

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF)	
LOUISVILLE GAS AND ELECTRIC)	
COMPANY FOR AN ADJUSTMENT OF)	
ITS ELECTRIC AND GAS RATES, A)	CASE NO. 2020-00350
CERTIFICATE OF PUBLIC)	
CONVENIENCE AND NECESSITY TO)	
DEPLOY ADVANCED METERING)	
INFRASTRUCTURE, APPROVAL OF)	
CERTAIN REGULATORY AND)	
ACCOUNTING TREATMENTS, AND)	
ESTABLISHMENT OF A ONE-YEAR)	
SURCREDIT)	

APPLICATION

Applicant, Louisville Gas and Electric Company (“LG&E”), pursuant to KRS Chapter 278 and the applicable sections of 807 KAR Chapter 5, hereby applies to the Kentucky Public Service Commission (“Commission”) for authority to adjust its electric and gas rates and to establish an Economic Relief Surcredit, a Certificate of Public Convenience and Necessity (“CPCN”) for the full deployment of Advanced Metering Infrastructure (“AMI”) across its service territory, and approval of certain regulatory and accounting treatments. LG&E’s Notice of Intent to File a Rate Application, required by 807 KAR 5:001, Section 16(2), stated that the Application would be supported by a fully forecasted test period, was filed with the Commission on October 23, 2020, was provided to the Attorney General of Kentucky, Office of Rate Intervention, and is attached hereto at Tab 7 of the Filing Requirements.

In support of its Application, LG&E states as follows:

1. The full name and mailing address of LG&E are: Louisville Gas and Electric Company, Post Office Box 32010, 220 West Main Street, Louisville, Kentucky 40202. LG&E may be reached by electronic mail at the electronic mail addresses of its counsel set forth below.

2. LG&E is a utility engaged in the electric and gas business. LG&E generates and purchases electricity, and distributes and sells electricity at retail in Jefferson County and portions of Bullitt, Hardin, Henry, Meade, Oldham, Shelby, Spencer, and Trimble Counties. LG&E also purchases, stores, and transports natural gas and distributes and sells natural gas at retail in Jefferson County and portions of Barren, Bullitt, Green, Hardin, Hart, Henry, Larue, Marion, Meade, Metcalfe, Nelson, Oldham, Shelby, Spencer, Trimble, and Washington Counties.

3. LG&E was incorporated in Kentucky on July 2, 1913, and is currently in good standing in Kentucky. A copy of LG&E's good standing certificate from the Kentucky Secretary of State is attached at Tab 1 of the Filing Requirements.

4. This Application constitutes notice to the Commission pursuant to KRS 278.180(1) of the changes proposed to be made to LG&E's electric and gas rates. LG&E's Statutory Notice is attached to this Application. LG&E is filing its Certificate of Notice to the public of the changes in its tariffs that result in increased rates, which Certificate is attached hereto at Tab 6 of the Filing Requirements.

5. Pursuant to 807 KAR 5:001 Section 8, on October 23, 2020, LG&E filed with the Commission notice of its intent to use electronic filing procedures in this proceeding. Copies of all orders, pleadings, and other communications related to this proceeding should be directed to:

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Adjustment of Electric Rates

6. In accordance with the provisions of KRS 278.180 and 278.190, LG&E requests Commission approval of a change in existing rates, terms, conditions, and tariffs for electric service. LG&E proposes to change its existing electric rates and tariffs to those rates and charges set forth in the proposed tariffs attached hereto at Tab 4 of the Filing Requirements. A comparison of the present and proposed rates and charges is attached hereto at Tab 5 of the Filing Requirements. The proposed revisions in the special contracts are summarized at Tab 4 of the Filing Requirements. The proposed adjustments in electric rates will result in an increase in revenues of approximately \$131.1 million, or 11.6 percent, per year for the

forecasted test period compared to the operating revenues for the forecasted test period under existing electric rates.

7. The monthly residential electric bill increase due to the proposed electric base rates will be 11.81 percent, or approximately \$11.74, for a customer using 894 kWh of electricity (the average monthly consumption of an LG&E residential customer).

Adjustment of Gas Rates

8. LG&E also requests Commission approval of a change in existing rates, terms, conditions, and tariffs for gas service. LG&E proposes to change its existing gas rates and tariffs to those rates and charges set forth in the proposed tariffs attached hereto at Tab 4 of the Filing Requirements. A comparison of the present and proposed rates and charges is attached hereto at Tab 5 of the Filing Requirements. The proposed adjustments in gas rates will result in an increase in revenues of approximately \$30.0 million, or 8.3 percent, per year for the forecasted test period compared to the operating revenues for the forecasted test period under existing gas rates.

9. The monthly residential gas bill increase due to the proposed gas rates will be 9.37 percent, or approximately \$6.17, for a customer using 54 Ccf of gas (the average monthly consumption of an LG&E residential gas customer).

Support for Change in Existing Rates and Tariffs

10. In accordance with 807 KAR 5:001 Section 16(1)(b)(1), LG&E states that the requested change in existing rates, terms, conditions, and tariffs is required to enable LG&E to continue providing safe and reliable service to its customers, and to afford LG&E a reasonable opportunity to earn a fair return on its investment property used to provide that service while attracting necessary capital at reasonable rates. LG&E's current rates and tariffs are inadequate

for those purposes. Therefore, as explained in more detail in the verified testimony and exhibits identified below, the requested change in existing rates is required.

11. LG&E supports its request for a change in its existing rates and tariffs for electric and gas service with the verified testimony and exhibits of the following persons:

- Paul W. Thompson, President and Chief Executive Officer
- Kent W. Blake, Chief Financial Officer
- Lonnie E. Bellar, Chief Operating Officer
- David S. Sinclair, Vice President – Energy Supply and Analysis
- John K. Wolfe, Vice President – Electric Distribution
- Eileen L. Saunders, Vice President – Customer Services
- Gregory J. Meiman, Vice President – Human Resources
- Daniel K. Arbough, Treasurer
- Adrien M. McKenzie, President, FINCAP, Inc.
- Christopher M. Garrett, Controller
- John J. Spanos, President, Gannett Fleming, Inc.
- Robert M. Conroy, Vice President – State Regulation and Rates
- William Steven Seelye, Managing Partner, The Prime Group LLC

12. LG&E further supports its request for a change in its existing rates and tariffs for electric and gas service with the following exhibits complying with the requirements of 807 KAR 5:001, Sections 14, 16, and 17:

Tab	Filing Requirement	Description
1	807 KAR 5:001 Section 14(1)	Name, Address, Facts
1	807 KAR 5:001 Section 14(2)	Corp. - Good Standing
1	807 KAR 5:001 Section 14(3)	LLC - Organized, Good Standing
1	807 KAR 5:001 Section 14(4)	LP - Agreement
2	807 KAR 5:001 Section 16(1)(b)1	Reason for Rate Adjustment
3	807 KAR 5:001 Section 16(1)(b)2	Certificate of Assumed Name

Tab	Filing Requirement	Description
4	807 KAR 5:001 Section 16(1)(b)3	Proposed Tariff
5	807 KAR 5:001 Section 16(1)(b)4	Proposed Tariff Changes
6	807 KAR 5:001 Section 16(1)(b)5	Statement about Customer Notice
7	807 KAR 5:001 Section 16(2)	Notice of Intent
8	807 KAR 5:001 Section 16(6)(a)	Financial Data
9	807 KAR 5:001 Section 16(6)(b)	Forecasted Adjustments
10	807 KAR 5:001 Section 16(6)(c)	Capital, Net Investment Rate Base
11	807 KAR 5:001 Section 16(6)(d)	No Revisions to Forecast
12	807 KAR 5:001 Section 16(6)(e)	Alternative Forecast
13	807 KAR 5:001 Section 16(6)(f)	Reconciliation of Rate Base and Capital
14	807 KAR 5:001 Section 16(7)(a)	Testimony
15	807 KAR 5:001 Section 16(7)(b)	Capital Construction Budget
16	807 KAR 5:001 Section 16(7)(c)	Factors Used in Preparing Forecast
17	807 KAR 5:001 Section 16(7)(d)	Annual and Monthly Budget
18	807 KAR 5:001 Section 16(7)(e)	Statement of Attestation
19	807 KAR 5:001 Section 16(7)(f)	Major Construction Projects
20	807 KAR 5:001 Section 16(7)(g)	Other Construction Projects
21	807 KAR 5:001 Section 16(7)(h)	Financial Forecasts
22	807 KAR 5:001 Section 16(7)(h)(1)	Operating Income Statement
23	807 KAR 5:001 Section 16(7)(h)(2)	Balance Sheet
24	807 KAR 5:001 Section 16(7)(h)(3)	Statement of Cash Flows
25	807 KAR 5:001 Section 16(7)(h)(4)	Revenue Requirement
26	807 KAR 5:001 Section 16(7)(h)(5)	Load Forecast
27	807 KAR 5:001 Section 16(7)(h)(6)	Access Line Forecast (Telephone)
28	807 KAR 5:001 Section 16(7)(h)(7)	Mix of Generation (Electric)
29	807 KAR 5:001 Section 16(7)(h)(8)	Mix of Gas Supply (Gas)
30	807 KAR 5:001 Section 16(7)(h)(9)	Employee Level
31	807 KAR 5:001 Section 16(7)(h)(10)	Labor Cost Changes
32	807 KAR 5:001 Section 16(7)(h)(11)	Capital Structure Requirements
33	807 KAR 5:001 Section 16(7)(h)(12)	Rate Base
34	807 KAR 5:001 Section 16(7)(h)(13)	Gallons of Water Projected (Water)
35	807 KAR 5:001 Section 16(7)(h)(14)	Customer Forecast (Gas, Water)
36	807 KAR 5:001 Section 16(7)(h)(15)	Sales Volume Forecasts (Gas)
37	807 KAR 5:001 Section 16(7)(h)(16)	Toll and Access Forecast (Telephone)
38	807 KAR 5:001 Section 16(7)(h)(17)	Detailed Explanation of Other Info
39	807 KAR 5:001 Section 16(7)(i)	FERC Audit Reports
40	807 KAR 5:001 Section 16(7)(j)	Stock or Bond Prospectuses
41	807 KAR 5:001 Section 16(7)(k)	FERC Form 1, 2
42	807 KAR 5:001 Section 16(7)(l)	Annual Reports to Shareholders
43	807 KAR 5:001 Section 16(7)(m)	Current Chart of Accounts
44	807 KAR 5:001 Section 16(7)(n)	Monthly Managerial Reports
45	807 KAR 5:001 Section 16(7)(o)	Monthly Budget Variance Reports
46	807 KAR 5:001 Section 16(7)(p)	SEC Reports (10-Ks, 8-Ks, 10-Qs)
47	807 KAR 5:001 Section 16(7)(q)	Independent Auditor's Annual Opinion
48	807 KAR 5:001 Section 16(7)(r)	Quarterly Reports to Stockholders

Tab	Filing Requirement	Description
49	807 KAR 5:001 Section 16(7)(s)	Summary of Latest Depreciation Study
50	807 KAR 5:001 Section 16(7)(t)	Computer, Software, Hardware, etc.
51	807 KAR 5:001 Section 16(7)(u)	Affiliate, et. al., Allocations/Charges
52	807 KAR 5:001 Section 16(7)(v)	Cost-of-Service Study
53	807 KAR 5:001 Section 16(7)(w)	Incumbent Local Exchange Carriers
54	807 KAR 5:001 Section 16(8)(a)	Financial Summaries
55	807 KAR 5:001 Section 16(8)(b)	Rate Base Summaries
56	807 KAR 5:001 Section 16(8)(c)	Operating Income Summaries
57	807 KAR 5:001 Section 16(8)(d)	Summary of Income Adjustments
58	807 KAR 5:001 Section 16(8)(e)	Federal & State Income Tax Summaries
59	807 KAR 5:001 Section 16(8)(f)	Summary of Membership Dues, etc.
60	807 KAR 5:001 Section 16(8)(g)	Analyses of Payroll Costs
61	807 KAR 5:001 Section 16(8)(h)	Gross Revenue Conversion Factor
62	807 KAR 5:001 Section 16(8)(i)	Comparative Income Statements, etc.
63	807 KAR 5:001 Section 16(8)(j)	Cost of Capital Summary
64	807 KAR 5:001 Section 16(8)(k)	Financial Data and Earnings Measures
65	807 KAR 5:001 Section 16(8)(l)	Narrative Description of Tariff Changes
66	807 KAR 5:001 Section 16(8)(m)	Revenue Summary
67	807 KAR 5:001 Section 16(8)(n)	Typical Bill Comparison
68	807 KAR 5:001 Section 17(4)	Customer Notice Information
68	807 KAR 5:001 Section 17(1)	Sample Notices Posted
68	807 KAR 5:001 Section 17(2)	Method of Customer Notice
68	807 KAR 5:001 Section 17(3)	Proof of Customer Notice

13. As authorized by KRS 278.192(1), the Application for a general adjustment of electric rates is supported by a twelve-month fully forecasted test period in accordance with 807 KAR 5:001, Section 16(1)(a)2 with the forecasted test period ending June 30, 2022. The Application is supported by a base period consisting of the twelve (12) months ending February 28, 2021. As authorized by KRS 278.192(2), this base period begins not more than nine (9) months prior to the date of the filing of this Application, and is a period consisting of not less than six (6) months of historical data and not more than six (6) months of estimated data. Within forty-five (45) days after the last day of the base period, LG&E will file the actual results for the estimated months of the base period as required by KRS 278.192(2)(b).

14. In support of its Application for a general adjustment of electric and gas rates supported by a fully forecasted test period, LG&E has presented its financial data for the

forecasted period in the form of pro forma adjustments to the base period, has limited the forecasted adjustments to the forecasted period, and has based capitalization and net investment rate base on a thirteen-month average for the forecasted period, all as shown in Tabs 8, 9, and 10.

15. The testimony and exhibits to the application demonstrate the rates, terms, conditions, and tariffs proposed for electric service are fair, just, and reasonable under KRS 278.030.

Reasons for Increase in Revenue Requirements

16. Based upon LG&E's current and projected operations, LG&E's existing rates for electric service produce revenues in the forecasted test period that are approximately \$131.2 million less than those necessary to meet LG&E's reasonable operating expenses and provide a reasonable rate of return for its electric operations. Similarly, LG&E's existing rates for gas service produce in the forecasted test period approximately \$30.0 million less than necessary to meet LG&E's reasonable operating expenses and provide a reasonable rate of return for its gas operations. These revenue deficiencies exist despite aggressive efforts to increase operational efficiencies and reduce costs. It is driven by necessary investments to provide safe and reliable service to LG&E customers. LG&E has experienced a \$1.17 billion increase in Kentucky base rate adjusted capitalization in this proceeding relative to that used to set base rates in its last rate case proceeding. After removing the \$0.80 billion capitalization associated with Environmental Cost Recovery and Gas Line Tracker projects, which are simply being moved from that mechanism to base rates with no net revenue increase, LG&E has experienced an approximately \$0.37 billion increase in capitalization that translates into a \$34.3 million increase in base revenue requirement (Electric \$25.4 million; Gas \$8.9 million). The larger

Plant in Service balances increase annual depreciation expense, or recovery of investment by \$16.3 million (Electric \$10.1 million; Gas \$6.2 million) and property taxes by \$6.6 million (Electric \$6.0 million; Gas \$0.6 million). Recommended changes in depreciation rates for LG&E's remaining coal-fired generation further increase revenue requirement by \$59.2 million for its electric operations. Operation and maintenance expenses for LG&E's electric operations have or are expected to increase by \$24.5 million. Additionally, LG&E's electric operations experienced a \$6.4 million reduction in load and other net revenues, and a \$7.9 million reduction in revenue as a result of the expiration of the refined coal agreements at its Mill Creek and Trimble County facilities. Operation and maintenance expenses for LG&E's gas operations have or are expected to increase by \$14.2 million.

Economic Relief Surcredit

17. LG&E proposes to provide customers a one-year surcredit through the Economic Relief Surcredit Adjustment Clause, which will provide a total surcredit of \$38.9 million to LG&E electric customers and \$2.7 million to LG&E gas customers. The surcredit will be applied to customers' bills during the first year that the base rates in this proceeding are in effect and will serve to mitigate the increase. The items to be returned through the surcredit include the remaining fees LG&E secured for its customers through its negotiation of refined coal facility agreements at the Mill Creek and Trimble County generation plants (electric surcredit), its remaining unprotected excess accumulated deferred income taxes (ADIT) balances (electric and gas surcredit), and the payment received by LG&E in connection with a disputed electric service territory matter (electric surcredit).¹ The total surcredit amount

¹ See *Electronic Joint Application of Louisville Gas and Electric Company, Meade County Rural Electric Cooperative Corporation, and Big Rivers Electric Corporation for (1) Approval of an Agreement Modifying an Existing Territorial Boundary Map and (2) Establishing Meade County Rural Electric Cooperative Corporation*

will be distributed on a per-kWh or per-Ccf basis over twelve months, with a one-month true-up charge or credit in the fifteenth month to ensure accurate distribution of the total surcredit amount per utility. The design of this surcredit is comparable to the surcredit approved in Case No. 2018-00034 to distribute the benefits of the Tax Cuts and Jobs Act.² The surcredit is intended to ease the burden of the proposed increase for one year as the local economy recovers from the impact of the COVID-19 pandemic by more quickly returning certain regulatory liabilities to customers than currently required. The details of the surcredit and resulting tariff provisions are discussed in the testimonies of Mr. Blake and Mr. Conroy.

Certificate of Public Convenience and Necessity for AMI Deployment

18. Pursuant to KRS 278.020(1) and 807 KAR 5:001, Section 15(2), LG&E and Kentucky Utilities Company (“KU”) (“the Companies”) request a CPCN to deploy AMI infrastructure within their service territories. The proposed deployment is expected to begin in late 2021 and be completed by March 2026. As part of the AMI deployment, LG&E will exchange most of its existing electric meters with AMI meters, insert an AMI module in most of its existing gas meters, and insert an encoder receiver transmitter (“ERT”) to enable the use of automated meter reading (“AMR”) technology in its existing gas meters in its gas-only service areas. Approximately 419,000 of LG&E’s electric meters will be replaced and approximately 337,000 of its gas meters will be inserted with an AMI module. An additional 11,500 meters in LG&E’s gas-only service areas will receive an ERT module. The AMI meters that LG&E proposes to deploy will have two-way communications capabilities that will communicate usage and other relevant data to LG&E at regular intervals and have the ability

as the Retail Electric Supplier for Nucor Corporation's Proposed Steel Plate Mill in Buttermilk Falls Industrial Park in Meade County, Kentucky, Case No. 2019-00370, Order (Ky. PSC Feb. 24, 2020).

² *Kentucky Industrial Utility Customers, Inc., Complainant, v. Kentucky Utilities Company and Louisville Gas and Electric Company, Defendants, Case No. 2018-00034, Order (Ky. PSC Mar. 20, 2018).*

to receive information from LG&E, such as software upgrades and requests to provide meter reads in real time. The AMI electric meters will also have remote service switching capabilities. The AMR meters allow for only one-way radio communication but permit the meter to be read from a distant moving vehicle. The estimated capital cost of the Companies' proposed AMI infrastructure deployment is \$302.5 million.

19. LG&E supports its request for a CPCN, including the information required by 807 KAR 5:001, Section 15(2), through the testimonies of Mr. Bellar, Mr. Wolfe, Ms. Saunders, and Mr. Conroy and the exhibits thereto, as well as Exhibits 1 through 6 to this Application for which Mr. Bellar is the sponsoring witness.

20. Statement of Public Convenience and Necessity (807 KAR 5:001, Section 15(2)(a)): The Companies have approximately 978,000 electric meters in their Kentucky service areas. Approximately 713,000 of these electric meters are electromechanical meters, are an average age of 32 years, are near obsolescence, and are no longer being manufactured. Each month the Companies must manually read most of their meters and manually provide meter-related services such as connecting and disconnecting meters for service. LG&E must also manually read most of its gas meters. The proposed AMI deployment (including the insertion of an AMI module into the 340,000 gas meters that are located in LG&E's electric service territory and the insertion of an ERT into gas meters in LG&E's gas-only service areas) will achieve several operational efficiencies as well as enhance the present quality of service and provide additional benefits to and options for the Companies' customers. The Companies estimate that the full deployment of AMI meters is the least cost alternative among several alternatives and will produce for customers over 30 years over \$50 million in net present value revenue requirements savings versus the continued use of non-communicating metering

equipment. The Companies' analysis is set forth in "Analysis of Metering Alternatives," which is attached to Mr. Bellar's testimony as Exhibit LEB-3. The proposed savings derive from reduction in meter reading and field services costs, avoided meter costs, and fuel savings resulting from the ability to leverage AMI to reduce customers' energy usage by incrementally lowering distribution voltages. Equally important, the proposed deployment will improve service quality and distribution system performance by providing real-time information that can be used to prevent and handle outages, validate restoration, manage voltage, and assess asset loading. The proposed AMI meters will capture more detailed and near real-time energy usage information that will permit customers to become better informed about their usage patterns and behaviors and will enable the Companies to develop and offer new programs and rate options that will potentially lower energy bills and produce greater customer satisfaction. The proposed deployment will also permit the Companies to be more flexible and responsive to customer needs by establishing service more quickly or settling overdue balances. By eliminating the need to manually read meters and manually provide some field services, it will eliminate employee safety concerns associated with those activities.

21. Permits or Franchises (807 KAR 5:001, Section 15(2)(b)): LG&E is not aware of any permits or franchises it must seek for the meter deployment.

22. Description of Proposed Location for Construction (807 KAR 5:001, Section 15(2)(c)): AMI will be deployed throughout LG&E's certified territory. AMR technology will be installed in the gas-only portions of LG&E. The deployment will not compete with the facilities of any other utility but is intended to improve the quality and reliability of the service that LG&E provides in its service territory. Exhibit 1 to this Application provides the AMI

deployment schedule. A map of the Companies' certified territories, which shows the location of the proposed metering deployment, is attached to this Application as Exhibit 2.

23. Area Maps (807 KAR 5:001, Section 15(2)(d)(1)): The meter program will be implemented throughout LG&E's service area. The required maps showing the service territory where LG&E proposes to implement the meter program are attached as Exhibit 2 to this Application. LG&E believes the map satisfies 807 KAR 5:001, Section 15(2)(d)(1), but if the Commission finds it does not, LG&E requests a deviation from the same.

24. Plans and Specifications (807 KAR 5:001, Section 15(2)(d)(2)): Exhibit 3 to this Application contains a diagram of the overall metering systems depicting the interaction of the devices (meters, modules, routers, back office systems, etc.) being deployed as part of the proposed metering deployment. Exhibits 4 through 6 to this Application contain specifications of the communications network, electric meters, and natural gas modules to be installed, respectively. LG&E believes this information satisfies 807 KAR 5:001, Section 15(2)(d)(2), but if the Commission finds it does not, LG&E requests a deviation from the same.

25. Financing Plans (807 KAR 5:001, Section 15(2)(e)): The total projected capital expenditures for the Companies' AMI infrastructure deployment is \$302.5 million. These expenditures will be financed with a combination of new debt and equity. The mix of debt and equity used to finance the project will be determined so as to allow LG&E to maintain its strong investment-grade credit ratings. The cost details of the full AMI deployment are contained in "Analysis of Metering Alternatives" (Mr. Bellar's Testimony, Exhibit LEB-3) and in Mr. Blake's testimony.

26. Estimated Cost of Operations (807 KAR 5:001, Section 15(2)(f)): The estimated annual operating costs of the full AMI deployment are set forth in “Analysis of Metering Alternatives” (Mr. Bellar’s Testimony, Exhibit LEB-3).

Ratemaking Treatment for AMI Deployment

27. LG&E proposes to defer recovery of the costs related to its AMI investment until the entire project is fully implemented and placed into service, which is projected to be March 2026, and all benefits associated with the AMI implementation are available. It would record its investment in the AMI project as construction work in progress and accrue an allowance for funds used during construction (“AFUDC”) for the capital and financing costs during the projected five-year implementation period. It would record as a regulatory liability until its first base rate case following AMI implementation the amount that actual meter reading and field service expenses were less than the forecasted test period level embedded into the base rates awarded in this proceeding. LG&E would record as a regulatory asset during the implementation period (1) the operating expenses associated with the project implementation and (2) the difference between AFUDC accrued at the Companies’ weighted average cost of capital as shown in this Application and that calculated using a strict interpretation of the methodology approved by the Federal Energy Regulatory Commission. Recovery of actual implementation costs would be addressed in LG&E’s first base rate case following implementation. Mr. Blake discusses the proposed ratemaking treatment of AMI implementation costs in his testimony.

28. LG&E also proposes to establish a regulatory asset for the remaining net book value of its electric meters retired as a result of the proposed AMI deployment. Upon completion of the proposed deployment, the amount of this regulatory asset for the Companies

is projected to be approximately \$26.8 million. As the proposed retirement of the Company's existing electric meters is an extraordinary and non-recurring expense that will produce savings that fully offset the costs associated with the meters' retirement, the establishment of a regulatory asset account is consistent with prior Commission decisions addressing the deployment of AMI meters. The amortization of this regulatory asset to recover any of the net book value of the replaced meters would not be addressed until the Companies' first base rate case proceeding following AMI implementation. Mr. Blake discusses the proposed establishment of this regulatory asset and regulatory liability in his testimony.

29. The proposed ratemaking treatment is a reasonable and appropriate method for addressing the costs of the AMI Project. It will permit the installation of the AMI infrastructure without immediately affecting customer bills. Moreover, as discussed in Mr. Blake's testimony, the Companies expect the amortization of the proposed regulatory assets and liabilities associated with the AMI Project and the savings achieved from the AMI infrastructure will make unlikely any increase in revenue requirements associated with the installation and implementation of AMI infrastructure.

**Request for Deviations from Commission Regulations
Regarding Meter Inspection and Testing**

30. The advanced technology contained in the AMI metering equipment that LG&E proposes to deploy throughout its territory achieves the safety and reliability objectives that certain Commission regulations pertaining to meter inspection and testing were intended to ensure and eliminates the need for continued compliance with those regulations. To avoid the requirements that will no longer significantly enhance safety or service reliability and to eliminate the costs associated with these requirements, LG&E requests that the Commission

authorize a deviation from those regulations. Mr. Conroy in his testimony discusses these requests and the cost savings that will result from granting the requested relief.

31. 807 KAR 5:006, Section 7(5). Section 7(5)(a) requires a utility to read each customer's meter at least quarterly except if prevented by reasons beyond its control and excepting customer-read meters subject to Section 7(5)(b). In turn, Section 7(5)(b) requires that a meter be read manually at least once during each calendar year. Commission Staff has previously opined that solid-state metering systems that record meter readings at least daily and transmit such meter readings directly to a utility's central office comply with this regulation without requiring a manual reading.³ LG&E therefore requests an order confirming that interpretation and declaring that LG&E will be in compliance with 807 KAR 5:006, Section 7(5)(a) and (b) even if it does not physically read AMI meters. In the alternative, LG&E requests a permanent deviation from this regulation because AMI metering equipment will transmit at least daily the same information to LG&E, eliminating the need to manually read AMI electric meters.

32. 807 KAR 5:006, Section 14(3). This regulation requires a utility to "inspect the condition of its meter and service connections before making service connections to a new customer so that prior or fraudulent use of the facilities shall not be attributed to the new customer." The proposed AMI meters are capable of sensing meter tampering and other defects and transmitting such information to LG&E. This capability renders physical inspections of meter and service connections unnecessary. Accordingly, LG&E requests a

³ Letter from Beth O'Donnell, Executive Director, Kentucky Public Service Commission, to Ron Sheets, President, Kentucky Association of Electrical Cooperatives (Sept. 27, 2006).

permanent deviation from 807 KAR 5:006, Section 14(3) for its AMI meters that allow for remote data communication.⁴

33. 807 KAR 5:006, Sections 26(4)(e) and 26(5)(a)(2). Section 26(4)(e) requires an electric utility to inspect its meters at least every two years. Section 26(5)(a)(2) requires a gas utility to inspect its meters at least every three years. An AMI meter provides information on its condition on a daily basis and has systems to promptly alert the utility of tampering or of malfunctions. Once receiving this information, the utility can conduct a physical inspection. An AMI gas module provides similar data concerning the gas meter in which it is installed. This capability eliminates the need for biennial physical inspections. LG&E estimates that the elimination of this requirement will result in annual savings to the Companies of \$300,000, which are in addition to the savings the Companies have projected as resulting from the full AMI deployment. Accordingly, LG&E requests a permanent deviation from the inspection requirements of 807 KAR 5:006, Sections 26(4)(e) and 26(5)(a)(2) for AMI meters.

34. 807 KAR 5:041, Sections 15(3) and 16; 807 KAR 5:006 Section 19. 807 KAR 5:041 Sections 15(3) and 16 require that single-phase electric meters must be tested every eight years or in accordance with a Commission-approved sample-meter testing plan; the Company has such a testing plan, which the Commission approved in Case No. 2005-00276.⁵ Because LG&E proposes to replace all of its existing non-AMI single-phase meters within a five-year period with new AMI equipment, continued testing during this period appears unnecessary. LG&E therefore requests a deviation from this regulation to suspend testing immediately and

⁴ The Commission granted a similar waiver to Duke Energy Kentucky in its AMI proceeding. *See* Case No. 2016-00152, Order at 16-17 (Ky. PSC May 25, 2017).

⁵ *The Joint Amended Application of the Utilities: Inter-County Energy Cooperative Corp., Kentucky Power Company, Kentucky Utilities Company, Louisville Gas and Electric Company, Owen Electric Cooperative, Inc., Shelby Energy Cooperative, Inc., and the Union Light, Heat and Power Company for Approval of a Pilot Meter Testing Plan pursuant to 807 KAR 5:041, Sections 13, 15, 16, 17, and 22, Case No. 2005-00276, Order (Ky. PSC Nov. 10, 2005).*

to resume testing in accordance with its existing Commission-approved testing plan after completion of AMI deployment. The Commission has permitted other electric utilities to suspend testing for similar deployments.⁶

Similarly, Section 15(3) requires electric utilities to test metering equipment when removed from service. LG&E intends during its AMI deployment to remove all existing non-AMI meters and immediately to dispose of the vast majority of the removed meters without testing them. Testing all of the removed meters would cost the Companies approximately \$3.3 million and would likely serve little or no purpose, particularly because over the last five years more than 99% of the Companies' electric meters tested have been within +-2%, and of the less than 1% that were fast or slow, 90% were slow and 10% were fast, meaning that less than 0.06% of electric meters tested were fast. Granting this requested waiver would result in saving the \$3.3 million that would be necessary to test all the removed meters. Therefore, LG&E requests a deviation from Section 15(3) to permit LG&E's proposed meter-testing approach concerning the removed non-AMI meters, with the resumption of full compliance with Section 15(3) after the proposed AMI deployment has been completed.

Finally, LG&E requests a deviation from 807 KAR 5:006 Section 19 to the extent it applies to the meters the Company will remove from service as part of its full AMI deployment. The regulation states, "A utility shall make a test of a meter upon written request of a customer if the request is not made more frequently than once each twelve (12) months." On its face,

⁶ *The Application of Big Sandy Rural Electric Cooperative Corporation for Deviation from the Provisions of 807 KAR 5:006, Section 6(5) and 807 KAR 5:041, Section 15(3)*, Case No. 2005-00048, Order (Ky. PSC Apr. 21, 2005) (approving a suspension of meter testing for four years while the AMR program was deployed); *The Application of Owen Electric Cooperative, Inc. for a Deviation from Approved Meter Testing Program*, Case No. 2006-00468, Order (Ky. PSC Dec. 13, 2006) (approving a deviation from its Sample Meter Testing Plan for a period of 3 years during the installation of solid-state meters); *Request of Shelby Energy Cooperative, Inc. for a Temporary Deviation from its Sample Meter Testing Plan*, Case No. 2010-00331, Order (Ky. PSC Aug. 3, 2011) (approving deviation from sample meter testing plan for two years during the installation of an AMI system).

this requirement would appear to apply only to meters still in service, not to meters already removed from service. But out of an abundance of caution, the Company asks the Commission to grant the Company a deviation from the entirety of 807 KAR 5:006 Section 19 with regard to all meters the Company removes—and only with regard to the meters it removes—as part of the full AMI deployment; the reasons for the deviation are the same as those given above for the Company’s requested deviation from 807 KAR 5:041 Section 15(3) concerning testing of meters removed from service.

Deferral Accounting

35. Pursuant to its Order in Case No. 2019-00017, the Commission authorized and confirmed LG&E’s establishment of a deferred asset for approximately \$6.8 million in incremental operations and maintenance costs with damage caused by an ice storm occurring on November 14, 2018 and ordered that the amount of the regulatory asset to be amortized and included in rates should be determined in LG&E’s next rate case.⁷ The current balance of the November 2018 Ice Storm regulatory asset is \$6.5 million. LG&E requests these costs be amortized over a ten-year period beginning when new rates take effect from this proceeding. The ten-year amortization period is consistent with the most recent case involving significant storm damages.⁸

36. LG&E requests the Commission approve its use of an eight-year average of generator outage expenses in its revenue requirement determination. Historical expenses for

⁷ *Application of Louisville Gas and Electric Company for an Order Approving the Establishment of a Regulatory Asset*, Case No. 2019-00017, Order at 4 (Ky. PSC Mar. 25, 2019).

⁸ *Electronic Joint Application of Kentucky Utilities Company and Louisville Gas and Electric Company For An Order Approving The Establishment of Regulatory Liabilities and Regulatory Assets*, Case No. 2018-00304, Order at 5 (Ky. PSC Dec. 20, 2018). See also *Electronic Application of Kentucky Utilities Company For An Adjustment of Its Electric Rates*, Case No. 2018-00294, Order at 9, 30 (Ky. PSC Apr. 30, 2019) *Electronic Application of Louisville Gas and Electric Company For An Adjustment of Its Electric and Gas Rates*, Case No. 2018-00295, Order at 10, 33 (Ky. PSC Apr. 30, 2019).

January 2017 through August 2020 and forecasted expenses for September 2020 through 2024 were utilized to develop the eight-year average outage expense included in the forecasted test year.

37. LG&E also requests the Commission approve the use of regulatory asset and liability accounting related to generator outage expenses that are greater or less than the eight-year average of LG&E's generator outage expenses. This regulatory accounting will ensure LG&E may collect, or will have to return to customers, through future base rates any amounts that are above or below the eight-year average embedded in the electric revenue requirement in this proceeding. This methodology is the same methodology set forth in the Stipulation and Recommendation in LG&E's 2016 rate case proceeding and approved by the Commission.⁹ As of June 30, 2021, LG&E forecasts a \$11.1 million regulatory asset associated with the scheduled outages from the 2018 base rate case. It proposes to amortize this amount over an eight-year period consistent with the 2018 base rate case with amortization beginning when new base rates take effect. As of June 30, 2021, LG&E forecasts a \$6.4 million regulatory asset associated with the scheduled outages from the 2016 base rate case. It proposes to amortize these remaining balances over a six-year period (eight-year amortization period less 2 years of amortization resulting from the 2018 rate case) when new base rates take effect. Mr. Garrett discusses these proposals in his testimony.

Removal of Projects from Environmental Cost Recovery Mechanism

38. LG&E proposes to eliminate LG&E Projects 22, 23 and 26-28 (from LG&E's 2009, 2011, and 2016 ECR Plans) from its ECR mechanism and monthly filings on a going-forward basis. These projects are completed and in service or will be before the end of the test

⁹ *Electronic Application of Louisville Gas and Electric Company for an Adjustment of its Electric and Gas Rates and for Certificates of Public Convenience and Necessity*, Case No. 2016-00371, Order (Ky. PSC June 22, 2017).

year and their costs are mostly already recovered in base rates through a series of “roll-ins.” Their elimination will simplify the oversight and administration of the LG&E’s ECR mechanism. LG&E proposes to recover the revenue requirements for the environmental compliance rate base associated with these projects through base rates and to continue to recover the revenue requirements of the remaining environmental compliance rate base through its ECR mechanism.

Gas Line Tracker Mechanism

39. LG&E proposes to remove from its Gas Line Tracker (“GLT”) the Steel Customer Service Lines and Targeted Removal of County Loops and Steel Curbed Services Program (“Steel Services Program”) and the Transmission Modernization Program and to recover those costs through the proposed change in base rates. It proposes to eliminate these programs from the GLT rate base because the Steel Services Program expires at the end of the test year and the Transmission Modernization Program is expected to be complete at the end of the test year. Because the Transmission Modernization Program has been removed from the GLT rate base, LG&E proposes to eliminate the corresponding volumetric charge and return the GLT to its fixed rate mode with the change in base rates. Other GLT projects that will be removed from GLT rate base due to their completion include the Main Replacements portion of the Leak Mitigation Project and the Aldyl-A Mains and Services Replacement Project.

Depreciation Rates

40. In support of this Application, LG&E submits Mr. Spanos’s testimony and the depreciation study he prepared at LG&E’s request. Maintenance of sound depreciation rates requires periodic review of those rates and nearly five years have passed since a study was last performed for LG&E. Mr. Spanos recommends LG&E’s continued use of the Average Service

Life and remaining life basis methodology of depreciation, and LG&E agrees with that recommendation. His study and recommendations include revised life and salvage parameters based on updated historical information, industry benchmarks, and site visits to LG&E's facilities.

WHEREFORE, Louisville Gas and Electric Company respectfully requests the Kentucky Public Service Commission to enter an order:

1. Approving the revised tariff sheets for electric service at Tab 4 of the Filing Requirements;

2. Approving rates to reflect a revenue increase of \$131.1 million for LG&E's electric operations and \$30.0 million for LG&E's gas operations;

3. Approving LG&E's proposed Economic Relief Surcredit;

4. Granting a CPCN for the full deployment and implementation of AMI infrastructure in LG&E's service territory;

5. Authorizing LG&E to defer recovery of AMI Project investment until the entire project is fully implemented, to record investment in the AMI Project as construction work in progress, and to accrue an allowance for funds used during construction for the capital and financing costs during the projected five-year implementation period;

6. Authorizing LG&E to record a regulatory liability until its first base rate proceeding following implementation for the excess of forecasted test period meter reading and field service expenses embedded in base rates approved in this proceeding over actual meter reading and field expenses;

7. Authorizing LG&E to record a regulatory asset during the implementation period composed of operating expenses associated with the project implementation and the

difference between AFUDC accrued at the Companies' weighted average cost of capital as shown in this Application and that calculated using a strict interpretation of the methodology approved by the Federal Energy Regulatory Commission;

8. Authorizing LG&E to establish a regulatory asset to reflect the remaining net book value of the electric meters that are retired as a result of the full AMI deployment;

9. Declaring LG&E's use of AMI to measure and monitor its customers' electricity or gas use satisfies the meter reading requirements of 807 KAR 5:006, Section 7(5), or in the alternative authorizing LG&E to deviate from the requirement of 807 KAR 5:006, Section 7(5), when a customer's usage is measured and monitored by an AMI meter;

10. Authorizing LG&E to:

a. Permanently deviate from 807 KAR 5:006, Section 14(3) for its AMI meters that allow for remote data communication;

b. Permanently deviate from the inspection requirements of 807 KAR 5:006, Section 26(4)(e) and 26(5)(a)(2) for its AMI meters;

c. Suspend the testing of electric meters as required by 807 KAR 5:041, Sections 15(3) and 16 until after the proposed AMI deployment has been completed;

d. Deviate from 807 KAR 5:041, Section 15(3) as it relates to the testing of electric meters removed from service as part of the AMI deployment;

e. Deviate from 807 KAR 5:006 Section 19 in its entirety concerning meters the Company removes as part of the AMI deployment;

11. Approving LG&E's request for amortization of its 2018 ice storm regulatory asset over a ten-year period;

12. Approving LG&E's use of an eight-year average of generator outage expenses in its revenue requirement determination and the use of regulatory asset and liability accounting for the generator outage expenses consistent with the proposals set forth in Mr. Garrett's testimony;

13. Approving LG&E's ECR Plan termination as described in the testimony of Mr. Conroy;

14. Approving LG&E's proposed revisions to its GLT;

15. Approving LG&E's proposed depreciation rates; and

16. Granting all other relief to which LG&E may be entitled.

Dated: November 25, 2020

Respectfully submitted,



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and Electric Company*

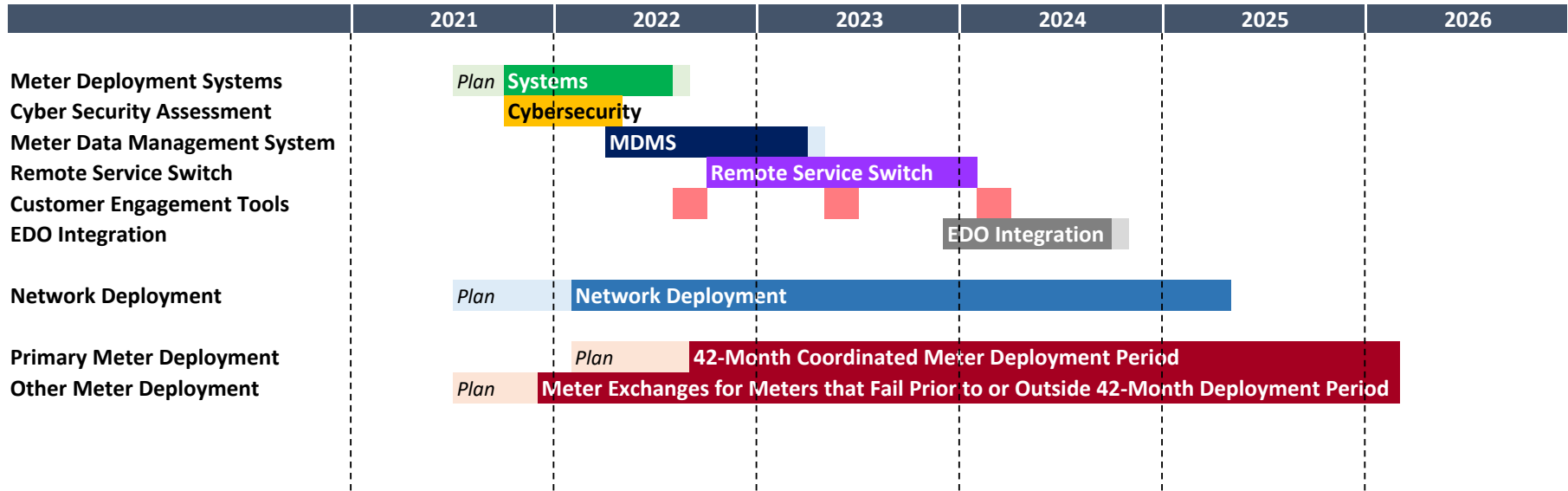
CERTIFICATE OF COMPLIANCE

In accordance with 807 KAR 5:001 Section 8(7), this is to certify that Louisville Gas and Electric Company's November 25, 2020 electronic filing is a true and accurate copy of the documents being filed in paper medium; that the electronic filing has been transmitted to the Commission on November 25, 2020; that there are currently no parties that the Commission has excused from participation by electronic means in this proceeding; and that a true and correct copy in paper medium will be delivered to the Commission within 30 days of the lifting of the State of Emergency.




Kenneth R. Niess
*Counsel for Louisville Gas
and Electric Company*

AMI Deployment Schedule




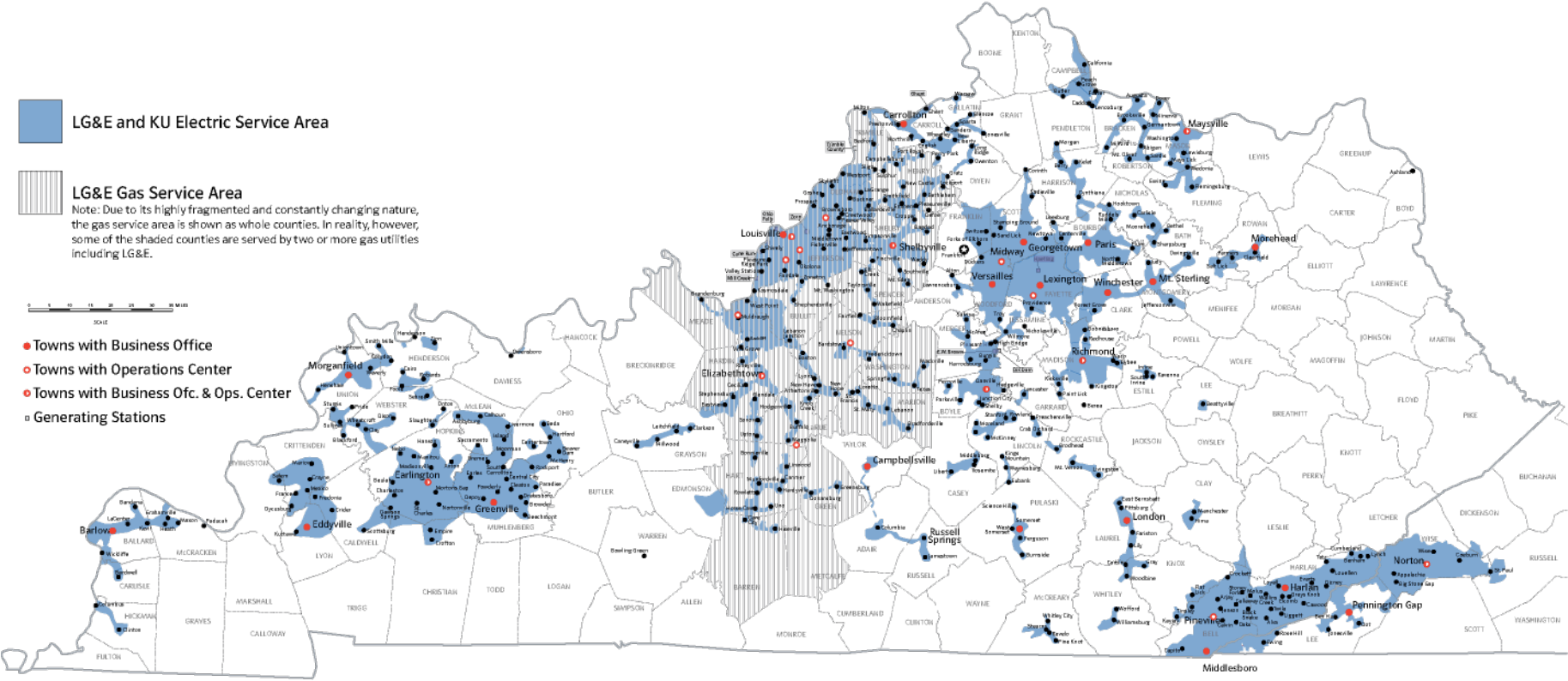


 LG&E and KU Electric Service Area

 LG&E Gas Service Area
 Note: Due to its highly fragmented and constantly changing nature, the gas service area is shown as whole counties. In reality, however, some of the shaded counties are served by two or more gas utilities including LG&E.



-  Towns with Business Office
-  Towns with Operations Center
-  Towns with Business Ofc. & Ops. Center
-  Generating Stations

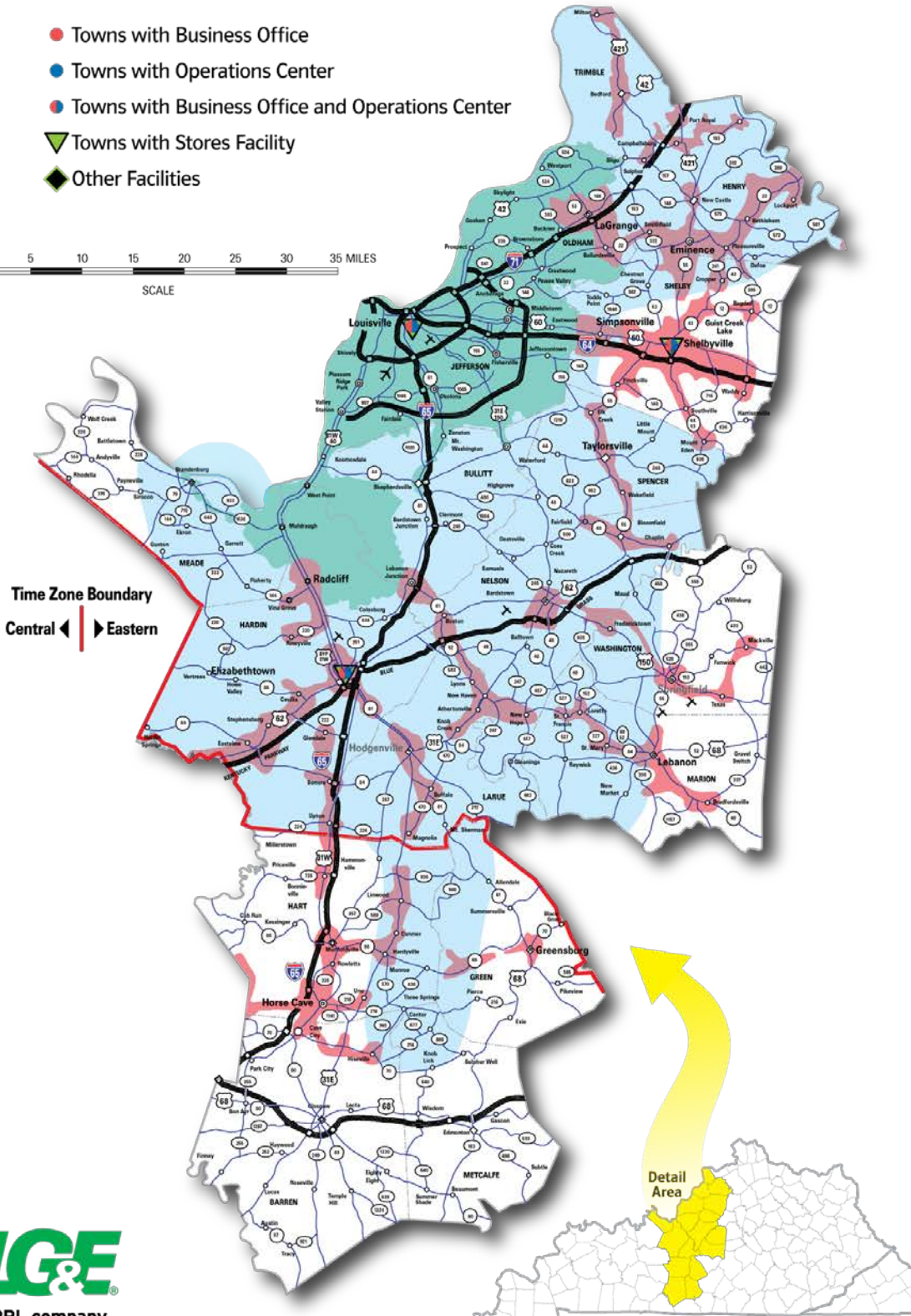
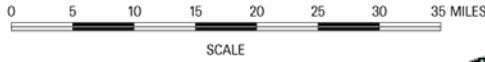


Gas Service Area

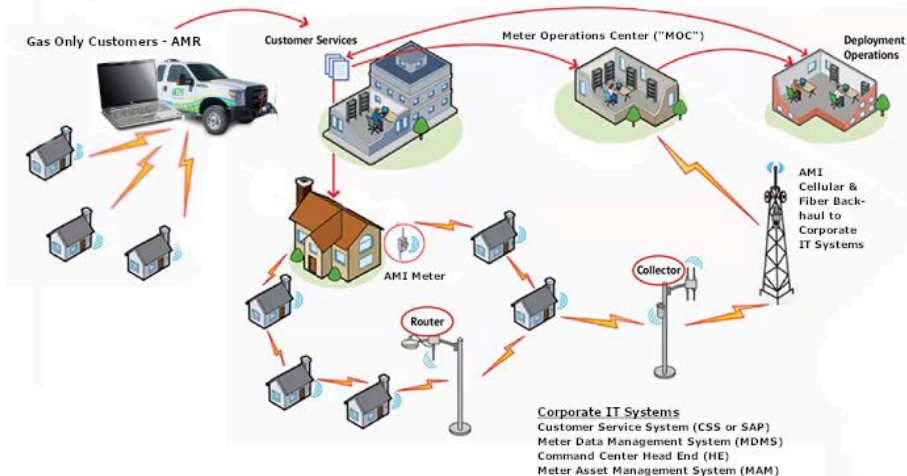
■ LG&E Gas Service Area^o
■ LG&E Electric Service Area
 ■ KU Electric Service Area

^oNote: Gas distribution service areas do not have legal boundaries, or legally designated service territories. Service area shown may overlap the service areas of other gas distribution utilities.
Source: Kentucky Public Service Commission.

- Towns with Business Office
- Towns with Operations Center
- Towns with Business Office and Operations Center
- ▼ Towns with Stores Facility
- ◆ Other Facilities



Metering Overview



Gridstream RF Mesh

Advanced Grid Communications Network



**Need a scalable network that
can handle today's robust data
management applications?**

The Gridstream® RF network simply does more. Handles more messages. Connects to more sensors. Provides more control. And ultimately returns more to your bottom line. How? By supporting advanced multi-commodity metering, grid automation and home energy management applications – under a single network. Gridstream RF gives you the power to monitor and control, all while positioning your grid to meet future applications and standards requirements.

The innovative network is designed to support up to 5-minute interval data collections from residential and commercial meters, along with applications for advanced grid and load management.

Gridstream RF is a true mesh, peer-to-peer network where each endpoint, device and router extends the coverage and reliability of the network. It's also self-healing to provide dynamic routing of messages that automatically adjust for changes to endpoints and the introduction of obstructions such as foliage or new construction.

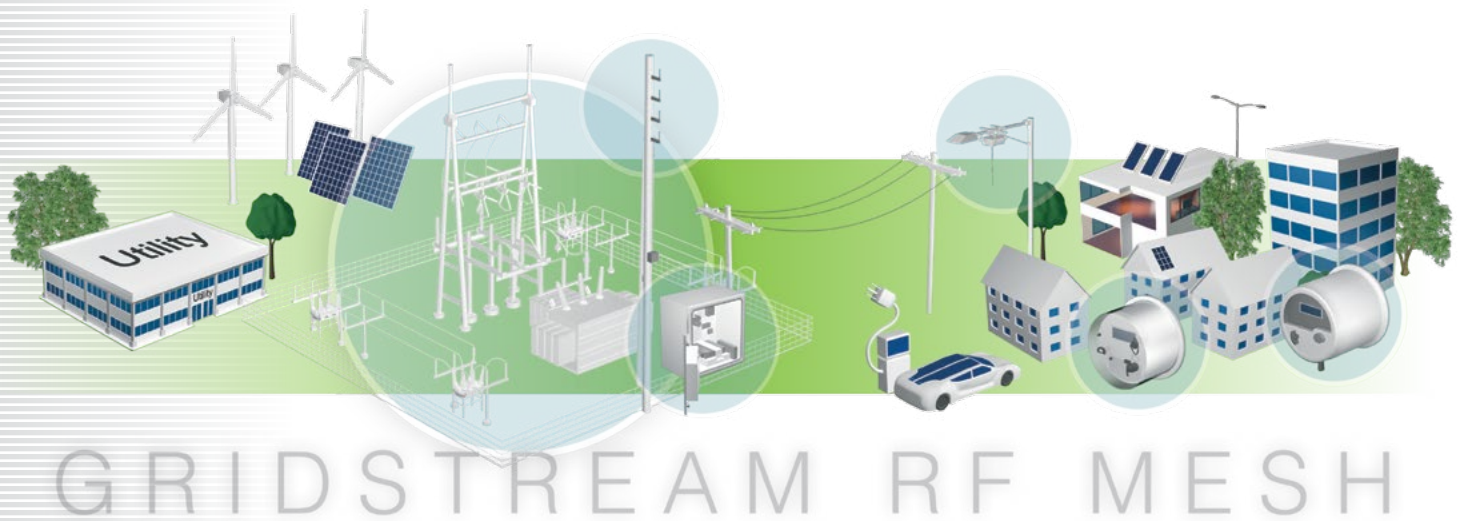
The system's routers are low power devices that extend network coverage and throughput. In addition, data collectors support up to 25,000 meters, which further minimizes infrastructure and maintenance costs.

From operations and engineering to customer service and billing, Gridstream delivers the applications that best define smart grid value.

HIGHLIGHTS:

- Best-in-class security
- Remote configuration of endpoints
- “Plug-and-play” auto-registering endpoints and devices
- Outage and restoration notifications
- Variable payment options, such as prepay and time-of-use rates
- Remote disconnect/connect with advanced FOCUS® meters
- ZigBee®-enabled home area network
- Theft detection
- Direct load control and dynamic voltage management
- Standards-based network components, software and software integration

Gridstream RF Mesh Connects Utility Assets Across the Grid



Applications

Distribution System Analytics

Leverage voltage and power quality data to optimize performance and reliability and prevent outages before they occur.

Demand Response

Peak power management options include dynamic voltage management, time-based pricing programs and direct load control.

Remote Disconnect

Offset costs and improve operational efficiency through consumer-directed programs and the ability to perform immediate load-side disconnects.

Consumer Energy Management

Engaging the consumer through energy portals, home area networking and dynamic payment programs such as prepay, encourages energy efficiency and improves customer service.

Multi-Commodity and Scope

Two-way communication capabilities extend to water and gas modules, distribution devices and direct load control switches for a one-stop resource management package.

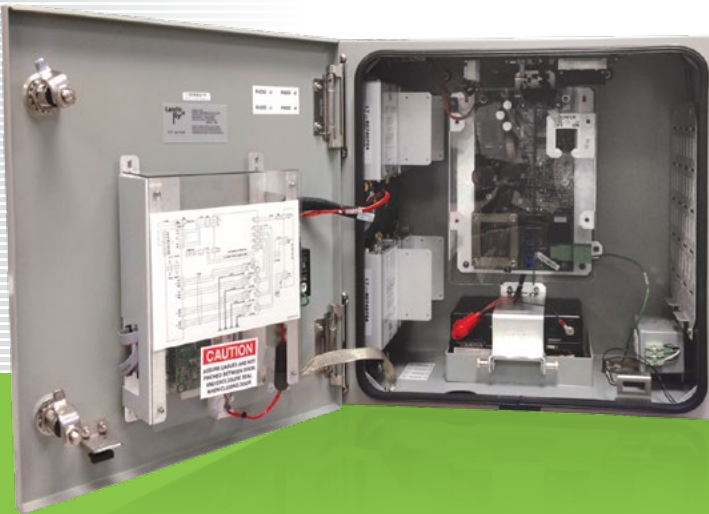
Outage Detection

Because endpoints are in continuous communication with the network, outage reporting and restoration detection are triggered automatically.

Integration with Most Applications

Realize secure and easy integration into existing utility operations. Utilizing a standards-based approach, Command Center (the operating software for the Gridstream system) and the Gridstream Meter Data Management solution enable interoperability with other utility applications like those used for CIS, billing, engineering, operations, analytics and data management.

Gridstream C7500 RF Collector



Extended Data Collection Capabilities for RF Mesh Systems

Overview

With enhanced on-board memory and faster communication speeds, the Gridstream® C7500 Collector is a powerful and flexible data collection and control center for users of Landis+Gyr's RF Mesh advanced metering systems.

The collector is designed to actively monitor up to 25,000 endpoints simultaneously to continuously communicate unique commands to individual endpoints, in both defined groups or across the entire network. Data is received from network routers and endpoints to provide a conduit for system hosting via Internet packets.

Installation options of the secure NEMA-4 collector include a distribution substation, wood utility pole, steel monopole, radio tower or in a rack. In addition, the C7500 is designed to support future applications and upgrades and can accommodate a variety of communications options to the utility including RF, fiber, cellular and microwave with the use of a WAN modem.

FEATURES & BENEFITS:

Why Landis+Gyr makes a difference.

- Simultaneously monitors to up to 25,000 AMI endpoints in Gridstream environments
- Auto-baud rates enable uninterrupted data communication regardless of RF link quality changes
- Maximizes bandwidth use with asynchronous spread spectrum frequency hopping
- Packet switching guarantees message transfer with automatic store and forward routing
- Auto-notification of power outage and restoration across entire AMI system

Product Specifications: **Gridstream C7500 RF Collector**

Specifications

Collector Dimensions	18"H x 17.5"W x 11"D (excludes antennas)
Weight	51 lbs.
Antennas	Four (4), remote RF Mesh Antennas, Antenex FG 9023 (typical)
Input Voltage	Selectable: 120/240 +/-20%
Input Current	1A typical at 120V
Power Consumption	48W maximum, 20W typical
Operating Frequency Band	902-928 MHz, Unlicensed
Transmit Output Power	1W maximum for each IWR
Standards Compliance	FCC Part 15, Class B
Operating Temperature	-40°C to +85°C (maximum local internal ambient temperature)*
Storage Temperature	-40°C to +85°C
Color	Gray
Enclosure Material/Type	Aluminum/ NEMA-4, Lockable
Backup Battery	SLA, 12V, 13 Ah
Backhaul Data	Ethernet 10/100T
Mounting Options	Rack Mount, Utility Pole, Pad Mount, Roof Top, Unistrut Frame, other

*-40C to +60C outdoors, direct sunlight; -40C to +70C indoors or out of direct sunlight

Gridstream Series V Radio Specifications

Electrical (General)

Input Voltage Range	6 – 28 VDC
Input Current (in transmitting mode)	320 mA typical (12 VDC operation)
Input Current (in receiving mode)	38 mA typical (12 VDC operation)
RF Frequency Range	902-928 MHz
Channel Spacing	100, 300 or 500 kHz depending on the mode
RF Data Rate	9.6, 19.2, 38.4, 115.2, 300 kbps

Receiver

Sensitivity (at 10% packet error rate)	-112 dBm (9.6 kbps) Typical
	-101 dBm (115.2 kbps) Typical
	-95 dBm (300 kbps) Typical
Co-channel Rejection	10 dB Typical
Adjacent Channel Rejection	30 dB Typical
Alternate Channel Rejection	45 dB Typical

Transmitter

Output Power (at Antenna Connector)	21/25/30 dBm (user selectable)
Modulation Type	2-FSK, GFSK
Modulation Index	1
Out-of-band Spurious Emissions	<-70 dB

Phone: **678.258.1500**

FAX: **678.258.1550**

landisgyr.com

3.18.14



Gridstream
C6500 RF Collector



C6500 RF Collector *Ethernet only*
C6550 and C6560 RF Collector *with LTE cellular modem*

Versatile and Cost-Effective Communication Solution

Overview

Ease of installation and dependable design make the Gridstream® C6500 Collector a cost-effective, workable option for efficient communication between Gridstream RF endpoints, routers and the Command Center server, while performing all necessary functions of the standard data collector.

The C6500 can be installed in a variety of locations and is configured to accept public backhaul communication options. The C6500 can be ordered with an internal cellular backhaul modem or without a modem in cases where an Ethernet connection is available.

FEATURES & BENEFITS:

Why Landis+Gyr makes a difference.

- Interoperability to enable integration with numerous partners and supported devices
- Standards-based, including IPv6, to protect existing and future investments
- Integrated wireless radio backhaul modem
- Data security and error-checking algorithms assure integrity and reliability
- Simpler and reduced installation time
- Dynamic routing by each radio in the mesh network
- Downloadable code for easy, over-the-air firmware upgrades and near real-time monitoring and control

Product Specifications: **Gridstream C6500 RF Collector**

Specifications

Dimensions (excludes antennas)	5.04"H x 11.82"W x 9.30"D
Antennas	Two (2), one blackhaul (top) and one (1) Gridstream (bottom)
Antenna Height Minimum	20 ft.
Weight	9.6 lbs.
Standard Compliance	FCC Part 15, Class B
Operating AC Voltage	96-277 Vrms
Power Consumption	9W typical – batteries not charging 18W typical – batteries charging
Operating Frequency Band	902-928 MHz, unlicensed
Transmit Output Power	1W maximum for single IWR radio
Baud Rate Range	9.6, 19.2, 38.4, 115.2, 300 kbps
Endpoint Capacity (initial)	4,500
Processing	CPU – ARM 9 Internal Memory – 16 MB Flash – 8 MB
Operating Temperature	-40°C to 60°C, outdoors
Storage Temperature	-40°C to 85°C
Color	White
Enclosure Material/Type	Aluminum/NEMA-4, sealed
Battery	Backup Time – 8 hours, typical Backup – LiFePO4 cells in a 4s4p arrangement, 13.2V, 12800mAh nominal Life – 15 years, maintenance free
Backhaul Communications	Integrated LTE cellular modem or wired Ethernet connection
Supplied Cellular Carriers	C6550: Verizon, C6560: AT&T
Mounting Options	Utility poles and streetlights

Phone: **678.258.1500**

FAX: **678.258.1550**

landisgyr.com

11.15.17

Network Gateway



Flexible and Interoperable Utility IoT Network Communications

Landis+Gyr's Network Gateway is an integral part of Gridstream® Connect, our industry-leading utility IoT platform. The Network Gateway is a powerful field data center that supports a variety of communications protocols. By enabling device and sensor interoperability, the Network Gateway provides unparalleled flexibility and limitless potential for growth.

FLEXIBLE COMMUNICATIONS

- Supports a wide array of communications technologies, including RF Mesh, Mesh IP, and cellular WAN backhaul
- Multiple radio options

BATTERY BACK-UP

- Maintenance-free Lithium Iron Phosphate battery

LAYERED INTELLIGENCE: INTELLIGENCE WHEN AND WHERE YOU NEED IT

- On-board Linux processor
- Distributed data processing lowers cost of data sharing and networking

FUTURE-READY AND SCALABLE

- Configurable, serviceable, and upgradeable
- Secure Wi-Fi for local configuration of radios or integrated sensor controller
- 2X Ethernet ports



FLEXIBLE
COMMUNICATIONS



BATTERY
BACK-UP



LAYERED
INTELLIGENCE



FUTURE-READY
AND SCALABLE

Network Gateway

PRODUCT SPECIFICATIONS

ELECTRICAL	
Input Voltage Range	120 to 240 VAC
Current	0.5A-0.25A
GATEWAY PROCESSING UNIT	
CPU	Cortex A5
RAM Memory	512 MB DDR2 RAM
FLASH Memory	2 GB NAND + 4 GB External
GATEWAY RADIO PROCESSING UNIT	
CPU	Dual-core Cortex M4
RAM Memory	304 Kbytes
FLASH Memory	2 MB + 4MB External
ROM Memory	8 Kbytes
SERIES 5 RADIO VARIANT	
Communication Protocol	IEEE 802.15.4g - SUN FSK PHY
RF Frequency Range	902-928 MHz
Channel Spacing	N2450 (RF Mesh IP): 400 KHz N2400 (RF Mesh): 100, 300 KHz
RF Data Rate	N2450 (RF Mesh IP): 50, 150, 200 Kbps N2400 (RF Mesh): 9.6, 19.2, 38.4, 115.2 Kbps
Modulation Type	2FSK, 2GFSK
SERIES 6 RADIO VARIANT	
Communication Protocol	IEEE 802.15.4 – 2015 SUNPHY
RF Frequency Range	902 – 928 Mhz 2400 – 2485 Mhz
Channel Spacing	400 KHz, 1200 KHz
RF Data Rate	50 Kbps to 600 Kbps (900 Mhz Band –Series 5 Compatibility Mode) 100 Kbps to 2400 Kbps (2400 Mhz Band)
Modulation Types	SUNFSK, O-QPSK, OFDM

Kbps = Kilobytes per second

This information is provided on an "as is" basis and does not imply any kind of guarantee or warranty, express or implied. Changes may be made to this information.

TRANSMITTER	
Output Power (at Antenna Connector)	Up to 1W
ETHERNET & WIFI	
ETH 0 ETH 1	10/100/1000 Ethernet 10/100 Ethernet
WI-FI	Yes
LTE Cat6	Yes
MECHANICAL	
Enclosure	Aluminum / IP67
Dimensions	10.94" W x 5.31" D x 12.23" H (278mm W x 135mm D x 311mm H)
Weight	11.7 lbs
Operating Temp Range	-40°C to 60°C (-40 to 140° F)
Storage Temp Range	-40°C to 70°C (-40 to 158° F)
REGULATORY COMPLIANCE	
Safety & EMC, FCC Class A Device	

GET IN TOUCH.

For more information and nationwide warranty terms, visit us at landisgyr.com or call us at 888-390-5733.



LET'S BUILD A BRIGHTER FUTURE TOGETHER

Since 1896, Landis+Gyr has been a global leader of energy management solutions. We've provided more than 3,500 utility companies all over the world with the broadest portfolio of products and services in the industry. With a worldwide team of 1,300+ engineers and research professionals, as well as an ISO certification for quality and environmental processes, we are committed to improving energy efficiency, streamlining operations, and improving customer service for utility providers.



Gridstream RF Router



Advanced, Yet Cost-effective, Communication Solution

Overview

The Landis+Gyr RF Router helps form the powerful Gridstream® RF wireless mesh network used in Advanced Metering, Distribution Automation and Demand Response applications. Network performance and reliability are assured via the routers basic mesh functions including full two-way, peer-to-peer communication to all devices in the network, asynchronous spread spectrum frequency hopping and dynamic message routing.

The RF Router is designed to deliver enhanced on-board memory and communication speeds to support future application and development needs. In addition, advanced functionality enables individual message prioritization, automatic network registration and localized intelligence. The router can also provide distributed device control capabilities via programmable applets.

To provide critical network operations—even during small or widespread system power outages—a typical purchase includes battery backup integrated within the aluminum housing.

FEATURES & BENEFITS:

Why Landis+Gyr makes a difference.

- Interoperability to enable integration with numerous partners and supported devices
- Standards-based, including IPv6, to protect existing and future investments
- Individual message prioritization provides end device interfacing with other smart grid applications and functions
- Dynamic routing by each radio in the mesh network
- Data security and error-checking algorithms to assure integrity and reliability
- Downloadable code for easy, over-the-air firmware updates for near real-time monitoring and control

Product Specifications: **Gridstream RF Router**

Specifications

Size	11.82"W x 9.30"D x 4.07"H
Weight	Base – 5 lbs 8 oz (2.49 kg)
	Battery adds 2 lbs 8 oz (1.13 kg)
Operating Temperature	-40°C to +85°C (internal ambient of enclosure)
Power Supply	Operating AC Voltage – 96-317 VAC
	Input for Receive mode / 120VAC Operation – 15 mA (max)
	Input for Transmit mode / 120VAC Operation – 95 mA (peak), 25 mA (Avg)
	Input for Battery charging mode / 120VAC Operation – 30 mA (max)
RF Output Power	21, 25, 30 dBm (user selectable)
General Radio Items	Frequency Range – 902-928 MHz
	Channel Spacing – 100 kHz, 300 kHz, or 500 kHz (dependent on mode)
	Channels – 56, 80, 240 (dependent on mode)
	RF Baud Rates – 9.6, 19.2, 38.4, 115.2, 300 kbps
Battery	Backup Time – 8 hours, typical
	Backup – 12V SLA 2500mAh, nominal
	Life – 5–7 years, typical
Processing	CPU – ARM9
	SRAM – 16 MB
	Flash – 8 MB ANSI C12.1 Compliance
Approvals	FCC Certified Part 15.247
ANSI C12.1 Compliance	Operating vibration; operating shock; electromagnetic radiation emissions, electromagnetic susceptibility, surge withstanding capability, electrostatic discharge
Enclosure Material Type	Aluminum/NEMA-4, sealed
Standard Shipment Includes	White, die-cast aluminum all-weather enclosure
	Operation on DC (12/24 VDC) or AC power, with automatic switching between 120 VAC or 277 VAC when connected to power source
	RS-232/485 lines for both LPPx and transparent port communication
	Standard N-Female antenna connector
	Integrated filter for attenuation of out-of-band interference
	Mounting hardware



Residential: FOCUS AXe Metering Platform

E331 FOCUS AXe/AXRe/RXRe
E351 FOCUS AXe/AXRe/RXRe-SD



Advanced Metering Performance and Safety

Overview

The FOCUS® AXe platform for advanced electric metering and smart grid applications is designed to enhance your sensor ecosystem with proven reliability and innovative features. Expanding on Landis+Gyr's industry-leading FOCUS AX platform, the FOCUS AXe adds increased memory and processing power to enable greater measurement, power quality, and data profiling capabilities. Furthermore, the FOCUS AXe incorporates a sensor to detect meter removal and insertion as a possible indication of tamper as well as increased power supply capacity to support more advanced AMI modules for expanded communications abilities.

Reliable disconnect service - for any type of residential installation

The E351 FOCUS AXe-SD provides reliable remote service disconnect and reconnect with a motor driven, cam action switch under the meter cover. Available in both CL200 and newly released CL320 UL certified models, the switches operate safely for thousands of iterations at full rated current. Along with direct switch actuation, the AXe-SD supports multiple load limiting features that initiate a disconnect when a specified instantaneous power or average demand level is reached.

The AXe-SD Form 2SE delivers precedent setting remote service disconnect capability to larger 320 amp installations, providing Landis+Gyr's unique solution to evolving utility requirements.

KEY FEATURES:

- Active Energy "kWh" meter: Optional
Reactive Energy "kVAh or kVARh"
- Two, simultaneous demands: kW, kVA,
and kVAR
- Motor driven, cam action service disconnect
switches: 200 amp and NEW 320 amp
- All meters exceed ANSI requirements for
meter accuracy (0.2%) and surge protection (10KV)
- Power Quality Metrics: Sag, Swell and
Total Harmonic Distortion
- Up to 8 channels of Load Profile standard
- Independent 2nd 8-channel Load Profile
Recorder (optional)
- Every S Base meter form is UL listed
- Meter removal and insertion detection to
indicate possible tamper
- Magnetic and DC presence detection
- Over-the-air firmware and program updates¹
- Dedicated Voltage Log
- Configurable optical port lockout¹

Product Specifications: Focus AXe Residential Electric Metering Platform

SPECIFICATIONS

General Specifications	ALL models support demand billing and are time-of-use (TOU) Ready – Battery Optional	
	Third Generation processor runs 2x as fast as FOCUS AX	
	2x RAM, 2x ROM, and 4x the Non-Volatile Memory as FOCUS AX	
	Designed for 20+ years life	
	Utilizes ANSI protocol (for optical port and between meter and AMI device)	
	9-Digit LCD	
	Display scroll sequence programmable (factory or end user)	
	Configuration Port – standard plastic: Optional ANSI C12.18 optical	
Operating Temperature	-40C to +85C under cover	
Nominal Voltage	120V or 240V	
Operating Voltage	80% to 115% of Nominal Voltage	
Frequency	60Hz +/- 5%	
Humidity	5% to 95% relative humidity, non condensing	
Starting Load (Watts)	Class 20	0.005 Amp (0.6W)
	Class 100	0.030 Amp (3.6W)
	Class 200	0.050 Amp (12W)
	Class 320	0.080 Amp (19.2W)
	Class 480	0.120 Amp (28.8W)
Voltage Burden	< 1.9W Max	
Load Performance Accuracy	Accuracy Class 0.2% (reactive energy 0.5%)	
Available Forms	Self-Contained	1S, 2S, 2SE (320A), 12S, 25S
	Transformer Rated	3S, 4S
	K-Base	2K (480A)
Display Options	Energy Metrics: +kWh, -kWh, Net kWh, added kWh (Security), KVAh or kVARh	
	Metric Energy Display Format – 4x1, 4x10, 5x1, 5x10, 6x1 or 6x10	
	TOU, demand billing and two demands (selectable kW, kVA or kVAR)	
Communications ¹	Modular design - with or without AMI communication	
Selectable Meter Multiplier	Up to 4096 as result of PT ratio x CT ratio	
Applicable Standards	ANSI C12.1 for electric meters	
	ANSI C12.10 for physical aspects of watt hour meters	
	ANSI C12.18 Protocol specifications for ANSI Type 2 Optical Port	
	ANSI C12.19 Utility Industry End Device Data Tables	
	ANSI C12.20 for electricity meters, 0.2 and 0.5 accuracy classes	
	CAN3-C17-M84 Canadian specifications for approval of type of electricity meters	
Service Disconnect	UL 2735 Standard for Electric Utility Meters	
	200A disconnect - 10,000 operations at full rated current (disconnect/connect) Available forms: 1S, 2S, 12S, 25S	320A disconnect - 3,000 operations at full rated current (disconnect/connect) Available forms: 2SE
International Certifications	Measurement Canada (MC) AE-1967 <i>Form 2SE-SD pending MC approval</i>	

1. Select features rely on a communications module. Meters that are AMI-enabled with communications are clearly labeled on meter face above digital display.

Commercial Industrial Metering

Choice for Demanding Polyphase Applications

Do your commercial meters deliver the data you need while providing both flexibility and value?



With options to cover most metering challenges, Landis+Gyr's commercial and industrial meter family delivers performance and value. Both the E650 S4x and E330 FOCUS[®] AX Polyphase meters are designed to cover a wide range of requirements and applications – from light commercial to industrial metering – with proven reliability and unmatched features.

Landis+Gyr's polyphase meters eliminate the need to pre-program the service type. Simply install the meter, and it automatically detects the service type and voltage, displaying the information on the LCD and configuring the

GyrBox for a complete diagnostic installation check. By continually performing diagnostics on the metering installation equipment, service wiring and load characteristics, GyrBox identifies issues with equipment, installation, wiring, load conditions, power quality and tampering.

Both platforms provide an ANSI Type 2 optical port for meter programming and firmware upgrades. They utilize advanced second generation over-the-air, flashable firmware, so when supported by the AMI network, they can be upgraded remotely without losing the meter configuration or billing data.

HIGHLIGHTS:

- Active and reactive energy measurement
- Demand, TOU and load profile
- ANSI C12.19 standard protocol
- Ease of AMI integration
- Over-the-air firmware updates
- Measurement accuracy class of 0.2%
- Unsurpassed 10KV surge protection for safety
- Extensive event logging
- Designed for a 20+ year life

Choice for Demanding Polyphase Applications

	The Family of Commercial Meters	
	E330 FOCUS AX Polyphase	E650 S4x
Metrics		
Delivered (+kWh) and received (-kWh) active energy	+	+
Delivered and received reactive energy, kVAh and KVARh	+	+
Voltage sag and swell per phase	+	+
Temperature sensing – record in LP, trigger event	+	+
Twelve self reads – all summations and demands	+	+
True four quadrant meter – all metrics in all quadrants		+
Delivered and received kW, kVA, and KVAR demands		+
Two alternate reactive and apparent energy algorithms		+
All data stored in engineering units for increased resolution		+
Security and Tamper Detection		
Optical port lockout – via AMI system	+	+
Cover removal switch – detects physical tamper		+
Tilt and vibration sensor – detects excessive force		+
Leading PF detection – senses potential DC presence	+	+
Magnetic tamper detection – via hall effect sensor		+
Hardware Options		
Gridstream® RF communication module	+	+
True three-phase power supply		+
Input/output (I/O) board for external sense, KYZ and load control		+
Support 480V line to neutral		+
Load Profile		
Channels	8	16
Standard memory	77 K	256 K
Increased memory (optional)		1 MB
Second recorder – different interval structure (optional)		16 Channels
Data resolution	16 Bit	32 Bit

E330 FOCUS AX Polyphase

Proven Platform

The AX Polyphase brings the same proven, solid-state performance utilities have come to expect from the FOCUS family in an AMI-ready platform for light commercial applications.

AMI Communications

Like all other FOCUS AX meters, the AX Polyphase supports multiple modular AMI solutions. Along with Gridstream RF, solutions are available from four other communications providers spanning RF mesh, cellular and power line carrier technologies.

Cost Effective

The FOCUS AX Polyphase is perfectly positioned alongside the full-featured S4x

platform. The FOCUS AX Polyphase provides a cost effective alternative for light commercial metering applications not requiring the same level of functionality as the S4x.

E650 S4x

Metrics and Load Profile

The E650 S4x provides an extensive array of energy and demand metrics. With more data available, customers can utilize more load profile capability. Standard load profile memory of 256 KB is upgradable to 1 MB without adding metrology hardware. An optional second recorder provides dual structure load profile. Load profile can be configured for up to 16 channels (32 with dual structure) of information from a choice of over 70 different storage metrics.

Tamper Detection

The E650 S4x raises the bar on security features and tamper detection. Tilt and vibration sensing, magnetic field detection, and a cover removal switch are innovative new capabilities designed to reinforce revenue protection efforts.

Input/Output

An optional I/O board provides up to four solid-state relay outputs and up to two external inputs for recording pulses from remote sources. These relays can be programmed for end-of-interval, power factor alert, diagnostic alert, voltage alert, demand threshold alert, KYZ or load control. The I/O board can be used in conjunction with a Gridstream RF module for ultimate flexibility.



Gridstream: M120 RF Residential Gas Module



Two-way Residential Gas Metering for Network Continuity

Overview

The M120 RF Residential Gas Communications Module provides two-way AMI communications over Landis+Gyr's scalable, secure and interoperable Gridstream® RF Mesh network. The module is designed to record and communicate both total consumption and one channel of interval data. The data can be used to empower utilities to offer flexible rates and assist with capacity planning.

The M120 gas module simplifies deployment by automatically registering on the Gridstream network upon installation, eliminating the need for field installation tools. The M120 module mounts on most any residential gas meter built since the 1950's. In addition, the module is programmed to transmit data once a day.

The M120 gas module is designed to communicate with electric meters, routers or radios on distribution automation devices. This flexibility is key for utilities to maximize the benefits of Gridstream and manage multiple types of endpoints on a single network.

With a 20-year battery life, the M120 gas module ensures years of customer service.

FEATURES & BENEFITS:

Why Landis+Gyr makes a difference.

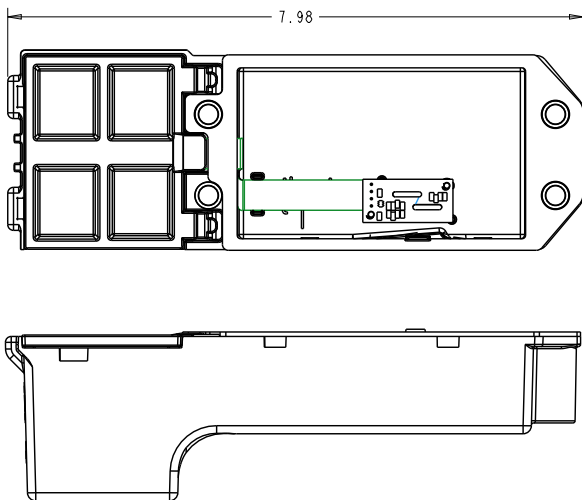
- Leverages full potential and scalability of Gridstream AMI network
- Fits most common residential gas meters and uses existing index
- No field programming, special field tools or costly infrastructure add-ons required
- Performs self-diagnostics
- Variety of event settings available to inform of module issues such as low battery
- Enhanced range (250 mW output)
- Plug-and-play activation keeps deployment on-schedule
- Interoperable for future advancements in gas measurement
- Produces one channel of load profile data which can be used for advanced rates, such as time of use

Product Specifications: **Gridstream M120 RF Residential Gas Module**

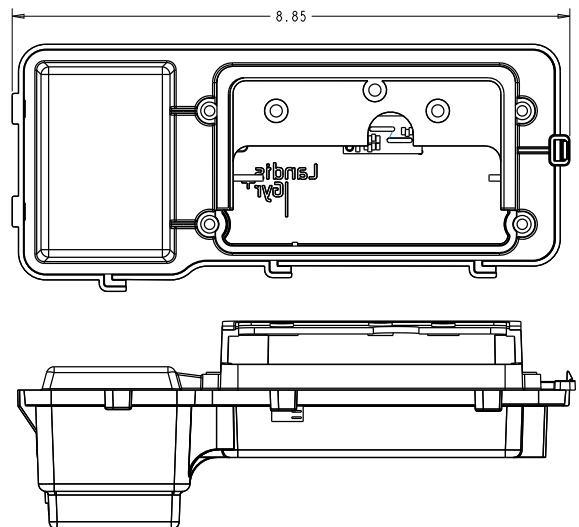
Specifications

Power Supply	Two "A" lithium manganese dioxide batteries 20-year battery life	
Environmental Temperature Rating	-40°C to +85°C	
Environmental	Relative humidity 0% to 100%	
RF Standards	FCC Part 15.247 Frequency; 902 – 928 MHz unlicensed Baud Rate: 9600 to 38400 BPS	
ANSI Standards	B109.1-2000 Compliance B109.2-2000 Compliance	
UL	Class 1, Division 1, Group D	
Data Transmission	The data is transmitted once per day. Each transmission includes last 24 hours of 15-minute interval data and last consumption value.	
Events Included	Tamper detection Tilt switch Consumption rollover Low battery Stale register Extreme temperature change Cover off	
Universal Retrofit	Model	Meter Manufacturer
	M120-1	Elster (American)
	M120-2	Itron (Actaris/Schlumberger/Sprague)
	M120-3	Sensus (Invensys/Equimeter/Rockwell)
	M120-4	National
Interval Data	45 days of one-channel, 15 minute LP data	

American



Sprague



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Gridstream: M220 RF Commercial & Industrial Gas Module

Landis+Gyr+
manage energy better

Two-way C&I Gas Metering for Utility Efficiency

Overview

The M220 RF C&I Gas Communications Module provides two-way AMI communications over Landis+Gyr's scalable, secure and interoperable Gridstream® RF Mesh network. The module is designed to record and communicate both total consumption and two channels of interval data (configurable for 15 and 60 minutes). Interval data can be used to empower utilities to offer flexible rates and assist with capacity planning.

The M220 gas module simplifies deployment by automatically registering on the Gridstream network upon installation, eliminating the need for field installation tools. The M220 module also utilizes "Plug and Play" technology allowing accurate count from time of installation, until the pulse input configuration parameters are received over the network. In addition, the module is programmed to transmit data once a day.

The M220 gas module is designed to communicate with electric meters, routers or radios on distribution automation devices. This flexibility is key for utilities to maximize the benefits of Gridstream and manage multiple types of endpoints on a single network.

With a 20-year battery life, the M220 gas module ensures years of customer service.

FEATURES & BENEFITS:

Why Landis+Gyr makes a difference.

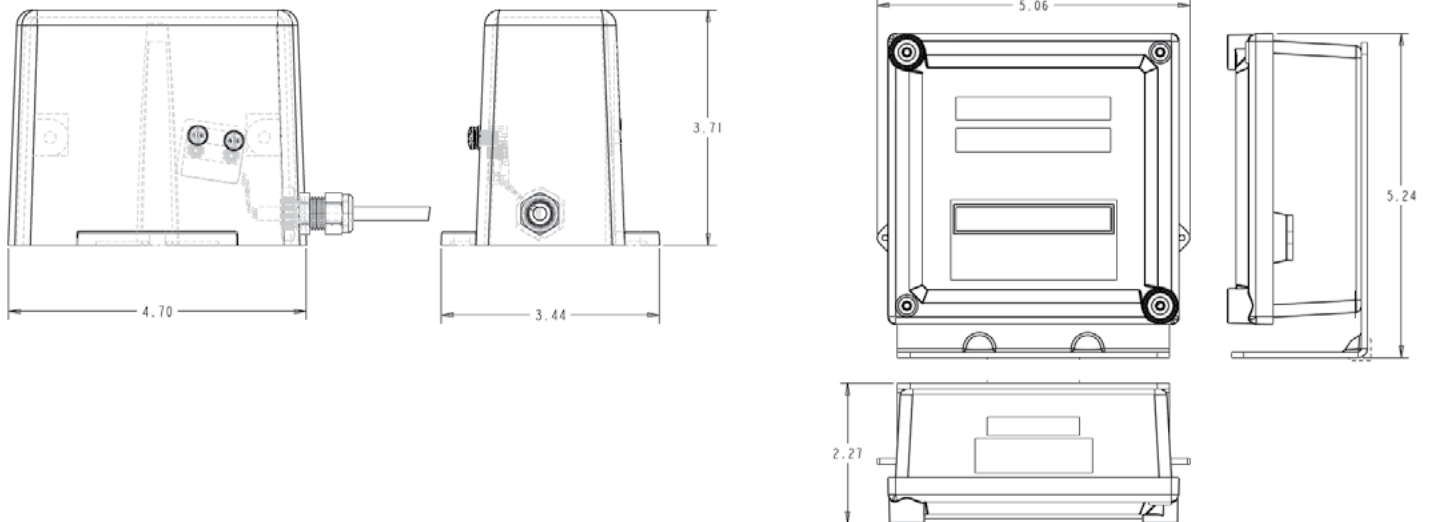
- Leverages full potential and scalability of Gridstream AMI network
- Fits most common C&I gas meters and uses current indexes
- No field programming, special field tools or costly infrastructure add-ons required
- Performs self-diagnostics
- Variety of event settings available to inform of module issues such as low battery
- Enhanced range (250 mW output)
- Plug-and-play activation keeps deployment on-schedule
- Interoperable for future advancements in gas measurement
- Provides up to two channels of load profile data which can be used for advance rates, such as time of use

Product Specifications: **Gridstream M220 RF C&I Gas Module**

Specifications

Power Supply	Four "A" lithium manganese dioxide batteries 20-year battery life
Environmental Temperature Rating	-40°C to +85°C
Environmental	Relative humidity 0% to 100%
RF Standards	FCC Part 15.247 Frequency: 902 – 928 MHz unlicensed Baud Rate: 9600 to 38400 BPS
ANSI Standards	B109.1-2000 Compliance B109.2-2000 Compliance
UL	Class 1, Division 1, Group D
Data Transmission	The data is transmitted once per day. Each transmission includes last 24 hours of 15-minute interval data and last consumption value.
Events Included	Tamper detection Tilt switch Sensor failure Low battery Stale register Extreme temperature change Cover off
Universal Retrofit	Model Meter Manufacturer
	M220-1 Elster (American)
	M220-2 Itron (Actaris/Schlumberger/Sprague)
	M220-3 Sensus (Invensys/Equimeter/Rockwell)
Interval Data	45 days of two-channel, 15 and 60 minute LP data

American M220-1



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Gridstream GPR-PT Commercial & Industrial Pressure and Temperature Monitoring Module



Two-Way C&I Pressure and Temperature Intelligent Energy Management

Overview

The Gridstream® Recorder for Pressure and Temperature (GPR-PT) C&I Gas Communications Module provides two-way communications over Landis+Gyr's scalable, secure and interoperable Gridstream RF Mesh network. The two-way gas module records and communicates up to four channels of interval data (configurable for 15, 30 and 60 minutes). A serial Modbus (RS-232) connection is used to communicate with correctors and pressure trackers. Select correctors from Mercury/Honeywell and Eagle Research Inc. are supported. Four dynamic channels can be programmed to record Pressures, Temperature, Corrected and Uncorrected Volumes, and Voltages from the attached device. Data that is recorded can be pushed to the Head End System every 1, 2, 4, 6, 8, 12 and 24-hour period for efficient system monitoring.

The module works with most devices within the Gridstream wireless mesh network – including electric meters, routers or radios on distribution automation devices – to send and receive information.

The module uses the unlicensed FCC part 15 902-928 MHz band to transmit using frequency hopping, spread spectrum technology. For efficiently manage energy consumption, the module is programmed to periodically report customer usage profiles and accept system configuration changes.

Fast, Easy Installation and Operation

- Auto-Registration
- No Field Programming or special field tools required
- Over-the-Air Firmware Upgrade
- On-Request Data Reads
- Flexible Mounting Bracket

FEATURES & BENEFITS:

*Why Landis+Gyr
makes a difference.*

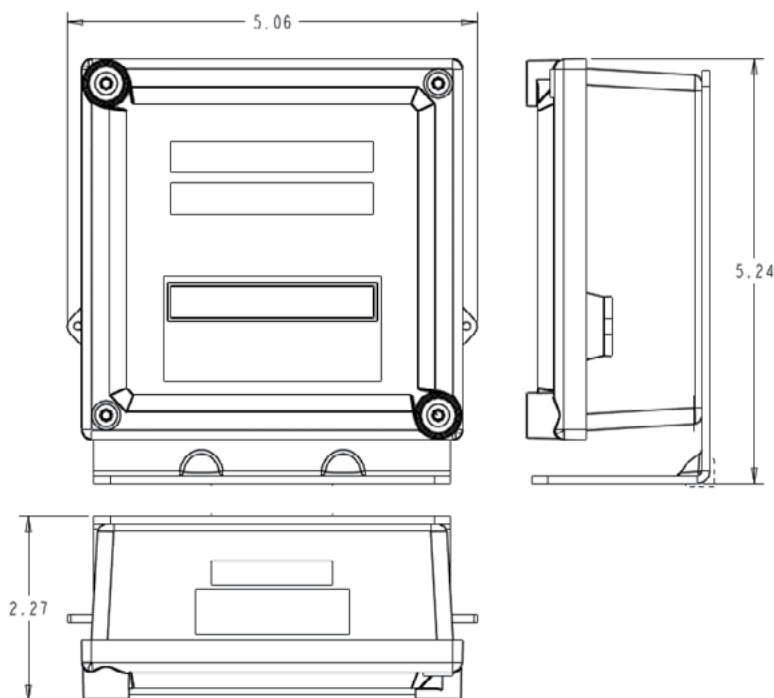
- Leverages full potential and scalability of Gridstream AMI network
- Supports one generic collector alarm
- Variety of event settings available to inform of issues, such as low battery and tamper
- Serial Modbus Interface directly to Corrector
- Provides four dynamic channels of data to HES
- Configurable channels monitor Pressures, Temperature, Voltages, Corrected Volume and Uncorrected Volumes from supported devices
- Pressure Max and Min thresholds supported at the Head End System

Product Specifications: **GPR-PT C&I Pressure and Temperature Monitoring Module**

Specifications

Power Supply	Four "A" lithium manganese dioxide batteries 20-year battery life
Modulation Type	FSK modulation
Operating Temperature Range	-40°C to +85°C
Environmental	Relative humidity 0% to 100%
RF Standards	FCC Part 15.247 Frequency: 902-928 MHz Baud Rate: 9600 to 38400 BPS
ANSI Standards	B109.1-2000 Compliance B109.2-2000 Compliance
Enclosure Rating	NEMA 3R
UL	UL – Class 1, Division 1, Group D
GPR-PT Events Included	Tilt switch Sensor failure Low battery Stale register Extreme temperature change Configuration change Cut lead detect

GPR-PT



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40GB

Gas ERT® Module

Introduction

The 40GB Gas ERT module serves as the data collection endpoint device for Itron's industry-leading portfolio of RF-based meter data collection solutions for natural gas meters and measurement devices. The 40GB is built on the legacy leadership of the field-proven 40G Gas ERT® module that transmits consumption and tamper information in traditional wake-up mode to Itron's radio-based handheld and mobile AMR systems.

Itron's line of 40GB Gas ERT module provides two operational modes:

- > **Wake-up** When programmed for wake-up mode, the 40GB operates in traditional wake-up mode and transmits meter reads and tamper information in response to a wake-up signal from an Itron radio-equipped handheld or mobile reader
- > **Bubble-up** When programmed for bubble-up mode, the 40GB transmits information at regular intervals without the need for a wake-up signal from the reading device. Bubble-up mode is intended for use with fixed network solutions that combine collectors and repeaters

A 40GB Gas ERT module operating in bubble-up mode can still receive and respond to a wake-up signal, providing increased flexibility for handheld and mobile reads when operating under a fixed network. Note that an FCC license is required any time a wake-up signal is transmitted from a reading device.

The line of 40GB Gas ERT module allows for field installation on a variety of gas meters, even while gas is flowing through the meter, making AMR easy to install and justify. It is powered by a long-life, replaceable "A" cell lithium battery, which provides an average life in excess of 25 years which exceeds the 20 year design life of the ERT.



Residential Meters

> **METRIS 250**



> **Sensus/
Rockwell R275**



> **Elster American
AC250**



> **National 250**



Commercial Meters

> **Itron 1000A**



> **Sensus/
Rockwell 750**



> **Elster American
AL800**



Ultrasonic Meters

> **Sensus Sonix**



Rotary Meters

> **Dresser B3 with
Direct mount**



> **Dresser LMMA
with Remote ERT**



Electronic Correctors

> **Mercury Mini-AT**



Residential diaphragm meters

Itron provides an extensive line of direct-mount 40GB Gas ERT modules for use with residential diaphragm gas meters with capacities ranging from 75 to 630 CFH for popular models from Elster American Meter, Sensus/Invensys/Equimeter/Rockwell, Itron/Actaris/Schlumberger/Sprague and National/Lancaster. Direct-mount modules are also available for some older meter types such as American 5 Metric and Sprague 1A. The compact design and direct engagement to the meter drive assure the unparalleled accuracy that makes Itron gas ERT modules the industry standard.

A remote-mount module is also available for some less common meter types where a direct-mount solution is not available.

Commercial diaphragm meters

Itron also provides direct-mount 40GB Gas ERT modules for use with the following commercial diaphragm gas meters: Elster American Meter, Sensus/Invensys/Equimeter/Rockwell, and Itron/Actaris/Schlumberger. The unobtrusive profile is easy to install and the direct meter drive engagement assures the highest level of accuracy. Built-in passive radiators are standard on all commercial, direct-mount 40GB.

Elster American Meter and Itron/Actaris/Schlumberger commercial diaphragm meters with top-mount instrument drives utilize the same version commercial direct-mount module. For American commercial diaphragm meters, the ERT mounts directly to the meter. For Itron/Actaris/Schlumberger meters, an adapter kit must be purchased.

A remote-mount module is available for some less common meter types where a direct-mount solution is not available.

Ultrasonic Meters

Itron offers a remote-mount 40GB Gas ERT module for use on the Sensus Sonix gas ultrasonic meter. The 40GB Sonix ERT module is available with mounting hardware to make installation fast and easy. The electrical connection to the meter is established through the Sensus factory-connected ERT.

Rotary meters

Itron has several solutions for interfacing with rotary gas meters. For Dresser LMMA and B3 rotary meters with Dresser-supplied AMR adapter, Itron offers direct-mount ERT modules designed for American and Sensus residential diaphragm meters. For Dresser rotary meters with Instrument Drive (ID), Itron offers the direct mount ERT designed for American commercial diaphragm meters. For Dresser, Romet and American Meter rotary meters with pulse output (version 17 or higher required for Dresser) and a military connector pin, Itron offers the remote-mount 40GB Gas ERT module.

Electronic Correctors

Itron offers a remote-mount 40GB Gas ERT module for Mercury Instruments for EC-AT, Mini-P, Mini-AT and Mini-Max electronic correctors. The 40GB can be connected to these gas electronic correctors for temperature- and pressure-corrected consumption (Form A board required). The module attaches easily to the Mercury corrector circuit board through the terminal strip connector already installed on Mercury units. One 40GB can be used for uncorrected consumption and a second 40GB can be used for corrected consumption.

Functional Specifications

- > Power source: "A" cell lithium battery
- > Radio programming parameters: wake-up mode or bubble-up mode, index reading, count rate, index rollover, pressure compensation and security level
- > Additional programming parameters for Mercury Instruments
 - Correctors must have a Form A board (Form C and mechanical reed switch outputs are not supported)
 - Item #056 Pulse Scaling Factor: must be set to 2.0
 - Item #096 Corrected Volume Display: must be set at 1, 2, 3 or 4 Blanks (0 Blanks is not supported)
 - Item #115 Output Pulse Code: must be set at 1, 2, 3 or 4 (0 Output Pulse Code is not supported)
- > Tamper detection:
 - Direct-mount modules: mercury-free tilt tamper and magnetic tamper
 - Remote-mount modules: mercury-free tilt tamper and cut cable
- > Operating temperature: -40° to +158°F (-40° to +70°C)
- > Operating humidity: 5 to 95% non-condensing relative humidity
 - 40GB ERT modules can be installed indoors or outdoors above grade
- > Product identification: numeric and bar-coded ERT module type and serial number

Programming Options

- > **Wake-up mode:** ReadOne Pro, ERTInstall, FC200R, FC200SR or FC300 with SRead can be used to program the ERT module. When using ReadOne Pro, no changes to a legacy 40G ROCL are required. 40GB ERT modules can also be programmed using Itron's 900MHZ Belt Clip Radio and a customer supplied laptop with Endpoint-Link version 5.5 or higher. The Belt Clip Radio can be connected to a laptop via USB cable or Bluetooth™
- > **Bubble-up mode:** ReadOne Pro can be used to program the ERT module. The ReadOne Pro must be version 5.0 or higher and ROCL must be base V22 or higher. Contact Itron for additional options

Approved Reading Devices

- > 40GB ERT modules used in wake-up mode are compatible with all Itron handheld and mobile reading devices
- > 40GB ERT modules used in bubble-up mode are compatible with Fixed Network 2.0 collectors and repeaters. If 40GB ERT modules are programmed to bubble-up mode and handheld or mobile reads are desired, an FCC license is required to transmit the wake-up signal from a reading device. In this case, the 40GB ERT module will transmit its standard consumption message upon hearing the wake-up signal

Battery Life and Design Life

- > All 40GB ERT modules contain field-replaceable "A" cell lithium battery
- > 40GB programmed to wake-up mode has an average battery life in excess of 25 years
- > 40GB programmed to bubble-up mode with 15 second bubble-up interval has an average battery life of 13 years
- > All 40GB ERT modules are designed for a 20 year total life

Regulatory & Standards

- > FCC compliance: Part 15 certified
- > Industry Canada 864K1124, 864101732A; Measurement Canada AG-0371
- > Safety approvals: intrinsically safe per UL Class I, Division 1, Groups C & D

Operational

- > Receive frequency (wake-up mode): 952-956 MHz (MAS Bands)
- > Transmit frequency: unlicensed spread spectrum 910-920 MHz
- > FCC license is required for the reading device if a signal will be transmitted to wake up the 40GB ERT module
- > Data integrity: verified in every message

Physical

- > **Residential Direct-Mount**
 - Material of construction: gray polycarbonate housing; encapsulated electronics for protection against environmental hazards and tampering
 - Dimensions:
 - American: 5.54" x 2.57" x 3" (140 x 65 x 76 mm)
 - Sensus/Rockwell: 4.3" x 2.8" x 2.9" (109 x 71 x 74 mm)
 - Actaris/Sprague: 6" x 3.3" x 3.9" (152 x 84 x 99 mm)
 - National: 6.2" x 3" x 3.4" (157 x 76 x 86 mm)
- > **Commercial Direct-Mount**
 - Material of construction: gray polycarbonate housing; encapsulated electronics for protection against environmental hazards and tampering
 - Dimensions:
 - American: 5.16" x 2.42" x 5.16" (131 x 61 x 131 mm)
 - Sensus/Rockwell: 5.38" x 4" x 2.5" (137 x 102 x 64 mm)
- > **All Remotes**
 - Material of construction: black polycarbonate housing; encapsulated electronics for protection against environmental hazards and tampering
 - Dimensions:
 - 4.9" x 3.6" x 1.7" (124 x 92 x 43 mm)

Shipping Information

	Modules Per Box	Box Dimensions	Box Weight	Modules Per Pallet*	Pallet Dimensions	Pallet Weight
Residential Direct-Mount						
Elster American	30	18.6" x 15.8" x 8.3"	19.4 lbs / 8.8 kg	1080	37.1" x 47.4" x 54.9" H	698 lbs / 318 kg
Sensus/Rockwell	30	18.6" x 15.8" x 8.3"	17.4 lbs / 7.9 kg	1080	37.1" x 47.4" x 54.9" H	626 lbs / 285 kg
Itron/Sprague	30	19.25" x 18" x 9"	22 lbs / 10 kg	600	40" x 48" x 50" H	490 lbs / 222 kg
National	30	20" x 20" x 9.25"	30 lbs / 13.6 kg	600	40" x 48" x 50" H	650 lbs / 295 kg
Commercial Direct-Mount						
Elster American & Itron	10	18" x 14.5" x 9.5"	16 lbs / 7.3 kg	300	40" x 48" x 54" H	530 lbs / 240 kg
Sensus/Rockwell	10	18" x 14.5" x 9.5"	16 lbs / 7.3 kg	300	40" x 48" x 54" H	530 lbs / 240 kg
Remotes	30	30	20" x 13" x 13"	24 lbs / 10.9 kg	900	40" x 48" x 72" H

* ERT modules are not stacked when shipped but can be stored 2 pallets high. Modules are to be stored indoors. If outdoor storage is necessary, modules must be sheltered from weather and damage

Meter Compatibility

- > Refer to Gas ERT Meter Compatibility List (PUB-0117-002) for detailed information on gas meter compatibility

Additional Information

- > 40GB Installation Guide – Direct Mount (PUB-0025-100)
- > 40GB Installation Guide – Remote Mount (PUB-0087-001)
- > Gas ERT Ordering Guide (PUB-0117-001)
- > Endpoint Technology Guide (PUB-0156-001)
- > ROCL Checklist Form (TDC-0064)
- > ReadOne Pro ERT Programming Guide Formatted Reads Version (TDC-0440)
- > ReadOne Pro ERT Programming Guide (TDC-0027 – WYSIWYG water)
- > Endpoint-Link ERT Programming Guide (TDC-0744)
- > The Proving Ground: Itron delivers industry-leading battery performance and the test data to back it up
- > Predicting ERT Module Life

About Itron Inc.

Itron Inc. is a leading technology provider to the global energy and water industries. Our company is the world's leading provider of intelligent metering, data collection and utility software solutions, with nearly 8,000 utilities worldwide relying on our technology to optimize the delivery and use of energy and water. Our products include electricity, gas, water and heat meters; data collection and communication systems, including automated meter reading (AMR) and advanced metering infrastructure (AMI); meter data management and related software applications; as well as project management, installation, and consulting services. To know more, start here: www.itron.com



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100G DLS Datalogging

ERT® Module

The 100G DLS Datalogging ERT® module is the fourth evolution in Itron's line of 100 series radio frequency (RF) gas meter modules and is part of our industry-leading portfolio of RF-based meter data collection solutions. The 100G DLS Datalogging ERT, or 100G DLS, offers all the benefits of its 100G predecessors while delivering a new message called SCM+, which is different from the legacy SCM message. The new SCM+ message has the capacity to use serial numbers up to 10 digits long and includes other valuable data. The 100G DLS also offers optional enhanced security with the addition of authentication and encryption.

The 100G DLS boasts an accuracy of 99.999 percent between the index read and ERT read—an unprecedented benchmark in Advanced Metering Infrastructure (AMI) and Automated Meter Reading (AMR). The module also achieves the industry's highest UL rating for intrinsic safety. The two-way 100G DLS surpasses its predecessor, the 100G DLN, by offering optional authentication of command and encryption of communications data when Itron Security Manager is added to your Itron system. Additionally, the 100G DLS offers extended data—low battery indicator, metrology and non-metrology programming counters—which can be read not only by fixed network, but for the first time by mobile and handheld readers. The 100G DLS also offers improved tilt tamper detection.

The 100G DLS automatically stores 40 days of hourly data, providing a “black box” of hourly usage which has proven valuable in case of a catastrophic event. This functionality benefits mobile customers by providing valuable information for: move in/move out reads to minimize off-cycle reading; daily data for customer service and billing disputes; monthly gas balancing reads; hourly data to facilitate load studies and data to support mid-cycle rate changes. With its programmable output power and two-way functionality, the 100G DLS easily enables migration from mobile to fixed network reading and supports time-synchronized interval data and Gas Day Take reads.

FEATURES

- » Offers optional enhanced security with authentication of command and encryption of communications data
- » New SCM+ message allows unique ERT ID numbers up to 10 digits and includes extended data
- » Can be read alongside legacy gas ERT modules with Itron's 900 MHz ChoiceConnect® handheld, mobile and fixed network data collection solutions
- » Continually stores and updates the last 40 days of hourly interval data which can be read via handheld, mobile and fixed network
- » Operates in bubble-up mode and does not require a license from the Federal Communications Commission (FCC) or Industry Canada (IC)

- » Designed for a 20-year battery life regardless of data collection solution to ensure low operating and maintenance costs
- » Module design makes installation fast and easy, especially when gas is flowing through the meter
- » Made in the USA at Itron's facility in Waseca, Minnesota

Residential Meters

Itron provides the most extensive line of direct mount 100G DLS ERT modules for use with residential diaphragm gas meters. Capacities range from 75 to 630 CFH for popular models from Elster American Meter, Sensus/Invensys/Equimeter/Rockwell, Itron/Actaris/Schlumberger/Sprague and National/Lancaster. Direct mount modules are also available for older Sprague 1A and Sprague 175RM meters. The compact design and direct engagement with the meter drive assure the unparalleled accuracy that makes Itron gas ERT modules the industry standard. A remote mount module is available for some less common meter types where a direct mount solution is not available.

meters with top-mount instrument drives utilize the same version commercial direct mount module. For Elster American Meter commercial diaphragm meters, the ERT mounts directly to the meter. For Itron/Actaris/Schlumberger meters, an adapter kit must be purchased. A remote mount module is available for some less common meter types where a direct mount solution is not available.



Itron 1000A



Sensus/ Rockwell 750



Elster American AL 800



Itron I-250



Sensus/ Rockwell R275



Elster American AC250

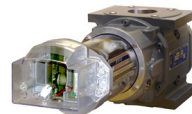


National 250

Commercial Meters

Itron also provides direct mount 100G DLS ERT modules for use with the following commercial diaphragm meters: Elster American Meter, Itron/Actaris/Schlumberger and Sensus/Invensys/Equimeter/Rockwell. The unobtrusive profile is easy-to-install and the direct meter drive engagement assures the highest level of accuracy. Built-in passive radiators are standard on all commercial, direct mount 100G DLS ERT modules.

Elster American Meter, and Itron/Actaris/Schlumberger commercial diaphragm



Dresser B3 with Direct mount



Dresser LMMA with Remote ERT

Electronic Meters and Correctors

Itron offers a remote mount 100G DLS for Itron's DATTUS meter. One 100G DLS can be used for uncorrected consumption and a second module can be used for corrected consumption.

Itron offers a remote mount 100G DLS for Honeywell/Mercury Instruments EC-AT, Mini-P, Mini-AT, Mini-Max and TCI electronic correctors. The ERT

can be connected to these devices for temperature- and/or pressure-corrected consumption (Form A board required). The ERT attaches easily to the Mercury corrector circuit board through the terminal strip connector already installed on Mercury units (module to TCI is wired). Itron offers a remote mount 100G DLS for Dresser Micro Correctors (IMC/W, MC2 and Eagle MPplus. For Mercury, Dresser, and Eagle, one 100G DLS module can be used for uncorrected consumption and a second module can be used for corrected consumption.



DATTUS III



Mercury Mini-AT



Eagle MPplus



Dresser IMC

Functional Specifications

- » Power source:
 - Direct mount module: "A" cell lithium battery
 - Remote-mount module: Two "A" cell lithium batteries
- » Radio programming parameters: Utility ID, index reading, count rate, index rollover, pressure compensation, security level, output power and bubble-up rate
- » Tamper detection:
 - Direct mount module: mercury-free tilt tamper and magnetic tamper
 - Remote mount module: mercury-free tilt tamper and cut cable (for Mercury TCI, optionally can get any TCI alarm in place of cut cable)
- » Battery Counter Indicator
- » Operating temperature: -40°F to +158°F (-40°C to +70°C)
- » Operating humidity:
 - 5 to 95% non-condensing relative humidity
 - 100G DLS ERT modules can be installed indoors or outdoors above grade
- » Product identification: Numeric and bar-coded ERT module type and up to 10 digit serial number

Programming Mode Options

- » **Mobile/Handheld Mode*** with +10 dBm output power (10 milliwatts) and a 15-second bubble-up rate with a 20-year battery life. This mode is recommended when using traditional walk-by or drive-by meter reading methods
- » **Mobile HP Mode*** with +24dBm output power (250 milliwatts) and a 60-second bubble-up rate with a 20-year battery life. This mode allows readings to be collected from further away, bypassing many streets and reducing total miles driven
- » **Hard-to-Read Mobile/Handheld Mode*** with +24 dBm output power (250 milliwatts) and a 30-second bubble-up rate. This mode reduces battery life to 18 years with basic security and 13 years with enhanced security. Assuming that utilities would prefer a 20-year battery life, this mode should only be used for exceptionally hard-to-read applications such as meters on a roof or in a sub-basement

*Note: When reading 40 days of hourly intervals with mobile or handheld, the operator will need to slow or stop briefly, which will increase route processing time

- » **Fixed Network Mode**** with +27 dBm output power (500 milliwatts), and a 5-minute bubble-up rate of the Network Interval Message (NIM). The NIM includes the current index read and the last 8 hourly intervals (7 full hours and one partial hour) with a 20-year battery life
- » **Itron Cellular Solutions (ICS) Mode**** The 100G DLS module is compatible with the OpenWay CENTRON with 3G Itron Cellular Module (ICM) and is programmed with FDM Tools with Enhanced Security or FDM. In ICS mode, the 100G DLS transmits a high-powered network interval message (NIM) RF message every five minutes across 50 channels for optimum operation. Output power in this mode is 500 milliwatts or +27 dBm with a 20-year battery life

NOTE: The 100G DLS must be in full security mode to work with ICS

**NOTE: Interspersed in the high power NIM, the 100G transmits a medium power RF message at 10 milliwatts or +10 dBm every 60 seconds

Approved Reading Devices for Collecting Reads with Basic Security

Handheld and Mobile Application Software
SCM+ Only:

- » MV-RS v8.5.5 or higher
- » Field Collection System (FCS) v2.3 or higher
 - Including FCS DC v2.3.10.1 and FCS DC v2.4.8.2
- » Mobile Collection Software v3.4 or higher
- » Field Deployment Manager (FDM) v3.3 or higher

Handheld and Mobile Application Software
Datalogging:

- » MV-RS v8.5.5 or higher
- » Field Collection System (FCS) v2.3 or higher
 - Including FCS DC v2.3.10.1 and FCS DC v2.4.8.2 and the database update script from FCS Server 2.3.2.4 HF5 and FCS Server 2.4.1.20 HF8
- » Mobile Collection Software v3.4 or higher
- » Field Deployment Manager (FDM) v3.3 or higher

Handhelds and Radios:

- » FC300SR: All models along with application software listed above
- » 900MHz Belt Clip Radio: All models require firmware v1.6.12 or higher along with FDM software listed above
- » FC200SR: Application software listed above along with models listed here:
 - SCM+ Only: FC2-0005-002, FC2-0006-002, FC2-0005-003, FC2-0006-003, FC2-0006-004
 - Datalogging: FC2-0005-004, FC2-0006-004, FC2-0005-104, FC2-0006-104

Mobile Collectors:

- » MC3 when used with Mobile Collection Software v3.4 and application software listed above.
 - SCM+ Only: DCU-5300-001 *, DCU-5300-011U *, DCU-5300-101U, DCU-5300-111U
 - Datalogging: DCU-5300-001DL, DCU-5300-001DLU, DCU-5300-011DLU, DCU-5310-001, DCU-5310-011, DCU-5310-011U
- » MCLite when used with application software listed above.
 - SCM+ Only: DCU-5000-001 *, DCU-5000-002 *, DCU-5000-002U *, DCU-5000-102U
 - Datalogging: DCU-5000-002DL, DCU-5310-201

Network Products:

- » ChoiceConnect Network Software v4.1.6.68
- » CCU100: All models when used with Network Software v4.1.6.68 or higher
- » Repeater 100: All models when used with Network Software v4.1.6.68 or higher
- » CCU 4.2: All models when used with updated Network Software and the included firmware update

Approved Reading Devices for Collecting Reads with Enhanced Security

Note: Requires purchase of security keys (SEC-0000-001), Itron Security Manager and FDM or FDM Endpoint Tools Enhanced

Handheld and Mobile Application Software:

- » Field Collection System (FCS) v2.5 or higher
- » Mobile Collection Software v3.5.1 or higher
- » Field Deployment Manager (FDM)
 - FDM work orders v3.3 or higher
 - or FDM Tools with Enhanced Security v3.3 or higher

Note: ICS mode requires v3.4 or higher

- » FC300SR: All models along with application software listed above
- » 900MHz Belt Clip Radio - All models require firmware v1.6.12 or higher along with FDM software listed above
- » FC200SR: Application software listed above along with models listed here:
 - SCM+ Only: FC2-0005-002, FC2-0006-002, FC2-0005-003, FC2-0006-003, FC2-0006-004
 - Datalogging: FC2-0005-004, FC2-0006-004, FC2-0005-104, FC2-0006-104

Mobile Collectors:

- » MC3 when used with Mobile Collection Software v3.4 and application software listed above.
 - SCM+ Only: DCU-5300-001 *, DCU-5300-011U *, DCU-5300-101U, DCU-5300-111U
 - Datalogging: DCU-5300-001DL, DCU-5300-001DLU, DCU-5300-011DLU, DCU-5310-001, DCU-5310-011, DCU-5310-011U
- » MCLite when used with application software listed above.
 - SCM+ Only: DCU-5000-001 *, DCU-5000-002 *, DCU-5000-002U *, DCU-5000-102U
 - Datalogging: DCU-5000-002DL, DCU-5310-201

Network Products:

- » ChoiceConnect Network Software v5.0
- » CCU 100: All models support enhanced security when used with Network Software v5.0
- » Repeater 100: All models support enhanced security when used with Network Software v5.0 and the included firmware update

Battery Life and Design Life

- » 100G DLS allows for a field-replaceable

*Firmware must be updated at service center.

- » “A” cell lithium battery
- » All programming modes and security levels support a 20-year battery life (20+ years for remotes) except Hard-to-Read Mobile/Handheld mode, which reduces battery life to 18 years with basic security and 13 years with enhanced security
- » All 100G DLS modules are designed for a 20-year total life

Regulatory & Standards

- » FCC compliance: Part 15.247 and Part 15.249 (programming) certified
- » FCC ID EWQ100GDLAS, Industry Canada 864D-100GDLAS; Measurement Canada (AG-0546)
- » Safety approvals: Intrinsically safe per UL Class I, Division 1, Groups C & D

Operational

- » All 100G DLS ERT modules operate

- without the need for an FCC or IC license
- » Frequency Range: Frequency-Hopping Spread Spectrum 903 to 926.85 MHz in the ISM band
- » Program frequency: 908 MHz
- » NIM: FM modulation; all other messages are AM modulated
- » Data integrity: Verified in every message

Physical

All 100G DLS ERT modules have encapsulated electronics for protection against environmental hazards and tampering. All 100G DLS module housings are made of gray polycarbonate. For direct mount residential ERT modules, the gasket material is molded Sevrene™ and the index cover material is clear polycarbonate.

Meter Compatibility

Refer to Gas & Telemetry Module

Compatibility List (PUB-0117-002) for detailed information on gas meter compatibility.

Additional Information

- » 100G DLS Datalogging ERT Module Installation Guide: Direct Mount (TDC-0823)
- » 100G DLS Datalogging ERT Module Installation Guide: Remote Mount (TDC-0824)
- » Gas & Telemetry Module Ordering Guide (PUB-0117-001)
- » 100 Series Technology Guide (TDC-0825)
- » Field Deployment Manager Endpoint Tools Mobile Application Guide (TDC-0934)
- » Field Deployment Manager Endpoint Tools Configuration Guide (TDC-0935)
- » Field Deployment Manager Endpoint Checklist (TDC-0942)

Physical (width x height x depth)

	Elster American	Sensus/Rockwell	Itron/Sprague	National	All
Residential	5.54" x 3.57" x 3.1"	4.3" x 3.8" x 2.9"	6" x 4.1" x 3.9"	6" x 3.3" x 3.9"	
Commercial	5.16" x 2.42" x 5.16"	5.38" x 4" x 2.5"	5.16" x 2.42" x 5.16"		
Remote					4.9" x 3.6" x 2.5"

Shipping Information

	Modules Per Box	Box Dimensions	Box Weight	Modules Per Pallet*	Pallet Dimensions	Pallet Weight
Residential Direct-Mount						
Elster American	10	20" x 11.75" x 4"	8.5 lbs / 3.9 kg	800	40" x 48" x 48" H	680 lbs / 308 kg
Sensus/Rockwell	10	20" x 11.75" x 4"	6.9 lbs / 3.1 kg	800	40" x 48" x 48" H	552 lbs / 250 kg
Itron/Sprague	10	21" x 12.625" x 4.25"	8.8 lbs / 4.0 kg	600	40" x 48" x 50" H	528 lbs / 240 kg
National	10	21" x 12.625" x 4.25"	9.7 lbs / 4.4 kg	600	40" x 48" x 50" H	582 lbs / 264 kg
Itron/Sprague 175 RM	10	22.625 x 11.25" x 4.75"	9.8 lbs / 4.4 kg	600	40" x 48" x 50" H	588 lbs / 267 kg
Commercial Direct-Mount						
Elster American & Itron	5	20" x 11.75" x 4"	7.6 lbs / 3.4 kg	300	40" x 48" x 52.5" H	456 lbs / 207 kg
Sensus/Rockwell	5	20" x 11.75" x 4"	7.5 lbs / 3.4 kg	300	40" x 48" x 52.5" H	450 lbs / 204 kg
Remotes	20	23" x 15.8" x 6.5"	22 lbs / 10.1 kg	500	40" x 48" x 37.5" H	550 lbs / 253 kg

* Modules are not stacked when shipped but can be stored two pallets high. Modules are to be stored indoors. If outdoor storage is necessary, modules must be sheltered from weather and damage.



Join us in creating a more **resourceful world**.
To learn more visit **itron.com**

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100G DLT Datalogging

ERT® Module

The 100G DLT Datalogging ERT® Module, or 100G DLT, is a hybrid in Itron's line of 100 series radio frequency (RF) gas meter modules and is part of our industry-leading portfolio of RF-based meter data collection solutions. The 100G DLT combines fourth generation circuit board hardware with the same SCM message used in the 100G DLN. This means that utilities currently reading the SCM message from the 100G DLN can use the 100G DLT without any upgrades needed for programming or meter reading. The circuit board hardware used in the 100G DLT offers improved tilt tamper detection compared to the 100G DLN but does not offer optional enhanced security or extended tamper information available in the 100G DLS.

The 100G DLT boasts an accuracy of 99.999 percent between the index read and ERT read—an unprecedented benchmark in Advanced Metering Infrastructure (AMI) and Automated Meter Reading (AMR). The module also achieves the industry's highest UL rating for intrinsic safety. The two-way 100G DLT surpasses its predecessor, the 100G DLN, by offering improved tilt tamper detection. The 100G DLT automatically stores 40 days of hourly data, providing a “black box” of hourly usage which has proven valuable in case of a catastrophic event. This functionality benefits mobile customers by providing valuable information for: move in/move out reads to minimize off-cycle reading; daily data for customer service and billing disputes; monthly gas balancing reads; hourly data to facilitate load studies and data to support mid-cycle rate changes. With its programmable

output power and two-way functionality, the 100G DLT easily enables migration from mobile to fixed network reading and supports time-synchronized interval data and Gas Day Take reads.

FEATURES

- » Utilities currently reading the SCM message from the 100G DLN can use the 100G DLT without any upgrades needed for programming or meter reading
- » Can be read alongside legacy gas ERT modules with Itron's 900 MHz ChoiceConnect® handheld, mobile and fixed network data collection solutions
- » Continually stores and updates the last 40 days of hourly interval data which can be read via handheld, mobile and fixed network

- » Operates in bubble-up mode and does not require a license from the Federal Communications Commission (FCC)
- » Designed for a 20-year battery life regardless of data collection solution to ensure low operating and maintenance costs
- » Module design makes installation fast and easy, especially when gas is flowing through the meter
- » Made in the USA at Itron's facility in Waseca, Minnesota

Residential Meters

Itron provides the most extensive line of direct mount 100G DLT ERT modules for use with residential diaphragm gas meters. Capacities range from 75 to 630 CFH for popular models from Elster American Meter, Sensus/Invensys/Equimeter/Rockwell, Itron/Actaris/Schlumberger/Sprague and National/Lancaster. Direct mount modules are also available for older Sprague 1A and Sprague 175RM meters. The compact design and direct engagement with the meter drive assure the unparalleled accuracy that makes Itron gas ERT modules the industry standard. A remote mount module is available for some less common meter types where a direct mount solution is not available.



Itron 1000A



Sensus/ Rockwell 750



Elster American AL 800

Rotary Meters

Itron has several solutions for interfacing with rotary gas meters. For Dresser LMMA and B3 rotary meters with Dresser-supplied AMI/AMR adapter, Itron offers the American residential 100G DLT. For Dresser rotary meters with Instrument Drive (ID), Itron offers the direct mount ERT designed for American commercial diaphragm meters. For Dresser, Romet and American Meter rotary meters with pulse output (version 17 or higher required for Dresser) and a military connector pin, Itron offers the remote mount 100G DLT.



Itron I-250



Sensus/ Rockwell R275



Elster American AC250

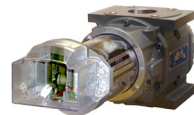


National 250

Commercial Meters

Itron also provides direct mount 100G DLT ERT modules for use with the following commercial diaphragm meters: Elster American Meter, Itron/Actaris/Schlumberger and Sensus/Invensys/Equimeter/Rockwell. The unobtrusive profile is easy-to-install and the direct meter drive engagement assures the highest level of accuracy. Built-in passive radiators are standard on all commercial, direct mount 100G DLT ERT modules.

Elster American Meter, and Itron/Actaris/Schlumberger commercial diaphragm meters with top-mount instrument drives utilize the same version commercial direct mount module. For Elster American Meter commercial diaphragm meters, the ERT mounts directly to the meter. For Itron/Actaris/Schlumberger meters, an adapter kit must be purchased. A remote mount module is available for some less common meter types where a direct mount solution is not available.



Dresser B3 with Direct mount



Dresser LMMA with Remote ERT

Electronic Meters and Correctors

Itron offers a remote mount 100G DLT for Itron's DATTUS meter. One 100G DLT can be used for uncorrected consumption and a second module can be used for corrected consumption.

Itron offers a remote mount 100G DLT for Honeywell/Mercury Instruments EC-AT, Mini-P, Mini-AT, Mini-Max and TCI electronic correctors. The ERT can be connected to these devices for temperature- and/or pressure-corrected consumption (Form A board required). The ERT attaches easily to the Mercury corrector circuit board through the terminal strip connector already installed on Mercury units (module to TCI is wired). Itron offers a

remote mount 100G DLT for Dresser Micro Correctors (IMC/W, MC2 and Eagle MPplus. For Mercury, Dresser, and Eagle, one 100G DLT module can be used for uncorrected consumption and a second module can be used for corrected consumption.

Functional Specifications



DATTUS III



Mercury Mini-AT



Eagle MPplus



Dresser IMC

- » Power source:
 - Direct mount module: "A" cell lithium battery
 - Remote-mount module: Two "A" cell lithium batteries
- » Radio programming parameters: Utility ID, index reading, count rate, index rollover, pressure compensation, security level, output power and bubble-up rate
- » Tamper detection:
 - Direct mount module: mercury-free tilt tamper and magnetic tamper
 - Remote mount module: mercury-free tilt tamper and cut cable (for Mercury TCI, optionally can get any TCI alarm in place of cut cable)
- » Battery Counter Indicator for FN reads
- » Operating temperature: -40°F to +158°F (-40°C to +70°C)
- » Operating humidity:
 - 5 to 95% non-condensing relative humidity
 - 100G DLT ERT modules can be installed indoors or outdoors above grade
- » Product identification: Numeric and bar-coded ERT module type

Programming Device (same as 100G DLN)

- » 100G DLT ERT modules can be programmed using FC200SR with Endpoint- Link (EPL) or Endpoint-Link Pro (EPLP) v5.3 or higher or using FC300SR with EPL or EPLP v5.5 or higher for all modes except fixed network mode which includes the Network Interval Message. 100G DLT ERT modules can also be programmed using Itron's 900 MHz Belt Clip Radio and a customer-supplied laptop with EPL v5.5 or higher for all modes except fixed network mode. The Belt Clip Radio can be connected to a laptop via USB cable or Bluetooth

Note: EPL and EPLP are no longer supported

- » 100G DLT ERT modules can be programmed using FC200SR or FC300SR with Field Deployment Manager (FDM) v1.1 or higher. 100G DLT ERT modules can also be programmed using Itron's 900 MHz Belt Clip Radio and a customer supplied laptop with FDM v1.1 or higher. The Belt Clip Radio can be connected to a laptop via USB cable or Bluetooth

Note: EPL and EPLP are no longer supported

Programming Options (same as 100G DLN)

- » **Mobile/Handheld Mode*** with +10 dBm output power (10 milliwatts), and a 15-second bubble-up rate with a 20-year battery life. This mode is recommended when using traditional walk-by or drive-by meter reading methods
- » **Mobile HP Mode*** with +24dBm output power (250 milliwatts) and a 60-second bubble-up rate with a 20-year battery life. This mode allows readings to be collected from further away, bypassing many streets and reducing total miles driven
- » **Hard-to-Read Mobile/Handheld Mode*** with +24 dBm output power (250 milliwatts) and a 30-second bubble-up rate. This mode reduces battery life from 20 years to 15 years. Assuming that utilities would prefer a 20-year battery life, this mode should only be used for exceptionally hard-to-read applications such as meters on a roof or in a sub-basement

- » **Fixed Network Mode** with +27 dBm output power (500 milliwatts), and a 5-minute bubble-up rate of the Network Interval Message. The NIM includes the current index read and last 8 hourly intervals (7 full hours and one partial hour) with a 20-year battery life

*Note: When reading 40 days of hourly intervals with mobile or handheld, the operator will need to slow or stop briefly which will increase route processing time. Interspersed in the high power NIM, the 100G transmits a medium power RF message at 10 milliwatts or +10 dBm every 60 seconds

Approved Reading Devices for Collecting SCM Reads (same as 100G DLN)

- » FC200SR with; MV-RS® v7.8.6 or higher; Field Collection System (FCS) v1.8.5.2 or higher
- » FC300SR with; MV-RS v8.0 or higher; FCS v2.1 or higher
- » G5SR with; Premierplus4 v3.2 or higher; MV-RS v7.8.6 or higher; Integrator v6.0 or higher
- » Mobile Collector 2.0 or higher with MC Software v2.6 or higher with; MV-RS v7.7 or higher; FCS v1.6 or higher; Premierplus4 v3.2 or higher; Integrator v6.0 or higher
- » MC3 with MC Software v3.0 or higher with; MV-RS v7.7 or higher; FCS v1.6 or higher; Premierplus4 v3.2 or higher; Integrator v6.0 or higher
- » MC Lite with MV-RS v7.8.5 or higher
- » ChoiceConnect Fixed Network 2.0; Cell Control Unit (CCU) 4.2; 8-channel repeaters; CCU Meter Reading Application software v3.6.02 or higher; Fixed Network Application software v2.2.3 or higher; Billing Gateway software v2.0.8 or higher

Approved Reading Devices for Collecting Datalogging Reads

- » Availability of SCM based ERT ID's are being extended requiring FCS v2.5 with a service pack, FCS v2.6 or higher, or MV-RS v8.4.6 or higher with the following:
 - MC3 (MC3-B or MC3-DL radio) with MC software v3.3 or higher
 - MC Lite (MCL-B radio)
 - FC300SR
 - FC200SR (part number FC2-0005-004 or FC2-0006-004)

Approved Reading Device for Collecting Network Interval Message (NIM) Reads

ChoiceConnect Fixed Network 100 Network; Cell Control Unit 100 (CCU100); Repeater 100; Network Software v4.0 or higher; Billing Gateway software v3.0.4 or higher.

Battery Life and Design Life

- » 100G DLT ERT modules allow for a field-replaceable "A" cell lithium battery
- » When programmed to mobile/handheld mode or fixed network mode, battery life is 20 years (20+ years for remotes)

Regulatory & Standards

- » FCC compliance: Part 15.247 and Part 15.249 (programming) certified
- » FCC ID EWQ100GDLAS
- » Safety approvals: Intrinsically safe per UL Class I, Division 1, Groups C & D

Operational

- » All 100G DLT ERT modules operate without the need for an FCC license
- » Frequency Range: Frequency-Hopping Spread Spectrum 903 to 926.85 MHz in the ISM band
- » Program frequency: 908 MHz
- » NIM: FM modulation; all other messages are AM modulated
- » Data integrity: Verified in every message

Physical

All 100G DLT ERT modules have encapsulated electronics for protection against environmental hazards and tampering. All 100G DLT module housings are made of gray polycarbonate. For direct mount residential ERT modules, the gasket material is molded Sevrene™ and the index cover material is clear polycarbonate.

Meter Compatibility

Refer to Gas Endpoint Meter Compatibility List (PUB-0117-004) for detailed information on gas meter compatibility.

Additional Information

- » 100G Datalogging ERT Module Installation Guide: Direct Mount (TDC-0823)
- » 100G Datalogging ERT Module Installation Guide: Remote Mount (TDC-0824)
- » Gas Endpoint Ordering Guide (PUB-0117-003)
- » 100 Series Technology Guide (TDC-0825)
- » Field Deployment Manager Endpoint Tools Mobile Application Guide (TDC-0934)
- » Field Deployment Manager Endpoint Tools Configuration Guide (TDC-0935)
- » Field Deployment Manager Endpoint Checklist (TDC-0942)

Physical (width x height x depth)

	Elster American	Sensus/Rockwell	Itron/Sprague	National	All
Residential	5.54" x 3.57" x 3.1"	4.3" x 3.8" x 2.9"	6" x 4.1" x 3.9"	6" x 3.3" x 3.9"	
Commercial	5.16" x 2.42" x 5.16"	5.38" x 4" x 2.5"	5.16" x 2.42" x 5.16"		
Remote					4.9" x 3.6" x 2.5"

Shipping Information

	Modules Per Box	Box Dimensions	Box Weight	Modules Per Pallet*	Pallet Dimensions	Pallet Weight
Residential Direct-Mount						
Elster American	10	20" x 11.75" x 4"	8.5 lbs / 3.9 kg	800	40" x 48" x 48" H	680 lbs / 308 kg
Sensus/Rockwell	10	20" x 11.75" x 4"	6.9 lbs / 3.1 kg	800	40" x 48" x 48" H	552 lbs / 250 kg
Itron/Sprague	10	21" x 12.625" x 4.25"	8.8 lbs / 4.0 kg	600	40" x 48" x 50" H	528 lbs / 240 kg
National	10	21" x 12.625" x 4.25"	9.7 lbs / 4.4 kg	600	40" x 48" x 50" H	582 lbs / 264 kg
Itron/Sprague 175 RM	10	22.625 x 11.25" x 4.75"	9.8 lbs / 4.4 kg	600	40" x 48" x 50" H	588 lbs / 267 kg
Commercial Direct-Mount						
Elster American & Itron	5	20" x 11.75" x 4"	7.6 lbs / 3.4 kg	300	40" x 48" x 52.5" H	456 lbs / 207 kg
Sensus/Rockwell	5	20" x 11.75" x 4"	7.5 lbs / 3.4 kg	300	40" x 48" x 52.5" H	450 lbs / 204 kg
Remotes	20	23" x 15.8" x 6.5"	22 lbs / 10.1 kg	500	40" x 48" x 37.5" H	550 lbs / 253 kg

* Modules are not stacked when shipped but can be stored two pallets high. Modules are to be stored indoors. If outdoor storage is necessary, modules must be sheltered from weather and damage.



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