Damvent

to reach...and exceed

Product Overview
HYBRID HVAC SOLUTIONS

DamVent Ireland

Damvent
to reach...and exceed

https://youtu.be/mDvPdysuwOs

Our **COMPANY**

- Damvent has been in the HVAC market since 1989
- Production facility in Bourgas, Bulgaria
- Export - since 2010 to 24 countries
- Focus only on Hybrid AHU’s for fresh air treatment.
- More than 1600 Hybrid AHUs produced, delivered, installed and commissioned
- In the UK market since 2012 and Ireland since 2019 (100+ units in the UK)

TECHNOLOGY LEADER IN PREMIUM HYBRID HVAC SOLUTIONS

Damvent
to reach....and exceed

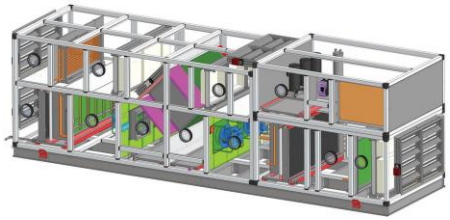
Our CONCEPTS

MAX.e MINI

MAX.e²

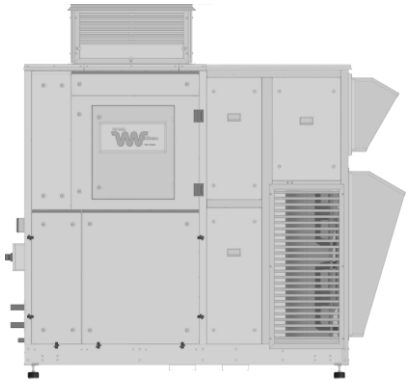
MAX.e³ MAX.e POOL

MAX.e³dh



MAX.e²dh

MAX.e thvac



WF thvac

MAX.e MINI

max.e-mini - Hybrid AHU with “2-stage thermodynamic heat recovery technology”- recovering up to 100% of the extracted heat from the room. Fitted with a Plate Heat Exchanger

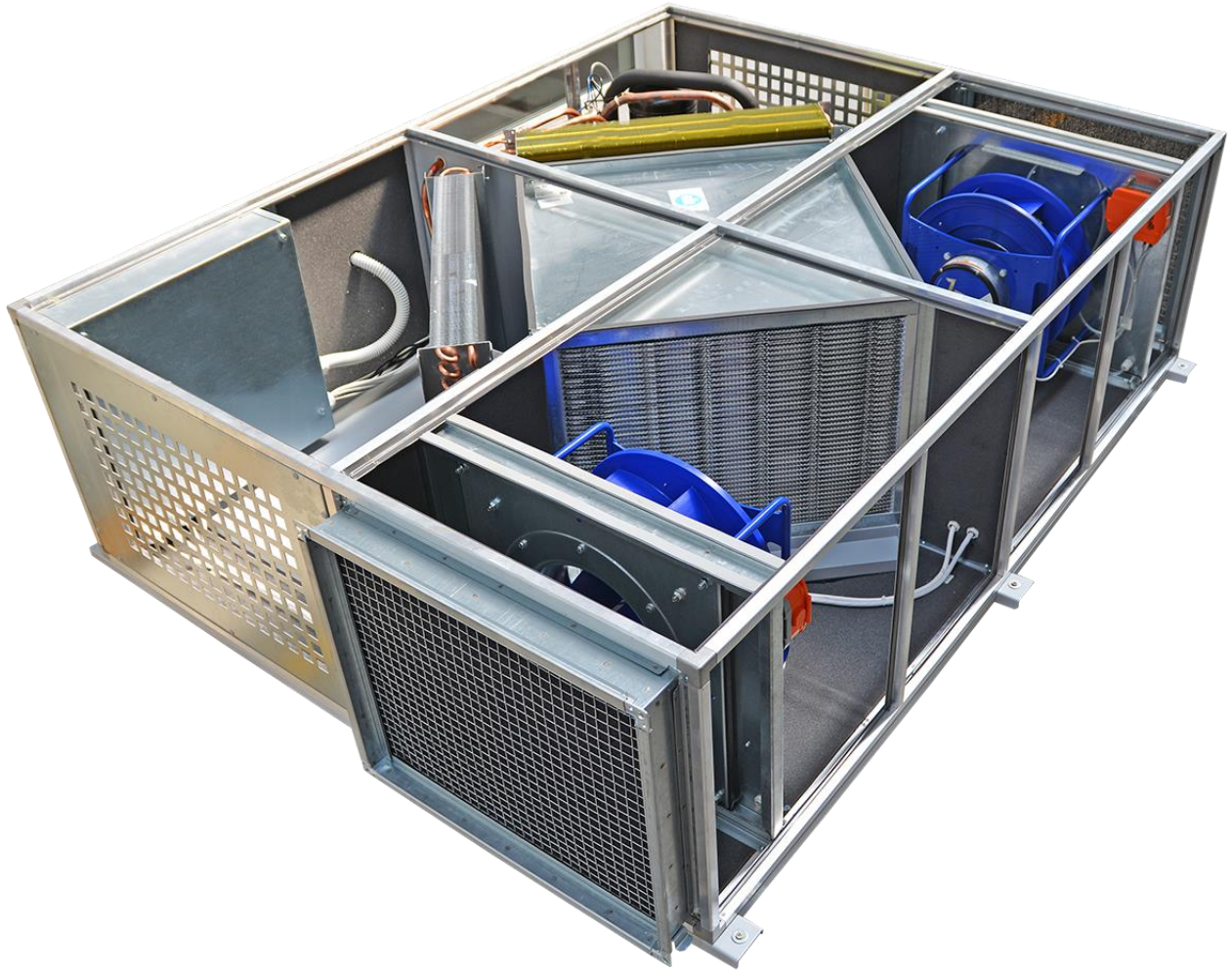
Damvent
to reach...and exceed

key FEATURES

- Available in 2 Sizes (max.e-mini 1 & max.e-mini 2)
- Compact design - Possibility for internal and external installation
- Decentralised (independence)
- Mixing Box Available
- Lower refrigerant content compared to the classical systems
- Plug & Play

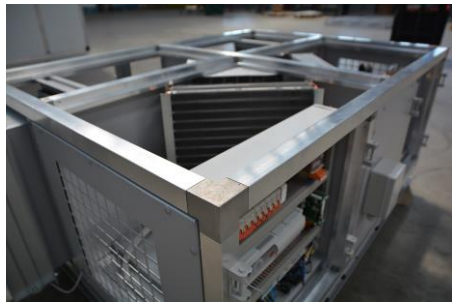
key ADVANTAGES

- Initial Investment Costs
- Installation Cost and Labour
- Installed Electrical Power
- Energy & Running Costs
- Service & Maintenance Cost
- Time
- Space
- BMS
- Suitable for Every Climate – from -20°C to +40°C



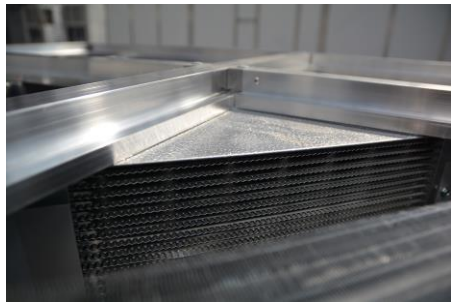
Damvent
to reach...and exceed

key HARDWARE



Design

max.e-mini is a single "1 piece" (standalone) unit consisting of aluminium profiles, fastenings and connecting angles. The standard construction of max.e-mini is intended for indoor ceiling installation.



Heat Exchanger

max.e-mini uses a plate air-to-air heat exchanger made from aluminium fins with condensate drain pain.

Heat Pump

100% DX unit - No additional water, electric or DX heating/cooling coils are needed in the max.e-mini, which makes it independent of other additional heating/cooling sources (boilers, chillers, VRF systems, etc.)

Fans

max.e-mini use ZAbluefin plug fans with latest EC Blue (Electronically Commutated) from the company Ziehl-Abegg. Fan wheel statically and dynamically balanced on the axis of the direct-driven motor. The fan wheel, together with the motor, is mounted on a common base frame with vibration dampers.

key HARDWARE

Automation System

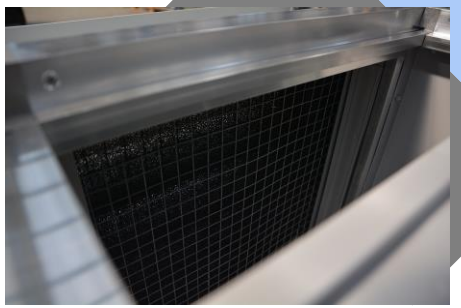
The electric switchboard is integrated into the unit and located on the operation side.

The "Brain" of max.e-mini is its specially designed by Damvent controller which controls and manages all processes and protects the unit from eventual cut-offs.

Connectivity

The built-in circuit board allows a permanent internet connection to max.e from any location in the world.

This option helps you/us to make adequate reaction to situations requiring fast and accurate solutions to the problem.



Filters

Filters are installed at the entrance of the unit to ensure the normal operation of the AHU and to prevent contamination of the components.

Filter medium composition: Polyurethane with the possibility for regeneration (washable)

External Option

It is also possible to produce max.e-mini for outdoor horizontal mounting

The construction is manufactured from high-quality profiles and roof.

Galvanized sheet steel C-section base frame. The base frame's standard height is 100 mm.

		max.e-mini 1 1000/2000	max.e-mini 2 2000/3200
Nominal Airflow	m3/h	1500	2500
Total Cooling Capacity (summer mode)	kW	10.8	17.8
Total Heating Capacity (winter mode)	kW	15.6	27
Total Installed Power (compressors + fans)	kW	3.66	10
Total Power Input (compressors + fans) (summer mode)	kW	3.19	5.81
Full Load Current	A	26	22.1
Connection Voltage	V/Ph/Hz	400/3/50	400/3/50
EER Net (summer mode)		3.39	3.07
COP Net (winter mode)		7.12	7.04
Weight (Adding different options will change the weight)	kg	260	400
Motor Efficiency		IE5	IE5
Installed Motor Power Supply side	kW	1.3	2.5
Installed Motor Power Exhaust side	kW	1.3	2.5
Installed Current Supply side	A	6.6	4
Installed Current Exhaust side	A	6.6	4
Protection Class	IP	55	55
Temperature Efficiency (winter mode)	%	62	64
Recovered Heating Capacity (winter mode)	kW	11.6	19.6
Condensation Rate (winter mode)	l/h	4.6	8
Compressor Type		Rotary	Scroll
Number of compressors		1	1
Number of circuits		1	1
Winter Mode Power Input	kW	1.7	3
Summer Mode Power Input	kW	2.9	5.4
Max. Full Load Current	A	12.8	14.1
EER (summer mode)		3.04	2.6
COP (winter mode)		4.7	4.6
Filter Type		Polyurethane (washable)	Polyurethane (washable)
Classification (EN779:2012)	G	G2	G2
Filtration Efficiency	%	40	40
Total Filtration Area	m2	0.21	0.3

MAX.e²

max.e2 - Hybrid AHU with "2 stage thermodynamic heat recovery technology"- recovering up to 100% of the extract heat from the room. Fitted with a Plate Heat Exchanger

Damvent
to reach...and exceed

key FEATURES

- Available in 6 Standard Sizes (from 2,000m3/h to 18,000m3/h)
- Suitable for Internal or External(with Factory Fitted Roof) Installation
- Less maintenance regarding the plate heat exchanger compared with the Rotary heat exchanger
- Compact design (available with Top Connection Ducts)
- Lower refrigerant content compared to the classical systems
- Stepless Capacity Control

key ADVANTAGES

- Initial Investment Costs
- Installation Cost and Labour
- Installed Electrical Power
- Energy & Running Costs
- Service & Maintenance Cost
- Time
- Space
- BMS
- Suitable for Every Climate – from -20°C to +40°C

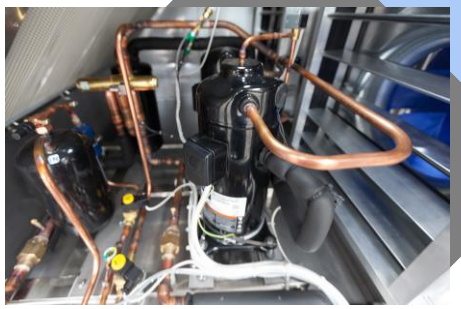
key HARDWARE

Design

max.e2 is designed as a system with the structure of the unit manufactured as a mono-block. The construction is manufactured from high-quality profiles made of extruded aluminium characterized by high strength and resistance to adverse weather conditions.

Heat Exchanger

For all of the units of the type max.e2 are used plate air-to-air heat exchangers, made from aluminium fins - “epoxy” coated, with condensate drain pain. This special cover of the plate heat exchanger allows extending their useful life and also their best levels of performance for a long time.



Heat Pump

100% DX unit - No additional water, electric or DX heating/cooling coils are needed in the max.e2, which makes it independent of other additional heating/cooling sources (boilers, chillers, VRF systems, etc.)

Fans

max.e2 use ZAbluefin plug fans with latest EC Blue (Electronically Commutated) from the company Ziehl-Abegg. Fan wheel statically and dynamically balanced on the axis of the direct-driven motor. Fan wheel, together with the motor, is mounted on a common base frame with vibration dampers.

key HARDWARE

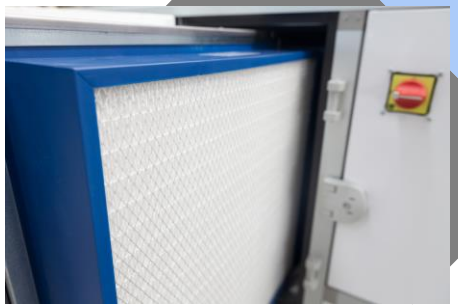
Automation System

The "Brain" of max.e2 is its specially designed by Damvent controller, which controls and manages all processes and protects the unit from eventual cut-offs.

Connectivity

The built-in circuit board allows a permanent internet connection to max.e2 from any location in the world.

This option helps you/us to make adequate reaction to situations requiring fast and accurate solutions to the problem.



Filters

Microcell filters are used in the units max.e2. These filters are made of plated micro-glass paper and spaced with hot melt adhesive beads, which are uniformly positioned to deliver optimum airflow.

External Option

It is also possible to produce max.e2 for outdoor horizontal mounting

The construction is manufactured from high-quality profiles and roof.

Galvanized sheet steel C-section base frame. The base frame's standard height is 100 mm.

		max.e2-02 1000/2000	max.e2-03 2000/3000	max.e2-06 4000/7000	max.e2-09 5500/10000	max.e2-13 9000/14500	max.e2-20 13000/20000
Nominal airflow	m3/h	1500	2500	6000	9000	13000	16000
Total Cooling Capacity (summer mode)	kW	11.4	18.6	41.2	55.7	81.4	104.4
Total Heating Capacity (winter mode)	kW	18.5	32.3	72.7	103.1	151.1	191
Total Installed Power (compressors + fans)	kW	7.7	10	16.9	23.2	31.8	41.6
Total Power Input (compressors + fans) (summer mode)	kW	3.56	6.32	12.32	14.7	27.48	26.1
Full Load Current	A	20.8	22.1	39.4	46.2	75.2	87.6
Connection Voltage	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
EER Net (summer mode)		2.69	2.34	2.74	3.23	2.7	4.01
COP Net (winter mode)		8.9	9.1	9.4	10.6	8.8	11.71
Weight (Adding different options will change the weight)	kg	950	1100	1430	1800	2200	3850
Motor Efficiency		IE5	IE5	IE5	IE5	IE5	IE5
Installed Motor Power Supply side	kW	2.5	2.5	3.5	5.4	6	2 x 4.6
Installed Motor Power Exhaust side	kW	2.5	2.5	3.5	5.4	6	2 x 4.6
Installed Current Supply side	A	4	4	5.6	8.6	9.4	2 x 7.4
Installed Current Exhaust side	A	4	4	5.6	8.6	94	2 x 7.4
Protection Class	IP	55	55	55	55	55	55
Temperature Efficiency (winter mode)	%	68	68	65	65	64	60
Recovered Heating Capacity (winter mode)	kW	12.6	21	48.6	72.6	103.5	118.7
Condensation Rate (winter mode)	l/h	5.2	8.7	21	31.3	44.6	16.4
Compressor Type		Rotary	Scroll	Scroll	Scroll	Scroll	Scroll
Number of compressors		1	1	2	2	4	4
Number of circuits		1	1	1	1	2	2
Winter Mode Power Input	kW	1 x 1.50	1 x 2.80	2 x 2.68	2 x 3.01	4 x 2.57	4 x 3.15
Summer Mode Power Input	kW	1 x 3.40	1 x 6.70	2 x 6.00	2 x 6.39	4 x 6.15	4 x 5.57
Max. Full Load Current	A	1 x 12.8	1 x 14.1	2 x 14.1	2 x 14.5	4 x 14.1	4 x 14.5
EER (summer mode)		2.59	2.12	2.66	3.31	2.64	3.59
COP (winter mode)		4.79	4.82	5.46	6.31	5.68	5.73
Filter Type		Glass Micro Fiber	Glass Micro Fiber	Microcell Rigid Filters	Microcell Rigid Filters	Microcell Rigid Filters	Microcell Rigid Filters
Classification (EN779:2012)	M	M5	M5	M6	M6	M6	M6
Filtration Efficiency	%	55	55	60 - 80	60 - 80	60 - 80	60 - 80
Total Filtration Area	m2	2.7	4.06	37.2	46.5	37.2	130.2

MAX.e³

max.e3 - Hybrid AHU with "2-stage thermodynamic heat recovery technology"- recovering up to 100% of the extract heat / cool / humidity. Fitted with a Sorption Rotary Heat Exchanger

Damvent
to reach...and exceed

key
FEATURES

- Increased Total Filtration Area(m2) by 45%.
- Decreased Total Internal Pressure Drop (Pa) by 20÷40%
- Sound Pressure Level, reduced up to 5 dB(A)
- Higher Total Heating Capacity (kW) by 30÷35%
- Precise Condensing Temperature/Pressure control during the summer mode
- Stepless Capacity Control
- Up to 78% humidity recovery during the winter mode
- 30÷45% higher Total Cooling Capacity (kW)

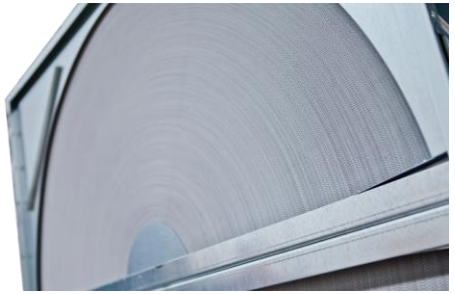
key ADVANTAGES

- Initial Investment Costs
- Installation Cost and Labour
- Installed Electrical Power
- Energy & Running Costs
- Service & Maintenance Cost
- Time
- Space
- BMS

key HARDWARE

Design

The solutions from the max.e3 series are designed and manufactured in accordance with EN 1886 – (Ventilation for buildings-Air handling units Mechanical Performance). Consisting of aluminium profile, supporting elements, connection angles and locking accessories.



Heat Exchanger

All of the max.e3 units use an air-to-air rotary heat exchanger- Sorption type, made from aluminium foil and 3Å molecular sieve, which gives high sensitivity for absorbing water molecules (HM1 type). Sorption rotors provide an excellent method to pre-cool and dehumidify the fresh air before entering the DX cooling coil.

Heat Pump

100% DX unit - No additional water, electric or DX heating/cooling coils are needed in the max.e3, which makes it independent of other additional heating/cooling sources (boilers, chillers, VRF systems, etc.)

Fans

max.e3 use ZAbluefin plug fans with latest EC Blue (Electronically Commutated) from Ziehl-Abegg. Fan wheel statically and dynamically balanced on the axis of the direct-driven motor. Fan wheel, together with the motor, is mounted on a common base frame with vibration dampers.

key HARDWARE

Automation System

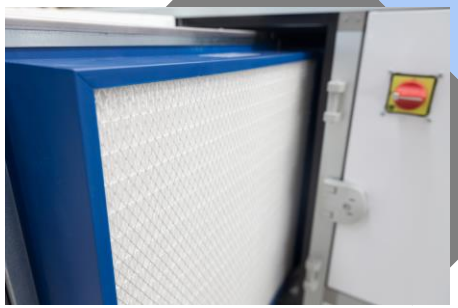
The electric switchboard is integrated into the unit and located on the operation side.

The "Brain" of max.e3 is its specially designed by Damvent controller which controls and manages all processes and protects the unit from eventual cut-offs.

Connectivity

The built-in circuit board allows a permanent internet connection to max.e from any location in the world.

This option helps you/us to make adequate reaction to situations requiring fast and accurate solutions to the problem.



Filters

Microcell filters are used in the units max.e3. These filters are made of plated micro-glass paper and spaced with hot melt adhesive beads, which are uniformly positioned to deliver optimum airflow.

Accessories

It is also possible to produce max.e3 for outdoor mounting

In this instance a Factory Fitted roof is provided.

Each unit is mounted on a galvanized sheet steel C-section base frame. The base frame's standard height is 100 mm with lifting points.

		max.e3-02 1000/2000	max.e3-03 2000/3200	max.e3-04 2000/4000	max.e3-06 4000/7000	max.e3-09 5500/10000	max.e3-15 9000/15000	max.e3-18 13000/18000
Nominal Airflow	m3/h	1500	2500	3500	6000	9000	13000	16000
Total Cooling Capacity (summer mode)	kW	15.3	24.8	31.7	56.7	79.1	119.5	144.1
Total Heating Capacity (winter mode)	kW	26.3	46.5	60.8	107.7	155.5	228.5	277.5
Total Installed Power (compressors + fans)	kW	7.7	9.95	10.8	19.9	26.6	34.2	45.6
Total Power Input (compressors + fans) (summer mode)	kW	3.41	6.11	7.2	11.94	14.16	24.66	30.26
Full Load Current	A	20.8	22.1	22.5	44.2	53	85.2	93.6
Motor Efficiency		IE5	IE5	IE5	IE5	IE5	IE5	IE5
Installed Motor Power Supply side	kW	2.5	2.5	2.5	2 x 2.5	3 x 2.5	2 x 3.6	2 x 5.2
Installed Motor Power Exhaust side	kW	2.5	2.5	2.5	2 x 2.5	3 x 2.5	2 x 3.6	2 x 5.2
Installed Current Supply side	A	4	4	4	2 x 4.0	3 x 4.0	2 x 5.4	2 x 8.4
Installed Current Exhaust side	A	4	4	4	2 x 4.0	3 x 4.0	2 x 5.4	2 x 8.4
Protection Class	IP	55	55	55	55	55	55	55
Temperature Efficiency (winter mode)	%	77.1/79.4	76.7/78.9	71.5/72.6	75.6/77.6	74.4/76.2	74.7/76.5	73.0/74.4
Recovered Heating Capacity (winter mode)	kW	21.9	36.2	47	85.6	126.3	182.9	219.7
Mass Transfer Humidity (winter mode)	l/h	10.6	17.6	22.6	41.4	61	88.5	105.9
Compressor Type		Rotary	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Number of compressors		1	1	1	2	2	4	4
Number of circuits		1	1	1	1	1	2	2
Winter Mode Power Input	kW	1 x 1.46	1 x 2.91	1 x 3.25	2 x 2.77	2 x 3.11	4 x 2.66	4 x 3.09
Summer Mode Power Input	kW	1 x 2.83	1 x 5.37	1 x 5.88	2 x 5.02	2 x 5.48	4 x 4.88	4 x 5.75
Max. Full Load Current	A	1 x 12.8	1 x 14.1	1 x 14.5	2 x 14.1	2 x 14.5	4 x 14.1	4 x 14.5
EER (summer mode)		2.76	2.33	2.76	2.77	3.37	2.96	3.08
COP (winter mode)		2.92	3.48	4.08	3.89	4.58	4.01	4.41
Filter Type		Microcell Rigid Filters	Microcell Rigid Filters	Microcell Rigid Filters	Microcell Rigid Filters	Microcell Rigid Filters	Microcell Rigid Filters	Microcell Rigid Filters
Classification (EN779:2012)	M	M6	M6	M6	M6	M6	M6	M6
Filtration Efficiency	%	60 - 80	60 - 80	60 - 80	60 - 80	60 - 80	60 - 80	60 - 80
Total Filtration Area	m2	18.6	24.8	24.8	37.2	43.4	65.1	65.1
Classification (EN779:2012)	M	M5	M5	M6	M6	M6	M6	M6
Filtration Efficiency	%	55	55	60 - 80	60 - 80	60 - 80	60 - 80	60 - 80
Total Filtration Area	m2	2.7	4.06	37.2	46.5	37.2	130.2	130.2

MAX.e POOL

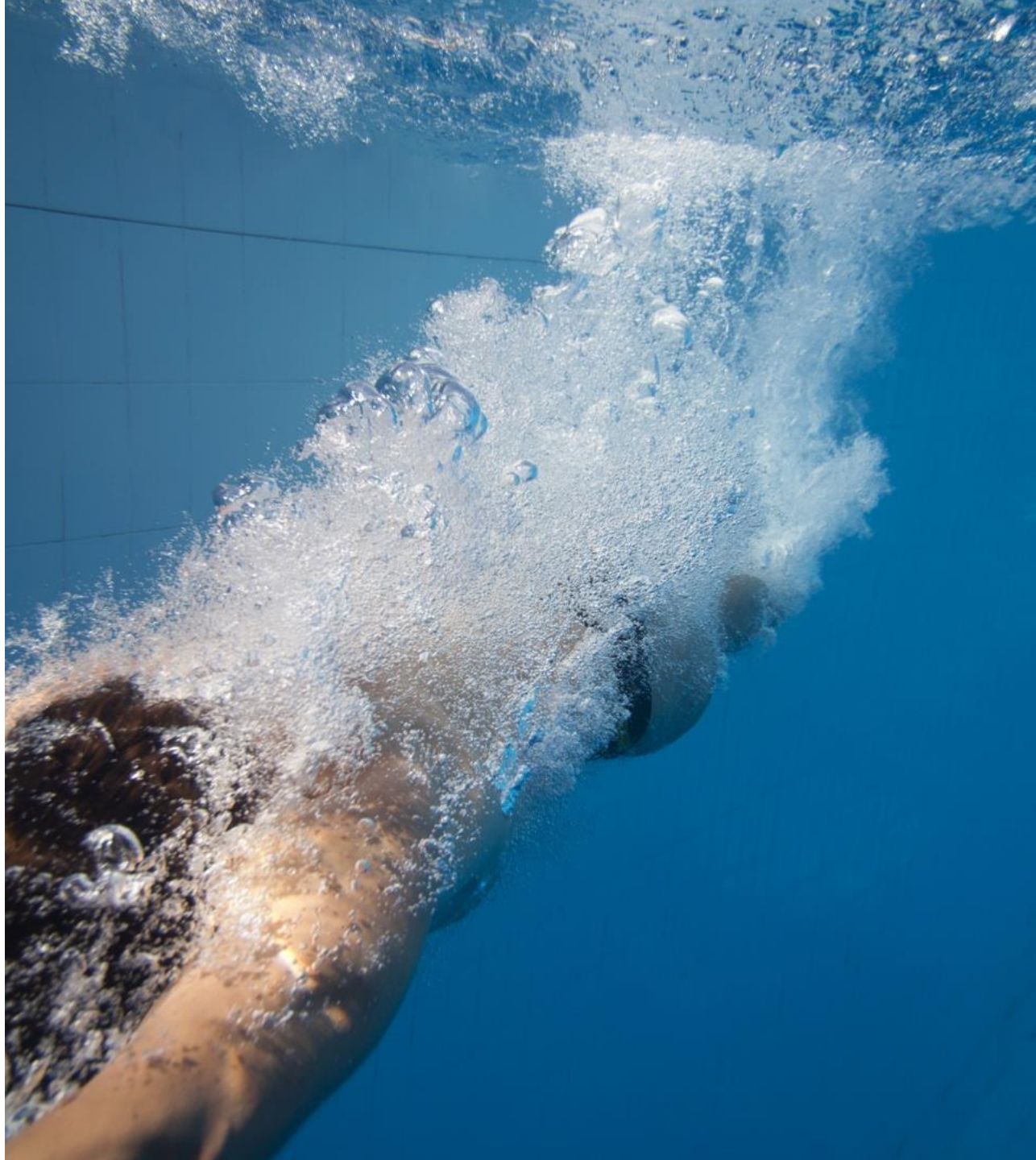
max.e-pool is designed to maintain the indoor climate parameters (Temperature and Relative Humidity) in covered swimming pools.

Damvent
to reach...and exceed

key

FEATURES

- Available in 7 Standard Sizes (from 2,000m3/h to 18,000m3/h)
- Suitable for Internal or External(with Factory Fitted Roof) Installation
- plate air-to-air heat exchangers, made from aluminium fins - “epoxy” coated
- Compact design
- Lower refrigerant content compared to the classical systems
- Stepless Capacity Control



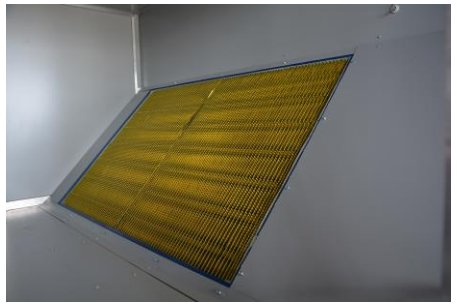
key ADVANTAGES

- Initial Investment Costs
- Installation Cost and Labour
- Installed Electrical Power
- Energy & Running Costs
- Service & Maintenance Cost
- Time
- Space
- BMS
- Suitable for Every Climate – from -20°C to +40°C

key HARDWARE

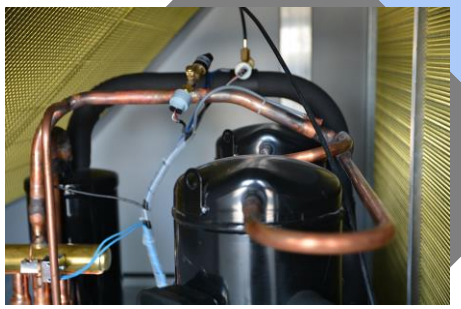
Design

max.e-pool is designed as a system with the structure of the unit manufactured as a mono-block. The construction is manufactured from high-quality profiles made of extruded aluminium characterized by high strength and resistance to adverse weather conditions.



Heat Exchanger

For all of the units of the type max.e-pool are used plate air-to-air heat exchangers, made from aluminium fins - “epoxy” coated, with condensate drain pan. This special cover of the plate heat exchanger allows extending their useful life and also their best levels of performance for a long time.



Heat Pump

100% DX unit - No additional water, electric or DX heating/cooling coils are needed in the max.e-pool, which makes it independent of other additional heating/cooling sources (boilers, chillers, VRF systems, etc.)

Fans

max.e-pool use ZAbluefin plug fans with latest EC Blue (Electronically Commutated) from the company Ziehl-Abegg. Fan wheel statically and dynamically balanced on the axis of the direct-driven motor. Fan wheel, together with the motor, is mounted on a common base frame with vibration dampers.

key HARDWARE

Automation System

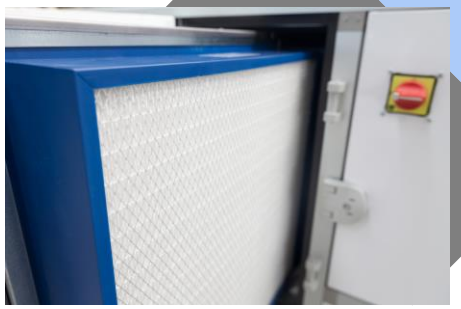
The electric switchboard is integrated into the unit and located on the operation side.

The "Brain" of max.e-pool is its specially designed by Damvent controller which controls and manages all processes and protects the unit from eventual cut-offs.

Connectivity

The built-in circuit board allows a permanent internet connection to max.e from any location in the world.

This option helps you/us to make adequate reaction to situations requiring fast and accurate solutions to the problem.



Filters

Filters are installed at the entrance of the unit to ensure the normal operation of the AHU and to prevent contamination of the components.

Filter medium composition: Polyurethane with the possibility for regeneration (washable)

External Option

It is also possible to produce max.e-pool for outdoor horizontal mounting

The construction is manufactured from high-quality profiles and roof.

Galvanized sheet steel C-section base frame. The base frame's standard height is 100 mm.

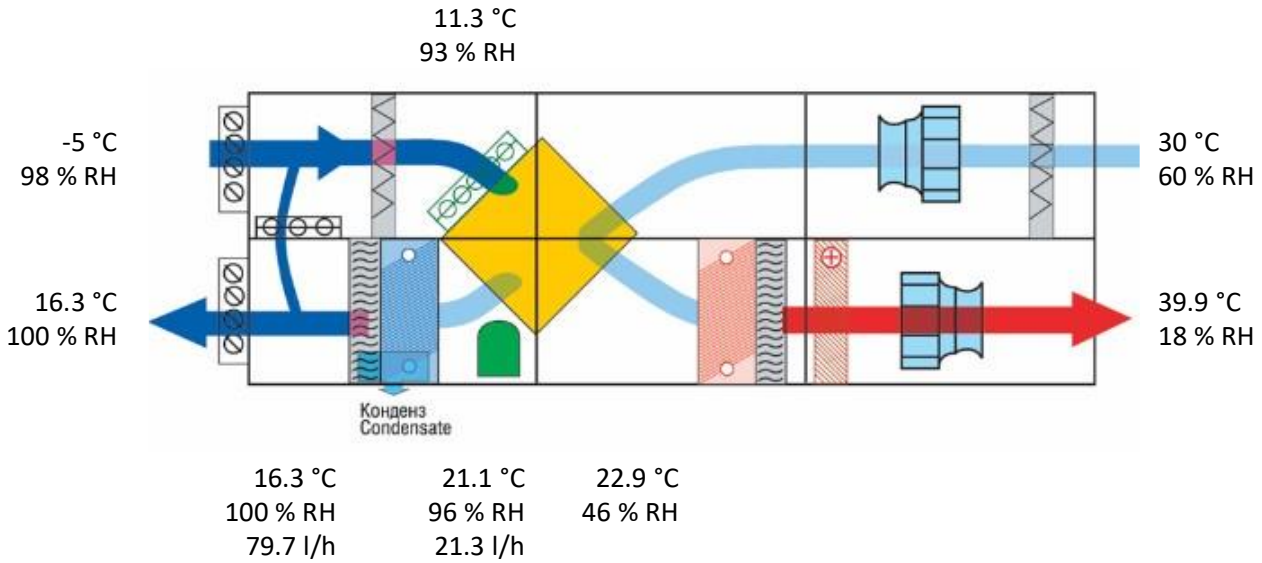
Working Modes

Damvent
to reach...and exceed

operation mode

DEHUMIDIFICATION WITH HEAT PUMP

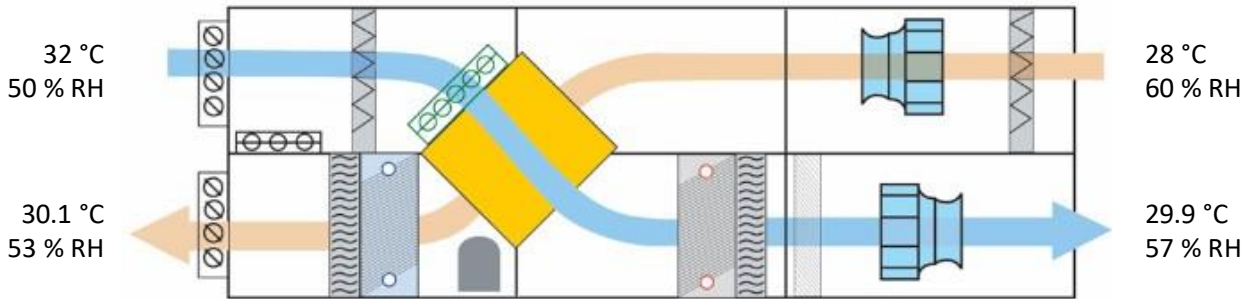
- Typically used as main operation mode
- The exhaust air from the pool is pre-cooled in the plate heat exchanger, then sub-cooled in the evaporator below the dew point temperature.
- The moisture in the form of condense is taken out.
- The necessary fresh air is partially mixed with dehumidified, recirculation air.
- The mixed air is first pre-heated in the plate heat exchanger, then re-heated within the condenser and then supplied to the pool.



operation mode

100% VENTILATION WITHOUT HEAT PUMP

- Typically used during the warmer summer days, the heat pump is switched off and only the exhaust and supply fan are operating.
- The bypass of the plate heat exchanger is open and the unit supplies to the pool the maximum quantity of fresh air, achieving an optimum comfort.



		max.e3 pool-02 1000/2000	max.e3 pool-03 2000/3200	max.e3 pool-04 2000/4000	max.e3 pool-06 4000/7000	max.e3 pool-09 5500/10000	max.e3 pool-13 9000/14500	max.e3 pool-20 13000/20000
Nominal Airflow	m3/h	1500	2500	3500	6000	9000	13000	16000
Dehumidification capacity (VDI 2089)	kg/h	10.9	17.8	22.1	39.4	52.9	75	99.3
Pool Area Surface (Private pool)	m2	56	93	130	224	336	486	600
Pool Area Surface (Public pool)	m2	42	70	100	168	252	365	450
Total Heating Capacity (winter mode)	kW	19	31.7	39.7	69.2	92.8	136.7	174
Total Installed Power (compressors + fans)	kW	7.7	10	10.8	16.9	18.4	34.8	41.6
Total Power Input (compressors + fans) (winter mode)	kW	3.41	5.92	7.37	11.49	14.07	26.45	27.93
Full Load Current	A	20.8	22.1	22.5	39.4	39.8	85.4	87.6
Connection Voltage	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
COP Net (winter mode)		5.57	5.35	5.39	6.02	6.6	5.17	6.23
Motor Efficiency		IE5	IE5	IE5	IE5	IE5	IE5	IE5
Installed Motor Power Supply side	kW	2.5	2.5	2.5	3.5	4.6	6	2 x 4.6
Installed Motor Power Exhaust side	kW	2.5	2.5	2.5	3.5	4.6	6	2 x 4.6
Installed Current Supply side	A	4	4	4	5.6	7.4	9.4	2 x 7.4
Installed Current Exhaust side	A	4	4	4	5.6	7.4	9.4	2 x 7.4
Protection Class	IP	55	55	55	55	55	55	55
Temperature Efficiency (winter mode)	%	68	68	65	67	66	63	65
Recovered Heating Capacity (winter mode)	kW	7.9	13	16.7	29.6	42.3	60	76.2
Condensation Rate (winter mode)	l/h	3.5	5.8	6.9	12.6	17	24.1	31.3
Compressor Type		Rotary	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Number of compressors		1	1	1	2	2	4	4
Number of circuits		1	1	1	1	1	2	2
Winter Mode Power Input	kW	1 x 2.62	1 x 4.79	1 x 5.42	2 x 4.38	2 x 4.73	4 x 4.26	4 x 4.88
Max. Full Load Current	A	1 x 12.80	1 x 14.10	1 x 14.50	2 x 14.10	2 x 14.50	4 x 14.10	4 x 14.50
COP (winter mode)		4.13	3.78	4.04	4.38	5.2	4.79	4.91
Filter Type		Polyester	Polyester	Polyester	Polyester	Polyester	Polyester	Polyester
Classification (EN779:2012)	M	M5	M5	M5	M5	M5	M5	M5
Filtration Efficiency	%	50	50	50	50	50	50	50
Total Filtration Area	m2	2.7	4.06	4.06	3.04	4.18	3.04	4.14

max.e3dh

max.e3dh - is a 3 stage (Heat / Cool / Humidity) recovery hybrid designed to maintain T/RHsupply (°C/%) around the world, throughout the whole year, passing through different modes absolutely automatically

Damvent
to reach...and exceed

key FEATURES

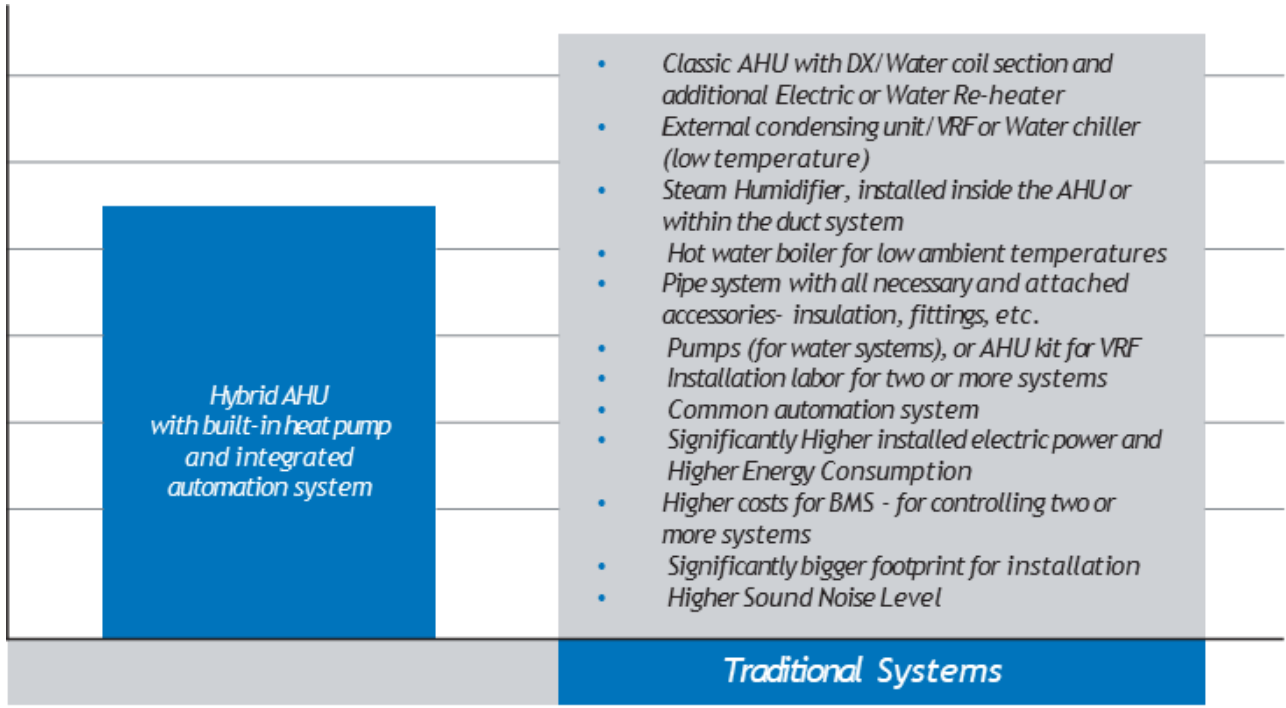
- Available in 5 Sizes, ranging from a nominal 4,000m3/h to 18,000m3/hr
- It is a unique **3 stage Heat/Cool/Humidity** Recovery Hybrid designed to closely control the RH(%) and T(°C)
- MAX.E3 DH* is **designed to maintain T/RHsupply** (°C/%) around the world, throughout the whole year

key FEATURES

- Achieved by - "consecutively" in 3 stages:
  - 1st stage - Cool / Humidity Recovery in the rotary wheel +
  - 2nd stage - deep cooling and dehumidifcation in the evaporator +
  - 3rd stage - re-heating by the additional re-heater (condenser) in summer, spring and autumn seasons and 1.Heat/Humidity recovery by the rotary wheel + 2.Heating by the Condenser + 3.Humidification by the Steam Humidifier in the winter season.

key ADVANTAGES

- Initial Investment Costs
- Installation Cost and Labour
- Installed Electrical Power
- Energy & Running Costs
- Service & Maintenance Cost
- Time
- Space
- All in One Solution

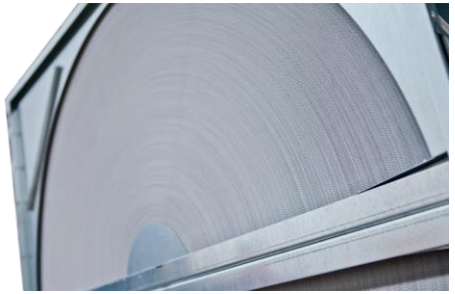


Damvent
to reach...and exceed

key HARDWARE

Design

The solutions from the max.e3-DH series are designed and manufactured in accordance with EN 1886 – (Ventilation for buildings-Air handling units Mechanical Performance). Consisting of aluminium profile, supporting elements, connection angles and locking accessories.



Heat Exchanger

All of the max.e3-DH units use an air-to-air rotary heat exchanger- Sorption type, made from aluminium foil and 3Å molecular sieve, which gives high sensitivity for absorbing water molecules (HM1 type). Sorption rotors provide an excellent method to pre-cool and dehumidify the fresh air before entering the DX cooling coil.

Heat Pump

100% DX unit - No additional water, electric or DX heating/cooling coils are needed in the max.e3-DH, which makes it independent of other additional heating/cooling sources (boilers, chillers, VRF systems, etc.)

Fans

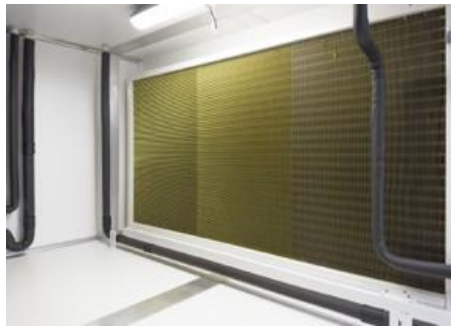
max.e3-DH use ZAbluefin plug fans with latest EC Blue (Electronically Commutated) from Ziehl-Abegg. Fan wheel statically and dynamically balanced on the axis of the direct-driven motor. Fan wheel, together with the motor, is mounted on a common base frame with vibration dampers.

key HARDWARE

Automation System

The electric switchboard is integrated into the unit and located on the operation side.

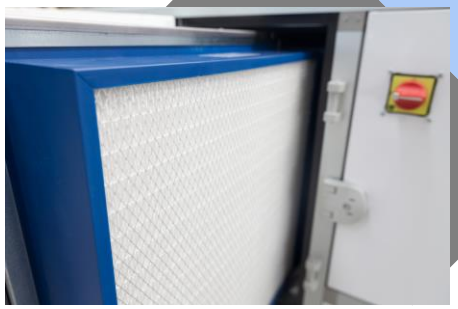
The "Brain" of max.e3-DH is its specially designed by Damvent controller which controls and manages all processes and protects the unit from eventual cut-offs.



+ DH Re-heater

The additional re-heater is an integral part of the refrigerant circuit and recovers heat.

The re-heated air is supplied with the desired parameters (e.g. T/RHsupply = 18°C/50%) without using any electric or water source.



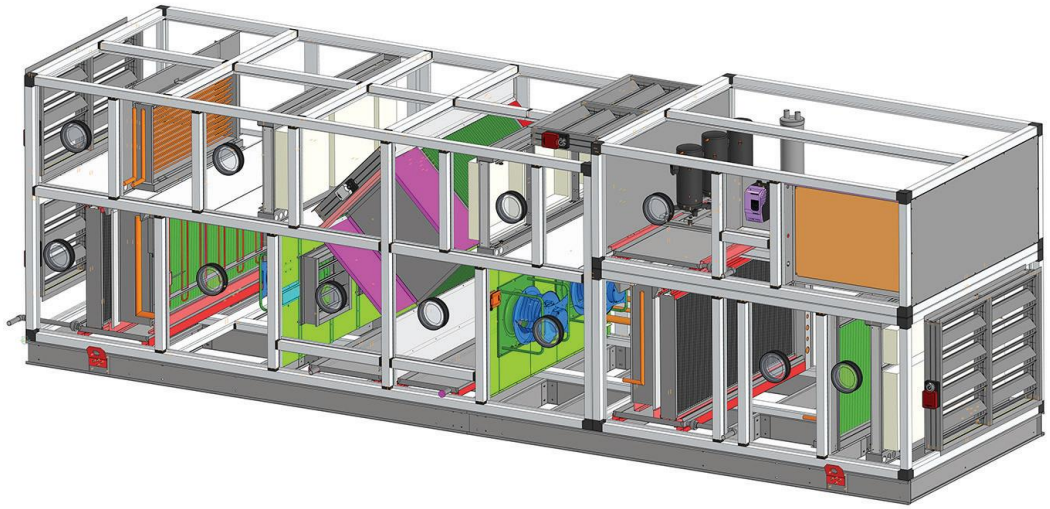
Filters

Microcell filters are used in the units max.e3-DH. These filters are made of plated micro-glass paper and spaced with hot melt adhesive beads, which are uniformly positioned to deliver optimum airflow.

Steam Humidifier

During the winter season, we recover up to 85% of the extract RH(%) from the room, but still, an additional Steam Humidifier is required to reach the necessary RHroom(%)

The humidifier could be fully integrated within the unit or installed within the building but in both cases controlled by our ICB.



max.e3dh - is a 3 stage (Heat / Cool / Humidity) recovery hybrid designed to maintain T/RH supply (°C/%) around the world, throughout the whole year, passing through different modes absolutely automatically

key

FEATURES

- Designed specifically for **Healthcare** Buildings.
- They comply with the requirements of Health Technical Memorandum 03-01 (reference: PAR38) (**HTM 03-01**).
- Component access is **right-hand side** in the direction of airflow. Left-hand side access is available upon request.
- Suitable for **internal** and **external** installation. For external applications, an additional roof plate is fitted.

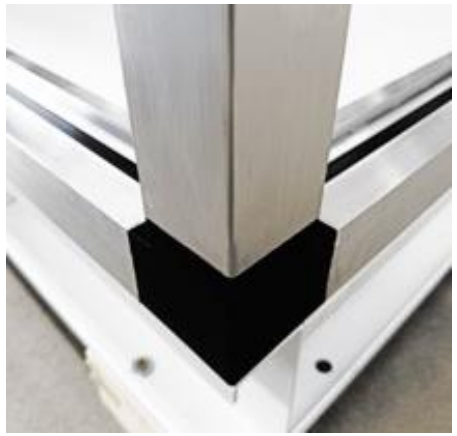
key TECHNICAL ELEMENTS

- Mechanical Strength: **D1** - Air Leakage: **L1** - Thermal transmittance: **T2** - Thermal Bridging: **TB2**
- All doors have locking handles with keys. Those exposed to positive pressure (overpressure) are equipped with **handles with safety pawls** that protect against the sudden opening of the door caused by the air pressure.
- All four inlets/outlets of the AHU are equipped with **shut-off louvre dampers**. Their position is controlled via spring return actuators.
- The current pollution of the filters can be monitored on **Magnehelic gauges**. Their displays (dials) are installed outside the AHU
- Each complete fan assembly is mounted on a diaphragm plate **on slide rails** for easy removal.
- The fan section provides enough free space for access, servicing, and replacing the fans. The wires are equipped with **plug-in/out connectors** to ease fan replacement.
- When the fan section is equipped with two or more fans, each fan nozzle (located on its suction side) is equipped with a **non-return louvre damper**. This avoids the by-pass of the air through the nozzle of the non-working fan.

key ADVANTAGES

- Integrated Heat Pump
- Installation Cost and Labour
- Installed Electrical Power
- Energy & Running Costs
- Service & Maintenance Cost
- Fully Factory Tested
- Time / Space
- Fully integral Controls with BMS/SCADA & remote maintenance

key HARDWARE

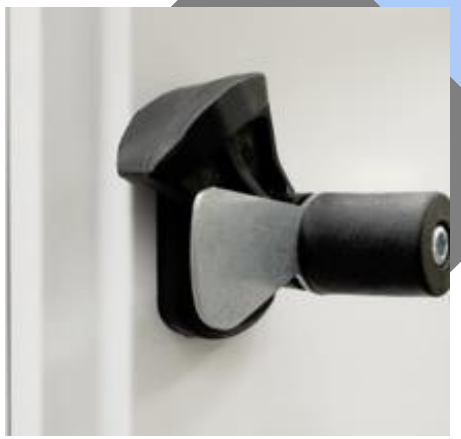


Construction

The aluminum profiles are hygienic execution with round inner corners. Also, they are equipped with a thermal break system

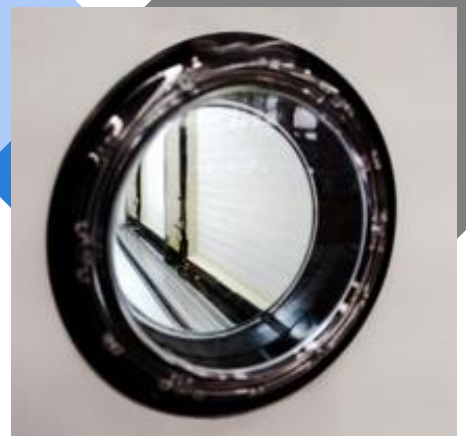
Base Frame

Each unit is mounted on a 170 mm high, 3 mm thick galvanized sheet steel C-section base frame — powder-coated RAL 9003 (white mat). The base frame is designed for lifting and moving the AHU by forklift (using the channels in the frame) and by crane (using lifting lugs).



Doors

All doors have locking handles with keys. Those exposed to positive pressure (overpressure) are equipped with handles with safety pawls that protect against the sudden opening of the door caused by the air pressure.



Service

All enclosure panels on the service side are removable.

For visible check of inner AHU condition, doors and enclosure panels are equipped with glass viewports (windows).

key HARDWARE

Internal Lighting

Also, all sections have internal LED lights controlled by a common switch.

Removable Trays

Condensate drain trays are manufactured from stainless steel and are fitted beneath condensate producing components. Condensate removal occurs via traps which are provided by others.

Dampers

Dampers have 100mm pitch louvres manufactured from anodised aluminum profiles with nylon gears. For better maintenance, dampers are located outside the AHU body.

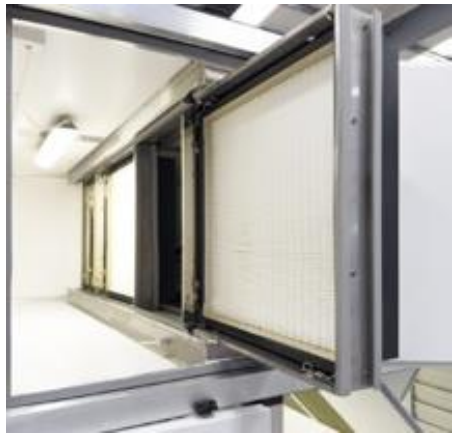
Damper tightness is enhanced by gaskets fitted along the louvre length and within the frame.

Bypass Damper

The brass shaft for counter-flow movement of the damper blades has a square section of 12x12 mm and is 50 mm long.

max.e2-DH HTM-03 is also equipped with a bypass damper of the plate heat exchanger foreseen to open in case of freezing.

key HARDWARE



Filters

max.e2-DH HTM-03 units use M6 and F9 microcell rigid filters. The fresh air side filter has an efficiency of M6. An F9 class filter delivers fine filtration on the Supply air side. The same filter is used on the Extract air side.

Dirty Filter

Each filter is fitted with a pressure stat to provide an alarm signal when the filter pressure drop exceeds the dirty filter setting.

The current pollution of the filters can be monitored on Magnehelic gauges. Their displays (dials) are installed outside the AHU

Fans

EC Plug Fans complete with integrated frequency inverter and IE5 efficiency motor. The fan wheel is statically and dynamically balanced on the axis of the direct-driven motor before the complete assembly is mounted on a common base frame with anti-vibration isolators.

Heat Exchanger

The plate heat exchanger is equipped with condensing drain trays as a component that generates condensing.

Drain trays are made of stainless steel with a sufficient slope for the outflow of the condense through the water traps (siphons)

key HARDWARE

Filters

The heat pump is located outside of the air stream in a separate section! This feature reduces the possibility of refrigerant coming into the conditioned area in case of leakage.

Leak Detection

max.e2-DH HTM-03 units are equipped with a refrigerant leakage sensor whose role is to register elevated concentrations (in ppm) of chlorofluorocarbon gases in the supplied air.

Defrost Mode

Installed on the surface of the evaporator (the DX coil is located on the exhaust air side during the Winter mode). When there are enough available conditions which would cause icing on the coil surface, defrost module will be switched on. Generating radiant heating, the coil's fins will be protected from icing.

Controls

The "Brain" of the max.e2-DH HTM-03 is the ICB controller specially designed by Damvent, which controls and manages all processes and protects the unit from unexpected cut-offs. The software automates all processes and is developed with a high level of expertise.

Damvent
to reach...and exceed

https://youtu.be/hUtXzvaWXNU

MAX.e thvac

Air-to-Air packaged Heat Pump for Space Cooling and Space Heating via 100% Fresh/Extract Air

Damvent
to reach...and exceed

main

FEATURES

1

Plate Heat Exchanger

For all of the units of the type max.e thvac are used high efficiency air-to-air plate heat exchangers (PHE), made from aluminum fins, with condensate drain pain and with Edry = 65 - 70%

The PHE is equipped with by-bass damper for free-cooling and smooth capacity control.

2

Heat Pump

- High Efficiency DC + EVI Scroll compressor with enhanced performance (- 30 to + 60°C)
- BLDC Variable Frequency Drive (VFD)
- Electronic Expansion Valves (EEV)
- High efficiency Cu/Al coils
- Refrigerant – R410A
- Continuous work during frost forming conditions

3

Fans

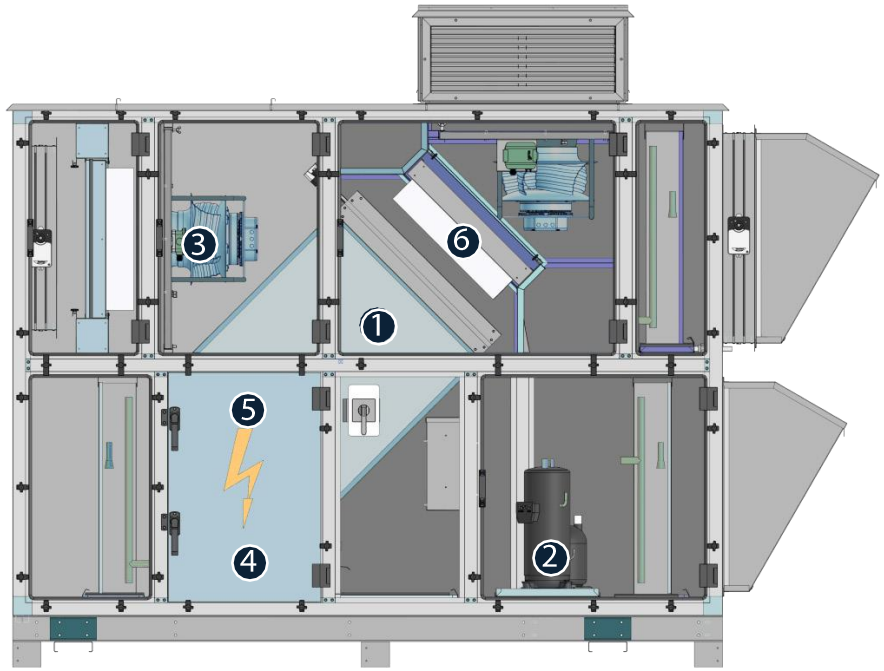
max.e tHVAC use ZAbluefin plug fans with latest EC Blue (Electronically Commutated) from of the company Ziehl-Abegg. Fan wheel statically and dynamically balanced on the axis of the direct-driven motor. Fan wheel together with the motor are mounted on a common base frame with vibration dampers.

4

Automation System

max.e tHVAC is fully equipped with all necessary automation and all executive mechanisms. The electric switchboard is integrated into the unit and located on the operation side.

The "Brain" of max.e tHVAC is its specially designed by Damvent controller which controls and manages all processes and protects the unit from eventual cut-offs.



1 Plate heat exchanger
2 Heat pump
3 Fans
4 Automation system
5 Connectivity and Mobility
6 Filters

main

FEATURES

5

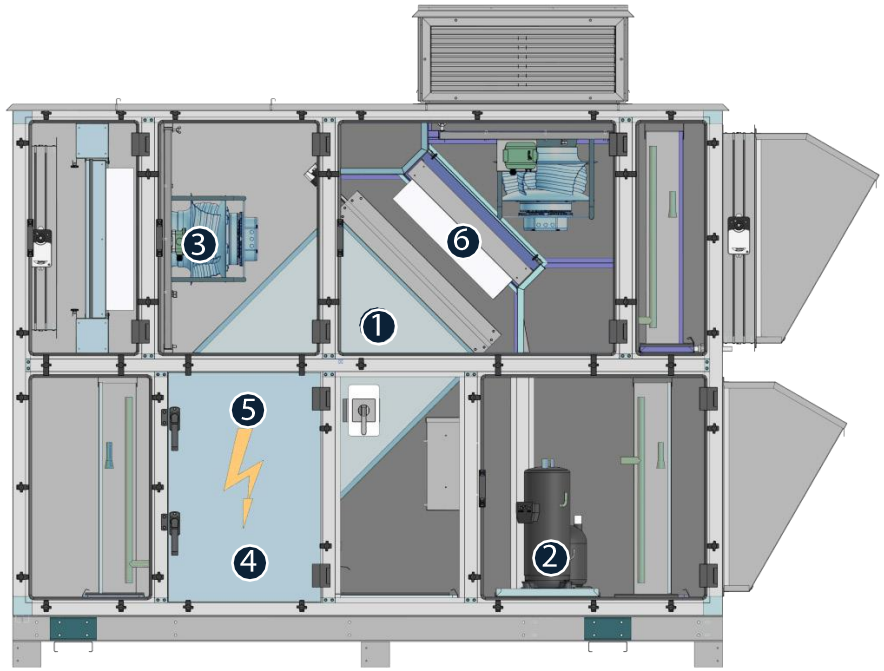
Connectivity and mobility

All hybrid units allow the corresponding connector of the ICB controller to be mounted specialized internet circuit board for internet connection. The built-in circuit board, allows a permanent internet connection to the max.e tHVAC from any location in the world. This option helps you/us to make immediate changes to situations requiring fast and accurate solutions to the problem.

6

Filters

Filters are installed at the air entry of the unit to ensure normal operation of the AHU and to prevent contamination of the components.
Microcell filters are used in the units max.e tHVAC. These filters are made of plated micro glass paper and spaced with hotmelt adhesive beads which are uniformly positioned to deliver optimum airflow.



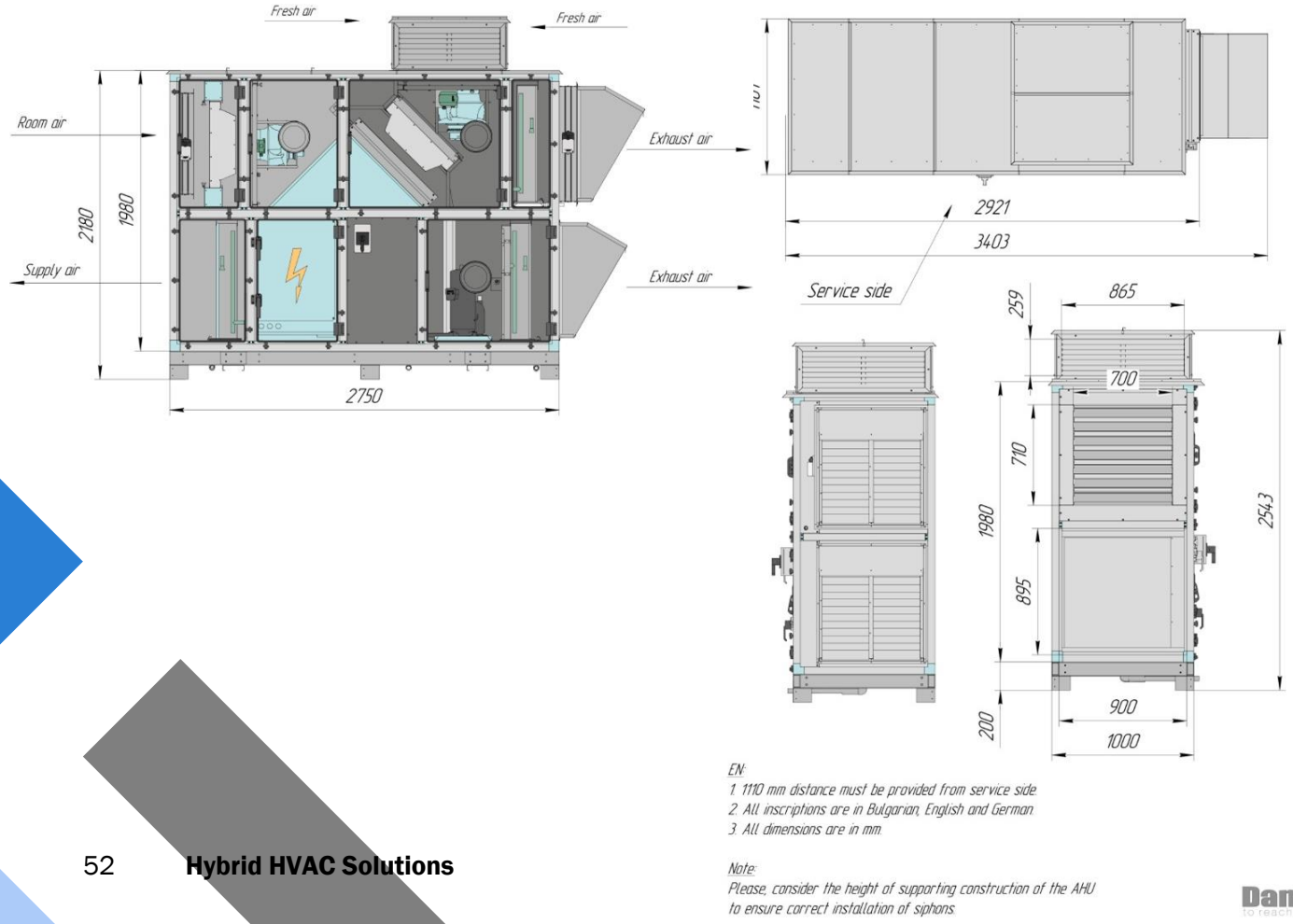
1 Plate heat exchanger
2 Heat pump
3 Fans
4 Automation system
5 Connectivity and Mobility
6 Filters

key ADVANTAGES

- Space Cooling and Space Heating unit using 100% fresh air, with no recirculation air, nor indoor units. In the **post COVID** times that`s a major advantage. It provides constantly fresh air, exceeding the levels required for max. amount of people in the room.
- By providing a min.air change rate → **nmin = 5(h-1)** and with the Free-Cooling mode, the unit will maintain Troom during intermediate seasons (spring and autumn with Tambient ≥ 10 Cand ≤ 20oC), which form 30-40% of the total annual working hours), only by using Free-Cooling and Ventilation, without compressor`s working. That`s a high energy saving feature, that cannot be achieved elsewhere.

- At design ambient/room conditions (-15oC) COPnet for heating mode of the unit (incl. HR and all fans) reaches: **COPnet = 7,64**
- ...a value not possible for all classic air-to-air heat pumps and VRF`s

key PARAMETERS



MAX.e thvac *TechnicalData Rev.*		Work. Conditions 1 -15°C/90% 22°C/30% 34°C/44% 25°C/50%	Work.Conditions 2 -4°C/98% 22°C/30% 29°C/60% 25°C/50%
T_{supply} (winter)/(summer)(°C)	-	29/15	34/14
Heating Losses/Cooling Loads(kW)	-	10/7	11/12
Heating Capacity/P(compressor)	-	19.5/4.3	21.5/4.8
Heating Capacity/P(Total incl.HR and fans)	-	44.8/5.86	40/6.36
Cooling Capacity/P(compressor)	-	25.5/6.5	25.5/6.5
Cooling Capacity/P(Total incl.HR and fans)	-	31.5/8.05	28.5/8.05
COPnet/EERnet	-	7.64/3.9	6.3/3.54
SCOP/SEER*	-	4.3/5.12	
SeasonalSpaceCool/HeatEfficiency $\eta_{sh/sc}$	-	169/202	
CapacityControl Method	-	Inv erter controlled	
Compressor	Quantity	1	
-	Type	BLDC Scroll	
-	Crankcaseheater(W)	30	
Ambient Temperature Operation Range	°C	-20 ⟶ +40	
Refrigerant	Type/Charge(kG)	R410A/12	
Refrigerant oil	Type/Chargedv olume(l)	Synthetic(ether) oil FV68S / 1.7	
PED Category		CategoryII	
$Airflow_{max}$ (m^3/h)		3000	
Filters	Microcell	-	
Supply/ExtractSide	Class of Filtration	F6	
	Total Filtration Area(m^2)	18.5/12.4	
Plate Heat Exchanger	Type/Material	Crossflow/Aluminum	
-	CapacityControl Method	Bypass	
Recov eredHeat (kW)	-	25.3	18.4
Recov eredCool(kW)	-	6.07	2.9
Temp.Eff(Dry)/Hum.Eff(Wet) %/%	-	66/67	
Supply/ExtractFan	Internal static pressure(Pa)	298/353	
	External static pressure(Pa)	300/300	
	Total Pressure(Pa)	598/653	
	Eff.grade Nactual | Ntarget(%)	65.4/64.8	
	Efficiency Class	IE5	
	Powerabsorbedat fan shaft(Pa)	0.762/0.840	
	Motor Duty(kW)	2.5	
	Motor Efficiency	ErP conformity - 2015/ECcontroller integrated	
Electrical Specifications	-		
Power Supply		3N~ /50Hz/380415V	
Voltage Range	Min.(%)/Max.(%)	±10	
Current	Nominal running current (RLA) - 50Hz (Cooling) - (A)	14,87	
	Full load amps (FLA) - Total (A)	22.27	
Dimensions-without packaging (mm) -BxHxL		1000x2180x2700	
Weight- without packaging(kg)		890	

WF thvac

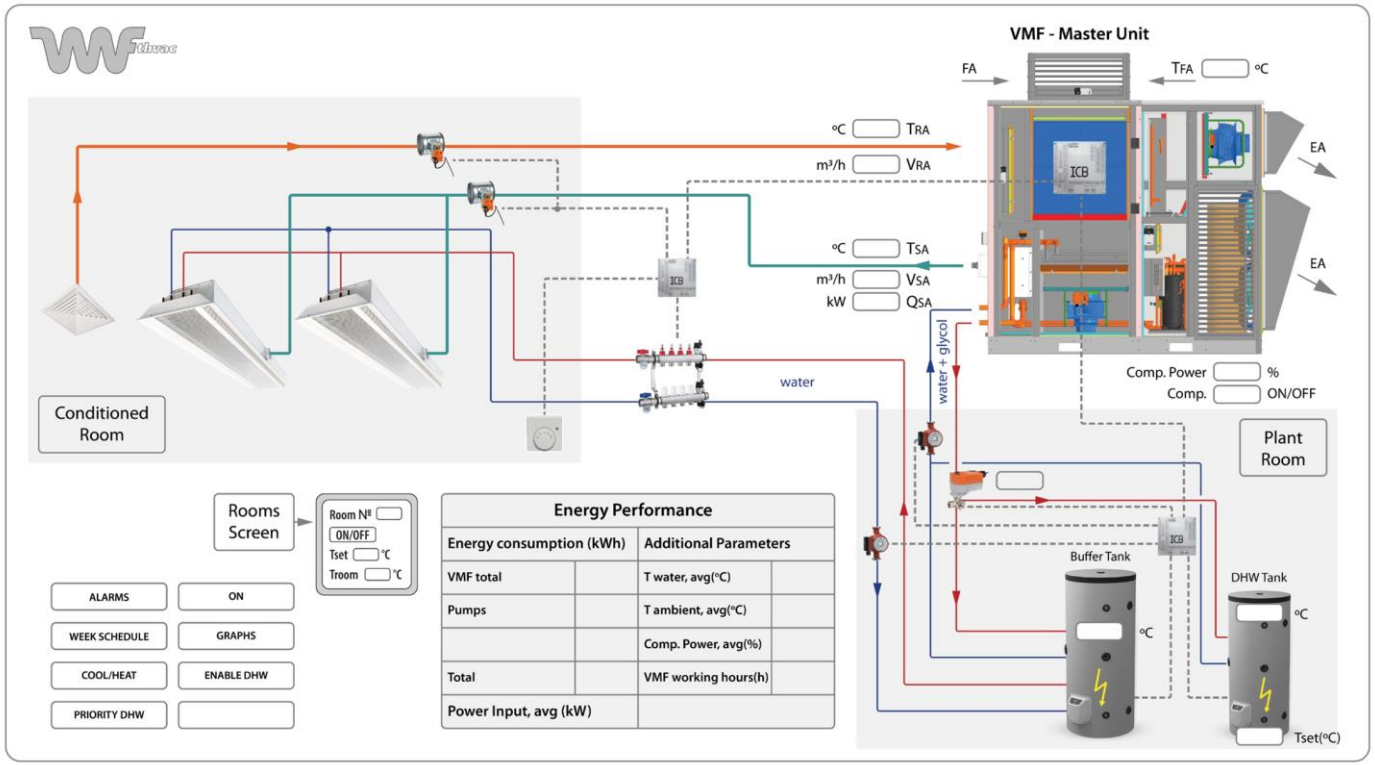
Commercial Air-to-Water Heat Pump + Ventilation, DHW and RH (%) control

- Space Heating
- Space Cooling
- Sanitary Hot Water
- Ventilation 100% Fresh Air
- Humidity Control in summer (RH%)
- Integrated BMS/EMS (Energy Management System)

Damvent
to reach...and exceed

main
FEATURES

Model Range – We believe in Simplicity - VMF has only 2 models - 06/04 with up to 60kW/4200m3/h and 03/02 with up to30kW/2000m3/h. For higher capacity demands, combination of models is available, with Independent or combined Hydraulic Circuit. In that way we can cover from the smallest project to biggest with capacity demands over 1 MW



A+++ Energy Class

Low Noise Operation

+55°C Outlet sanitary water temperature up to +55°C

BLDC inverter compressor + EVI allowing stable operation down up to **-30 °C**

Refrigerant-free rooms - pure water system

ICB- Intelligent Master Controller, equipped with ModBus/RS485 communication Interface to get long distance and smart control

Integrated Hydraulic Module

DC brushless fan Motor and EC ventilation fans

Easy access to every component and easiest of service

Modbus over RS485

Certificates:

key ADVANTAGES

All in 1unit (Single Piece Mono block unit)replacing 3 different traditional units (External Condensing/VRF unit, Ventilation Unit and Dehumidification Unit)

75-100% lower Energy Consumption vs. VRF+AHU
50-75% lower Installed Power Input vs. VRF+AHU

50-100 % Less Footprint for installation vs. VRF+AHU

Outstanding average water temperatures:
Tw,avg = **18-20°C** in cooling
Tw,avg = **35°C** in heating (close to underfloor heating)

2 pipe water system

Ambient Temperature Range

Simultaneous Heating and Cooling in different rooms

NO CO_2 control in the rooms!
Always works with max.
Fresh Air quantity

Centralized/Automatic
Troom(°C) control

Service and Maintenance-
Less than any existing System

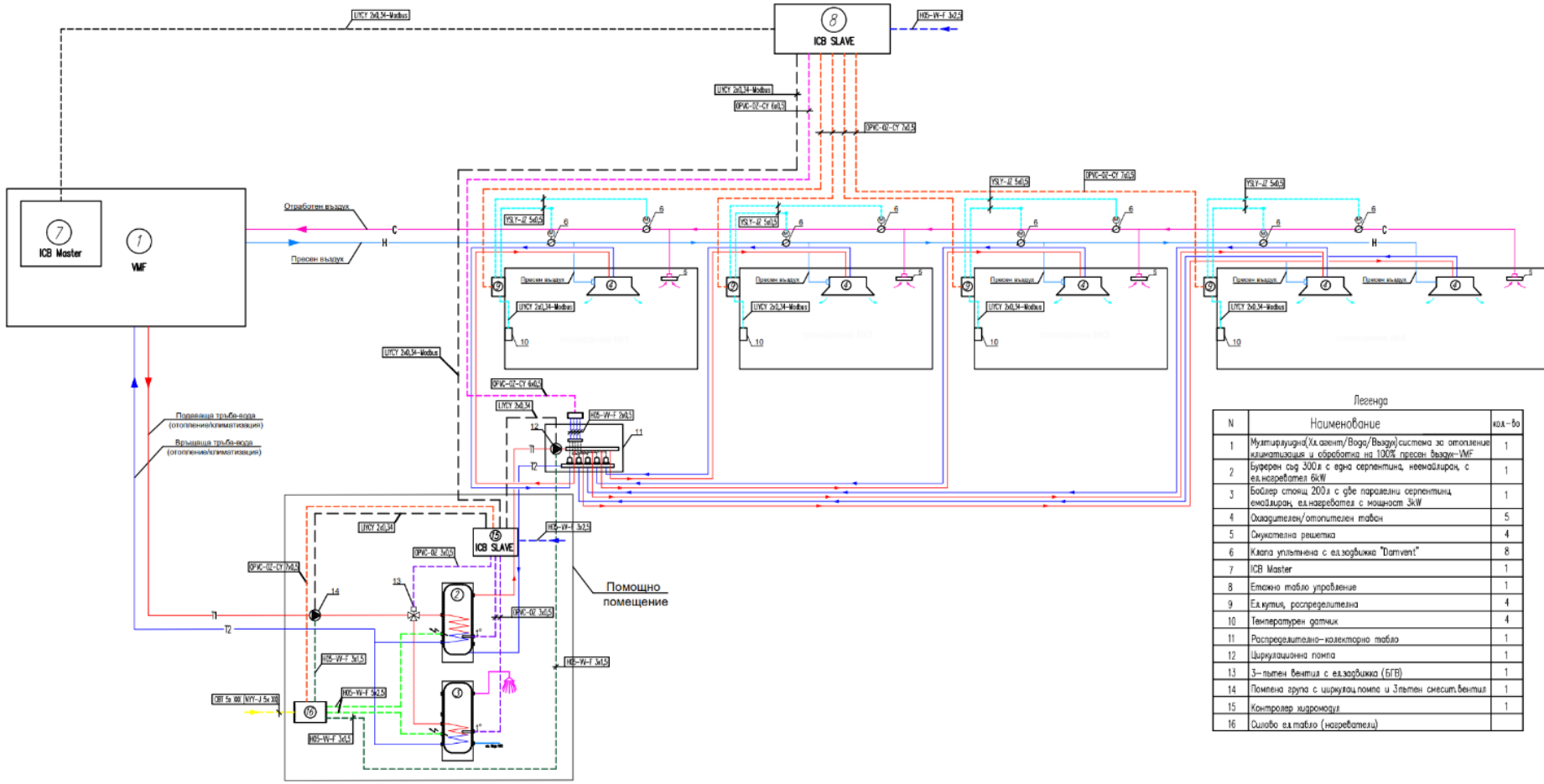
- Yearly heat/cool/humidity recovery of the extract air from the rooms →much higher COPnet
- No Maintenance for coils and fans- located inside → longer life
- No refrigerant noise indoors
- Significantly less electronics vs. VRF + AHU →higher reliability
- Lowest refrigerant quantity (kg) per Capacity(kW) vs. VRF`s- Total of 12kg
- No length/height limitations (m) between VMF and Internal Units (Chilled Beams)
- Separate circulating pump(s) for each floor
- Non-stop work of the system during frost forming conditions
- Only 1 Automation system/Master Controller- No need for BMS(in the HVAC part)!

Cooling/Heating Active Chilled Beams

The traditional internal units (cassettes or fan coils) are replaced by Cooling/Heating Active Chilled Beams with the following distinguished advantages:

typical

SCHEMATIC



Легенда

N	Наименование	кол.-бр
1	Мултифункционална (Хладилен агент/Вода/Въздух) система за отопление, климатизация и обработка на 100% пресен въздух-VMF	1
2	Буферен съд 300л с една серпентина, неемайлиран, с ел.нагревател 6kW	1
3	Бойлер стоящ 200л с две паралелни серпентини, емайлиран, ел.нагревател с мощност 3kW	1
4	Охладителен/отоплителен таван	5
5	Смукателна решетка	4
6	Клапа управлявана с ел.задвижка "Damvent"	8
7	ICB Master	1
8	Етажно табло управление	1
9	Ел.кутия, разпределителна	4
10	Температурен датчик	4
11	Разпределително-колекторно табло	1
12	Циркулационна помпа	1
13	3-пътен вентил с ел.задвижка (БГВ)	1
14	Помпена група с циркулац.помпа и 3пътен смесит.вентил	1
15	Контролер хидромодул	1
16	Силово ел.табло (нагреватели)	

Кабели

№	Обозначение	Наименование
1		LIYCY 2x0,34-Modbus
2		OPVC-OZ-CY 7x0,5
3		OPVC-OZ 6x0,5
4		OPVC-OZ 3x0,5
5		YSLY-JZ 5x0,5
6		H05-VV-F 3x1,5
7		H05-VV-F 5x2,5
8		CBT 5x XXX (NYY-J 5x XX)
9		H05-VV-F 3x2,5

key PARAMETERS

Case Study: City - London (UK) - Total of 8760 h/year

Tout-bin outdoor temperature (°C), Hours - number of hours per bin (h)

T_{room}=22°C (in Heating Mode) and T_{room}=25°C/60% (In Cooling Mode); Domestic Hot Water (DHW) SetPoint = 45°C

Coeff. of Usage - Percentage (%) of the Yearly Operating Hours (h) in which VMF is working prioritized either in DHW or Heat/Cool Yearly Power Input, avg (kW/h) - average value of Total Yearly Energy Consumption (kWh) divided by the Total Yearly Hours (8760h)

SCOP - Seasonal Coefficient of Performance

SEER - Seasonal Energy Efficiency Ratio

London	Heating																					
Tout(oC)	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	2	3	4	5	6	7	8	9	10	11	12
Hours(h)	0	0	0	0	0	0	13	20	44	83	142	159	186	229	270	314	384	481	538	536	535	582
	Free Cooling/Ventilation										Cooling											
	13	14	15	16	17	18	19	20	21	22	24	25	26	27	28	29	30	31	32			
	553	559	559	18	410	432	357	301	228	154	98	77	51	32	32	23	28	12	5	*8760*		

			Coeff.of Usage	
Yearly Energy consumption(kWh)	Heating+Cooling+Ventilation+RH(%) control	42558	0.8	34046.4
Yearly Energy consumption(kWh)	Domestic Hot Water(DHW)- T_{DHW}=45oC	46157	0.2	9231.4
			Total:	43277.8
Yearly Power Input,avg/hour(kW/h)				4.94
SCOP/SEER	Heating+Cooling+Ventilation+RH(%) control			7.18
SCOP	Domestic Hot Water(DHW)- TDHW=45oC			3.7
$SCOP/SEER_{eq}$	Cooling+Ventilation+RH(%)control+(DHW)- TDHW=45oC			6.48

* Pumps = 7-10% x VMF's yearly Energy Consumption

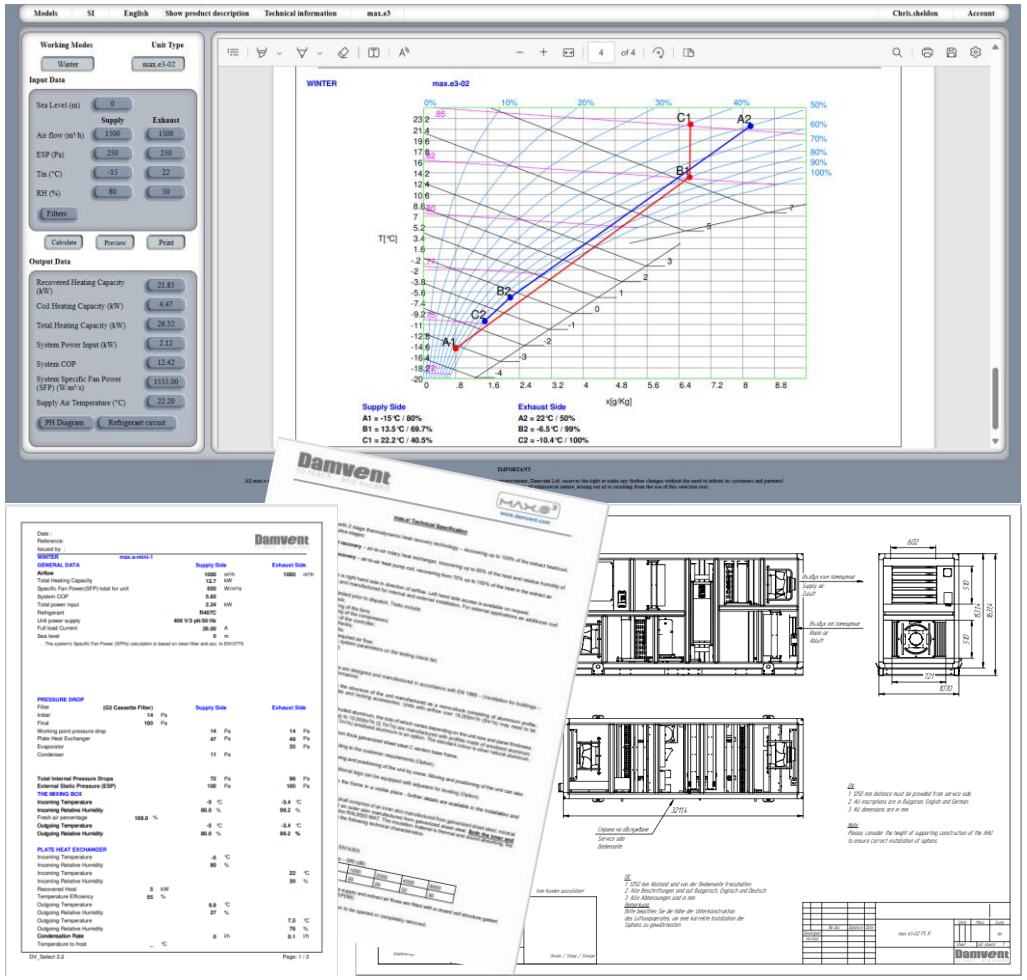
Model		VMF 03/02	VMF 06/04
		Refrigerant Side/Circuit	
Cooling Capacity (Nom)-kW		29(1)	55(1)
Heating Capacity (Nom)-kW		27,5(2)	57(2)
Capacity Control Method		Inverter controlled	Inverter controlled
PI_{nom}(Cooling)-kW @50Hz		6,3(1)	12.29(1)
PI_{nom}(Heating)-kW @50Hz		5.8(2)	11.15(2)
EER		4.6(1)	4.475(1)
ESEER		5.27(5)/6.94(6)	5.23(5)/7.05(6)
COP		4,74(2)	5.11(2)
Air flow rate (Cooling Nom.) m³/h		9000	14000
Sound power level	Cooling Nom. dBA	72,8	80,9
Sound pressure level	Cooling Nom. dBA	53	60,8
Compressor	Model/Quantity	BLDC/1	BLDC/1
Operation range	Cooling Min.~Max. °CDB	-10→+45	-10→+45
	Heating Min.~Max. °CWB	-30→+15	-30→+15
	Simultaneous Cooling and Heating	-10→+25	-10→+25
Refrigerant	Type/Charge(kG)	R-410A /8	R-410A /12
PED Category		Category II	Category II
		Fresh Air Side	
$Airflow_{nom(max)}$(m3/h)		1500 (2000-max.)	3100 (4200-max.)
Filters	Microcell	F7	F7
Heat Recovery	Type/Material	Plate HE-Counterflow	Plate HE-Counterflow
Recovered Heat (kW)		7,8	13.4(4)
Recovered Cool(kW)		9	15.44(3)
Temp.Eff(Dry)/Hum.Eff(Wet) %/%		76/60	76/60
Supply/Extract Fans	Internal static /Total pressure(Pa)	(275/300)/1150	(275/233)/1500
	Efficiency grade Nactual |Ntarget(%)	81,2 |62	80,4 |62
	Efficiency Class	IE5	IE5
	Power absorbed at fan shaft(Pa)	0,575	0.784/0.715
	Motor Duty(kW)	1,3	2,5
	Motor Efficiency	ErP conformity 2015/EC controller Integrated	ErP conformity 2015/EC controller Integrated
		Water Side	
Plate Heat Exchanger	Type	Brazed Plate	Brazed Plate
	Water volume (l)	2,8	5,2
	Flow Rate-Cooling/Heating (l/h)	6500/5000	11000/8500
Operation Water temp.	Heating (◦C)/Cooling(◦C)	20→60 /7→25	20→60 /7→25
Water Pipe	Outlet(mm)/Inlet(mm)	32/32	42/42
		VMF General Data	
*Cooling/Heating Capacity (Tot)-kW		38/35.3	70,44/70.4
*PI_{tot} (Cooling)/(Heating)- kW		7/6,5	13.3/12.5
*COPnet/ *EERnet		5.42/5.43	5.6/5.66
Power Supply		380-415v, 50Hz, 3N~	380-415v, 50Hz, 3N~
Nominal running current 50Hz (Cooling) - (A)		13.4*	24.96*
Dimensions-no packaging (mm)-BxHxL		1200x2100x2500	1200x2500x2500
Weight- without packaging(kg)		900	1100

Our Software

software

WHAT DO YOU NEED TO KNOW?

1. Specifics of the Selection Software for Hybrids:
2. Selection Software key functionalities:
    - Summer (cooling) and Winter (heating) mode calculations
    - Airflow(m3/h), ESP(Pa), T/RH ambient(°C/%); T/RH room(°C/%)
    - Selection of a unit size



Thank you

Thanks for your attention, Any Questions?

Damvent
to reach...and exceed