



sartorius

## FLOW-X4 Process Controller



- Weighing and Control unit for continuous flow
- Compact unit with integrated PLC and operator interface
- Powerful digital signal processing and digital control algorithms
- Intelligent top-up mode for "indefinite" material flow
- User friendly material and parameter data base
- Communication via serial interface, fieldbus or ethernet (TCP/IP)

The FLOW-X4 is a flexible control unit for the direct control of continuous charge or discharge processes from weigh-hoppers.

Operator interface, digital signal processing, digital controller and PLC are integrated in a single compact unit. It not only integrates direct control of feeders and valves but also supports special functions like automatic start-up value acquisition, linear material compression correction and intelligent top-up functions.

The unit is designed to allow the flow control of different materials even under adverse conditions. It is very versatile and especially easy to operate.

### Benefits

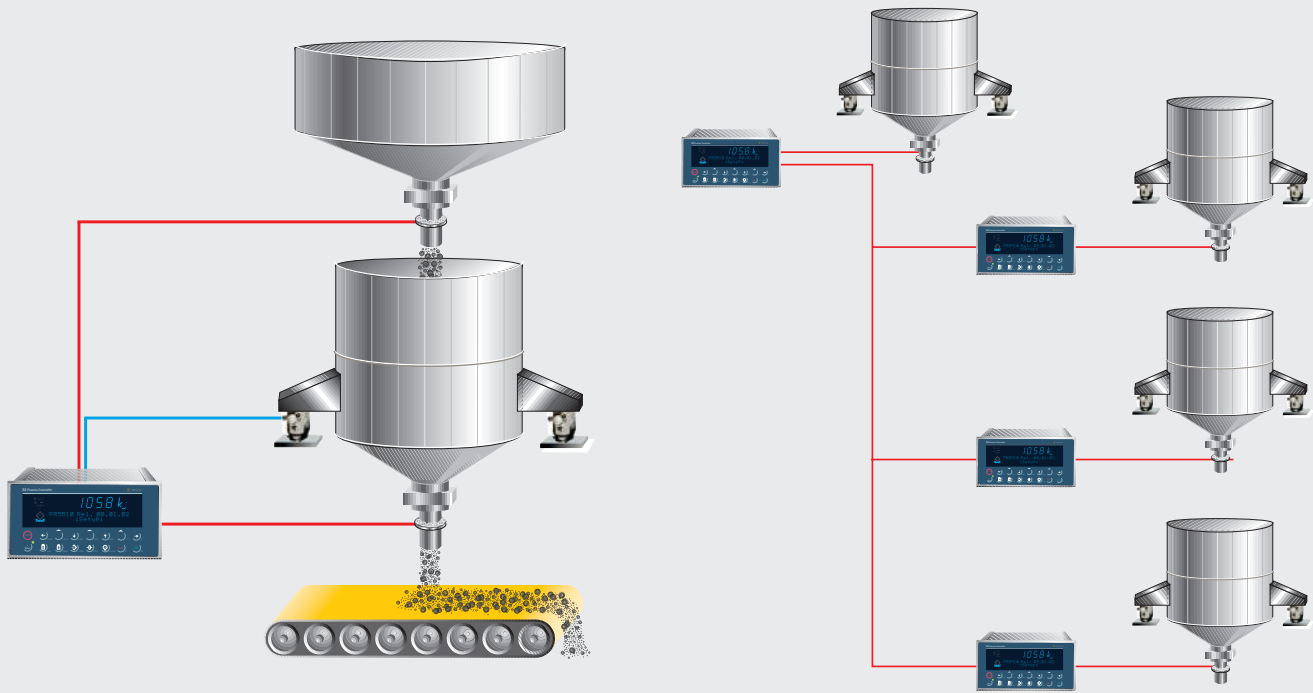
- Direct control of valves and feeders via analogue output
- User-friendly material data base
- Manual or fully automatic adaptation to different materials
- Totaliser function
- Intelligent top-up mode for continuous material flow

### Operation

The heart of the FLOW-X4 is its high precision instrumentation amplifier and A/D-converter. The integrated digital controller provides very fast and accurate control of the material flow rate. Powerful digital signal processing and an integrated high-performance PLC (programmable according to IEC 61131) for easy adaptation to virtually all process requirements. SmartCalibration feature for easy calibration even without the use of weight stones.

### PowerTools (Option)

- FlashIt for download of programs.
- LayoutIt driver for NiceLabelExpress
- DisplayIt let your PC take control of your FLOW-X4
- TranslateIt for simple editing of language tables
- RecoverIt saves the complete configuration on your PC
- AccessIt for working with databases of the controllers and loading into the PC



**Continuous control of material flow from weigh-hoppers dG/dt (differential scale)**

The FLOW-X4 controls the continuous discharge of material from a weigh hopper at a defined flow rate.

The process is started by simple entry of the desired flow rate ( e.g. in kg/min). The internal material data base allows the storage of material and control parameters for many different materials.

By selecting a material the process can be started with the pre-defined values from the table. Many additional features simplify operation and commissioning and help to achieve better results in a shorter period of time.

**Cascade controller**

The controller set-point can be provided by various sources direct: input of the operator, via fieldbus, DDE or OPC, a serial interface or via analogue input. By using the serial interface or the analogue input, cascaded controllers can be built up without external components. One unit (master) measures and controls the material flow rate and provides the result as a set-point to further instruments (slaves). The FLOW-X4 cascade control function provides also for difficult to batch materials a proportionally correct mixture.

The internal PI-controller can be switched off. In this case, the instruments function is reduced to material flow measurement only.

**Operator interface**

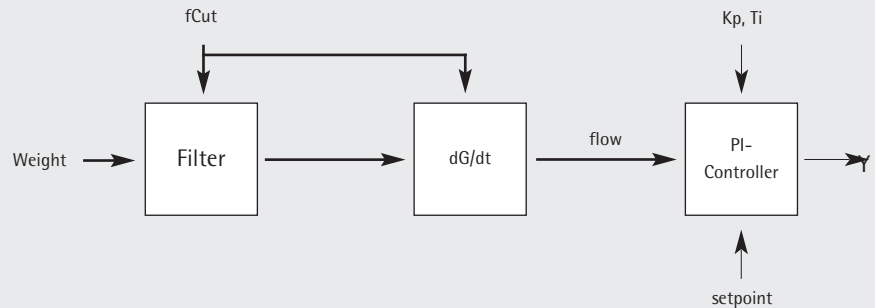
During operation the display informs the operator about the current flow rate, the control output to the feeder or the net or gross weight of the hopper. This ensures that the operator is not only informed but stays in full control of the process at all times.

**Powerful signal processing**

The FLOW-X4 is designed to allow operation even under adverse conditions. It includes not only a selectable analogue filter but also powerful digital filter algorithms. The filter circuits are designed to minimise the influence of external disturbances to the process (e.g. vibration).

## Digital PI-Controller

```
"Water"  
Auto = Lin = Man  
  
Flow = 0.00 kg/min  
Start = Total = Displ  
  
48.7 % 0.99 kg/min  
+ KP +: 18  
  
Total = 627.92 kg  
Flow % Y % Total  
  
48.8 % 1.00 kg/min  
+ Ti +: 1 s  
  
Gross = 37.64 kg  
Flow % Y % Mat
```



### Start-up values

In the material tables values for the different expected flow rates can be stored. Those can be entered manually (if known) or by simple linear interpolation of two values (10% and 90%). More powerful is the fully automatic acquisition of these values by the controller itself.

### Linear material compression correction

As material behaviour varies at different fill levels of the hopper the material compression correction provides a simple way to take this into account in a very effective way. This is of particular interest when automatic top-up mode is active as it enhances the overall result of the flow control.

### High-performance digital control algorithm

The integrated digital PI-controller can be configured to meet the different requirements of different materials and feeders. By simply adjusting  $K_p$  and  $T_i$  this allows effective control and adaptation to different situations.

### „Indefinite“ material flow

The intelligent top-up mode allows the discharge of a continuous material flow for a virtually indefinite duration. Therefore it freezes the last control value to the feeder during top-up. This can be initiated manually or by setting limits. If limits are set and the automatic top-up is enabled the FLOW-X4 automatically replenishes the material in the weigh hopper if and when required. The material compression correction leads to enhanced accuracy during top-up.

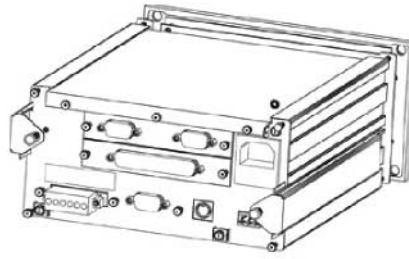
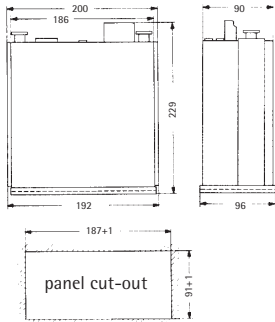
### Consumption reports

The built-in totaliser sums up the material discharged individually for every material and can be reset before the start of the process. The totaliser even works during top-up conditions and provides accurate consumption reports of the materials at any time.

### Stop at Setpoint

Additionally to the control of the continuous discharge of material with a defined flow rate, the FLOW-X4 has the function to stop the material flow at a predefined setpoint. A detailed report will be printed out automatically.

## Technical Data FLOW-X4



### Power supply

115 - 230V<sub>AC</sub> 50 - 60Hz +10%/-15%  
max. 19VA

### Housing

Material: Aluminium  
Protection class: IP 30  
Front panel: IP 65

### Order information

Type	Description	Order number	SLOT	1	2	3	4
PR5510/40	FLOW-X4 230V	9405 155 10401					
<b>Pluggable Options Cards</b>							
PR5510/04	Serial Interface card (RS 232/485)	9405 355 10041		o	o		
PR5510/06	1 analogue Output 0/4 -20mA *	9405 355 10061					x
PR5510/07	1 analogue Output / 4 analogue Input *	9405 355 10071		o	o		
PR5510/08	BCD open emitter	9405 355 10081		o	o		
PR5510/09	BCD open collector	9405 355 10091		o	o		
PR5510/12	Digital 6 In- / 12 Output, Opto / Opto	9405 355 10121		x	o		
PR5510/14	Ethernet, 10MBaud	9405 355 10141					o
PR1721/31	Profibus DP	9405 317 21311					o
PR1721/32	Interbus S	9405 317 21321					o
PR1721/34	DeviceNet	9405 317 21341					o
PR1721/35	CC-Link	9405 317 21351					o
<b>Further Options</b>							
PR1792/13	OPC Server Licence	9405 317 92131					
PR1792/20	AccessIt Licence	9405 317 92201					
PR8001/01	X-Family PowerTools	9405 380 01011					
PR8901/81	Internal Alibi-Memory (Licence)	9405 389 01811					
PR1623/10	Connecting Cable (4m)	9405 316 23101					
PR1623/20	Relay I/O Module	9405 316 23201					
PR1623/30	Terminal I/O Module	9405 316 23301					

o = optional, x = included in delivery

The documentation will be delivered on a CD, a paper version can be ordered separately.

\* Pay attention to the total load. Refer to documentation.

### Display

7-Digit plus status symbols  
text: 2 lines, 20 characters

### Load cell input

6-or 4-wire  
Load cell supply: 12V<sub>DC</sub>  
Impedance: min. 75Ω,  
e.g. 12 load cells with 1,080Ω

### Interface

- Built-in bidirectional serial interface RS 232; user selectable protocols: remote display, printer
- Keyboard interface PS2

### Accuracy

6000e OIML R76  
min. verification interval 0,5μV/e

### Linearity

< 0.002%

### Resolution

2.5 Mio. counts for 1mV/V

### Measuring time

10... 1,280ms, adjustable

### Filter

4-pole digital filter 0.1 to 5Hz

### Input signal range

0... 36mV  
Dead load suppression: 100%

### Temperature influence

Zero: < 0.05μV/K RTI  
Span: < +/-4ppm/K

### Environmental conditions

#### Temperature range

Operation: -10°C to +40°C  
Storage: -40°C to +70°C

### Electrical safety

according to IEC 61010-1

### Vibration

according to IEC 60068-2-6

### Conformity

EN61000-6-2 and EN61000-6-4  
NAMUR, CE

Specifications subject to change  
without notice.

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