



# Introduction Manual

RELEASE R130.1



## PREFACE

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### General

The CIU 888 is Honeywell's next generation *Communication Interface Unit*. The CIU 888 is the crucial link between tank gauging instruments and control room systems. It provides operators with reliable and accurate real-time tank inventory data 24 hrs a day, 7 days a week.

### Purpose of this manual

The purpose of this manual is to provide an overview of the main features and functions of the CIU 888.

### Target audience of this manual

This manual is primarily intended for:

- Service technicians who are responsible for commissioning and configuring the CIU 888, diagnosing, troubleshooting, servicing, and maintaining the CIU 888
- IT managers who are responsible for implementing and maintaining the technology infrastructure of the company's network
- System integrators who are responsible for designing and verifying the customer's tank farm operations system in which the CIU 888 provides the tank inventory data
- System administrators who are responsible for management of the CIU 888 and the site network

### CIU 888 documentation suite

The CIU 888 documentation suite includes the following documents:

- Introduction Manual (Part No. 4417591)
- Installation Manual (Part No. 4417590)
- Configuration Manual (Part No. 4417584)
- Protocol Manual - Modbus Host Part No. 4417588)
- Protocol Manual - CIU Emulation Part No. 4417589)
- Sealing Guide (Part No. 4417595)
- System Administration Manual (Part No. 4417598)
- Security Manual (Part No. 4417597)
- Firmware Upgrade Manual (Part No. 4417596)
- Troubleshooting & Maintenance Guide (Part No. 4417594)
- Ensite Pro to CIU 888 Migration Manual (Part No. 4417593)

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## CHAPTER 1 INTRODUCTION

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### 1.1 Next generation CIU

Successor to the CIU 880 Prime and Plus, the CIU 888 is the crucial link between the gauging instruments on bulk liquid storage tanks and the control, monitoring and safety systems in the site control room. The CIU 888 provides operators with reliable and accurate real-time tank inventory data 24 hours a day, 7 days a week, increasing the site's effectiveness and productivity while reducing costs.



FIGURE 1-1

The CIU 888

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The CIU 888 serves as data acquisition unit of tank gauging instruments, and continuously scans gauge data. All measured data is used to calculate accurate tank inventory data using international standardized methods of calculation, such as API and ASTM among others.

All measured and calculated data is instantly available for use by host applications, such as tank inventory systems, Distributed Control Systems (DCSs), Programmable Logic Controllers (PLCs), and others via multiple and dedicated host links and interfaces. Support of multiple host interfaces guarantee convenient and reliable connectivity between the installed field instruments and the systems in the control room.

1.2 Full support of installed base

Building on the strengths of its predecessors, the CIU 888 can be migrated into an existing tank inventory system with minimal effort. A single CIU 888 can replace a set of CIU 880 Plus and Prime, a single CIU 880 Prime or a single CIU 858/SmartLink.

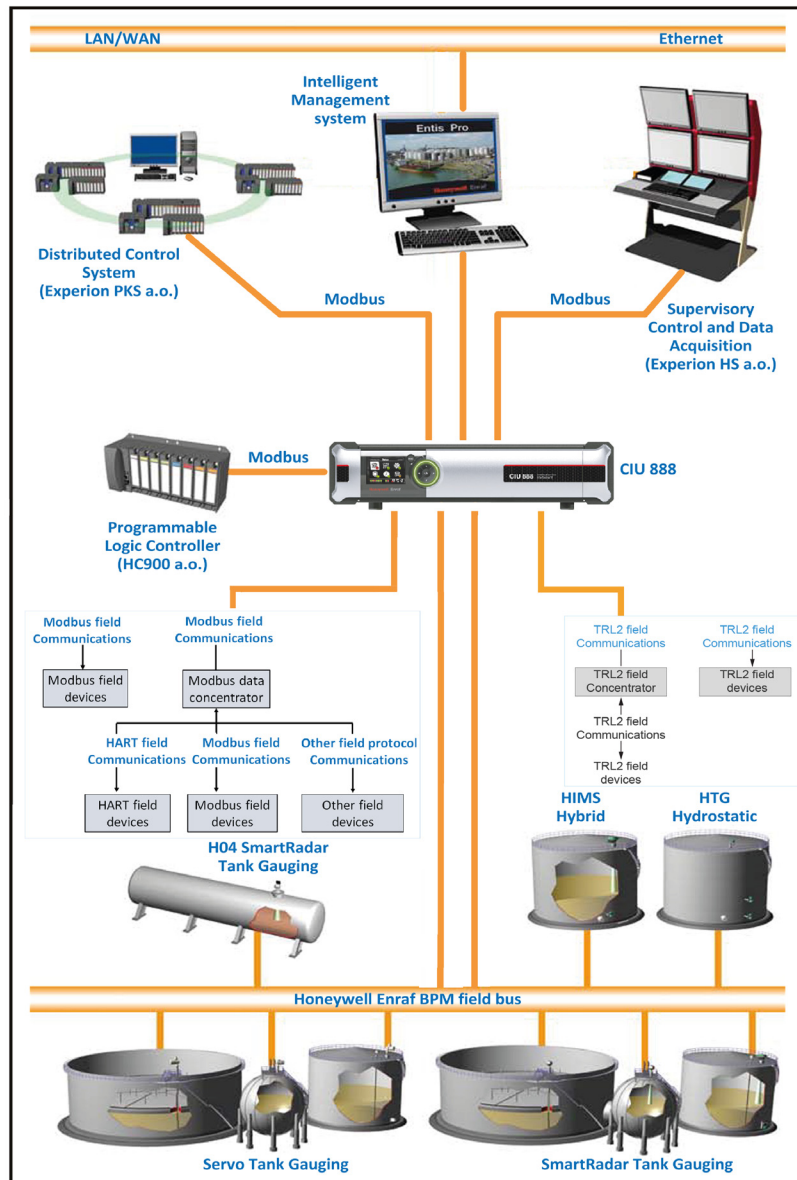


FIGURE 1-2

Tank gauging system with CIU 888 as crucial link between field and control room



## Introduction

The advantages of the CIU 888 become clear when comparing the CIU 888 to previous generations in the CIU series, as shown in TABLE 1-1.

TABLE 1-1 Comparison between CIU 888 and previous generations in CIU series

|                                     | CIU 858 | SmartLink | CIU Prime | CIU Plus | CIU 888 R101.5 | CIU 888 R103 | CIU888 R120 | CIU888 R130 |
|-------------------------------------|---------|-----------|-----------|----------|----------------|--------------|-------------|-------------|
| <b>Field lines</b>                  | 3       | 3         | 4         | 2        | Up to 4        | Up to 6      | Up to 6     | Up to 6     |
| <i>BPM</i>                          | ✓       | ✓         | ✓         | ✗        | ✓              | ✓            | ✓           | ✓           |
| <i>TRL/2 Modbus</i>                 | ✗       | ✗         | ✗         | ✗        | ✗              | ✗            | ✓           | ✓           |
| <i>Serial GPU</i>                   | ✗       | ✗         | ✓         | ✗        | ✓              | ✓            | ✓           | ✓           |
| <i>Serial Modbus</i>                | ✗       | ✗         | ✗         | ✓        | ✗              | ✓            | ✓           | ✓           |
| <b>Serial Host links</b>            | 1       | 2         | 2         | 4        | 2 to 4         | 2 to 6       | 2 to 6      | 2 to 6      |
| <i>Serial GPU</i>                   | ✓       | ✓         | ✓         | ✗        | ✓              | ✓            | ✓           | ✓           |
| <i>Serial Modbus</i>                | ✗       | ✗         | ✓         | ✓        | ✓              | ✓            | ✓           | ✓           |
| <b>Ethernet Host links</b>          | ✗       | ✗         | ✗         | ✗        | ✗              | ✗            | ✗           | 3           |
| <i>Modbus TCP/IP</i>                | ✗       | ✗         | ✗         | ✗        | ✗              | ✗            | ✗           | ✓           |
| <b>Separate service port</b>        | ✗       | ✗         | ✗         | ✗        | ✓              | ✓            | ✓           | ✓           |
| <b>Volume correction</b>            | ✗       | ✗         | ✗         | ✓        | ✓              | ✓            | ✓           | ✓           |
| <b>W&amp;M sealing</b>              | ✗       | ✓         | ✓         | ✓        | ✓              | ✓            | ✓           | ✓           |
| <b>No. of emulation host ports</b>  | ✓       | ✓         | 1         | ✗        | 1              | Up to 4      | Up to 4     | Up to 4     |
| <b>No. of Tanks</b>                 | ✗       | ✗         | 50        | 50       | 50             | 80           | 80          | 80          |
| <b>No. of Modbus TCP/IP clients</b> | ✗       | ✗         | ✗         | ✗        | ✗              | ✗            | ✗           | 15          |

### 1.3 Designed for users

One of the most striking features of the CIU 888 is its user-friendliness. The CIU 888's user interface guarantees an intuitive operation, and makes sure that users do not suffer from information overload and are presented with the essentials, where it is also possible to analyze the details easily.

### 1.3.1 Ring of light

The ring of light located at the front of the CIU 888, as shown in FIGURE 1-3, immediately draws the attention of the user. It provides a clear indication of the actual CIU 888 status based on NAMUR color coding.

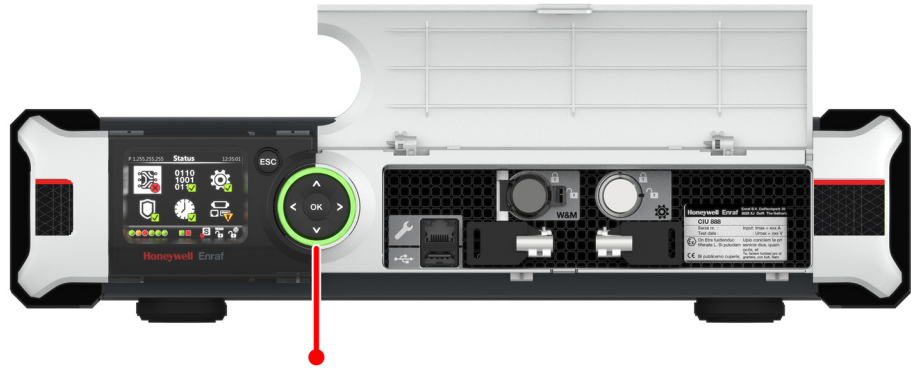


FIGURE 1-3

CIU 888: Ring of light

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### 1.3.2 CIU 888 display and navigation keys

The LCD display, as shown in FIGURE 1-4, provides more detailed information about the status of the CIU 888.

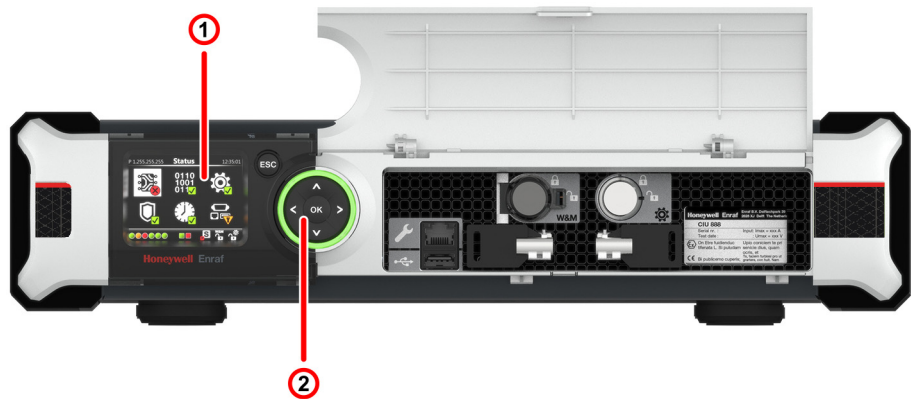


FIGURE 1-4

CIU 888: Display (1) and navigation keys (2)

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The main screen of the display, called the *Status Dashboard*, gives users quick feedback on the operational state and health of the CIU 888 and its interfaces. Additionally, the *Status Dashboard* serves as a portal

to more detailed status information and configuration settings, which can be accessed using the navigation keys.



FIGURE 1-5

CIU 888 display: Status Dashboard

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### 1.3.3 CIU 888 Web interface

The CIU 888 Web interface, shown in FIGURE 1-6, can be accessed for in-depth diagnostics, monitoring and service of the CIU 888.

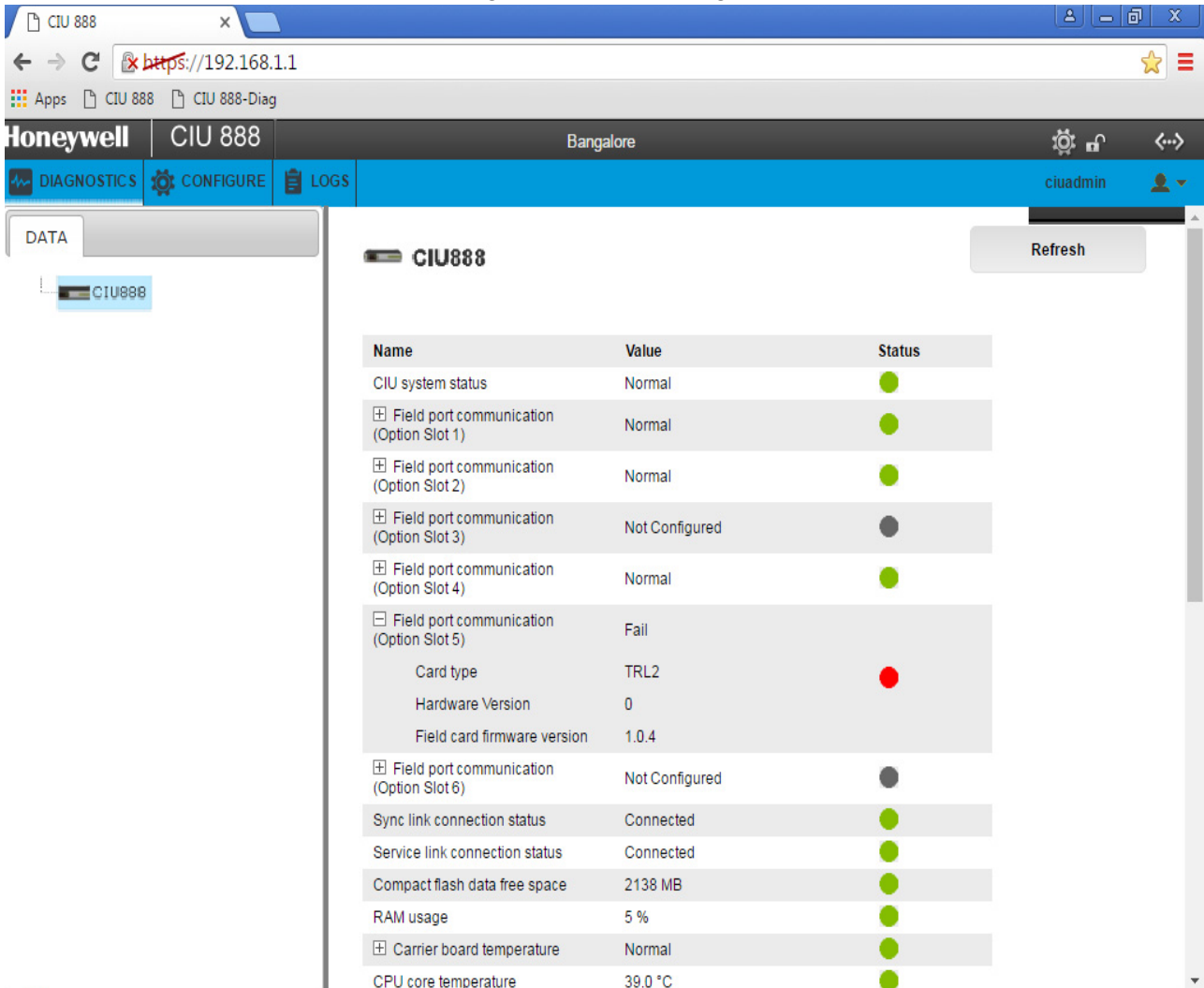


FIGURE 1-6

CIU 888 Web interface

The Web interface is easy accessible via a standard browser and allows users to perform a range of tasks, including commissioning and configuration of the CIU 888 and performing system diagnostics. For more information refer to the Configuration Manual (4417584).

### 1.4 Increased IT security and safety

The CIU 888 is designed from a multi-layered approach to IT security, in which multiple security measures are placed throughout the device. Should one security measure not be able to avert a security breach,

others continue to protect resources and data thereby preventing/limiting any potential damage.

The security measures implemented in the CIU 888 vary in nature, but fundamentally they all share the same goal: protecting the confidentiality, integrity and availability of data.

Below a non-exhaustive list of examples of security measures implemented in the CIU 888:

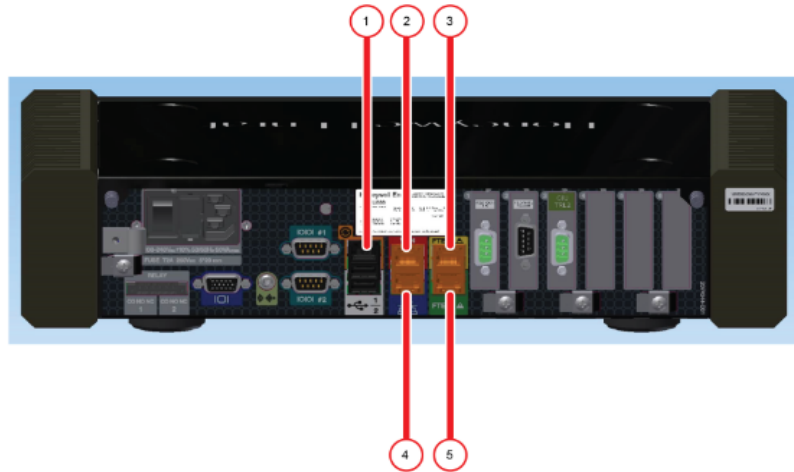
- Full network segregation via integrated firewall
- User access to the CIU 888 and the CIU 888 Web interface restricted to authorized users
- Use of cyclic redundancy checks (CRCs) to indicate the integrity of site configuration data
- Option to seal the CIU 888 to indicate that the system settings are unchanged after verification and to be used for W&M-certified applications for inventory control, custody transfer, accounting and duties
- Hardened CIU888 box with a low susceptibility to virus and malware infestation to ensure uninterrupted data availability, and availability of critical applications and services.
- Auto-disabled USB ports preventing accidental virus infection or distribution of malware through the use of USB drives
- Ports are enabled only after configuration. Only the required ethernet ports are enabled.

### 1.5 Delivering ultimate connectivity

Where serial interfaces used to be the standard also in the industry, Ethernet based networks are more common today on several levels. Unlike its predecessors, the CIU 888 not only fully supports current standard interfaces, but also supports Ethernet connectivity. With the right approach on security, possibilities to share data with other applications are easily in reach. Reliable, accurate data can help business applications or planning, reconciliation, etc. to become more effective and efficient.

### 1.5.1 Ethernet ports

The CIU 888 has six dedicated Ethernet ports, as shown in FIGURE and FIGURE 1-7. The sixth port is located on the front panel.



- |                   |                    |
|-------------------|--------------------|
| 1. Sync Link port | 4. Office LAN port |
| 2. VPN port       | 5. FTE port B      |
| 3. FTE port A     | 6. Service Port    |

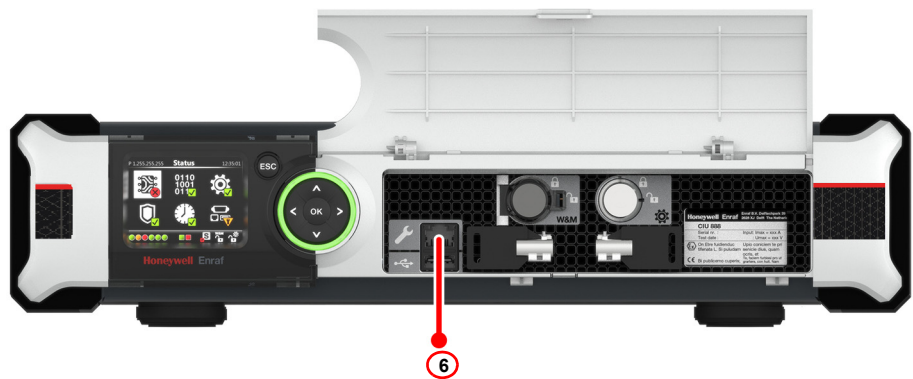


FIGURE 1-7

CIU 888: Service port on the front and back panel

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## Introduction

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TABLE 1-2 provides a description of each port.

TABLE 1-2 Description of the Ethernet ports

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| Ethernet port   | Description   |
|-----------------|---|
| Service port    | The Service port is used to set up a point-to-point connection between the CIU 888 and a service laptop/PC, allowing service technicians to configure the CIU 888 including field instruments connected to the CIU 888, and to perform system diagnostics. The Service port is also used to perform firmware upgrades and to view/updated the license of the CIU 888. The service port is conveniently located at the front of the CIU 888 for easy access.   |
| Sync Link port  | The Sync Link port is used as dedicated, private synchronization link (point-to-point) between two CIU 888s in a redundant system setup. Continuous data synchronization between the CIUs guarantee highest data availability.  |
| VPN port        | The VPN port is intended to be used to set up a secure point-to-point connection to provide remote access enabling off-site service and diagnostics of CIU 888 and gauges. This port will be enabled in future releases.  |
| FTE ports       | The FTE (Fault Tolerant Ethernet) ports are intended to be used to set up individual connections between the CIU 888 and host systems such as PLCs and DCSs. The FTE ports can also be used combined to support an FTE connection with Experion. By providing multiple communication paths between nodes (servers and stations), FTE tolerates more faults, i.e. all single faults, as well as many multiple faults. FTE ensures a rapid response in case of communication failures with minimal switchover time. Ethernet nodes with no FTE hardware or software can be connected to the FTE control network and benefit from its highly available communications environment. |
| Office LAN port | The Office LAN port is intended to be used to connect the CIU 888 (and the control network it is part of) to the business network of the site in order to securely share data with office applications, thereby saving costs on operation and data exchange.  |

**NOTE:** *In this release, the Service port and the Sync Link port are enabled.*

Network segregation is supported by the CIU 888 - a software-based firewall ensures that only the required socket ports are opened for each enabled Ethernet port. The firewall monitors and identifies all incoming and outgoing network traffic and blocks all unwanted network traffic.

### 1.5.2 Serial host ports

To support existing applications, the CIU 888 has two fixed serial (RS-232/RS-485) host ports, as shown in FIGURE 1-8.

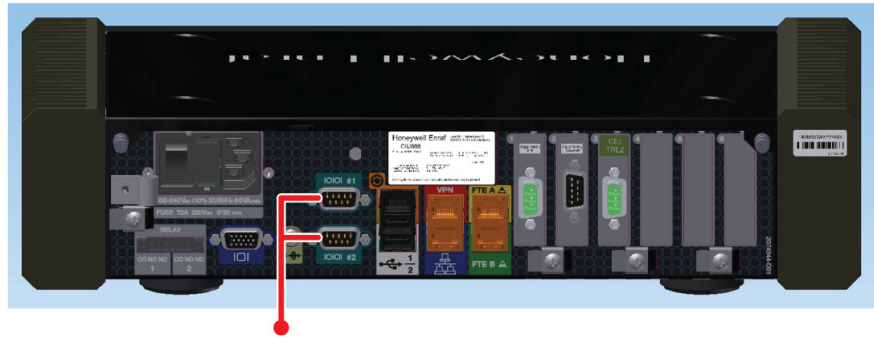


FIGURE 1-8 CIU 888: Fixed serial host ports

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These serial ports can be used to connect hosts with the CIU 888 using modbus RTU. The 100% compatibility with the CIU 880 interface ensures a smooth migration of existing applications. Other modbus mapping is also possible to support other data to be transferred.

Alternatively, any host port can be configured to support the standard CIU 858 protocol and ensures to provide backward compatibility.

### 1.5.3 Ethernet host ports

CIU 888 supports ethernet connectivity to Tank Inventory systems via FTEA, FTEB and Office LAN ports as shown in FIGURE 1-9.

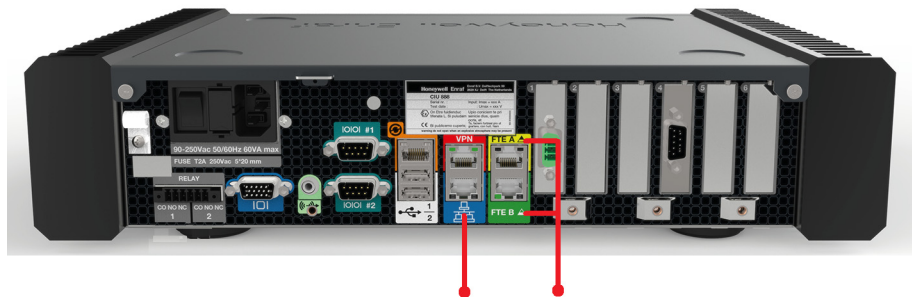


FIGURE 1-9 CIU 888: Ethernet host ports

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These ethernet ports (FTEA, FTEB, Office LAN) can be used to connect hosts with the CIU 888 using Modbus TCP/IP. Modbus maps supported by ethernet host ports is same as that of serial host ports.



### 1.5.4 Option slots

The CIU 888 has six option slots, as shown in FIGURE 1-10.

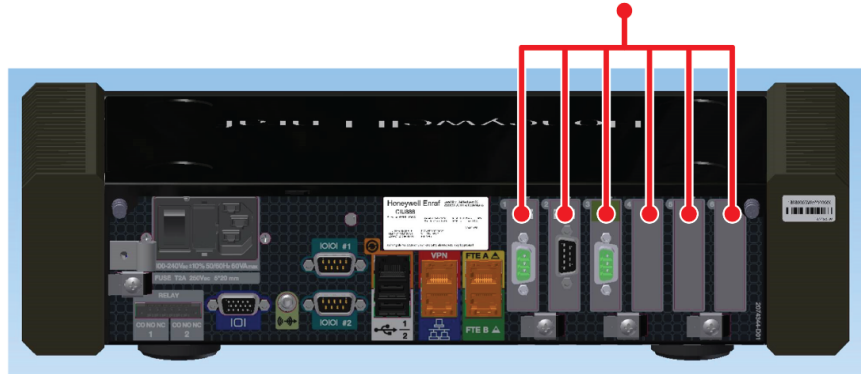


FIGURE 1-10

CIU 888: Option slots

The options slots support a wide range of connectivity possibilities, including:

- Gauging instruments on bulk storage tanks connecting over BPM or serial (RS-232/RS-485) field lines
- Gauging instruments on bulk storage tanks connecting over TRL/2 (Emerson Rex 2160)
- Host systems connecting over serial (RS-232/RS-485) field lines
- Downlink CIU (i.e. CIU 858, SmartLink) with gauges, connecting over serial (RS-232/RS-485) field lines
- Honeywell/third party Modbus field devices connecting over serial (RS-232/RS-485) field lines
- HART, Modbus or other protocol field devices connected to CIU 888 Via Modbus data concentrator and communicating over serial (RS-232/RS-485) field lines
- Honeywell/third party TRL/2 Modbus field devices connecting over TRL/2 field lines

### 1.5.5 USB ports

The CIU 888 has three USB ports as shown in FIGURE 1-11 and FIGURE 1-12. The USB ports enable connection of data storage devices, such as USB flash drives and pen drives, in order to install firmware upgrades and CIU 888 license updates.

*NOTE: Refer to the Firmware Upgrade Manual CIU 888 (Part No. 4417596) for more information.*

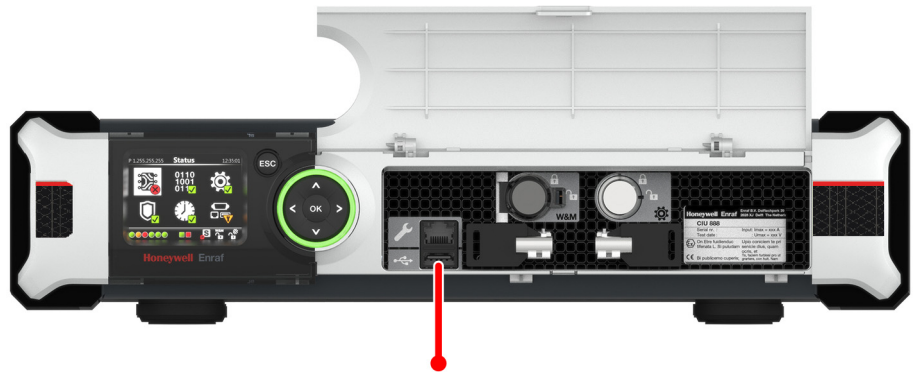


FIGURE 1-11 CIU 888: USB port located at the front

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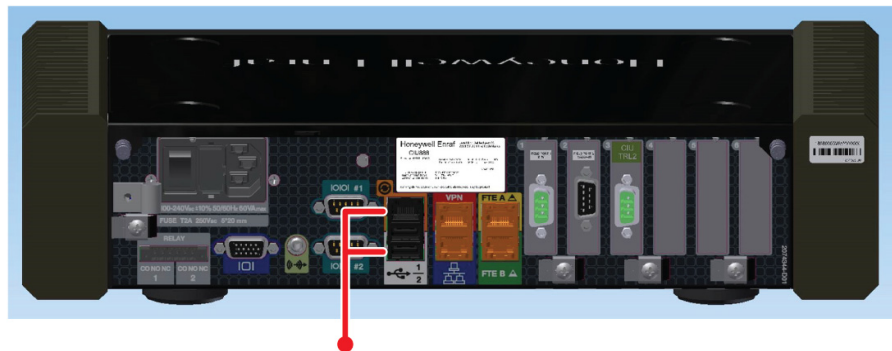


FIGURE 1-12 CIU 888: USB ports located at the back

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By default, access to the USB ports is disabled in order to prevent accidental infection or distribution of malware. The USB ports are enabled only when required for example, enabled during firmware upgrade and disabled after the operation is completed.

*NOTE: Refer to the IT Security Manual CIU 888 (Part No. 4417597) for more information.*

### 1.5.6 Relays

The CIU 888 has two relays located at the back, as shown in FIGURE 1-13. Each relay has three contacts: CO (Common), NO (Normally open) and NC (Normally closed).



FIGURE 1-13 CIU 888: Relays

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The relays are intended to be used in future for multiple purposes, for example to control systems like Distributed Control Systems (DCSs) via a hardwire connection, and indicate system status.

### 1.5.7 Other connections

A VGA connector and an audio connection are located at the back of the CIU 888, as shown in FIGURE 1-14. Both are for future use.

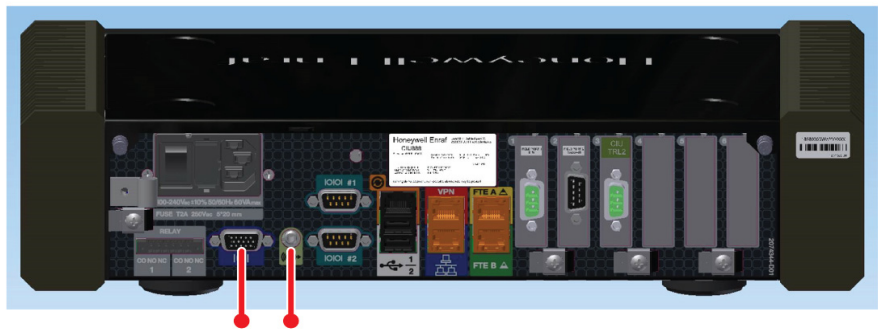


FIGURE 1-14 CIU 888: VGA connector and audio input

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## 1.6 Up-to-date regulatory compliance

The CIU 888 is verified and approved by internationally recognized metrology authorities, to international accepted industry standards for the assessment of taxes or duties. Coverage can be expanded to support new or specific standards.

*NOTE: Refer to the Sealing Guide CIU 888 (Part No. 4417595) for more information.*

### 1.7 Maximizing data availability through full redundancy

Operations for inventory control and custody transfer rely on accuracy, reliability and availability of the tank gauging system. By setting up two CIU 888s in a redundant system setup, system reliability and availability can be increased even more. Continuous data synchronization and host initiated switchover ensures highest data availability and smooth transition between CIUs, with minimal interruption of critical applications and services.

### 1.8 Remote access for safe and secure support of gauges

The CIU 888 is the interconnection between gauging instruments in the field and service tools, such as Honeywell's *Engauge and Rosemount TankMaster*, in the site control room. All Honeywell gauging instruments communicating via GPU/Flexconn protocol/TRL/2 can be accessed and configured remotely via the CIU 888 in a safe and secure way, enabling site support and more efficient commissioning. In a similar manner, the Emerson TRL/2 devices (e.g. Rex gauges) can also be accessed and configured remotely via the CIU 888.

## Technical Specifications and Dimensions

### CHAPTER 2 TECHNICAL SPECIFICATIONS AND DIMENSIONS

#### 2.1 Technical Specifications - Functional (Software version R130.1)

| General                              |  |
|--------------------------------------|--|
| Description                          | Field scanning and communication interface for tank Inventory applications with optional embedded tank inventory calculation functionality.  |
| Application                          | For all applications requiring accurate and reliable process and inventory data, such as refineries, tank farms and terminals. Data is suitable for custody transfer, safe product transfer and tank farm operation. |
| Intended Use                         | Control room equipment.  |
| Legal Metrology and Custody Transfer | Compliant to API standards as stated by approval and certification by notified bodies as NMI.  |

| Functional Specification                |  |
|---|--|
| Tank Database                           | 80 tanks   |
| Redundancy                              | Hot standby and real-time synchronization.   |
|   | Switchover within 10 seconds.  |
| Supported Gauge Models                  | All GPU enabled tank gauges (such as 811, 813, 865, 866, 854, 872, 873, 877, 894, and 990)   |
| Modbus Gauges                           | Smartline level transmitter (SLG 700) via Moore HCS Modbus HART converter  |
| TRL/2 Gauges                            | Honeywell TRL/2 Radar gauge (990) and Rex gauge (Rex RTG)  |
| Gauge Commands                          | <ul style="list-style-type: none"> <li>- Lock Test</li> <li>- Freeze</li> <li>- Alarm Test (SmartRadar)</li> <li>- Unlock</li> <li>- Calibrate (854, 894, 990)</li> <li>- Water Dip</li> <li>- Block</li> <li>- Density Dip</li> </ul>   |
| Tank Scanning                           | Max. 6 field ports sequential and/or parallel.   |
| Inventory Calculations                  | Conform API MPMS Ch. 12.1.   |
| Tank Capacity Tables (Strapping Tables) | Up to 5,000 straps per tank. 400,000 straps total.   |
| Support API/ASTM Product Calculations   | <ul style="list-style-type: none"> <li>- ASTM D1250-52 Table 23, 24, 53 and 54</li> <li>- ASTM D1250-1980; conform Vol. X - Tables, 5, 6, 23, 24, 53, 54, 59 and 60 and 59, 60 Alternative Temperature, product groups A, B, C, D</li> <li>- API MPMS Ch. 11.1 (2007; adj. to ASTM D1250-04 and IP-200) - Tables 5, 6, 23, 24, 53, 54, 59, 60 and 59, 60 Alternative Temperature, product groups A, B, C, D</li> <li>- API MPMS Ch. 11.2.4 (GPA TP-27) - Tables 5, 6, 23, 24, 53, 54, 59, 60 and 59, 60 Alternative Temperature</li> </ul> |
| Product Group E                         | <ul style="list-style-type: none"> <li>- ASTM D4311-83 Table 1 and 2</li> <li>- ASTM D4311-96 Table 1</li> <li>- ASTM D4311-04 Table 1 and 2</li> </ul>  |
| Available Gauge Data                    | <ul style="list-style-type: none"> <li>- Product Level</li> <li>- Product Temperature</li> <li>- Vapor Pressure</li> <li>- Water Level</li> <li>- Spot Temperatures</li> <li>- Gauge Status and Alarms</li> <li>- Vapor Temperature</li> <li>- Ambient Temperature</li> <li>- Observed Density (Servo, HTG, HIMS)</li> </ul>   |

## Technical Specifications and Dimensions

| Functional Specification              |  |   |
|---------------------------------------|--|---|
| Available (Calculated) Inventory Data | <ul style="list-style-type: none"> <li>- S&amp;W, Vapor (4 types), DCF, TCF, manual CTL</li> <li>- Volume (TOV, GOV, GSV, NSV)</li> <li>- Reference Density</li> </ul> | <ul style="list-style-type: none"> <li>- Mass (liquid, vapor, total)</li> <li>- Volume Correction Factor (VCF, CTL)</li> <li>- Volume Derived Flow</li> </ul> |
| Clock & Time Synchronization          | External using (optional) Entis Pro.   |   |
| Supported Engineering Units           | - Level  | m, mm, ft, in, in/16 and ft-in-16 (fis)   |
|                                       | - Temperature  | °C, °F  |
|                                       | - Density  | kg/m <sup>3</sup> , °API, lb/ft <sup>3</sup> , RD60/60, lb/USgal  |
|                                       | - Pressure   | kgf/cm <sup>2</sup> , kPa, psi(g), Pa   |
|                                       | - Volume   | m <sup>3</sup> , USgal, bbl, l(L)   |
|                                       | - Mass/weight  | kg, lb, metric ton, long ton, US ton  |
|                                       | - Flow   | m <sup>3</sup> /min, m <sup>3</sup> /h, l/min, l/h, bbl/min, bbl/h, USgal/min, USgal/h, UKgal/h   |
| Available Correction Methods          | <ul style="list-style-type: none"> <li>- CTSh</li> <li>- Floating Roof Weight</li> </ul>   |   |

| Host Connectivity               |   |
|---------------------------------|---|
| Serial Ports                    | 2x Modbus serial + 4 additional ports by using option slots   |
| Ethernet Ports                  | 3x Modbus TCP/IP ethernet (FTEA, FTEB and Office LAN)   |
| Supported Host Protocols        | <ul style="list-style-type: none"> <li>- Serial Modbus slave (CIU 880 Modbus maps)</li> <li>- Ethernet Modbus TCP/IP Server (CIU 880 Modbus maps)</li> <li>- CIU 858 Emulation</li> <li>- Modbus Emulation</li> </ul> |
| Number of Modbus TCP/IP Clients | 15  |

| Field Connectivity      |   |
|-------------------------|---|
| Field Ports             | 6x option slots (of which 4 Serial ports can be used for host connectivity).  |
| Wireless Connectivity   | ISA 100 via Honeywell WDM   |
| Available Option Boards | <ul style="list-style-type: none"> <li>- Enraf BPM Field Bus Card</li> <li>- Enraf Serial Communication Card</li> <li>- Enraf TRL/2 Field Bus Card</li> <li>- Serial Modbus Card</li> </ul> |

| Compliance & Certifications   |   |
|-------------------------------|---|
| European Directives           | <ul style="list-style-type: none"> <li>- CE</li> <li>- 2006/95/EC (Low Voltage directive)</li> <li>- 2004/108/EC (EMC)</li> </ul> |
| IT Security                   | Conform WIB M 2784-X - 10   |
| User Interface                | Designed for compliance with NAMUR NE 43  |
| Self Monitoring & Diagnostics | Designed for compliance with NAMUR NE 107   |

## Technical Specifications and Dimensions

| Compliance & Certifications          |   |
|--------------------------------------|---|
| Legal Metrology (Weights & Measures) | <ul style="list-style-type: none"> <li>- NMI - Netherlands</li> <li>- OIML - Global</li> <li>- PTB - Germany (pending)</li> </ul> |

### 2.2 CIU 888 Option Board Specifications

| Enraf BPM Field Bus Card   |   |
|----------------------------|---|
| Physical Layer             | 2-wire Bi-phase mark modulated (MIL-STD-1553)       |
| Supported Protocol(s)      | Enraf BPM   |
| Typical No. Field Devices  | 10-15, depending on cable specifications and length |
| Baud Rate                  | 1200/2400/4800 Baud                                 |
| Distance                   | 10 km or more depending on cable characteristics    |
| Cable Characteristics      | 1 uF/200 Ohm max.                                   |
| Type of Galvanic Isolation | Transformer coupled with ground shield              |
| Galvanic Isolation         | 1500 V  |

| Enraf Serial Communication Card |  |
|---------------------------------|--|
| Physical Layer                  | 2/4-wire RS-485 or RS-232C   |
| Protocol(s)                     | GPU/Flexconn master (for field communications)<br>Modbus master (for field communications) |
| Baud Rate                       | 1200 up to 38400 Baud  |
| Type of Galvanic Isolation      | Opto isolation   |
| Galvanic Isolation              | 1500 V   |

| Serial Modbus Card         |   |
|----------------------------|---|
| Physical Layer             | 2/4-wire RS-485 or RS-232C              |
| Protocol(s)                | Modbus - Slave (for host communication) |
| Baud Rate                  | 1200 up to 38400 Baud                   |
| Type of Galvanic Isolation | Opto isolation                          |
| Galvanic Isolation         | 1500 V                                  |

| Enraf TRL/2 Field Bus Card |  |
|----------------------------|--|
| Physical Layer             | Emerson TRL/2 Protocol   |
| Supported Protocol(s)      | Modbus RTU   |
| Typical No. Field Devices  | 8  |
| Baud Rate                  | 4800 Baud  |
| Distance                   | 4 km   |
| Cable Characteristics      | 18 AWG (minimum) with shielded twisted pair, max 4 kms with max 8 multi drop Gauge connections |
| Type of Galvanic Isolation | Transformer coupled with ground shield   |

## Technical Specifications and Dimensions

| Enraf TRL/2 Field Bus Card |        |
|----------------------------|--------|
| Galvanic Isolation         | 1500 V |

### 2.3 Technical Specifications - Hardware

| Electrical               |   |
|--------------------------|---|
| Power Supply             | 100-240 Vac, auto ranging (-15% to +10%), 45-65 Hz                                      |
| Power Rating             | Max. 60 VA (35 VA nominal)  |
| Nominal Start-Up Current | 60 mA (Fuse: 2A Slow Blow)<br>Start Up Current is (inrush): 60A @230V                   |
| Overall Voltage Category | II  |
| Cooling System           | 2 heat sinks with heat pipe design (no moving parts)                                    |
| Battery                  | Type 3V, 225mAh, 23mm (for back-up system clock only - 10 years estimated service time) |

| Operating System |                                |
|------------------|--------------------------------|
| O/S              | Linux Arch version 3.4         |
| Memory           | 4 GB Flash memory (upgradable) |

| User Interface and I/O |   |
|------------------------|---|
| Front Panel Display    | Backlight LCD color display (50 x 38 mm; 320 x 240 pixels) for status and diagnostics |
| User Input             | 6 switches (←, →, ↑, ↓, OK and Esc) with LED (ring of light) status indication        |
| Key Lock Switches      | 2x (for configuration and W&M sealing respectively)                                   |
| Relay Output           | 2x DPDT for CIU status (Hot Standby); contact rating: 30VDC, 1A                       |
| Video Output           | SVGA (future use)   |
| Audio Output           | 1x std. line out (x Vtt), 3.5 mm mini-jack  |
| Serial Ports           | 2x non-isolated   |
| Ethernet Ports         | 5x 10/100 Mb on back side (1 for future use)  |
| Service Ethernet Port  | 1x behind front panel - DHCP enabled, auto sensing, 10/100 Mb                         |
| USB Ports              | 1x behind front panel; 2x on back side - default disabled                             |

| Environmental            |  |
|--------------------------|--|
| Ambient Temperature      | 0 °C to +60 °C (+32 °F to +140 °F)       |
| Storage Temperature      | -20 °C to +85 °C (-40 °F to +185 °F)     |
| Enclosure Classification | Against mechanical impact IP 30 (NEMA 1) |
| Humidity                 | 0% to 90% non-condensing                 |
| EMC Class                | CLASS A                                  |

| Mechanical |   |
|------------|---|
| Materials  | <ul style="list-style-type: none"> <li>- Enclosure: Acryl painted steel</li> <li>- Heat sinks (left and right side): Black anodized aluminum</li> <li>- Front panel: ABS/PPE</li> </ul> |



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## Technical Specifications and Dimensions

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| Mechanical                       |  |
|----------------------------------|--|
| Dimensions                       | 400 x 93 x 283 mm (WxHxD) (15¾ x 3¾ x 11¼ in. (WxHxD)) |
| Weight                           | ~ 7.5 kg (16.5 lb) (excluding option cards)            |
| Installation                     | Wall mounting, 19" rack or table top                   |
| Max. Load on Top (Table Top Use) | 10 kg (22.0 lb)  |

2.4 Dimensional drawing

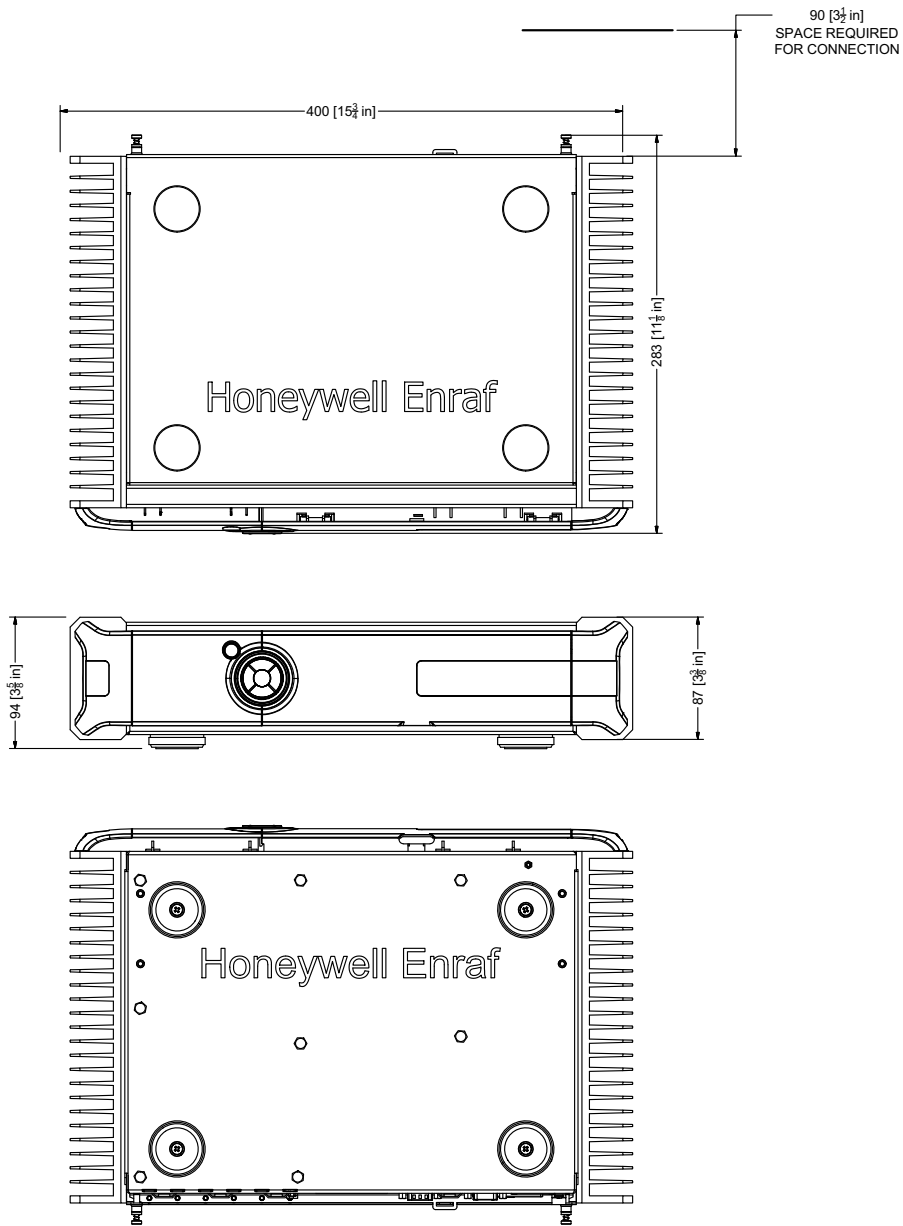


FIGURE 2-15

Overall dimensions of the CIU 888

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## APPENDIX A LIST OF ABBREVIATIONS

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| Abbreviation | Meaning  |
|--------------|--|
| API          | American Petroleum Institute   |
| ASTM         | American Society for Testing and Materials   |
| BPM          | Bi-Phase Mark  |
| CRC          | Cyclic Redundancy Check  |
| CTL          | Correction for Temperature on Liquid   |
| DCS          | Distributed Control Systems  |
| FTE          | Fault Tolerant Ethernet  |
| GOV          | Gross Observed Volume  |
| GPU          | Gauge Processing Unit  |
| GSV          | Gross Standard Volume  |
| IT           | Information Technology   |
| LAN          | Local Area Network   |
| NMi          | Netherlands Measurement Institute (Nederlands Meetinstituut)   |
| NSV          | Net Standard Volume  |
| OIML         | International Organization of Legal Metrology (French: <i>Organisation Internationale de Métrologie Légale</i> ) |
| PC           | Personal Computer  |
| PLC          | Programmable Logic Controller  |
| RS           | Recommend Standard   |
| RTU          | Remote Terminal Unit   |
| TOV          | Total Observed Volume  |
| TRL          | Tank Radar Level   |
| USB          | Universal Serial Bus   |
| VCF          | Volume Correction Factor   |
| VGA          | Video Graphics Array   |
| VPN          | Virtual Private Network  |
| W&M          | Weights and Measures   |

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For service-related questions, contact:

**Technical Assistance Centre**

Phone:

+1 800 423 9883 or

+1 215 641 3610

E-mail:

[HFS-TAC-SUPPORT@honeywell.com](mailto:HFS-TAC-SUPPORT@honeywell.com)

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## **For More Information**

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