

# Gas Controllers CO<sub>2</sub> - O<sub>2</sub>

**Warner Instruments** is pleased to offer the complete line of gas controllers from Okolab. This family of controllers includes the basic manual mixers featuring floating ball flow meters to mix the gas streams. The DGT Line offer digital control of CO<sub>2</sub> or O<sub>2</sub> and floating ball meters to set the air flow rate. The Bold Line controllers offer full digital control over the gas mixtures, are fully integrated with the Bold Line temperature controllers, and can be operated via a touch screen interface, OKO-Control 2.0 software, or Nis Elements software.



**Bold Line CO<sub>2</sub>/O<sub>2</sub> Multi-User**



**DGT Line Digital CO<sub>2</sub>/O<sub>2</sub> Manual Air**



**Bold Line Digital CO<sub>2</sub>**



**Touch Controller**

# Manual Mixers

## Two Gas Mixer (2GF-MIXER)

- Set point resolution 1%
- Works with any microscope incubator
- CO<sub>2</sub> concentrations in the 0-15% range
- Reusable PTFE membrane filter (0.2 mm pores)

### Description

The 2GF MIXER is a two gas mixer used to generate CO<sub>2</sub>-Air mixtures with an adjustable CO<sub>2</sub> concentration in the range of 0-15%. The mixer can be used as a stand-alone device or in combination with any microscope incubator. Air and CO<sub>2</sub> flows are regulated by dual floating ball flow meters in the range 0.2 -1.7 NI/min and 0.013 - 0.13 NI/min, respectively.



Manual Mixers Manual CO<sub>2</sub>/O<sub>2</sub> Manual Air

## Three Gas Mixer / (3GF Mixer-Hypoxia) Manual CO<sub>2</sub> - Manual N<sub>2</sub> - Manual Air

- CO<sub>2</sub> range 0 - 15%
- O<sub>2</sub> range 2 - 20%
- Set point resolution 1%
- PTFE membrane filter (0.2 mm pores)

### Description

The 3GF Mixer-Hypoxia is a 3 gas mixer (Carbon Dioxide, Nitrogen, Air) which employs floating ball flow meters.



Manual Mixers 3GF-Mixer

## Three Gas Mixer / (3GF Mixer-Hyperoxia) Manual CO<sub>2</sub> - Manual N<sub>2</sub> - Manual Air

- CO<sub>2</sub> range 0 - 15%
- O<sub>2</sub> range 40 - 85%
- Set point resolution 1%
- PTFE membrane filter (0.2 mm pores)

### Description

The 3GF Mixer-Hyperoxia is a 3 gas mixer (Carbon Dioxide, Nitrogen, Air) which employs floating ball flow meters. Gas connectors and valves are cleaned for use with oxygen.

Order #	Model	Product
<b>Manual Mixers</b>		
64-1996	2GF-Mixer	2 Gas mixer, Air and CO <sub>2</sub> 0-15%
64-1997	3GF-Mixer-Hypoxia	3 Gas mixer, Air Nitrogen and CO <sub>2</sub> , O <sub>2</sub> -2-20%
64-1998	3GF-Mixer-Hyperoxia	3 Gas mixer, Air Nitrogen and CO <sub>2</sub> , O <sub>2</sub> -40-85%

### Accessories

64-1999	OKO-AP	Air pump max pressure 300 mbar
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# Digital Gas / Manual Air Mixers

## DGT Gas Controllers / (CO<sub>2</sub> DGT-BX)

### Digital CO<sub>2</sub> / Manual Air

- Adds CO<sub>2</sub> in Air or in N<sub>2</sub>
- CO<sub>2</sub> Range 0-20%
- Accuracy ± 5% of CO<sub>2</sub> concentration
- Repeatability better than 0.1%
- Floating ball air flow meter 0-1 NI/min
- Total flow rate (at 5% CO<sub>2</sub>) 0.5 NI/min
- Outlet pressure: ambient
- CO<sub>2</sub> consumption (at 5% and air flow rate 0.5 NI/min): 0.027 NI/min
- CO<sub>2</sub> sensor Non Dispersive InfraRed (NDIR) dual wave length detector
- Software control with OKO Control 2012 or NIS-Elements
- Filtering device PTFE membrane with 0.2 µm pores
- Can work in series with O<sub>2</sub> DGT BX HYPOXIA

### Description

An infrared sensor continuously measures CO<sub>2</sub> concentration in the mixed gas stream and a PID closed loop controller gives feedback to a fine valve regulating CO<sub>2</sub> flow. Air flow is manually regulated with a floating ball flow meter.

The serial RS-232 interface and OKO-Control 2.0 Software allow the user to control the unit with a personal computer and to acquire concentration data stored in computer memory.

*The CO<sub>2</sub> controller is supplied with the following: gas filter, pressure gauge for CO<sub>2</sub> with regulator, two white rigid tubes: 6mm O.D., 3m length one blue rigid tube: 6mm O.D., 2 m length*

*Optional Air Pump is a good choice for labs lacking a source of clean air.*



**DGT CO2 DGT-BX**



**DGT CO2 DGT-BX rear panel**



**Optional Air Pump**

Order #	Model	Product
<b>DGT Mixers</b>		
64-1991	DGT-CO2BX-PLUS	Digital CO <sub>2</sub> / manual Air CO <sub>2</sub> 0-20%
<b>Accessories</b>		
64-1999	OKO-AP	Air pump max pressure 300 mbar

# Digital Gas / Manual Air Mixers

## DGT Gas Controllers / (O<sub>2</sub> DGT-BX Hypoxia)

### Digital O<sub>2</sub> / Manual Air

- Adds N<sub>2</sub> in Air
- O<sub>2</sub> Range 1-19%
- Accuracy: ± 0.1% at 5% O<sub>2</sub>
- Repeatability: better than 0.05% of O<sub>2</sub>
- Floating ball air flow meter 0-0.4 NI/min
- Total flow rate (at 5% O<sub>2</sub>) 0.5 NI/min
- Outlet pressure: ambient
- N<sub>2</sub> consumption (at 5% O<sub>2</sub>) 0.5 NI/min
- O<sub>2</sub> sensor Zirconium oxide with 10 year life
- Software control with OKO Control or NIS-Elements
- Filtering device PTFE membrane with 0.2 µm pores
- Works in series with CO<sub>2</sub> DGT BX



**DGT O<sub>2</sub> DGT-BX Hypoxia**

## Description

### Technology

The O<sub>2</sub> DGT-BX HYPOXIA controls Oxygen concentration by mixing Air with Nitrogen. Air flow is set to 0.1 liter per minute by means of a floating ball flowmeter. When combined with the Digital CO<sub>2</sub> Controller, you have control over 3 gas Mixtures (Nitrogen-Carbon Dioxide-Oxygen).

The long life zirconium oxide sensor lasts up to 10 years if continuously used and considerably longer if used intermittently.

### Data Storage

The serial RS-232 interface and Oko-Contol software allow the user to control the unit and to acquire and store concentration data on a PC compatible computer.

### Accessories

The O<sub>2</sub> controller is supplied with the following: gas filter, pressure gauge for N<sub>2</sub> with regulator, two white rigid tubes: 6mm O.D., 3m length



**DGT O<sub>2</sub> DGT-BX Hypoxia rear panel**

Order #	Model	Product
<b>DGT Mixers</b>		
64-1992	DGT-CO2BX-ES	Digital CO2 w/ external sensor
64-1993	DGT-O2BX-PLUS	Digital O2 / manual Air O2 - 3-19%
<b>Accessories</b>		
64-1999	OKO-AP	Air pump max pressure 300 mbar

# Bold Line CO<sub>2</sub> Controller



## Description

The Bold Line CO<sub>2</sub> controller mixes Air or N<sub>2</sub> and CO<sub>2</sub>, and controls the concentration with digital accuracy. Operation is via an easy to use touch screen interface, OKO-Touch. An optional Smart Box data logger and web server allows operation via any web-enabled device. The system may also be operated via a PC using OKO-Control 2.0 software or Nis Elements software.

Sensor calibration is made with an external meter or calibration gas. The controller can be attached to O<sub>2</sub> Unit-BL [1-20] to control both CO<sub>2</sub> and O<sub>2</sub> within the range 0-10% and 0-18%, respectively.

## Technical Specifications

Operating mode	Adds CO <sub>2</sub> in Air or in N <sub>2</sub>
Concentration range	0-18%
Accuracy CO <sub>2</sub>	± 5% of CO <sub>2</sub> concentration, i.e. ± 0.25% at 5%
Set Point Resolution	0.1%
Repeatability	Better than 0.1%
Total flow rate	0.4 NI/min - constant
Outlet pressure	Ambient
CO <sub>2</sub> consumption (at 5%)	0.02 NI/min
CO <sub>2</sub> sensor	10 year-life Non Dispersive InfraRed (NDIR) dual wave length detector
Filtering device	PTFE membrane with 0.2 µm pores

## Optional Bold Line Air Pump



## Order # Model Product

### Bold Line Controllers

64-2000	CO2 Unit-BL	CO <sub>2</sub> / Air - CO <sub>2</sub> 0-18%
64-2007	Oko-Touch	Touch screen display

### Accessories

64-2008	SM-BL	Smart Box, data logger, web server
64-2001	O <sub>2</sub> Unit-BL[1-20]	O <sub>2</sub> 1 - 20.5%
64-2006	OKO-AP_BL	Bold Line Air Pump max pressure 300 mbar

# Bold Line O<sub>2</sub> Controller



## Description

The Bold Line O<sub>2</sub> unit controls the oxygen concentration over the range of 1-20% by mixing Air with Nitrogen. Gas flow rates are digitally controlled. A long life zirconium oxide sensor precisely measures the O<sub>2</sub> concentration with great accuracy.

Operation is via an easy to use touch screen interface, OKO-Touch. An optional Smart Box data logger and web server allows operation via any web-enabled device. The system may also be operated via a PC using OKO-Control 2.0 software, or Nis Elements software.

Sensor calibration is made with an external meter or calibration gas. The controller can be attached to CO<sub>2</sub> Unit-BL to control both CO<sub>2</sub> and O<sub>2</sub>.

## Technical Specifications

Operating mode	Adds N <sub>2</sub> to Air
Concentration range	0-20%
Accuracy	± 0.1% @ 5% of O <sub>2</sub>
Repeatability	0.05% of O <sub>2</sub>
Set Point Resolution	0.1%
Total flow rate	0.4 NI/min - constant
Outlet pressure	Ambient
N <sub>2</sub> consumption (at 5% of O <sub>2</sub> )	0.03 NI/min
O <sub>2</sub> sensor	10 year-life zirconium oxide senso
Filtering device	PTFE membrane with 0.2 μm pores



**A typical complete system**

## Order # Model Product

### Bold Line Controllers

64-2001	O2 Unit-BL[1-20]	O2 1 - 20.5%
64-2007	Oko-Touch	Touch screen display

### Accessories

64-2008	SM-BL	Smart Box, data logger, web server
64-2000	CO2 Unit-BL	CO <sub>2</sub> / Air - CO <sub>2</sub> 0-18%
64-2006	OKO-AP_BL	Bold Line Air Pump max pressure 300 mbar

# Bold Line CO<sub>2</sub> - O<sub>2</sub> Controllers



## Description

### CO<sub>2</sub>-O<sub>2</sub> UNIT-BL [0-10;1-18] and [0-20;1-95]

The Bold Line combination CO<sub>2</sub> - O<sub>2</sub> gas controllers are ideal for hypoxia and hyperoxia experiments. Two versions are available, CO<sub>2</sub>; 0-10% and O<sub>2</sub>; 1-18%, and CO<sub>2</sub>; 0-20% and O<sub>2</sub>; 1-95%.

Gas flow rates are digitally controlled. A long life zirconium oxide sensor precisely measures the O<sub>2</sub> concentration, a non dispersive InfraRed (NDIR) dual wave length detector sets the CO<sub>2</sub> concentration.

Operation is via an easy to use touch screen interface, OKO-Touch. An optional Smart Box data logger and web server allows operation via any web-enabled device. The system may also be operated via a PC using OKO-Control 2.0 software or Nis Elements software.

Sensor calibration is made with an external meter or calibration gas.

### Technical Specifications CO<sub>2</sub>-O<sub>2</sub> UNIT-BL [0-10;1-18]

Operating mode	Adds CO <sub>2</sub> and N <sub>2</sub> to Air
Concentration range	CO <sub>2</sub> range: 0-10%, O <sub>2</sub> range: 1-18%
CO <sub>2</sub> Accuracy	± 5% of CO <sub>2</sub> concentration, i.e. ± 0.25% at 5%CO <sub>2</sub>
O <sub>2</sub> Accuracy	0.1% at 5%O <sub>2</sub>
Set Point Resolution	0.1%
CO <sub>2</sub> Repeatability	Better than 0.1%
O <sub>2</sub> Repeatability	0.05% of O <sub>2</sub>
Total flow rate	0.4 NI/min - constant
Outlet pressure	Ambient
CO <sub>2</sub> consumption (at 5%)	0.02 NI/min
N <sub>2</sub> consumption (at 5% of O <sub>2</sub> )	0.3 NI/min
CO <sub>2</sub> sensor	10 year-life Non Dispersive InfraRed (NDIR) dual wave length detector
O <sub>2</sub> sensor	10 year-life zirconium oxide sensor
Filtering device	PTFE membrane with 0.2 μm pores

### Technical Specifications CO<sub>2</sub>-O<sub>2</sub> UNIT-BL [0-20;1-95]

Operating mode	Mixes CO <sub>2</sub> , O <sub>2</sub> , and N <sub>2</sub>
Concentration range	CO <sub>2</sub> range: 0-20%, O <sub>2</sub> range: 1-95%
CO <sub>2</sub> Accuracy	± 0.3 % at 5% CO <sub>2</sub> and 5% O <sub>2</sub>
O <sub>2</sub> Accuracy	± 0.2% at 5% CO <sub>2</sub> and 5% O <sub>2</sub>
Set Point Resolution	0.1%
Total flow rate	0.35 NI/min - constant
Outlet pressure	Ambient
CO <sub>2</sub> consumption	(at 5% of CO <sub>2</sub> ): 0.0175 NI/min
O <sub>2</sub> consumption	(at 5% of O <sub>2</sub> ): 0.0175 NI/min
N <sub>2</sub> consumption	(at 5% of CO <sub>2</sub> and at 5% of O <sub>2</sub> ): 0.315 NI/min
Digital Flow Meters	CMOS Sensors
CO <sub>2</sub> sensor	10 year-life Non Dispersive InfraRed (NDIR) dual wave length detector
O <sub>2</sub> sensor	10 year-life zirconium oxide sensor
Filtering device	PTFE membrane with 0.2 μm pores

### Order # Model Product

#### Bold Line Controllers

64-2002	CO2-O2 Unit-BL[1-10;1-18]	Combined CO <sub>2</sub> / O <sub>2</sub>
64-2003	CO2-O2 Unit-BL[1-20;1-95]	Combined CO <sub>2</sub> / O <sub>2</sub>
64-2007	Oko-Touch	Touch screen display

#### Accessories

64-2008	SM-BL	Smart Box, data logger, web server
64-2006	OKO-AP_BL	Bold Line Air Pump max pressure 300 mbar

# Bold Line Three Gas Mixer Multi-user



## Description CO<sub>2</sub>-O<sub>2</sub> UNIT-BL CP

### Designed supply desired Air-CO<sub>2</sub> or N<sub>2</sub>-O<sub>2</sub>-CO<sub>2</sub> mixture at controlled pressure

The CO<sub>2</sub> O<sub>2</sub> Unit BL CP replaces pre-mixed tanks or compressed gas lines, one unit supplies up to 10 microscope incubators.

The device mixes two or three gases, according to operator's need.

A long life zirconium oxide sensor precisely measures the O<sub>2</sub> concentration, a non dispersive InfraRed (NDIR) dual wave length detector sets the CO<sub>2</sub> concentration. Operation is via an easy to use touch screen interface, OKO-Touch.

An optional Smart Box data logger and web server allows operation via any web-enabled device. The system may also be operated via a PC using OKO-Control 2.0 software or Nis Elements software.

Sensor calibration is made with an external meter or calibration gas.

*Note: Order Single floating ball flowmeters along with the Multi-user controller, one for each incubator to be connected.*

## Technical Specifications CO<sub>2</sub>-O<sub>2</sub> UNIT-BL [0-20;1-95]

Output pressure	1-4 atm (absolute pressure)
Pressurized Vessel	5 lt
Operating mode	Adds CO <sub>2</sub> and Air to N <sub>2</sub>
Concentration range	CO <sub>2</sub> range: 4-8%, O <sub>2</sub> range: 3-7%
CO <sub>2</sub> Accuracy	± 5% of CO <sub>2</sub> concentration, i.e. ± 0.25% at 5% CO <sub>2</sub>
O <sub>2</sub> Accuracy	0.1% at 5% O <sub>2</sub>
Set Point Resolution	0.1%
CO <sub>2</sub> repeatability	better than 0.1%
O <sub>2</sub> repeatability	0.05% of O <sub>2</sub>
Total flow rate	0.5 NI/min (at 4 ata)
CO <sub>2</sub> consumption	(at 6% of CO <sub>2</sub> ): 0.042 NI/min
Air consumption	(at 6% of CO <sub>2</sub> and 5% O <sub>2</sub> ): 0.167 NI/min
N <sub>2</sub> consumption	(at 5% of O <sub>2</sub> ): 0.5 NI/min
CO <sub>2</sub> sensor	10 year-life Non Dispersive InfraRed (NDIR)
dual wave length detector	
O <sub>2</sub> sensor	10 year-life zirconium oxide sensor
Filtering device	PTFE membrane with 0.2 μm pores

## Order # Model Product

### Bold Line Controllers

64-2004	CO2-O2 Unit-BL CP	Multi-user combined CO <sub>2</sub> / O <sub>2</sub>
64-2007	Oko-Touch	Touch screen display

### Accessories

64-2008	SM-BL	Smart Box, data logger, web server
64-2006	OKO-AP_BL	Bold Line Air Pump max pressure 300 mbar