Refrigerated Incubator
Model 165000 and 165000-2
Operating Instructions

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1. Safety

The following symbols marked on the equipment mean:



Caution: Please read and understand all necessary installation and operating instructions prior to operating the system.

Always observe the following safety precautions:



- Use only as specified by the operating instructions or the intrinsic protection may be impaired.



- WARNING: Do not modify the system or its components. Any alterations or modifications to the Refrigerated Incubator may be dangerous and will void the warranty.



- WARNING: Do not attempt to modify the system's firmware or attempt to install 3rd party firmware. Only use firmware provided by Boekel Scientific. Any alterations or modifications to the firmware may be dangerous and will void the warranty.



- WARNING: To avoid the risk of electric shock, this equipment must only be connected to a supply mains with protective earth.
- Connect only to a power supply with a voltage corresponding to that on the serial number label.



- Connect only to a power supply that provides a safety ground terminal.
- After transport or storage in humid conditions, dry out the unit before connecting it to the supply voltage. During drying out, the intrinsic protection may be impaired.



- Disconnect power before servicing, moving, or cleaning.
- Do not position system where it is difficult to reach the power inlet or power switch.
- Do not block or restrict ventilation slots. Allow at least 4" clearance around the entire unit.
- It is the user's responsibility to carry out appropriate decontamination per their SOP if hazardous material is spilled on or inside the equipment.
- Before using any cleaning or decontamination method, users should verify that the method of cleaning will not damage the unit.



- If liquid is spilled inside the unit, disconnect it from the power supply and follow the site's SOP for cleaning.



- Do not use with flammable, corrosive, or hazardous material.
- Electromagnetic interference could affect the operation of the system if it is used in the vicinity of devices that have not been evaluated to the relevant EMC standard/s.
- Heavy equipment: two people required to lift, move, or carry the unit.

1.1. EMF Interference

This system may cause interference to radio and television reception or to equipment sensitive to electromagnetic fields. When installed properly, the system has been designed to minimize this effect. However, there is no guarantee that electromagnetic interference will not be caused by the system.

If the system does cause interference to radio, television, or other equipment, which can be determined by turning the instrument off and on, the user may attempt to correct the interference by one or more of the following measures:

- Increase the distance between the system and the radio/TV receiver.
- Connect the system to an outlet on an electrical circuit different from that which the radio/TV receiver is connected.

If this system is used near an intense electromagnetic source, interference noise may cause an adverse effect on the system performance or functionality.

The system is designed to minimize possible interference from external electromagnetic fields; however, there is no guarantee that external electromagnetic fields will not have an effect on this instrument.

If the system does incur electromagnetic interference, which can be determined by turning on and off possible source(s) of electromagnetic interference nearby, the user may attempt to correct the interference by one or more of the following measures:

- Reorient the instrument.
- Increase separation between the instrument and possible source(s) of electromagnetic interference.
- Connect the instrument to an outlet on a different electrical circuit from the possible source(s) of electromagnetic interference.
- Check that any other device connected to the system is not affected by electromagnetic interference.

1. Product Information

1.1 Introduction

The Boekel Scientific Refrigerated Incubator offers bi-directional controlled temperature and an easy-to-clean chamber in a stylish, modern package. The system uses a thermoelectric device and resistive heating elements to maintain temperature; there is no refrigerant or compressor. The easy-to-use, color touchscreen interface allows for viewing of the temperature and humidity data logs, alarms to protect the integrity of the product and the unit, and network communications for remote monitoring.

2. Assembly

2.1 Unpacking

- Remove packing materials carefully and retain for future shipment or storage of the unit.
- Inspect for damage. Report all shipping damage to the carrier immediately. Shipping damage is covered by the carrier and repair/replacement for shipping damages must be coordinated through the carrier.
- Complete and return the Warranty Registration Card or scan the QR code and submit the Information Online
- Package contents:
  (1) Boekel Scientific Refrigerated Incubator
  (1) 2.0 meter Power Cord
  (1) Operating instructions
  (2) Shelves

2.2 Installation

1. Place the Refrigerated Incubator on a flat and stable surface, preferably away from drafts, making certain the sides and back have at least 4 inches of clearance for proper airflow.

2. Fit the power line cord into the IEC power socket on the left side of the unit and plug the power cord into a properly grounded outlet.

3. Power on the unit using the switch above the power cord inlet

4. Once the system boots up, it will immediately begin controlling temperature. No operator intervention is required for this.

2.3 Operation Using Humidity Tray

Certain test procedures require use of elevated levels of relative humidity. This can be achieved by adding water to the stainless steel tray provided with the unit as needed.

Chlorinated water may cause rusting of the tray and is not to be used. Distilled water is recommended for use. To control bacteria, a 2% solution of quaternary ammonium can be added, if desired.

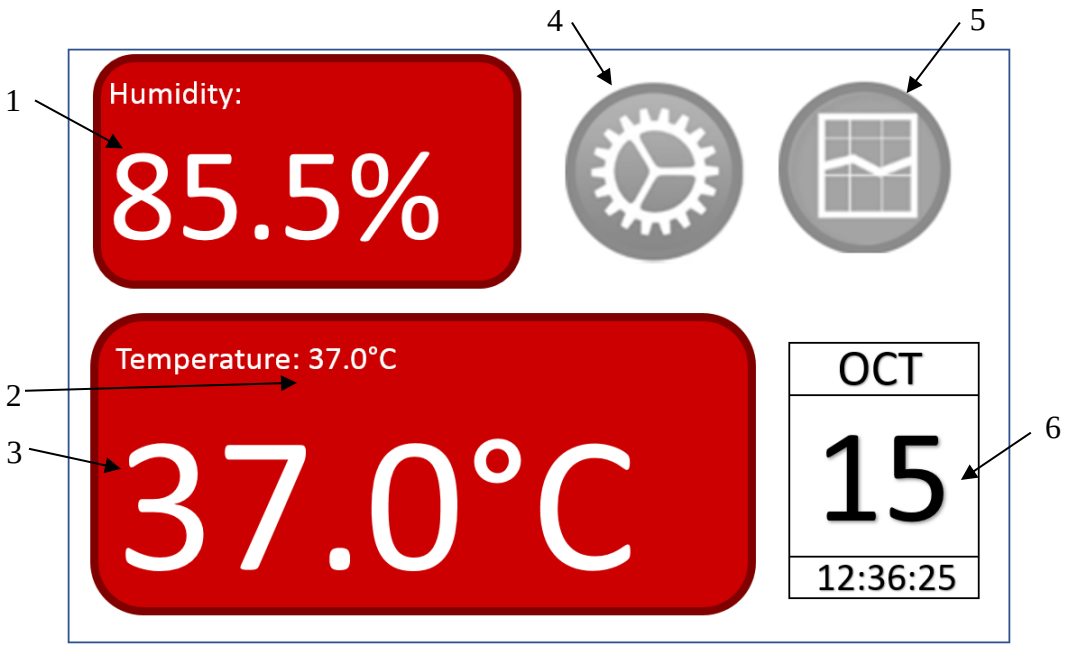
Please note that condensation may occur in the chamber when extremely high relative humidity levels are used and the temperature setpoint is lowered. This is normal and expected. Consult a dew point calculator or psychrometric charts to determine safe, non-condensing operating levels.

In the event of condensation forming, be sure to dry out the chamber completely by wipedown or other means. Use only a mild detergent to clean or disinfect the chamber surfaces.

3. Operation

3.1 Controls and Displays – Home Screen

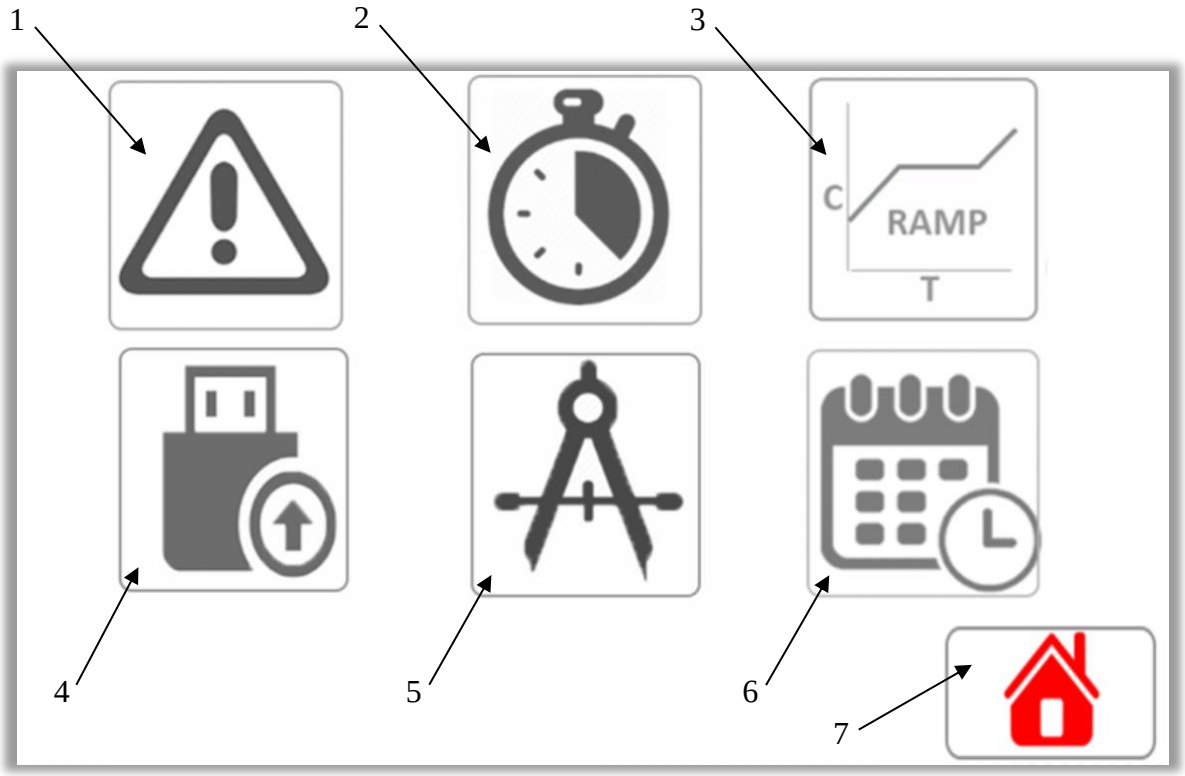
Below is a picture of the **Home Screen**.



1. Relative humidity sensed inside the chamber
2. Chamber temperature setpoint
3. Actual chamber temperature (may be different than setpoint if unit was recently disturbed, e.g. door opened or setpoint changed) – press to change chamber setpoint temperature.
4. Settings icon – press to enter Settings Screen.
5. Data logs icon - press to enter Data Logging Screen.
6. System Date/Time – Displays the current date and the current time in 24-hour format.

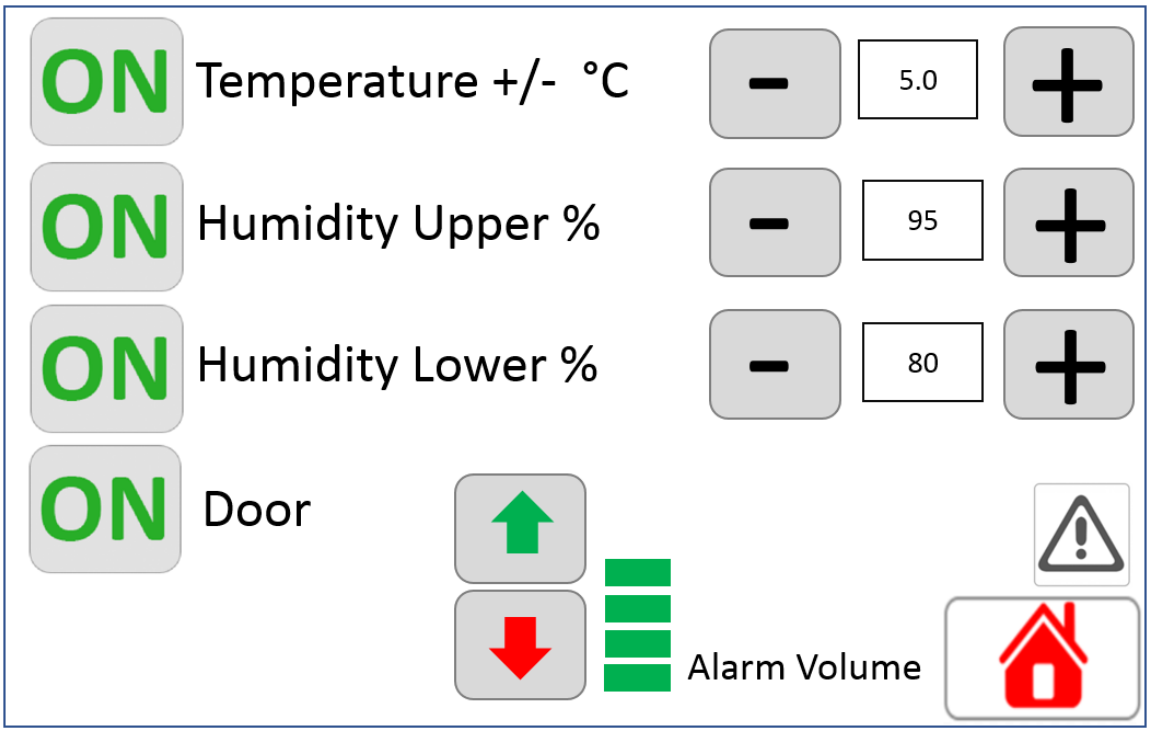
3.2 Settings Screen

The **Settings Screen** is accessed by pressing the *Settings Icon:*



1. Alarm Set Screen – turn on/off alarms and set alarm high/low limits
2. Timer Set Screen – set equipment timers and outcomes (shut off, temperature change, etc.)
3. Control Ramp Screen – configure ramping programs
4. Firmware Upload and Service Log screen – upload firmware or download service logs
5. Calibration Screen – calibrate temperature and humidity readings
6. Set Time and Date
7. Home Screen

3.3 Alarm Set Screen



The Alarm Set Screen can be used to configure the setpoints for various process alarms in the incubator, including temperature, humidity, and door state.

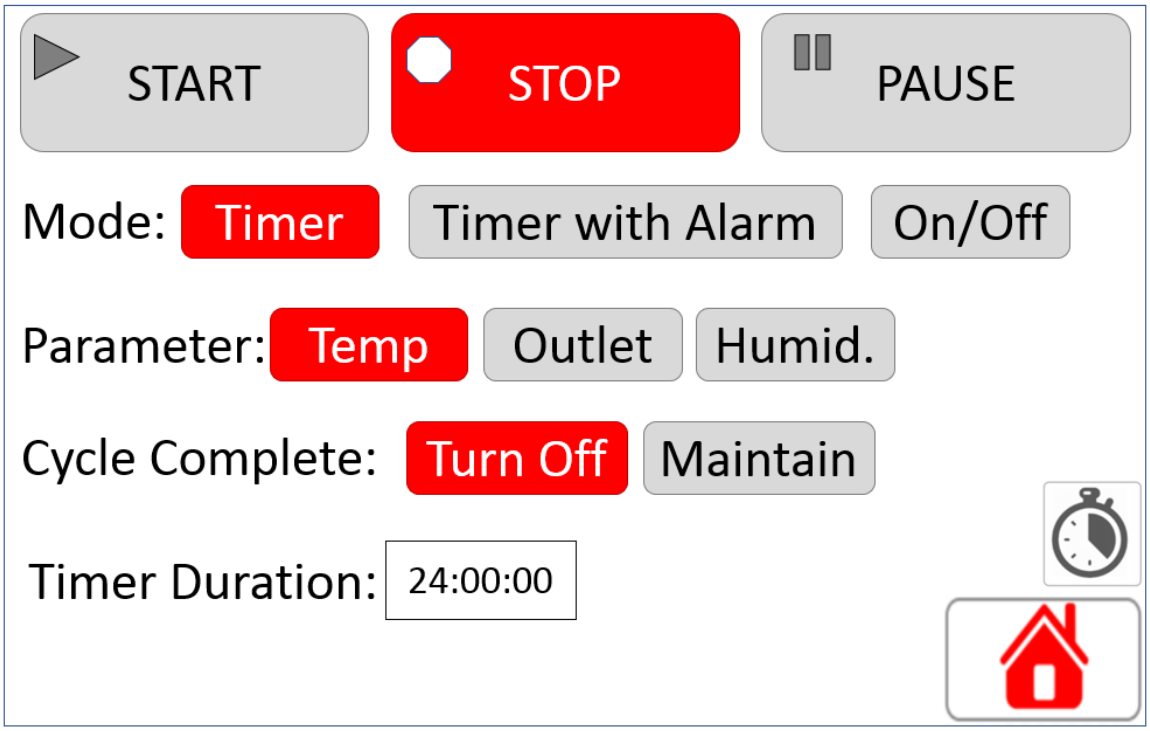
The “Temperature +/- °C” adjustment is used to set how far the chamber temperature can deviate from setpoint before alarming.

The “Humidity Upper %” adjustment is used to set how high the relative humidity level in the chamber can be before alarming. The alarm will sound when the level meets or exceeds the value shown.

The “Humidity Lower %” adjustment is used to set how low the relative humidity level in the chamber can be before alarming. The alarm will sound when the level meets or drops below the value shown.

The “Door” alarm will trigger, when active, after the door has been open for two minutes.

3.4 Timer Set Screen



Once the parameters are selected the user touches START and the unit returns to the home screen and the program starts. If the User touches STOP or PAUSE the screen remains and the program stops or pauses. The user will have to touch the HOME button to return to the main screen. If the program is paused the PROGRAM BLOCK will say “Paused”. If the program is stopped the main screen will returned to the default home screen.

Timer Mode – The unit displays a countdown timer when activated

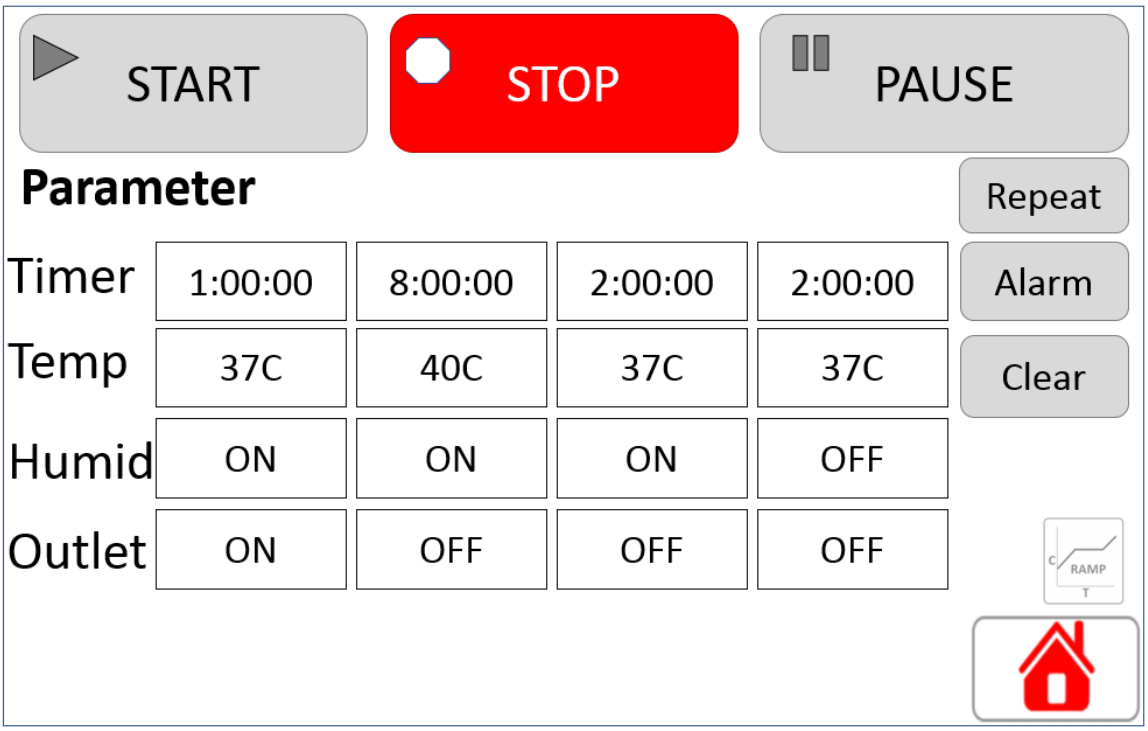
Timer With Alarm – The unit Alarms when the timed cycle is complete.

ON/OFF – will control based on Time of Day (entered in military time) or Duration. All other parameters will be controlled by the setting entered on the Home Screen.

Parameter – selects what parameters are being controlled by the timer. Multiple parameters can be selected.

Cycle Complete – Turns off Control or Maintains the current setpoint when the timer is complete

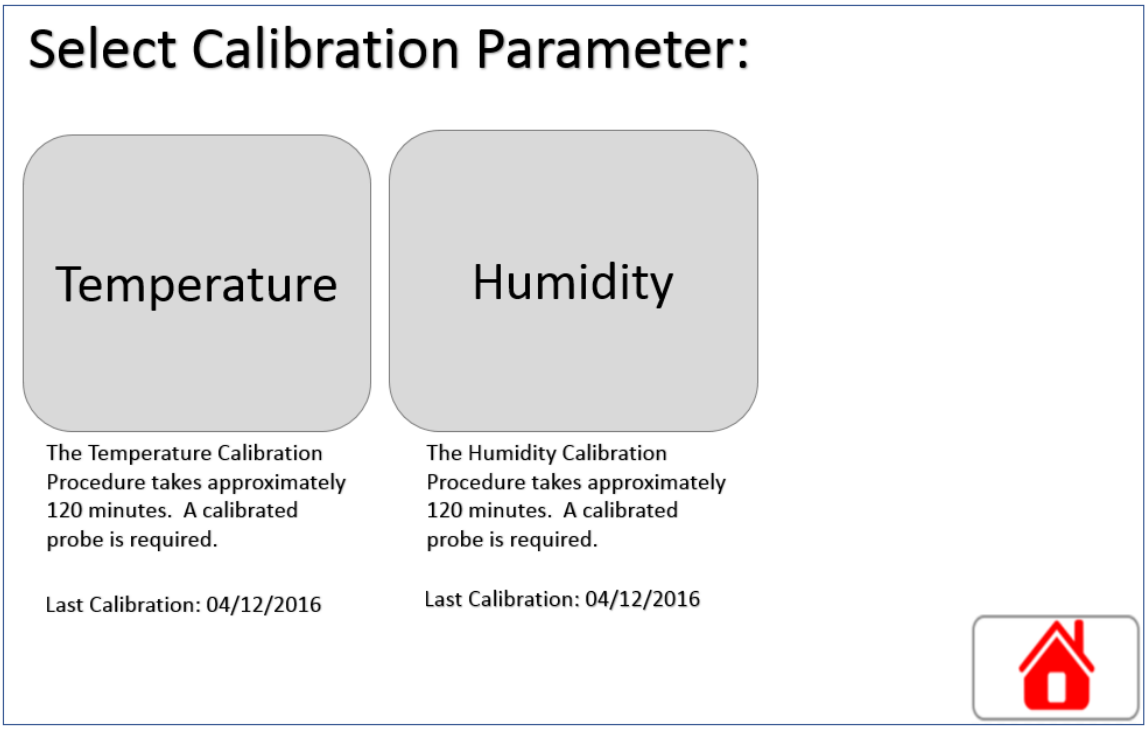
3.5 Ramp Set Screen



The Ramp Set Screen can be used to specify multi-step ramp profiles, controlling temperature and outlet conditions over specified time periods.

The Repeat button can be used to repeat the profile indefinitely upon completion. The Alarm button can be used to trigger an alarm upon completion. The Clear button clears the parameters on the Ramp Set Screen.

3.6 Calibration Screen



The Calibration Screen can be used to calibrate temperature and humidity readings via user-supplied, calibrated probes. Both calibration routines are two-point calibrations that prompt the user to enter readings from the external, calibrated probes after meeting the process requirements.

Enter either calibration mode and follow the on-screen prompts to complete the routine. Calibration frequency is determined by the user's requirements but should be done annually at a minimum.

4. Network Connection

The refrigerated incubator is supplied with the hardware and software required for integration into a building or hospital management system.

Protocol Available:
MODBUS TCP/IP via Ethernet RJ45

The Refrigerated Incubator has an ethernet port that can be connected to a network and accessed from a single connection via its IP address through MODBUS TCP/IP protocol. The Incubator operates as a stand-alone piece of equipment. Network connections are only used to indicate status of the key read only parameters described below. The Incubator supports both static and dynamic IP addressing which can be set up by entering the ethernet settings menu on the controller's touchscreen.

MODBUS TCP/IP is a variant of the MODBUS family of simple, vendor-neutral communication protocols intended for supervision and control of automation equipment. Specifically, it covers the use of MODBUS messaging in an 'Intranet' or 'Internet' environment using the TCP/IP protocols.

The Incubator will only accept requests for function codes 02 and 04. If sent any other request it will return 01 - Illegal Function Exception. If a function code 02 and 04 request is sent that is outside the address range that the incubator is expecting, it will return 02 Illegal Data Address Exception.

For further technical detail on communication protocol, please refer to vendor document, "Refrigerated and CO2 Incubator Communication Protocol."

Discrete Inputs (Read Only)

Block Index	Name	Description	Size (bits)
1	IN1	Power Signal	1
2	IN2	Alarm Signal	1
3	OUT1	Alarm Relay	1
4	OUT2	Fan Motor	1
5	OUT4	Door Open	1
6	OUT5	Outlet On	1
7	OUT6	Heater On	1
8	OUT7	Cooling On	1
9			
10			
11			
12			
13			

14		
15		
16		Reserved for future use
…		
65535		Reserved for future use

Inputs (Read Only)

Block Index	Name	Description	Size (Bytes)
1	Firmware Version	Firmware Version (ASCII)	6
2	TempSet	Temperature Setpoint	2
3	Temp	Temperature	2
4			2
5			2
4	Humidity	Humidity	2
5	Date	Date	2
6	Time	Time	2
8	Alarm Code	Alarm Condition Error code	2
12		Reserved for future use	
…			
65535		Reserved for future use	

5. Specifications & Operating Conditions

Refrigerated incubator:	Model 165000 and 165000-2
Electrical:	165000: 115VAC, 50/60 Hz, 6A, 460 Watts 165000-2: 230VAC, 50/60 Hz, 3A, 460 Watts
Internal Electrical Outlet Specifications for Aux Equipment:	165000: 115V, 60 Hz, 1A (Max.) 165000-2: 230V, 50 Hz, 0.5A (Max.)
Temperature Range:	(Ambient - 15°C) to 60°C
Temperature Control Method:	Thermoelectric Cooling and Resistive Heating
Ambient Temperature Range:	15°C – 28°C Ambient
Temperature Accuracy:	±0.25°C at 37°C
Connectivity:	USB and Ethernet
Product Dimensions: W x D x H	25.75” W x 27.5” D x 27.75” H
Interior Dimensions:	20” W x 18.25” D x 17.5” H
Weight:	105 pounds net
Transport and Storage Temperature Range:	10°C – 50°C
Humidity (operation, transport, or storage):	25-90% (non-condensing)
Altitude:	0 - 2,000 m above sea level

7. Maintenance and Service

7.1. Cleaning

Before using any cleaning or decontamination method, users should verify that the method of cleaning will not damage the unit.

1. Turn power switch to the off (O) position.
2. Remove mains power supply cord.
3. Clean interior and exterior of unit with a mild detergent and cloth dampened with water.

7.2. Calibration

1. Refer to section 3.6 for performing temperature calibration.

7.3. Replacement of Fuses

To change the main incubator fuses:

1. Turn power switch to the off (O) position.
2. Disconnect the unit from the power supply.
3. Remove the line cord from the power entry module on the back of the unit.
4. Pull back on the fuse drawer catch (located on top of power entry module).
5. Pull out the fuse drawer.
6. Check and replace with the correct fuses if necessary. The fuses must be 5mm x 20mm, fast acting, rated at 6A 250V.
7. Push the drawer back in and reconnect the unit to the power supply.

To change the chamber fuse:

1. Turn the incubator power switch to the off (O) position.
2. Disconnect the unit from the power supply.
3. Remove the line cord from the power entry module on the back of the incubator unit.
4. Unscrew the fuse holder, located on the right wall, above the ethernet jack..
5. Check and replace with the correct fuses if necessary. The fuses must be 5x20mm, 1A, 250V fast-acting for 165000, and 5x20mm, 0.5A, 250V fast-acting for 165000-2.
6. Screw the cap back on and reconnect the unit to the power supply.

8. Troubleshooting

Symptoms	Possible Cause	Corrective Action
Power		
The unit does not power on.	• Power cord not connected to Electrical receptacle on Unit, and/or Wall outlet • Power supply failure • A fuse has blown • Malfunctioning Power Key • Malfunctioning Control System	• Fit the power line cord into the IEC power socket on the rear of the unit and verify if plugged into a properly grounded outlet • Verify that power source is active and regulated • Replace fuse • Contact Boekel Scientific for Service • Contact Boekel Scientific for Service
Temperature Control		
The temperature does not stabilize	• Not enough clearance around incubator • Faulty Temperature Sensor • Confirm Ambient Temperature is within the recommended range	• Confirm there is 4 inches of clearance around the incubator • Contact Boekel Scientific for Service
The displayed temperature does not match a calibrated temperature measuring device	• Unit is in need of calibration • Faulty Temperature Sensor	• Refer to Calibration Section • Contact Boekel Scientific for Service
Alarm Failure		
Audible alarm does not sound	• Alarm/notification does not generate an audible alarm • Buzzer volume has been turned off • Faulty piezo buzzer	• Check Alarms section of this document to ensure the alarm is supposed to be audible for the particular event • Turn on the alarm volume through the settings menu • Contact Boekel Scientific for Service

9. Warranty and Service

9.1. Warranty

When used in the appropriate laboratory conditions and in accordance with these operating instructions, Boekel Scientific warrants this product to be free of defective parts, material and workmanship for a period of two years from the date of shipment. The liability of Boekel Scientific for any defective equipment during the warranty period shall be limited to the repair of defective equipment or replacement thereof without charge for parts or labor.

9.2. Service

A Boekel Scientific Returned Material Authorization (RMA) number provided by Boekel Scientific is required before any Boekel products are returned for any reason. Contact Boekel Customer Service at 1-800-336-6929. A Decontamination Certificate must be completed, signed by the user, and returned to Boekel Scientific prior to receiving the RMA number. Please be sure to mark the outside of the returned goods package with this RMA number to ensure prompt handling.

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