



# HALLAND INSTRUMENTS AS

PH-1700      pH analyser for extremely corrosive saturated solutions with automatic cleaning of the electrodes

## Technical data

---

Contents	What is PH-1700
	Dimension drawings
	Electrical connections
	Specifications



Picture to the left is the PH-1700 analyser after one year of operation in the hydrochloric acid nickel matte leaching process.





## PH-1700

PH-1700 is an automatic on-line pH analyser with an advanced system for cleaning of the electrodes. The pH value of the solution is measured discontinuously. Since the cycle time is very short, the measurement can be used as a continuous measurement. The analyser is a complete working unit for sampling, dilution, measuring and cleaning of the electrodes. The analyser has 4-20 mA output, alarm output and a Modbus RTU computer interface. The PH-1700 pH analyser system dilutes the sample and measures the pH of saturated or near saturated solutions. Saturated solutions have profound influence of the pH electrode response. For this reason, dilution of process fluids has tended to become the norm. The analyser has very good long-time accuracy and do not require frequent calibrations

### Function

The analyser sucks up a sample from the process. Then the analyser dilutes the sample using hot or cold water, but preferably a little hotter or the same temperature as the process solution. Then the pH is measured. Then the sample is returned to the process. Then analyser suck up a fixed, adjustable amount of washing detergent, most often an acid. The electrodes are sprayed with this solution. After a pause the electrodes are sprayed with hot or cold water. Then the washing water is returned to the process and the cycles starts again.

### Proven technology

The instrument is built on 40 years of experience with design, construction and sale of pH analysers.

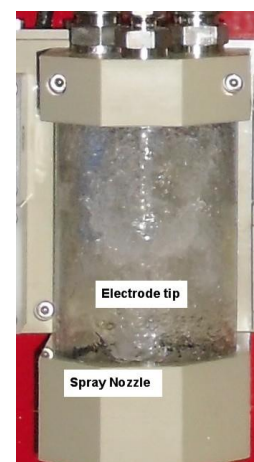
Every new design has been based on the knowledge experience gathered from the older designs. The knowledge is not from one zinc plant or one person but from many zinc plants and many persons who has been dedicated to measuring the pH in the plants as accurate and reliable as possible.

### Designed for extremely corrosive liquids

All the wetted parts are made of materials that withstand Hydro Chloric Acid

### Automatic cleaning system for the electrodes

Only a clean pH sensor can provide accurate and reliable measurements. With our system the electrode is kept clean automatically. The instrument has a system for dosing and cleaning the electrodes with an acid or other suitable detergent. To prevent the reference electrode from being poisoned by the process solution we use a flowing type electrode with overpressure. The analyser is equipped with a KCl reservoir with safety valve.





Regular sensor cleaning ensures:

- Increased process safety due to accurate, reliable measurement
- Defined and consistent product quality
- A greater reproducibility of measurements for better process control
- Replacement/maintenance costs savings due to an extended lifetime of electrode

Modes of operation

- Normal: The instrument is running continuously.
- For batch processes: A Modbus start command or a 24 volt signal starts the analysers and the analyser runs continuously until a stop command or a 0 volt signal is received, then the current cycle is finished, and the analyser stops.
- Fixed intervals; the instrument executes one cycle for instance every 10 minutes.



## Advantages and earnings

- Automatic washing prevents dirtying, deposits and contamination of the electrodes. This results in stable measurements and makes it possible to optimize the process.
- Cleaning of the electrode gives long electrode life. The electrode is only in contact with the solution in a limited time, the measurement cycle, which also gives long electrode life. The low consumption of electrodes does, in many cases, the procurement of the instrument cost saving.
- High measuring accuracy. This makes accurate process control possible
- It is very easy to calibrate the instrument. It is only necessary to stop the instrument few minutes for calibration. Simple procedure – push-button calibration. No special skills are needed for the calibration and maintenance of the instrument.
- The electrode is protected against mechanical strains - no risk of broken electrodes.
- It is very easy to replace the electrodes.
- PH-1500 can use a wide selection of chemicals in addition to water spraying for cleaning of the electrodes.
- It is easy to install the instrument; normally no encroachment in the process equipment is required. The instrument can for instance take the sample from a tank or a launder.
- Reliable and patented system for sampling. Suction circuit; vacuum-pump, valve and connections are cleaned automatically.
- Uncomplicated mechanical design, with few parts, gives reliable operation and little maintenance. It is designed in such a way that it is easy to carry out the maintenance.
- It is very easy to change the times, for instance for emptying, spraying and measuring, and to set the measurement range etc.
- The built-in Modbus RTU interface makes it very straightforward to communicate with a process control computer or PLC. The temperature is also available through the Modbus line.
- It is possible to start and stop the analyser via the Modbus line.
- Sophisticated intelligent monitoring; of measured value and electrode response. The instrument gives warning with the alarm relay and message on the Modbus line if the electrode response is abnormal or if the measurement is abnormal. These functions can be switched off if they are not needed.
- The instrument can be mounted where it is easy to access it for calibration and maintenance.

Is designed for measuring of the pH of solutions and slurries with high temperatures

The instrument can be used to measure the pH in solutions with temperatures over 100 degrees centigrade. It can be used to measure the pH of slurries with particle sizes up to 5 mm in diameter. The instrument can be used to measure the pH of most chemical solutions.

## Maintenance

The instrument is design for easy maintenance. No special skills are needed for the maintenance and the calibration of the instrument.



## Installation

It is easy to install the instrument. Normally no encroachment in the process equipment is needed for taking the sample. The cabinet should be mounted in normal working height for easy access. Mount the instrument close to or on tank, basin or launder. Can be mounted maximum 4 meters over the sampling point, the length of the suction tube should anyway be no more than 10 meters.

## Electrical connections

RK1 terminal No.	Description
26	4-20 mA output, +10-24 volts for feeding the mA loop.
12	4-20 mA output, return 4-20 mA, connect load from here to 0 (-10-24V)
9/23	+ for RS485/MODBUS or 0 VDC for remote start stop
10/24	- for RS485/MODBUS
11/25	Screen RS485/MODBUS Cable or 24 VDC for remote start stop
8	Alarm signal output +, normal operation +24 VDC, alarm 0 VDC. Wire terminals 8/22 to alarm relay or galvanic isolated digital input on process control computer or warning system.
22	Alarm signal output - (0 VDC)
3	Digital input for remote start/stop signal. Wire terminals 3/17 to external contact for remote start/stop (relay contact or switch).
17	Digital input for remote start/stop signal
RK3 terminal No.	
1	230 VAC
2	230 VAC
3	Earth, preferably local earth

The pH measurement, the temperature, the step number in operation and the warnings are available over the Modbus line.



Electronic unit



# HALLAND INSTRUMENTS AS

## Specifications

Water pressure.....3-7 bar.  
Air pressure.....4-7 bar  
Detergent consumption, adjustable ..... 4-10 ml/wash  
The acid washing frequency is programmable

Suction height (from vessel, duct etc to cabinet).....6 meter water column.

pH range.....0 to 14 pH.....Span....1-14 pH.  
Temperature.....0-100 °C.  
Accuracy, transmitter.....0.01 pH.  
Power supply.....110 or 220/230 volt AC.  
Power consumption.....35 Watt.  
Internal tubing.....Teflon .  
Electronic enclosure.....IP 65.  
Cabinet (GRP with glass window).....IP 65.

Weight ca.....27.5 kg.

### *Outputs:*

4-20 mA loop powered, maximum load 950  $\Omega$  at 24V dc, linearity and offset error max 0.1 %.  
Alarm signal: 24 VDC, 0.5 A. RS485 (Modbus RTU) computer interface (1 start bit, 8 data bits, 2 stop bits, 9600 baud). All outputs are galvanic isolated from the measuring circuits and from each other.

