

# Lindab **FRU**

Flow measuring unit - circular



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# FRU



## Description

FRU is a measuring unit with a measuring cross used for measuring volume air flow rate in circular duct systems.

FRU is equipped with a regulator, providing an output signal that is proportional to the volume air flowrate. FRU can be used to monitor the actual airflow or can be used to control a volume flow regulator.

Regulators comes with either flow sensor (D3) for clean air or membrane sensor (M1) for contaminated air.

FRU is equipped with Lindab Safe in the front for connection to the duct and a female coupling in the back, and is ready for insulation up to 50 mm.

FRU can be installed in any position without requiring adjustment.

The FRU needs a certain distance of straight duct before the unit and this has to be observed to obtain a stable and accurate air flow regulation.

To avoid clogging of the measuring cross, it is recommended to use FRU only in applications with clean air, meaning free of dust, particles and similar.

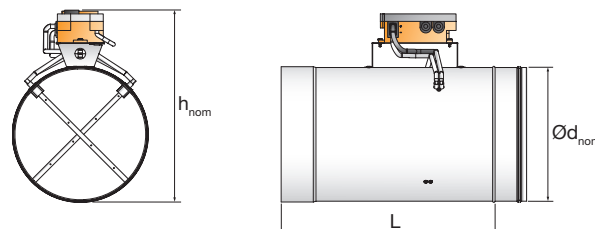
- Belimo MP, Modbus, BACnet & analogue 0(2)-10V.
- Integrated NFC interface, compliant with Belimo Assistant App.

## Order code

|                          |     |     |   |
|--------------------------|-----|-----|---|
| Product                  | FRU | 200 | M |
| Type                     |     |     |   |
| FRU                      |     |     |   |
| Dimension                |     |     |   |
| Ød 100 - 630             |     |     |   |
| Regulator                |     |     |   |
| D D3 dynamic flow sensor |     |     |   |
| M M1 membrane sensor     |     |     |   |

Example: FRU - 200 - M

## Dimension



## Dimension table

| Ød <sub>nom</sub> | L   | h <sub>nom</sub> | Weight |
|-------------------|-----|------------------|--------|
| 100               | 300 | 205              | 1.6    |
| 125               | 300 | 230              | 1.8    |
| 160               | 300 | 265              | 2.1    |
| 200               | 300 | 305              | 2.4    |
| 250               | 400 | 355              | 3.7    |
| 315               | 400 | 420              | 4.5    |
| 400               | 400 | 507              | 6.6    |
| 500               | 510 | 607              | 9.3    |
| 630               | 560 | 737              | 12.4   |

## Regulator type table

| Type  | Regulator  |
|-------|------------|
| FRU-D | VRU-D3-BAC |
| FRU-M | VRU-M1-BAC |

## Belimo documentation

For Belimo motor documentation, visit and read more on Belimo's homepage:

| Type | Documentation                    |
|------|----------------------------------|
| All  | <a href="#">Belimo Universal</a> |

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## Technical data

### Air flow measurement

The accuracy of air flow measurement depends on the flow conditions in front of the measuring cross. It is preferable to have a long straight duct section in front of the measuring point, according to the table below.

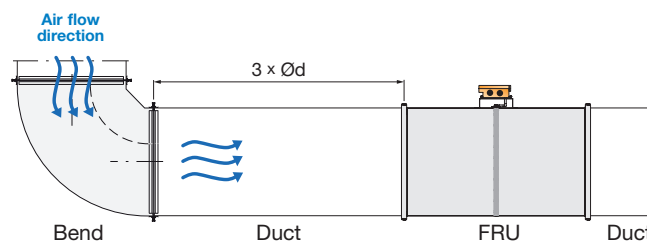
If these recommendations are not followed, it will cause an unstable air flow measurement and therefore higher inaccuracy in the regulation of the required air flow.

| Components | Recommended straight duct before unit |
|------------|---------------------------------------|
| Bend       | 3 x Ød                                |
| Tee-piece  | 4 x Ød                                |
| Damper     | 6 x Ød                                |

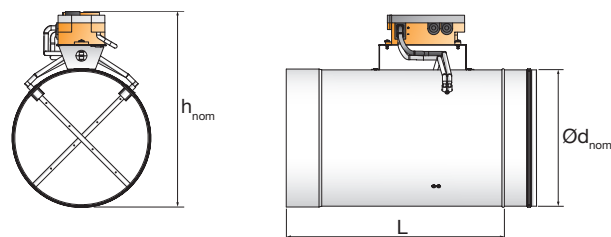
With recommended straight duct in front of the unit, the air flow accuracy will be according to the table below.

| Duct velocity | Air flow accuracy |
|---------------|-------------------|
| > 3 m/s       | +/- 5%            |
| 1.2 - 3 m/s   | +/- 10%           |
| 0.7 - 1.2 m/s | +/- 25%           |

### Example:



Example above showing top view of recommended straight duct distance between duct bend and a FRU.



Front and side view of FRU and dimension Ød.

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## Settings

$V_{nom}$  indicates the measuring range for the actuator. A standard FRU is calibrated to  $V_{nom}$  of 7 m/s according to the table below.

In special cases the FRU can be set to a higher  $V_{nom}$ , e.g. 10 m/s.

The output signal from Belimo VAV universal is linear between 2-10 V which corresponds to a flow between 0 and  $V_{nom}$ .

Air flows corresponding to air velocities below 0.7 m/s will result in a 2 V signal. (Zero flow).

FRU nominal air flow ( $V_{nom}$ ) and measuring limit.

| Size<br>Ød mm | Measuring limit (0.7m/s) |     | (Standard) $V_{nom}$ (7m/s) |      | $V_{nom}$ (10m/s) |      |
|---------------|--------------------------|-----|-----------------------------|------|-------------------|------|
|               | m <sup>3</sup> /h        | l/s | m <sup>3</sup> /h           | l/s  | m <sup>3</sup> /h | l/s  |
| 100           | 20                       | 6   | 198                         | 55   | 283               | 79   |
| 125           | 31                       | 9   | 309                         | 86   | 442               | 123  |
| 160           | 51                       | 14  | 506                         | 141  | 723               | 201  |
| 200           | 79                       | 22  | 791                         | 220  | 1130              | 314  |
| 250           | 124                      | 34  | 1236                        | 343  | 1766              | 491  |
| 315           | 196                      | 54  | 1963                        | 545  | 2804              | 779  |
| 400           | 317                      | 88  | 3165                        | 879  | 4522              | 1256 |
| 500           | 495                      | 138 | 4946                        | 1374 | 7065              | 1963 |
| 630           | 785                      | 218 | 7851                        | 2181 | 11216             | 3116 |

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## Technical data

### Adjustment and simulation tool

- Graphical display of setpoint and actual values
- Create and print trend evaluations
- Useful tool for troubleshooting on the MP-Bus®
- Access levels can be defined and managed via release code
- Specialised software for OEMs to make efficient use of the tool in the production process



### ZTH EU Service Tool

- The handy ZTH EU Service Tool is connected directly to the actuator for parameterisation
- Reliable and proven connection via the tool socket
- Supply via actuator – always ready
- MP-Bus® tester integrated (packet counter, signal level)
- ZIP level converter to USB for connecting the actuator with the PC Tool



You can find further information about the possible connections of the ZTH EU Service Tool at [Belimo.com](http://Belimo.com).

### Belimo Assistant App

- Belimo devices marked with the NFC logo can be parameterised

using the Assistant App

- Can be installed on all Android mobile phones and iPhones
- Can be operated with ease using the smartphone's touch display
- The actuator can be parameterised while de-energised
- Updates are undertaken automatically via the



### ZIP-BT-NFC Bluetooth to NFC converter

- Allows for simple use of the Belimo Assistant App via Bluetooth with Android mobile phones and iPhones in order to parameterise NFC enabled devices.
- Safe to attach to the actuator thanks to countless micro suction cups attached to the bottom.





Most of us spend the majority of our time indoors. Indoor climate is crucial to how we feel, how productive we are and if we stay healthy.

We at Lindab have therefore made it our most important objective to contribute to an indoor climate that improves people's lives. We do this by developing energy-efficient ventilation solutions and durable building products. We also aim to contribute to a better climate for our planet by working in a way that is sustainable for both people and the environment.

[Lindab](#) | For a better climate