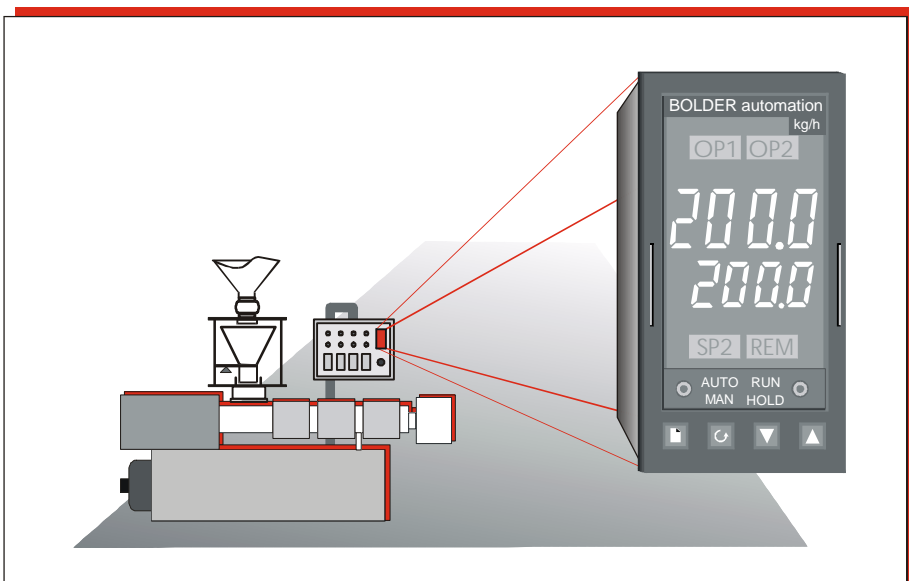


# GraviMaster 2408ex

## Extruder throughput controller

DC output / Stepping controller output



### Profits for production

- Saving of material through fast and reliable attainment of the specified tolerance.
- Compensation of variations caused by regrind, temperature, charge properties, etc.
- Production control
- Reproducible working points

### Application area

GraviMaster 2408ex controls the throughput of an **extruder** or **feeding station** in steady state operation. Start-up of the system is done in manual mode. As soon as the set working range has been reached automatic mode can be switched on. Remaining deviations, material dependent fluctuations and process drifts are controlled out.

The throughput measuring process is based on the loss-in-weight measuring principle. A **normal weighing hopper** with a strain gauge unit can be used. GraviMaster supplies the strain gauge unit registers the weight signal (<40mV), also over a great distance (<200m) in a noise free way.

Eurotherm Controls Ltd., UK, as an ISO 9001 certified manufacturer, guarantees good quality.

### Simple operation

The machine operator uses the controller for start-up and for switch-over to automatic. With just a few moves the system can be brought to a controlled state.

### DC output

The speed of the screw is set in manual mode with  $\blacktriangle$  and  $\blacktriangledown$  keys on the controller. When the throughput comes into the tolerance band the controller switches over to automatic by itself or by the  $\odot$  Man/Auto key, and adjusts the speed.

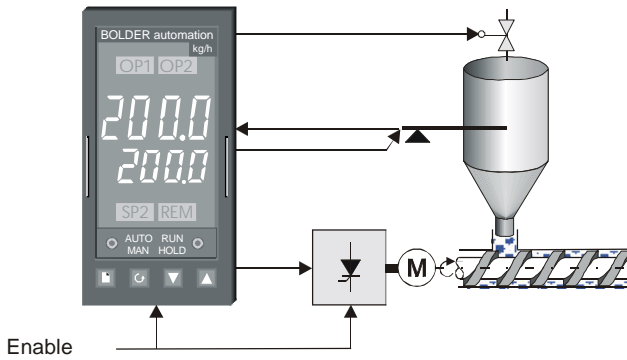
### Stepping controller output

By means of a drive control unit with Raise/Lower inputs or a motorised potentiometer the system is driven by hand to the working range. For a given setpoint only the Man/Auto key is operated. GraviMaster 2408ex controls to the setpoint with pulses.

### Controller features

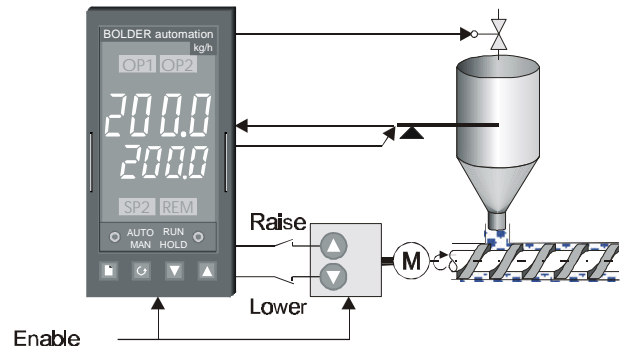
- Good price/performance ratio
- High accuracy
- Standard product
- Easy to operate and secure through:
  - Adaptive throughput control
  - Adaptation to bulk density
  - Simple calibr. procedure
  - Control strategies
  - Configurable versions
  - Set up of handling
  - Extruder specific control
  - Extruder start interlock
  - Diagnostics
  - Communications interface

## DC output



GraviMaster, working with a continuous output, feeds the analogue input of a drives electronics via a galvanically isolated DC output with 0...10V. If the drives electronics is not enabled the controller sets the DC output to 0V and the start conditions to start-up.

## Stepping controller output



GraviMaster, working with a stepping controller output, drives the RAISE/LOWER inputs of a motorised potentiometer to adjust the screw speed. If the drive is not enabled the controller sets the controller to manual mode and the start conditions to start-up.

## Comparison of advantages

### Resolution of the screw speed

Input positioning step: > 0.1%, Control step < 0.01%  
 No hysteresis with residual control error  
 Reproducible setting  
 Repeatable control movement

### Reliability

No mechanical wear of the motorised potentiometer

### Reliability

During a disturbance the motorised potentiometer or the drive control has to be operated independently.

### Retrofit

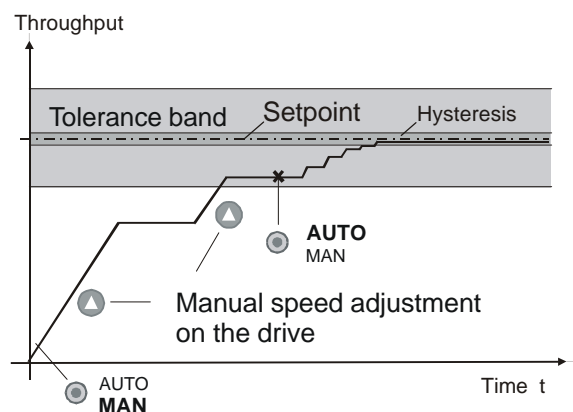
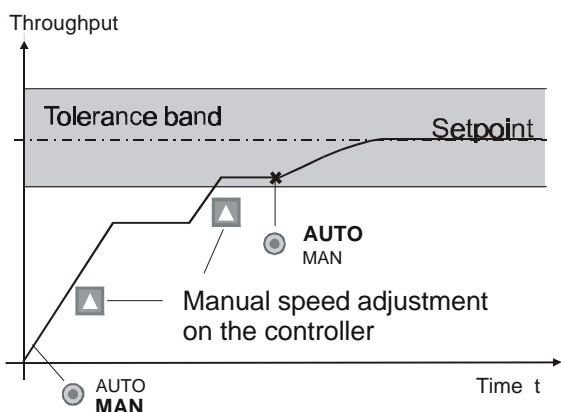
The throughput control as an addition is easy to retrofit.  
 Operation in manual mode continues to exist.

## Differences between the controller types

<b>Output power</b>	0 ... 10V 0.01% Resolution, galvanically isolated
<b>Enable OFF</b>	Output: 0V; Manual mode Extruder control: Set start conditions
<b>Controller</b>	PI controller, cont. adaptation of the control parameters, can be switched off, disturbance response assessable
<b>Display</b>	Manual: throughput value / output [%] Auto: throughput value / setpoint

<b>Output power</b>	2x relay or logic module, selectable min. : output pulse 55ms, Resolution: 0.1% for 60sec ramp time
<b>Enable OFF</b>	Output passive; manual mode Extruder control: Set start conditions
<b>Controller</b>	Adaptive stepping controller with hysteresis
<b>Display</b>	Field OP 1: RAISE; Field OP 2: LOWER Speed via DC input measurable

## Start-up of the system and switch over to automatic mode



## Data sheet

<b>Fascia operation</b>	Scope of operation	Operation, changeable Commissioning Configuration
	Display	Automatic mode                      Throughput value/ setpoint [kg/h] Manual mode, continuous        Throughput value/ output [%] Manual mode, step                Throughput value/ ---
	Selectable values	Setpoint, output power, status, weight, material usage
	Status display	Controller                              AUTO/MAN Material totalization                RUN/HOLD
	Status display, blinking	i.e. the status is forced internally; it changes when permissible
	REM field	Communications access            interface active
	OP1 and OP2 field	Stepping output                      RAISE/LOWER active
	Fascia keys	RAISE/LOWER for changing values Menu selection Scroll parameter selection Controller                              AUTO/MAN Material totalization                RUN/HOLD/RESET
<b>Material totalization</b>	Range	1 kg ... 9999t, dynamically managed, 4 significant digits
	Operation	Via the Fascia (see above) or the communications interface
<b>Throughput</b>	Display range	0.01 ... 9999 kg/h
	Display characters	< 40 kg/h                              00.00 ... 40.00 kg/h < 400 kg/h                            00.0 ... 400.0 kg/h > 400 kg/h                            0 ... 9999 kg/h
	Measurement accuracy class	0,1%
	Measurement accuracy <b>with</b> Weighing hopper	typ. < 0.5 % for throughput > 10 kg/h, 15 min assessment time typ. < 1% for throughput 1 ... 10 kg/h, >1% for throughput < 1 kg/h
<b>Automatic strategy</b>	Fast start-up	Independent switch over to AUTO in the tolerance band
	Standard	Manual switch over to AUTO in the tolerance band
	Starve fed start up	Manual switch over inside and outside the tolerance band
	Take over of the working point	Setpoint tracking in manual mode
<b>Extruder control</b>	Start conditions	Manual mode, Start up status via: Power ON, enable inhibited
	Start up	Wait for automatic mode request
	Control	Automatic set, automatic active
	Disturbance in automatic mode	Automatic set, manual active
<b>Analogue inputs</b>	Weighing hopper input option: read back of speed	Range: 0 ... 40 mV, resolution 1 µV Module 3, input voltage = 0...10V
<b>Output power</b>	Output	0 ... 10VDC or stepping output (RAISE/LOWER), configurable
<b>Valve drive</b>		Output via a change over contact, output invertible
<b>Alarm output</b>	Alarm types Function Output	Hopper empty alarm, tolerance band alarm, sensor break individual or as logic OR function, invertible Relay, change over contact or logic signal each in slot 1 & 3, config.
<b>Digital inputs</b>	Digital input LA Digital input LB	Enable drive Force fill up valve to open or close, config
<b>Comms interface</b>	Protocol  Physical level	Modbus RTU, 16bit Addressing, access to all values, transmission of all decimal places, function code 01,...,08,16; even parity  RS232, RS 422/485 (4 wire, 32 devices), RS485; 9600 baud

## Accessories:



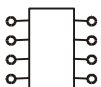
### Weighing hoppers

Volume 3,..., 50 Litre  
Granulate, regrind,  
powder, flowable material



### Production supervision

Siemens WinCC  
Visualising, operating, alarms  
quality documentation, reports



### Electronic interfaces

Strain gauge supply, 2...4 strain gauge  
units. Motorised pot. drive and supply, etc.

### Management with data bank:

Production and quality data,  
orders, stores, etc.

## Order code:

### GraviMaster/Controller/Hardware/Handbook/Control/Weighing hopper/Material/Feed//

<b>Controller</b>	<b>GraviMaster</b>	
<b>Type</b>	2408ex <input checked="" type="checkbox"/>	Sleeve on end, 96x48x150mm, ambient temperature 0... 55°C, IP 54 Extruder control to the working point
<b>Controller</b>	DC <input type="checkbox"/> DP <input type="checkbox"/> DR <input type="checkbox"/>	DC controller with DC output Stepping controller without feedback Stepping controller with feedback of speed or potentiometer position
<b>Hardware</b>		
<b>Supply</b>	VH <input type="checkbox"/> VL <input type="checkbox"/>	Voltage range world wide, 85...264VAC, 48...62Hz, <10W Low voltage 24VDC/AC, -15%, +20%
<b>Module 1</b>	XX <input type="checkbox"/>	No module
<b>Str. gauge supply</b>	G5 <input type="checkbox"/>	Strain gauge supply 1 x galv. isol. U: 10V <sub>DC</sub> o. Sense, R <sub>L</sub> > 300R
<b>Alarm</b>	RR <input type="checkbox"/> TP <input type="checkbox"/>	Relay, N.O. 2x I <sub>max</sub> : 2A U <sub>max</sub> : 264V <sub>AC</sub> U <sub>min</sub> : 12V <sub>DC</sub> I <sub>min</sub> : 100mA, R-Load Logic output 3x galv. isol. U <sub>ein</sub> : 12...13 V <sub>DC</sub> I <sub>ein</sub> : < 8 mA
<b>Module 2</b>	RR <input type="checkbox"/>	Relay:RAISE;LOWER 2x I <sub>max</sub> : 2A U <sub>max</sub> : 264V <sub>AC</sub> U <sub>min</sub> : 12V <sub>DC</sub> I <sub>min</sub> : 100mA, R-Load
<b>Output</b>	TP <input type="checkbox"/> D4 <input type="checkbox"/>	Logic :R/L, Alarm 3x galv. isol. U <sub>ein</sub> : 12...13 V <sub>DC</sub> I <sub>ein</sub> : < 8 mA DC Output 1x galv. isol. U: 0...10V, R <sub>L</sub> > 500R
<b>Module 3</b>	XX <input type="checkbox"/>	No module
<b>Alarm</b>	RR <input type="checkbox"/> TP <input type="checkbox"/> R2 <input type="checkbox"/> R4 <input type="checkbox"/>	Relay, N.O. 2x I <sub>max</sub> : 2A U <sub>max</sub> : 264V <sub>AC</sub> U <sub>min</sub> : 12V <sub>DC</sub> I <sub>min</sub> : 100mA, R-Load Logic output 3x galv. isol. U <sub>ein</sub> : 12...13 V <sub>DC</sub> I <sub>ein</sub> : < 8 mA Relay. N.O. 1x I <sub>max</sub> : 2A U <sub>max</sub> : 264V <sub>AC</sub> U <sub>min</sub> : 12V <sub>DC</sub> I <sub>min</sub> : 100mA, R-Load Relay, C.O. 1x I <sub>max</sub> : 2A U <sub>max</sub> : 264V <sub>AC</sub> U <sub>min</sub> : 6V <sub>DC</sub> I <sub>min</sub> : 1mA,
<b>Speed</b>	WP <input type="checkbox"/>	Signal input 1x galv. isol. U: 0...10V <sub>DC</sub>
<b>Comms interface</b>	XX <input type="checkbox"/> A2 <input type="checkbox"/> F2 <input type="checkbox"/> Y2 <input type="checkbox"/>	No module Interface RS232, galv. isol.,protocol MODBUS RTU Interface RS422, galv. isol.,protocol MODBUS RTU Interface RS485, galv. isol.,protocol MODBUS RTU
<b>Handbook</b>	X <input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/>	No handbook German English
<b>Control</b>		
<b>Dig.input 1</b>	XX <input type="checkbox"/> RL <input type="checkbox"/>	No function Enable output power and set the start up conditions via a contact
<b>Dig. input 2</b>	XX <input type="checkbox"/> VC <input type="checkbox"/> VO <input type="checkbox"/>	Valve only cyclic 0: cyclic, 1: valve forced closed via a contact 0: cyclic, 1: valve forced open via a contact
<b>Automatic</b>	IA <input type="checkbox"/> DB <input type="checkbox"/> OA <input type="checkbox"/> MT <input type="checkbox"/>	Standard Manual switch over to AUTO in the tolerance band Fast start up: Independent switch over to AUTO in the tolerance band Starve fed start up Manual switch over in and outside the tolerance band Take over working point Setpoint tracking in manual mode
<b>Weighing hopper</b>		
<b>Volume</b>	[15] ..... Litre	
<b>Valve</b>	OP <input type="checkbox"/> CL <input type="checkbox"/>	Normally open Normally closed
<b>Load cell</b>	[18] ..... max. weight [kg]	
<b>Type</b>	NC <input type="checkbox"/> [2,2] .....	Load cell, not calibrated mV/V characteristic of the calibrated load cell
<b>Material</b>		
<b>Bulk density, min</b>	[400] ..... kg/m <sup>3</sup>	
<b>Bulk density, max</b>	[700] ..... kg/m <sup>3</sup>	
<b>Feed</b>		
<b>Throughput, max</b>	[400] ..... kg/h	
<b>Ramp</b>	[90] ..... sec ramp time for 0 ... 100% for stepping controller	

When ordering please
<input checked="" type="checkbox"/> cross or
..... fill out

- Standard config. for controller with DC output:  GraviMaster/2408ex/DC/VH/G5/D4/R2/xx/D//
- Standard config. for stepping controller:  GraviMaster/2408ex/DP/VH/G5/RR/R2/xx/D//
- Customer specified config. On request  GraviMaster/2408ex/Appl. 100 ... 999//
- Gravimetric for **Co- Extrusion** and **Blending**  Please ask for documentation about **GraviProfi 2408**.

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