

# Volume flow regulator

# VRA/FRA



VRA-0 / FRA

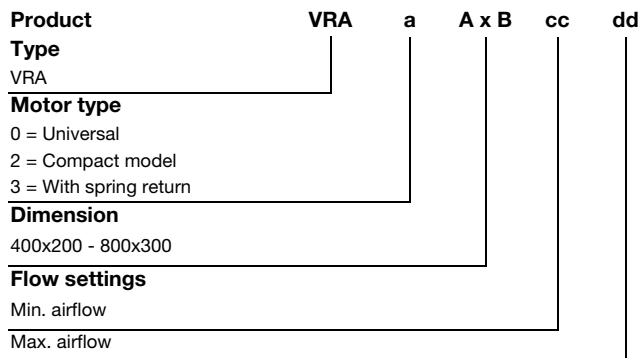
## Description

FRA is a measuring unit with a measuring cross, which is used for measuring volume flow in rectangular ducts. FRA is equipped with Belimo VRD3, which provides an output signal that is proportional to the volume flow.

VRA consists of a FRA measuring unit and a DJP type damper put together to form a complete unit. VRA is used for volume flow regulation in rectangular ducts, either for constant volume flow with step control, e.g. controlled by a switch or clock, or for variable volume flow, where the volume flow varies between a defined minimum and maximum limit. The actual volume flow is determined by a control signal from, for example, Regula Combi, BMS or another FRA/VRA. VRA-0 consists of a regulator (Belimo VRD3) with a manual setting and motor. VRA-2 is equipped with a regulator and motor in one unit (Belimo NMV-D3-MP), which is programmable and has MP bus. VRA-3 consists of a regulator (Belimo VRD3) with a manual setting and motor with a spring return. Further documentation on the diffusers can be requested from Lindab.

VRA/FRA is equipped with LS flanges and is supplied ready for insulation up to 50 mm. VRA/FRA can be installed in any position without requiring adjustment. To avoid dirtying the measuring cross and sensor, VRA/FRA should only be used for clean air.

## Order code



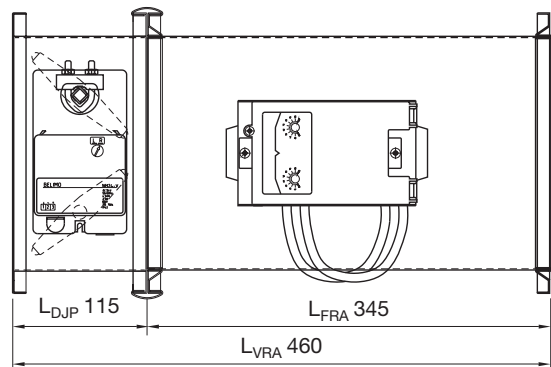
Example: VRA - 2 - 500 x 200 - 55 l/s - 220 l/s

VRA is as standard delivered with 2-10 V control signal. On request it can be delivered with 0-10 V.

## Advantages of VRA/FRA

- Requires minimal initial pressure (<20 Pa at  $V_{nom}$ )
- Has large regulation range
- Simple adjustment of volume flow
- Parallel or slave operation of several terminals
- Shut-off to damper tightness class 3 (VRA only)
- Establishment of over/underpressure or pressure balance in the ventilated zones
- Output signal indicates actual volume flow
- Is compatible with all types of automatic equipment with control voltage 2-10 V or 0-10 V
- VRA-2 can communicate with BMS systems via MP bus

## Dimensions



## Motor overview

Type	Motor
VRA-0	VRD3 + NM24-V
VRA-2	NMV-D3-MP
VRA-3	VRD3 + NF24A-MF

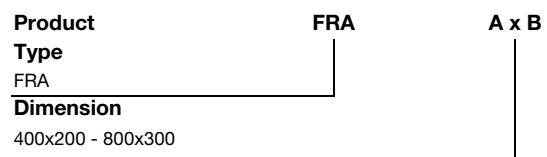
  

FRA	VRD3
-----	------

## Standard sizes

- 400 x 200
- 500 x 200
- 600 x 200
- 600 x 300
- 800 x 300

## Order code - FRA



Example: FRA - 500x200

Other sizes are available on request. Please contact Lindab's sales department for further information.

# Volume flow regulator

## VRA/FRA VRU/FRU

### Technical data

#### Sizes and volume flows

VRU/FRU and VRA/FRA are calibrated and set as standard to a nominal volume flow ( $V_{nom}$ ) of 7 m/s according to the tables below. In special circumstances they can be set to a higher  $V_{nom}$ , e.g. 10 m/s.  $V_{nom}$  indicates the measuring range for the regulator, and the linear output signal (2-10 V or 0-10 V) is an expression of the volume flow between 0 –  $V_{nom}$ .

For VRU/VRA,  $V_{max}$  and  $V_{min}$  indicate the limits for the regulator's working range. Similarly there is a linear connection between  $V_{min}$  -  $V_{max}$  and the input signal (2-10 V or 0-10V).  $V_{max}$  can be set in the range 20-100% of  $V_{nom}$ ,  $V_{min}$  in the range 0-100% of  $V_{nom}$ ; however, air velocities below 0,7 m/s corresponds to a measuring pressure of less than 1 Pa, which makes the flow regulation less accurate.

$V_{max}$ ,  $V_{min}$  and mode (2-10 V / 0-10 V) for VRU/VRA and mode (2-10 V / 0-10 V) for FRU/FRA can be set using the adjustment tool Belimo ZTH-GEN. For VRU-2 (with L/NMV-D3-MP-F) there are several programming options for using Belimo PC-Tool. See the Belimo documentation for further details.

VRU/VRA works with almost no initial pressure. Pressure loss over VRU/VRA at nominal volume flow and with a fully open damper is less than 20 Pa.

#### VRU/VRA or FRU+DCT/FRA+DJP

The choice between VRU/VRA or FRU+DCT-Rx / FRA+DJP-Rx depends on the installation features of the duct system. VRU/VRA should be used where it can be positioned so that the flow to the measuring cross ensures a good volume flow measurement. If you wish to position the damper close to a joint or bend, a DCT type duct damper should be used. In that case, volume flow regulator FRU with measuring cross is positioned after the damper with a suitably straight section of duct in front of it.

#### Volume flow measurement

The accuracy of volume 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.

Components	Recommended straight duct section in front of measuring cross
Bend	3 x d
Tee-piece	2 x d
Damper	6 x d

In poor flow conditions the absolute volume flow measurement will be less accurate (i.e. min. and max. volume flow with greater inaccuracy), while the VAV function will not normally change (i.e. any temperature control in the room will still function).

#### VRU capacity, - max.

Size $\varnothing d_1$ mm	(Standard) $V_{nom}$ (7m/s)		$V_{nom}$ (10m/s)	
	m <sup>3</sup> /h	l/s	m <sup>3</sup> /h	l/s
125	309	86	442	123
160	506	141	723	201
200	791	220	1130	314
250	1236	343	1766	491
315	1963	545	2804	779
400	3165	879	4522	1256
500	4946	1374	7065	1963
630	7851	2181	11216	3116

#### VRA capacity, - max.

Size A mm	Size B mm	(Standard) $V_{nom}$ (7m/s)		$V_{nom}$ (10m/s)	
		m <sup>3</sup> /h	l/s	m <sup>3</sup> /h	l/s
400	200	2016	560	2880	800
500	200	2520	700	3600	1000
600	200	3024	840	4320	1200
600	300	4536	1260	6480	1800
800	300	6048	1680	8640	2400