



## **ENRAF TANK FARM GATEWAY CIU 888**

The next generation CIU for reliable, accurate gauge and inventory data



Honeywell's Enraf Tank Farm Gateway CIU 888 is the critical link between tank gauging equipment and control room systems. It provides the operator with reliable, accurate, real-time tank inventory data 24 hours a day, 7 days a week. Replacing the legacy 858 and 880 series, the CIU 888 serves as the data acquisition unit for tank measurement equipment, continuously scanning gauge data. It is used to calculate accurate tank inventory data according to international standardized calculation methods, such as the API, ASTM, GPA and many others.



## Global Experience. Locally Applied.

All measured and calculated data is directly available for use by host applications such as the inventory management system, the DCS or management information system via multiple dedicated serial host links and network interfaces. Support of multiple protocols guarantees simple and reliable connectivity of installed field equipment to the control room. The modular design provides a flexible upgrade path for the future.

# Enhanced Connectivity

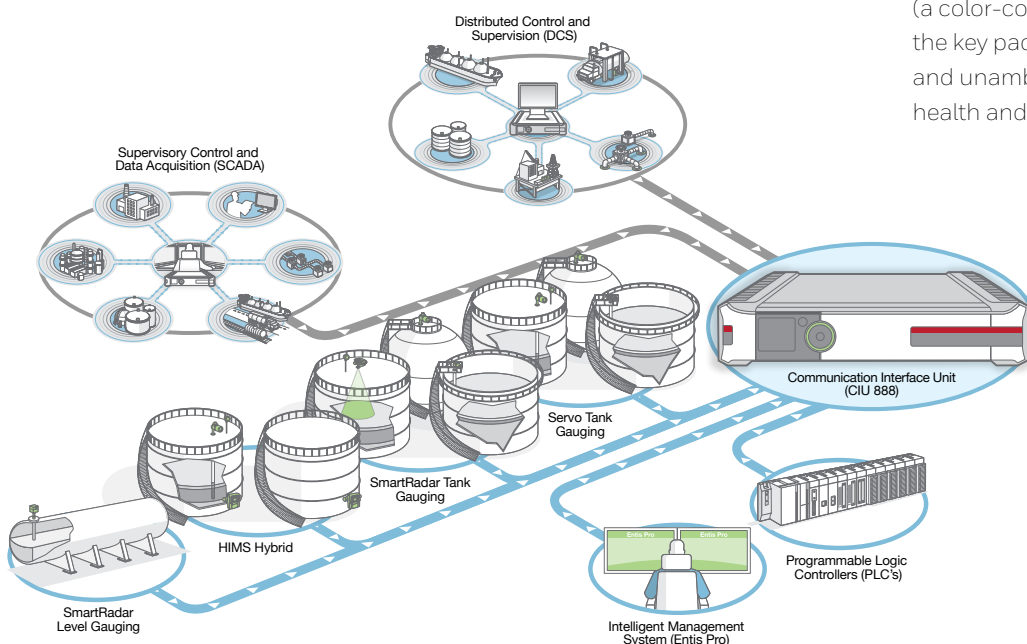
The CIU 888 (pronounce as "triple eight") series is the first fully Ethernet enabled CIU available in the market. While previous generations of tank interface units have been based mostly on serial interfaces, the CIU 888 offers connectivity via multiple Ethernet ports. Internal firewalls enable safe and secure connections with multiple systems simultaneously, control systems and Office LAN cannot interfere due to strict segregation. VPN connectivity allows remote connection, while the layered cyber security model (LCSM) helps to comply with strict IT security rules,

helping your plant to be safe and secure. A dedicated service LAN port on the front provide technicians easy access to configure the unit locally and to communicate with the field equipment. Also here the layered security model (LCSM), with user and access profiles, helps to promote safety and security.

The CIU 888 robustness is based on strict industrial design rules. All boards are tropicalized (acc. ISA 71.04), and the CAE thermal design using heat-pipes instead of conventional fans results in a full ruggedized, all-solid-state, non-moving parts solution, built to last.

Unique autonomous redundancy features will ensure uninterrupted data availability to all users. Hot-Standby relay contacts provide real-time notification of CIU status and simplify handling by DCS-systems reducing downtime. Upcoming redundant Ethernet ports will complete the redundancy concept, simplifies implementation further reducing costs and ensure uninterrupted availability of data.

An easy-to-read colour display at the front provides diagnostic information, easy to interpreted, supporting faster service. The graphic diagnostic dashboard combined with a ring of light (a color-coded LED ring surrounding the key pad) provides an at-a-glance and unambiguous indicator of system health and availability.





**Front view (with closed door)**

- LCD color display for status and diagnostics
- Convenient lid automatically covers access to Service- and USB-port and keys for Configuration lock and W&M sealing
- Navigation keys and ring of light showing CIU status

**Rear view (left to right)**

- Two status relay contacts (Hot-Standby)
- VGA & Audio future use
- Two serial host ports: Compatible with Entis Pro
- Two USB ports: Auto-disabled; Future use
- 5 dedicated Ethernet ports, segregated by Firewall
- 6 flexible field and Host communication ports

Modbus TCP/IP communication between the CIU 888 and the host systems is established through FTEA, FTEB and Office LAN ports. CIU 888 exposes the same data (Modbus maps) over the Ethernet host ports as that exposed in the serial host ports.

**Technical Specifications—Functional (Software)**

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	50 tanks (Entis Pro compatibility) and 80 tanks when CIU is connected to a Modbus host (not supported when Entis Pro is also scanning CIU 888)									
Redundancy	Hot standby, real-time synchronization (redundancy controlled by Entis Pro or modbus host)									
Supported Gauge Models	All GPU enabled tank gauges (such as 811, 813, 866, 854, 872, 873, 877, 894 and 990)									
Gauge Commands	<table border="1"> <tr> <td>• Lock test</td> <td>• Unlock</td> <td>• Block</td> </tr> <tr> <td>• Freeze</td> <td>• Calibrate (854, 894)</td> <td>• Density dip</td> </tr> <tr> <td>• Alarm test (SmartRadar)</td> <td>• Water dip</td> <td></td> </tr> </table>	• Lock test	• Unlock	• Block	• Freeze	• Calibrate (854, 894)	• Density dip	• Alarm test (SmartRadar)	• Water dip	
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• Freeze	• Calibrate (854, 894)	• Density dip								
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Tank Scanning	6 field ports sequential and/or parallel, refresh rate 2-4 sec. <sup>1</sup>									
Inventory Calculations	Conform API MPMS Ch. 12.1									
Tank Capacity Tables (strapping tables)	Up to 5000 straps per tank, 400000 straps total									
Support API/ASTM Product Calculations	<ul style="list-style-type: none"> <li>• ASTM D1250-80; conform Vol. X—Tables, 5, 6, 23, 24, 53, 54, 59, 60 and 59, 60 Alt-T, Product groups A, B, C &amp; 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; Product group E</li> <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 <sup>2</sup>	<table border="1"> <tr> <td>• Product level</td> <td>• Gauge status and alarms</td> </tr> <tr> <td>• Product temperature</td> <td>• Vapor temperature</td> </tr> <tr> <td>• Vapor pressure</td> <td>• Ambient temperature</td> </tr> <tr> <td>• Water level</td> <td>• Observed density (Servo, HTG, HIMS)</td> </tr> </table>	• Product level	• Gauge status and alarms	• Product temperature	• Vapor temperature	• Vapor pressure	• Ambient temperature	• Water level	• Observed density (Servo, HTG, HIMS)	
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Available (Calculated) Inventory Data	<table border="1"> <tr> <td>• Volume (TOV, GOV, GSV, NSV)</td> <td>• Mass (Liquid, vapor, total)</td> </tr> <tr> <td>• Reference density</td> <td>• Volume correction factor (VCF, CTL)</td> </tr> <tr> <td>• S&amp;W, Vapor (4 types), DCF, TCF, manual CTL</td> <td>• Volume derived flow</td> </tr> </table>	• Volume (TOV, GOV, GSV, NSV)	• Mass (Liquid, vapor, total)	• Reference density	• Volume correction factor (VCF, CTL)	• S&W, Vapor (4 types), DCF, TCF, manual CTL	• Volume derived flow			
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Clock & Time Synchronization	Internal or external using Entis Pro or Modbus host systems such as DCS									

Functional Specification (cont.)		
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, bbl/min, bbl/h, USgal/min, USgal/h, UKgal/h
Available Tank Correction Methods	<ul style="list-style-type: none"> <li>• CTSh<sup>3</sup></li> <li>• Floating Roof Weight</li> </ul>	
Host Connectivity		
Serial Ports	2x modbus serial (+ 4 additional ports by using optional slots)	
Supported Host Protocols	<ul style="list-style-type: none"> <li>• Serial modbus (Slave)</li> <li>• CIU 858 emulation</li> <li>• CIU 880 Prime/Plus emulation (serial modbus)</li> </ul>	
Ethernet/LAN	3x Modbus TCP/IP ethernet (FTEA, FTEB and Office LAN)	
Field Connectivity		
Field Ports	6x option slots (of which 4 ports can be used for serial host connectivity)	
Wireless Connectivity	ISA 100 via Honeywell WDM through TCP/IP to serial converters	
Available Option Boards	Enraf BPM fieldbus, Serial modbus (master) and Serial GPU input	
Compliance & Certifications		
Electrical Safety	<ul style="list-style-type: none"> <li>• IEC 61010-1:2010 (3rd edition)</li> <li>• EN 61010-1:2010</li> </ul>	
European Directives	CE: <ul style="list-style-type: none"> <li>• 2006/95/EC (Low voltage directive)</li> <li>• 2004/108/EC (EMC)</li> <li>• CAN/CSA-C22.2 No. 61010-1-12</li> <li>• UL Std. No. 61010-1 (3rd Edition)</li> </ul>	
Self Monitoring & Diagnostics	Designed for compliance with NAMUR NE 107	
Legal Metrology (Weight & Measures)	<ul style="list-style-type: none"> <li>• NMI – Netherlands</li> <li>• PTB – Germany (pending)</li> </ul>	

**Footnote:** <sup>1</sup> Depending on number of used field ports, scan strategy, and baud rate. <sup>2</sup> Depending on gauge functionality. <sup>3</sup> Ambient temperature input required.

## CIU 888 Option Board Specifications

Enraf BPM Field Bus Card (Pos 8 to 13 = B)	
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 spec 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 (GPU Master (Input), Modbus Master (Input) and Modbus Slave (Host))	
Physical layer	2-4 wire RS-485 or RS-232C
Protocol(s)	<ul style="list-style-type: none"> <li>• GPU Master (Field communication)</li> <li>• Modbus Master (Field communication)</li> <li>• Modbus Slave (Host communication)</li> </ul>
Baud Rate	1200 up to 38400 Baud
Type of Galvanic Isolation	Opto isolation
Galvanic Isolation	1500 V
Number of Modbus Slave Devices (for modbus master field communications)	<ul style="list-style-type: none"> <li>• 32 modbus field devices (RS 485) multi-dropped.</li> <li>• 1 modbus field device (RS232)</li> <li>• 50 devices can be configured (If connected through a converter/concentrator)</li> </ul>

(cont. next page)

## 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); Start up current is (inrush): 60mA @230V
Over Voltage Category	II
Cooling System	2 heat sinks with heat pipe design (no moving parts)
Battery	Type 3V, 225mAh (for back-up system clock only—10 yrs. estimated life time)
Operating System	
O/S	Linux Arch
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, resp. W&M sealing)
Relay Output	2x DPDT for CIU status (Hot Standby); contact rating: 30Vdc,1A
Video Output	SVGA
Audio Output	Line out
Serial Ports	2x non-isolated RS-232C
Ethernet Ports	5x 10/100 Mb on back side (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 (-4 °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>
Dimensions (WxHxD)	400 x 93 x 283 mm (15¾ x 3¾ x 11¼ in.)
Weight	~ 7.5 kg (16.5 lb) (excluding option cards)
Installation	Wall mounting, 19" rack or table top (see Accessoires)
Max. Load on Top (Table Top Use)	10 kg (22.0 lb)

## Available Accessories

Electrical	
19" Installation Brackets (2x)	Part. Nr. A0888904
Wall Mounting Bracket	Part. Nr. A0888903
Set Ethernet Patch Cables (Cat5e) (6x)	Part. Nr. A0888911
Serial Null Modem Cable (9p)	Part. Nr. S2570244 (3m/12ft) or S2570245 (12m/40 ft)
Tag Plate (Bare)	Part. Nr. A0888107

# Identification Code – Hardware Configuration

## Pos 1 Application

- U** For Inventory Control of Bulk Storage Tanks
- X** Compliant with National W&M Requirements (specify country)

## Pos 2 Base Configuration Hardware

- S** CIU for Tank Inventory Management

## Pos 3 Memory

- A** 4 GB Flash

## Pos 4 Selection

- H** CIU 888 Hardware Configuration

## Pos 5, 6, 7 Product designation

- 8** **8** **8** Communication Interface Unit

## Pos 8 Field Card Slot 1

- Z** Not Used
- M** Serial Modbus Input (Master)
- T** TRL/2 Fieldbus (Contact Honeywell representative)
- B** Enraf Fieldbus (BPM)
- G** Serial GPU (input)

## Pos 9 Field Card Slot 2

- Z** Not Used
- M** Serial Modbus Input (Master)
- T** TRL/2 Fieldbus (Contact Honeywell representative)
- B** Enraf Fieldbus (BPM)
- G** Serial GPU (Input)

## Pos 10 Field and Host Communication Slot 3

- Z** Not Used
- M** Serial Modbus Input (Master)
- T** TRL/2 Fieldbus (Contact Honeywell representative)
- H** Host Serial Modbus (Slave)
- B** Enraf Fieldbus (BPM)
- G** Serial GPU (Input)

## Pos 11 Field and Host Communication Slot 4

- Z** Not Used
- M** Serial Modbus Input (Master)
- T** TRL/2 Fieldbus (Contact Honeywell representative)
- H** Host Serial Modbus (Slave)
- B** Enraf Fieldbus (BPM)
- G** Serial GPU (Input)

## Pos 12 Field and Host Communication Slot 5

- Z** Not Used
- M** Serial Modbus Input (Master)
- T** TRL/2 Fieldbus (Contact Honeywell representative)
- H** Host Serial Modbus (Slave)
- C** Host CIU Emulation
- B** Enraf Fieldbus (BPM)
- G** Serial GPU (Input)

## Pos 13 Field and Host Communication Slot 6

- Z** Not Used
- M** Serial Modbus Input (Master)
- T** TRL/2 Fieldbus (Contact Honeywell representative)
- H** Host Serial Modbus (Slave)
- B** Enraf Fieldbus (BPM)
- C** Host CIU Emulation
- G** Serial GPU (Input)

## Pos 14 Extended Memory

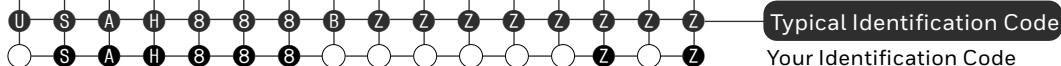
- Z** Not Installed

## Pos 15 Tag Plate

- Z** Not Required
- T** Tag Plate Sticker Added

## Pos 16 Not Used

- Z** Not Used



# Identification Code – Software Functionality

## Pos 1 Application

- U For Inventory Control of Bulk Storage Tanks
- X Compliant with National W&M Requirements (specify country)

## Pos 2 Base Configuration Software

- S Single CIU System
- R Redundancy Enabled Per Unit

## Pos 3 Functionality

- S Based on CIU 888 Tank Gauging Interface

## Pos 4 CIU Type

- F Tank Gauging Software Functionality

## Pos 5, 6, 7 Product designation

- 8 8 8 Communication Interface Unit

## Pos 8, 9 Interfacing and Calculations

- S 1 Scanning Functionality
- V 1 Scanning with Embedded Volume Calculation Module

## Pos 10 Web Monitoring

- S Configuration and Diagnostics

## Pos 11 Host Communication OPC

- Z Not Enabled

## Pos 12 Host Communication Modbus TCP/IP

- Z Not Enabled
- S Standard Ethernet (Modbus slave)

## Pos 13 Host Communication Fault Tolerant Ethernet

- Z Not Enabled

## Pos 14 Remote Diagnostics

- Z Not Enabled

## Pos 15 Field Communication Ethernet

- Z Not Enabled

## Pos 16 One Wireless Connectivity

- Z Not Enabled

## Pos 17, 18 Number of Tanks

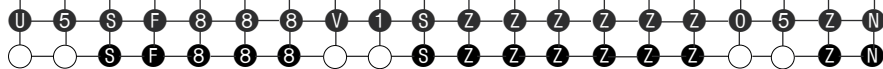
- 0 5 Max. tanks 5
- 1 0 Max. tanks 10
- 2 0 Max. tanks 20
- 3 0 Max. tanks 30
- 4 0 Max. tanks 40
- 5 0 Max. tanks 50
- 6 0 Max. tanks 60
- 7 0 Max. tanks 70
- 8 0 Max. tanks 80

## Pos 19 Language

- Z English Only

## Pos 19A Upgrade

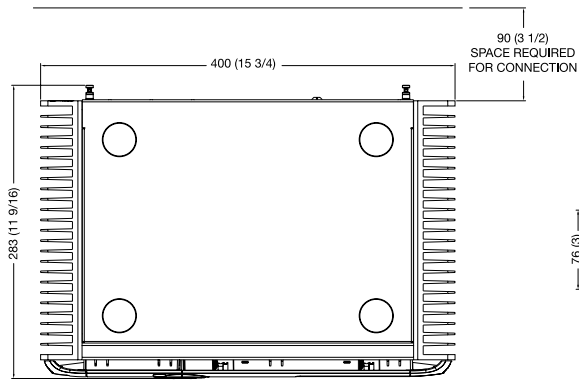
- N New CIU ordering
- U Upgrade  
(Serial number of CIU and License required)



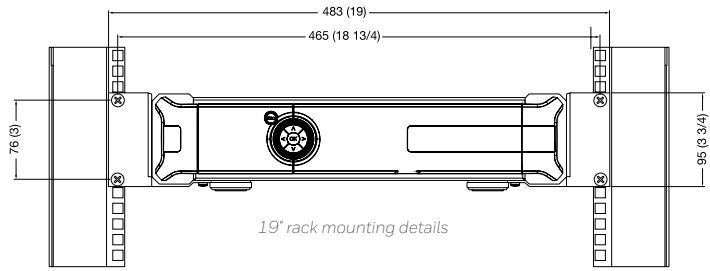
Typical Identification Code

Your Identification Code

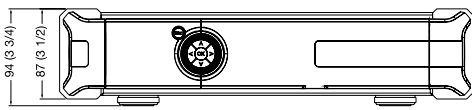
## Overall Dimensions



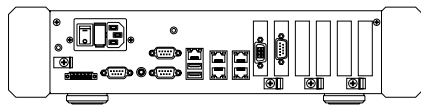
Top view



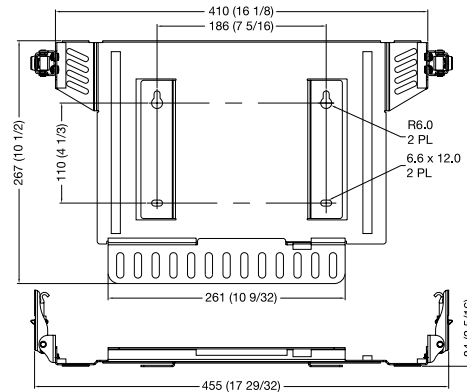
19' rack mounting details



Front view



Rear view



Wall mount bracket

### For More Information

To learn more about Honeywell's Enraf Small Volume Provers, visit [www.honeywellenraf.com](http://www.honeywellenraf.com) or contact your Honeywell account manager.

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