New office building with future-oriented Hybrid VRF air conditioning system

Air Conditioning

A global software company uses a Hybrid VRF air conditioning system at its headquarters in Würzburg, Germany, which operates with a significantly reduced quantity of refrigerant and primarily with water inside the building.

Case Study

Infosim GmbH & Co. KG, Würzburg

> “The overall task was to design an office building for an IT company in the software development sector. The particular challenges here were that the building had above-average thermal loads and a clear north-south orientation.”

Dr Köhler,
Owner and Managing Director
of Infosim GmbH & Co. KG

Infosim GmbH & Co. KG is a market-leading manufacturer of automated service fulfilment and service assurance solutions on a global scale.

The company is privately owned and, in addition to its headquarters in Würzburg,Germany, has branches in Singapore and Austin, Texas (USA). Employees in the custom software development department develop solutions tailored to customer needs that result in significant cost savings.

Up to now, the company leased its premises at its headquarters in Würzburg. However, this was no longer meeting current requirements. The premises could not be significantly extended in terms of area, and the technical building systems did not meet the demands of a modern, internationally active company. The company founder and manager therefore decided that a new office building was needed.

The result is a new five-storey office building in the Hubland district of the city, situated on a former military site very close to the University of Würzburg. The building is divided into three sections. Offices are situated to the left and right of the central service core, which contains elevators, server rooms, logistics rooms and sanitary facilities.

The requirements for this building were very demanding, particularly in terms of the air-conditioning system. In order to achieve the best possible result, the client invited tenders in an architectural competition to which several companies responded with their proposals.

Some of these were based on traditional concepts for the building services engineering, for example with nighttime ventilation and open-window concept as well as with separate heating and air-conditioning systems. Goldbeck GmbH submitted a concept as general contractor that immediately appealed to the client. It met the requirements for year-round cooling and was also extremely economical and environmentally friendly. "It was particularly important to us that a refrigerant circuit was not installed in the building. We wanted only water to be used as the medium for cooling," states Köhler.

Case Study

Infosim GmbH & Co. KG, Würzburg

The HVRF system was specially developed to meet the demands of modern building architecture with high efficiency and comfort requirements. Each individual indoor unit can be operated independently in heating or cooling mode.

A City Multi Hybrid VRF (HVRF) system from Mitsubishi Electric was suggested by Goldbeck as the heating and air-conditioning solution for simultaneous heating and cooling with heat recovery in different performance levels.

Thanks to the heat recovery capability, heat extracted from the rooms requiring cooling is used elsewhere to heat rooms, so a separate heating system was not required for the office building.

"Since the building has a right wing and a left wing, it made sense for the left and right wings to have separate HVRF systems on each floor," states Frank Eisenstein, Managing Director of Rhön Kälte GmbH in explanation of the basic structure of the air-conditioning system.

The HVRF outdoor units are installed on the roof and transfer the refrigerant via pipe trains to the Hybrid BC controllers (HBC controllers), which are located in technical rooms on each floor. The HBC controllers are responsible for heat exchange between the refrigerant-controlled outdoor circuits and the water-based indoor circuits to the indoor units.

"This means that there are refrigerant-conducting pipelines only in the riser shaft and in the technical room. All other pipelines through the building carry water," Eisenstein continues.

This offers numerous advantages. With the Hybrid VRF system, for example, a simple leak test is sufficient, since, in this system, plastic pipelines are press-fitted in the building instead of having copper pipelines soldered as in a standard VRF system.

Also, in view of possible problems around the future use of refrigerant, the system here is a future-oriented, flexible solution in which conflicts with EN378 (refrigerant concentration) are avoided.

Infosim GmbH & Co. KG, Würzburg

All public rooms as well as the meeting rooms in the entire building are supplied with continuous ventilation via a central air conditioning system.

The fresh air to be brought into the building from the central ventilation system is pre-conditioned by Mr Slim outdoor units with Zubadan technology.

The outdoor units form a cascade of two. Cascading allows the units to operate simultaneously under partial load. This is much more efficient than just operating one module at full load and leaving the other one on standby.

During servicing work, continuous cooling operation is ensured by the second outdoor unit. The outdoor units are equipped with Zubadan inverter technology to ensure heat supply even when temperatures are below freezing. They have an optimised defrost function and deliver absolute operational reliability, even at extremely low outside temperatures. Heating operation is guaranteed down to an outside temperature of -28 °C and offers full heating output down to a temperature of -15 °C.

Problem-free communication between the air conditioners and the heat exchanger battery of the ventilation units is ensured by four PAC-IF013B-E interface kits. The interface kits (one for each outdoor unit) coordinate the compressors precisely to the output requirement of the central ventilation system.

Server room cooling is an extremely important feature in the building. There is a server room on each floor, with two server rooms on the top floor. Two indoor units are provided in each server room for optimal cooling. The unit assignment is clearly defined. One 4-way ceiling cassette per server room is connected to the HVRF system and can feed excess heat to the HBC controller. The second indoor unit is connected to a Y-series VRF outdoor unit on a separate train. This redundantly designed system structure ensures operational reliability in the event that one of the two units has to be shut down for service or maintenance work. The second aspect is the high output capacity required for reliable server cooling, even at continuously high outside temperatures. Subsequent expansion of server capacities is also enabled by the cooling system.

Case Study

Infosim GmbH & Co. KG, Würzburg

The client attached particular importance to a tailor-made and convenient operating concept.

This requirement was met using Mitsubishi Electric product solutions.

In addition to functionality and quality, the manufacturer places particular emphasis on convenience and ease of use in its control technology in order to meet building specific requirements.

The indoor units are connected to several AE-200E and EW-50E central remote controllers for central control and monitoring of the air-conditioning systems by the central building control system. The AE-200E central controller manages the connected indoor units. In conjunction with the use of EW-50E expansion modules, up to 200 indoor units can be combined in one system.

In addition to a graphic touch display, the AE-200E enables the display of all indoor units precisely on the floor plan of the building and allows operation and monitoring of the air-conditioning units. Operating parameters and error messages can also be displayed, time programs set and trend data analysed. A total of 2000 indoor units can be managed with the additional centralised TG-2000A remote controller. Data is collected and transferred to the building control system via BUS interfaces. Here this data can be centrally monitored, analysed and combined into logical links in conjunction with other systems. For example, the operation of the ventilation and air-conditioning system can be linked to the fire alarm system.

New PAR-CT01MAA touch remote controllers are used for individual operation of the indoor units in the offices and meeting rooms. The controller is a sophisticated all-rounder featuring a customisable full-colour display. The Bluetooth version of this product supports the integration of a company or brand logo and includes a 180-colour palette for tailoring the user interface to match the corporate design of each and every customer. The PAR-CT01 can be configured and operated with a mobile phone via Bluetooth.

Free apps are available for Android and iOS.

Infosim GmbH & Co. KG, Würzburg

Conclusion:

The air conditioning requirements for this building were extremely challenging and required in-depth planning. The task was to provide air conditioning for an IT company's office building with above-average heat loads and a clear north-south orientation. A particularly important aspect was that no refrigerant was to be used in the building itself with only water being employed as a transport medium. A City Multi Hybrid VRF system from Mitsubishi Electric was offered by Goldbeck as the heating and air-conditioning solution for simultaneous heating and cooling with heat recovery.

The 2-pipe system for simultaneous cooling and heating with heat recovery combines the benefits of a direct evaporation system and those of a chilled water system. The systems easily met the strict requirements of the Renewable Energy Heat Act (EEGWärmeG) and the German Energy Saving Regulation (EnEv). Centralised control of the air-conditioning systems was achieved with the use of TG-2000, AE-200E and EW-50E centralised controllers. In addition, they were connected to the building control system via a KNX interface.

Centralised management of the technical systems as well as centralised control of the air-conditioning technology support reliability of operation and offer numerous possibilities for optimising the operation of all systems.

Case Study

Infosim GmbH & Co. KG, Würzburg

Installation Summary

CITY MULTI CONTROLS

R410A Outdoor Units

- x 10 PURY-EP200YLM Heat Pump Outdoor Unit
- x 1 PUHY-EP200YLM Heat Pump Outdoor Unit

Master HBC Controllers R410A (HVRF)

- x 6 CMB-WP1016V-GA1

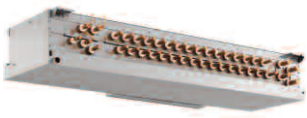
Indoor Units

- x 113 PLFY-WP-VFM-E 600x600 4-Way Blow Ceiling Cassette Indoor Units (x14 WP15 / x94 WP20 / x5 WP25)
- x 10 PLFY-P63VEM-E 4-Way Blow Ceiling Cassette Indoor Units

Controls

- x1 AE200 Centralised Controller (x1 AE200 Energy Management Licence Pack)
- x2 EW50E Centralised Controller
- x106 PAR-CT01 Remote Controllers
- x1 TG-2000 Mini

PUHY/PURY-EP200YLM



CMB-WM1016V-AA

PLFY-P63VEM-E

PLFY-WP-VFM-E

AE-200E

EW50E

PAR-32MAA-J

The Renewable Solutions Provider
Making a World of Difference

MITSUBISHI ELECTRIC
Changes for the Better

Telephone: 01707 282880
email: air.conditioning@meuk.mee.com web: www.airconditioning.mitsubishielectric.co.uk

UNITED KINGDOM Mitsubishi Electric Europe Living Environmental Systems Division
Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, England General Enquiries Telephone: 01707 282880 Fax: 01707 278881

IRELAND Mitsubishi Electric Europe Westgate Business Park, Ballymount, Dublin 24, Ireland
Telephone: Dublin (01) 419 8800 Fax: Dublin (01) 419 8890 International code: (003531)

Note: The fuse rating is for guidance only. Please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air-conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774) or R134a (GWP:1430). *These GWP values are based on Regulation (EU) No.517/2014 from IPCC 4th edition. In case of Regulation (EU) No.626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP: 550), R407C (GWP:1650) or R134a (GWP:1300).

Green Gateway®
www.greengateway.mitsubishielectric.co.uk
Mitsubishi Electric UK's commitment to the environment

Follow us @meuk_les
Follow us @green_gateway
Mitsubishi Electric Living Environmental Systems UK
mitsubishielectric2
BLOG thehub.mitsubishielectric.co.uk

Effective as of March 2019