Dulcometer® D1C and D2C Series Process Controller

D1C Series Single Variable Controllers and D2C Series Dual Variable Controllers for Water and Wastewater Treatment or Industrial Process Control

The D1C/D2C integrates process monitoring and control into a single, easy-to-use device, replacing separate and multiple monitors and controllers: ProMinent Dulcotest sensors measure the process and the controller displays the value on a large LCD screen; control outputs can operate various control devices (e.g. metering pumps) to keep the process within control limits using proportional or PID control action; alarm relays are available for fault annunciation and analog outputs are available for recording the measured value. Features/options are selectable by identity code.

Features:
• Microprocessor based technology
• Large, clear, backlit display of measured and correcting values, status, error annunciation
• Menu-driven calibration, limit and control settings
• Control opposing functions with one unit (e.g. both acid and base to set pH) with or without deadband
• Sensor diagnostics monitor alarms upon sensor failure
• Five available voltages, including DC capability
• Limit values may be exceeded for adjustable time periods before relays change state (hysteresis)
• Programmable access code prevents unauthorized setting changes, yet allows calibration by operators
• Non-volatile memory retains all settings, including calibration, when power is lost; with automatic restart when power is restored
• Retains last measured value in memory during calibration to allow time for sample analysis so that the exact concentration in the sample becomes the standard
• Fault text on the LCD describes the nature of the fault, allowing fast diagnostics and correction
• Electrically isolated signal outputs
• Two current analog signal outputs (optional)
• Spannable outputs offer greater detail for recording and optimization of control
• Controller can revert to pre-set basic load output during calibration or in the event of a fault

Mounting
• **Wall mount:** Nonmetallic enclosure with protective gland-style strain relief cable sockets
  
  Dimensions: 7.87"H x 7.87"W x 3.00"D (200 mm x 200 mm x 76 mm)
  
  Cable glands: Five Pg11, Five Pg7
  
  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 5.50"D (96 mm x 96mm x 140 mm)
  
  Weight: Approximately 1.87 lbs. (850 g); 2.6 lbs. (1200 g) shipping weight
  
  Protection class: NEMA 3 (IP 54) when mounted in panel
Dulcometer D1C/D2C Series (cont.)

Measured Value Ranges Available (from ProMinent Dulcotest sensors or other devices)

- pH value: 0 to 14 pH units
- Oxidation Reduction Potential (ORP): -1000 to 1000 mV
- Free Chlorine Concentration: 0 to 10 ppm (sensor dependent)
- Total Chlorine Concentration: 0 to 20 ppm (sensor dependent)
- Bromine Concentration (using CTE sensor and Chlorine D1C): 0 to 10 ppm (sensor dependent)
- Conductivity (from conductometric or torroidal sensors): 0 to 20,000 mS/cm
- Dissolved Ozone Concentration: 0 to 2 ppm
- Chlorine Dioxide Concentration: 0 to 10 ppm (sensor dependent)
- Temperature: 32º to 212º (0º to 100ºC)
- Standard analog (mA) signal inputs from other devices: 0/4 to 20 mA
- Hydrogen Peroxide: 1 to 20, 10 to 200, 100 to 2000 ppm (signal converter dependent)
- Peracetic Acid: 10 to 200, 100 to 2000 ppm (signal converter dependent)

Other Inputs

- Feed Forward (disturbance variable) from flow meter for compound loop control (D1C only)
- Pause contact to stop control output based on external event (D1C only)
- Correcting variables: temperature for pH and conductivity; pH for free chlorine
- Solution ground for pH

Control Capabilities

- Monitoring only
- Setpoint (on/off) control based on high and low limit relays
- Proportional control for batch processes
- PID (Proportional-Integral-Derivative) control for once-through processes (available on D2C in Spring ’99)
- Compound loop PID for once-through processes with varying flow (available on D2C in Spring ’99)

Outputs

- Analog (mA) control output or measured value output to recorder
- Pulse control outputs for metering pumps (adjustable from 1 to 500 pulses/minute) (D1C only)
- Relay control outputs for solenoid valves or constant speed pumps with adjustable minimum on-time
- Actuator relay control output with feedback for stroke positioners or control valves
- General fault annunciation relay changes state on internal faults, loss of sensor signal, exceeding either high or low limit
- High and low limit relays
Dulcometer D1C/D2C Series (cont.)

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

**Chlorine Dioxide Concentration** - 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 measurable 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.

- **UP menu button**
  To increase a displayed numerical value and to change variables (flashing display).

- **START/STOP menu button**
  Start/stop of control function.

- **BRANCH BACK menu button**
  To exit operating menu (back to start of relevant setting).

- **ENTER menu button**
  To accept, confirm or save a displayed value or status. For alarm acknowledgement.

- **DOWN menu button**
  To decrease a displayed numerical value and to change variables (flashing display).
Identity Code: Dulcometer D1C Controller

<table>
<thead>
<tr>
<th>Series:</th>
<th>D1C  DULCOMETER one-channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series version:</td>
<td>A Standard</td>
</tr>
<tr>
<td>Type of mounting:</td>
<td>W Wall mounting, D Panel mounting</td>
</tr>
<tr>
<td>Operating voltage:</td>
<td>0 230 VAC, 50/60 Hz, 1 ph, 1 115 VAC, 50/60 Hz, 1 ph, 4 24 V AC/DC</td>
</tr>
</tbody>
</table>

*Note: Power cord not included with unit. For 115 V US & Canada power cord, see PN. 741203.4*

<table>
<thead>
<tr>
<th>Measured variables:</th>
</tr>
</thead>
<tbody>
<tr>
<td>P pH, R Redox/ORP, C Chlorine, L Conductivity, Z Ozone, D Chlorine dioxide, T Temperature, S Standard process signal (0/4-20 mA), A Peracetic acid, H Hydrogen peroxide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connection for sensor input:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Standard signal 0/4-20 mA, 2 SN6 plug (From pH or ORP sensor cable), 3 Terminal for standard conductivity cell (L), 4 Terminal for PT 100 temperature sensor (T), 5 Terminal for mV signal (From pH or ORP sensor cable)</td>
</tr>
</tbody>
</table>

| Correcting value: | (" Not available for measured variables A & H) |
|-------------------|
| 0 None, 1 pH for free chlorine, 2 Temperature correction terminal for P or L (Temperature monitoring only for other variables), 3 Temperature correction terminal for 4-20 mA signal for P or L (Temperature monitoring only for other variables), 4 Manual temperature setting for P or L |

<table>
<thead>
<tr>
<th>Feed forward control:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 None, 1 0/4-20 mA signal, 2 0-500 Hz signal, 3 0-10 Hz signal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pause contact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 None, 1 Pause contact</td>
</tr>
</tbody>
</table>

| Analog signal output (0/4-20 mA): | (" Not available for measured variables A & H) |
|-----------------------------------|
| 0 None, 1 Measured value (For recording), 2 Control action, 3 Measured correcting value, 4 Two current outputs |

<table>
<thead>
<tr>
<th>Relay outputs:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Alarm relay, G Alarm + 2 limit relays, M Alarm + 2 control relays, R Alarm + positioner relays w/ position feedback potentiometer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pump pacing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 None, 2 Two pulse control outputs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control action:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Proportional control, 2 PID control</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interface:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 None (Future versions will have RS interface)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language:</th>
</tr>
</thead>
<tbody>
<tr>
<td>P Polish, D † German, H † German, E † English, F † French, S Spanish, I Italian, N † Dutch, K Korean</td>
</tr>
</tbody>
</table>

| D1C A W 1 P 2 2 1 1 1 G 2 2 0 E |

(" Languages for variables A & H)
### Series:
**D2C**
DULCOMETER two-variable

### Series version:
**A**
Standard

### Type of mounting:
- **W**: Wall mounting
- **D**: Panel mounting

### Operating voltage:
- 0: 230 VAC, 50/60 Hz, 1 ph.
- 1: 115 VAC, 50/60 Hz, 1 ph.
- 4: 24 V AC/DC

**Note:** Power cord not included with unit. For 115 V US & Canada power cord, see PN. 741203.4

### Measured variables:
- **PC**: pH/Chlorine
- **PR**: pH/Redox
- **PP**: pH/pH

### Measurement variable 1 connection (Variable 2 connection: 4-20 mA):
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 correction terminal
- 4: Manual temperature setting

### Pause contact:
- 0: None

### Analog signal output (0/4-20 mA):
- 0: None
- 4: Two current outputs

### Relay outputs:
- **A**: Alarm relay
- **G**: Alarm + 2 limit relays
- **M**: Alarm + 2 control relays
- **R**: Alarm + positioner relays w/ position feedback potentiometer

### Control action:
- 1: Proportional control
- 2: PID control

### Interface:
- 0: None (Future versions will have RS interface)

### Language:
- **D**: German
- **E**: English
- **F**: French
- **S**: Spanish
Identity Code Options for D1C / D2C Controllers

NOTE: OPTIONS ARE NOT THE SAME FOR BOTH D1C AND 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, 5.51" (14 cm) depth. The unit must be mounted in an enclosure suitable for the environment. The controller’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 790235.8.

OPERATING VOLTAGE:
0 = 230 VAC, 50/60 Hz, 1 phase
1 = 115 VAC, 50/60 Hz, 1 phase
2 = 200 VAC, 50/60 Hz, 1 phase*
3 = 100 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 741203.4

*Not for measured variable L (Conductivity)

D1C MEASURED VARIABLES:
P = pH: For wall mount, use connection 2 (SN6) for push-and-twist connectors with pH sensors (PHEX, PHE, PHEP, PHED). 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 305350.1. For distances > 300 feet from sensor to controller or with stray currents, use connection 1 with signal converter pH V1 (PN 809126.6) giving 4-20 mA output.
R = Oxidation Reduction Potential: For wall mount, use connection 2 (SN6) for push-and-twist connectors with ORP sensors RHEX or RHE. 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 305350.1. For distances > 300 feet from sensor to controller or with stray currents, use connection 1 with signal converter rH V1 (PN 809127.4) giving 4-20 mA output.
C = Chlorine; use connection 1. For free chlorine (hypochlorous acid) measurement, use CLE3 - mA, 2 ppm or 10 ppm sensors. See "correcting value" for optional pH correction on free chlorine. For total chlorine or bromine measurement, use CTE - mA - 0.5 ppm, 2 ppm or 10 ppm sensors.
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.
D = Chlorine Dioxide; use connection 1 and CDE 2 - mA - 0.5 ppm, 2 ppm or 10 ppm sensors.
T = Temperature; use connection 4, terminal, with PT100 sensor. For distances > 30 feet from sensor to D1C, use connection 1 with signal converter PT 100 V1 (PN 809128.2) giving 4-20 mA output.
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 percent of input current.
A = Peracetic Acid; use connection 1 with transducer corresponding to desired measuring range.
H = Hydrogen Peroxide; use connection 1 with transducer corresponding to desired measuring range.

D2C MEASURED VARIABLES:
PC = pH/chlorine: See above descriptions for each variable.
PR = pH/Oxidation Reduction Potential: See above descriptions for each variable.
PP = pH/pH: See above descriptions for each variable.

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:
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 809126.6).
2 = Temperature for 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 other variables)
3 = Temperature for P or L via 0/4-20 mA signal; used with signal converter PT 100 V1 (PN 809128.2) and PT 100 sensor. Feed Forward control is not possible with this option. (Temperature
Identity Code Options for D1C/D2C Controller (cont.)

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
1 = Pause contact

ANALOG OUTPUTS (0/4-20 mA) - Note that only one analog output is possible; therefore, you cannot have an analog control output and an analog measured value output for recording. If this control output is used, it can only be for one-way control such as acid feed for pH control. For bi-directional control, use relay or pump pacing control outputs.:

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:
A = Alarm relay: changes state when high or low limits are exceeded, internal faults are sensed, 4-20 mA input signal is lost or sensor has failed as determined by no change in the measured variable over a time period adjustable between 1 and 9999 seconds.
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 drives or to open and close solenoid valves for opposing functions. Modulating output corresponds to whatever control action is 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 whatever control action is 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 whatever control action is 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 (Future versions will have RS interface available)

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

1E = English (D, F, N) A = Swedish (D, E, P)
1F = French (D, E, N) J = Japanese (D, E)
1S = Spanish (D, I, F) C = Chinese
1D = German (E, F, N) B = Portuguese (S, F, E)
1H = German (F, I, S) U = Hungarian (P, F, E)
1I = Italian (D, F, S) T = Thai
1N = Dutch (D, E, F) K = Korean
1P = Polish (D, E, A)

Languages available for measured variables A and H

NOTE: Power cord not included.
Power cord, 6 ft. (2 m) 115 VAC 741203.4
Power cord, 6 ft. (2 m) 230 VAC 7724015.8
Specifications for Wall and Panel Mount D1C/D2C

Temperature data (Panel Mount)

Permissible ambient temperature

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

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

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

Material data/chemical resistance:
<table>
<thead>
<tr>
<th>Part</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing and frame</td>
<td>PPO GF 10</td>
</tr>
<tr>
<td>Rear panel</td>
<td>PPE GF 20</td>
</tr>
<tr>
<td>Membrane keypad</td>
<td>Polyester film PET</td>
</tr>
<tr>
<td>Seal, outside</td>
<td>Cellular rubber CR</td>
</tr>
<tr>
<td>Seal, inside</td>
<td>Silicon-based sealing compound</td>
</tr>
<tr>
<td>Retaining clip and screws</td>
<td>Galvanized steel</td>
</tr>
</tbody>
</table>

Temperature data (Wall Mount)

Permissible ambient temperature

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

Extended version (with status feedback or with correction value via mA or with disturbance variable via mA):
- 23°F to 104°F (-5°C to 40°C)
- 14°F to 158°F (-10°C to 70°C)

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

Material data/chemical resistance:
<table>
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<tr>
<th>Part</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Luranyl PPE GF 10</td>
</tr>
<tr>
<td>Membrane keypad</td>
<td>Polyester film PET</td>
</tr>
<tr>
<td>Housing seal</td>
<td>Cellular rubber CR</td>
</tr>
<tr>
<td>Outer seal</td>
<td>Cellular rubber CR</td>
</tr>
<tr>
<td>Retaining bracket</td>
<td>Galvanized steel</td>
</tr>
<tr>
<td>M5 screws</td>
<td>A2</td>
</tr>
</tbody>
</table>

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**
- Rated voltage: 115/230 VAC, 50/60 Hz
- Max. power input: 140 mA at 115 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

**Wall Mount**
- Rated voltage: 115/230 VAC, 50/60 Hz
- Max. power input: 120 mA at 115 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

**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
- 250 V 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
Sensor input via SN6 socket:
- Input impedance > 10^{12} \, \Omega
- Input impedance with reference electrode with respect to:
  - Device ground: < 1 k\Omega
  - 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 \times 10^{11} \, \Omega
- Input impedance with reference electrode with respect to:
  - Device ground: < 1 k\Omega
  - 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 \, \Omega (Panel Mount); 50 \, \Omega (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 \, \Omega
- 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 \, \Omega ...10 k\Omega
- 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 \, \Omega
- 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 \times 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 suppressed with varistors
- Load capacity: 250 VAC, 3 A, 700 VA
- Contact service life: >50 \times 10^6 switching operations (Panel Mount)
  >20 \times 10^6 switching operations (Wall Mount)
Specifications (cont.)

| Power relay output for Type of contact: | n/o contact, interference supressed with varistors |
| Load capacity: | 250 VAC, 3 A, 700 VA |
| Contact service life: | >20 x 10⁶ switching operations |

**Serial interface:**  
(Not yet available)

| in accordance with RS 232  
Baud rate: | 4800, 9600 Bd (programmable) |
| Other parameters: | 1 stop bit  
No parity bit  
8 bit data length |
| Control: | XON/XOFF |

**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/C1 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