DAMA® IDECool® Pro

for Energy Efficient and Healthy Buildings



Thoughtful, Sustainable
Cooling Solutions

Milestones

Foundation
1998-2008

- Inception of HMX
- Factory was setup in Peenya
- The first Indirect Direct Evaporative Cooling (IDEC) machine installed
- Exploration of IDEC in different applications
- Winner at the Investor Forum of the World Resources Institute
- Nominated for World Clean Energy Awards under the products category

Organising for Growth
2008-2010

- Bigger team, system thinking, new processes, sales expansion
- Patent for novel IEC heat exchanger and two-stage indirect evaporative cooling, in India, US and Australia

Emerging Years
2010-2013

- Focus on industrial space cooling
- Secured our first breakthrough order from a leading global automotive manufacturer (32 machines - 1.5 million CFM)
- Added pre-cooling units and hybrid air-conditioners to the product range
- Multiple segments began to open up for HMX technology

Expansion Phase
2013-2017

- Ventured into international markets
- ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, IGBC LEED India Gold certified
- In-house lab for evaporative cooling as per ASHRAE standards, first in India

Broadening Horizons
2017-2022

- Launch of standard products range IDECool and spray bank evaporative cooling
- New manufacturing plant established in Ahmedabad
- Patent for high-efficiency IEC
- Finalist for Global Cooling Prize
- IFC TechEmerge Sustainable Cooling Latin America grant awardee

Redefining Scale and Sustainability
2022-Present

- Range per machine from 500 CFM to 200,000 CFM
- Manufacturing facility expanded, meeting the IGBC green building standard
- Over 100+ machines supplied to a single global automotive manufacturer
- All HMX products are Type 1 Ecolabel certified

Supply Base

120,000,000+ CFM

Built around renowned DAMA® technology

DAMA® optimised for Indirect Evaporative Cooling (IEC)

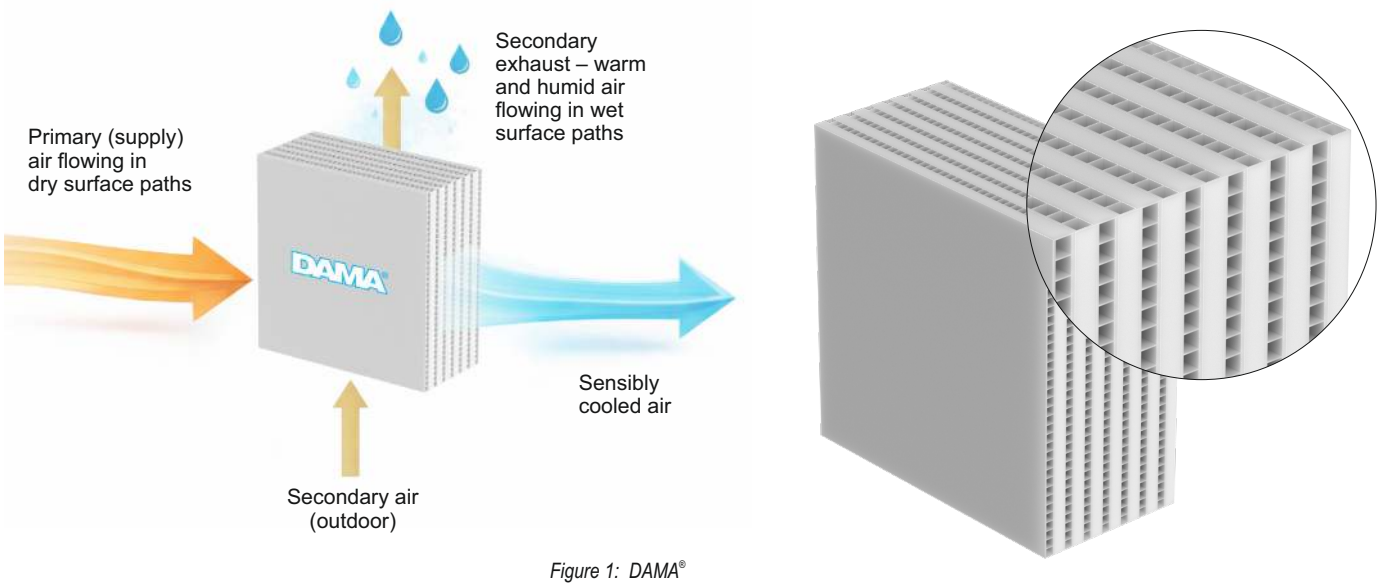


Figure 1: DAMA®

HMX's core technology is DAMA® (Dry Air Moist Air) - an advanced, crossflow plate-type heat exchanger optimised for Indirect Evaporative Cooling (IEC). Warm primary air passes through dry channels while secondary air flows through wet channels, separated by a thin wall that enables efficient heat transfer without moisture transfer. The primary air is cooled without added moisture, as evaporation occurs only on the wet side. This delivers highly-efficient sensible cooling, making DAMA® an energy-saving and eco-friendly solution for modern HVAC applications.

What sets DAMA® apart from similar heat exchangers?

DAMA® is **optimised for sensible cooling**

DAMA® is the result of 20+ years of research and engineering put together to **provide high performance cooling with proven reliability**

The DAMA® design, including integral counter-flow water distribution, ensures **low fouling and consistent performance over many years of use**

DAMA®

Robotic manufacturing ensures **high reliability and low leakage** between air streams

DAMA® **performance has been type-tested by a reputed third party**

HMX's unique DAMA® technology has been **granted patents** in the US, Australia and India

Certified as **Green Product** by the CII-Green Products and Services Council, in accordance with the standard of **GreenPro Ecolabel**

DAMA® IDECool® Pro

HMX's pioneering IDEC technology for increasing health and productivity in industrial and commercial spaces

Providing comfort to people in medium and large spaces like an industrial shed or a commercial building can be tricky. The most commonly selected options, till now, have been either air-conditioning or Direct Evaporative Cooling (DEC).

Air-conditioning is an extremely energy intensive option and also uses recirculated air. This leads to a drop in Indoor Air Quality (IAQ) and poses a health risk to the occupants of a building.

Direct Evaporative Cooling, even though is economical and works on 100% fresh air, fails to provide the required level of comfort to the occupants of a building during peak summer and on humid days.

With DAMA®, a heat exchanger optimised for Indirect Evaporative Cooling (IEC), at its core, DAMA® IDECool® Pro is an ideal solution for applications where large spaces like manufacturing units or shopping malls have to be cooled at an affordable cost and without compromising on the health of the occupants.

DAMA® IDECool® Pro is an ideal solution in such cases.

It strikes a perfect balance between comfort and productivity of occupants on one hand and power consumption on the other, making it a widely accepted solution.

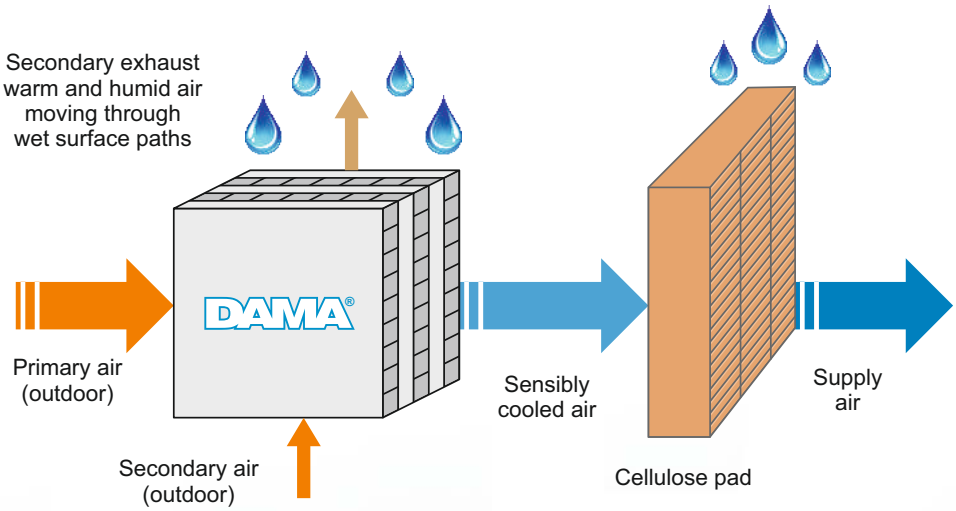


Figure 2: IEC + DEC

- **Up to 120% overall wet bulb efficiency**
- **Up to 60% less power consumption compared to an air-conditioning system**
- **Up to 60% less moisture addition in supply air as compared to DEC alone**

Supply temperature for various ambient conditions

The reduction in temperature possible will depend on both the prevailing Dry Bulb Temperature (DBT) and the Relative Humidity (RH). The table below shows the temperature at the DAMA® IDECool® Pro unit outlet for various combinations of DBT and RH.

DBT °C ↓ / RH% →	10	15	20	25	30	35	40	45	50	55	60
32	9.3	11.3	13.3	15.1	16.8	18.3	19.8	21.1	22.4	23.6	24.8
34	10.3	12.5	14.5	16.4	18.2	19.8	21.3	22.8	24.1	25.4	26.5
36	11.3	13.6	15.8	17.8	19.6	21.3	22.9	24.4	25.8	27.1	28.3
38	12.3	14.8	17.0	19.1	21.1	22.9	24.5	26.1	27.5	28.8	30.1
40	13.3	16.0	18.4	20.5	22.5	24.4	26.1	27.7	29.2	30.6	NA
42	14.4	17.2	19.7	21.9	24.0	26.0	27.7	29.4	30.9	NA	NA
44	15.4	18.4	21.0	23.4	25.5	27.5	29.4	31.1	NA	NA	NA
46	16.5	19.6	22.3	24.8	27.0	29.1	31.0	NA	NA	NA	NA
48	17.5	20.8	23.7	26.3	28.6	30.7	NA	NA	NA	NA	NA

Above condition is based on internal test laboratory.

Schematic of DAMA® IDECool® Pro

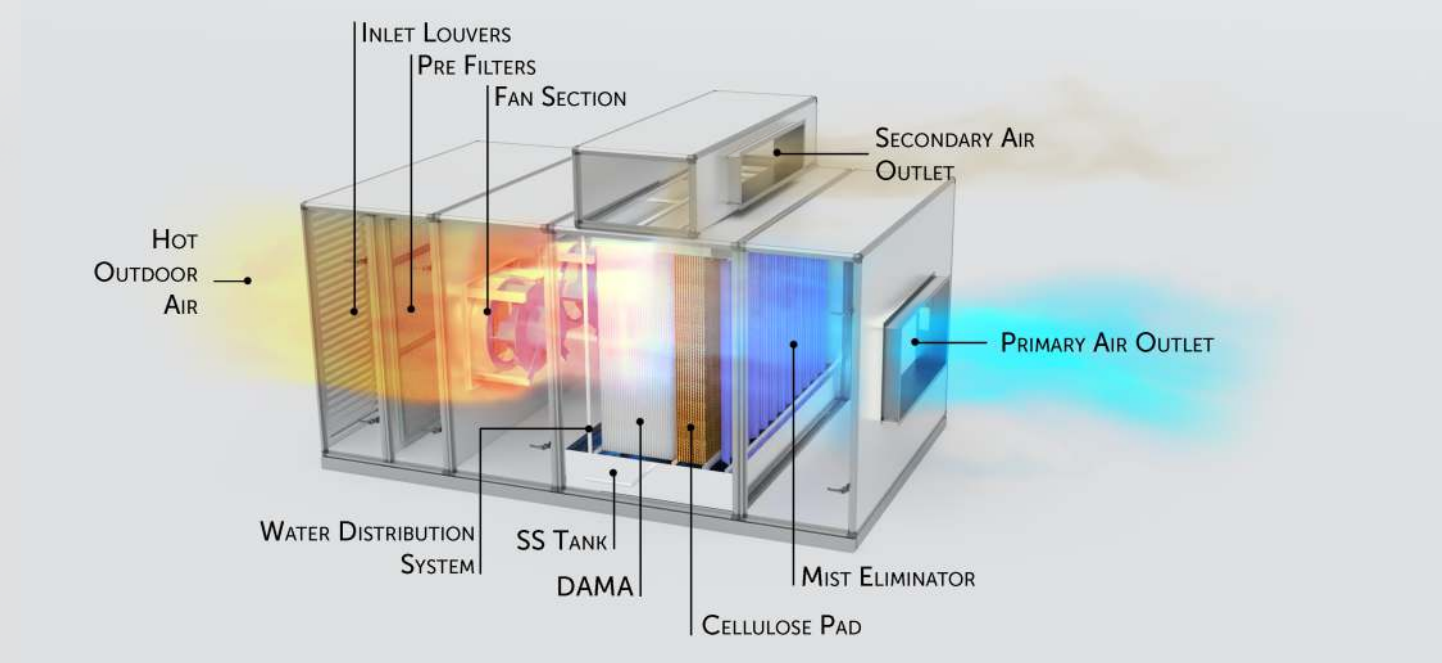


Figure 3: DAMA® IDECool® Pro

Get the DAMA® IDECool® Pro advantage

Cool and filtered outdoor air with low moisture content helps maintain excellent indoor air quality (IAQ)

Upgrade over conventional direct evaporative coolers

Energy efficient alternative to air-conditioning

World class product with robust construction and smart controls with options of receiving real time monitoring reports through IoT

Best in class comfort for suitable climates

Capacities available-starting from 500 CFM to 2,00,000 CFM

DAMA® IDECool® Pro is extensively used in a wide variety of applications

Automobile and ancillaries

Engineering and capital goods

Food and beverages

Print and packaging

Commercial kitchens

Educational institutes

Healthcare

Hospitality

Indoor sport arenas

Malls and marts

Office buildings

Religious establishments

DAMA® AHU

Breathe healthy with 3x the fresh air – without increasing power consumption

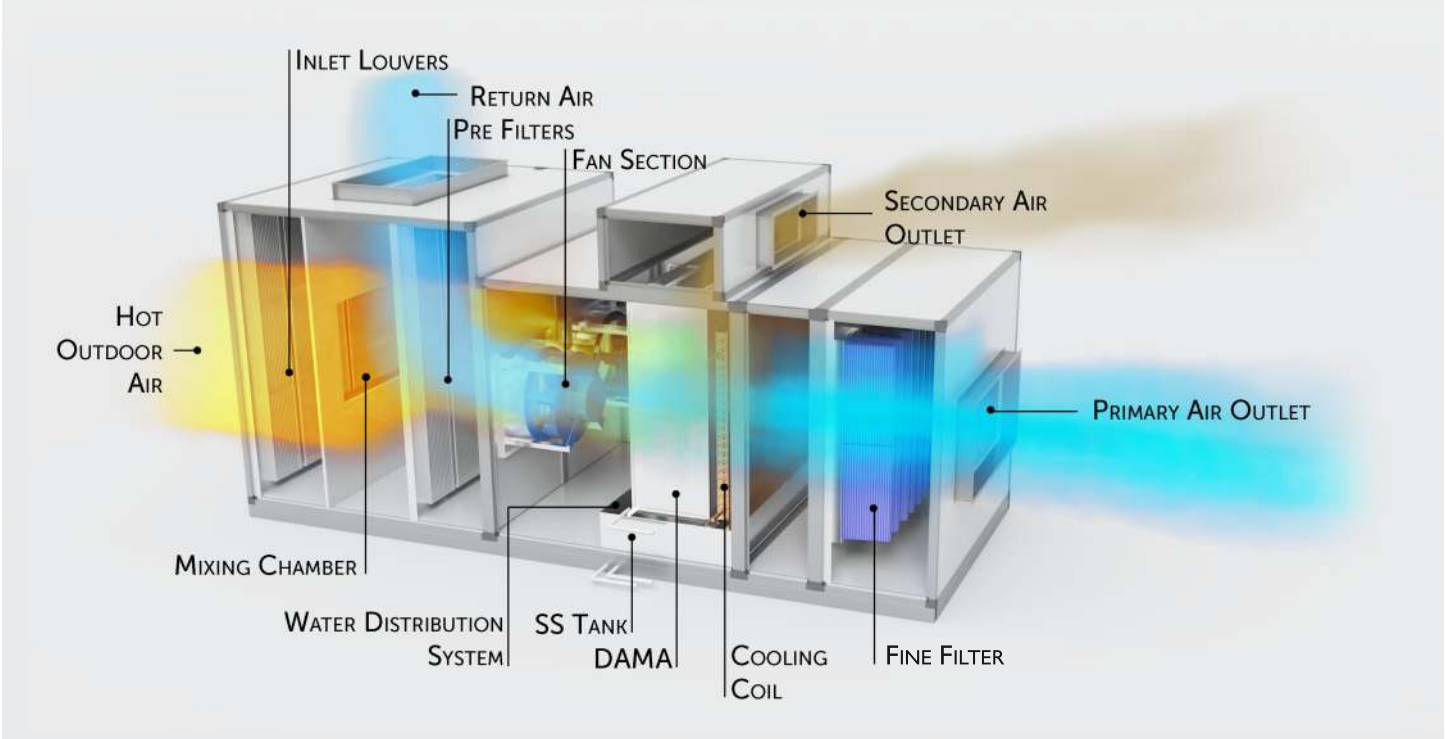


Figure 4: DAMA® AHU

Conventional Air Handling Units (AHUs) are generally designed to handle about 10% outdoor air. At times they may operate with an even lower outdoor air ratio in case the occupancy level of the conditioned space is higher than the assumed design level. Increasing the quantity of outdoor air is recommended for health reasons, but increases energy consumption significantly.

The supply of additional outdoor air through other methods such as dedicated fresh air units also leads to higher energy consumption. Thus, induction of a higher quantity of fresh air seems to invariably lead to spiralling operational cost.

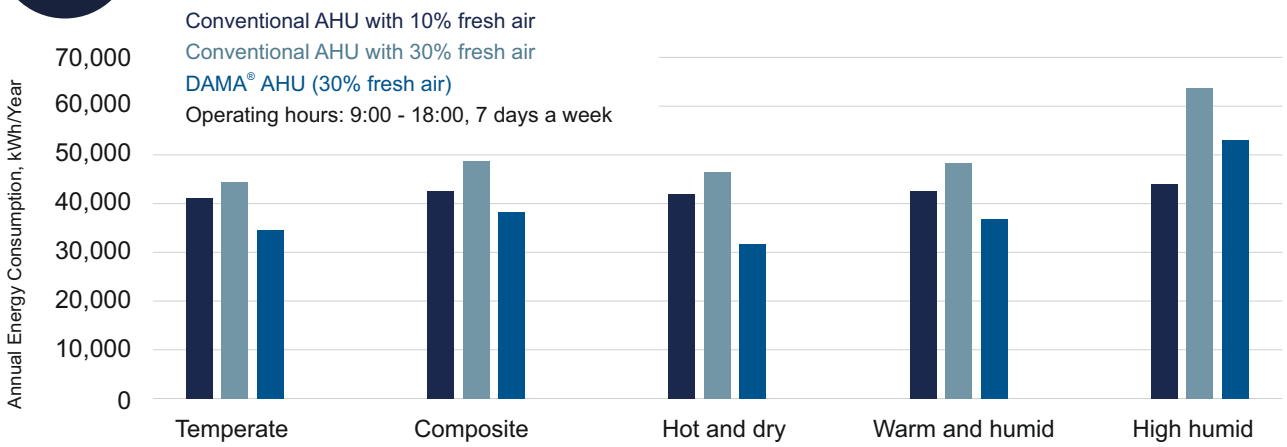
DAMA® AHU combines the benefits of a high proportion of fresh air–as high as 30%–but without an increase in energy consumption and without any compromise in the cooling provided.

DAMA® AHU is ideally suited for centrally air-conditioned applications for industrial and commercial spaces. This solution can be incorporated in both new building designs and existing buildings. The design air flows can be customised to suit pressurisation and other requirements while maintaining similar levels of performance of the heat exchanger.

The DAMA® AHU advantage

HMX helps you increase fresh air in indoor spaces:

Low power consumption across climate types



There is no change in room conditions since the amount of cooling provided is the same.

Helps drive out harmful contaminants from the conditioned space

Maintains a healthier indoor air quality

Improves people productivity-no sick building syndrome

DAMA® AHU is extensively used in a wide variety of applications

Commercial buildings

- Office complexes
- Hospitals
- Hotels

Retail and allied markets

- Restaurants
- Supermarkets
- Warehouses

Large halls

- Community centres
- Religious places
- Entertainment centres

Industrial spaces

- Pharmaceutical
- Food and beverages
- Manufacturing

DAMA® TFA

Save by pre-cooling while introducing outdoor air into a centrally air-conditioned building to improve air quality

Normally 30% of the overall cooling load in a centrally air-conditioned space is taken up by the cooling of outdoor air being fed into the conditioned space to maintain healthy indoor air quality.

DAMA® TFA units effectively pre-cool outdoor air being supplied to a building in an energy efficient and hence economical manner. The output of DAMA® TFA can be supplied directly to the conditioned space or further cooled through a chilled water or a DX coil. Either way, there is significant overall energy saving.

The DAMA® TFA can be retrofitted to existing fresh air handling units or can be supplied to individual AHU rooms.

DAMA® TFA is built around DAMA®, a heat exchanger optimised for Indirect Evaporative Cooling (IEC). DAMA® has been extensively deployed by HMX in IEC applications for air cooling, with supplies of 120+ million CFM covering 24+ million sq. ft. in 12+ countries.

It strikes a perfect balance between good indoor air quality on one hand and energy efficiency on the other, making it an ideal solution.

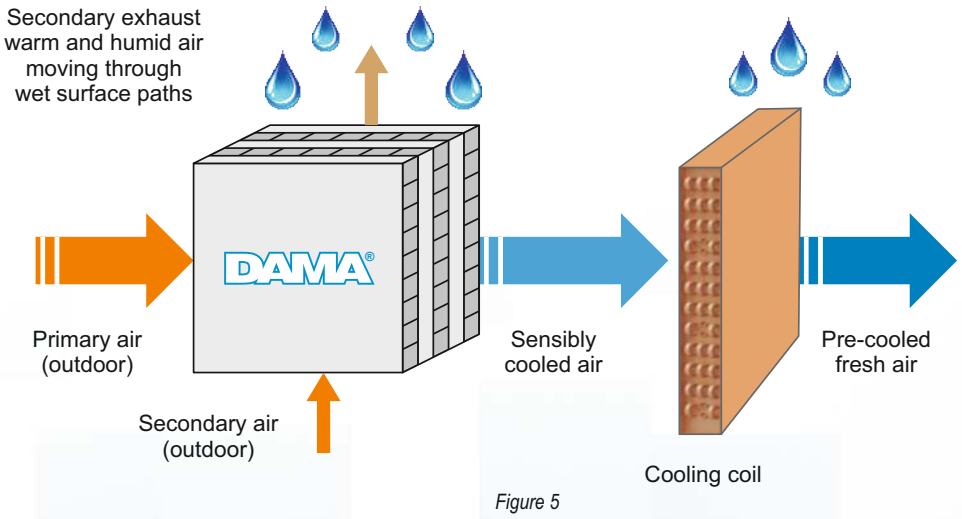


Figure 5

How DAMA® TFA scores over a conventional TFA/ERW*

Parameters	Conventional TFA/ERW	DAMA® TFA (IEC based TFA)
Requirement of return air/exhaust air	Yes (ERW)	No
Contamination of fresh air	High possibility (ERW)	Zero possibility
Odour transfer	High possibility (ERW)	Zero possibility
CapEx	High (both)	Moderate
Power consumption	High (conventional TFA)	Moderate

* ERW: Energy Recovery Wheel

Schematic of DAMA® TFA

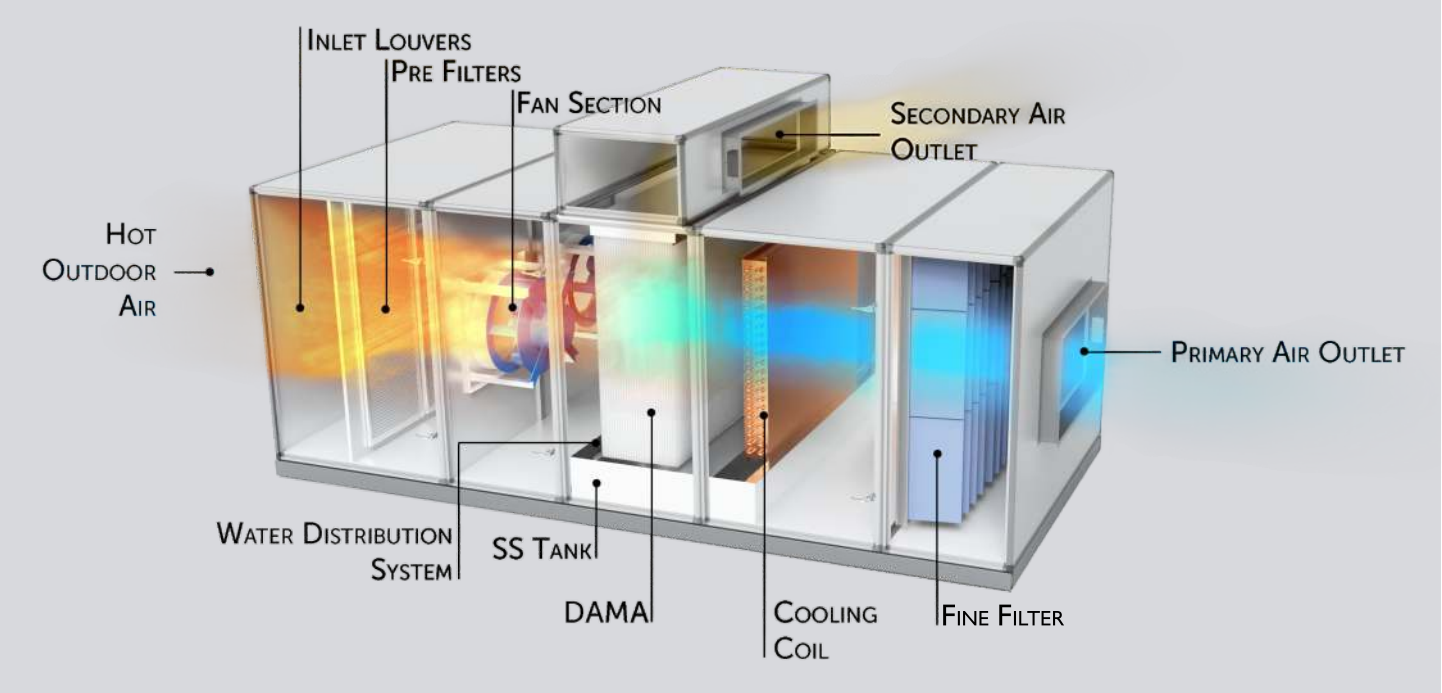


Figure 6: DAMA® TFA

Get the DAMA® TFA advantage

Pre-cooled outdoor air with zero moisture addition reduces the TR load on existing air conditioning systems

Energy efficient alternative to energy recovery wheels, heat pipes, air-to-air heat exchangers, etc.

Low life cycle costs due to low maintenance requirements

Zero possibility of cross contamination

Zero possibility of odour transfer since return air is not required

Can be used as a stand-alone system or retrofitted to existing AHUs

Capacities available from 2,000 CFM to 30,000 CFM

Available with plug type or EC fans

DAMA® TFA is extensively used in a wide variety of applications

Auditoriums and banquet halls

FMCG

Food and beverages

Healthcare facilities

Hotels and restaurants

Indoor sport arenas

Malls and marts

Buildings

Our valued customers

ABB	ACG	adani	albatha البطحاء
المراعي Almarai	الرومانسية alRomansiah	amazon	amcor
apollo TYRES	ATG A GROUP COMPANY OF YOKOHAMA	BARRY CALLEBAUT	BOSCH
CEAT	Coca-Cola	Dr.Reddy's	ENGIE
Godrej	Google	Haldiram's NAGPUR TASTE OF TRADITION	Himalaya SINCE 1930
INTAS	Infosys	ITC Limited	حديقة الملك سلمان King Salman Park
مجموعة كوت الغذائية Kout Food Group	الكويتية KUWAIT AIRWAYS	LANDMARK GROUP	Mahindra
marico	P&G	القدية Qiddiya	Reliance Industries Limited
ROYAL ENFIELD	SAR الخطوط الحديدية السعودية SAUDI ARABIA RAILWAYS	SIEMENS	TATA MOTORS
VISA		wipro	and more...

What makes HMX a trusted brand?

12+ countries with installations

550+ happy customers worldwide

24+ million² ft. area cooled

120+ million CFM installed across the globe

Environment-friendly technology, uses 100% outdoor air

Well suited for most geographies of the world

About the A.T.E. Group

Vision: A value-driven, world-class group spearheading innovative and sustainable solutions

Founded in 1939 in India, A.T.E. has evolved into a multifaceted engineering group offering world-class products and solutions spanning severals segments. A.T.E. is an expert resource for textile machinery, and an impactful innovator in clean technology.

A.T.E. has developed several cutting-edge technology products and solutions, and has several patents to its credit.

A.T.E. has established an exemplary reputation for competence and trustworthiness. A.T.E.'s long associations with its customers, team members and business partners are testimony to A.T.E.'s value based operation, dependability and service.

Textile Engineering
Cutting edge machinery solutions for every textile process

Precision Components
Precision rotating components for textile and engineering applications

Wastewater Treatment
Comprehensive solutions for wastewater treatment and recycling, and sludge management

Cooling Solutions
Energy efficient, fresh air rich cooling solutions for industrial and commercial applications

Safety, Health, and Environment for Packaging, Textiles, etc.
Register control, web viewing and inspection, ink conditioning, electrostatic control, waste heat recovery

HMX

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