

# **SM 3000 Smart Meter User's Manual**

**34-ST-25-08D  
03/96**

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## About This Publication

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The SM 3000 Smart Meter User's Manual provides a description of the SM 3000 and procedures for installing, operating, and calibrating the SM 3000. It is intended to supplement the given transmitter documentation.



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<b>Publication Title</b>	<b>Publication Number</b>
<i>ST 3000 Smart Transmitter and SFC Smart Field Communicator User's Manual (for Series 100/600)</i>	34-ST-25-09
<i>ST 3000 Smart Transmitter Series 100e/900 and SFC Smart Field Communicator User's Manual</i>	34-ST-25-11
<i>STT 3000 Smart Temperature Transmitter User's Manual</i>	34-ST-25-10
<i>MagneW 3000 Magnetic Flowmeter User's Manual</i>	36-KI-25-01



## CE Conformity (Europe) Notice for Remote SM 3000 Smart Meters

### About conformity and special conditions

This product is in conformity with the protection requirements of 89/336/EEC, the EMC Directive. Conformity of this product with any other "CE Mark" Directive(s) shall not be assumed.

Deviation from the installation conditions specified in this manual, and the following special conditions, may invalidate this product's conformity with the EMC Directive.

- You must use shielded, twisted-pair cable such as Belden 9318 for all signal/power wiring.
- You must connect the shield to ground at only one end of the cable. Connect it to the power supply and the meter sides of the wiring; leave the shield insulated at the transmitter side of the wiring. The explosionproof meter housing has an internal ground screw terminal.
- You must connect the explosionproof meter housing to ground through its internal or external ground screw terminal.

### ATTENTION

#### ATTENTION

The emission limits of EN 50081-2 are designed to provide reasonable protection against harmful interference when this equipment is operated in an industrial environment. Operation of this equipment in a residential area may cause harmful interference. This equipment generates, uses, and can radiate radio frequency energy and may cause interference to radio and television reception when the equipment is used closer than 30 meters (98 feet) to the antenna(e). In special cases, when highly susceptible apparatus is used in close proximity, the user may have to employ additional mitigating measures to further reduce the electromagnetic emissions of this equipment.

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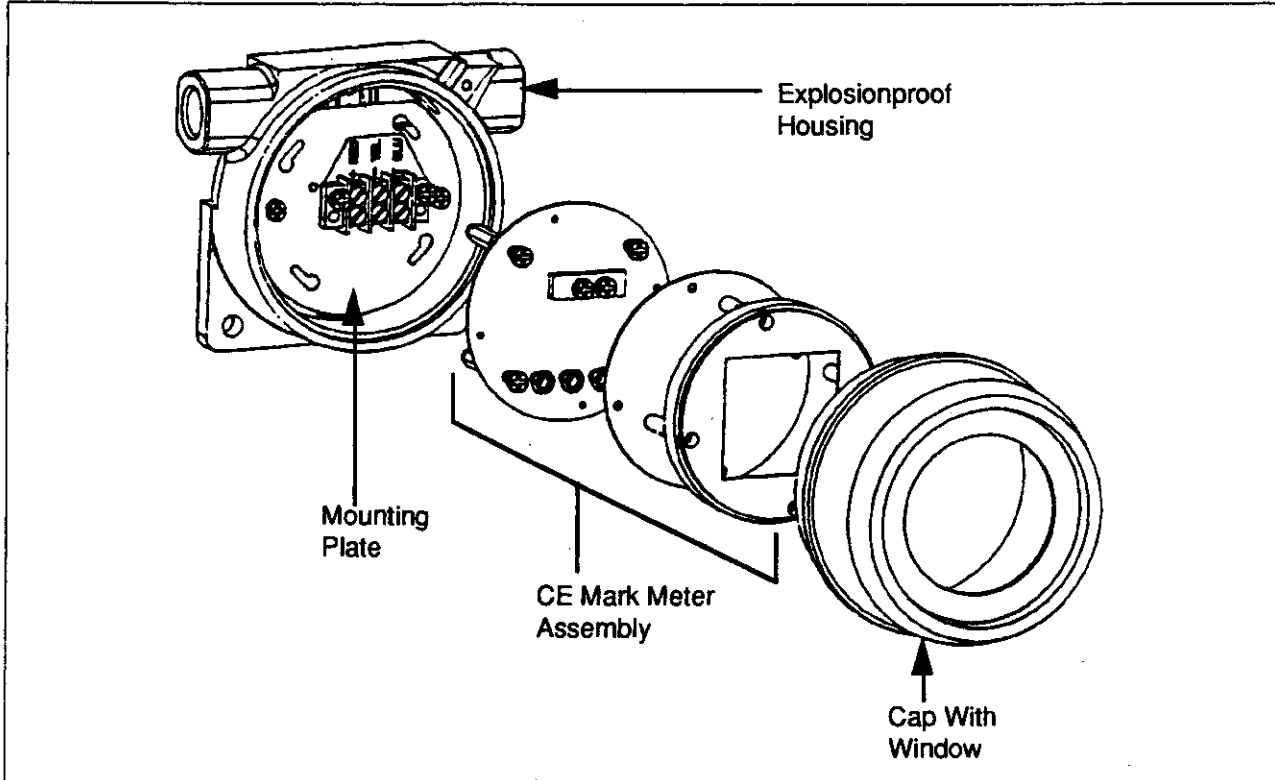
## CE Conformity (Europe) Notice , Continued

### CE Mark meter assembly

The SM 3000 meter assembly for CE Mark includes an integral filter plate and an associated mounting plate in the explosionproof housing as shown in Figure 1. To install a CE Mark SM 3000 Smart Meter:

- Remove cap from explosionproof housing.
- Turn meter assembly counter-clockwise until it can be pulled from the mounting plate in the housing.
- Connect field wiring to terminal block in housing.
- Align four stand-offs on bottom of meter assembly with holes in the mounting plate, insert bottom of stand-offs into holes, and turn meter assembly clockwise to lock in place. Be sure meter is oriented properly for viewing through the cap window.
- Replace cap.

Figure 1 SM 3000 Meter Assembly for CE Mark.



# Section 1 – SM 3000 Smart Meter

## 1.1 Overview

---

<b>Purpose of this manual</b>	This manual describes how to use and operate an SM 3000 Smart Meter with a given Honeywell Smartline™ Transmitter or an applicable non-Honeywell transmitter.
<b>Reader assumptions</b>	We assume that you are somewhat familiar with your Honeywell Smartline Transmitter. If you are not, we recommend that you have the instruction manual for your transmitter on hand when you install the SM 3000 Smart Meter.
<b>How to use this manual</b>	<p>If you have installed and used the SM 3000 Smart Meter before, just skim the data to find the pertinent installation procedure.</p> <p>If this is your first SM 3000 Smart Meter installation, we recommend that you read this manual before you install the SM 3000.</p>

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**In this manual**

These main topics are covered in this manual.

Topic	See Page
2.1 Function and Design	2
3.1 Integral Mounting in Series 100/600 ST 3000	7
3.2 Integral Mounting in Series 100e/900 ST 3000	9
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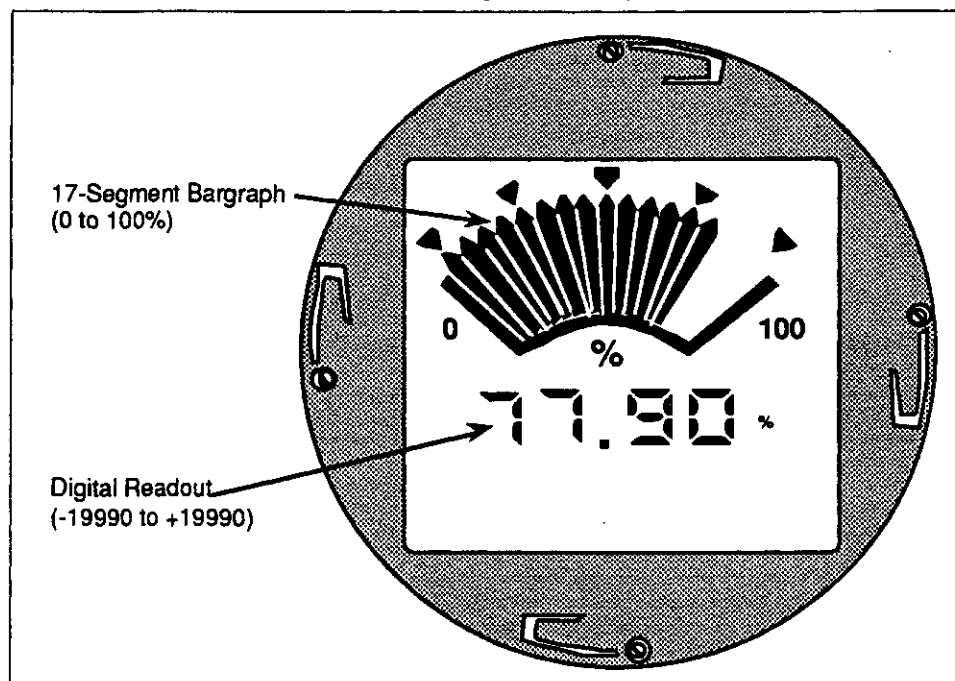
## Section 2 – SM 3000 Description

### 2.1 Function and Design

#### About the SM 3000

The SM 3000 Smart Meter functions as an output and status indicator for a compatible Honeywell Smartline Transmitter or just as an output indicator for a non-Honeywell transmitter operating in a 4 to 20 mA current loop. Figure 1 shows a typical output reading in percent. The digital reading can be in selected engineering units for a Smartline Transmitter.

Figure 1 Typical SM 3000 Output Reading in Percent.



#### Compatible Smartline transmitters

You can use the SM 3000 with any one of these Honeywell Smartline Transmitters operating in either the analog (4 to 20 mA) or Honeywell proprietary digital enhanced (DE) mode.

- ST 3000™ Smart Transmitter (pressure)
- STT 3000™ Smart Temperature Transmitter
- MagneW 3000™ Electromagnetic Flowmeter

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## 2.1 Function and Design, Continued

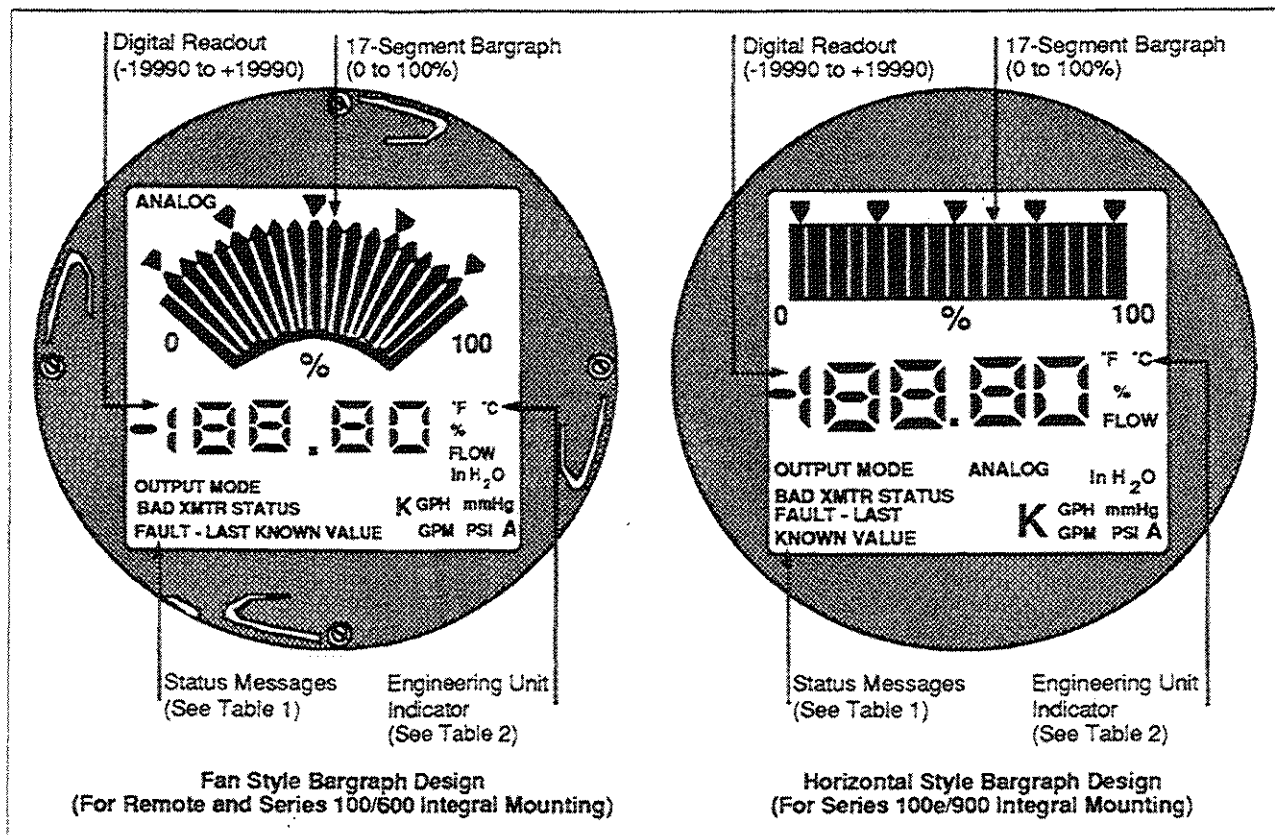
### Two meter designs

The SM 3000 with a fan style bargraph display is used in all applications except those involving a Series 100e/900 ST 3000 Smart Transmitters with an integral meter.

The SM 3000 with horizontal style bargraph display is used as an integral meter for Series 100e/900 ST 3000 Smart Transmitters only.

Figure 2 shows the fan style and horizontal style bargraph designs for comparison. The meters are identical otherwise.

Figure 2 SM 3000 Meter Designs.



### Meter attributes

As shown in Figure 2, the SM 3000 has these attributes.

- A 17-Segment *Bargraph* gives a gross indication of the transmitter's PV output from 0 to 100% that can be read from up to 30 feet away.

*Continued on next page*

## 2.1 Function and Design, Continued

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### Meter attributes, continued

- *A Digital Readout* gives a precise indication of transmitter output from -19990 to +19990 in the selected engineering unit. The engineering units vary with the transmitter type and they are easily selected with a press of a button on the side of the meter. Note that indications in the range of  $\pm 199.9$  will include a decimal point. Also, readings above 19990 are automatically converted by a 1000 display multiplier so that a value of 20000 would be displayed as 20.0 K.
- *Status Messages* serve as on-line diagnostics and operational flags for various detectable loop conditions and transmitter functions. Refer to Table 1 for a list of the messages and the detectable conditions/functions they represent. Note that both the bargraph and the digital readout flash while a diagnostic message is displayed.
- *Engineering Unit Indicators* show what the digital readout represents. These eight units are programmable for display on the LCD:
  - in H<sub>2</sub>O
  - PSI
  - mm Hg
  - °F
  - °C
  - GPM
  - GPH
  - %
- In square root mode, the display is 0 to 100% calibrated span.

### **ATTENTION**

A sheet (30756918-001) containing other selectable engineering units as stick-on labels is supplied with this instruction as an alternative way of unit indication. Refer to Table 2 for a list of selectable engineering units for a given transmitter and the corresponding meter code for its selection.

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## 2.1 Function and Design, Continued

### Status messages description

Table 1 lists the detectable status messages for Honeywell's Smartline Transmitters and what they mean.

Table 1 Detectable Status Messages for Smartline Transmitters

If Status Message is . . .	THEN It means
<b>OUTPUT MODE</b>	Transmitter in DE mode is in OUTPUT mode and it is not sending a real PV signal. Not available for transmitter in analog mode.
<b>BAD XMTR STATUS</b>	Transmitter in DE mode is broadcasting critical status, or analog transmitter's output is less than -2.0% or greater than 106%.
<b>FAULT - LAST KNOWN VALUE</b>	An internal Smart Meter self-check has failed. A loop problem or a problem within the Smart Meter has stopped or corrupted communication data. Bargraph and digital readout indication do not represent the present transmitter output value. Instead, the indications equal the last output value sent prior to receipt of a diagnostic. This message appears when there is any problem with communication.
<b>ANALOG</b>	Transmitter connected to Smart Meter is operating in analog mode.
<b>A</b>	Smart meter is connected to an absolute pressure transmitter. Digital readout represents absolute values.
<b>K</b>	Multiplier of 1000. A PV of 20, 000 is displayed as 20.0 K. Turns on automatically when reading exceeds 19990
<b>FLOW</b>	Smart meter is connected to a differential pressure transmitter that is configured for a square root output form. The default engineering unit is percent (%) and it can not be changed.

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## 2.1 Function and Design, Continued

### Selectable engineering units

Table 2 lists the Smart Meter codes and corresponding engineering units that you can select the SM 3000 to display for a given Smartline Transmitter type. The procedure for selecting engineering units is given in Section 4 of this manual.

Table 2 Selectable Engineering Units and Smart Meter Codes.

Smart Meter Code	Transmitter Type/ Engineering Unit		
	ST 3000	STT 3000	MagneW 3000
EU1	in H <sub>2</sub> O *	°C *	m <sup>3</sup> /hr
EU2	mmHg *	°F *	GPH *
EU3	PSI *	°K	L/hr
EU4	KPa	°R	cc/hr
EU5	MPa	mV	m <sup>3</sup> /min
EU6	mbar	Volts	GPM *
EU7	bar	Ohms	L/min
EU8	g/cm <sup>2</sup>	% *	cc/min
EU9	Kg/cm <sup>2</sup>	% *	m <sup>3</sup> /day
EUA	mmH <sub>2</sub> O	% *	GPD
EUB	inHg	% *	KGPD
EUC	mH <sub>2</sub> O	% *	BPD
EUD	% *	% *	m <sup>3</sup> /sec
EUE	% *	% *	% *
EUF	% *	% *	% *

\*Programmable engineering unit indicators. Use stick-on labels provided for other engineering units.

### Integral or remote mounting

You can mount the SM 3000 in an ST 3000 pressure transmitter with a meter end cap or an STT 3000 temperature transmitter mounted in an explosionproof housing. It can also be mounted in a separate housing in a location remote to the transmitter.

## Section 3 – SM 3000 Installation

### 3.1 Integral Mounting in Series 100/600 ST 3000

#### Background

You can mount the SM 3000 with fan style bargraph as an integral meter in the electronics housing of the Series 100/600 ST 3000 Transmitter.

#### Getting started

Before you install the meter, be sure that;

- Transmitter has a “meter” end cap,
- Power is removed from the transmitter,
- Meter end cap is removed, and
- You have a screwdriver (medium blade)

#### ATTENTION

If meter is already installed, remove it by pulling the meter toward you so you can make field wiring connections and check the meter connections to the transmitter.

#### Procedure

Use the procedure in Table 3 with the wiring connections shown in Figure 3 to install the SM 3000 as an integral meter in a Series 100/600 ST 3000.

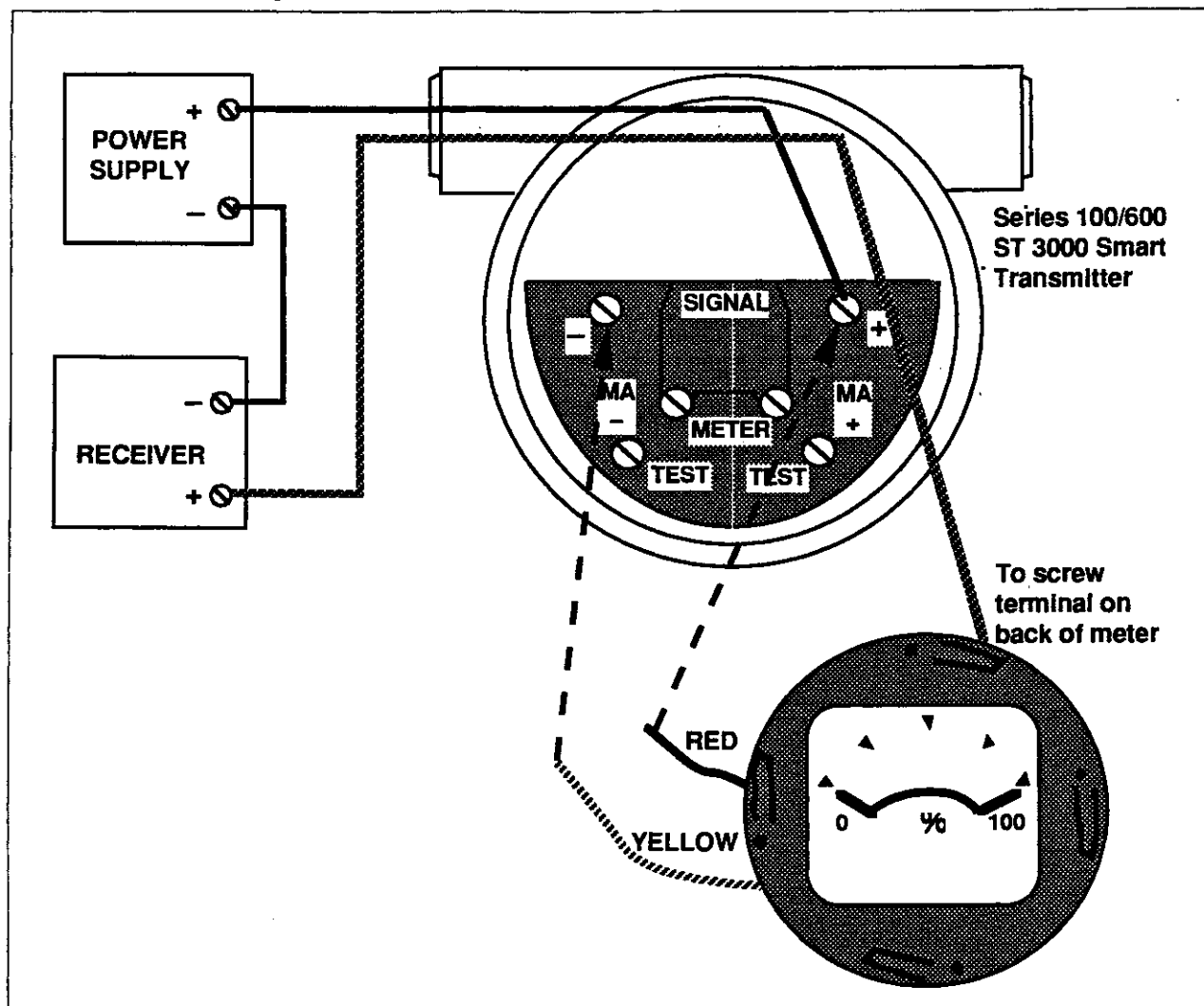
Table 3 Installing SM 3000 in Series 100/600 ST 3000.

Step	Action
1	Connect Yellow lead from SM 3000 to –SIGNAL terminal and Red lead to +SIGNAL terminal on transmitter's terminal block. <b>CAUTION</b> Never connect the SM 3000 leads to the terminals marked METER on the transmitter's terminal block. Also, be sure to leave the jumper installed across the meter terminals in place.
2	Connect a lead from + node of receiver (typically a 250-ohm resistor) to screw terminal on back of meter. Note that this connection is negative side of current loop. With previous meter designs, this connection was made to – SIGNAL terminal.
3	Consult transmitter's instruction to make other field wiring connections.
4	Orient SM 3000 for proper viewing through end cap window, align feet on meter with holes in terminal block, and press meter in place.
5	Lubricate end cap O-ring with silicon grease (recommend Dow Corning #33 or equivalent).
6	Go to Section 4 to prepare SM 3000 for operation before replacing end cap.
7	Replace end cap and tighten end cap lock.

*Continued on next page*

### 3.1 Integral Mounting in Series 100/600 ST 3000, Continued

Figure 3 Wiring Connections for SM 3000 in Series 100/600 ST 3000.



## 3.2 Integral Mounting in Series 100e/900 ST 3000

### Background

You can mount the SM 3000 with horizontal style bargraph as an integral meter in the electronics housing of the Series 100e/900 ST 3000 Transmitter.

### Getting started

Before you install the meter, be sure that;

- Transmitter has a “meter” end cap,
- Power is removed from the transmitter,
- Meter end cap is removed, and
- You have a screwdriver (medium blade)

### ATTENTION

If meter is already installed, remove it by releasing the meter’s mounting legs and pulling the meter toward you so you can make field wiring connections and check the meter connections to the transmitter.

### Procedure

Use the procedure in Table 4 with the wiring connections shown in Figure 4 to install the SM 3000 as an integral meter in a Series 100e/900 ST 3000.

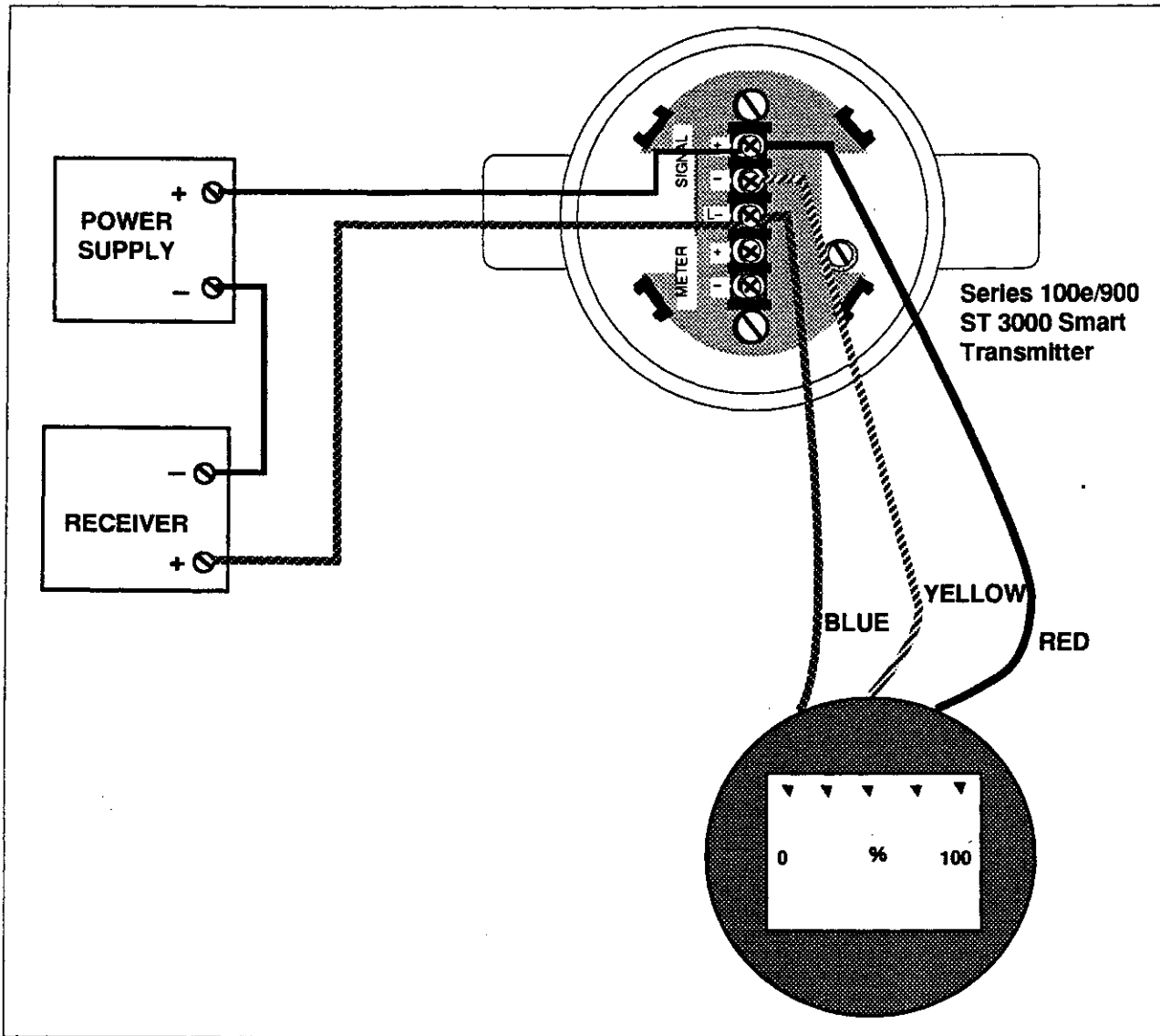
Table 4 Installing SM 3000 in Series 100e/900 ST 3000.

Step	Action
1	Connect Yellow lead from SM 3000 to –SIGNAL terminal and Red lead to +SIGNAL terminal on transmitter’s terminal block. <b>CAUTION</b> Never connect the SM 3000 leads to the terminals marked METER on the transmitter’s terminal block. Also, be sure to leave the jumper installed across the meter terminals in place.
2	Connect lead from + node of receiver (typically a 250-ohm resistor) to L– terminal on transmitter’s terminal block.
3	Connect Blue lead from SM 3000 to L– terminal on transmitter’s terminal block.
4	Consult transmitter’s instruction to make other field wiring connections.
5	Orient SM 3000 for proper viewing through end cap window, align legs on meter with guides on terminal block, and snap meter in place.
6	Lubricate end cap O-ring with silicon grease (recommend Dow Corning #33 or equivalent).
7	Go to Section 4 to prepare SM 3000 for operation before replacing end cap.
8	Replace end cap and tighten end cap lock.

*Continued on next page*

### 3.2 Integral Mounting in Series 100e/900 ST 3000, Continued

Figure 4 Wiring Connections for SM 3000 in Series 100e/900 ST 3000.



### 3.3 Integral Mounting in STT 3000

#### Background

You can mount the SM 3000 with fan style bargraph as an integral meter for STT 3000 transmitter mounted in an explosionproof housing.

#### Getting started

Before you install the meter, be sure that;

- Transmitter is mounted in explosionproof housing with meter cover,
- Power is removed from the transmitter,
- Meter cover is removed, and
- You have a screwdriver (medium blade)

#### ATTENTION

If meter is already installed, remove it by releasing the meter's mounting legs and pulling the meter toward you so you can make field wiring connections and check the meter connections to the transmitter.

#### Procedure

Use the procedure in Table 5 with the wiring connections shown in Figure 5 to install the SM 3000 as an integral meter in an STT 3000 mounted in an explosionproof housing.

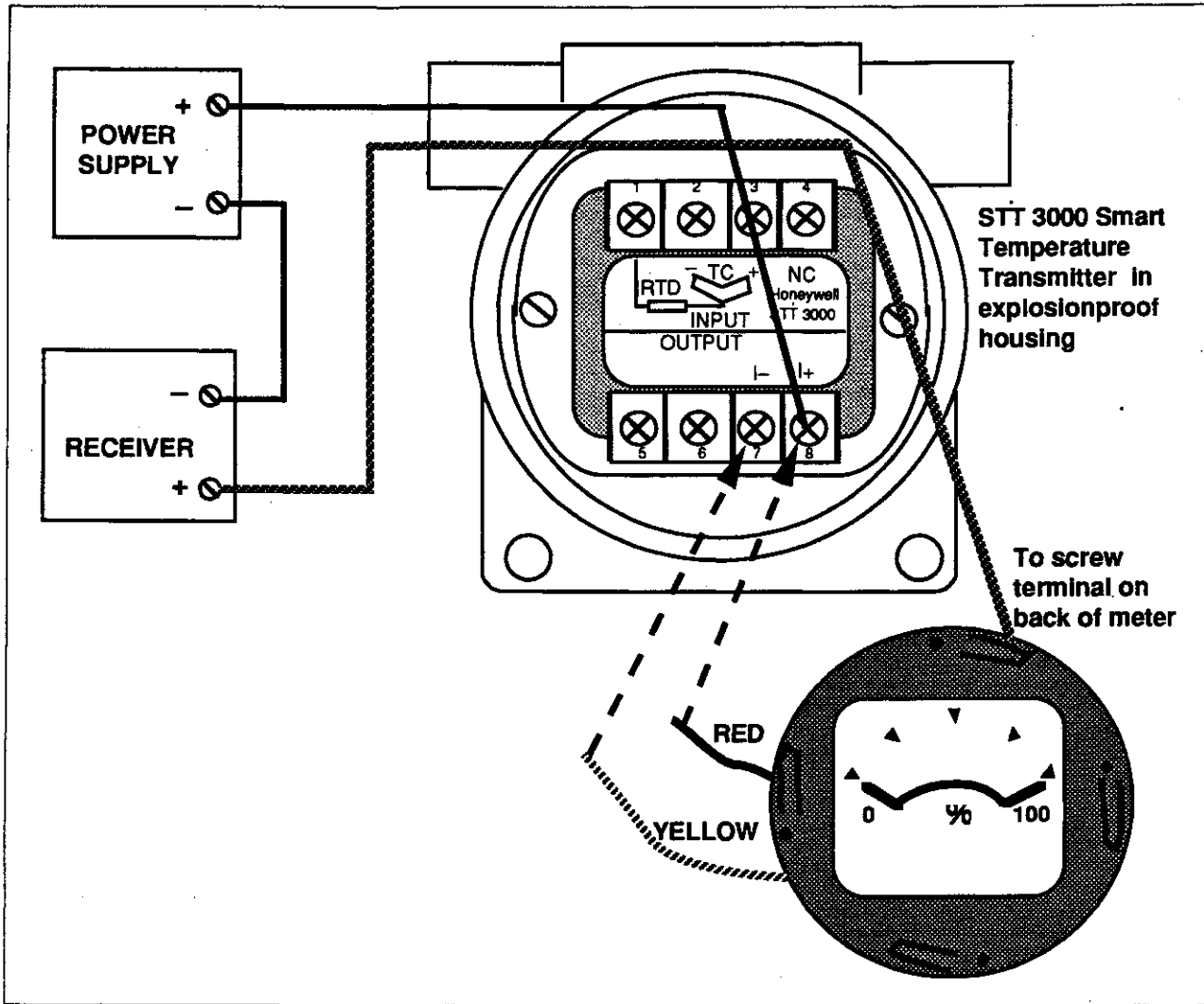
Table 5 Installing SM 3000 in STT 3000.

Step	Action
1	Connect Yellow lead from Smart Meter to I – (7) terminal and Red lead to I + (8) terminal on transmitter.
2	Connect a lead from + node of receiver (typically a 250-ohm resistor) to screw terminal on back of meter. Note that this connection is negative side of current loop. With previous meter designs, this connection was made to – SIGNAL terminal.
3	Consult transmitter's instruction to make other field wiring connections.
4	Orient SM 3000 for proper viewing through cover window, align feet on meter with holes in spacer assembly, and press meter in place.
5	Go to Section 4 to prepare SM 3000 for operation before replacing end cap.
6	Replace cover.

*Continued on next page*

### 3.3 Integral Mounting in STT 3000, Continued

Figure 5 Wiring Connections for SM 3000 in STT 3000.



## 3.4 Remote Mounting With Smartline Transmitters

### Background

You can mount the SM 3000 with fan style bargraph in a separate remote housing for use with a given Smartline Transmitter.

### Getting started

Before you install the meter, be sure that;

- You have hardware to attach housing to surface or mounting bracket part number 30755905-001 for 2-inch pipe mounting.
- You have drill, wrenches, screwdriver, etc. as required for mounting hardware.
- Review recommended conduit connection practices on page 20.
- You have three 16 AWG (maximum) leads (one yellow, one red, and one blue, if possible) in one conduit to connect remote Smart Meter to transmitter for Method 1. Note that only two leads per conduit are needed to wire the meter as shown for Method 2 in Figure 7.
- Review external wiring diagram 30756922-000.
- Power is removed from the transmitter,
- Transmitter end cap is removed, and
- You have a screwdriver (medium blade)

### Procedure

Use the procedure in Table 6 with the wiring connections shown in Figure 6 or Figure 7 to install the SM 3000 in a remote housing

Table 6 Installing SM 3000 in Remote Housing.

Step	Action
1	For pipe mounting, attach housing to bracket and mount bracket to 2-inch pipe as shown on drawing 30756029-000. Skip to Step 6.
2	For surface mounting, position housing in desired location on mounting surface.
3	Use center punch, scribe, etc. to mark location of holes in housing on surface.
4	Prepare surface for user supplied mounting hardware as required.
5	Secure housing to surface using mounting holes and user supplied hardware.
6	Connect conduit - See page 20.
7	Remove cover from housing. If meter is already installed, remove it by pulling meter toward you to access captive mounting screws and terminal block connections.

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### 3.4 Remote Mounting With Smartline Transmitters, Continued

Procedure, continued

Table 6 Installing SM 3000 in Remote Housing, Continued

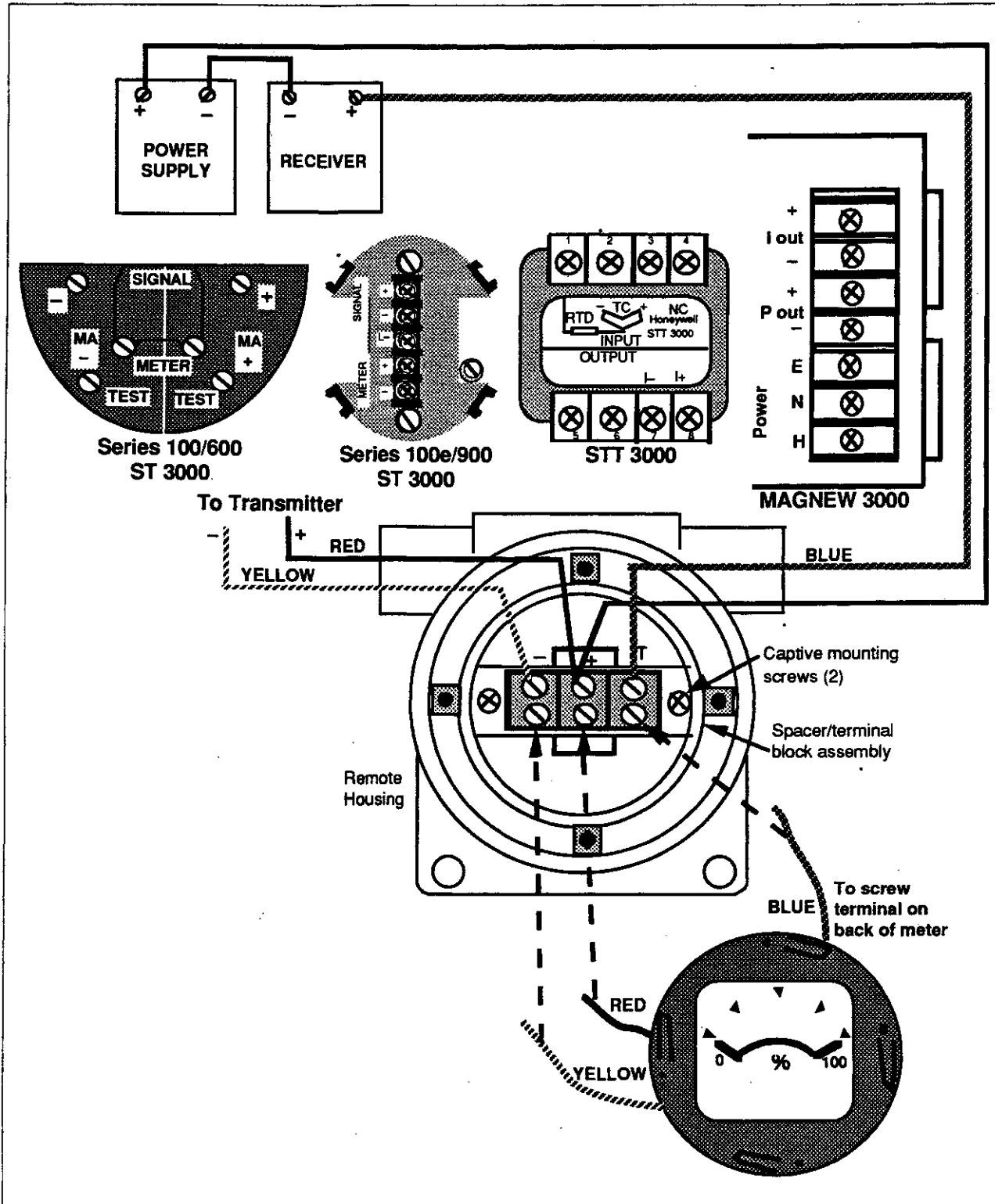
Step	Action
8	Loosen captive mounting screws and remove spacer/terminal block assembly.
9	Review Figures 6 and 7 to determine whether wiring <b>Method 1</b> or <b>Method 2</b> is best for your installation. <b>Method 1</b> lets you run three wires in one conduit while <b>Method 2</b> only requires two wires per conduit. Note that <b>Method 1</b> is described in this procedure.
10	Feed one end of Yellow, and Red leads for connecting SM 3000 to transmitter through a conduit connection in housing. Connect Yellow lead to remaining – ( <b>negative</b> ) terminal and Red lead to remaining + ( <b>positive</b> ) terminal on terminal block. Run other end of leads to given transmitter; and observing RED to + polarity, connect leads across transmitter's signal (I) terminals.
11	Feed one end of Blue lead for connecting SM 3000 to + node of receiver (typically a 250-ohm resistor) through a conduit connection in housing. Connect blue lead to remaining T terminal on terminal block. Run other end of lead to + node of receiver which is negative side of current loop. Note that with previous meter designs, this connection was made to – SIGNAL terminal.  <div style="border: 1px solid black; padding: 2px; display: inline-block;"><b>ATTENTION</b></div> If the lead from the + node of the receiver is currently connected to the – SIGNAL terminal on the transmitter, remove it from the – SIGNAL terminal and splice it to the Blue lead from the T terminal. If you have a Series 900 ST 3000 transmitter, you can connect the + node lead and the Blue lead to the transmitter's L– terminal.
12	Replace spacer/terminal block assembly and tighten mounting screws.
13	If SM 3000 has not been installed, connect Yellow lead from meter to – ( <b>negative</b> ) terminal, Red lead to adjacent + ( <b>positive</b> ) terminal, and Blue lead to T terminal on terminal block.
14	Orient SM 3000 for proper viewing through cover window, align mounting feet over holes and press meter in place.
15	Go to Section 4 to prepare SM 3000 for operation before replacing end cap.
16	Replace cover.

*Continued on next page*



### 3.4 Remote Mounting With Smartline Transmitters, Continued

Figure 7 Method 2 Wiring Connections.



## 3.5 Remote Mounting With Non-Honeywell Transmitters

### Background

You can mount the SM 3000 with fan style bargraph in a separate remote housing for use with a non-Honeywell 4 to 20 mA transmitter.

### Getting started

Before you install the meter, be sure that;

- You have hardware to attach housing to surface or mounting bracket part number 30755905-001 for 2-inch pipe mounting.
- You have drill, wrenches, screwdriver, etc. as required for mounting hardware.
- Review recommended conduit connection practices on page 20.
- You have two 16 AWG (maximum) leads to connect remote Smart Meter to transmitter.
- You have a screwdriver (medium blade)

### ATTENTION

When the SM 3000 is used with non-Honeywell devices transmitting in the 4 to 20 mA mode, the SM 3000 becomes a simple indicator displaying percent (%) output. The "ANALOG" status message is displayed at all times. The "BAD XMTR STATUS" message will be displayed if loop current is less than -2% (3.6 mA) or greater than 106% (21.2 mA). If there is an internal SM 3000 fault, the "FAULT - LAST KNOWN VALUE" message may be displayed. But, the other status messages will not be available. The only engineering unit indicator is %, and any attempt to change it will result in an 'Err' message.

### Procedure

Use the procedure in Table 7 with the wiring connections shown in Figure 8 to install the SM 3000 in a remote housing

Table 7 Installing SM 3000 in Remote Housing With Non-Honeywell Transmitter

Step	Action
1	For pipe mounting, attach housing to bracket and mount bracket to 2-inch pipe as shown on drawing 30756029-000. Skip to Step 6.
2	For surface mounting, position housing in desired location on mounting surface.
3	Use center punch, scribe, etc. to mark location of holes in housing on surface.
4	Prepare surface for user supplied mounting hardware as required.
5	Secure housing to surface using mounting holes and user supplied hardware.
6	Connect conduit - See page 20.

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## 3.5 Remote Mounting With Non-Honeywell Transmitters,

Continued

Procedure, continued

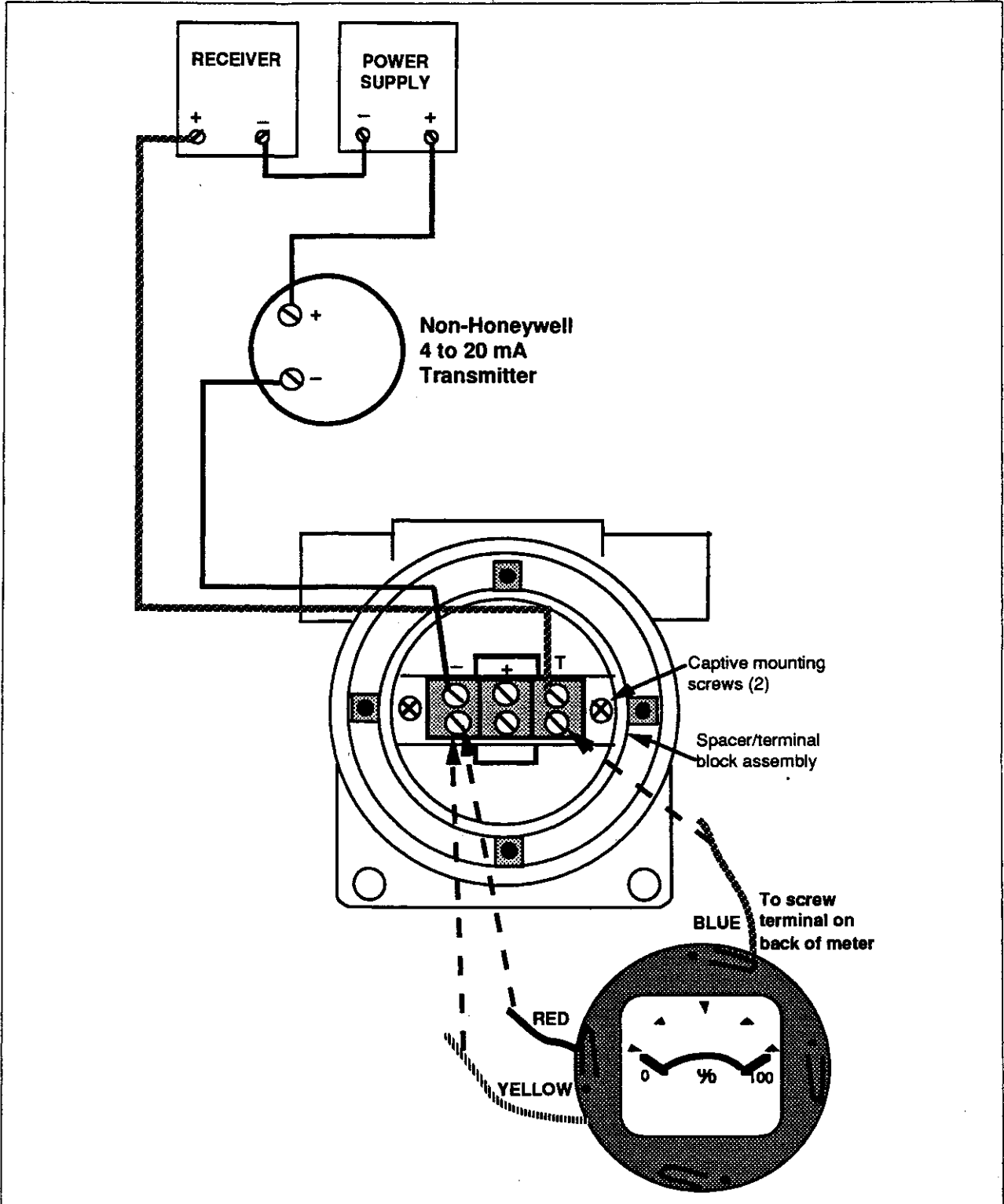
Table 7 Installing SM 3000 in Remote Housing With Non-Honeywell Transmitter, Continued

Step	Action
7	Remove cover from housing. If meter is already installed, remove it by pulling meter toward you to access captive mounting screws and terminal block connections.
8	Loosen captive mounting screws and remove spacer/terminal block assembly.
9	Remove SM 3000's Red lead from + terminal on terminal block and connect it to - terminal on terminal block with SM 3000's Yellow lead
10	Connect positive side of current loop to - terminal on terminal block (Red and Yellow SM 3000 leads) Connect + node of receiver (negative side of current loop) to T terminal on terminal block (lead to screw terminal on back of SM 3000).
11	Replace spacer/terminal block assembly and tighten mounting screws.
12	If SM 3000 has not been installed, connect SM 3000's Red and Yellow leads to - ( <b>negative</b> ) terminal on terminal block and its Blue lead from screw terminal to T terminal on terminal block.
13	Orient SM 3000 for proper viewing through cover window, align mounting feet over holes and press meter in place.
14	You can make a calibration check or adjustment before replacing cover - See Page 27 for details. When connecting current source for calibration, be sure to observe this polarity: connect + node of current source to - terminal on terminal block and - node of current source to T terminal on terminal block.
15	Replace cover.

*Continued on next page*

### 3.5 Remote Mounting With Non-Honeywell Transmitters, Continued

Figure 8 Wiring Connections for Non-Honeywell Transmitter.



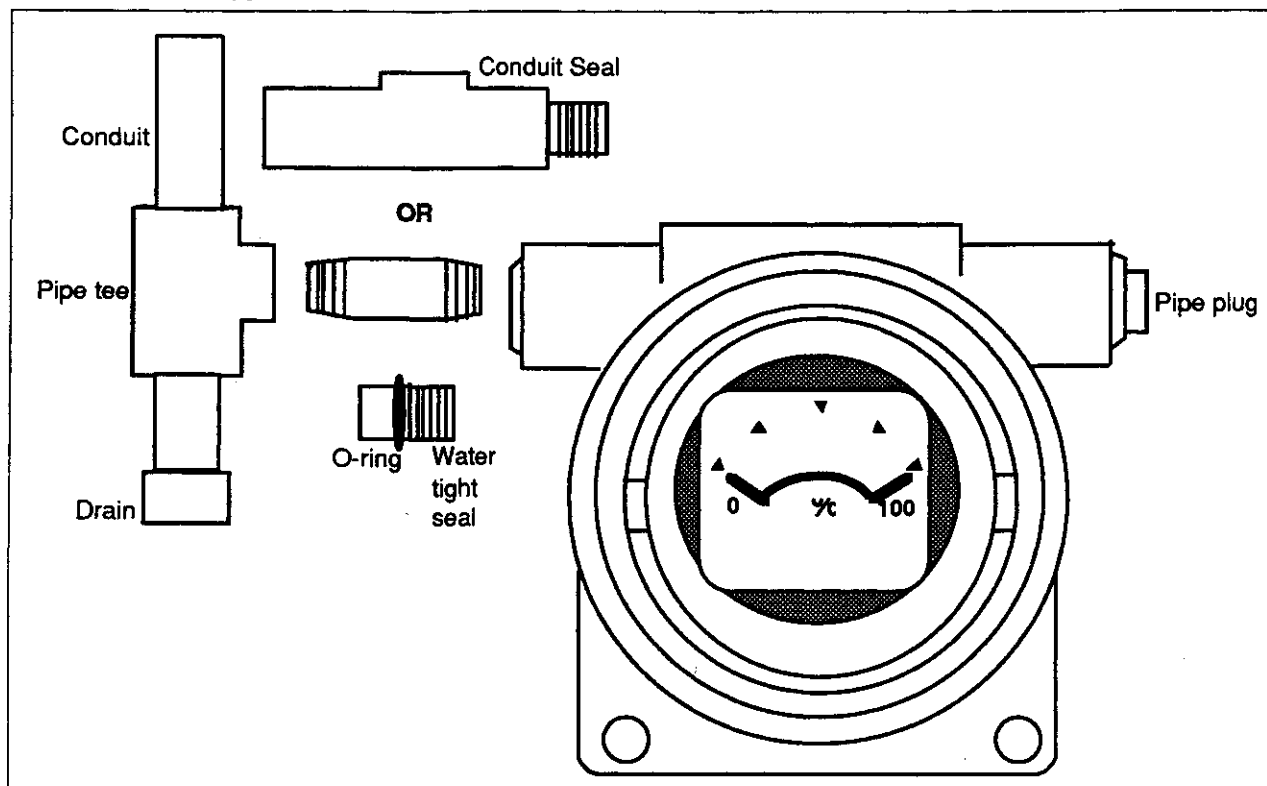
## 3.6 Conduit Connections

### Recommended practices

When making typical conduit connections as shown in Figure 9,

- Be sure to include drain for conduit.
- Be sure all pipe threads are adequately sealed against weather by using pipe joint tape or compound suitable to environment.
- Be sure to seal unused outlet with pipe plug.

Figure 9 Typical Conduit Connections



## Section 4 – SM 3000 Operation

### 4.1 Startup and Engineering Unit Selection

---

#### Background

For the SM 3000 to operate correctly, it must first identify which Smartline Transmitter it is connected to and whether the transmitter is configured for analog (4 to 20 mA) or digital enhanced (DE) communications. Next, you can select the desired engineering units for digital readout - percentage (%) is the default selection.

The following procedure outlines the steps for getting the meter to identify which transmitter it is connected to and for selecting the desired engineering units.

---

#### **CAUTION**

The SM 3000 will automatically assume that the transmitter is configured for analog communications, if it doesn't detect DE communications within 10 seconds after the transmitter is powered up. You can change the transmitter configuration from analog to DE mode. But, if the transmitter has been configured for the DE mode and you change it back to the analog mode, the meter detects this mode change as a "fault" and displays the status message **FAULT - LAST KNOWN VALUE**. To recover from this fault, you must remove power from the SM 3000 or short the yellow lead on the SM 3000 to the screw terminal on the back of the SM 3000.

---

#### Starting point assumptions

We assume that,

- The SM 3000 has been installed and wired.
  - An SFC is connected across the current loop for the transmitter.
  - Smartline Transmitter has a valid configuration database.
- 

#### Procedure

Use the procedure in Table 8 to startup the Smartline Transmitter with SM 3000 and select the desired engineering units for display.

---

*Continued on next page*

# 4.1 Startup and Engineering Unit Selection, Continued

Procedure, continued

Table 8 Startup and Engineering Unit Selection

Step	Action						
1	<p>Apply power to transmitter and wait for SM 3000 to run its self-diagnostic tests.</p> <p>Example - SM 3000 self-test display.</p> <div data-bbox="721 562 1284 1073" style="border: 1px solid black; padding: 10px; text-align: center;"> <p>The display shows an analog gauge labeled 'ANALOG' with a needle pointing to approximately 50%. Below the gauge is a digital readout showing '188.80'. To the right of the readout are unit selection options: '°F °C', '%', 'FLOW', 'In H<sub>2</sub>O', 'K GPH mmHg', and 'GPM PSI A'. At the bottom, it says 'OUTPUT MODE', 'BAD XMTR STATUS', and 'FAULT - LAST KNOWN VALUE'.</p> </div> <table border="1" data-bbox="638 1157 1357 1371" style="margin: 10px auto;"> <thead> <tr> <th>If Smartline Transmitter is In ...</th> <th>Then...</th> </tr> </thead> <tbody> <tr> <td>DE mode with "DE 6-BYTE" format</td> <td>go to Step 3.</td> </tr> <tr> <td>DE mode with "DE 4-BYTE" format or analog mode</td> <td>go to Step 2</td> </tr> </tbody> </table>	If Smartline Transmitter is In ...	Then...	DE mode with "DE 6-BYTE" format	go to Step 3.	DE mode with "DE 4-BYTE" format or analog mode	go to Step 2
If Smartline Transmitter is In ...	Then...						
DE mode with "DE 6-BYTE" format	go to Step 3.						
DE mode with "DE 4-BYTE" format or analog mode	go to Step 2						
2	<p>Press [ID] key on SFC. If transmitter response message "DE XMTR XXXXXXXX" appears on SFC, press [SHIFT], [ID] keys. This lets meter obtain some of transmitter's database so it knows which transmitter it is connected to, and if it is configured for DE (4-BYTE or 6-BYTE) or analog communications.</p> <p><b>CAUTION</b> On Smartline Transmitters with analog communications or DE communications configured for "DE 4-BYTE" format, reconfiguring the transmitter or connecting the SM 3000 to another transmitter can cause a mismatch between the SM 3000 and the transmitter databases. To avoid this mismatch, repeat Step 2 after any transmitter reconfiguration or after the SM 3000 is connected to a different transmitter.</p>						

Continued on next page

# 4.1 Startup and Engineering Unit Selection, Continued

Procedure, continued

Table 8 Startup and Engineering Unit Selection, Continued

Step	Action
3	<p>Press button on left side of SM 3000 to call up present Smart Meter code selection on display. Note code and check it against selections listed in Table 2.</p> <p>Example - Checking Smart Meter Code.</p> <div data-bbox="649 630 1429 1428" style="text-align: center;"> <p>The diagram shows a circular display with an analog bargraph at the top. Below the bargraph, the digital code 'EUF' is displayed. To the right of the code, there are several unit options: '°F °C', '%', 'FLOW', 'In H<sub>2</sub>O', 'K GPH mmHg', and 'GPM PSI A'. The code 'EUF' is highlighted with a box. An arrow points from the text 'Smart Meter Code - See Table 2' to the code. Another arrow points from the text 'Press button to display present code selection...' to a button on the left side of the display.</p> </div> <p>Smart Meter Code - See Table 2</p> <p>Press button to display present code selection. Press and hold button to scroll through codes in this order starting from present selection : EU1, EU2, EU3, EU4, EU5, EU6, EU7, EU8, EU9, EUA, EUB, EUC, EUD, EUE, EUF, CAL.</p>
<p><b>ATTENTION</b> For SM 3000 with horizontal style bargraph for Series 100e/900 ST 3000 , the button is accessed through a hole in the bottom center of the SM 3000.</p>	

22532

Continued on next page

## 4.1 Startup and Engineering Unit Selection, Continued

Procedure, continued

Table 8 Startup and Engineering Unit Selection, Continued

Step	Action
4	<p>To change engineering unit selection, press and hold button on left side or bottom center of meter to scroll through all codes (<i>EU1</i> to <i>EU8</i>) including "<i>CAL</i>", and release button when desired code appears on display to select corresponding engineering units for given transmitter. Note that calibration (<i>CAL</i>) is described on Page 27.</p> <p><b>ATTENTION</b> If the selected engineering unit doesn't match one of the eight unit indicators of the meter, peel off a matching stick-on unit label from the sheet provided and paste it in the lower right-hand corner of the meter.</p>
5	SM 3000 is ready for operation. If applicable, replace end cap or cover on transmitter or remote housing.

## 4.2 Normal Operation

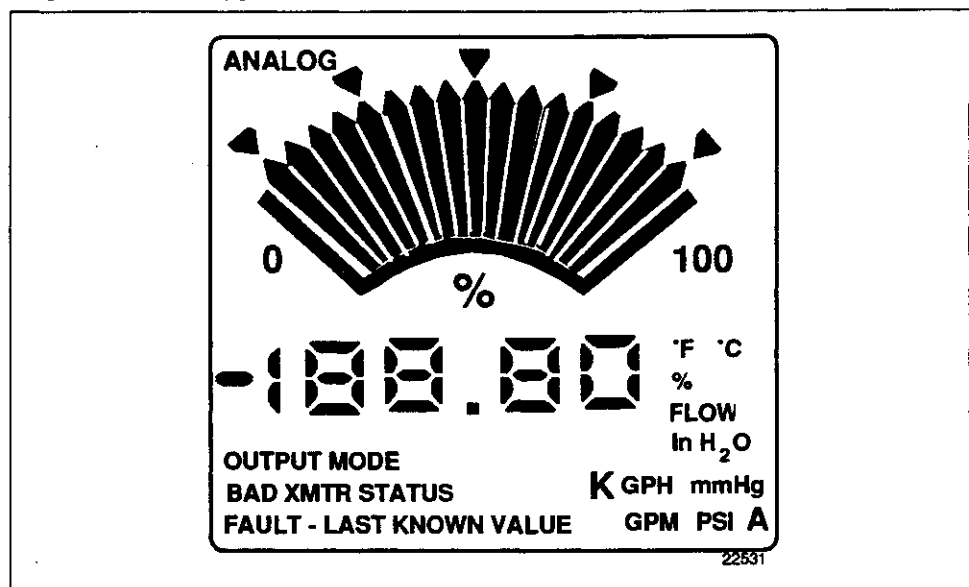
### Summary

Once the SM 3000 is installed and prepared for operation, you can begin monitoring meter indications for transmitter PV output and loop status messages. The self-test indications and some typical operation indications are outlined in this section for reference.

### Self-test indications

Every time power is cycled to the transmitter the SM 3000 runs a self-test to check certain internal operations and lights all display segments, as shown in Figure 10, for up to 10 seconds so they can be visually checked for uniform appearance. If the self-test fails, the display will go blank.

Figure 10 Typical SM 3000 Self-Test Indications.



### Typical operational indications

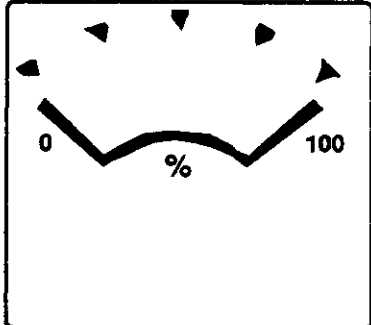
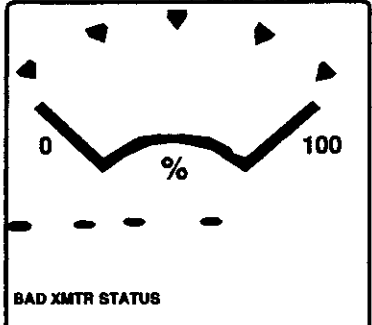
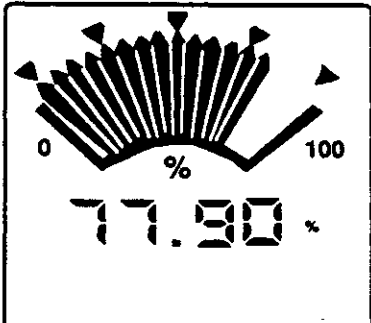
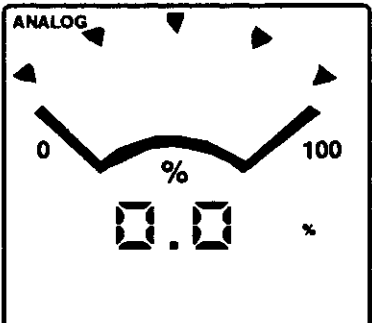
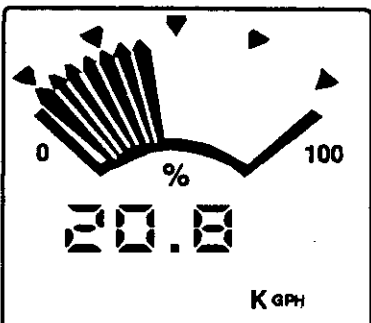
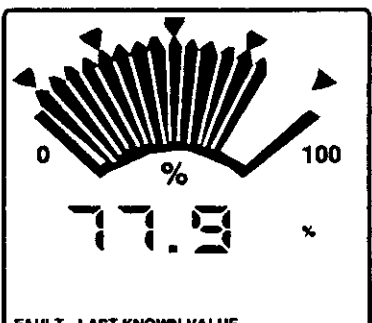
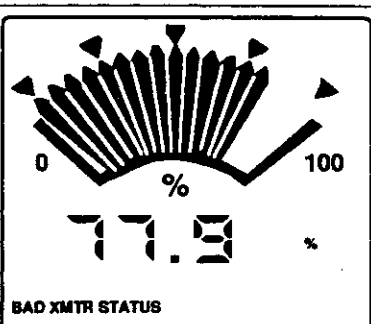
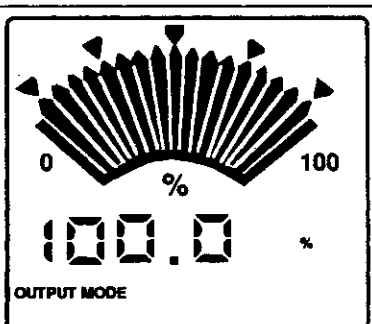
Table 9 summarizes typical SM 3000 operation indications. Note that other combinations of status messages are possible.

*Continued on next page*

## 4.2 Normal Operation, Continued

Typical operational indications, continued

Table 9 Summary of Typical SM 3000 Indications

SM 3000 Indication	What It Means	SM 3000 Indication	What It Means
 <p>22534</p>	No power applied	 <p>22535</p>	After meter ran its self-test, it detected a critical transmitter status at start up.
 <p>22536</p>	Normal operation display with DE transmitter	 <p>22539</p>	Meter has never been calibrated for transmitter in analog mode.
 <p>22536</p>	K flag indicates multiplier of 1000. PV is 20,800 GPH.	 <p>22536</p>	<ul style="list-style-type: none"> <li>• Meter has lost communication or received communication data with five or more corrupted values from transmitter in DE mode. Display flashes.</li> <li>• Meter has detected an internal fault.</li> </ul>
 <p>22537</p>	DE transmitter is in critical status. The bargraph and displayed value will be flashing. The displayed value may not be correct.	 <p>22541</p>	Transmitter configured for DE mode has been put into OUTPUT mode. Bargraph and display flash the value that was entered with the SFC.

## Section 5 – SM 3000 Calibration

### 5.1 Analog Mode Calibration

#### Background

The SM 3000 is calibrated "BY EXAMPLE" and requires no adjustments - just an accurate current source. Note that calibration only affects accuracy when the Smart Meter is operating with a transmitter in the analog mode. The meter doesn't require calibration when it is operating with a transmitter in the DE mode.

#### ATTENTION

All SM 3000s are factory calibrated before shipment. If a meter used with a transmitter in the analog mode displays 0.0 % output regardless of the transmitter's actual PV output, the meter must be calibrated.

#### In-loop calibration

You can calibrate the SM 3000 in the loop by putting the Smartline transmitter into its OUTPUT mode so it can be used as a current source. Be sure to put the loop into MANUAL mode first; then, set the transmitter's output to 0 % (4 mA) for meter's "zero" calibration and 100 % (20 mA) for its URV calibration. When the meter is used with a Honeywell Smart line Transmitter, this is the preferred calibration method. Otherwise, you must obtain an accurate current source to calibrate the SM 3000 separately.

#### Procedure

Use the procedure in Table 10 to calibrate the SM 3000

Table 10 Calibrating the SM 3000

Step	Action
1	Observing polarity, disconnect SM 3000 leads from transmitter and connect them to accurate current source. Or, put loop into MANUAL mode and transmitter into its OUTPUT mode.
2	Set current source or transmitter output to 4 mA (0 %).
3	Press and hold button on left side or bottom center of meter until CAL appears in display - release button. Meter does a zero (LRV) calibration and resumes normal operation.  <b>ATTENTION</b> If "bAd" appears in display, 4 mA signal is not within meter's acceptable accuracy range and calibration was aborted. Check current source and repeat calibration steps as required.
4	Set current source or transmitter output to 20 mA (100 %).

*Continued on next page*

## 5.1 Analog Mode Calibration, Continued

Procedure, continued

Table 10 Calibrating the SM 3000, Continued

Step	Action
5	<p>Press and hold button on left side or bottom center of meter until <i>CAL</i> appears in display - release button. Meter does an Upper Range Value (URV) calibration and resumes normal operation.</p> <p><b>ATTENTION</b> If "bAd "appears in display, 20 mA signal is not within meter's acceptable accuracy range and calibration was aborted. Check current source and repeat calibration steps as required.</p>
6	Disconnect current source and connect meter to transmitter. Or, turn off transmitter's OUTPUT mode (press [OUTPUT], [CLR] keys on SFC) and put loop into AUTOMATIC mode.

## Section 6 – SM 3000 Reference Data

### 6.1 Specifications

**Specification table** Table 11 lists pertinent SM 3000 specifications for reference.

Table 11 SM 3000 Specifications

Operating Conditions		
Parameter	Rated	Extreme, Transportation and Storage
<b>Ambient Temperature</b> ° F ° C	-40 to 185 -40 to 85	-58 to 194 -50 to 90
<b>Relative Humidity</b> % RH	0 to 100	0 to 100
Design		
<b>Accuracy</b> Analog (4-20 mA) Mode Honeywell Digital (DE) Mode	± 0.5% of span No error. Reproduces transmitter signal exactly within its resolution.	
<b>Display Resolution</b> Bargraph Digital Readout	± 3 % reading ±0.05 for ±199.9 reading range, ± 0.5 for ±1999 reading range, or ±5 for ±19990 reading range.	
<b>Maximum Meter Voltage</b> (red lead to yellow lead)	42 Vdc	
<b>Maximum Loop Voltage Drop</b> (yellow lead to screw terminal)	2.25 Vdc	
<b>Minimum Loop Operating Current</b>	3.6 mA	

**ATTENTION**

The LCD display will turn black at some temperature between 80 to 90 °C (176 and 194 °F), rendering the display unreadable. This effect is only temporary, and normally occurs at 90 °C (194 °F).

## 6.2 Replacement Parts

---

**Parts list**                      Table 12 lists replacement parts for SM 3000.

Table 12      SM 3000 Replacement Parts

<b>Description</b>	<b>Part Number</b>
Stick-on engineering unit labels	30756918-001
Wire/terminal assembly (for remote housing)	30756921-001

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## 6.3 Reference Drawings

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**Drawing numbers**

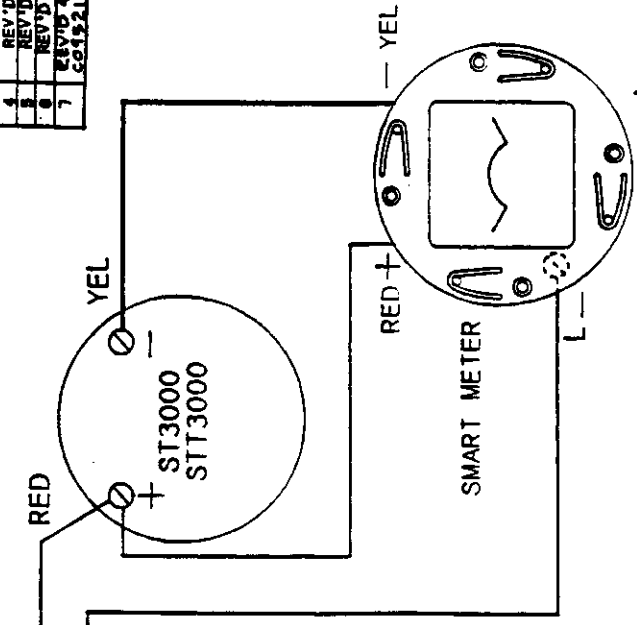
These drawings are inserted behind this page

- 30756029-000 - Remote meter installation
  - 30756922-000 - External Wiring Diagram
-





REV	REVISION/DATE	APP'D
1	REL'D 012801	EdK
2	REV'D 022191	EdK
3	REV'D 052391	JK
4	REV'D 061891	JK
5	REV'D 110291	JK
6	REV'D 472375	BG
7	REV'D 472744	JK
	CS 30756922	



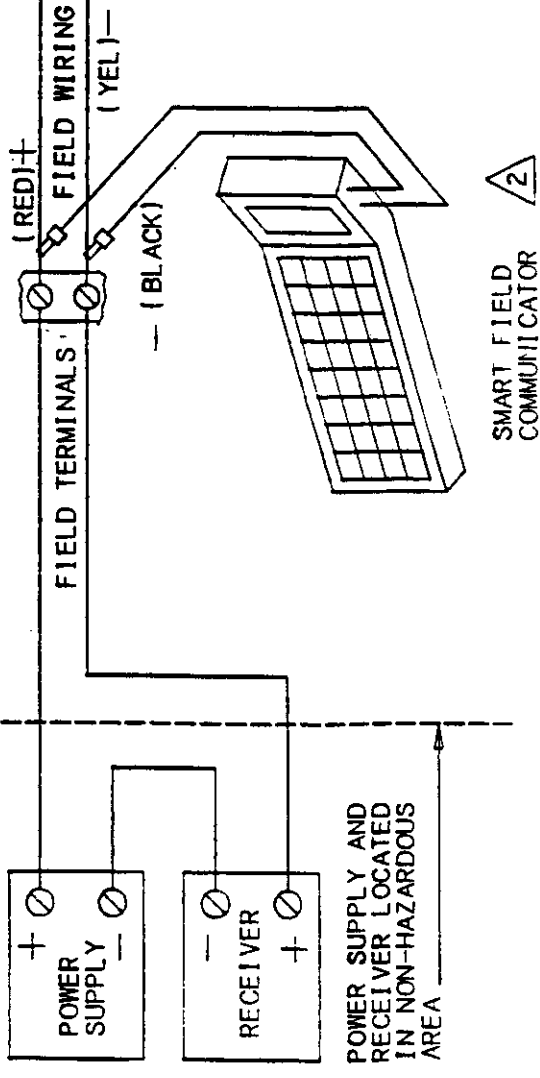
**LOCAL ST3000 SERIES 100/600**

DO NOT CHANGE WITHOUT PRIOR FM APPROVAL.

30756922

DRWN	EdK	102390
CHECKED	EdK	102890
DEV ENGR	TO	102890
WFS ENGR	MCD	102890
QA ENGR	JR	102890
WRT ENGR	DB	102890

PROJECTION: THIRD ANGLE  
 LINEAR MEASURE: INCH  
 MATERIAL:   
 FINISH:   
 HONEYWELL  
 EXTERNAL WIRING DIAGRAM  
 ST3000, STT3000, MAGNEW  
 WITH SMART METER  
 SCALE:  $\frac{1}{32}$  USED ON  $\frac{1}{16}$  SHEET OF  $\frac{1}{8}$   
 30756922



4 SEE DRAWING 30753667-000 FOR INTRINSICALLY SAFE INSTALLATION OF ST3000, AND 30756321-000 FOR STT3000. SMART METER ADDS NO CAPACITANCE OR INDUCTANCE TO THE LOOP. ANALOG METER ADDS 0.15 mH.

5 METER MUST BE REMOVED FROM HOUSING TO GAIN ACCESS TO TERMINAL BLOCK.

6 SMART FIELD COMMUNICATOR MAY BE CONNECTED AT ANY POINT IN THE LOOP BETWEEN THE BARRIER(S) AND THE ST3000. STT3000 OR MAGNEW TRANSMITTER AT WHICH CONNECTIONS ARE ACCESSIBLE. THERE MUST BE A MINIMUM SERIES RESISTANCE OF 250 OHMS BETWEEN THE SMART FIELD COMMUNICATOR CONNECTION POINT AND POWER SUPPLY. SEE INSTALLATION MANUAL.

7 LOOP RESISTANCE EQUALS WIRE RESISTANCE PLUS RECEIVER RESISTANCE.

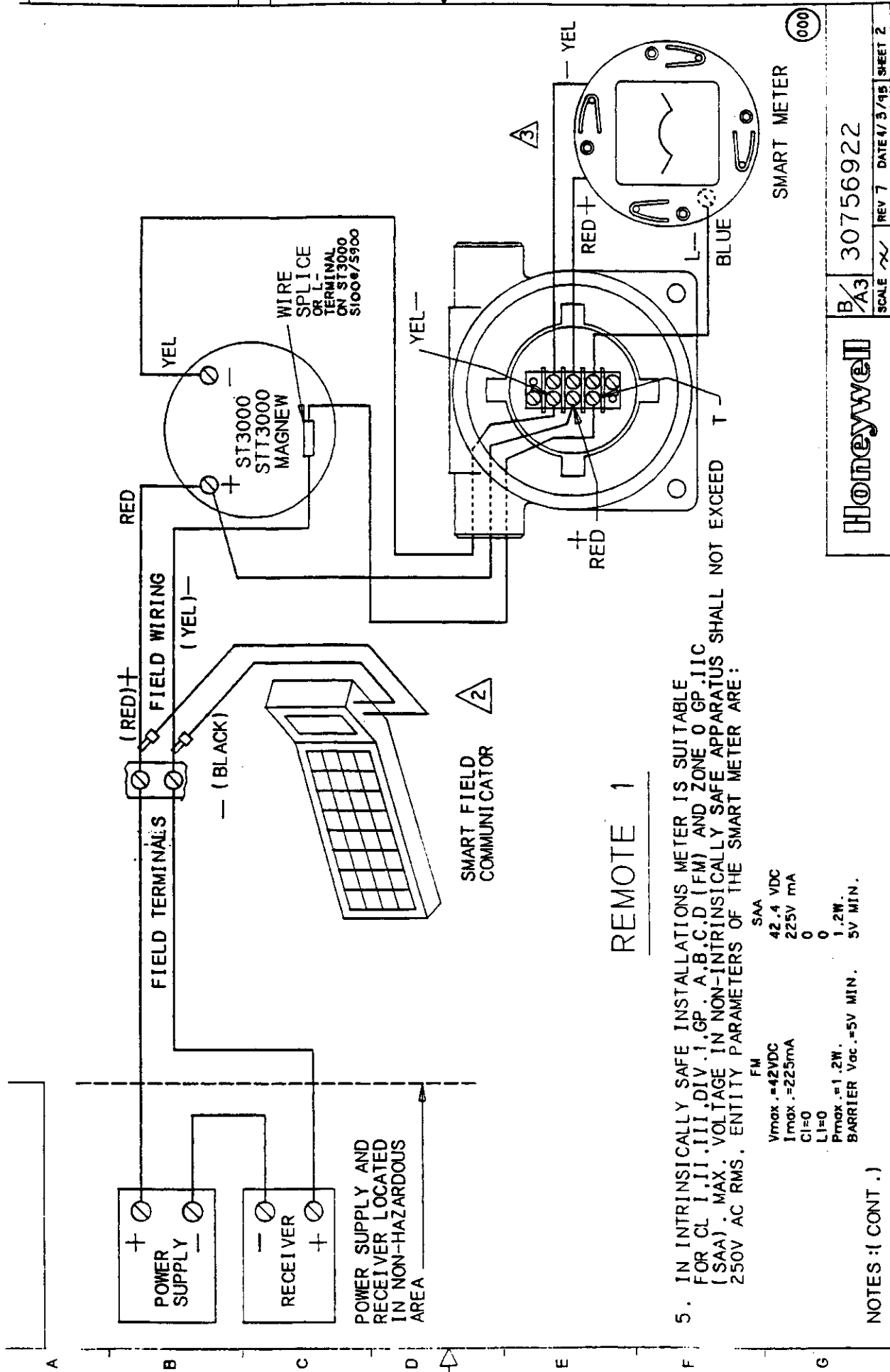
NOTES

THE DESIGNER OF THIS DRAWING IS RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF THE DRAWING AND SHALL BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED.

DO NOT SCALE DRAWING

PLATE

A B C D E F G



REMOTE 1

5. IN INTRINSICALLY SAFE INSTALLATIONS METER IS SUITABLE FOR CL 1, II, III, DIV 1, GP, A, B, C, D (FM) AND ZONE 0 GP, IIC (SAA). MAX. VOLTAGE IN NON-INTRINSICALLY SAFE APPARATUS SHALL NOT EXCEED 250V AC RMS. ENTITY PARAMETERS OF THE SMART METER ARE:

	FM	SAA
V <sub>max</sub>	=42VDC	42.4 VDC
I <sub>max</sub>	=22.5mA	225V mA
Cl	=0	0
Li	=0	0
P <sub>max</sub>	=1.2W.	1.2W.
BARRIER Voc	=5V MIN.	5V MIN.

NOTES: (CONT.)

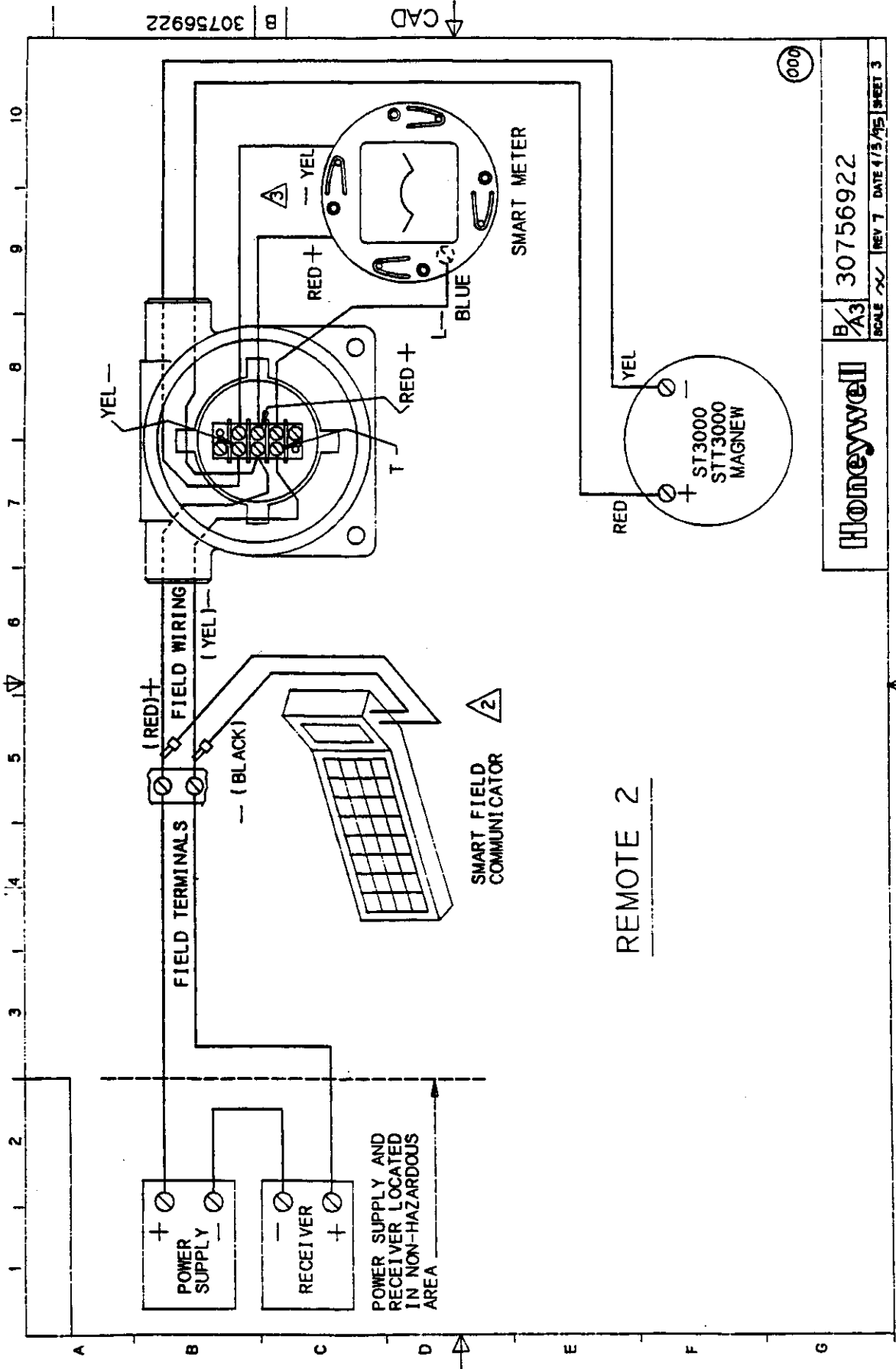


B/A3 30756922


SCALE REV 7 DATE 4/3/95 SHEET 2

SMART METER

000



REMOTE 2


B/A3
30756922
SCALE 1/32" DATE 1/3/75 SHEET 3

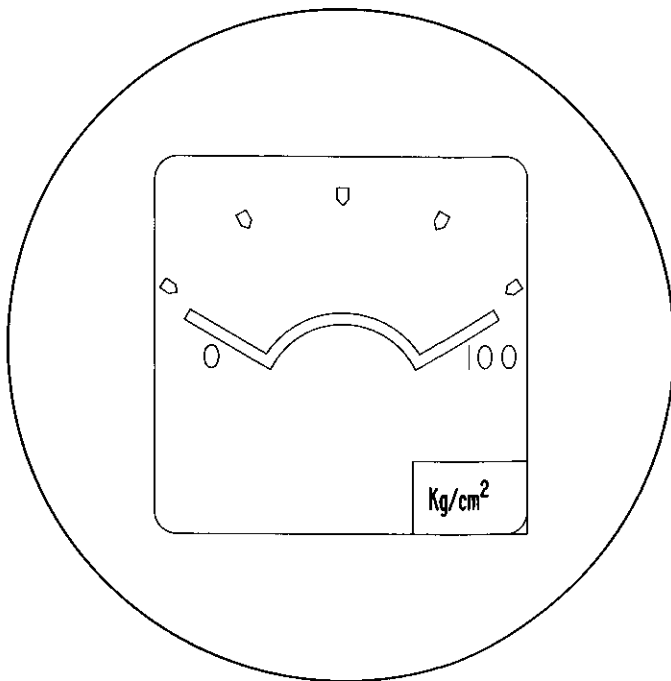
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# STICK-ON ENGINEERING UNIT LABELS

TO USE A STICK-ON LABEL AS IDENTIFICATION FOR THE SELECTED ENGINEERING UNIT THAT DOES NOT HAVE AN INTEGRAL "INDICATOR" IN THE METER.

- 1 PEEL OFF MATCHING LABEL FROM THIS PAGE
- 2 ALIGN LABEL OVER LOWER RIGHT-HAND CORNER OF METER'S DISPLAY SO ITS BOTTOM AND RIGHT-HAND EDGES COINCIDE WITH EDGES ON PLASTIC BEZEL, AS SHOWN. NOTE THAT A LABEL IN THIS POSITION DOES NOT HIDE OTHER "INDICATORS" THAT CAN APPEAR ON DISPLAY.
- 3 CAREFULLY, STICK LABEL ON DISPLAY.



SMART METER CODE	TRANSMITTER TYPE		
	ST3000	STT3000	MAGNEW
EU1			m <sup>3</sup> /hr
EU2			
EU3		°K	L/hr
EU4	KPa	°R	cc/hr
EU5	MPa	mv	m <sup>3</sup> /min
EU6	mbar	Volts	
EU7	bar	Ohms	L/min
EU8	g/cm <sup>2</sup>		cc/min
EU9	Kg/cm <sup>2</sup>		m <sup>3</sup> /day
EUA	mmH <sub>2</sub> O		GPD
EUB	inHg		KGPD
EUC	mH <sub>2</sub> O		BPD
EUD			m <sup>3</sup> /sec
EUE			
EUF			

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EUA 6  
EUB 6  
EUC 6  
EUD 6  
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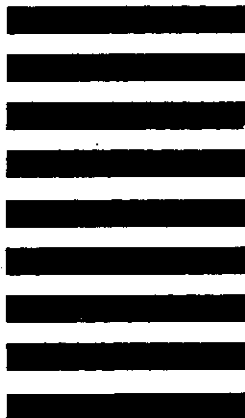
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