

S4e UtiliNet User Manual

Bulletin Revision A

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DOCUMENT HISTORY

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Safety Warnings

The following safety precautions must be observed during all phases of operation, service, and repair of this device. Failure to comply with these precautions or with specific warnings elsewhere in these instructions violates safety standards of design, manufacture, and the intended use of the metering instrument. Landis+Gyr Inc assumes no liability for the customer's failure to comply with these requirements.

- **Warning:** Any work on, or near, energized meters, meter sockets, or other metering equipment can present a danger of electrical shock. All work on this product should be performed only by qualified electricians and metering specialists in accordance with local utility safety practices, utility requirements and procedures outlined in Chapter 14 of The Handbook for Electricity Metering (9th edition). The information contained within this manual is intended to be an aid to qualified metering personnel. It is not intended to replace the extensive training necessary to handle metering equipment in a safe manner.
- Remove the meter from service prior to installing the antenna isolation kit and/or remote external antennas.
- Be aware that dangerous voltages exist at several points within the meter when this product is installed on a meter socket.
- Always disconnect power before meter disassembly, soldering, or replacing components.

The S4e meter is connected directly to line potential. Due to the possibility of the potential lines being reversed, points accessible with the cover off may be at line voltage.

LINE POTENTIAL IS PRESENT ON THE INCOMING CONNECTORS ON THE MEASUREMENT BOARD INCLUDING THE BATTERY CONNECTOR.

The connectors have full-length insulators crimped onto each connector, which are shielded by the housing. However, pulling the connector loose will expose the battery terminals, which may be at line potential. The option board is connected directly to the main board and may be at a high potential. A Mylar shield prevents touching the option board. Removing the Mylar shield exposes line voltage. The above warning label affixed to the meter frame identifies hazards in the meter.

Failure to follow all instructions may result in an unsafe product that could cause injury or death

CAUTION:

DO NOT OPERATE METER WITHOUT ANTENNA ATTACHED.
OPERATION WITHOUT ANTENNA MAY CAUSE PERMANENT DAMAGE
TO THE UTILINET MODULE.



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FCC Information

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

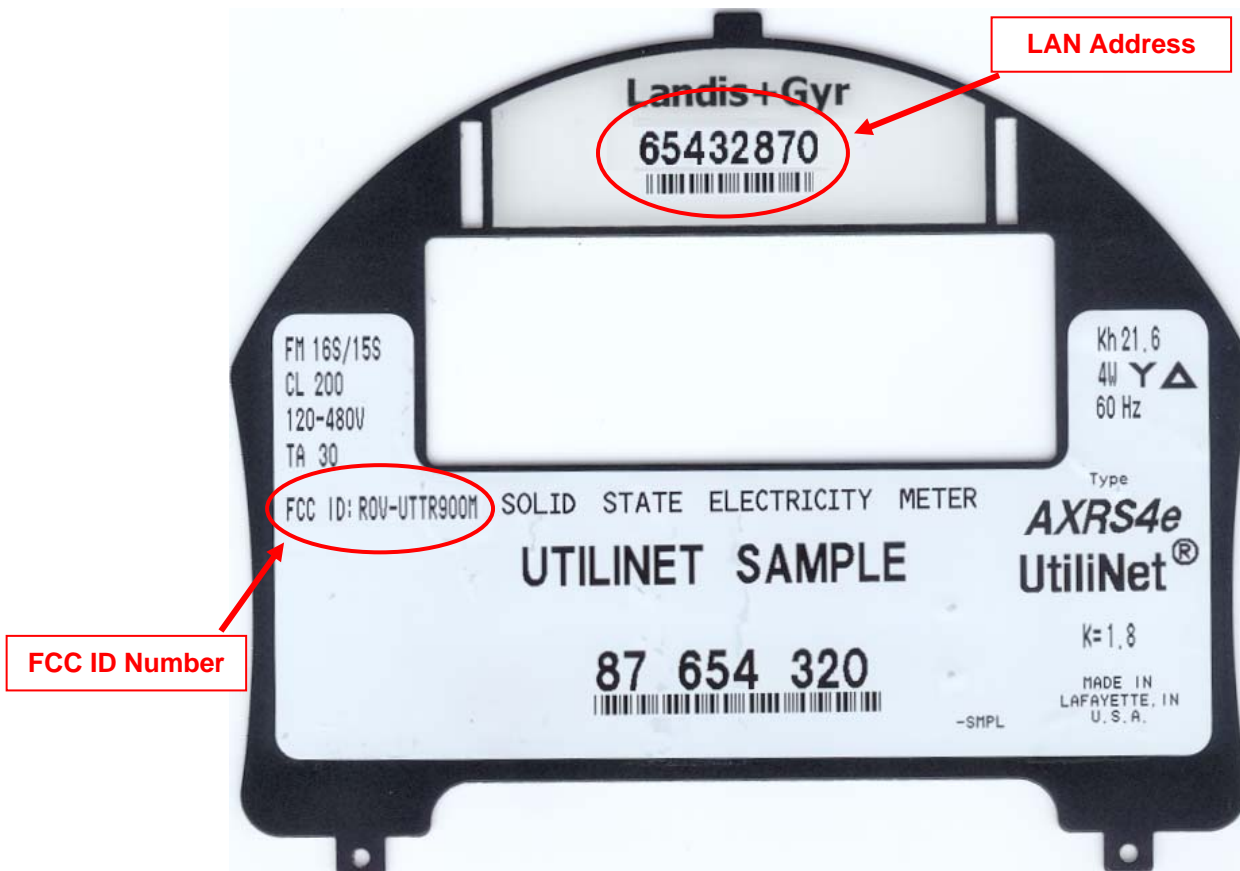
- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by Landis+Gyr could void the user's authority to operate the equipment.

Note:

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult Landis+Gyr or an authorized technician for help.



Introduction

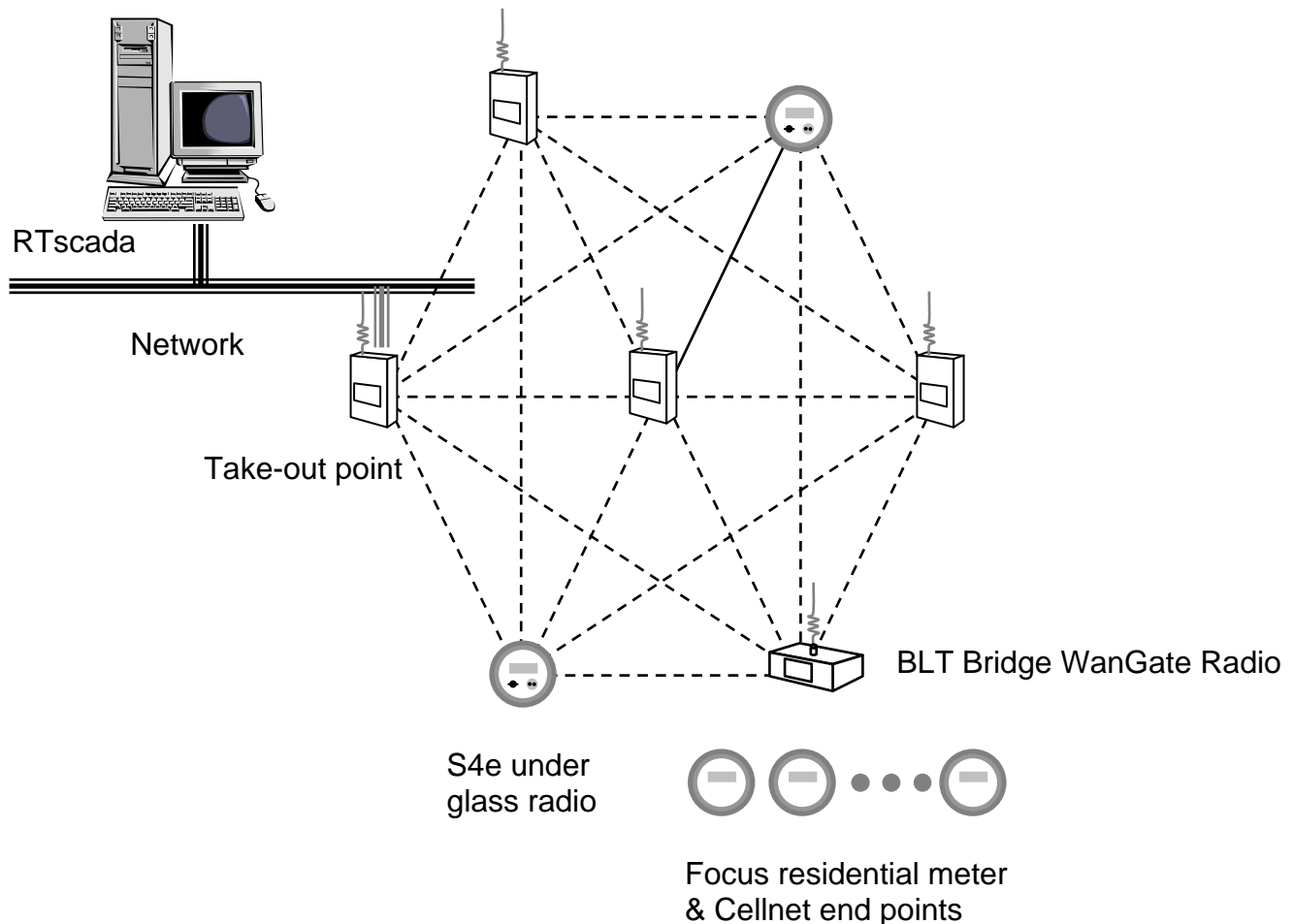
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The S4e UtiliNet is Landis+Gyr's latest polyphase meter product targeting advanced communications for commercial and industrial metering needs. The S4e UtiliNet is a marriage of Landis+Gyr's 4th generation solid-state commercial and industrial meter with an under-glass UtiliNet module. It provides the following benefits:

- Low operational cost AMR solution
- Cumulative, Interval, Registers and Event Data
- On Demand or On Schedule Reads
- Supports small to large deployments

System Overview

The S4e UtiliNet system looks as follows:



Data acquisition can be provided by a hosted service for small to large meter deployments or an own and operate solution. The UtiliNet network provides secure, packet based data transfer. The Landis+Gyr designed UtiliNet module supports the following system services:

- Uses Device Control Word (DCW) programming language
- Spread Spectrum Frequency Hopping Technology
- Utilizes an Unlicensed Frequency Band

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- Devices act as end devices and repeaters
- Utilizes packet switching data transmission
- Increase coverage by adding more radios

S4e Meter Overview

All S4e meters include wide-dynamic voltage application capability, forms reduction, Service Scan automatic service recognition, and GyrBox installation diagnostics and monitoring. The S4e is available with several register types, providing the right functionality for any metering application. The S4e UtiliNet can be ordered with the following register configurations:

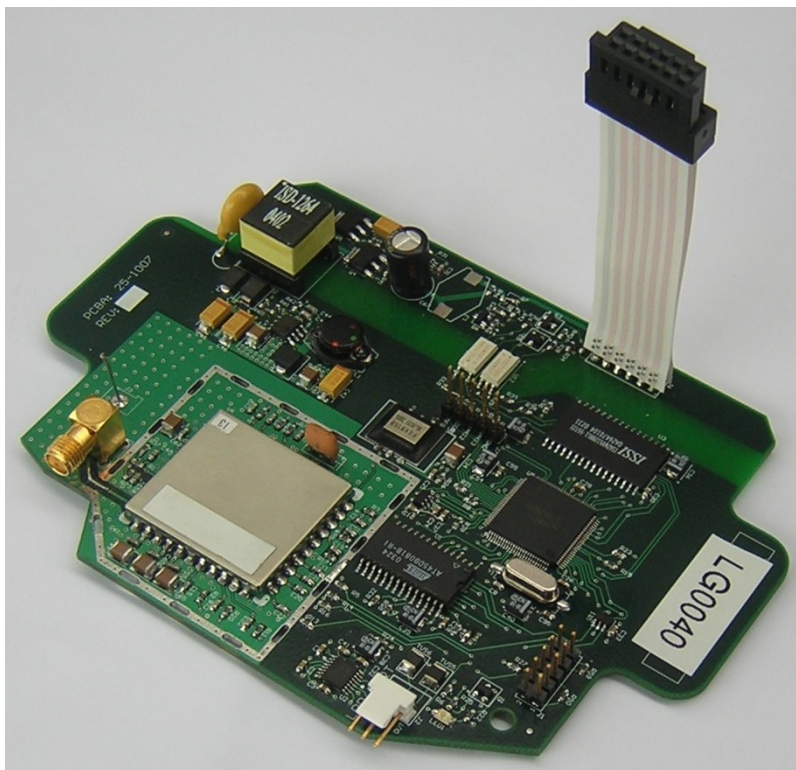
AX	Active energy, Demand or TOU
AXR 32K	Active energy, with a 32K byte load profile recorder
AXR 128K	Active energy, with a 128K byte load profile recorder
RX	Active and reactive measurement, Demand or TOU
RXR 32K	Active and reactive measurement with 32K byte load profile recorder
RXR 128K	Active and reactive measurement with 128K byte load profile recorder

An optional input/output board provides up to 2, form C, solid-state relays and up to one external inputs for recording pulses from a remote source. The 4 relay option board is not available with the S4e UtiliNet meter. One external input can also be used for real-time rate changes or self-read actuation. The board can be easily added in the field without the need for special tools or soldering.

For additional information on the S4e meter, consult the *S4/S4e Solid State Meter Instruction/Technical Manual*.

UtiliNet Module Overview

The S4e meter is modular in its design. The UtiliNet module occupies the communications board slot in an S4e meter.



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Configuration of the UtiliNet Module

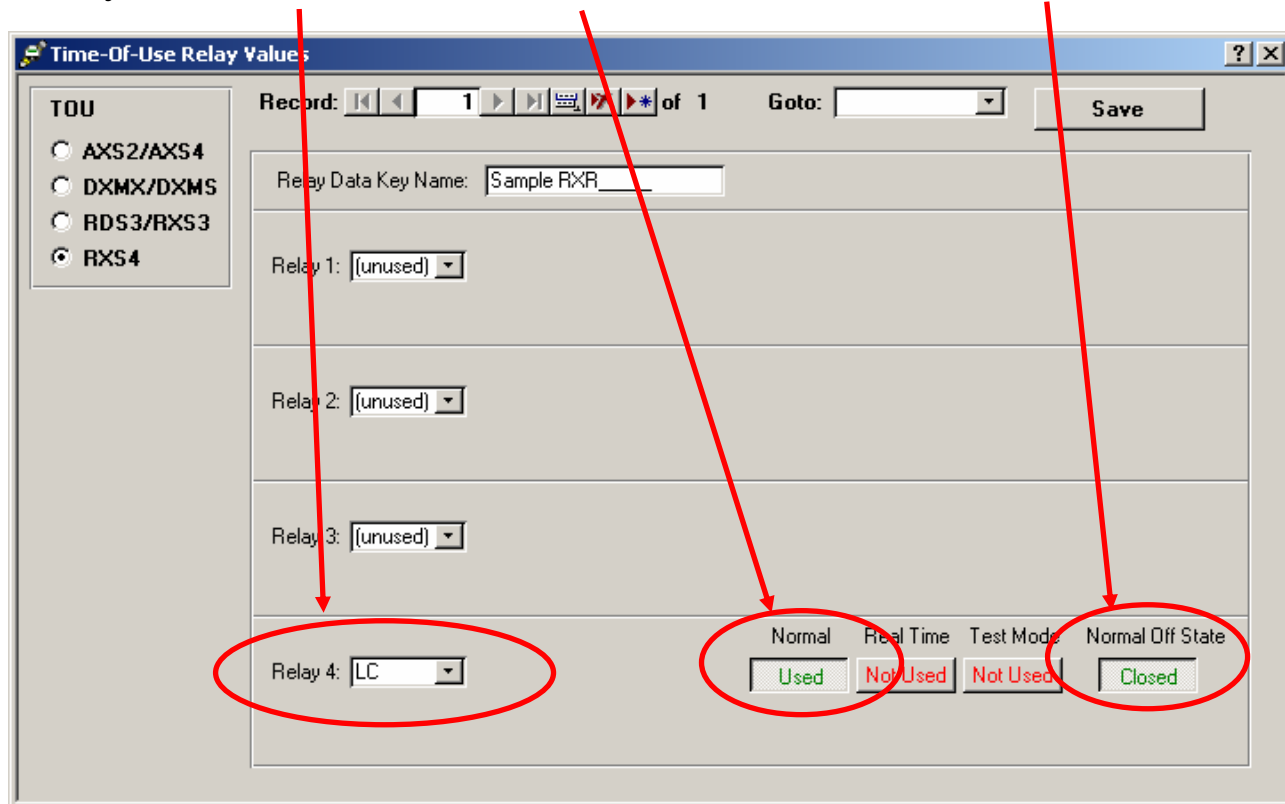
The S4e UtiliNet meter is programmed using 1132Prog/1132Com. The UtiliNet module is factory programmed with a LAN Address.

Meter Setup

The Utilinet module relies on certain inputs from relay 4 for its operation. As a result there are a few minimum programming requirements for the S4 (using 1132Prog). The load control relay activates the relay upon power up. This relay triggers the UtiliNet module to power up. If the meter is not programmed as shown below the UtiliNet module will not operate as expected. A special tool, Utilinet Radio Tool, was developed to query and reboot the UtiliNet module.

Relays:

Set Relay 4 to Load Control ("LC"), "Used" in Normal Mode and Normal Off State to "Closed".



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TOU Rates Schedule:

Set AX/RX Only? to "Yes", and Schedule Relay? to "Yes"

Time-Of-Use Rates Schedule

Record: 1 of 2 Goto: Save

Define TOU Schedule Define Season Define Day Types View Schedule

TOU Schedule Name: AX RX Samp Rate ID: 000001

Notes: Sample Rates for AX and RX meters

No. of Seasons: 2

No. of Day Types: 2

No. of Holiday Types: 1

Max ANSI Switch Points: 224

Max DGCOM Switch Points: 234

Total Current Switch Point Count: 13

AX/RX Only? Yes No

Schedule Relay:

Relay 1? No

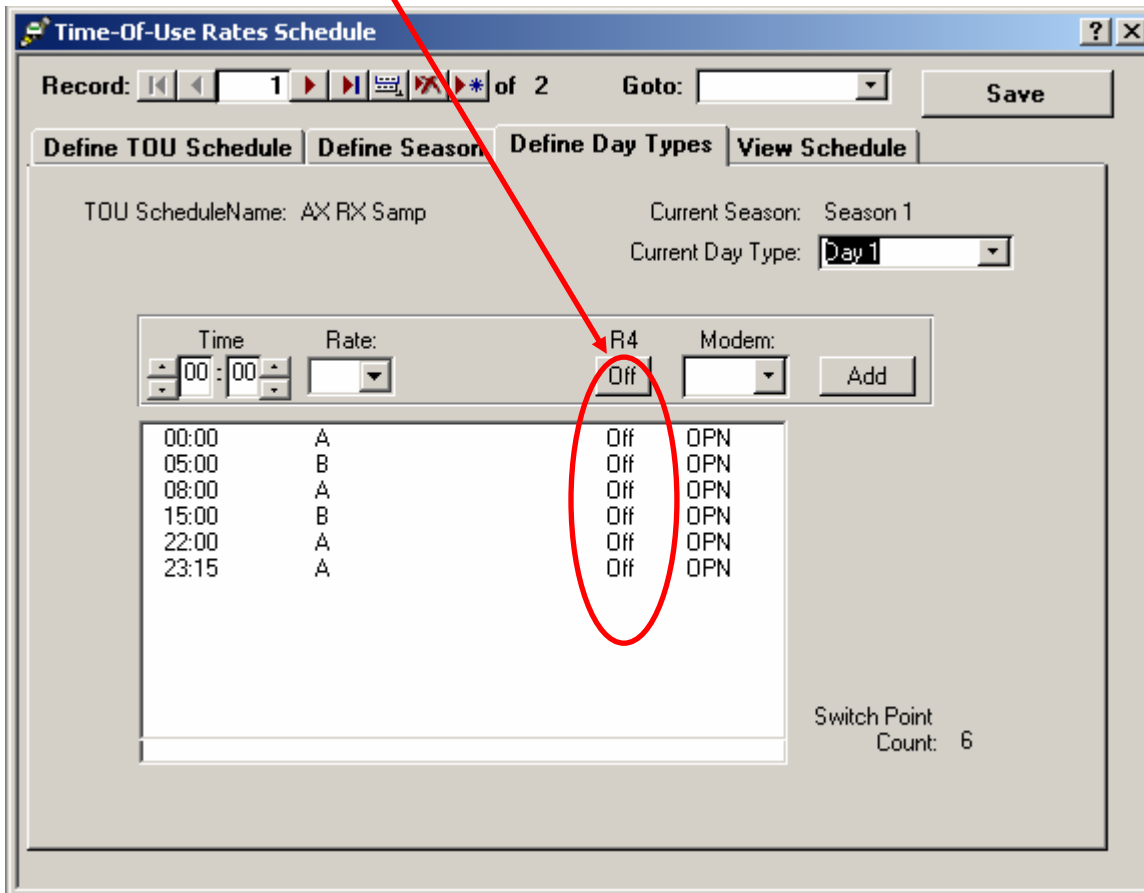
Relay 2? No

Relay 3? No

Relay 4? Yes

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Also, Set all Switchpoints to "OFF" in the Rates Schedule



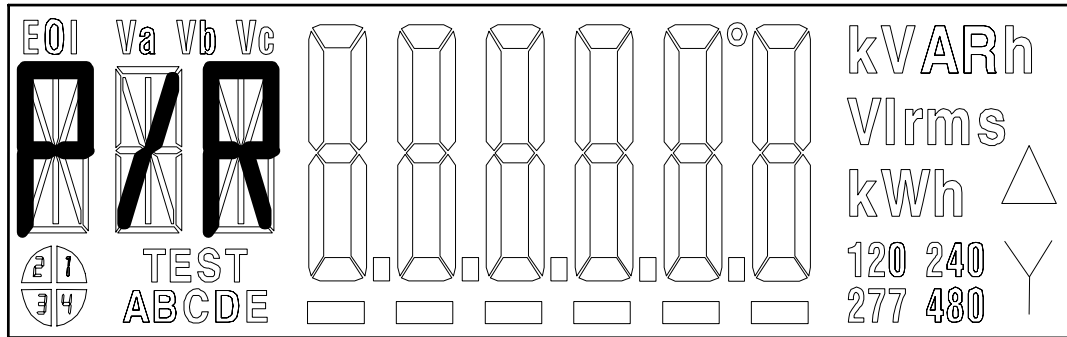
Meter Installation

Step 1. Installing S4e UtiliNet Meter

If existing meter is present, follow company procedures for meter removal and installation. (Note: Meter removal and installation should only be performed by a properly trained technician.)

During communication the LCD will flash P/R in the alphanumeric segments.

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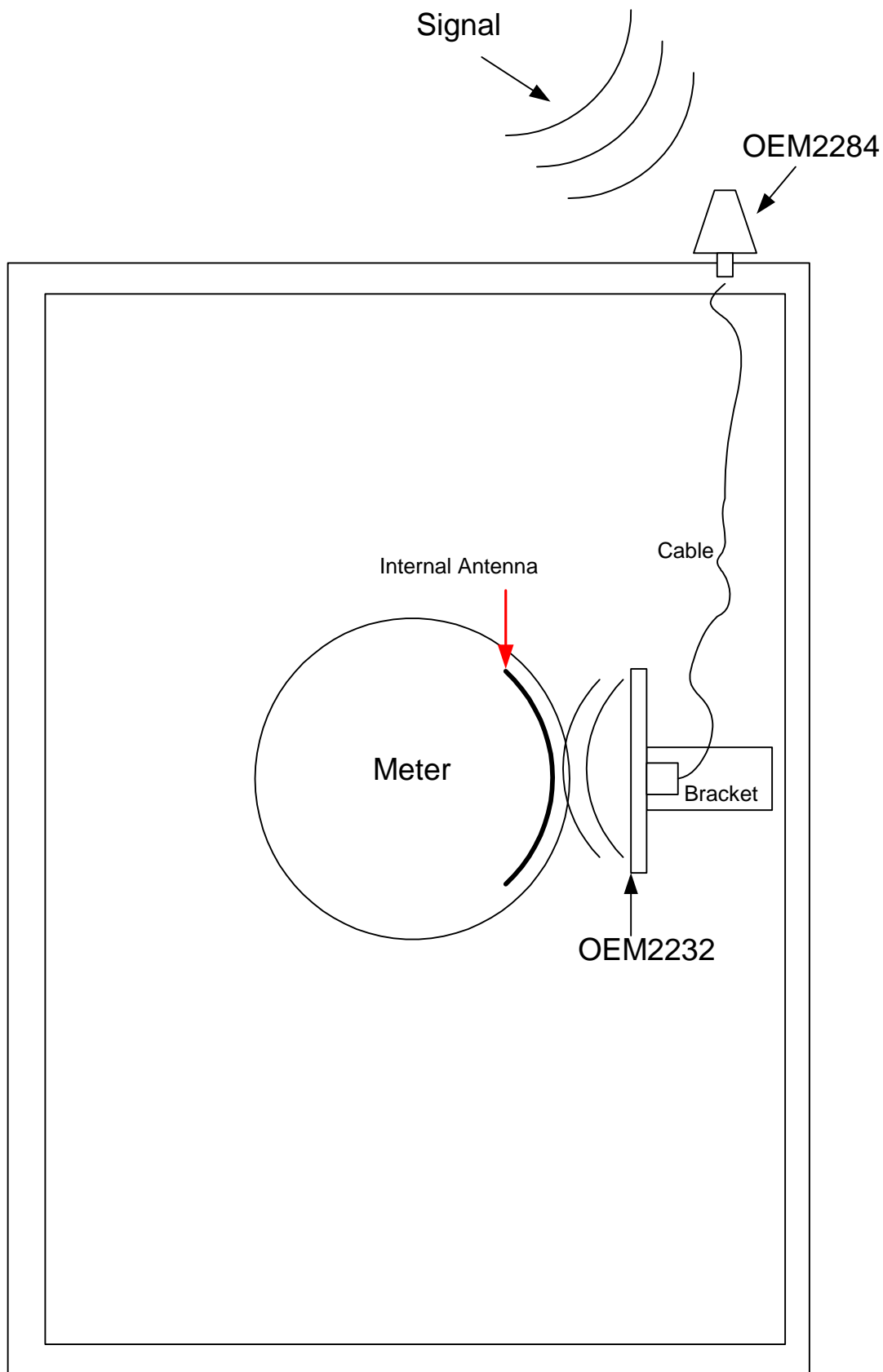
Step 2. Verifying the S4e UtiliNet Communicates Over the Network

Trouble shooting Guide

Symptom	Possible Causes
S4e Meter LCD Display Blank	Check voltage to meter
UtiliNet Not Communicating	Check Module to Meter Connection
UtiliNet communicates but not connecting to host	Verify correct DCW Programming. Use UtiliNet Radio Tool to check UtiliNet programming status.
UtiliNet communicates but no load profile sent	Verify that S4e meter recorder is programmed. Using 1132Com perform a View Data and check that meter device type detected as AXR or RXR and that the load profile settings are correct.

Use of External Antennas

S4e UtiliNet equipped meters are manufactured with an internal antenna. However, some meter locations have less than optimal RF reception. Many meter services are ungrounded. Examples of these types of services include single-phase form 2S, as well as floating 3-wire delta services, 12S and 45S/5S. To improve the reliability and safety of these floating services, Landis+Gyr has developed an interface for remotely mounted antennas that allows RF reception under these service conditions. The High Voltage antenna coupling system protects UtiliNet components from transients reaching up to 7,000 volts. The Landis+Gyr External Antenna Isolation Solution needs to be installed in the S4e meter in accordance with Landis+Gyr Specifications. Contact the factory for more information regarding ordering and installing approved external antenna solutions. See the diagram on the next page.



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Technical Features of the S4e UtiliNet

S4e and UtiliNet Specifications

Applicable Standards

ANSI C12.1-2001	for electricity metering
ANSI C12.10-1987	for watt-hour meters
ANSI C12.20-1998	for solid-state electricity meters
CAN3-C17-M84	Canadian Specs for approval of electrical meters
CAN3-Z234.4-79	Canadian Specs for all-numeric dates and times
FCC	Certified Part 15.247
Industry Canada	RSS 210
NOM	121-SCTI-1994

Application Information

Frequency	50 or 60 Hz +/- 5%
Nominal Voltage	120-480 VAC ranging
Operating Voltage	80-115% of nominal
Operating Temperature	
Meter	-40 to +85 C under cover
UtiliNet Radio	-40 to +60 C under cover
Humidity	Meter Less than or equal to 95% relative humidity, non-condensing UtiliNet rated 65 ⁰ C at 90% relative humidity, non-condensing

Meter

Rated Accuracy at Unity Power Factor

Transformer-Rated/ Self Contained Meters	+/- 0.2%
K-Base Meters	+/- 0.5%
Over voltage Withstand	
Temporary (.5 sec)	150% rated voltage
Continuous (5 hours)	120% rated voltage
Starting Load:	
Class 20	0.004 amps
Class 200	0.050 amps
Class 320	0.050 amps

Available Meter Forms

Base	Transformer Rated Class 20	Class 120	Class 200	Class 320**	Class 480
S-Base	3, 9/8, 45(5)*, 36(6)*, 29, 56		2, 12, 25, 16/15/14	2, 12, 16/15/14	
A-Base	10/8, 45(5)*, 36(6)*	16/15/14			
K-Base					12, 16/15/14, and 27

*36S/36A replaces the traditional 6S/6A, 45S/45A replaces the traditional 5S/5A

**Class 320 Meters are referred to as SE base

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UtiliNet Specifications

General

Frequency Range	902-928 MHz
Channels	240, 25kHz wide
Channel Spacing	100 kHz
Raw RF Data Rate	9600 bps
Spreading Technique	Frequency Hopping
Hopping Technique	Pseudo Random, Asynchronous
Hopping Patterns	65,536 (Unique per Network)
Network Address	Latitude/Longitude Coordinates

Receiver

Type	Double Conversion Superheterodyne; 1 st IF 45 MHz, 2 nd IF 455 kHz
Dynamic Range	-104 to -20 dBm
Packet Error Rate	1×10^{-2} (1×10^{-6} BER)
IF Selectivity	6 dB down @ 30 kHz
45 MHz IF Rejection	<90 dB
Frequency Stability	2.5 ppm (0.00025%) @ -30° to +75° 5 ppm (0.0005%) @ -40° to +85°

Transmitter

RF Output Min (at antenna conn.)	+17 dBm (50 mW)
RF Output Typical	+20 dBm (100 mW)
Out-of-Band Spurious Radiation	< -55 dBc (1kHz bandwidth)
Deviation	± 5.5 kHz $\pm 10\%$
Module Bandwidth	25 kHz
Modulation	Standard FSK
Output Impedance	50 Ohms
Frequency Stability	2.5 ppm (0.00025%) @ -30° to +75° 5 ppm (0.0005%) @ -40° to +85°