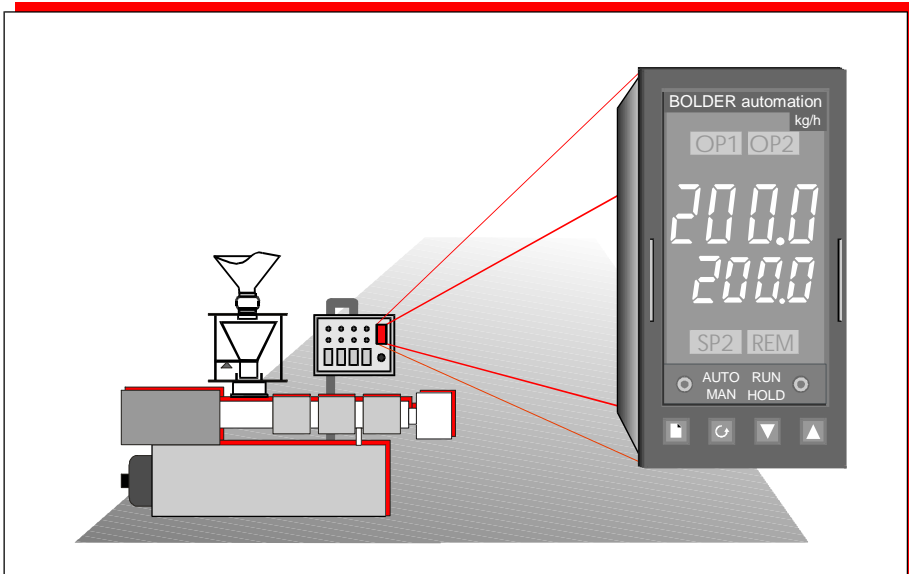


# GraviMaster 2408ex

**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 and keys on the controller. When the throughput comes into the tolerance band the controller switches over to automatic by itself or by the  Man/Auto key, and adjusts the speed.

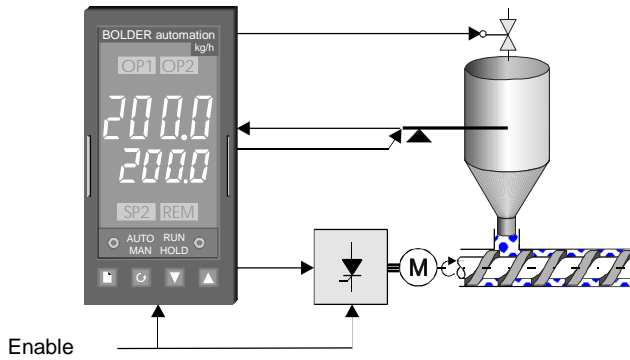
## Stepping controller output

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

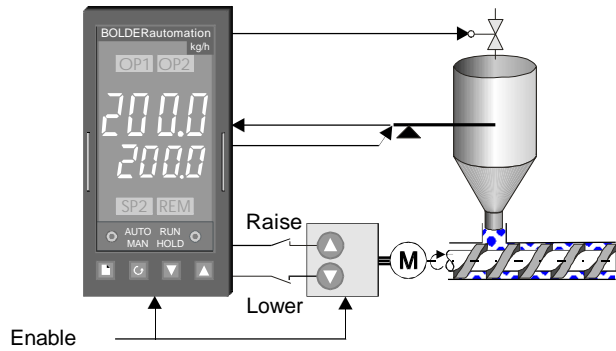
- ▶ Good price/performance ratio
- ▶ High accuracy
- ▶ Standard product
- ▶ Easy to operate and secure through:
  - Adaptive throughput control**
  - Adaptation to bulk density**
  - Simple calibr. procedure**
  - Control strategies**
  - Configurable versions**
  - Set up of handling**
  - Extruder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

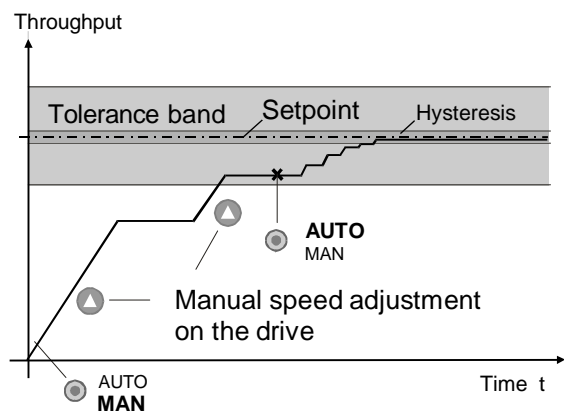
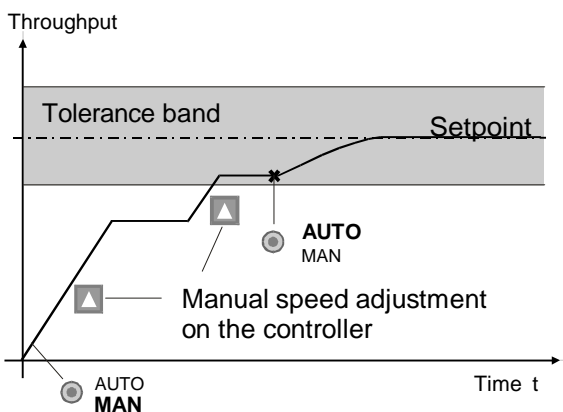
The throughput control as an addition is easy to retrofit.  
 Operation in manual mode continues to exist.

## Differences between the controller types

|                     |   |
|---------------------|---|
| <b>Output power</b> | 0 ... 10V<br>0.01% Resolution, galvanically isolated  |
| <b>Enable OFF</b>   | Output: 0V; Manual mode<br>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 [%]<br>Auto: throughput value / setpoint                                      |

|                     |   |
|---------------------|---|
| <b>Output power</b> | 2x relay or logic module, selectable<br>min. : output pulse 55ms,<br>Resolution: 0.1% for 60sec ramp time |
| <b>Enable OFF</b>   | Output passive; manual mode<br>Extruder control: Set start conditions                                     |
| <b>Controller</b>   | Adaptive stepping controller with hysteresis  |
| <b>Display</b>      | Field OP 1: RAISE; Field OP 2: LOWER<br>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<br>Commissioning<br>Configuration  |
|                           | Display   | Automatic mode                      Throughput value/ setpoint [kg/h]<br>Manual mode, continuous          Throughput value/ output [%]<br>Manual mode, step                    Throughput value/ --- |
|                           | Selectable values                                   | Setpoint, output power, status, weight, material usage   |
|                           | Status display                                      | Controller                                AUTO/MAN<br>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<br>Menu selection<br>Scroll parameter selection  |
|                           |   | Controller                                AUTO/MAN<br>Material totalization                 RUN/HOLD/RESET   |
|                           | <b>Material totalization</b>                        | Range  |
|                           | 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<br>< 400 kg/h                                00.0 ... 400.0 kg/h<br>> 400 kg/h                                0 ... 9999 kg/h          |
|                           | Measurement accuracy class                          | 0,1%   |
|                           | Measurement accuracy <b>with</b><br>Weighing hopper | typ. < 0.5 % for throughput > 10 kg/h, 15 min assessment time<br>typ. < 1 % for throughput 1 ... 10 kg/h,<br>> 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                               | Range: 0 ... 40 mV, resolution 1 µV  |
|                           | option: read back of speed                          | 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   | Hopper empty alarm, tolerance band alarm, sensor break   |
|                           | Function  | individual or as logic OR function, invertible   |
|                           | Output  | Relay, change over contact or logic signal each in slot 1 & 3, config.   |
| <b>Digital inputs</b>     | Digital input LA                                    | Enable drive   |
|                           | Digital input LB                                    | Force fill up valve to open or close, config   |
| <b>Comms interface</b>    | Protocol  | Modbus RTU, 16bit Addressing, access to all values, transmission of all decimal places, function code 01, ..., 08, 16; even parity   |
|                           | Physical level                                      | RS232, RS 422/485 (4 wire, 32 devices), RS485; 9600 baud   |

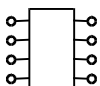
## Accessories:



**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//



#### Controller GraviMaster



**Type** 2408ex  Sleeve on end, 96x48x150mm, ambient temperature 0... 55°C, IP 54  
Extruder control to the working point




**Controller** DC  DC controller with DC output  
DP  Stepping controller without feedback  
DR  Stepping controller with feedback of speed or potentiometer position






#### Hardware


**Supply** VH  Voltage range world wide, 85...264VAC, 48...62Hz, <10W  
VL  Low voltage 24VDC/AC, -15%, +20%





**Module 1** XX  No module  
**Str. gauge supply** G5  Strain gauge supply 1 x galv. isol. U: 10V<sub>DC</sub> o. Sense, R<sub>L</sub>> 300R

**Alarm** RR  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  
TP  Logic output 3x galv. isol. U<sub>ein</sub>: 12...13 V<sub>DC</sub> I<sub>ein</sub>: < 8 mA

**Module 2** RR  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  
**Output** TP  Logic :R/L, Alarm 3x galv. isol. U<sub>ein</sub>: 12...13 V<sub>DC</sub> I<sub>ein</sub>: < 8 mA  
D4  DC Output 1x galv. isol. U: 0...10V, R<sub>L</sub>> 500R



**Module 3** XX  No module  
**Alarm** RR  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  
TP  Logic output 3x galv. isol. U<sub>ein</sub>: 12...13 V<sub>DC</sub> I<sub>ein</sub>: < 8 mA  
R2  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  
R4  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,




**Speed** WP  Signal input 1x galv. isol. U: 0...10V<sub>DC</sub>





**Comms interface** XX  No module  
A2  Interface RS232, galv. isol.,protocol MODBUSRTU  
F2  Interface RS422, galv. isol.,protocol MODBUSRTU  
Y2  Interface RS485, galv. isol.,protocol MODBUSRTU

**Handbook** X  No handbook  
D  German  
E  English

#### Control

**Dig.input 1** XX  No function  
RL  Enable output power and set the start up conditions via a contact

**Dig. input 2** XX  Valve only cyclic  
VC  0: cyclic, 1: valve forced closed via a contact  
VO  0: cyclic, 1: valve forced open via a contact


**Automatic** IA  Standard Manual switch over to AUTO in the tolerance band  
DB  Fast start up: Independent switch over to AUTO in the tolerance band  
OA  Starve fed start up Manual switch over in and outside the tolerance band  
MT  Take over working point Setpoint tracking in manual mode

#### Weighing hopper

**Volume** [15] ..... Litre

**Valve** OP  Normally open  
CL  Normally closed

**Load cell** [18] ..... max. weight [kg]


**Type** NC  Load cell, not calibrated  
[2,2] ..... mV/V characteristic of the calibrated load cell

#### Material

Bulk density, min [400] ..... kg/m<sup>3</sup>  
Bulk density, max [700] ..... kg/m<sup>3</sup>

#### Feed

**Throughput, max** [400] ..... kg/h  
**Ramp** [90] ..... sec ramp time for 0 ... 100% for stepping controller

|  |
|--|
| When ordering please   |
|  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**.