

General Specifications

Model PH150
Panel Mounted Converter
for pH and Redox (ORP)



Housed in a compact panel mounted case with IP65 front and featuring an intuitive interface with touch screen, the EXAxt PH150 is ideally suited to the creation of control systems where panel size is at a premium.

With the correct sensor configuration, the simultaneous measurement and control of both pH and ORP values is possible. This makes the PH150 ideally suited for use in the field of effluent treatment, where it can replace two conventional systems.

Derived from the famous EXA series, the PH150 has the self-diagnostic features that have made the EXA a market leader. Included in the 96mm x 96mm square housing are two isolated mA outputs with linearisation, HART® communication and PID control functions. Two SPDT relay contact outputs provide alarm and control functions.

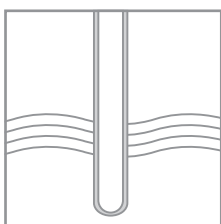
The unique touch screen interface provides simple, intuitive configuration and access to the display features. A large clear graphical display with backlight makes it very easy to read primary and secondary values. Trend charts, diagnostics, logbook and configuration data are all readily available. A flip-up transparent dust cover is fitted to keep the display clean.



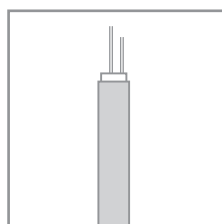
Features

- Compact panel mount design
- Interactive touch screen interface
- Trend displays pH, ORP & temperature
- Process temperature compensation
- pH and ORP simultaneous measurement
- Sensor diagnostic system
- HART® communications (DD available)
- Event logbooks
- Programmable security codes
- Adjustable output damping
- IP65 (front panel)
- English language interface
- French, German, Spanish or Japanese as second language.

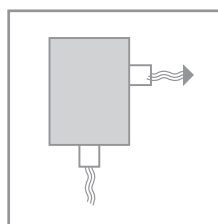
System Configuration



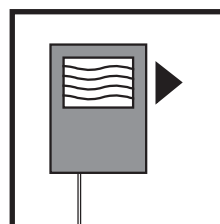
Sensors



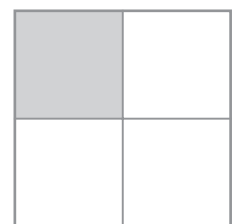
Cables



Fittings



Transmitters



Accessories

General specifications of EXAxt PH150

A) Inputs specifications

: One high impedance input ($\geq 10^{13}\Omega$).
 One low impedance input ($\geq 10^8\Omega$).
 One temperature input. One liquid earth input.

B) Input ranges

pH : -2 to 16 pH
 ORP : -1500 to 1500 mV
 rH : 0 to 55 rH
 Temperature : Pt1000, -30 to 140°C
 : Pt100, -30 to 140°C
 : 350 Ω (DKK), -30 to 140°C
 : 5k1, -30 to 140°C
 : 6k8, -30 to 140°C
 : NTC10k, -20 to 140°C
 : NTC 8k55, -10 to 120°C
 : 3kBalco, -30 to 140°C

C) Accuracy

pH input : ≤ 0.01 pH
 ORP input : ≤ 1 mV
 Temperature : ≤ 0.3 °C (≤ 0.4 °C for Pt100)
 mA output circuits : ≤ 0.02 mA
 Ambient temperature influence : $\pm 0.05\%$ /°C

D) Transmission signals

General : Two isolated outputs of 4-20 mA. DC with common negative. Maximum load 600 Ω .
 Control function : Linear or 21-step table for pH, temperature, ORP or rH. PID control. Burn up (21.0mA) or burn down (3.6mA) to signal failure.

E) Contact outputs

General : Two SPDT relay contacts with display indicators.
 Switch capacity : Maximum values 100 VA, 250 VAC, 5 Amps. Maximum values 50 Watts, 250 VDC, 5 Amps.
 Status : High/Low process alarms, selected from pH, ORP, rH and temperature. Configurable delay time and hysteresis.
 Control function : On / Off
 PID duty cycle or pulsed frequency control.
 FAIL alarm

F) Temperature compensation

Function : Automatic or manual. Compensation to Nernst equation. Process compensation by configurable temperature coefficient, NEN6411 for strong acids/bases or programmable matrix.

G) Calibration

: Semi-automatic 1/2/3 point calibration using pre-configured NIST, US, DIN buffer tables 4, 7 & 9, or with user defined buffer tables, with automatic stability check. Manual adjustment to grab sample.

H) Serial communication

: Bi-directional HART® digital communication, superimposed on mA1 (4-20) signal. Device description available.

I) Logbook

: Software record of important events and diagnostic data readily available in the display.

J) Display

: Graphical Quarter VGA (320 x 240 pixels) LCD with LED backlight and

touchscreen. Plain (English) language messages, with choice of alternative languages.

K) Shipping details

Package size w x h x d : 180 x 161 x 243 mm
 (7.1 x 6.3 x 9.6 inch)

Package weight : approx 1.1 kg (2.4lbs)

L) Housing

Enclosure : High quality chemical resistant plastic front 96x96 mm. SS housing behind the panel depth 98 mm behind the panel (121 mm including cover)

Mounting : Panel-mounted design in a standard DIN-size 92x92 mm cutout.

M) Power supply : 85-265 VAC (47-63 Hz) 10VA
 max 9.6-30 VDC 10W max

N) Regulatory compliance

EMC : Meets directive 89/336/EEC
 Emission conform EN 55022 class A
 Immunity conform IEC 61000-6-2

Low voltage : Meets directive 73/23/EEC
 Conform IEC 61010-1, UL/cUL 3101-1 and CSA 22.2 No. 1010, Installation category II, Pollution degree 2
 Certification pending for cCSAus, Kema Keur and Geprüfte Sicherheit

O) Environment and operational conditions

Ambient temperature : -20 to +55 °C
 Storage temperature : -30 to +70 °C
 Humidity : Up to 90% rH at 40 °C (non-condensing)

Environmental protection: IP65 (NEMA 4X) front panel, IP20 behind the panel

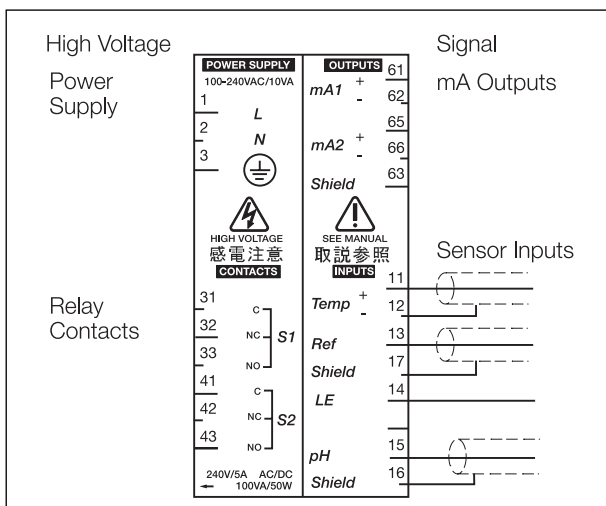
Data protection : EEPROM for configuration data and logbook. Lithium cell for clock.

Watchdog timer : Checks microprocessor.

Power down : Reset to measurement.

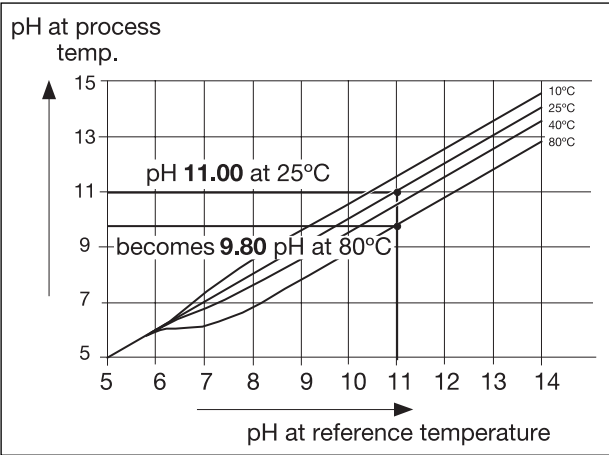
Automatic safeguard : Auto return to measuring mode when touchscreen is untouched for 10 min.

Model Code	Suffix Code	Option Code	Description
PH150	.....	.....	Panel mount pH converter
	-A.....	.....	85 - 265 VAC power supply
	-D.....	.....	9.6 - 30 VDC power supply
	-D.....	.....	Second language - German
	-F.....	.....	Second language - French
	-J.....	.....	Second language - Japanese
	-S.....	.....	Second language - Spanish
	-AA.....	.....	Always AA
	/TAG.....	.....	Tagnumber



Proces Temperature Compensation

The graph shows the strong influence that temperature has on the measurement of pH. The dependency is caused by the increased dissociation of water at higher temperatures, creating more hydrogen ions, and hence lowering the pH. The unusual graph is explained by the fact that the extra H⁺ ions are masked in acid solutions, where there are many. In the alkaline region (above pH7) the effect is pronounced.



pH as a function of temperature for strong electrolytes

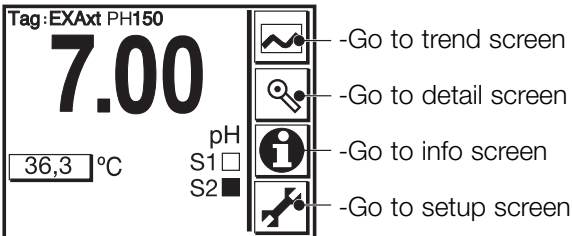
EXAxt PH150 has three sorts of user-configurable process temperature compensation.

- 1) The NEN 6411 compensation uses the dependency shown in the graph to correct in solutions containing strong acids and bases. The values are corrected to the 25°C reference temperature. This is perfect for alkalinized boiler water, and other alkali dosing systems.
- 2) Temperature coefficient setting, which is easily determined from measuring a sample at two different temperatures. This is a simple compensation for systems with repeatable conditions.
- 3) A matrix table that the user creates from laboratory measurements is useful for measuring a complex mixture of weakly dissociated chemicals, under varying conditions.

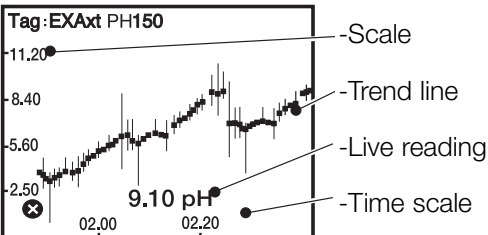
Display and Operating Interface

The display is a large clear graphical LCD with LED backlight and QVGA resolution. Operation is by touch screen. Graphical keys on the right and other areas of the screen respond to contact as virtual push buttons.

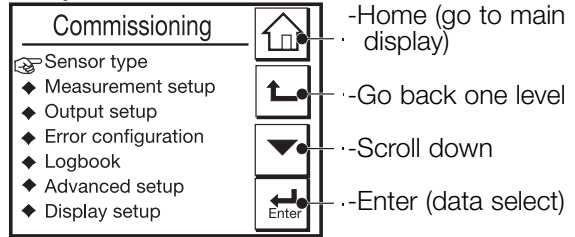
Main Screen



Trend Screen



Setup Screen



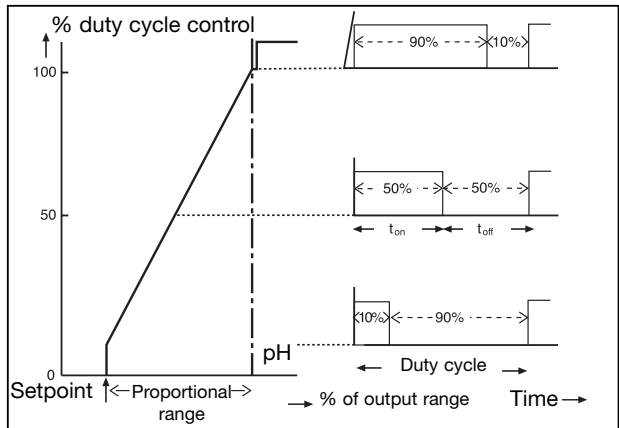
Output and Alarm Functions

Two isolated mA outputs are provided, and can be set for linear or scaled output signals. Alternatively PID analogue control is available on either or both mA outputs. The transmitted or control parameter may be pH, ORP, rH or temperature. Control settings are fully configurable.

Two SPDT relays are included as standard, and can be configured by the user as conventional process alarms, or in one of 2 control modes:

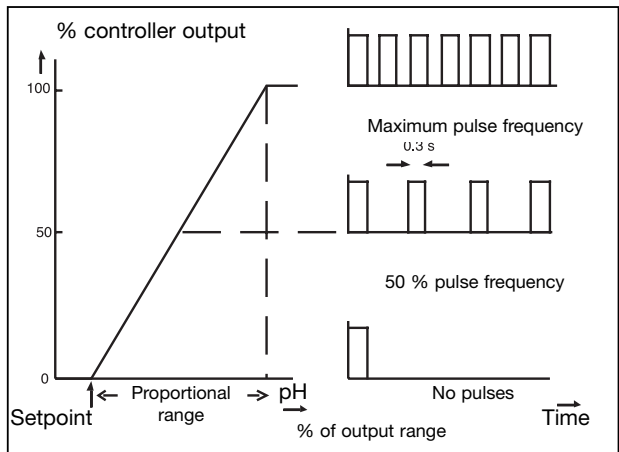
1) PID duty cycle control

In this type of control, the on/off ratio is controlled to vary the dose rate through a solenoid valve. This is a very economic way of achieving PID control.



2) PID pulse frequency control

The pulsing frequency is regulated to control electrical valve opening or pump stroke. In each case the setpoint, PB, I and D terms are all easily adjustable in the PH150.



Maintenance and Calibration

It is important that a pH system should be well maintained. The electrodes should be kept clean, and calibration needs to be checked at regular intervals. To ensure a high accuracy measurement, careful calibration must be performed using accurate and stable buffers, taking into account the temperature dependence of the solutions. The EXAxt PH150 has 3 sorts of primary buffer solutions pre-configured in memory. The user selects from these standards the solutions to be used in the plant. The tables below are extracted from the data programmed in the PH150. They show how much variation exists, and why it is compensated. EXAxt can also have three user defined buffer tables.

A) N.I.S.T. International Standard

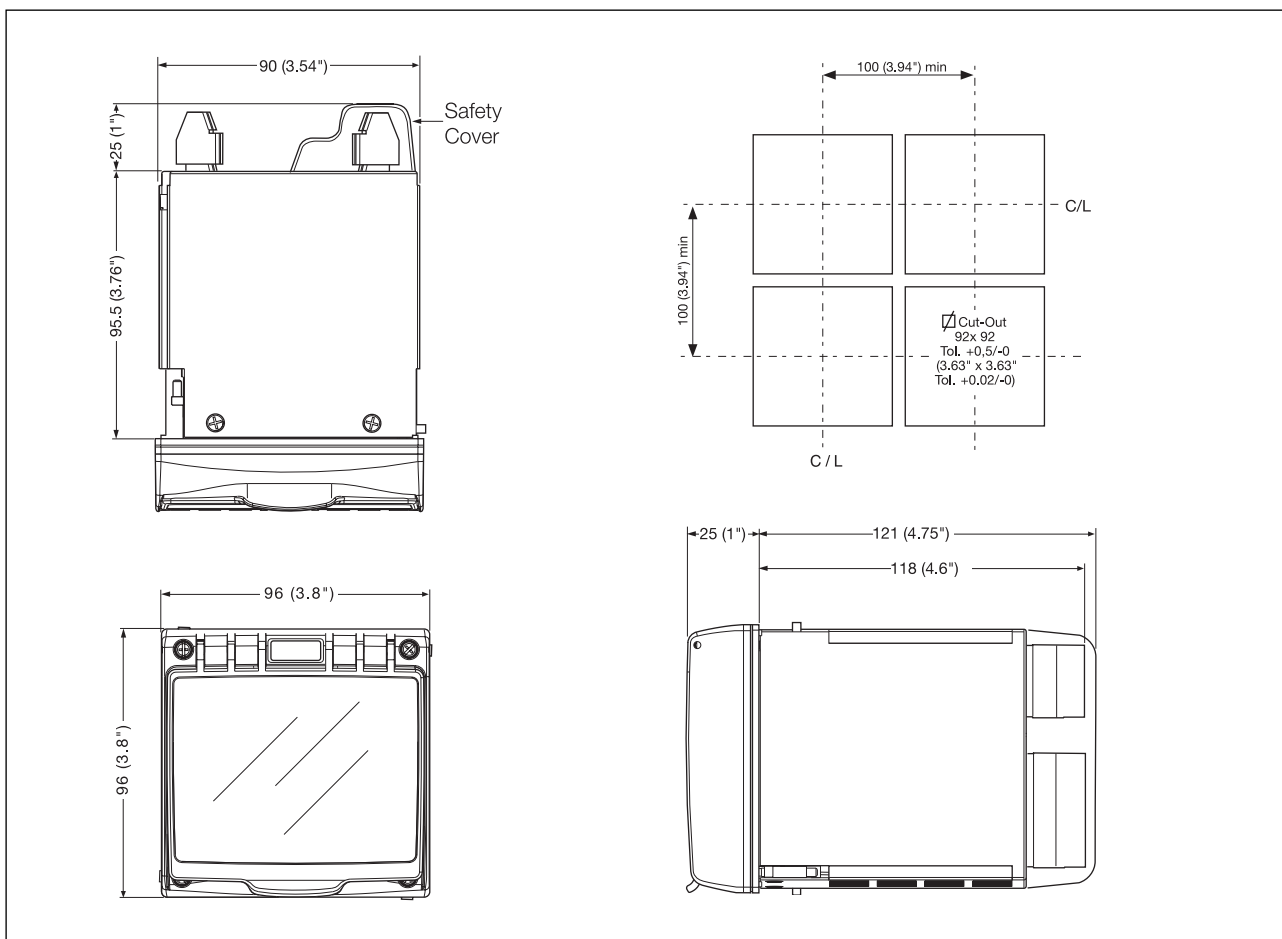
°C	5	10	15	20	25	30
1.68pH NIST	1.668	1.670	1.672	1.675	1.679	1.683
4.01pH NIST	3.999	3.998	3.999	4.002	4.008	4.015
6.87pH NIST	6.951	6.923	6.900	6.881	6.865	6.853
9.18pH NIST	9.395	9.332	9.276	9.225	9.180	9.139

B) DIN German Industry Standard

°C	5	10	15	20	25	30
4.65 pH DIN	4.665	4.660	4.655	4.650	4.650	4.650
6.79 pH DIN	6.865	6.840	6.820	6.800	6.790	6.780
9.23 pH DIN	9.425	9.370	9.320	9.270	9.230	9.180

C) Technical Standards (common in US)

°C	5	10	15	20	25	30
4.0 pH US	3.998	3.997	3.998	4.001	4.005	4.001
7.0 pH US	7.090	7.060	7.040	7.020	7.000	6.990
10.0 pH US	10.245	10.179	10.118	10.06	10.01	9.97



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