ProMinent® D1C and D2C Analyzers

Overview: D1C and D2C

An Introduction to Process Measurement and Control

Process control in water treatment involves measurement of a variable related to water quality, combined with automation of chemical feed equipment or other physical/chemical processes to keep the measured value as close as possible to the desired setpoint or between high and low control limits.

ProMinent's approach combines the functions of an analyzer and a controller into one instrument, dedicated to a specific water quality parameter to simplify calibration and operation.

Each ProMinent DULCOTEST® sensor measures a specific water quality parameter and sends an electronic signal back to a DULCOMETER® controller. The operator calibrates that sensor to a known standard. It then displays any changes that are measured in that parameter within the sensor's range.

Measured Value Outputs

Up to two outputs are available. DULCOMETER® controllers offer the ability to continuously record measured values to document water quality or to send to another control device. Analog 4-20 mA or 0-20 mA measured value outputs are proportional to the measuring range of the sensor or spannable to provide greater detail within a smaller range, for connection to a chart recorder, datalogger or distributed control system [D1C/D2C controllers and DULCOMETER® transmitters (monitor only)]

Control Outputs

Different control outputs are available to control virtually any type of actuating device.

Setpoint relays change state (open or close contact) when the measured value drops below or exceeds the setpoint to start a process control device or alarm, and shut it off when the setpoint is reached (D1C or D2C).

Analog control outputs (4-20 or 0-20 mA) can drive a variable speed analog control device, such as a DC SCR drive or AC inverter, according to the control action used (D1C or D2C).

Pulse outputs are brief contact closures to pace pulse-input metering pumps corresponding to the control action used (D1C).

Modulating relay outputs cause a relay to open and close according to the control action used. These are used with solenoid valves or constant-speed motor-driven metering pumps. Minimum on-times may be set to prevent overheating of motors (D1C or D2C).

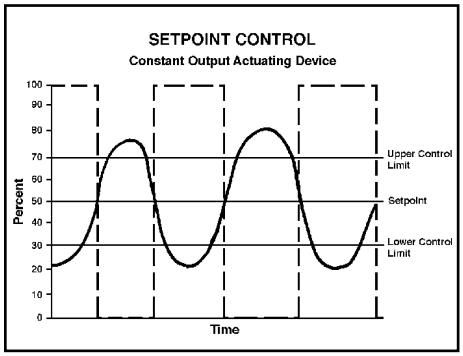
3P relays provide two relay outputs to control a bi-directional actuator (such as a stroke length controller on a metering pump) with provision for feedback potentiometer from the actuator to display the position according to the control action used (D1C or D2C).

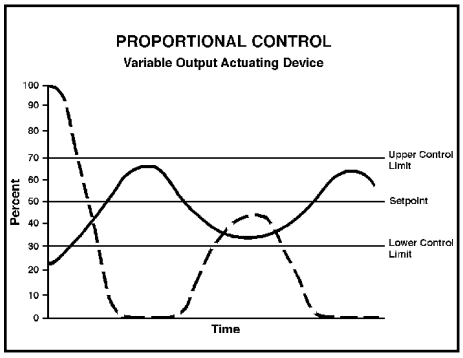
CONTROL ACTION RESPONSE IN ONCE-THROUGH SYSTEMS

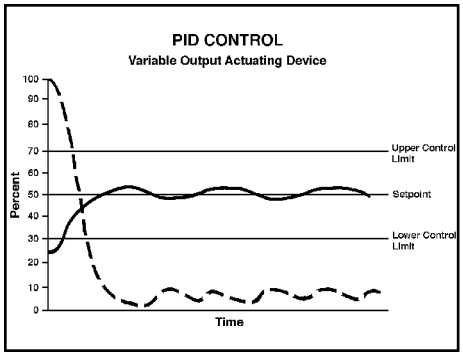
Note: Actuating device output increases measured value in example (e.g. chlorine feed)

—— Measured value (as percent of measurement range)

– – Actuating device output (as percent)







Control Actions

A variety of control actions are available to suit the application and budget. Any variable control output listed above may be used with any of the control actions listed below.

Setpoint Control

Setpoint control uses a setpoint relay to start a constant output pump or open a solenoid valve when the measured value drops below (or exceeds) the setpoint. Once the measured value reaches setpoint again, the pump stops or the valve closes. This always results in overshooting the setpoint because of the lag time between the point of chemical addition and the point of measurement. This can waste chemicals and cause excessive variation on either side of the setpoint. It is suited only for closed systems or batch applications where tight control is not required (D1C or D2C).

ProMinent® D1C and D2C Analyzers

Overview: D1C and D2C

Proportional Control

Proportional control gives an output that is directly proportional to the measured value's deviation from the setpoint. The farther from setpoint, the greater the output of the actuating device, and the closer to setpoint, the lesser the output. Proportional control is suitable for closed systems or batch applications where more precise control is required. The proportional bandwidth may be spanned to set the distance from setpoint at which the actuating device is operating at maximum output. A small bandwidth results in maximum output at a measured value close to setpoint, and may cause overshooting. A large bandwidth may result in long time periods required until the setpoint is reached (D1C or D2C).

PID Control

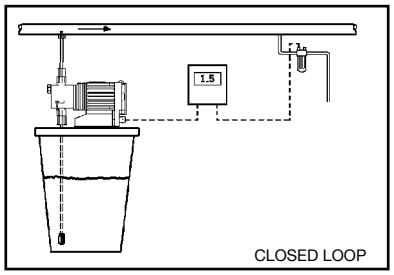
PID control combines proportional, integral and derivative control actions, or any combination thereof.

Integral control considers the time interval of deviation and increases output when the deviation exceeds a programmed time interval. Derivative control considers the rate of change of deviation and increases the output when the rate of deviation exceeds a programmed rate. PID control ensures the least deviation from setpoint possible (D1C, D2C).

Control Techniques

The control technique used depends on the location of the sensor in relation to the actuating device, the presence of other inputs which may effect the measured value, or the requirement for secondary actuating devices to handle large swings. Some common control techniques are described below.

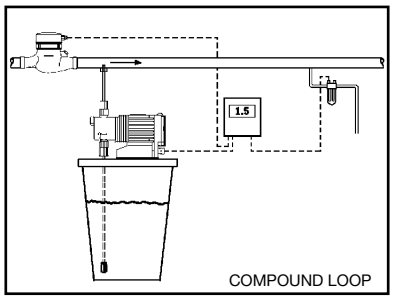
Closed loop control is where the sensor is located downstream of the actuating device and measures changes caused by the device. The controller varies the device's output to maintain the desired setpoint. This is usually used in recirculating or batch applications,



CLOSED LOOP

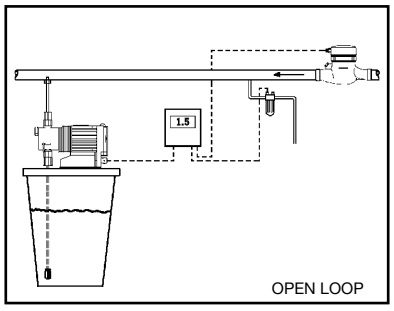
or once-through systems with constant flow rate. The sensor must be located far enough downstream to ensure that any physical/chemical changes are complete, whether measuring pH, oxidant residuals or other variables (D1C or D2C).

Compound loop control combines



COMPOUND LOOP

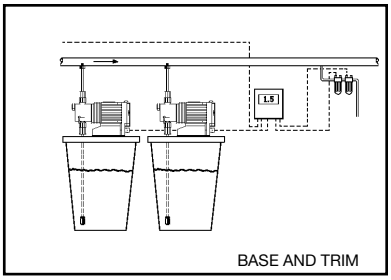
the closed loop signal from the sensor with a second (disturbance) input, normally water flow rate, and changes the actuating device's output in response to both variables. This is typically used in once-through applications with varying flow rates (D1C).



OPEN LOOP

With open loop control, the sensor is upstream of the actuating device and a control signal changes the actuating device's output. Usually, this is only used when the resulting measured value would be outside of the sensor's measuring range (D1C or D2C).

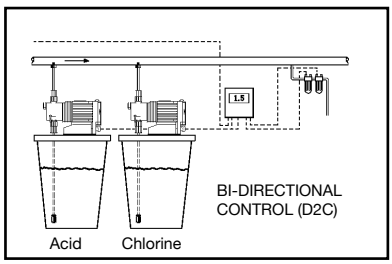
Base and trim control uses two actuating devices to bring large fluctuations into control very quickly, yet provide tight control under normal operation. A variable output actuating device is normally used



BASE AND TRIM

with proportional or PID control for the trim or fine tuning. A constant output device would be started by a setpoint relay for the base load to make fast changes in the event of large fluctuations that the trim device cannot handle (D1C or D2C).

Bi-directional control of two opposing actuating devices, such as pumps for acid and base in a pH control application, is possible with one controller (D1C or D2C). To prevent repeated corrections caused by overshooting on both sides, a deadband may be programmed (between two setpoints) in which both actuating devices are stopped (D1C or D2C).



PROPORTIONAL CONTROL ONLY (BATCH LINE)

ProMinent® D1C and D2C Analyzers

Specifications

Temperature data (Panel Mount)

Permissible ambient temperature

Basic version: Control panel installation: 32° to 122°F (0° to 50°C)
Installation in wall-mounted housing: 23° to 113°F (-5° to 45°C)

Extended version (with status feedback or with correction value via mA or with disturbance variable via mA: Control panel installation: 32° to 113°F (0° to 45°C)
Installation in wall-mounted housing: 23° to 104°F (-5° to 40°C)

Permissible storage temperature: Control panel installation: 14° to 158°F (-10° to 70°C)

Material data/chemical resistance:

Part	Material
Housing and frame	PPO GF 10
Rear panel	PPE GF 20
Membrane keypad	Polyester film PET
Seal, outside	Cellular rubber CR
Seal, inside	Silicon-based sealing compound
Retaining clip and screws	Galvanized steel

Temperature data (Wall Mount)

Permissible ambient temperature

***Basic version*:** 23° to 122°F (-5° to 50°C)
Installation in wall-mounted housing: 23° to 113°F (-5° to 45°C)

Extended version (with status feedback or with correction value via mA or with disturbance variable via mA: 23° to 104°F (-5° to 40°C)

Permissible storage temperature: 14° to 158°F (-10° to 70°C)

Material data/chemical resistance:

Part	Material
Housing	Luranyl PPE GF 10
Membrane keypad	Polyester film PET
Housing seal	Cellular rubber CR
Outer seal	Cellular rubber CR
Retaining bracket	Galvanized steel
M5 screws	A2

Standards: Supply voltage in accordance with DIN IEC 38
Electrical safety in accordance with EN 61010-1
Electromagnetic emitted interference in accordance with EN 55011 Gr.1/C1.A
CSA special inspection

Electrical data:	**Panel Mount**	**Wall Mount**
Rated voltage:	115/230 VAC, 50/60 Hz	115/230 VAC, 50/60 Hz
Max. power input:	140 mA at 115 V 70 mA at 230 V	120 mA at 115 V 60 mA at 230 V
Internal fuse protection:	Fine-wire fuse 5 x 20 mm 250 V slow-blow 100-115 V = 315 mA 200-230 V = 160 mA	Fine-wire fuse 5 x 20 mm 250 V slow-blow 100-115 V = 315 mA 200-230 V = 160 mA

Rated voltage: 100/200 VAC, 50/60 Hz
Max. power input: 150 mA at 100 V
75 mA at 200 V

Internal fuse protection: Fine-wire fuse 5 x 20 mm
250V slow-blow
100-115 V = 315 mA
200-230 V = 160 mA

Electrical data for both wall mount and panel mount D1C's

Rated voltage: 24 VDC or 24 VAC, 50/60 Hz (low voltage operation only)
Internal fuse protection: Fine-wire fuse 5 x 20 mm
250 V slow-blow, 100-115 V = 315 mA, 200-230 V = 160 mA

ProMinent® D1C and D2C Analyzers

Specifications

Sensor input via SN6 socket:

Input impedance > 10^{12} W
Input impedance with reference electrode with respect to:
Device ground: <1 kW
Input range: ±1 V
Accuracy: ±0.5% of input range
Resolution: 0.0625% of input range
Connection facility for one potential equalization electrode (solution ground). As an alternative, two connection terminals can be connected with a wire jumper.

Sensor input via terminals:

Input impedance: >5 x 10^{11} W
Input impedance with reference electrode with respect to:
Device ground: <1 kW
Input range: ±1 V
Accuracy: ±0.5% of input range
Resolution: 0.0625% of input range
Connection facility for one potential equalization electrode (solution ground). As an alternative, two connection terminals can be connected with a wire jumper.

Standard signal input for measured variable:

Input range: 0/4...20 mA (programmable)
Input impedance: 50 W (Panel Mount) and (Wall Mount)
Accuracy: 0.5% of input range
Resolution: 0.014/0.012 mA
Supply voltage and current for external electronics: 20 V ±0.5 V, 20 mA

Standard signal input for correction measured value or disturbance variable mA:

Galvanically isolated from remaining inputs and outputs
Insulation voltage: 500 V
Input range: 0/4...20 mA (programmable)
Input resistance: 50 W
Accuracy: 0.5% of input range
Resolution: 0.014/0.012 mA
Supply voltage and current for external electronics: 23 V ±1 V, 20 mA **(Panel)**
19 V ±1.5 V, 20 mA **(Wall)**

Pt100 input:

Input range: 32° to 212°F (0° to 100°C)
Accuracy: ±0.5°C
Resolution: 0.1°C

Digital inputs:

Common reference potential with respect to each other and with the RS 232 interface, but galvanically isolated from remaining inputs and outputs
Insulation voltage: 500 V (Wall Mount only)
Disturbance variable: Up to 10 Hz or up to 500 Hz (as per identity code/ programmable)

Status signaling input:

Galvanically isolated from remaining inputs and outputs
Insulation voltage: 500 V
Potentiometer to be connected: 800 W ...10 kW
Accuracy (without potentiometer error): 1% of input range
Resolution: 0.5% of input range

Current output:

Galvanically isolated from remaining inputs and outputs
Insulation voltage: 500 V (Wall Mount only)
Output range: 0/4...20 mA (programmable)
Maximum load: 600 W
Accuracy: 0.5% of output range with respect to displayed value

Frequency outputs (Reed relay)

Type of contact: n/o contact, interference suppressed with varistors
Load capacity: 100 V peak, 0.5 A switching current (Panel Mount)
25 V peak, 0.5 A switching current (Wall Mount)

for pump control:

Contact service life: >50 x 10^6 switching operations at contact load 10 V, 10 mA
Max. frequency: 8.33 Hz (500 strokes/min)
Closing time: 100 ms

Power relay output for alarm signaling:

Type of contact: Changeover contact, interference supressed with varistors
Load capacity: 250 VAC, 3 A, 700 VA
Contact service life: >50 x 10^6 switching operations (Panel Mount)
>20 x 10^6 switching operations (Wall Mount)

ProMinent® D1C and D2C Analyzers

Specifications

Power relay output for control variable output or limit value signaling:	Type of contact:	n/o contact, interference supressed with varistors
	Load capacity:	250 VAC, 3 A, 700 VA
	Contact service life:	>20 x 10^6 switching operations

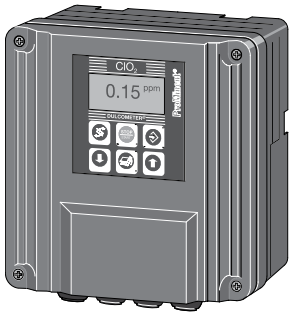
Electrotechnical Safety/Radio Interference Protection:

EC low voltage directive (73/23/EEC) subsequently 93/44/EEC
EC EMC directive (89/336/EEC) subsequently 92/31/EEC
Supply voltage in accordance with DIN IEC 38
Electrical safety in accordance with EN 61010-1
Electromagnetic emitted interference in accordance with EN 55011 Gr. 1/Cl B
Noise immunity in accordance with IEC 801-2, -3, -4 or DIN VDE 0843, Part 2, Part 3, Part 4 or *EN 50082-2*

EN 60335-1:	Safety of electrical devices for domestic use
EN 50081-1:	EMC, emitted interference, residential
EN 50082-2:	EMC, noise immunity, industrial
EN 60555-2:	EMC, reactions in power supply networks, harmonics
EN 60555-3:	EMC, reactions in power supply networks, voltage fluctuations

ProMinent® D1C and D2C Analyzers

Technical Data



Wall Mount

Panel Mount

Measurement range:	**Type of connection mV:**
	pH 0.00 … 14.00
	ORP +1000 mV
	Type of connection mA:
	Chlorine: 0.00...0.500/2.00/5.00/10.0/20.0/50.0/100.0 ppm
	Chlorine dioxide: 0.00...0.500/2.00/10.0/20.0 ppm
	Chlorite: 0.02...0.50/0.1...2 ppm
	Bromine: 0.02...2.0/0.1...10.0 ppm
	Ozone: 0.00...2,00 ppm
	Hydrogen peroxide, sensor PER1: 2.0...200.0/20...2,000 ppm
	Hydrogen peroxide, sensor PEROX: 0...20/200/2,000 ppm, 1 vol.%
	Peracetic acid: 1...20/10...200/100...2,000 ppm
	Dissolved oxygen: 0.1...10/0.1...20 ppm
	pH: 0.00...14.00
	ORP: 0...+1000 mV
	Conductivity: 0...20/200/1,000 mS/cm
Resolution:	pH: 0.01 pH / ORP:1 mV
	Amperometric 0.001/0.01 ppm/l/0.1 %
Accuracy:	0.5 % from measurement range
Measurement input:	SN6 (input resistance > 0.5 x 1012 Ω)
Correction variable:	pH (Cl_2 version only) Temperature via Pt 100 (pH and conductivity only)
Correction range temp.:	50 - 113 °F (10 - 45°C) (pH and conductivity only)
Correction range pH:	7.0 - 8.5 pH (ClO_2 version only)
Disturbance signals:	Additive/multiplicative
Control characteristic:	P/PID control
Control:	2-way control
Signal current output:	1 x electrically isolated 0/4-20 mA max. load 450 Ω Adjustable range and direction (measured, correction and control variable)
Control outputs:	2 reed contacts (pulse rate, for pump control) 2 relays (pulse length, 3P or limit value) 1 x 0/4-20 mA
Alarm relay:	250 V~3 A, 700 VA changeover contact
Power supply:	90 - 253 V, 50/60 Hz
Ambient temperature:	Wall mounted: 23 - 122°F (-5 - 50°C)

Mounting

- **Wall mount**: Nonmetallic enclosure with protective gland-style strain relief cable sockets

  Dimensions: 7.79”H x 7.87”W x 3.00”D (198 mm x 200 mm x 76 mm)

  Weight: Approx. 2.6 lbs. (1.2 kg) Shipping Weight: 4.4 lbs. (2.0 kg)

  Mounting: Detachable wall mount bracket

  Protection class: NEMA 4X (IP 65)

- **Panel mount:**

  Dimensions: 3.78”H x 3.78”W x 5.70”D (96 mm x 96mm x 145 mm)

  Protection class: NEMA 3 (IP 54) when mounted in panel

ProMinent® D1C and D2C Analyzers

Typical Applications

pH - Control acid and/or base feed via metering pumps or valves to adjust pH

ORP - Control hypochlorite metering pump to maintain oxidant residual; or control sulfonator or bisulfite metering pump for dechlorination

Free Chlorine - Control chlorination or hypochlorite metering pump to maintain residual

Total Chlorine - Control chlorination or hypochlorite metering pump to maintain residual; or control sulfonator or bisulfite metering pump for dechlorination

Bromine - Control tablet brominator via solenoid valve; or bromine solution metering pump to maintain residual

Conductivity - Control conductivity through valve on blowdown/makeup for rinse bath, boiler or cooling tower

Dissolved Ozone - Control ozone generator output to maintain residual

Dissolved Oxygen - Control aeration units to limit energy usage or for nitrification/dentrification

Chlorite - Control chlorite as a by-product of the chlorine dioxide process

Fluoride - Monitor fluoride concentration in potable water

Chlorine Dioxide - Control chlorine dioxide generator output to maintain residual

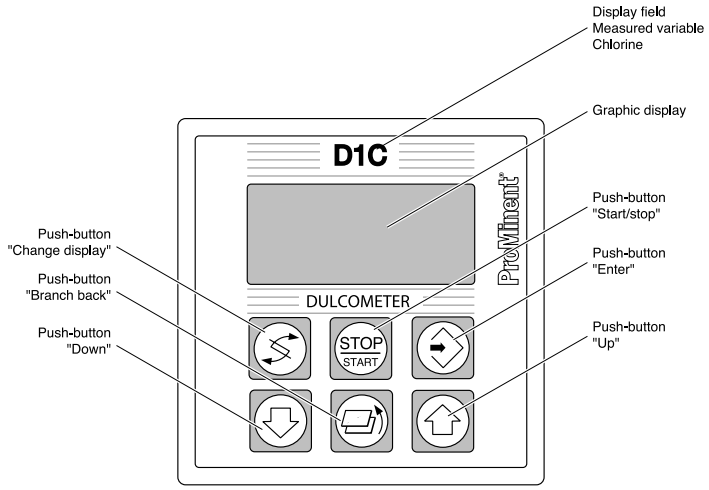
Temperature - Control heater or heat exchanger to maintain bath temperature or process cooling

Analog Signal Inputs - Control virtually any measureable and adjustable process where the measuring device has an analog output and the adjusting device may be controlled by one of the D1C's available control outputs

Peracetic Acid - Monitor or control concentration to ensure disinfection

Hydrogen Peroxide - Control peroxide metering pump for oxidation or advanced oxidation (AOX) systems

User Interface



	CHANGE DISPLAY menu button To change over within a menu level and to change from one variable to another within a menu point.
STOP START	START/STOP menu button Start/stop of control and metering function.
	ENTER menu button To accept, confirm or save a displayed value or status. For alarm acknowledgement.

	UP menu button To increase a displayed numerical value and to change variables (flashing display)
	BRANCH BACK menu button To exit operating menu (back to start of relevant setting).
	DOWN menu button To decrease a displayed numerical value and to change variables (flashing display).

ProMinent® D1C and D2C Analyzers

Identcode Overview (D1C/ D2C)

NOTE: OPTIONS ARE NOT IDENTICAL FOR THE D1C / D2C CONTROLLERS. REFER TO THE IDENTITY CODE.

SERIES:

D1C = Single variable controller

D2C = Dual variable controller

SERIES VERSION:

A = Standard

MOUNTING:

W = Wall mount enclosed in NEMA 4X non-metallic housing. Includes detachable mounting plate in back to allow easy removal from wall. Features five Pg11 and five Pg7 glands for wiring power cord, relays, SN6 connectors, etc.

D = Panel mount (no enclosure). Fits 3.78" x 3.78" (9.6 cm x 9.6 cm) opening, 5.70" (145 mm) depth. The unit must be mounted in an enclosure suitable for the environment. The controllers's membrane switch face and gasketed frame provide NEMA 3 (IP 54) protection; mounting hardware included. For optional wall mount enclosure for the panel mount controller, see PN 790235.

OPERATING VOLTAGE:

0 = 230 VAC, 50/60 Hz, 1 phase
1 = 115 VAC, 50/60 Hz, 1 phase
4 = 24 V AC/DC

Note: Power cord not included with unit. For 115 V US power cord, see PN 741203.

D1C MEASURED VARIABLES:

P = pH: For wall mount, use connection 2 (SN6) for push-and-twist connectors with pH sensors. For panel mount, use terminal connection 5 for same sensors. For distances between 30 and 300 feet from sensor to controller, add impedance converter, PN 305350. For distances > 300 feet from sensor to controller or with stray currents, use connection 1 with signal converter pH-V1 (PN 809126) giving 4-20 mA output.

R = Oxidation Reduction Potential: For wall mount, use connection 2 (SN6) for push-and-twist connectors with ORP sensors. For panel mount, use terminal connection 5 for same sensors. For distances between 30 and 300 feet from sensor to D1C, add impedance converter, PN 305350. For distances > 300 feet from sensor to D1C or with stray currents, use connection 1 with signal converter RH-V1 (PN 809127) giving 4-20 mA output.

C = Chlorine; use connection 1. For free chlorine (hypochlorous acid) measurement, use CLE-3-mA sensors. See "correcting value" for optional pH correction on free chlorine. For total chlorine, use CTE-mA sensors.

B = Bromine; use connection 1 and bromine BRE 1-mA-10 ppm sensor.

L = Conductivity; use connection 1 for conductivity cells with transducer giving 4-20 mA output. Use connection 3 for standard conductivity cells.

Z = Ozone; use connection 1 and OZE 3-mA-2 ppm sensor.

X = Dissolved Oxygen; Use connection 1 and DO1-mA-20 ppm sensor.

D = Chlorine Dioxide; use connection 1 and CDE 2-mA - 0.5 ppm, 2 ppm or 10 ppm sensors, or the CDP with PT 100.

S = Standard signal 0/4-20 mA. Use connection 1 with any measuring device that outputs a 0-20 or 4-20 mA signal corresponding to the measured value. Display is as a pecent of input current.

A = Peracetic Acid; use connection 1 with PAA transducer (PN 741128).

H = Hydrogen Peroxide; use connection 1 with Perox transducer (PN 741129).

F = Fluoride; SN6 with transducer and connection 1

I = Chlorite; use connection 1

D2C MEASURED VARIABLES:

PC = pH/chlorine: See above descriptions for each variable.

PR = pH/Oxidation Reduction Potential: See above descriptions for each variable. (Requires Signal Converter PN 809127)

PP = pH/pH: See above descriptions for each variable. (Requires Signal Converter PN 809126) Variable 1 can be controlled, Variable 2 is for monitoring.

CC = Free Chlorine/Total chlorine: See above descriptions for each variable.

PD = pH/chlorine dioxide: See above descriptions for each variable. (Requires Signal Converter PN 809126) Variable 1 can be controlled, Variable 2 is for monitoring.

CONNECTION FOR SENSOR INPUT (FOR VARIABLE 1 CONNECTION ON D2C CONTROLLERS):

1 = Standard signal 0/4-20 mA

2 = SN6 plug connector for pH (P) or ORP (R). Usually, this is only used with the wall mount since SN6 plugs cannot pass through cable glands on a panel mount enclosure.

3 = Terminal for standard conductivity cell (L)

4 = Terminal for PT 100 temperature sensor (T)

5 = Terminal for mV input on standard pH (P) or ORP (R) sensors

CORRECTING VALUE:

0 = None

1 = pH for free chlorine (total chlorine does not require pH correction); corrects CLE sensor's hypochlorous acid (HOCl) measurement by chlorine dissociation curve to display free chlorine ($HOCl + OCl^-$).The correcting pH input must be a 4-20 mA signal, requiring signal converter PH-V1 (PN 809126).

2 = Temperature for P or L via terminal for PT-100 sensor. Required for accurate pH measurement when operating at extreme pH values and high temperatures.Required for accurate conductivity measurement at varied temperatures. (Temperature monitoring only for othervariables)

3 = Temperature for P or L via 0/4-20 mA signal; used with signal converter PT-100-V1 (PN 809128) and PT-100 sensor. Feed Forward control is not possible with this option. (Temperature monitoring only for other variables)

4 = Manual temperature entry for P or L (no sensor); used where temperature is constant.

ProMinent® D1C and D2C Analyzers

Identcode Overview (D1C/ D2C)

FEED FORWARD CONTROL - The D1C's control output is based on measured value; however, with feed forward control, a signal from a flow meter proportions the control output considering both the measured value and process flow rate. This eliminates the need for both variable speed drives and stroke positoners on compound loop control metering pumps. Several types of signals may be accepted proportional to process flow:

0 = None

1 = 0/4-20 mA signal (such as from a magmeter or open channel flow meter) Note: cannot be used for chlorine measurement with pH compensation (D1C)

2 = 0-500 Hz signal (such as from a paddlewheel sensor)

3 = 0-10 Hz (0-600 pulses/min.) signal (such as from a pulse-type water meter)

PAUSE CONTACT - The pause contact allows the controller to continue monitoring measured value, but stops control outputs when the NC contact is opened. This may be used to stop metering when a main water pump is stopped, or when water flow in the sample line to the sensor is blocked as signaled by the DGMa rotameter:

0 = None (D1C); Pause contact (D2C)

1 = Pause contact (D1C)

ANALOG OUTPUTS (0/4-20 mA) - Analog outputs can be programmed as a control output or a measured value output for recording. Up to 2 analog outputs are possible except for Hydrogen Peroxide and Peracetic Acid controllers.

0 = None

1 = Measured value; normally used for chart recorder, datalogger or DCS.

2 = Control action; normally used to control a variable speed drive or actuator.

3 = Measured correcting value; normally used for recording or as input to a second D1C.

4 = Two current outputs (Not for measured variables A and H)

RELAY OUTPUTS:

G = Alarm + 2 limit relays: limits may be on either side of setpoint, or both limits may alarm on one side, such as low limit and low, low limit. May be used to start a constant rate feeder for simple setpoint control, or a baseline feeder to handle large swings with trim pump on the control output.

M = Alarm + 2 control relays: used to start and stop constant speed pumps or to open and close solenoid valves for opposing functions. Modulating output corresponds to the control action selected (proportional or PID). The minimum "on-time" period may be adjusted from 1 to 9,999 seconds.

R = Alarm + 2 positioner relays with positioner feedback from 1 kOhm feedback potentiometer. Positioner status displayed on LCD. Used for ProMinent 3P stroke positioning motors or valve positioners. Output corresponds to the control action selected (proportional or PID).

PUMP PACING - gives pulse outputs for controlling 1 or 2 metering pumps:

0 = None

2 = Outputs for one or two pulse-control metering pumps (spannable from 0-500 pulses per minute); for opposing functions. Pulse (dry contact) output corresponds to the control action selected (proportional or PID).

CONTROL ACTION:

0 = None; for use as monitor or setpoint relay controller only.

1 = Proportional control; used for batch processes, where output signal is proportional to the measured variable such that the farther from setpoint the greater the output; the closer to setpoint the lesser the output.

2 = PID control; used for once-through or difficult to control processes, providing proportional, integral and derivative control actions, or a combination thereof.

INTERFACE:

0 = None

LANGUAGE - Note that it is possible to change among other languages in the field, as indicated in parentheses:

†E = English (D, F, N)	†D = German (E, F, N)
†F = French (D, E, N)	H = German (F, I, S)
S = Spanish (D, I, F)	I = Italian (D, F, S)

Call for other available languages.

†Languages available for measured variables A and H

NOTE: Power cord not included.

Power cord, 6 ft. (2 m) 115 VAC
PN - 741203

Power cord, 6 ft. (2 m) 230 VAC
PN - 7724015

ProMinent® D1C and D2C Analyzers

Identcode Ordering System D1C (Version a)

D1C	Series
	A

Type of Mounting:	
W	Wall Mount (NEMA 4x)
D	Panel Mount (no enclosure)

Operating Voltage:	
0	230 V, 50/60 Hz
1	115 V, 50/60 Hz
4	24 V AC/DC

Measured Variables:			
A	Peracetic acid	P	pH
B	Bromine	R	ORP (Redox)
C	Chlorine (Free or Total)	S	0/4-20 mA norm signal
D	Chlorine dioxide	T	Temperature
H	Hydrogen peroxide	X	Dissolved oxygen
I	Chlorite	Z	Ozone
L	Conductivity		

Connection for Sensor Input:	
1	Standard signal 0/4-20 mA, all measured variables
2	SN6 plug (from pH or ORP sensor cable)
3	Terminal for standard conductivity cell (L)
4	Terminal for PT 100 temperature sensor
5	Terminal for mV signal (From pH or ORP sensor cable)
6	Terminal for inductive conductivity sensors
7	Standard signal 0/4-20 mA (for PAA and H2O2 25mm sensors)

Correcting variable: (Not available for measured variables A&H)	
0	None
1	pH for free chlorine via 4-20 mA signal
2	Temperature correction terminal for P or L (Temp. For all other variables)
3	Temperature correction terminal for 4-20 mA signal for P&L (Temp. For all other variables)
4	Manual temperature input for P&L

Feed forward control:	
0	None
1	4-20 mA signal
2	0-500 Hz signal
3	0-10 Hz signal

Pause contact:	
0	None
1	Pause contact

Analog signal output (0/4-20 mA):			
0	None	3	Measured correcting value
1	Measured value	4	Two current outputs
2	Control action		

Relay Ouputs:	
G	Alarm and 2 limit relays
M	Alarm and 2 control relays
R	Alarm and positioner relays w/ position feedback potentiometer

Pump pacing:	
0	None
2	Two pulse control outputs

Control Action:	
0	None
1	Proportional control
2	PID

Language:	
E	English

D1C	A	W	1	A	1	0	0	0	0	G	0	0	E	

ProMinent® D1C and D2C Analyzers

Identcode Ordering System D1C (Version b & c)

D1C	Series																	
	B	Wall mount version																
	C	Panel mount version																
		Type of Mounting:																
		W	Wall mounting (IP 65, D1Cb only)															
		D	Panel mounting (IP 54, D1Cc only)															
			Execution:															
			00	w/h LCD + keypad, w/h PM - Logo														
				Operating Voltage:														
				6	90 - 253 VAC 50/60 Hz													
					Approvals:													
					01	CE approval												
						Hardware add-on I:												
						0	None											
							Hardware add-on II:											
							0	None										
							1	RC protection for power relays (only D1Cb)										
								External connection:										
								0	None									
									Preset software functions:									
									V	Preset software functions								
										Measured Variables:								
										0	None			I	Chlorite			
										A	Peracetic acid			P	pH			
										B	Bromine			R	ORP (Redox)			
										C	Chlorine			S	0/4-20 mA norm signal			
										D	Chlorine dioxide			X	Dissolved oxygen			
										F	Fluoride			Z	Ozone			
										H	Hydrogen peroxide			T	Temperature via mA transducer			
										L	Conductivity via mA transducer				*Must include signal converter (pn. 809128)			
											Connection of measured variable:							
											1	Standard signal 0/4-20 mA, all measured variables						
											2	SN6 plug (mounting type "W" D1Cb only)						
											5	mV input for pH/redox via guard terminal						
												Correction variable:						
												0	None					
												2	Temperature Pt 100 / Pt 1000 (pH/conductivity)					
												4	Manual temperature input (pH/conductivity)					
													Control inputs:					
													0	None				
													1	Pause				
														Signal Output				
														0	None (Standard)			
														1	4-20 analog output			
															Relay Ouputs:			
															G	Alarm and 2 limit relays or 2 timer relays		
															M	Alarm and 2 limit relays or 2 relays		
																Pump pacing:		
																0	No pumps	
																2	Two pumps	
																	Control Action:	
																	0	None
																	1	Proportional control
																	2	PID control
																		Language:
																		00 Language neutral
D1C	**B**	**W**	**00**	**6**	**01**	**0**	**0**	**0**	**V**	**0**	**1**	**0**	**0**	**0**	**G**	**0**	**0**	**00**

Identcode Ordering System (D2C)

D2C	Series Version:											
	A	Standard										
		Type of mounting:										
		W	Wall mounting (IP 65)									
		D	Panel mounting (IP 65)									
			Operating voltage:									
			0	230 V, 50/60 Hz								
			1	115 V, 50/60 Hz								
			4	24 V AC/DC								
				Measured variables:								
				PC	pH/chlorine							
				PR	pH/redox							
				PP	pH/pH							
				CC	Free chlorine/Total chlorine							
				PD	pH/chlorine dioxide							
					Connection for sensor input:							
					1	Standard signal 0/4-20 mA						
					2	SN6 plug (From pH or ORP sensor cable)						
					5	Terminal for mV signal (From pH or ORP sensor cable)						
						Correcting value:						
						0	None					
						2	Temperature for P via terminal (Pt 100) for pH only					
						4	Manual temperature setting for P or L					
							Pause contact:					
							0	None				
								Analog signal output:				
								0	None			
								4	2 Programmable 0/4-20 mA standard signal outputs			
									Relay outputs:			
									G	Alarm + 2 limit relays		
									M	Alarm + 2 solenoid valve relay (pulse length control)		
										Control action:		
										1	Proportional control	
										2	PID control	
											Interface:	
											0	None
												Language: (Other languages available)
												E English
D2C	**A**	**W**	**0**	**PC**	**1**	**0**	**0**	**0**	**G**	**1**	**0**	**E**

NOTE: Power cord not included with unit. For 115 V US & Canada pwower cord, see PN. 741203

ProMinent® D1C and D2C Analyzers

Fluoride Monitoring System

The D1C fluoride monitoring system incorporates the first buffer or reagent-free, ion specific sensor with a DULCOMETER® D1C fluoride monitor. The monitor features upper and lower limit relays with alarm, and analog output for recording.

Note: The fluoride D1C is for monitoring only.

Measuring Principle & Application

The D1C fluoride monitoring system is based on the principles of potentiometric measuring using a reagent-free, ion specific sensor & reference electrode. The fluoride sensor features a continuous electrode activation function, ensuring long-term stability of the measurement without the need for frequent recalibration or conditioning chemicals. The fluoride sensor automatically compensates temperature, but a temperature sensor is also used to compensate for fluctuation during application.

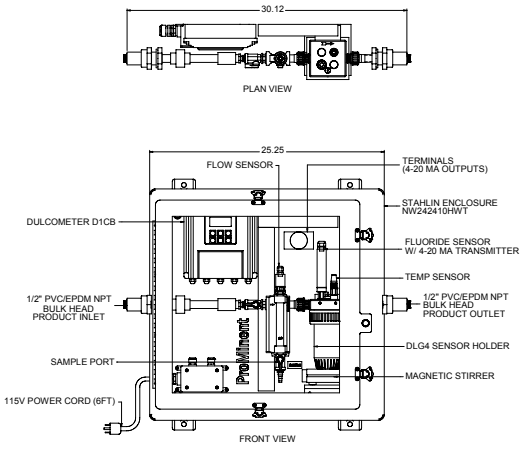
The fluoride sensor is recommended for use in water treatment only (patent pending). We recommend installation at atmospheric pressure.

Measuring Ranges & Operating Conditions of Fluoride Sensor

Measurement Range:	0.05 to 10 ppm fluoride
pH Operating Range:	5.5 to 8.5
Temperature Range:	34 to 95°F (1 to 35°C)
Max. Operating Pressure:	101.5 psi (7 bar) **Note:** the maximum admissible operating pressure for the monitoring system is 14.5 psi (1 bar) determined by the in-line sensor housing.
Sensor Response Rate T_{90}:	approx. 30 seconds
Reproducible Measuring Accuracy:	0.1 ppm
Measurement Water Flow Rate:	16 gph (60 L/h)

Fluoride Monitoring System

Part No. 7744836



- D1C Fluoride Monitor
- Fluoride sensor: FLE 010 SE with PG 13.5 male threaded connector & SN6 plug
- Reference electrode REFP-SE with PG 13.5 male connector & SN6 plug
- Temperature sensor: PT 100 SE with PG 13.5 connector & SN6 plug
- 4-20 mA Measurement transducer: FV1 for connection to fluoride monitor & reference electrode
- DLG IV In-line sensor housing: with PG 13.5 threaded connector
- Sample outlet
- Magnetic stirrer and magnet
- PVC piping with ball stop/adjusting valve, rotameter with limit contact, sampling tap
- Sample inlet
- 115V Power cord, connectors from monitor to sensors
- PP Backpanel

Options

Stand Base	7744837
NEMA 4X enclosed	7744711
Heater	7744722
Sun shield	7744723

Replacement Sensors

FLEP 010 Fluoride Sensor with PG 13.5 male threaded connector and SN6 plug	1028279
REFP-SE Reference Electrode with PG 13.5 male connector and SN6 plug	1018458
PT 100 SE Temperature Sensor with PG 13.5 male connector and SN6 plug	305063
FPV1 4-20 mA Measurement Transducer for connection to fluoride monitor and reference electrode	1028280

Fluoride Photometer

The D2TA or D2TB Photometer (see page 229) can be used to calibrate the fluoride monitor.

Measurement Range:	**DT2A**	0.05 to 2 mg/L fluoride
	DT2B	0.05 to 2 mg/L fluoride
		0.05 to 6 mg/L free or total chlorine
		0.01 to 11 mg/L chlorine dioxide

D2TA kit with carry case	1010383
D2TB kit with carry case	1010394

ProMinent® D1C and D2C Analyzers

Overview: Hydrogen Peroxide and Peracetic Acid

Measuring principle

The Perox measuring systems are based on amperometric/potentiostatic measuring principles incorporating several special features compared to conventional measuring technologies. The platinum [hydrogen peroxide (H_2O_2) measurement] or gold (peracetic acid measurement) working electrode with a small surface area is covered by a microporous membrane cap to achieve a degree of selectivity and independence from flow influences. The entire stainless steel shaft of the Perox sensor serves as the counter-electrode. This represents the complete sensor section for H_2O_2 measurement; a reference pH electrode is also required for peracetic acid measurement.

A special, continuous electrode activation facility which represents the actual know-how, ensures long-term stability of the measurement without the need for frequent recalibration.

Since all amperometric measurement methods are relatively dependent of temperature, we recommend additional temperature compensation with the Pt 100 sensor if temperature fluctuations occur during applications. With the Pt 100, H_2O_2 measurement is a 2-electrode system while peracetic acid measurement is based on a 3-electrode system.

Applications

The environmentally-friendly substance hydrogen peroxide is used to an increasing extent in process control applications as an oxidizing or reduction agent. Examples of applications where continuous Perox H_2O_2 measure-ment control is used either alone or in advanced oxidation systems (with ozone, UV or Fenton's reagent) are:

- Odor control scrubbers
- Ground water purification
- Drinking water oxidation
- Utility water/cooling water disinfection
- Dechlorination, e.g. in chemical processes
- Landfill leachate treatment
- Biotechnology
- Vat dying/textile industry
- Swimming pool water disinfection

Peracetic acid as a disinfectant is used in the following industries:

- Food and beverage
- Cosmetics
- Pharmaceuticals
- Medicine

Continuous measurement and control is necessary wherever more demanding requirements are made with regard to disinfection and quality assurance.

Increasing the peracetic acid concentration in CIP processes as well as concentration control in bottle cleaning machines are typical applications of Perox peracetic acid measurement.

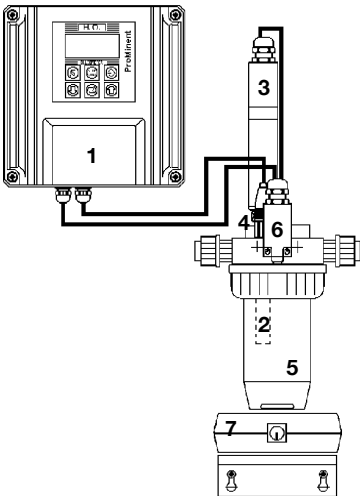
Operating conditions

Measuring ranges and applications	H2O2	Peracetic acid
Measuring range (selectable) mg/l	1 - 20 / 10 - 200 / 100 - 2000	10 - 200 / 100 - 2000
pH range	pH 2.5 - 10	pH 1 - 8
Temperature range	32 - 104°F (0 - 40°C)	41 - 95°F (5 - 35°C)
Permissible changes in temperature	less than 0.9°F (0.5°C) per minute	
Sensor response rate T_{90} approx.	20 seconds	2 minutes
Reproducible measuring accuracy	better than 2% referred to end value of measuring range	
Min. conductivity of measurement solution at:		
measuring range 20 mg/L	50 µS/cm	-
measuring range 200 mg/L	200 µS/cm	500 µS/cm
up to 1000 mg/L	500 µS/cm	2000 µS/cm
up to 2000 mg/L	1000 µS/cm	4000 µS/cm
Measurement water flow rate	recommended 16 gph (60 L/h)	
Max. operating pressure	29 psig (2 bar)	

Depending on the application, other parameters or water constituents may be of significance. For instance, higher concentrations of surface-active substances, such as fats or tensides, or suspended solids can have a detrimental effect on the measurement.

ProMinent® D1C and D2C Analyzers

Hydrogen Peroxide Analyzers



Recommended Hydrogen Peroxide System (descriptions follow)

			Part No.
1	D1C H_2O_2 Controller (1)		
1	Hydrogen Peroxide Sensor: H 2.10 P, complete with membrane cap (2)		792976
1	Perox signal converter: Perox-micro-H 1.20-mA (3)		741129
1	Connection between Perox signal converter and limit sensor Three-wire cable, priced per foot (specify length)		791948
1	Temperature Sensor: Pt 100 SE (4)		305063
1	Connection between the temperature sensor and the controller: (Based on distance between the controller and temperature sensor)		
	Up to 30 ft	SN6 open end cable, 6 ft. (2 m) long	305030
		SN6 open end cable, 15 ft. (5 m) long	305039
		SN6 open end cable, 30 ft. (10 m) long	305040
	Over 30 ft.	Signal converter 4-20 mA Pt 100 V1	809128
		Two-wire cable - priced per foot (specify length)	7740215
1	DLG-PER In-line sensor housing (5) (includes limit sensor with 2 n/o contacts) (6)		1000165
1	Connection between the limit switch on the DLG-PER and the controller: Two-wire cable - priced per foot (specify length)		7740215
1	Magnetic stirrer 115 VAC (7)		7790915
1	Stirrer Magnet		7790916
1	Compact stand (PE, UV protected, black)		7740000
1	Power Cord, 6 ft.		741203

Accessories:

Replacement membrane cap: M 2.0 P for H_2O_2 sensor	792978
Polishing paste for sensor, 3 oz. (90 g) tube	559810

Note: We can also provide measuring and control instruments mounted and wired, e.g. on PVC board or in a control cabinet. See PCM Systems in Feed & Control Packages section.

Sensors: Hydrogen Peroxide Measurement

The H_2O_2 sensor shaft is made of stainless steel (counter and reference electrode) with a platinum working electrode. Installation length 4.7" (120 mm), 0.5" (12 mm) Ø, PG 13.5 internal thread and SN6 plug connection.

H 2.10 P, complete with membrane cap	792976

Temperature sensor Pt 100 for temperature compensation of H_2O_2 measurement; necessary when temperature fluctuations can occur in the measurement medium.

Pt 100 SE	305063

A coaxial measuring line with an SN6 connector is required for direct connection of a temperature sensor:

SN6 open end	6 ft. (2 m) long	305030
SN6 open end	15 ft. (5 m) long	305039
SN6 open end	30 ft. (10 m) long	305040

When distances between the measuring unit and sensor exceed 30 ft. (10 m), it is recommended to use a temperature signal converter which transmits the temperature signal via a 2-wire connection at 4-20 mA. Temperature compensation input should be taken into consideration when selecting the D1C-Perox controller from the identity code.

Signal converter 4-20 mA Pt 100 V1	809128
Two-wire cable for connection between point-of-use signal converter 4-20 mA and controller - priced per foot (specify length).	7740215

Perox Signal Converter

The signal converter controls and activates the hydrogen peroxide sensor and evaluates the sensor signal. It is screw-mounted directly on the head of the sensor.

The signal converter has a length of approx. 8.1" (205 mm) and a 1.25" (32 mm) Ø.

Signal converter for H_2O_2 measurement

A changeover switch for the three measuring ranges 1 - 20, 10 - 200 and 100 - 2000 mg/L H_2O_2 is located on the inside.

	Part No.
Perox-micro-H 1.20-mA	741129

In-line Sensor Housing

The DLG-PER in-line sensor housing must be used for hydrogen peroxide measurement where all (max. 3) individual sensors are installed in a measuring cup. A limit sensor must also be used which switches off the power supply for the signal converter when the measuring cup is removed. The DLG-PER in-line sensor housing features a body made of rigid PVC with a transparent polyamide cup and measurement water connection with 1/2" MNPT fittings.

DLG-PER In-line sensor housing (includes limit sensor with 2 n/o contacts)	1000165
Two-wire cable for connection between the limit switch on the DLG-PER and the controller - priced per foot (specify length)	7740215

For calibration of the DLG-PER in-line sensor housing, we recommend a magnetic stirrer to facilitate flow independent calibration.

Magnetic stirrer 115 VAC	7790915
Stirrer magnet	7790916
Mounting bracket for magnetic stirrer PVC (includes screws with wall anchor)	1000166

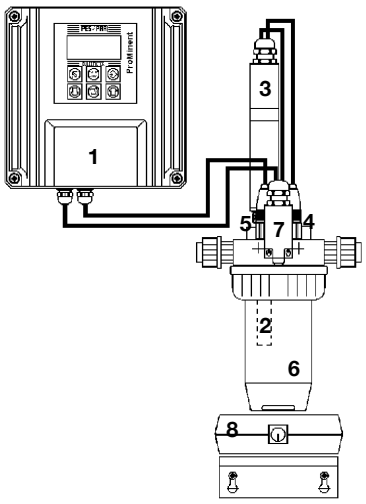
Accessories/Spare Parts

Replacement membrane cap:

M 2.0 P for H_2O_2	792978
Polishing paste for Perox sensor, 3 oz. (90 g) tube	559810

ProMinent® D1C and D2C Analyzers

Peracetic Acid Analyzers



Recommended Peracetic Acid System (descriptions follow)

			Part No.
1	D1C PAA Controller (1)		
1	Peracetic Acid Sensor: P2.10 B, complete with membrane cap (2)		809150
1	Perox signal converter: Perox-micro-P 1.30-mA (3)		741128
1	Connection between Perox signal converter and limit sensor		
	Three-wire cable, priced per foot (specify length)		791948
1	pH Sensor: REFP - SE (4)		1000505
1	Temperature Sensor: Pt 100 SE (5)		305063
1	Connection between the temperature sensor and the controller: (Based on distance between the controller and temperature sensor)		
	Up to 30 ft	SN6 open end cable	6 ft. (2 m) long 305030
			15 ft. (5 m) long 305039
			30 ft. (10 m) long 305040
	Over 30 ft.	Signal converter 4-20 mA Pt 100 V1	809128
		Two-wire cable - priced per foot (specify length)	7740215
1	DLG-PER In-line sensor housing (6) (includes limit sensor with 2 n/o contacts) (7)		1000165
1	Connection between the limit switch on the DLG-PER and the controller: Two-wire cable - priced per foot (specify length)		7740215
1	Magnetic stirrer 115 VAC (8)		7790915
1	Stirrer Magnet		7790916
1	Compact stand (PE, UV protected, black)		7740000
1	Power Cord, 6 ft.		741203

Accessories:

Replacement membrane cap: M 2.0 B for peracetic acid sensor	809154
Polishing paste for sensor, 3 oz. (90 g) tube	559810

Note: We can also provide measuring and control instruments mounted and wired, e.g. on PVC board or in a control cabinet. See PCM Systems in Feed & Control Packages section.

Sensors: Peracetic Acid Measurement

The peracetic acid sensor shaft is made of stainless steel (counter electrode) with a gold working electrode. Installation length 4.7" (120 mm), 0.5" (12 mm) Ø.

P 2.10 B, complete with membrane cap 809150

A pH sensor is also required as a reference electrode for peracetic acid measurement

REFP - SE 1000505

Temperature sensor Pt 100 for temperature compensation of peracetic acid measurement; necessary when temperature fluctuations can occur in the measurement medium.

Pt 100 SE 305063

A coaxial measuring line with an SN6 connector is required for direct connection of a temperature sensor:

SN6 open end	6 ft. (2 m) long	305030
SN6 open end	15 ft. (5 m) long	305039
SN6 open end	30 ft. (10 m) long	305040

When distances between the measuring unit and sensor exceed 30 ft. (10 m), it is recommended to use a temperature signal converter which transmits the temperature signal via a 2-wire connection at 4-20 mA. Temperature compensation input should be taken into consideration when selecting the D1C-Perox controller from the identity code.

Signal converter 4-20 mA Pt 100 V1 809128

Two-wire cable for connection between point-of-use signal converter 4-20 mA and controller - priced per foot (specify length). 7740215

Perox Signal Converter

The signal converter controls and activates the pracetic acid sensor and evaluates the sensor signal. It is screw-mounted directly on the head of the sensor.

The signal converter has a length of approx. 8.1" (205 mm) and a 1.25" (32 mm) Ø.

Signal converter for peracetic acid measurement

A changeover switch for the two measuring ranges 10 - 200 and
100 - 2000 mg/L peracetic acid is located on the inside; the standard scope of delivery includes a measuring line with SN6 plug connector to facilitate connection to the reference electrode.

	Part No.
Perox-micro-P 1.30-mA	741128

In-line Sensor Housing

The DLG-PER in-line sensor housing must be used for peracetic acid measurement where all (max. 3) individual sensors are installed in a measuring cup. A limit sensor must also be used which switches off the power supply for the signal converter when the measuring cup is removed. The DLG-PER in-line sensor housing features a body made of rigid PVC with a transparent polyamide cup and measurement water connection with 1/2" MNPT fittings.

DLG-PER In-line sensor housing (includes limit sensor with 2 n/o contacts)	1000165
Two-wire cable for connection between the limit switch on the DLG-PER and the controller - priced per foot (specify length)	7740215
For calibration of the DLG-PER in-line sensor housing, we recommend a magnetic stirrer to facilitate flow independent calibration.	
Magnetic stirrer 115 VAC	7790915
Stirrer magnet	7790916
Mounting bracket for magnetic stirrer PVC (includes screws with wall anchor)	1000166

Accessories/Spare Parts

Replacement membrane cap:	
M 2.0 B for peracetic acid	809154
Polishing paste for Perox sensor, 3 oz. (90 g) tube	559810

ProMinent® Compact Controller

Overview: Compact

DULCOMETER
Compact

The Measuring Transducer DULCOMETER® Compact with control function for the measured variables pH and redox provides basic functions for applications in water treatment. It has a fixed configuration with the following features.

Summary of advantages:

- Measured variables pH and ORP (can be changed on the controller)
- Operation independent of the operating language (use of abbreviations, such as CAL, PARAM, CONFIG, ERROR)
- Illuminated display
- 3 LED display operating state (relay 1 / 2 active, Error)
- Sensor monitoring for pH
- P and PID control characteristics
- Selectable control direction (raise or lower measured value)
- Pulse frequency relay for control of metering pump
- Power relay can be configured as an alarm, limit value or pulse width modulated control output for metering pumps (connection function or switch on operating voltage)
- Analog output 4-20 mA can be configured as a writer output or control output
- Digital input to switch off the control or to process a sample water limit contact by remote control
- Temperature sensor input (Pt 1000) for temperature compensation of the pH and chlorine value

Applications

- Waste water treatment
- Treatment of drinking water
- Swimming pool water treatment

Technical Data

Measurement range:	pH: 0.00 - 14 ORP: -1000 - +1000 mV
Resolution:	pH: 0.01 pH ORP: 1 mV
Correction variable:	Temperature for pH via Pt 1000
Correction range:	32 - 248 °F, (0 - 120 °C)
Control characteristic:	P/PID
Control:	1-way controller with selectable control direction (raise/lower)
Signal current output:	1 x 4-20 mA galvanically isolated max. load 400 Ω Range and assignment (measured or actuating variable) can be set
Control outputs:	1 pulse frequency output for control of the metering pump 1 relay (alarm or limit value relay or pulse length control) 1 x analog output 4-20 mA
Electrical connection:	90 - 253 V ~
Ambient temperature:	14 - 140 ° F, (-10 - +60 °C)
Enclosure rating:	IP 67
Dimensions:	135 x 125 x 75 mm (H x W x D)
Weight:	1.10 lbs, (0.5 kg)

	Part no.
Compact controller for pH/ORP	1035638

ProMinent® DMT Transmitters

Overview: DMT

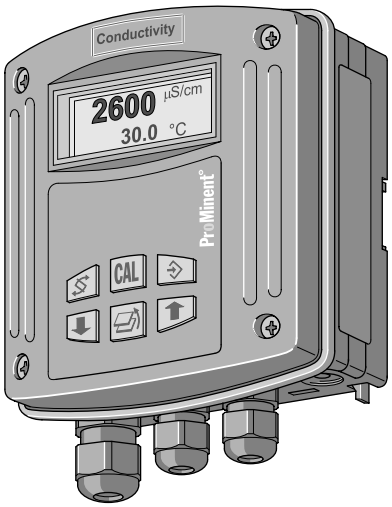
DULCOMETER® DMT type transmitters are compact 2-wire transmitters for measured variables pH, redox, chlorine, conductive conductivity, temperature.
Easily combined with programmable memory controllers.

Summary of advantages:

- Reliable measurement
- High level of operating safety, e.g. probe monitoring (pH), electrical isolation
- Simple flexible installation
- Full text user guidance
- Automatic buffer recognition (pH)
- Autoranging (conductivity)
- Compact design
- Switch between pH, redox and temperature

Applications: **process control, food and beverage industry, chemical and pharmaceutical industries, water treatment, waste water treatment, power plant**

Technical Data



pk_5_001

Measurement range:	pH -1.00 - 15.00 -1200…+1200 mV redox voltage 0.01…50.0 ppm/l chlorine -20 - +150 °C 1 µS/cm - 200 mS/cm (autoranging)
Cell constant:	0.006…12.0/cm for conductivity
Resolution:	pH 0.01 1 mV 0.1 % from measurement range for chlorine 0.1 °C Conductivity 1/1000 of display value (min. 0.001 µS/cm)
Reproducibility:	0.5 % from measurement range
Measurement input:	mV terminal (pH, redox); input resistance >5 x 10^{11} Ω Chlorine terminal (DMT chlorine probes) Pt 100/1000 terminal Conductivity terminal (2 or 4 wire connector)
Correction variable:	Temperature via Pt 100/1000 (pH, chlorine, conductivity)
Correction range:	chlorine: 5 - 45 °C, pH: 0 - 100 °C, Cond: 0 - 100 °C
Current output:	4 - 20 mA, fault current 23 mA
Supply voltage:	16 - 40 V DC
Feed voltage:	2-wire transmitter, 16 - 40 V DC, nominal 24 V PROFIBUS® DP version, 16 - 30 V DC, nominal 24 V communication interface:
Communication interface:	PROFIBUS® DP (wall-mounted version only)
Ambient temperature:	-5 - +55 °C
Climatic conditions:	up to 95 % relative humidity (non-condensing)
Enclosure rating:	IP 65 (wall/pipe mounted) IP 54 (control panel installation)
Display:	graphical display
Housing:	PPE
Dimensions:	125 x 135 x 75 mm (WxHxD)
Weight:	approx. 450 g

A complete measuring station comprises the following:

- Measuring transducer DMTa (see Identcode)
- In-line probe housing: DGMa..., DLG III ..., immersible in-line probe housing
- Chlorine sensor
- Assembly set for chlorine sensor
- pH sensor
- Redox sensor
- Temperature sensor Pt 100 /Pt 1000
- Conductivity sensor
- Sensor cable
- PROFIBUS®-DP connection accessories

ProMinent® DMT Transmitters

Identcode Ordering System

DMT	Version:												
	A												
		Type of Mounting:											
		W	Wall mounted (also rail mounted)										
		S	Control panel installation[1]										
			Logo:										
			0	With ProMinent® logo									
				Electrical connection:									
				9	Ring main 4-20 mA (two wire technology), operating voltage 16-40 V DC, nominal 24 V DC								
				5	PROFIBUS® DP, operating voltage 16 - 30 V DC, nominal 24 V DC (only if communication interface = PROFIBUS® DP)								
					Communication interface:								
					0	None							
					4	PROFIBUS® DP (assembly type W only)							
						Measured variable 1:							
						P	pH						
						R	Redox						
						T	Temperature						
						C	Chlorine						
						L	Conductivity						
							Measured variable 2 (Correcting value):						
							1	Temperature Pt 1000 / Pt 100					
							0	None (in the case of measured variable T)					
								Enclosure rating:					
								0	Standard				
									Language:				
									E	English			
										Presetting A, probe:			
										0	Standard ProMinent® buffer solution pH 4-7-10		
											Presetting B, probe:		
											0	Autom. Temperature measurement (standard)	
											1	Manual temperature measurement	
											2	Autom./manual temperature measurement	
											9	No temperature measurement	
												Presetting C, output:	
												0	Prop. Measured variable (standard)
												1	Manual adjustable current value
												2	Proportional or manual
												3	Proportional or manual hold
												4	4 mA constant current
													Presetting C:
													0 Standard
DMT	**A**	**W**	**0**	**9**	**0**	**P**	**1**	**0**	**E**	**0**	**0**	**0**	**0**

ProMinent® DDC Analyzers

Overview: DDC

pk_5_045

The Multi-channel Measuring and Control System DULCOMARIN® II has the following features:

- 5.7", 1/4 VGA color display for ease of operation
- Integrated data logger with screen recorder: Directly view the measured data on the controller
- SD card and card reader included: simply transmit measured data to the PC as standard
- Control of one to 16 drinking water systems or filtration circuits in swimming pools
- CAN bus system: Simple wiring and can be subsequently upgraded
- Visualization*: Simple with embedded web server* and standard web browser
- LAN port*: Simple connection to PC or PC network or internet
- Operation possible using Apple® iPod or iPad (WLAN access point needed)
- Intelligent sensors: with CANopen bus, save the sensor data and stay within the optimum measuring range thanks to auto ranging
- Intelligent metering pumps: using CANopen bus obtain information on operating parameters, such as for instance: chemicals levels and pump capacity in the metering range of 0.19-272 gph (0.74 - 1,030 l/h)
- Standby metering pump for disinfectant (automatic switchover in the event of low level and pump malfunction)

Area of application drinking water (and general applications)

Using a power input module (I module), the following measuring parameters can be measured via 4-20 mA and displayed. These values are also available on the data logger/screen recorder, the web and OPC server:

- Flow (as disturbance variable for pH and chlorine control)
- UV intensity
- Conductivity
- Chlorine dioxide
- Chlorite
- Ammonia
- Fluoride

Pt100 resistance thermometer via a transducer

Display and control of free chlorine and total available chlorine
OPC server*: Simple connection to superordinate visualization systems

*optional

Area of application swimming pools

Remote calibration possible using Apple® iPod or iPad (WLAN access point needed)
Energy and chemical savings thanks to new EcoMode
Integral filter control
Bound chlorine: is reliably minimized via controller output and corresponding systems
OPC server*: Simple connection to superordinate visualization systems
Control of pool temperature via standard temperature controller (Pt100x needed)
High chlorination or night setback by means of contact via second parameter set
The decentralized modular DULCOMARIN® II system is designed for use in public swimming pools in compliance with DIN 19643. The system can be configured to meet the demand for a compact DULCOMARIN® II compact system or as a decentralized modular system DULCOMARIN® II DULCO®-Net.

The areas of application are determined in the identcode

Every drinking water measurement system or every filtration circuit features its own on-site calibration option for all measured variables.

What is the Eco!Mode operating mode?

Eco!Mode enables the circulation capacity to be reduced if the DIN hygienic parameters pH, redox, free and bound chlorine are within the permitted limits.

A circulation pump with frequency converter with an analog input is needed for this.

This reduction can be enabled depending on the DIN hygienic parameters, time and activation via a remote control input. A combination of the criteria is also possible. If the DIN hygienic parameters can no longer be met, then the circulation capacity is raised again to nominal capacity.

Lowering the pump capacity saves energy, thereby reducing CO_2 emissions.

Furthermore, when a set redox potential is reached, for instance 780 mV, signaling good disinfection of the water, then chlorine metering is either reduced gradually or in one step. If the DIN hygienic parameters can no longer be met, then chlorine metering is raised again to its standard set point.

What is a web server?

A web server is a software application that is implemented by the DULCOMARIN® II.

The web server provides web pages with information about measurements, control, sensor calibration and controller configuration to a PC with web browser (e.g. Microsoft® Internet Explorer).

The web server can be used to provide simple visualization of the DULCOMARIN® II without special visualization software being needed on the PC. The web server is independent of the PC operating system.

The DULCOMARIN® II is connected to a PC via a LAN/Ethernet port and the connection can be made directly, via a network or via the internet. The cables needed for direct connection to a PC or network are included.

Commercially available standard network components can be used for the cabling, router and WLAN access points etc.

The same information is available via the web server as on the DULCOMARIN® II itself, for instance the set points of all control variables can be changes, the various controller can be switched off and the pool/system names can be entered. Exceptions to this are the controller settings and bus configuration that can only be entered directly on the controller itself.

What is OPC?

OPC stands for Openness, Productivity, Collaboration (formerly OLE for Process Control) and designates a uniform and manufacturer-independent software interface. OPC Data Access (OPC DA) is based on Windows technology COM (Component Object Model) and DCOM (Distributed Component Object Model). In contrast, OPC XML is based on the internet standards XML, SOAP, and HTTP.

OPC is used wherever sensors, controllers, and controls from various manufacturers are used to form a common, flexible network. Without OPC, two devices require precise knowledge of the communication options of the other device to be able to exchange data. Extensions and replacement are therefore correspondingly difficult. With OPC, an OPC-compliant driver for each device has to be written only once. Ideally this driver is provided by the manufacturer. An OPC driver can be integrated easily in any major control and monitoring system without needing much in the way of adaptation.

ProMinent provides an OPC server/driver for the Multi-channel Measuring and Control System DULCOMARIN® II.

The examples shown below are suitable for applications in drinking water treatment and swimming pool systems.

ProMinent® DDC Analyzers

Overview: DDC

The multi-channel measuring and control system DULCOMARIN®II is suitable to control 1 to 16 filtration circuits or drinking water systems. The following bus modules are available for the control:

M module (measurement and controlling):

- Measurement and control of the pH value
- Measurement and display (optional control) of the ORP
- Measurement and display of the temperature of the sample water
- Sample water monitoring
- Measurement of free chlorine
- Measurement of combined chlorine (optional, calculated from total chlorine and free chlorine)

Chlorine sensors:

- Measurement of free chlorine and temperature
- Measurement of total available chlorine and temperature
- Measurement of combined chlorine as differential chlorine measurement

A module (controlling of metering pumps, analog outputs):

- 3 frequency outputs to control metering pumps for pH correction, disinfection and flocculent metering
- 3 contact inputs to process pump alarm relays or tank fill level monitoring
- 4 freely programmable analog outputs 4-20 mA for pH, ORP, free chlorine, combined chlorine or temperature

P module (controlling of peristaltic pumps, power supply of bus modules):

- Power relay pulse length control for pH value (e.g. controlling of peristaltic pump)
- Power relay pulse length control of disinfectant (e.g. controlling of chlorine electrolysis plant)
- Power relay limit value output to minimize combined chlorine
- Alarm relay
- Power supply of bus modules

N module (power supply of bus modules):

- Power supply of bus modules with no further function

R module (controlling of chlorine gas metering units):

- Controlling of a chlorine gas metering unit and processing of a position feedback potentiometer (0-10 kΩ) (only possible as external module)

Metering pumps with CANopen interface of the type Beta®, delta®, Sigma/ 1, Sigma/ 2, and Sigma/ 3

- Direct connection to the bus
- When using Beta®/4aCANopen metering pumps, the A module is not required (provided no current outputs are required).

I module (current input module)

- 2 current inputs active/passive (e.g. to connect 2-wire measuring transducers)
- 1 current inputs passive (e.g. to connect a magnetically-inductive flow meter)
- 2 digital inputs for sample water alarm and pause control

G module (limit value and alarm module)

- 2 potential-free changeover relays to signal alarm states
- Connected to other unites via the main bus cable using the T-distributor and 0.5m CAN connection cable supplied

ProMinent® DDC Analyzers

Technical Data

Measurement range:	pH:	-1 - 15
	Redox:	-1200 - +1200 mV
	Chlorine free:	0.01 - 10 ppm
	Chlorine total:	0.01 - 10 ppm
	Combined chlorine:	0.01 - 2 ppm
Temperature:	Pt 100 or Pt 1000, 28 to 302 ºF (-20 to +150 °C)	
Resolution:	0.01 pH / 1 mV / 0.01 ppm / 0.1 °C	
Reproducibility:	0.5 % of the measurement range (at 25 °C)	
Measurement inputs:	pH and Redox via terminal mV Chlorine via CANopen Bus	
Control type:	P/PI/PID-control	
Control:	Acid or alkali, chlorine	
Digital inputs:	Voltage free inputs (sample water, pause, 3 pump faults	
Signal current outputs:	4 x 0/4-20 mA (electrically isolated for each measured variable) Max. burden 600 Ω , range adjustable	
Control outputs:	Reed contacts, acid, alkali and chlorine (pulse rate for actuation of metering pumps) 2 relays (pulse length) make/break switches for actuation of solenoid valves or peristaltic pumps 250 V~, 3 A	
Alarm relay:	250 V ~3 A, 700 VA make/break switches	
Interfaces:	LAN, RS 232 as configuration interfaces, SD-expansion slot (for SD cards)	
Power supply:	85 - 265 V~, 50/60 Hz	
Ambient temp. :	23 to 118ºF (-5 to 45 °C)	
Storage temp. :	14 to 158ºF (-10 to 70 °C)	
Enclosure rating:	IP 65	
Climate:	Admissible relative humidity: 95% non condensing DIN IEC 60068-2-30	
Dimensions:	342 x 227 x 78 mm (WxHxD)	

Guaranteed CANopen specifications, all devices:

All devices meet the standardized CAN specification for hardware 2.0 (ISO99-1, ISO99-2). This includes the CAN protocol (ISO 11898-1) and details about the physical application layer in accordance with ISO 11898-2 (high speed CAN to 1Mbit/sec.) and ISO 11898-3 (Low speed CAN to 125kBit/sec).

The device complies with the CAN-Open specification CIA-DS401, the basis of the European standard EN50325-4. It complies with the controller device profile CiA-404.

Identcode Ordering System

DULCOMARIN® II DXC range

DXCa	Mounting type									
	W	Wall mounted (IP 65)								
	S	Control cabinet (IP 54)								
		Version								
		0	with operating elements							
		D	with operating elements for use in drinking water/disinfection applications							
			Communication interfaces							
			0	None						
			5	Embedded Web Server, LAN including 5m LAN patch cable 1:1, LAN coupling, 5m crossover cable [1]						
			6	OPC server + embedded web server, LAN including 5m LAN patch cable 1:1, LAN coupling, 5m crossover cable [1]						
				Options						
				0	None					
				1	Videographic recorder with data logger including SD card and USB card reader for PC					
					Module 1:					
					M	M module, measurement module for pH, ORP, temperature				
					A	A module, control module: 3 pump and 4 analog outputs				
					I	I module, current input module, 3 mA, 2 digital inputs				
						Module 2:				
						0	Not in use			
						A	A module, control module: 3 pump and 4 analog outputs			
						M	M module, measuring module pH, ORP, temperature			
						I	I module, current input module, 3 mA, 2 digital inputs			
							Module 3:			
							P	P module, mains power module, 1 alarm relay, 3 solenoid valve relays		
							N	N module, mains power module without relay		
								Application:		
								S	Swimming pool	
								D	Drinking water/disinfection	
									Preset language:	
									EN	English
										Approvals:
										01 CE-mark
DXCa	**W**	**0**	**0**	**0**	**M**	**0**	**P**	**S**	**EN**	**1**

The Identcode describes the **DULCOMARIN® II compact** controller.

1 The supplied cable is intended for the connection to a hub, switch, router, or Internet.
For a direct connection of the DULCOMARIN® II to a PC/MAC, the supplied LAN coupling and the crossover cable cat. 5 are required.
The maximum LAN cable length is approx. 100 m.
To operate the Web server on a PC we recommend using Microsoft Internet Explorer 5 or higher as browser.
The folling components are supplied in the DXCa package:
1 T-distributor, 1 connecting cable CAN,
1 termination resistor coupling and
1 termination resistor plug,
1 SC card, 1 card reader for PC.

Important note when ordering multi-channel measuring and control systems for drinking water and pool water applications:

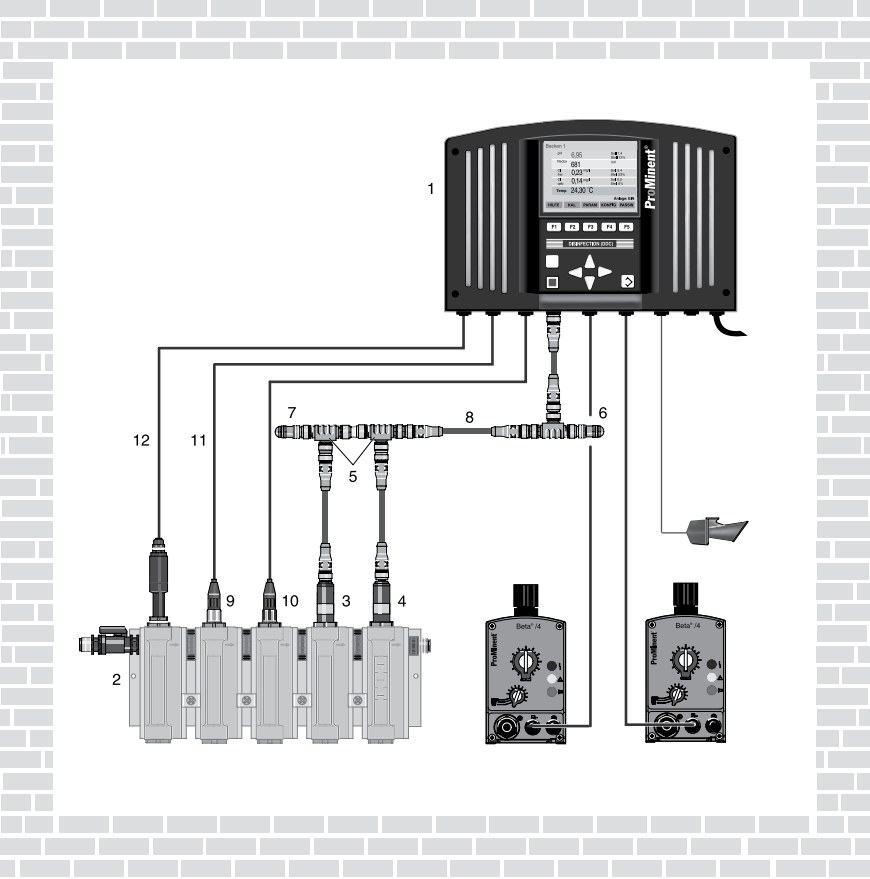
Drinking water application: In the identcode, a "D" for "Drinking water/disinfection" must be selected under "Version" and "Application". The description "System" will appear in the controller menu for the different drinking water lines.

Swimming pool water applications: In the identcode, a "0" for "with operating elements" must be selected under "Version" and the an "S" for "Swimming pool" under "Application". The description "Tank" will appear in the controller menu for the different filter circuits.

All adjustment options and the use of the different modules are identical with both applications.

ProMinent® DDC Analyzers

Configuration



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The measurement and control system shown above for a single system comprises the following components (without metering equipment):

Item	Quantity	Name	Part No.
1	1	DULCOMETER® (DDC) central unit with actuator and measurement modules DXCa W 0 0 0 M A P 0 EN 01	
2	1	DULCOTEST® in-line probe housing DGMa 3 2 2 T 0 0 0	
3	1	Chlorine sensor CTE 1-CAN-10 ppm	1023427
4	1	Chlorine sensor CLE 3.1-CAN-10 ppm	1023426
5	3	T-distributors M12 5 pole CAN	1022155
6	1	Load resistor M12-coupler	1022154
7	1	Load resistor M12-plug	1022592
8	5	Connecting cable - CAN M12 5 (pole). 1.5 ft (0.5 m)	1022137
9	1	pH electrode	As per application
10	1	Redox electrode	As per application
11	2	Coaxial cable, 6 ft. (2 m) - SN6 - pre-assembled*	1024106
12	6 ft. (2 m)	2 wire cable	7740215

* other lengths available

DULCO®-Net

The DULCOMETER® (DDC) DULCO®-Net control system uses the CANopen – BUS as the medium for transmission of the data between the measurement and actuator units and the sensors and the central unit.

In its maximum expanded form the system can control up to 16 systems, i.e. 16 measurement units and 16 dosing units and corresponding sensors can be operated from a single central unit.

For this purpose a central unit is combined with the number of measurement and dosing units required for the application.

A M12 T-distributor is required for connection to any CANopen device (sensors module, actuator module, metering pumps and chlorine sensors). This connects the device to the main bus via a stub cable.

The sum of the lengths of all stub cables in a CANopen system cannot exceed 45 ft. (15 m.)

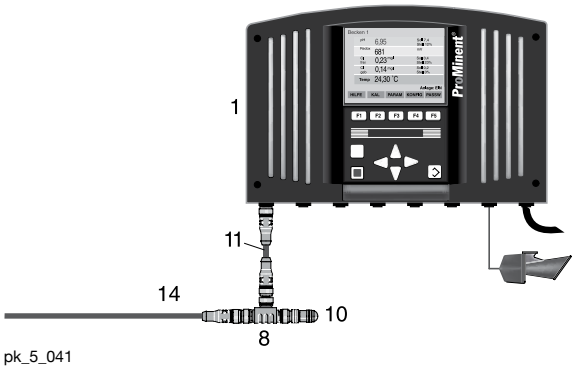
DULCOMETER® (DDC) DULCO®-Net and compact can both be easily expanded later.

What components make up a DULCOMETER® (DDC) DULCO®-Net system?

A DULCOMETER® (DDC) DULCO®-Net system comprises:

- One central unit **and** an individual combination of the following components:
- Measurement unit
- Dosing unit without main power module
- Dosing unit with main power module (optional)
- Chlorine gas dosing unit

Central unit



pk_5_041

The central unit can be installed anywhere, e.g. in a control room or in the office. It serves as an input/output module (for viewing and configuring individual modules) and has the following functions: screen recorder, interface, Embedded Web Server and power supply. The central unit may optionally incorporate a sensor and an actuator module. The central unit is connected with the other units via the main Bus. CAN connection cables are used for this purpose. The main Bus of the first unit must be connected with a M 12 load resistor coupling and the final unit with a M 12 load resistor plug.

A unit always consists of a module, a T-connector and a CAN stub connection cable, 1.5 ft. (0.5 m) long.

The central unit in the above example comprises the following components:

Item	Quantity	Name	Part No.
1	1	DULCOMETER® (DDC) Central unit DXCa W 0 5 1 M A P 0 EN	
8	1	T-distributor M12 5 pole. CAN	1022155
1	1	Connecting cable - CAN M12 5 pole. 0.5 m	1022137
14	1	Connecting cable - CAN M12 5 pole 5 m	1022141
10	1	M 12 load resistor coupling	1022154

ProMinent® DDC Analyzers

DULCO®-Net

The multi-channel measuring and control system DULCOMARIN®II DULCO®-Net in the maximum configuration can control 16 drinking water systems/filtration circuits, i.e. the required external modules for 16 pools can be connected to the central unit and operated. The following options are given.

Measurement and controlling of:

- Up to 16 times:
- pH value
- ORP
- free chlorine
- combined chlorine (calculated)
- Temperature of the sample water

Additionally in the drinking water application (via I module):

- Flow rate (as disturbance for pH and chlorine control)
- UV intensity
- Conductivity
- Chlorine dioxide
- Chlorite
- Ammonia
- Fluoride
- Pt100 resistance thermometer via transducer

Other inputs and outputs:

Up to 16 times:
3 frequency outputs to control metering pumps for pH correction, disinfection and flocculent metering
3 contact inputs to process pump alarm relays or tank fill level monitoring
4 freely programmable analogue outputs 0/4-20 mA (for pH, ORP, free chlorine, combined chlorine or temperature)
3 power relays pulse length control of pH value, of the disinfectant and minimization of combined chlorine (e.g. controlling of a peristaltic pump and chlorine electrolysis plant and UV plant)
Controlling of a chlorine gas metering unit
3 Beta®/4CANopen metering pumps

Developed by Bosch and known from the automotive industry, the very fail safe CAN bus with CANopen protocol is used to transfer data between the different bus modules. The maximum length of the main bus train is 400 meters.
For connecting any bus module (M module, A module, P module, N Module, Beta®/4CANopen metering pumps and CAN chlorine sensors), a T-distributor is used which connects the units with the main bus train via a spur line.
T-distributor and spur line are included in the modules' delivery scope.
All bus modules are supplied with 24 V operating voltage via the CAN bus (except Beta®/4CANopen metering pumps, P modules, N modules. These require a separate power supply).
For this reason, additional P or N modules that supply operating voltage for the bus modules on the bus are required depending on the size of the installation (number of filtration circuits to be controlled). The central unit always includes a power supply unit (N or P module).

How many additional N or P modules do you require?

Number filtration circuits	Additional N or P modules	Number filtration circuits	Additional N or P modules
1	-	9	4
2	-	10	5
3	1	11	5
4	2	12	6
5	2	13	6
6	3	14	7
7	3	15	7
8	4	16	8

The DULCOMARIN®II compact and DULCO®-Net can be upgraded subsequently by simply connecting bus modules

ProMinent® DDC Analyzers

DULCO®-Net

Which components are included in a DULCOMARIN®II DULCO®-Net system?

A DULCOMARIN®II DULCO®-Net system consists of one:

Central unit DXCa with controls and the individual combination of the following components:

M module: DXMaM (measurement and controlling)

A module: DXMaA (controlling of metering pumps, analog outputs)

P module: (module in DXCa housing to supply power to modules and alarm relays, power relays to control e.g. peristaltic pumps)

N Module: DXMaN (power supply of external modules with no further function)

R module: DXMaR (controlling of chlorine gas metering units with position feedback processing)

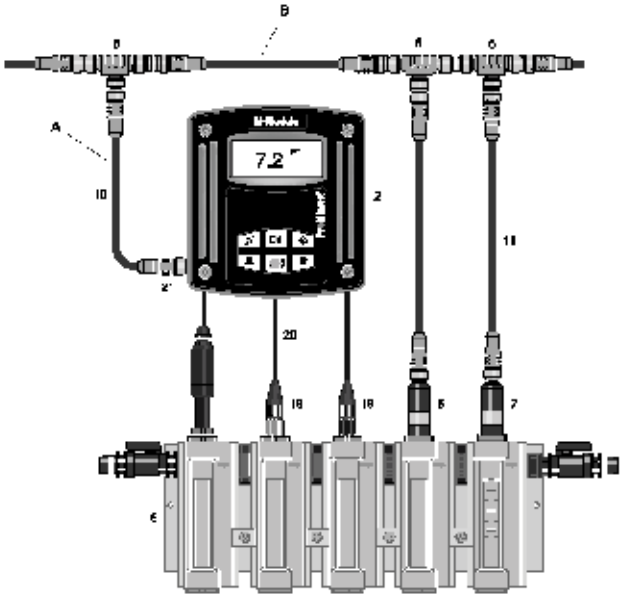
I module: (processing of sensor signals above 4-20 mA)

The maximum main bus length is 16 inches!

ProMinent® DDC Analyzers

M Module (Measuring Module)

A Stub cable
B Main BUS cable



pk_5_042

The M module with its illuminated graphic display and keypad displays the measured values and allows all sensors for the corresponding filter circuit to be calibrated on site.

The following measurements can be taken:

- pH value
- ORP potential
- **free chlorine** and **total available chlorine** (optional or combined chlorine is (calculated) and **sample water temperature using the temperature probe in the chlorine sensor or optionally using a separate Pt100/Pt1000 resistance thermometer**

The M module has 3 digital inputs for:

- sample water monitoring
- controlling breaks in filter backwashing
- Parameter changeover for Eco!Mode
- The M module is connected to the other bus modules via the main bus cable, using the T-distributor supplied and the 0.5 m CAN connection cable.

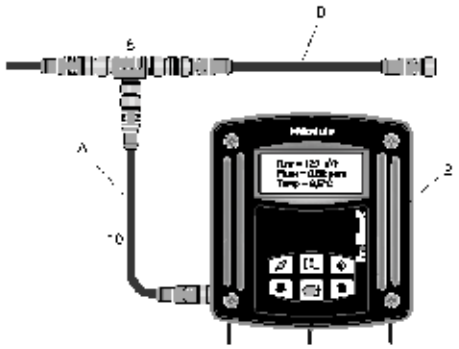
The M module in the above example comprises the following components:

Item	Number	Name	Part No.
2	1	M module DXMa M W 0 S EN 01	DXMa M W 0 S DE 01
5	1	In-line probe housing DGMa 3 2 2 T 0 0 0	DGMa 3 2 2 T 0 0 0
6	1	Chlorine sensor CTE 1-CAN-10 ppm	1023427
7	1	Chlorine sensor CLE 3.1-CAN-10 ppm	1023426
8	3	T-distributors M12 5 pole CAN	included in delivery
10	1	Connecting cable - CAN M12 5 (pole) 0.5 m	included in delivery
11	2	Connection cable - CAN M12 5 (pole) 0.5 m	included in delivery
18	1	pH sensor PHES 112 SE PHES 112 SE	150702 150092
19	1	ORP sensor RHES-Pt-SE	150703
20	2	Cable combination coax 2m-SN6-pre-assembled*	1024106
21	2m	Signal lead, sold by the meter 2 x 0.25 mm^2 Ø 4 mm	725122

* other lengths available

I Module (Current Input Module)

A Stub cable
B Main BUS cable



AP_DC_001_SW

The I module with its illuminated graphic display and keypad is a current input module capable of processing 3 standard signals from sensors and two digital signals.

It can be used together with the multi-channel controller DULCOMARIN® II in drinking water and swimming pool applications. All measured variables are available in the screenwriter and web and OPC®server.

Two analog inputs are provided as 2-wire inputs and one as passive input.

The inputs can process the following values as 4-20 mA standard signals:

- Turbidity
- Flow
- UV intensity
- Conductivity (via DMTa transducer)
- Chlorine dioxide*
- Chlorite
- Ammonia
- Fluoride
- Pt100 resistance thermometer via a transducer
- Dissolved oxygen
- Hydrogen peroxide *

The I module has 2 digital inputs for:

- sample water monitoring and
- pause control

The flow information can be used as an interference variable for the control of chlorine, pH correction and chlorine dioxide.

* these measured variables can also be controlled

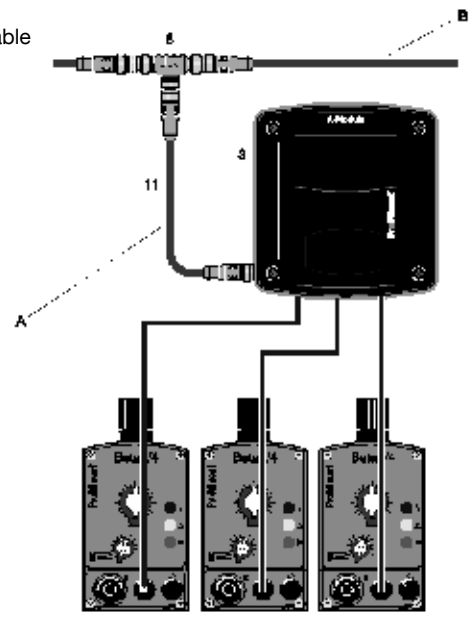
The I module is connected to other bus modules via the main bus cable using the T-distributor and 0.5 m CAN connection cable supplied.

The I module in the above example consists of the following components:

Item	Number	Name	Part No.
2	1	I module DXMa I W 0 D EN 01	-
8	1	T-distributors M12 5P CAN	included in delivery
10	1	Connecting cable - CAN, M12, 5 (pole), 0.5 m	included in delivery

Actuator Module

A Stub cable
B Main BUS cable



pk_5_043

The A module permits the control of up to three metering pumps via pulse frequency. Possible metering combinations are:

- pH lowering and disinfectant and flocculent or
- pH raising and disinfectant and flocculent or
- pH lowering and pH raising and disinfectent

It includes 3 digital inputs to evaluate the alarm relay of metering pumps, 4 freely programmable standard signal outputs 0/4-20 mA to document measured values, or as control outputs.

For this connection, the T-distributor and the CAN connecting cable 0.5 m include in the scope of delivery are used.

To be noted: If Beta®/4CANopen metering pumps are used, no A modules are required!

The A module in the above example consists of the following components (without metering equipment):

Item	Quantity	Designation	Order No.
3	1	A module DXMa A W 20 00 01	
8	1	T-distributor M12 5P CAN	included in delivery
11	1	Connecting cable - CAN M12 5 (pole) 1.5 ft. (0.5 m)	included in delivery

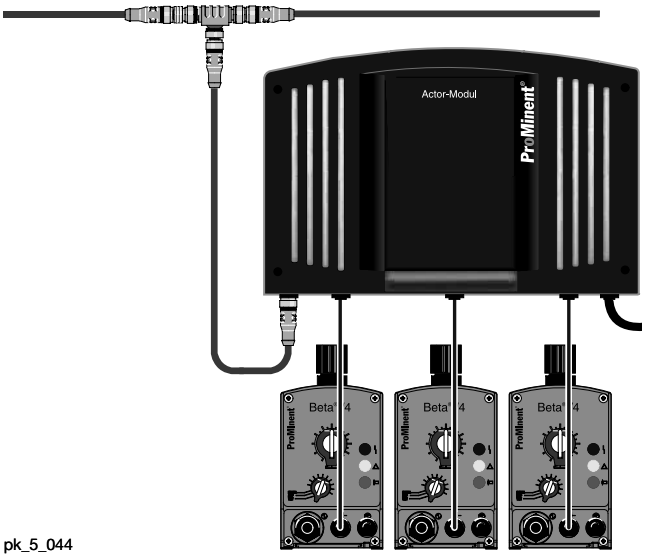
The A module is connected to other units via the main bus train.

For connection to units which are not electrically isolated (e.g. PLC), an isolating amplifier, e.g. order no. 1033536, is required!

The Combination Module

Actuator module with power supply:

A Stub cable
B Main BUS cable



pk_5_044

Combination A module and P module

Up to three different modules can be connected to the combination module (DXCa without controls). The function of the combination module is based on the function of the individual modules (see description above). The modules in the combination module are operated via the DXCa central unit.

The module is connected to the other bus modules via the main bus cable using the T-distributor supplied and the 0.5 m CAN connection cable.

See the table below for the various fitting options:

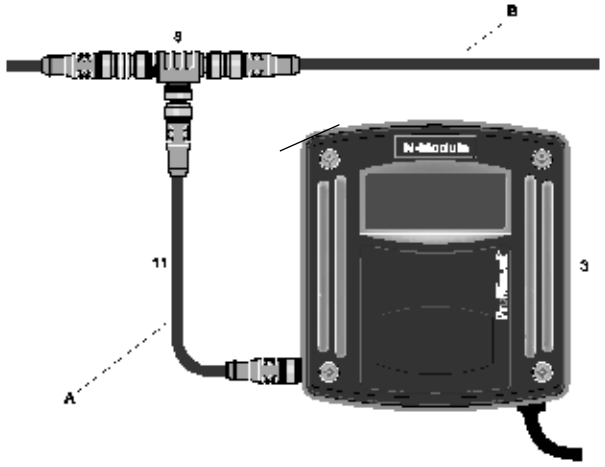
Module position 1	Module position 2	Module position 3
M module	M module	P module
M module	M module	N module
A module	A module	P module
A module	A module	N module
M module	A module	P module
M module	A module	N module

The combination in the above example consists of the following components (without chemical fluid handling):

Item	Number	Name	Order No.
3	1	Control module DXCa W 2 0 0 0 A P S 00 01	
8	1	T-distributor M12 5 pole CAN	included in delivery
11	1	Connecting cable - CAN M12 5 pole 1.5 ft. (0.5 m)	included in delivery

N Module (Power Supply Module)

A Stub cable
B Main BUS cable



pk_5_043_C_power

The N module (power supply) is used to supply the bus modules with power and has no further function.

The number of N modules required can be seen from the table below. If P modules are used in a system, the number of N modules is reduced accordingly. The central unit always includes a power supply unit (N or P module).

How many additional N or P modules do you require?

Number filration circuits	Additional N or P modules	Number filtration circuits	Additional N or P modules
1	-	9	4
2	-	10	5
3	1	11	5
4	2	12	6
5	2	13	6
6	3	14	7
7	3	15	7
8	4	16	8

The N module requires power supply for operation and is connected to the other bus modules via the main bus train. For this connection, the T-distributor and the CAN connecting cable 0.5 m included in the scope of delivery are used.

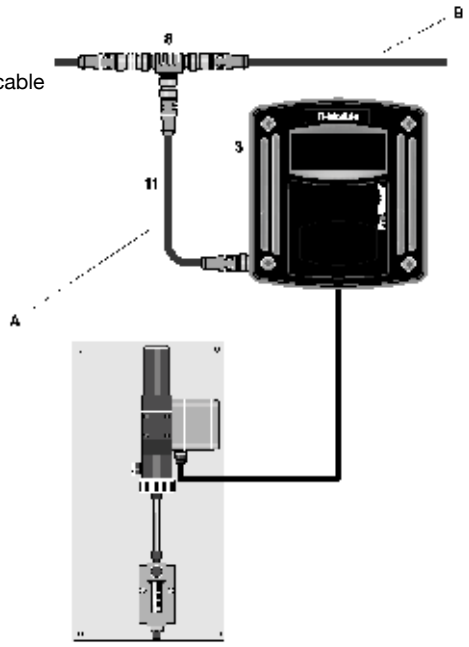
The power module in the above example comprises the following components:

Item	Number	Designation	Part No.
3	1	Power-module DXMa N W 2 0 00 01	
8	1	T-distributor M12 5 Pol. CAN	included in delivery
11	1	Connecting cable - CAN M12 5 (pole) 1.5 ft. (0.5 m)	included in delivery

If you have any questions, please contact our sales department.

R Module (Control Module For Chlorine Gas Metering Units)

A Stub cable
B Main BUS cable



pk_5_043_C_power

The R module permits the control of chlorine gas metering units which are equipped with a position feedback potentiometer.

It includes 2 power relays for opening and closing and an input for a position feedback potentiometer 1-10 kΩ.

The R module is connected to other units via the main bus train.

For this connection, the T-distributor and the CAN connecting cable 0.5 m included in the scope of delivery are used.

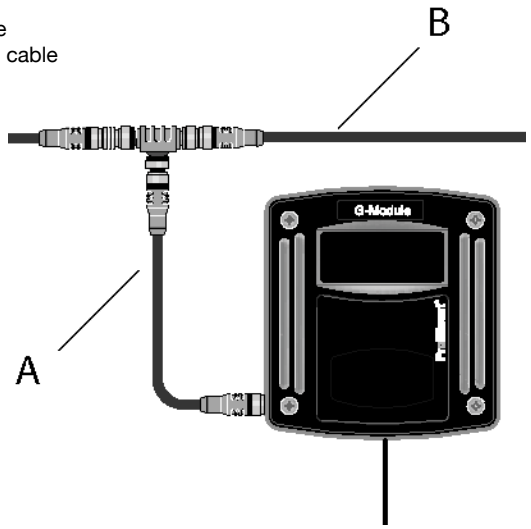
The R module in the above example consists the following components (without chlorine gas metering unit):

Item	Number	Designation	Part No.
3	1	R module DXMa R W 2 0 0 0 01	
8	1	T-distributor M12 5 P CAN	included in delivery
11	1	Connecting cable - CAN, M12, 5 (pole) 1.5 ft. (0.5 m)	included in delivery

If you have any questions, please contact our sales department.

G Module (Limit Value and Alarm Module)

A Stub cable
B Main BUS cable



P_DM_0024_SW3

The G module is a limit value and alarm emitting module with 2 potential-free changeover relays to signal alarm states. Each of the two relays has ten different setting options to monitor measured values for minimum and maximum values and, should the values exceed or fall below these limits, this then effects the relay. Both relays have the same setting options, thereby enabling for pre-warnings or shutdowns to be generated by the use of different delay periods.

The G module is connected to the other units via the main bus cable using the T-distributor and 0.5m CAN connection cable supplied.

The G module in the above example consists the following components:

Item	Number	Designation	Order No.
3	1	G module DXMa R W 2 0 0 0 01	
8	1	T-distributor M12 5 pin CAN	included in delivery
11	1	Connecting cable - CAN, M12, 5 pin 1.5 ft. (0.5 m)	included in delivery

If you have any questions, please contact our sales department.

Identcode Ordering System CANopen Modules

Measurement Module for DULCOMARIN® II Series DXM

DXMa	Module:						
	M	M module, measuring module: pH, ORP, temperature					
	A	A module, control module: 3 pump and 4 analog outputs					
	R	R module, control module: chlorine gas metering unit with feedback					
	N	N module, mains power module without relay					
	P	P module, mains power module with relay, only mounting type "O"					
	I	I module, current input module, 3 mA inputs, 2 digital inputs					
	G	G module					
		Installation:					
		0	No housing, only P module (IP 00)				
		W	Wall mounting (IP 65)				
		E	Retrofit module (installation module for DXCa, IP 20)				
			Version:				
			0	With controls (only M module, mounting type W)			
			2	Without controls			
			3	Without controls (only mounting type "E" and "H"			
				Application:			
				0	Standard		
				S	Swimming pool (only M module)		
				D	Drinking water/disinfection (only I module)		
					Language default:		
					EN	English	
						Approvals:	
						00	No approval, only P module without housing
						01	CE mark
DXMa	**M**	**0**	**0**	**0**	**EN**	**0**	

Please note the following:

Upgrade modules for existing systems require a software update for the existing system. A Software Update Kit is needed to avoid any possible incompatibility between the different modules.

The update kit is free of change and one is also needed when ordering more than one upgrade module. The kit includes a SD memory card with the current software for the DULCOMARIN II and a description about how to perform the software update.

	Order No.
Update kit/DXC and modules	1031284

ProMinent® DDC Analyzers

Spare parts and upgrade sets

Internal spare parts and upgrade sets for the DULCOMARIN® II cannot be ordered using the part number printed on the modules!

Modules have to be fully replaced (the exception to this is the N module).

The electrical unit for the central unit can only be replaced by a complete processor spare part.

Please use only the following identcodes when ordering identcodes:

Replacement central units

Replacement central unit: DXCAC001000#DE01 (without communications interface, # = please state "S" for applications in swimming pools and "D" for applications relating to drinking water).
Replacement central unit: DXCAC051000#DE01 (with web server, # = please state "S" for applications in swimming pools and "D" for applications relating to drinking water).
Replacement central unit: DXCAC061000#DE01 (with OPC and web server, # = please state "S" for applications in swimming pools and "D" for applications relating to drinking water).

External modules (replacement or upgrade modules):

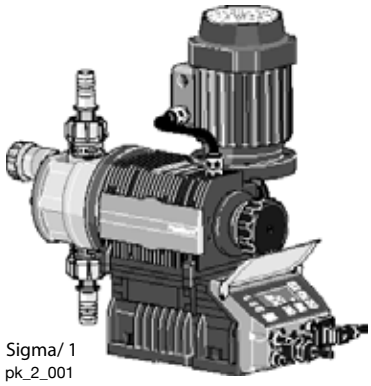
- M module: DXMa M W 0 S EN 01 (with display)
- A module: DXMa AW2 0 00 01 (without display)
- N module: DXMa N W 2 0 00 01 (without display)
- R module: DXMa R W2 0 00 01 (without display)
- G module: DXMa G W2 0 00 01 (without display)
- P module: DXCa W 2 00 00 PS 00 01 (without display in large DXC housing)
- I module: DXMa I W 0 D D E 01 (with display)
- I module: DXMa I W 2 D 0 0 0 1 (without display)

Internal modules (replacement or upgrade modules):

M M module: DXMa M E3S 00 01
M A module: DXMa A E30 00 01
M P module: DXMa P03 00 00
M I module: DXMa I E 3 D 00 01
M N module: Order no. 732485, electrical set DXMaN 24 V/1A

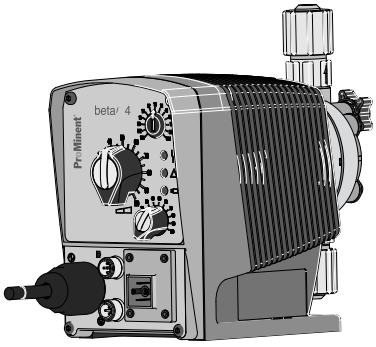
ProMinent® DDC Analyzers

Diaphragm Metering pumps compatible with CANopen bus



Sigma/ 1
pk_2_001

CANopen bus interface for DULCOMARIN® II
Feed rate range 0.19-9 gph (0.74-34 l/h), 29-232 psi (2-16 bar)
Stroke length continuously adjustable between 0-100% (recommended 30-100%)
Transmission of the stroke length setting from DULCOMARIN II
Material versions PP, plexiglass/PVC
Patented coarse / fine bleed valve for PP and plexiglass/PVC
Self-bleeding liquid end version in PP and plexiglass/PVC
Port for 2-phase level switch
Version for extra-low voltage 12/24 V DC, 24 V AC
4 LED display for operation, warning and error messages
Alarm for stroke length changes > ± 10%
Transmission of level alarm without alarm relay via the bus



P_BE_0002_SW
Beta®

P_DE_0002_SW
delta®

Number and type of modules required for a given number of pools

Number filtration circuits	Central unit DXCa	P module	M module	A module	Additional N or P module (power supply	Sensor free chlorine unit)	Sensor total chlorine - (optional)
1	1	1	1	1	-	1	1
2	1	1	2	2	-	2	2
3	1	1	3	3	1	3	3
4	1	1	4	4	2	4	4
5	1	1	5	5	2	5	5
6	1	1	6	6	3	6	6
7	1	1	7	7	3	7	7
8	1	1	8	8	4	8	8
9	1	1	9	9	4	9	9
10	1	1	10	10	5	10	10
11	1	1	11	11	5	11	11
12	1	1	12	12	6	12	12
13	1	1	13	13	6	13	13
14	1	1	14	14	7	14	14
15	1	1	15	15	7	15	15
16	1	1	16	16	8	16	16

* No A module if metering pumps with CANopen are used.
The avove modules include all CAN bus connecting elements (T-distributor and spur line).
The T-distributors can also be directly coupled.
For distributed systems, CAN cable must be ordered by the meter with the by the meter connecting kit.

	Order no.
CAN (by the meter) - connection kit*	1026589
Connecting cable - CAN (by the meter)*	1022160

* The CAN by-the-meter connecting kit consists of a CAN coupling M12 5P and a CAN connector M12 5P and a wiring diagram.
The by-the-meter connecting cable can be configured into a cable of individual length using the CAN by-the-meter connecting kit.
One CAN by-the-meter connecting kit is required for each cable to be configured.
The connecting cables CAN M12 5P 0.5m ?(pump 1 m) supplied with the sensors and modules must be used for the spur lines.

If you have any questions, please contact our sales department.

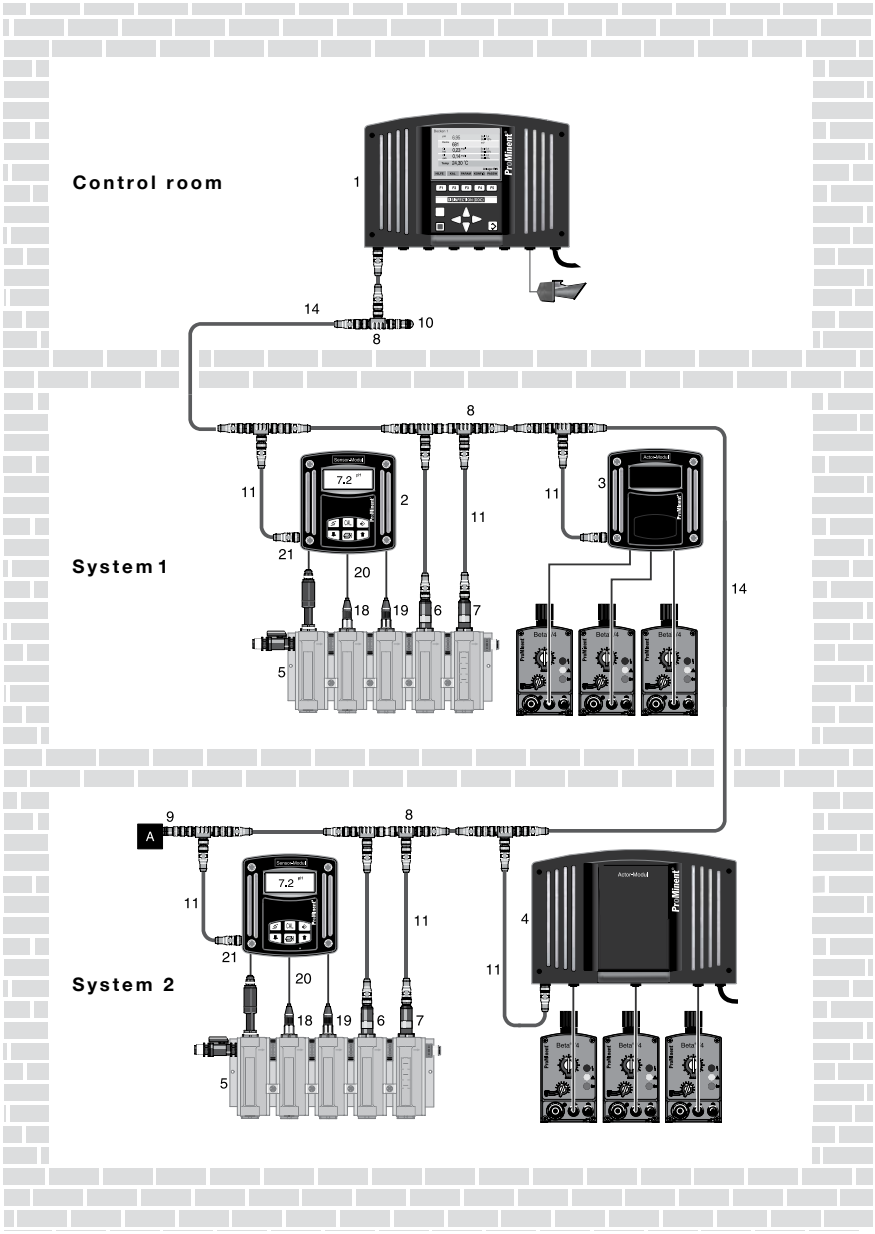
Caution:

The maximum main bus length (not including stubs) may be 400 m at the most.

ProMinent® DDC Analyzers

Complete System

Example of configuration for two control systems:



pk_5_022

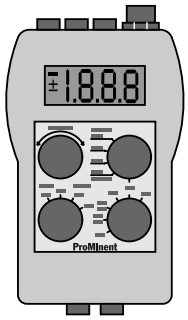
ProMinent® Measurement Simulator

Overview: Simulator

- Simulation of pH and mV signals
- Simulation of Pt 100/Pt 1000 (25 °C and 80 °C)
- Simulation and measurement of mA signals

Applications:
testing DULCOMETER® devices, service and laboratory

Technical Data



pk_5_108

Measurement range U_+:	5…30 V DC (measures the supply voltage for external passive 4…20 mA transmitters)
Simulation:	pH 2.00…12.00 ±1000 mV 0…20 mA Pt 100, Pt 1000 (25 °C and 80 °C)
Simulation output:	SN6 banana socket
Battery:	9 V battery pack
Operating life:	Approx. 150 hours
Weight:	Approx. 265 g (with battery)
Enclosure rating:	IP 20
Ambient temperature:	0…40 °C
Accessories:	9 V battery, signal lead kit

	Part No.
	1004042

ProMinent® Portable DT Photometer

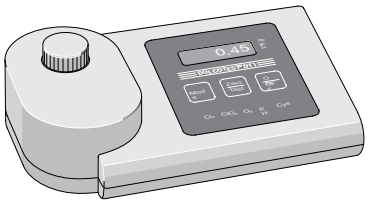
Overview: Photometer

Photometer DT1, DT2, DT3 and DT4

- Portable compact Photometer
- Simple to operate with support text
- Reliable, simple measurement of chlorine, chlorine dioxide, fluoride, chlorite, H_2O_2, bromine, ozone, pH and cyanuric acid
- Self-diagnostic

Applications:
swimming pool, drinking water, process water

Technical Data


pk_5_021

Measurement range of DT1:	0.05…6.0 mg/l free chlorine (DPD 1) + total chlorine (DPD3) 0.1…13.0 mg/l bromine (DPD 1) 0.05…11 mg/l chlorine dioxide (DPD 1) 0.03…4.0 mg/l ozone (DPD 4) pH 6.5…8.4 (phenol red) 1…80 mg/l cyanuric acid
Measurement range of DT2B:	0.05…2.0 mg/l fluoride 0.05…6.0 mg/l free chlorine and total chlorine 0.05…11.0 mg/l chlorine dioxide
Measurement ranges, DT3:	1 - 50 / 40 - 500 mg/l hydrogen peroxide
Measurement ranges, DT4:	0.03 - 2.5 mg/l chlorite, 0.05 - 11 mg/l chlorine dioxide, 0.05 - 6 mg/l chlorine
Measuring tolerance:	Dependent upon measured value and measuring method
Battery:	9 V battery (approx. 600 x 4-minute measurement cycles)
Ambient temperature:	41 - 104° F (5 - 40 °C)
Relative humidity:	30 - 90 % (non-condensing)
Housing material:	ABS
Keypad:	Polycarbonate
Dimensions:	7.5 x 4.3 x 2.2 in (190 x 110 x 55 mm (LxWxH))
Weight:	approx. 1 lb. (0.4 kg)

	Part No.
Type **DT1 photometer**, complete with carrying case	1003473
Type **DT2B photometer**, complete with carrying case	1010394
Type **DT3 photometer**, complete with carrying case	1023143
Type **DT4B photometer**, complete with carrying case	1039318

Photometers supplied with accessories, container vessels and reagents.

Consumable items:	**Part No.**
DPD 1 buffer, 15 ml	1002857
DPD 1 reagent, 15 ml	1002858
DPD 3 solution, 15 ml	1002859
Phenol red tablets R 175 (100 in each)	305532
Cyanuric acid tablets R 263 (100 in each)	305531
SPADNS reagent, 250 ml for fluoride detection	1010381
Calibration standard fluoride 1 mg/l for calibration of photometer (fluoride detection)	1010382
3 spare cells: round cells with covers for DPD phenol red and cyanuric acid detection (DT1 and DT2B)	1007566
3 spare cells for fluoride detection (DT2A and B)	1010396
DPD reagents set, 15 ml each: 3 x DPD 1 buffer, 1 x DPD 1 reagent, 2 x DPD 3 solution	1007567
Chlorine dioxide tablets Nr. 1 R 127	501317
Chlorine dioxide tablets Nr. 2 R 128	501318

Spare parts

Chlorite meter:

Foamer for expulsion of chlorine dioxide (DT4)	1022754
3 No. spare cuvettes for chlorite determination	1007566

H_2O_2 meter:

Reagent for H_2O_2 (DT3), 15 ml	1023636
Spare cuvettes, 5 No., for H_2O_2 (DT3)	1024072

ProMinent® Cooling Tower & Boiler Controllers

MicroFLEX Controllers

ProMinent's microFLEX controller is the perfect economical solution that provides the latest in water management technology for Cooling Towers and Boilers. The microFLEX water treatment controller offers a worry-free thermal flow switch that does not require any user adjustments. It also integrates built-in diagnostics with real-time monitoring in a compact design (5.9"W x 5.9"H x 3.5"D).

Features

- **Models:** Boiler, Cooling, Condensate diverter, Closed loop – reverse conductivity
- **Inhibitor Modes:** Bleed & Feed, Bleed then Feed, Percent Time, Meter Volume
- **Inputs:** Conductivity, Meter, System status
- **Outputs:** Two Powered Relays
- **Standard:** Single point calibration, 2 Line – 16 Character LCD, Built-In Diagnostics NEMA 4X Enclosure, CE Approved, 5 Key Universal Keypad
- **Options:** Web Browser Interface for remote view and configuration or Dry contact alarm or 4-20mA out on conductivity

Identcode Ordering System

M02	Series Version:					
	A	MicroFLEX 2 Controller Version A: Two relay controller with conductivity and temperature inputs, single inhibitor feed based on water meter input, bleed or % time with overfeed protection, flow switch/status input, 2 line display and 5 key universal keypad.				
		Application:				
		COIN	Cooling Tower			
		BBIN	Boiler			
		CLAH	Closed loop reverse conductivty			
		CMAH	Condensate monitor			
			Expansion Option:			
			XX	None		
			CL	4-20 mA output on conductivity		
			LB	Ethernet networking		
			AR	Dry contact alarm relay		
				Remote communications:		
				0	None	
					Approvals:	
					01	Standard
M02	**A**	**COIN**	**XX**	**0**	**01**	

ProMinent® Cooling Tower & Boiler Controllers

SlimFLEX Controllers

ProMinent's SlimFLEX water treatment controller provides the latest in water management technology. With available options, the SlimFLEX controller is designed to provide the highest degree of control and flexibility with low cost.

Features

- Model: Cooling Tower - four powered relays: Inhibitor, bleed & two timed biocides
- Inhibitor Modes: Bleed & Feed, Bleed then Feed, Percent Time, Meter Volume
- Biocide Modes: Daily, weekly or monthly program
- Inputs: Conductivity, Meter, System status. Optional pH or ORP
- Standard: Single point calibration, 2 Line – 16 Character LCD, Built-In Diagnostics NEMA 4X Enclosure, CE Approved, 5 Key Universal Keypad
- Options: Web Browser Interface for remote view and configuration or Dry contact alarm or 4-20mA out on conductivity, pH control or ORP control (Replaces one timed biocide)

Identcode Ordering System

S4T	**Series Version:**						
	A	SlimFLEX 4 Tower Controller Version A: Four relay cooling controller with single inhibitor feed based on water meter input, bleed or % time with overfeed protection, conductivity based bleed relay, two application relays (below), flow switch/status input, 2 line display and 5 key universal keypad.					
		Base:					
		COIN	Conductivity control - selectable inhibitor feed				
			Application Relays:				
			TBTB	Dual biocide timers			
			OXTB	ORP control and biocide timer			
			PHTB	pH control and biocide timer			
				Expansion Option:			
				XX	None		
				CL	4-20 mA output on conductivity		
				LB	Ethernet networking		
				AR	Dry contact alarm relay		
					Remote communications:		
					0	None	
						Approvals:	
						01	Standard
S4T	**A**	**COIN**	**TBTB**	**XX**	**0**	**01**	

ProMinent® Cooling Tower & Boiler Controllers

MultiFLEX Controllers

ProMinent's MultiFLEX water treatment controllers exemplify the latest in water management technology. Packed with features, the MultiFLEX line of products are designed to provide the highest degree of control and flexibility. With one MultiFLEX you can control and monitor multiple towers, multiple boilers, or tower/boiler combos.

Features

- Control up to 4 Towers at once
- Control up to 8 Boilers at once
- Web Browser Accessible
- LAN Accessible
- Up to 14 Analog Inputs
- Twelve Digital Inputs
- Ten Relay Outputs
- Works with Trackster 3 Software
5-Key Universal Keypad
- 4 Line, 20 Character Backlit Display
- Easily Upgraded with Plug-in Modules
- Fully Programmable
- Ethernet with user definable static IP address
- NEMA 4X Enclosure
- 120 or 240VAC 50/60Hz, Switch Selectable
- CE Approved
- Supports "Percentage Time Bleed & Feed"

ProMinent® Cooling Tower & Boiler Controllers

Identcode Ordering System (M5)

M05 Series Version:

A — **MultiFLEX 5 Controller Version A:** Includes 5 universally controlled powered (120/240VAC) relays, 6 status/water meter digital inputs, 7 analog input/output channels, a 4 line 20 character back lit display, 5 key universal keypad and an Ethernet port with Browser communications. Can be programmed for cooling, boiler, process or mixture of all on one unit.

Application:

B	Boiler
T	Tower, combination, or monitor
X	Custom application with factory configuration

I/O Expansion Slot 'A' and 'B'. (*options marked are tower only):

XX	None	RR*	Dual ORP - Relay
B1	Single Boiler Conductivity with Blowdown Relay	O2*	Dual ORP - Monitor
BM	Single Boiler Conductivity - Monitor	OP*	ORP and pH - Relay
B2	Dual Boiler Conductivity with Blowdown Relay	MM*	ORP and pH - Monitor
BB	Dual Boiler Conductivity - Monitor	CR*	Single corrosion rate
CC	Boiler Condensate Conductivity/Temp - Relay	DC*	Dual corrosion rate
CN	Boiler Condensate Conductivity/Temp - Monitor	CI	Single 4-20 mA Input - Relay
PC	Single Boiler Condensate pH - Relay	IM	Single 4-20 mA Input - Monitor
PN	Single Boiler Condensate pH - Monitor	2I	Dual 4-20 mA Input 1 relay
CO*	Cooling Tower Conductivity/Temp - Relay	I2	Dual 4-20 mA Input 2 relays
CM*	Cooling Tower Conductivity/Temp - Monitor	2M	Dual 4-20 mA Input Monitor
PH*	Single Cooling Tower pH - Relay	II	Dual 4-20 mA Input (isolated) 1 relay
PM*	Single Cooling Tower pH - Monitor	I3	Dual 4-20 mA Input (isolated) 2 relays
PP*	Dual Cooling Tower pH - Relay	I4	Dual 4-20 mA Input (isolated) Monitor
P2*	Dual Cooling Tower pH - Monitor	IO	Single 4-20 mA Output
PT*	Single pH/Temp (Temperature compensated pH)	OO	Dual 4-20 mA Output
OR*	Single ORP - Relay	RS	Rate to Stroke driver
OM*	Single ORP - Monitor	CS	Conduct continuous sample monitor

I/O Expansion Slot 'C' and 'D':

XX — Use same selection options as expansion slot 'A' and 'B'

I/O Expansion Slot 'E' and 'F':

XX — Use same selection options as expansion slot 'A' and 'B'

I/O Expansion Slot 'G':

XX — Same choices as Slot A/B except **only single expansion card options allowed**

Pre-wired power relay plug box:

0	None	3	Three outlets
1	One outlet	4	Four outlets
2	Two outlets	5	Five outlets

Inhibitor powered relays (tower only):

0	None	3	Three
1	One	4	Four
2	Two		

Timed biocide powered relays:

0	None	3	Three
1	One	4	Four
2	Two		

Internal boiler treatment:

0	None	5	Five
1	One	6	Six
2	Two	7	Seven
3	Three	8	Eight
4	Four		

Remote communications:

0	None
P	Phone modem communications with data logging

Feed verifications:

0	None	3	Feed verification (3)
1	Feed verification (1)	4	Feed verification (4)
2	Feed verification (2)		

Operating Voltage:

A	115 VAC 50/60 Hz
B	230 VAC 50/60 Hz

M05	A	B	XX	XX	XX	XX	0	0	0	0	0	0	A

ProMinent® Cooling Tower & Boiler Controllers

Identcode Ordering System (M10)

M10 Series Version:

A — **MultiFLEX 10 Controller Version A:** Includes 10 universally controlled powered (120/240VAC) relays, 12 status/water meter digital inputs, 14 analog input/output channels, 4 line 20 character backlit display, 5 key universal keypad and an Ethernet port with Browser communications. Can be programmed for cooling, boiler, process or a mixture of all on one unit.

Application:

B	Boiler
T	Tower, combination, or monitor
X	Custom application with factory configuration

I/O Expansion Slot 'A' and 'B'. (*options marked are tower only):

XX	None	RR*	Dual ORP - Relay
B1	Single Boiler Conductivity with Blowdown Relay	O2*	Dual ORP - Monitor
BM	Single Boiler Conductivity - Monitor	OP*	ORP and pH - Relay
B2	Dual Boiler Conductivity with Blowdown Relay	MM*	ORP and pH - Monitor
BB	Dual Boiler Conductivity - Monitor	CR*	Single corrosion rate
CC	Boiler Condensate Conductivity/Temp - Relay	DC*	Dual corrosion rate
CN	Boiler Condensate Conductivity/Temp - Monitor	CI	Single 4-20 mA Input - Relay
PC	Single Boiler Condensate pH - Relay	IM	Single 4-20 mA Input - Monitor
PN	Single Boiler Condensate pH - Monitor	2I	Dual 4-20 mA Input 1 relay
CO*	Cooling Tower Conductivity/Temp - Relay	I2	Dual 4-20 mA Input 2 relays
CM*	Cooling Tower Conductivity/Temp - Monitor	2M	Dual 4-20 mA Input Monitor
PH*	Single Cooling Tower pH - Relay	II	Dual 4-20 mA Input (isolated) 1 relay
PM*	Single Cooling Tower pH - Monitor	I3	Dual 4-20 mA Input (isolated) 2 relays
PP*	Dual Cooling Tower pH - Relay	I4	Dual 4-20 mA Input (isolated) Monitor
P2*	Dual Cooling Tower pH - Monitor	IO	Single 4-20 mA Output
PT*	Single pH/Temp (Temperature compensated pH)	OO	Dual 4-20 mA Output
OR*	Single ORP - Relay	RS	Rate to Stroke driver
OM*	Single ORP - Monitor		

I/O Expansion Slot 'C' and 'D':

XX — Use same selection options as expansion slot 'A' and 'B'

I/O Expansion Slot 'E' and 'F':

XX — Use same selection options as expansion slot 'A' and 'B'

I/O Expansion Slot 'G' and 'H':

XX — Use same selection as expansion slot 'A' and 'B'

I/O Expansion Slot 'I' and 'J':

XX — Use same selection options as expansion slot 'A' and 'B'

I/O Expansion Slot 'K' and 'L':

XX — Use same selection options as expansion slot 'A' and 'B'

I/O Expansion Slot 'M' and 'N':

XX — Use same selection options as expansion slot 'A' and 'B'

Pre-wired power relay plug box:

0	None	6	Six outlets
1	One outlet	7	Seven outlets
2	Two outlets	8	Eight outlets
3	Three outlets	9	Nine outlets
4	Four outlets	A	Ten outlets
5	Five outlets		

Inhibitor powered relays (tower only):

0	None	3*	Three
1*	One	4*	Four
2*	Two		

Timed biocide powered relays:

0	None	3	Three
1	One	4	Four
2	Two		

Internal boiler treatment:

0	None	5	Five
1	One	6	Six
2	Two	7	Seven
3	Three	8	Eight
4	Four		

Remote communications:

0	None
P	Phone modem communications with data logging

Feed verifications:

0	None
1	Feed verification (1)
2	Feed verification (2)
3	Feed verification (3)
4	Feed verification (4)

Operating Voltage:

A	115 VAC 50/60 Hz
B	230 VAC 50/60 Hz

M10	A	B	XX	XX	XX	XX	XX	XX	XX	0	0	0	0	0	0	A

ProMinent® Cooling Tower & Boiler Controllers

AEGIS Controllers

ProMinent's AEGIS controller provides the latest in technology and is the perfect economical solution for process, cooling, boiler and waste water treatment applications.

Features

- Inhibitor Feed Using PPM Setpoints
- Volumetric Timer Controls
- Relay Mirroring
- Ethernet Communications
- Optional MODBUS
- Industrial and Commercial Series
- Plug and Play Upgrades
- Works with Trackster 3 Software
- Aquatrac Thermal Flow Switch
- Easily Upgradeable with Plug-in Modules
- Program Chemical Feed
- CE Approved
- NEMA 4X Enclosure
- Variable Frequency Pump Controls
- Data Logging
- Drum Level Alarms
- ProMinent Pump integration

Advantages & Benefits

Variable Frequency Pump Controls: Accurate and precise chemical feed using pulse outputs. Can also select On/Off control if desired.

Data Logging: Data history provides sensor minimum, maximum and average. Also records pump run times, pump feed volume, calculated drum levels, water meter volume, tower run time.

Aquatrac Exclusive Thermal Flow Switch: Aquatrac's exclusive design does not require user adjustment or calibration. Operates on 1GPM flow rate with no moving parts.

ProMinent Pump Integration: Select from popular ProMinent pump models built into the Aegis programming for accurate ppm feed, tank level and feed volume.

Feed Inhibitor using ppm setpoints: Accurate and precise inhibitor feed by simply inputting desired ppm level based on inhibitor chemistry. Use with make-up water meter.

Plug and Play Onsite Upgrades: The Aegis features Plug and Play technology allowing the user to perform simple onsite upgrades and scalability.

Program chemical feed based on drop tests: Program chemical feed by entering results of system testing using ppm, ml or drop tests. Enter the new value and desired alarm setpoints for worry-free chemical feed and control.

Drum Level Alarms: Provide low level alarms without the use of level sensors. The Aegis calculates volume fed and subtracts from tank inventory.

Communications: Ethernet, MODBUS, land phone line

ProMinent® Cooling Tower & Boiler Controllers

Identcode Ordering System AEGIS

AGIA Series Version:

A — Browser command & control with live views via 10 Base T TCP-IP Ethernet LAN port. User reconfigurable I/O including 8 universal digital inputs for water meter or contact sets, 5 ON/OFF powered relays for pump and valve control and 4 variable frequency pulse pump speed controls. Standard unit includes conductivity, temperature and 4-20 mA inputs. Sensors not included.

Base (built-in) conductivity, Inputs 'A' and 'B':

0	None
1	CTF Cooling tower conductivity-temperature-flow switch input (with Blowdown relay)
2	Cooling tower conductivity-temperature input (with Blowdown relay)
3	Boiler conductivity sensor input (with Blowdown relay)
4	Condensate conductivity-temperature input (with Blowdown relay)
5	Conductivity continuous sample monitor

Expansion Slot #1, Inputs 'C' and 'D':

XX	None	OM	Single ORP - Monitor
B1	Single boiler conductivity with blowdown relay	RR	Dual ORP - Control
BM	Single boiler conductivity - monitor	O2	Dual ORP - Monitor
B2	Dual boiler conductivity with blowdown relay	OP	ORP and pH - Control
BB	Dual boiler conductivity - monitor	MM	ORP and pH - Monitor
CC	Boiler condensate conductivity/temp - relay	CR	Single Corrosion Rate
CN	Boiler condensate conductivity/temp - monitor	DC	Dual Corrosion Rate
PC	Single boiler condensate pH - control	CI	Single 4-20 mA input - Control
PN	Single boiler condensate pH - monitor	IM	Single 4-20 mA input - Monitor
CO	Cooling tower conductivity/temp - relay	2I	Dual 4-20 mA input 1 Control
CM	Cooling tower conductivity/temp - monitor	2M	Dual 4-20 mA input 2 Control
PH	Single cooling tower pH - control	II	Dual 4-20 mA input (isolated) 1 Control
PM	Single cooling tower pH - monitor	I3	Dual 4-20 mA input (isolated) 2 Control
PP	Dual cooling tower pH - control	I4	Dual 4-20 mA input (isolated) Monitor
P2	Dual Cooling Tower pH - Monitor	IO	Single 4-20 mA output
PT	Single pH/Temp (temperature compensated pH)	OO	Dual 4-20 mA output
OR	Single ORP - Control		

Expansion Slot #2, Inputs 'E' and 'F':

XX	None	OR	Single ORP - Control
B1	Single Boiler Conductivity with Blowdown Relay	OM	Single ORP - Monitor
BM	Single Boiler Conductivity - Monitor	RR	Dual ORP - Control
B2	Dual Boiler Conductivity with Blowdown Relay	O2	Dual ORP - Monitor
BB	Dual Boiler Conductivity - Monitor	OP	ORP and pH - Control
CC	Boiler Condensate Conductivity/Temp - Relay	MM	ORP and pH - Monitor
CN	Boiler Condensate Conductivity/Temp - Monitor	CR	Single Corrosion Rate
PC	Single Boiler Condensate pH - Control	DC	Dual Corrosion Rate
PN	Single Boiler Condensate pH - Monitor	CI	Single 4-20 mA input - Control
CO	Cooling Tower Conductivity/Temp - Relay	IM	Single 4-20 mA input - Monitor
CM	Cooling Tower Conductivity/Temp - Monitor	2I	Dual 4-20 mA input 1 Control
PH	Single Cooling Tower pH - Control	I2	Dual 4-20 mA input 2 Control
PM	Single Cooling Tower pH - Monitor	2M	Dual 4-20 mA input Monitor
PP	Dual Cooling Tower pH - Control	IO	Single 4-20 mA output
P2	Dual Cooling Tower pH - Monitor	OO	Dual 4-20 mA output
PT	Single pH/Temp (temperature compensated pH)		

4-20 mA input, Input 'G':

0	Standard feature. Input can be used for any 4-20 mA input single (See sensor list for loop powered torroidal choices)
1	Torroidal Conductivity

Pump Output Type (includes 1 powered relay for blowdown):

P	Powered (120/240VDC) relays (4 max)
V	Variable frequency pulse out (4 max)
X	Combination of P and V (must select X for factory configuration)

Factory configuration (assign inputs/outpus, etc.)

0	None
T	Cooling tower - factory configuration
B	Boiler - factory configuration
X	Factory configuration (must supply worksheet)
C	Cooling tower trim feed

Pre-wired power relay plug cables:

0	None	3	Three
1	One	4	Four
2	Two	5	Five

Pre-wired power relay plug box:

0	None	3	Three outlets
1	One outlet	4	Four outlets
2	Two outlets	5	Five outlets

Inhibitor on/off outputs (tower only)

0	None
1	One
2	Two

Timed biocide on/off outputs:

0	None	2	Two
1	One	3	Three

Internal boiler treatment on/off outputs

0	None	3	Three
1	One	4	Four
2	Two	5	Five

Enclosure Option:

0	Standard enclosure 7.5"W x 11.3"H
S	Standard enclosure with mains switch
E	Extra large enclosure 16"W x 14"H
F	Extra large enclosure 16"W x 14"H w/ mains switch

Remote communications:

0	Standard option; Ethernet port
P	Phone Modem
M	Modbus
R	Alarm Relay
N	Modbus + Alarm Relay

Operating Voltage:

0	115 VAC 50/60 Hz
1	230 VAC 50/60 Hz

Approvals (Internal only):

01	Standard

AIGA	A	0	XX	XX	0	P	0	0	0	0	0	0	0	0	0	01

ProMinent® Cooling Tower & Boiler Controllers

Aquatrac Accessories

Analog Sensors	Controller Choice	Part No.
ORP Sensor Package - Chlorination with cable, Tee and probe holder	B,C, D	7760768
ORP Electrode, flat faced double junction 100 psi @175°F - cable required PN 1036595	B,C,D	7761399
PHED Sensor Package with cable, Tee and probe holder	B,C,D	7760729
pH Electrode, flat faced double junction 100 psi @ 175°f - cable required PN 1036595	B,C,D	7760998
Conductivity/Temperature Electrode 125 psi @125°F with Tee - Cooling applications	B,C,D	7760200
Aquatrac Conductivity/Temperature/Thermal Flow Switch CTF (Cooling)	A,B,D	7760021
Corrosion Rate Electrode, Admirality	C,D	7760748
Corrosion Rate Electrode, Carbon Steel	C,D	7760746
Corrosion Rate Electrode, Copper	C,D	7760747
Corrosion Rate Electrode, Cupro-Nickle	C,D	7760750
Corrosion Rate Electrode, Stainless Steel	C,D	7760749
Corrosion Rate Electrode, Zinc	C,D	7760745
Aquatrac Thermal Flow Switch 100psi @125°F	A,B,C,D	7760175
Conductivity Electrode 3/4" NPT 250psi steam max (Boiler - standard sensor)	A,C,D	7760002
Conductivity/Temperature Electrode 250psi steam max 3/4" NPT 4 wire (Condensate)	A,C,D	7760191
pH Electrode, 1/2" NPT SS, 230°F max (Condensate)	B,C,D	7760465
High Pressure Flow Switch 1.5GPM, 400 psi max 3/4" NPT , Bronze	A,B,C,D	7760203
Water Meters		
3/4” Contacting head water meter, 1GPC, 3/4” FNPT	B,C,D	7760518
1” Contacting head water meter, 10GPC, 1” FNPT	B,C,D	7760515
1 1/2” Contacting head water meter, 100 GPC, 1” FNPT	B,C,D	7760516
2" Contacting head watermeter 100GPC, 2"FNPT	B,C,D	7760517
3/4in Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760514
1in Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760508
1.5" Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760509
2" Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760510
3" Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760511
4" Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760512
Solenoids and Valves		
1/2" Solenoid valve for cooling application. 150 psi max	A B,C,D	7760212
3/4" Solenoid valve for cooling application. 150 psi max	A,B,C,D	7760213
1" Solenoid valve for cooling application. 150 psi max	A,B,C,D	7760214
Needle valve 1/2", rated 250 psi steam, color coded shaft, numbered handle	A,B,C,D	7760006
Orifice Union, 1/2" NPT, 250 psi steam, with four orifice plates	A,B,C,D	7760109
Motorized blowdown valve 1/2"NPT, 120VAC, 250psi steam	A,B,D	7760217
Motorized blowdown valve 3/4"NPT, 120VAC, 250psi steam	A,B,D	7760218
Motorized blowdown assembly, 1/2"NPT, 120VAC 250psi steam w/needle valve and T	A,B,D	7760013

A - microFLEX **B** - SlimFlex **C** - multiFLEX **D** - AEGIS