▲ INDULFLOOR can be used in a range of application areas in modern architecture, especially in office spaces.

FLOOR AIR DIFFUSER INDULFLOOR

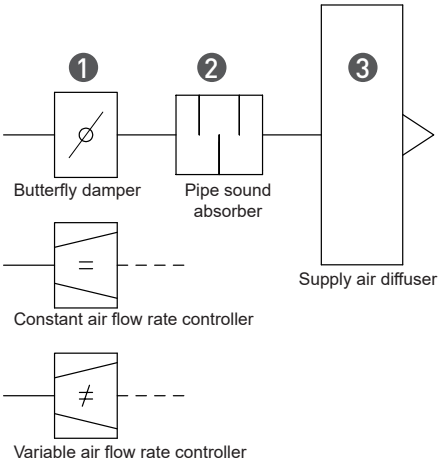
Kiefer Klimatechnik

Three functions combined into a single floor air diffuser

INDULFLOOR is a floor air diffuser with an integrated sound absorber and innovative mechanics for demand-based volume flow control and discharge setting.
The INDULFLOOR is perfect for integration into raised floors and can be installed along façades to save space.

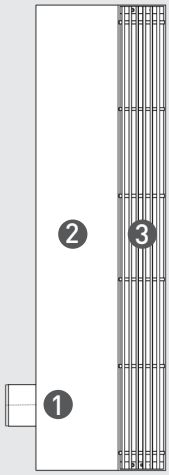
INDULFLOOR

THREE FUNCTIONS COMBINED INTO A SINGLE FLOOR AIR DIFFUSER



Ventilation diagram of commercially available floor air diffuser

1. Butterfly damper, air flow rate limiter or controller
2. Pipe sound absorber
3. Plenum box with outlet



INDULFLOOR ventilation concept

1. Damper element with mechanics for air flow rate adjustment or control, optionally electric.
2. Sound absorber
3. Plenum box with integrated mechanism for discharge setting

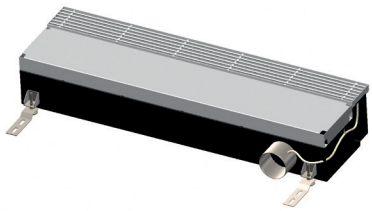
INSTALLATION SITUATION

The INDULFLOOR is installed directly onto the unfinished floor. Installation tolerances are easy to compensate for with the height-adjustable feet so that the diffuser can easily be aligned then secured to the floor with the impact-noise decoupled fixing tabs.

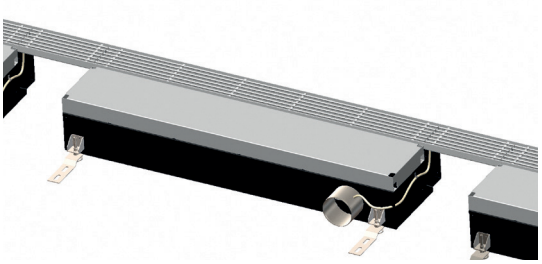
The INDULFLOOR has a stable console to which the floor covering can be applied directly. The floor panels of the raised floor can be recessed in the area around the INDULFLOOR, thereby reducing the overall installation height.

The INDULFLOOR can be installed as a single diffuser or as band arrangement. With the band arrangement, a connecting plate is installed between the active diffusers to which the linear grille spacer can then be fitted. This allows multiple INDULFLOOR units to join together as a visually continuous band.

Single element



Band arrangement



INDULFLOOR

SPECIAL FEATURES

All benefits at a glance

Installation	Low box height for problem-free installation in raised floors, without clearance to the façade.
Components	Compact, ready-to-use solution: air diffuser, air flow rate and discharge setting (optionally with actuator or air flow rate controller), sound absorbing.
Assembly / Installation	Single-piece for ease and speed of installation.
Commissioning	No adjustment needed, factory preset.
Air Flow Rate Control	No access hatch needed, as the air flow rate can be adjusted manually from the room or electrically. The pressure measurement nipple is used to measure the set air flow rate.
Ambient Air Flow & Thermal Comfort	Inductive air diffuser profile for optimal mixing/source flow, independent of the set air flow rate. Subsequent increase or decrease of the air flow rate is possible without impacting comfort.
Acoustics	Sound absorbing integrated into the air diffuser.
Cleaning	Floor trough of linear diffuser can be cleaned according to VDI 6022 by removing the floor grille and air diffuser profile.
Flexibility	Electric actuator or air flow rate controller can be retrofitted from the room side.
Energy	Energy-efficient ventilation with minimal pressure loss. Electric adjustment and variable air flow rate control enable energy and cost savings through demand-driven ventilation.

All Variants at a Glance

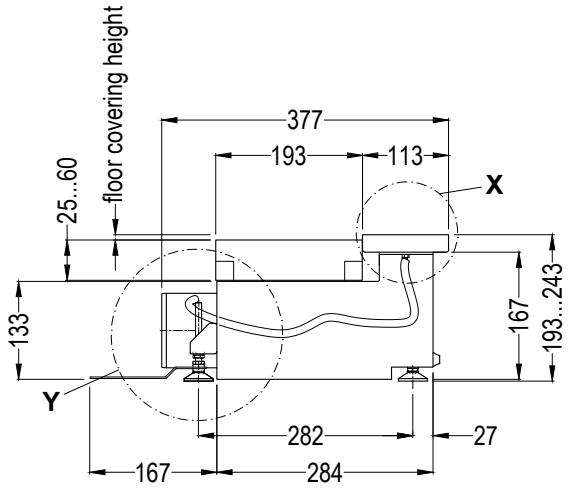
			Manual	2-Step	Stepless	Master/Follower[1]
Air Flow Rate Control	V		Manual	Electric		
Factory preset	V_{Soll}		■			
	V_{Min} and V_{Max}			■		
	V_{Min} and V_{Max}	stepless			■	■
		autonomous[2]				■
Air diffuser integrated			■	■	■	■
Automatic discharge setting			■	■	■	■
Sound absorbing integrated			■	■	■	■

[1] Use only in combination with a master unit
[2] Independent of duct pressure

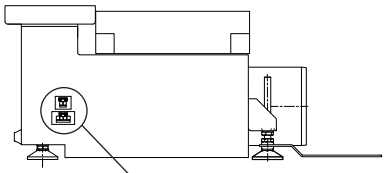
TECHNICAL DATA

DESIGN VERSIONS

Side View Right

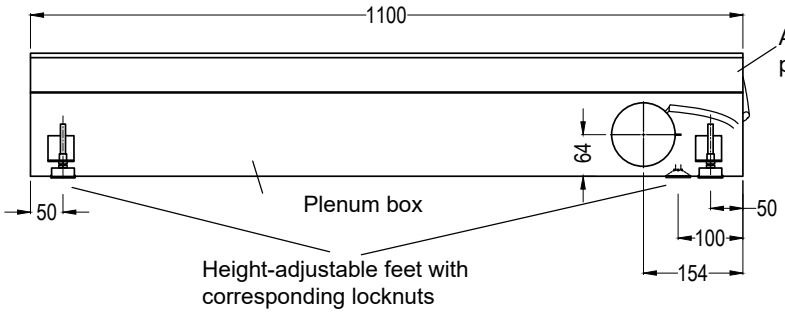


Side View Left

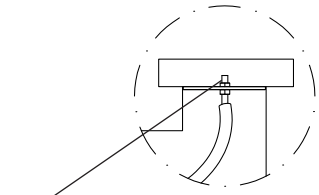


Connector exclusively for electric variants

Front View

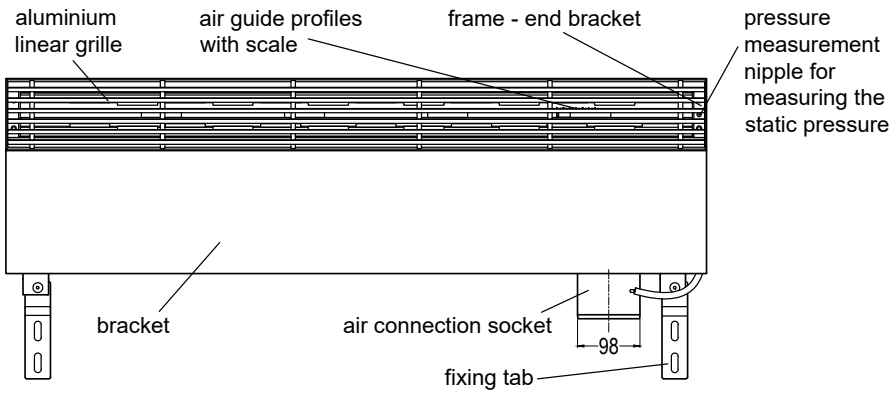


Detail "X", M 1:2

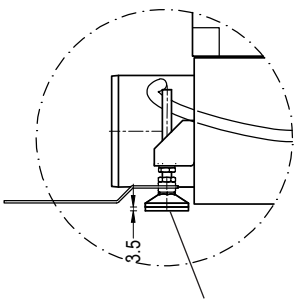


Pressure Measurement Nipple
For measuring the static pressure in the connection box.

Top View



Detail "Y"



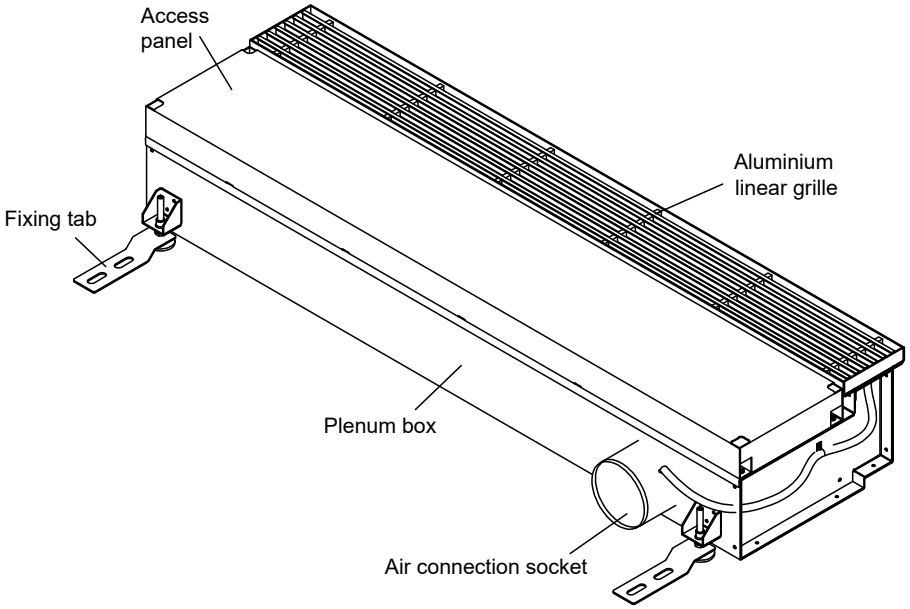
Optional Anti-Slip Pads for attachment as needed

Total height including adjustable feet without Anti-Slip Pads 193 … 243 mm

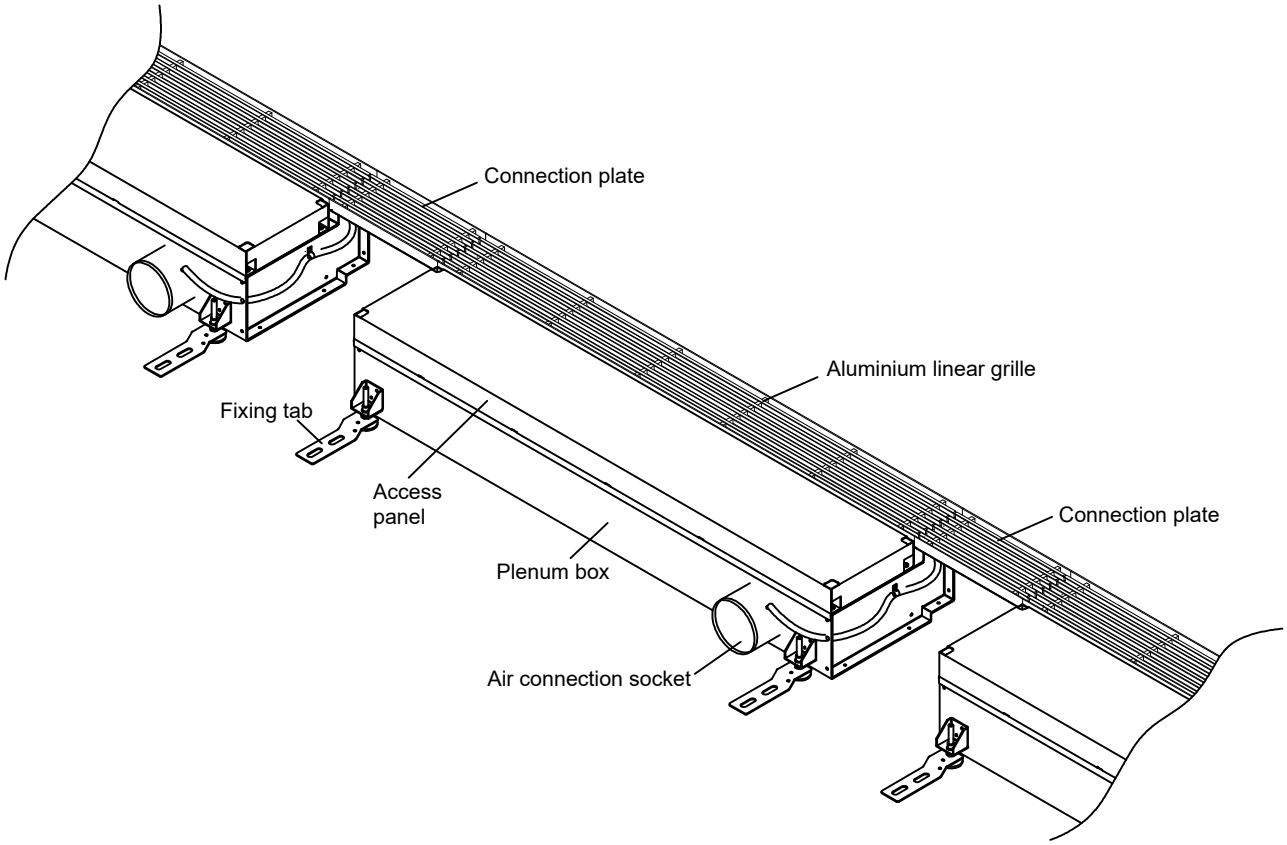
Total height including adjustable feet with Anti-Slip Pads 196.5 … 246.5 mm
Maximum floor covering height: 35 mm

DESIGN VERSIONS

Single element



Band arrangement



Air Flow Rate and Discharge Setting

External energy	Without	Electrical			
Execution/Actuator	**Manual**	**2-Step**	**Stepless**	**Master**	**Follower**
Function/Air flow rate	Set 1 value	Switch between 2 levels	Adjust variably	Control variably	Adjust synchronously with master unit
For Air Flow Rate System	 CAV DPC	 VAV / DCV + DPC	 VAV / DCV + DPC	 VAV / DCV + (DPC)	 VAV / DCV + DPC
Pressure-independent*	No	No	No	Yes	
Pressure controller	Required	Required	Required	Recommended	

* The static pressure at the air connection socket of the floor air diffuser is referred to as the pre-pressure. If this pressure fluctuates, the air volume flow will also change. In the pressure-independent version, such fluctuations are automatically compensated, ensuring that the air volume flow remains constant within a specific pressure range, without requiring an upstream pressure controller.

Explanation of Air Flow Rate Systems:

CAV: Constant Air Volume
VAV: Variable Air Volume
DCV: Demand Controlled Ventilation
e.g., dependent on presence or CO_2 levels.
Integration of external sensors is possible.
DPC: Duct Pressure Control. The static pressure in the duct is maintained at a constant level.

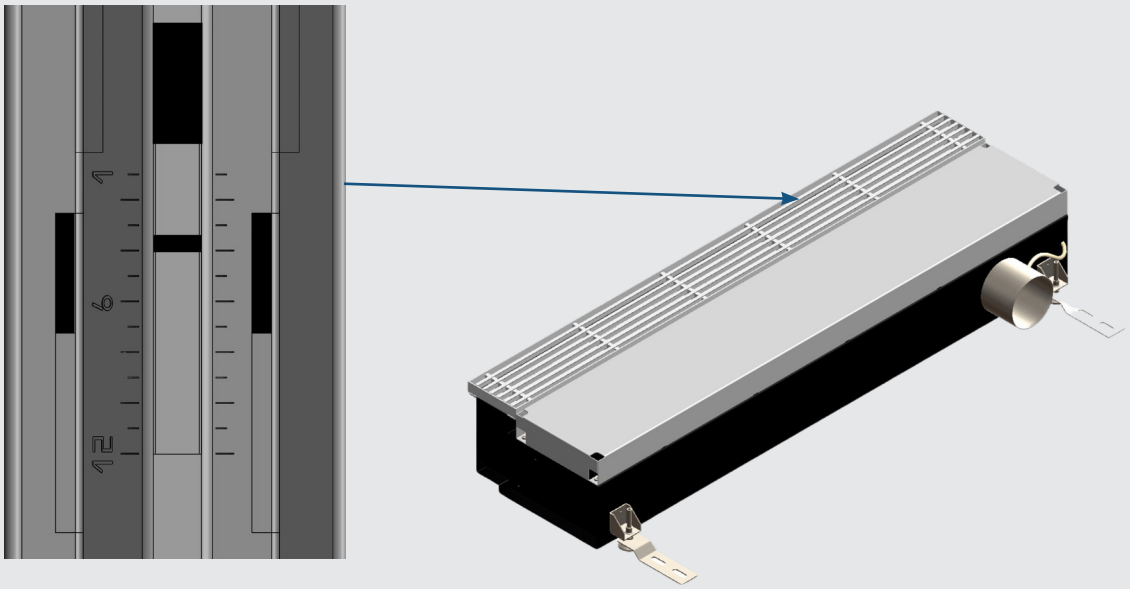
TECHNICAL DATA

DESIGN TABLES

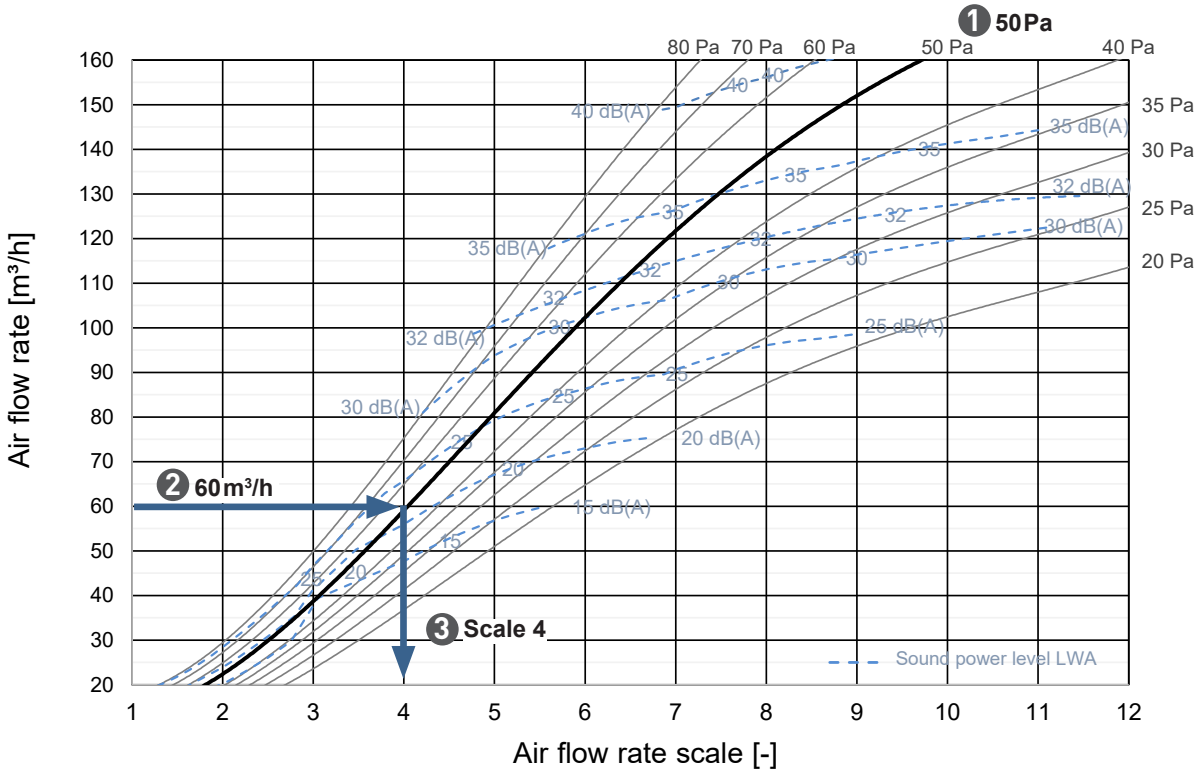
Scale	Pre-charge pressure Δp 30 Pa		Pre-charge pressure Δp 40 Pa		Pre-charge pressure Δp 50 Pa	
	V [m³/h]	LWA [dB(A)]	V [m³/h]	LWA [dB(A)]	V [m³/h]	LWA [dB(A)]
3	29	< 15	34	18	38	21
4	45	< 15	52	18	59	22
5	61	18	71	22	80	26
6	79	23	91	27	101	30
7	95	27	110	31	122	34
8	109	29	126	33	141	36
9	118	31	136	35	152	38
10	125	32	144	36	162	39
11	132	33	153	37	171	40
12	140	33	162	38	181	41

Selected pre-charge pressure and sound power level according to supply air flow rate and scale setting per air diffuser.

Note!
For versions with an actuator, the sound power level may slightly increase during air flow rate adjustment.
The sound power level of the actuator alone is 35 dB(A).
In a stable control loop, the actuator's active time is max. 5%.

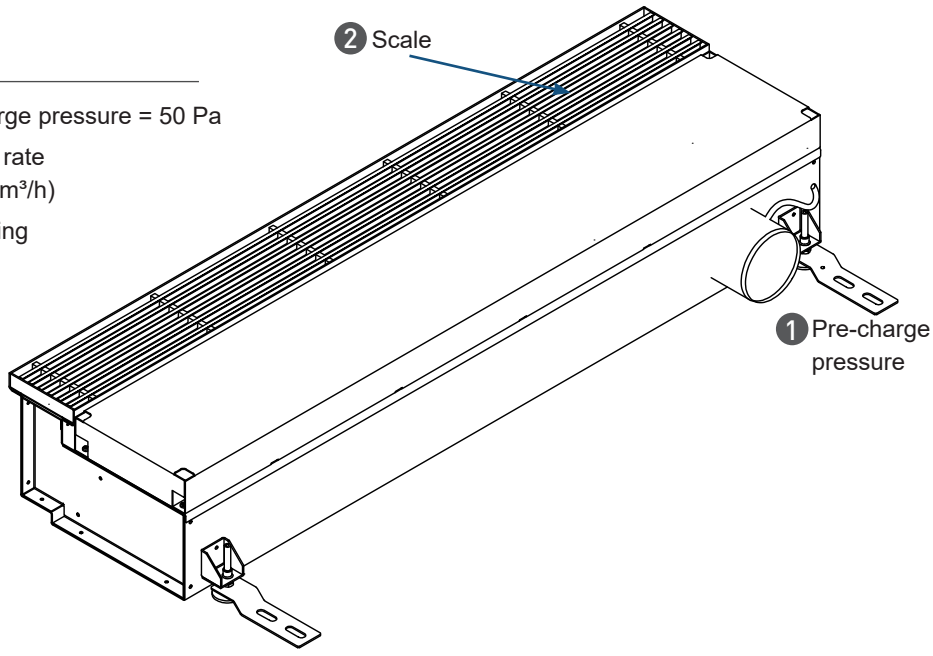


DESIGN EXAMPLE



Example design:

1. Determine pre-charge pressure = 50 Pa
2. Determine set flow rate (example $\dot{V}_{set}$ = 60 m³/h)
3. Read off scale setting (example = 4)



Note!
In the Manual (V_{set}) and 2-Step versions (V_{min} and V_{max}), the scales are factory preset.

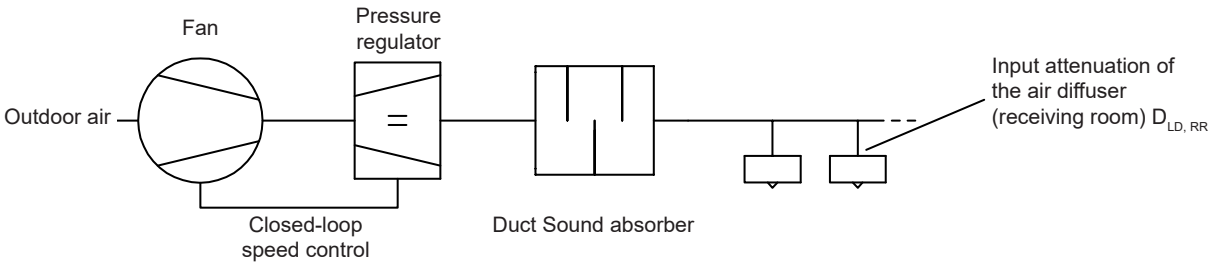
Practical questions relating to input attenuation

Case 1: To what extent does the INDULFLOOR as a sound absorber reduce the flow-generated noise (e.g. from fans, moulded parts, pressure regulators, butterfly dampers, etc.) remaining in the air ducts?

Case 2: To what extent can sound transmission, especially of conversations between adjacent rooms, be reduced?

The INDULFLOOR integrates a sound absorber or cross-talk sound absorber, which helps to reduce transmitted cross-talk sound by several orders of magnitude.
At the same time, the sound absorber integrated into the floor air diffuser is highly effective when it comes to reducing the system noise that remains in the duct network.
The effective sound level reduction by the floor air diffuser can be evaluated, inter alia, by specifying the input attenuation value of the air diffuser D_{LD}. By knowing the input attenuation, the planning office can, for instance, calculate the design of the sound absorption value of the air path or standard edge sound level difference in accordance with VDI 2081.

Case 1: Reduction of flow-generated noise in the air ducts



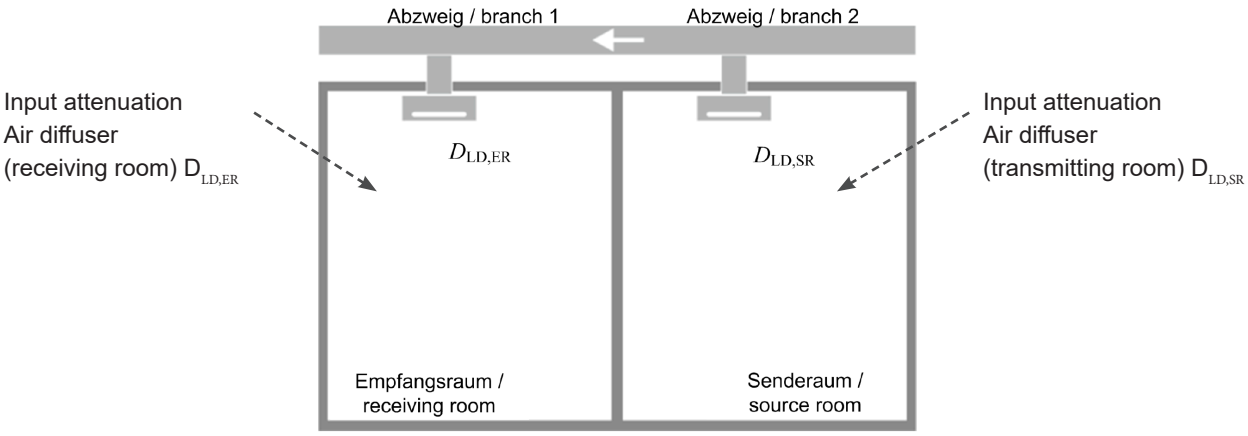
Example comparison of the input attenuation (INDULFLOOR) with the input attenuation of a traditional duct sound absorber

	Hz	63	125	250	500	1000	2000	4000
INDULFLOOR Input attenuation $D_{LD,ER}$ (scale 4)	**dB**	14	17	16	30	34	37	38
Traditional duct sound absorber (L1000, DN100, packing thickness 25) Input attenuation	**dB**	1	5	9	17	30	42	38

Case 2: Reduction of sound transmission between two adjacent rooms

The input attenuation of the components for two sound directions (VDI 2081-Sheet 1:2022) must be used to calculate sound transmission or to calculate the total attenuation between two rooms (cross-talk sound transmission):

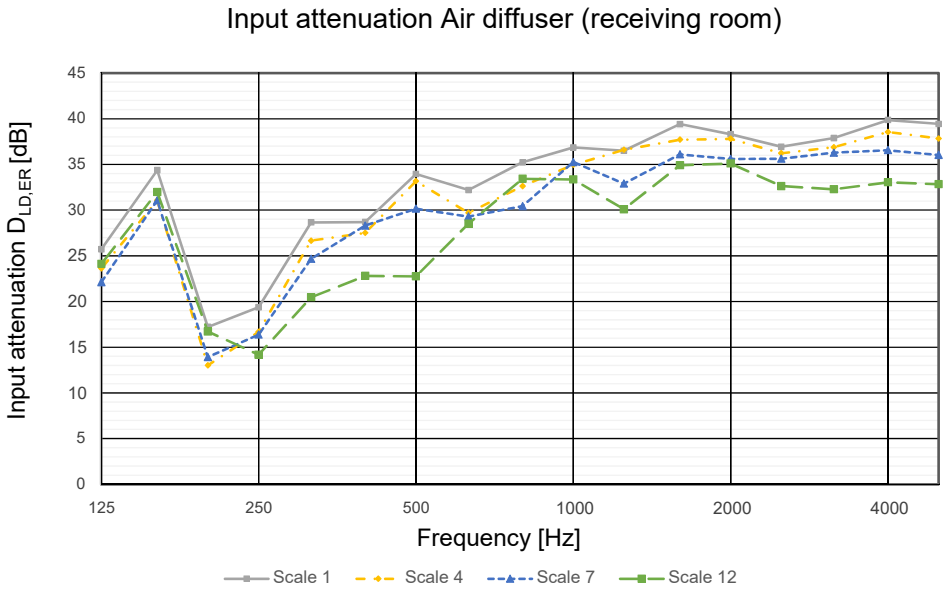
- Input attenuation from the air duct into the room ($D_{LD,ER}$)
- Input attenuation from the room into the air diffuser and air duct ($D_{LD,SR}$)



A transmission path between two diffusers with air duct connected between two rooms.

Use of the INDULFLOOR floor air diffuser, with its high input attenuation, means that additional cross-talk sound absorption measures for the air path between rooms can usually be omitted.

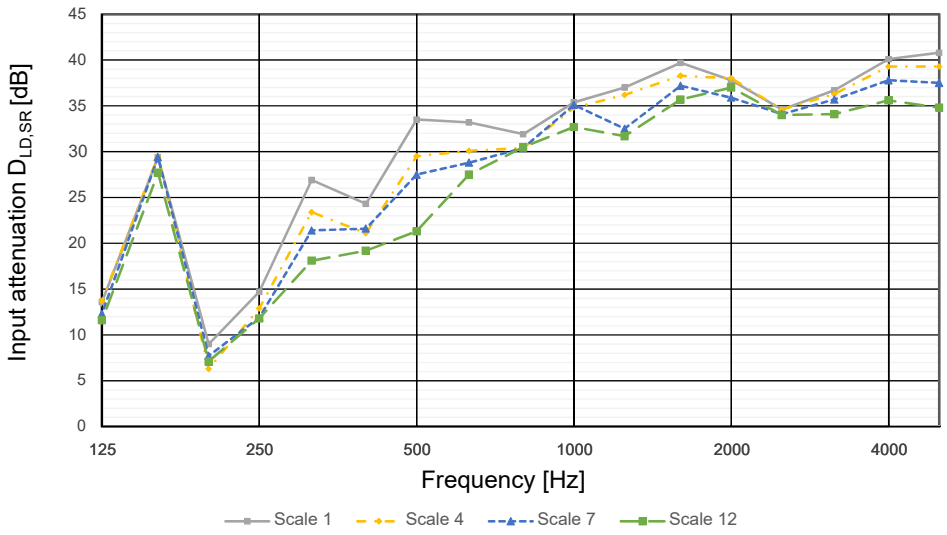
INPUT ATTENUATION



f [Hz]	$D_{LD,ER}$ [dB]			
	Scale 1	Scale 4	Scale 7	Scale 12
50	18.1	17.9	17.3	18.8
63	14.9	14.3	13.9	15.2
80	12.8	11.8	11.7	13.0
100	13.1	12.9	11.4	13.3
125	25.7	23.6	22.1	24.1
160	34.4	31.1	31.1	32.0
200	17.2	13.0	13.9	16.7
250	19.4	16.7	16.4	14.2
315	28.7	26.7	24.7	20.5
400	28.7	27.5	28.3	22.8
500	34.0	33.2	30.2	22.8
630	32.2	29.7	29.3	28.5
800	35.2	32.6	30.4	33.4
1000	36.9	35.0	35.3	33.4
1250	36.5	36.6	32.9	30.1
1600	39.4	37.7	36.1	34.9
2000	38.3	37.8	35.6	35.1
2500	36.9	36.2	35.6	32.6
3150	37.9	36.9	36.3	32.3
4000	39.9	38.6	36.6	33.1
5000	39.4	37.8	36.0	32.8

INPUT ATTENUATION

Input attenuation air diffuser transmitting room



f [Hz]	$D_{LD,SR}$ [dB]			
	Scale 1	Scale 4	Scale 7	Scale 12
50	0.3	-1.7	-0.4	2.2
63	-1.8	-1.9	-2.4	-3.1
80	-2.4	-1.5	-1.3	-2.1
100	-0.5	0.9	0.3	-0.5
125	13.6	13.7	12.3	11.6
160	29.4	29.5	29.4	27.7
200	9.0	6.3	7.7	7.1
250	14.7	12.9	11.9	11.8
315	26.9	23.4	21.4	18.1
400	24.3	21.1	21.6	19.2
500	33.5	29.5	27.5	21.3
630	33.2	30.1	28.8	27.5
800	31.9	30.4	30.4	30.5
1000	35.4	34.8	35.1	32.7
1250	37.0	36.2	32.5	31.7
1600	39.7	38.3	37.2	35.7
2000	37.8	38.0	35.9	37.0
2500	34.6	34.6	34.1	34.0
3150	36.7	36.3	35.7	34.1
4000	40.1	39.3	37.8	35.6
5000	40.8	39.3	37.5	34.8

D3011_03/25

All earlier versions of this technical Information lose their validity with the publication of this document.