

Ducted Fan Coil Units

Operation and Installation Manual



Ceiling Concealed Ducted Fan Coil

DF23 - 2-pipe system | DF422 and DF431 - 4-pipe systems | AC and EC motor versions
Back air inlet (B) and end air inlet (E) versions | Sizes 34 to 238

- All installation work must be carried out by qualified technicians.
- Please read this manual carefully and follow the steps exactly as described.
- Keep this manual in a safe place for future reference.
- Our products are continuously developed and improved. The information in this document is subject to change without prior notice.
- Only qualified personnel may install and service the equipment covered by this document.

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1 Identification

1.1 Document and product data

Item	Detail
Document	Operation and Installation Manual
Product	DF ducted fan coil units, ceiling concealed
Series and sizes	DF23 (2-pipe, 3 rows), DF422 (4-pipe, 2+2 rows), DF431 (4-pipe, 3+1 rows); sizes 34, 51, 68, 85, 102, 136, 170, 204, 238; AC and EC motor versions
Air inlet versions	B = back air inlet, E = end air inlet
Supplier	KONVEKA, UAB, Vokiečių g. 185, LT-45251 Kaunas, Lithuania konveka.com/en sales@konveka.lt +370 677 06303
Manufacturer	See the rating plate on the unit
Year of manufacture	See the rating plate on the unit
Document number	OIM-DF-2026-EN
Edition / revision	2026-07 / Rev. 01
Language	English – original instructions

1.2 Model designation

Position	Code	Meaning
Series	DF	Ducted fan coil unit, ceiling concealed
Pipe system and rows	23 422 431	2-pipe, 3-row heat exchanger 4-pipe, 2 rows cooling + 2 rows heating 4-pipe, 3 rows cooling + 1 row heating
Size	34 ... 238	Nominal air flow at high speed in m ³ /h divided by ten
Air inlet	B E	Back air inlet End air inlet
Motor	AC EC	Four-speed asynchronous motor EC motor with 0-10 V speed control

Example: DF23-136-B-EC = ducted fan coil, 2-pipe system with a 3-row heat exchanger, nominal air flow 1360 m³/h at high speed, back air inlet, EC motor.

NOTE
The data on the rating plate takes precedence over the data in this manual.
Keep this manual for the whole service life of the unit and hand it over to the operator.

2 Safety

2.1 Qualification of personnel

Fan coil units are terminal units of a chilled/hot water air conditioning system. They may be installed, commissioned, operated and maintained only by qualified, specially trained and authorised staff. Electrical work may be carried out only by qualified electricians.

2.2 Residual risks

ELECTRICAL HAZARD

Before any work on the unit, power the unit down. Check that the unit is isolated and secure the on-site supply point against being switched back on.

DANGER OF SCALDING

Before work on the valves or the inlet and outlet pipes, shut off the heating or cooling water and allow the heating water to cool down.

DANGER FROM ROTATING PARTS

Rotating fan wheels can cause injury. Ensure the unit is powered down and secured against being switched back on before any work.

DANGER FROM OVERHEAD LOADS

Wear a helmet and safety boots when fitting the unit to the ceiling. Ceiling installation must always be carried out by two people.

RISK OF PERSONAL INJURY

Wear protective gloves when moving or fitting the unit. The sheet metal edges and the coil fins are sharp.

2.3 Intended use

DF ducted fan coil units are designed exclusively for ventilating, heating, filtering and cooling of room air, with chilled or hot water as the medium. Intended use also includes observance of this manual and of the prescribed inspection and maintenance conditions. The user is responsible for proper use.

- Indoor installation only, concealed in or above a false ceiling, with ducted supply air
- Operation within the limits given in the operating limits table
- Water quality within the limits of the water quality table

2.4 Improper use

The unit is considered to be used improperly if it is applied for a purpose not covered by this manual. In such a case the manufacturer and the supplier are not liable for any resulting damage; the user alone bears the full risk. The unit may not be operated:

- for the treatment of outside air
- in locations where there is a risk of explosion
- in wet areas
- in locations with high dust levels or aggressive air
- without the air filter fitted
- outside the operating limits

RISK OF PERSONAL INJURY AND MATERIAL DAMAGE

Improper use can cause personal injury and material damage.

2.5 Operating limits

Operating limits

Unit and heat exchanger	Value
Max. working pressure	1,6 MPa (16 bar)
Max. water temperature	85 °C
Max. ambient temperature	40 °C
Min. ambient temperature	2 °C
Operating voltage	220-230 V AC, 1 Ph, 50 or 60 Hz
Insulation class	E
External static pressure	12 / 30 / 50 Pa
Installation	Indoors only

2.6 Water quality

Water quality limit values for Cu/Al heat exchangers

Parameter	Symbol	Unit	Value
pH value (at 20 °C)			7,5 - 9
Conductivity (at 20 °C)		µS/cm	< 700
Oxygen content	O ₂	mg/l	< 0,1
Total hardness		°dH	1 - 15
Dissolved sulphur	S		not detectable
Sodium	Na ⁺	mg/l	< 100
Iron	Fe ²⁺ , Fe ³⁺	mg/l	< 0,1
Manganese	Mn ²⁺	mg/l	< 0,05
Ammonium content	NH ₄ ⁺	mg/l	< 0,1
Chloride	Cl ⁻	mg/l	< 100
Sulphate	SO ₄ ²⁻	mg/l	< 50
Nitrite	NO ₂ ⁻	mg/l	< 50
Nitrate	NO ₃ ⁻	mg/l	< 50

NOTE

In open systems the limit values above must be observed and the water must additionally be cleaned of suspended matter by a filter at the inlet, otherwise there is a risk of erosion.

Protect the unit from dust and other substances that cause an acidic or alkaline reaction in combination with water (aluminium corrosion).

3 Technical data

The tables below give the performance, electrical, acoustic, hydraulic and dimensional data of the DF range. Rating conditions - cooling: entering air 27 °C DB / 19,5 °C WB, entering water 7 °C, leaving water 12 °C. Heating: entering air 21 °C, entering water 60 °C, water flow as in cooling.

DF23 – 2-pipe, 3 rows, AC motor

Name	Unit		DF23-34 AC	DF23-51 AC	DF23-68 AC	DF23-85 AC	DF23-102 AC	DF23-136 AC	DF23-170 AC	DF23-204 AC	DF23-238 AC
Air flow	m³/h	H	340	510	680	850	1020	1360	1700	2040	2380
		M	255	382	510	637	765	1122	1402	1683	1927
		L	170	255	340	425	510	850	1062	1275	1487
Total cooling capacity	kW	H	2,17	3,12	4,09	4,75	6,07	8,21	9,38	11,65	12,49
		M	1,95	2,82	3,74	4,35	5,45	7,47	8,54	10,50	11,48
		L	1,58	2,32	3,01	3,50	4,38	6,04	6,89	8,48	9,27
Sensible cooling capacity	kW	H	1,86	2,64	3,47	4,43	5,41	7,21	8,28	10,17	10,79
		M	1,56	2,23	2,94	3,83	4,56	6,15	7,04	8,45	9,11
		L	1,09	1,51	2,02	2,38	2,89	4,05	4,69	5,77	6,21
Heating capacity	kW	H	3,50	5,01	6,74	7,62	9,76	13,18	14,81	18,03	19,70
		M	3,04	4,36	5,65	6,82	8,25	11,30	12,88	15,74	17,05
		L	2,52	3,71	4,99	5,64	7,03	9,49	10,66	13,16	13,99
Power input at 12 Pa	W		28	34	55	68	87	125	152	185	205
Power input at 30 Pa	W		42	55	68	87	108	142	174	210	253
Power input at 50 Pa	W		49	66	84	100	118	174	210	250	300
Max. running current	A		0,25	0,30	0,32	0,42	0,55	0,85	1,40	1,20	2,00
Sound pressure at 12 Pa	dB(A)		34	35	38	42	43	44	46	48	49
Sound pressure at 30 Pa	dB(A)		37	38	41	44	45	46	48	48	49
Sound pressure at 50 Pa	dB(A)		42	44	46	47	49	50	52	54	56
Water flow	l/h		373	536	703	851	1044	1412	1613	2004	2148
Water pressure drop	kPa		20	20	20	30	40	40	40	40	50
Power supply	220-230 V / 1 Ph / 50 or 60 Hz										
External static pressure	12 / 30 / 50 Pa										
Fan type	Forward-curved centrifugal fan										
Motor type	Four-speed asynchronous motor										
Insulation class	E										
Heat exchanger	Copper tube expanded into aluminium fins; 2-pipe, 3 rows										
Max. working pressure	1,6 MPa (16 bar)										
Water connections	3/4" FPT										
Condensate connection	3/4" MPT										
Unit length	mm		670	770	970	1070	1170	1370	1470	1770	1870
Unit width	mm		512	512	512	512	512	512	512	512	512
Unit height	mm		230	230	230	230	230	230	230	230	230
Dim. A	mm		640	740	940	1040	1140	1340	1440	1740	1840
Dim. B, air outlet width	mm		505	585	755	840	965	1160	1260	1510	1620
Dim. C, hanging holes	mm		475	555	725	810	935	1130	1230	1480	1590
Dim. D, air inlet width	mm		445	525	695	780	905	1100	1200	1450	1560
Net weight	kg		11,4	12,5	15,5	16,5	17,9	23,9	25,7	30,7	31,6
Gross weight	kg		12,6	13,8	17,0	18,2	19,7	26,2	28,1	33,7	34,6

Sound pressure measured in an acoustic room 1 m in front of and 1 m below the vertical centre line of the unit. External static pressure measured without filter and without air outlet spigot. On EC units the power input and the sound pressure level are given as the range over the full 0-10 V control signal. Dimensions in millimetres.

DF23 – 2-pipe, 3 rows, EC motor

Name	Unit		DF23-34 EC	DF23-51 EC	DF23-68 EC	DF23-85 EC	DF23-102 EC	DF23-136 EC	DF23-170 EC	DF23-204 EC	DF23-238 EC
Air flow	m³/h	H	340	510	680	850	1020	1360	1700	2040	2380
		M	255	382	510	637	765	1122	1402	1683	1927
		L	170	255	340	425	510	850	1062	1275	1487
Total cooling capacity	kW	H	2,17	3,12	4,09	4,75	6,07	8,21	9,38	11,65	12,49
		M	1,95	2,82	3,74	4,35	5,45	7,47	8,54	10,50	11,48
		L	1,58	2,32	3,01	3,50	4,38	6,04	6,89	8,48	9,27
Sensible cooling capacity	kW	H	1,86	2,64	3,47	4,43	5,41	7,21	8,28	10,17	10,79
		M	1,56	2,23	2,94	3,83	4,56	6,15	7,04	8,45	9,11
		L	1,09	1,51	2,02	2,38	2,89	4,05	4,69	5,77	6,21
Heating capacity	kW	H	3,50	5,01	6,74	7,62	9,76	13,18	14,81	18,03	19,70
		M	3,04	4,36	5,65	6,82	8,25	11,30	12,88	15,74	17,05
		L	2,52	3,71	4,99	5,64	7,03	9,49	10,66	13,16	13,99
Power input at 12 Pa	W		8-17	9-20	10-36	11-44	12-56	20-78	23-88	26-114	28-139
Power input at 30 Pa	W		10-26	11-34	12-42	13-51	15-63	25-91	26-101	28-140	30-166
Power input at 50 Pa	W		12-29	13-38	14-49	15-56	17-80	26-101	28-125	30-173	32-208
Max. running current	A		0,21	0,30	0,37	0,40	0,50	0,74	0,91	1,04	1,30
Sound pressure at 12 Pa	dB(A)		21-35	22-37	20-39	22-41	24-43	28-44	28-46	29-48	30-50
Sound pressure at 30 Pa	dB(A)		22-38	23-40	21-42	23-44	25-45	29-46	29-48	30-50	31-52
Sound pressure at 50 Pa	dB(A)		23-40	24-42	22-44	24-45	26-47	30-48	30-50	31-52	32-54
Water flow	l/h		373	536	703	851	1044	1412	1613	2004	2148
Water pressure drop	kPa		20	20	20	30	40	40	40	40	50
Power supply	220-230 V / 1 Ph / 50 or 60 Hz										
External static pressure	12 / 30 / 50 Pa										
Fan type	Forward-curved centrifugal fan										
Motor type	EC motor with 0-10 V speed control										
Insulation class	E										
Heat exchanger	Copper tube expanded into aluminium fins; 2-pipe, 3 rows										
Max. working pressure	1,6 MPa (16 bar)										
Water connections	3/4" FPT										
Condensate connection	3/4" MPT										
Unit length	mm		670	770	970	1070	1170	1370	1470	1770	1870
Unit width	mm		512	512	512	512	512	512	512	512	512
Unit height	mm		230	230	230	230	230	230	230	230	230
Dim. A	mm		640	740	940	1040	1140	1340	1440	1740	1840
Dim. B, air outlet width	mm		505	585	755	840	965	1160	1260	1510	1620
Dim. C, hanging holes	mm		475	555	725	810	935	1130	1230	1480	1590
Dim. D, air inlet width	mm		445	525	695	780	905	1100	1200	1450	1560
Net weight	kg		11,4	12,5	15,5	16,5	17,9	23,9	25,7	30,7	31,6
Gross weight	kg		12,6	13,8	17,0	18,2	19,7	26,2	28,1	33,7	34,6

Sound pressure measured in an acoustic room 1 m in front of and 1 m below the vertical centre line of the unit. External static pressure measured without filter and without air outlet spigot. On EC units the power input and the sound pressure level are given as the range over the full 0-10 V control signal. Dimensions in millimetres.

DF422 – 4-pipe, 2 rows cooling + 2 rows heating, AC motor

Name	Unit		DF422-34 AC	DF422-51 AC	DF422-68 AC	DF422-85 AC	DF422- 102 AC	DF422- 136 AC	DF422- 170 AC	DF422- 204 AC	DF422- 238 AC
Air flow	m³/h	H	340	510	680	850	1020	1360	1700	2040	2380
		M	255	382	510	637	765	1122	1402	1683	1927
		L	170	255	340	425	510	850	1062	1275	1487
Total cooling capacity	kW	H	1,92	2,74	3,68	4,53	5,40	6,59	7,60	9,32	10,01
		M	1,73	2,48	3,36	4,15	4,85	5,60	6,94	8,40	9,20
		L	1,40	2,04	2,71	3,34	3,90	4,85	5,60	6,79	7,43
Sensible cooling capacity	kW	H	1,64	2,32	3,12	4,23	4,81	5,79	6,71	8,13	8,65
		M	1,38	1,96	2,64	3,66	4,06	4,61	5,72	6,76	7,30
		L	0,97	1,33	1,82	2,27	2,57	3,25	3,81	4,62	4,98
Heating capacity	kW	H	3,07	4,39	5,89	7,25	8,64	10,54	12,20	14,92	16,02
		M	2,67	3,81	4,94	6,49	7,31	8,22	9,65	11,73	12,74
		L	2,21	3,24	4,36	5,36	6,22	7,76	8,96	10,86	11,89
Power input at 12 Pa	W		28	34	55	68	87	125	152	185	205
Power input at 30 Pa	W		42	55	68	87	108	142	174	210	253
Power input at 50 Pa	W		49	66	84	100	118	174	210	250	300
Max. running current	A		0,25	0,30	0,32	0,42	0,55	0,85	1,40	1,20	2,00
Sound pressure at 12 Pa	dB(A)		34	35	38	42	43	44	46	48	49
Sound pressure at 30 Pa	dB(A)		37	38	41	44	45	46	48	48	49
Sound pressure at 50 Pa	dB(A)		42	44	46	47	49	50	52	54	56
Water flow, cooling	l/h		360	482	655	814	936	1285	1397	1768	1870
Water flow, heating	l/h		360	482	655	814	936	1285	1397	1768	1870
Water pressure drop, cool	kPa		20	20	20	30	40	40	40	40	50
Water pressure drop, heat	kPa		20	20	20	30	40	40	40	40	50
Power supply	220-230 V / 1 Ph / 50 or 60 Hz										
External static pressure	12 / 30 / 50 Pa										
Fan type	Forward-curved centrifugal fan										
Motor type	Four-speed asynchronous motor										
Insulation class	E										
Heat exchanger	Copper tube expanded into aluminium fins; 4-pipe, 2+2 rows										
Max. working pressure	1,6 MPa (16 bar)										
Water connections	3/4" FPT										
Condensate connection	3/4" MPT										
Unit length	mm		670	770	970	1070	1170	1370	1470	1770	1870
Unit width	mm		512	512	512	512	512	512	512	512	512
Unit height	mm		230	230	230	230	230	230	230	230	230
Dim. A	mm		640	740	940	1040	1140	1340	1440	1740	1840
Dim. B, air outlet width	mm		505	585	755	840	965	1160	1260	1510	1620
Dim. C, hanging holes	mm		475	555	725	810	935	1130	1230	1480	1590
Dim. D, air inlet width	mm		445	525	695	780	905	1100	1200	1450	1560
Net weight	kg		12,8	14,1	17,0	18,0	19,4	26,7	28,4	33,2	33,8
Gross weight	kg		14,0	15,4	18,5	19,7	21,2	29,0	30,8	36,2	36,8

Sound pressure measured in an acoustic room 1 m in front of and 1 m below the vertical centre line of the unit. External static pressure measured without filter and without air outlet spigot. On EC units the power input and the sound pressure level are given as the range over the full 0-10 V control signal. Dimensions in millimetres.

DF422 – 4-pipe, 2 rows cooling + 2 rows heating, EC motor

Name	Unit		DF422-34 EC	DF422-51 EC	DF422-68 EC	DF422-85 EC	DF422-102 EC	DF422-136 EC	DF422-170 EC	DF422-204 EC	DF422-238 EC
Air flow	m³/h	H	340	510	680	850	1020	1360	1700	2040	2380
		M	255	382	510	637	765	1122	1402	1683	1927
		L	170	255	340	425	510	850	1062	1275	1487
Total cooling capacity	kW	H	1,92	2,74	3,68	4,53	5,40	6,59	7,60	9,32	10,01
		M	1,73	2,48	3,36	4,15	4,85	5,60	6,94	8,40	9,20
		L	1,40	2,04	2,71	3,34	3,90	4,85	5,60	6,79	7,43
Sensible cooling capacity	kW	H	1,64	2,32	3,12	4,23	4,81	5,79	6,71	8,13	8,65
		M	1,38	1,96	2,64	3,66	4,06	4,61	5,72	6,76	7,30
		L	0,97	1,33	1,82	2,27	2,57	3,25	3,81	4,62	4,98
Heating capacity	kW	H	3,07	4,39	5,89	7,25	8,64	10,54	12,20	14,92	16,02
		M	2,67	3,81	4,94	6,49	7,31	8,22	9,65	11,73	12,74
		L	2,21	3,24	4,36	5,36	6,22	7,76	8,96	10,86	11,89
Power input at 12 Pa	W		8-17	9-20	10-36	11-44	12-56	20-78	23-88	26-114	28-139
Power input at 30 Pa	W		10-26	11-34	12-42	13-51	15-63	25-91	26-101	28-140	30-166
Power input at 50 Pa	W		12-29	13-38	14-49	15-56	17-80	26-101	28-125	30-173	32-208
Max. running current	A		0,21	0,30	0,37	0,40	0,50	0,74	0,91	1,04	1,30
Sound pressure at 12 Pa	dB(A)		21-35	22-37	20-39	22-41	24-43	28-44	28-46	29-48	30-50
Sound pressure at 30 Pa	dB(A)		22-38	23-40	21-42	23-44	25-45	29-46	29-48	30-50	31-52
Sound pressure at 50 Pa	dB(A)		23-40	24-42	22-44	24-45	26-47	30-48	30-50	31-52	32-54
Water flow, cooling	l/h		360	482	655	814	936	1285	1397	1768	1870
Water flow, heating	l/h		360	482	655	814	936	1285	1397	1768	1870
Water pressure drop, cool	kPa		20	20	20	30	40	40	40	40	50
Water pressure drop, heat	kPa		20	20	20	30	40	40	40	40	50
Power supply	220-230 V / 1 Ph / 50 or 60 Hz										
External static pressure	12 / 30 / 50 Pa										
Fan type	Forward-curved centrifugal fan										
Motor type	EC motor with 0-10 V speed control										
Insulation class	E										
Heat exchanger	Copper tube expanded into aluminium fins; 4-pipe, 2+2 rows										
Max. working pressure	1,6 MPa (16 bar)										
Water connections	3/4" FPT										
Condensate connection	3/4" MPT										
Unit length	mm		670	770	970	1070	1170	1370	1470	1770	1870
Unit width	mm		512	512	512	512	512	512	512	512	512
Unit height	mm		230	230	230	230	230	230	230	230	230
Dim. A	mm		640	740	940	1040	1140	1340	1440	1740	1840
Dim. B, air outlet width	mm		505	585	755	840	965	1160	1260	1510	1620
Dim. C, hanging holes	mm		475	555	725	810	935	1130	1230	1480	1590
Dim. D, air inlet width	mm		445	525	695	780	905	1100	1200	1450	1560
Net weight	kg		12,8	14,1	17,0	18,0	19,4	26,7	28,4	33,2	33,8
Gross weight	kg		14,0	15,4	18,5	19,7	21,2	29,0	30,8	36,2	36,8

Sound pressure measured in an acoustic room 1 m in front of and 1 m below the vertical centre line of the unit. External static pressure measured without filter and without air outlet spigot. On EC units the power input and the sound pressure level are given as the range over the full 0-10 V control signal. Dimensions in millimetres.

DF431 – 4-pipe, 3 rows cooling + 1 row heating, AC motor

Name	Unit		DF431-34 AC	DF431-51 AC	DF431-68 AC	DF431-85 AC	DF431- 102 AC	DF431- 136 AC	DF431- 170 AC	DF431- 204 AC	DF431- 238 AC
Air flow	m³/h	H	340	510	680	850	1020	1360	1700	2040	2380
		M	255	382	510	637	765	1122	1402	1683	1927
		L	170	255	340	425	510	850	1062	1275	1487
Total cooling capacity	kW	H	2,17	3,12	4,09	4,75	6,07	8,21	9,38	11,65	12,49
		M	1,95	2,82	3,74	4,35	5,45	7,47	8,54	10,50	11,48
		L	1,58	2,32	3,01	3,50	4,38	6,04	6,89	8,48	9,27
Sensible cooling capacity	kW	H	1,86	2,64	3,47	4,43	5,41	7,21	8,28	10,17	10,79
		M	1,56	2,23	2,94	3,83	4,56	6,15	7,04	8,45	9,11
		L	1,09	1,51	2,02	2,38	2,89	4,05	4,69	5,77	6,21
Heating capacity	kW	H	1,70	2,21	3,15	3,96	5,19	5,66	6,90	8,12	9,93
		M	1,48	1,92	2,64	3,54	4,39	4,85	6,00	7,09	8,59
		L	1,22	1,64	2,33	2,93	3,74	4,08	4,97	5,93	7,05
Power input at 12 Pa	W		28	34	55	68	87	125	152	185	205
Power input at 30 Pa	W		42	55	68	87	108	142	174	210	253
Power input at 50 Pa	W		49	66	84	100	118	174	210	250	300
Max. running current	A		0,25	0,30	0,32	0,42	0,55	0,85	1,40	1,20	2,00
Sound pressure at 12 Pa	dB(A)		34	35	38	42	43	44	46	48	49
Sound pressure at 30 Pa	dB(A)		37	38	41	44	45	46	48	48	49
Sound pressure at 50 Pa	dB(A)		42	44	46	47	49	50	52	54	56
Water flow, cooling	l/h		347	498	654	791	971	1313	1500	1864	1998
Water flow, heating	l/h		146	190	271	341	446	487	593	698	854
Water pressure drop, cool	kPa		20	20	20	30	40	40	40	40	50
Water pressure drop, heat	kPa		5	12	17	28	25	16	18	23	29
Power supply	220-230 V / 1 Ph / 50 or 60 Hz										
External static pressure	12 / 30 / 50 Pa										
Fan type	Forward-curved centrifugal fan										
Motor type	Four-speed asynchronous motor										
Insulation class	E										
Heat exchanger	Copper tube expanded into aluminium fins; 4-pipe, 3+1 rows										
Max. working pressure	1,6 MPa (16 bar)										
Water connections	3/4" FPT										
Condensate connection	3/4" MPT										
Unit length	mm		670	770	970	1070	1170	1370	1470	1770	1870
Unit width	mm		512	512	512	512	512	512	512	512	512
Unit height	mm		230	230	230	230	230	230	230	230	230
Dim. A	mm		640	740	940	1040	1140	1340	1440	1740	1840
Dim. B, air outlet width	mm		505	585	755	840	965	1160	1260	1510	1620
Dim. C, hanging holes	mm		475	555	725	810	935	1130	1230	1480	1590
Dim. D, air inlet width	mm		445	525	695	780	905	1100	1200	1450	1560
Net weight	kg		12,8	14,1	17,0	18,0	19,4	26,7	28,4	33,2	33,8
Gross weight	kg		14,0	15,4	18,5	19,7	21,2	29,0	30,8	36,2	36,8

Sound pressure measured in an acoustic room 1 m in front of and 1 m below the vertical centre line of the unit. External static pressure measured without filter and without air outlet spigot. On EC units the power input and the sound pressure level are given as the range over the full 0-10 V control signal. Dimensions in millimetres.

DF431 – 4-pipe, 3 rows cooling + 1 row heating, EC motor

Name	Unit		DF431-34 EC	DF431-51 EC	DF431-68 EC	DF431-85 EC	DF431- 102 EC	DF431- 136 EC	DF431- 170 EC	DF431- 204 EC	DF431- 238 EC
Air flow	m³/h	H	340	510	680	850	1020	1360	1700	2040	2380
		M	255	382	510	637	765	1122	1402	1683	1927
		L	170	255	340	425	510	850	1062	1275	1487
Total cooling capacity	kW	H	2,17	3,12	4,09	4,75	6,07	8,21	9,38	11,65	12,49
		M	1,95	2,82	3,74	4,35	5,45	7,47	8,54	10,50	11,48
		L	1,58	2,32	3,01	3,50	4,38	6,04	6,89	8,48	9,27
Sensible cooling capacity	kW	H	1,86	2,64	3,47	4,43	5,41	7,21	8,28	10,17	10,79
		M	1,56	2,23	2,94	3,83	4,56	6,15	7,04	8,45	9,11
		L	1,09	1,51	2,02	2,38	2,89	4,05	4,69	5,77	6,21
Heating capacity	kW	H	1,70	2,21	3,15	3,96	5,19	5,66	6,90	8,12	9,93
		M	1,48	1,92	2,64	3,54	4,39	4,85	6,00	7,09	8,59
		L	1,22	1,64	2,33	2,93	3,74	4,08	4,97	5,93	7,05
Power input at 12 Pa	W		8-17	9-20	10-36	11-44	12-56	20-78	23-88	26-114	28-139
Power input at 30 Pa	W		10-26	11-34	12-42	13-51	15-63	25-91	26-101	28-140	30-166
Power input at 50 Pa	W		12-29	13-38	14-49	15-56	17-80	26-101	28-125	30-173	32-208
Max. running current	A		0,21	0,30	0,37	0,40	0,50	0,74	0,91	1,04	1,30
Sound pressure at 12 Pa	dB(A)		21-35	22-37	20-39	22-41	24-43	28-44	28-46	29-48	30-50
Sound pressure at 30 Pa	dB(A)		22-38	23-40	21-42	23-44	25-45	29-46	29-48	30-50	31-52
Sound pressure at 50 Pa	dB(A)		23-40	24-42	22-44	24-45	26-47	30-48	30-50	31-52	32-54
Water flow, cooling	l/h		347	498	654	791	971	1313	1500	1864	1998
Water flow, heating	l/h		146	190	271	341	446	487	593	698	854
Water pressure drop, cool	kPa		20	20	20	30	40	40	40	40	50
Water pressure drop, heat	kPa		5	12	17	28	25	16	18	23	29
Power supply	220-230 V / 1 Ph / 50 or 60 Hz										
External static pressure	12 / 30 / 50 Pa										
Fan type	Forward-curved centrifugal fan										
Motor type	EC motor with 0-10 V speed control										
Insulation class	E										
Heat exchanger	Copper tube expanded into aluminium fins; 4-pipe, 3+1 rows										
Max. working pressure	1,6 MPa (16 bar)										
Water connections	3/4" FPT										
Condensate connection	3/4" MPT										
Unit length	mm		670	770	970	1070	1170	1370	1470	1770	1870
Unit width	mm		512	512	512	512	512	512	512	512	512
Unit height	mm		230	230	230	230	230	230	230	230	230
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Dim. B, air outlet width	mm		505	585	755	840	965	1160	1260	1510	1620
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Dim. D, air inlet width	mm		445	525	695	780	905	1100	1200	1450	1560
Net weight	kg		12,8	14,1	17,0	18,0	19,4	26,7	28,4	33,2	33,8
Gross weight	kg		14,0	15,4	18,5	19,7	21,2	29,0	30,8	36,2	36,8

Sound pressure measured in an acoustic room 1 m in front of and 1 m below the vertical centre line of the unit. External static pressure measured without filter and without air outlet spigot. On EC units the power input and the sound pressure level are given as the range over the full 0-10 V control signal. Dimensions in millimetres.

4 Installation

4.1 Delivery check

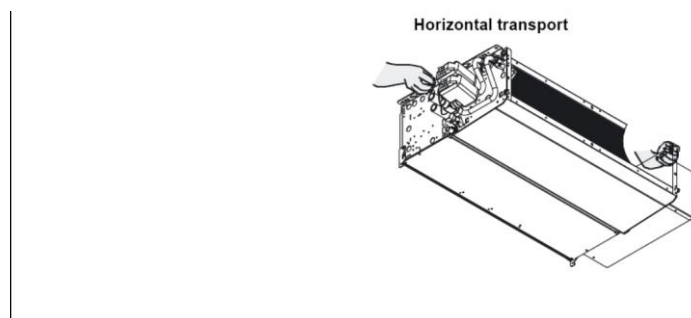
Each fan coil is packed in a corrugated carton. Check the goods on receipt as follows.

- Check the packaging for visible damage before accepting the delivery
- If the carton is damaged, unpack immediately and inspect the unit and the accessories. If the unit is damaged, note this on the delivery note and refuse acceptance
- Check for concealed damage. If concealed damage is found, do not move the unit, stop unloading and take photographs
- Notify the carrier and arrange a joint inspection by the carrier and the consignee
- Do not carry out any repair before the carrier's representative has inspected and confirmed the damage
- After the damage has been confirmed, contact the supplier for replacement

4.2 Transport

DAMAGE TO THE UNIT AND RISK OF PERSONAL INJURY
Wear protective gloves - risk of injury from sharp edges
The fan coil must be carried by at least two people
For deliveries on pallets, use only lifting and transport equipment with sufficient carrying capacity
Secure the load during transit to prevent it from tipping or falling

Transport and lift the unit horizontally, holding it at both sides of the top of the unit body. Never lift the unit by the water connections, the drain pan or the electrical box. Unit weights are given in the technical data.



Correct handling of the unit

4.3 Temporary storage

- Store the unit in its original packaging
- The storage location must be weatherproof, dry and free of dust
- Humidity must be between 50 and 85 % r.h.
- The storage temperature must be between -10 °C and +50 °C
- Do not stack units above the number of layers marked on the packaging

4.4 Preparing for installation

DANGER FROM ELECTRIC CURRENT

Ensure that the intended drilling area is free from electrical cables and pipes before drilling.

RISK OF PERSONAL INJURY

Injury may be caused by falling parts and sharp edges

Wear a helmet, safety boots and protective gloves when installing the unit

Ceiling installation must always be carried out by two people

NOTE

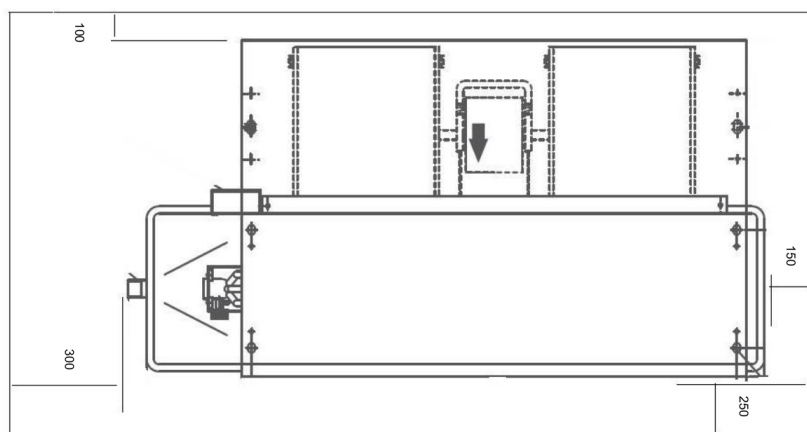
No mechanical deformation or twisting of the unit may occur during installation, in any installation position.

4.4.1 Installation location

- The ceiling or the mounting structure must be capable of carrying the weight of the unit including all accessories
- Install the unit indoors only, in an enclosed space
- The type, condition and ambient temperature of the installation location must be suitable for the unit
- The entire false ceiling area must be dry and sufficiently protected against humidity and moist air, with no openings to the outside
- The electrical wiring must be prepared and available for connection in the false ceiling
- Make all wall and ceiling openings in conjunction with the architect or structural engineer and the building contractor

4.4.2 Recommended service opening

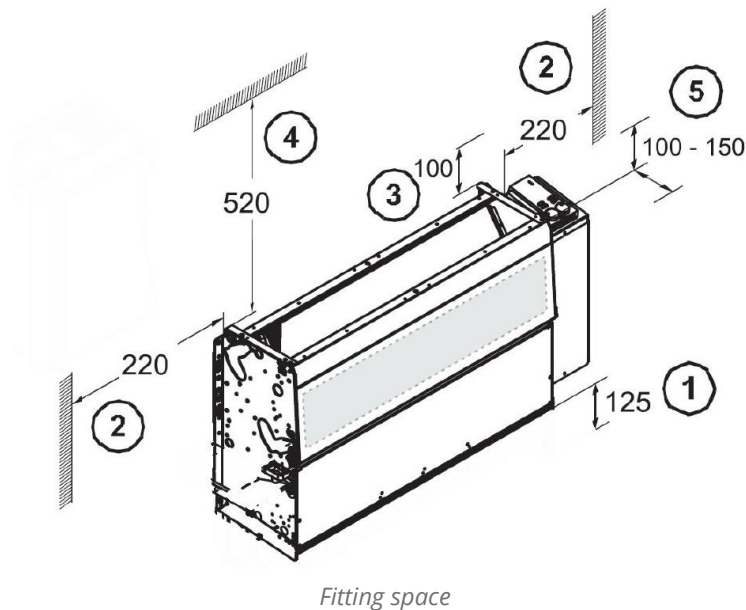
To allow all necessary service and maintenance work on the unit, provide a service opening in the false ceiling with at least the dimensions shown below. Larger or additional openings may be necessary where further accessories are fitted, and the opening must give access to the filter.



Recommended service opening

4.4.3 Fitting space

Depending on the model and the installation, the pipes may be connected from the left or from the right. Observe the fitting distances shown below and reserve adequate space for pipes, valves, wiring and for withdrawal of the filter. Where the accessibility of the connections is uncertain, reserve a larger fitting space.



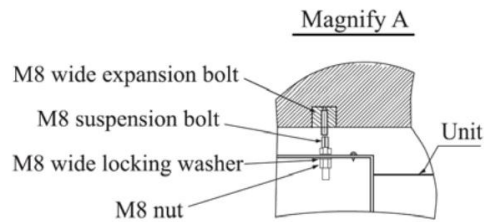
4.5 Unit installation

4.5.1 Precautions

- Provide adequate space for installation and maintenance. Removable ceiling panels or access panels must be provided for routine maintenance
- Determine the routing of pipework and electrical wiring before installation and reserve adequate space for the connections
- Make sure that the suspension structure is adequate for the weight of the unit
- All units must be levelled to ensure proper condensate drainage and correct operation
- The connected duct must be within the external static pressure rating of the unit
- Thermal insulation of the chilled water valves and pipework is the responsibility of the installer

4.5.2 Suspension

The unit is suspended from the structural ceiling by four M8 suspension bolts, two on each side. Use anchor bolts in an existing ceiling; for a new ceiling use cast-in bolts or parts prepared on site. The suspension bolts must be of high-quality carbon steel protected against corrosion, or of stainless steel.



Suspension bolt, washers and nuts

1. Transfer the hanging hole dimensions from the technical data to the ceiling
2. Fit the suspension bolts and check that the structure carries the unit weight
3. Hang the unit on the suspension brackets
4. Level the unit in all directions with a spirit level by turning the nuts up or down
5. Tighten the nuts above and below each bracket to fix the unit

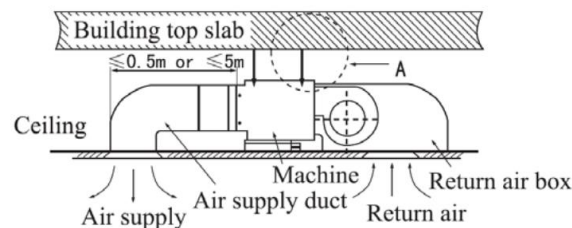
NOTE

To ensure complete removal of condensate from the drain pan, install the unit with a fall of about 5 mm towards the condensate drain connection and 0 to 2 mm towards the front of the unit

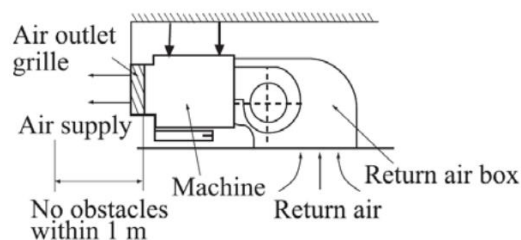
The suspension must not transmit vibration into the structure. Where the ceiling construction is light, use vibration isolators between the bracket and the bolt

4.6 Duct connection

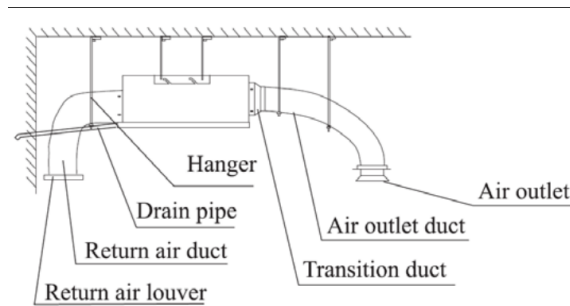
Air ducts of galvanised steel sheet, provided by the installer, are connected to the flanges at the air inlet and the air outlet of the unit. Insert the duct into the flange and fix it with screws or rivets. Where the duct and the flange are of different sizes, connect them through an adapter made on site. Use flexible connectors at the unit to avoid transmitting fan vibration into the duct system.



Return air box and supply duct in a false ceiling



Supply air grille arrangement, no obstacles within 1 m



Typical duct arrangement

NOTE

Always make sure that the duct length and the fittings are in accordance with the external static pressure rating of the unit (12, 30 or 50 Pa)

The distance from the duct outlet to the supply air terminal depends on the actual duct length and on the terminal used

Fit the ducts so that they can be removed for cleaning of the unit

4.7 Pipe connection

DANGER OF SCALDING BY ESCAPING HEATING MEDIUM

Before the on-site pipework and the hydraulic connection of the fan coil are set up, the heating and cooling water must be shut off and secured against being opened unintentionally.

NOTE

The water connections of all sizes are 3/4" FPT

Remove the caps from the water inlet and outlet pipes at the start of the fitting procedure

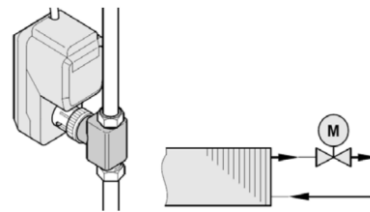
Hold the coil connection with a second spanner when tightening, so that the coil header is not twisted

When all connections have been completed, tighten all screwed connections and check that they are free of mechanical stress

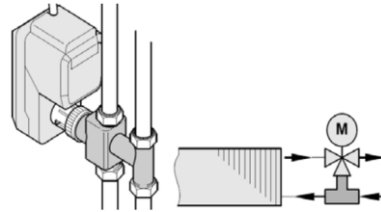
Arrange the connections so that the heat exchanger can be disconnected at any time for cleaning or removal

4.7.1 Valve connection

The units are supplied without valves. Where valves are fitted on site, the arrangement of the water inlet and outlet depends on the position of the water connection and on the valves used. A 4-pipe unit has two sets of water connections and therefore requires two sets of valves, one for the cooling circuit and one for the heating circuit.



2-way valve arrangement

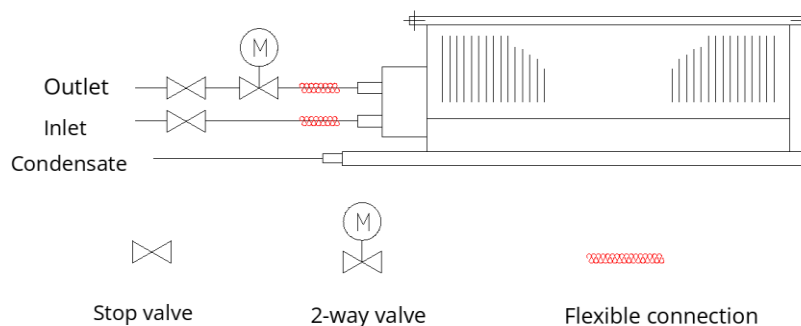


3-way valve arrangement

ACTUATOR SUPPLY VOLTAGE

The A230NC thermoelectric actuator is a 230 V type. A 24 V actuator must never be connected to a 230 V output. If a 24 V actuator is required, it has to be supplied from a separate 24 V safety transformer and switched by an interposing relay.

4.7.2 Water inlet and outlet connection



Water and condensate connections

Symbols in the figure, from left: stop valve, motorised 2-way valve, flexible connection.

NOTE

The water inlet is the lower connection and the water outlet the upper connection; refer also to the label on the side of the unit

Flexible connections must be used at the water inlet and outlet fittings

Stop valves must be installed in the inlet and the outlet pipework

An air vent must be installed at the highest point of the water system

A drain valve must be installed at the lowest point of the water system

All on-site pipework carrying chilled water must be insulated against condensation, with careful treatment at the ends of the insulation

4.7.3 Condensate drain connection

The condensate drain provided by the installer is connected to the 3/4" MPT condensate connection of the drain pan. Connect it free of mechanical stress.

- Run the condensate pipe with a continuous fall of at least 1:100
- Where the condensate pipe is connected to the wastewater system, fit a trap in accordance with the local wastewater regulations. No trap is required where the pipe runs pressureless or discharges outdoors
- Insulate the condensate pipe to prevent condensation forming on its outside
- Tighten all pipe joints to prevent leakage and test the drain with water before the ceiling is closed
- Clean the drain pan after installation to ensure free drainage

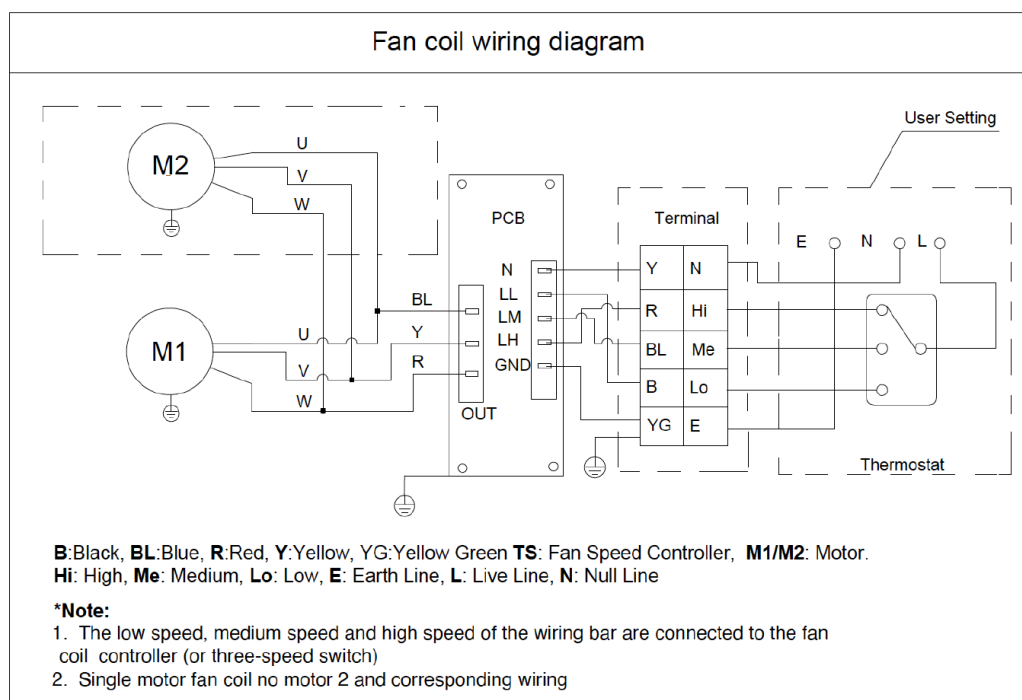
4.8 Electrical installation

DANGER FROM ELECTRIC CURRENT

Disconnect the power supply before starting any installation work

The electrical installation may be carried out only by qualified electricians, in accordance with this manual

- The electrical connection must be made in accordance with the valid connection diagram. The binding diagram is the one attached to the inside of the cover of the electrical box of the unit supplied
- Check the rating plate before connecting the supply. An incorrect supply voltage destroys the motor
- The earth point provided on the unit must be connected to the earthing system of the building
- All electrical connections must comply with the local electrical regulations
- The connection diagrams do not contain any protective measures. The standards and regulations in force must be observed and agreed with the local electricity supplier
- Wire the motorised valves and the room thermostat in accordance with their own installation instructions and make the correct interlock with the unit



Wiring diagram, AC units

DAMAGE TO THE UNIT

An incorrect connection can cause permanent damage to the fan motor. Wire the unit strictly in accordance with the diagram attached to the electrical box.

5 Commissioning

SAFETY

The warnings in section 2 apply in full: electrical hazard, danger of scalding and danger from rotating parts. Before any work on the unit, isolate it electrically, secure it against being switched on again, and shut off and allow the heating medium to cool down.

5.1 Requirements for commissioning

After installation, the installer must check and confirm the following. This manual has been read in full and the operators are familiar with the unit and able to operate it.

- The fan coil is electrically isolated
- The complete fan coil system has been installed both mechanically and electrically
- The air ducts are completely connected and firmly fixed
- All water pipes have been flushed and are free from residues and foreign objects
- The system has been pressure-tested and filled with clean water
- The fan coil is properly fixed, mounted and levelled, with the fall towards the condensate drain
- The valves, actuators and the room thermostat have been checked manually in accordance with their own manuals
- All water connections are tightened
- All electrical connections have been checked against the current wiring diagram and the terminal screws are tight
- The heat exchanger, the drain pan, the condensate drain and the filter are clean

NOTE

When the system is filled for the first time, air remains in the pipework and collects at the highest point of the water system. If abnormal noise is heard due to residual air, open the air vent until water flows out steadily and then close it again.

5.2 Start-up

1. Switch on the power supply and operate each unit in turn at low, medium and high speed on AC units, or over the whole control range on EC units
2. Vent the heat exchanger and the pipework
3. Set the fan speed, or the 0-10 V signal, so that the air flow and the external static pressure match the duct system as designed
4. Balance the water flow with the lockshield valve to the design flow given in the technical data
5. Check that condensate drains freely by pouring water into the drain pan

6. Adjust the supply air terminals to obtain even air distribution
7. Check the operation of the valve actuators in heating and in cooling mode
8. Run the unit at high speed for 24 hours and check its behaviour again

In the event of abnormal noise or behaviour, switch the unit off and check the items listed above again before continuing.

DAMAGE TO THE UNIT

If the unit is not used during the winter, the water inside the unit must be drained after commissioning, to prevent the pipes from cracking due to ice formation.

5.3 Handover

- Record the commissioning results and the settings made
- Instruct the operator in the use of the room thermostat and in cleaning the filter
- Hand this manual over to the operator and point out the maintenance intervals
- Point out that the unit must not be operated without the filter fitted

6 Operation and maintenance

6.1 Everyday operation

The unit is operated from the room thermostat: TW230-3 on AC units, FC280 on EC units. Switching on and off, the operating mode, the set room temperature and the fan speed are selected at the thermostat; follow the instructions supplied with it. The unit needs no other operator intervention in normal use.

- Set the room temperature to a moderate value. Every degree of overcooling or overheating increases the energy consumption noticeably
- Take particular care with the set temperature where elderly people, children or sick persons are present
- Keep the supply and return air terminals free. Blocking or covering them reduces the output and can cause condensate to be carried over into the duct
- Where the unit serves a room with openable windows, close the windows while the unit is running
- A brief interruption of the supply or a nearby lightning strike can disturb the electronics. If this happens, switch the power off and on again

6.2 Seasonal changeover and shutdown

- Before the cooling season, check that the drain pan and the condensate pipe are clean and that the filter has been cleaned
- Before the heating season, check that the heat exchanger has been vented
- If the unit is taken out of service during the winter, or if the building is left unheated, drain the water from the unit and from the pipework to prevent frost damage
- For long shutdowns, isolate the unit electrically and close the stop valves

6.3 Restrictions on use

RISK OF PERSONAL INJURY AND MATERIAL DAMAGE
Do not put fingers or any object into the air inlet or the air outlet. The fan runs at high speed and can cause serious injury
Do not clean the unit with water. Water can cause a short circuit and destroy the unit
Do not operate the unit without the filter fitted
Do not remove any cover of the unit. All work behind the covers is service work and may be carried out only by trained personnel
Do not modify the unit or its wiring

6.4 Maintenance

The DF ducted fan coil is a high-quality, reliable unit. Regular maintenance and inspection by technical experts is nevertheless necessary in order to guarantee its permanent function and performance.

NOTE
Maintenance may be carried out only by trained technical personnel, in accordance with this manual and the applicable regulations
Before any maintenance work, isolate the unit electrically, secure it against being switched on again, and shut off and allow the heating medium to cool down
The warranty is void if damage to the unit is attributable to failure to carry out the prescribed maintenance and inspections
A written maintenance record must be kept

6.5 Maintenance schedule

Maintenance intervals

Component / activity	Quarterly	Annually
Checking and cleaning the filter	•	
Checking that the drain pan is clean and drains freely	•	
Checking the condensate drain and its fall		•
Cleaning the drain pan		•
Cleaning the heat exchanger		•
Checking the fan wheel and the fan housing		•
Checking the screwed connections of the water pipes		•
Venting the heat exchanger		•
Checking the electrical connections		•
Checking the earthing		•
Checking the setting and function of all valves		•
Checking the unit casing for corrosion		•

6.6 Cleaning the filter

The filter is the item that most affects the output and the sound level of the unit in service. A blocked filter reduces the air flow, lowers the capacity and can cause condensate to be carried over into the duct.

1. Isolate the unit electrically and secure it against being switched on again
2. Open the service opening and withdraw the filter from the return air plenum
3. Clean the filter dry with a vacuum cleaner set to medium or low power, or wash it in lukewarm water with a mild detergent
4. Allow a washed filter to dry completely before it is refitted
5. Replace the filter if the mesh is damaged or if the contamination cannot be removed
6. Refit the filter and close the plenum before the unit is switched on again

NOTE
In dusty locations, in the first months after handover of a new building, and in installations with a high proportion of outside air, the filter needs to be checked more often than quarterly.

6.7 Annual maintenance

6.7.1 Condensate system

- Check the drain pan and the condensate connection for contamination before the start of the cooling season
- Check the fall of the external condensate pipe and, where fitted, clean and refill the trap
- Check free drainage by pouring water into the drain pan

6.7.2 Heat exchanger and fan

- Check the fins for contamination and damage. Clean the coil with compressed air or a soft brush in the direction of the fins, or with a proprietary coil cleaner suitable for copper and aluminium
- Do not use caustic or acidic cleaning agents and do not straighten the fins with a hard tool
- Check that the fan wheel is clean, undamaged and turns freely by hand
- Vent the heat exchanger

6.7.3 Pipework and electrical connections

- Check that all screwed pipe connections are secure. Hold the connection with a second spanner when retightening
- Open the electrical box and check that all connections are firmly seated in the terminals
- Check the earthing of the unit with a suitable measuring instrument
- Close the electrical box again

7 Troubleshooting

Deviations from the normal operating state are evidence of a malfunction and must be investigated by maintenance personnel. The tables below are a starting point for the possible causes and their correction. The items marked with an asterisk may be carried out only by a qualified technician.

SAFETY	
Before any fault finding on the unit, isolate it electrically, secure it against being switched on again, and shut off and allow the heating medium to cool down.	

7.1 The fan does not run

Possible cause	Remedy
Unit not switched on	Switch the unit on at the thermostat
No supply voltage	Check the fuse and the supply *
Cables not connected or terminal loose	Check and connect the cables *
No speed signal from the thermostat	Check the thermostat wiring and setting *

7.2 The unit is too noisy

Possible cause	Remedy
Fan speed set too high for the duct system	Select a lower speed or a lower control voltage
Air inlet or outlet blocked	Clear the obstruction and check the ducts for kinks
Filter dirty	Clean or replace the filter
Air in the heat exchanger	Vent the heat exchanger and the pipework
Fan bearings noisy	Replace the fan *

7.3 Insufficient cooling or heating

Possible cause	Remedy
Air volume flow too low	Select a higher speed and check the duct system
Filter dirty	Clean or replace the filter
Heat exchanger dirty	Clean the heat exchanger *
Water flow rate too low	Check the pump and the hydraulic balancing *
Valve not opening	Check the actuator and its wiring *
Water temperature not correct	Check the chiller or boiler, the circulating pump and the changeover

7.4 Water leaking at the unit

Possible cause	Remedy
Drain pan or condensate drain blocked	Clean the drain pan and the condensate drain
Condensate pipe without fall, or trap empty	Correct the fall; clean and fill the trap *
Chilled water pipes not correctly insulated	Insulate the pipes *
Unit not levelled	Align the unit with the fall towards the drain *
Heat exchanger or connection leaking	Check and retighten the connections; replace the heat exchanger if it leaks *

8 Disposal and conformity

8.1 Decommissioning and disposal

1. Isolate the unit electrically and secure it against being switched on again
2. Shut off the water connections and drain the heat exchanger and the drain pan completely
3. Disconnect the electrical and hydraulic connections and the ducts
4. Remove the unit. Ceiling work must be carried out by two people
5. Separate the materials - galvanised and painted steel sheet, copper, aluminium, plastics, insulation and electronic components - and dispose of them in accordance with the applicable national regulations

Electrical and electronic components must not be disposed of with household waste. They must be handed over to an authorised collection point in accordance with Directive 2012/19/EU (WEEE) and the corresponding national legislation.

8.2 Rating plate

The rating plate is attached to the unit casing and contains the model designation, the serial number, the rated voltage and frequency, the power input, the current, the protection class and the year of manufacture. The data on the rating plate takes precedence over the data in this manual.

8.3 Warranty

Item	Detail
Warranty period	12 months
Start of the warranty period	Date of sale
Conditions	Installation, commissioning and maintenance in accordance with this manual, carried out by qualified personnel; maintenance recorded in writing; water quality within the limits given in section 2; the unit operated within the operating limits

The warranty does not cover:

- damage caused by transport, storage or handling after delivery
- installation, commissioning or repair by unqualified personnel
- use outside the operating limits or the intended purpose
- water quality outside the limits given in section 2, and the resulting corrosion, scaling or blockage
- frost damage and damage caused by the water not being drained
- failure to carry out the prescribed maintenance, in particular cleaning of the filter and of the condensate system
- operation without the filter fitted
- unauthorised modification of the unit or use of non-original spare parts
- damage caused by the power supply, such as over-voltage or lightning, or by the building installation
- normal wear parts such as the filter

Claims procedure: report the fault to the supplier without undue delay after it is detected, stating the model designation and serial number from the rating plate, the date of sale, the place of installation and a description of the fault, and enclose photographs and the maintenance record. Do not dismantle the unit before the supplier responds. The supplier decides whether the unit is repaired, replaced or credited.

8.4 Conformity

The unit carries the CE marking. The EU declaration of conformity is supplied with the unit and is available from the supplier on request. It states, as a minimum:

- the applicable European directives
- the harmonised standards applied
- the manufacturer and the person authorised to compile the technical file

9 Accessories

The accessories below are matched to the DF ducted fan coils. They are ordered separately.

9.1 Accessories overview

Code	Product	Data
TVSP15	Thermostatic valve, straight	Thread 1/2"; Kvs 2,0; PN10; working temperature -10 °C to +120 °C
LS15	Lockshield valve, straight	Thread 1/2"; Kvs 2,0; PN10; working temperature -10 °C to +120 °C
LA15	Lockshield valve, angle	Thread 1/2"; Kvs 2,0; PN10; working temperature -10 °C to +120 °C
A230NC	Thermoelectric actuator	230 V AC; IP54; connection thread M30 × 1,5 mm; housing PC/ABS; normally closed
TW230-3	Room thermostat, AC units	88 × 88 × 43 mm; 230 V AC, max. 3 A; 1,5 W; 5-35 °C; three fan speeds; weekly schedule
FC280	Room thermostat, EC units	88 × 88 × 43 mm; 230 V AC, max. 3 A; 1,5 W; 5-35 °C; 0-10 V fan control; weekly schedule

NOTE

The valve connection thread is 1/2" while the coil connections are 3/4" FPT. Provide reducers or connection sets on site.

9.2 Valve selection

The valves listed above have Kvs 2,0. The tables below give the Kvs required for a pressure drop of approximately 15 kPa across the control valve at the design water flow, calculated from $\Delta p = (Q / Kvs)^2$ with Q in m³/h and Δp in bar. The last row gives the smallest connection size at a water velocity of not more than 1,2 m/s.

DF23 - one valve per unit

Size	34	51	68	85	102	136	170	204	238
Design flow (l/h)	373	536	703	851	1044	1412	1613	2004	2148
Required Kvs	1,0	1,4	1,8	2,2	2,7	3,6	4,2	5,2	5,5
Δp with Kvs 2,0 (kPa)	3,5	7,2	12,4	18,1	27,3	49,8	65,0	100,4	115,4
Min. connection	DN15	DN15	DN15	DN15	DN20	DN20	DN25	DN25	DN25

DF422 - one valve per circuit, both circuits identical

Size	34	51	68	85	102	136	170	204	238
Design flow (l/h)	360	482	655	814	936	1285	1397	1768	1870
Required Kvs	0,9	1,2	1,7	2,1	2,4	3,3	3,6	4,6	4,8
Min. connection	DN15	DN15	DN15	DN15	DN20	DN20	DN20	DN25	DN25

DF431 - one valve per circuit

Size	34	51	68	85	102	136	170	204	238
Cooling flow (l/h)	347	498	654	791	971	1313	1500	1864	1998
Required Kvs, cooling	0,9	1,3	1,7	2,0	2,5	3,4	3,9	4,8	5,2
Min. connection, cooling	DN15	DN15	DN15	DN15	DN20	DN20	DN20	DN25	DN25
Heating flow (l/h)	146	190	271	341	446	487	593	698	854
Required Kvs, heating	0,4	0,5	0,7	0,9	1,2	1,3	1,5	1,8	2,2
Min. connection, heating	DN15	DN15	DN15	DN15	DN15	DN15	DN15	DN15	DN15

Where the calculated Kvs differs considerably from the valve fitted, check the hydraulic balancing of the circuit. A valve that is too large gives poor control at part load.