REC 16-438

WES Energy & Environment, LLC
902 Market Street
Meadville, PA 16335
Office: (814) 336-1284

April 7, 2016

Debra A. Howland
Executive Director
New Hampshire Public Utilities Commission
21 South Fruit Street, Suite 10
Concord, NH 03301-2429

Re: Application for Class I Thermal Renewable Energy Source Eligibility for Inter-Lakes High School

Dear Ms. Howland,

Enclosed is Inter-Lakes School District's application for Class I Thermal Renewable Energy Source eligibility for Inter-Lakes High School. This facility completed its pellet boiler installation in January of this year, has complied with best management practices, and has implemented a metering protocol to meet the metering rules as per PUC 2506.

WES E&E thanks the PUC staff for all their efforts in making the Thermal RECs in NH a reality, and is pleased to submit this application. Please do not hesitate to call either Inter-Lakes School District or me with any questions or clarifications on the application.

Sincerely,

WES Energy and Environment, LLC

Daniel A. Wilson
Vice President

Attachments:

- Inter-Lakes High School TREC Application

State of New Hampshire
Public Utilities Commission

21 S. Fruit Street, Suite 10, Concord, NH 03301-2429

DRAFT

APPLICATION FORM FOR
RENEWABLE ENERGY SOURCE ELIGIBILITY FOR
CLASS I THERMAL SOURCES WITH RENEWABLE THERMAL ENERGY CAPACITY GREATER THAN
150,000 BTU/HR

Pursuant to New Hampshire Administrative Code PUC 2500 Rules

- Please submit one (1) original and two (2) paper copies of the completed application and cover letter* to:

Debra A. Howland
Executive Director
New Hampshire Public Utilities Commission
21 South Fruit Street, Suite 10
Concord, NH 03301-2429

- Send an electronic version of the completed application and the cover letter electronically to executive.director@puc.nh.gov.

* The cover letter must include complete contact information and identify the renewable energy class for which the applicant seeks eligibility. Pursuant to PUC 2505.01, the Commission is required to render a decision on an application within 45 days of receiving a completed application.

If you have any questions please contact Barbara Bernstein at (603) 271-6011 or Barbara.Bernstein@puc.nh.gov.

Only facilities that began operation after January 1, 2013 are eligible.

Is this facility part of a Commission approved aggregation?
Yes X No ____
Aggregator's Company Name: WES Energy & Environment, LLC
Aggregator Contact Information: 902 Market St, Meadville, PA 16335 (814) 336-1284
dan@wesenergyandenvironment.com

Contents

Attachment Labeling Instructions

Please label all attachments by Part and Question number to which they apply (e.g. Part 3-7). For electronic submission, name each attachment file using the Owner Name and Part and Question number (e.g. Pearson Part 3-7).

Part 1. General Application Information

Please provide the following information:

Applicant

Name: Inter-Lakes School District

Mailing Address: 103 Main Street

Town/City: Meredith State: NH Zip Code: 03253

Primary Contact: Chris Wald

Telephone: (603) 279-7947 Cell: (603) 236-9709

Email Address: chris.wald@interlakes.org

Facility

Name: Inter-Lakes High School

Physical Address: 1 Laker Lane

Town/City: Meredith State: NH Zip Code: 03253

If the facility does not have a physical address, the Latitude: _____ & Longitude _____

Installer

Name: Honeywell

Installer License Number: n/a

Mailing Address: 17 Windsor Green Road

Town/City: Greenland State: NH Zip Code: 03840

Primary Contact: Jim Lucy

Telephone: (603) 767-8058 Cell: n/a

Email Address: james.lucy@honeywell.com

If the equipment was installed by the facility owner, check here: ☐

The seller of the equipment was Act Bio Energy, 30 Commerce Park Drive, Schenectady, NY 12309. Larry Farrelly (518) 377-2349 info@actbioenergy.com

Facility Operator

If the facility operator is different from the owner, please provide the following:

Name: _____

Facility Operator Telephone Number: _____

Independent Monitor

Name: Adam Kohler, P.E.

Mailing Address: 306 Hall Road

Town/City: Barrington State: NH Zip Code: 03825

Primary Contact: Adam Kohler, P.E.

Telephone: use cell Cell: (603) 969-6459

Email Address: adam.kohlerandlewis@gmail.com

NEPOOL/GIS Asset ID and Facility Code

In order to qualify your facility's thermal energy production for RECs, you must register with the NEPOOL – GIS. Contact information for the GIS administrator follows:

James Webb
Registry Administrator, APX Environmental Markets
224 Airport Parkway, Suite 600, San Jose, CA 95110
Office: 408.517.2174
jwebb@apx.com

Mr. Webb will assist you in obtaining a GIS facility code and an ISO-New England asset ID number.

GIS Facility Code # NON74878 Asset ID # n/a

1. Has the facility been certified under another non-federal jurisdiction's renewable portfolio standards?

Yes [ ] No [X]

If you selected yes, *please provide proof of certification in the form of an attached document as Attachment 1-1.*

2. Attach any supplementary documentation that will help in classification of the facility as Attachment 1-9

Part 2. Technology Specific Data

All Technologies

Fuel type (solar, geothermal, or biomass): biomass (wood pellets)

Rated Thermal Capacity (Btu/hr): 1,700,000 Btu/hr (0.4982 MW)

Date of initial operation using renewable fuels: 1/12/2016

Biomass

If a thermal biomass facility, provide proof of New Hampshire Department of Environmental Services approval that the facility meets the emissions requirements set forth in Puc 2500, as Attachment 2-1.

Solar Thermal

If a solar thermal facility, please provide the Solar Rating and Certification Corporation rating based on Mildly Cloudy C (kBtu/day): _____

Geothermal

If a geothermal facility, please provide the following:

The coefficient of performance (COP): _____

The energy efficiency ratio of the system: _____

Part 3. Metering and Measurement of Thermal Energy and REC Calculations

This section deals with the thermal metering system including methods for calculation and reporting useful thermal energy. **A copy of PUC 2506.04 of the RPS rules is included as Appendix A.**

Using the table below, identify the thermal metering system or custom components (e.g., heat meters, flow meters, pressure and temperature sensors) used to measure the useful thermal energy and enter the accuracy of measurement for the entire system:

System or Component	Product name	Product Manufacturer	Model No.
BTU METER	SOLAR	ISTEC	52025
	FLOW METER	ISTEC	1830
Total System Accuracy (Percent)	1.5%		

Attach component specification sheets (Accuracy, Operating Ranges) as Attachment 3-1. ☑

Attach a simple schematic identifying the location of each sensor that is part of the metering system as Attachment 3-2. X

Check the applicable standard for meter accuracy prescribed in Puc 2506.04 among the six choices below (compliance with Puc 2506.04 shall be certified by a professional engineer licensed by the state of New Hampshire and in good standing):

If the facility is a large thermal source using a liquid or air based system, check the method that applies:

A. Installation and use of heat meters capable of meeting the accuracy provisions of European Standard EN 1434 published by CEN, the European Committee for Standardization. The heat meter shall have the highest Class flow meter that will cover the design flow range at the point of measurement and a temperature sensor pair of Class 5K or lower. [✓]

B. Installation and use of meters that do not comply with European Standard EN 1434, provided that the manufacturers' guaranteed accuracy of the meters is ±5.0% or better, [ ]

C. Use of an alternative metering method approved pursuant to Puc 2506.06. [ ]

If the facility is a large thermal source using a steam-based system, check the method that applies:

D. Installation and use of meters with accuracy of ±3.0% or better. [ ]

E. Installation and use of meters with system accuracy that do not meet D but are ±5% or better. [ ]

F. Use of an alternative metering method approved pursuant to Puc 2506.06. [ ]

Please summarize the manufacturer's recommended methods and frequency for metering system calibration and provide reference for source document (e.g. owners/operators manual):

[ ]

REC Calculation Discount factor for meter accuracy (Enter 0 if no discount is required): 0 %

If the meters used to measure useful thermal energy comply with the accuracy of the European Standard EN 1434 for liquid systems or use of meters with accuracy of ±3.0% or better for steam systems enter zero, for all other systems enter the sum total of the manufacturer's guaranteed accuracy of the meters used or the accuracy of the alternative method approved pursuant to Puc 2506.06.

REC Calculation Discount factor for operating energy and thermal energy losses: 2 %

Check the method used for determining the operating energy and thermal loss factor among the choices below:

Default Factor [X]

- For sources using solar thermal technology, the discount factor shall be 3.0% of the useful thermal energy produced;
- For sources using geothermal technology, the discount factor shall be 3.6% of the useful thermal energy produced;
- For sources using thermal biomass renewable energy technology, the discount factor shall be

2.0% of the useful thermal energy produced.

Actual Metering ☐

- Include a simple schematic identifying the operating energy and thermal energy losses and placement of the meters.

Interim Alternative Metering Method

Until such time as the Puc 2500 rule is finalized applicants may utilize an alternative method as described in the draft rule 2505.02(e)(2):

In lieu of the information required by Puc 2505.02 (d) (11) through (13), a thermal source may submit a detailed explanation of the methodology used to measure and calculate thermal energy and an attestation by a professional engineer that is licensed in New Hampshire and in good standing that the methodology for measuring useful thermal energy and calculating certificates is sound.

Part 4. Affidavits

Owners Affidavit

The following affidavit must be completed by the owner attesting to the accuracy of the contents of the application pursuant to PUC 2505.02 (b) (14).

AFFIDAVIT

I, Patricia M. Temperino have reviewed the contents of this application and attest that it is accurate and is signed under the pains and penalties of perjury.

Applicant's Signature Patricia M Temperino Date 4.7.2016

Applicant's Printed Name Patricia M. Temperino

Subscribed and sworn before me this 7th Day of April (month) in the year 2016

County of Belknap State of NH

MARIBETH RYAN
MY COMMISSION EXPIRES OCT. 21, 2020
NOTARY PUBLIC NEW HAMPSHIRE

Maribeth L Ryan
Notary Public/Justice of the Peace Seal

My Commission Expires 10/21/2020

NH Professional Engineer Affidavit

AFFIDAVIT

I, Kenneth W Whitney attest that this facility meets the requirements of the thermal REC eligibility requirements of Puc 2500, including the thermal metering and measurement methodologies and standards and REC calculation methodologies.

Professional Engineer's Signature [signature] Date 3/30/16

Professional Engineer's Printed Name Kenneth W Whitney

NH Professional Engineer License Number 10863

PE Stamp

Owner's Affidavit with Regard to Metering Equipment:

Inter-Lakes School District commits to following the requirements of PUC 2506, and to maintaining the installed metering equipment per the manufacturer's recommendations.

Signed Patricia M Temperino Date 4.7.16

The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

March 30, 2016

Mr. Charles R. Niebling
Innovative Natural Resource Solutions LLC
37 Old Pound Road
Antrim, NH 03440

Re: Recommended Certification as a Class I Thermal Renewable Energy Source
Inter-Lakes School District
Meredith, NH

Dear Mr. Niebling:

In response to your request on behalf of Inter-Lakes School District (I-LSD), SAU2 for certification of two biomass (wood pellet) boilers located at the two public school facilities described below as a Class I thermal renewable energy source, the New Hampshire Department of Environmental Services (DES) recommends that the Public Utilities Commission (PUC) grant approval to I-LSD as a Class I thermal renewable energy source eligible to generate renewable energy certificates. A summary of the facility description, DES's review of best management practices (BMP) requirements, and a recommendation for approval are presented below.

Facility Description

Facility Name: I-LSD
Locations: I-L Elementary School (one), Meredith, NH and
I-L High School (one), Meredith, NH
Primary Fuel: wood pellets
Net Maximum Output: 1,700,000 BTU/hr per boiler

Emissions

By definition, *"Thermal biomass renewable energy technologies"*, requires units rated less than 3 MMBtu/hr gross heat input to meet best management practices (BMP) as established by DES for control of particulate matter (PM) and nitrogen oxides (NOx) emissions. DES herein establishes BMP as certifying that boiler tune-ups will be conducted annually in accordance with the report titled *Emission Controls for Small Wood-Fired Boilers* (Prepared for United States Forest Service, Western Forestry Leadership Coalition).

Conclusion and Recommendation for Approval

DES believes that I-LSD currently meets, and annually will meet, the requirements to be certified as a Class I - New Biomass thermal renewable energy source. DES recommends that the PUC certify I-LSD as a Class I thermal renewable energy source eligible to generate thermal renewable energy certificates, on the condition that I-LSD annually certifies that BMP continue to be met.

Please submit a copy of this letter with I-LSD's completed application for renewable energy source eligibility to the PUC. If you have any questions, please contact me at joseph.fontaine@des.nh.gov or (603) 271-6794.

Sincerely

Joseph T. Fontaine
Program Manager
Air Resources Division

Colin C. Hewett, PE

Hewett & Whitney
ENGINEERS & DESIGNERS
Electrical & Mechanical Systems

Kenneth W. Whitney, PE

March 30, 2016

To Whom It May Concern:

Re: Interlakes High School, Meredith, NH, BTU Meter:

The purpose of this letter is to confirm that the installation of the BTU meter associated with the biomass boiler at the Interlakes High School, in Meredith, NH complies with all requirements necessary to obtain Renewable Energy Credits.

Documents Attached:

1. Part 1: Title Page
2. Part 2: General Application Page
3. Part 3. Metering and Measurement of Thermal Energy and REC Calculations.
4. Part 4. Affidavits.
5. BTU Meter Test Certificate.
6. Declaration of Conformity that the BTU meter complies with European Standard 1434.
7. Specification for the BTU meter. Istec Scylar Model 5202s and flow meter model 1830.
8. Sketch of the installation.

Description of System:

The Istec Scylar Model 5202s and flow meter model 1830, BTU meter, has been installed in the injection loop to the biomass boiler. A temperature sensor has been provided on the supply and return piping of this loop. The pump associated with this boiler will function in a constant volume manner with the supply temperature varying from 140°F to 200°F based on outside air temperature. The flow is 174 GPM as measured by the balancing contractor.

Description of Maintenance Procedures:

The manufacturer has indicated that there are no specific periodic maintenance procedures or calibration procedures that need to take place on the unit other than to ensure there is no scale build-up on the flow meter over time.

Calculation Methodology:

The BTU meter measures energy use by multiplying flow volume and temperature difference as governed by the following formula whereby C is a constant for water density that is adjusted based on actual water density. C will generally range between approximately 482 and 493 based on water density tables at temperatures between 130°F and 200°F.

BTU/Hr = C x ΔT x GPM

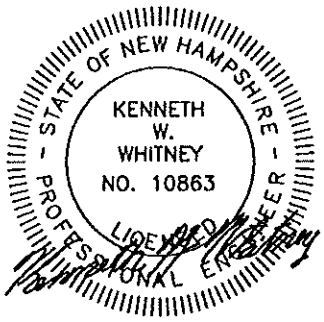
Statement of Compliance:
To the best of my knowledge the thermal energy measuring system in the school meets the metering requirements of PUC 2506 and that the meters were installed according to the manufacturer's recommendations and the renewable energy source meets the requirements of Part 3 of the REC application.

Signed

Date: 3/30/16

Sincerely,

Kenneth W. Whitney, P.E. LEED AP
Principal



DIEHL
Metering

106812

Prüfschein
Test Certificate

Gegenstand *Object*	**Durchflusssensor**
Hersteller *Manufacturer*	**Diehl Metering**
Produktname *Product name*	WP-XKA
Typ *Type*	Qn 32 m³/h | DN 80 mm | 248 °F
	45700018 457 3 38928
Fabrikat/Serien-Nr. *Serial number*	Siehe Seite 3 ff *See Page 3 ff*
	1/5
Auftraggeber *Customer*	40355
Auftragsnummer *Order No.*	**100330678 (1371988)**
Anzahl Seiten des Prüfscheines *Number of pages of the certificate*	**3**
Datum der Prüfung *Date of calibration*	11.05.2015

Datum
Date

24.03.2016

Diehl Metering GmbH
Industriestrasse 13 / 91522 Ansbach / GERMANY
Telefon: +49 (0)981 / 1806-0 / Fax.: +49 (0)981 / 1806-405
http://www.diehl.com/metering

Kalibriergegenstand
Calibration object

Das Volumenmessteil ist ein Messgerät zur Bestimmung des Volumens für Wärmemessgeräte.
The volume measuring component is a measuring device for determing volume for heat meters.

Kalibrierverfahren
Calibration method

Die Kalibrierung erfolgte durch ein gravimetrisches Prüfverfahren (Volumenvergleichsverfahren mit Vergleichsnormal Waage).
Calibration is performed using a gravimetric method (volume comparison method with standard balance).

Messbedingungen
Test conditions

Prüfmedium: Wasser
Test medium: Water

Temperatur: 49,00 °F
Temperature

Messergebnisse
Test results

Siehe Seite 3 ff
See Page 3 ff

Die Kalibrierung umfasst die Messgröße Volumen
The calibration covers the measurement quantity of volume

Messunsicherheit
Measurement uncertainty

Angegeben ist die erweiterte Messunsicherheit, die sich aus der Standardmessunsicherheit durch Multiplikation mit dem Erweiterungsfaktor k = 2 ergibt. Sie wurde gemäß DKD-3 ermittelt. Der Wert der Messgröße liegt in der Wahrscheinlichkeit von 95% im zugeordneten Werteintervall.
The value given is the extended measurement uncertainty, which results from the standard measurement uncertainty multiplied by the extension factor k = 2. It was determined as per DKD-3. The value of the measurement quantity lies within the assigned value range with a probability of 95 %.

Verwendete Normale und Messgeräte
Standards and measuring devices used

Die bei den Messungen verwendeten Normale und Messgeräte sind an die nationalen Normale der Bundesrepublik Deutschland bei der Physikalisch Technischen Bundesanstalt (PTB) angeschlossen.
The standards and measuring devices used for the measurements are connected to the national standards of the Federal Republic of Germany at the Federal Institute of Physical Engineering (PTB).

Prüfergebnisse Volumenprüfung
Test results volume test

Prüfpunkt *Test point*	Prüfdurchfluss *Test flow rate* [l/h]	Prüfvolumen *Test volume* [l]	Messunsicherheit *Measurement uncertainty* [%]
1: qp	30.909,50	501,84	0,6
2: 0,1*qp	4.813,45	203,19	0,6
3: qi	3.224,33	101,98	0,6

Messabweichung Volumenprüfung [%]
Error of measurement [%]

HY Seriennr. *HY serial number*	Kundenseriennr. Customer s.n.	Prüfpunkt *Test point* 1	Prüfpunkt *Test point* 2	Prüfpunkt *Test point* 3
53024800	53024800	1,50	2,90	0,10

Ende des Prüfscheins
End of test certificate

DIEHL
Metering

smart in solutions

EG-Konformitätserklärung

EC Declaration of Conformity

Diehl Metering GmbH
Industriestr. 13
91522 Ansbach
GERMANY

DMDE-CE 145/2

Wir erklären hiermit, dass das Produkt / We hereby declare that the product

Rechenwerk / calculator Type 548	Handelsname / trade name SCYLAR INT 8, classic S3
EG-Baumusterprüfbescheinigung Nr. EC Type-examination Certificate number DE-10-MI004-PTB004	Nummer Benannte Stelle Modul D Notified Body number module D 0102

(Typ entsprechend des Angebotes, der Auftragsbestätigung, der Gerätekennzeichnung; Details in Montage- und/oder Bedienungsanleitung) konform ist mit folgenden Richtlinien des Europäischen Parlaments und des Rates, soweit diese auf das Produkt Anwendung finden:
(Type according to the supply, the order confirmation, the equipment identification, Details in assembly and/or instruction manual) are concurring with the following guidelines of the European Parliament and the Council as far as these apply to the product:

EMV-Richtlinie (2004/108/EG)	EMC Directive (2004/108/EC)
LVD-Richtlinie (2006/95/EG)	LVD Directive (2006/95/EC)
MID-Richtlinie (2004/22/EG)	MID Directive (2004/22/EC)
R&TTE-Richtlinie (1999/5/EG)	RTTE Directive (1999/5/EC)

Das Produkt entspricht ferner den folgenden, angewendeten harmonisierten Normen bzw. normativen Dokumenten, Regeln und Technischen Richtlinien (Stand wie angegeben).
Furthermore the product complies with the following used harmonised standards and normative documents, rules and technical guidelines (level as indicated).

EN 55022:2010	
EN 60529:2000	EN 301 489-3 v1.4.1
EN 61010-1:2010	EN 300 220-2 v2.4.1
EN 1434:2007	OIML R75:2006
EN 301 489-1 v1.9.2	WELMEC 7.2:2009

EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + AC:2011

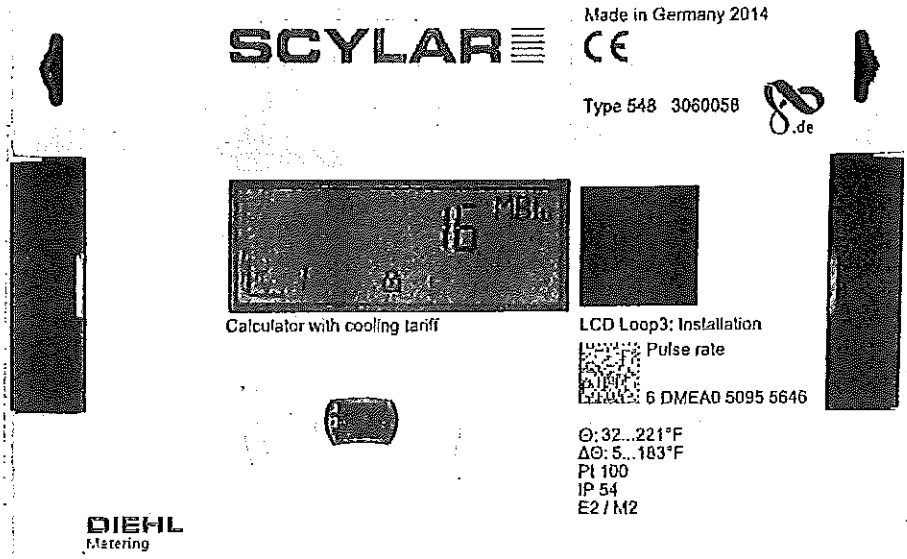
Ansbach, 01.10.2014
Diehl Metering GmbH

.....
ppa. R. Zahn
(Leiter Betrieb)
(Head of Operations)

.....
ppa. Dr. K. Herrmann
(Leiter Entwicklung)
(Head of Research & Development)

ISTEC
Flow Measurement & Control

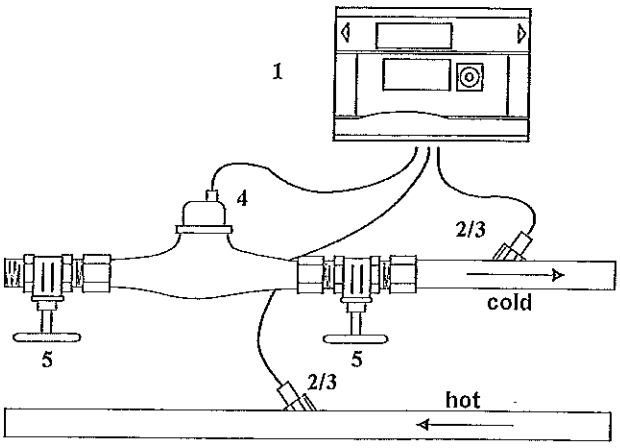
ENERGY METER
ENGINEERING MANUAL
SCYLAR SERIES
MODEL 5202S



FLOW MEASUREMENT & CONTROL SOLUTIONS

ISTEC Corporation
5 Park Lake Road, Unit 6, Sparta, NJ 07871
Tel: +1-973-383-9888
Fax: +1-973-383-9088
www.istec-corp.com
sales@istec-corp.com

SYSTEM OVERVIEW



ISTEC BTU Meters measure energy usage by multiplying flow volume and temperature difference.

BTUs = Flow x ΔT

As the water (or other liquid) passes through the system piping, the flowmeter's turbine rotates and sends impulses to the electronic calculating unit. The sensors of the electronic calculating unit measure the supply and return water temperature. Flow volume and ΔT are used to calculate BTU's which are displayed on a non-resettable LCD.

COMPONENT DESCRIPTION

All ISTEC Energy Meter Systems consists of the following components:

1) Electronic Calculating Unit (Model 5202S) – Solid State circuitry for accurate and reliable operation with automatic compensation for water density. Non-resettable LCD indicates flow, temperatures and BTUs.

2) Temperature Sensors – Platinum RTDs for fast response and high accuracy. Sensors are available in lengths of 1½"/40mm, 3½"/90mm and 5¾"/145mm.

3) Sensor Wells – Wells are available in three sizes: 1½"/40mm, 4"/100mm and 6"/150mm.

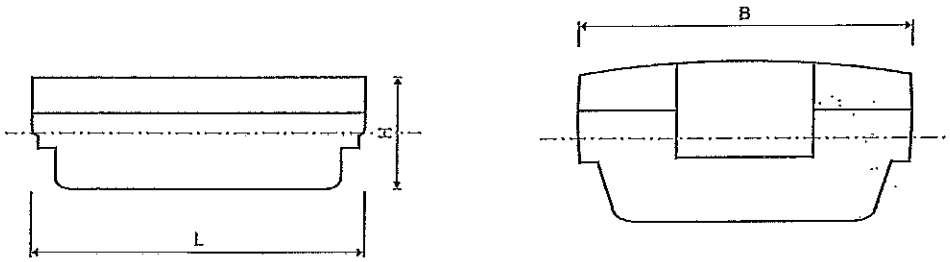
4) Flowmeter – Industrial grade multi-wing turbine type with pulse output. Available in ½" (15mm) through 6" (150mm) sizes. Sizes up to 1½" (40mm) have union connections, 2" (50mm) and larger have ANSI 150-lb flanges.

5) Stop Valves – The flowmeter should always be installed with a stop valve on each side for easier servicing.

TECHNICAL SPECIFICATIONS

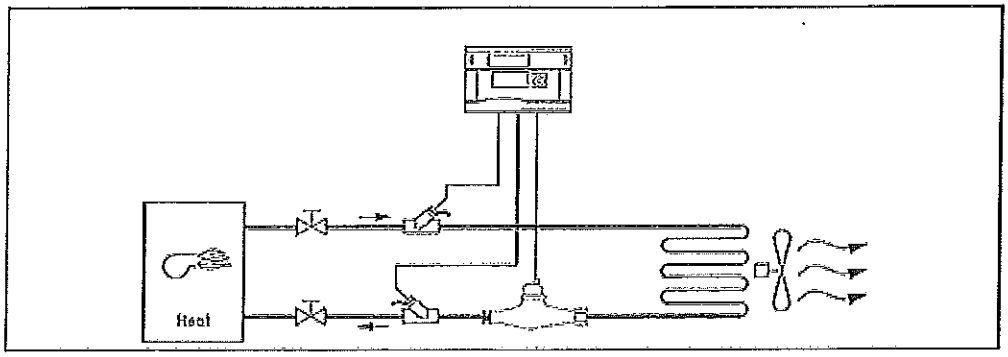
TEMPERATURE RANGE	23°F - 356°F (-5°C - 180°C)
ΔT RANGE	0.225°F – 333°F (0.125K – 185K)
ENVIRONMENTAL PROTECTION	41°F - 302°F (5°C – 150°C)
CLASS	IP54
LCD	8-DIGITS
SENSORS	PLATINUM; PT100 or PT 500
POWER SUPPLY and OUTPUT	11 OR 16-YEAR BATTERY or 24VAC M-BUS, ANALOG (4-20mA) or PROGRAMMABLE PULSE OUTPUTS.

DIMENSIONS

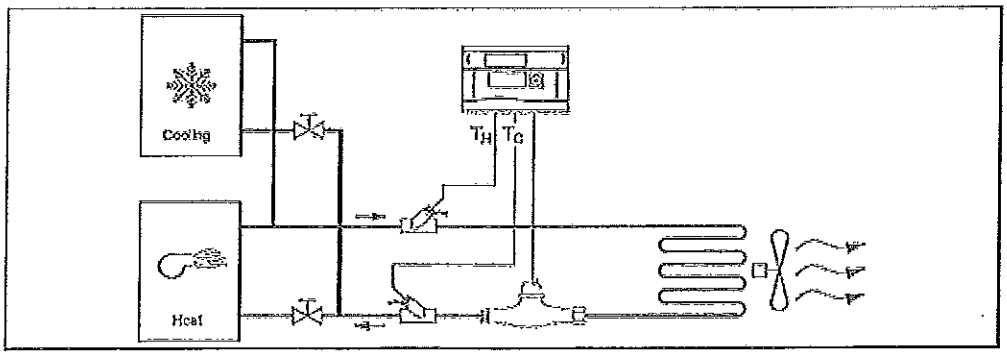


Overall length	L	5.9"
Width of calculator	B	3.9"
Height	H	2.1"

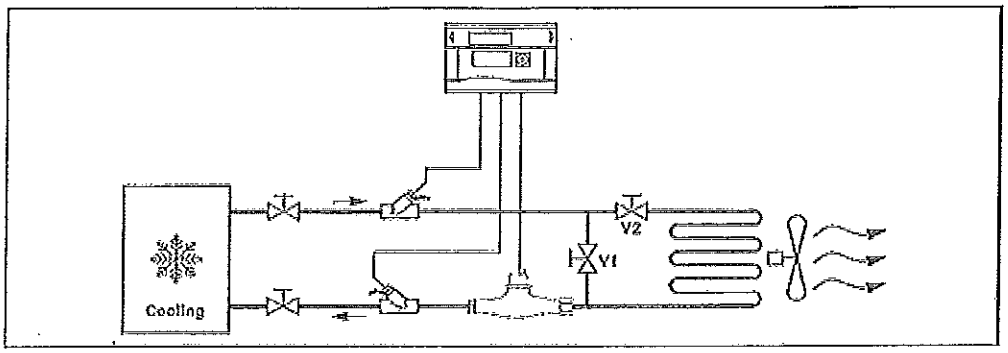
SCYLAT 5202S is able to handle 3 types of applications:



1) District heating/boiler application



2-Pipe Combined heating/cooling application W.S. Heat Pump



3) Condenser or Chilled water application

BTU METERING SYSTEM SPECIFICATION:
SCYLAR Series Model 5202S
AS MANUFACTURED BY ISTEC CORPORATION
5 PARK LAKE ROAD, UNIT 6, SPARTA, NJ 07871 USA

The contractor shall furnish and install as shown on the plans an electronic BTU Metering System. The system shall be designed and programmed exclusively for energy (BTU) metering. It shall be factory assembled, calibrated and tested, incorporating the following features:

ELECTRONIC CALCULATING UNIT

The calculator contains all the necessary circuits for recording the flow rate and temperature as well as for calculating, logging and displaying the data. The calculator can be remotelly mounted from the flow meter. The calculator can be conveniently read from a single line 8-digit display with units and symbols. A push-button provides user-friendly control of the various display loops. All failures and faults are recorded automatically and shown on the LC display. To protect the reading data, all the relevant data are saved in a non-volatile memory (EEPROM). This memory saves the measured values, device parameters and types of error at regular intervals.

POWER SOURCE

The Electronic Calculating Unit shall be powered by an integral 11-year battery. An optional 16-year battery or 24 volt, 60 Hz power adapter shall be available.

SENSORS

Temperature sensors shall be the Platinum RTD PT 100 or PT 500 type to provide high accuracy, stability and long term reliability. They shall be supplied in matched pairs. The sensor probe shall be available in lengths of; 1½"/40mm, 3½"/90mm and 5¾"/145mm to accommodate different pipe sizes. They shall be designed to fit tightly into immersion wells that are inserted into the water flow.

SENSOR WELLS

Sensor Wells shall be 1½"/40mm long x ⅜" NPT for pipe sizes up to 1"/25mm and 4"/100mm long x ½" NPT for pipe sizes 1¼"/32mm to 3"/80mm. For pipe sizes 4"/100mm and above a 6"/150mm long x ½" NPT well shall be available. They shall incorporate a locking screw to secure the sensor.

OUTPUT

The Electronic Calculating Unit shall provide optional open collector, M-Bus or Analog (4-20mA) output modules.

DATA LOGGING

The Electronic Calculating Unit shall provide up to a 24-month history in memory.

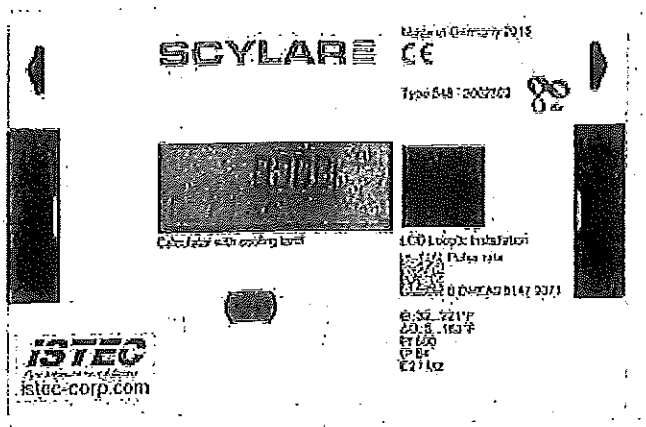
FLOWMETER (see ISTEC 1700 or 1800 Series Flowmeter Engineering Manual for complete data)

A separate Flowmeter shall be utilized so various temperatures, pressures and flow rates can be accommodated. It shall be the multi-wing turbine type, ISTEC Model 1830. It shall have a line size of 3 inch(s) (_____mm). The body shall be constructed of brass/cast iron. The unit shall have a hermetically sealed mechanical counter, which shall be non-resettable. It shall be constructed so that the flow insert assembly and counter can be replaced without removing the meter body. The Flowmeter shall have an accuracy of ±1.5% at 170 gpm (_____ lph). It shall have a continuous flow rating of 1410.9 gpm (_____ m^3ph). The peak flow, which the meter can not be subjected to for more than one hour per day, shall be N/A gpm (_____ m^3ph). The Flowmeter shall provide a "pulse" type output of 1 contact closure for every 1/10/100 gallon(s) of flow (metric counters provide 1 pulse for every 1/10/100 liter(s) of flow).

REMOTE TYPE HEAT/COOL ENERGY METER

ISTEC
Flow Measurement & Control

SCYLAR SERIES – Model 5202S



APPLICATIONS

- Combination Heat/Cool Systems
- Heating Only Systems
- Cooling Only Systems
- Solar Systems
- Geothermal Systems
- Efficiency Measuring/Verification
- Heat Reclaimers

FEATURES

- Automatic Heat/Cool Changeover
- Battery or 24-Volt Powered
- Prog. Pulse & 4-20mA Output
- Liquid Crystal Display
- Data Storage

PRODUCT OVERVIEW

ISTEC's Energy Meter measures the total energy used or transferred in a liquid system. BTUs are calculated by multiplying the system temperature difference by the flow volume.

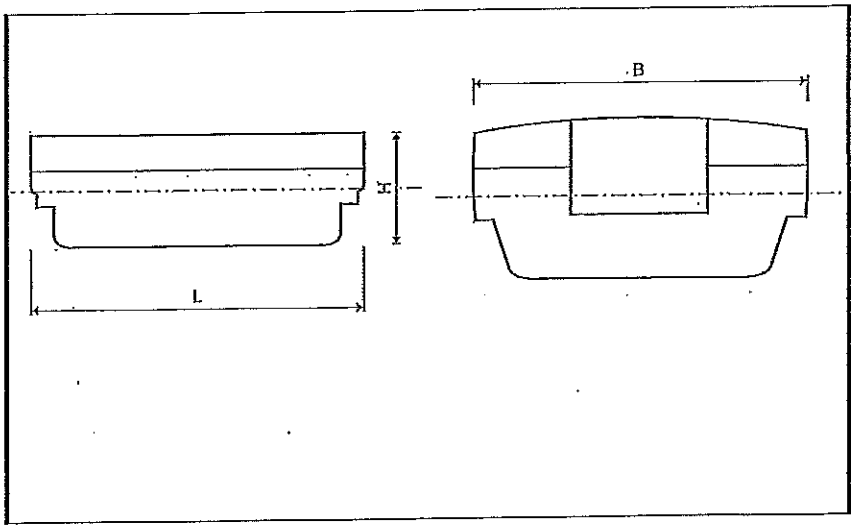
The SCYLAR 5202S Energy Meter is an ideal choice for applications requiring a simple, compact and cost effective unit.

DIMENSIONS

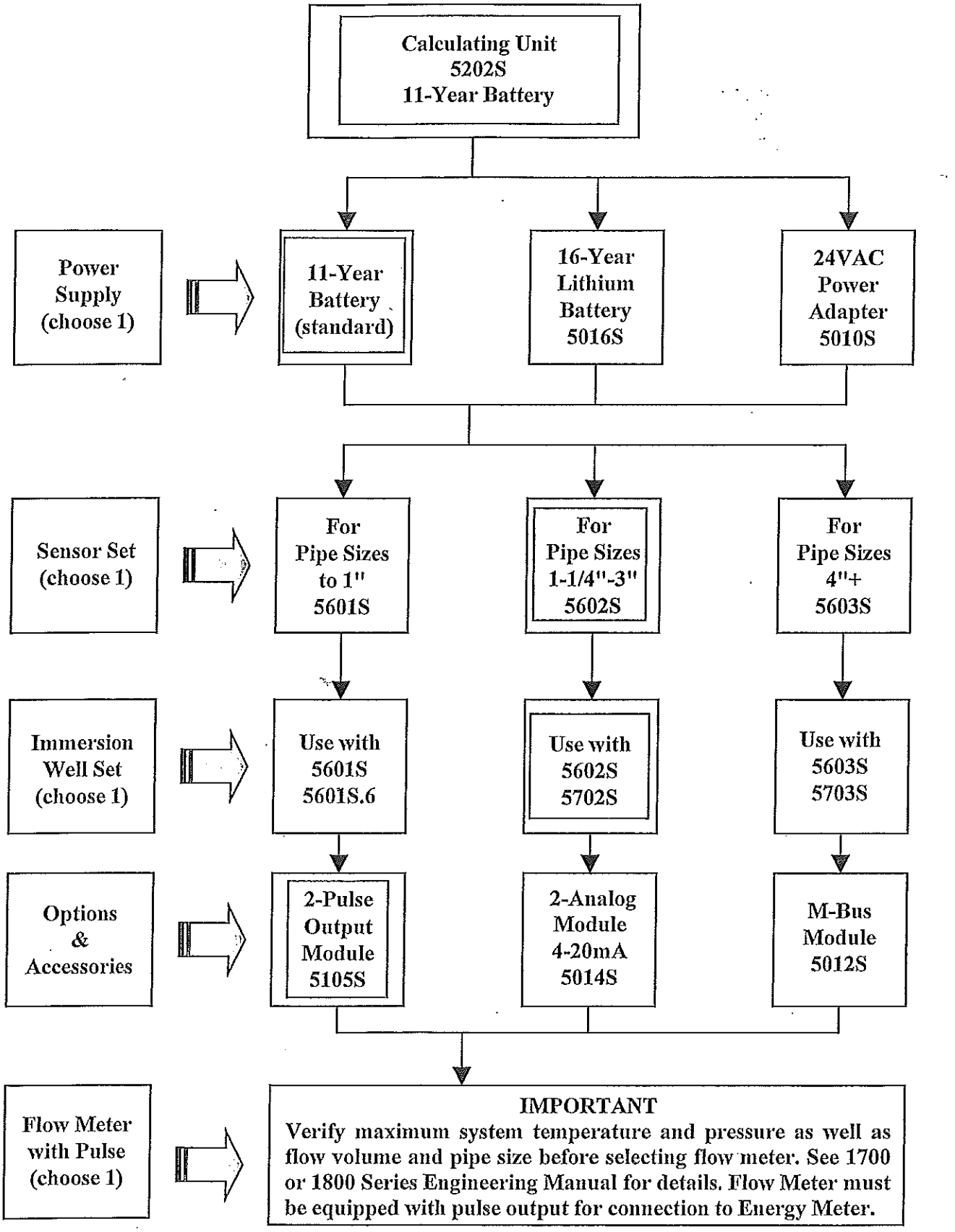
L	5.9" (128mm)
B	2.1" (143mm)
H	3.9" (85mm)

TECHNICAL SPECIFICATIONS

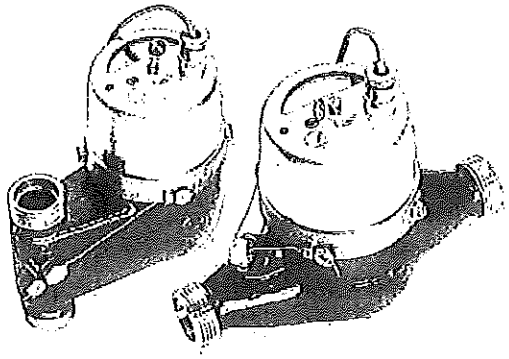
Temperature Range	41°F - 302°F (5°C - 150°C)
ΔT Range	-4°F - 374°F (-20°C - 190°C)
Ambient Conditions	32°F – 131°F (0°C - 55°C)
LCD	8-Digits
Sensors	Platinum RTD
Power Supply	Battery or 24VAC
Output	MBus, Pulse, 4-20ma



HOW TO SELECT A SCYLAR ENERGY METERING SYSTEM



ISTEC's 1800 Series Multi-Jet Water Meter in 3/4" thru 2"

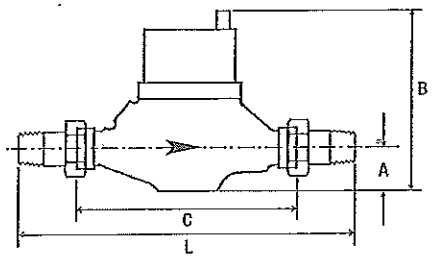


- Multi-Jet Design with only the impeller operating in the flow chamber for reliable performance
- No Straight Pipe required before or after the meter
- Hermetically-sealed Counter is dust and waterproof preventing internal condensation
- Roller Counter can be rotated for easy reading
- Built-in Reed Switch is cast into a waterproof enclosure and can be field replaced (Contact Rating 24V, 0.2A)
- Compact Design for easy installation
- Unique Design allows easy maintenance and repair
- Calibration Test Certification available on request

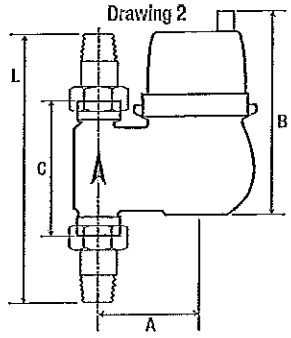
Model Number	1807	1810	1811	1812	1815	1816	1820
Pipe Size	3/4"	1"	1"	1"	1-1/2"	1-1/2"	2"
Min. Flow Rate (gpm)	0.22	0.4	0.4	0.4	0.7	0.7	2.64
Continuous Flow Rate (gpm)	11	26.4	26.4	26.4	44	44	66
Max. Flow Rate (gpm)	22	52.8	52.8	52.8	88	88	132
Max. Operation Temperature (°F)	248	248	248	248	248	248	248
Max. Operation Pressure (psi)	232	232	232	232	232	232	232
Design	Multi-Jet	Multi-Jet	Multi-Jet	Multi-Jet	Multi-Jet	Multi-Jet	Multi-Jet
Mounting Connections	NPT	NPT	NPT	NPT	NPT	NPT	Flanged
Mounting Position	U	H	D	U	H	D	H
Pulse (gal/pulse)	1	1	1	1	1	1	10
Weight (pounds)	5.25	7.5	8.1	8.1	14.2	15.5	27.5

H : Horizontal Installation, D : Vertical Downflow Installation, U : Vertical Upflow Installation

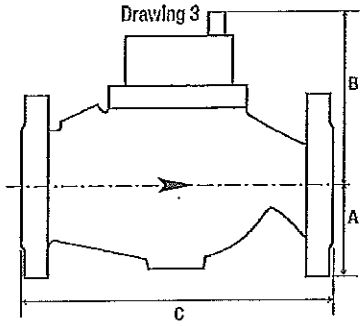
Drawing 1



Drawing 2



Drawing 3



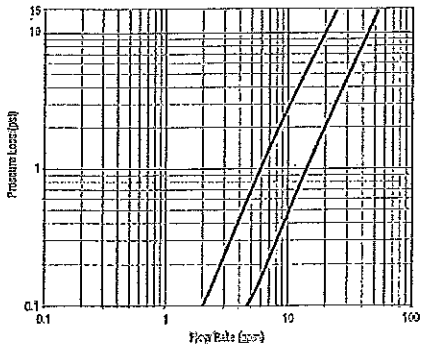
Dimensions	1807	1810	1811	1812	1815	1816	1820
Pipe Size	3/4"	1"	1"	1"	1-1/2"	1-1/2"	2"
A	3-1/4"	2"	3-3/4"	3-3/4"	2-1/4"	4-3/4"	3-1/4"
B	6-1/2"	7"	7-1/4"	7-1/4"	8"	8-1/4"	6-1/4"
C	4-1/4"	10-1/4"	6"	6"	11-7/8"	8"	10-1/2"
L	9-1/4"	15-1/2"	11-1/4"	11-1/4"	17-1/2"	13-3/4"	N/A
Drawing	2	1	2	2	1	2	3

See Next Page for Pressure Loss and Accuracy

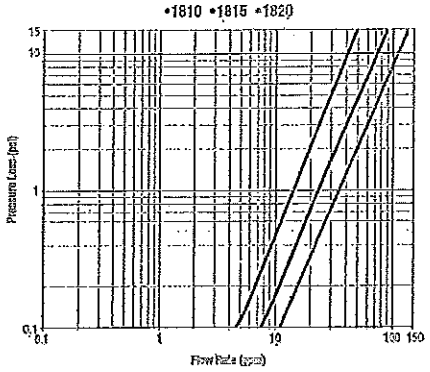
ISTEC's 1800 Series Multi-Jet Water Meter in 3/4" thru 2"

Pressure Loss

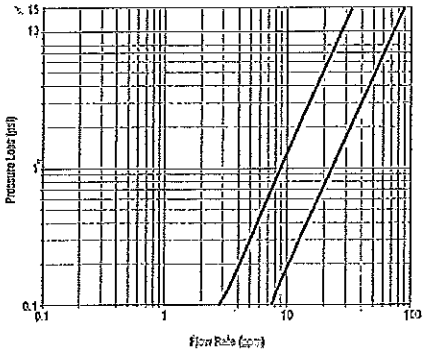
•1807 •1812



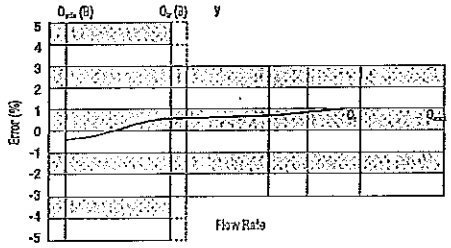
•1810 •1815 •1820



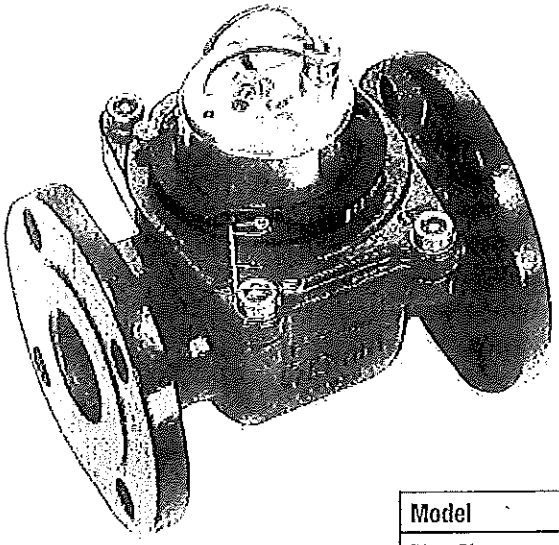
•1811 •1816



Accuracy



ISTEC's 1800 Series Woltmann Design Water Meter in 2" thru 6"

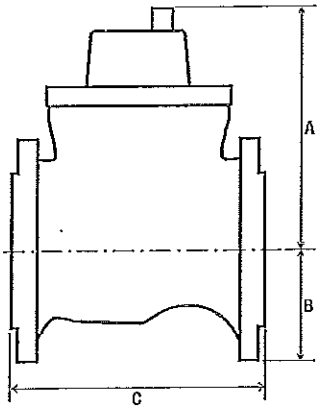


- Woltmann (Flow Chamber) Design with only the impeller operating in the flow chamber for reliable performance
- Very low Head Pressure loss
- Installation in Horizontal or Vertical positions
- Hermetically-sealed Counter is dust and water proof preventing internal condensation
- Roller Counter can be rotated for easy reading
- Built-in Reed Switch is cast into a waterproof enclosure and can be field replaced (Contact Rating 24V, 0.2A)
- Compact Design for easy installation
- Field Replaceable Flow Chamber is factory calibrated

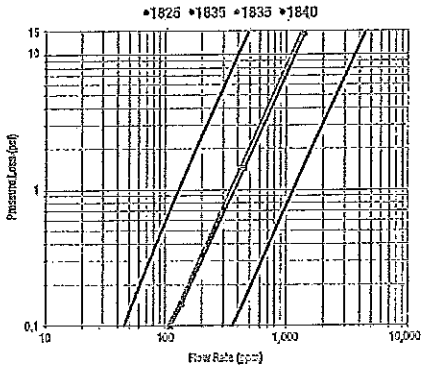
Model	1825	1830	1835	1840
Pipe Size	2"	3"	4"	6"
Min. Flow Rate (gpm)	2.6	14.1	8.8	35
Continuous Flow Rate (gpm)	66	140.9	264	880.6
Max. Flow Rate (gpm)	264	396.3	792.5	1320.9
Max. Operation Temperature (°F)	248	248	248	248
Max. Operation Pressure (PSI)	232	232	232	232
Design	Woltmann	Woltmann	Woltmann	Woltmann
Mounting Connections	Flanged	Flanged	Flanged	Flanged
Mounting Position	Horz or Vert	Horz or Vert	Horz or Vert	Horz or Vert
Pulse (gal/pulse)	10	10	10	100
Weight (pounds)	25	31	48	88

1800 Series Dimensions

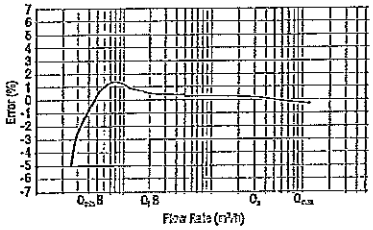
Dimensions	1825	1830	1835	1840
Pipe Size	2"	3"	4"	6"
A	5-1/2"	5-1/2"	8-1/4"	9"
B	3"	3-3/4"	4-3/8"	5-3/4"
C	7-7/8"	8-7/8"	9-7/8"	11-7/8"



Pressure Loss



Accuracy



ISTEC
Flow Measurement & Control

SUBMETERING - HEATING OR COOLING

Submetering is nothing new. We are all familiar with electric meters, water meters, gas meters, etc. The user has to be responsible for the consumption of all energy sources and is charged for the quantity used. The thriftier he is in using these energy sources, the more he can save in energy costs. This basic premise has worked for products and services. We are all aware that money is one of the most influential factors in controlling people's actions. Statistics have shown that tenants who have to pay for heating or cooling on a separate invoice soon become energy-conscious, and save approximately 20-25%. If the heating cost is included in the rental agreement, a room thermostat is never lowered and the temperature is regulated by opening the windows. What a waste of energy! What a waste of money for the person who has to pay the energy bill! This is the main reason half of Europe has to allocate energy consumption by law. Energy usage is measured and tenants are billed for energy costs.

ISTEC BTU Meters are modern, high-accuracy measuring instruments that calculate how much energy each tenant has used so that the cost can be allocated. BTU Meters measure the temperature difference between the heating supply and the return lines; they also measure how much hot water has gone through the piping system. This allows the Meter to calculate the exact energy that has been used. Allocation of energy cost is encouraged because it promotes conservation, which is of major importance worldwide.

ISTEC
Flow Measurement & Control

5 Park Lake Road, Sparta NJ 07871
Tel +1-973-383-9888
Fax +1-973-383-9088
www.istec-corp.com

ALLOCATION METHOD BASED ON ENERGY METER READING AND SQUARE FOOT AREA OF APARTMENT

This sample allocation method is for six tenants and is based on Energy Meter readings and area of the tenant's apartment (base cost). The apartments in this example have three different square foot areas. 50% of the total Energy cost will be allocated based on the square foot area of each apartment and 50% will be allocated on the Energy Meter readings.

1.	Monthly cost of Energy (oil, gas, electricity, etc.)	$480.00
2.	Operating Cost:	
	Electricity, Maintenance, Reading the meter and invoicing tenants	$ 56.00
3.	Total Energy Cost	**$536.00**

Distribution of Energy Cost

50% - Size of Apartment	$268.00
50% - Meter Reading	$268.00

4. **Cost Allocation of Square Foot Area**

Amount to be allocated: $268.00
Total sq. foot area (all tenants): 3350 sq. ft.
Cost per square foot area: $268: 3350 = .08 per sq. ft.

Tenant A.	500 sq. ft. @ 8¢ per sq. ft. =	$ 40.00
Tenant B.	600 sq. ft. @ 8¢ per sq. ft. =	$ 48.00
Tenant C.	550 sq. ft. @ 8¢ per sq. ft. =	$ 44.00
Tenant D.	550 sq. ft. @ 8¢ per sq. ft. =	$ 44.00
Tenant E.	550 sq. ft. @ 8¢ per sq. ft. =	$ 44.00
Tenant F.	600 sq. ft. @ 8¢ per sq. ft. =	$ 48.00
		$268.00

5. **Cost Allocation on Meter Reading**

Amount to be allocated: $268.00
Total Energy Units used (all tenants): 6700 units
Cost per Energy Unit: $ 268 : 6700 = .04 per unit

Tenant A.	1100 Energy Units @ 4¢ per unit =	$ 44.00
Tenant B.	1300 Energy Units @ 4¢ per unit =	$ 52.00
Tenant C.	800 Energy Units @ 4¢ per unit =	$ 32.00
Tenant D.	1000 Energy Units @ 4¢ per unit =	$ 40.00
Tenant E.	1600 Energy Units @ 4¢ per unit =	$ 64.00
Tenant F.	900 Energy Units @ 4¢ per unit =	$ 36.00
	6700 Energy Units	$268.00

6. **Individual Billing to Tenants**

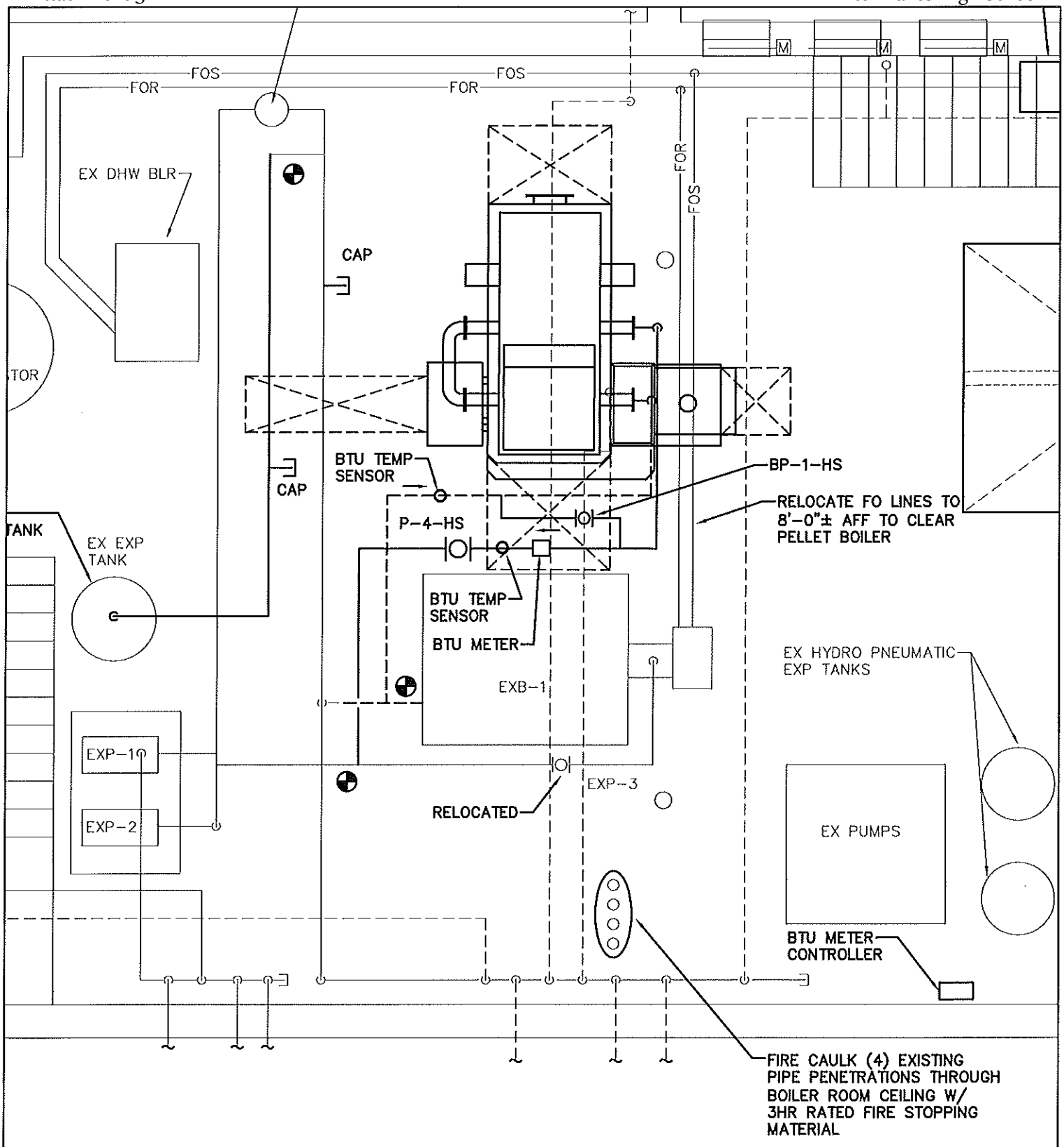
	Sq. Ft. Area (Base Cost)	Energy Units Used		Total
Tenant A.	$40.00	$44.00	=	$ 84.00
Tenant B.	$48.00	$52.00	=	$100.00
Tenant C.	$44.00	$32.00	=	$ 76.00
Tenant D.	$44.00	$40.00	=	$ 84.00
Tenant E.	$44.00	$64.00	=	$108.00
Tenant F.	$48.00	$36.00	=	$ 84.00

Total $536.00

ISTEC
Flow Measurement & Control

5 Park Lake Road, Sparta NJ 07871
Tel: +1-973-383-9888, Fax: +1-973-383-9088

www.istec-corp.com
sales@istec-corp.com



JOB NO. 14046	NAME INTERLAKES HIGH SCHOOL – BIOMASS		FILE:
DRAWING BTU METER LOCATION			
☐ FIELD ORDER	☐ CHANGE ORDER	☒ SKETCH	
DRAWN BY: KWW	CHECKED BY: KWW	DATE: 3/29/16	
SCALE: 1/4"=1'-0"	SHEET: 1	OF: 1	

Hewett & Whitney
ENGINEERS DESIGNERS
ELECTRICAL & MECHANICAL SYSTEMS
161 MAIN STREET WINTHROP, MAINE
Tel 207·377·6969 Fax 207·377·7584