PaceSetter® Model E

Computerized Chemical Feed System

The PaceSetter® Model E Computerized Chemical Feed System is a self-contained monitoring and control device that is specifically designed for cooling system applications. Its modular construction and optional prepackaged configuration (Figure 1) simplifies installation. This product is easy to operate, and provides a wide range of control features. All models include:

- PaceSetter Model E Controller
- Probe Header

Options for pH control, modem communication, and a compact mounting panel assembly can be added to the standard product. A full option package includes:

- The controller physically configured with a modem and factory installed conductivity and pH control capabilities
- The probe header
- The complete mounting panel assembly

This package is fully assembled and factory tested to reduce installation and startup expenses.

Other BetzDearborn or Customer-supplied equipment may include:

- Up to four Chemical Feed Pumps
- Blowdown Valve
- Blowdown Meter
- Makeup Meter
- Makeup Conductivity Sensor
- Temperature Sensor(s)
- Alarm Horn

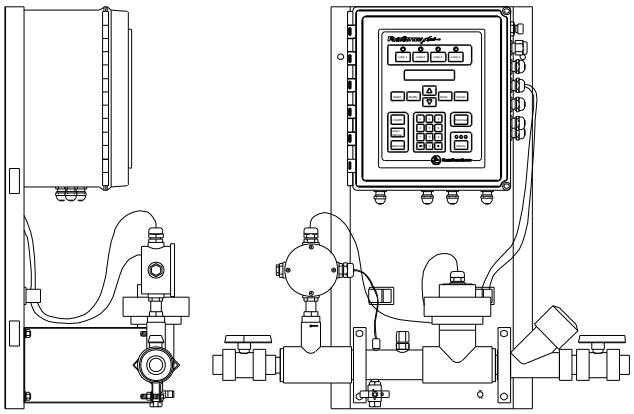

Figure 1: PaceSetter Model E with Prepackaged Panel Mount Option.

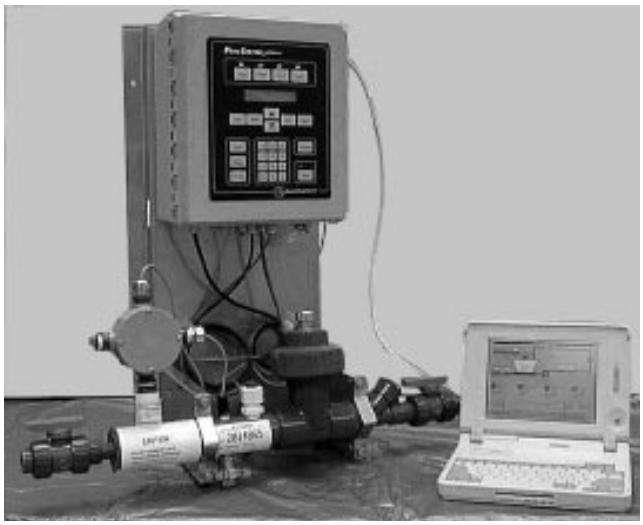

Figure 2: PaceSetter® Model E Computerized Chemical Feed System.

Features

- Versatile system design with multiple treatment programs in a single control package.
- Cost effective in reducing chemical overfeed or underfeed.
- Easy-to-install and service through modular construction
- Bleed-then-feed strategies
- Cycles-based blowdown control
- Interval and scheduled feed strategies for Biocide including Biocide with prebleed and lockout
- Access to site data with Model E Notebook software via phone line*, RS-232 or RS-485 network
- Monitoring of Signet (paddlewheel), Carlon / Seametrics (contacting head) or 4–20 mA makeup and/or blowdown flow meters (2 meters max.)
- Historical data logging
- Pro Care®, Call Home®, and Heartbeat™ service*
- Built in 24 VDC power supply, available to support up to four transmitters (4–20 mA)
- Feed Failure Alarm for up to four feed pumps**

** When equipped with optional modem.*

*** Pumps must be equipped with LMI Digi-Pulse Flow Monitor Device.*

Equipment Facts

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System Components

PaceSetter® Model E Controller

The controller supports four feed control loops (with on/off chemical feed pumps) and one blowdown valve. Each feed loop performs one of the following functions:

- Monitor/control/alarm based on conductivity and blowdown
- Monitor/control/alarm based on pH (optional)
- Determines the feedrate of chemical, based on conductivity, pH (optional), blowdown, or makeup flow
- Schedules chemical feed on certain days at specific times, or at periodic intervals.

Loops are interdependent and can lock other loops out while they are providing blowdown and chemical feed. The loops can also generate alarms based on their configured parameters exceeding predetermined limits.

Each loop controlling chemical feed can be configured to alarm on feed failure. This feature requires the use of an optional, LMI Digi-Pulse Flow Monitor Device.

Probe Header

The probe header assembly provides process information to the controller by sampling the cooling water flow. On-line readings are continuously monitored and include:

- Conductivity measurement
- pH measurement (optional)
- Flow switch feed lockout
- pH temperature compensation (optional)

The probe header is installed with the controller for cooling applications. It is mounted horizontally in a sample line off of the cooling water supply line. The probe header consists of the following components:

- PVC Header
- Torroidal, electrodeless conductivity probe
- Flat bottom pH probe (optional)
- Flow switch
- pH solution ground insert
- pH temperature compensation probe (optional)
- Check valve for backflow prevention
- Isolation valves (inlet/outlet)
- Sample valve

Product Configuration

The PaceSetter Model E computerized chemical feed system is available in two configurations:

- The Receptacle Model
- The NEMA 4/IP65 Model

The Receptacle model is designed to power four chemical feed pumps equipped with AC power cords that are plugged into receptacles on the controller. As a result, the operating environment is limited to protected areas by electrical safety regulations. This unit is not approved by any agency. For unrestricted environmental operation, the NEMA 4/IP65 Model, which conforms to International Standards, is available with a CSA/NRTL Mark. Hardwiring of all pumps, blowdown valve, and alarm is required with the NEMA 4/IP65 model.

Both models provide AC power and control for up to four chemical feed pumps, a blowdown valve, and an alarm device/signal.

Control Schemes

The Pacesetter Model E controls cooling tower blowdown as well as chemical feed of up to four chemicals. It does this through a set of user selected built-in control and chemical feed configurations as summarized in Table 1.

Cycles-based blowdown control can be configured through Feed on Blowdown, Feed on Makeup, or enhanced Bleed-then-Feed control types. To use cycles control, the Model E needs a makeup conductivity input, blowdown, or makeup flow meter input and system volume (manually entered). The cycles control algorithm is designed to reach the configured cycles (target) setpoint as makeup water enters the cooling system. The more makeup that enters the cooling system, the faster the cycles setpoint will be reached. In situations where there is extraneous non-metered blowdown or it is desired to have a quicker ramp-up to the cycles setpoint, the user can enter a blowdown offset value of up to 100 gpm (22.7 m^3/h).

All configurations are entered directly from the Model E keypad.

Table 1: Configuration and description.

Configuration Name	Description
Bleed-Then-Feed	Opens blowdown valve based on conductivity setpoint then feeds chemical for same time period. Bleed only is also available.
pH control	Feeds acid or caustic based on a pH setpoint and hysteresis.
Biocide Schedule	Feed biocide based on a 14 day schedule. Maximum of 28 schedules.
Biocide Interval	Feed biocide at repeating intervals.
Feed on makeup flow, bleed on conductivity	Feed chemical based on Make-up flow. Flow meter can be Signet paddle wheel, contacting head type or 4–20 mA flow transmitter. Actual sample residual can be entered to change chemical feed requirements.
Feed on blowdown flow, bleed on conductivity	Same as Feed on make-up except blowdown is used.
Closed system chemical	Feed chemical when a low conductivity setpoint is reached to elevate conductivity to correct level.
Biocide with pre-bleed	Feed chemical based on a 14 day schedule with a pre-bleed cycle to reduce system conductivity before chemical feed.
Enhanced bleed then feed	Same as bleed then feed but target residual is entered for chemical feed calculations. Actual sample residual can be entered to change chemical feed requirements.

Alarm Response

The PaceSetter Model E controller has a unique, Call Home capability which enables it to notify BetzDearborn with a predetermined critical alarm. A Model E calls out via modem, to the Pro Care Network Communications Center. The center receives the alarm and notifies the proper BetzDearborn personnel. The Pro Care Network is functional 24 hours a day, 7 days a week to respond to customer alarms. In addition to callout function, each PaceSetter Model E calls into the Pro Care Center once per day, using our unique Heartbeat™ monitoring service, to verify ongoing surveillance and communications.

Choosing a System

Each controller model includes a Probe Header Assembly for continuous on-line sampling of the process flow. Optional pH control and modem communication features provide cost flexibility for customers. Choose a part number from the system part number matrix to order your system factory configured with the options you require. Options can also be ordered in kit form for field upgrade.

Option Kits Available for Field Installation

2015365	pH Monitor and Control Kit (Includes pH transmitter and sensor)
418957	pH Temperature Compensation Kit
2015259	Panel Mounting Kit (Includes S.S. Panel for controller and probe header mounting)
2015176	Modem Kit (U.S.). (Includes Modem and mounting hardware)
2015220	Modem Kit (Canada). (Includes Modem and mounting hardware)

System Part Number Matrix

Part numbers listed in Table 2 are for complete systems with factory installed options indicated.

Table 2: Part Numbers with factory-installed options.

Part Number	Standard Conductivity	pH	Modem	Prepackaged Panel Mount
NEMA 4/IP65 Version - 115/230VAC				
2014842	X			X
2015519	X	X		X
2015521	X		X	X
2015520	X	X	X	X
2015512	X			
2015516	X	X		
2015518	X		X	
2015517	X	X	X	
Receptacle Version - 115 VAC				
2017610	X			X
2017611	X	X		X
2017613	X		X	X
2017612	X	X	X	X
2015511	X			
2015513	X	X		
2015515	X		X	
2015514	X	X	X	
Canada Only NEMA 4/IP65 Version - 115/230VAC				
2015536	X		X	X
2015523	X	X	X	X

Note: Modems are country specific. Please select a part number from the Canada-Only matrix when ordering systems for Canada that require a modem.

PaceSetter Model E Notebook Software

The BetzDearborn PaceSetter Model E Notebook Software for Windows™ is a versatile, easy-to-use application package. Use it for reports and graphs of process data and remote uploading and viewing of information from the BetzDearborn PaceSetter Model E controller. The software executes on an IBM-compatible personal computer loaded with Microsoft Windows™ 3.11 using DOS 5.0 or 6.2.

Features

- Network communication with multiple PaceSetter Model E controllers from a central Model E Workstation computer
- Uploads process data from the connected Model E controller
- Graphing and Reporting on selected Process Variables
- Direct connection over an RS-232 cable or an RS-485 Network
- Remote connection over a modem and telephone line
- Can export up to one year of process data to Excel™, Action Alert®, InfoCalc® or tab-delimited formats for maximum portability
- Password protection
- Simple Windows-based operation
- Provides Real-Time Process “Mimic” Graphics
- Accumulates chemical feed and makeup and blowdown volumes
- Calculates evaporation credits when the Model E is equipped with makeup and blowdown flowmeters

Historical Data Logs

The controller will store up to 60 days of historical information in 20-minute increments. The historian points are preselected: up to 4 chemical feed accumulations, pH and conductivity values, alarm and alarm status, blowdown and makeup flow accumulation. The historian can be uploaded using the Notebook Software, locally with a laptop computer, or from a remote computer via an RS 485 network connection or with an optional modem.

Process *“Mimic”* Graphics

The Notebook Software “Real-Time” Overview Screen provides a live cooling tower mimic. (Figure 3) Depending on your specific configuration the “Mimic” Screen allows you to view all of the critical variables associated with the cooling tower on a “Real-Time” basis. The “Mimic” Screen graphically displays, Process Variables, Pump Status, and Blowdown Valve Status. Readings from external devices such as Makeup and Blowdown Flow Meters, a Makeup Conductivity Transmitter, Return Temperature, Sump Temperature, and an Auxiliary Transmitter can also be displayed.

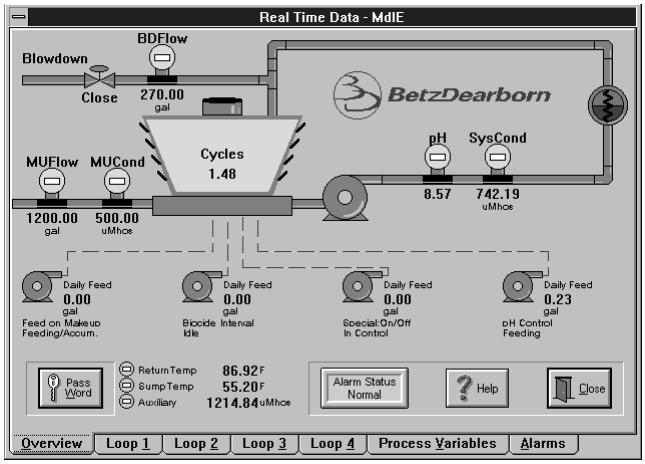

Figure 3: Notebook Software real-time "Mimic Graphics".

In addition to the "Mimic" screen, critical parameters for configured control loops as well as Alarm status and Process Variables can also be accessed simply by selecting the desired "tab" shown at the bottom of the "Mimic" screen. A real-time connection to the PaceSetter Model E will also allow you to remotely change control limits and target residual for individual loops and initiate manual chemical feed.

RS 485 Network Communications

The Networking capability allows you to use one centralized desktop computer to communicate, using Notebook Software, with up to 31 Model E Controllers. Networking your Model E Controllers is made easy by ordering the Networking Kit that best fits your needs.

The Model E Network Workstation, Part Number 2012750, comes with everything you need to network up to 31 Model E controllers. Included is an IBM-compatible Pentium Computer, preloaded with Model E Notebook Software for Windows, Carbon Copy Remote Access Software, a Modem, an RS-485 Network Card, 10 feet of Belden 8102 cable, pre-wired with a 25-pin connector and all associated hardware that you need to complete your network.

There is also a **Model E Network Kit,** Part Number 2012753, that can be ordered if there is already a computer available on site and only the extra network hardware and software are needed.

Note: Due to limitations in the Windows Operating Software, the Model E Notebook Software and the Smartscan Plus® Software can not run on the same computer.

Network Communications Kit Part Numbers:

2012750 Model E Network Workstation Includes: IBM-compatible Pentium computer, SVGA monitor, Modem, Software, and Hardware required for network hook up. (10 feet of Belden 8102 cable is supplied. For additional cable, see part numbers listed below).

2012753 Model E Network Kit Includes: Model E Notebook Software, an RS-485 Network Card and hardware. Use if computer is available on site (10 feet of Belden 8102 cable is supplied. For additional cable, see part numbers listed below).

2013954 Spare RS-485 Card Manual

1413883 Belden cable #8102, 24 AWG 2-twisted pair w/shield. (100-foot spool)

1413884 Belden cable #8102, 24 AWG 2-twisted pair w/shield. (500-foot spool)

1413867 Belden cable #8102, 24 AWG 2-twisted pair w/shield. (1000-foot spool)

Product Specifications

Model E products are designed for indoor or outdoor use; however, outdoor operation with the Receptacle Model requires protection from direct exposure to rain, snow and ice. For unrestricted outdoor use or washdown environments, the NEMA4/IP65 Model is required.

Environmental Characteristics

- ambient temperature +2 to 50°C (34 to 122°F); operation below 2°C requires temperature protection for liquid-filled equipment
- relative humidity – 5 to 95% maximum, non-condensing
- altitude – 2000 meters maximum

Physical Characteristics

- Receptacle or NEMA 4/IP65 Model Controllers – 12 $^1/_2$ in. wide x 14 in. high x 8 $^1/_2$ in. deep (318 mm x 356 mm x 216 mm); 25 lb (11.5 kg)
- Probe Header – 6 in. x 8 in. x 31 in. (152 mm x 203 mm x 787 mm); 10 lb (4.5 kg)
- Prepackaged Controller and Probe Header – 33 in. wide x 32 in. high x 15 in. deep (838 mm x 813 mm x 381 mm); 70 lb (32 kg)

Operating Requirements

- Receptacle Models – 15 amp, single phase, 115 VAC, 50/60 Hz, dedicated circuit
- NEMA4/IP65 Models – 15/10 amp, single phase, 115/230 VAC, 50/60 Hz., dedicated circuit
- Primary signal – 4–20 mA, paddlewheel or contact flow meter for makeup and /or blowdown flow
- Probe Header Flow Rate – 3 gpm (11 L/min) minimum, 15 gpm (55 L/min) maximum
- Chemical Products – Only Class IIIB and Non-Category M Chemicals (per NFPA 30)
- Material Compatibility – system chemicals must be compatible with PVC, brass, stainless steel, glass, and Viton® (DuPont Elastomer)

Agency Certifications

- CSA/NRTL Certification for NEMA4/IP65 Models only; Installation Category II and Pollution Category 2
- CB Certificate for product safety to IEC 1010-1, -2
- NVLAP Certified Laboratory evaluation for radio interference emissions to EN 55011