Code:

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CONTROL SYSTEMS

Databook

Daikin On Site

- Remote monitoring and control
- User-friendly dashboards
- Real-time data access and storage





Daikin on Site is a cloud-based remote monitoring and control system for chiller plants and air handling units. It is a web-based application, which means users can access the service at any time from anywhere.

Using enhanced control, monitoring and measuring, Daikin on Site provides:

- real-time data access and storage
- support from Daikin experts

- possibility to you identify cost-saving opportunities, increase the lifetime of your unit and reduce the risk of unexpected issues.

Preliminary Operation

Daikin On Site is always available on Microtech 4 and Microtech III controllers and an internet connection must be available.

Customer has three way to connect the controller:

- 1. LAN
- 2. Custom M2M device (i.e. 3G/4G Router).
- 3. Daikin On Site M2M Kit (4G router + 4G connection).

Only with Daikin M2M Kit it is not necessary parameter configuration, for other connection shall be performed IP configuration.

After Internet connection DoS shall be activated on the controller as follow:



The unit is connected, with Authorization Key and based site info (name, address...) provided to Tenant Administrator Plant is activated on Daikin on Site. Tenant Admin adds the Owner of the plant who will receive an email notification about his new account. Owner may add other users.

PRELIMINARY OPERATION	ACTION
Before Commissioning	1. Provided an internet connection
Unit Connection	 IP configuration, necessary only with (Customer Lan or custom M2M device) Activation of DoS on the controller and annotation of the Auth. Key
	Access to Daikin On Site by invitation only
Plant Activation	 Contact your Tenant Admin and provide him the Auth. Key and basic information (Name, address)
Plant Configuration	 The Tenant Admin adds the Owner of the plant who will receive an email notification about his new account Owner may add other users Plant is on line

Resume table of preliminary operation

Daikin on site Features

Remote Monitoring and Control

This feature provides data analysis for determining if the unit is operating optimally and whether maintenance is needed to improve its performance.

User roles

Daikin on Site supports five User roles:

- 1. **Operator** with read only access to data points
- 2. Trained operator with access to operational data points and settings
- 3. Owner with access to operational data points and settings
- 4. **External service** with access to operational data points and some settings for commissioning and maintenance
- 5. Daikin Service with full access to all data points

8				2		
Operator	Trained Operator	Owner	External Service	Daikin Service		
Plant dashboard	Plant dashboard	Plant dashboard	Plant dashboard	Plant dashboard		
Data points 🔊 🔊	Data points	Data points	Data points	Data points 🔊		
Alarms	Alarms	Alarms	Alarms	Alarms		
Web graphic	Web access	Web access	Web access	Web access		
History	Web graphic	Web graphic	Web graphic	Web graphic		
Schedulers	History	History	History	Upgrade		
Documentation	Schedulers	Schedulers	Schedulers	History		
	Documentation	Documentation	Documentation	Schedulers		
		Plant settings		Tasks		
			/	Documentation		

Application Set

Daikin on Site allows the visualization of plant data, alarms and unit performance in a User-friendly interface.

The Application Set is the graphical configuration of the plant and it defines how and which information should be displayed in Daikin on Site for the selected unit. It depends on the controller firmware version (Application Version). Each Application Version has an its mapping file (List of Datapoints).



List of Datapoints

Application Set

Dashboard Overview

A Dashboard is the main page in which the Datapoints are divided into sections and are presented with colored tiles. Only some values can be edited, depending on the software.

The Daikin on Site dashboards are application specific, which means the panel can feature different information depending on which applications connect to the programme. The dashboard is also customised to show insight based on user predefined page role.



Dashboard: Overview

Dashboard Map

An overview of where Plants are located geographically. Plants are identified in according to KPI. KPI are useful to have a direct read of the units status and get a global knowledge about other features and functionalities that can be displayed on the Map.



Available by default:

- Online status
- Chiller alarm status
- AHU alarm status
- iCM Alarm
- Chiller Master/Slave
- Energy Meter installed
- Maintenance indicator
- Chiller Load Status
- Controller reset cause
- Rapid Restart Option

Trend Viewer

User can access data points to change values or update previous configurations. The trend viewer tool shows the progression of operational data and uses graphs to highlight key insight. User can also download the analyses for further reporting.

Trend Viewer is available on any Chart Tile within a Dashboard. The Trend viewer comes with a great number of functions. The default settings are taken from the Chart, which will show datasets from the Chart, typically over a period of one day.

Within the Trend viewer you can change the period of time for display of datasets, you can zoom-in and out on datasets, deactivate and activate the display of individual datasets and export data to CSV files.



The time duration of data to be displayed within the Trend viewer is initially determined by the Time window, customer can set the Time Window (day, week, month...). After a redefinition Trend Viewer then reloads datasets.



It is possible to select a date, datasets are shown until selected date for selected period. This operation is called time until.



Datapoints

All information about a unit are reported in variables, named as "datapoints". Datapoints are organized by sections, which title suggest the scope of the datapoints inside each section.

For example:

- Unit status: useful info to get a general overview of the unit
- Circuit #1 status: useful info to get to get a general overview of circuit number 1
- Energy meter: datapoints related to the energy meter device (if available); if the device is not available or the option it's disabled, this section will disappear from the list.

	Dperating >. Data points				
Plant dashboard	Unit status				
Data points 🔊					
Alarms	Circuit #1 status				
Web access	Energy meter				
Web graphic					
Upgrade	Condenser status all circuits				
History					
Scheduler	Circuit #1 compressor #1				
Tasks	Circuit #1 economiser and expansion valve				
Files					
Plant settings	Input/output states unit				
Application set	Input/output states circuit #1				
	Setup unit				
	Operating > ··· Deva points Litit queue				
	Unit mode	Cool		des.	
	Unit status	8		idea.	
	Control source	Local	1	des.	
	Chiler alarm	Alanm		idea.	

Online scheduling

User can schedule the operation times of the equipment per day, week or for an extended period

Master-slave configuration

Master-Slave configuration allows to optimise the start-up, staging and sequencing of chillers. A specific dashboard will help to find the right data and change parameters.

Remote support by Daikin

Once Daikin receives an alarm notification from Daikin on Site, Daikin experts will begin an initial analysis of the situation to determine the next steps for maintenance staff and whether an on-site visit is necessary. Daikin experts will work closely with customers to find the right solution.

Connected maintenance

Customer can combine Daikin on Site with a complimentary service plan that best suits his needs.

Web Graphic

Web graphics is another way to show information about the unit and it shows the components of the Unit: fans, compressors, coils, etc. This interface is made available only for expert technicians.



Plant and Alarm Notifications

Alarms are available on the controllers of the equipment or Daikin on Site and reach customers via email. They can also be managed and processed by Daikin experts depending on the service agreement. The assigned operator or service responsible will be able to make the necessary checks and analyses to prepare corrective actions.

This function allows you to define Plant Notifications that are sent via email to selected recipients.

A Plant Notification consists of the following:

- **Basic settings**; the definition of the email notification to be sent out
- Alarm classes; the definition of which Alarm class is associated with the notification.
- **Alarm times**; the definition of the weekdays and the time window in which the notification shall be active.
- **Excluded dates**; the optional definition of dates during the year, when the notification is not to be active.

In basic setting the operator can define alarm notifications, Name for the notifications, email address of recipients and the Text of the message.

lants			Send test notification Save
Plant users			
Plant notifications	 Basic settings 		
Plant settings	Notification type	Alarm	~
Application set	Send on	Appearing alarm	>
Plant operating	Name	AlarmNotification-test	
iers	Recipients	myemail@daikinapplied.eu	
nants	Subject	DoS Alarm Notification - [SiteName]	
ant roles	Message	Plant: [SiteName]	
e-register	Available tokens		
gital wallet	[AlarmText] [Appearing] [/Appearing]	Alarm occurred: (Alarmitext)	
2M router	[SiteName] [SiteDescription]	Best Regards.	
	 [SiteAddress] [SiteZipCode] 	Delike on City	
	• [siteCity] • [SiteState]	Dakin on Site.	
	[SitePhane] [SitePhane]		
	- (renanceane)		
	Alarm classes		
	Alarm times		
	Excluded dates		

Reporting

Daikin on site can generate Report. Report is a data collection that allows to analyze the operation of the unit: performance, alarms and operating parameters. Reporting is on a quarterly and/or monthly basis.

Diagnostic Tool

Diagnostic Tool is designed to support maintenance engineer. It creates a report from unit data (alarm). This tool is external to Daikin On Site, it receives Unit Data from DoS and elaborates a series of recommended actions (Report).



Diagnostic Tool is designed, when an alarm occurs, to exclude some causes using Fault-Tree-Analysis (FTA) from the most frequent and important alarms. Users, on alarm dashboard, visualize a short list of recommended actions to solve the problem.

Event ofat 2020.04.28 11:42:48 Details of EvapFlowLoss (EvapFlowLoss-OffNormal): InAlarm		Ticket Status: Closed + Generate	x report • Copy to clipboard
Details Recommendations Comments O	Previous alarms		
	# Time	Delta	Status
Wrong settings	2/2 2020.04.28 11:42:48	EvapFlowLoss (EvapFlowLoss-OffNormal): InAlar	rm 🕺 🦰 Unit Trip
Check the evap. leaving water temperature limits; check the evaporator leaving water temperature setpoint or the evaporator freeze temperature setpoint.	1/2 2020.04.27 15:41:14		🐥 🔨 Unit Trip
T			
Recommended		Alarm	
Action			

Energy Analysis

Including an energy meter, Daikin on Site can monitor the energy efficiency of the unit. With this information, Daikin technicians can provide recommendations to optimise the unit and secure additional cost-savings. Daikin on Site is allowed to read data from Energy Meter (Unit control option 16 and 16a) On Dashboard, are shown graphics of voltage rating, absorbed Current another power data.



IAQ monitoring

The new Daikin IAQ sensor offers the possibility to monitor the IAQ at your customer facility for commercial and industrial buildings and helps to identify IAQ improvement assessment and develop service activities. The Sensor is ready to be connected via Wi-Fi or NB-IoT (Narrow Band IoT) to the Daikin cloud web platform called "Caelum" and will allow your service dept and their customer to download periodical reports. In addition, instantaneous measurements in a Daikin branded Video Wall application is available within the IAO sensor features and included on the Daikin packaged offer.

AMBIENT LIGHT

Range: 0 lux to 120000 lux Precision: ±10% Resolution: 0,1 lux

TEMPERATURE

Range: -40°C a 85°C Precision: ± 1°C (nel range 0÷65°C) Resolution: 0,1°C

HUMIDITY

Range: 0 to 100% RH Precision: ± 3% RH Resolution: 0,1% RH

AIR PRESSURE hPa Range: 300 to 1100 mbar (hPa)

Precision: ± 1 mbar (hPa) Resolution: 0,18 mbar (hPa)

SOUND PRESSURE

Range: 35 to 120 dBspl Frequency: from 50 Hz to 20 KHz Precision: ±1 dBspl Resolution: 0,1 dBspl

FINE DUST Concentration Measure PM10/PM2.5: 0 µg/m3 to 1000 µg/m3 Precision (from $0 \mu g/m3$ to $100 \mu g/m3$) : $\pm 15 \mu g/m3$ Precision (from 100 µg/m3 to 1000 µg/m3): ± 15 % Resolution: 1 µg/m3



85mm x 85 mm x 60 mm

ELECTROSMOG

LF Range: 0-400000 nT - Range: 5Hz-120Hz Precision +/- 5% - Resolution: 25nT HF Range: 0 - 10 V/m - Range: 50 MHz - 300 GHz Precision: ±10% - Resolution 0,1 V/m Measurements performed on 3 axes



Range: 0 to 500 Precision: ±10% Resolution: 0,1

CO2

Range: 0 to 5000ppm Precision: ±30ppm (da 0 a 1000ppm) ±3% (over 1000ppm) Resolution: 1ppm

> TVOC Range: 0 ppb to 1187 ppb **Resolution: 1ppb** Precision: ±10%

> > CO₂e

Range: 400 to 8192ppm Precision: ±10% **Resolution: 1ppm**

WIFI NETWORKS & LEVEL (2,4GHz band) Detects Access Point n° in band 2.4Ghz and overall signal level (from 0 to -100 dBm)



Leak Detection

A leak detection algorithm is available with Daikin on Site. The algorithm can detect slow leakages on Air Cooled Chillers with R134a and R1234ze refrigerants. The Leak function can detect a leak in the circuits independently with at max 15% of gas loss.

		D	aikin (R134	a)	Daikin (R1234ze)			
			LWT (°C)		LWT (°C)			
		5 - 7	7 - 10	10 >	5 - 7	7 - 10	10 >	
	100	★★ 15%	★★ 15%	★★ 15%	★★ 15%	★★ 15%	★ 15% (*)	
Load (%)	50-100<	★★ 15%	★★ 15%	★ 15% (*)	★★ 15%	★★ 15%	★ 15% (*)	
	33-50<	★ 20% 15% (*)	★ 20% 15% (*)	★ 15% (*)	★ 15% (*)	★ 15% (*)	NA	

Security

Daikin on Site CSA (CERT Security Assessment) SAL-2 is ongoing and offers a comprehensive security assessment such as hacker testing, DDOS and virus attack, unauthorised read/write access, interface hack, password forgery and key simulation.

The Security Certificate uses SHA-256 encryption, between the controller and cloud & between cloud and web client.

Communication between Daikin on Site and connected Plant controllers is HTTPS end-to-end encrypted, to prevent wiretapping and man-in-the-middle attack.

Communication between the MicroTech Plant controllers and the Daikin on Site's cloud base application is outbound only, which means that the MicroTech Plant controller does not allow incoming connections.

The Daikin on Site cloud-based application does not contact the MicroTech controller, as that is not possible by the design of the communication and not desirable from a security point of view.

The MicroTech maintains an outbound connection with the Daikin on Site cloud-based application to deliver data and fetch data generated within the Daikin on Site cloud-based application, e.g. a set-point change.

When connecting a Plant controller to the Internet, a firewall **MUST** be applied, and the Firewall **MUST** be configured to permit outgoing connections **ONLY**. Incoming connections **MUST** be concealed.

Data privacy

Daikin on Site is **EU General Data Protection Regulation (GDPR)** compliant and is obtaining **CSA Security Attestation** - Security Level 2, as defined by the standard IEC/ISA-62443. Daikin on Site data privacy is conforming to EU Data Privacy Chapter 5.

MICROTECH data points

Available parameters vary according to unit model and type.

Setpoints

Unit Unit Enable Unit type Unit Status after Power Failure Control source Available Modes Cool LWT 1 Cool LWT 2 Heat Recovery LWT Ice LWT Startup Delta T Shut Down Delta T Stage Up Delta T (between compressors) Stage Down Delta T (between compressors Heat Recovery Differential Max Pulldown **Evap Recirc Timer** Evap Control LWT Reset Type Max Reset Start Reset Delta T Start Reset OAT Max Reset OAT Soft Load

Starting Capacity Limit.

Soft Load Ramp Demand Limit Current limit Current @ 20mA Current limit Set Point # of Circuits Ice Cycle Delay Clear Ice Timer SSS Communication **PVM** Noise Reduction Noise Reduction Start Time Noise Reduction End Time Noise Reduction Condenser Offset BAS Interface Ident number Baud Rate Evap LWT sensor offset Evap EWT sensor offset

Compressors-Global

OAT sensor offset

Start-start timer Stop-start time Pumpdown Pressure Pumpdown Time Limit Light Load Stg Dn Point Load Stg Up Point Stage Up Delay Stage Down Delay Stage Delay Clear Max # Comps Running Sequence # Cir 2 Sequence # Cir 2 Sequence # Cir 3 Number of Pulses 10% to 50% Slide Load Delay Minimum Slide Load Delay Maximum Slide Unload Delay Maximum Slide Unload Delay Maximum Liquid Injection Activation Liquid Line Solenoid Valves

Alarm Limits

Low Evap Pressure-Unload Low Evap Pressure-Hold High Oil Press Delay High Oil Press Differential Low Oil Level Delay High Discharge Temperat. High Lift Pressure Delay Low Pressure Ratio Delay Start Time Limit Evaporator Water Freeze Evaporator Flow Proof Evap Recirculate Timeout Enable Iow ambient lockout

Setpoint per circuit	EXV model
Circuit mode	Oil Sump Check
Compressor Size	Service Pumpdown
Heat Recovery Enable	Evap pressure offset
Economizer	Cond pressure offset
Capacity Control	Oil pressure offset
Manual capacity	Suction temp offset
Clear Cycle Timers	Discharge temp offset
EXV control	

EXV position

<u>Fans</u>

	Fan Stage Up Deadband 0
	Fan Stage Up Deadband 1
	Fan Stage Up Deadband 2
	Fan Stage Up Deadband 3
	Fan Stage Up Deadband 4
	Fan Stage Up Deadband 5
า	

Fan Stage Down Deadband 2 Fan Stage Down Deadband 3 Fan Stage Down Deadband 4 Fan Stage Down Deadband 5 Fan Stage Down Deadband 6 VFD Max Speed VFD Min Speed

Fan VFD enable Number of fans Min Saturated Cond Temp Max Saturated Cond Temp Heat Recovery Saturated Condenser Temp Target Min

Heat Recovery Saturated Condenser Temp Target Max

HARDWARE COMPONENTS

Modem kit with Antenna (Option 155)

Daikin On Site Modem is provided with a M2M Sim card (1.5GB data traffic per month) and factorymounted inside the unit electrical and control box.

Daikin on site modem with antenna technical data:

PHYSICAL SPECIFICATION	
Casing material	Aluminium housing with DIN rail mounting option, plastic panels
Dimensions (W x H x D)	83 x 25 x 74 mm
Weight	125 g
Mounting options	Bottom and sideways DIN rail mounting slots
OPERATING ENVIRONMENT	
Operating temperature	-40 °C to 75 °C
Operating humidity	10% to 90% non-condensing
POWER	
Connector	4 pin industrial DC power socket
Input voltage range	9 – 30 VDC, reverse polarity protection, surge protection >33 VDC 10us max
PoE (passive)	Passive PoE over spare pairs (available from HW revision 0007 and batch number 0010). Possibility to power up through LAN port, not compatible with IEEE802.3af, 802.3at and 802.3bt
Power consumption	< 6.5 W Max
MOBILE	
Mobile module	4G (LTE) - Cat 4 up to 150 Mbps, 3G - Up to 42 Mbps, 2G - Up to 236.8 kbps

EKDOSMWO (accessory) - Daikin on Site Modem without M2M card

ALC DC8 – Gateway for legacy and third-party Units

ALC DC8 is a Controller/Gateway used to connect any unit, able to communicate mainly in MODBUS or BACNET, to Daikin on Site. Through the ALC DC8, legacy Daikin units equipped with MTII controller can be seamlessly integrated with DoS while keeping any kind of BMS integration already foreseen in the plant.



ALC allows the integration of some sensors because it is equipped with an hardware I/O interface. These sensors are:

- Power meter for recording electrical energy consumption.
- Differential pressure sensor for calculation of thermal energy
- Flow meter
- Ambient temperature sensor
- Specific sensors requested by customer



ALC DC8 – Waring Diagram

Controller Operating Limits

Operation (IEC 721-3-3):

- Temperature -40...+70 °C
- Restriction LCD -20... +60 °C
- Restriction Process-Bus -25....+70 °C
- Humidity < 90 % r.h (no condensation)
- Air pressure min. 700 hPa, corresponding to max. 3,000 m above sea level

Transport (IEC 721-3-2):

- Temperature -40...+70 °C
- Humidity < 95 % r.h (no condensation)
- Air pressure min. 260 hPa, corresponding to max. 10,000 m above sea level

CHILLER FAMILY	UNIT NAME	MAX NUM. MAPPED DATAPOINTS	MAX NUMBER OF COMPRESSOR	MAX NUMBER OF CIRCUIT	N° OF COMPRESSOR PER CIRCUIT	BMS MODBUS/BACNETIP COMPATIBILITY*	M2M COMPATIBILITY*
	PFS		2	2	1	Y	Y
	ALS/WHS		4	4	1	Y	Y
Screw Chiller	MCAIR	~ 200	4	4	1	Y	Y
	MTM (MNG, HPI)		2	2	1	Y	Y
Contrifuent Chillor	WSC, WDC, WPV, WCC, HSC, TSC HDC	~ 120	2	1	2	Y	Y
Centinagai Chiller	wмс	130	2	1	2	Y	Y

ALC DC8 compatibility table