

Halton Max Ultra Circular (MUC) - Quick guide for commissioning

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1 Introduction

1.1 About this document

This quick guide provides the instructions on how to commission the product. This document is intended for properly trained persons performing these tasks.

Note: Project-specific variations are possible.

1.2 Copyright and disclaimers

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1.3 Summary of changes

Release	Date	Description
2.3	07-Mar-2023	<ul style="list-style-type: none"> ▪ Duct connection size 630 mm added. ▪ Chapter <i>Commissioning</i> updated.
2.2	25-Nov-2022	<ul style="list-style-type: none"> ▪ Modbus RTU communication added.
2.1	23-Sept-2022	<ul style="list-style-type: none"> ▪ Duct connection size 500 mm added. ▪ Modbus device number updated.
2.0	12-Apr-2022	<ul style="list-style-type: none"> ▪ Duct connection size 400 mm added. ▪ New actuator models added. ▪ Chapter <i>Commissioning</i> updated. ▪ Chapter <i>Troubleshooting</i> added. ▪ Editorial changes.

1.4 Contact information

For contact information, see www.halton.com.

2 Product description

2.1 Overview



Fig. 1. Halton Max Ultra Circular (MUC)

Circular airflow management damper using the ultrasound technique for airflow measurement.

Application areas

- Variable (VAV) and constant (CAV) airflow control applications
- Supply and exhaust installations
- Available also for Halton Workplace applications

Key features

- Insensitive to dust collection
- Enables flexibility in terms of space layout
- Individually calibrated for higher accuracies
- Low pressure loss for reducing the noise level
- Can be connected to Building Management System (BMS)

3 Commissioning

3.1 Before you start

3.1.1 Commissioning process

The main steps in the commissioning process are the following:

- Configuring the basic controller settings (including: selecting the installation case)
- Setting the Modbus communication parameters (optional)

3.1.2 Commissioning information

Before the system start-up, the controller settings (including the correct installation case) and optionally the Modbus communication parameters have to be set.

Factory settings

The airflow range for Halton Max Ultra Circular (MUC) is preset at the factory. The factory settings for the control signal and feedback signal are the same, but they can be configured individually. If the airflow range is not specified by the customer, the default factory settings are the following:

- Minimum airflow rate: 0 l/s
- Maximum airflow rate corresponds to an airflow velocity of 10 m/s

The maximum airflow rates in the following table are given with an airflow velocity of 10 m/s.

NS	Max. airflow [l/s] @ 10 m/s (Vnom)	Max. airflow [m ³ /h] @ 10 m/s (Vnom)
100	79	283
125	123	441
160	201	723
200	314	1130
250	491	1767
315	779	2805
400	1257	4524
500	1963	7068
630	3117	11222

Table 1. Halton Max Ultra Circular (MUC) factory settings

3.1.3 Airflow control panel

Halton Max Ultra Circular (MUC) airflow controller has a control panel with a display and four pushbuttons.

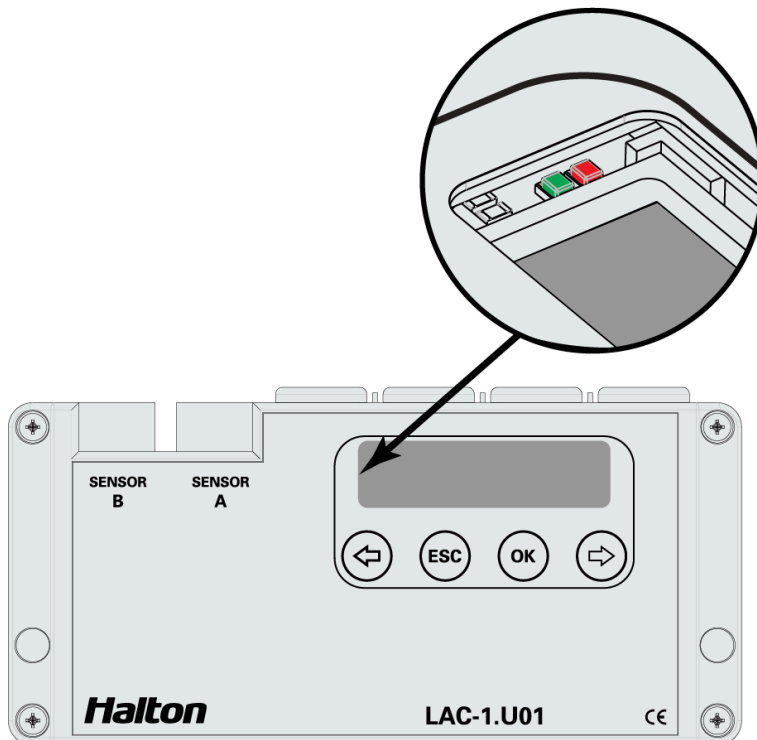
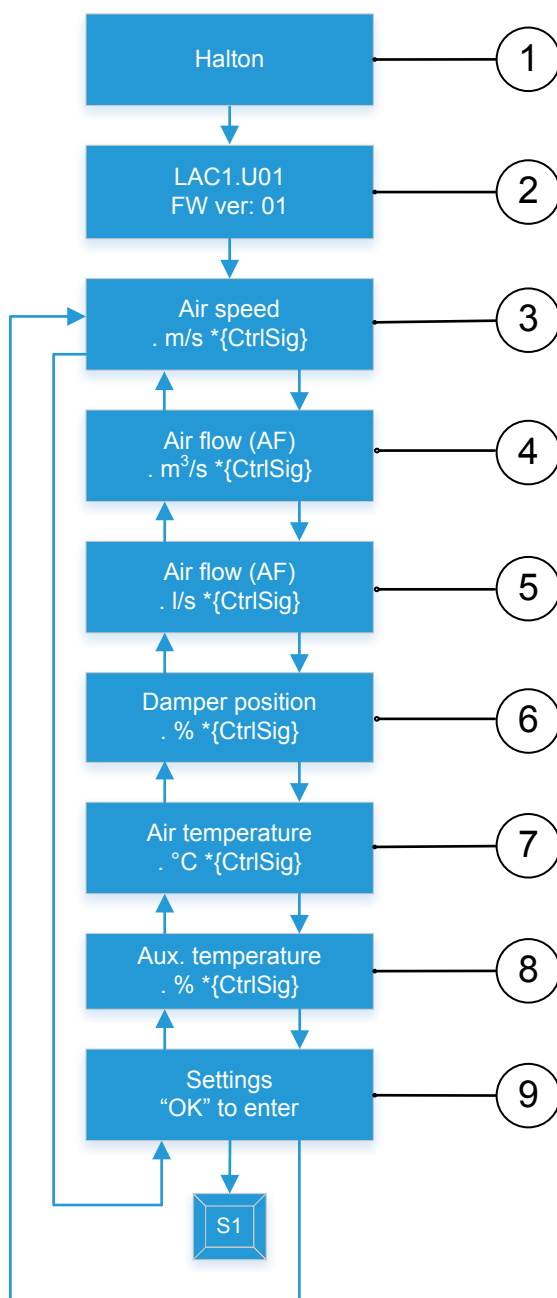


Fig. 2. Control panel

The LCD display can show 16 characters in 2 lines.

- Press the OK button to move to the next view. Press the ESC button to move to the previous view.
- Press the left or right arrow buttons to move between different parameter settings.
- When the 'Settings' view is displayed, press the OK button to see the controller parameter menu.
- If no button is pressed, the display goes back into the default view.
- LED signal lights indicate Modbus communication:
 - The red light indicates RS-485 Rx communication packet from master.
 - The green light indicates RS-485 Tx communication packet to master.

3.1.4 Airflow control panel: start-up views



No.	Description
1	Default view
2	Software version
3	Measured airflow in m/s
4	Measured airflow in m ³ /h
5	Measured airflow in l/s
6	Damper blade position (0-100%)
7	Measured temperature
8	Measured room temperature
9	Settings view

Fig. 3. Halton Max Ultra Circular (MUC) start-up views

- Press the OK button to move to the next view. Press the ESC button to move to the previous view.
- Press the left or right arrow buttons to move between different parameter settings.
- When the 'Settings' view is displayed, press the OK button to see the controller parameter menu.

3.1.5 Modbus RTU communication

The Halton Max Ultra Circular (MUC) airflow control damper can communicate with the Building Management System (BMS) via Modbus RTU. With the Modbus register, you can read and configure parameter values.

The default communication settings are Slave-ID 1, 115200bsp, O (Odd), 8 (bit), 1 (stop bit).

You can change the communication settings on the correct parameter pages of the Halton Max Ultra Circular (MUC) controller:

- Controller support slave ID: 1..247
- Communication speed: 4k8 / 9k6 / 14k4 / 19k2 / 38k4 / 56k0 / 57k6 / 115k2
- Parity: None / Even / Odd

There can be up to 32 devices in one Modbus RTU bus. The length and quality of the bus cable as well as other disturbances can affect the maximum number of devices. The shortest poll time of the controller is 200 ms.

To configure parameters using Modbus, you need to send a password to MUC before it approves the changes. When configuring the Holding register or Coils, first send the register value you want to change. After that, send value 9055 to Holding register 40905, then send value 0 to Holding register 40905.

3.1.6 Self-diagnosis function

Halton Max Ultra Circular (MUC) includes an advanced self-diagnosis function for monitoring the controller's own performance.

If the controller is installed in a location where the airflow is highly turbulent and the air velocity is high (approximately 10 m/s), it can cause a wrong kind of measurement action to the sensor. In cases like this, the self-diagnosis function restarts the measurement sensors. During the restart process, the damper blade goes into the close position for 1 second, then continues normal operation.

3.2 Step by step instructions

3.2.1 Configuring basic controller settings in analog mode

Steps

1. Go to the controller parameter menu.
2. Set parameter *CtrlMode* to 'Analog'.
3. Check the values of the following parameters. If needed, modify the values.
 - Control signal range (*AI1rg*)
 - Possible values: 0..10V / 2..10V
 - Default: 0..10V
 - Minimum flow setting *Vmin* (*AI1min*)
 - Default: $V_{min}=0$
 - Maximum flow setting *Vmax* (*AI1max*)
 - Default: $V_{max}=V_{nom}$
 - Feedback signal range (*AO1rg*)
 - Possible values: 0..10V / 2..10V
 - Default: 0..10V
4. To ensure accurate measurement results, select the correct installation case and set the value of parameter *SelectDuctType* accordingly.
 - Possible values: #0..#51
 - Default: #0
 - For information on the installation cases and their corresponding *SelectDuctType* parameter values, see chapter [Halton Max Ultra Circular \(MUC\) installation cases](#) in *Technical reference data*.

3.2.2 Configuring basic controller settings in Modbus mode

Context

See also [Modbus RTU communication](#).

Steps

1. Go to the controller parameter menu.
2. Set parameter *CtrlMode* to 'Modbus'.
3. To ensure accurate measurement results, select the correct installation case and set the value of parameter *SelectDuctType* accordingly.
 - Possible values: #0..#51
 - Default: #0
 - For information on the installation cases and their corresponding *SelectDuctType* parameter values, see chapter [Halton Max Ultra Circular \(MUC\) installation cases](#) in *Technical reference data*.
4. Check the values of the following Modbus RTU parameters. If needed, modify the values.
 - Slave ID (*SlVID*)
 - Possible values: 1..247

- Default: 1
- Baud rate (*Baud*)
 - Possible values: 4k8 / 9k6 / 14k4 / 19k2 / 38k4 / 56k0 / 57k6 / 115k2
 - Default: 115k2
- Parity (*Pr*)
 - Possible values: None / Even / Odd
 - Default: Odd

3.2.3 Configuring basic controller settings in console mode (service or testing)

Steps

1. Go to the controller parameter menu.
2. Set parameter *CtrlMode* to 'Console'.
3. Set the value of the setpoint parameter *SP*.
 - Default: V_{nom}
4. To ensure accurate measurement results, select the correct installation case and set the value of parameter *SelectDuctType* accordingly.
 - Possible values: #0..#51
 - Default: #0
 - For information on the installation cases and their corresponding *SelectDuctType* parameter values, see chapter [Halton Max Ultra Circular \(MUC\) installation cases](#) in *Technical reference data*.

3.2.4 Calculating the airflow control and feedback signals

With these formulas, you can calculate the airflow control and feedback signals when using the analog mode.

Steps

1. Calculate the airflow control signal.
 - If you use a 0-10 DC control signal, use the following formula:

$$V_{sp} = V_{min} + \frac{Y}{10DC} \times (V_{max} - V_{min})$$

- If you use a 2-10 DC control signal, use the following formula:

$$V_{sp} = V_{min} + \frac{Y - 2DC}{8DC} \times (V_{max} - V_{min})$$

2. Calculate the airflow feedback signal.
 - If you use a 0-10 DC feedback signal, use the following formula:

$$V_{act} = V_{nom} \times \frac{U}{10DC}$$

- If you use a 2-10 DC feedback signal, use the following formula:

$$V_{act} = V_{nom} \times \frac{U - 2DC}{8DC}$$

3.2.5 Rebooting the controller

Context

Steps

1. Go to the controller parameter menu.
2. Press the left arrow button, the right arrow button, and the OK button at the same time for 2 seconds. The second level of the controller parameter menu opens.
3. Set parameter *Recal. Pos* to 'Yes'.

Results

The controller restarts.

3.2.6 Configuring the scheduled restart function

You can set the controller to restart at scheduled intervals.

Context

For more information, see [Self-diagnosis function](#).

Steps

1. Go to the controller parameter menu.
2. Press the left arrow button, the right arrow button, and the OK button at the same time for 2 seconds. The second level of the controller parameter menu opens.
3. Select parameter *Actuator param. > Recal.*, then set a value (hours between restarts).
 - Value range: 0-999 hours
 - Default value: 0 hour (no scheduled restarts)

4 Troubleshooting

Problem	Possible cause	Possible solution
No values on the controller display	Missing power	Check the power supply.
Measured airflow values are out of tolerance	Installation location	Check the installation case and make sure the correct parameter value is used. See Halton Max Ultra Circular (MUC) installation cases .
<i>Fault 7</i> showing on the controller display	The controller is in 'Service request' mode. For more information, see Self-diagnosis function .	Reboot the controller. For instructions, see Rebooting the controller .
Modbus RTU communication not	External disturbance causes noise to communication bus.	Check bus end resistors and bias resistors.

Problem	Possible cause	Possible solution
working fluently		

5 Technical reference data

5.1 Controller connections

Connection diagram

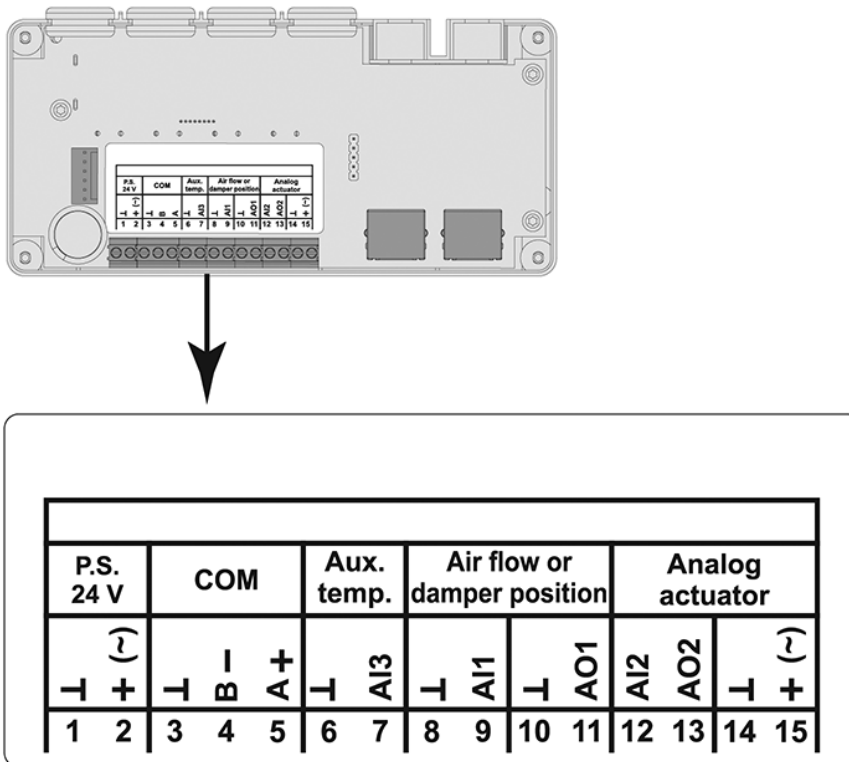


Fig. 4. Halton Max Ultra Circular (MUC) connection diagram

Terminals

Terminal	Name	Comment
1	GND	Ground
2	24 V DC/AC	Power supply input
3	GND	Ground
4	Standard RS-485 B	Data receive/send line B -
5	Standard RS-485 A	Data receive/send line A +
6	GND	Ground
7**	AI3	Input for NTC 10k temperature sensor
8	GND	Ground
9	AI1	Input for airflow or damper control signal
10	GND	Ground
11	AO1	Output for airflow or damper feedback

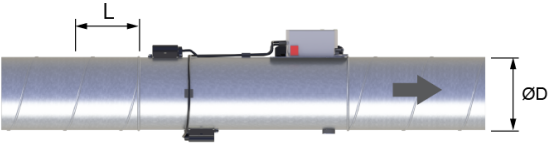
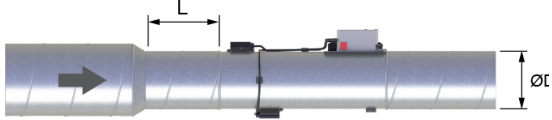
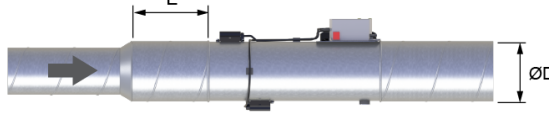
Terminal	Name	Comment
		signal
12*	AI2	Analog actuator feedback signal
13*	AO2	Analog actuator reference signal
14*	GND	Ground
15*	24 V DC/AC	Power supply output for the analog actuator

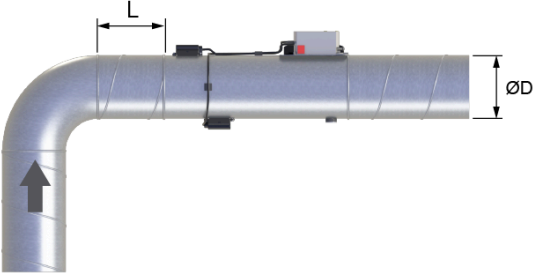
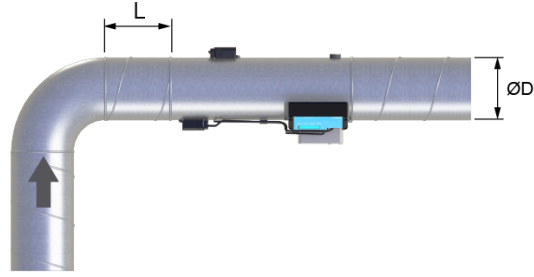
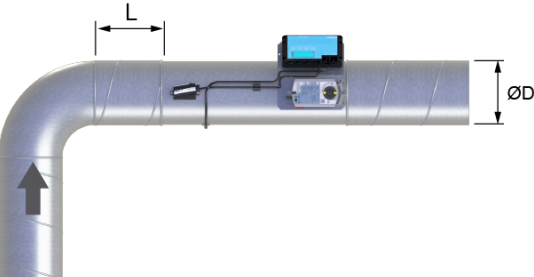
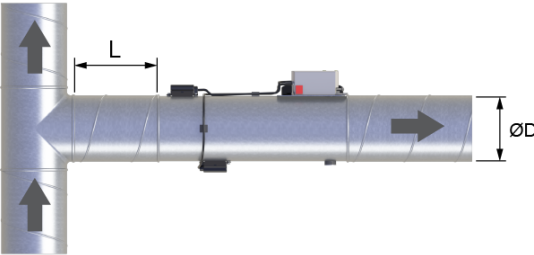
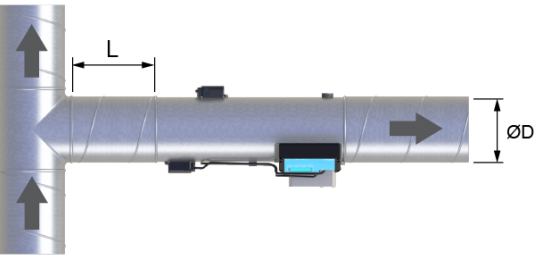
* Connected to Siemens GDB 161.1E actuator or Belimo LM24A-SR actuator

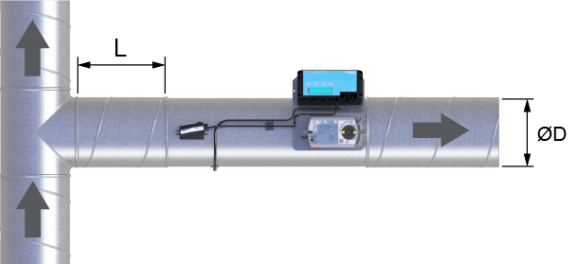
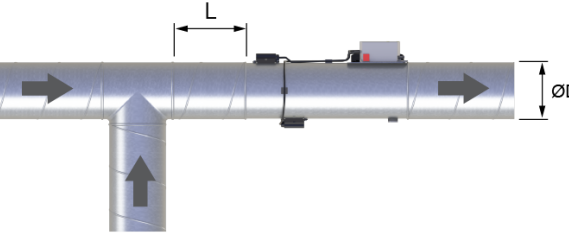
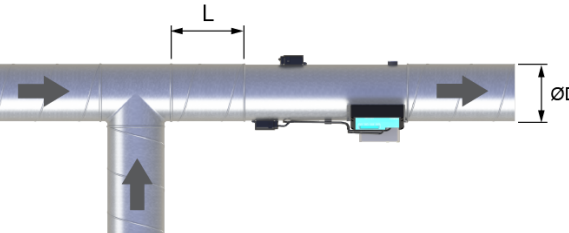
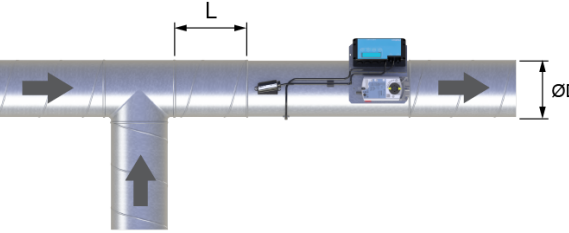
** Not included in delivery

5.2 Parameters

5.2.1 Halton Max Ultra Circular (MUC) installation cases

Installation case	Sensor position	Safety distance (L)	Value of parameter <i>SelectDuctType</i>
	-	> 7D	#0
	-	1D	#1
		1D..7D	#2
	-	1D	#3
		2D	#4
		3D	#5
		3D..7D	#6
	Outwards	1D	#7
		2D	#8
		3D	#9
		5D	#10
		5D..7D	#11

Installation case	Sensor position	Safety distance (L)	Value of parameter <i>SelectDuctType</i>
			
	Inwards	1D	#12
2D		#13	
3D		#14	
5D		#15	
5D..7D		#16	
	Side	1D	#17
2D		#18	
3D		#19	
5D		#20	
5D..7D		#21	
	Outwards	1D	#22
2D		#23	
3D		#24	
5D		#25	
5D..7D		#26	
	Inwards	1D	#27
2D		#28	
3D		#29	
5D		#30	
5D..7D		#31	

Installation case	Sensor position	Safety distance (L)	Value of parameter <i>SelectDuctType</i>
	Side	1D	#32
		2D	#33
		3D	#34
		5D	#35
		5D..7D	#36
	Outwards	1D	#37
		2D	#38
		3D	#39
		5D	#40
		5D..7D	#41
	Inwards	1D	#42
		2D	#43
		3D	#44
		5D	#45
		5D..7D	#46
	Side	1D	#47
		2D	#48
		3D	#49
		5D	#50
		5D..7D	#51