parameter is selected, press ⏎ to change the value marked by the blinking cursor.

8. Use digit buttons to enter value.

9. When finished, press ⏎ again.

10. Press button:
    - ESC to exit to Run screen;
    - ⓘ to exit to Info screen.

Running the **HyCon**

1. Fully open the valve of Flow meter H1(H2).
2. To start run the **HyCon** press Start H1 or Start H2 button. Screen Run is on automatically. Button Start H1 or Start H2 is light green.
3. Adjust necessary flow rate through C1(C2) by using the valve of Flow meter C1(C2)
4. For stop run **HyCon** press Start H1 or Start H2 button repeatedly.

Note: If sustained hypoxia is exposure (S1=S2) use the valve of Flow meter H1(H2) to decrease flow rate through H1(H2) and save gases.

Description parameters
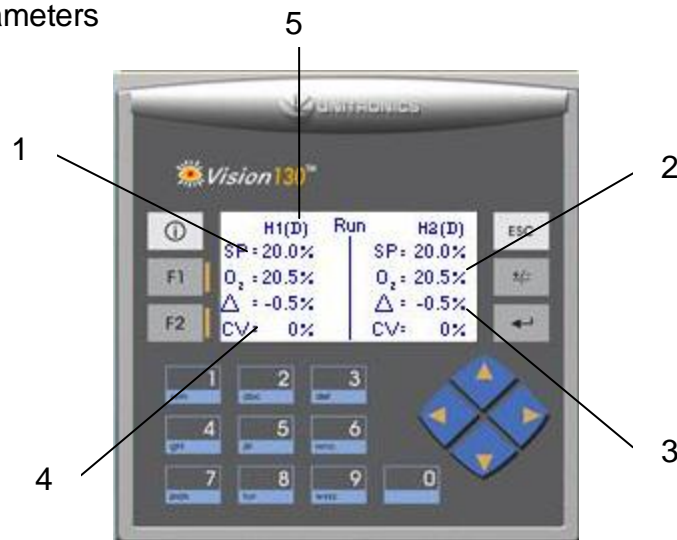
1. Set Point H1 (H2).
2. Oxygen concentration value H1 (H2).
3. Error H1 (H2).
4. Percent open control valve H1 (H2).
5. Day cycle (D) or Night cycle (N) H1 (H2).

Press button:
- [1] to exit to Trend H1 screen;
- [2] to exit to Trend H2 screen;
- [F1] to exit to General Settings H1 screen;
- [F2] to exit to General Settings H2 screen;
- [ⓘ] to exit to Info screen;

Monitoring the parameters in real time and historical mode

1. Press ![icon] or ![icon] to activate Trend H1 or Trend H2 screen. Trend H1 and Trend H2 screens display real time variation of set point and oxygen concentration H1 (H2).

2. Press ![icon] to activate historical mode. Use ![icon] buttons to scroll through history.

3. Press ![icon] to exit from historical mode.

4. Press button:

- ![ESC] to exit to Run screen;

- ![F1] to exit to General Settings H1 screen;

- ![F2] to exit to General Settings H2 screen;

- ![icon] to exit to Info screen;

Alarm Screen 1

1. If the pressure of air(oxygen) drops to less than 25 PSI **HyCon** activates the Alarm Screen 1 and stops the experiment.
2. At this time, **HyCon** will control oxygen concentration up-to-date 20%.
3. If the pressure of air(oxygen) boosts more than 25 PSI, press **Start H1(H2) button** for reactivates Run mode.
4. Exit from Alarm screen only if the pressure of air(oxygen) boosts to more than 25 PSI and press ![ESC].

Alarm Screen 2(3)

1. If the oxygen concentration in H1(H2) not reach Low Set Point for five cycles in succession **HyCon** activates the Alarm Screen 2(3) and stops the experiment.
2. At this time, **HyCon** will control oxygen concentration up-to-date 20%.
3. Check the nitrogen pressure and press **Start H1(H2) button** for reactivates Run mode.
4. For exit from Alarm Screen 2(3) press ![ESC].

Alarm Screen 4(5)

1. If the oxygen concentration in H1(H2) is dropping more than Low Set Point on 1% of oxygen concentration HyCon activates the Alarm Screen 4(5) and stops the experiment.
2. At this time, **HyCon** will control oxygen concentration up-to-date 20%.
3. Check the nitrogen pressure and press **Start H1(H2) button** for reactivates Run mode.
4. For exit from Alarm Screen 4(5) press ![ESC].

Oxygen sensor calibration

1. Press button for move to Calibration screen.
2. Performing an Atmospheric Span Calibration

    3.1 Select "Span" for the corresponding sensor by using buttons.
    3.2 Ensure that the sensor is exposed on the fresh air.
    3.3 Adjust the sensor's reading by using Up or Down buttons. The sensor should show 20.9%.

3. Performing Zero Calibration

    3.1 Select "Zero" for corresponding sensor by using buttons.
    3.2 Apply N2 calibration gas to the corresponding sensor.
    3.3 Adjust the sensor's reading by using Up or Down buttons. The sensor should show 0%.

4. For exit from Calibration screen press .