

**mark**

building climate technology

Technical manual **EN**

# MARK FLATLINE LW

0661211\_R01



## **Safety**

The installation of the FlatLine LW unit needs to be performed according to the general en local building codes, safety instructions and municipal installation instructions and electrical company. The unit may only be operated when all ducts are connected and inspection doors are locked. This way the contact with moving parts is prevented. The unit is supplied with an isolation switch. Before inspection and/or maintenance of the unit, the isolation switch needs to be set "OFF". The isolation switch could potentially be locked with a padlock.

## **Unit (intended use)**

The FlatLine LW units are designed for use in comfort installations. The units are not constructed for the extraction of aggressive damp and high temperatures. Every other use will be qualified as not intended use. The manufacturer does not accept any liability regarding the resulting damage or injury.

## **Liability**

The FlatLine LW unit is designed and manufactured for use in "Balanced ventilation systems in comfort installations". Every other use is considered as "unintended use" and can lead to damage to the FlatLine LW unit or lead to personal injury, for which the manufacturer cannot be held accountable.

## **Warranty**

Mark BV constantly aims for an optimal quality of the applied materials and methods of manufacturing regarding the goods produced. The installation should be executed by the current regulations and in accordance with the accompanying installation and maintenance instructions from Mark BV. The manufacturer guarantees the correct operation of the FlatLine LW for a period of one year after installation. Warranty can only be claimed for material- and/or constructional faults which arise during the warranty period. In case of a warranty claim the FlatLine LW unit may not be disassembled without written permission of the manufacturer. Warranty on spare parts can only be granted when they are supplied by the factory and are installed by the acknowledged installer. The warranty expires when the appliance is used without filters. Mark BV aims for an improvement of the products and reserves the right to make changes in the design or change specifications without informing in advance.

# Read this document before installing the appliance

EN

## Warning

An incorrectly performed installation, adjustment, alteration, repair or maintenance activity may lead to material damage or injury. All work must be carried out by approved, qualified professionals. If the appliance is not positioned in accordance with the instructions, the warranty shall be voided. This appliance is not meant for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they are under supervision or are instructed about the use of the appliance by a person who is responsible for their safety. Children should be monitored to make sure that they will not play with the appliance.

## 1 The aim of this manual

This manual is intended to correctly install and maintain the Mark air handling units during its lifetime. It is recommended to study this manual well so that the appliance can be maintained correctly. In case problems arise, this manual can help the user to make a quick diagnose.

The information in this document is subject to change without notice. The most recent version of this manual is always available at [www.markclimate.com/downloads](http://www.markclimate.com/downloads).

## 2 General description

The Mark air handling units meet all regulations.

The design of the units guarantees a minimal consumption of energy.

The applied materials and components guarantee a long durability.

### 2.1 FlatLine LW series with aluminum counterflow heat exchanger

The Mark FlatLine LW units are intended for heat recovery, filtering and optional heating/cooling of normal air in a climate application. Use in areas with an explosive atmosphere is not permitted. The transport of air containing a lot of dust or aggressive media is also not permitted. Air intake temperatures from -20°C to +40°C are permitted.

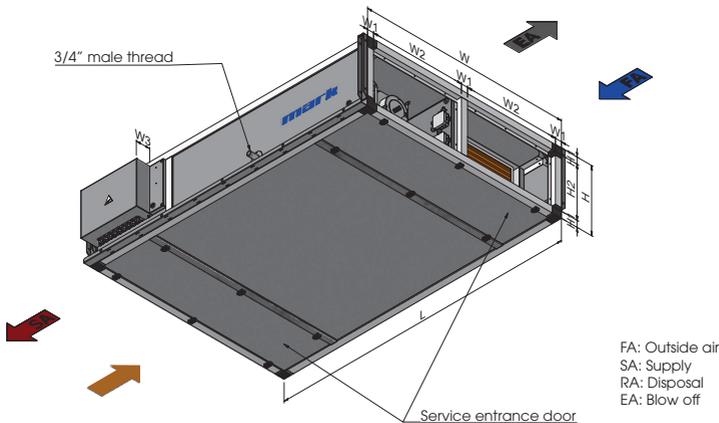
**Features:**

- Aluminium counterflow plate heat exchangers, efficiency up to 90%.
- Fans provided by motors with EC technology (class IE5).
- Frost protection of the heat exchangers included in the regulations.
- Application of high quality filters for the lowest possible air resistance. Supply air F7 and M5 in return air.

**Optional:**

- Louver dampers for outside air, exhaust air
- Silencers
- Duct reducer from rectangular to round
- Extension section with heating battery
- Add-on section with cooling coil, drip catcher and drip tray

### 3 Technical information



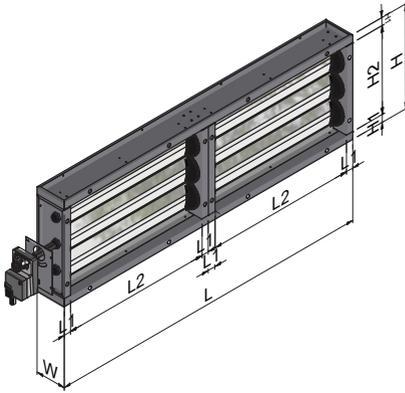
Type	L	W	W1	W2	W3	H	H1	H2	Weight
800/1500	1830	1280	40	580	103	400	40	320	130KG
1800/3000	2340	1890	40	885	103	490	40	410	240KG

FlatLine LW		800	1200	1500	1800	2400	3000
Max. air volume	m <sup>3</sup> /h	800	1200	1500	1800	2400	3000
Max. external pressure	Pa	300	300	300	300	300	300
Efficiency	%	90	90	90	90	90	90
Total power consumption per device	KW	0,4	0,58	0,86	0,86	1,14	1,54
Max power consumption per device	KW	1	1	1	2	2	2
Nominal current consumption per unit	A	2	2,79	3,91	4,25	5,57	7,12
Maximum current consumption per unit	A	4,8	4,8	4,8	9,4	9,4	9,4

\* Values at P<sub>external</sub>= 200 Pa

### 3.1 Accessories dimensions

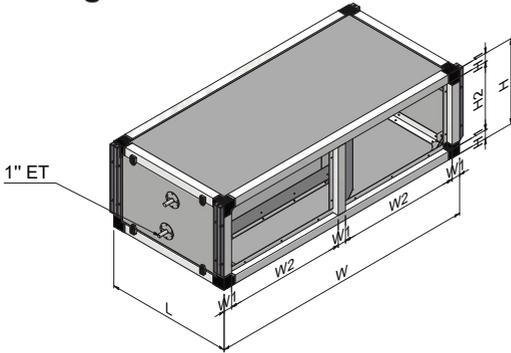
#### Louvre damper with servo motor



EN

Type	L	L1	L2	W	H	H1	H2	Weight
800/1500	1280	30	580	120	400	30	340	15KG
1800/3000	1890	30	885	120	490	30	430	20KG

## Heating section



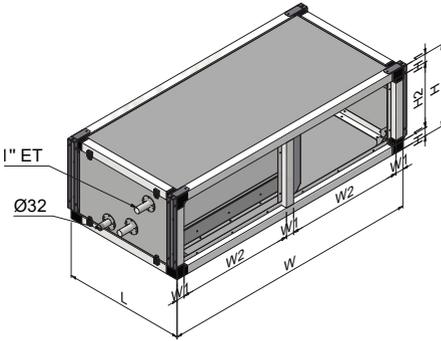
Type	L	W	W1	W2	H	H1	H2	Weight
800/1500	600	1280	40	580	400	40	320	40KG
1800/3000	600	1890	40	885	490	40	410	60KG

The heating coil of the FlatLine LW has a 1" ET connection (male thread).

Type	1500			3000		
Code Nr.	5997484			5997487		
M <sup>3</sup> /h	800	1200	1500	1800	2400	3000
60/40 T16 (KW)	4,34	5,70	6,51	9,16	10,99	12,83
60/40 T16 Output temperature	32 °C	30 °C	28,8 °C	31 °C	29,5 °C	28,6 °C
60/40 T16 Water-side resistance	0,4 kPa	0,7 kPa	0,9 kPa	0,5 kPa	0,7 kPa	0,9 kPa
45/40 T16 (KW)	4,21	5,45	6,21	8,85	10,58	12,32
45/40 T16 Output temperature	31,5 °C	29,4 °C	28,2 °C	30,5 °C	29 °C	28,1 °C
45/40 T16 Water-side resistance	4,9 kPa	7,8 kPa	9,9 kPa	5,8 kPa	8 kPa	10,5 kPa
35/30 T16 (KW)	2,39	3,09	3,56	5,13	6,10	7,03
35/30 T16 Output temperature	24,8 °C	23,6 °C	23 °C	24,4 °C	23,5 °C	22,9 °C
35/30 T16 Water-side resistance	1,9 kPa	3 kPa	3,8 kPa	2,2 kPa	3,1 kPa	3,9 kPa

Capacity for deviating data is available on request. \*100% water: Max 30% Ethyl glycol allowed

## Cooling section



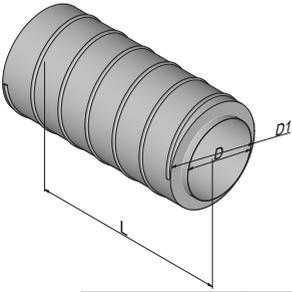
EN

Type	L	W	W1	W2	H	H1	H2	Weight
800/1500	600	1280	40	580	400	40	320	68KG
1800/3000	600	1890	40	885	490	40	410	85KG

The cooling coil of the FlatLine LW 1500 and 3000 has a 1" ET connection (male thread).

Type	1500			3000		
Code Nr.	5997494			5997497		
M <sup>3</sup> /h	800	1200	1500	1800	2400	3000
7/12 T25 RV60% (KW)	4,19	5,33	5,79	8,77	10,54	13,03
7/12 T25 Output temperature	14,4 °C	15,8 °C	16,6 °C	14,9 °C	15,9 °C	16 °C
7/12 T25 Water-side resistance	8,7 kPa	13,3 kPa	16,7 kPa	9,3 kPa	12,8 kPa	18,7 kPa

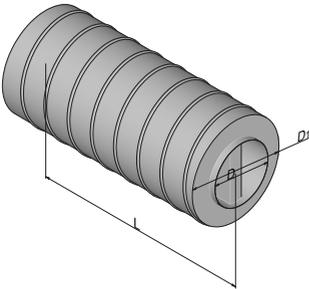
Capacity for deviating data is available on request. \*100% water: Max 30% Ethyl glycol allowed



### Damper without core

Type	L	D	D1	Weight
800/1500	900	Ø315	415	15KG
1800/3000	900	Ø450	550	25KG

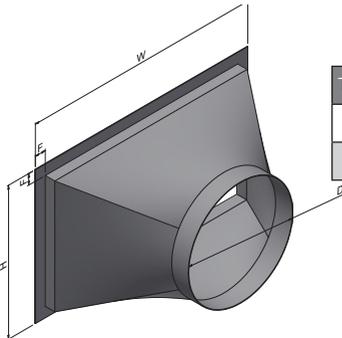
	D	63	125	250	500	1000	2000	4000	8000	Hz
Intermediate damping	315	0	5	9	18	23	32	20	18	db
	450	2	4	10	22	23	11	4	4	db



### Damper with core

Type	L	D	D1	Weight
800/1500	1200	Ø315	515	35KG
1800/3000	1200	Ø450	650	55KG

	D	63	125	250	500	1000	2000	4000	8000	Hz
Intermediate damping	315	9	10	18	31	43	47	39	24	db
	450	6	7	15	26	38	41	30	21	db



### Duct reducer rectangular to round

Type	L	W	F	D	Weight
800/1500	640	400	30	Ø315	15KG
1800/3000	945	490	30	Ø450	20KG

## 4 Installation

On receipt, check immediately that the supply had been delivered in full. Check also for any damage caused during transportation. If what is delivered does not comply with the goods indicated on the packing list, and/or damage during transportation is recorded, the recipient must state this on the delivery note indicating the date of receipt. If the recipient fails to comply with the requirements above, he shall have no right to claim.

The installation must be carried out by a skilled and certified installer. The installation must comply with applicable national and regional regulations

### 4.1 Placement [1]

**The units are designed for hanging installation. A material lift or hoist is required for hanging units. Make sure the ceiling opening is large enough for installation and maintenance requirements of the unit.**

When selecting and preparing the installation location of the device, consider the following recommendations.

- Take the weight of the FlatLine LW into account. The weight can be found on the unit nameplate (weight excluding attachments).
- Provide sufficient space for removal of the access panel and access for maintenance.
- All units must be installed with a 0.5% slope towards the condensate drain pipe. [2]

Ensure there is sufficient space to install pipework and electrical connections. Support all pipes and ducts independently of the unit to prevent excessive noise and vibration.

Hanging a FlatLine LW is carried out using hanging brackets located on one side of each unit section. [3]

#### *Storage on-site*

Remove the packaging material from the Mark FlatLine LW immediately upon arrival and check for damage. The unit must be stored dry. Store unit on a flat surface. Seal any openings to prevent contamination.

### 4.2 Transport to the installation location

The Mark FlatLine LW is supplied complete. The recipient is responsible for unloading and transport to the installation location. Note the following points:

- Use a fork lift truck with forks which are long enough to lift the appliance safely.
- Also be aware of the lifting torque, the weight of the appliance, the spread of weight and the distance between the forks.
- Place appliances only in the position indicated.

### 4.3 Duct connections

In an indoor installation, the air ducts of the Mark FlatLine LWV must be insulated to prevent condensation on the outside of the duct. It is recommended to install a silencer in the supply and extract air duct. This will prevent any noise from the fans. Besides that, noise transfer (cross-talk) from one room to the other caused by the connecting duct work must be prevented. For this, a crosstalk attenuator has to be applied.

### 4.4 Condensation drain [4]

In the section where the drip tray is placed there is a maximum under pressure of 650 Pa. In order to drain the condensation water well, it is necessary to place a ball siphon. This siphon is positioned on the outside of the air handling unit and connected to the condensation drainage (min. 40 mm). This condensate can be drained through a drainpipe. It is not permitted to connect several outlet pipes to a single, shared siphon. The heat recovery unit produces the most condensation water in the cold months. The siphon pipe must not be connected directly to the sewage, but must be able to flow freely into the sewage.

- In case of underpressure the ball seat should be mounted below the lowest point of the drip tray according to the formula below.

$$H_{min} = \frac{P_{a_{\text{underpressure}}}}{10\text{mm}} + 10\text{mm}$$

### 4.5 Frost protection

To prevent freezing of the aluminum heat exchanger there is a security in the electric controls. This works fully automatically and is pre-programmed in the factory.

### 4.6 Electrical connections

The Mark FlatLine LW is fully wired internally. The maintenance switch and the connection box for external control are mounted outside the heat recovery unit. The power supply must be connected to the 230V maintenance switch.

The remote control and cabling for BMS, start/stop, fire alarm and any other external controls can be connected to the cable box. The diagram for the above connections is located in the switch cabinet in the heat recovery unit.

To pre-fuse the appliance, a circuit breaker with a C characteristic must be used. If an earth leakage circuit breaker is used, this must be an earth leakage circuit breaker type B of 300mA.

The heat recovery unit is prepared for an external fire signal. When the unit receives a fire signal, it shuts down. After the unit has been switched off by a fire signal, the heat recovery unit must be restarted using the control panel.

\*Cables

The electrical cabling must comply with national and regional regulations for the cabling of the display and modbus. JSTY shielded data cable with a diameter of 0.8 m2 is recommended. This cable is also recommended for the optional CO2 sensor, room temperature sensor and pressure sensor.\*

## 5 Control system

### 5.1 Integrated control system

The Mark Airstream series is supplied with an extremely modern control system which is standardly delivered as a “stand alone”. The control system is very flexible and especially designed for balanced ventilation systems where it can be expanded and modified to the needs of the client. The control system is suitable for the most conventional data communication-protocols and can easily be added in for example building management systems. The detailed and intelligent design makes the control system very user-friendly. The built-in webserver, with three user levels, makes the use and operation of the control system very easy and effective. The control system is ready for the future, is flexible and saves time and costs because of its user-friendliness. Due to the intelligent user-interface, the control system is easy to implement, use and maintain. The control system is reliable and tuned to a lowest possible energy use of the installation. The control system communicates through RS 485 Modbus and is built around a powerful ARM9 processor.

*Optional:*

- CO<sub>2</sub>
- Supply pressure control
- Room temperature
- Servo motor control
- Hot water battery (Factory software setting)
- Cold water battery (Factory software setting)

## 6 Operation

The control system of the unit can be used in two ways.

### 6.1 Operation with OJ user interface with touch panel

OJ user interface with touch panel (article number: 0631374) is a user friendly control panel for commissioning and setting the daily operation of the Mark Airstream. The control panel is very easy to use, thanks to the logical menu's, easy navigation and recognizable symbols. For more information and operation please see the instruction of the user interface (article number 0664220).

## 6.2 Operation with a computer

The unit can be operated with a PC or laptop. Connect the PC or laptop through a LAN cable with the master in the junction box.

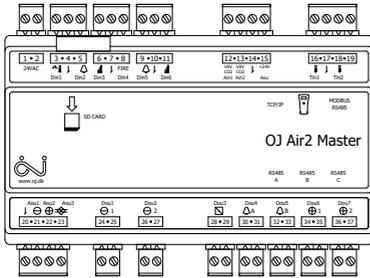


Image 1



Image 2

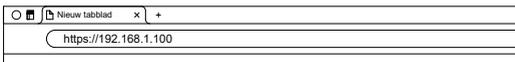
The LAN connection TCP/IP can be found on top of the master. (Image 1)

Also connect the user interface with the connection wire in the junction box to the unit. (Image 2)

Then put the isolation switch “ON”.

Leave the inspection door open (watch out for the turning parts of the fan!).

Start Internet Explorer and enter the following IP Address: **192.168.1.100**



The next screen will be shown: (image 3).

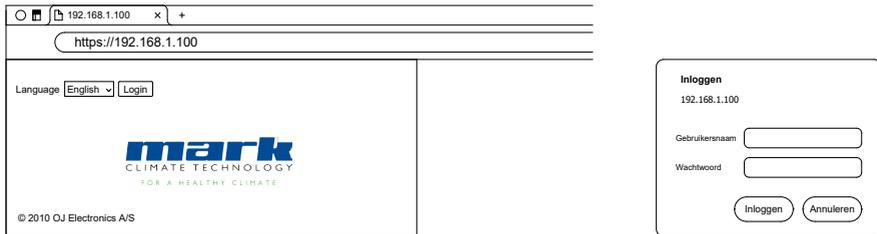


Image 3

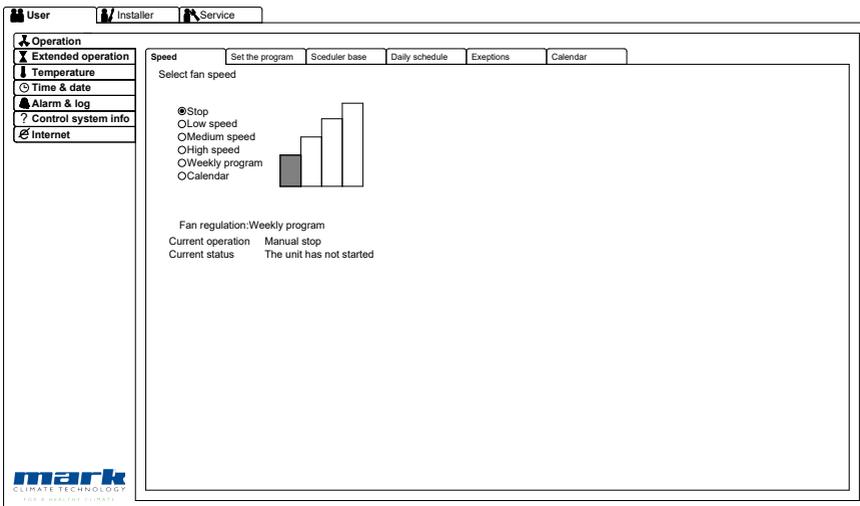
Enter the user name: USER

Enter the password: 111

For installer level, enter the user na: INSTALLE

Enter the password: 222

The next screen will be shown: (image 4).



EN

Image 4

Through the tabs on the top side and left side of the screen the actual status of the unit can then be seen and possible changes can be modified. This depends on the factory installed levels. The menu structure is in general the same as the above-mentioned instructions of the hand terminal. For modifications and/or reading out actual values with pc or laptop the same instructions can be used.

## 7 Maintenance

*Maintenance must be carried out by skilled technicians. Before starting work, stop the unit and switch off the power with the maintenance switch when the fans are standing still (waiting time 2 minutes).*

### 7.1 Filters

The filters need to be periodically checked on pollution. We advise to do this twice a year, depending on the pollution on site. Change the filters when they are seriously polluted. Under normal circumstances this will be every six months. The unit can never be used without filters. Next to clearing the supplied air, the filters also have the task to protect the components in the unit. This guarantees a long durability of the unit and saves costs for maintenance.

### 7.2 Heat exchanger

During the inspection of the filters the aluminium counterflow heat exchanger also needs to be checked for pollution. Severe pollution can occur because of filters that are not replaced on time or used at all. This can lead to a decrease of the capacity and an increase of the energy consumption. If the heat exchanger is heavily contaminated, you should contact your installer immediately.

### 7.3 Inspection panel

The inspection panel is secured with panel stops. To remove the panel, the panel stops must be loosened with a wrench, after which the panel stops can be easily turned. This allows the panel to be completely removed.

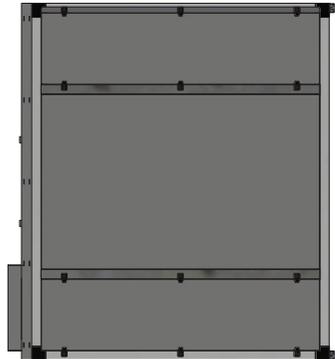
The externally mounted hinge fittings allow a completely smooth interior which prevents dirt accumulation in the unit.

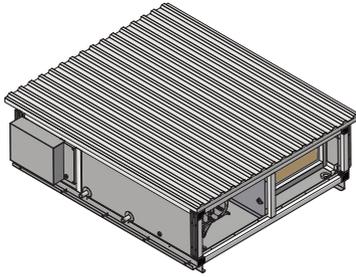
### 7.4 Spare parts

For spare parts you can contact our service department. You can find the article number for the filters on the type plate of the appliance.

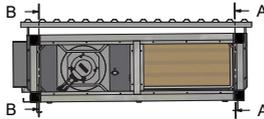
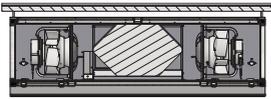
### 7.5 Checking and Cleaning the Siphons

The siphons must be checked for contamination and cleaned if necessary.

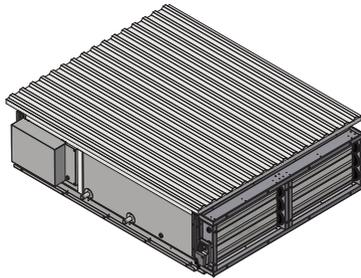
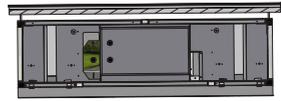




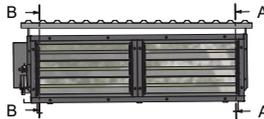
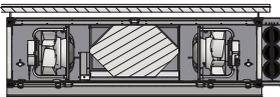
B-B



A-A

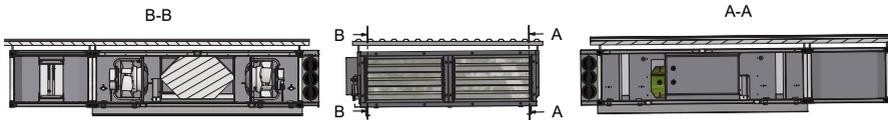
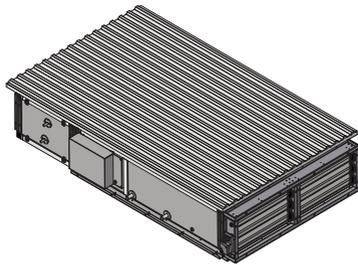
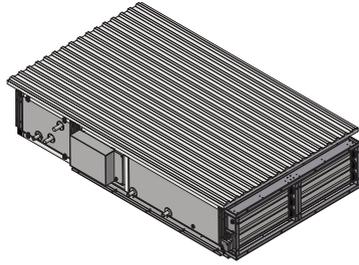


B-B

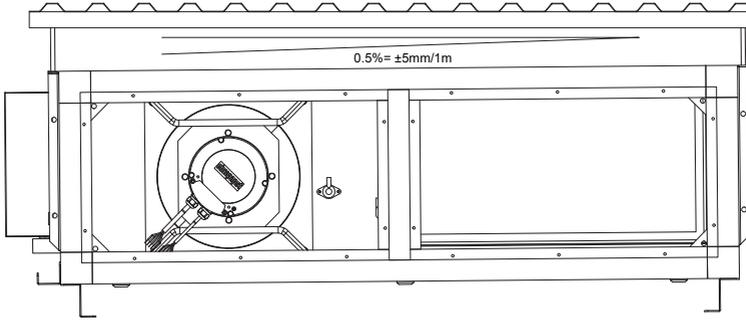


A-A



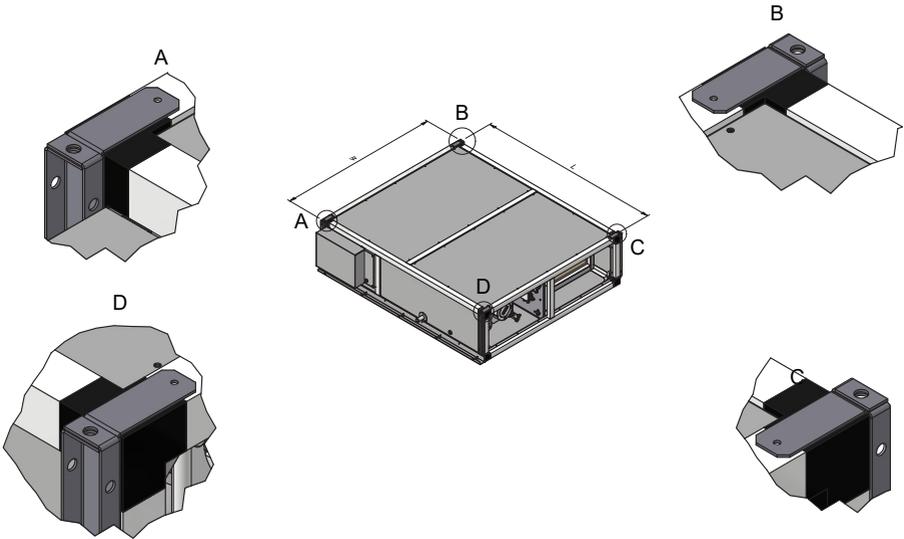


[2]

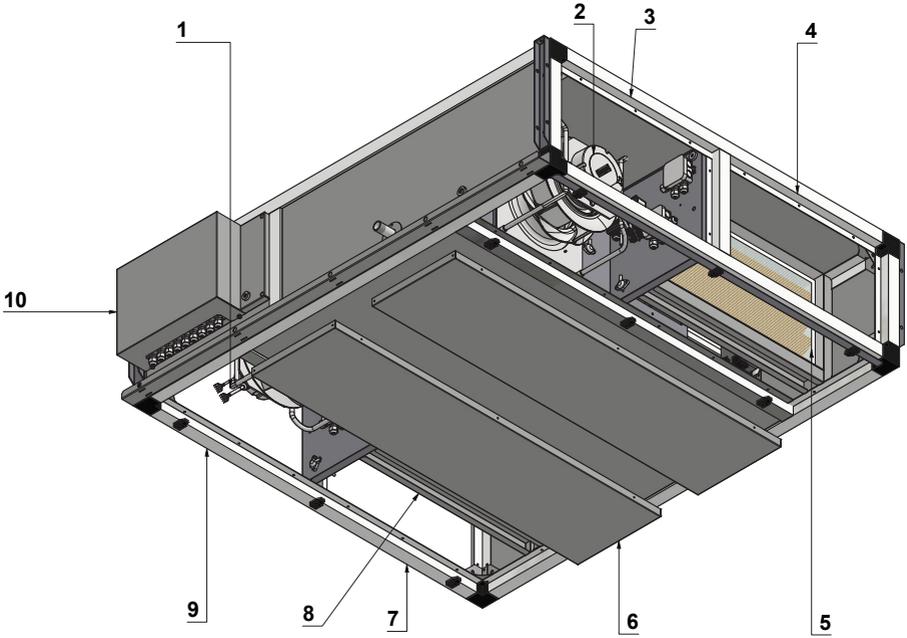


EN

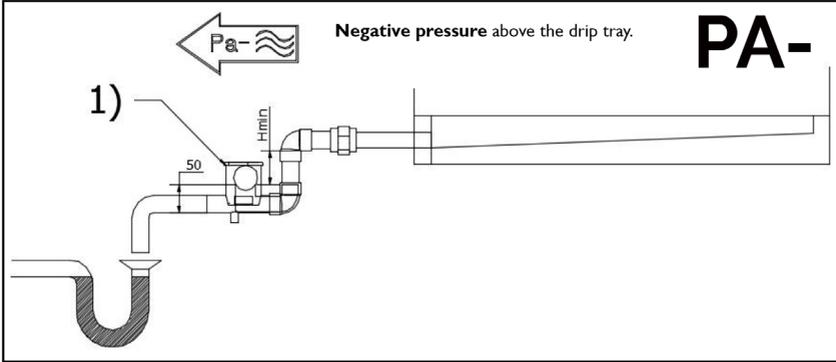
[3]



Type	Code number	L	W
1500	5997422	1791	1303
	5997423	1791	1303
	5997424	1791	1303
3000	5997428	2301	1913
	5997429	2301	1913
	5997430	2301	1913



Description	L	Description
1 EC fan supply air	7	Return air
2 EC exhaust air fan	8	Filter EPM10 60% (M5) Return air
3 Exhaust air	9	Supply air
4 Outside air	10	Regulation
5 Filter EPM1 55% (F7) Outside air	11	Door catch
6 Inspection door		



- 1) Place the O-ring gasket on the inside of the siphon cover.
- Hmin ?** Pa- < 500 Pa: Hmin = 60mm  
Pa- >= 500 Pa: Hmin = (Pa / 10)mm + 10mm.
- 2) Option: place the heating element in the siphon.
- 3) To drain.

## 7.6 Connect and configure options

It is possible to connect the options below to the FlatLine LW heat recovery unit.

- [5]** 06 29 356 External room temperature sensor
- [6]** 06 29 165 CO2 room sensor\*  
06 29 166 CO2 duct sensor\*
- [7]** 30 04 505 Supply air duct pressure sensor\*
- [8]** 31 89 450 Servo motor open/close on the outside air damper or discharge damper  
FlatLine 800/1200/1500  
31 89 455 Servo motor open/close on the outside air damper or discharge damper  
FlatLine 1800/2400/3000
- [9]** 30 04 575 Heating block  
30 04 576 Cooling block
- [10]** 30 04 577 Electric heating section FlatLine 800  
30 04 578 Electric heating section FlatLine 1200/1500/1800  
30 04 579 Electric heating section FlatLine 1200/1500/1800/2400/3000

\* Options 6 and 7 cannot be applied together.

See the tables below for setting up the unit with the options used.

- [11]** Configure/set the room temperature sensor.
- [12]** Configure/set the CO2 room sensor.
- [13]** Configure/set the pressure sensor on the supply air duct.

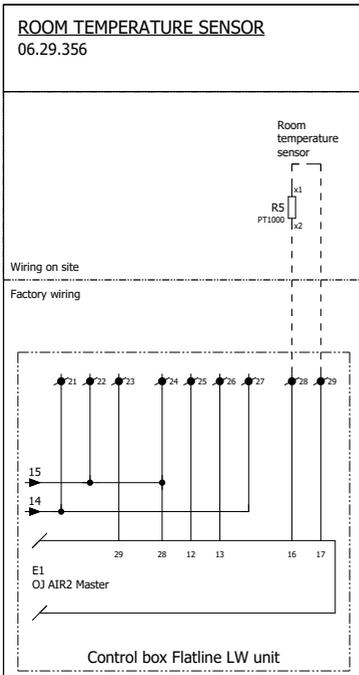
*Connect the servo motor open/close to the outside air damper/drain damper.*

If an on/off servo motor is connected to the outside air damper or discharge valve, this does not need to be set. When this is connected to the correct terminals, they will automatically open when the unit starts up.

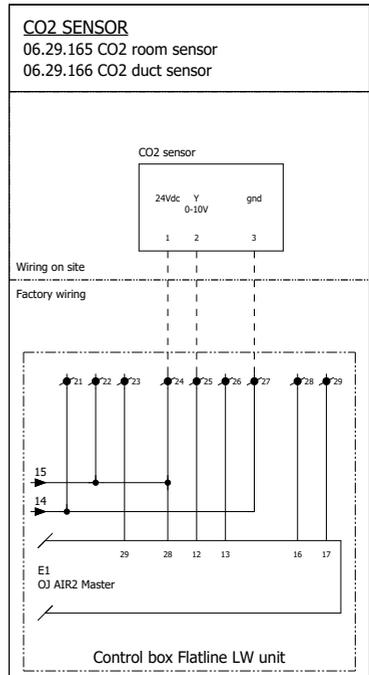
*Configuring/setting a heating/cooling (water heating block/cooling block).*

These options can only be added from the factory (pre-ordered) or by our service department.

[5]

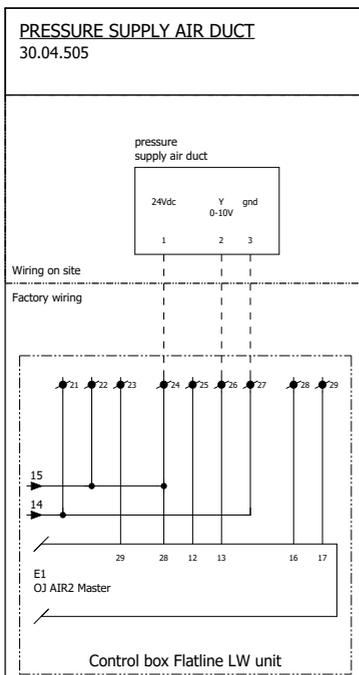


[6]

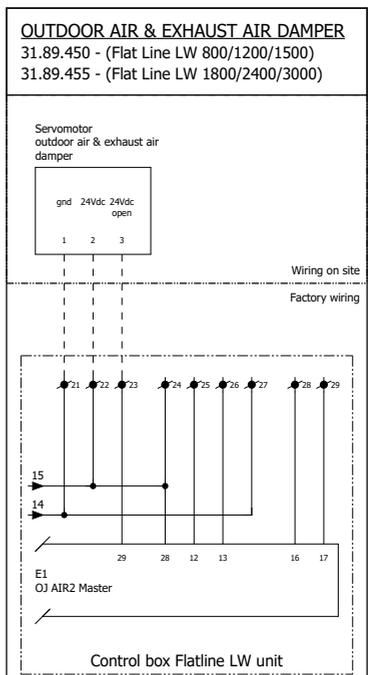


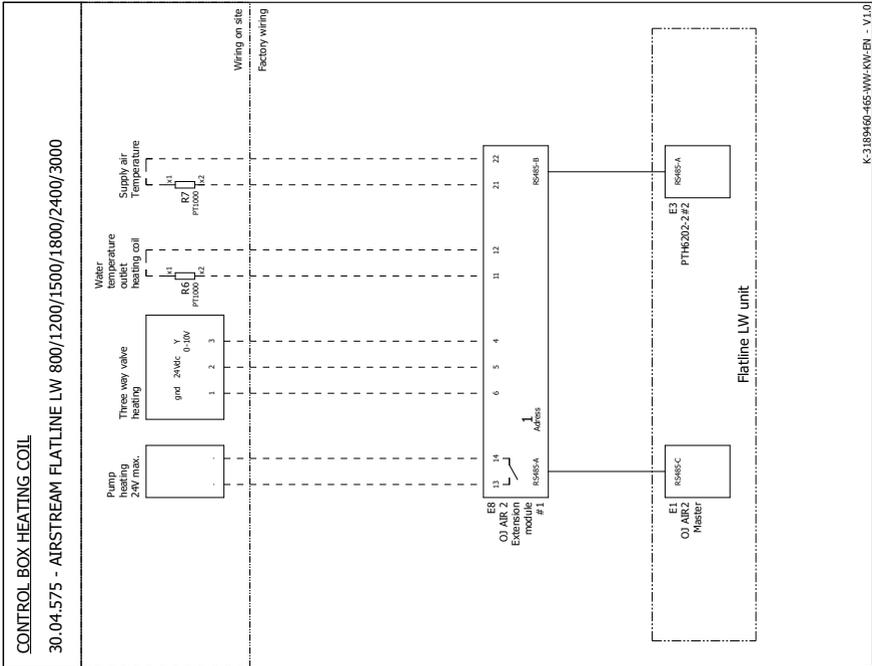
EN

[7]

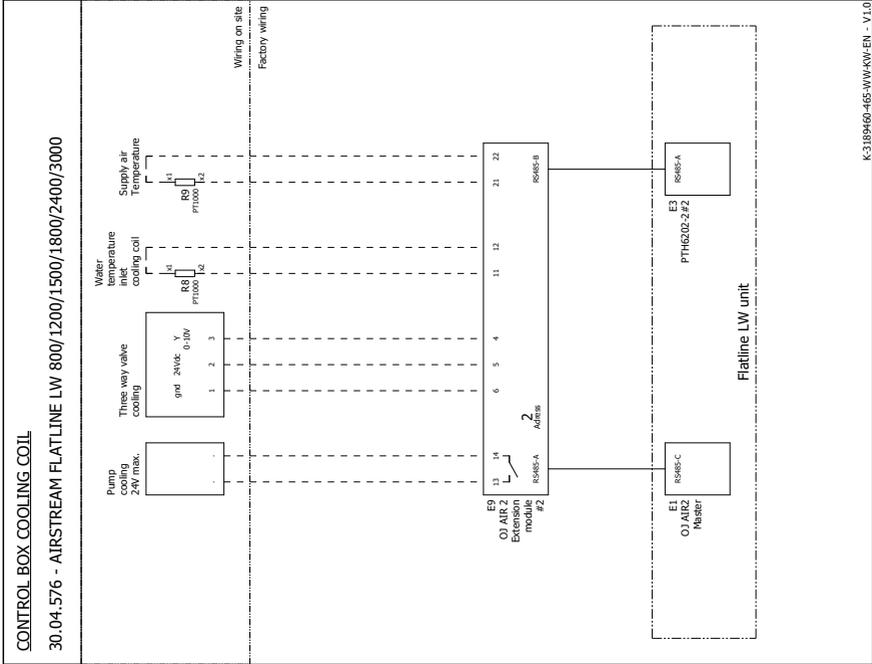


[8]





K-3189469-465-NW-KW-EN - Y1.0



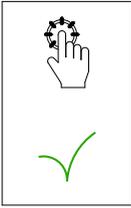
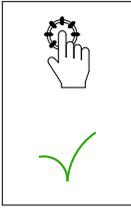
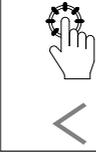
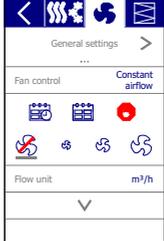
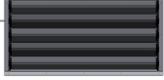
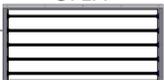
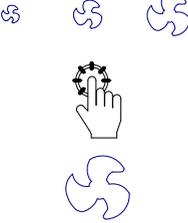
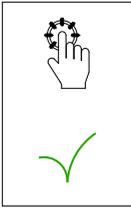
K-3189469-465-NW-KW-EN - Y1.0



	<p>&gt;</p>		<p>&gt;</p>		<p>&gt;</p>	
<p><b>1</b></p>		<p><b>2</b></p>		<p><b>3</b></p>		<p><b>4</b></p>
	<p>&gt;</p>		<p>&gt;</p>		<p>&gt;</p>	
<p><b>5</b></p>		<p><b>6</b></p>		<p><b>7</b></p>		<p><b>8</b></p>
	<p>&gt;</p>		<p>&gt;</p>		<p>&gt;</p>	
<p><b>9</b></p>		<p><b>10</b></p>		<p><b>11</b></p>		<p><b>12</b></p>
	<p>&gt;</p>		<p>&gt;</p>		<p>&gt;</p>	
<p><b>13</b></p>		<p><b>14</b></p>		<p><b>15</b></p>		<p><b>16</b></p>

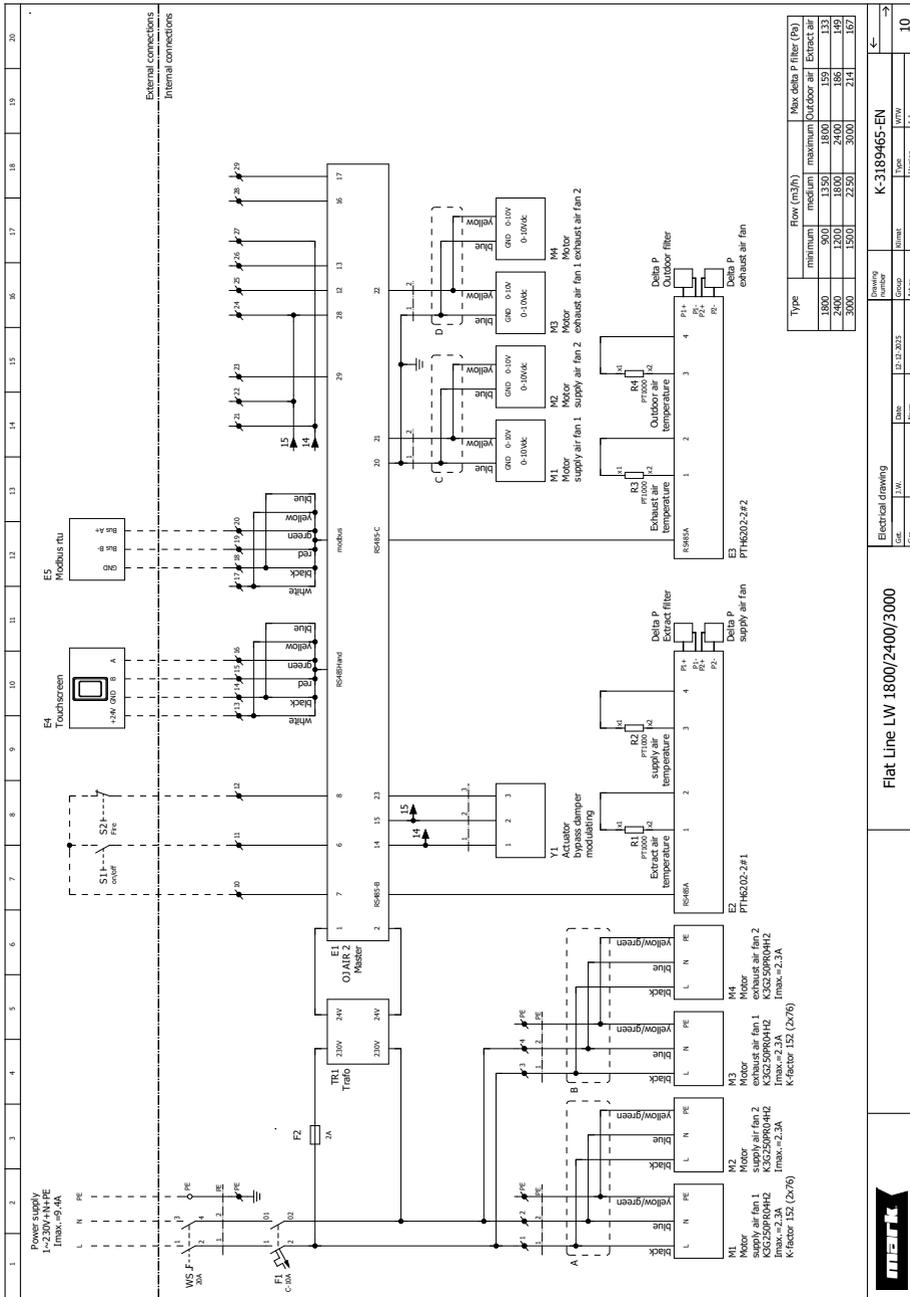
	<p>&gt;</p>		<p>&gt;</p>		<p>&gt;</p>	
<b>1</b>		<b>2</b>		<b>3</b>		<b>4</b>
	<p>&gt;</p>		<p>&gt;</p>		<p>&gt;</p>	
<b>5</b>		<b>6</b>		<b>7</b>		<b>8</b>
	<p>&gt;</p>		<p>&gt;</p>		<p>&gt;</p>	
<b>9</b>		<b>10</b>		<b>11</b>		<b>12</b>
	<p>&gt;</p>		<p>&gt;</p>		<p>&gt;</p>	
<b>13</b>		<b>14</b>		<b>15</b>		<b>16</b>

<b>1</b>	<b>2</b>		
<b>5</b>	<b>6</b>	<b>7</b>	
<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>

	<p>High speed</p> <p>750 m<sup>3</sup>/h</p> <p>^ v</p> <p>✗ ✓</p>		
<p>17</p>	<p>18</p>	<p>19</p>	<p>20</p>
	<p>Supply air fan</p> 		<p>CLOSED ✗</p>  <p>OPEN</p> 
<p>21</p>	<p>22</p>	<p>23</p>	<p>24</p>
	 <p>?? Pa</p>		 <p>Fan control</p> <p>Constant airflow</p>
<p>25</p>	<p>26</p>	<p>27</p>	<p>28</p>
	 <p>○ Extract air slave</p>		
<p>29</p>	<p>30</p>	<p>31</p>	<p>32</p>

	<p>&gt;</p>		<p>&gt;</p>		<p>&gt;</p>	
<p><b>33</b></p>		<p><b>34</b></p>		<p><b>35</b></p>		<p><b>36</b></p>
	<p>&gt;</p>		<p>&gt;</p>		<p>&gt;</p>	
<p><b>37</b></p>		<p><b>38</b></p>		<p><b>39</b></p>		<p><b>40</b></p>
	<p>&gt;</p>					
<p><b>41</b></p>		<p><b>42</b></p>				







**MARK BV**

BENEDEN VERLAAT 87-89  
VEENDAM (NEDERLAND)  
POSTBUS 13, 9640 AA VEENDAM  
TELEFOON +31(0)598 656600  
FAX +31 (0)598 624584  
info@mark.nl  
www.mark.nl

**MARK EIRE BV**

COOLEA, MACROOM  
CO. CORK  
P12 W660 (IRELAND)  
PHONE +353 (0)26 45334  
FAX +353 (0)26 45383  
sales@markeire.com  
www.markeire.com

**MARK BELGIUM b.v.b.a.**

KERNENERGIESTRAAT 47 UNIT G  
2610 WILRIJK (ANTWERPEN)  
(BELGIË/BELGIQUE)  
TELEFOON +32 (0)3 6669254  
info@markbelgium.be  
www.markbelgium.be

**MARK DEUTSCHLAND GmbH**

MAX-PLANCK-STRASSE 16  
46446 EMMERICH AM RHEIN  
(DEUTSCHLAND)  
TELEFON +49 (0)2822 97728-0  
TELEFAX +49 (0)2822 97728-10  
info@mark.de  
www.mark.de

**MARK POLSKA Sp. z o.o**

UL. JASNOGÓRSKA 27  
42-202 CZĘSTOCHOWA (POLSKA)  
PHONE +48 34 3683443  
FAX +48 34 3683553  
info@markpolska.pl  
www.markpolska.pl

**MARK SRL ROMANIA**

STR. BANEASA NO 8 (VIA STR. LIBERTATII)  
540199 TÂRGU-MURES, JUD MURES  
(ROMANIA)  
TEL/FAX +40 (0)265-266.332  
office@markromania.ro  
www.markromania.ro

