DOD Technologies

EC20x

Electrochemical Gas Detector Cabinet
Operating Manual

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Chapter 1 – Overview

1.1 Introduction

DOD Technologies' EC20x Gas Detector Cabinet is designed to house a series of single-point electrochemical gas detectors – see specifications for compatibility. While creating a centralized hub, the EC20x is fully customizable from the factory. This transforms a seemingly ordinary cabinet into a robust toxic gas monitoring system (TGMS) with improved transport time and extractive detection from distances up to 600 feet.

1.2 Theory of Operation

The EC20x simply requires AC power (110VAC or 230VAC – pump dependent), sample tubing - 1/4" OD x 3/16" ID FEP Teflon (up to 20 points) and exhaust tubing – 3/8" OD x ¼" ID x 25' maximum (two required and provided with your system).
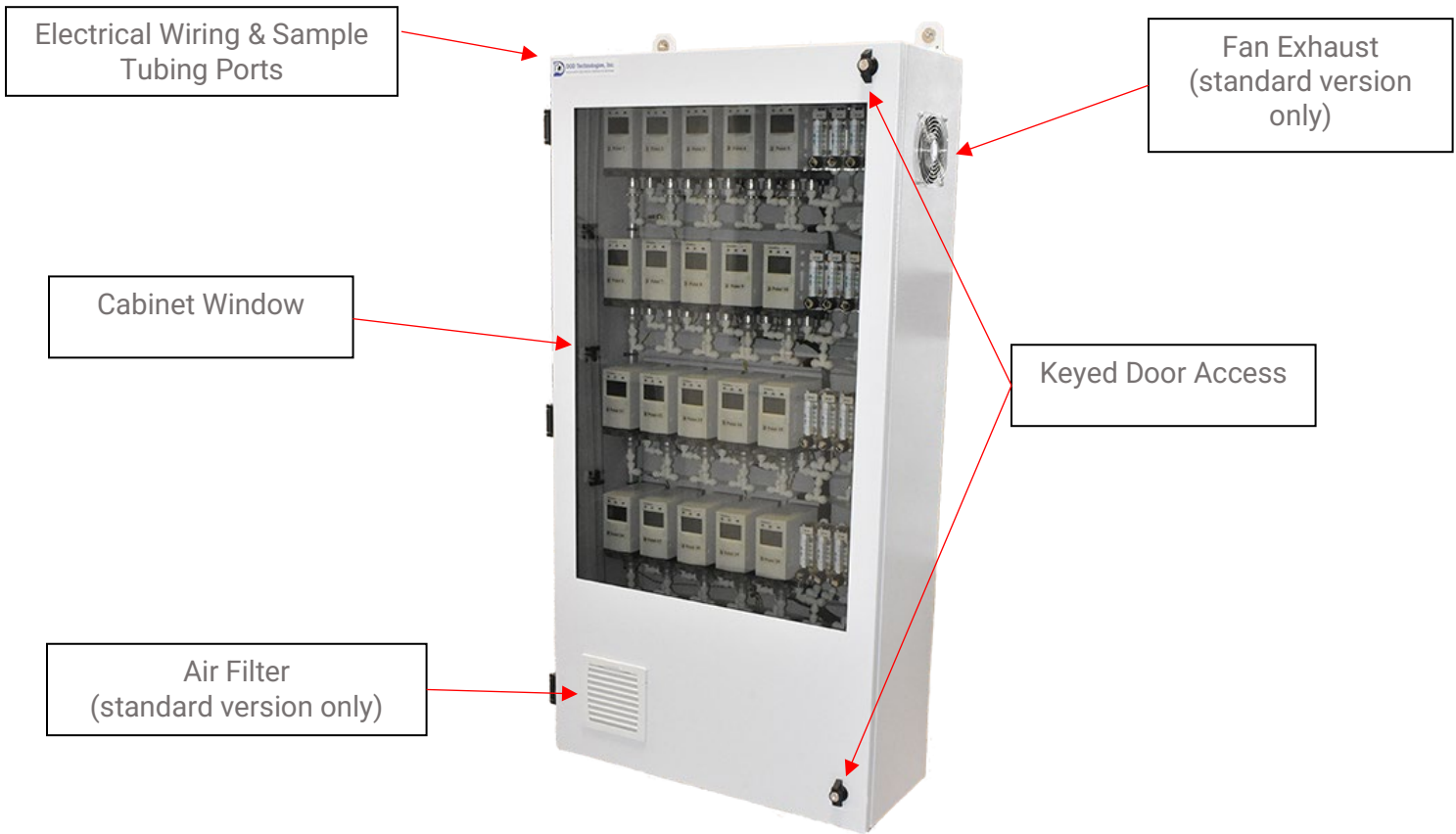
The cabinet comes standard with (4) pumps total (one for points 1-10, one for points 11-20, and one backup pump for each in case of a pump failure). If the instrument detects a pump failure, the backup pump switches automatically and notifies the user of the problem via a Form C (NO, NC, COM) output relay (one output relay for each primary pump). The EC20x also has a redundant power supply in case of failure and (2) Form C relays to notify the user in the event of a failure.

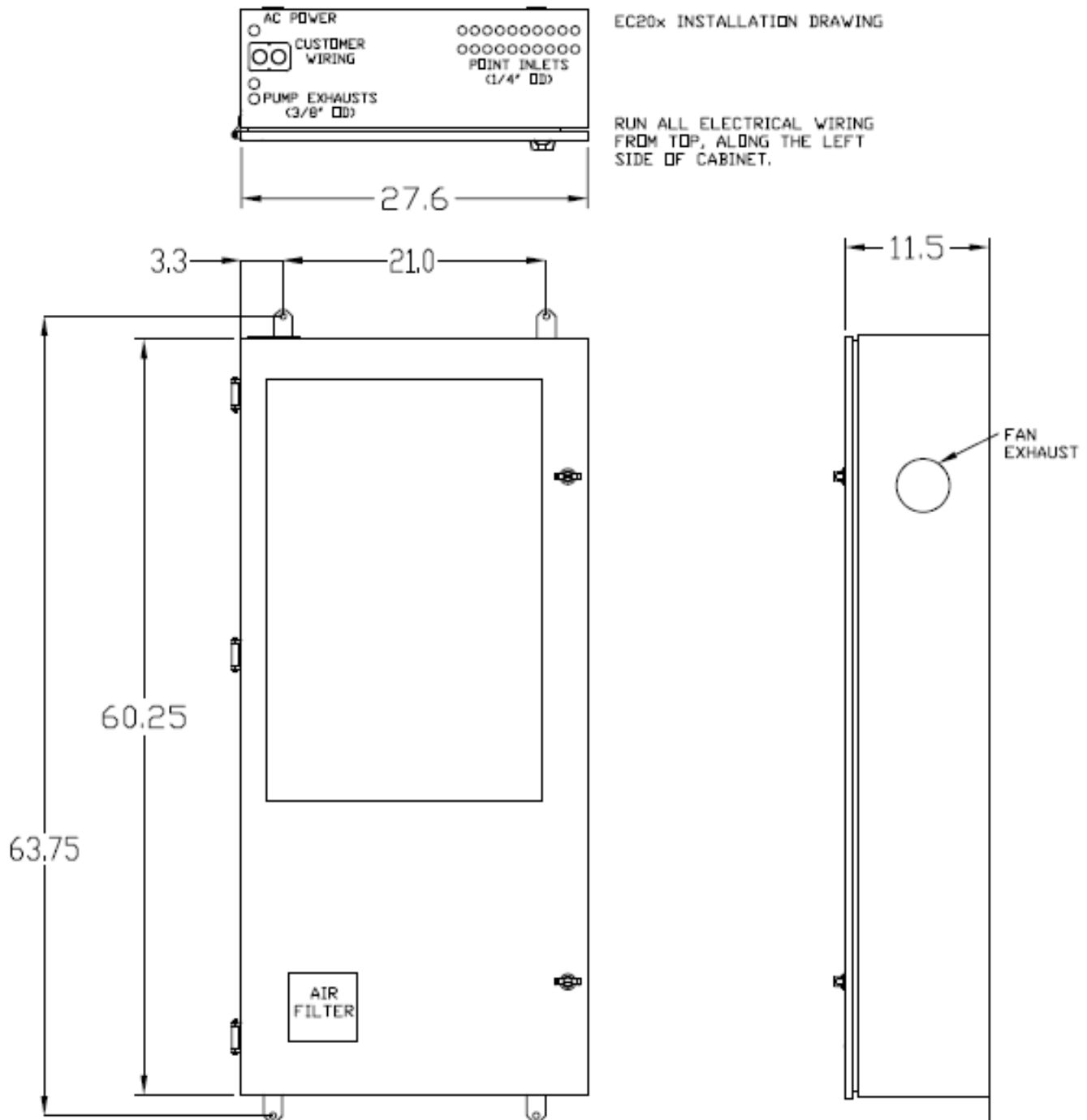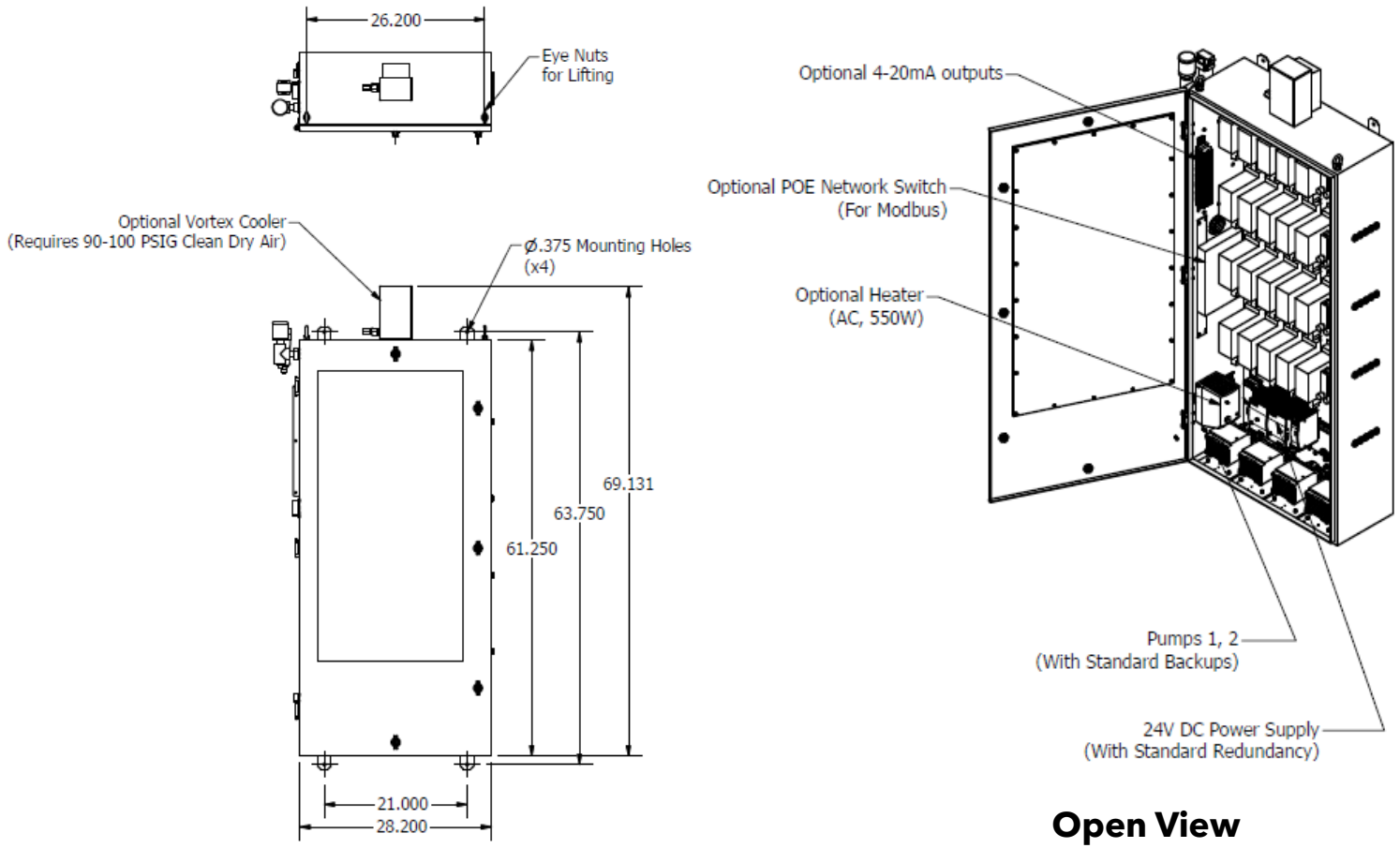|	WARNING : If the system is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Chapter 2 – Features
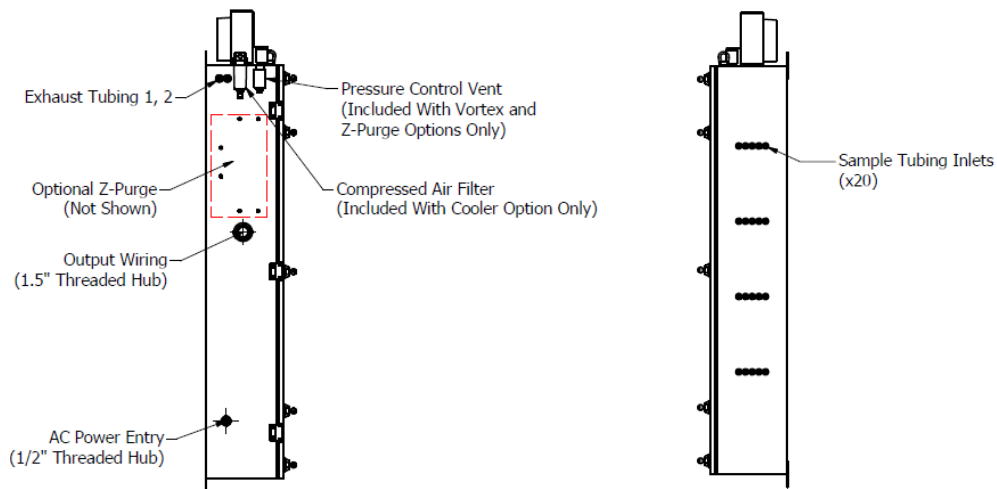
2.1 External Layout

Electrical Wiring & Sample Tubing Ports

Fan Exhaust (standard version only)

Cabinet Window

Keyed Door Access

Air Filter (standard version only)

2.2 External Dimensions

Standard Version

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NEMA 4X Indoor/Outdoor Version

Top & Front Views

Open View

Side Views

2.3 Wiring Diagrams

EC20X WIRING.dwg

PAGE 3 OF 6 (OPTION 2-900-104-1 OR 2-910-002-420)

PRIMARY PUMP 3 PTI1-20

PRIMARY PUMP 1 PTI-10

BACKUP PUMP 2 PTI-10

BACKUP PUMP 4 PTI1-20

INTERNAL VAC 5V 2-300-128

9-200-349 TIME DELAY RELAY
FUNCTION SETTING = J - HOLD/ON LATCH

HARD WIRE
2-200-177 uses
5A TIME DELAY
1/4 x 1-1/4 FUSE
9-200-266
NOTE: PAINT GND SCREW GREEN
Start-up AC current: 2.1 Amps
Steady AC current: 1.3 Amps

AC IN / AC OUT   N L G

9-200-156 DIN FUSEHOLDER

2-200-103 24VDC   N L G

2-200-330 REDUNDANCY 24VDC

2-200-103 24VDC   N L G

FAN 2-200-059

PUMP3 FAIL 2-300-048
PUMP1 FAIL 2-300-048
PS2 FAIL 2-300-002
PS1 FAIL 2-300-002

NOTE #
EL1008

PS7 OR GTD5000 (multiple)

CUSTOMER CONNECTION

2-200-327 C6015 Computer
LAN2 X103
LAN1 X102
X1 IN
EK1101
EL3014 (multiple)
EL1008
EL6652 ETHERNET IP

ETHERNET IP OPTION 2-910-004

SEE NOTE 2

CUSTOMER CONNECTION

SEE NOTE 3 FOR ID SETTINGS

NOTE 1: IF FACTORY INSTALLATION FOR LOWER OR UPPER PANEL JDE'S DOES NOT HAVE DETECTOR(S) INSTALLED THE CORRESPONDING PANEL THE PUMPS ARE DISCONNECTED AND THE TIME DELAY RELAY SETTING IS CHANGED TO 'ON', PERFORMING THESE STEPS ARE REQUIRED TO PREVENT A FALSE TRIP OF THE PUMP FAIL.

SERVICE NOTE: FIELD UPDATE INSTALL TO ADD DETECTORS TO PANEL (FACTORY INSTALL HAD NO DETECTORS) REQUIRES SERVICE PERSON TO RECONNECT DISCONNECTED PUMPS AND TO SET THE TIME DELAY RELAY (2-200-349) 'TIME RANGE SETTING' TO 'J' SETTING, PERFORMING THIS ACTION WILL RE-ENABLE THE PUMP FAIL RELAY.

NOTE 3: ID ROTARY SWITCHES STANDARD X256 '1', X16 '8', X1 '1', USE SETTINGS X256 '1', X16 '9', X1 '7' IF OPTION 2-910-004 INSTALLED

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EC20X WIRING.dwg   PAGE 4 OF 6 (OPTION EC20X CENTRALIZED 4-20mA WIRING 2-910-003)

CUSTOMER
WIRING
CONNECTIONS
ENCLOSURE
TERMINAL BLOCKS
INTERIOR LEFT-SIDE

+G   GAS CONCENTRATION OUTPUT.
-H   (4-20MADC)

ANALOG OUTPUT
4-20MADC

+G
-H

CONTROL

EC20X WIRING.dwg   PAGE 5 OF 6 (PS-7-01ER ALARM CONTACTS OPTION 2-910-104)

CUSTOMER
WIRING
CONNECTIONS
ENCLOSURE
TERMINAL BLOCKS
INTERIOR LEFT-SIDE

ZA1 1ST STAGE GAS ALARM OUTPUT.
MAX LOAD 125VAC OR 30VDC 0.5A (RESISTIVE LOAD)
ZA2 1ST STAGE GAS ALARM OUTPUT.
MAX LOAD 125VAC OR 30VDC 0.5A (RESISTIVE LOAD)
ZC COMMON FOR ZA1 AND ZA2

NOTE: The PS-7-01ER is specific for how the contacts of
the test head are acutuated. Detector Head with normally
Closed ENERGIZED relays.

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Chapter 3 – Maintenance Alarms

Maintenance alarms are intended for the user to indicate a pump or power supply has failed. However, the system will continue to operate utilizing the redundant/backup unit. While the system will continue to operate, maintenance is recommended as soon as possible to maintain operation with a backup unit in place.

3.1 Vacuum Pumps with Form C Relays

The EC20x utilizes primary and redundant vacuum pumps with Form C Relays:
- Pump 1 primary for points 1-10
- Pump 2 *redundant* for points 1-10
- Pump 3 primary for points 11-20
- Pump 4 *redundant* for points 11-20
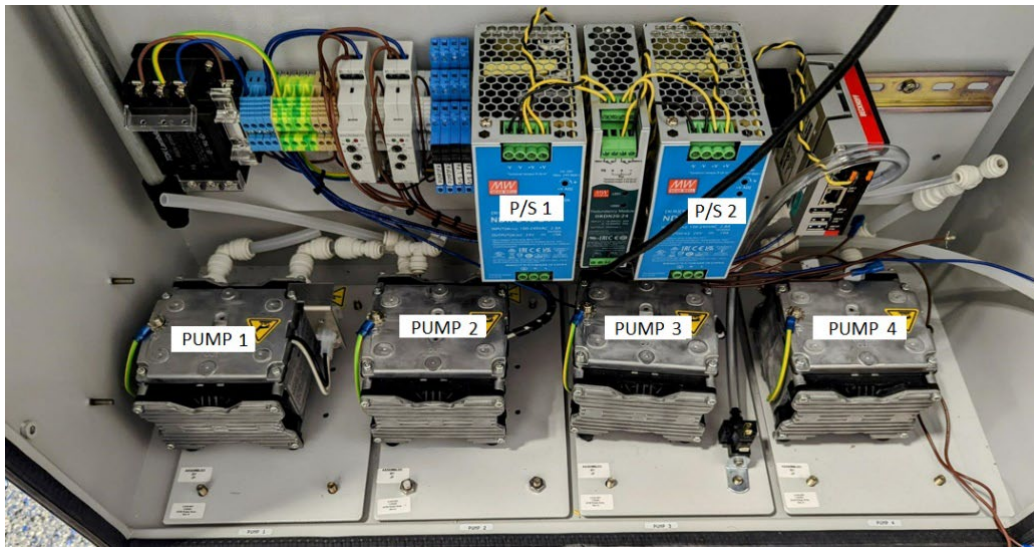
Figure 3.1 – EC20x control DIN rail view

Figure 3.1.1 – View of Form C Relays for maintenance alarms

3.2 Normal Operation of Form C Relays for Maintenance Alarms

3.2.1 Vacuum Pump PUMP1FAIL Form C Relay

The Form C relay LED indicator is OFF under **normal operation**. Meaning the main vacuum pump is running the system. The relay is under the NC (normally closed contact position). Also note the Latching relay PUMP 1 RED LED is ON.
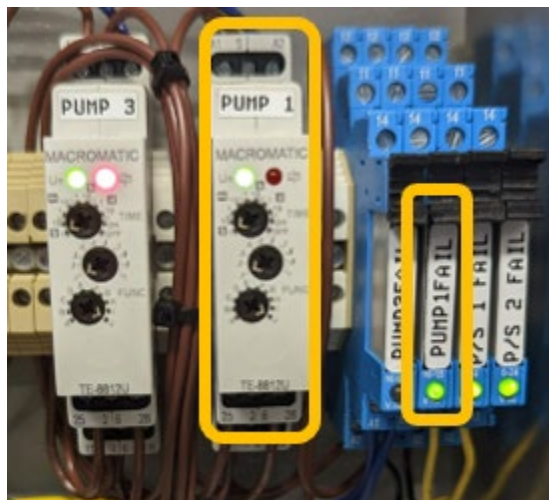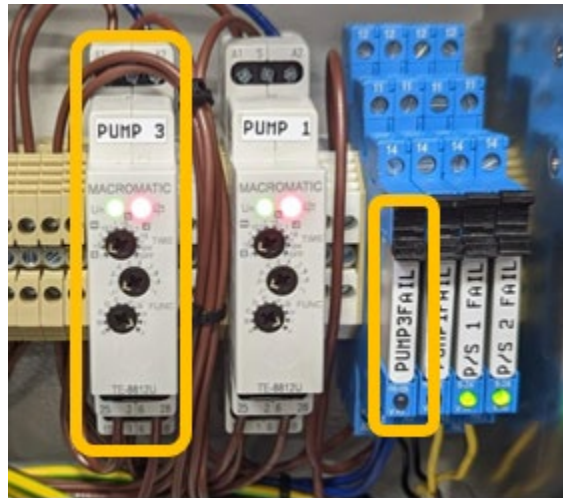

Figure 3.2.1

If the system is running with the **Redundant/Backup** pump the Form C relay LED indicator is ON under the maintenance alarm condition. Meaning the Redundant/Backup pump is running the system. The relay is under the NO (normally open contact position). Also note the Latching relay PUMP 1 RED LED is OFF.

Figure 3.2.1.1

3.2.2 Vacuum Pump PUMP3FAIL Form C Relay

The Form C Relay LED indicator is OFF under **normal operation**. This indicates the primary vacuum pump is running the system. The relay is under the NC (normally closed contact position). Also note the Latching relay PUMP 3 RED LED is ON.

Figure 3.2.2

If the system is running with the Redundant/Backup pump the Form C Relay LED indicator is ON under the maintenance alarm condition. This indicates the Redundant/Backup pump is running the system. The relay is under the NO (normally open contact position). Also note the Latching relay PUMP 1 RED LED is OFF.

Figure 3.2.2.1

3.2.3 Power Supply Maintenance Alarm P/S 1 FAIL

The Form C Relay LED indicator is ON under **normal operation**. This indicates the main power supply is running the system. The relay is under the NO (normally open contact position). Also note the redundancy module LED1 and P/S 1 DC OK green LEDs are ON.

Figure 3.2.3

If the system is running with the **Redundant/Backup** pump the Form C Relay LED indicator is OFF under the maintenance alarm condition. This indicates the main power supply is running the system. The relay is under the NC (normally closed contact position). Also note the redundancy module LED1 and P/S 1 DC OK green LEDs are OFF.

Figure 3.2.3.1

3.2.4 Power Supply Maintenance Alarm P/S 2 FAIL

The Form C Relay LED indicator is ON under **normal operation**. This indicates the main power supply is running the system. The relay is under the NO (normally open contact position). Also note the redundancy module LED2 and P/S 2 DC OK green LEDs are ON.

Figure 3.2.4

If the system is running with the **Redundant/Backup** pump the Form C relay LED indicator is OFF under the maintenance alarm condition. Meaning the main power supply is running the system. The relay is under the NC (normally closed contact position). Also note the redundancy module LED2 and P/S 2 DC OK green LEDs are OFF.

Figure 3.2.4.1

3.3 4-20mA EC20x Centralized Option (2-910-003)

When this option is installed, each extractive gas detector unit has the 4-20mA pre-wired to terminal blocks. Those pre-wired to terminal blocks are numbered according to the point.
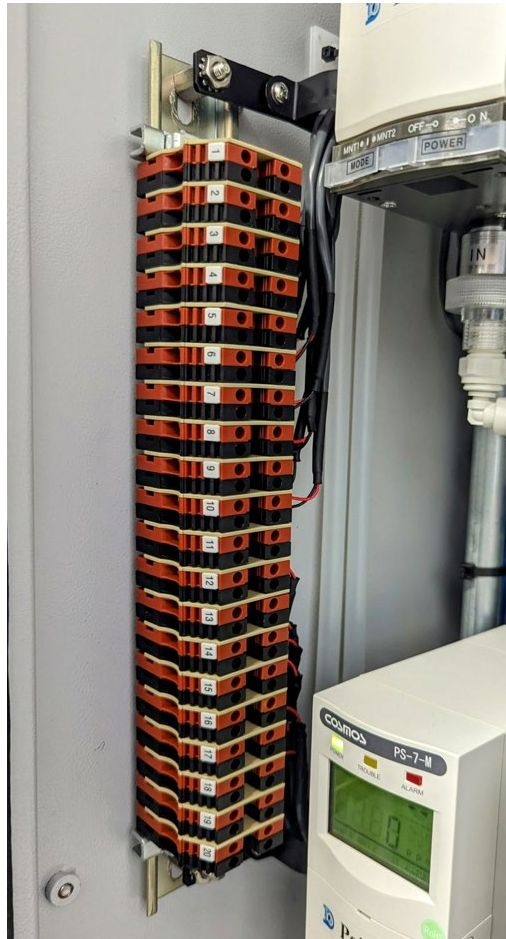
Figure 3.3

Chapter 4 – EC20x Modbus Interface Option for Cosmos PS-7-M

Optional Modbus communication protocol for New Cosmos PS-7-M units provide a remote means to monitor the entire system. * *Please contact us for info regarding other compatible gas detector units.*

4.1 EC20x Modbus Interface (Option 2-910-002)

Address plate

With address plate removed
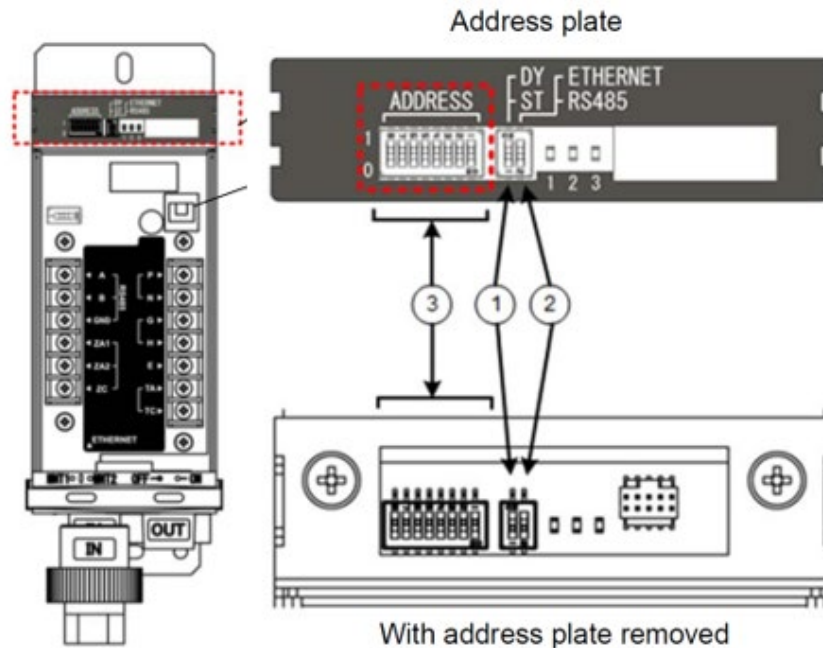
DIP Switches

Item	Component	Description/function
1	IP address type switch	Switches the IP address type between "DY" and "ST". DY: Dynamic IP address (DHCP) ST: Static IP address
2	Mode change switch	Switches the communication mode between "ETHERNET" and "RS485". ETHERNET: Modbus TCP (Ethernet) RS485: Modbus RTU (RS-485)
3	Address setting switches (8 places)	Sets the address (unit ID) for this product. Settable range: 1 (0000 0001) to 254 (1111 1110). The unit ID set here will also serve as the 4th value of the IP address when Modbus TCP (Ethernet) is selected with the mode change switch.*

* If the 4th value is set to 0 (0000 0000) with the address setting switches, it will be superseded by the value set by a web browser

NOTE: The DIP switches are accessible when the address plate is removed. To remove the address plate, refer to 7-1. "Operation Procedure" of the PS-7-M series gas detector's instruction manual.

4.2 DIP Switch Setup

MODE DIP SWITCH: Set Far right dip switched as follows below, Left switch off, and Right switch ON.

Set the IP address type: "DY" or "ST" Select the IP address type between "Dynamic" and "Static" by using the IP address type switch. When "Dynamic" is selected, IP address will be automatically assigned to the detector. The setting here is active when the "ETHERNET (Modbus TCP)" is selected with the mode change switch.
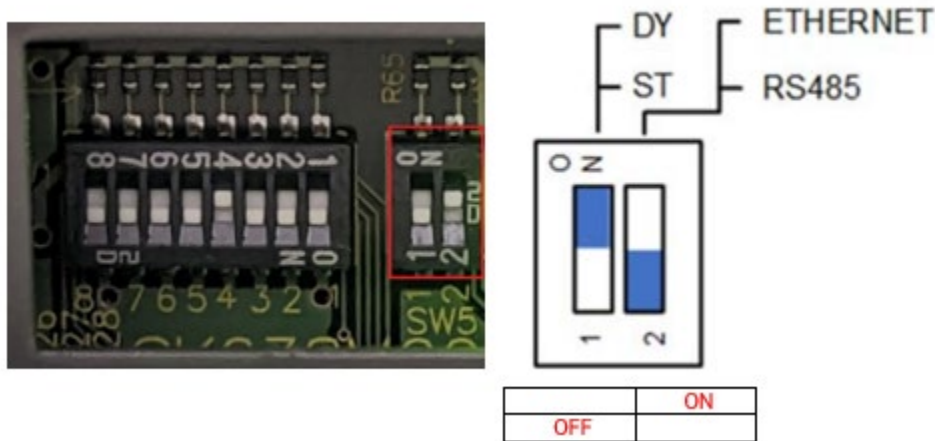
The EC-20x Cosmos PS-7-M is to be set to ST (Static IP address) and ETHERNET as shown in the images and table above. Further details contained in the PS-7-M Communications Specifications Guide.
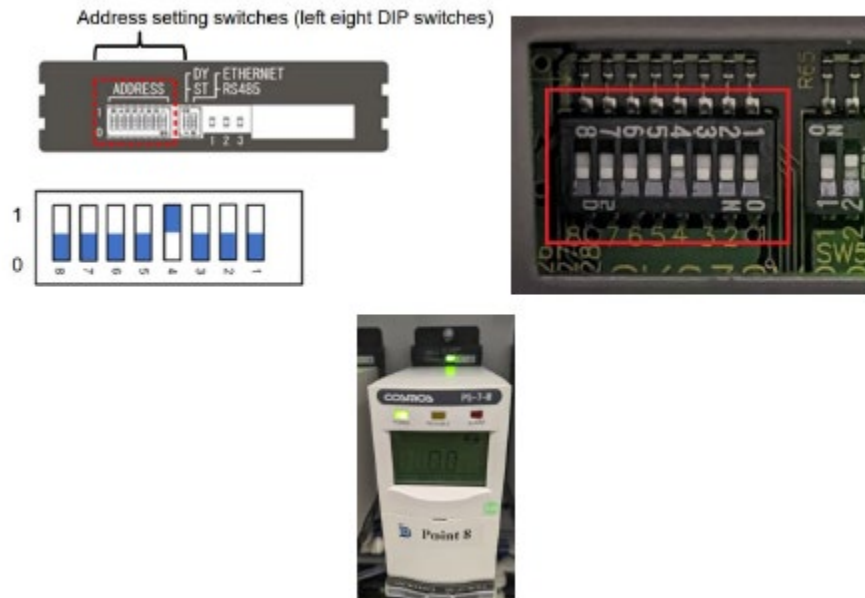
Example above is for point 8 (Binary 1000).

Set the address by sliding the eight address setting switches to the "1" or "0" positions. The 8-digit number is an 8-bit binary number representing the address. The address settable range is 1 (0000 0001) to 254 (1111 1110). Further details contained in the PS-7-M Communications Specifications Guide.

Positions 1-8 Dip Switches should be set from right to left as they are defined in the table below.

Switch 8	Switch 7	Switch 6	Switch 5	Switch 4	Switch 3	Switch 2	Switch 1	Sensor Number
OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	2
OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	3
OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	4
OFF	OFF	OFF	OFF	OFF	ON	OFF	ON	5
OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	6
OFF	OFF	OFF	OFF	OFF	ON	ON	ON	7
OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	8
OFF	OFF	OFF	OFF	ON	OFF	OFF	ON	9
OFF	OFF	OFF	OFF	ON	OFF	ON	OFF	10
OFF	OFF	OFF	OFF	ON	OFF	ON	ON	11
OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	12
OFF	OFF	OFF	OFF	ON	ON	OFF	ON	13
OFF	OFF	OFF	OFF	ON	ON	ON	OFF	14
OFF	OFF	OFF	OFF	ON	ON	ON	ON	15
OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	16
OFF	OFF	OFF	ON	OFF	OFF	OFF	ON	17
OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	18
OFF	OFF	OFF	ON	OFF	OFF	ON	ON	19
OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	20

4.3 Status LEDs

The status LEDs located on the base unit indicate the LAN cable and communication statuses.
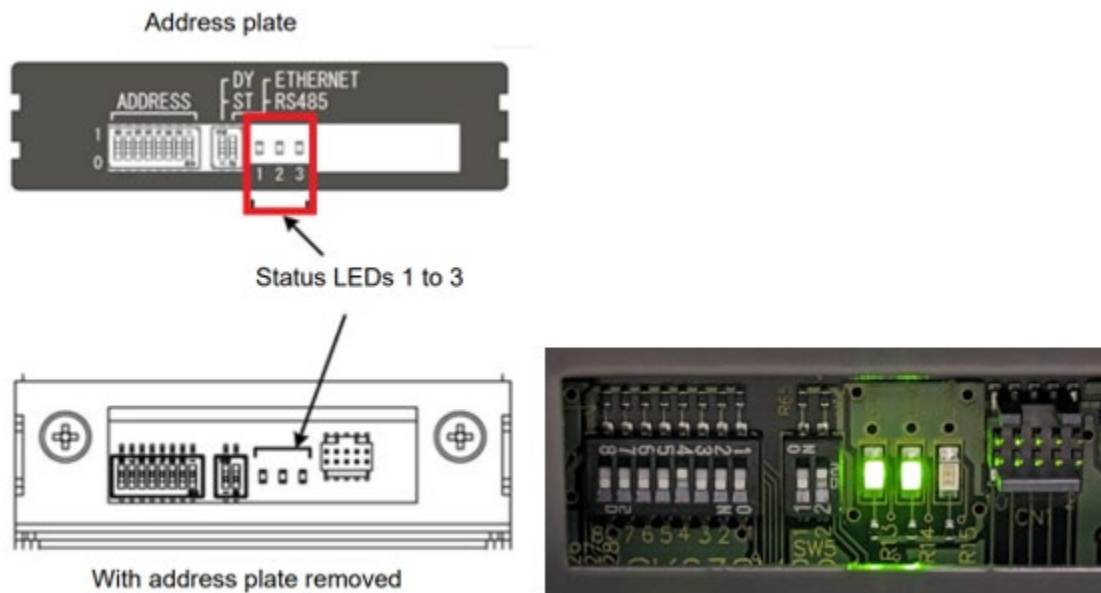
Component	LED No.	Description/function
Green Status LEDs	1	When lit, a LAN cable is securely connected to the RJ-45 jack and a switching hub
	2	When flashing, Ethernet or RS-485 communication is in progress
	3	Communication status between the base unit and main unit · When flashing, communication is normal (transmitting and receiving are in progress) · When steady, no response from the main unit (no receiving) · When not lit, no request from the base unit (no transmitting)

Chapter 5 – EC20x Modbus/TCP Operation

NOTE: The following section applies to EC20x software version 23.06xx and newer. Please contact DOD Technologies for instructions pertaining to earlier software versions.

1. Network access for MODBUS/TCP and Remote viewing on the EC20x is provided through LAN port 2 on the Beckhoff IPC inside the unit as shown below.
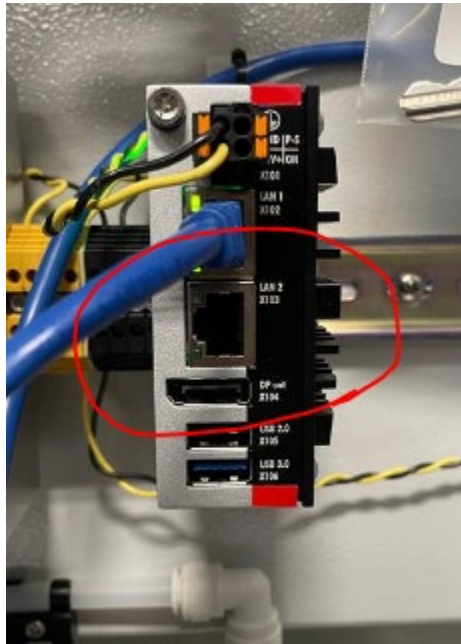
2. The default webserver IP address on port 2 is 192.168.16.215. For remote access to the IPC, download and install Tight-VNC. (Tight-VNC install https://www.tightvnc.com/download.php).

3. Using Tight-VNC connect to the default IP address above with a password of dod675.

4. Once the remote connection is established use these steps to change the IP address.

   a. Minimize or close the application.

   b. Click on Start->Control Panel

   c. Select 'Network and Sharing Center'

5. Once selected, change the adapter settings by selecting the adapter labeled 'Ethernet'
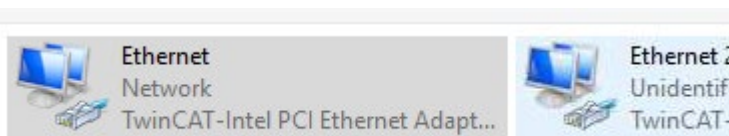
6. Select 'Properties' and IPv4
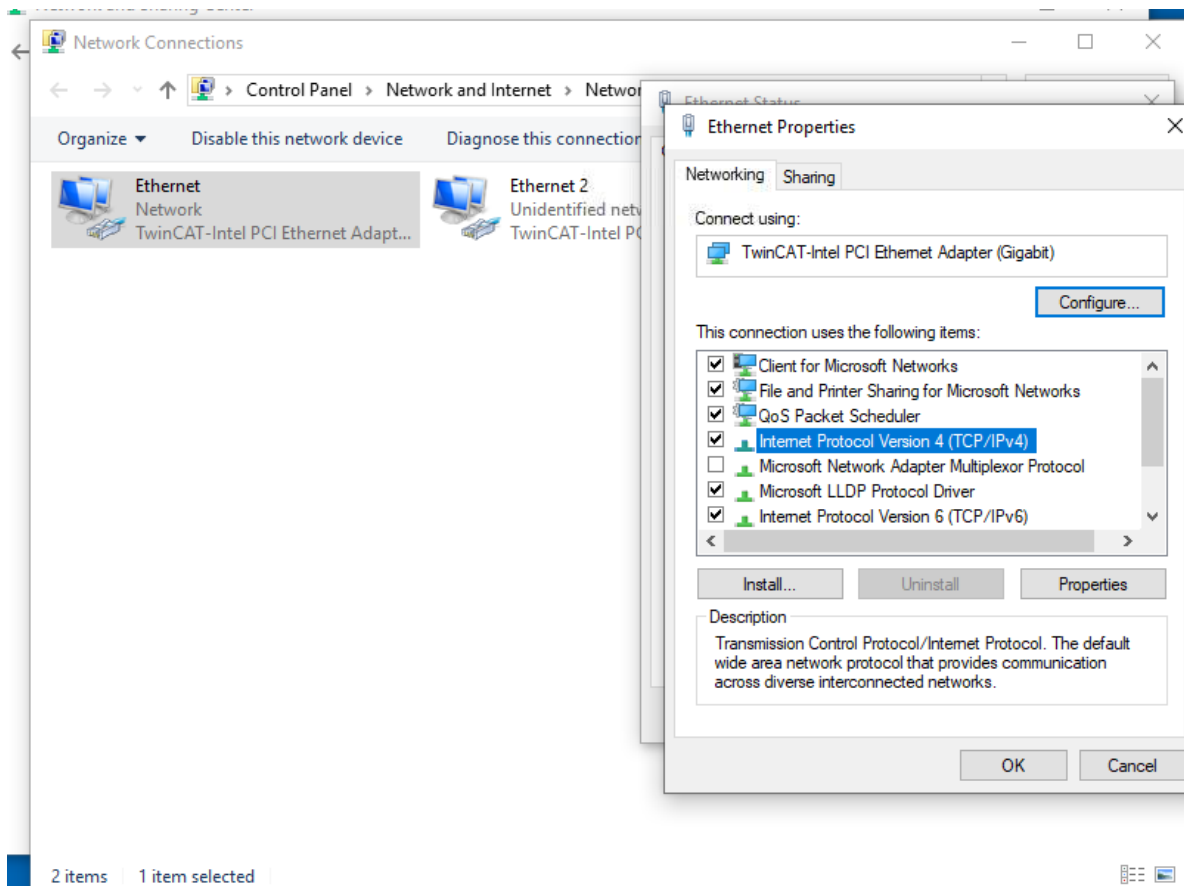
7. The IP can now be changed as desired by following the same process as performed on a standard windows computer.

8. Additionally, the IP address can be changed directly through the webserver by selecting 'Network'. Note, it is important to note the new IP address before submitting this change as this process will disconnect the existing webserver connection.
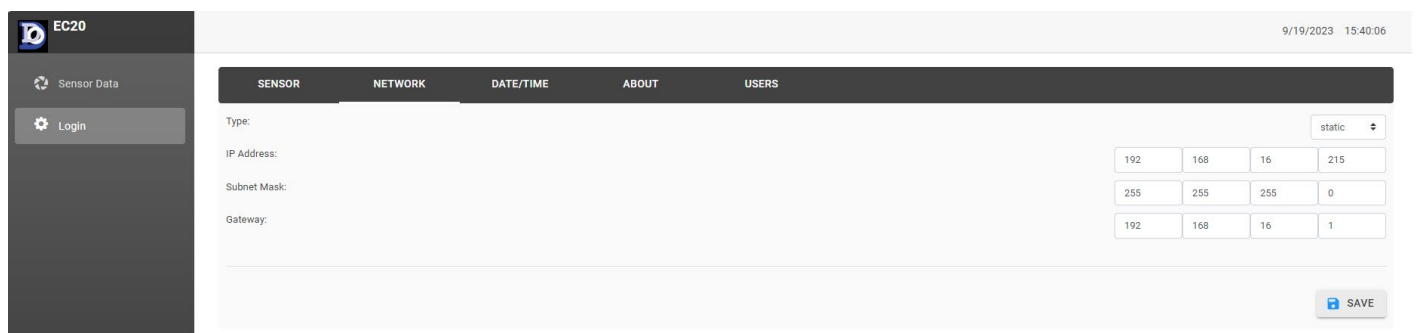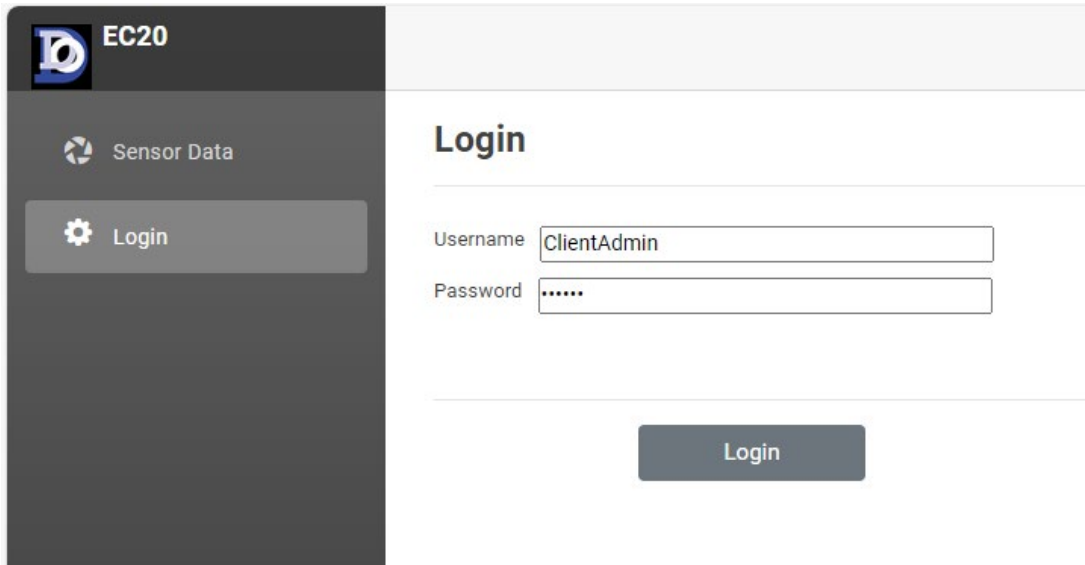
5.1 General Operation – Application Window

1. The EC20x now functions similarly to its predecessor, the EC20. The webserver display the data and there is no longer an application window.
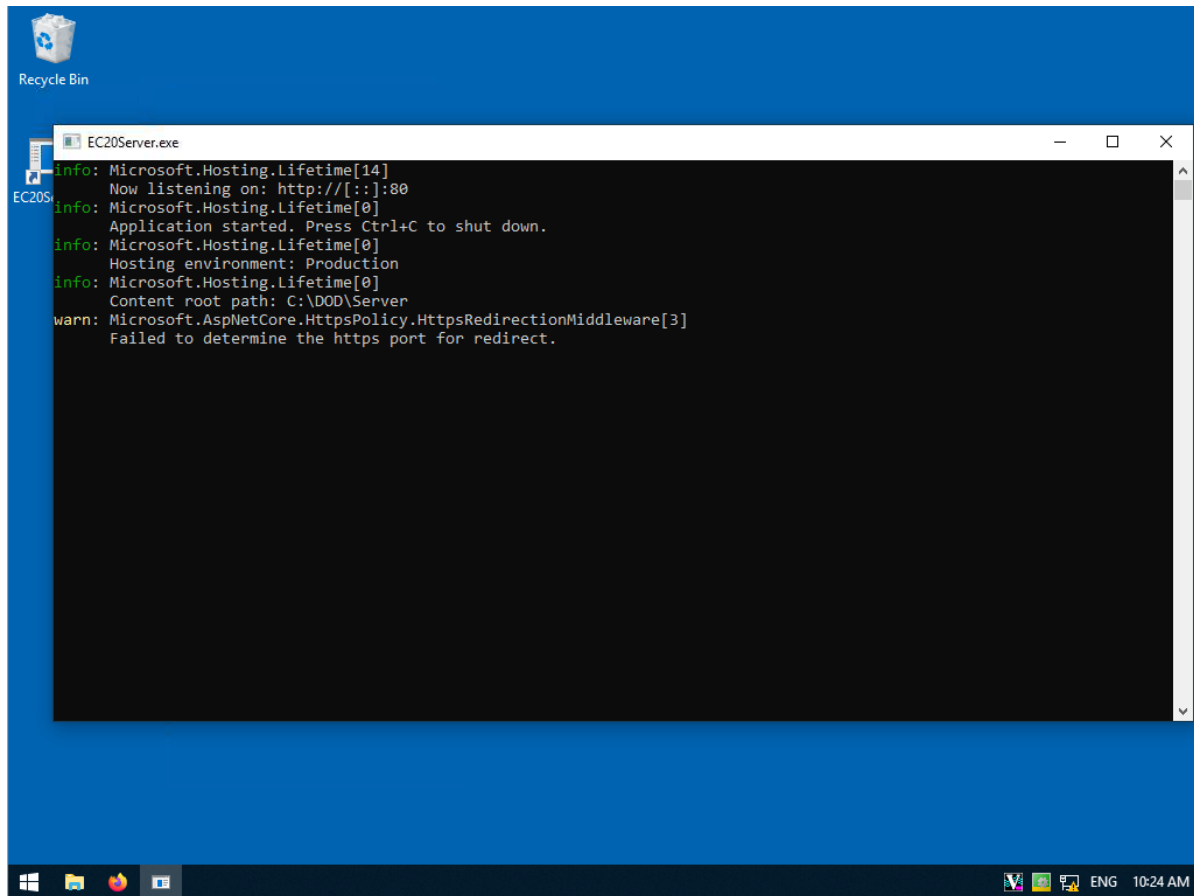
2. Using the webserver (Default IP 192.168.16.215) would generate a screen in likeness to the photo below.

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3. To log onto the webserver, begin by using the default username (ClientAdmin) and default password. We highly recommend changing this Username and Password following the initial log in by accessing it under the 'Users' menu. Contact DOD Technologies (see Section 6) if you require additional assistance accessing the software.

4. After logging in, under Configuration, select the 'Sensor' tab to select the sensor type, enable/disable each sensor, enable/disable Modbus communication for each sensor (it would need to be configured via dip switches to match the IP shown on this page), add a custom description, establish gas alarms and enable/disable Pyrolzers. The Configuration section also allows you to view/modify your network settings, set Date/Time and add/delete users.

SENSOR	NETWORK	DATE/TIME	ABOUT	USERS								
Sensor	Enabled	Modbus Option	Description	Type	Gas	Alarm1	Alarm2	IP Address	Signal(mA)	Zero(mA)	Span(mA)	Pyrolyzer
1	☑	☑		CDS-7BCL20 0-10ppm ⇕	Cl2	0	0	192.168.100.1	NA	NA	NA	☐
2	☑	☑		CDS-7BCL20 0-10ppm ⇕	Cl2	0	0	192.168.100.2	NA	NA	NA	☐
3	☑	☑		CDS-7BCL20 0-10ppm ⇕	Cl2	0	0	192.168.100.3	NA	NA	NA	☐
4	☑	☑		CDS-7BCL20 0-10ppm ⇕	Cl2	0	0	192.168.100.4	NA	NA	NA	☐
5	☑	☑		CDS-7BCL20 0-10ppm ⇕	Cl2	0	0	192.168.100.5	NA	NA	NA	☐
6	☑	☑		CDS-7BCL20 0-10ppm ⇕	Cl2	0	0	192.168.100.6	NA	NA	NA	☐
7	☑	☑		CDS-7BCL20 0-10ppm ⇕	Cl2	0	0	192.168.100.7	NA	NA	NA	☐
8	☑	☑		CDS-7-07GH06* 0-1ppm ⇕	GeH4	0	0	192.168.100.8	NA	NA	NA	☐
9	☑	☑		CDS-7-07GH06* 0-1ppm ⇕	GeH4	0	0	192.168.100.9	NA	NA	NA	☐
10	☑	☑		CDS-7BCL20 0-10ppm ⇕	Cl2	0	0	192.168.100.10	NA	NA	NA	☐
11	☑	☑		CHS-7-F2M40 0-5000ppm ⇕	CH3OH	0	0	192.168.100.11	NA	NA	NA	☐
12	☑	☑		CDS-7-07GH06* 0-1ppm ⇕	GeH4	0	0	192.168.100.12	NA	NA	NA	☐
13	☑	☑		CDS-7-07AH76 0-0.25ppm ⇕	AsH3	0	0	192.168.100.13	NA	NA	NA	☐
14	☑	☑		CDS-7-07SD30 0-5ppm ⇕	SO2	0	0	192.168.100.14	NA	NA	NA	☐
15	☑	☑		CDS-7-07SD26* 0-10ppm ⇕	SO2	0	0	192.168.100.15	NA	NA	NA	☐
16	☑	☑		CDS-7-07SD30 0-5ppm ⇕	SO2	0	0	192.168.100.16	NA	NA	NA	☐
17	☑	☑		CDS-7-7DNH56* 0-100ppm ⇕	NH3	0	0	192.168.100.17	NA	NA	NA	☐

SAVE

Chapter 6 – Service & Support

Contact DOD Technologies for product assistance and technical support:

Phone Support
M-F 8:30am – 5pm (Central Time Zone-U.S.A.)
815.788.5200

International Headquarters
675 Industrial Drive, Bldg. A.
Cary, IL 60013

Visit our website:
DODtec.com

For permanent discontinuation:
Discontinued units may be eligible for recycling. Please contact DOD Technologies for additional information and instructions for arranging safe return of your equipment.

Appendix A – EC20x Modbus TCP Server Settings

Default IP: 192.168.16.215
Default Subnet: 255.255.255.0
Default Gateway: 192.168.16.1

EC20 Address	# Words	Type	Read/Write	Data Description	Notes
40001	1	Word	Year		
40002	1	Word	Month		
40003	1	Word	Day		
40004	1	Word	Hour		Start time for Pass through all sensors
40005	1	Word	Minute		
40006	1	Word	Second		
40007	2	Float	PLC Version		
40009	2	Float	Webserver Version		
40011	1	Word	EC20 Status		See Table 1.2
…					

Note: Each sensor has twelve registers, Sensor 1 data starts at register 40099. Sensor 2 starts at 40111, Sensor 5 at 40147, etc.

EC20 Address	# Words	Type	Read/Write	Data Description	Notes
40099	2	Float	Read	Sensor 1 Concentration	
40101	2	Float	Read	Sensor 1 Alarm 1 Value	
40103	2	Float	Read	Sensor 1 Alarm 2 Value	
40105	1	Word	Read	Sensor 1 Status	See Table 1.1
40106	1	Word	Read	Sensor 1 Manufacturer	0:New Cosmos, 1 Gastron
40107	1	Word	Read	Sensor 1 Sensor Type	PS7:0 PS7-M:1(New Cosmos only)
40108	1	Word	Read	Sensor 1 Gas ID	(DOD Gas ID)
40109	1	Word	Read	Sensor 1 Range	(0-Fullscale)
40110	1	Word	Read	Sensor 1 Units	0:ppb, 1:ppm, 2:%LEL
40111	2	Float	Read	Sensor 2 Concentration	

EC20 Address	# Words	Type	Read/Write	Data Description	Notes
40113	2	Float	Read	Sensor 2 Alarm 1 Value	
40115	2	Float	Read	Sensor 2 Alarm 2 Value	
40117	1	Word	Read	Sensor 2 Status	See Table 1.1
40118	1	Word	Read	Sensor 2 Manufacturer	0:New Cosmos, 1 Gastron
40119	1	Word	Read	Sensor 2 Sensor Type	PS7:0 PS7-M:1(New Cosmos only)
40120	1	Word	Read	Sensor 2 Gas ID	(DOD Gas ID)
40121	1	Word	Read	Sensor 2 Range	(0-Fullscale) See Table 1.1
40122	1	Word	Read	Sensor 2 Units	0:ppb, 1:ppm, 2:%LEL
...					

Table 1.1

Bit	Description	State
0	Alarm 1	0:Normal 1: Active
1	Alarm 2	0:Normal 1: Active
2	Fault – EC Sensor signal not detected (0mA)	0:Normal 1: Active
3	Sensor enabled/disable	0:Disabled 1: Enabled
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Table 1.2

Bit	Description	State
0	Power supply 1 status	1:normal 0:Active
1	Power supply 2 status	1:normal 0:Active
2	Pump 1 status	1:normal 0:Active
3	Pump 2 status	1:normal 0:Active
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		