

HyPerforma G3Pro Bioprocess Controller

The Thermo Scientific™ HyPerforma™ G3Pro™ Bioprocess Controller contains many of the capabilities of the Thermo Scientific™ HyPerforma™ G3Lite™ Bioprocess Controller for Thermo Scientific™ HyPerforma™ Single-Use Fermentors (S.U.F.s) (30 L and 300 L) and Single-Use Bioreactors (S.U.B.s) (50 L to 2,000 L). The HyPerforma G3Pro Bioprocess Controller enables an additional layer of versatility, allowing mobility and flexibility for reconfiguration and application expansion.

Features

- Open-architecture capabilities to integrate with vessels from other suppliers
- Scalability that allows transfer of any process from 30 L to 2,000 L
- Adaptable for multi-product applications and to fit individual process needs
- Redundant sensor-control mechanism
- Automated pinch valve that opens the flow to backup exhaust filter at vessel pressure increase
- Built-in circuit for optional stack light
- Alarm relay for building alarm
- Probe configuration options that are flexible to connect for electrochemical, single-use, or both for pH and dissolved oxygen (DO) measurements
- Utilizes Thermo Scientific™ TruBio™ Bioprocess Automation and Control Software powered by the DeltaV™ Distributed Control Platform from Emerson, with a touchscreen interface for data entry and control
- Each HyPerforma G3Pro Bioprocess Controller has 8 additional analog input connectors (4–20 mA) plus 4 auxiliary control loop connectors (4–20 mA) for system expansion capability



Mounting control cart

- Single- or dual-cart mount option for easy mobility and reduced footprint
- Each control cart can support 2 utility towers, mounted on opposite sides of the cart
- Equipped with an adjustable cable guide designed to carry the cables and tubing from the cart to the bioreactor/fermentor vessel; this protects the cables and tubing from being tangled or obstructed by other equipment or laboratory activity

HyPerforma G3Pro Bioprocess Controller specifications

Utility cart dimensions (H x W x D)	914.4 x 609.6 x 228.6 mm (36 x 24 x 9 in.)
Enclosure rating	NEMA12/IP56 Touchscreen control box: NEMA4X
Operating temperature	5°C to 40°C (41°F to 104°F)
Storage temperature	-25°C to 85°C (-13°F to 158°F)
Relative humidity	5% to 95% (noncondensing)
Weight/shipping weight	18.1 kg/41 kg (40 lb/90 lb)
Control cart weight/shipping weight	75 kg (165 lb)/120 kg (265 lb)
pH (up to 3 available)	Thermo Scientific™ TruSens Transmitter (electrochemical mV), 2 included as standard for redundancy, third one is optional
DO (up to 3 available)	TruSens Transmitter (electrochemical nA), 2 included as standard for redundancy, third one is optional
Temperature (up to 2 available)	TruSens Transmitter resistance temperature detector (RTD), 1 included as standard
Pressure (up to 2)	PendoTECH™ PT-10, 1 included as standard
Liquid control	4 variable-speed Watson-Marlow™ peristaltic pumps
Pump head options	Watson-Marlow™ 114, 313, or 520 series
Gas control	Thermo Scientific™ TruFlow™ mass flow controller (MFC): option of up to 6 MFCs (up to 6 gas inlets and 3 gas outlets) Option of high flow and very high flow rates available—up to 600 L/min on separate manifold
Scales/balances	4 x AI (Profibus) available for digital scales (analog optional)
Inputs/outputs	AI x 4 (0–20 mA, 16-bit resolution) (24 V DC, PV) AI x 4 (0–20 mA, 12-bit resolution) (24 V DC, PV) AUX x 4 (0–20 mA, 12-bit resolution) (SP, PV)
Thermal control	Thermal control unit (TCU) for jacketed vessels and optional heated S.U.B.
External pumps	In addition to the pumps on the cart, additional external pumps can be mounted on a pump tower, and optional analog controlled case pumps
Agitator	Vessel adapter box (VAB) with VFD supplied for HyPerforma vessels and third-party vessels
Alarm	Alarm relay for building alarm, optional stack light circuitry (must order stack light separately)
Vent filter heater	Option to control 2 or 4 vent filter heaters

HyPerforma G3Pro Bioprocess Controller accessories

TruFlow gas mass flow controller (MFC)

The TruFlow gas mass flow controller (MFC) is designed to work with all of the HyPerforma bioreactor control systems. Its compact assembly provides up to 6 standard mass flow controllers and 3 associated solenoid valves. When connected, the TruFlow gas MFC is instantly recognized by TruBio software to provide precise control of gas flow, without requiring any configuration, even at extremely low flow rates.

TruFlow gas MFC key features

- Variety of flow rate options*
- Flow range configurability
- Plug-and-play connectivity



TruFlow gas MFC specifications

Enclosure dimensions (H x W x D)	Six mass flow controllers: 9.1 x 7.4 x 6.2 in.
Rating	NEMA 1, IP 51 (liquid wipedown), option of high flow and very high flow rates available up to 600 L/min on separate manifold
Maximum gas flow rate	Configurable up to 50 L/min*
Weight/shipping weight	5.8 kg/9.1 kg (12.8 lb/20 lb)
Operating temperature	5°C to 40°C (41°F to 104°F)
Storage temperature	-25°C to 70°C (-15°F to 158°F)
Relative humidity	5% to 95% (noncondensing)
Certifications	CE: EN-61326 and EN-61010
Inlet pressure	1.6 to 2.3 bar/25 to 35 psig
Outlet pressure	0 to 1.38 bar/0 to 20 psig
Accuracy	±0.8% of flow rate and ±0.3% full scale (Burkert)
Repeatability	±0.1% full scale (Burkert)
Cable assembly	2 m (6 ft) standard

Note: MFCs greater than 50 L/min are mounted as individual units and are not part of the main MFC block.

* May require additional configuration for specific flow rate. Please consult with your local sales representative for more information.

Suggested range of operating parameters

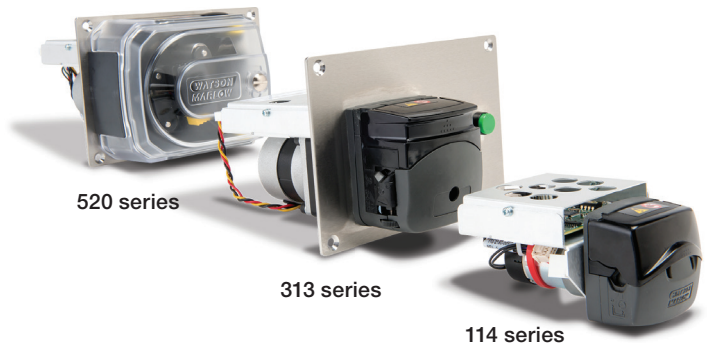
Volume	50 L			100 L			250 L			500 L			1,000 L			2,000 L		
	DHS	Cross-flow	Overlay	DHS	Cross-flow	Overlay	DHS	Cross-flow	Overlay	DHS	Cross-flow	Overlay	DHS	Cross-flow	Overlay	DHS	Cross-flow	Overlay
Recommended maximum gas flow rates (slpm)																		
Air	5	5	5	10	9	9	25	13	13	50	25	25	100	40	40	200	60	60
O ₂	5	-	-	10	-	-	25	-	-	50	-	-	100	-	-	200	-	-
CO ₂	1	-	-	2	-	-	2	-	-	2	-	-	5	-	-	5	-	-
N ₂	1	-	-	2	-	-	5	-	-	5	-	-	10	-	-	10	-	-
Total	5	5	5	10	9	9	25	13	13	50	25	25	100	40	40	200	60	60

Peristaltic pumps

Precision for dosing, feeding, mixing, transferring, and harvesting

Our pumps have been designed to meet high-precision liquid delivery requirements in bioprocess applications. The pumps combine industry-known Watson-Marlow pump heads with electronic boards. This pairing guarantees optimized control of dosing, feeding, product transfer/harvest, buffer mixing (gradient or step), or general liquid management.

These pumps are standard in the HyPerforma G3 Bioprocess Controllers and can be easily exchanged if the process flow rate requirements change. The pumps on the G3Pro Bioprocess Controller utility tower are peristaltic, variable-speed with stop-on-open function; they contain Watson-Marlow heads, controlled by motors with individual microprocessors for maximum control and accuracy. The pumps can be configured based on your specific requirements using Watson-Marlow 100, 300, or 500-series pump heads.



Pump specifications			
Pump series	114	313	520
Power supply	24 V DC	24 V DC	24 V DC
Maximum current (at 25°C)	0.25 A	0.95 A	1.5 A
Average current (at 25°C)	0.2 A	0.75 A	1 A
Speed	5–160 rpm	1–300 rpm	1–300 rpm
Accuracy	±2 rpm, or ±2% of set point	±1 rpm, or ±2% of set point	±1 rpm, or ±2% of set point
Tubing (thickness, ID)	0.8 mm, 4.8 mm	0.8 mm, 8.0 mm	1.6 mm, 9.6 mm
Operating temperature	5°C to 50°C (41°F to 122°F)		
Storage temperature	–10°C to 70°C (14°F to 158°F)		
Humidity	10% to 90% (noncondensing)		
Certifications	CE: EN-60101 and EN-61326		

Sensors and transmitters

Single-use and reusable sensors for superior process control

Thermo Fisher Scientific offers best-in-class single-use and reusable sensors for the measurement of pH, DO, biomass, and headspace pressure—with high reliability and superior performance for cell culture and fermentation process monitoring to meet all of your process analytical technology (PAT) needs. To further enhance your processes, digital integration is possible by pairing our bioprocess controllers with the TruBio Bioprocess Control Software. We offer a range of intuitive process sensors whether you're incorporating them into a single-use bioprocess container or autoclavable vessel process—to help you monitor processes, reduce failures, and gain efficiencies.



TruSens transmitter blade

The Thermo Scientific™ TruSens transmitter blade is a combined technology designed to monitor all conventional pH and DO sensors. It allows the connection of a resistance temperature detector (RTD) or thermistor inputs to suit the user's preferred sensor technology in upstream processes. This transmitter blade with TruBio software allows for temperature compensation and is compatible with electrochemical sensors and digital sensors that output nA or mV signals.



TruSens transmitter blade specifications	
Physical	
Case material	Aluminum bracket
Dimensions (H x W x D)	13 x 3.5 x 12.8 cm (5.1 x 1.4 x 5.0 in.)
Weight/shipping weight	0.1/0.3 kg (0.2/0.6 lb.)
Mounting	Enclosure mounted within utility tower
Display	TruBio Bioprocess Control Software (GAMP5)
RFI/EMI	EN 61326-1
Operating temperature	5°C to 45°C (41°F to 113°F) ambient
Storage temperature	0°C to 65°C (32°F to 149°F)
Relative humidity	10% to 90% (noncondensing)

Electrical	
Power supply	24 V DC @ 150 mA
Signal outputs*	6 analog 4–20 mA (1 electrochemical pH, 1 electrochemical DO, 2 PT100 RTD, 2 thermistor)
Signal inputs	pH (–520 mV to 520 mV), DO (0–500 nA), PT100 RTD (0 to 100°C), thermistor (0 to 100°C for 10 kΩ, 15 to 130°C for 22 kΩ)
Output accuracy	Analog: ±0.1 mA Digital: NA

* If a sensor loop is activated but no sensors are attached, the following errors will be seen: The DO current will drop and produce a low "%SAT" reading, the pH will be unstable and indeterminate, RTD channels will read maximum temperature, and the thermistor channels will read minimum temperature.

TruBio Bioprocess Automation and Control Software

The TruBio software provides easy-to-configure process control, eliminating the need to learn automation control programming. Developed for use with HyPerforma Bioprocess Controllers, TruBio software is designed to support easy scaling and technology transfer and building of sophisticated process control strategies. It also provides the flexibility to incorporate a wide range of cell culture, fermentor, or mixing vessels, and to manage multiple data streams from several unit operations. TruBio software, powered by the Emerson DeltaV system, has been developed according to Good Automated Manufacturing Practice (GAMP™) 5 methods, and conforms to regulatory requirements for use in cGMP-compliant processes.



Find out more at thermofisher.com/controllers

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