
AIRMASTER®
ventilation in balance
AIRLINQ® - DIGITAL BMS GUIDE
LON® · KNX® · BACnet™ · MODBUS®
LON® Parameter Information
KNX® Parameters
BACnet™ Parameters
MODBUS® Parameters

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1. Introduction

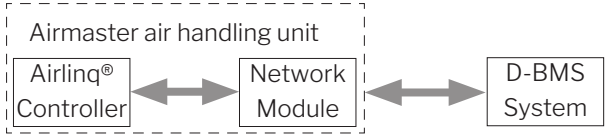
The present document represents a Guide for the basic setup of **B**uilding **M**anagement **S**ystem (BMS) communication with Airmaster **A**ir **H**andling **U**nits (AHU) with Airlinq® control systems via one of the following network protocols: LON®, KNX®, BACnet™ IP, BACnet™ MS/TP or MODBUS® RTU RS485.

The Guide contains descriptions of the system functions and capabilities, examples of control strategies etc. and may be seen as a supplement to other relevant manuals that can be found at the Airmaster website.

It is recommended that a person who is familiar with the current network technology carries out the network integration.

2. Basic Information

The Airlinq® controller in the AHU contains all settings and control functions that are used to determine the operation of the unit. The AHU requires an additional network module in order to communicate with a **D**igital **BMS** (D-BMS). The network module provides the connection between the Airlinq® controller and the D-BMS system by making some control parameters in the Airlinq® controller available via the network protocol.



Each individual AHU can only be supplied with one network module either LON®, KNX®, BACnet™ IP, BACnet™ MS/TP, or MODBUS® RTU RS485.

The communication between the D-BMS system and the AHU has to be initiated by the D-BMS system. The D-BMS system have to poll the values of the output parameters from the AHU.

The description of hardware connection and cable recommendation of the network modules are found in the Installation manual.

2.1. Airlinq® Service Tool

The software Airlinq® Service Tool is useful for the setup of a D-BMS system for AHUs, such as retrofitting and addressing. The software can be acquired at the Airmaster website.

NB! Airlinq® Service Tool is described in the Installation manual.

2.2. Available Parameters

The parameters available for the D-BMS depend on the type of the Airlinq® controller and the options the AHU is produced with. E.g. it is only possible to read values from the parameter for the CO_2 level if the AHU is produced with a CO_2 sensor. Otherwise, the parameter outputs 0.

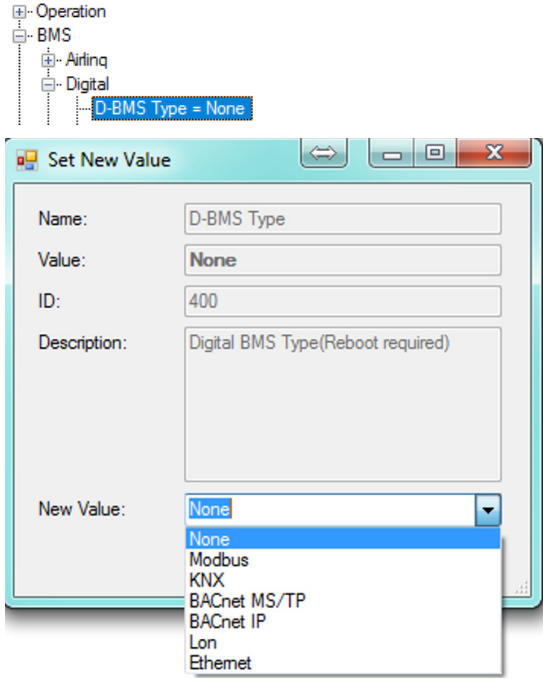
Furthermore, the parameters depend on the software version of the Airlinq® controller and the type of D-BMS.

See the Operator's Manual for detailed description of most relevant settings for the AHU depending on the options.

2.3. Retrofitting of Networks Modules

An AHU with Airlinq® control system can be retrofitted with a network module. The Airlinq® controller has to be programmed in order to use the specific network module. The programming of the Airlinq® controller is performed using a PC with the Airlinq® Service Tool software.

The picture below shows the digital settings menu in the Airlinq® Service Tool. Choose the retrofitted D-BMS module.



3. Addressing and Identification

In case the AHU is ordered with a specific network module all necessary settings for providing access to control parameters in the Airlinq® controller are programmed ex-factory. The AHU only has to be addressed as described in the next subsections, respectively

The description of hardware connection and cable recommendation for the network modules are found in the Installation manual.

3.1. LON®

A LON® integration file (external interface file .xif) is available on the Airmaster website. The integration file is a template for the setup of Airlinq parameters in the LON® system.

The addressing of AHUs is carried out in the LON® system. Ex-factory, each LON® module is provided with a unique Neuron® ID, which is used to address the AHU in the LON® system. The ID number is located on a label on the control box in the AHU. Press the test button on the LON® module to identify the AHU. Below is shown an example of a unique LON® Neuron® ID.

AQC LON
07 00 10 61 88 00

3.2. KNX®

A KNX® project file (.knxproj) is available on the Airmaster website. The project file is used to get necessary information regarding the integration of Airlinq parameters in the KNX® system.

The addressing of AHUs is carried out in the KNX® system. Each individual KNX® module is supplied with the same address: 15.15.254. Press the test button on the KNX® module to identify the AHUs one by one and establish communication. The test button puts the AHUs into programming mode, enabling among other things change of address to a unique address in the system.

3.3. BACnet™/IP

The Anybus IPconfig software is available on the Airmaster website and the functioning is described in Appendix 3. The software is used for scanning of the network and addressing the AHUs by setting a specific IP for BACnet™ IP module in the BACnet™ IP system.

Each BACnet™ IP module has a unique unit ID, termed "BACnet Object Identifier". The ID number is located on a label on the control box in the AHU. Below is shown an example of a unique BACnet™ ID.

AQC BACNET
1988169

The identification number can also be read from the status window, using the Airlinq® Service Tool software. In the Airlinq® Service Tool, the unique unit ID is termed "Bacnet Device Id".

Digital BMS

Bacnet Device Id	1988169

It is not possible to distinguish the various AHUs on the network in the "Anybus IPconfig" program by the unique unit ID number. Airmaster recommends to shut the power off for every AHU except the one of interest and scanning the network, which results in that only the AHU of interest is found.

3.4. BACnet™ MS/TP

The addressing of AHUs is carried out by assigning an Address and a Baud Rate to each BACnet™ MS/TP module. The BACnet™ MS/TP index, Airlinq parameter number, designation, and default value are given in the table below.

Index	Parameter	Designation	Value
128	ID405	BACnet Address	0
129	ID406	BACnet Baud Rate	9600

Each BACnet™ MS/TP module has a unique unit ID, termed BACnet™ Object Identifier. The ID number is located on a label on the control box in the AHU.

Below is shown an example of a unique BACnet™ ID.

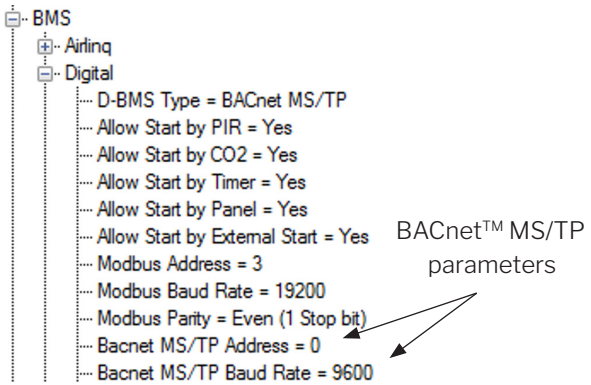
AQC BACNET
2067302

The identification number can also be read from the status window, using the Airlinq® Service Tool software. In the Airlinq® Service Tool, the unique unit ID is termed "Bacnet Device Id".

Digital BMS

Bacnet Device Id	2067302

The addressing of the AHUs is carried out by either using Airlinq Service Tool or directly via the BACnet™ MS/TP network. Addressing the AHUs using Airlinq Service Tool requires that a PC is connected via USB connection to one AHU at a time. Change the BACnet™ Address to a unique address for each AHU and the BACnet™ Baud Rate to the system requirement for all AHUs.



For addressing the modules using the BACnet™ MS/TP system, it is recommended to shut the power off for every AHU except the one of interest, which results in that only the AHU of interest is found. This procedure ensures that the AHU is addressed correctly.

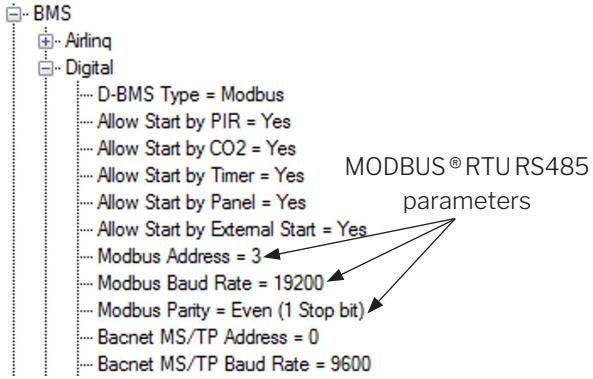
3.5. MODBUS® RTU RS485

The addressing of AHUs is carried out by assigning an Address, Baud Rate and Parity to each AHU. The MODBUS® RTU RS485 register, Airlinq parameter number, designation, and default value are given in the table below.

MODBUS®	Parameter	Designation	Value
40001	ID402	Modbus Address	3
40002	ID403	Modbus Baud Rate	19200
40003	ID404	Modbus Parity	Even (1 stop bit)

The addressing of the AHUs is carried out by either using Airlinq Service Tool or directly via the MODBUS® RTU RS485 network.

Addressing the AHUs using Airlinq Service Tool requires that a PC is connected via USB connection to each AHU. Change the Modbus® Address to a unique address for each AHU and the Modbus® Baud Rate and Modbus® Parity according to the system requirements for all AHUs.



For addressing the modules using the MODBUS® RTU RS485 system, it is recommended to either turn off the power supply or disconnect the communication line of every AHU except the one of interest. This procedure ensures that the AHU is addressed correctly.

4. Control Strategy

It is recommended to define a detailed control strategy for the AHU in collaboration with the customer in order to ensure that the network integration of the AHU meets the customers' expectations. The objective of the control strategy is to ensure the best possible indoor climate with the lowest possible energy consumption.

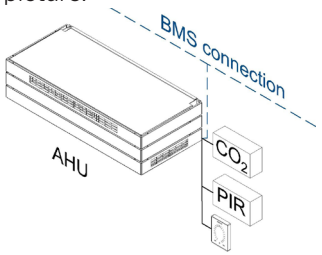
It is recommended to provide descriptions of the control strategy and setup in order to make fault finding, future corrections, and development of the system easier.

There are multiple different approaches on how to control the AHU via D-BMS. A control strategy for an AHU is presented, by using an example of a typical ventilation system with Airmaster AHU equipped with the most common options.

4.1. D-BMS Stand Alone AHU and D-BMS Master

NB! This control strategy applies to both a stand alone AHU and a master AHU in a master/slave system. The configuration of the slave AHU is described in Section 4.2.

An air handling unit (AHU) is installed in a room with one local CO_2 sensor, one local motion (PIR) sensor, and one local control panel connected directly to the Airlinq® controller. The AHU is connected to the D-BMS via the network module. A principle of the setup is shown at the following picture.



4.1.1. Typical Control Strategy for the AHU

Start and stop: All start and stop signals are determined by the D-BMS system. Operation between 8 a.m. and 4 p.m. each Monday to Friday. At any other times the AHU can start by a start signal from the PIR sensor, the CO_2 sensor, or the control panel.

Airflow: Automatic adjustment of the airflow according the CO_2 concentration.
Operation between min. and max. capacity of the AHU with Airmaster default CO_2 settings.
Users are allowed to change the airflow through the control panel.
When the PIR sensor is triggered the AHU start with default settings.

Inlet temperature: The inlet temperature setpoint shall be available on the D-BMS system.

Night time cooling: Automatic activation of night time cooling based on the measured room temperature.
Operation between 0 a.m. and 6 a.m. all day with Airmaster default settings.

4.1.2. D-BMS Parameters

All relevant parameters for meeting the control strategy defined in the previous section are shown at the figure and tables on the following page.

4.1.2.1. Start and Stop

The AHU is started at 8 a.m. via the start input by D-BMS. This means that the Airlinq® controller automatically adjusts fans, main damper, bypass damper, heating surfaces etc. in order to achieve the desired flow rate, inlet temperature etc. At 4 p.m. the AHU is stopped by using the same input parameter.

The above timer settings have to be handled within the D-BMS. It is also possible to use the timers in the Airlinq® controller. However, the timers have to be set using Airlinq® Service Tool and Airlinq® User Tool.

NB! The timers in the Airlinq® controller is by default deactivated when an AHU is ordered with a network module.

At any other times, the AHU is started by inputs from the user. That is either by a signal from the PIR sensor, CO_2 sensor, or the control panel. Be aware, these start methods have to be allowed through the parameters "Allow start by local PIR", "Allow start by CO2" or "Allow start by Panel".

4.1.2.2. Control Panel

The functioning of the two control panels, Viva and Orbit, can be consulted in the Operator's Manual for a detailed description. The limitations using a control panel together with D-BMS are presented in section 5.

4.1.2.3. CO_2 Concentration

By using the default settings, the Airlinq® controller automatically adjusts the airflow based on the measured CO_2 concentration in case the AHU is connected to a KNX®, BACnet™, or MODBUS® based D-BMS system.

If the AHU is connected to a LON® based D-BMS the measured CO_2 concentration needs to be send back to the Airlinq® controller as an input value.

4.1.2.4. Airflow

The airflow of an AHU depends on the start signal, CO_2 concentration, and inputs from the control panel. When starting the AHU by D-BMS, you can program a D-BMS airflow setpoint. This airflow setpoint is used as the lower limit for the CO_2 regulation interval.

The airflow of an AHU, when started by local PIR sensor, local CO_2 sensor or local control panel, is set by the parameter "Default Airflow". Ex-factory, the "Default Airflow" is set to 30 % when an AHU is ordered with CO_2 sensor and 80 %, when it is ordered without.

NB! Changing the 'Default Airflow" takes effect after a restart of the AHU.

NB! Inputs from the control panel such as adjusting the airflow overrides the CO_2 regulation control for a specific period. Read more about the control panel in chapter 5.

The airflow setpoint depending on the start signals is explained in section 4.1.3.

4.1.2.5. Inlet Temperature

The inlet temperature of an AHU depends on the start signal. If the AHU is started by D-BMS, the setpoint for the inlet temperature can be set by a D-BMS parameter.

If the AHU is started by local PIR sensor, local CO_2 sensor or local control panel, the setpoint for the inlet temperature setpoint is set by the parameter "Default Temperature". Ex factory, the "Default Temperature" is set to 19 °C.

NB! Changing the 'Default Temperature" takes effect after a restart of the AHU.

The temperature setpoint depending on the start signals is explained in section 4.1.3.

The actual inlet temperature of an AHU fluctuates around the inlet temperature setpoint, due to change in outside and room temperature. Furthermore, the actual inlet temperature is affected by internal processes in the AHU, such as "Low Temp" and "High Temp". The processes are described in the Operator's Manual.

4.1.2.6. Night Time Cooling

To reduce to high room temperature in daytime the function "Night Time Cooling" can be used. At 0 a.m. a Night Time Cooling start signal is activated by D-BMS. At 6 a.m. the AHU is stopped by using the same input parameter. Even though the start signal is activated, the Airlinq® controller will only turn on the AHU in case the default start conditions for night time cooling are met. Please consult the Operator's Manual for a detailed description of the control process and parameters.

4.1.3. Start Signals and Setpoints

The table below shows the various start signals in order of priority and the corresponding setpoints for airflow and temperature.

Start signals in order of priority		Setpoints
1	Local Timer (if activated)	Timer airflow* Timer inlet temperature*
2	D-BMS (incl. Night Time Cooling)	D-BMS airflow D-BMS inlet temperature (NC FLow, NC IT)
3	Local PIR (Motion Sensor)	Default Airflow
4	Local External Start	Default Temperature
5	Local Panel	
6	Local 0-10V Signal	
7	Local CO_2 sensor	

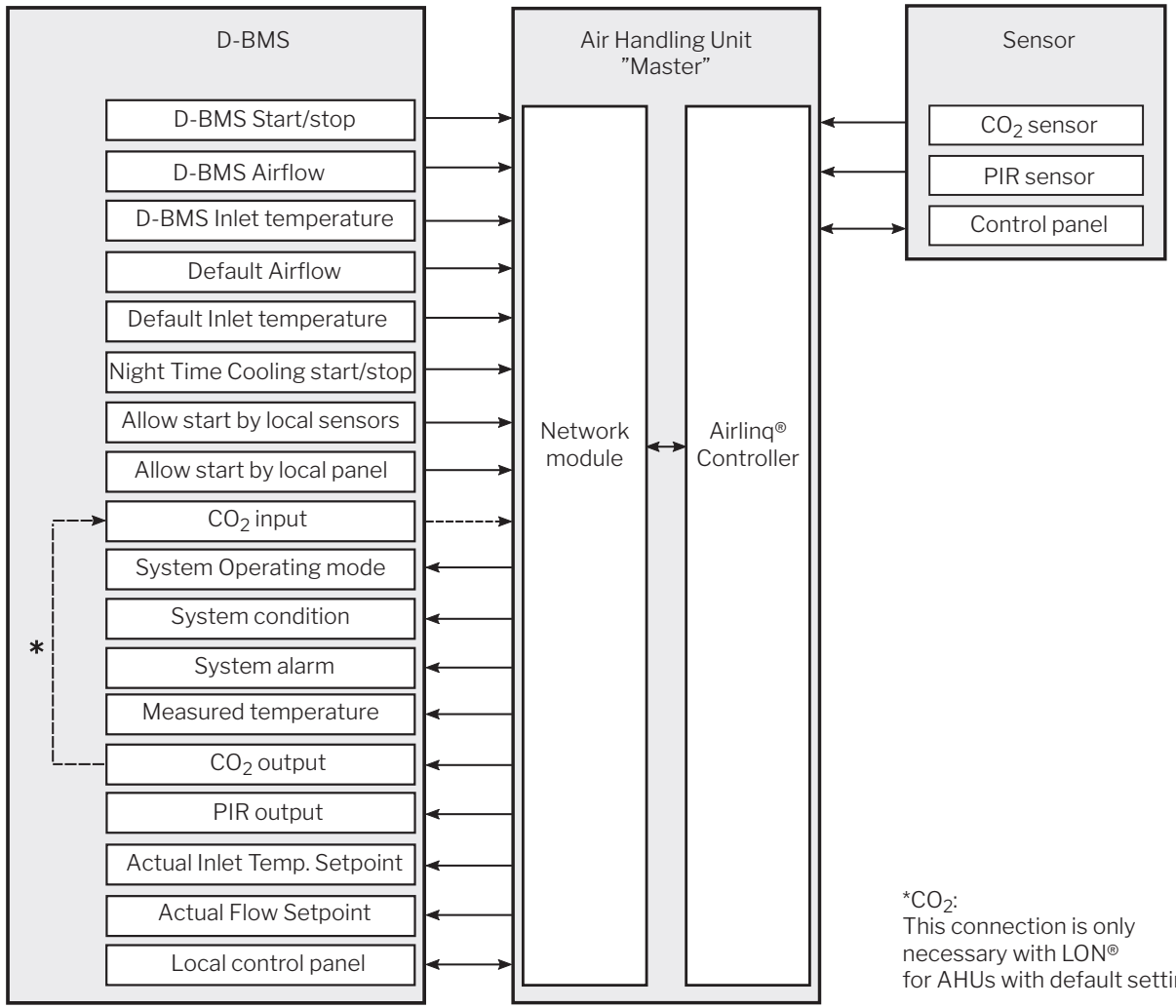
* Setpoints and schedules for local timers are set via a PC with Airlinq User Tool or Airlinq Service Tool connected directly to the AHU.

On the following pages, the communication between the D-BMS and the AHU is presented in the schematic diagram. The parameters are listed in D-BMS related tables.

NB! A limited control of an AHU using only the sensors is shown in a schematic diagram in Appendix 1.

4.1.4. Control Strategy for an AHU used as a Stand Alone AHU and D-BMS Master:

Below, a schematic diagram of the control strategic for the AHU used as a stand alone or as a D-BMS master using D-BMS is shown. In the D-BMS square on the diagram the relevant input and output parameters are listed. The corresponding parameter names of the inputs and outputs depending on the type of D-BMS are listed in the two tables on the next page.



*CO_2:
This connection is only necessary with LON® for AHUs with default settings.

Input signals to the Airlinq® controller

	LON®	KNX®	BACnet™	MODBUS®
D-BMS Start / stop	nviOpMode	Index 1	Index 122	Register 40004
D-BMS Airflow	nviFlowSetpoint	Index 2	Index 125	Register 40005
D-BMS Inlet temperature	nviInletTempStpt	Index 3	Index 126	Register 40006
Defualt Airflow	-	Index 62	Index 133	Register 40072
Default Inlet temperature	-	Index 63	Index 134	Register 40073
Night time cooling start/stop	nviOpMode	Index 5	Index 123	Register 40008
Allow Start by Local PIR	nviControlBasic.bit1	Index 38	Index 118	Register 40042
Allow Start by Local CO2	nviControlBasic.bit2	Index 39	Index 119	Register 40043
Allow Start by Local Panel	nviControlBasic.bit4	Index 41	Index 121	Register 40045
CO_2 concentration Input	nviCO2	Index 4	Index 127	Register 40007

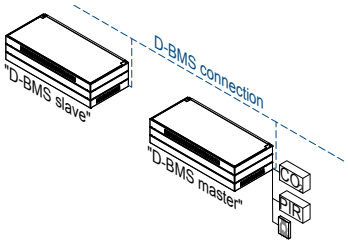
Output signals from the Airlinq® controller

	LON®	KNX®	BACnet™	MODBUS®
System operating mode	nvoUnitStatus	Index 24	Index 20	Register 40027
System condition	nvoCondition	Index 25	Index 21	Register 40028
System alarm	nvoAlarm2	Index 26	Index 22	Register 40029
Measured room temperature	nvoRoomTemp	Index 14	Index 1	Register 40017
Measured inlet temperature	nvoInletTemp	Index 15	Index 2	Register 40018
Measured outside temperature	nvoHVACTemp_2	Index 20	Index 7	Register 40023
Measured exhaust temperature	nvoExhaustTemp	Index 21	Index 8	Register 40024
CO_2 output	nvoCO2	Index 11	Index 9	Register 40014
PIR output	nvoOccup	Index 12	Index 24	Register 40015
Actual Inlet Temp. Setpoint	nvoEffTempSetpt	Index 35	Index 16	Register 40038
Actual Flow Setpoint	nvoEffFlowSptPct	Index 36	Index 17	Register 40039

Parameters for local control panel are described in chapter ”5 Airlinq® Control Panel and D-BMS”.

4.2. D-BMS Slave

Two air handling units (AHUs) are installed in a room with one local CO_2 sensor, one local PIR sensor, and one local control panel connected directly to the Airlinq® controller of the first of the two units, referred to as the master. The AHUs are connected to the D-BMS via the network module. A principle of the setup is shown at the following picture.



NB! The control strategy of the D-BMS master AHU is described in section "4.1. D-BMS Stand Alone AHU and D-BMS Master" and it is recommended to have read the section before continuing.

In this example of a control strategy, it is chosen to control the slave AHU by the airflow, the inlet temperature, and the start/stop request from the master AHU.

Start and Stop

The start/stop signal from the master AHU is read through the parameter "System Operating Mode" and is sent to the parameter "D-BMS Start/Stop" parameter of the slave AHU.

The start/stop signal is read through "System Operating Mode" parameter, since a control panel is installed on the master AHU.

To use the parameter "System Operating Mode" for starting the slave AHU, the D-BMS system has to convert the output the parameter to a binary value, which is readable for the parameter "D-BMS Start".

NB! The programming procedure of conversion must be handled within the D-BMS system.

The output from the parameter "System Operating Mode" depends on the type of D-BMS. It is either a numeric or a Multi-State value, meaning that it contains various information. The output of the Multi-State value is a string accompanied with an integer value.

The outputs of interest from the parameter "System Operating Mode" are listed below:

- 0 = Stopped
- 1 = Starting
- 2 = Auto/running
- 3 = Stopping

The programming procedure must convert the starting output, 1 = Starting, to the binary value of 1 and the stopping output, 3 = Stopping, to the binary value of 0. The binary value is then sent to the "D-BMS Start/Stop" Parameter.

"System operating mode" output	"D-BMS Start" Input
0 = Stopped	Stop, value 0
1 = Starting	Start, value 1
2 = Auto/running	Start, value 1
3 = Stopping	Stop, value 0

NB! Be aware, that the numbering can start at 1 instead of 0 depending on the software setup.

It is recommended to test if the output of the parameter "System Operating Mode" correspond to the actual operation of the AHU.

Airflow

The airflow is read from the master AHU through the parameter "Actual Flow Setpoint" and sent to the input parameter "D-BMS Airflow" of the slave AHU. The "Actual Flow Setpoint" includes overrides from both CO_2, control panel and PIR sensor in contrast to sending the same value to the "D-BMS Airflow" parameter for both of the units.

Temperature

The inlet temperature is read from the master AHU through the parameter "Actual Inlet Temperature Setpoint" and is sent to the input parameter "D-BMS temperature" of the slave AHU.

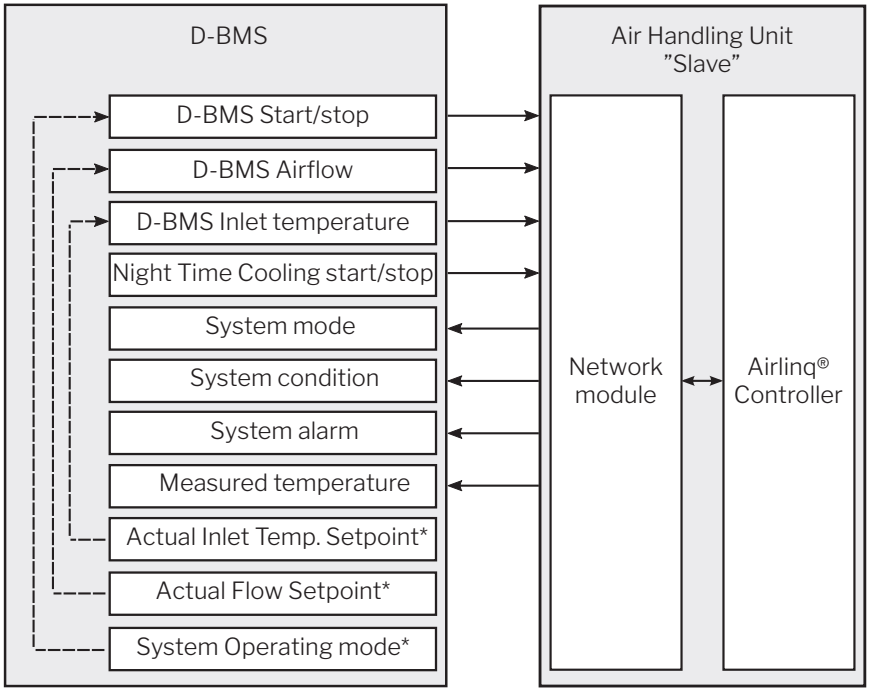
NB! Controlling the slave AHU using only the sensor signals is described in Appendix 2.

The above control strategy for the slave AHU applies to setups with control panel and where the master and the slave AHUs measure nearly identical temperatures.

Without a control panel and with different temperatures, due to e.g. a local heating source, a typical control strategy is to send the sensor signals from the master AHU to the slave AHU, that is the CO2 and PIR signals.

Control Strategy for an AHU used as D-BMS Slave:

Below is shown a schematic diagram of the control strategy for the AHU slave using D-BMS. In the D-BMS square on the diagram the relevant input and output parameters are listed.



*These parameters are read from the master AHU and sent to the slave AHU.

Input signals to slave AHU for control of slave AHU:

	LON®	KNX®	BACnet™	MODBUS®
D_BMS Start/stop	nviOpMode	Index 1	Index 122	Register 40004
D-BMS Airflow	nviFlowSetpoint	Index 2	Index 125	Register 40005
D-BMS Inlet Temperature	nviInletTempStpt	Index 3	Index 126	Register 40006
Night time cooling start/stop	nviOpMode	Index 5	Index 123	Register 40008

Output signals from slave AHU

	LON®	KNX®	BACnet™	MODBUS®
System operating mode	nvoUnitStatus	Index 24	Index 20	Register 40027
System condition	nvoCondition	Index 25	Index 21	Register 40028
System alarm	nvoAlarm2	Index 26	Index 22	Register 40029
Measured room temperature	nvoRoomTemp	Index 14	Index 1	Register 40017
Measured inlet temperature	nvoInletTemp	Index 15	Index 2	Register 40018
Measured outside temperature	nvoHVACTemp_2	Index 20	Index 7	Register 40023
Measured exhaust temperature	nvoExhaustTemp	Index 21	Index 8	Register 40024

Outputs from master AHU for control of slave AHU:

	LON®	KNX®	BACnet™	MODBUS®
Actual Flow Setpoint	nvoEffFlowSptPct	Index 36	Index 17	Register 40039
Actual Inlet Temperature Setpoint	nvoEffTempSetpt	Index 35	Index 16	Register 40038
System Operating Mode	nvoUnitStatus	Index 24	Index 20	Register 40027

5. Airlinq® Control Panel and D-BMS

As default an AHU with D-BMS and control panel is programmed such that it is allowed to start the AHU from the control panel. But it is not allowed to turn off the AHU. This is due to the parameter "Panel OFF Allowed" is set to "none" as default.

In order to allow the AHU to be turned off by the control panel, a reprogramming with the Airlinq® Service Tool is required. The standby function on the control panel is always functioning.

In a master/slave configuration, the control panel affects only the unit it is connected to, which is typically the master unit. The start, stop, and standby inputs from the control panel only make the master AHU start, stop, and standby. Hence, the start, stop, and standby inputs from the control panel can be send to the slave AHU using the D-BMS.

NB! See the control strategy in section "4.2. D-BMS slave".

NB! The control panel shows only status values, warnings, and alarms for the AHU it is connected to. Also resetting service on the panel affects only this AHU.

The available parameters for a local control panel depend on the type of D-BMS.

5.1. LON®

NB! No parameters concerning a local control panel are available for LON® systems. The AHU has to be adjusted locally using Airlinq® Service Tool.

5.2. KNX®, BACnet™/IP, BACnet™ MS/TP, and MODBUS® RTU RS485

How the AHU responds to a change of the airflow by the user via the control panel is determined by the parameter "Panel Flow Function". This parameter has three settings, i.e. "Direct", "None", and "D-BMS":

- Choose "Direct" to allow the airflow to be overridden by the control panel during a specified time period.
- Choose "None" to not allow the control panel to override the airflow specified in the D-BMS.
- Choose "D-BMS" to not allow the control panel to override the airflow specified in the D-BMS. However, it allows the chosen airflow to be read in the D-BMS through the "Panel Flow Request" parameter.

How long time the airflow chosen on the control panel overrides the actual airflow is set by the parameter "Manual Override Time" (The default value is 12 hours).

The airflow in percentage chosen on the control panel can be read in the D-BMS by the parameter "Panel Flow Request" depending on the parameter "Panel Flow Function".

The parameters described above are listed in the table below for BACnet™, KNX®, and MODBUS®. Hence, the control panel parameters are not available for LON®, but can be adjusted locally with the Airlinq® Service Tool.

	KNX®	BACnet™	MODBUS®
Panel Flow Request	Index 74	Index 35	Register 40069
Panel Flow Function	Index 59	Index 130	Register 40070
Manual Override Time	Index 64	Index 135	Register 40074

6. Filter and Alarm Parameters

The available parameters for filter and alarm depend on the type of D-BMS.

6.1. LON®

Only one filter parameter “nvoFilterDaysLft” is available for LON® systems. This parameter outputs the remaining life time of the filters in days. It is not possible to reset the filter status or change how the filter life is controlled. Because of this, it is important to be aware of the following listed points:

- When filters are replaced, it is required to log on to each AHU, using a PC with Airlinq® Service Tool or Airlinq® User Tool and reset the filter status.
- Alternatively, the filter control can be deactivated using Airlinq® Service Tool. This is done by setting the parameter “Filter Test Mode” to “Off” and “Filter Max Life Time, Warning” and “Filter Max Life Time, Alarm” to “0”.
- If the filter control is deactivated, it is recommended to have a fixed service deal with filter replacement minimum once a year.

NB! Warnings are not available for LON!

The alarms of the AHUs can be read from the parameters “nvoAlarm2” and “nvoUnitStatus”. Both parameters require the LON® system is set to handle the outputs.

The parameter “nvoAlarm2” contains information that has to be stored and processed in an alarmlog. The “nvoAlarm2” output can only handle one single alarm message at the same time. By storing the output in a log, it is possible to see if the alarm is deactivated, if there are multiple alarms etc.

The information from “nvoAlarm2” includes a timestamp and a description. The description consists of up to 22 numeric values. The numeric values must be converted to an ASCII text code. An example:

Numeric value from “nvoAlarm2” description field:

70 105 108 116 101 114 65 108 97 114 109 61 84 82 85 69

Converting the values to an ASCII text code:

FilterAlarm = TRUE

The parameter “nvoUnitStatus” includes a subset “in_alarm”. If the value of this subset differs from 0, the AHU will be in alarm. The value is an integer, which must be converted to a binary number. The context between the value, the binary number, and the type of alarm is listed below:

- 1 = Bit 0 = [Low Temp Alarm|False|True]
- 2 = Bit 1 = [Condensation Alarm|False|True]
- 4 = Bit 2 = [Filter Alarm|False|True]

Basically, using the parameter ”nvoAlarm2” is more comprehensive than using the parameter “nvoUnitStatus”. It is not possible to get the alarm “Critical Hardware Fault” from “nvoUnitStatus”.

6.2. KNX®, BACnet™/IP, BACnet™ MS/TP and MODBUS® RTU RS485

For AHUs with software versions of 6.112 or newer 11 parameters concerning the filters of the AHUs are available. It is possible to reset the filter status from the D-BMS system by the “Reset Filter Status” parameter.

Furthermore, it is possible to read the status of the filters in days, hours, and percentage by the parameters “Filter, remaining service life [Days]”, “Remaining Service Life [Hours]”, and “Remaining Service Life [%]”.

With the parameter “Filter Test Mode”, it is set how the status of the filters are evaluated. It contains four options:

- 0 = off (Deactivation of the filter monitoring)
- 1 = Timer (Default for AHUs with AQC-L)
- 2 = Tacho (Flow measurement)
- 3 = Timer and Tacho (Default for AHUs with AQC-P)

Also, the value defining the operating hours before filter warning is set by the parameters “Life Span Warning” and “Filter Warning Period”. And, the value defining the operating hours before filter alarm is set by the parameters “Life Span Alarm” and “Filter Max Life Time”.

The warnings of the AHUs can be read from the “System Condition” parameter including the filter warning. However, the parameter contains also information of the various processes of the AHUs, such as Low Temp, High Temp, etc.

The output of this parameter is an integer value, which must be converted to a binary value. Below is listed the warnings read from the parameter “System Condition” alongside with the binary and the integer value:

- 8 = Bit 3 = [Non Critical Hardware Fault|False|True]
- 64 = Bit 6 = [Filter Change Needed|False|True]

The warnings listed below are only for AHUs with a cooling module:

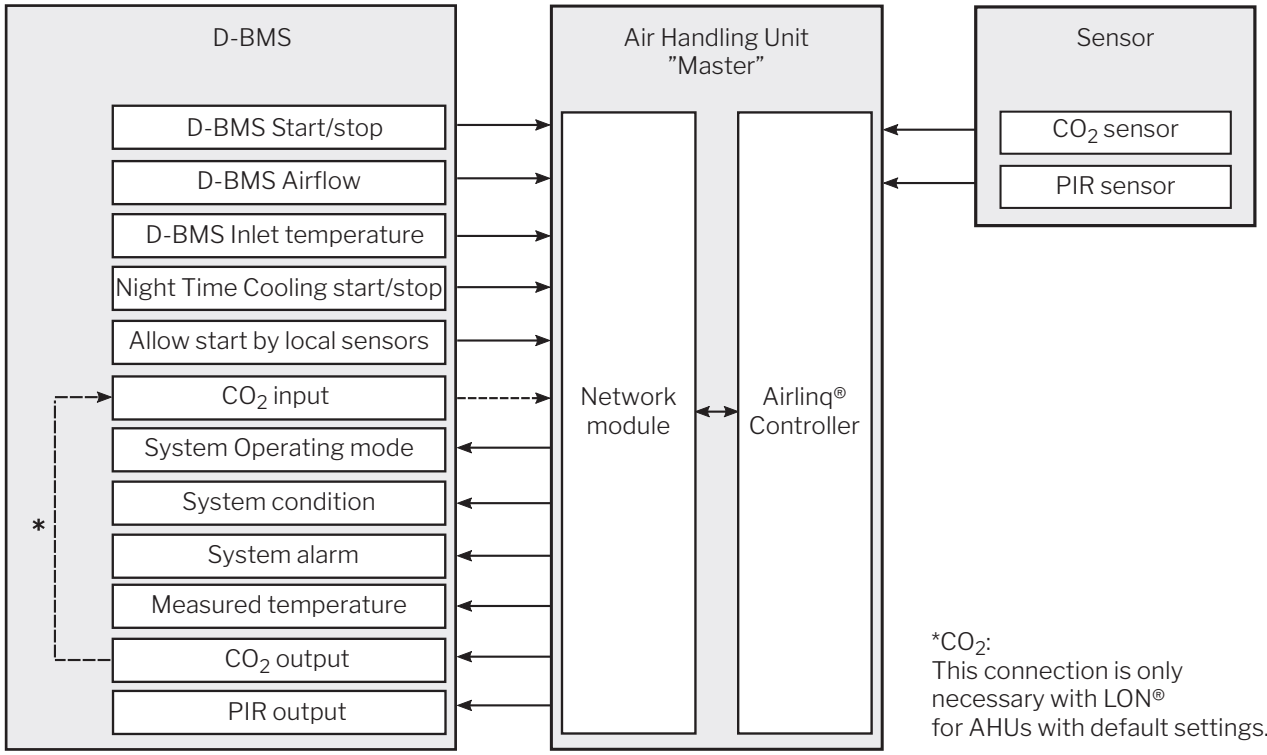
- 16 = Bit 4 = [Condenser Overheated|False|True]
- 32 = Bit 5 = [Compressor Locked|False|True]
- 1024 = Bit 10 = [Comfort Cool Defrost Warning|False|True]
- 2048 = Bit 11 = [Comfort Cool Condensation Warning|False|True]
- 8192 = Bit 13 = [Comfort Cool Hotgas Warning|False|True]
- 16384 = Bit 14 = [Comfort Cool Pressure Warning|False|True]

The alarms of the AHUs can be read from the “System Alarm” parameter. The output of this parameter is an integer value, which must be converted to a binary value in order for comparing it to the listed alarms:

- 1 = Bit 0 = [Low Temp Alarm|False|True]
- 2 = Bit 1 = [Condensation Alarm|False|True]
- 4 = Bit 2 = [Filter Alarm|False|True]
- 8 = Bit 3 = [Critical Hardware Fault|False|True]

Appendix 1 Limited Control of Master/ Stand Alone AHU with Sensors

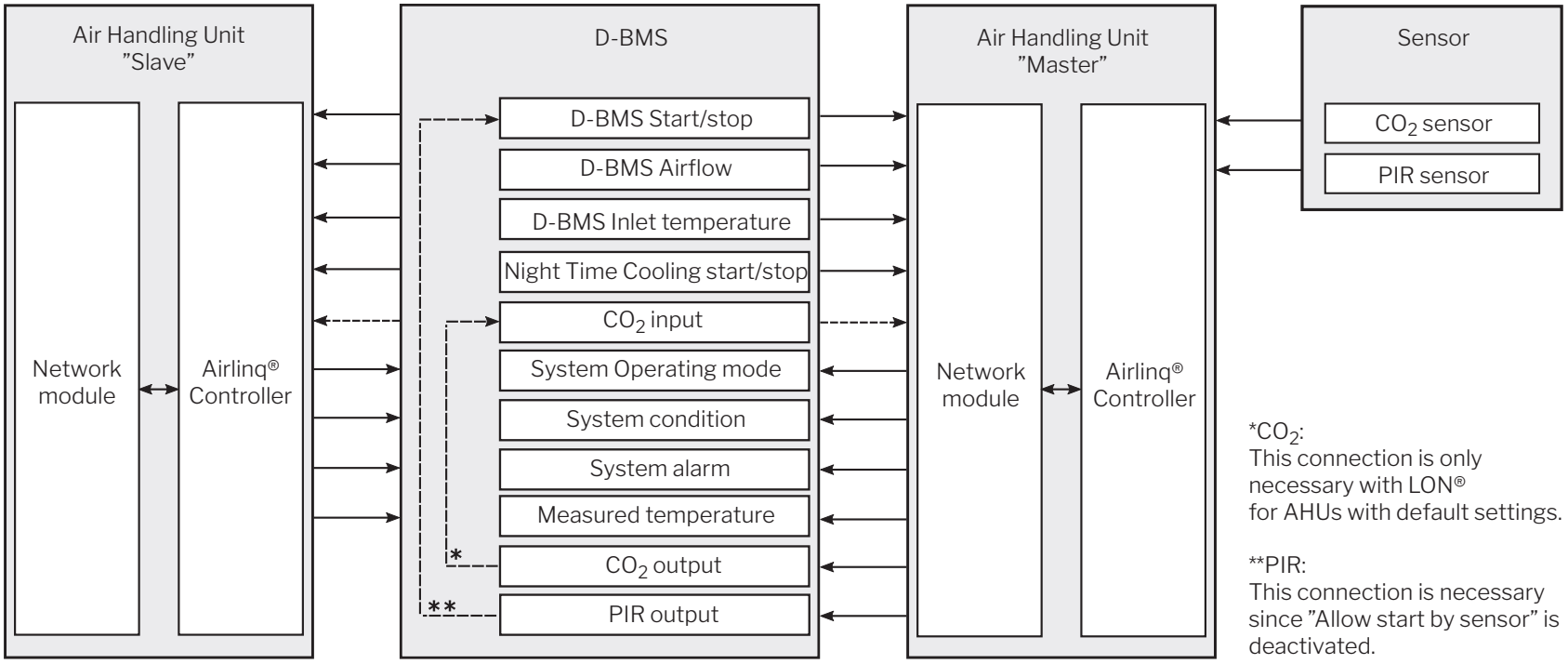
This setup utilises the build-in functions of the AHU controller. That is the CO_2 regulation, the handling of start signals from the CO_2 and PIR sensors, and the default airflow and temperature set ex-factorty.



*CO_2:
This connection is only necessary with LON® for AHUs with default settings.

Appendix 2 Control of Master/Slave AHUs with Sensors

The parameters for default airflow and temperature and the allow by sensors are not used in this setup. The PIR and CO_2 output from the master AHU is processed in the D-BMS and converted to a start signal for the master and slave AHU.



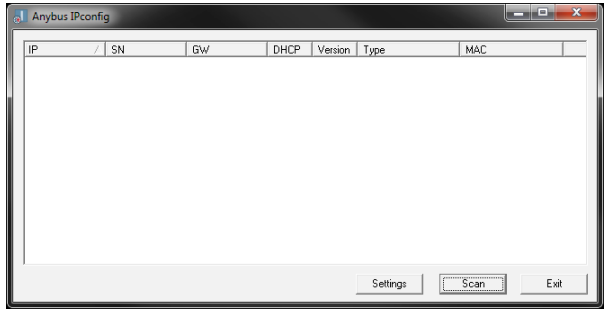
*CO_2:
This connection is only necessary with LON® for AHUs with default settings.

**PIR:
This connection is necessary since "Allow start by sensor" is deactivated.

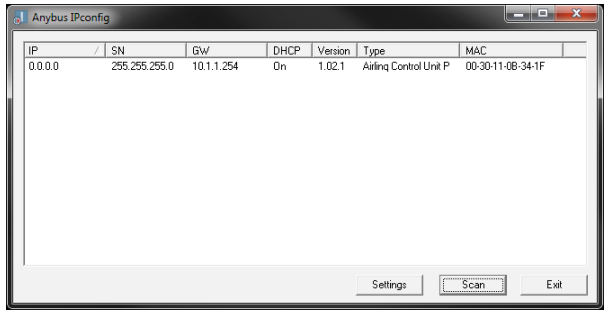
Appendix 3 Anybus IPconfig

The addressing of AHUs with BACnet™ IP is carried out by setting a specific IP for each AHU in the BACnet™ IP system. Scanning of the network and setting the IP addresses can be carried out with the Anybus IPconfig program, which is available on the Airmaster website for free.

Running Anybus IPconfig, the initial screen of the program is seen.



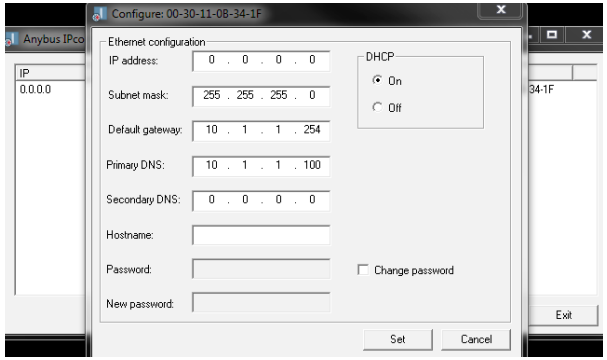
Ensure that the BACnet unit and the computer are connected to the same network. Press “Scan” and the BACnet unit will appear on the list.

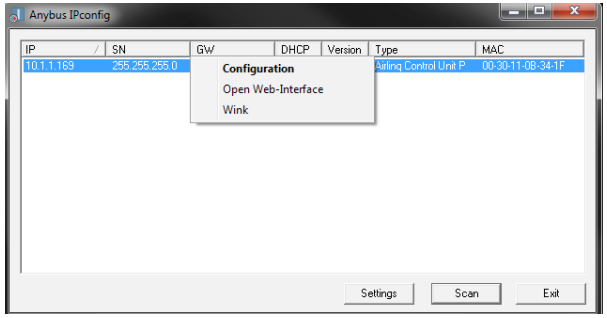


The communication settings for the BACnet unit is found by either pressing “Settings”, by double-clicking on the unit in the list, or by right-click on the BACnet unit in the list and pressing “Configuration”.

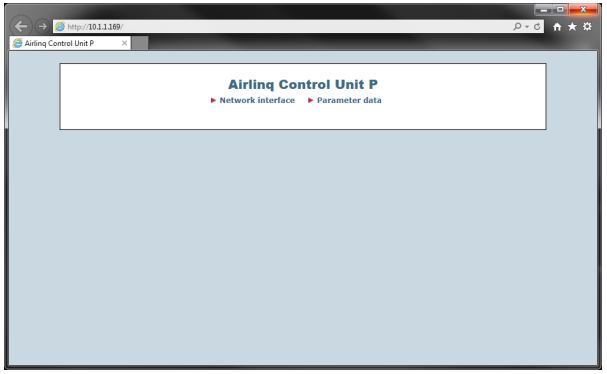
NB! Remember to set DHCP to ”Off” in case static IP addresses are required.

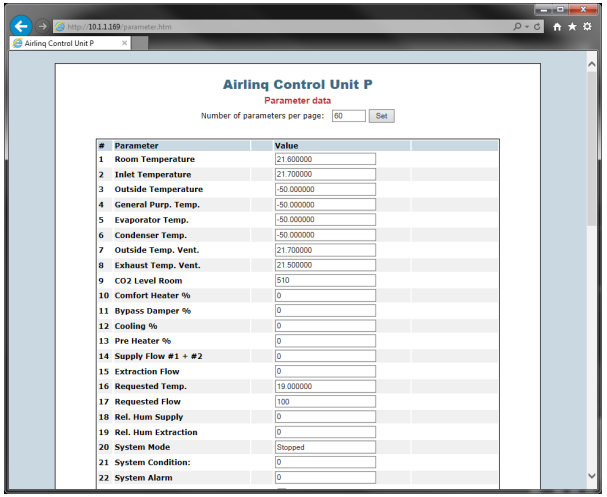
NB! A reboot of the AHU is required after a change of communication settings





A Web-Interface can be opened by right-clicking on the BACnet unit in the list and pressing “Open Web-Interface”.





Appendix 4 Error Descriptions

Error 1: No communication with the AHU.

Cause:

- The AHU is not connected to power supply.
- The communication cable is not connected, wrongly connected, or defective.
- Communication settings are not set correctly or conflicts with other units in the system.

Error 2: The AHU does not react on a start signal.

Cause:

- The AHU has an active alarm, e.g. filter alarm.
- The start dependency parameter is set to "Dependency".

Error 3: The AHU does not stop even though the D-BMS start signal is removed.

Cause: The AHU is equipped with a sensor and it is allowed to start by it, e.g. CO2 or PIR sensor.

Error 4: The setpoints for airflow and inlet temperature do not change though it is changed in the D-BMS.

Cause: Incorrect setpoint parameter is changed or the AHU is not rebooted/restarted yet. Changes in default airflow and temperature requires a reboot/restart of the AHU to take effect.

Error 5: The AHU has a higher airflow than requested by the D-BMS.

Cause: The AHU is equipped with a CO2 sensor, which overrides the D-BMS airflow or the "High Temp" process is active.

Error 6: The AHU has a lower inlet temperature than requested by the D-BMS.

Cause:

- The "High Temp" process is active in order to reduce the room temperature.
- The inlet temperature of the AHU cannot be higher than the room temperature as default.

Error 7: The status parameters of AHU remains at a constant value.

Cause: The D-BMS has to request for information from the AHU, i.e. the D-BMS has to poll the data from the AHU. The intervals for the data polling are determined in the D-BMS.

Error 8 (LON® only): The CO2-concentration is high, however the airflow of the AHU is low.

Cause: The auto-regulation of the airflow due to the CO2 concentration is deactivated. The measured CO2 concentration has to be sent back as an input to the AHU.

Error 9 (MODBUS® only): No output from the AHU status parameters.

Cause:

- Incorrect or missing communication settings (address, baud rate, parity, etc.).
- Incorrect indication of register (the actual software search for parameters in the 40000 series. In some cases it is required to send and read from register 4 instead of 40004 etc.).

Error 10 (MODBUS® only): The AHU does not react on parameter changes or the output from status parameters are not as expected.

Cause: There is a offset of parameters in the actual software. E.g. the output from register 40001 have to be read at register 40002.

Error 11 (MODBUS® only): The AHU outputs a setpoint for the inlet temperature of 14 °C although another value is sent.

Cause: The value sent as setpoint, to the AHU, has to be scaled. E.g. for the AHU to use 19 °C as inlet temperature, a value of 190 has to be sent to register 40006.

Appendix 5 Parameter Overview

NB! Detailed parameter lists for the individual network protocols can be acquired from the Airmaster website.

NB! The structure of this parameter overview corresponds to the structure of the detailed parameter lists except the LON® manual.

Appendix 5.1. Communication

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
402	Modbus Address	-	-	-	-	-	-	-	40001	Modbus Address
403	Modbus Baud Rate	-	-	-	-	-	-	-	40002	Modbus Baud Rate
404	Modbus Parity	-	-	-	-	-	-	-	40003	Modbus Parity
405	Bacnet MS/TP Address	-	-	-	-	-	128	Bacnet MS/TP addr.	-	-
406	Bacnet MS/TP Baud Rate	-	-	-	-	-	129	Bacnet MS/TP baud.	-	-

Appendix 5.2. Basic Control Settings

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
490	D-BMS auto vent.	nviOpMode:HVAC_AUTO	airHandlingUnit	Page 28	1	Control - Automatic Operation: Start	122	D-BMS auto vent.	40004	Automatic Operation: Start
493	D-BMS airflow %	nviFlowSetpoint	NodeObject	Page 19	2	Control - Automatic Operation: Flow setpoint	125	D-BMS airflow %	40005	Automatic Operation: Flow setpoint
494	D-BMS temperature	nviInletTempStpt	airHandlingUnit	Page 28	3	Control - Automatic Operaion: IT setpoint	126	D-BMS temperature	40006	Automatic Operaion: IT setpoint
495	D-BMS CO2 PPM	nviCO2	airHandlingUnit	Page 29	4	Control - Automatic Operation: CO2 input	127	D-BMS CO2 PPM	40007	Automatic Operation: CO2 input

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
491	D-BMS nightcool	nviOpMode: HVAC_ NIGHT_PURGE	airHandlingUnit	Page 28	5	Control - Night Cooling: Start	123	D-BMS nightcool	40008	Night Cooling: Start
492	D-BMS Holiday mode	nviOpMode: ECONOMY	airHandlingUnit	Page 28	6	Control - Holiday Mode Operation: Start	124	D-BMS Holiday mode	40009	Holiday Mode Operation: Start
414	Allow Start by PIR	nviControlBasic.bit1	NodeObject	Page 16	38	Control Basic - Allow Start by Local PIR	118	D-BMS Start by PIR	40042	Allow Start by Local PIR
415	Allow Start by CO2	nviControlBasic. bit2	NodeObject	Page 16	39	Control Basic - Allow Start by Local CO2	119	D-BMS Start by CO2	40043	Allow Start by Local CO2
416	Allow Start by Timer	nviControlBasic. bit3	NodeObject	Page 16	40	Control Basic - Allow Start by Local Timer	120	D-BMS use timer	40044	Allow Start by Local Timer
417	Allow Start by Panel	nviControlBasic. bit4	NodeObject	Page 16	41	Control Basic - Allow Start by Local Panel	121	D-BMS Panel start	40045	Allow Start by Local Panel
45	Allow Start by External Start	nviControlBasic. bit0	NodeObject	Page 16	42	Control Basic - Allow Start by Local External Start	103	Allow Ext. Start	40046	Allow Start by Local External Start

Appendix 5.3. Advanced Control Settings

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
3	Default Airflow	-	-	-	62	Optional Setting - Default Airflow	133	Default Airflow	40072	Default Airflow
4	Default Temperature	-	-	-	63	Optional Setting - Default Temperature	134	Default Temperature	40073	Default Temperature
27	PIR Afterrun Time	nciPirHoldTime	airHandlingUnit	Page 38	45	Optional Setting - PIR Afterrun Time	102	PIR afterrun	40049	PIR Afterrun Time
118	CO2 Min	nciCO2Limit[1]	airHandlingUnit	Page 39	46	Optional Setting - CO2, Minimum	109	Min CO2	40050	CO2, Minimum
119	CO2 Max	nciCO2Limit[2]	airHandlingUnit	Page 39	47	Optional Setting - CO2, Maximum	110	Max CO2	40051	CO2, Maximum

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
24	High Room Temperature, High Limit	nciHiRoomTempHiL	airHandlingUnit	Page 37	43	Optional Setting - High Room Temperature, High limit	100	High Roomtemp.	40047	High Room Temperature, High limit
25	High Room Temperature, Low Limit	nciHiRoom-TempLwL	airHandlingUnit	Page 38	44	Optional Setting - High Room Temperature, Low limit	101	Low Roomtemp.	40048	High Room Temperature, Low limit
81	NC High Limit	nviNightCoolHiLm	NodeObject	Page 14	48	Optional Setting - Night Cooling: High limit	107	Nightcool High	40054	Night Cooling: High limit
82	NC Low Limit	nviNightCoolLoLm	NodeObject	Page 15	49	Optional Setting - Night Cooling: Low limit	108	Nightcool Low	40055	Night Cooling: Low limit
75	NC IT	nviNightCoolTemp	NodeObject	Page 14	50	Optional Setting - Night Cooling: IT setpoint	105	Nightcool IT	40056	Night Cooling: IT setpoint
80	NC Flow	nviNightCoolFlow	NodeObject	Page 15	51	Optional Setting - Night Cooling: Flow setpoint	106	Nightcool Flow	40058	Night Cooling: Flow setpoint
346	HC d_AH_min_A	nviAbsHumMinAcof	NodeObject	Page 16	53	Optional Setting - Absolute humidity Min. A Coefficient	112	d_AH_min_A	40059	Absolute humidity Min. A Coefficient
347	HC d_AH_min_B	nviAbsHumMinBcof	NodeObject	Page 17	54	Optional Setting - Absolute humidity Min. B Coefficient	113	d_AH_min_B	40060	Absolute humidity Min. B Coefficient
348	HC d_AH_min_C	nviAbsHumMinCcof	NodeObject	Page 17	55	Optional Setting - Absolute humidity Min. C Coefficient	114	d_AH_min_C	40061	Absolute humidity Min. C Coefficient
349	HC d_AH_max_A	nviAbsHumMa-xAcof	NodeObject	Page 18	56	Optional Setting - Absolute humidity Max. A Coefficient	115	d_AH_max_A	40062	Absolute humidity Max. A Coefficient
350	HC d_AH_max_B	nviAbsHumMa-xBcof	NodeObject	Page 18	57	Optional Setting - Absolute humidity Max. B Coefficient	116	d_AH_max_B	40063	Absolute humidity Max. B Coefficient

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
351	HC d_AH_max_C	nviAbsHumMaxC-cof	NodeObject	Page 18	58	Optional Setting - Absolute humidity Max. C Coefficient	117	d_AH_max_C	40064	Absolute humidity Max. C Coefficient
72	Reboot	-	-	-	52	Optional Setting - Reboot	104	Reboot	40057	Reboot

Appendix 5.4. Sensor Signals

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
1009	CO2 Level Room	nvoCO2	co2Sensor	-	11	Sensor - CO2 output	9	CO2 Level Room	40014	CO2 output
1041	PIR	nvoOccup	occupancySensor	-	12	Sensor - PIR output	24	PIR Output	40015	PIR output
1038	Manuel Start	nvoControlStatus. bit0	NodeObject	Page 21	13	Sensor - External Start output	23	Manuel Start	40016	External Start output
1000	Room Temperature	nvoRoomTemp	airHandlingUnit	Page 24	14	Sensor - Room Temperature	1	Room Temperature	40017	Room Temperature
1001	Inlet Temperature	nvoInletTemp	airHandlingUnit	Page 26	15	Sensor - Inlet Temperature	2	Inlet Temperature	40018	Inlet Temperature
1006	Outside Temperature Ventilation	nvoHVACTemp_2	hvacTempSensor_2	-	20	Sensor - Outside Temperature at Ventilation Unit	7	Outside Temp. Vent.	40023	Outside Temperature at Ventilation Unit
1007	Exhaust Temperature Ventilation	nvoExhaustTemp	airHandlingUnit	Page 30	21	Sensor - Exhaust Temperature at Ventilation Unit	8	Exhaust Temp. Vent.	40024	Exhaust Temperature at Ventilation Unit
1002	Outside Temperature	nvoOutsideTemp	airHandlingUnit	Page 29	16	Sensor - Outside Temperature	3	Outside Temperature	40019	Outside Temperature
1003	General Purpose Temperature	nvoHVACTemp_3	hvacTempSensor_3	-	17	Sensor - General Purpose Temperature	4	General Purp. Temp.	40020	General Purpose Temperature
1005	Condenser Temperature	nvoHVACTemp_1	hvacTempSensor_1	-	18	Sensor - Condenser Temperature	6	Condenser Temp.	40021	Condenser Temperature
1004	Evaporator Temperature	nvoEvaporatTemp	airHandlingUnit	Page 29	19	Sensor - Evaporator Temperature	5	Evaporator Temp.	40022	Evaporator Temperature

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
1056	Evaporator In Temperature	-	-	-	75	Sensor - Evaporator In Temperature	36	Evaporator In Temp.	40084	Evaporator In Temperature
1057	Evaporator Out Temperature	-	-	-	76	Sensor - Evaporator Out Temperature	37	Evaporator Out Temp	40085	Evaporator Out Temperature
1058	Hotgas Temperature	-	-	-	77	Sensor - Hotgas Temperature	38	Hotgas Temperature	40086	Hotgas Temperature
1032	Relative Humidity Supply Air	nvoRelativHum_1	RelHumiditySen_1	-	22	Sensor - Relative Humidity, outside	18	Rel. Hum Supply	40025	Relative Humidity, outside
1033	Relative Humidity Extraction Air	nvoRelativHum_2	RelHumiditySen_2	-	23	Sensor - Relative Humidity, inside	19	Rel. Hum Extraction	40026	Relative Humidity, inside
1023	Supply Flow	nvoSupplyAirFlow	airHandlingUnit	Page 34	33	SysInfo - Supply Flow	14	Supply Flow #1 + #2	40036	Supply Flow
1024	Extraction Flow	nvoExtAirFlow	airHandlingUnit	Page 34	34	SysInfo - Extraction Flow	15	Extraction Flow	40037	Extraction Flow
1050	Air Handling Unit Power Consumption	nvoTotalPwr	airHandlingUnit	Page 35	-	-	-	-	40040	Airhandling Unit Energy Meter
1051	Air Handling Unit Power Consumption decimal points	-	-	-	-	-	-	-	40041	Airhandling Unit Energy Meter decimal points
1053	Air Handling Unit Power Consumption	-	-	-	37	SysInfo - Airhandling Unit Energy Meter	30	Tot. Power (Wh)	-	-
1065	Cooling Unit Power Consumption	-	-	-	-	-	-	-	40080	Cooling Unit Power Consumption
1066	Cooling Unit Power Consumption decimal points	-	-	-	-	-	-	-	40081	Cooling Unit Power Consumption decimal points
1067	Cooling Unit Power Consumption	-	-	-	73	SysInfo - Cooling Unit Power Consumption	34	Cool Unit Power	-	-
1034	System Mode	nvoUnitStatus	airHandlingUnit	Page 26	24	SysInfo - System Operating Mode	20	System Mode	40027	System Operating Mode

Appendix 5.5. System Information

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
1030	Requested Temperature	nvoEffTempSetpt	airHandlingUnit	Page 30	35	SysInfo - Actual Inlet Temperature setpoint	16	Requested Temp.	40038	Actual Inlet Temperature setpoint
1031	Requested Flow	nvoEffFlowSptPct	NodeObject	Page 22	36	SysInfo - Actual Flow Setpoint	17	Requested Flow	40039	Actual Flow Setpoint
1019	Pre Heater Percent	nvoPreHeater	airHandlingUnit	Page 33	30	SysInfo - Pre Heater percent	13	Pre Heater %	40033	Pre Heater percent
1015	Comfort Heater Percent	nvoHeater	airHandlingUnit	Page 32	28	SysInfo - Comfort Heater percent	10	Comfort Heater %	40031	Comfort Heater percent
1018	Cooling Percent	nvoCooling	airHandlingUnit	Page 33	29	SysInfo - Comfort Cooling percent	12	Cooling %	40032	Comfort Cooling percent
1016	Bypass Damper Percent	nvoBypassDamper	airHandlingUnit	Page 32	32	SysInfo - Bypass Damper percent	11	Bypass Damper %	40035	Bypass Damper percent
1035	System Condition	nvoCondition	NodeObject	Page 21	25	SysInfo - System Condition	21	System Condition:	40028	System Condition
1036	System Alarm	nvoAlarm2	NodeObject	Page 20	26	SysInfo - System Alarm	22	System Alarm	40029	System Alarm
1071	Hardware Errors LSB	-	-	-	-	-	-	-	40082	Hardware Errors LSB
1072	Hardware Errors MSB	-	-	-	-	-	-	-	40083	Hardware Errors MSB
1063	Hardware errors	-	-	-	72	SysInfo - Hardware errors	33	Hardware errors	-	-
255	Software Version	nvoHostSWver	NodeObject	Page 23	27	SysInfo - Software Version	111	Firmware version	40030	Software Version

Appendix 5.6. Local Control Panel

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
502	Panel Flow Request For D-BMS	-	-	-	74	SysInfo - Panel Flow Request	35	Panel Flow Request	40069	Panel Flow Request
333	Panel Flow Function	-	-	-	59	Control Basic - Panel Flow Function	130	Panel Flow Function	40070	Panel Flow Function
50	Manual Override Time	-	-	-	64	Optional Setting - Manual Override Time	135	Manual OverrideTime	40074	Manual Override Time

Appendix 5.7. Service and Filter Information

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
121	Operating Hours Since Last Service	-	-	-	-	-	-	-	40065	Service hour count
1049	Filter, remaining service life [days]	nvoFilterDaysLft	NodeObject	Page 21	31	SysInfo - Filter, remaining service life [days]	29	Filter remain. days	40034	Filter, remaining service life [days]
1055	Remaining Service Life [Hours]	-	-	-	71	SysInfo - Remaining Service Life [Hours]	32	Remain Serv. Life H	40068	Remaining Service Life [Hours]
1054	Remaining Service Life [%]	-	-	-	70	SysInfo - Remaining Service Life [%]	31	Remain Serv. Life %	40067	Remaining Service Life [%]
496	Reset Filter Status	-	-	-	61	Control Basic - Reset Filter Status	132	Reset Filter Status	40066	Reset Filter Status
51	Filter Test Mode	-	-	-	65	Optional Setting - Filter Test Mode	136	Filter Test Mode	40075	Filter Test Mode
52	Life Span Warning	-	-	-	66	Optional Setting - Life Span Warning	137	Life Span Warning	40076	Life Span Warning
55	Life Span Alarm	-	-	-	67	Optional Setting - Life Span Alarm	138	Life Span Alarm	40077	Life Span Alarm

Parameter ID	Airlinq® Service Tool Name	LON® Name	Function Block Name	Description in manual	KNX® Index	Name	BACnet™ Index	Name	MODBUS® Register	Name
432	Filter Max Life Time, Alarm	-	-	-	68	Optional Setting - Filter Max Life Time	139	Filter Max Lifetime	40078	Filter Max Life Time
543	Filter Max Life Time, Warning	-	-	-	69	Optional Setting - Filter Warning Period	140	Filter Warn. Period	40079	Filter Warning Period
497	Run Filter Calibration	-	-	-	60	Control Basic - Run Filter Calibration	131	Run Filter Calib.	40071	Run Filter Calibration

Appendix 6 LON® Parameter Information

The LON® parameters are available in the manuals

”Information Guide LON® module”

and

”BMS module for LONWORKS®”

Please download the manuals here

https://www.airmaster-as.com

Appendix 7 KNX® Parameters

BASIC INFORMATION

The present document is only valid for air handling units with firmware version 6.1 or newer. The firmware version is specified at index 27.
KNX integration project file is available at Airmaster's website.

BASIC CONTROL SETTINGS

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Comments
1	Control - Automatic Operation: Start	Activate Automatic Operation at this input. This parameter is typically used to start/stop the air handling unit from the BMS. N.B.: Index 38-42.	[R/W]		0	1	0	1	0 = No / Stop 1 = Yes / Start
2	Control - Automatic Operation: Flow setpoint	Setpoint for desired airflow in case the unit is started by the BMS (index 1). If running by CO_2 sensor, set the basic flow level here, e.g. 40%.	[R/W]	%	0	100	0	1	
3	Control - Automatic Operaion: IT setpoint	Setpoint for desired inlet temperature in case the unit is started by the BMS (index 1). Please consult the maunal for recommendations.	[R/W]	°C	8	40	19	0,1	
4	Control - Automatic Operation: CO2 input	1) Leave this input at 0 ppm to allow the unit to run by CO_2 sensor(s) connected directly to the unit. 2) Set this input to -1 ppm to prevent the unit from running by CO_2 sensor(s) connected directly to the unit. 3) In case the BMS system has a CO_2 sensor, connect it to this input. Any ppm value greater than 0 ppm will disable any CO_2 sensor connected directly to the unit. N.B.: CO_2 limits can be adjusted: CO_2 minimum and maximum (index 46 and 47). For further information please consult the manual.	[R/W]	PPM	-1	5000	0	1	
5	Control - Night Cooling: Start	Activate this input to request night cooling. Night cooling will only run when setpoint temperatures are exceeded during the day. The limits are adjustable via Night Cooling: high and low limit (index 48 and 49). For further information please consult the manual.	[R/W]		0	1	0	1	0 = No 1 = Yes
6	Control - Holiday Mode Operation: Start	Activate holiday mode operation at this input.	[R/W]		0	1	0	1	0 = No 1 = Yes
38	Control Basic - Allow Start by Local PIR	PIR sensor is optional. In case the unit has a PIR sensor connected directly, is it allowed to start by it, or shall it only pass on the signal to the BMS system. When the unit is started by a local PIR sensor, index 62 and 63 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	1	0 = No 1 = Yes
39	Control Basic - Allow Start by Local CO2	CO_2 sensor is optional. In case the unit has a CO_2 sensor connected directly, is it allowed to start by it, or shall it only pass on the signal to the BMS system. When the unit is started by a local CO_2 sensor, index 62 and 63 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	1	0 = No 1 = Yes
40	Control Basic - Allow Start by Local Timer	Is the unit allowed to start by the build in timer. The timer settings are not available via BMS, only the possibility to enable/disable the timer are available to BMS.	[R/W]		0	1	0	1	0 = No 1 = Yes
41	Control Basic - Allow Start by Local Panel	Control panel is optional. In case the unit has a local control panel connected, is it allowed to start by it. When the unit is started by a local control panel, index 62 and 63 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	1	0 = No 1 = Yes
42	Control Basic - Allow Start by Local External Start	In case the unit has an External Start Signal connected directly, is it allowed to start by it, or shall it only pass on the signal to the BMS system. When the unit is started by a local external start signal, index 62 and 63 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	1	0 = No 1 = Yes

ADVANCED CONTROL SETTINGS

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Comments
62	Optional Setting - Default Airflow	Setpoint for desired airflow in case the unit is started by a local PIR, CO_2, control panel or local external start (index 38, 39, 41, 42).	[R/W]	%	0	100	80	1	The default value is 0 % if the air handling unit is supplied with a CO_2 sensor.
63	Optional Setting - Default Temperature	Setpoint for desired inlet temperature in case the unit is started by a local PIR, CO_2, control panel or local external start (index 38, 39, 41, 42). Please consult the maunal for recommendations.	[R/W]	°C	8	30	19	1	
45	Optional Setting - PIR Afterrun Time	Setpoint for the PIR afterrun time, local connected PIR only.	[R/W]	min	0	1080	30	1	The default value is 5 min if the air handling unit is supplied with a CO_2 sensor.
46	Optional Setting - CO2, Minimum	Setpoint for minimum CO_2 limit, when overriding flow by a CO_2 sensor. Consult the manual for further information on CO_2 control.	[R/W]	PPM	400	5000	500	50	
47	Optional Setting - CO2, Maximum	Setpoint for maximum CO_2 limit, when overriding flow by a CO_2 sensor. Consult the manual for further information on CO_2 control.	[R/W]	PPM	400	5000	900	50	
43	Optional Setting - High Room Temperature, High limit	Setpoint for the limit that causes the unit to enter "High Room Temperature" operation mode. Consult the manual for further description of the "High Room Temperature" operation mode.	[R/W]	°C	0	50	25	1	
44	Optional Setting - High Room Temperature, Low limit	Setpoint for the limit that causes the unit to exit "High Room Temperature" operation mode. Consult the manual for further description of the "High Room Temperature" operation mode.	[R/W]	°C	0	50	24	1	
48	Optional Setting - Night Cooling: High limit	Setpoint for Night Cooling High Limit, Consult the "Night Cooling" section in the manual for further description.	[R/W]	°C	0	30	26	1	
49	Optional Setting - Night Cooling: Low limit	Setpoint for Night Cooling Low Limit, Consult the "Night Cooling" section in the manual for further description.	[R/W]	°C	0	30	23	1	
50	Optional Setting - Night Cooling: IT setpoint	Inlet Temperature setpoint when running in Night Cooling mode, started from BMS (index 5).	[R/W]	°C	0	30	14	1	
51	Optional Setting - Night Cooling: Flow setpoint	Air flow setpoint when running in Night Cooling mode, started from BMS (index 5).	[R/W]	%	0	100	100	1	
55	Optional Setting - Absolute humidity Min. C Coefficient	Coefficient for absolute humidty calculation.	[R/W]		-99,99	99,99	0	0,01	The default value is 3,6 if the air handling unit is supplied with electronic humidity sensors.
58	Optional Setting - Absolute humidity Max. C Coefficient	Coefficient for absolute humidty calculation.	[R/W]		-99,99	99,99	0	0,01	The default value is 6,1 if the air handling unit is supplied with electronic humidity sensors.
52	Optional Setting - Reboot	Activate this input to reboot the controller by setting the value to 1. The value will automatically return to 0.	[R/W]		0	1	0	1	0 = No 1 = Yes

SENSOR SIGNALS

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Comments
11	Sensor - CO2 output	CO_2 sensor is optional. The CO_2 concentration from a CO_2 sensor connected directly to the unit. N.B.: Automatic Operation: CO2 input (Index 4). N.B.: Allow Start by Local CO2 (index 39).	[R]	PPM	0	5000	0	1	
12	Sensor - PIR output	Motion sensor (PIR) is optional. The PIR signal includes the afterrun time (index 45). In case a PIR signal without afterrun time is preferred, set the afterrun time to 0. N.B.: Allow Start by Local PIR (index 38).	[R]		0	1	0	1	0 = Off 1 = On
13	Sensor - External Start output	Indicates if the hardware input "External Start" is activated or not. N.B.: Allow Start by Local External Start (index 42).	[R]		0	1	0	1	0 = Off 1 = On
14	Sensor - Room Temperature	Room temperature, measured in the extraction air.	[R]	°C	-49	100	0	0,1	
15	Sensor - Inlet Temperature	Inlet Temperature, measured at the inlet opening.	[R]	°C	-49	100	0	0,1	
20	Sensor - Outside Temperature at Ventilation Unit	Outside Temperature, measured at the air handling unit.	[R]	°C	-49	100	0	0,1	
21	Sensor - Exhaust Temperature at Ventilation Unit	Exhaust temperature, measured at the air handling unit, near the heat exchanger.	[R]	°C	-49	100	0	0,1	
16	Sensor - Outside Temperature	Cooling module is optional. Outside temperature, measured at the cooling module. Used for both ON/OFF and inverter controlled cooling modules.	[R]	°C	-49	100	0	0,1	
18	Sensor - Condenser Temperature	ON/OFF controlled cooling module is optional. Condenser Temperature. The Condenser is a part of the cooling module.	[R]	°C	-49	100	0	0,1	
19	Sensor - Evaporator Temperature	ON/OFF controlled cooling module is optional. Evaporator Temperature. The Evaporator is a part of the cooling module.	[R]	°C	-49	100	0	0,1	
76	Sensor - Evaporator In Temperature	Inverter controlled cooling module is optional. Evaporator temperature, inlet. The evaporator is a part of the comfort cooling unit.	[R]	°C	-49	100	0	0,1	
77	Sensor - Evaporator Out Temperature	Inverter controlled cooling module is optional. Evaporator temperature, outlet. The evaporator is a part of the comfort cooling unit.	[R]	°C	-49	100	0	0,1	
78	Sensor - Hotgas Temperature	Inverter controlled cooling module is optional.	[R]	°C	-49	100	0	0,1	
22	Sensor - Relative Humidity, outside	Humidity sensor is optional: Humidity measured in the supply air.	[R]	%	0	100	0	1	
23	Sensor - Relative Humidity, inside	Humidity sensor is optional: Humidity measured in the extraction air.	[R]	%	0	100	0	1	
33	SysInfo - Supply Flow	Flow measurement is optional. Measured supply airflow.	[R]	m³/h	0	10000	0	1	
34	SysInfo - Extraction Flow	Flow measurement is optional. Measured extraction airflow.	[R]	m³/h	0	10000	0	1	
37	SysInfo - Airhandling Unit Energy Meter	Energy meter is optional. The energy meter measure the energy consumption of the air handling unit.	[R]	Wh	0	4294967295	0	1	
73	SysInfo - Cooling Unit Power Consumption	Energy meter and cooling module are optional. The energy meter measure the energy consumption of the cooling module.	[R]	Wh	0	4294967295	0	1	

SYSTEM INFORMATION

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Comments
24	SysInfo - System Operating Mode	This output indicates the system operating mode for the air handling unit.	[R]		0	255	0	1	0 = Stopped 1 = Starting 2 = Auto / Running 3 = Stopping 4 = Filter Test Running 5 = Filter Calibration 6 = Night Cooling 7 = Holiday Mode 8 = Manual Mode
35	SysInfo - Actual Inlet Temperature setpoint	The actual inlet temperature setpoint may vary from requested value, thus the actual setpoint is available here.	[R]	°C	0	100	0	0,1	
36	SysInfo - Actual Flow Setpoint	The actual air flow setpoint may vary from requested value, thus the actual setpoint is available here, e.g. due to CO_2 override.	[R]	%	0	100	0	1	
30	SysInfo - Pre Heater percent	Preheaing suface is optional. Percentage heat output relative to maximum.	[R]	%	0	100	0	1	
28	SysInfo - Comfort Heater percent	Comfort heaing surface is optional. Percentage heat output relative to maximum.	[R]	%	0	100	0	1	
29	SysInfo - Comfort Cooling percent	Comfort cooling module is optional. Percentage cooling output relative to maximum.	[R]	%	0	100	0	1	
32	SysInfo - Bypass Damper percent	Bypass damper is optional. Percentage bypass position relative to maximum.	[R]	%	0	100	0	1	0 = full heat recovery
25	SysInfo - System Condition	This output indicates the system condition for the air handling unit.	[R]		-32768	32767	0	1	N.B.: Convert to binary representation Bit 0 = [Low Temp Process|Inactive|Active] Bit 1 = [High Temp Process|Inactive|Active] Bit 2 = [Condensation Process|Inactive|Active] Bit 3 = [Non Critical Hardware Fault|False|True] Bit 4 = [Condenser Overheated|False|True] Bit 5 = [Compressor Locked|False|True] Bit 6 = [Filter Change Needed|False|True] Bit 7 = [High Room Temp|False|True] Bit 8 = [Abnormal Filter Test Calibration Result|False|True] Bit 9 = [Manual Override Active|False|True] Bit 10 = [Comfort Cool Defrost Warning |False|True] Bit 11 = [Comfort Cool Condensation Warning|False|True] Bit 12 = [Boost Mode Active|False|True] Bit 13 = [Comfort Cool Hotgas Warning|False|True] Bit 14 = [Comfort Cool Pressure Warning|False|True] Bit 15 = [Group Master Not Available Warning|False|True]
26	SysInfo - System Alarm	This output indicates system alarms for the air handling unit.	[R]		-32768	32767	0	1	N.B.: Convert to binary representation Bit 0 = [Low Temp Alarm|False|True] Bit 1 = [Condensation Alarm|False|True] Bit 2 = [Filter Alarm|False|True] Bit 3 = [Critical Hardware Fault|False|True]

SYSTEM INFORMATION

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Comments
72	SysInfo - Hardware errors	This output indicates the hardware status of the the air handling unit and cooling module.	[R]		0	4294967295	0		N.B.: Convert to binary representation Bit 0 = [Room Temperaturesensor|OK|Fault] Bit 1 = [Inlet Temperaturesensor|OK|Fault] Bit 2 = [Outside Temperaturesensor|OK|Fault] Bit 3 = [General Purpose Temperaturesensor|OK|Fault] Bit 4 = [Condenser Temperaturesensor|OK|Fault] Bit 5 = [Evaporator Temperaturesensor|OK|Fault] Bit 6 = [Exhaust Temperaturesensor Ventilation Unit|OK|Fault] Bit 7 = [Outside Temperaturesensor Ventilation Unit|OK|Fault] Bit 8 = [Supplyflow Sensor 1|OK|Fault] Bit 9 = [Supplyflow Sensor 2|OK|Fault] Bit 10 = [Extractionflow Sensor|OK|Fault] Bit 11 = [CO2 Sensor|OK|Fault] Bit 12 = [Supply Fan|OK|Fault] Bit 13 = [Extraction Fan|OK|Fault] Bit 14 = [Evaporator In Temperaturesensor|OK|Fault] Bit 15 = [Evaporator Out Temperaturesensor|OK|Fault] Bit 16 = [Hotgas Temperaturesensor|OK|Fault] Bit 17 = [Comfort Cooling Connection Lost|OK|Fault] Bit 18 = [Comfort Cooling Stepdriver |OK|Fault] Bit 19 = [Comfort Cooling Frequency Inverter|OK|Fault] Bit 20 = [Humidity Supply Air Sensor|OK|Fault] Bit 21 = [Humidity Extraction Air Sensor|OK|Fault] Bit 22 = [Humidity Sensor Settings|OK|Fault]
27	SysInfo - Software Version	Software version installed in the air handling unit.	[R]		0	32	6	0,001	

LOCAL CONTROL PANEL

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Comments
74	SysInfo - Panel Flow Request	Local control panel is optional. Flow percent requested by the user via a local control panel. N.B.: Panel Flow Function (index 59).	[R]	%	0	100	0	1	0 = no request from user
59	Control Basic - Panel Flow Function	This value defines how the air handling unit respond to a change of the airflow setpoint by the user via a local control panel. "Direct": The airflow setpoint can temporarily be overridden from a local control panel. "None": The airflow setpoint can not be overridden from a local control panel. "D-BMS": A change of the airflow setpoint from a local control panel will be shown at index 74, but will not affect the actual flow setpoint directly. N.B.: Manual Override Time (index 64).	[R/W]		0	2	1	1	0 = Direct 1 = None 2 = D-BMS
64	Optional Setting - Manual Override Time	This value defines for how long time an override of the airflow setpoint from a local control panel will be stored in the controller.	[R/W]	hour(s)	0	18	12	1	

SERVICE AND FILTER INFORMATION

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Comments
31	SysInfo - Filter, remaining service life [days]	Estimated remaining service life of the filters in days calculated by the average daily operating hours since last service.	[R]	days	0	1000	0	1	
71	SysInfo - Remaining Service Life [Hours]	Remaining service life of filters in operating hours.	[R]	hour(s)	0	65535	0	1	
70	SysInfo - Remaining Service Life [%]	Estimated remaining service life of filters in %.	[R]	%	0	101	0	1	0 = filter change required 100 = clean filters
61	Control Basic - Reset Filter Status	The filter monitoring must be reset after a filter change. Set the value to 1 to reset filter status. The value will automatically return to 0 when filter status has been reset.	[R/W]		0	1	0	1	0 = No 1 = Yes
65	Optional Setting - Filter Test Mode	This parameter defines the filter test mode. "Timer": Filter monitoring using an hour counter. "Tacho": Electronic flow monitoring. "Timer and tacho": Filter monitoring using an hour counter and electronic flow monitoring.	[R/W]		0	3	3	1	0 = Off 1 = Timer (default for air handling units with AQC-L) 2 = Tacho 3 = Timer And Tacho (default for air handling units with AQC-P)
66	Optional Setting - Life Span Warning	This value defines the operating hours before activating a filter warning at index 25.	[R/W]	hour(s)	0	8760	3000	1	
67	Optional Setting - Life Span Alarm	This value defines the operating hours before activating a filter alarm at index 26.	[R/W]	hour(s)	0	8760	8760	1	
68	Optional Setting - Filter Max Life Time	This value defines the maximum filter life time and for how many months the air handling unit can operate after a service reset before activating a filter alarm (index 26). The max life time alarm can be disabled by setting the value to 0.	[R/W]	month(s)	0	48	24	1	
69	Optional Setting - Filter Warning Period	This value defines the period for a filter warning at index 25 before the filter alarm activates. By using the default value of this parameter the filter warning at index 25 is activated 2 months before the maximum filter life time expires (index 68).	[R/W]	month(s)	0	12	12	1	
60	Control Basic - Run Filter Calibration	Set the value to 1 to run a filter calibration. The value will automatically return to 0 when the calibration process has finished. N.B.: Do only run a filter calibration with clean filters. N.B.: Do only run a filter calibration at the first start of an air handling unit with AQC-P control box by non standard installation e.g. on reduction of the duct size, when using more than 1 m of duct or when installing with elbows. N.B.: A new filter calibration shall be performed if the filter class is changed (from M5 to F7 etc.) during a service routine of the air handling unit with AQC-P control box.	[R/W]		0	1	0	1	0 = No 1 = Yes

Appendix 8 BACnet™ Parameters

BASIC INFORMATION

The present document is only valid for air handling units with firmware version 6.1 or newer. The firmware version is specified at index 111.

BACnet™ /IP: Unit IP address, gateway, DHCP settings etc. can be changed by using the configuration software that is available at Airmaster's website.

BACnet™ MS/TP: Unit address and baud rate can be changed via index 128 and 129 or by using Airlinq Service Tool that is available at Airmaster's website.

BACNETCOMMUNICATION

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Data type	Comments
128	Bacnet ms/tp addr.	BACnet™ MS/TP address.	[R/W]		0	127	0	1	Analog Value	
129	Bacnet ms/tp baud.	BACnet™ MS/TP baud rate.	[R/W]		0	3	0	1	Multi-State Value	0 = 9600 1 = 19200 2 = 38400 3 = 76800

BASIC CONTROL SETTINGS

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Data type	Comments
122	D-BMS auto vent.	Activate Automatic Operation at this input. This parameter is typically used to start/stop the air handling unit from the BMS. N.B.: Index 103, 118-121.	[R/W]		0	1	0	1	Binary Value	0 = No / Stop 1 = Yes / Start
125	D-BMS airflow %	Setpoint for desired airflow in case the unit is started by the BMS (index 122). If running by CO_2 sensor, set the basic flow level here, e.g. 40%.	[R/W]	%	0	100	0	1	Analog Value	
126	D-BMS temperature	Setpoint for desired inlet temperature in case the unit is started by the BMS (index 122). Please consult the maunal for recommendations.	[R/W]	°C	8	40	19	0,1	Analog Value	
127	D-BMS CO2 PPM	1) Leave this input at 0 ppm to allow the unit to run by CO_2 sensor(s) connected directly to the unit. 2) Set this input to -1 ppm to prevent the unit from running by CO_2 sensor(s) connected directly to the unit. 3) In case the BMS system has a CO_2 sensor, connect it to this input. Any ppm value greater than 0 ppm will disable any CO_2 sensor connected directly to the unit. N.B.: CO_2 limits can be adjusted: CO_2 minimum and maximum (index 109 and 110). For further information please consult the manual.	[R/W]	PPM	-1	5000	0	1	Analog Value	
123	D-BMS nightcool	Activate this input to request night cooling. Night cooling will only run when setpoint temperatures are exceeded during the day. The limits are adjustable via Nightcool high and low limit (index 107 and 108). For further information please consult the manual.	[R/W]		0	1	0	1	Binary Value	0 = No 1 = Yes
124	D-BMS Holiday mode	Activate holiday mode operation at this input.	[R/W]		0	1	0	1	Binary Value	0 = No 1 = Yes
118	D-BMS Start by PIR	PIR sensor is optional. In case the unit has a PIR sensor connected directly, is it allowed to start by it, or shall it only pass on the signal to the BMS system. When the unit is started by a local PIR sensor, index 133 and 134 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	1	Binary Value	0 = No 1 = Yes
119	D-BMS Start by CO2	CO_2 sensor is optional. In case the unit has a CO_2 sensor connected directly, is it allowed to start by it, or shall it only pass on the signal to the BMS system. When the unit is started by a local CO_2 sensor, index 133 and 134 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	1	Binary Value	0 = No 1 = Yes
120	D-BMS use timer	Is the unit allowed to start by the build in timer. The timer settings are not available via BMS, only the possibility to enable/disable the timer are available to BMS.	[R/W]		0	1	0	1	Binary Value	0 = No 1 = Yes
121	D-BMS Panel start	Control panel is optional. In case the unit has a local control panel connected, is it allowed to start by it. When the unit is started by a local control panel, index 133 and 134 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	1	Binary Value	0 = No 1 = Yes
103	Allow Ext. Start	In case the unit has an External Start Signal connected directly, is it allowed to start by it, or shall it only pass on the signal to the BMS system. When the unit is started by a local external start signal, index 133 and 134 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	1	Binary Value	0 = No 1 = Yes

ADVANCED CONTROL SETTINGS

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Data type	Comments
133	Default Airflow	Setpoint for desired airflow in case the unit is started by a local PIR, CO_2, control panel or local external start (index 103, 118, 119, 121).	[R/W]	%	0	100	80	1	Analog Value	The default value is 0 % if the air handling unit is supplied with a CO_2 sensor.
134	Default Temperature	Setpoint for desired inlet temperature in case the unit is started by a local PIR, CO_2, control panel or local external start (index 103, 118, 119, 121). Please consult the maunal for recommendations.	[R/W]	°C	8	30	19	1	Analog Value	
102	PIR afterrun	Setpoint for the PIR afterrun time, local connected PIR only.	[R/W]	min	0	1080	30	1	Analog Value	The default value is 5 min if the air handling unit is supplied with a CO_2 sensor.
109	Min CO2	Setpoint for minimum CO_2 limit, when overriding flow by a CO_2 sensor. Consult the manual for further information on CO_2 control.	[R/W]	PPM	400	5000	500	50	Analog Value	
110	Max CO2	Setpoint for maximum CO_2 limit, when overriding flow by a CO_2 sensor. Consult the manual for further information on CO_2 control.	[R/W]	PPM	400	5000	900	50	Analog Value	
100	High Roomtemp.	Setpoint for the limit that causes the unit to enter "High Room Temperature" operation mode. Consult the manual for further description of the "High Room Temperature" operation mode.	[R/W]	°C	0	50	25	1	Analog Value	
101	Low Roomtemp.	Setpoint for the limit that causes the unit to exit "High Room Temperature" operation mode. Consult the manual for further description of the "High Room Temperature" operation mode.	[R/W]	°C	0	50	24	1	Analog Value	
107	Nightcool High	Setpoint for Night Cooling High Limit, Consult the "Night Cooling" section in the manual for further description.	[R/W]	°C	0	30	26	1	Analog Value	
108	Nightcool Low	Setpoint for Night Cooling Low Limit, Consult the "Night Cooling" section in the manual for further description.	[R/W]	°C	0	30	23	1	Analog Value	
105	Nightcool IT	Inlet Temperature setpoint when running in Night Cooling mode, started from BMS (index 123).	[R/W]	°C	0	30	14	1	Analog Value	
106	Nightcool Flow	Airflow setpoint when running in Night Cooling mode, started from BMS (index 123).	[R/W]	%	0	100	100	1	Analog Value	
114	d_AH_min_C	Coefficient for absolute humidty calculation.	[R/W]		-99,99	99,99	0	0,01	Analog Value	The default value is 3,6 if the air handling unit is supplied with electronic humidity sensors.
117	d_AH_max_C	Coefficient for absolute humidty calculation.	[R/W]		-99,99	99,99	0	0,01	Analog Value	The default value is 6,1 if the air handling unit is supplied with electronic humidity sensors.
104	Reboot	Activate this input to reboot the controller by setting the value to 1. The value will automatically return to 0.	[R/W]		0	1	0	1	Binary Value	0 = No 1 = Yes

SENSOR SIGNALS

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Data type	Comments
9	CO2 Level Room	CO_2 sensor is optional. The CO_2 concentration from a CO_2 sensor connected directly to the unit. N.B.: D-BMS CO2 PPM (index 127). N.B.: D-BMS Start by CO2 (index 119).	[R]	PPM	0	5000	0	1	Analog Value	
24	PIR Output	Motion sensor (PIR) is optional. The PIR signal includes the afterrun time (index 102). In case a PIR signal without afterrun time is preferred, set the afterrun time to 0. N.B.: D-BMS Start by PIR (index 118).	[R]		0	1	0	1	Binary Value	0 = Off 1 = On
23	Manuel Start	Indicates if the hardware input "External Start" is activated or not. N.B.: Allow Ext. Start (index 103).	[R]		0	1	0	1	Binary Value	0 = Off 1 = On

SENSOR SIGNALS

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Data type	Comments
1	Room Temperature	Room temperature, measured in the extraction air.	[R]	°C	-49	100	0	0,1	Analog Value	
2	Inlet Temperature	Inlet Temperature, measured at the inlet opening.	[R]	°C	-49	100	0	0,1	Analog Value	
7	Outside Temp. Vent.	Outside Temperature, measured at the air handling unit.	[R]	°C	-49	100	0	0,1	Analog Value	
8	Exhaust Temp. Vent.	Exhaust temperature, measured at the air handling unit, near the heat exchanger.	[R]	°C	-49	100	0	0,1	Analog Value	
3	Outside Temperature	Cooling module is optional. Outside temperature, measured at the cooling module. Used for both ON/OFF and inverter controlled cooling modules.	[R]	°C	-49	100	0	0,1	Analog Value	
6	Condenser Temp.	ON/OFF controlled cooling module is optional. Condenser Temperature. The Condenser is a part of the cooling module.	[R]	°C	-49	100	0	0,1	Analog Value	
5	Evaporator Temp.	ON/OFF controlled cooling module is optional. Evaporator Temperature. The Evaporator is a part of the cooling module.	[R]	°C	-49	100	0	0,1	Analog Value	
36	Evaporator In Temp.	Inverter controlled cooling module is optional. Evaporator temperature, inlet. The evaporator is a part of the comfort cooling unit.	[R]	°C	-49	100	0	0,1	Analog Value	
37	Evaporator Out Temp.	Inverter controlled cooling module is optional. Evaporator temperature, outlet. The evaporator is a part of the comfort cooling unit.	[R]	°C	-49	100	0	0,1	Analog Value	
38	Hotgas Temperature	Inverter controlled cooling module is optional.	[R]	°C	-49	100	0	0,1	Analog Value	
18	Rel. Hum Supply	Humidity sensor is optional: Humidity measured in the supply air.	[R]	%	0	100	0	1	Analog Value	
19	Rel. Hum Extraction	Humidity sensor is optional: Humidity measured in the extraction air.	[R]	%	0	100	0	1	Analog Value	
14	Supply Flow #1 + #2	Flow measurement is optional. Measured supply airflow.	[R]	m³/h	0	10000	0	1	Analog Value	
15	Extraction Flow	Flow measurement is optional. Measured extraction airflow.	[R]	m³/h	0	10000	0	1	Analog Value	
30	Tot. Power (Wh)	Energy meter is optional. The energy meter measure the energy consumption of the air handling unit.	[R]	Wh	0	4294967295	0	1	Analog Value	
34	Cool Unit Power	Energy meter and cooling module are optional. The energy meter measure the energy consumption of the cooling module.	[R]	Wh	0	4294967295	0	1	Analog Value	

SYSTEM INFORMATION

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Data type	Comments
20	System Mode	This output indicates the system operating mode for the air handling unit.	[R]		0	255	0	1	Multi-State Value	0 = Stopped 1 = Starting 2 = Auto / Running 3 = Stopping 4 = Filter Test Running 5 = Filter Calibration 6 = Night Cooling 7 = Holiday Mode 8 = Manual Mode
16	Requested Temp.	The actual inlet temperature setpoint may vary from requested value, thus the actual setpoint is available here.	[R]	°C	0	100	0	0,1	Analog Value	
17	Requested Flow	The actual air flow setpoint may vary from requested value, thus the actual setpoint is available here, e.g. due to CO_2 override.	[R]	%	0	100	0	1	Analog Value	
13	Pre Heater %	Preheaing suface is optional. Percentage heat output relative to maximum.	[R]	%	0	100	0	1	Analog Value	
10	Comfort Heater %	Comfort heaing surface is optional. Percentage heat output relative to maximum.	[R]	%	0	100	0	1	Analog Value	

SYSTEM INFORMATION

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Data type	Comments
12	Cooling %	Comfort cooling module is optional. Percentage cooling output relative to maximum.	[R]	%	0	100	0	1	Analog Value	
11	Bypass Damper %	Bypass damper is optional. Percentage bypass position relative to maximum.	[R]	%	0	100	0	1	Analog Value	0 = full heat recovery
21	System Condition	This output indicates the system condition for the air handling unit.	[R]		-32768	32767	0	1	Analog Value	N.B.: Convert to binary representation Bit 0 = [Low Temp Process|Inactive|Active] Bit 1 = [High Temp Process|Inactive|Active] Bit 2 = [Condensation Process|Inactive|Active] Bit 3 = [Non Critical Hardware Fault|False|True] Bit 4 = [Condenser Overheated|False|True] Bit 5 = [Compressor Locked|False|True] Bit 6 = [Filter Change Needed|False|True] Bit 7 = [High Room Temp|False|True] Bit 8 = [Abnormal Filter Test Calibration Result|False|True] Bit 9 = [Manual Override Active|False|True] Bit 10 = [Comfort Cool Defrost Warning |False|True] Bit 11 = [Comfort Cool Condensation Warning|False|True] Bit 12 = [Boost Mode Active|False|True] Bit 13 = [Comfort Cool Hotgas Warning|False|True] Bit 14 = [Comfort Cool Pressure Warning|False|True] Bit 15 = [Group Master Not Available Warning|False|True]
22	System Alarm	This output indicates system alarms for the air handling unit.	[R]		-32768	32767	0	1	Analog Value	N.B.: Convert to binary representation Bit 0 = [Low Temp Alarm|False|True] Bit 1 = [Condensation Alarm|False|True] Bit 2 = [Filter Alarm|False|True] Bit 3 = [Critical Hardware Fault|False|True]
33	Hardware errors	This output indicates the hardware status of the the air handling unit and cooling module.	[R]		0	4294967295	0	1	Analog Value	N.B.: Convert to binary representation Bit 0 = [Room Temperaturesensor|OK|Fault] Bit 1 = [Inlet Temperaturesensor|OK|Fault] Bit 2 = [Outside Temperaturesensor|OK|Fault] Bit 3 = [General Purpose Temperaturesensor|OK|Fault] Bit 4 = [Condenser Temperaturesensor|OK|Fault] Bit 5 = [Evaporator Temperaturesensor|OK|Fault] Bit 6 = [Exhaust Temperaturesensor Ventilation Unit|OK|Fault] Bit 7 = [Outside Temperaturesensor Ventilation Unit|OK|Fault] Bit 8 = [Supplyflow Sensor 1|OK|Fault] Bit 9 = [Supplyflow Sensor 2|OK|Fault] Bit 10 = [Extractionflow Sensor|OK|Fault] Bit 11 = [CO2 Sensor|OK|Fault] Bit 12 = [Supply Fan|OK|Fault] Bit 13 = [Extraction Fan|OK|Fault] Bit 14 = [Evaporator In Temperaturesensor|OK|Fault] Bit 15 = [Evaporator Out Temperaturesensor|OK|Fault] Bit 16 = [Hotgas Temperaturesensor|OK|Fault] Bit 17 = [Comfort Cooling Connection Lost|OK|Fault] Bit 18 = [Comfort Cooling Stepdriver |OK|Fault] Bit 19 = [Comfort Cooling Frequency Inverter|OK|Fault] Bit 20 = [Humidity Supply Air Sensor|OK|Fault] Bit 21 = [Humidity Extraction Air Sensor|OK|Fault] Bit 22 = [Humidity Sensor Settings|OK|Fault]
111	Firmware version	Software version installed in the air handling unit.	[R]		0	32	6	0,001	Analog Value	

LOCAL CONTROL PANEL

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Data type	Comments
35	Panel Flow Request	Local control panel is optional. Flow percent requested by the user via a local control panel. N.B.: Panel Flow Function (index 130).	[R]	%	0	100	0	1	Analog Value	0 = no request from user
130	Panel Flow Function	This value defines how the air handling unit respond to a change of the airflow setpoint by the user via a local control panel. "Direct": The airflow setpoint can temporarily be overridden from a local control panel. "None": The airflow setpoint can not be overridden from a local control panel. "D-BMS": A change of the airflow setpoint from a local control panel will be shown at index 35, but will not affect the actual flow setpoint directly. N.B.: Manual Override Time (index 135).	[R/W]		0	2	1	1	Multi-State Value	0 = Direct 1 = None 2 = D-BMS
135	Manual Override Time	This value defines for how long time an override of the airflow setpoint from a local control panel will be stored in the controller.	[R/W]	hour(s)	0	18	12	1	Analog Value	

SERVICE AND FILTER INFORMATION

Index	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Resolution	Data type	Comments
29	Filter remain. days	Estimated remaining service life of the filters in days calculated by the average daily operating hours since last service.	[R]	days	0	1000	0	1	Analog Value	
32	Remain Serv. Life H	Remaining service life of filters in operating hours.	[R]	hour(s)	0	65535	0	1	Analog Value	
31	Remain Serv. Life %	Estimated remaining service life of filters in %.	[R]	%	0	101	0	1	Analog Value	0 = filter change required 100 = clean filters
132	Reset Filter Status	The filter monitoring must be reset after a filter change. Set the value to 1 to reset filter status. The value will automatically return to 0 when filter status has been reset.	[R/W]		0	1	0	1	Binary Value	0 = No 1 = Yes
136	Filter Test Mode	This parameter defines the filter test mode. "Timer": Filter monitoring using an hour counter. "Tacho": Electronic flow monitoring. "Timer and tacho": Filter monitoring using an hour counter and electronic flow monitoring.	[R/W]		0	3	3	1	Multi-State Value	0 = Off 1 = Timer (default for air handling units with AQC-L) 2 = Tacho 3 = Timer And Tacho (default for air handling units with AQC-P)
137	Life Span Warning	This value defines the operating hours before activating a filter warning at index 21.	[R/W]	hour(s)	0	8760	3000	1	Analog Value	
138	Life Span Alarm	This value defines the operating hours before activating a filter alarm at index 22.	[R/W]	hour(s)	0	8760	8760	1	Analog Value	
139	Filter Max Life Time	This value defines the maximum filter life time and for how many months the air handling unit can operate after a service reset before activating a filter alarm (index 22). The max life time alarm can be disabled by setting the value to 0.	[R/W]	month(s)	0	48	24	1	Analog Value	
140	Filter Warn. Period	This value defines the period for a filter warning at index 21 before the filter alarm activates. By using the default value of this parameter the filter warning at index 21 is activated 2 months before the maximum filter life time expires (index 139).	[R/W]	month(s)	0	12	12	1	Analog Value	
131	Run Filter Calib.	Set the value to 1 to run a filter calibration. The value will automatically return to 0 when the calibration process has finished. N.B.: Do only run a filter calibration with clean filters. N.B.: Do only run a filter calibration at the first start of an air handling unit with AQC-P control box by non standard installation e.g. on reduction of the duct size, when using more than 1 m of duct or when installing with elbows. N.B.: A new filter calibration shall be performed if the filter class is changed (from M5 to F7 etc.) during a service routine of the air handling unit with AQC-P control box.	[R/W]		0	1	0	1	Binary Value	0 = No 1 = Yes

Appendix 9 MODBUS® Parameters

BASIC INFORMATION

The present document is only valid for air handling units with firmware version 6.1 or newer. The firmware version is specified at register 40030.

MODBUS Data Model: Holding Registers
Function Code: 03 Read Holding Registers
Transmission Mode: RTU, RS-485
Register Formats: Signed 16-bit Integer

MODBUS COMMUNICATION

Register	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Scale	Comments
40001	Modbus Address	Setpoint for the Modbus address. N.B.: Any change of the current parameter requires a reboot (register 40057).	[R/W]		1	247	3	X1	
40002	Modbus baud	Setpoint for the Modbus baud rate. N.B.: Any change of the current parameter requires a reboot (register 40057).	[R/W]		0	5	1	X1	0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 115200 5 = 230400
40003	Modbus Parity	Setpoint for the Modbus parity mode. N.B.: Any change of the current parameter requires a reboot (register 40057).	[R/W]		0	2	2	X1	0 = None (2 Stop bits) 1 = Odd (1 Stop bit) 2 = Even (1 Stop bit)

BASIC CONTROL SETTINGS

Register	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Scale	Comments
40004	Automatic Operation: Start	Activate Automatic Operation at this input. This parameter is typically used to start/stop the air handling unit from the BMS. N.B.: Register 40042-40046.	[R/W]		0	1	0	X1	0 = No / Stop 1 = Yes / Start
40005	Automatic Operation: Flow setpoint	Setpoint for desired airflow in case the unit is started by the BMS (register 40004). If running by CO_2 sensor, set the basic flow level here, e.g. 40%.	[R/W]	%	0	100	0	X1	
40006	Automatic Operaion: IT setpoint	Setpoint for desired inlet temperature in case the unit is started by the BMS (register 40004). Please consult the maunal for recommendations.	[R/W]	°C	8	40	19	X10	
40007	Automatic Operation: CO2 input	1) Leave this input at 0 ppm to allow the unit to run by CO_2 sensor(s) connected directly to the unit. 2) Set this input to -1 ppm to prevent the unit from running by CO_2 sensor(s) connected directly to the unit. 3) In case the BMS system has a CO_2 sensor, connect it to this input. Any ppm value greater than 0 ppm will disable any CO_2 sensor connected directly to the unit. N.B.: CO_2 limits can be adjusted: CO_2 minimum and maximum (register 40050 and 40051). For further information please consult the manual.	[R/W]	PPM	-1	5000	0	X1	
40008	Night Cooling: Start	Activate this input to request night cooling. Night cooling will only run when setpoint temperatures are exceeded during the day. The limits are adjustable via Night Cooling: high and low limit (register 40054 and 40055). For further information please consult the manual.	[R/W]		0	1	0	X1	0 = No 1 = Yes
40009	Holiday Mode Operation: Start	Activate holiday mode operation at this input.	[R/W]		0	1	0	X1	0 = No 1 = Yes

BASIC CONTROL SETTINGS

Register	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Scale	Comments
40042	Allow Start by Local PIR	PIR sensor is optional. In case the unit has a PIR sensor connected directly, is it allowed to start by it, or shall it only pass on the signal to the BMS system. When the unit is started by a local PIR sensor, register 40072 and 40073 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	X1	0 = No 1 = Yes
40043	Allow Start by Local CO2	CO_2 sensor is optional. In case the unit has a CO_2 sensor connected directly, is it allowed to start by it, or shall it only pass on the signal to the BMS system. When the unit is started by a local CO_2 sensor, register 40072 and 40073 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	X1	0 = No 1 = Yes
40044	Allow Start by Local Timer	Is the unit allowed to start by the build in timer. The timer settings are not available via BMS, only the possibility to enable/disable the timer are available to BMS.	[R/W]		0	1	0	X1	0 = No 1 = Yes
40045	Allow Start by Local Panel	Control panel is optional. In case the unit has a local control panel connected, is it allowed to start by it. When the unit is started by a local control panel, register 40072 and 40073 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	X1	0 = No 1 = Yes
40046	Allow Start by Local External Start	In case the unit has an External Start Signal connected directly, is it allowed to start by it, or shall it only pass on the signal to the BMS system. When the unit is started by a local external start signal, register 40072 and 40073 are used as setpoints for airflow and inlet temperature.	[R/W]		0	1	1	X1	0 = No 1 = Yes

ADVANCED CONTROL SETTINGS

Register	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Scale	Comments
40072	Default Airflow	Setpoint for desired airflow in case the unit is started by a local PIR, CO_2, control panel or local external start (register 40042, 40043, 40045, 40046).	[R/W]	%	0	100	80	X1	The default value is 0 % if the air handling unit is supplied with a CO_2 sensor.
40073	Default Temperature	Setpoint for desired inlet temperature in case the unit is started by a local PIR, CO_2, control panel or local external start (register 40042, 40043, 40045, 40046). Please consult the maunal for recommendations.	[R/W]	°C	8	30	19	X1	
40049	PIR Afterrun Time	Setpoint for the PIR afterrun time, local connected PIR only.	[R/W]	min	0	1080	30	X1	The default value is 5 min if the air handling unit is supplied with a CO_2 sensor.
40050	CO2, Minimum	Setpoint for minimum CO_2 limit, when overriding flow by a CO_2 sensor. Consult the manual for further information on CO_2 control.	[R/W]	PPM	400	5000	500	X1	
40051	CO2, Maximum	Setpoint for maximum CO_2 limit, when overriding flow by a CO_2 sensor. Consult the manual for further information on CO_2 control.	[R/W]	PPM	400	5000	900	X1	
40047	High Room Temperature, High limit	Setpoint for the limit that causes the unit to enter "High Room Temperature" operation mode. Consult the manual for further description of the "High Room Temperature" operation mode.	[R/W]	°C	0	50	25	X10	
40048	High Room Temperature, Low limit	Setpoint for the limit that causes the unit to exit "High Room Temperature" operation mode. Consult the manual for further description of the "High Room Temperature" operation mode.	[R/W]	°C	0	50	24	X10	
40054	Night Cooling: High limit	Setpoint for Night Cooling High Limit, Consult the "Night Cooling" section in the manual for further description.	[R/W]	°C	0	30	26	X10	
40055	Night Cooling: Low limit	Setpoint for Night Cooling Low Limit, Consult the "Night Cooling" section in the manual for further description.	[R/W]	°C	0	30	23	X10	
40056	Night Cooling: IT setpoint	Inlet Temperature setpoint when running in Night Cooling mode, started from BMS (register 40008).	[R/W]	°C	0	30	14	X10	
40058	Night Cooling: Flow setpoint	Airflow setpoint when running in Night Cooling mode, started from BMS (register 40008).	[R/W]	%	0	100	100	X1	
40061	Absolute humidity Min. C Coefficient	Coefficient for absolute humidty calculation.	[R/W]		-99,99	99,99	0	X100	The default value is 3,6 if the air handling unit is supplied with electronic humidity sensors.
40064	Absolute humidity Max. C Coefficient	Coefficient for absolute humidty calculation.	[R/W]		-99,99	99,99	0	X100	The default value is 6,1 if the air handling unit is supplied with electronic humidity sensors.
40057	Reboot	Activate this input to reboot the controller by setting the value to 1. The value will automatically return to 0.	[R/W]		0	1	0	X1	0 = No 1 = Yes

SENSOR SIGNALS

Register	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Scale	Comments
40014	CO2 output	CO_2 sensor is optional. The CO_2 concentration from a CO_2 sensor connected directly to the unit. N.B.: Automatic Operation: CO_2 input (register 40007). N.B.: Allow Start by Local CO_2 (register 40043).	[R]	PPM	0	5000	0	X1	
40015	PIR output	Motion sensor (PIR) is optional. The PIR signal includes the afterrun time (register 40049). In case a PIR signal without afterrun time is preferred, set the afterrun time to 0. N.B.: Allow start by local PIR (register 40042).	[R]		0	1	0	X1	0 = Off 1 = On
40016	External Start output	Indicates if the hardware input "External Start" is activated or not. N.B.: Allow start by External Start (register 40046).	[R]		0	1	0	X1	0 = Off 1 = On
40017	Room Temperature	Room temperature, measured in the extraction air.	[R]	°C	-49	100	0	X10	
40018	Inlet Temperature	Inlet Temperature, measured at the inlet opening.	[R]	°C	-49	100	0	X10	
40023	Outside Temperature at Ventilation Unit	Outside Temperature, measured at the air handling unit.	[R]	°C	-49	100	0	X10	
40024	Exhaust Temperature at Ventilation Unit	Exhaust temperature, measured at the air handling unit, near the heat exchanger.	[R]	°C	-49	100	0	X10	
40019	Outside Temperature	Cooling module is optional. Outside temperature, measured at the cooling module. Used for both ON/OFF and inverter controlled cooling modules.	[R]	°C	-49	100	0	X10	
40021	Condenser Temperature	ON/OFF controlled cooling module is optional. Condenser Temperature. The Condenser is a part of the cooling module.	[R]	°C	-49	100	0	X10	
40022	Evaporator Temperature	ON/OFF controlled cooling module is optional. Evaporator Temperature. The Evaporator is a part of the cooling module.	[R]	°C	-49	100	0	X10	
40084	Evaporator In Temperature	Inverter controlled cooling module is optional. Evaporator temperature, inlet. The evaporator is a part of the comfort cooling unit.	[R]	°C	-49	100	0	X10	
40085	Evaporator Out Temperature	Inverter controlled cooling module is optional. Evaporator temperature, outlet. The evaporator is a part of the comfort cooling unit.	[R]	°C	-49	100	0	X10	
40086	Hotgas Temperature	Inverter controlled cooling module is optional.	[R]	°C	-49	100	0	X10	
40025	Relative Humidity, outside	Humidity sensor is optional. Humidity measured in the supply air.	[R]	%	0	100	0	X1	
40026	Relative Humidity, inside	Humidity sensor is optional. Humidity measured in the extraction air.	[R]	%	0	100	0	X1	
40036	Supply Flow	Flow measurement is optional. Measured supply airflow.	[R]	m^3/h	0	10000	0	X1	
40037	Extraction Flow	Flow measurement is optional. Measured extraction airflow.	[R]	m^3/h	0	10000	0	X1	
40040	Airhandling Unit Energy Meter	Energy meter is optional. The energy meter measure the energy consumption of the air handling unit. N.B.: decimal points are available in a seperate value (register 40041).	[R]	kWh	0	32767	0	X1	
40041	Airhandling Unit Energy Meter decimal points	Energy meter is optional. The decimal values of the air handling unit energy consumption.	[R]	kWh	0	0,999	0	X1000	
40080	Cooling Unit Power Consumption	Energy meter and cooling module are optional. The energy meter measure the energy consumption of the cooling module. N.B.: decimal points are available in a seperate value (register 40081).	[R]	kWh	0	32767	0	X1	
40081	Cooling Unit Power Consumption decimal points	Energy meter and cooling module are optional. The decimal values of the cooling module energy consumption.	[R]	kWh	0	0,999	0	X1000	

SYSTEM INFORMATION

Register	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Scale	Comments
40027	System Operating Mode	This output indicates the system operating mode for the air handling unit.	[R]		0	255	0	X1	0 = Stopped 1 = Starting 2 = Auto / Running 3 = Stopping 4 = Filter Test Running 5 = Filter Calibration 6 = Night Cooling 7 = Holiday Mode 8 = Manual Mode
40038	Actual Inlet Temperature setpoint	The actual inlet temperature setpoint may vary from requested value, thus the actual setpoint is available here.	[R]	°C	0	100	0	X10	
40039	Actual Flow Setpoint	The actual air flow setpoint may vary from requested value, thus the actual setpoint is available here, e.g. due to CO_2 override.	[R]	%	0	100	0	X1	
40033	Pre Heater percent	Preheaing suface is optional. Percentage heat output relative to maximum.	[R]	%	0	100	0	X1	
40031	Comfort Heater percent	Comfort heaing surface is optional. Percentage heat output relative to maximum.	[R]	%	0	100	0	X1	
40032	Comfort Cooling percent	Comfort cooling module is optional. Percentage cooling output relative to maximum.	[R]	%	0	100	0	X1	
40035	Bypass Damper percent	Bypass damper is optional. Percentage bypass position relative to maximum. 0 means full heat recovery.	[R]	%	0	100	0	X1	0 = full heat recovery
40028	System Condition	This output indicates the system condition for the air handling unit.	[R]		-32768	32767	0	X1	N.B.: Convert to binary representation Bit 0 = [Low Temp Process|Inactive|Active] Bit 1 = [High Temp Process|Inactive|Active] Bit 2 = [Condensation Process|Inactive|Active] Bit 3 = [Non Critical Hardware Fault|False|True] Bit 4 = [Condenser Overheated|False|True] Bit 5 = [Compressor Locked|False|True] Bit 6 = [Filter Change Needed|False|True] Bit 7 = [High Room Temp|False|True] Bit 8 = [Abnormal Filter Test Calibration Result|False|True] Bit 9 = [Manual Override Active|False|True] Bit 10 = [Comfort Cool Defrost Warning |False|True] Bit 11 = [Comfort Cool Condensation Warning|False|True] Bit 12 = [Boost Mode Active|False|True] Bit 13 = [Comfort Cool Hotgas Warning|False|True] Bit 14 = [Comfort Cool Pressure Warning|False|True] Bit 15 = [Group Master Not Available Warning|False|True]
40029	System Alarm	This output indicates system alarms for the air handling unit.	[R]		-32768	32767	0	X1	N.B.: Convert to binary representation Bit 0 = [Low Temp Alarm|False|True] Bit 1 = [Condensation Alarm|False|True] Bit 2 = [Filter Alarm|False|True] Bit 3 = [Critical Hardware Fault|False|True]

SYSTEM INFORMATION

Register	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Scale	Comments
40082	Hardware Errors LSB	This output indicates the hardware status of the the air handling unit and cooling module.	[R]		-32768	32767	0	X1	N.B.: Convert to binary representation Bit 0 = [Room Temperaturesensor|OK|Fault] Bit 1 = [Inlet Temperaturesensor|OK|Fault] Bit 2 = [Outside Temperaturesensor|OK|Fault] Bit 3 = [General Purpose Temperaturesensor|OK|Fault] Bit 4 = [Condenser Temperaturesensor|OK|Fault] Bit 5 = [Evaporator Temperaturesensor|OK|Fault] Bit 6 = [Exhaust Temperaturesensor Ventilation Unit|OK|Fault] Bit 7 = [Outside Temperaturesensor Ventilation Unit|OK|Fault] Bit 8 = [Supplyflow Sensor 1|OK|Fault] Bit 9 = [Supplyflow Sensor 2|OK|Fault] Bit 10 = [Extractionflow Sensor|OK|Fault] Bit 11 = [CO2 Sensor|OK|Fault] Bit 12 = [Supply Fan|OK|Fault] Bit 13 = [Extraction Fan|OK|Fault] Bit 14 = [Evaporator In Temperaturesensor|OK|Fault] Bit 15 = [Evaporator Out Temperaturesensor|OK|Fault]
40083	Hardware Errors MSB	This output indicates the hardware status of the the air handling unit and cooling module.	[R]		-32768	32767	0	X1	N.B.: Convert to binary representation Bit 0 = [Hotgas Temperaturesensor|OK|Fault] Bit 1 = [Comfort Cooling Connection Lost|OK|Fault] Bit 2 = [Comfort Cooling Stepdriver |OK|Fault] Bit 3 = [Comfort Cooling Frequency Inverter|OK|Fault] Bit 4 = [Humidity Supply Air Sensor|OK|Fault] Bit 5 = [Humidity Extraction Air Sensor|OK|Fault] Bit 6 = [Humidity Sensor Settings|OK|Fault]
40030	Software Version	Software version installed in the air handling unit.	[R]		0	32	6	X1000	

LOCAL CONTROL PANEL

Register	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Scale	Comments
40069	Panel Flow Request	Local control panel is optional. Flow percent requested by the user via a local control panel. N.B.: Panel Flow Funktion (register 40070).	[R]	%	0	100	0	X1	0 = no request from user
40070	Panel Flow Function	This value defines how the air handling unit respond to a change of the airflow setpoint by the user via a local control panel. "Direct": The airflow setpoint can temporarily be overridden from a local control panel. "None": The airflow setpoint can not be overridden from a local control panel. "D-BMS": A change of the airflow setpoint from a local control panel will be shown at register 40069, but will not affect the actual flow setpoint directly. N.B.: Manual Override Time (register 40074).	[R/W]		0	2	1	X1	0 = Direct 1 = None 2 = D-BMS
40074	Manual Override Time	This value defines for how long time an override of the airflow setpoint from a local control panel will be stored in the controller.	[R/W]	hour(s)	0	18	12	X1	

SERVICE AND FILTER INFORMATION

Register	BMS Name	BMS Description	Access	Unit	Min	Max	Default	Scale	Comments
40065	Service hour count	Operating hours since last service. N.B.: Multiply the value by 10 to get actual hour count.	[R]	hour(s)	0	300000	0	DIV10	
40034	Filter, remaining service life [days]	Estimated remaining service life of the filters in days calculated by the average daily operating hours since last service.	[R]	days	0	1000	0	X1	
40068	Remaining Service Life [Hours]	Remaining service life of filters in operating hours.	[R]	hour(s)	0	65535	0	X1	
40067	Remaining Service Life [%]	Estimated remaining service life of filters in %.	[R]	%	0	101	0	X1	0 = filter change required 100 = clean filters
40066	Reset Filter Status	The filter monitoring must be reset after a filter change. Set the value to 1 to reset filter status. The value will automatically return to 0 when filter status has been reset.	[R/W]		0	1	0	X1	0 = No 1 = Yes
40075	Filter Test Mode	This parameter defines the filter test mode. "Timer": Filter monitoring using an hour counter. "Tacho": Electronic flow monitoring. "Timer and tacho": Filter monitoring using an hour counter and electronic flow monitoring.	[R/W]		0	3	3	X1	0 = Off 1 = Timer (default for air handling units with AQC-L) 2 = Tacho 3 = Timer And Tacho (default for air handling units with AQC-P)
40076	Life Span Warning	This value defines the operating hours before activating a filter warning at register 40028.	[R/W]	hour(s)	0	8760	3000	X1	
40077	Life Span Alarm	This value defines the operating hours before activating a filter alarm at register 40029.	[R/W]	hour(s)	0	8760	8760	X1	
40078	Filter Max Life Time	This value defines the maximum filter life time and for how many months the air handling unit can operate after a service reset before activating a filter alarm (register 40029). The max life time alarm can be disabled by setting the value to 0.	[R/W]	month(s)	0	48	24	X1	
40079	Filter Warning Period	This value defines the period for a filter warning at register 40028 before the filter alarm activates. By using the default value of this parameter the filter warning at register 40028 is activated 2 months before the maximum filter life time expires (register 40078).	[R/W]	month(s)	0	12	12	X1	
40071	Run Filter Calibration	Set the value to 1 to run a filter calibration. The value will automatically return to 0 when the calibration process has finished. N.B.: Do only run a filter calibration with clean filters. N.B.: Do only run a filter calibration at the first start of an air handling unit with AQC-P control box by non standard installation e.g. on reduction of the duct size, when using more than 1 m of duct or when installing with elbows. N.B.: A new filter calibration shall be performed if the filter class is changed (from M5 to F7 etc.) during a service routine of the air handling unit with AQC-P control box.	[R/W]		0	1	0	X1	0 = No 1 = Yes

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