



Thomas Bozek, P.Eng.
Manager, Quality and Engineering

Agenda

- Basics of Thermal Metering
- EnerCare Connections Process Overview
- Central Plant Metering
- Thermal Rate Development

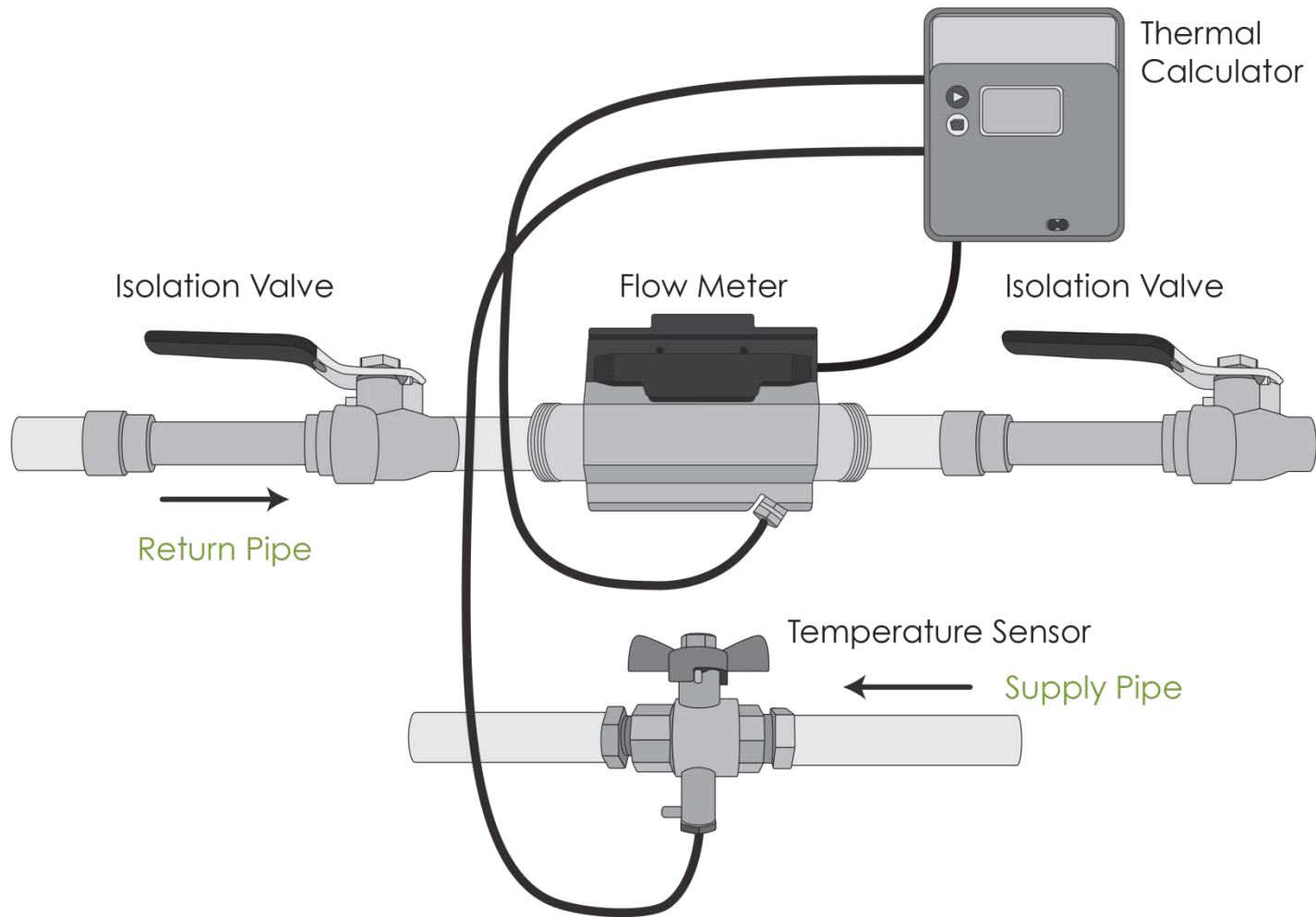
Basics of Thermal Metering

- Thermal, BTU and heat meters measure the amount of heat added or removed from a space
- Theory of Operation
 - Measure flow rate of heat transfer fluid
 - Measure change in temperature between inlet and outlet points

$$\text{Thermal Energy} = \text{Flow Rate} \times \text{Change in Temperature}$$

*Flow rate is the volume of fluid which passes per unit time

Thermal Meter Components



EnerCare Connections Process Overview

1. Design and Engineering Requirements
2. Meter Installation Options
3. Final Approval
4. Project Execution

Step 1 – Design and Engineering Requirements

- Documentation requirements
 - Mechanical and electrical drawings
 - Heat pump / fan coil unit specifications
- Heat pump / fan coil unit specifications
 - Pipe sizes
 - Nominal and maximum flow rates
 - Minimum and maximum temperatures in the heating and cooling loops
- Glycol manufacturer data and product properties
 - Densities (kg/m^3) table and specific heat (kJ/kg K) table



Step 2 – Meter Installation Options

Factory Installation

- Meters installed by the heat pump / fan coil manufacturer in the factory
- Pressure test in the factory with meter installed

On Site Installation

- Spacer installed in place of the thermal meter
- Thermal meter installed on site by Mechanical Contractor

External Installation

- Installation is external to heat pump / fan coil unit
- Occurs on site by Mechanical Contractor

Provision of 24V AC power terminal, power requirement < 1 Watt



Step 3 – Final Approval

- EnerCare will specify meters for fan coil / heat pump and central plant and send to the engineering consulting firm for approval



Step 4 – Project Execution

- Procurement of equipment to Mechanical Contractor or fan coil / heat pump manufacturer
- Electrical Contractor responsible for communication wiring from each suite to a common area communication closet
- ECI will install calculators (unless factory installed), all terminations, communications / calculator wiring



Step 4 – Project Execution

- Commissioning occurs using a staged approach
 - Multiple suite entries required for commissioning
- Requirements
 - Power to suite
 - Thermostat installed
 - Heating / cooling loop riser commissioned by Mechanical Contractor



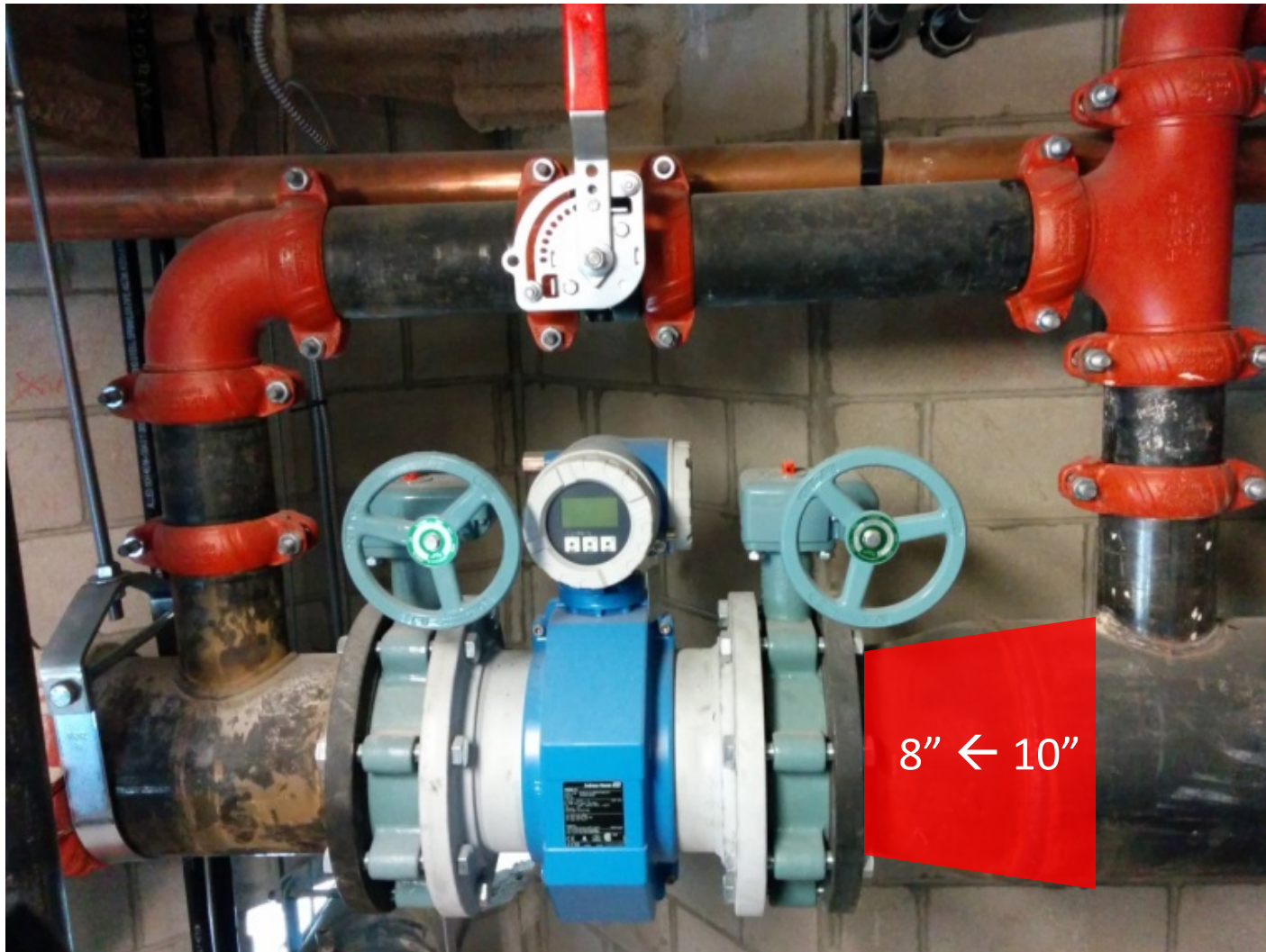
Central Plant Metering

- Meter the input energy
 - Water, Gas, Electricity
 - Electricity and Gas meters are Measurement Canada approved and **sealed** for revenue billing
- Meter the output energy
 - Boiler and chiller thermal meters
- EnerCare will specify gas meters based on pipe size, pressure and capacity
- ECI will specify thermal meters based on flow rates, min/max temperatures in the system

Central Plant Metering



Central Plant Metering



Thermal Rate Development

- Central plant meters ideally operational one month prior to first occupancy
- Develop rates using data from the central plant meters and commodity charges

$$\text{Thermal Rate} = \frac{\text{Total Fuel Used} \times \text{Commodity Charge}}{\text{Total Heating or Cooling Energy Produced}}$$

Thermal Rate With Glycol

$$\text{Thermal Rate}_G = \text{Thermal Rate} \times k$$

- K = correction factor
- Correction factor dependencies
 - Fluid temperature
 - Percent of glycol in the mix
 - Glycol manufacturer
- Correction factor is dynamic
 - Change occurs every time thermal rates are calculated

Dynamic Rate Development

- Heating rate and cooling rate calculated monthly
- As occupancy increases building dynamics adjust
- Diligence for all stakeholders involved in the process



Thank You