Metal Finishing

W600 Series Controllers

The W600 series provides reliable, flexible and powerful control for your electroless plating or etching process

Summary of Key Benefits

- Large touchscreen display with icon based programming makes setup easy
- Economical wall-mount package for easy installation
- Two sensor input slots provides extraordinary flexiblity; the same controller can be used with almost any type of sensor needed
  - Copper or Nickel plus pH
  - Dual analog inputs for any 4-20 mA transmitter
  - Universal analytical sensor card for pH/ORP, conductivity or disinfection
  - Combination analog input and analytical sensor input
- Two Virtual Inputs that are calculated from two real inputs or one input and a constant
- Multiple language support allows simple setup almost anywhere in the world
- Six control outputs allow the controller to be used in more applications
- Complete flexibility in the function of each relay
  - On/Off Setpoint
  - Plating Control (on/off with totalizing as metal turnovers)
  - Plating Follow (activate with another relay)
  - Time Proportional Control
  - Proportional Control (when purchased with 4-20mA or pulse solid state opto outputs)
  - In-Range or Out-of-Range activation
  - Probe wash
  - Timer-based activation
  - Flow Timer
  - Alarm
  - Spike Set Point
  - Lead/Lag control of up to 6 relays
- On-screen and web page graphing of sensor values and control output status
- Datalogging
- Emailing Alarm messages, Datalog, Graph, or System Summary reports
- Ethernet option for remote access via the Internet, LAN or Modbus/TCP

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Specifications

Inputs

Power
100-240 VAC, 50 or 60 Hz, 7A max Fuse: 6.3 Amp

Sensor Input Signals (0, 1 or 2 depending on model code)
Walchem Copper or Nickel, or
Contacting Conductivity: 0.01, 0.1, 1.0, or 10.0 cell constant, or
Electrodeless Conductivity (not available on the combination sensor/analog input card) or
Disinfection or
Amplified pH, ORP, or Ion Selective Electrode which requires a preamplified signal. ±5VDC power available for external preamps. Walchem WEL or WDS series pH/ORP sensors recommended.
Each sensor input card contains a temperature input.
Temperature: 100 or 1000 ohm RTD, 10K or 100K Thermistor

Analog (4-20 mA) Sensor Input (0, 1, 2 or 4 depending on model code)
2-wire loop powered and self-powered transmitters supported
3-wire and 4-wire transmitters supported
Each dual sensor input board has two channels: Channel 1, 130 ohm input resistance and Channel 2, 280 ohm input resistance. The combination input board has one channel, 280 ohm input resistance.
Available Power: One independent isolated 24 VDC ±15% supply per channel. 1.5 W maximum for each channel. 2W (83 mA at 24 VDC) total power consumption for all channels (four total channels possible if two dual boards are installed.

Digital Input Signals (6):
State-Type Digital Inputs
Electrical: Optically isolated and providing an electrically isolated 9V power with a nominal 2.3mA current when the digital input switch is closed. Typical response time: < 2 seconds. Devices supported: Any isolated dry contact (i.e. relay, reed switch). Types: Interlock

Low Speed Counter-Type Digital Inputs
Electrical: Optically isolated and providing an electrically isolated 9V power with a nominal 2.3mA current when the digital input switch is closed, 0-10 Hz, 50 msec minimum width. Devices supported: Any device with isolated open drain, open collector, transistor or reed switch.
Types: Contacting Flowmeter

High Speed Counter-Type Digital Inputs
Electrical: Optically isolated and providing an electrically isolated 9V power with a nominal 2.3mA current when the digital input switch is closed, 0-500 Hz, 1.00 msec minimum width. Devices supported: Any device with isolated open drain, open collector, transistor or reed switch. Types: Paddlewheel Flowmeter

Outputs

Powered Mechanical Relays (0 or 6 model code dependent)
Pre-powered on circuit board switching line voltage
All relays are fused together as one group, total current must not exceed 6A (resistive), 1/8 HP (93W)

Dry Contact Mechanical Relays (0, 2 or 4 model code dependent)
6 A (resistive), 1/8 HP (93W)
Dry contact relays are not fuse protected.

Pulse Outputs (0, 2 or 4 model code dependent)
Opto-isolated, solid-state relay, 200mA, 40V DC
VLOWMAX = 0.05V @ 18mA

4 - 20 mA (0 or 2 model code dependent)
Internally powered, Fully isolated
600 Ohm max resistive load, Resolution 0.0015% of span
Accuracy ± 0.5% of reading

Measurement Performance

	Range	Resolution	Accuracy
Copper	0.10 to 99 g/l (varies with the chemical being measured) 0.10 to 5.50 g/l typical for electroless copper	0.01 g/l	±0.01 g/l
Nickel	0.10 to 25 g/l (varies with the chemical being measured)	0.01 g/l	±0.01 g/l
0.01 Cell Contacting Conductivity	0-300 µS/cm	0.01 µS/cm, 0.0001 mS/cm, 0.001 mS/m, 0.0001 S/m, 0.01 ppm	±1% of reading
0.1 Cell Contacting Conductivity	0-3,000 µS/cm	0.1 µS/cm, 0.0001 mS/cm, 0.01 mS/m, 0.0001 S/m, 0.1 ppm	±1% of reading
1.0 Cell Contacting Conductivity	0-30,000 µS/cm	1 µS/cm, 0.001 mS/cm, 0.1 mS/m, 0.0001 S/m, 1 ppm	±1% of reading
10.0 Cell Contacting Conductivity	0-300,000 µS/cm	10 µS/cm, 0.01 mS/cm, 1 mS/m, 0.001 S/m, 10 ppm	±1% of reading
pH	-2 to 16 pH units	0.01 pH units	±0.01% of reading
ORP/Ion Selective Electrode	-1500 to 1500 mV	0.1 mV	±1 mV
Disinfection sensors	-2000 to 1500 mV	0.1 mV	±1 mV
	0 - 2 ppm to 0 - 20,000 ppm	Varies with range and slope	Varies with range and slope
Electrodeless Conductivity	500 - 12,000 µS/cm	1 µS/cm, 0.01 mS/cm, 0.1 mS/m, 0.001 S/m, 1 ppm	±1% of reading
	3,000-40,000 µS/cm	1 µS/cm, 0.01 mS/cm, 0.1 mS/m, 0.001 S/m, 1 ppm	±1% of reading
	10,000-150,000 µS/cm	10 µS/cm, 0.1 mS/cm, 1 mS/m, 0.01 S/m, 10 ppm	±1% of reading
	50,000-500,000 µS/cm	10 µS/cm, 0.1 mS/cm, 1 mS/m, 0.01 S/m, 10 ppm	±1% of reading
	200,000-2,000,000 µS/cm	100 µS/cm, 0.1 mS/cm, 1 mS/m, 0.1 S/m, 100 ppm	±1% of reading
Temperature	23 to 500°F (-5 to 260°C)	0.1°F (0.1°C)	±1% of reading within range

Temperature°C	Range Multiplier%
0	181.3
10	139.9
15	124.2
20	111.1
25	100.0
30	90.6
35	82.5
40	75.5
50	64.3
60	55.6
70	48.9

Temperature°C	Range Multiplier%
80	43.5
90	39.2
100	35.7
110	32.8
120	30.4
130	28.5
140	26.9
150	25.5
160	24.4
170	23.6
180	22.9

Note: Conductivity ranges above apply at 25°C. At higher temperatures, the range is reduced per the range multiplier chart.

Mechanical (Controller)

Enclosure Material Polycarbonate
Enclosure Rating NEMA 4X (IP65)
Dimensions 9.5" x 8" x 4" (241 mm x 203 mm x 102 mm)
Display 320 x 240 pixel monochrome backlit display with touchscreen
Ambient Temperature -4 to 131°F (-20 to 55°C)
Storage Temperature -4 to 176°F (-20 to 80°C)

Agency Certifications

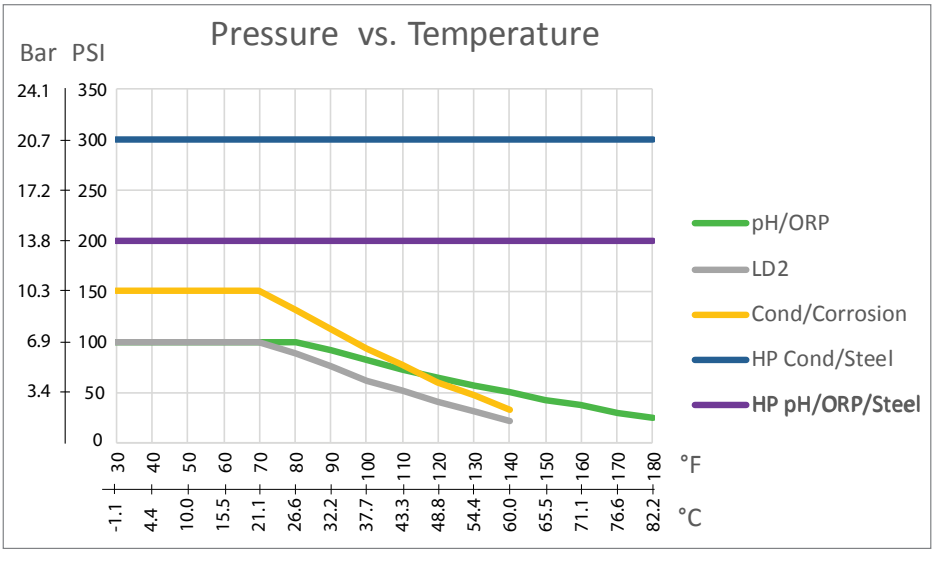
Safety: UL 61010-1:2012, 3rd Edition
CSA C22.2 No.61010-1:2012, 3rd Edition
IEC 61010-1:2010 3rd Edition
EN 61010-1:2010 3rd Edition

EMC: IEC 61326-1:2012
EN 61326-1:2013

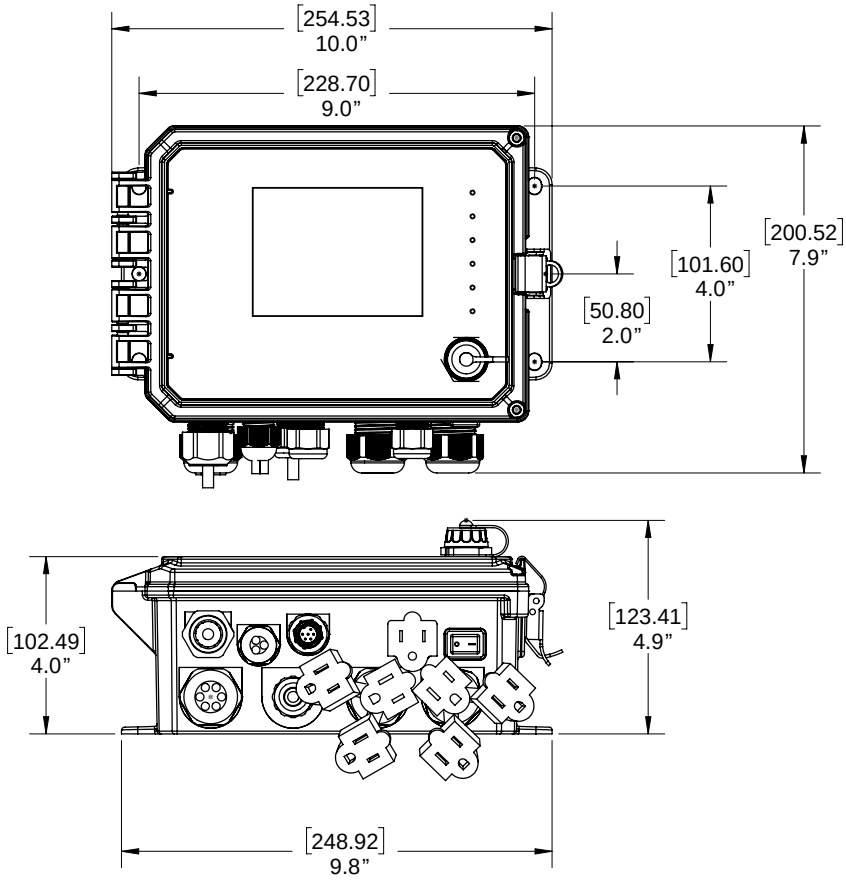
Note: For EN61000-4-6, EN61000-4-3 the controller met performance criteria B. This equipment is suitable for use in establishments other than domestic and those directly connected to a low voltage (100-240 VAC) power supply network which supplies buildings used for domestic purposes.

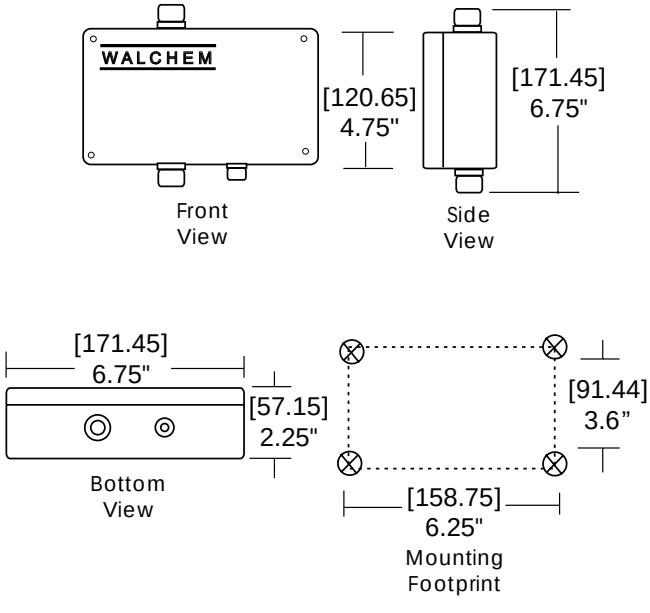
Mechanical (Sensors) (*see graph)

Sensor	Pressure	Temperature	Materials	Process Connections
Immersible Copper	Not applicable	32-200 F (0-93 C)	Polypropylene, glass	Not Applicable
Flow through Copper or Nickel	0-14.7 psi (0-1 bar)	32-200 F (0-93 C)	Polyethylene, glass, FKM	3/8” OD tubing compression fittings
Electrodeless conductivity	0-150 psi (0-10 bar)*	CPVC: 32-158°F (0 to 70°C)* PEEK: 32-190°F (0 to 88°C)	CPVC, FKM in-line o-ring PEEK, 316 SS in-line adapter	1” NPTM submersion 2” NPTM in-line adapter
pH	0-100 psi (0-7bar)*	50-158°F (10-70°C)*	CPVC, Glass, FKM o-rings, HDPE, Titanium rod, glass-filled PP tee	1” NPTM submersion 3/4” NPTF in-line tee
ORP	0-100 psi (0-7bar)*	32-158°F (0-70°C)*		
Contacting conductivity (Condensate)	0-200 psi (0-14 bar)	32-248°F (0-120°C)	316SS, PEEK	3/4” NPTM
pH (High Pressure)	0-300 psi (0-21 bar)*	32-275°F (0-135°C)*	Glass, Polymer, PTFE, 316SS, FKM	1/2” NPTM gland
ORP (High Pressure)	0-300 psi (0-21 bar)*	32-275°F (0-135°C)*	Platinum, Polymer, PTFE, 316SS, FKM	1/2” NPTM gland
Free Chlorine/Bromine	0-14.7 psi (0-1 bar)	32-113°F (0-45°C)	PVC, Polycarbonate, silicone rubber, SS, PEEK, FKM, Isoplast	1/4” NPTF Inlet 3/4” NPTF Outlet
Extended pH Range Free Chlorine/Bromine	0-14.7 psi (0-1 bar)	32-113°F (0-45°C)		
Total Chlorine	0-14.7 psi (0-1 bar)	32-113°F (0-45°C)		
Chlorine Dioxide	0-14.7 psi (0-1 bar)	32-131°F (0-55°C)		
Ozone	0-14.7 psi (0-1 bar)	32-131°F (0-55°C)		
Peracetic Acid	0-14.7 psi (0-1 bar)	32-131°F (0-55°C)		
Hydrogen Peroxide	0-14.7 psi (0-1 bar)	32-113°F (0-45°C)		
Flow switch manifold	0-150 psi (0-10 bar) up to 100°F (38°C)* 0-50 psi (0-3 bar) at 140°F (60°C)	32-140°F (0-60°C)	GFRPP, PVC, FKM, Isoplast	3/4” NPTF
Flow switch manifold (High Pressure)	0-300 psi (0-21 bar)*	32-158°F (0-70°C)*	Carbon steel, Brass, 316SS, FKM	3/4” NPTF

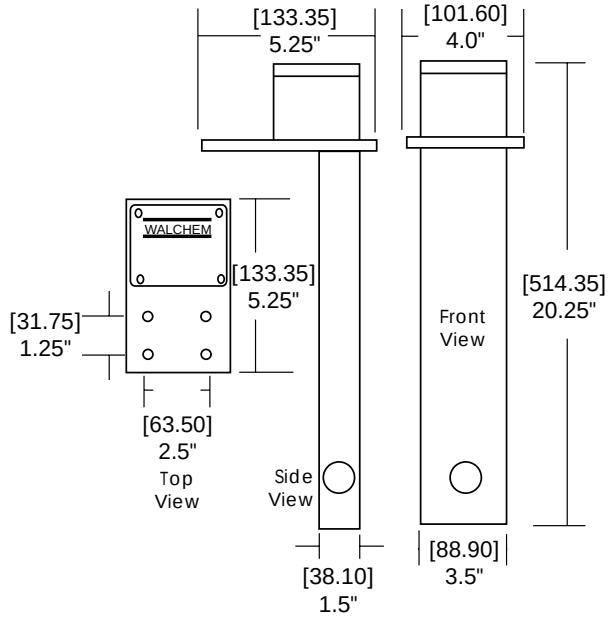


Dimensions





Flow through sensor



Immersible sensor

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Ordering Information

Example: WCU600PMNAE-AN

WCU WNI	RELAYS/WIRING	INPUT CARDS	ANALOG OUTPUTS	ETHERNET	-	SENSORS
	600P	MN	A	E		AN

RELAYS/WIRING

6 powered relays		
	600H	Hardwired
	600P	Prewired with USA cords and pigtails
	600D	Prewired with DIN power cord, no pigtails
2 powered 4 dry relays		
	610H	Hardwired
	610P	Prewired with USA cord and 2 pigtails
	610D	Prewired with DIN power cord, no pigtails
2 opto 4 dry relays		
	620H	Hardwired
	620P	Prewired with USA cord and two 20 ft. pulse cables
	620D	Prewired with DIN power cord, no pigtails
4 opto 2 dry relays		
	640H	Hardwired
	640P	Prewired with USA cord and four 20 ft. pulse cables
	640D	Prewired with DIN power cord, no pigtails

INPUT CARDS

NN	No sensor input cards
MN	One metal/pH input card
MM	Two metal/pH input cards
MS	One metal/pH input card and one sensor input card
MC	One metal/pH input card and one combination sensor/analog input card
MA	One metal/pH input card and one dual analog input card

ANALOG OUTPUTS

N	No analog outputs
A	One dual isolated analog output card

ETHERNET

N	No Ethernet
E	Ethernet card
M	Ethernet card with Modbus/TCP

WCU Copper Sensors

		Type of Input card required
NN	No sensor	
AN	Immersion copper sensor (190787)	M
BN	Flow through copper sensor – Standard 0.100" path length (190785)	M
CN	Flow through copper sensor – 0.025" path length (190893)	M
DN	Flow through copper sensor – 0.015" path length (191596)	M
AA	Two immersion copper sensors	MM
BB	Two Flow through copper sensors – Standard 0.100" path length	MM
CC	Two Flow through copper sensors – 0.025" path length	MM
DD	Two Flow through copper sensors – 0.015" path length	MM

WNI Nickel Sensors

		Type of Input card required
NN	No sensor	
AN	Flow through nickel sensor - Standard (190784)	M
AA	Two Flow through nickel sensors	MM
BN	Flow through nickel sensor + inline pH sensor with ATC	M
BB	Two Flow through nickel sensors + two inline pH sensors with ATC	MM

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