



sartorius

FLOW-X5 System 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-X5 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

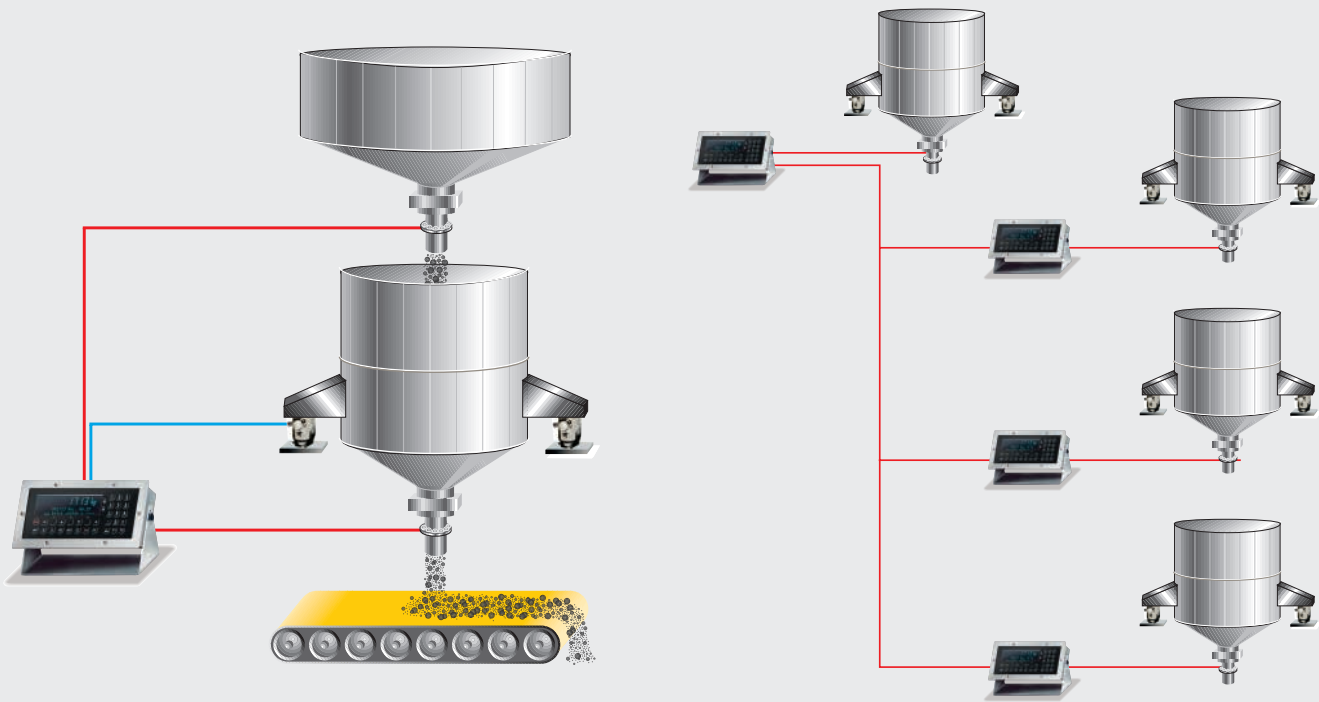
- Direct control of valves and feeders via analogue output
- User-friendly material data base
- Manual or fully automatic adaptation to different materials
- Totaliser function
- Intelligent top-up mode for continuous material flow

Operation

The heart of the FLOW-X5 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.

X5 PowerTools (Option)

- FlashIt for download of programs.
- LayoutIt driver for NiceLabelExpress
- DisplayIt let your PC take control of your FLOW-X5
- TranslateIt for simple editing of language tables
- RecoverIt saves the complete configuration on your PC



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

The FLOW-X5 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. The connection of a Sartorius high precision digital platform with the secure and approved XBPI protocol will round off the flexibility of this system

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-X5 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

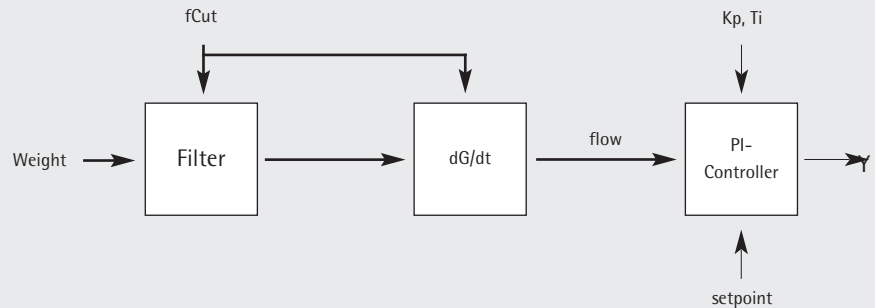
During operation the display informs the operator about the current flow rate, the control output to the feeder or the net or gross weight of the hopper. This ensures that the operator is not only informed but stays in full control of the process at all times.

Powerful signal processing

The FLOW-X5 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-X5 automatically replenishes the material in the weigh hopper if and when required. The material compression correction leads to enhanced accuracy during top-up.

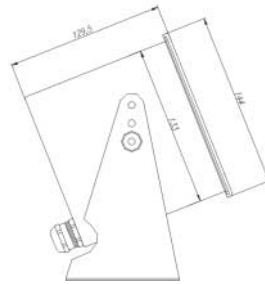
Consumption reports

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-X5 has the function to stop the material flow at a predefined setpoint. A detailed report will be printed out automatically.

Technical Data FLOW-X5



Power supply

115/230V V_{AC} 50-60 Hz
max. 19 W / 25 VA

Display

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

Housing

stainless steel DIN 1.43 01 (B.S. 304)
Ingress Protection: IP 65 eq. to (NEMA: 4X)

Order information

Type	Description	Order numbers
PR 5610/40	FLOW-X5 230 V	9405 156 10401
PR 5610/41	FLOW-X5 24 V _{AC/DC}	9405 156 10411
PR 5610/42	FLOW-X5 Ex-Zone 2/22 (230 V)	9405 156 10421
PR 5610/43	FLOW-X5 Ex-Zone 2/22 (24 V)	9405 156 10431

Options

PR 1713/05	RAM Memory Extension 1MB	9405 317 13051
PR 1799/99	W&M Approval Labels (1 set)	9405 317 99991
PR 8901/81	Internal Alibi Memory (Licence)	9405 389 01811 add. SW required
PR 8001/01	X-Family PowerTools	9405 380 01011
PR 1713/31	Extended EW Commands	9405 317 13311
PR 1792/20	AccessIt Licence	9405 317 92201
PR 1713/91	Panel Mounting kit	9405 317 13911
PR 1792/13	OPC Server Licence	9405 317 92131

			SLOT	1	2	3	4
PR 1713/04	Serial interface card (RS 232/485)	9405 317 13041			x	x	
PR 1713/06	Analogue Output 0/4-20 mA	9405 317 13061			o	x	
PR 1713/07	1 Analogue Output / 4 Analogue Input	9405 317 13071			o	o	
PR 1713/08	BCD 24 out, 1 in	9405 317 13081					
PR 1713/12	Digital 4 In-/4 Output, Opto/Opto Ouput: 31 V, 25 mA	9405 317 13121			o		
PR 1713/13	DIOS-Master (add. Software required)	9405 317 13131					o
PR 1713/15	Digital 4 In-/4 Output, Opto/Relais Output: 24 V, 1 A	9405 317 13151			o		
PR 1713/17	Digital 6 In-/8 Output, Opto/Opto Ouput: 31 V, 25 mA	9405 317 13171				x	
PR 1721/11	Profibus-DP interface	9405 317 21111					o
PR 1721/12	Interbus-S interface	9405 317 21121					o
PR 1721/14	DeviceNet interface	9405 317 21141					o
PR 1713/14	Ethernet interface, 10 MBaud	9405 317 13141					o

o = optional, x = included in delivery

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

Specifications subject to change
without notice.

Printed in Germany.

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Version 10.2004

Interfaces

Bi-directional serial interfaces RS 232 and RS 485; user selectable protocols: EW Com, remote string, printer, XON, Jbus, ModBus, Dust

Accuracy

5000d class III acc. to EN 45 501;
OIML R 76 min. verification interval 1.0 µV/e;
suitable for automatic weighing instruments

Linearity

< 0.007 %

Resolution

Max. 330,000 div. (internal) $\hat{=}$ 0.11 µV/d
Usable stepwidth 0.4 µV/d

Load cell input

6- or 4-wire
Load cell supply: 12 V
Impedance: min. 75 Ohm,
e.g. 8 load cells with 650 Ohm

Measuring principle

Ratiometric integrating A/D converter
Conversion time: 50 ms
Update: 100 ms to 2 s,
adjustable in 100 ms steps

Input signal range

Net range 2.4 mV to 36 mV
Tare range: 0... 33.6 mV
(for 100% maximum capacity)

Temperature influence

Live zero T_K: < 0.1 µV / K RTI
Span T_{K_{spn}}: < 0.006 %/10 K

Environmental conditions

Temperature range

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

Electrical safety

According to IEC 1010-1

Vibration

According to IEC 68-2-6, Test Fc

Electrostatic discharge

According to IEC 1000-4-2 Level 3

Supply line

According to IEC 1000-4-4 Level 3

Electromagnetic fields

According to IEC 1000-4-3 Level 2

Radio interference

According to EN 55011

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