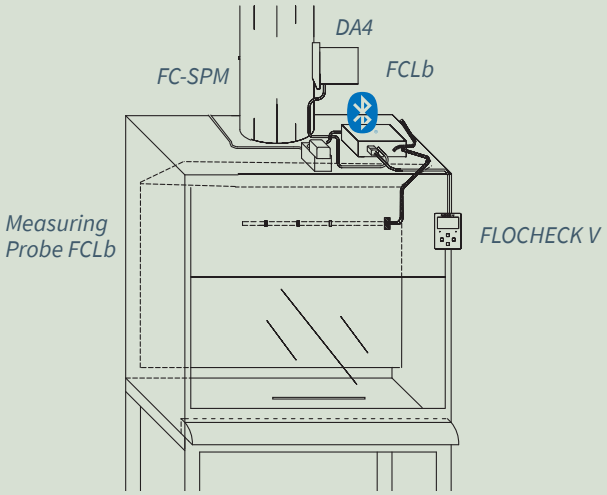
FCLb FUME HOOD CONTROLLER

PRE-CALIBRATION CONDITIONS:

- Measuring Probe Placement: The probe should be positioned to ensure adequate signal levels for measurement. See instructions below for checking signal level G1.
- The probe should be extended in hoods that are 1500 mm or wider.
- The damper should be adapted for fume hoods by removing a small part of the blade's sealing strip on one side. Dampers are referred to as FC-SPM or FC-SPMF.
- Both exhaust and supply air controls should be stable in the space where the fume hood is located.
- The doors to the space should be closed.
- There should be no large machines in the fume hood.
- Fume Hood Monitor FLOCHECK-V, Version B02 should be connected.
- Correct Reference Point: To avoid interference from disruptive air movements, a hose should be connected to the outlet marked reference. The hose opening should be placed at the hood's reference point or where there is no risk of disruptive air movements.



FCLb with additional equipment for a fume hood. FCLb is equipped with Bluetooth® for access via the LINDINSIDE mobile application.

COMMISSIONING VIA CONNECTED FLOCHECK-V

Log in to FCLb via FLOCHECK V with Code 0819.

NOTE: The main menu of the controller starts with Quick Config. This includes necessary settings from the entire menu structure to facilitate commissioning, which otherwise should follow the set factory settings.

Settings under Quick Config Menu

Node-ID [Enter Node-ID]

Enter Node-ID (A unique ID; 1-239 that must not be 0 and should be selected according to Lindinvent's recommended Node-ID division).

Damper Calibration [Control of Dampers]

- Check that the damper has fully opened. Confirm the position with <Confirm>.
- Check that the damper has fully closed. Confirm the position with <Confirm>.

G1 Voltage [Verification of signal level G1]

Reading for verification of signal level G1. At an actual air velocity of 0.5 m/s, it should be within the range of 1.035 to 1.065 V.

Zero-Point [Zero-Point Calibration]

Perform zero-point calibration. This should be done at atmospheric pressure over the sensor.

Low/High Point [Two-Point Calibration]

Perform two-point calibration. Select the low point at 0.50 and the high point at 0.80 m/s.

Air Velocity Correction [Correction According to Measured Airspeed]

After verifying an acceptable signal level G1 and performing air velocity calibration: Enter a correction factor to adjust the measured air velocity via the instrument and the controller reading.

Tid t elför [Setting for activation of electrical interlock equipment]

The electrical interlock contactor (EFK) is an accessory to FCLb that can be ordered separately. Activate the electrical interlock function by setting the Time t elför. The factory setting of 0 seconds means the function is not activated.

CONTINUED COMMISSIONING VIA CONNECTED FLOCHECK-V

Control of Regulation Function

The regulation should be quick, responsive, and not prone to oscillation.

- Check the regulation function when the sash is moved between closed and working positions (normally about 30 cm):

If oscillation occurs, first change *"R-int user"* under "Main Menu\Regulator\Parameters" from the default -1.0 to the desired new value. Step up from 1.0 until oscillation stops (may need to go up to 2-3 in some cases). In special cases, the P and I values may also need adjustment. Lower P in steps of 0.04 while simultaneously lowering I by 0.01 until the regulation is stable. Start from the default value of *"R-int user"*.

NOTE: Lowering R-interval, P, and I will result in a slower response time.

- Check that the damper motor remains still for extended periods when the sash is closed:

If regulation is unstable or tends to oscillate only when the sash is closed: Ensure the damper is adapted for the fume hood (a label is on the damper). If it is not, "*Minvinkelbeg*" under "Main Menu\Settings\Regulator" should be changed to 20-25 °C to prevent oscillation when the sash is closed.

Air Velocity Measurement Calibration Process

Once the damper for fume hood control is verified, the signal level from the sensor should be checked before calibrating the zero and low/high points.

1. Signal Level Verification:

- Set the sash opening to about 20 cm.
- Go to the menu option "G1 voltage" and check the signal level in volts (the left value). Simultaneously measure the actual air velocity in the sash opening with an anemometer.
- As a reference, 0.55 m/s actual air velocity should correspond to a "G1 voltage" within the range of 1.035-1.065 V.
- If the signal is low, e.g., below 1.030 V at 0.55 m/s, troubleshoot and correct the sensor/measurement point until an acceptable *"G1 voltage"* is achieved.
- Alternative positioning/rotation and/or extension of the measuring probe may be crucial. Also, check for any disturbances in the hood that may affect the signal level.

NOTE: Measurement in the sash opening requires the instrument to be held within a narrow area just in the plane of the sash, at the same point, midway between the lower edge of the sash and the lower edge of the sash opening.

2. Perform zero point calibration at atmospheric pressure:

- Disconnect the hose from FCLb to the measuring probe; activate calibration through the "Zero Point" menu option.

NOTE: FCLb allows zero calibration only after 1 minute of operation.

- Confirm the zero calibration by pressing "*Confirm*". The value set at confirmation is the deviation from the sensor's zero level (1.0 V).
- The adjustment should not exceed +/- 0.02-0.03 V.
- Completed calibration sets the parameter *"Calibration\Air Velocity\Calib Values\G1 Zero Calib"* (default 0).
- Reconnect the hose.

3. Low/High Point Calibration:

- Activated through the *"Low/High Point"* menu option. The low point is set at approximately 0.50 and the high point at 0.80 m/s.
- For both points, step the damper forward with the arrow keys until the air velocity point is measured with the instrument, and then enter the corresponding value in the panel. Ensure the sensor provides an adequate signal level as described in point 1.

NOTE: If calibration is incorrect, *"Invalid calibration"* is indicated in the panel. The signal level may have been too low. Re-check the signal level as described in point 1 if necessary.

- Completed calibration sets the parameter *"Calibration\Air Velocity\Calib Values\G1 k-value"* (default 1.1).

4. Final Adjustment of Air Velocity Measurement:

- After completing low/high point calibration, make a final adjustment at the normal working position (0.55 m/s).
- Set the sash at the hood's safety height (normally about 30 cm) and check the air velocity in the sash opening at 0.55 m/s.
- Correct any deviation between the instrument and panel using the "Correct Air Velocity" setting. The normal correction at 0.55 m/s should be within the range of +/- 0.05 m/s.

STATUS SCREEN AND MENU

This appendix presents the status screen with selected actual values and the entire menu structure of settings for FCLb.

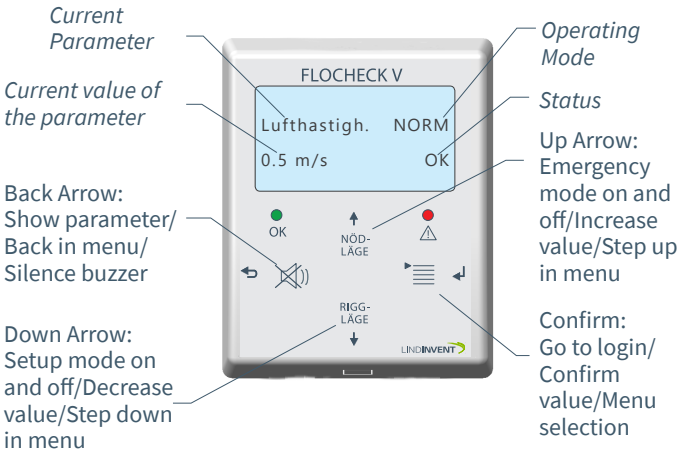
NOTE: The settings of the FCLb controller can also be accessed from LINDINSIDE via the Symbols screen.

Settings are displayed with factory default values; see comments and notes for guidance. The presented menu structure with parameter list applies from software version FCLb_6.2.0.

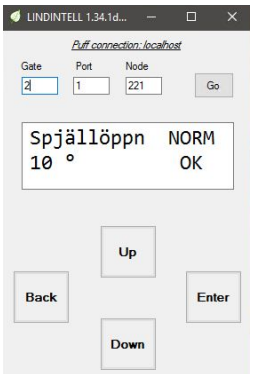
LOGIN

- Directly to the control unit via FLOCHECK V, a wired panel.
- The control unit can be accessed from LINDINTELL and the Remote tool when connected to CAN and assigned a Node-ID.

Note: Reading status values from FCLb does not require login. Changing settings, however, requires logging into the FCLb menu structure.



Fume Hood User Panel FLOCHECK V: See user information for a description of alarms and operational handling.



Screenshot from the connection to the controller via LINDINTELL and the Remote tool.

STATUS SCREEN FOR FCLB

Selected actual values displayed on the screen without prior login.

Actual Value Display for FCLb:

Actual Values	**Kommentar**
Air Velocity	Current air velocity in m/s
Damper Opening	Damper opening in degrees

Step through actual values display by repeatedly pressing the <Back Arrow>.

QUICK CONFIG MENU

Accessing the controller's menu structure requires login. All necessary settings for simple commissioning are gathered under the Quick Config menu option.

Settings under Quick Config:

Visas i display	**Kommentar [Defaultvärde]**
Snabbkonfig	Rubrik Huvudmeny
Nod-ID	Ange Nod-ID [211]
Spjällkalib	Test av motor; hitta max och min
G1 spänning	Verifiering av signalnivå [V]
Nollpunkt	Nollpunktskalibrering
Låg/hög punkt	Tvåpunkterskalibrering
Korr lufthast (Not1)	Korrektionsfaktor lufthastighet [m/s]
Tid t elför (Not 2)	Aktivering av elförregling [s]

PRESENTATION OF VARIABLES

Listed in the order that the headings appear in the control unit's main menu.

Meny Bör- och Ärvärden

Visas i display	Kommentar [Defaultvärde]
Börvärden	**Rubrik_2 (Huvudmeny)**
Lufthastighet (Not 3)	Lufthastighet i m/s [0.55]
Lufthast nöd	Lufthastighet i m/s [0.80]
Ärvärden	**Rubrik_3 (Huvudmeny)**
Lufthastig	Aktuell lufthastighet i m/s
Spjällöppn	Spjällöppning i grader
Spjällåter	Återkoppling från spjällmotor (V)
Driftsläge (Not 4)	[Normal]; Visar driftsläget i klartext.
In/Ut-signaler	Aktuella signalnivåer
AIN1	[0]
AIN2	[0]
DIN1	[0]
DUT1 (Relä)	[0]
AUT1	[0]
AUT2	[0]
G1 spänning	[0]

Meny Inställningar

Inställningar	**Rubrik_4 (Huvudmeny)**
Larm	
Larmgr låg	[0.49 m/s]
Larmgr hög	[1.00 m/s]
Tid t larm	[10 s]
Tid t åter	[20 min]
Ljudsignal	[Ljud från Dragskåpsvakt]
Elförregling	
Tid t elför	[0 s]
Bekräfta elf	[Ja]
Bekr elf v larm	[Nej]
Elf utan ljud	[Nej]
Elf vrigg	[Nej]
Elf v nöd	[Nej]
Riggläge	
Riggläge funktion	[Aktiv m tidsåt]
Tid återg rigg	[240 min]
Stoppv rigg	[10] Grader
Nödläge	
Nödläge funktion	[Aktiv]
Tid återg nöd	[240 min]
In/Ut-signaler	
Insignaler	
AIN1 till AIN2	
Funktion (Not 5)	[AIN1:spjäll]; [AIN2; Inaktiv]
Parameter 1 (Not 6)	[0]
Parameter 2 (Not 6)	[0]
DIN1	
Funktion	[Inaktiv] Används ej
Parameter	[0] Ej relevant
Utsignaler	
AUT1 till AUT2	
Funktion (Not 5)	[AUT1:spjäll]; [AUT2; Inaktiv]
Parameter 1 (Not 6)	[0]
Parameter 2 (Not 6)	[0]
DUT1 (Relä)	
Funktion (Not 5)	[Elförregling]
Parameter (Not 6)	[0]
Filter AIN8-1 (Not 7)	[11111111 = filter På 8-1]; 0=Av

Meny Inställningar

Visas i display	Kommentar [Defaultvärde]
Regulator	
Parametrar	Avancerade inställningar
R-intervall (Not 8)	[1.0] Kan ställas via R-int user
R-int user (Not 8)	[-1] Om > 0 ställer R-intervall
Hyst lufthast (Not 9)	[0.05] Kan ställas via Hyst lufth user
Hyst lufth user (Not 9)	[-1] Om > 0 ställer Hyst lufthast
Hyst rel	Lufthastighetsavvikelse i % [+/- 0.0]
Hysterestid	Tid i sekunder [0]
Skalning (Not 10)	PID-skalning [-10 = fast angivna värden]
P	[0.4]
I	[0.08]
Minvinkelbeg	i grader [10]
Maxvinkelbeg	i grader [90]
Max pulser	[0]

Meny Kommunikation

Kommunikation	**Rubrik_5 (Huvudmeny)**
Nod-ID	1 - 247; [211]; Får ej sättas till 0
Grupper	
Grupp 8-1 (Not 11)	[0 = ingen grupptillhörighet]
Grupp 16-9	[0 = ingen grupptillhörighet]
Grupp 24-17	[0 = ingen grupptillhörighet]
Grupp 32-25	[0 = ingen grupptillhörighet]
Zoner	
Brand	
Brandzon	[0 = ingår ej i brandzon]
Handling zonbrand (Not 12)	[0]
Handling övrbrand (Not 12)	[0]

Meny Kalibrering, System, Logga ut, Debug

Kalibrering	**Rubrik_6 (Huvudmeny**
Spjäll (Not 13)	
Hitta max:	[255]
Hitta min:	[0]
Lufthastighet	Rubrik
Nollpunkt	Aktivera nollpunktskalibrering
Låg/hög punkt	Aktiver tvåpunktskalibrering
Kalibvärden	Rubrik
G1 nollkalib	[0]
G1 k-värde	[1.1]
Korr lufthast	[0]
LDE (G1)	
Tryckvärde	Korrigerat uppmätt tryck i Pa
Korr LDE	[0 %]; korrigeringskoeff. tryck
Prod kalib	Internt Lindinvent
System	**Rubrik_7 (Huvudmeny)**
Firmware	Visar aktuell mjukvaruversion
Reset (Not 14)	
Fabriksinst (Not 15)	
Självtest	Enbart internt Lindinvent
Logga ut (Not 16)	**Rubrik_8 (Huvudmeny)**
Debug	Enbart internt Lindinvent

Huvudmeny FCLb avslutad

NOTES:

Note 1 Parameter used during air velocity calibration for adjusting the displayed value against the calibrated instrument.

Note 2 Time until the electrical interlock triggers; when set to 0, the electrical interlock function is deactivated.

Note 3 Factory-set target values for air velocity should normally not be changed; these follow safety regulations.

Note 4 Used for diagnostics. Several operating modes are defined, indicating different operating conditions.

Note 5 Selection of function from a predefined list:
AIN: <Inactive>; <Damper (motor)>; <Fire>
DIN: Not supported; not used.
AUT: <Inactive>; <Parameter>; <Damper (motor)>; <Inverse damper (motor)>
DUT (Relay): <Inactive>; <Summarized alarm>; <Parameter>; <Electrical interlock>; <Follow fire>

Note 6 Parameter values used or not used depending on the selected function; may be the value at min or max.

Note 7 Filter function; binary input AIN1-8.

Note 8 Allows correction of the calculated air velocity change as a function of changed damper opening. If R-int user > 0, the value R-interval is set to the specified value.

For unstable regulation: Try gradually increasing the value of R-int user to 2-3.

Note 9 If Hyst air velocity user > 0, the value replaces Hyst air velocity.

Note 10 Set to -10 for the regulation to take the set values of P and I.

If the damper motor continues to oscillate despite in creased R-interval: Try the effect of gradually lowering the value of I by 0.01 and P by 0.04 in pairs until the regulation stabilizes.

Note 11 General group affiliation;
binary input [00000000]; specified in decimal.

Note 12 If in fire zone; 0 = regulates as usual; 1 = closed in case of fire; 2 = open in case of fire.

Note 13 For motor test and damper calibration; confirm min and max position with <Confirm>.

Note 14 Menu option Reset results in a restart with logout; counters and other set values are retained.

Note 15 Menu option Factory settings results in logout and resetting all settings and counters to factory settings.

Note 16 Menu option Logout results in logout. Adjusted values and counters are retained.