YPP6801 EXPLOSION-PROOF
FEET & INCHES LEVEL METER

- 4-20 mA Input Loop-Powered
- 0.6" (15.2 mm) Feet and Inches Display
- Display up to 399 FT, 11 15/16 IN
- Programmable for 1/8 or 1/16 Inch
- 20-Segment Tank Level Indicator
- 7 Alphanumeric Character, 0.4" (10.2 mm) Lower Display
- Lower Display for Tag, Volume, or Percent
- Through-Glass Button Programming
- 32-Point Linearization
- Open Collector Alarm Output
- Loop-Powered or External DC-Powered Backlight Standard
- HART® Protocol Transparent
- 3.0 V Drop (6.0 V with Backlight)
- Explosion-Proof, IP68, NEMA 4X Enclosure
- Operates from -40 to 75°C
Disclaimer
The information contained in this document is subject to change without notice. Yokogawa makes no representations or warranties with respect to the contents hereof; and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose.

CAUTION: Read complete instructions prior to installation and operation of the meter.

WARNING: Risk of electric shock or personal injury.

Warning

- This product is not recommended for life support applications or applications where malfunctioning could result in personal injury or property loss. Anyone using this product for such applications does so at his/her own risk. Yokogawa Corporation of America shall not be held liable for damages resulting from such improper use.
- Failure to follow installation guidelines could result in death or serious injury. Make sure only qualified personnel perform the installation.
- Never remove the meter cover in explosive environments when the circuit is live.
- Cover must be fully engaged to meet flameproof/explosion-proof requirements.

Limited Warranty
Yokogawa Corporation of America warrants this product against defects in material or workmanship for the specified period under “Specifications” from the date of shipment from the factory. Yokogawa’s liability under this limited warranty shall not exceed the purchase value, repair, or replacement of the defective unit.

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INTRODUCTION

The YPP6801 is a rugged, explosion-proof loop-powered indicator specifically designed for level applications in hazardous areas or in the harshest environmental conditions. The meter displays level in easy to read and understand feet, inches, and fractions of an inch; and a 20-segment tank level indicator. The lower display can show a custom unit or tag, percent full, or a second scale for the 4-20 mA input used to indicate volume.

The meter derives all of its power from the 4-20 mA loop. It is programmed using the four Through-Glass buttons, without removing the cover, and can be scaled with or without a calibration signal.

The upper display will read up to 399 ft – 11 15/16 inches. The alphanumeric volume/tag display will read up to 9,999,999. The alphanumeric display can also be programmed to show any combination of numbers and letters up to seven characters long for use as engineering units and/or the process identification tag. The backlight lets you see the display under any lighting condition and can be powered from either the 4-20 mA loop or from a separate DC power supply.

The enclosure is provided with two threaded conduit holes and integrated pipe or wall mounting slotted flanges.

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>YPP6801-0K1</td>
<td>Explosion-Proof Loop-Powered Feet &amp; Inches Level Meter</td>
</tr>
</tbody>
</table>
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SPECIFICATIONS

Except where noted all specifications apply to operation at +25°C.

**General**

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>Feet &amp; Inches</th>
<th>0.60&quot; (15.2 mm) high 0 to 399(^{FT}) 11(^{15/16})(^{IN}) 7-segment, programmable 1/16 or 1/8 fraction display</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seven characters (Tag &amp;/or Volume)</td>
<td>0.4&quot; (10.2 mm) high 14-segment, 7-digits</td>
</tr>
<tr>
<td></td>
<td>Tank Level Indicator</td>
<td>20-segments, F (Full) and E (Empty)</td>
</tr>
<tr>
<td></td>
<td>Alarm Indication</td>
<td>HI and LO</td>
</tr>
<tr>
<td></td>
<td>Backlight</td>
<td>White</td>
</tr>
</tbody>
</table>

**DISPLAY ASSIGNMENT**

Lower display may be assigned to custom unit or tag, volume, volume and tag, percent height, percent height and tag, or off.

**DISPLAY UPDATE RATE**

Ambient > -25°C: 2 Updates/Second

Ambient < -25°C: 1 Update/5 Seconds

**OVERRANGE AND UNDERRANGE**

Level display flashes to 399\(^{FT}\) 11\(^{15/16}\)\(^{IN}\)

Volume display flashes 999999 if overrange, -999999 if underrange.

**PROGRAMMING METHOD**

Four Through-Glass buttons when cover is installed. Four internal pushbuttons when cover is removed.

**NOISE FILTER**

Programmable low (LO), medium (MED), high (HI), or off (OFF)

**RECALIBRATION**

Recalibration is recommended at least every 12 months.

**PASSWORD**

Programmable password restricts modification of programmed settings.

**NON-VOLATILE MEMORY**

All programmed settings are stored in non-volatile memory for a minimum of ten years if power is lost.

**NORMAL MODE REJECTION**

64 dB at 50/60 Hz

**ENVIRONMENTAL**

Operating temperature range: -40 to 75°C

Storage temperature range: -40 to 75°C

Relative humidity: 0 to 90% non-condensing

**CONNECTIONS**

Screw terminals accept 12 to 22 AWG wire

**ENCLOSURE**

Explosion-proof die cast aluminum with glass window, corrosion resistant epoxy coating, color: green. NEMA 4X, 7, & 9, IP68.

Two ¾" NPT threaded conduit openings. One ¾" NPT metal conduit plug with 12 mm hex key fitting installed.
MOUNTING
May be mounted directly to conduit. Two slotted flanges for wall mounting or NPS 1½" to 2½" or DN 40 to 65 mm pipe mounting. See Mounting Dimensions on page 44.

OVERALL DIMENSIONS
5.65" x 5.25" x 4.86" (W x H x D)
(144 mm x 133 mm x 124 mm)

WEIGHT
5.00 lbs (80 oz, 2.27 kg)

WARRANTY
3 years parts and labor

Input

ACCURACY
±0.03% of calibrated span ±1 count

Input Range
3 to 24 mA

MULTI-POINT LINEARIZATION
2 to 32 points, level and volume independently programmed.

TEMPERATURE DRIFT
50 PPM/°C from -40 to 75°C ambient

CALIBRATION RANGE
An Error message will appear if input 1 and input 2 signals are too close together.
Input Range: 4-20 mA
Input 1 & 2 Minimum Span: 0.10 mA

MAXIMUM VOLTAGE DROP
Without Backlight or with Externally-Powered (DC Powered) Backlight: 3.0 VDC @ 20 mA
With Loop-Powered Backlight: 6.0 VDC @ 20 mA

EQUIVALENT RESISTANCE
150 Ω @ 20 mA without loop-powered backlight. 300 Ω @ 20 mA with loop-powered backlight.

EXTERNALLY POWERED BACKLIGHT
Voltage Range: 9-36 VDC

<table>
<thead>
<tr>
<th>Supply Voltage</th>
<th>9 VDC</th>
<th>12 VDC</th>
<th>24 VDC</th>
<th>36 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Power</td>
<td>0.2 W</td>
<td>0.25 W</td>
<td>0.5 W</td>
<td>0.75 W</td>
</tr>
</tbody>
</table>

INPUT OVERLOAD
Over current protection to 2 A max.

Open Collector Output

RATING
Isolated open collector, 30 VDC @ 150 mA max.

ALARM OUTPUT
Assign to level or volume for high or low alarm trip point.

DEADBAND
0-100% FS, user selectable

ACKNOWLEDGE
Front panel ENTER button and external RESET terminals resets output and screen indication.
Product Ratings and Approvals

FM
- Class I, Division 1, Groups B, C, D
- Class II, Division 1, Groups E, F, G
- Class III, Division 1; T6
- Class I, Zone 1, AEx d IIC T6 Gb
- Zone 21, AEx tb IIIC T85°C
- Ta = -40°C to +75°C
- Enclosure: Type 4X & IP66
- Certificate number: 3048884

ATEX
- Ex II 2 G D
- Ex d IIC T6 Gb
- Ex tb IIIC T85°C Db IP68
- Ta = -40°C to +75°C
- Certificate number: Sira 13ATEX1121X

CSA
- Class I, Division 1, Groups B, C, D
- Class II, Division 1, Groups E, F, G
- Class III, Division 1; T6
- Class I, Zone 1, Ex d IIC T6
- Ta = -40°C to +75°C
- Enclosure: Type 4X & IP66
- Certificate number: 2605742

IECEx
- Ex d IIC T6 Gb
- Ex tb IIIC T85°C Db IP68
- Ta = -40°C to +75°C
- Certificate number: IECEx SIR 13.0042X

Special Conditions for Safe Use:
Use suitably certified and dimensioned cable entry device and/or plug. The equipment shall be installed such that the supply cable is protected from mechanical damage. The cable shall not be subjected to tension or torque. If the cable is to be terminated within an explosive atmosphere, then appropriate protection of the free end of the cable shall be provided.

Year of Construction
This information is contained within the serial number with the first four digits representing the year and month in the YYMM format.

For European Community: The YPP6801 must be installed in accordance with the ATEX directive 94/9/EC, and the product certificate Sira 13ATEX1121X.
Electromagnetic Compatibility

**EMISSIONS**

EN 61326:2006
Safety requirements for measurement, control, and laboratory use – Industrial
Group 1 Class A ISM emissions requirements

<table>
<thead>
<tr>
<th>Radiated Emissions</th>
<th>Class A</th>
</tr>
</thead>
</table>

**IMMUNITY**

EN 61326:2006
Safety requirements for measurement, control, and laboratory use

<table>
<thead>
<tr>
<th>ESD</th>
<th>±4 kV contact, ±8 kV air</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFI – Amplitude Modulated</td>
<td>80-1000 MHz @ 10 V/m, 1.4-2.0 GHz @ 3 V/m, 2.0-2.7 GHz @ 1 V/m, 80% AM (1 kHz)</td>
</tr>
<tr>
<td>EFT</td>
<td>±2 kV DC mains, ±1 kV other</td>
</tr>
<tr>
<td>Telco Surge</td>
<td>±1 kV</td>
</tr>
<tr>
<td>CRFI</td>
<td>3 V, 0.15-80 MHz, 1 kHz 80% AM</td>
</tr>
</tbody>
</table>

SAFETY INFORMATION

**WARNINGS**

- Read complete instructions prior to installation and operation of the meter.
- Installation and service should be performed only by trained service personnel. Service requiring replacement of internal components must be performed at the factory.
- Disconnect from supply before opening enclosure. Keep cover tight while circuits are alive. Conduit seals must be installed within 18" (450mm) of the enclosure.
- Verify that the operating atmosphere of the meter is consistent with the appropriate hazardous locations certifications.
- If the meter is installed in a high voltage environment and a fault or installation error occurs, high voltage may be present on any lead.
INSTALLATION

For Installation in USA: The YPP6801 must be installed in accordance with the National Electrical Code (NEC) NFPA 70.

For Installation in Canada: The YPP6801 must be installed in accordance with the Canadian Electrical Code CSA 22.1. All input circuits must be derived from a CSA approved Class 2 source.

For European Community: The YPP6801 must be installed in accordance with the ATEX directive 94/9/EC and the product certificate Sira 13ATEX1121X.

WARNING

Disconnect from supply before opening enclosure. Keep cover tight while circuits are alive. Conduit seals must be installed within 18" (450mm) of the enclosure.

Wiring connectors are accessed by opening the enclosure. To access electrical connectors, remove the 2 captive screws, then disconnect the ribbon cable from the display module and set the display module aside.

Unpacking

Remove the meter from box. Inspect the packaging and contents for damage. Report damages, if any, to the carrier.

If any part is missing or the meter malfunctions, please contact your supplier or the factory for assistance.

Pre-Installed Conduit/Stopping Plug

The YPP6801 is supplied with one pre-installed conduit plug for installations that do not require the use of both conduit entries. The conduit/stopping plug includes an internal hexagonal socket recess for removal. The pre-installed plug and its installation are included in the hazardous area approvals for the YPP6801.

WARNING

In hazardous areas, conduit and conduit/stopping plugs require the application of non-setting (solvent free) thread sealant. It is critical that all relevant hazardous area guidelines be followed for the installation or replacement of conduit or plugs.
Mounting

The YPP6801 has two slotted mounting flanges that may be used for pipe mounting or wall mounting. Alternatively, the unit may be supported by the conduit using the conduit holes provided.

Refer to Mounting Dimensions, page 44 for details.

**WARNING**

Do not attempt to loosen or remove flange bolts while the meter is in service.

Cover Jam Screw

The cover jam screw should be properly installed once the meter has been wired and tested in a safe environment. The cover jam screw is intended to prevent the removal of the meter cover in a flameproof environment without the use of tools. Using a M2 hex wrench, turn the screw clockwise until the screw contacts the meter. Turn the screw an additional 1/4 to 1/2 turn to secure the cover. Caution: Excess torque may damage the threads and/or wrench.

Connections

**WARNINGS**

- Static electricity can damage sensitive components.
- Observe safe handling precautions for static-sensitive components.
- Use proper grounding procedures/codes.
- If the meter is installed in a high voltage environment and a fault or installation error occurs, high voltage may be present on any lead or terminal.

To access the connectors, remove the enclosure cover and unscrew the two captive screws that fasten the display module. Disconnect the ribbon cable and remove the display module. Signal connections are made to a four-terminal connector in the base of the enclosure. Grounding connections are made to the two ground screws provided on the base – one internal and one external.
Connections (continued)

**SIGNAL +**  
4-20 mA signal input positive terminal connection

**SIGNAL -**  
4-20 mA signal return/negative terminal connection when not using loop powered backlight.

**BACKLIGHT +**  
+9-30 VDC when powering backlight from external supply.

**BACKLIGHT -**  
4-20 mA signal return/negative terminal when using the installed loop powered backlight or ground/negative when powering backlight from external supply.

**OUTPUT+**  
NPN open collector output positive.

**OUTPUT-**  
NPN open collector output negative.

**RESET +**  
Contact closure alarm acknowledge pullup to 3 VDC

**RESET-**  
Contact closure alarm acknowledge ground/negative.

Refer to Figure 1 for terminal positions.

---

**WARNING**  
Observe all safety regulations. Electrical wiring should be performed in accordance with all agency requirements and applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety.

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*Figure 1. Connector Board*
Input Signal & Backlight Connections

Signal and backlight connections are made to a four-terminal connector mounted in the base of the enclosure. For installations without backlight, only the two signal terminals are connected. The 4-20 mA input with no backlight has a maximum voltage drop of 3 V and is wired as shown in Figure 2. The loop-powered backlight configuration requires a total maximum voltage drop of 6 V. The backlight is recommended for dim lighting conditions and is enabled when wired as shown in Figure 3 or Figure 4.

Figure 2. Input Connections without Backlight

Figure 3. Input Connections with Loop-Powered Backlight
It is possible to use the same transmitter (signal loop) power supply for the externally powered backlight. The backlight circuit will draw 25 mA in addition to the loop circuit.

**External Acknowledge Connection**

External acknowledge connections are made to two terminals labeled RESET. Connect to a contact closure source such as a relay or a pushbutton as shown in Figure 5.
Open Collector Output Connections

Output connections are made to two terminals labeled OUTPUT. Connect to an input device such as alarm indicator as shown in Figure 6, or drive a relay as shown in Figure 7.

WARNING
To avoid damaging the YPP6801’s amplifying components, use care not to wire incorrectly or exceed output ratings. A diode, such as 1N4000 series, will provide protection from relay transients.

Figure 6. Connection to Device with Internal Pull-Up

Figure 7. Output Connections
There is **no need to recalibrate** the meter when first received from the factory. The meter is **factory calibrated** prior to shipment. The calibration equipment is certified to NIST standards.

**Overview**

Setup and programming is done through the infrared Through-Glass buttons, or using the mechanical buttons when uncovered. There are two slide switches located on the connector board. One is used to select backlight power (if equipped) and the other is to lock or unlock the Through-Glass Buttons.

After all connections have been completed and verified, connect the ribbon cable to the display module, fasten the display module to the base, install enclosure cover, and then apply power.
Through-Glass Buttons

The YPP6801 is equipped with four sensors that operate as through-glass buttons so that it can be programmed and operated without removing the cover (and exposing the electronics) in a hazardous area. These buttons can be disabled for security by selecting the LOCK setting on the Through-Glass Buttons switch located on the connector board in the base of the enclosure.

Through-Glass Button Operation

To actuate a button, press and remove one finger to the glass directly over the marked button area. Remove finger to at least 4 inches away from the glass in between button activations. Through-Glass and mechanical buttons may be held to cycle through menus or digits in place of repeatedly pushing a button.

The sensors are disabled when a mechanical button is pressed and will automatically be re-enabled after 60 seconds of inactivity.

Through-Glass Button Tips and Troubleshooting

The Through-Glass Buttons are designed to filter normal levels of ambient interference and to protect against false triggering, however it is recommended that the Through-Glass Buttons be turned off (slide Through-Glass Buttons switch to OFF) if there is an infrared interference source in line-of-sight to the display or if the buttons are not needed.

Through-Glass Button Tips:

- To the extent possible, install the display facing away from sunlight, windows, reflective objects and any sources of infrared interference.
- Keep the glass window clean.
- Tighten the cover securely.
- Use a password to prevent tampering.
- If the cover has not been installed and secured tightly, it may take a moment for the Through-Glass buttons to properly self calibrate when the cover is tightened.

Through-Glass buttons will not work if two or more buttons are detected as being pressed simultaneously. As a result, be careful to avoid triggering multiple buttons or reaching across one button location to press another.
## Buttons and Display

<table>
<thead>
<tr>
<th>Button Symbol</th>
<th>Description</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MENU</td>
<td>Menu</td>
<td>FT</td>
<td>Feet</td>
</tr>
<tr>
<td>RESET</td>
<td>Right Arrow/Reset</td>
<td>IN</td>
<td>Inches and Fractional Inches</td>
</tr>
<tr>
<td>DISPLAY</td>
<td>Up Arrow/Display</td>
<td>F</td>
<td>Tank Full Indicator</td>
</tr>
<tr>
<td>ENTER</td>
<td>Enter/Alarm Acknowledge</td>
<td>E</td>
<td>Tank Empty Indicator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HI</td>
<td>High Alarm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LO</td>
<td>Low Alarm</td>
</tr>
</tbody>
</table>
Menu Button

- Press the **Menu** button to enter Programming Mode.
- Press the **Menu** button during Programming Mode to return to return to the previous menu selections.
- Hold the **Menu** button for 1.5 seconds at any time to exit Programming Mode and return to Run mode.
- Press and hold the **Menu** button for 3 seconds to access the *Advanced* features of the meter.

Right / Reset Button

- Press the **Right** arrow button to move to the next digit or decimal position during programming.
- Press **Right** to go backward through most selection menus.

Up / Display Button

- Press **Display** when in Run mode to display the loop input value in $\mu$A. The display will time out in 12 seconds. Press **Display** again to resume normal lower display operation (lower display will read **RESUME**).
- Press the **Up** arrow button to scroll forward through the menus, decimal point, or to increment the value of a digit.

Enter Button

- Press the **Enter** button to access a menu or to accept a setting.
- Press **Enter** to acknowledge alarm (if enabled).
Main Menu

The main menu consists of the most commonly used functions: Setup, Advanced, and Password.

Press MENU button to enter Programming Mode then press the Up Arrow button to scroll through the main menu.

Hold MENU, at any time, to exit and return to Run Mode. Changes made to settings prior to pressing ENTER are not saved.

Press the MENU button during Programming Mode to return to return to the previous menu selections.

Changes to the settings are saved to memory only after pressing ENTER.

The display moves to the next menu every time a setting is accepted by pressing ENTER.
Setting Numeric Values

The numeric values are set using the RIGHT and UP arrow buttons. Press RIGHT arrow to select next digit and UP arrow to increment digit. The digit being changed blinks.

Press the ENTER button, at any time, to accept a setting.

Hold MENU, at any time, to exit and return to Run Mode. Changes made to settings prior to pressing ENTER are not saved.

Press the MENU button during Programming Mode to return to return to the previous menu selections.

Select Next Digit  Increment Digit  Accept Setting
Setting Up the Meter (SETUP)

The Setup menu is used to select:

1. Feet and inches display scale
2. Inch fraction display mode
3. Tank indicator full value
4. Bottom display selection

Press the ENTER button to access any menu or press UP arrow button to scroll through choices.

Hold MENU, at any time, to exit and return to Run Mode. Changes made to settings prior to pressing ENTER are not saved.

Press the MENU button during Programming Mode to return to return to the previous menu selections.
Setup Menu Display Functions & Messages

The meter displays various functions and messages during setup, programming, and operation. The following table shows the Setup menu functions and messages in the order they appear in the menu.

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter</th>
<th>Action/Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>SETUP</td>
<td>Setup</td>
<td>Enter Setup menu</td>
</tr>
<tr>
<td>SCALE</td>
<td>Scale</td>
<td>Enter the Scale menu for feet and inches</td>
</tr>
<tr>
<td>INPUT 1</td>
<td>Input 1</td>
<td>Set input 1 value in μA</td>
</tr>
<tr>
<td>DISPLAY 1</td>
<td>Display 1</td>
<td>Set display 1 feet and inches</td>
</tr>
<tr>
<td>INPUT 2</td>
<td>Input 2</td>
<td>Set input 2 value in μA</td>
</tr>
<tr>
<td>DISPLAY 2</td>
<td>Display 2</td>
<td>Set display 2 feet and inches</td>
</tr>
<tr>
<td>SAVE ?</td>
<td>Save</td>
<td>Save entered scale parameters</td>
</tr>
<tr>
<td>SPN ERR</td>
<td>Span Error</td>
<td>Scale point 1 and 2 span error</td>
</tr>
<tr>
<td>FRACTN</td>
<td>Fraction</td>
<td>Enter the Program menu</td>
</tr>
<tr>
<td>1/16th</td>
<td>1/16th</td>
<td>Set display for 1/16(^{th}) inch fractions</td>
</tr>
<tr>
<td>OFF</td>
<td>Off</td>
<td>Turn off inch fraction display</td>
</tr>
<tr>
<td>1/8th</td>
<td>1/8th</td>
<td>Set display for 1/8(^{th}) inch fractions</td>
</tr>
<tr>
<td>TANK HT</td>
<td>Tank height</td>
<td>Enter the Tank Height Indicator menu</td>
</tr>
<tr>
<td>DISPLAY</td>
<td>Display</td>
<td>Enter Bottom Display menu</td>
</tr>
<tr>
<td>TAG</td>
<td>Tag</td>
<td>Display a custom unit or tag</td>
</tr>
<tr>
<td>VOLUME</td>
<td>Volume</td>
<td>Display volume</td>
</tr>
<tr>
<td>VOL+TAG</td>
<td>Volume + Tag</td>
<td>Display volume and custom tag</td>
</tr>
<tr>
<td>PCT HT</td>
<td>Percent Height</td>
<td>Display percent height</td>
</tr>
<tr>
<td>PCT+TAG</td>
<td>Percent Height</td>
<td>Display percent height and custom tag</td>
</tr>
</tbody>
</table>

For instructions on how to program numeric values, see Setting Numeric Values on page 21.
Scaling the Meter (SCALE)

The 4-20 mA input is scaled to display the process in feet and inches. To scale the meter, enter the values in micro-amps (μA) for input 1, and then the corresponding feet and inches display value. Do the same for input 2.

Note: 4,000 μA = 4 mA, 20,000 μA = 20 mA

After entering the display 2 value, confirm the new scale by pressing ENTER at the Save menu.

A signal source is not needed to scale the meter; simply program the inputs and corresponding display values.

Programming Note

When programming the left-most digit of the feet and inches display during Display 1 and Display 2 programming, a zero is represented by \( \text{Z} \). This left most zero character will not display during operation, and is only used when programming the left-most display digit.

For instructions on using multipoint scaling, see Level Input Multipoint Linearization (MULTIPT) on page 36.

For instructions on how to program numeric values see Setting Numeric Values, page 21.
Minimum Input Span

The minimum input span is the minimum difference between input 1 and input 2 signals required to complete the calibration or scaling of the meter. The minimum span is 100 μA.

Scale Error Message (SPN ERR)

If the minimum span is not maintained, the meter will show a span error (SPN ERR) and revert to input 2, allowing the appropriate input signals to be applied.

Selecting Inch Fraction Display Mode (FRACTN)

The display may be programmed to display fractions of an in 1/8th or 1/16th increments, or to show no fraction.

Scaling the Tank Height Indicator (TANK HT)

The display includes a 20-segment tank height indicator. This menu sets full value, in feet and inches, for the tank height indicator.

This value may differ from the 20 mA (20,000 μA) full-scale value programmed in the Scale menu. This is ideal for level transmitters that output less than 20 mA at the maximum height of the tank or pit.

As an example, when using a level transmitter that outputs 20 mA at 250 feet, the tank height indicator may be set for 100 feet, 0 inches. At 100 feet 0 inches on the display, the tank height indicator will show as full, even though the input is not 20 mA.
Configuring the Lower Display (DISPLAY)

The lower display may be configured to display a custom tag (TAG), volume (VOLUME), volume and tag (VOL+TAG), percent of full height (PCT HT), or percent of full height and tag (PCT+TAG), or be blank (OFF).

A custom tag may be up to seven alphanumeric characters programmed for identification (e.g. TANK 3) or for engineering units (e.g. GALLONS).

Volume is a separate, second scale of the input process variable. This is configured in Volume Display Scaling (VOLSCAL) on page 32.

Percent full height shows the percent full of the tank height level indicator programmed in the Scaling the Tank Height Indicator (TANK HT) menu, on page 25.
Setting the TAG (TAG)

Any bottom display setting that includes a tag will require the tag to be entered.

The fully alphanumeric values for the tag are set using the RIGHT button to select the digit, the UP and RIGHT arrow buttons to select the digit reading, and the ENTER button to confirm and select the next digit.
Advanced Features Menu (ADVANCE)

To simplify the setup process, functions not needed for most applications are located in the Advanced features menu. Access the Advanced features menu by pressing ENTER at the Advance menu in the Main Menu defined on page 20.

The Advanced menu is used to select:

1. Open collector output configuration (OUTPUT)
2. Input filter (FILTER)
3. Volume display scale (VOLSCAL)
4. Live signal level display calibration (LVL CAL)
5. Internal Calibration (ICAL)
6. Multipoint linearization for level (MULTIPT)
7. Meter system information display (INFO)
Advanced Features Menu & Display Messages

The following table shows the *Advanced* features menu functions and messages in the order they appear in the menu.

<table>
<thead>
<tr>
<th>Display</th>
<th>Parameter</th>
<th>Action/Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT</td>
<td>Output</td>
<td>Enter output menu</td>
</tr>
<tr>
<td>OFF</td>
<td>Off</td>
<td>Disable output</td>
</tr>
<tr>
<td>ALARM</td>
<td>Alarm Output</td>
<td>Enter alarm output menu</td>
</tr>
<tr>
<td>LEVEL</td>
<td>Level Alarm</td>
<td>Assign alarm output to level</td>
</tr>
<tr>
<td>SET</td>
<td>Set Point</td>
<td>Set alarm set point</td>
</tr>
<tr>
<td>RESET</td>
<td>Reset Point</td>
<td>Set alarm reset point</td>
</tr>
<tr>
<td>VOLUME</td>
<td>Volume Alarm</td>
<td>Assign alarm output to volume</td>
</tr>
<tr>
<td>FILTER</td>
<td>Filter</td>
<td>Set noise filter</td>
</tr>
<tr>
<td>LO</td>
<td>Filter Low</td>
<td>Set noise filter to low setting</td>
</tr>
<tr>
<td>MED</td>
<td>Filter Medium</td>
<td>Set noise filter to medium setting</td>
</tr>
<tr>
<td>HI</td>
<td>Filter High</td>
<td>Set noise filter to high setting</td>
</tr>
<tr>
<td>OFF</td>
<td>Filter Off</td>
<td>Disable noise filter</td>
</tr>
<tr>
<td>VOLSCAL</td>
<td>Volume Scale</td>
<td>Scale the volume display</td>
</tr>
<tr>
<td>NO PTS</td>
<td>Number of Points</td>
<td>Set the number of points for volume scaling</td>
</tr>
<tr>
<td>INPUT 1</td>
<td>Input 1</td>
<td>Set volume input 1 on the level display</td>
</tr>
<tr>
<td>DISPLY 1</td>
<td>Display 1</td>
<td>Set volume display 1</td>
</tr>
<tr>
<td>INPUT 2</td>
<td>Input 2</td>
<td>Set volume input 2 on the level display</td>
</tr>
<tr>
<td>DISPLY 2</td>
<td>Display 2</td>
<td>Set volume display 2</td>
</tr>
<tr>
<td>SAVE ?</td>
<td>Save</td>
<td>Save entered volume scale parameters</td>
</tr>
<tr>
<td>LVL CAL</td>
<td>Level Calibration</td>
<td>Calibrate the level display</td>
</tr>
<tr>
<td>INPUT 1</td>
<td>Input 1</td>
<td>Calibrate input 1 value</td>
</tr>
<tr>
<td>DISPLY 1</td>
<td>Display 1</td>
<td>Set display 1 feet and inches</td>
</tr>
<tr>
<td>INPUT 2</td>
<td>Input 2</td>
<td>Calibrate input 2 value</td>
</tr>
<tr>
<td>DISPLY 2</td>
<td>Display 2</td>
<td>Set display 2 feet and inches</td>
</tr>
<tr>
<td>SAVE ?</td>
<td>Save</td>
<td>Save entered calibration parameters</td>
</tr>
<tr>
<td>ICAL</td>
<td>Internal Calibration</td>
<td>Enter internal reference calibration</td>
</tr>
<tr>
<td>Display</td>
<td>Parameter</td>
<td>Action/Setting</td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>4mA</td>
<td>4 mA</td>
<td>Calibrate input at 4 mA</td>
</tr>
<tr>
<td>20mA</td>
<td>20 mA</td>
<td>Calibrate input at 20 mA</td>
</tr>
<tr>
<td>ERRSPAN</td>
<td>Error Span</td>
<td>Error with calibration point 1 and 2 span</td>
</tr>
<tr>
<td>MULTIPT</td>
<td>Multipoint</td>
<td>Set level display multipoint linearization</td>
</tr>
<tr>
<td>DISABLE</td>
<td>Disable</td>
<td>Disable multipoint linearization</td>
</tr>
<tr>
<td>ENABLE</td>
<td>Enable</td>
<td>Enable multipoint linearization</td>
</tr>
<tr>
<td>INFO</td>
<td>Meter Information</td>
<td>Show software number and version, or reset to factory defaults</td>
</tr>
<tr>
<td>SOFT</td>
<td>Software</td>
<td>Software number</td>
</tr>
<tr>
<td>VERSION</td>
<td>Software Version</td>
<td>Software version</td>
</tr>
<tr>
<td>DFALTSP</td>
<td>Reset Defaults</td>
<td>Restore factory default parameter settings</td>
</tr>
</tbody>
</table>

For instructions on how to program numeric values, see Setting Numeric Values on page 21.
Alarm Output (OUTPUT)

The YPP6801 is equipped with an NPN open collector output that may be set up for high or low alarm trip point based on the feet and inches level display (LEVEL) or the volume scale (VOLUME). The output may be disabled by selecting OFF.

When the alarm is enabled for level, the HI and LO symbols are used and will flash, accompanied by a flashing level display. A tank height indicator segment will flash at the level the alarm is set to while the level indicator is at or above the alarm point.

When the alarm is enabled for volume, the HI and LO symbols are used and will flash, accompanied by a flashing bottom display.

To set a high alarm, program the set point above the reset point.

To set a low alarm, program the set point below the reset point.

To acknowledge an alarm, press the ENTER button once for acknowledge prompt and a second time to confirm. Acknowledging an alarm will turn off the alarm output and stop the display from flashing. The HI or LO symbol will remain until the alarm condition is cleared.

The alarm status will show on the display even if the output is not wired.
Input Signal Filter (FILTER)

The noise filter is available for unusually noisy signals that cause an unstable process variable display. The noise filter averages the input signal over a certain period. The filter level can be set to low (LO), medium (MED), high (HI), or off (OFF). The higher the filter setting, the longer the averaging time and so the longer the display may take to find its final value.

The filter contains a noise filter bypass feature so that while small variations in the signal will be filtered out, large, abrupt changes to the input signal are displayed immediately.

Volume Display Scaling (VOLSCAL)

Volume may be scaled as a function of the feet and inches level display. It may use up to 32-point linearization. The multi-point linearization can be used to linearize the display for non-linear signals such as those from level transmitters used to measure volume in odd-shaped tanks.

To display the volume, select a bottom display including the volume display in the Display menu as shown in Configuring the Lower Display (DISPLAY) on page 26.
To scale the volume display, enter the level in feet and inches for input 1, and then the corresponding volume display value. Do the same for input 2.

After entering the display 2 value, confirm the new volume scale by pressing ENTER at the Save menu.

**Level Input Live Signal Calibration (LVL CAL)**

The meter can be calibrated using a current source instead of scaling. This process will override previously programmed scaling of the feet and inches display.

The use of a calibrated signal source is strongly recommended.
LVL CAL

INPUT 1

Display Flashes Accepting Input

DISPLAY

Set Display 1 Level Value

Calibrate Input 2

SAVE?

Press ENTER to Save Calibration and Exit Programming
Internal Calibration (ICAL)

There is no need to recalibrate the meter when first received from the factory. The meter is factory calibrated prior to shipment. The calibration equipment is certified to NIST standards.

The internal calibration is the meter’s master calibration that makes scaling the meter without a signal source possible. Use of a calibrated signal source is necessary to perform an internal calibration of the meter. Check calibration of the meter at least every 12 months. Incorrect calibration will affect the ability of the meter to properly read, scale, and display the input.

Notes:
The signal source must have a full-scale accuracy of 0.002% or better between 4 and 20 mA in order to maintain the specified accuracy of the meter.
Allow the meter to warm up for at least 15 minutes before performing the calibration procedure.

Press and hold the MENU button for 5 seconds to enter the Advanced features menu. Press the UP arrow button to scroll to the Internal Calibration menu (ICAL) and press ENTER.
The meter displays 4 mA. Apply a 4.000 mA signal and press ENTER. The display flashes for a moment while the meter is accepting the signal.
After the signal is accepted, the meter displays 20 mA. Apply a 20.000 mA signal and press ENTER. The display flashes for a moment while the meter is accepting the signal.

Calibration Error Message (ERRSPAN)

An error message indicates that the calibration process was not successful. After the error message is displayed, the meter will revert to the 4 mA calibration menu. The error message might be caused by inadvertently leaving the signal at the previous level or not maintaining the minimum span. Press the MENU button to cancel the current calibration process if necessary.
Level Input Multipoint Linearization (MULTIPT)

This menu enables multipoint linearization for scaling and calibrating of the level display.

Setting MULTIPT to ENABLE will alter the level display Scaling (See Scaling the Meter (Scale) on page 24) and Level Calibration (See Level Input Live Signal Calibration (Lvl Cal) on page 33) menus to include a Number of Points (No Pts) parameter before entering Input 1.

32-point linearization can be used to linearize the display for non-linear signals.

Information (INFO)

The Information menu shows the software identification number and version number. To determine the software version of a meter:

Go to the Information menu (INFO) and press ENTER button.

Continue pressing ENTER to scroll through the software release number and software version.

Following the information display, the meter will exit the Advanced features menu and return to run mode.
Setting Up the Password (PASSWRD)

The Password menu is used to program a five-digit password to prevent unauthorized changes to the programmed parameter settings. A password protected meter will display LOCKED when the MENU button is pressed.

**Locking the Meter**

Enter the Password menu and program a five-digit password.

For instructions on how to program numeric values see Setting Numeric Values, page 21.

Record the password for future reference. If appropriate, it may be recorded in the space provided.

<table>
<thead>
<tr>
<th>Model:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial Number:</td>
<td></td>
</tr>
<tr>
<td>Password:</td>
<td>__ __ __ __ __</td>
</tr>
</tbody>
</table>

**Making Changes to a Password Protected Meter**

If the meter is password protected, the meter will display the message LOCKED when the Menu button is pressed. Press the Enter button while the message is being displayed and enter the correct password to gain access to the menu. After exiting the programming mode, the meter returns to its password protected condition.
Disabling Password Protection

To disable the password protection, access the Password menu and enter the correct password, as shown below.

If the correct five-digit password is entered, the meter displays the message UNLOCKD (unlocked) and the protection is disabled until a new password is programmed.

If the password entered is incorrect, the meter displays the message LOCKED and returns to Run Mode. To try again, repeat the above procedure.

Did you forget the password?
The password may be disabled by entering a master password. If you are authorized to make changes, enter the master password 50865 to unlock the meter.
## OPERATION

### Front Panel Buttons Operation

<table>
<thead>
<tr>
<th>Button Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MENU</strong></td>
<td>Press to Enter or Exit Programming Mode</td>
</tr>
<tr>
<td><strong>RESET</strong></td>
<td>Used During Programming Mode Only</td>
</tr>
</tbody>
</table>
| **DISPLAY** | Press to Display Input Current in μA  
Press to Resume Run Mode in Lower Display  
*Note: 1,000 μA = 1 mA* |
| **ENTER** | Press to Acknowledge Alarm (if Enabled) |
Display Measurement Input Current (LOOP μA)

The measured input loop current may be displayed on the lower display. This is most often used to troubleshoot the installation.

To display the measured input loop current, press the DISPLAY button. The meter will display LOOP μA, followed by the measured input current in micro-amps (μA). The current display will remain for 10 seconds, and then the lower display will return to the normal run mode lower display as programmed in Configuring the Lower Display (DISPLAY) on page 26.

Note: 1,000 μA = 1 mA
Example: 4,000 μA = 4 mA
20,000 μA = 20 mA

Press DISPLAY while displaying the input current to return to the normal operation. The meter will display RESUME followed by the run mode lower display.

Press DISPLAY while displaying the input current to return to the normal operation. The meter will display RESUME followed by the run mode lower display.

Run Mode
Reset Meter to Factory Defaults

When the parameters have been changed in a way that is difficult to determine what’s happening, it might be better to start the setup process from the factory defaults.

Instructions to load factory defaults:

Enter the Advanced features menu.

Press and hold RESET button when INFO is shown. For information on navigating to the Information menu, refer to Advanced Features Menu on page 28.

Press ENTER when DFALTS? prompt is flashing.

Note: If ENTER is not pressed within three seconds, the prompt will stop flashing return to run mode.

Hold ▶️ for 5 Seconds

INFO → IFALTS? → LOADING

Flash Defaults

Factory Defaults Restored
Factory Defaults & User Settings

The following table shows the factory setting for most of the programmable parameters on the meter. Next to the factory setting, the user may record the new setting for the particular application.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Display</th>
<th>Default Setting</th>
<th>User Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Setup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input 1</td>
<td>INPUT 1</td>
<td>4.000 mA</td>
<td></td>
</tr>
<tr>
<td>Display 1</td>
<td>DSPLY 1</td>
<td>00 ft 00 in 0/16</td>
<td></td>
</tr>
<tr>
<td>Input 2</td>
<td>INPUT 2</td>
<td>20.00 mA</td>
<td></td>
</tr>
<tr>
<td>Display 2</td>
<td>DSPLY 2</td>
<td>100 ft 00 in 0/16</td>
<td></td>
</tr>
<tr>
<td>Fraction</td>
<td>FRACTN</td>
<td>1/16th</td>
<td></td>
</tr>
<tr>
<td>Tank Indicator Height</td>
<td>TANK HT</td>
<td>100 ft 00 in 0/16</td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>DISPLAY</td>
<td>Tag</td>
<td></td>
</tr>
<tr>
<td>Tag</td>
<td>TAG</td>
<td>TANK 1</td>
<td></td>
</tr>
<tr>
<td>Advanced Features</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>OUTPUT</td>
<td>Off</td>
<td></td>
</tr>
<tr>
<td>Filter</td>
<td>FILTER</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Volume Scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Points</td>
<td>NO PTS</td>
<td>02</td>
<td></td>
</tr>
<tr>
<td>Volume Scale Input 1</td>
<td>INPUT 1</td>
<td>00 ft 00 in 0/16</td>
<td></td>
</tr>
<tr>
<td>Volume Display 1</td>
<td>DSPLY 1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Volume Scale Input 2</td>
<td>INPUT 2</td>
<td>100 ft 00 in 0/16</td>
<td></td>
</tr>
<tr>
<td>Volume Display 2</td>
<td>DSPLY 2</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>Multipoint</td>
<td>MULTIPT</td>
<td>Disable</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td>PASSWRD</td>
<td>00000 (unlocked)</td>
<td></td>
</tr>
</tbody>
</table>
TROUBLESHOOTING

The rugged design and the user-friendly interface of the meter should make it unusual for the installer or operator to refer to this section of the manual. If the meter is not working as expected, refer to the recommendations below.

Troubleshooting Tips

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Check/Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>No display or faint display</td>
<td>Check input signal connections. Perform hard reset by shorting S+ and S- terminals.</td>
</tr>
<tr>
<td>Level display unsteady</td>
<td>Increase filter setting in Advanced menu.</td>
</tr>
<tr>
<td>Meter displays error message during calibration (ERROR)</td>
<td>Check signal connections. Verify minimum input span requirements</td>
</tr>
<tr>
<td>Lever display flashing 399 ft 11 in.</td>
<td>Check input signal and scaling within range of 399 ft 11 in.</td>
</tr>
<tr>
<td>Meter flashes 9999999 or -999999</td>
<td>Check level display within volume scale range of 9999999 and -999999.</td>
</tr>
<tr>
<td>Display response is too slow</td>
<td>Check filter setting to see if it can be lowered to LO or OFF.</td>
</tr>
<tr>
<td>If the display locks up or the meter does not respond at all</td>
<td>Perform hard reset by shorting S+ and S-terminals.</td>
</tr>
<tr>
<td>Backlight does not appear</td>
<td>Backlight is intended for viewing assistance in dim lighting conditions. It may not be noticeable under good lighting conditions. Check connections are as shown in Figure 3 or Figure 4 on page 13.</td>
</tr>
<tr>
<td>Other symptoms not described above</td>
<td>Call Technical Support for assistance.</td>
</tr>
<tr>
<td>Through-Glass buttons do not respond</td>
<td>Mechanical buttons may have been pushed. The Through-Glass buttons will be re-enabled automatically 60 seconds after the last button push. If slide switch on connector board is in Lock position, switch to Unlock. Sunlight can interfere with the sensors. It is recommended to shield the window from sunlight while operating the buttons by standing so as to block direct sunlight.</td>
</tr>
</tbody>
</table>
MOUNTING DIMENSIONS
All units: inches [mm]

Figure 8. Enclosure Dimensions – Front View
Figure 9. Enclosure Dimensions – Side Cross Section View
QUICK USER INTERFACE REFERENCE

<table>
<thead>
<tr>
<th>Pushbutton</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>MENU</td>
<td>Go to programming mode or leave programming. Hold for 5 seconds to enter Advanced feature menu directly.</td>
</tr>
<tr>
<td>RIGHT Arrow</td>
<td>Move to next digit. Go to previous menu or alphanumeric character selection</td>
</tr>
<tr>
<td>UP Arrow</td>
<td>Move to next selection or increment digit. Go to or cancel μA display mode.</td>
</tr>
<tr>
<td>ENTER</td>
<td>Accept selection/value and move to next selection. Acknowledge alarms.</td>
</tr>
</tbody>
</table>

Operational Modes

- Advanced Features
- Run
- μA Display
- Program

- Hold MENU for 5 seconds
- UP Arrow
- MENU
Main Menu

Run Mode → Display Input uA

- Setup
  - Advance
  - Password

- Scale
  - Fraction
  - Tank Height
  - Display

Advanced Menu

- Output
  - Alarm
  - Volume

  - Filter
    - Off
    - Low
    - Medium
    - High

  - Level
  - Calibration

  - Input Calibrate

  - Multipoint
    - Enable
    - Disable

- Information
  → Software
  → Version

*Factory Defaults

*Access by holding Right/Reset for 3 seconds
EC DECLARATION OF CONFORMITY

Issued in accordance with ATEX Directive 94/9/EC

Manufacturer: Yokogawa Corporation of America
2 Dart Road
Newnan, Georgia 30265 USA

Device: YPP6801 Series Process Meter

Notified Body: Sira Certification Service, notified body no. 0518
Rake Lane, Eccleston, Chester, CH4 9JN, England

EC Type Examination Certificate: Sira 13ATEX1121X
Quality Assurance Notification No.: ITS12ATEXQ7640

Compliance with Standards: Product Markings:

EN 60079-0:2009 Ex II 2 G D
EN 60079-1:2007 Ex d IIC T6 Gb
EN 60079-31:2008 Ex tb IIIC T85°C Db IP68
EN 61326:2006 Tamb -40°C to +75°C
IEC 61010-1:2010 & EN 61010-1:2010, including Group and National Differences as they apply for AU, CA, US and KR

Community Directives:

94/9/EC ATEX Directive
2004/108/EC EMC Directive

Company: Yokogawa Corporation of America
Date: 6/6/2013