



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

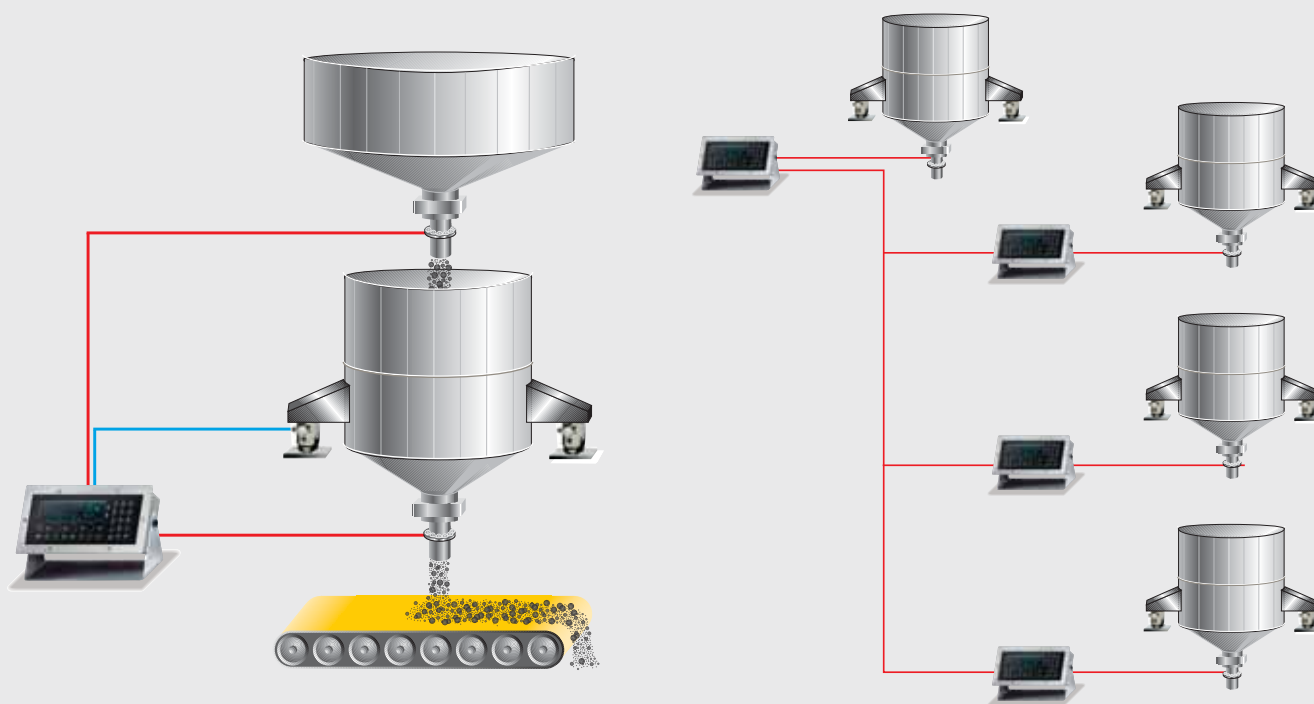
Operation

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)

The PowerTools are a collection of powerful programs to speed-up commissioning:

- 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

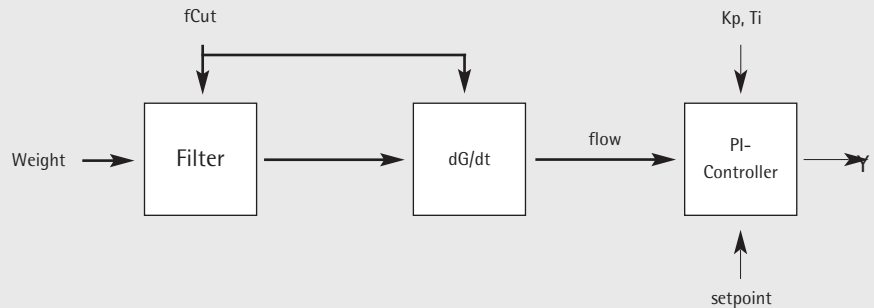
During operation the display informs the operator about the current flow rate, the control output to the feeder or the net or gross weight of the hopper. This ensures that the operator is not only informed but stays in full control of the process at all times.

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.

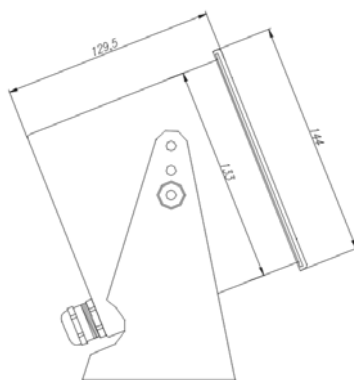
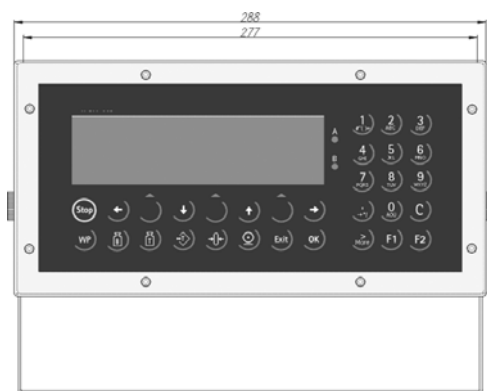
Consumption reports

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



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 ATEX 2/22+ FM CI 1/ Div 2 (230 V) | 9405 156 10421 |
| PR 5610/422 | FLOW-X5 ATEX 2/22+ FM CI 1/ Div 2 (115 V) | 9405 156 10422 |
| PR 5610/43 | FLOW-X5 ATEX 2/22+ FM CI 1/ Div 2 (24 V) | 9405 156 10431 |

Options

| | | |
|------------|---------------------------------|------------------------------------|
| PR 1713/05 | RAM Memory Extension 1 MB | 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 (RS232 485) | 9405 317 13041 | | x | o | | |
| 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 Output: 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 Output: 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.

* max. 1 Analogue Output Card

*** The temperature range for operation can be extended if the number of installed option cards is limited. (Temperature specification on request.)

Specifications subject to change
without notice.
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Power supply

115/230 V_{AC} 50-60 Hz or 24 V_{AC/DC}
Max. 14,5 W/19 VA

Housing

Stainless steel DIN 1.43 01 (B.S. 304)
Ingress Protection: IP65 eq. to (NEMA: 4X)

Display

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

Interface

Bi-directional serial interfaces RS232;
user selectable protocols: Keyboard connector,
Remote Display, Printer, XON, Jbus, XBPI,
ModBus, Dust 3964 R

Linearity

<0.007 %

Resolution

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

Accuracy

5000 e class III acc. to EN 45 501;
OIML R 76 min. verification interval 1.0 μ V/e;

Load cell input

6- or 4-wire
Load cell supply: 12 V
Impedance: min. 75 Ω

Measuring principle

Ratiometric integrating A|D converter
Conversion time: 50 ms
Update rate : 50 ms to 2 s
Digital filter: 0.1 to 5 Hz

Input signal range

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

Temperature influence

Live zero T_{K₀}: <0.1 μ V/K RTI
Span T_{K_{spn}}: <0.006%/10 K

Environmental conditions

Temperatur range***

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

Conformity:

NAMUR, CE
ATEX Zone 2/22
FM Class 1 | Div2

Weight

net: 3.5 kg
gross: 5 kg

Sartorius Mechatronics T&H GmbH
Meiendorfer Strasse 205
22145 Hamburg, Germany

Phone +49.40.67960.303
Fax +49.40.67960.383

info.mechatronics@sartorius.com
www.sartorius-mechatronics.com