

Lesman handles instruments for your process that run from the most simple to the most advanced. Look here for assistance finding the exact model to meet your process needs: approval certifications for your environment, materials that offer chemical resistance and long life, configuration and mounting styles that meet your mechanical requirements.



## Concentration Percentage/Brix/Refractive Index

K-Patents Process Refractometers for Concentration Measurement Call 176



## Conductivity/Total Dissolved Solids (TDS)

|                                                                   |           |     |
|-------------------------------------------------------------------|-----------|-----|
| Aquametrix Conductivity Cells                                     | \$195.00  | 173 |
| AquaMetrix Multivariable Transmitters, Analyzers, and Controllers | \$495.00  | 161 |
| Honeywell Conductivity Cell Assemblies                            | \$235.00  | 174 |
| Honeywell APT2000/APT4000 Analytical Process Transmitters         | \$1594.00 | 168 |
| Honeywell DirectLine™ DL423 Analytical System for Conductivity    | \$667.00  | 166 |
| Honeywell UDA2182 Multiparameter Analyzer Controller              | \$830.00  | 164 |



## Dissolved Oxygen

|                                                                       |          |     |
|-----------------------------------------------------------------------|----------|-----|
| Honeywell DirectLine DL424/425 Analytical System for Dissolved Oxygen | \$811.00 | 166 |
| Honeywell DL5000 Equilibrium Probe for Dissolved Oxygen               | \$992.00 | 166 |
| Honeywell UDA2182 Multiparameter Analyzer Controller                  | \$830.00 | 164 |



## Humidity and Temperature

|                                                                 |          |     |
|-----------------------------------------------------------------|----------|-----|
| Rotronic HygroClip2 Humidity Probes                             | \$375.00 | 184 |
| Rotronic HygroFlex3 Industrial Humidity/Temperature Transmitter | \$445.00 | 180 |
| Rotronic HygroFlex5 Industrial Humidity/Temperature Transmitter | \$345.00 | 181 |
| Rotronic HygroPalm Portable Humidity/Temperature Indicators     | \$475.00 | 183 |
| Rotronic Temperature/Humidity Datalogger                        | \$595.00 | 182 |



## pH/Oxygen Reduction Potential (ORP)

|                                                                   |           |     |
|-------------------------------------------------------------------|-----------|-----|
| AquaMetrix Differential Measurement pH/ORP Replacement Probes     | \$585.00  | 160 |
| AquaMetrix Multivariable Transmitters, Analyzers, and Controllers | \$495.00  | 161 |
| Honeywell APT2000/APT4000 Analytical Process Transmitters         | \$1594.00 | 168 |
| Honeywell DirectLine DL421/422 Analytical System for pH/ORP       | \$606.00  | 166 |
| Honeywell HB Series Rugged Glass pH/ORP Electrodes                | \$281.00  | 170 |
| Honeywell HBD Series Rugged Glass-Free pH/ORP Electrodes          | \$898.00  | 171 |
| Honeywell pH Electrode Mountings                                  | \$442.00  | 172 |
| Honeywell Replacement Electrodes for pH/ORP Measurement           | \$204.00  | 169 |
| Honeywell UDA2182 Multiparameter Analyzer Controller              | \$830.00  | 164 |





## pH/ORP Replacement Probes



**Low cost, drop-in replacements for Great Lakes pH probes!**

### Features

- Accurate differential measurement
- Eliminates ground loop interference
- Built-in preamplifier
- Replaceable salt bridge
- Temperature compensation device built into all sensors

The P60C8 pH and the R60C8 ORP probe are dependable industrial grade sensors designed to provide accurate measurement and longer service life under the most demanding conditions.

The 60C8 incorporates all the benefits of three-electrode differential measurement. The domed glass process electrode is designed for use in tough applications. The second electrode is immersed in a pH 7 buffer that is fully encapsulated in the probe. This second electrode is protected from the process by a double junction salt bridge.

The resulting true differential measurement has several advantages over conventional probes: ground loop problems are virtually eliminated, and the salt bridge is easy to replace. If the internal solution becomes contaminated, the probe can be rejuvenated by replacing the salt bridge and reference solution.

A thermistor at the probe's tip performs automatic temperature compensation. This placement provides rapid response for process temperature variations.

The encapsulated preamp provides an output signal that can be transmitted 3000 feet. Another version encapsulates a blind 4 to 20 mA two-wire transmitter that can transmit a virtually unlimited distance over a twisted pair cable.



### Quick GLI to AquaMetrix Part Number Crossover

| pH Sensors      |                        | ORP Sensors     |                        |
|-----------------|------------------------|-----------------|------------------------|
| GLI Part Number | AquaMetrix Part Number | GLI Part Number | AquaMetrix Part Number |
| 6020P0          | P60C8                  | 2020R0          | R60C8                  |
| 6021P0          | P60C8                  | 2021R0          | R60C8                  |
| 6022P0          | P60C8                  | 2022R0          | R60C8                  |
| 6026P0          | P60C8                  | 2026R0          | R60C8                  |
| 6028P0          | P60C8                  | 2028R0          | R60C8                  |
| 6052P0          | P60C8                  | 2052R0          | R60C8                  |
| 6056P0          | P60C8                  | 2056R0          | R60C8                  |
| 6058P0          | P60C8                  | 2058R0          | R60C8                  |

### AquaMetrix pH probes plug right in, to replace your GLI/Hach pH sensors!

Get an easy, drop-in pH sensor, with the same performance specifications as the Great Lakes probes you're currently using, and save time, money, and hassles on every order!

Plus, you'll save on inventory costs. Just look below: One AquaMetrix pH probe model and one AquaMetrix ORP sensor replace 16 different Great Lakes sensor models. So, you only have to stock one or two part numbers for quick, easy replacements in your applications!

If you're having problems getting delivery of Great Lakes probes, we have great news! Lesman stocks the most popular models of AquaMetrix probes — so you can have replacement probes as soon as the next business day. Just place your order before 3 pm Central Time, and your in-stock probes will ship the same day.

### Specifications

**Measuring Range:** pH: 0 to 14.00 pH (consult factory for applications below  $\alpha$  2 and above  $\alpha$  12); ORP: -2000 mV to 2000 mV

**Flow Rate:** 10 ft/sec max (3 meters/sec).

**Wetted Materials:** CPVC, ceramic/kynar, glass, titanium palladium alloy and EPDM (platinum for ORP probe)

**Transmission Distance:** 3000 feet max

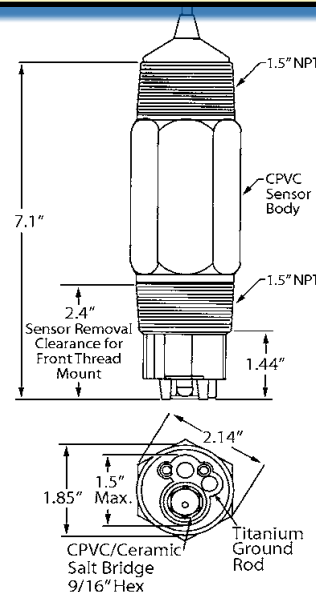
**Sensitivity:** pH: <0.005 pH; ORP: 0.5 mV

**Stability:** 0.03 pH/day, non-cumulative

**Automatic Temperature Compensation:** Within temperature limits 23° to 203° F

**Pressure Limit:** 100 PSIG at 149° F max

**Temperature Limits:** CPVC: 23° to 203° F



### Model Selection Guide

| Description                                                                                |                                                   | Catalog Number | Price    |
|--------------------------------------------------------------------------------------------|---------------------------------------------------|----------------|----------|
| 60 Series Differential pH Sensor                                                           |                                                   | P              | \$585.00 |
| 60 Series Differential ORP Sensors                                                         |                                                   | R              | 585.00   |
| Elec-<br>tronics                                                                           | Standard 5-Wire Sensor                            | 60C            | 0.00     |
|                                                                                            | Two-Wire Transmitter, 4-20 mA Output              | 65C            | 125.00   |
| Body                                                                                       | 1.5" NPT Threaded (GLI Replacement Sensor)        | 8              | 0.00     |
|                                                                                            | GLI 605IPO Replacement (Sensor Only)              | 4              | 0.00     |
|                                                                                            | Fixed Insertion, Sanitary 2.5" Tri-Clover Fitting | S              | 175.00   |
| Options                                                                                    | Hardened Glass Electrode                          | H              | 75.00    |
|                                                                                            | Flat Faced Glass Electrode (Sanitary Body)        | F              | 75.00    |
|                                                                                            | Gold Electrode for ORP Sensors                    | G              | 75.00    |
| Cable*                                                                                     | Extended Cable Length (in Feet)                   | XXX            | +1.50/ft |
| Mounting Hardware and Accessories                                                          |                                                   |                |          |
| Salt Bridge kit, Ceramic Outer Junction, 3-Pack for -8 Body Type (GLI Replacement Sensors) |                                                   | AM60-9765      | 95.00    |
| Union Tee with Adapter for -8 Body Type                                                    |                                                   | AM-MH538N9A    | 195.00   |
| Submersion Hardware                                                                        |                                                   | STC60L         | 125.00   |
| Salt Bridge Kit, Ceramic Outer Junction, 3-Pack                                            |                                                   | C35-17         | 95.00    |

\* For standard cable length (15 feet) leave XXX in the cable selection. Otherwise, change the XXX to your desired length in feet, and add \$1.50 per foot to the price.



## Multichannel Controllers, Transmitters and Analyzers



**Loop-powered transmitters starting at \$495.00!**

### Features

- Measures pH, ORP, conductivity, and flow out of the box — no extra cards needed!
- 1/4 DIN enclosures
- SharkTX and SharkTXP transmitters feature 4-20 mA + 24 VDC loop power, 2 x 16 character LCD display; NEMA 4X enclosure or front panel
- Shark-120 analyzer/controllers feature 4-digit LED with colored bargraph, relay cycle on/off timers; two control relays and high/low alarm relay, two 4-20 mA outputs, snap-on terminal connectors



**Full-function analyzer for just \$945.00!**

### Specifications

|                        | pH                                                  | ORP                                                    | Conductivity                                                                                        | Flow                                                                                                                                                           |
|------------------------|-----------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Measuring Range</b> | pH: 0.01 to 14.00; Temp: 32° to 212° F/0° to 100° C | ORP: -1999 to 1999mV; Temp: 32° to 212° F/0° to 100° C | uS/cm: 0 to 2.000/20.00/200.0/2000; mS/cm: 0 to 20.00/200.0; MΩ/cm: 0 to 19.99; Temp: 32° to 212° F | Flow: 0 to 9999, selectable flow rate units (gal, ft <sup>3</sup> , liters, m <sup>3</sup> , custom); Volume: 0 to 9999, auto range; Time units: Hrs, min, sec |
| <b>Sensor Distance</b> | Differential: 3000 ft; Combination: 10 ft           |                                                        | 300 ft                                                                                              | 2000 ft                                                                                                                                                        |

**Analog Output:** SharkTX/TXP: One 4-20 mA Isolated Output, Range expand 0–100% full scale (min segment 10% FS), max. load 800Ω; Shark-120: Two 4-20 mA isolated outputs, Range expand 0–100% full scale (min 10% FS), max. load 800Ω

**Relay Outputs (Shark-120 Only):** Two Control Relays: 10A/NO, 5A/NC @ 240 VAC or 28 VDC. Mode: Process control, Adjustable parameters: process direction, (rising or falling) On/Off setpoints, (0–100% FS), cycle timer (on/off, 0–600 sec), failsafe (on/off). One Alarm Relay: 10A/NO, 5A/NC @ 240 VAC or 28 VDC. Mode: High/low alarm, Adjustable parameters: High/Low on/off setpoints (0–100% FS).

**Display:** SharkTX/SharkTXP: 2 x 16 alphanumeric LCD; Shark-120: 4 x 7 segment 1/2" LED, 1 LED indicator online, 7 LED front panel bargraph, 2 x 16 alphanumeric LCD inside panel

**Ambient Conditions:** Temperature: -4° to 140° F; Humidity: 0 to 90% RH

**Enclosure:** NEMA 4X polycarbonate, ; SharkTX: Two 1/2" conduit holes, surface/pipe/panel mount; SharkTXP: 1/4 DIN, panel/DIN rail mount; Shark-120: Four 1/2" conduit holes, surface/pipe/panel mount.

**Power Requirements:** SharkTX/SharkTXP: 4-20 mA loop powered, 16 to 32 VDC; Shark-120: 120 VAC 50/60Hz (<12 VA) or 240 VAC 50/60 Hz (<12 VA)

### Model Selection Guide

| Description                                       | Catalog No | Price    |
|---------------------------------------------------|------------|----------|
| Multiparameter Transmitter, Panel/Pipe/Surface Mt | SharkTX    | \$535.00 |
| Multiparameter Transmitter, Panel/DIN Rail Mount  | SharkTXP   | 495.00   |
| Multiparameter Controller/Analyzer, 120V Power    | Shark-120  | 945.00   |

See pages 160 and 173 for pH and conductivity sensors.

## AquaMetrix 2300 1/4 DIN Web-Enabled Multi-Input Controller

- Comes standard with four 4-20 mA sensor and three frequency/pulse counter inputs: Any combination: pH, ORP, conductivity, flow, on/off signals, and more
- Four programmable relay outputs
- Alarm notifications by e-mail, text, and/or display for each input
- Perform differential measurement from two analog inputs
- Log data to SD card, download via web
- Web enabled for setup, data collection, and remote viewing with password protection
- 1/4 DIN panel mount enclosure standard; Add NEMA 4X adapter for wall mounting

### Specifications

**Inputs:** Analog: Four 4-20 mA standard; Frequency: Two optically isolated, up to 24 VDC or 120 VAC; Counter: One accumulator for tracking equipment on time

**Outputs:** Relays: Four 120V/240V @ 10A/5A; Alarms: Configurable as E-mails or texts for alarms, alerts, or reminders; Digital output: Modbus RTU over RS485 or Modbus TCP over TCP/IP\*

**Web:** Remote programming and viewing with a browser on a computer, tablet, or smartphone; Secure password login required.

**Datalogging:** Logs CSV files to micro SD card

**Mounting:** 1/4 DIN panel mount or wall mount

**Protection:** NEMA 4X

\* One expansion slot is available to add inputs or relay or digital outputs

**Functionality of a PLC and SCADA at the price of a transmitter!**



### Model Selection Guide

| Description                                      | Catalog Number               | Price     |
|--------------------------------------------------|------------------------------|-----------|
| Multi-Input Universal Controller                 | 2300                         | \$1950.00 |
| NEMA 4X Wall-Mount Enclosure Kit                 | 2300-WALL-ENCL               | 95.00     |
| Expansion Cards (One Slot Available)             |                              |           |
| Add Four 4-20 mA Inputs                          | 2300-CARD-420-IN             | 380.00    |
| Add Four 4-20 mA Outputs                         | 2300-CARD-420-OUT            | 300.00    |
| Add Six 240V 5Amp Relay Outputs                  | 2300-CARD-RELAY-OUT          | 250.00    |
| Add Modbus TCP/Modbus RTU                        | 2300-MODBUS                  | 200.00    |
| Add Three Pulse Inputs and Four 5A Relay Outputs | 2300-CARD-PULSE-IN-RELAY-OUT | 250.00    |



Choosing the Right pH/ORP Analysis System

pH/ORP Analysis, Control, and Monitoring Devices



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|                                        | DirectLine™ Model DL421 with Durafet II Sensor                                                                       | APT2000/4000 pH Transmitter/Analyzer                                                    | UDA2182 Analyzer/Controller                                                                             |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Measurement                            | pH                                                                                                                   | pH/ORP                                                                                  | pH/ORP                                                                                                  |
| Case                                   | Plastic Polycelfoam enclosure, IP66, H 4.84" x W 1.89" x D 1.81"                                                     | Plastic enclosure made of PBT NEMA 4X, IP65 rating                                      | GE Valox® 357 plastic CSA Type 4X/NEMA 4X rating                                                        |
| Display                                | LCD 4-digit, 7-segment                                                                                               | 7-segment LCD display                                                                   | Backlit LCD, 128x64 pixels                                                                              |
| Display Accuracy                       | pH: ±0.02; temperature: ±0.1° C/F                                                                                    | pH: ±0.02; Temp ±0.01° C/F                                                              | ±0.5% reading                                                                                           |
| Control Capabilities/Advanced Features | Integral electronics/sensor design, one or two point calibration, Auto Buffer Recognition                            | Electronics sensor and diagnostics, Auto Buffer Recognition, HART Communications option | PID, duplex, On/Off control AccuTune II, fuzzy logic overshoot Auto Buffer Recognition (US, NIST, Euro) |
| Operating Conditions                   | -4° to 185° F (-20° to 85° C)                                                                                        | -4 to 131° F (-20° to 55° C)                                                            | 32° to 140° F (0° to 60° C)                                                                             |
| Operating Voltage                      | 16 to 42 VDC                                                                                                         | 2000: 14 to 40 VDC; 4000: 20 to 253 VAC/DC                                              | 90-264 VAC                                                                                              |
| Analog Outputs                         | One 4 to 20 mA                                                                                                       | One 4 to 20 mA                                                                          | Up to three 0 or 4 to 20 mA                                                                             |
| Relays                                 | N/A                                                                                                                  | 2000: N/A; 4000: Hi/lo alarm relays                                                     | Up to 4 SPDT (Form C) relays                                                                            |
| Mountings                              | Integral: no electronics mounting needed; Remote: pipe, wall or DIN rail                                             | Pipe, wall or panel                                                                     | Pipe, wall or panel                                                                                     |
| Approvals                              | CE; General purpose: UL; CSA; FM Class 1, Div 1, Groups A-D (1.5); FM Class I, Div 2, Groups A-D (N.I. Field Wiring) | CE; FM Class I, Div 2; FM Class 1, Div 1 IS & CENELEC                                   | CE, UL/CSA General Purpose FM Class I, Div 2                                                            |



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Call Us!

pH/ORP Sensors

|                   | Durafet® III Glass-free unbreakable electrode                                                              | Meredian II for pH and ORP Glass electrode for general service                | HB Series for pH/ORP Glass electrode for harsh conditions                                                        | HPW7000 Hi-pHurity System                             |
|-------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Measurement Range | 0 to 14 pH                                                                                                 | 0 to 14 pH, 1999 to 1999 mV (ORP)                                             | 0 to 14 pH                                                                                                       | 4 to 10 pH                                            |
| Temperature Range | 14° to 266° F (-10° to 130° C)                                                                             | 32° to 230° F (0° to 110° C)                                                  | Good to 284° F (140° C)                                                                                          | -4 to 302° F (-20° to 150° C)                         |
| Materials         | Ryton body, silicon ISFET die electrode, ceramic reference junction, Viton media seal, EPDM reference seal | Ryton body, glass electrode, EPDM seals ORP model has gold/platinum electrode | CPVC, Polypropylene or Ryton body Viton or EPDM O-rings, glass (pH) or platinum (ORP) electrode, Teflon junction | 136L SS                                               |
| Special Features  | Response time 10 times faster than glass, replaceable reference junction                                   |                                                                               | Axial ion path technology eliminates leak pathways and breakage                                                  | 0.1 pH accuracy in process with conductivity <10µS/cm |



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Mountings

| Style                            | 7773 Mounting                                                                                                                                        | 7774 Mounting                                                                     | 7777DVP Mounting                                                    | 7794DVP Mounting                                      | 7758 Mounting                                                                                       |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Measurement Range                | 0 to 14 pH; ±1600 mV ORP                                                                                                                             | 0 to 14 pH; ±1600 mV ORP                                                          | 0 to 14 pH                                                          | 0 to 14 pH                                            | 0 to 14 pH; ±1600 mV ORP                                                                            |
| Pressure and Temperature Ratings | Immersion: Polypropylene: 100 psig at 140° F, 316 SS: 100 psig at 176° F, Flowthrough: Polypropylene: 100 psig at 140° F, 316 SS: 150 psig at 176° F | 316 SS: Determined by electrode; CPVC: 100 psig at 122° F (689 kPa at 50° C)      | 100 psig at 122° F (Up to 689 kPa at 50° C)                         | 100 psig at 212° F (Up to 689 kPa at 100° C)          | 316 SS: 150 psig at 212° F (1034 kPa at 100° C) Polypropylene: 100 psig at 95° F (689 kPa at 35° C) |
| Materials                        | Polypropylene, Ryton or 316 SS                                                                                                                       | Ball valve, mounting nipple, extension tube, 316 SS or CPVC O-rings: EPDM & Viton | Durafet III electrode bodies: Ryton, silicone ISFET die             | Body: Polysulfone                                     | 316 SS cover, wetted 316 SS or polypropylene bushings, Viton o-rings                                |
| Special Features                 | Allows separate measuring and reference electrodes in one mounting                                                                                   | Insertion/removal under pressure without interrupting process                     | Non-glass electrode with Vario pin quick-disconnect, FM approved IS | Sanitary 3-A approval for food and dairy applications | Allows variable immersion depths in pipe                                                            |
| Mountings                        | Immersion or flow-through                                                                                                                            | 1 1/4" NPT (316 SS) or 1 1/2" NPT (CPVC) pipe nipple through ball valve           | Immersion or in-line tee (3/4" NPT fitting)                         | 1 1/2", 2", or 3" tri-clamp flange mounting           | 3/4" NPT bushing                                                                                    |

Need help? Fill out a Honeywell analytical instruments datasheet at [www.Lesman.com/datasheets](http://www.Lesman.com/datasheets) and fax it to Lesman.

## Choosing the Right Conductivity Analysis System

### Conductivity Analysis, Control, and Monitoring Devices

|                                               | DirectLine Model DL423                                                                                                                                                                                                                                | UDA2182 Dual Input Analyzer/Controller                                                                                      | APT2000/4000CC Contacting Conductivity Transmitter                                                  | APT2000/4000TC Toroidal Conductivity                                                                 |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Case</b>                                   | Plastic Polycelfoam enclosure, IP66, H 4.84" x W 1.89" D 1.81"                                                                                                                                                                                        | GE Valox® 357 plastic CSA Type 4X/NEMA 4X rating                                                                            | Plastic enclosure made of PBT NEMA 4X, IP65 rating                                                  | Plastic enclosure made of PBT NEMA 4X, IP65 rating                                                   |
| <b>Display</b>                                | LCD 4-digit, 7 segment                                                                                                                                                                                                                                | LCD dot matrix, 128x64 dpi,                                                                                                 | 7-segment LCD display                                                                               | 7-segment LCD display                                                                                |
| <b>Display Accuracy</b>                       | Conductivity/resistivity: greater of $\pm 2$ counts or $\pm 0.5\%$ of reading<br>Concentration: $\pm 0.5\%$ of reading<br>Temperature: $\pm 0.1^\circ\text{C}$ from 14 to $210^\circ\text{F}$ , $\pm 1^\circ\text{F}$ from 212 to $284^\circ\text{F}$ | 0.5% of reading                                                                                                             | Conductivity: 1% of measured value or $\pm (-0.4 \mu\text{cm}^*$ cell constant)                     | Conductivity: (1% of measured value) $\pm (0.2 \mu\text{cm} \pm 1$ Significant digit)                |
| <b>Advanced Control Capabilities/Features</b> | Integral electronics/sensor design; trim valve or 1 pt solution calibration                                                                                                                                                                           | PID, duplex, on/off control, AccuTune II, fuzzy logic overshoot suppression, USP26 alarm, solution temperature compensation | Measures conductivity, resistivity or salinity, electronics & sensor diagnostics, HART comm. option | Measures conductivity or chemical concentration; electronics & sensor diagnostics, HART comm. option |
| <b>Operating Con.</b>                         | $-4^\circ$ to $185^\circ\text{F}$ ( $-20^\circ$ to $85^\circ\text{C}$ )                                                                                                                                                                               | $32^\circ$ to $140^\circ\text{F}$ ( $0^\circ$ to $60^\circ\text{C}$ )                                                       | $-4$ to $131^\circ\text{F}$ ( $-20^\circ$ to $55^\circ\text{C}$ )                                   | $-4$ to $131^\circ\text{F}$ ( $-20^\circ$ to $55^\circ\text{C}$ )                                    |
| <b>Operating Voltage</b>                      | 16-42 VDC                                                                                                                                                                                                                                             | 90-264 VAC                                                                                                                  | 2000: 14-42 VDC; 4000: 20-253 VAC/VDC                                                               | 2000: 14-42 VDC; 4000: 20-253 VAC/VDC                                                                |
| <b>Analog Inputs</b>                          | One 4 to 20 mA                                                                                                                                                                                                                                        | Up to three 0 or 4 to 20 mA                                                                                                 | One 4 to 20 mA                                                                                      | One 4 to 20 mA                                                                                       |
| <b>Relays</b>                                 | None                                                                                                                                                                                                                                                  | Up to 4 SPDT (Form C) relays                                                                                                | 2000: N/A; 4000: Hi/lo alarm relays                                                                 | 2000: N/A; 4000: Hi/lo alarm relays                                                                  |
| <b>Mountings</b>                              | Integral, no electronics mounting; Remote: pipe, wall or DIN rail                                                                                                                                                                                     | Pipe, wall or panel                                                                                                         | Pipe, wall or panel                                                                                 | Pipe, wall or panel                                                                                  |
| <b>Approvals</b>                              | Industrial: CE; General: UL/CSA, FM                                                                                                                                                                                                                   | CE, UL/CSA General; FM Class I, Div 2                                                                                       | CE, FM Class 1, Div 2; FM Class 1, Div 1                                                            | CE, FM Class 1, Div                                                                                  |

### Conductivity Cell Assemblies and Sensors

|                                    | 4973 Contacting                     | 4974 Contacting                                                          | 4905 Contacting                         | 4909 Contacting                                                                                                                                | 5000 TC Toroidal                                          |
|------------------------------------|-------------------------------------|--------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| <b>Measurement Range</b>           | 0.01, 0.1, 1.0, 10.0 cell constants |                                                                          | 0.01, 0.1, 10.0, 25 & 50 cell constants |                                                                                                                                                | 0.2 to 2000 $\mu\text{cm}$                                |
| <b>Pressure &amp; Temp Ratings</b> | 250 PSI at $284^\circ\text{F}$      | 150 PSI at $257^\circ\text{F}$                                           | 250 PSI at $284^\circ\text{F}$          | SS: 50 PSI at $284^\circ\text{F}$ (3.45 bar at $140^\circ\text{C}$ )<br>CPVC: 30 PSI at $284^\circ\text{F}$ (2.07 bar at $140^\circ\text{C}$ ) | *see note                                                 |
| <b>Materials</b>                   | Titanium or graphite                | Titanium or graphite with food-grade silicone rubber and polished 316 SS | Nickel or platinum                      | Nickel or platinum                                                                                                                             | Polypropylene, PVDF, PEEK, PFA teflon                     |
| <b>Mounting</b>                    | 3/4" NPT thread fitting             | 1 1/2" or 2" Tri-clover clamp                                            | 1" NPT threaded fitting                 | CPVC or SS; allows insertion/removal of cell without stopping process                                                                          | Immersion, union, sanitary 2" flange or insertion/removal |

\* Polypropylene: 100 PSI at  $212^\circ\text{F}$  (6.9 bar at  $100^\circ\text{C}$ ) PVDF: 100 PSI at  $248^\circ\text{F}$  (6.9 bar at  $120^\circ\text{C}$ ) PEEK: 200 PSI at  $302^\circ\text{F}$  (13.8 bar at  $150^\circ\text{C}$ ) PFA Teflon: 200 PSI at  $302^\circ\text{F}$  (13.8 bar at  $150^\circ\text{C}$ )

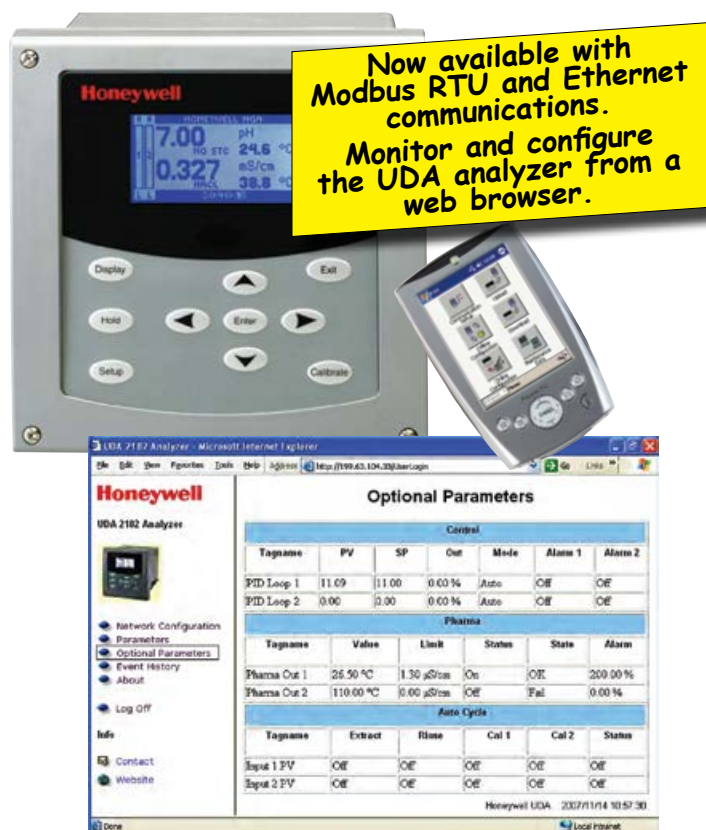
### Choosing Your Dissolved Oxygen Analysis System

|                                               | DL424 ppm, DL425 ppb                                                    | UDA2182 Analyzer/Controller                                                            |
|-----------------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <b>Case</b>                                   | DIN size aluminum, NEMA 4X/IP65                                         | DIN size, GE Valox® case, NEMA 4X                                                      |
| <b>Display</b>                                | Backlit dot matrix LCD                                                  | Backlit LCD 128x64 pixels                                                              |
| <b>Display Accuracy</b>                       | 0.01 ppm; 0.1 ppb in 0-20 ppb range, 1.0 ppb in 0-200 ppb range         | $\pm 0.5\%$ reading                                                                    |
| <b>Operating Conditions</b>                   | $-4^\circ$ to $185^\circ\text{F}$ ( $-20^\circ$ to $60^\circ\text{C}$ ) | $32^\circ$ to $140^\circ\text{F}$ ( $0^\circ$ to $60^\circ\text{C}$ )                  |
| <b>Control Capabilities/Advanced Features</b> | Integral electronics/sensor design                                      | PID, duplex, on/off control, AccuTune II, automatic altitude and salinity compensation |
| <b>Operating Voltage</b>                      | 16-42 VDC                                                               | 90-264 VAC                                                                             |
| <b>Analog Outputs</b>                         | One 4 to 20 mA                                                          | Up to three 0 or 4 to 20 mA                                                            |
| <b>Relays</b>                                 | N/A                                                                     | Up to four SPDT (Form C) relays                                                        |
| <b>Mountings</b>                              | Pipe, wall and panel                                                    | Pipe, wall and panel                                                                   |
| <b>Approvals</b>                              | UL and CSA general purpose                                              | CE, UL/CSA General; FM Class I, Div 2,                                                 |

| DL5000 Equilibrium probes for ppm or ppb applications |                                                                         |
|-------------------------------------------------------|-------------------------------------------------------------------------|
| <b>Materials</b>                                      | 316 SS or CVC housing                                                   |
| <b>Measurement Range</b>                              | 0 to 25,000 ppb or 0 to 25 ppm                                          |
| <b>Temperature Range</b>                              | $35.6^\circ$ to $140^\circ\text{F}$ ( $2^\circ$ to $60^\circ\text{C}$ ) |
| <b>Pressure Ratings</b>                               | 316 SS: 50 PSI (345 kPa)<br>CPPVC: 30 PSI (207 kPa)                     |
| <b>Special Features</b>                               | No internal probe maintenance                                           |
| <b>Mountings</b>                                      | Immersion, in-line or sample flow chamber                               |
| <b>Dimensions</b>                                     | 1" NPT pipe, 20 ft waterproof cable                                     |

# UDA2182 Single or Dual Loop Mixed Input Analyzer

# Honeywell



one analyzer. By upgrading, you'll be able to reduce inventory and add flexibility to your systems. Input boards are easy to replace. And you can add relays or an analog output with a single board. Board changes are fast and easy with front-hinged access to the analyzer.

The UDA2182 controller can be configured for On-Off, Current Adjusting Type (CAT), Pulse Frequency Type (PFT), Duration Adjusting Type (DAT), and PID. Each control loop has Honeywell's performance proven AccuTune III tuning algorithm. A selectable "Fuzzy Logic" algorithm is also provided for each loop to suppress unwanted process setpoint overshoot.

Two or four alarm relays are field-selectable for activating external equipment at alarm setpoints. Each alarm setpoint can be either a high or low alarm. Relays can also be assigned to temperature or diagnostics. They can also be configured to alarm on conductivity values.

## Added Features

**Realtime Clock:** The realtime clock supports time/date stamps for events and calibrations. Date/time stamps can be selected as tag names so they appear at the top of the display.

**Auto Clean/Cal:** Using the realtime clock, the UDA2182 can be configured to run a periodic cycle to clean and calibrate sensors.

**Event/Calibration Histories:** The UDA stores up to 256 time/date stamped events and up to 128 calibration events. Event (excluding calibration) data can be uploaded to a PC for reporting.

**pH Measurement from Differential Conductivity:** If you're measuring specific and cation conductivity, the UDA can calculate the pH level of your high purity water.

**CO2 Measurement:** UDA can calculate the concentration of CO2 (ppm) through cation and de-gassed conductivity levels.

**USP26 Conformance for High Purity Water:** The UDA2182 meets USP26 standards for alarming on increased conductivity.

**Protection:** CSA Type 4X (NEMA 4X) rating for front and case permits use in applications where it may be subjected to moisture, dust, or hose-down conditions.

**Approval:** General Purpose CSA certification and UL listing and FM Class I, Div. 2 is standard.

**Data Security:** Keyboard security protects configuration and calibration data, accessed by a configurable 4-digit code. Nonvolatile EEPROM memory assures data integrity during loss of power.

**Diagnostic/Failsafe Outputs:** Continuous diagnostic routines detect failure modes, trigger a failsafe output value and identify the failure to minimize troubleshooting time.

**High Noise Immunity:** Provides reliable, error-free performance in industrial environments that affect noise-sensitive digital equipment.

**pH Auto Buffer Calibration:** The unit can be set up to recognize NIST, US, and Euro buffers and automatically select the standardize and slope values at the calibration temperature

**Solution Temperature Compensation (high-purity water):** You can select preset compensations or configure custom values.

**Computed Variables:** For two-cell conductivity measurements, computed values of %Rejection/Passage, Difference, or Ratio can be displayed and assigned to the outputs or alarms.

**Dissolved Oxygen:** Auto-ranging of display and outputs with relays to indicate range, specialized probe bias diagnostics.

## Features

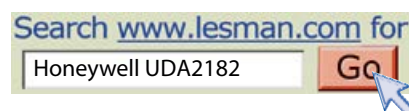
- Modbus/Ethernet option includes web server for monitoring analyzer from up to 10 different clients, e-mail support for alarm status updates, and DHCP configuration for dynamic Ethernet IP addressing
- Single or dual inputs — Dual input model accepts any combination of pH, ORP, conductivity, and dissolved oxygen
- Versatile, backlit graphical display
- Isolated inputs and outputs — Up to three analog outputs and four relays for monitoring and control
- Infrared port for PC or Pocket PC configuration, RS485 serial for Modbus RTU, and Ethernet for Modbus TCP
- Full DIN size — Fits panel cutouts of 7082 and 9782 analyzers
- CSA Type 4X (NEMA 4) enclosure with panel, wall, or pipe mounting — Easy access through hinged front door

The UDA2182 analyzer can accept single or dual inputs from Honeywell pH, ORP, contacting conductivity and dissolved oxygen sensors.

The graphical backlit LED can display two PV values and their engineering units simultaneously. Looking at the display, you'll also see the process temperature of both PVs, the analog output full scale percent, and the state of the relays. The display can show tags for each input, time/date information, and status messages.

Like the Honeywell UDC controllers, you can configure the UDA2182 with a PC or with a Pocket PC, using the embedded infrared communication port. There's absolutely no need to get access to the back of the unit to download or upload a brand new configuration!

With the UDA's mix-and-match design, analytical measurements of pH, conductivity and dissolved oxygen (ppm or ppb) can all be done in





**Don't see the input card you need? Call 800-953-7626.**

# DirectLine™ Two-Wire Transmitter with Flexible Mounting



## Features

- One third the cost of traditional analyzer/cable/sensor configurations!!!
- Local display and keypad for easy setup, calibration, and use
- Built-in diagnostics reduce troubleshooting time
- Plug-in modular design lets you safely remove and replace the probe without cycling power on the module
- Sampling and auto buffer options reduce calibration time
- Direct 4-20 mA output eliminates need for dedicated analyzers or transmitters, simplifying installation, start-up, operation, and maintenance tasks
- Integral electronics with local user interface simplifies installation and shortens calibration times
- Modular plug-in design simplifies electrode replacement
- Playing card-sized guide helps ensure simple, correct, and consistent calibration and configuration

## Flexibility Saves Installation Time and Costs

Honeywell's DirectLine architecture includes an electronics module integral to the electrode, eliminating the additional time and cost of installing an analyzer or transmitter, a separate preamp, and special cable! The electronics module provides a direct 4-20 mA output proportional to pH, ORP, DO, or conductivity.

The electronics module provides display, configuration, and calibration capabilities in a weatherproof and corrosion-resistant enclosure. You can order the sensors with a universal mounting kit, so the modules can be mounted on a wall, surface, or a pipe, or clipped to a DIN rail.

The DirectLine module continuously performs self-diagnostics on both the electronics and sensor. If a problem arises with the electronics or the sensor, the software prioritizes the problem type and displays only the highest priority error diagnostic. Once the problem is corrected, the error code disappears from the display.

## Calibration Was Never So Quick and Easy

Location, location, location! The DirectLine eliminates the extra time required to travel back and forth between the analyzer/transmitter and the sensor while you're performing a calibration. If applicable, take advantage of the auto buffer recognition calibration option to further reduce the time and cost of your calibrations. Forgot how to calibrate the pH/ORP electrode? The other side of the configuration guide quickly steps you through an electrode calibration.

## Measuring Conductivity

- EEPROM memory provides all cell info (cell constant and calibration factor), saves setup time and reduces errors
- Trim value or one-point solution calibration options reduce calibration time
- DL423 module can be used for conductivity, resistivity, TDS, and concentration
- Polyethersulfone cell bodies provide excellent corrosion resistance. Cell constants for processes from ultrapure water to acid/base concentrations

## Measuring Dissolved Oxygen

- Better accuracy with equilibrium probe — sensor readings independent of fouling and flow
- No internal probe maintenance — no electrolytes or electrodes to replace!
- No recalibrating after cleaning probes!
- No membrane replacement!



## Condensed Specifications

**Engineering Units:** pH; mV; °F; °C

**Displayed Accuracy:** pH:  $\pm 0.02$ ; ORP:  $\pm 1$  mV; DO:  $\pm 0.2$  ppm after stabilization, greater of  $\pm 2$  ppb or 5% reading after stabilization; Conductivity/Resistivity: Greater of  $\pm 2$  counts or  $\pm 0.5\%$  reading; Concentration:  $\pm 0.5\%$  reading; Temperature:  $\pm 0.1^\circ$  F from  $14^\circ$  to  $212^\circ$  F,  $\pm 1^\circ$  F from  $212^\circ$  to  $284^\circ$  F

**Displayed Process Variable:** pH: 0-14; ORP: -1600 to 1600 mV; Conductivity: 0-2000  $\mu$ S/cm, 0-20.00 mS/cm, 0-1000 mS/cm; Resistivity: 0-20.00 M $\Omega$ /cm; TDS: 0-2000 ppm/ppb, 0-200 ppt; %Concentration: 0-20.00% DO: 0-20 ppm in 1 ppm increments or 0-200 ppb in 1 and 10 ppb increments

**Displayed Temperature Range:** pH:  $14^\circ$  to  $230^\circ$  F; DO:  $35.6^\circ$  to  $140^\circ$  F; Conductivity:  $14^\circ$  to  $284^\circ$  F

**Sensor Survivable Temperature Range:**  $14^\circ$  to  $266^\circ$  F

**Electronics Module Ambient Temperature:**  $-4^\circ$  to  $185^\circ$  F

**Temperature Compensation:** 0.00pH/ $50^\circ$  F; -0.16pH/ $50^\circ$  F; 0.32 pH/ $50^\circ$  F

**Output:** 4-20 mA, 2-wire loop powered; **Calibration:** 4-20 mA

**Sensor Mating Connector Rating:** Submersible to 20 feet

**Output Cable:** Shielded twisted pair; **Termination:** Tinned leads; **Output:** 20' or 50'; **Sensor:** DuraFet: 20' or 50'; Meridian: 12' or 20'

**Power:** 16-42 VDC; **Max Load:** 250 $\Omega$  @ 16 VDC; 600 $\Omega$  @ 24 VDC; 1400 $\Omega$  @ 42 VDC

**Local Display and Buttons:** 4-digit, 7-segment LCD

**Calibration Options:** 1-point or 2-point sample; **Auto Buffer Recognition:** Selections: US, NIST, EURO

**Case:** Weatherproof, corrosion-resistant plastic housing

**Diagnostics:** Sensor and electronics

**Remote Mounting:** Pipe, wall, or DIN rail

**Approvals:** CE Mark for Industrial Applications; UL and CSA General Purpose; FM Class I, Div. 1, Groups C-D and Class I, Zone 0, A Ex ia IIB (I.S.); FM Class I, Div. 2, Groups C-D; Class I, Zone 2, Groups IIB (non-incendive field wiring)





# Honeywell

**Learn more about DirectLine at [Lesman.com](http://Lesman.com)**

## Ordering Instructions

Make a selection from each table. Follow the arrows down to be sure the unit you want is available. Complete catalog numbers look like this:

Module: DL4 \_ \_ \_ \_ \_  
Electrode Mounting: DL1 \_ \_ \_ \_ \_

**Step 1. Select your electronics**

**Step 2. Select the probe and mounting**

**Step 3. Place your order with Lesman!**

**Electronics modules, probes, and mountings must be specified as separate line items.**

## Step 1: Select Your Electronics Module

| Description                                                            | Catalog Number | Availability | Price    |
|------------------------------------------------------------------------|----------------|--------------|----------|
| <b>DirectLine Sensor Electronics Module</b>                            |                |              |          |
| For Use with Durafet III, Meridian II, and HPW7000 pH Electrodes       | DL421          | ↓            | \$606.00 |
| For Use with Contacting Conductivity Cells                             | DL423          | ↓            | 667.00   |
| For Use with Dissolved Oxygen ppm Probes                               | DL424          | ↓            | 811.00   |
| <b>Output Cable for Integral or Remote Mounting</b>                    |                |              |          |
| Cordset: 19.7 Ft (6 m) w/ Connector, Cable Field Wiring Connector Only | E              | • • •        | 61.00    |
|                                                                        | F              | • • •        | 30.00    |
| <b>Sensor Cable for Remote Mounting</b>                                |                |              |          |
| No Cable Required, Integral Mount                                      | 0              | • • •        | 0.00     |
| No Cable: Conductivity Remote Mount                                    | 5              | e            | 174.00   |
| No Cable: Dissolved Oxygen Remote Mount                                | 6              | e            | 174.00   |
| Output Cable: Durafet III Remote, 20 Feet                              | 7              | f            | 259.00   |
| Output Cable: Durafet III Remote, 50 Feet                              | 8              | f            | 336.00   |
| <b>Remote Mounting Options</b>                                         |                |              |          |
| None                                                                   | A              | • • •        | 0.00     |
| 2" Pipe Mount Bracket, Wall Mount, DIN-Rail Clip                       | B              | • • •        | 78.00    |
| <b>Options</b>                                                         |                |              |          |
| No ID Tag, No Certificates                                             | 0000           | • • •        | 0.00     |

### Restrictions

e For remote mount models only.

f For remote mount models only. Requires Durafet III electrode with Vario Pin connector.

**DirectLine models also available for ORP and PPB dissolved oxygen. Call for pricing.**

## Accessories and Replacement Parts

| Description                                 | Catalog Number | Price  |
|---------------------------------------------|----------------|--------|
| DirectLine Replacement Sensor Module for pH | 51452682-501   | 579.00 |
| Field Wiring Cable — 20 Feet                | 51500270-501   | 212.00 |
| Field Wiring Cable — 50 Feet                | 51500270-502   | 247.00 |

Call for pricing on 20 foot and 50 foot remote electrode mounting cables.

**Not sure DirectLine is right for you? Fill out a Honeywell analytical instruments datasheet at [www.Lesman.com/datasheets](http://www.Lesman.com/datasheets) and fax it to Lesman for engineering review.**

## Improved Enclosure

- 1/2" NPT conduit connection provides increased protection and noise immunity for output cable. Available on all DirectLine sensor modules.
- IP68 watertight output cable connection
- Protective PC sleeve on probe/module connections
- Captive stainless steel screw, thicker wall



## Step 2: DL421 with Durafet III Electrodes

| Description                                            | Catalog Number             | Price     |
|--------------------------------------------------------|----------------------------|-----------|
| <b>Electrode Mounting for Durafet III pH Electrode</b> |                            |           |
| Insertion/ Removal (7774)                              | DL1-                       | \$0.00    |
| CPVC Ball Valve Assembly                               | 741                        | 1190.00   |
| 316SS Ball Valve Assembly                              | 742                        | 1862.00   |
| Inline (7777)                                          | 771                        | 377.00    |
| 1" Electrode, Remote DL421 Mount                       | 772                        | 377.00    |
| 1" Electrode, Integral DL421 Mount                     | 774                        | 454.00    |
| Pipe Tee                                               | 775                        | 377.00    |
| 1" Electrode, Remote DL421 Mount                       | 777                        | 454.00    |
| 1" Electrode, Remote DL421 Vario Pin                   |                            |           |
| Options                                                | No ID Tag, No Certificates | 0000 0.00 |

**Need a sanitary mount pH electrode? Call Lesman for pricing and availability.**

## Step 2: DL423 for Contacting Conductivity

| Description                                               | Catalog Number | Price  |
|-----------------------------------------------------------|----------------|--------|
| <b>Electrode Mount for Contacting Conductivity Probes</b> |                |        |
| Remote Mount 3/4" NPT Compression Fittings                | DL4-           | \$0.00 |
| Cell Constant 0.1                                         | SX1            | 135.00 |
| Cell Constant 1.0                                         | SX2            | 135.00 |
| Cell Constant 10.0                                        | SX3            | 152.00 |
| Factory Use and Special Construction Codes                | 000-0000       | 0.00   |

Note: Remote cells are supplied with an integral 20-foot sensor cable that must be wired to the DL423 remote connector.

## Step 2: DL424/425 for Dissolved Oxygen

| Description                                              | Catalog Number | Price   |
|----------------------------------------------------------|----------------|---------|
| <b>DL5000 Dissolved Oxygen Probe - Parts per Billion</b> |                |         |
| <b>DL5000 Dissolved Oxygen Probe - Parts per Million</b> |                |         |
| Probe                                                    | DL5PPB         | \$0.00  |
| PVC Probe, Integral Mount, No Cable                      | DL5PPM         | 0.00    |
| PVC Probe, Remote Mount, 20 Ft Cable                     | 100            | 992.00  |
| PVC Probe, Remote Mount, 100 Ft Cable                    | 300            | 992.00  |
| 316 SS Probe, Integral Mount, No Cable                   | 700            | 1064.00 |
| 316 SS Probe, Remote Mount, 20 Ft Cable                  | 200            | 1332.00 |
|                                                          | 400            | 1332.00 |
| Tagging                                                  | 00__           | 0.00    |
| Stainless Steel ID Tag (3 Lines, 22 Char/Line)           | SS__           | 37.00   |
| Warranty                                                 | __00           | 0.00    |
| 1 Year Extended Warranty                                 | __W2           | 156.00  |
| 2 Years Extended Warranty                                | __W3           | 251.00  |

Note: Remote mounted 316SS probe available ONLY on DL5PPB models.

Two-Wire and Four-Wire Analytical Process Transmitters



Features

- Large display with easy-to-read 3/4" measured value
- Simple operator interface with basic pictographs
- Continuous diagnostics for monitoring calibration, cell health, and transmitter self-test
- Manual loopback check for integrity of 4-20 mA output
- Wall, pipe, or panel mount NEMA 4X/IP65 plastic enclosure
- Quick response time (less than five seconds per step change)

Condensed Specifications

pH/mV Input

**Range:** pH value: 0.00 to 14.00 pH; ORP value: -1500 to +1500 mV

**Accuracy:** pH: <0.02; Tc: 0.0021 pH/K mV: <1 mV Tc: 0.1 mV/K

Conductivity Input (Contacting)

**Range:** Contacting: 0000 to 9999 (0, 1, 2, or 3 decimal) µS/cm; 0000 to 9999 (1, 2, or 3 decimal) mS/cm; 0000 to 9999 (1, 2, or 3 decimal) MΩ-cm; Toroidal: 00.00 to 99.99, 000.0 to 999.9, or 0000 to 1999 mS/cm

**Accuracy:** Contacting: Greater of <1% measured value or ±0.4 µS/cm cell constant; Toroidal: 1% measured value ± 0.02 mS/cm ± 1 LDS

Diagnostics

**Sensecheck:** Polarization detection and monitoring of cable capacitance

**Sensor Standardization:** Entry of cell calibration factor with display of conductivity and temperature; Temperature probe adjustment

**Sensoface:** Monitors asymmetry potential, slope, calibration response time

Temperature Input

**Range:** 8550 Ω Thermistor: -14° to 266° F; Pt100/1000 Ω RTD: 4° to 302° F

**Accuracy:** < 0.5 K; **Resolution:** 0.1° C or 1° F

**Temperature Compensation:** Automatic or manual adjust

Supply/Output

**Current Source:** 3.80 mA to 22.0 mA; **Overrange:** 22 mA for error messages; **Error:** <0.3 % of current value + 0.05 mA

Specifications Unique to APT2000

Area Certifications / Compliances

**General Purpose:** Zone 2 (USA) FM: NI, Class I, Div 2, Groups A–D, T4

**Intrinsically Safe:** Zone 1 (USA) FM: IS, Class I, Div 1, Groups A–D, T4 Zone 1 (Europe); CENELEC: II 2G EEx ib [ia] IIC T6

**APT2000TC:** FM Class 1, Div. 2, Groups A–D



Features Unique to APT2000

- HART® bidirectional communications protocol
- Application in hazardous and safe areas
- Optical alarm signaling by blinking red LED
- Integrated current source for checking peripheral devices

Features Unique to APT4000

- Applications in Class I, Div 2 or General Purpose areas
- USP24 software with UPS control limit capabilities
- Remote "Hold Last Measured Value" capability
- Second parameter set programmable
- Optical alarm with relay contact
- Two current outputs available. Output 2 for temperature
- PID (pulse length and pulse frequency) software installed

Need more sophisticated analysis and control? Looking for one device to handle pH, ORP, Conductivity, and Dissolved Oxygen? See the UDA2182 on page 164.

Specifications Unique to APT4000

**PID Function:** Relay assignable for PID Control, (pulse length/frequency)

**Alarm Relay Contacts:** Min/max: SPST N/O (Hysteresis 0.2% range); Diagnostic: SPST N/C; Wash: SPST N/O

**Supply Voltage:** 20 to 253 VAC/DC, 45 Hz to 65 Hz, 2 VA/1.5 W

**USP24 Software:** Software for on-line water conductivity monitoring

**Supply Output Current:** 0 or 4 to 20 mA current loop, 10 V floating; Output #1 for PV, Output #2 for Temperature

**Output Minimum Span:** Linear: 5% selected range. Logarithmic: 1 decade

**Max Current/Voltage:** AC: <250V/<3A/<750 VA DC: < 30 V/ < 3A / < 90 W

**Approvals:** Area Certification: Zone 2 (USA) FM: NI, Class I, Division 2, Groups A–D, T4; APT4000TC: FM Class 1, Div. 2, Groups A–D

Ordering Instructions

Make one selection from each table section below. A finished catalog number looks like this: APT2000\_\_-H-\_\_-E00 or APT4000\_\_-E00

Model Selection Guide

| Description                                                          |                            | Catalog Number | Avail-ability | Price Each |
|----------------------------------------------------------------------|----------------------------|----------------|---------------|------------|
| APT2000 Two-Wire Analytical Process Transmitter, HART® Communication |                            |                |               |            |
| Model                                                                | pH/ORP                     | APT2000PH-H-   | ↓             | \$1594.00  |
|                                                                      | Conductivity               | APT2000CC-H-   | ↓             | 1594.00    |
|                                                                      | Toroidal Conductivity      | APT2000TC-H-   | ↓             | 1617.00    |
| Approval                                                             | General Purpose: FM/CSA    | 00-            | •             | 0.00       |
|                                                                      | Intrinsically Safe: FM/CSA | IS-            | •             | 161.00     |
| English User's Manual                                                |                            | E00            | • • •         | 0.00       |
| APT4000 Four-Wire Analyzer/Transmitter/Controller                    |                            |                |               |            |
| Model                                                                | pH/ORP                     | APT4000PH-     | ↓             | 1536.00    |
|                                                                      | Conductivity               | APT4000CC-     | ↓             | 1610.00    |
|                                                                      | Toroidal Conductivity      | APT4000TC-     | ↓             | 1610.00    |
| English User's Manual                                                |                            | E00            | • • •         | 0.00       |
| Mounting Hardware                                                    | Panel Mount Kit            | 51205990-001   | • • •         | 37.00      |
|                                                                      | Pipe/Wall Mount Kit        | 51205988-001   | • • •         | 78.00      |

Need a HART® handheld communicator? See page 95.

# Honeywell Replacement Electrodes for pH and ORP Use



| Measure                               | Electrode Type             | Connection/Leads                                    | Temperature Range | Catalog Number | Fits Enclosure 77 |    |    |    | Price    |
|---------------------------------------|----------------------------|-----------------------------------------------------|-------------------|----------------|-------------------|----|----|----|----------|
|                                       |                            |                                                     |                   |                | 58                | 73 | 74 | 77 |          |
| pH                                    | Durafet II                 | 3/4", 1-1/4" or 1-1/2" NPT, Quick Disconnect        | -10° to 110° C    | 51204976-501   | x                 | x  | x  |    | \$384.00 |
| pH                                    | Durafet II                 | 3/4" NPT, Quick Disconnect                          | -10° to 110° C    | 51204976-502   | x                 | x  |    |    | 348.00   |
| pH                                    | Durafet II                 | 1-1/4" or 1-1/2" NPT, 12 Ft. Integral               | -10° to 110° C    | 51204976-503   |                   |    | x  |    | 523.00   |
| pH                                    | Durafet II                 | 1-1/4" or 1-1/2" NPT, 20 Ft. Integral               | -10° to 110° C    | 51204976-504   |                   |    | x  |    | 547.00   |
| pH                                    | Durafet II                 | 3/4" NPT, Quick Disconnect                          | -10° to 110° C    | 51205554-501   |                   |    |    | x  | 391.00   |
| pH                                    | Durafet II                 | 3/4", 1-1/4" or 1-1/2" NPT, Quick Disconnect        | -10° to 110° C    | 51205554-502   |                   |    | x  | x  | 391.00   |
| pH                                    | Durafet II                 | 3/4" NPT, 12 Ft. Integral                           | -10° to 110° C    | 51205554-503   |                   |    |    | x  | 529.00   |
| pH                                    | Durafet II                 | 3/4" NPT, 20 Ft. Integral                           | -10° to 110° C    | 51205554-504   |                   |    |    | x  | 553.00   |
| pH                                    | Durafet II                 | 3/4" NPT, 50 Ft. Integral                           | -10° to 110° C    | 51205554-505   |                   |    |    | x  | 685.00   |
| pH                                    | Durafet II                 | 3/4" NPT, 50 Ft. Integral                           | -10° to 110° C    | 51205554-512   |                   |    | x  | x  | 385.00   |
| pH                                    | Glass Measuring            | 3/4" NPT, Screw Cap                                 | 10° to 80° C      | 31117390-501   | x                 | x  |    |    | 204.00   |
| pH                                    | Glass Measuring (Antimony) | 3/4" NPT                                            | 5° to 75° C       | 31117399-501   | x                 | x  |    |    | 517.00   |
| pH                                    | Glass Combination + ATC    | 1.25" or 1.5" NPT, 12 Ft. Tinned, Coax, Conductors  | 10° to 80° C      | 31050381-501   | x                 |    | x  |    | 403.00   |
| pH                                    | Glass Combination          | 3/4" NPT, Screw Cap w/ 6" Spade Lug                 | 10° to 100° C     | 31117486-501   | x                 | x  |    |    | 324.00   |
| pH                                    | Glass Combination          | 1-1/4" or 1-1/2" NPT                                |                   | 31117495-501   | x                 |    | x  |    | 360.00   |
| pH                                    | Glass Combination          | 3/4", 1-1/4" or 1-1/2" NPT, 12 Ft. Tinned           | 0° to 80° C       | 31117489-501   |                   | x  | x  |    | 324.00   |
| pH                                    | Glass Combination          | 3/4", 1-1/4" or 1-1/2" NPT, 12 Ft. Quick Disconnect | 0° to 80° C       | 31074387-501   |                   |    | x  | x  | 384.00   |
| pH                                    | Glass Combination          | 3/4" NPT, 16" Quick Disconnect                      | 0° to 80° C       | 31074397-501   |                   |    |    | x  | 401.00   |
| pH                                    | Glass Combination          | 3/4" NPT, 12 Ft. Quick Disconnect                   | 0° to 80° C       | 31074399-501   |                   |    |    | x  | 384.00   |
| ORP                                   | Glass Combination          | 3/4", 1-1/4" or 1-1/2" NPT, 12 Ft. Tinned           | -5° to 130° C     | 31020751-501   | x                 | x  | x  |    | 336.00   |
| ORP                                   | Glass Combination          | 3/4", 1-1/4" or 1-1/2" NPT, 12 Ft. Tinned           | -5° to 100° C     | 51451341-503   |                   |    | x  | x  | 590.00   |
| ORP                                   | Glass Combination          | 3/4", 1-1/4" or 1-1/2" NPT, 12 Ft. Tinned           | -5° to 110° C     | 51451340-503   |                   |    | x  | x  | 590.00   |
| Reference                             | Single Junction            | Gel Filled, Rytan Body, 3/4" NPT                    |                   | 31117481-501   |                   | x  |    |    | 216.00   |
| Automatic Temperature Compensation    |                            | 3/4" NPT                                            |                   | 31022289-501   |                   | x  |    |    | 168.00   |
| Automatic Temperature Compensation    |                            | 3/4" NPT                                            |                   | 31152137-501   |                   | x  |    |    | 211.00   |
| Cap Adapter for Durafet II Electrodes |                            | 20 Ft. Cable                                        |                   | 51205965-502   | x                 | x  | x  | x  | 350.00   |

## Durafet II to Durafet III Cross Reference

Use the cross reference table to change existing Durafet II Installations to a Durafet III Installation. Both electrode and cable have to be changed.

### Notes:

- 1 Use 20 foot Durafet III cables for these shorter lengths.
- 2 Use 50 foot Durafet III cables for these shorter lengths.

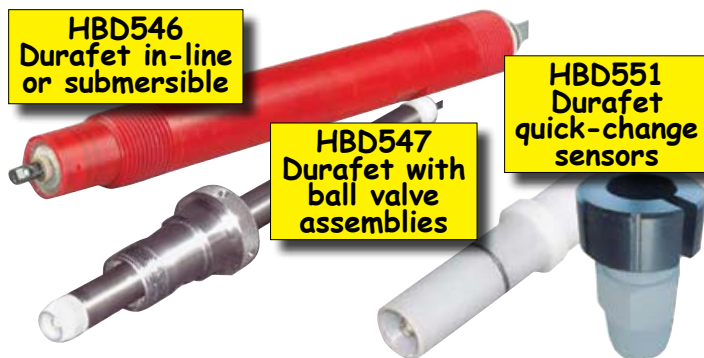
| Description             |                                        | Durafet II   | Durafet III  | Price    |
|-------------------------|----------------------------------------|--------------|--------------|----------|
| Industrial Electrode    | In-Line w/o Tip Guard, 8550 Thermistor | 51205554-001 | 51453503-501 | \$468.00 |
|                         | In-Line w/o Tip Guard, 1000 ohm RTD    | 51205554-009 | 51453503-502 | 468.00   |
|                         | Immersion w/Tip Guard, 8550 Thermistor | 51205554-002 | 51453503-505 | 468.00   |
|                         | Immersion w/Tip Guard, 1000 ohm RTD    | 51205554-010 | 51453503-506 | 468.00   |
| Sanitary Durafet        | 1.5" flange, shallow insertion         | 51450948-001 | 51453535-501 | 679.00   |
|                         | 1.5" flange, deep insertion            | 51450948-002 | 51453535-502 | 679.00   |
|                         | 2" flange, shallow insertion           | 51450948-003 | 51453535-503 | 679.00   |
|                         | 2" flange, deep insertion              | 51450948-004 | 51453535-504 | 679.00   |
|                         | 3" flange, shallow insertion           | 51450948-005 | 51453535-505 | 679.00   |
|                         | 3" flange, deep insertion              | 51450948-006 | 51453535-506 | 679.00   |
| Preamp Cable            | 4 foot Length (Note 1)                 | 51204782-006 | 50001623-501 | 258.00   |
|                         | 8 foot Length (Note 1)                 | 51204782-007 | 50001623-501 | 258.00   |
|                         | 12 foot Length (Note 1)                | 51204782-001 | 50001623-501 | 258.00   |
|                         | 20 foot Length                         | 51204782-002 | 50001623-501 | 258.00   |
|                         | 30 foot Length (Note 2)                | 51204782-003 | 50001623-502 | 400.00   |
|                         | 40 foot Length (Note 2)                | 51204782-004 | 50001623-502 | 400.00   |
| Cap Adapter Cable       | 50 foot Length                         | 51204782-005 | 50001623-502 | 400.00   |
|                         | 4 foot Length (Note 1)                 | 51205965-006 | 51453388-501 | 424.00   |
|                         | 8 foot Length (Note 1)                 | 51205965-007 | 51453388-501 | 424.00   |
|                         | 12 foot Length (Note 1)                | 51205965-001 | 51453388-501 | 424.00   |
|                         | 20 foot Length                         | 51205965-002 | 51453388-501 | 424.00   |
| DirectLine Remote Cable | 50 foot Length                         | 51205965-005 | 51453388-502 | 553.00   |
|                         | 20 foot Length                         | 51500270-001 | 51453225-501 | 247.00   |
| Accessories             | pH Buffer Solution 4.01                | 31103001-501 |              | \$34.00  |
|                         | pH Buffer Solution 6.86                | 31103002-501 |              | 34.00    |
|                         | pH Buffer Solution 9.18                | 31103003-501 |              | 32.00    |







# HBD Series Rugged pH/ORP Durafet Non-Glass Electrodes



## Features

- Non-glass Durafet electrode for entire pH range
- Great for high temperature and high pressure applications
- Combination pH electrode with measuring and reference electrode and temperature sensor
- One-piece chemically resistant Kynar body
- Compatible with most industrial transmitters and analyzers

**HBD546 Electrode (Left):** For threaded in-line and submersible use. The HBD546 has two 3/4" NPTM threads. One can be used to thread the electrode into a pipe tee for in-line mounting. The other can be used with a pipe coupling and support pipe for submersion mounting.

**HBD547 Electrode (Center):** For use with ball valve assemblies. Designed to be used with 1" NPTM Wrench-tite or 1.25" NPTM hand-tite compression fittings. HBD547 electrodes require a 1.25" or larger full port valve. Insertion depth is user-selectable.

**HBD551 Electrode (Right):** For sample lines and valve side-streams. These electrodes are designed for quick-change in-line operations, with a 1" NPTM threaded adapter and nut-loc retainer for quick removal and replacement.

## Honeywell Patented Unique Reference Cell Technology

- Extreme temperature and pressure tolerance
- For long life in low and high pH applications
- Prevents sensor poisoning
- Prevents internal leaks and plugs

Like other rugged semi-solid state references, the HBD reference is formed by a series of wood segments impregnated with KCL. But instead of the standard epoxy or impermeable barrier between wood segments, the HBD uses a pair of formed discs.

When the two disc faces are positioned adjacent to each other, they form a tortuous path, filled with electrolyte, between each of the segments. This path provides a more complete transition of KCl ions between the wood segments forward, and creates a difficult and longer distance for poison traveling back into the reference from the specimen fluid.

The Teflon reference junction acts as an interface between the process fluid and the reference electrode. This porous surface passes ions between the reference and measurement fluid, to allow very small amounts of KCl to leach from the reference, and provide the millivolts necessary for pH measurement. It also helps maintain a barrier between the measurement fluid and the reference, so the measured fluid doesn't rapidly poison or foul the reference.

## Specifications

**Operating Range:** 0-14 pH

**Pressure and Temperature Rating:** 50 psig, 212° F; 100 psig, 122°F

**Wetted Materials:** Kynar, porous Teflon, Viton, Ryton, EPDM, and Silicone

**Temperature Sensor:** 8550Ω thermistor, Pt1000 RTD

**HBD546 Mounting:** Threaded in-line: 3/4" NPTM threaded nose. Submerged: 3/4" NPTM threaded top connects to 3/4" NPTF coupling and extension pipe.

**HBD547 Mounting:** Ball-valve insertion: 1" NPTM wrench-tite, or 1.25" NPTM hand-tite compression fitting. Requires 1.25" or larger full port ball valve.

**HBD551 Mounting:** Quick-change in-line: 1" NPTM threaded adapter, nut-loc retainer for quick removal and replacement.

## Ordering Instructions

Make q selection from each table section below. A finished catalog number looks like this: HBD54\_-B\_-SD-T-\_-\_-\_-\_-000

| Description                                      |                                      | Catalog Number | Avail-ability | Price    |
|--------------------------------------------------|--------------------------------------|----------------|---------------|----------|
| In-Line or Submersible pH Sensor                 |                                      | HBD546-        | ↓             | \$898.00 |
| Ball Valve Insertion pH Assemblies               |                                      | HBD547-        | ↓             | 956.00   |
| Quick-Change In-Line pH Sensor                   |                                      | HBD551-        | ↓             | 1071.00  |
| Material                                         | Durafet, Kynar Body, Viton O-Ring    | BVSD-          | • • •         | 0.00     |
|                                                  | Durafet, Kynar Body, EPDM O-Ring     | BESD-          | • • •         | 0.00     |
| Temp Sensor                                      | Honeywell 8550 Ohm                   | TH_-           | • • •         | 200.00   |
|                                                  | Pt100 RTD                            | TC_-           | • • •         | 200.00   |
|                                                  | Pt1000 RTD                           | TK_-           | • • •         | 200.00   |
| Insertion Depth/Length                           | 0.9" Insertion Depth (Standard)      | __SN-          | • •           | 0.00     |
|                                                  | 1.9" Insertion Depth                 | __S1-          | •             | 0.00     |
|                                                  | 1.2" Insertion Length (Standard)     | __SN-          | •             | 0.00     |
|                                                  | 2.5" Insertion Length                | __S1-          | •             | 0.00     |
| Cable                                            | 10" Pigtail (for Junction Box)       | TT_-           | a             | 210.00   |
|                                                  | Pigtail for 16" Sheath Set           | J2_-           | a             | 221.00   |
|                                                  | Pigtail for 20" Sheath Set           | J3_-           | a             | 247.00   |
|                                                  | Pigtail for 24" Sheath Set           | J4_-           | a             | 315.00   |
|                                                  | 20-Foot Cable                        | 20_-           | • • •         | 0.00     |
|                                                  | 50-Foot Cable                        | 50_-           | • • •         | 173.00   |
| Lead                                             | All Tinned Leads                     | __ST-          | d d d         | 0.00     |
|                                                  | Vario Pin for Extension Cables       | __VP-          | e e e         | 0.00     |
| Options                                          | For Future Use                       | 000            | • • •         | 0.00     |
| Extension Cable                                  | 20' Direct Connection to UDA2182     | 50001391-501   |               | 269.00   |
|                                                  | 50' Direct Connection to UDA2182     | 50001391-502   |               | 395.00   |
|                                                  | 20' Cap Adapter Cable                | 51453388-501   |               | 424.00   |
|                                                  | 50' Cap Adapter Cable                | 51453388-502   |               | 553.00   |
| Wrench-Tite Ball Valve                           | 1.25" 316SS Ball Valve Assembly      | 50027636-001   |               | 532.00   |
|                                                  | 316SS Wrench-Tite Fitting            | 50027406-001   |               | 292.00   |
|                                                  | 316SS Clean/Cal/Purge Fitting (Opt.) | 50027412-003   |               | 307.00   |
| Hand-Tite Ball Valve                             | 1.25" 316SS Ball Valve Assembly      | 50027363-003   |               | 492.00   |
|                                                  | 316SS Hand-Tite Fitting              | 50027418-001   |               | 478.00   |
|                                                  | 316SS Clean/Cal/Purge Fitting (Opt.) | 50027412-001   |               | 331.00   |
| Sheath Sets                                      | 16" Titanium Sheath Set for HB547    | 50027425-001   |               | 266.00   |
|                                                  | 20" Titanium Sheath Set for HB547    | 50027425-002   |               | 306.00   |
|                                                  | 24" Titanium Sheath Set for HB547    | 50027425-003   |               | 359.00   |
| HBD551 Adapter                                   | 1" NPT Male, CPVC                    | 50027407-001   |               | 126.00   |
|                                                  | 1" NPT Male, Kynar                   | 50027407-002   |               | 165.00   |
|                                                  | 1" NPT Male, 316 SS                  | 50027407-003   |               | 154.00   |
|                                                  | 1" NPT Male, Kynar, 316SS Hex Nut    | 50027407-004   |               | 286.00   |
|                                                  | 1" NPT Male, 316SS, 316SS Hex Nut    | 50027407-005   |               | 273.00   |
| Insertion Collar Stop (for 20"/24" Sheaths Sets) |                                      | 50027421-001   |               | 67.00    |
| Junction Box (Order with New Installations)      |                                      | 50072803-501   |               | 82.00    |
| Tip Protector for HB546                          |                                      | 31075715-501   |               | 120.00   |

## Notes and Restrictions

- a For new installations, order extension cable and junction box.
- d Requires 20-foot or 50-foot cables.
- e Requires 10" pigtail for use with junction box.

## pH Electrodes and Mountings

### 7777DVP Durafet III pH Electrode Mounting with Vario Pin Connector

- Durafet III ISFET technology for exceptionally fast response
- Virtually unbreakable, solid state design
- Vario Pin quick disconnect IP68 waterproof cable for easy electrode installation and replacement
- FM Approved intrinsically safe mounting for Class I, Div 1, Groups A-D areas
- Rugged combination electrodes with fast-responding integral automatic temperature compensator

Honeywell's 7777 style electrode mounting enables users to interface Durafet® III pH electrodes to a process by either submersing the electrode or mounting it into a 3/4" threaded connection.

Durafet III electrodes provide fast, accurate, dependable pH measurement in the most demanding industrial applications.

#### Specifications

**Operating Range:** 0-14 pH; *Electrode:* 14° to 230° F; *Cap Adapter Cable:* 32° to 158° F

**Mounting:** Immersion or inline (3/4" NPT)

**Materials:** *Electrode body:* Ryton body, silicon ISFET die, ceramic reference junction, Viton media seal, nickel-plated brass, EPM reference frit seals; *Cables:* PVC, nickel-plated brass, and Viton

**Pressure/Temperature Rating:** Up to 100 PSIG at 122° F



#### Ordering Instructions

Make one selection from each table section below. A finished catalog number looks like this: 07777DVP - \_ \_ - \_ \_

#### Model Selection Guide

| Description                                       |                                         | Catalog Number | Price   |
|---------------------------------------------------|-----------------------------------------|----------------|---------|
| 7777DVP Durafet® III ISFET Electrode and Mounting |                                         | 07777DVP-      | \$ 0.00 |
| Immersion (w/ Tip Guard)                          | With 8550Ω Thermistor                   | 01-            | 442.00  |
|                                                   | With 1000Ω RTD                          | 02-            | 442.00  |
| In-Line Mount (No Tip Guard)                      | With 8550Ω Thermistor                   | 03-            | 442.00  |
|                                                   | With 1000Ω RTD                          | 04-            | 442.00  |
| Cable Length                                      | None                                    | 00-            | 0.00    |
|                                                   | UDA2182, 20 Feet (6,10 Meters)          | 01-            | 277.00  |
|                                                   | UDA2182, 50 Feet (15,24 Meters)         | 02-            | 388.00  |
|                                                   | Cap Adapter, 20 Feet (6,10 Meters)      | 04-            | 436.00  |
|                                                   | Cap Adapter, 50 Feet (15,24 Meters)     | 05-            | 542.00  |
| Customer ID Tag                                   | None                                    | 00 __          | 0.00    |
|                                                   | Stainless Steel (3 Lines x 22 Char Ea.) | SS __          | 47.00   |
| Certificates                                      | None                                    | __ 00          | 0.00    |
|                                                   | Certificate of Calibration              | __ CC          | 59.00   |
| Accessories                                       | Smooth Electrode Tip, In-Line Mount     | 51204993-501   | 14.17   |
|                                                   | Guarded Tip, Immersion Mount            | 51204992-501   | 14.76   |
|                                                   | CPVC Pipe Tee for In-Line Mounting      | 31120167-501   | 75.00   |

### 7794DVP 3A Sanitary Durafet III pH Electrode

- 3A sanitary approved
- "No Epoxy" packaging for greater reliability
- Remote mount option for DirectLine® sensor
- Uses ISFET, solid-state sensor instead of conventional glass membrane
- Vario Pin quick disconnect IP68 waterproof cable for easy installation and replacement
- Reference electrode and compensating temperature sensor integral with electrode

Honeywell's sanitary Durafet III is designed for direct insertion into production equipment without fear of contamination. Measurement can be online and continuous — no time-consuming grab sampling.



#### Specifications

**Operating Range:** 0-14 pH; 14° to 230° F (-10° to 110° C)

**Sterilization Conditions:** 266° F maximum at 50 PSIG

**Maximum Process Pressure:** 0 to 690 kPa from 14° to 212° F; 0 to 345 kPa at >212° F; 0 to 100 PSIG from 14° to 212° F; 0 to 50 PSIG at >212° F

**Electrode Body:** FDA-compliant Fortron® and polysulphone, ceramic reference junction, silicon ISFET measuring sensor, and a viton sensor seal

**Mounting:** Mounts to standard CIP fittings, Tri-Clamp or equivalent

#### Ordering Instructions

Make one selection from each table section below. A finished catalog number looks like this: 07794DVP - \_ \_ - \_ \_-0000

#### Model Selection Guide

| Description                                             |                                        | Catalog Number | Price   |
|---------------------------------------------------------|----------------------------------------|----------------|---------|
| 7794 Sanitary Mounting for Durafet III ISFET Electrodes |                                        | 07794DVP-      | \$0.00  |
| Immersion Style                                         | 1.5" Flange, Shallow Immersion (2.29") | 01-            | 643.00  |
|                                                         | 1.5" Flange, Deep Immersion (2.91")    | 02-            | 643.00  |
|                                                         | 2" Flange, Shallow Immersion (2.83")   | 03-            | 643.00  |
|                                                         | 2" Flange, Deep Immersion (3.72")      | 04-            | 643.00  |
|                                                         | 3" Flange, Shallow Immersion (2.53")   | 05-            | 643.00  |
|                                                         | 3" Flange, Deep Immersion (3.72")      | 06-            | 643.00  |
| Cable Length                                            | None                                   | 00-            | 0.00    |
|                                                         | UDA2182, 20 Feet (6,10 Meters)         | 01-            | 277.00  |
|                                                         | UDA2182, 50 Feet (15,24 Meters)        | 02-            | 388.00  |
|                                                         | Cap Adapter, 20 Feet (6,10 Meters)     | 04-            | 436.00  |
|                                                         | Cap Adapter, 50 Feet (15,24 Meters)    | 05-            | 542.00  |
| Accessories                                             | pH Buffer Solution 4.01                | 31103001-501   | \$34.00 |
|                                                         | pH Buffer Solution 6.86                | 31103002-501   | 34.00   |
|                                                         | pH Buffer Solution 9.18                | 31103003-501   | 32.00   |







## AS General Service Conductivity Cells

- Cell constants from 0.01 to 50
- Choice of 316 SS or graphite electrodes
- Noryl shell with epoxy body
- 3/4" NPT CPVC or SS compression fitting
- Automatic temperature compensation with your choice of thermistor or RTD
- Hot tap versions available

Aquametrix AS conductivity probes feature a choice of 316 stainless steel or graphite electrodes in Noryl shells to satisfy just about any industrial, power plant or lab application. Six cell constants from 0.1 to 50 are available to cover any water sample between pure water and brine.

A compression fitting allows for adjustable insertion length in 3/4" NPT piping or in the side of a tank. Reverse the direction of the compression fitting for submersion mounting. A ball valve ("hot-tap") types permit removal of the cell from process piping or from tanks without shutting down the system. All cell types are designed with a safety stop shoulder on the cell.

**AS conductivity sensors starting at \$195.00!**

## ES Toroidal Conductivity Sensors

- Choice of voltage output probe or 4 to 20 mA direct output probes
- Polypropylene (ES-1), Kynar or CPVC (ES-5) wetted materials
- Convertible style fitting
- Temperature compensation: PT1000 RTD (ES-1), PT100 RTD (ES-5)
- 20 foot cable standard
- Two year limited warranty

Aquametrix ES series electrodeless conductivity sensors are used in processes where conventional contacting sensors may become fouled or corroded. Each sensor can be mounted in flow-through applications or submersion mounted in tanks or open vessels.

The ES-1 provides a raw signal that requires a third party analyzer for power and signal processing. We recommend the Knick line for this purpose. The ES-5 is loop powered and directly outputs a 4-20 mA signal.



**ES toroidal sensors starting at \$495.00!**



**See Aquametrix Shark series transmitters and analyzers on page 161**

## **New!** Conductivity Cells



## AM Stainless Steel Conductivity Cells

- Cell constants from 0.01 to 50
- Stainless Steel electrodes and body with Teflon Insulators
- PVDF or SS compression fitting
- Automatic temperature compensation
- Adjustable or fixed insertion styles available
- General service, sanitary, and high temperature versions available

**AM conductivity sensors starting at \$325.00!**

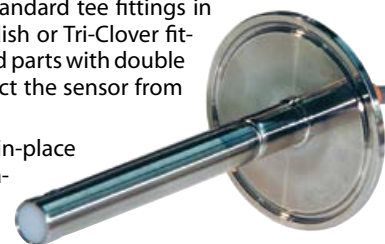
Aquametrix AM3422 general service conductivity cells fit into 3/4" to 1" process lines with standard pipe fittings. They're designed for durability in process applications, and their stainless steel and Teflon materials protect them from harm in corrosive chemical applications. The built-in temperature compensation helps ensure high accuracy.

The AM3444 conductivity cell is designed for high pressure and high temperature conductivity measurements, and is ideal for boiler control applications.

The AM3444 electrode is made of 316 stainless steel, with PEEK and EPDM o-rings for maximum reliability. The seals are designed to bear the brunt of chemical attack and hot water damage for long sensor life with low maintenance. The AM3444 is good for process temperatures up to 302° F.

The AM3455 conductivity cells are welded to blind flanges, so they can be inserted into standard tee fittings in sanitary applications using Ladish or Tri-Clover fittings. 316L stainless steel wetted parts with double redundant EPDM o-rings protect the sensor from chemical attack.

The AM3455 is built for clean-in-place service, with FDA-compliant materials, and can be ordered with USP Class VI approval.



## Conductivity Cells and Assemblies

## 4973 and 4974 Conductivity Cells

- Insertion and CIP Mountings
- Great for Pure Water Processes
- Corrosion-Resistant Body

The 4973 and 4974 cells are ideal for pure water applications, giving you the accuracy you demand. Polyether-sulfone (PES) construction, with electrodes of titanium or high-density graphite, increase resistance to corrosion.

These cells are flexible, designed for insertion, flow-through, direct installation into a process stream, or for use with a PES or stainless steel flow chamber in a bypass stream. For sanitary clean-in-place (CIP) piping systems, the 4794 cells include standard 1½" or 2" CIP fittings.

## Specifications

**Cell Constants:** 0.01, 0.1, 1.0 and 10 cm<sup>-1</sup> with individual calibration factors

**Temperature:** 4973: 284° F max. at rated pressure; 4974: 266° F max.

**Pressure:** 4973: 250 PSIG max. at rated temperature;  
4974: 150 PSIG max.

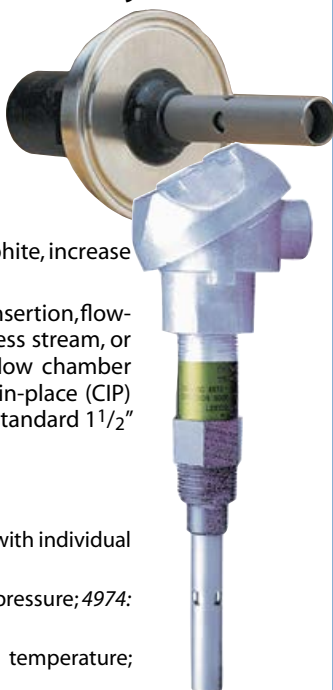
**Automatic Temperature Compensation:** Insertion available on all cells.  
4973: 3/4" NPT male thread for schedule 40 and 80 pipe; 4974: 1 1/2" or 2"  
sanitary CIP fitting

**Insertion Depth:** 3 1/2" for 1, 10, and 0.01 constants from solution end of 3/4" NPT male thread; 2 1/2" for 0.1 constant

**Wetted Parts:** U.S. Food & Drug Administration compliant

**Cell:**Body:PES;Electrodes:0.01 and 0.1 constant,titanium;1.0 and 10.0 constant, high-density graphite with Teflon guard. 4974 also includes food-grade silicone rubber and polished 316 SS

**Electrical Connections:** Integral PVC-covered non-shielded 18-gauge 4-conductor cable, 7' or 20', as specified.



## Ordering Instructions

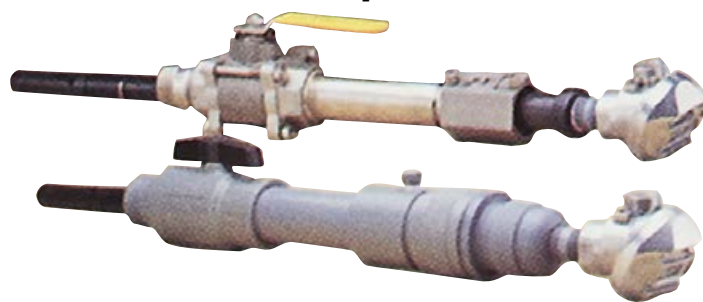
Select the key number and options you need. Follow the arrows to be sure the unit is available. A finished catalog number looks like this:

04973- - - -

## Model Selection Guide

| Description                                 |                                           | Catalog Number | Availability |   | Price   |
|---------------------------------------------|-------------------------------------------|----------------|--------------|---|---------|
| 4973 Conductivity Cell                      |                                           | 04973-         | ↓            |   | \$ 0.00 |
| 4974 Sanitary Conductivity Cell             |                                           | 04974-         |              | ↓ | 0.00    |
| Cell Constant                               | 0.01                                      | 001-           | •            | • | 81.00   |
|                                             | 0.10                                      | X01-           | •            | • | 81.00   |
|                                             | 1.00                                      | XX1-           | •            | • | 0.00    |
|                                             | 10.00                                     | X10-           | •            | • | 0.00    |
| Insertion                                   | Automatic Temperature Compensator         | 333-           | •            | • | 413.00  |
| Leadwire Length                             | 20 Ft. Leadwire                           | 20-            | •            | • | 0.00    |
|                                             | Junction Box Head, Aluminum               | X1-            | •            | • | 92.00   |
| CIP Sanitary Fittings                       | None                                      | 00-            | •            |   | 0.00    |
|                                             | 1.5" Clean-in-Place Fitting               | 15-            |              | • | 385.00  |
|                                             | 2.0" Clean-in-Place Fitting               | 20-            |              | • | 465.00  |
| Tagging 22 Char/Ln                          | None                                      | 0 __           | •            | • | 0.00    |
|                                             | Stainless Steel ID Tag (3 Line x 22 Char) | S __           | •            | • | 38.00   |
| No Documentation (Download from Lesman.com) |                                           | _00            | •            |   | 0.00    |

## Assemblies and Replacement Cells



- 316 Stainless Steel or CPVC Plastic
- Insertion Device Avoids Process Interruption

Honeywell 4909 conductivity assemblies let you insert or remove cells without interrupting your critical process. A restraining mechanism and an internal safety stop provide protection for safe removal at pressures to 50 PSIG. The plastic removal device uses a purge port to flush out accumulated debris.

## Specifications

**Cell Constants:** 0.01, 0.1, 5.0, and 10, 20, 25, and 50 cm<sup>-1</sup>

**Leadwire:** 4 leads; Tefzel-covered; 18-gauge cable, 7' or 20'

**Pressure:** 200 PSIG max. at 284° F. *Removal or insertion:* 50 PSIG max.

**Temperature:** 284° F max. at 200 PSIG

**Process Connection:** 1 1/4" NPT male Stainless Steel, 1 1/2" NPT male CPVC

**Length:** Insertion: 4.5 to 6.9"; Overall: Process to connection, 16.6,"; 20.5" with junction box; Total for Cell Removal: 44.5"; 50.5" with junction box

**Wetted Parts:** 316 SS ball valve, Viton and Teflon internal sealing materials.  
*Body:* PES electrode, nickel or platinum

## Ordering Instructions

Select the key number and options you need. A finished catalog number will look like this: 04909- - - - -

## Model Selection Guide

| Description                                 |                                           | Catalog No. | Price   |
|---------------------------------------------|-------------------------------------------|-------------|---------|
| 4909 Complete Conductivity Cell Assembly    |                                           | 04909-      | \$ 0.00 |
| 4908 Replacement Cell Only                  |                                           | 04908-      | 0.00    |
| Cell<br>Constant                            | 0.01                                      | 001-        | 395.00  |
|                                             | 0.10                                      | X01-        | 395.00  |
|                                             | 1.00                                      | XX1-        | 390.00  |
|                                             | 10.00                                     | X10-        | 390.00  |
|                                             | 50.00                                     | X50-        | 390.00  |
| Electrode<br>Material                       | Nickel                                    | 33-         | 0.00    |
|                                             | Platinum                                  | 44-         | 1067.00 |
| Insertion                                   | Automatic Temp. Compensator               | 333-        | 212.00  |
| Leadwire<br>Length                          | 20 Ft. Leadwire                           | 20-         | 0.00    |
|                                             | Junction Box Head, Aluminum               | X1-         | 92.00   |
| Valve/Cell<br>Material                      | 4909 Valve Assembly, Stainless Steel      | 02-         | 1026.00 |
|                                             | 4909 Valve Assembly, CVPC                 | 03-         | 596.00  |
|                                             | 4908 Replacement Cell (for SS Valve)      | 02-         | 0.00    |
|                                             | 4908 Replacement Cell (for CPVC)          | 03-         | 0.00    |
| Special<br>Insertion<br>Length              | None                                      | 000-        | 0.00    |
|                                             | 4.4" Extra Length (for SS Valves Only)    | 910-        | 132.00  |
|                                             | 4909 SS Support Tube/PES Cell             | 930-        | 579.00  |
|                                             | 4908 SS Support Tube/PES Cell             | 930-        | 0.00    |
| Tagging<br>22 Char/Ln                       | None                                      | 0 __        | 0.00    |
|                                             | Stainless Steel ID Tag (3 Line x 22 Char) | S __        | 38.00   |
| No Documentation (Download from Lesman.com) |                                           | _ 00        | 0.00    |

# Honeywell

## Conductivity Cells and Assemblies

### 4905 Series



- Wide Range of Cell Constants
- Insertion or Immersion Mountings
- High Temperature and Pressure Limits

Made of corrosion-resistant PES, 4905 cells can be used with either nickel or platinum electrodes for continuous, reliable readings.

For insertion applications, the 1" NPT male thread allows installation in a pipe or tank. For flow applications, install the cell directly into a process stream or use with a separate flow chamber in a bypass stream. For immersion applications, 1/2" rigid or flexible plastic pipe is threaded into the top of the cell — up to 6' for 7' cable, up to 19' for 20' cable.

#### Specifications

**Cell Constants:** 0.01, 0.1, 5.0, and 10, 20, 25, and 50 cm<sup>-1</sup>

**Temperature:** 284° F max. at rated pressure

**Pressure:** 250 PSIG max. at rated temperature

**Leadwire:** 4 leads; Tefzel-covered; 18-gauge cable, 7' or 20'

**Mounting:** 1" NPT male lead

**Length:** Insertion Depth: 4.5" to 6.9"; depends on cell constant; Overall: Approx. 6" to 8" (10 to 12 1/4" with junction head).

**Wetted Parts:** Cell: Polyethersulfone; Electrodes: Nickel or platinum

#### Ordering Instructions

Select the key number and options you need. A finished catalog number will look like this: 04905-\_\_\_\_-\_\_\_\_-\_\_\_\_-\_\_\_\_-\_\_\_\_-\_\_\_\_-\_\_\_\_-\_\_\_\_-\_\_\_\_-\_\_\_\_

#### Model Selection Guide

| Description                                    |                                                        | Catalog Number | Price   |
|------------------------------------------------|--------------------------------------------------------|----------------|---------|
| 4905 PES Corrosion-Resistant Conductivity Cell |                                                        | 04905-         | \$ 0.00 |
| Cell Constant                                  | 0.01                                                   | 001-           | 264.00  |
|                                                | 0.10                                                   | X01-           | 264.00  |
|                                                | 1.00                                                   | XX1-           | 258.00  |
|                                                | 10.00                                                  | X10-           | 258.00  |
|                                                | 50.00                                                  | X50-           | 258.00  |
| Electrode Material                             | Nickel                                                 | 33-            | 0.00    |
|                                                | Platinum (for Acid/Base Applications)                  | 44-            | 1067.00 |
| Insertion                                      | Automatic Temp. Compensator                            | 333-           | 195.00  |
| Leadwire Length                                | 20' Leadwire                                           | 20-            | 0.00    |
|                                                | Universal Head Aluminum                                | X1-            | 92.00   |
| Special Insertion                              | None                                                   | 000-           | 0.00    |
|                                                | 4.4" Extra Length                                      | 910-           | 132.00  |
| Tagging                                        | None                                                   | 0__            | 0.00    |
|                                                | 22 Char/Ln Stainless Steel I.D. Tag (3 Line x 22 Char) | S__            | 38.00   |
| No Documentation (Download from Lesman.com)    |                                                        | _00            | 0.00    |
| Accessories                                    | PES Flow Chamber                                       | 276127         | 113.00  |

### Toroidal (Electrodeless) Sensors

- Immersion, Union, Insertion/Removal, or Sanitary Mounting
- PEEK, PFA, Teflon®, PVDF, or Polypropylene
- Pt1000Ω RTD Temperature Compensation



Honeywell's 5000TC sensor is designed for tough applications where coating, fouling, corrosion, or extreme conditions are a concern. The 1.5" diameter bore reduces rough surfaces for low flow impedance.

#### Specifications

**Wetted Materials:** PFA Teflon, polypropylene, PVDF, or PEEK: Brass, CPVC, Teflon valve seats, Viton O-ring seals; Stainless steel: 316 SS, Teflon valve seats, Viton O-ring seals

**Maximum Flow Rate:** 10 feet per second

**Measuring Range:** 0.2 to 2000 millisiemens/cm

**Sensor Cable:** 20-ft. long, 5-conductor (plus 2 isolated shields) cable with polyethylene jacket; rated to 302° F

**Bore Size:** 1.5" diameter, 0.4" hole

**Operating Temperature Range:** 14° to 257° F (10° to 125° C); *Mounting Temperature Limits:* Plastic: 23° to 176° F, 23° to 203° F when supported with bracket; Stainless steel: 23° to 203° F

**Pressure/Temperature Limits:** Sensor only. Polypropylene: 100 PSI at 212° F; PVDF: 100 PSI at 248° F; PEEK/PFA Teflon: 200 PSI at 302° F; Mounting: Plastic: 50 PSI at 194° F; Stainless steel: 100 PSI at 194° F

#### Ordering Instructions

Select the key number and options you need. A finished catalog number looks like this: 5000TC-\_\_\_\_-\_\_\_\_-000

#### Model Selection Guide

| Description                                 |                                         | Catalog Number | Availability | Price    |
|---------------------------------------------|-----------------------------------------|----------------|--------------|----------|
| Toroidal (Electrodeless) Conductivity Probe |                                         | 5000TC         | ↓            | \$0.00   |
| Mount Material                              | No Mounting Assembly                    | 00             | •            | 0.00     |
|                                             | CPVC Pipe, PVC Junction Box             | 11             | •            | 293.00   |
|                                             | CPVC Union Adapter, Standard 2" Tee     | 23             | •            | 321.00   |
|                                             | CPVC Union Adapter Only                 | 24             | •            | 235.00   |
|                                             | CPVC Insertion/Removal Device           | 42             | •            | 1256.00  |
|                                             | PVDF Pipe, PVC Junction Box             | 12             | •            | 683.00   |
|                                             | PVDF Union Adapter, Standard 2" Tee     | 25             | •            | 838.00   |
|                                             | PVDF Union Adapter Only                 | 26             | •            | 614.00   |
|                                             | 316SS Union Adapter, Standard 2" Tee    | 21             | •            | 1187.00  |
|                                             | 316SS Union Adapter Only                | 22             | •            | 929.00   |
|                                             | 316SS Insertion/Removal Device          | 41             | •            | 281.00   |
| Sensor Material                             | 304SS Sanitary 2" Tee, Heavy-Duty Clamp | 31             | •            | 797.00   |
|                                             | No Sensor                               | 0              | •            | 0.00     |
|                                             | Polypropylene                           | 1              | a            | 1113.00  |
|                                             | PVDF                                    | 2              | a            | 1319.00  |
|                                             | PEEK                                    | 3              | a            | 1404.00  |
|                                             | PFA Teflon                              | 4              | a            | 1571.00  |
| Other                                       | Sanitary Polypropylene Sensor           | 5              | b            | 1267.00  |
|                                             | Sanitary PFA Sensor                     | 7              | b            | 1725.00  |
| For Future Use                              |                                         | 000            | •            | 0.00     |
| Accessories                                 | 6-Conductor Interconnect Cable          | 51451255-001   |              | 5.49/ft. |
|                                             | 5000TC Product Manual                   | 70-82-25-98    |              | 16.00    |

a Not available with sanitary mount.

b Available only with sanitary mount.

**Visit our website for complete specifications.**



# K-PATENTS Process Refractometers for In-Line Concentration



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## K-Patents Process Refractometers Fit Any Process

K-Patents' new PR-23 process refractometers are an affordable choice for a variety of processes. A new dual connectivity feature lets any two PR-23 sensors be connected to a single model DTR indicating transmitter.

### Sanitary compact refractometer PR-23-AC

A compact 3A approved refractometer for pipelines especially suitable for food and beverage processes.

### Sanitary probe refractometer PR-23-AP

The K-Patents Sanitary probe refractometer PR-23-AP-RSS/TSS provides an accurate on-line BRIX measurement in tanks and vessels.



### Sanitary flush mounted refractometer PR-23-APP

The K-Patents Sanitary flush mounted refractometer PR-23-APP provides an accurate on-line BRIX measurement in cookers and tanks. The sensor is flush mounted in the side wall, which allows the use of scrapers. It is also easily installed through a steam jacket.

### Process probe refractometer PR-23-GP

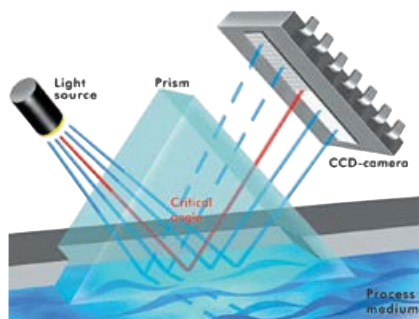
The K-Patents Probe process refractometer PR-23-GP provides an accurate on-line concentration measurement in large pipes and various tanks and vessels.

### Teflon body refractometer PR-23-M

An instrument with a specially designed flow cell (of Teflon® or Kevlar®) for measuring chemically aggressive solutions that corrode, foul or otherwise destroy metal parts, as well as for ultra-pure fine chemical processes where metal parts cannot be used.

### Saunders body refractometer PR-23-W

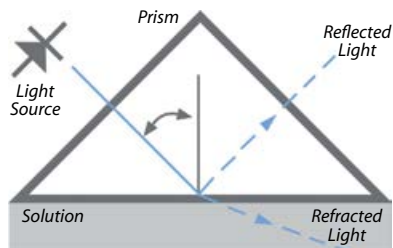
A heavy-duty instrument specially designed for measuring concentrations of chemically aggressive liquids in large-scale production and in large pipelines (diameter 50, 80 or 100 mm/2", 3" or 4"). Also for HF applications and other solutions that corrode or foul metal parts, as well as for ultra-pure fine chemical processes where metal parts cannot be used.



**Is a process refractometer right for you? Get a K-Patents application datasheet from [www.lesman.com/datasheets](http://www.lesman.com/datasheets) and send it to Lesman for engineering review. We'll help you get the system that best fits your needs.**

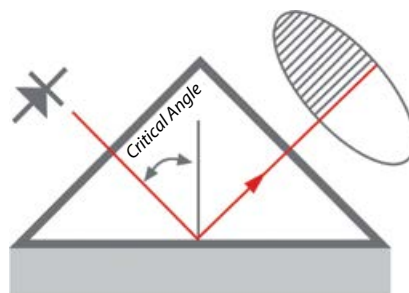
**Need a Brix table or the refractive index of a common material? See page 489.**

## Measurement Principle



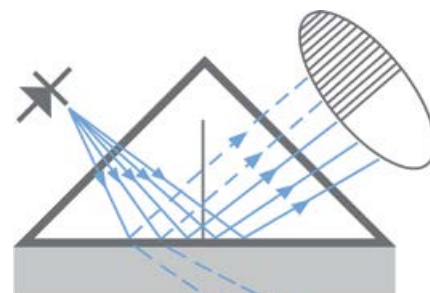
The light source sends light against the interface between a prism and the process solution, where the rays meet the surface at different angles.

Depending on the angle, some rays are totally reflected. Some rays are only partially reflected, and most of the light is refracted into the process solution. This creates an optical image with a dark sector and a light sector.



The angle corresponding to the shadow line is called the critical angle of total reflection. This angle is a function of the refractive index (the concentration of the solution.)

A digital CCD-camera detects the optical image and the shadow line. The camera transforms the optical image point-by-point to an electrical signal. The exact shadow line position is located, and the refractive index is determined.



A built-in temperature sensor measures the temperature (T) on the surface of the process liquid. The indicating transmitter converts the refractive index and temperature to concentration units.

The diagnostics program ensures that the measurement is reliable.

## Sanitary In-Line Process Refractometers for Brix and Concentration Measurement



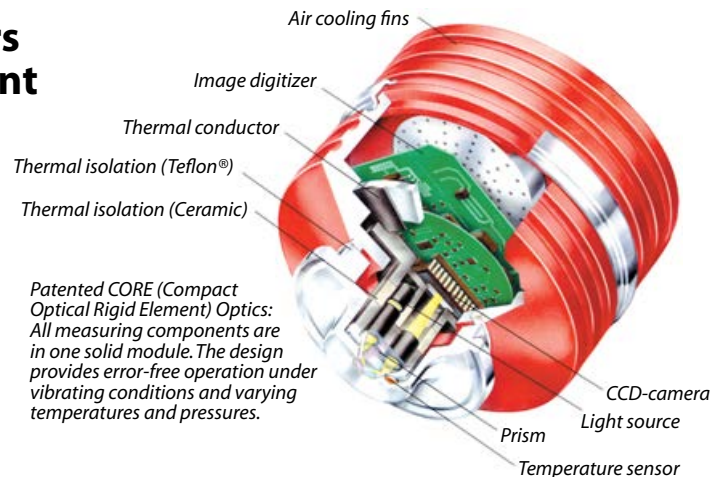
### Features

There's a K-Patents sanitary refractometer designed for installation in just about any configuration you need — in a pipe bend, large pipe or vessel, flush mount in a cooker.

- Full measurement range of 0–100 Brix
- Accuracy  $\pm 0.0002$  refractive index, corresponding to  $\pm 0.1\%$  by weight; unaffected by particles, bubbles, or color changes
- Fast (5-second) temperature measurement and automatic temperature compensation by mathematical curve.
- All sensor optics in a rigid patented CORE-optics module with no mechanical adjustments.
- Once the sensor is calibrated to the desired range, there's no need to recalibrate.
- Effective heat transfer and isolation using Teflon® and ceramics in the sensor provide safe operation in higher process temperatures (to 302° F).
- Meets the 3-A sanitary standard requirement.
- Connect one or two sensors to the transmitter module. Sensors are independent, with their own parameter sets and usable in different applications. Two current outputs configurable independently to indicate process concentration or temperature of either sensor.

**Ordering Information:** Sensor type and process connection, desired scale, properties of process solution, process temperature and pressure ranges, length of interconnection cable, supply voltage and frequency, options and accessories needed.

See the application datasheet at [www.Lesman.com/datasheets](http://www.Lesman.com/datasheets).



### Specifications

**Refractive Index Range Standard:** Full range 1.3100 to 1.5400 (corresponds to hot water 100 Brix) with spinal prism

**Accuracy:** R.I.  $\pm 0.0002$  (typically  $\pm 0.1\%$  by weight)

**Speed of Response:** 1 second undamped

**Damping Time Constant:** Selectable up to 5 minutes

**Calibration:** With Cargille standard R.I. liquids over full range

**Digital Image Detector:** 3648 pixel CCD-element

**Light Source:** Light emitting diode (LED)

**Temperature Measurement:** Built-in Pt1000 $\Omega$  sensor

**Temperature Compensation:** Automatic by mathematical curve

**Ambient Temperature:** Sensor: -4° to 113° F (-20° to 45° C)

### Sensors

**Sensor PR-23-A:** PR-23-AC: Compact sensor model for small pipe lines, PR-23-AP: Probe sensor model for large pipe lines and vessels

**Sensor: Wetted Parts, Standard:** AISI 316L stainless steel, prism gaskets teflon, prism spinel; **Option:** Hastelloy C/ASTM C276, titanium/ASTM B348 GR2, nickel 200, tantalum, zirconium/Zr702

**Process Connection:** PR-23-AC: Sanitary 3A-clamp 2.5", Varivent® inline access unit clamp or via elbow flow cell, PR-23-AP: Sanitary 3A-clamp 2.5" or 4", or MT4 DN 25/1T APV tank bottom flange

**Process Pressure:** Sanitary clamp max. 200 psi at 70° F, 125 psi at 250° F

**Process Temperature:** PR-23-AC: -4° to 266° F (-20° to 130° C); PR-23-AP: -4° to 302° F (-20° to 150° C)

**Sensor Protection Class:** IP67, NEMA 4X

### Indicating Transmitter DTR

**Hazardous Area Classification:** Zone 2 IIC T4 (KEMA No. EX-00.Y.1153); **Explosion-proof:** By purging

**Display:** 320 x 240 pixels graphic liquid crystal (LCD)

**Keypad:** 18 membrane keys

**Current Output:** Two independent current sources, 4–20 mA, max load 1000 $\Omega$ . Galvanic isolation 1500 VDC or VAC (peak), hold function during prism wash

**Power:** AC input 100–240 VAC/50–60 Hz, optional 24 VDC

**Alarms/Wash Relays:** Two built-in signal relays, max. 250V/3A

**Transmitter Protection Class:** Enclosure IP66, NEMA 4X

**Ethernet Connection:** 10/100 Mbps, data acquisition over UDP/IP protocol with K-Patents PR-11111 datalogging software (included on request)

**Interconnecting Cable:** Standard 33 ft. (20 m), max. 660 ft. (200 m)

**Options:** Stainless steel sensor housing, prism wash, cable fittings to the indicating transmitter, European cable glands M20x1.5 or US conduit hubs



**K-PATENTS**  
PROCESS INSTRUMENTS

## In-Line Process Refractometers for Liquids



**Mounts in pipes or vessels for measurement in chemical, plastics, pulp and paper, and compound applications.**

### Refractometer for In-Line Concentration Measurement of Liquids in Process Applications

#### Features

- Full measurement range of 1.32 to 1.53 DI (0–100 Brix)
- Accuracy  $\pm 0.0002$  refractive index, corresponding to  $\pm 0.1\%$  by weight; accuracy unaffected by particles, bubbles, or color changes
- Fast (6-second) temperature measurement and automatic temperature compensation by mathematical curve.
- All sensor optics in a rigid patented CORE-optics module with no mechanical adjustments.
- Once the sensor is calibrated to the desired range, there's no need to recalibrate.
- Effective heat transfer and isolation using Teflon® and ceramics in the sensor provide safe operation in higher process temperatures (to 302° F).
- Dual connectivity: One or two sensors can be connected to the transmitter module. Sensors are independent, with their own parameter sets and usable in different applications. Two current outputs configurable independently to indicate process concentration or temperature of either sensor.
- Ethernet-based communications solution for real-time measurement data and diagnostics on your plant network. All you need is a cross-over cable and K-Patents' ready-to-install Java-based data acquisition software.

#### Specifications

**Refractive Index Range Standard:** Full range 1.3200 to 1.5300 (corresponds to hot water 100 Brix)

**Accuracy:** R.I.  $\pm 0.0002$  (corresponds typically to  $\pm 0.1\%$  by weight); Repeatability and stability correspond to accuracy

**Speed of Response:** 1 second undamped

**Damping Time Constant:** Selectable up to 5 minutes

**Calibration:** With Cargille standard R.I. liquids over full range

**Digital Image Detector:** 3648 pixel CCD-element

**Light Source:** LED, 589 nm wavelength, sodium D-line

**Temperature Measurement:** Built-in Pt-1000 $\Omega$  sensor, linearization per IEC 751

**CORE-Optics:** No mechanical adjustments

**Temperature Compensation:** Automatic by mathematical curve, digital compensation

**Ambient Temperature:** Sensor: -4° to 113° F (-20° to 45° C); Indicating transmitter: 32° to 122° F (0° to 50° C)

#### Sensor (PR-23-GP)

**Process Connection:** Sandvik L clamp 88 mm/DIN-flange 2656, PN40 DN80/ANSI-flange, 150lb, 3" JIS flange, 10K 80A/line sizes less than 2" via pipe flow cell

**Process Temperature:** -4° to 302° F (-20° to 150° C)

**Process Pressure:** Up to 350 psi (25 bar)

**Wetted Parts:** AISI 316L stainless steel, prism gaskets PTFE Teflon®

**Sensor Protection Class:** IP67, NEMA 4X

#### Indicating Transmitter DTR

**Display:** 320 x 240 pixels graphic liquid crystal (LCD)

**Keypad:** 18 membrane keys

**Current Output:** Two independent current sources, 4–20 mA, max load 1000 $\Omega$ . Galvanic isolation 1500 VDC or VAC (peak), hold function during prism wash

**Ethernet Connection:** 10/100 Mbps, data acquisition over UDP/IP protocol with K-Patents PR-11111 datalogging software

**Power:** AC input 100–240 VAC/50–60 Hz, optional 24 VDC

**Alarms/Wash Relays:** Two built-in signal relays, max. 250V/3A

**Transmitter Protection Class:** Enclosure IP66, NEMA 4X

**Interconnecting Cable:** Standard 33 ft. (20 m), max. 660 ft. (200 m)

**Options:** Stainless steel sensor housing, prism wash, cable fittings to the indicating transmitter, European cable glands M20x1.5 or US conduit hubs

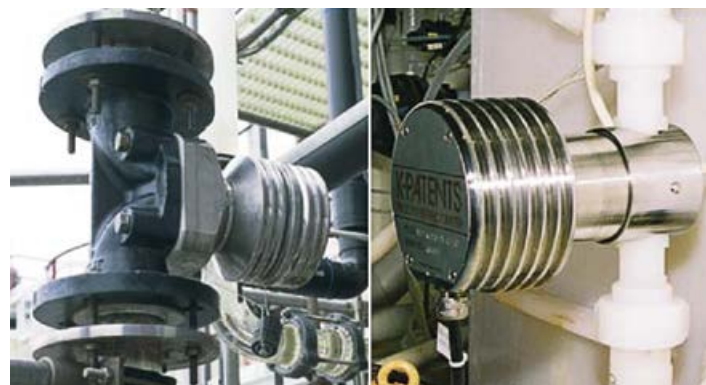
**Ordering Information:** Sensor type and process connection, desired scale, properties of process solution, process temperature and pressure ranges, length of interconnection cable, supply voltage and frequency, options and accessories needed.

**Ready to order a K-Patents process refractometer?**  
Complete the application datasheet from  
[www.Lesman.com/datasheets/](http://www.Lesman.com/datasheets/) and send it to Lesman  
for engineering review. We'll make sure you get the  
best system to fit your needs.





## Process Refractometers for In-Line Concentration Measurement of Chemically Aggressive Liquids



### Specifications

**Refractive Index Range:** *Standard:* Full range 1.3200 to 1.5300 (corresponds to 0–100% b.w.), spinel prism; *Optional:* 1.2600 to 1.5000, sapphire prism

**Accuracy:** R.I.  $\pm 0.0002$  (corresponds typically to  $\pm 0.1\%$  by weight); Repeatability and stability correspond to accuracy

**Speed of Response:** 1 second undamped; *Damping Time Constant:* Selectable up to 5 minutes

**Calibration:** With Cargille standard R.I. liquids over full range

**Digital Image Detector:** 3648 pixel CCD-element

**Light Source:** LED, 589 nm wavelength, sodium D-line

**Temperature Measurement:** Built-in Pt1000 sensor, linearization per IEC 751; *Temperature Compensation:* Automatic, digital compensation

**CORE-Optics:** No mechanical adjustments

**Ambient Temperature:** *Sensor:*  $-4^{\circ}$  to  $113^{\circ}$  F ( $-20^{\circ}$  to  $45^{\circ}$  C); *Indicating transmitter:*  $32^{\circ}$  to  $122^{\circ}$  F ( $0^{\circ}$  to  $50^{\circ}$  C)

### Sensors

**Process Connection:** *PR-23-W:* Threaded G1/2" or 1/2" NPTF; *PR-23-M:* ANSI 2", 3", or 4" 150 lb flange; DIN DN50, DN80, or DN100 PN 16 flange

**Wetted Parts:** Teflon® PTFE prism gasket, spinel or sapphire prism, Kalrez O-ring, sapphire adapter

**Process Pressure:** 145 psi (10 bar) max.

**Sensor Protection Class:** IP67, NEMA 4X

### Indicating Transmitter DTR

**Display:** 320 x 240 pixels graphic liquid crystal (LCD) with LED backlight and 8 membrane keys

**Current Output:** Two independent 4–20 mA sources, max load 1000 $\Omega$ . Galvanic isolation 1500 VDC or VAC (peak), hold function during prism wash

**Ethernet Connection:** 10/100 Mbps, data acquisition over UDP/IP protocol with K-Patents PR-11111 datalogging software

**Power:** AC input 100–240 VAC/50–60 Hz, optional 24 VDC

**Alarms/Wash Relays:** Two built-in signal relays, max. 250V/3A

**Transmitter Protection Class:** Enclosure IP66, NEMA 4X

**Interconnecting Cable:** Standard 33 ft. (20 m), max. 660 ft. (200 m)

**Options:** Stainless steel sensor housing, prism wash, cable fittings to the indicating transmitter, European cable glands M20x1.5 or US conduit hubs

**Ordering Information:** Sensor type and process connection, desired scale, properties of process solution, process temperature and pressure ranges, length of interconnection cable, supply voltage and frequency, options and accessories needed.

See the application datasheet at [www.Lesman.com/datasheets](http://www.Lesman.com/datasheets).

These K-Patents models provide accurate means for measuring liquid concentrations in chemically aggressive solutions that corrode, foul, or otherwise destroy metal parts. The work equally well in ultra-pure fine chemical processes where metal parts can't be used.

K-Patents Teflon body refractometer PR-23-M is designed for small pipe sizes. The sensor wetted parts — Teflon, Kynar, Sapphire, Kalrez, and Spinel — are carefully selected because they have high chemical and mechanical resistance.

The AISI 316L sensor cover and polyamid 6.6 electrical connector withstand chemically aggressive gases and splashes of the process liquid..

The Saunders (diaphragm) valve body refractometer PR-23-W is designed for use in chemically aggressive solutions and ultra-pure fine chemical processes in large-scale production, and in large pipelines (2", 3", or 4" diameters).

It can be mounted in either a vertical or horizontal pipe. The Saunders body material is graphite cast iron, which provides a solid mechanical base for the sensor installation. The cast iron is lined with 3 mm PFA fluoroplastic that gives the body its high chemical resistance. The sensor wetted parts are Teflon, PTFE, Spinel, and Sapphire. The sensor cover is AISI 316L stainless steel.

K-Patents' PR-23-W/M include an Ethernet-based communications solution that allows connection to computer networks (LAN) and the internet, to obtain real-time measurement data and diagnostic information. It also acts as a valuable service tool for parameter changes and software updates. All you need is a cross-over cable and K-Patents' java-based data acquisition software.

Like other models in the PR-23 series, the W/M models allow you to connect two sensors to a single indicating transmitter unit. Each sensor comes with a calibration certificate, comparing a set of standard liquids to the actual sensor output. The calibration and accuracy can be easily verified on-site with certified refractive index liquids and K-Patents' documented verification procedure.

**Need a Brix table or the refractive index of a common material? See page 489.**

# HygroFlex3 Industrial Humidity/Temperature Transmitter

## Features

- Duct or wall mount
- Relative humidity, temperature measurement, and dewpoint calculation
- Outstanding accuracy and repeatability
- Built-in Hygromer® IN-1 humidity sensor
- Auto-diagnostics and automatic correction



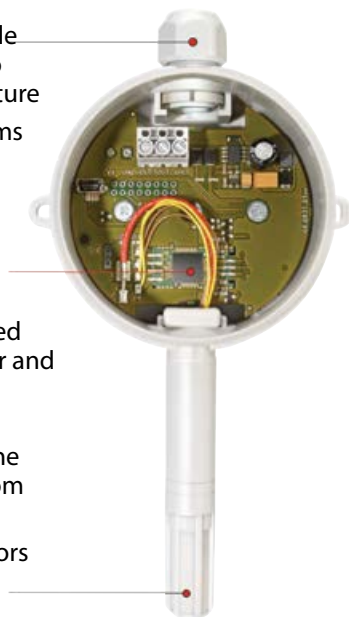
Rotronic's HygroFlex3 HVAC transmitters measure relative humidity, temperature, and dewpoint. In combination with advanced sensor technology and integration, the HF3 provides superb precision and state-of-the-art functionality.

The HF3 is ideal for applications where exact measurement of humidity and temperature is of decisive importance. Transmitters can be used for heating, ventilation, and air conditioning applications, greenhouses, museums, warehouses, and for climate control in office buildings. The duct-mount HF3 is great for use in ventilation shafts. The HF3 wall-mount version is best suited to technical equipment rooms.

The high flexibility of the HF3 series lets you freely select the output parameters and scale each output. All you need to do is enter the desired settings into HW4 software.

Up to 2,000 measurement values can be stored in the HF3 transmitter. Using HW4 software, you can configure the measurement interval, set alarm limits, scale the output signal, and download data for analysis and reporting.

- One or two selectable, scalable analog outputs, assignable to relative humidity or temperature
- Two-wire or three-wire systems
- AirChip3000 technology compensates humidity and temperature over 30,000 reference points
- 2,000 data point memory
- Application-Specific Integrated Circuit (ASIC) micro-controller and EEPROM in a single chip
- Thermal response improved significantly by decoupling the Pt100 temperature sensor from the probe
- Use of Pt100 1/3 Class B sensors for maximum accuracy



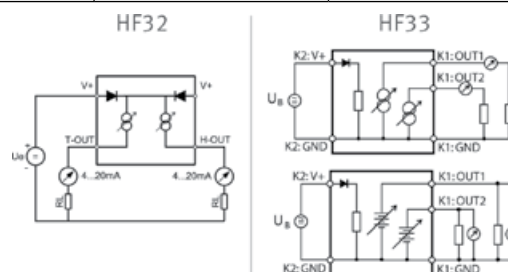
## Specifications

**Humidity:** Sensor: ROTRONIC Hygromer® IN-1; Measuring Range: 0 to 100 %RH; Accuracy:  $\pm 2.0$  %RH @ 73° F; Adjustment: 10%, 35%, 80% RH; Long-term stability: <1 %RH/year; Response time: <15 s; Scale Limits: -999 to 9999 units; Wind Velocity: 20 m/s maximum with filter

**Temperature:** Sensor: Pt100 Class A; Measuring Range: -40° to 140° F; Accuracy:  $\pm 0.3$  K @ 73° F; Adjustment points: 1; Long-term stability: <32°F/year; Response time: <15 s; Scale Limits: -999 to 9999 units

**Calculated Parameters:** Dewpoint, frost point

|                               | HF320          | HF332                                                                                      |
|-------------------------------|----------------|--------------------------------------------------------------------------------------------|
| <b>Analog Outputs (Qty=2)</b> | 4–20 mA        | 0–1, 0–5, or 0–10 V<br>0–20 or 4–20 mA<br>Can be rescaled with HW4 software.               |
| <b>Supply Voltage</b>         | 10–28 VDC      | 15–40 VDC, 12–28 VAC                                                                       |
| <b>Maximum Load:</b>          | 2x500 $\Omega$ | $\leq 2x500 \Omega$ (current output)<br>$\geq 1 \text{ k}\Omega/\text{V}$ (voltage output) |



**HW4 Software:** For firmware upgrades, select and scale outputs, configure datalogging and download data to PC for analysis and reporting

**Service Interface Cable:** Universal Asynchronous Receiver Transmitter (UART) interface cable AC3006; To power transmitter during configuration, use cable AC3009

**Environmental Range (Housing/Electronics):** -40° to 140° F, 0 to 100% RH

**CE / EMC Compatibility:** EMC Directive 2004/108/EC

**Fire Protection Class:** Corresponds to UL94-HB

**FDA/GMP Conformity:** Conforms to 21 CFR Part 11 and GAMP5

**Construction:** Housing: IP65-rated ABS plastic; Probe: Polycarbonate (fixed, not interchangeable); Filter: Polyethylene; Electrical Connections: Screw terminals inside, M16 cable gland

## Ordering Instructions

Select the key number and options you need. A finished catalog number will look like this: HF3 \_ \_ \_ \_ \_ X.

## Model Selection Guide

|                      | Description                                                                                                                                                   | Catalog Number                      | Price                               |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------|
| <b>Power/ Output</b> | 2-Wire Loop Powered/ 10–28 VDC / 4–20 mA<br>3-Wire / 15–40 VDC or 12–28 VAC / 4–20 mA                                                                         | HF320-<br>HF332-                    | \$445.00<br>445.00                  |
| <b>Mount</b>         | Duct Mount (Through-Wall), Probe: 0.6" x 9.2"<br>Wall Mount, Visible, Probe: 0.6" x 3.3"                                                                      | D _ _ _ _<br>W _ _ _ _              | 0.00<br>0.00                        |
| <b>Type</b>          | Humidity and Temperature<br>Humidity Only                                                                                                                     | _ B _ _ _<br>_ H _ _ _              | 90.00<br>0.00                       |
| <b>Output</b>        | Dewpoint or Frost Point in °F<br>Temperature: 0° to 50° C<br>Temperature 0° to 100° F                                                                         | _ _ MEX<br>_ _ 1XX<br>_ _ 6XX       | 0.00<br>0.00<br>0.00                |
| <b>Accessories</b>   | Software, Single-User License<br>Service Cable, Mini-USB to USB-A Converter<br>Active Service Cable (Powers Transmitter)<br>Duct Mounting Flange (max 212° F) | HW4-E<br>AC3006<br>AC3009<br>AC5005 | 315.00<br>140.00<br>140.00<br>15.00 |

# HygroFlex5 Industrial Humidity/Temperature Transmitter



Rotronic's HygroFlex5 transmitters measure humidity, temperature, and dewpoint. HygroFlex5 is ideal for all applications where exact measurement of humidity and temperature is critical.

The HF5 series is compatible with HygroClip2 probes with integrated AirChip3000 technology for unparalleled accuracy. HygroFlex HF5 transmitters take humidity and temperature measurement to a whole new level of performance (<0.02 %rH) and reliability (<0.8 %rH and <0.1 K).

A HygroFlex5 transmitter can be programmed with limits to generate an alarm that becomes available when the transmitter is communicating with a PC or compatible Rotronic device. In the event of a major sensor failure, the analog outputs can be set to a fixed value to indicate the alarm state. So, the HygroFlex5 can be integrated in any application.

## Specifications

**Models:** HF52: Two-wire; HF53: Three- or four-wire; HF55: Digital

**Probe Type:** HygroClip2. See page xx for full details.

**Probe Cable Extension:** Passive: max. 5 m, active 100 m

**Accuracy at 73 ± 5 ° F:** ±0.8 %rh / 0.2 K

**Response Time:** 3-12 s, depending on probe type

**Startup:** HF52: 10 seconds ; HF53, HF55: Typically 3 seconds

**Measuring Range:** -100° to 392° F, 0 to 100 %rH, probe dependent

**Electronics Operating Range:** -40° to 140° F / 0 to 100 %rH (14° to 140° F with LCD)

**Display:** Optional Graphic display with trend indicator, backlit with configurable parameters; HF52: No backlight

**Alarm Functions:** Programmable, open or shorted sensor

**Output Signals:** Scalable, 0 to 1, 0 to 5, or 0 to 10 V; 0/4 to 20 mA

**Digital Outputs:** Optional Ethernet (LAN, WLAN), USB, RS485

**Power Supply:** HF52: 10 to 28 VDC; 10 V + (0.02 x load); HF53/55: 15 to 40 VDC / 12 to 28 VAC

**Power Consumption:** HF52: 40 mA max; HF53: <100 mA; HF55: <300 mA

**Min/Max Load:** V-signal: ≥ 1kW/V / mA signal: ≤ 500 W with load compensation

**Firmware Update:** Via service connector, requires HW4 software

**Sensor Diagnostics:** Drift, state; Programmable, default: off

**Air Velocity:** 20 m/sec max at probe

**Adjustments:** Humidity: With keypad / software: multipoint; Temperature: With keypad; 1 point, by software: 2 points

**Datalogging:** External, 2000 data point memory

**Psychrometric Calculations:** All selectable

**PC Interface:** With service connector cable

**Data Processing by HW4:** Graphs, statistics, analysis, qualification

**Construction:** IP65-rated ABS plastic housing, compliant to UL94-HB; One x M16 x 1.5 cable connections on terminals

**Standards:** CE compliant, 2007/108/EG

**Audit Trail, Electronic Records:** FDA CFR21 Part 11 and GAMP compliant

## Features

- Relative humidity and temperature measurement with dewpoint and other psychrometric calculations
- Two freely selectable and scalable analog outputs
- Digital output option for integration on a network via RS485 or Ethernet – wired or wireless
- Easy-to-read backlit LCD shows measured values and trends
- Compatible with all HygroClip2 probes; Uses probe simulators allows easy process validation
- Auto-diagnostics and automatic correction; Compensates humidity and temperature over 30,000 reference points

## Ordering Instructions

Select the key number and options you need. A finished catalog number will look like this: HF5 \_\_\_ - \_\_\_\_\_ X X.

Probes are ordered separately. See page 184 for full probe specifications.

## Model Selection Guide

| Description                                         |                                          | Catalog Number  | Price    |
|-----------------------------------------------------|------------------------------------------|-----------------|----------|
| Circuit and Output                                  | 2-Wire Loop Power, 4-20 mA Output        | HF520-          | \$345.00 |
|                                                     | 3-Wire, Line Power, 0-20 mA Output       | HF531-          | 345.00   |
|                                                     | 3-Wire, Line Power, 4-20 mA Output       | HF532-          | 345.00   |
|                                                     | 3-Wire, Line Power, 0-1V Output          | HF533-          | 345.00   |
|                                                     | 3-Wire, Line Power, 0-5V Output          | HF534-          | 345.00   |
|                                                     | 3-Wire, Line Power, 0-10V Output         | HF535-          | 345.00   |
| Mount                                               | Duct, Probe: 208 mm x 15 mm Diameter     | D _____         | 0.00     |
|                                                     | Wall, Probe: 85 mm x 15 mm Diameter      | W _____         | 0.00     |
| Analog Output                                       | Humidity and Temperature                 | _ B _____       | 0.00     |
|                                                     | Humidity Only                            | _ H _____       | 0.00     |
| Temp Output                                         | 0° to 100° F                             | _ _ 6 X _ _ _   | 0.00     |
|                                                     | 0° to 200° F                             | _ _ 7 X _ _ _   | 0.00     |
|                                                     | 0° to 300° F                             | _ _ 8 X _ _ _   | 0.00     |
|                                                     | -50° to 200° F                           | _ _ 9 X _ _ _   | 0.00     |
| Options                                             | Keypad and Display                       | _ _ _ _ D _ _   | 175.00   |
|                                                     | No Keypad or Display (Blind Transmitter) | _ _ _ _ X _ _   | 0.00     |
| Analog Signal Cable Fittings                        | One M16 Cable Gland for Supply/Signal    | _ _ _ _ _ 1 _ _ | 0.00     |
|                                                     | One M16 Cable Gland, Vertical Mount      | _ _ _ _ _ 2 _ _ | 0.00     |
|                                                     | Conduit Adapter for Supply/Signal        | _ _ _ _ _ 3 _ _ | 0.00     |
|                                                     | Conduit Adapter, Vertical Mount          | _ _ _ _ _ 4 _ _ | 0.00     |
| Comms Signals Links                                 | RS485 Link, M16 Cable Gland, +1 Item     | _ _ _ _ _ 5 X X | 100.00   |
|                                                     | RS485 Link for Conduit Adapters          | _ _ _ _ _ 6 X X | 100.00   |
|                                                     | USB, RS485, M16 Cable Gland, Horiz Mt    | _ _ _ _ _ 7 X X | 100.00   |
|                                                     | USB, RS485 for Conduit, Horizontal Mt    | _ _ _ _ _ 8 X X | 100.00   |
| Accessories to Order as Separate Line Items         |                                          |                 |          |
| Standard Probe, -40° to 212° Range                  |                                          | HC2-S           | 375.00   |
| PPS Barrel, 250 mm Length, -148° to 392°, 2M Cable  |                                          | HC2-IC302       | 1045.00  |
| SS Barrel, 250 mm Length, -148° to 392°, 2M Cable   |                                          | HC2-IM302       | 1245.00  |
| DIN-Rail Mounting Kit (DIN Rail Not Included)       |                                          | AC5002          | 25.00    |
| Duct Mounting Flange, Max 212° F                    |                                          | AC5005          | 15.00    |
| Standard Filter, Polyethylene Insert                |                                          | NSP-PCB-PE      | 30.00    |
| Filter, Wire Mesh Insert (Faster Response Time)     |                                          | NSP-PCB-WM      | 30.00    |
| Filter, Teflon Insert (High Humidity, Low Air Flow) |                                          | NSP-PCB-TF      | 55.00    |
| 2M Data Extension Cable                             |                                          | E2-02A          | 135.00   |
| 5M Data Extension Cable                             |                                          | E2-05A          | 150.00   |
| Active UART to USB Converter Cable                  |                                          | AC3001          | 235.00   |
| Service Cable, Mini-USB to USB-A Converter          |                                          | AC3006          | 140.00   |
| HW4 Software CD-ROM, Single User License            |                                          | HW4-E           | 315.00   |

Need dewpoint or wet bulb temperature output? Call Lesman.  
Looking for a different probe or NIST calibration? See page 184.





## Humidity and Temperature Dataloggers



**rotronic**  
LEADING IN HUMIDITY MEASUREMENT

### HygroLog HL20 Humidity/ Temperature Datalogger

#### Features

- Accuracy at 0.8% RH and 0.2° C
- Outstanding long-term stability
- Psychrometric calculation of dewpoint and frost point
- Temperature compensates humidity with more than 30,000 reference points
- Holds up to 20,000 temperature/humidity value pairs in memory with date and time stamps
- Freely selectable logging interval, 5 seconds to 1 hour
- Integrated clock with time stamp for every measurement
- FDA 21 CFR Part 11 and GAMP 4 compliant
- Programmable alarm limits, with active alarming
- Visible alarms can be programmed for out-of-limit values, communication loss with probe, sensor failure, or sensor drift
- Clear backlit graphic display shows battery charge, plus measured and calculated data to two-decimal resolution
- Average 13-month battery life (with LC display)
- Interface (UART) for connection to PC

The long term recording of humidity and temperature conditions is critical in the pharmaceutical industry, production processes, storage, and test facilities. This provides valuable information on conditions that can have an influence on people and product quality.

The compact datalogger for humidity and temperature measurement offers high precision and reliability at an economical price. The HL20 series is easy to use and suitable for a wide range of applications. Thanks to its integrated batteries, the HL20 provides hours of operation and offers its users maximum flexibility.

Rotronic HL20 dataloggers completely fulfill the requirements of 21 CFR Part 11 and GAMP5. They are extremely accurate and easy to use. Data can be read and analyzed easily on a PC with HW4 software. The data can be saved either in tamper-proof LOG mode or in easily accessible Excel compatible files.

#### Model Selection Guide

If this is your first HL-20 datalogger, or if you already own the HW4 software and service cable, purchase the HL-20D set.

| Description                                                                                                     | Catalog Number | Price    |
|-----------------------------------------------------------------------------------------------------------------|----------------|----------|
| HL-20D Relative Humidity and Temperature Data Logger with Display, plus AC3006 Service Cable and HW4-E Software | HL-20D Set     | \$595.00 |
| Relative Humidity/Temperature Data Logger                                                                       | HL-20D         | 325.00   |



Left to right: 915 MHz wireless datalogger, Ethernet LAN interface unit, USB wireless adapter

## LOG HC2 915 MHz Wireless Temperature/Humidity Dataloggers

#### Features

- Interchangeable probes (HC2-S3)
- 915 MHz radio frequency for optimum penetration through brickwork and walls
- Stores up to 500,000 measured values with serial number, time and date
- Long-term recording up to 6 years
- Transmits data up to 100m with USB wireless adapter
- Data security: PIN (for activation and data access)
- Temperature range: -40° to 185° F
- Plastic housing, white, IP65
- Flash memory for data security in the case of power failures

Wireless data loggers for a wide range of humidity and temperature monitoring tasks. Wireless transmission means you can save on the wiring costs and data can be sent from inaccessible locations. Thanks to the advanced data logging function, the data is not lost in the event of an interruption in wireless transmission and can be retrieved at any time.

The USB wireless adapter serves as interface to a PC for maintenance applications, so you can program dataloggers and download the data via HW4 software.

Using the Rotronics LAN interface and your existing Ethernet infrastructure, remote data loggers can be accessed from any networked PC. The interface is capable of managing up to 100 digital wireless dataloggers over a 100 Mbps connection. The LAN interface supports the same standard SMA connector for an external 915 MHz antenna, and comes standard with an aluminum housing.

#### Model Selection Guide

| Description                                                     | Catalog Number   | Price    |
|-----------------------------------------------------------------|------------------|----------|
| 915 MHz Wireless Datalogger with Humidity and Temperature Probe | LOG-HC2-S3       | \$795.00 |
| USB Wireless Adapter, 915 MHz SMA-Antenna                       | LOG-DS-EXT-US    | 295.00   |
| LAN-Interface, 915 MHz SMA-Antenna                              | LAN-INTERFACE-US | 1295.00  |
| Software, Single-User License                                   | HW4-E            | 315.00   |

# HygroPalm Portable Humidity/Temperature Indicators



## HP22-A Features

- Compatible with all ROTRONIC HC2 probes
- Relative humidity, temperature, and dewpoint measurement
- All psychrometric calculations available
- 2,000 data point memory
- Sensor automatic diagnostics and correction
- Clear backlit display for easy reading
- Humidity and temperature compensated over 30,000 reference points
- Active alarming and information
- Display hold function freezes measured value

**See compatible HygroClip2 probes on page 184.**

## HP23-A Features

- Two probe connections for all ROTRONIC HC2 probes or analog third-party probes
- Data recording function up to 10,000 data records (with date, time, batch number) per probe
- Data capture of 250 data points each for up to eight defined locations
- All psychrometric calculations available
- Integrated real time clock
- Probe adjustment direct to dewpoint reference
- Unit display saves momentary state (capture logging) and allows readout of all values
- Display resolution to three decimal places
- Compatible with all HygroFlex transmitters for adjustment with service cable and HW4 software

The HygroPalm series is the latest in handheld measuring instruments for relative humidity, temperature, and dewpoint. Based on proven AirChip 3000 technology, this indicator achieves a degree of accuracy unparalleled in today's market.

Built-in sensor diagnostics keep your readings reliable. If the sensors deviate from factory-defined parameters, the measured values are compensated automatically. The HP22-A will automatically trigger a digital alarm if this happens. On the HP23-A, you can choose to have the alarm or not.

Compatible HygroClip2 sensors include three different factory adjustment profiles, to match accuracy to your specific application. The sensor's custom adjustment profile consists of 20 humidity values at three temperatures, to ensure optimum performance over the working range. Data is stored on the instrument's AirChip, and can be retrieved later for audit purposes.

The HP22-A can store up to 2,000 measurement values in the HygroClip2 probe. Using the companion HW4 software, you'll be able to configure the measurement interval, set alarm limits, scale the output signal, and download data to a PC for analysis and record-keeping. The HP23-A lets you record up to 250 data points at each of eight different locations. The data, including time stamp, can be called up individually, providing the ideal solution for room surveillance.

## Specifications

|                    | HP22                             | HP23                                             |
|--------------------|----------------------------------|--------------------------------------------------|
| <b>Probes</b>      | One HygroClip 2                  | Two HygroClip 2 or analog probes                 |
| <b>Datalogging</b> | 2,000 data point memory in probe | 20,000 data points (2 x 10,000 data point pairs) |

**Humidity and Temperature Sensors:** Depends on probe

**Psychrometric Calculations:** Dewpoint, wet bulb temperature, ratio of mixture, enthalpy, water vapor content, water vapor density

**Sensor:** Resolution: <0.02%RH/0.00K; Long-term stability: <1% RH/year

**Startup Time:** Typically 3 seconds

**Measurement Range:** -58° to 392° F

**Display:** Backlit graphic display with configurable parameters, trend indicator, low battery indicator

**Sensor Diagnostics:** Programmable for drift and state

**PC Interface:** Via Rotronic AC3006 interface cable

**Data Processing:** Via HW4 software, for graphs, statistics, analysis, and qualification; FDA CFR 21 Part 11 and GAMP compliant audit trails and electronic records

**Housing:** IP40 ABS plastic, compliant to UL94-HB fire protection rating

## Exclusive to HP23 Model

**Features:** Real-time clock with battery backup, battery voltage power for third-party probes, event logging

**Humidity/Temperature Adjustment:** Via keyboard: One-point or multipoint; Via dewpoint reference: Two-point temperature, humidity 100 points max.

## Model Selection Guide

| Description                                                                                                                                                 | Catalog Number | Price    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|
| HygroPalm22-A Humidity/Temperature/Psychrometric Calc. with Backlit LCD and One Interchangeable Probe                                                       | HP22-A         | \$475.00 |
| HygroPalm23-A Humidity/Temperature/Psychrometric Calc. with Backlit LCD, Two Interchangeable Probes, Data Logging and Calibrator for HF Series Transmitters | HP23-A         | 675.00   |
| <b>Accessories</b>                                                                                                                                          |                |          |
| 100-240 VAC / 5 VDC Power Adapter, Mini USB                                                                                                                 | AC1212         | 60.00    |
| Extension Cable HygroClip2 to Instrument, 2M Length                                                                                                         | E2-02A         | 135.00   |
| Software, Single-User License                                                                                                                               | HW4-E          | 315.00   |
| Service Cable (Required with HW4-E software)                                                                                                                | AC3006         | 140.00   |
| Desktop Stand for HygroPalm Meters                                                                                                                          | DESK-HP        | 75.00    |



**HygroClip2 probes  
<0.8% rH/0.1°K  
accuracy**

