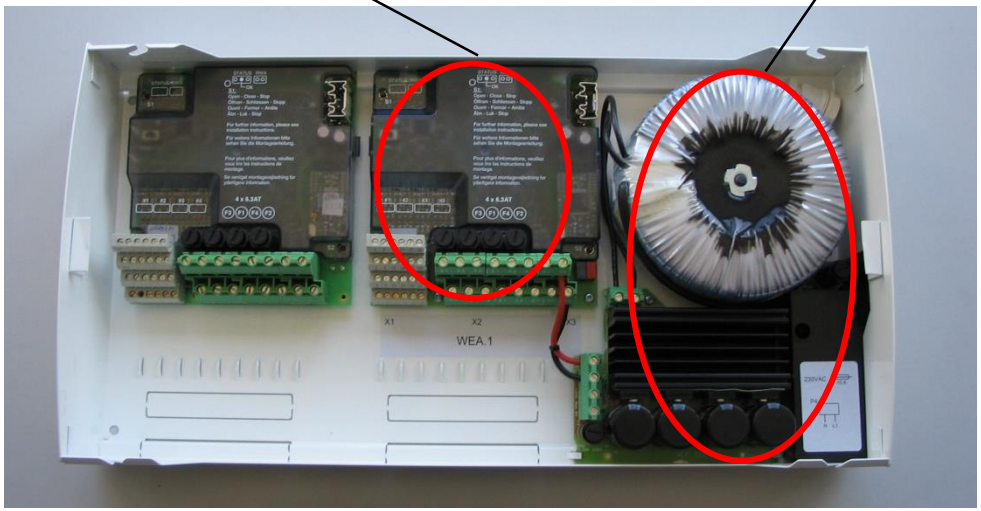
WEC16M Commissioning Guide

Motor Controller KNX

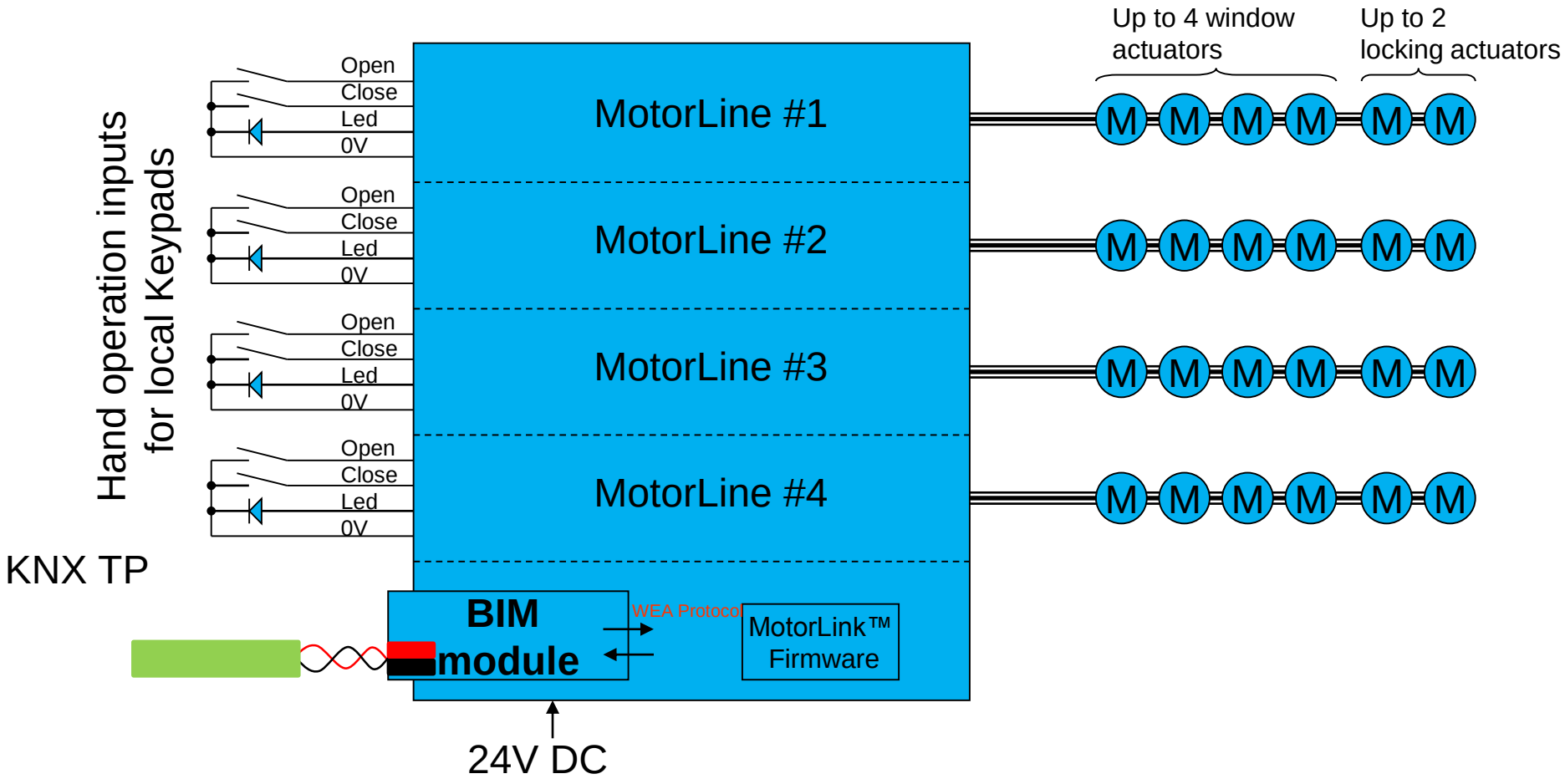
MotorController WEC 16M 080B

WEA 11M KNX control module
Controls up to 4 groups of motors
1 group = typical 1 windows
Each group up to 4 motors

Power supply for
up to 16 motors

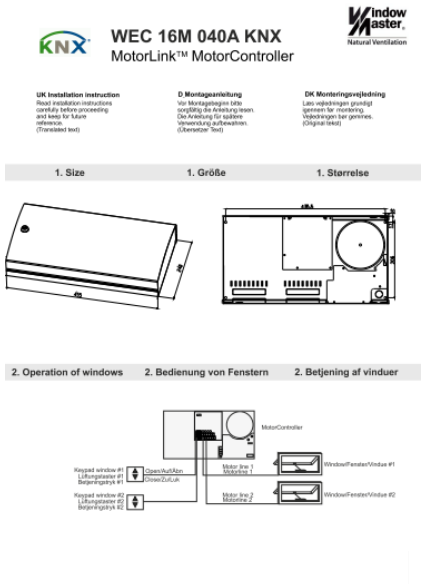


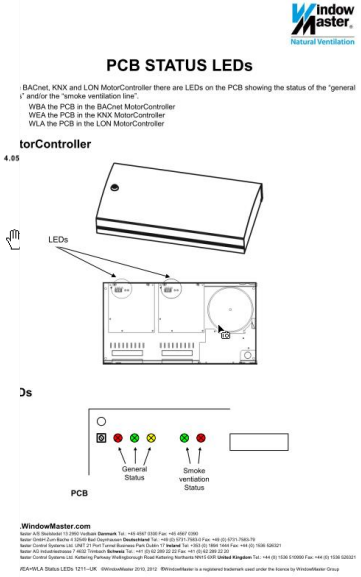
WEA 11M Overview

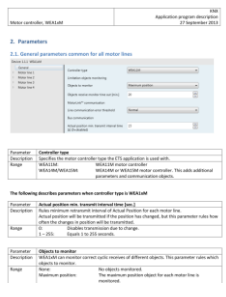


Documentation

- **Found at.** http://www.windowmaster.com
- **Product Sheet**
- **Installation instructions**
- **ETS Application description**
- **ETS application Download**
- **LED status guide**
- **Brochure**

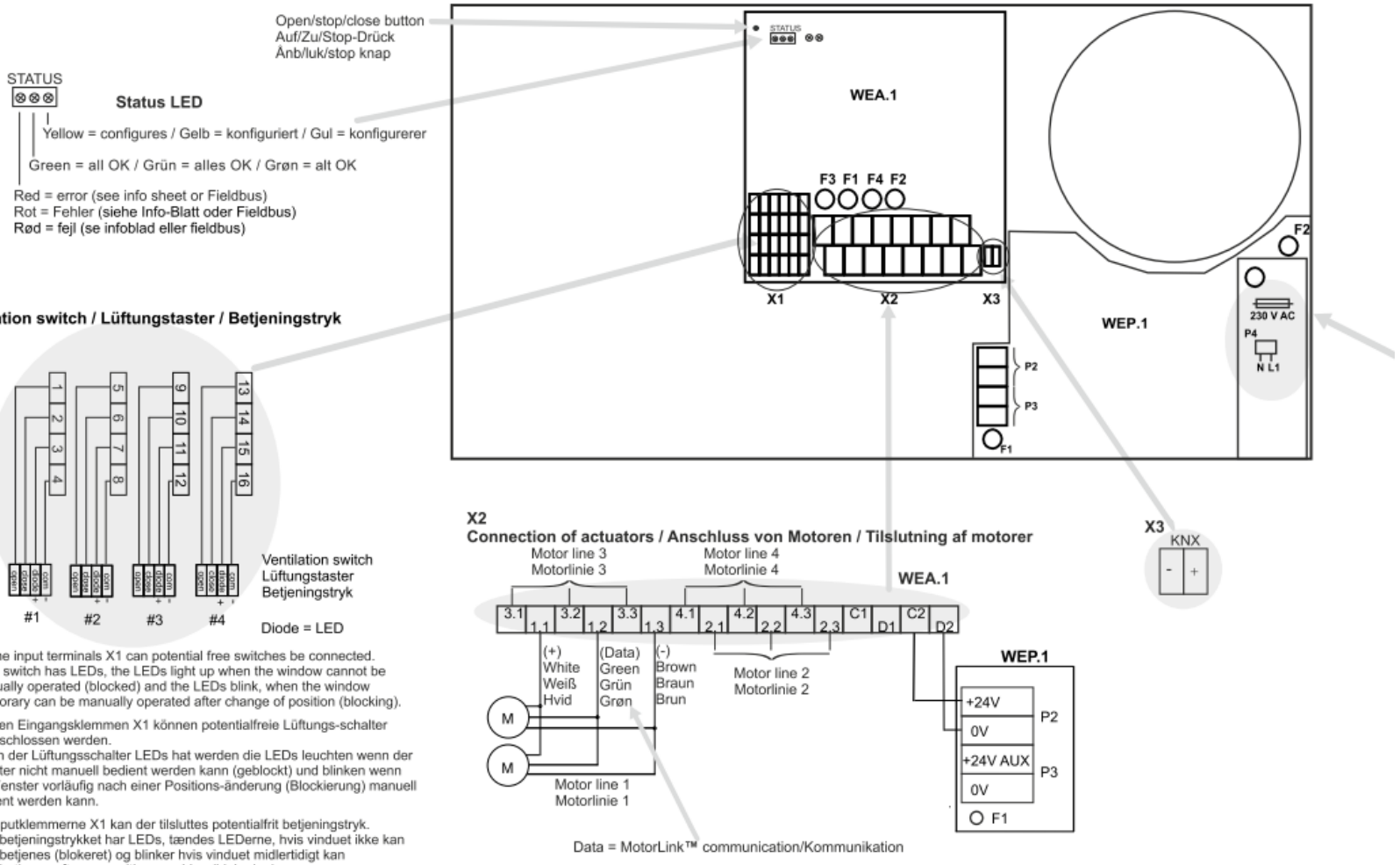






Connections

WEA Numbering goes from right to the left

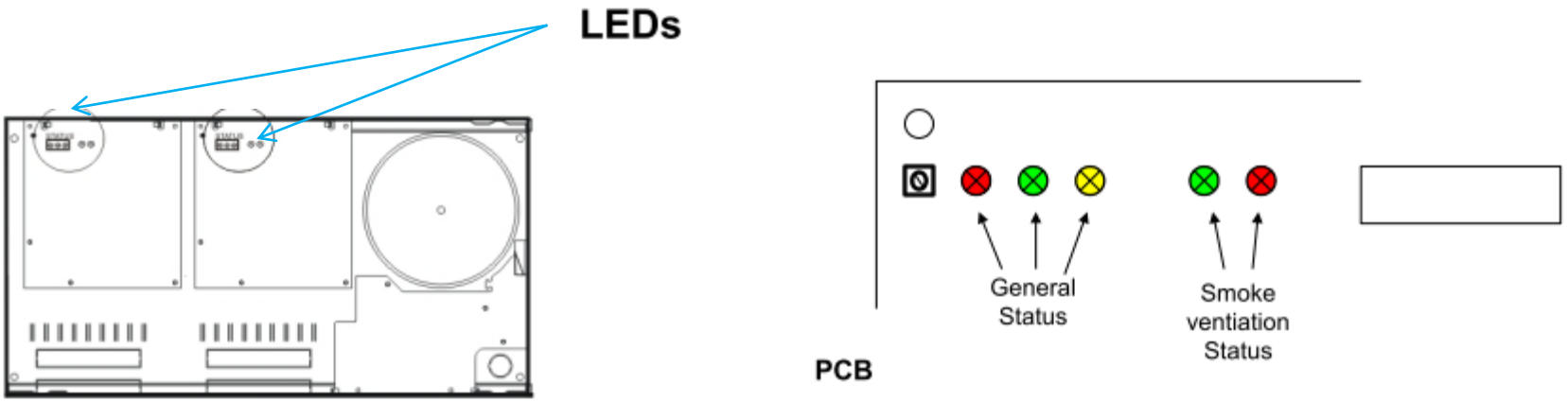


UK: On the input terminals X1 can potential free switches be connected. If the switch has LEDs, the LEDs light up when the window cannot be manually operated (blocked) and the LEDs blink, when the window temporary can be manually operated after change of position (blocking).

D: An den Eingangsklemmen X1 können potentialfreie Lüftungs-schalter angeschlossen werden. Wenn der Lüftungsschalter LEDs hat werden die LEDs leuchten wenn der Fenster nicht manuell bedient werden kann (geblockt) und blinken wenn der Fenster vorläufig nach einer Positions-änderung (Blockierung) manuell bedient werden kann.

DK: På inputklemmerne X1 kan der tilsluttes potentialfrit betjeningstryk. Hvis betjeningstrykket har LEDs, tændes LEDerne, hvis vinduet ikke kan håndbetjenes (blokeret) og blinker hvis vinduet midlertidigt kan håndbetjenes efter en positionsændring (blokering).

WEA Status LEDs



LEDs information:

		Status LEDs		
WBA / WEA / WLA status	**Priority** ***see note next page***	**Red**	**Green**	**Yellow**
OK	11	Off	On	Off
BACnet/KNX/LON watchdog timeout (MaxPos and/or Close commands not received as defined)	10	Off	Yellow/green alternating	BACnet/KNX/LON watchdog timeout (MaxPos and/or Close commands not received as defined)
No BACnet/KNX/LON response (No connection to BACnet/KNX/LON module)	9	Red/green alternating	Off	No BACnet/KNX/LON response (No connection to BACnet/KNX/LON module)

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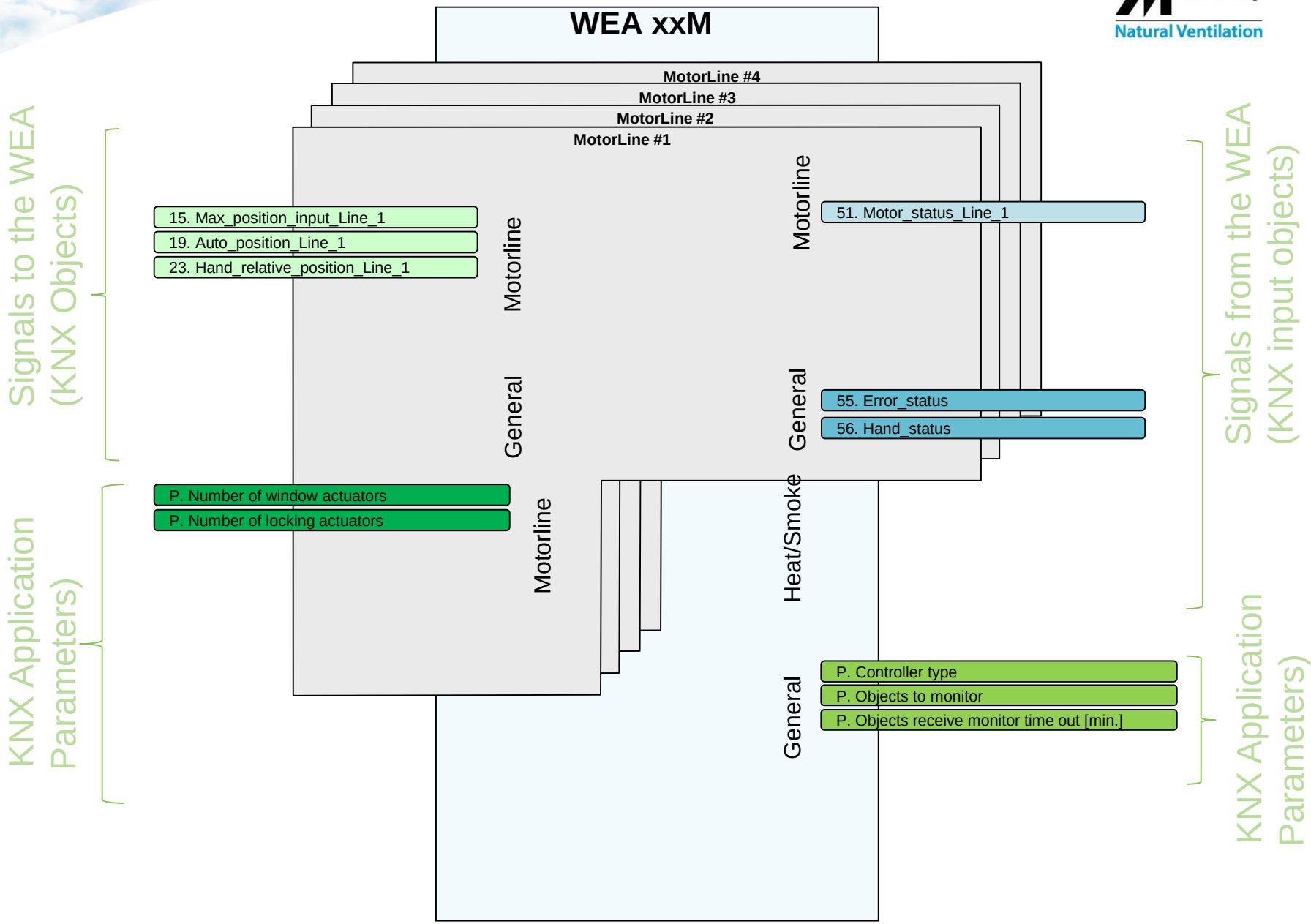
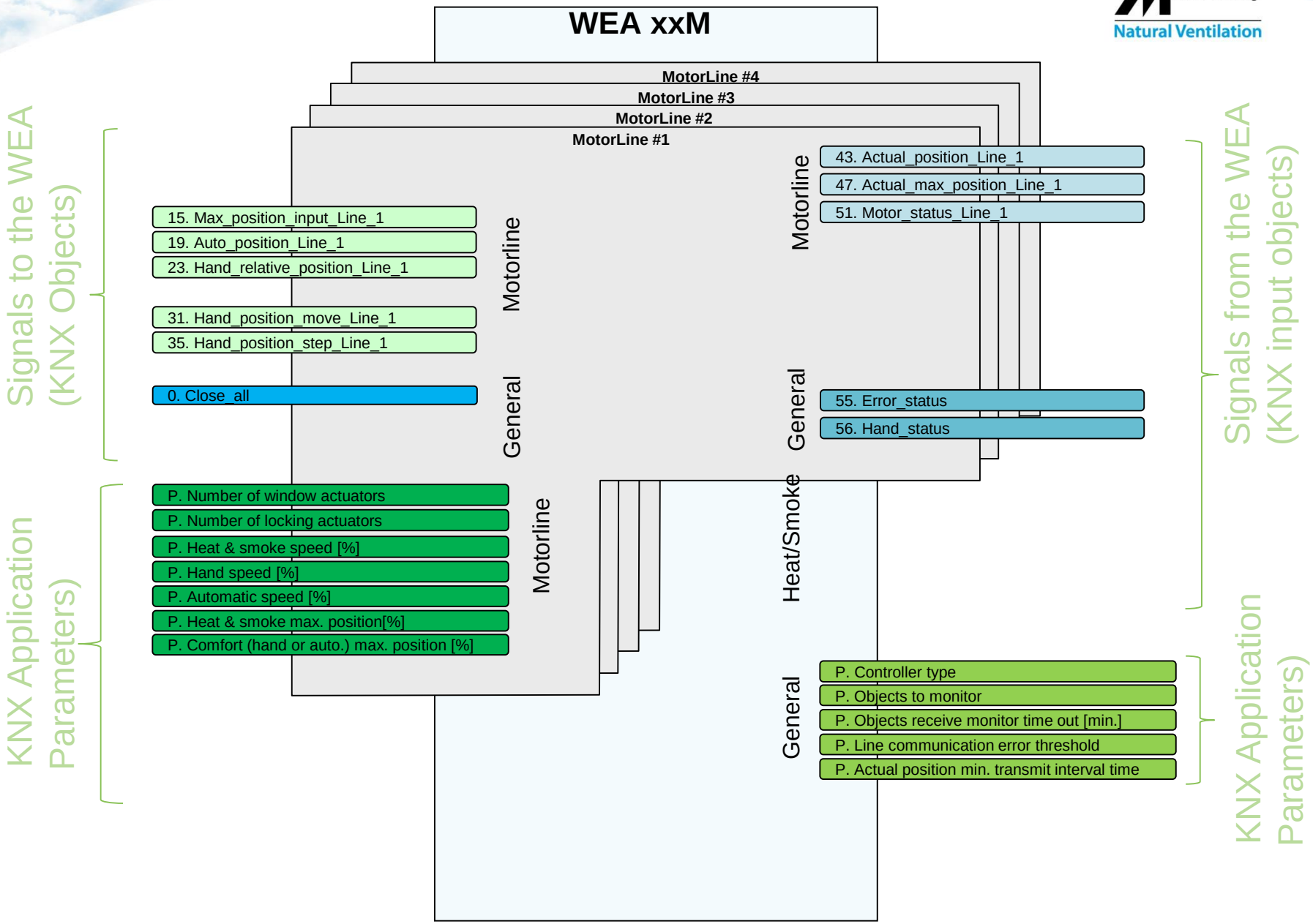
LEDs information:

		Status LEDs		
WBA / WEA / WLA status	**Priority *see note next page***	**Red**	**Green**	**Yellow**
Parameter scaling error on line 1	8	Flash 1	Flash 1	Off
Parameter scaling error on line 2	8	Flash 2	Flash 2	Off
Parameter scaling error on line 3	8	Flash 3	Flash 3	Off
Parameter scaling error on line 4	8	Flash 4	Flash 4	Off
Parameter scaling error on more lines	7	Flash all	Flash all	Off
Actuator position error on line 1	6	Flash 1	On	Off
Actuator position error on line 2	6	Flash 2	On	Off
Actuator position error on line 3	6	Flash 3	On	Off
Actuator position error on line 4	6	Flash 4	On	Off
Actuator positions error on more lines	5	Flash all	On	Off
Communication data error on line 1	4	Off	Flash 1	Off
Communication data error on line 2	4	Off	Flash 2	Off
Communication data error on line 3	4	Off	Flash 3	Off
Communication data error on line 4	4	Off	Flash 4	Off
Communication data error on more lines	3	Off	Flash all	Off
Start / Stop bit error on line 1	4	Off	Off	Flash 1
Start / Stop bit error on line 2	4	Off	Off	Flash 2
Start / Stop bit error on line 3	4	Off	Off	Flash 3
Start / Stop bit error on line 4	4	Off	Off	Flash 4
Start / Stop bit error on more lines	3	Off	Off	Flash all
Configuration error on line 1	2	Flash 1	Off	Off
Configuration error on line 2	2	Flash 2	Off	Off
Configuration error on line 3	2	Flash 3	Off	Off
Configuration error on line 4	2	Flash 4	Off	Off
Configuration error on more lines	1	Flash all	Off	Off

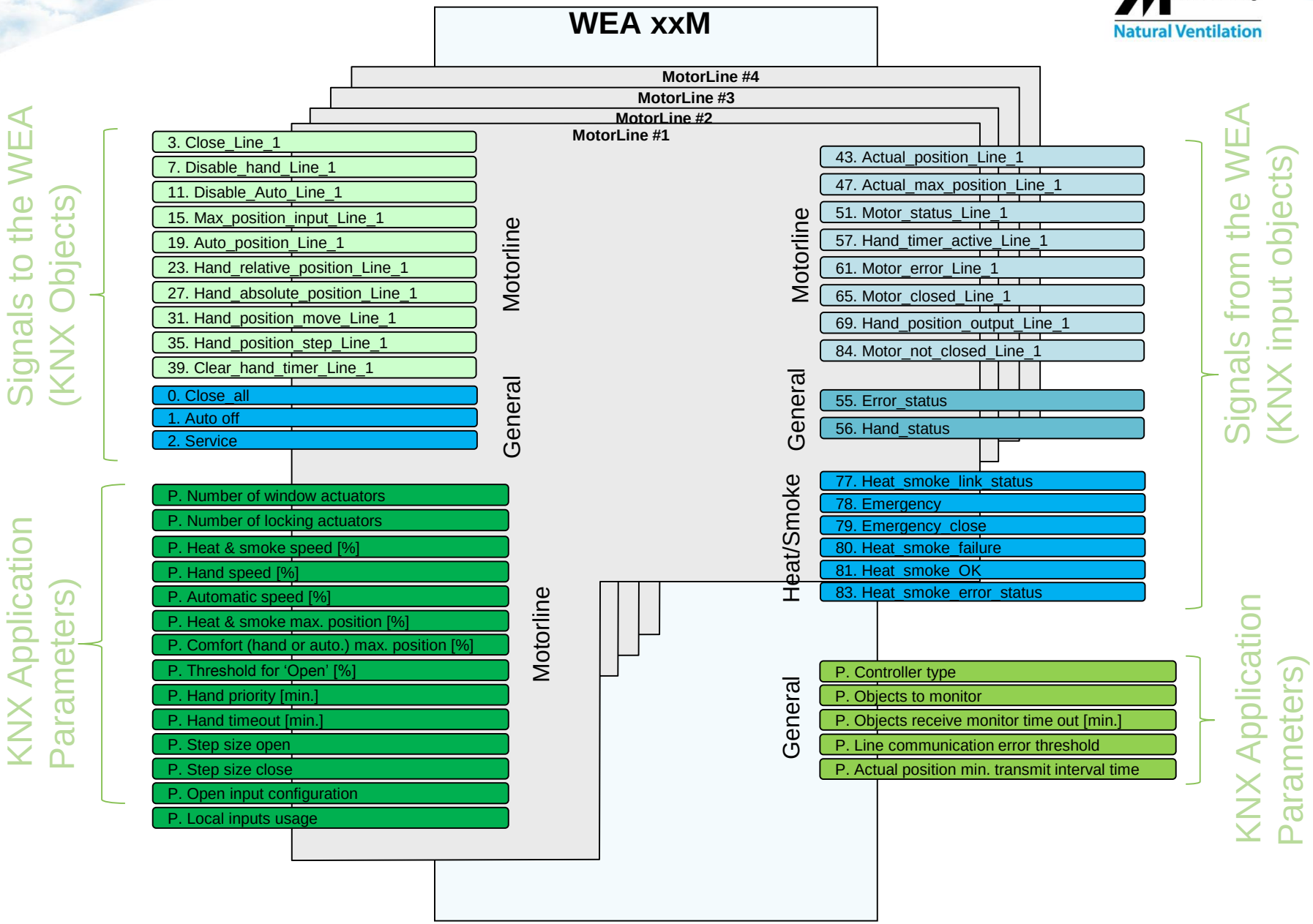
WEA 11M – Minimum KNX Objects



WEA 11M – Most used KNX Objects



WEA 11M – All KNX Objects



Hands on

- **Commission a WEC 16M – Actuators and MotorLines**

Before starting the commissioning process make sure that all actuators, mounted on windows, are connected to MotorLine cables and the cables are installed according to installation and cable plan documentation of the project.

For each MotorLine cable, terminated in the panel, do the following.

- Connect the MotorLine cable to the WAT 100.
- Run and Test the MotorLine. Refer to the WAT 100 User Guide for instructions.
- Verify that the window(s) running are the correct one(s) – as specified in the documentation.
- Make sure the actuators on the MotorLine are correctly calibrated. Refer to the actuators installation instruction for the calibration process.
- Disconnect the MotorLine cable from the WAT 100 and terminate it in the WBC panel according to the project documentation.

Hands on

Commission a WEC 16M – KNX configuration

For each controller PBC, WEA xxM in the panel do the following.

- Connect 230V power
- Connect the WEA to a KNX Field bus.
- Assign a physical address to the controller
- Using the ETS Parameters pane, Select the correct controller type
- Using the ETS Parameters pane, Configure the number of Window actors. If no actors – disable line.
- Using the ETS Parameters pane, Configure the number of Window actors. If no actors – “none”
- Using the ETS Group Objects pane, Link all required group addresses to the corresponding objects
- Using the ETS download the application to the controller
- Check the status LED on the controller – Green LED indicates all OK.

We highly recommend always to use the “Motor_status_Line_x” object. This is a powerful information source in chasing errors.

For a full description of the ETS application consult www.windowmaster.com

Important objects in details

- **Objects**
  - Parameter values – are saved in a “Non-volatile” memory and therefor only need to be set once during commissioning.
  - Communication objects are used in the operation of the controller. When resetting the controller all communication object are receiving their default values.
  - Many input communication objects are event based. The controller “reads” and react to them once, when a new value is received, but can react in an opposite direction if a new value is received on another object, disregarding the value of an object that was updated earlier. The values of input communication objects not always correctly represent the actual state of the controller. For example: The value of the “Auto_position_Line_x” does not necessarily represent the actual position of the MotorLine.

Important objects in details

- **MotorLine configuration**
  - **Function**

    The WEA 11M detects the number of actuators on each MotorLine and compares it to the number of actuators it expects on the line. If the numbers do not match or if the Team-Size parameter value in the actuators does not match the detected number of actuators, the WEA 11M will indicate a configuration error on the MotorLine. The MotorLine will not function until the error is resolved. For valid combinations of actuators on a MotorLine, see the description of the *"Number of windows actuators"* in the ETS application description.

  - **Opening actuators configuration** – **The WEA 11M compares**
    - *Number of windows actuators Line_x*

    With
    - *The actual number detected on the line*

    and indicates an error if the values do not indicate the same number of actuators.

    Must be set in ETS parameters
    Default value = "Don't care"

  - **Locking actuators configuration -** **The WEA 11M compares**
    - *Number of locking actuators Line_x*

    With
    - *The actual number detected on the line*

    and indicates an error if the values do not indicate the same number of actuators.

    Must be set in ETS parameters
    Default value = "None"

Important objects in details

- **Bus communication Watchdog configuration**
  - **Function**
    - To make sure windows are not staying opened in case of KNX communication failure, a watchdog timer is running on the controller. The timer is restarted whenever a KNX Update message is received on the "Max_opening_input_Line_x" object or the "Close_Line_x" object. If the timer expires the controller concludes that there is a problem on the KNX line. It will then close the windows by setting "**Max_Position_input" = 0** on all MotorLines and go into the "**Hand operation Blocking**", "**Hand operation Blocked**" sequence.

    - Note that as a default, the watchdog is disabled. If you want to use this safety function you must
      - a. Set parameter "**Objects_To_Monitor**" to a value different than "**None**" and
      - b. Program the BMS system to cyclically send Update messages on the selected triggering object so the timer will never run out.

  - **Monitored -** Motor line will close if object is not updated cyclically
    - What to monitor is specified by *Objects_To_Monitor*
      - None. (Function is disabled) <u>Default value</u>
      - Max position (*Max_Position_Input_Line_x*)
      - Close (*Close_Line_X)*
      - Max position and Close

    - Time out is specified by. *Objects_Receive_Monitor_Time_Out* [minutes]

      <u>Default value = 20 min.</u>

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Important objects in details

- **Operation functionality**

  - **Operation** - The WEA 11M has a 4 levels operation priority hierarchy. A higher priority operation overrides a lower priority operation. From high to low.
    - *Smoke ventilation operations – Only applies when the WEA is used within a WSC smoke panel.*
    - *Limiting operations*
    - *Manual operations*
    - *Automatic operations*

  - **Parameters** - A set of parameters is associated with each of the operation priority levels. These parameters enable running actuators in different speeds and with different opening limits in the different operation types.

  - **Actual status** - Status objects supply feedback, indicating the state of MotorLines at a given moment. The status feedback includes the actual position of a MotorLine, error indications and operation override information. See details bellow.

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Important objects in details

- **Operation functionality**
  - **The position limitation level**
    - The highest level (disregarding Smoke ventilation operations) is the Position Limitation operations. Two different commands are used to limit the maximum allowed opening of windows at a given time. A "**Max Opening input**" command is a 0 - 100% value used to limit the opening of a window to the designated value. A "**Close**" command is a binary value that forces the Max Opening to 0%. The Opening Limitation commands are initiated from KNX field bus. They are commonly used to implement safety functions like forcing windows to close when it is raining or limiting max opening to say 30% if wind velocity is over say 8 m/s.

      When a Position limiting command is given the MotorLine state is changed to "**Hand operation blocking**". In this state manual commands are not ignored although they have a lower priority. This is a safety feature making it possible to anyway open a window if a head or an arm was caught in it while a window is closing. The MotorLine status is changed to "**Hand operation blocked**" after a period of 5 minutes, unless a new manual command was given during this period. The 5 minutes period restarts each time a manual command is given within the 5 minutes duration. When in "Hand operation blocked" state the MotorLine ignores all lower priority operation commands.

Important objects in details

- **Operation functionality**

  - ***Position Limiting operation objects***

Close_All [True/False]	Closes all MotorLines
Close_Line_X [True/False]	Closes MotorLine X
Max_Position_Input_Line_X [0-100%]	Limits the opening of MotorLine X, if Value=0[%], only smoke opening is possible

  - **Parameters.**

Heat & Smoke_Speed	Speed used when moving to a limited position. Default value = 100%

  - **Actual status objects** (applies to all operation levels)

Actual_Max_Position_Line_X	Show the actual limitation status. If more than one limitation is active the lowest is always in effect
Motor_Closed_Line_X [True/False]	Indicates that a MotorLine is closed.
Motor_Status_Line_X	See possible values in Parameter document bellow
Actual_Position_Line_X	Shows the actual position of MotorLine X in %

Important objects in details

- **Operation functionality**
  - **The manual operation level**
    - Manual Override commands are medium priority level operations. Manual Override commands can be initiated either from KNX or physically from the Local inputs on the controllers. Manual Override commands are commonly used by people, pressing a push button, to override the BMS system. When a Manual command is triggered the controller will ignore Automatic commands for a predefined period of time. The length of the time period is defined by a parameter and can be reset from the KNX field bus. This parameter is normally being sat once, at commissioning.

  - **Hand operation commands**
    - *Hand_Relative_Position_Line_X [-100 - +100]* — Hand operation relative to current actual position.
    - *Hand_Absolute_Position_Line_X [0 – 100%]* — Hand operation to an absolute position.
    - Local inputs — Open / Close / Stop hand operations.

  - **Parameters**
    - *Hand_Speed* — Sets the speed of the actuators when in manual operation.
      Default value = 75%
    - *Comfort (hand or auto) max. position* — Sets the max position allowed when in **manual or auto** operations.
      Default value = 100%
    - *Hand Time Out [min]* — Sets the duration of time after a manual command where auto commands are ignored.
      Default value = 30 minutes

Important objects in details

- **Operation functionality**
  - **The auto operation level**
    - The automatic commands are the lowest priority level operations. Automatic commands can only be initiated from the KNX field bus and are normally used by the BMS for comfort ventilation.
  - **Auto operation object**
    - *Auto_Position_Line_X [0 – 100%]* — Auto operation to an absolute position.
  - **Parameter**
    - *Automatic_Speed_Line_X [0 – 100%]* — Sets the speed of the actuators when in auto operation.
      Default value = 30%
    - *Comfort (hand or auto) max. position* — Sets the max position allowed when in **manual or auto** operations.
      Default value = 100%

Important objects in details

- **Errors indications and Troubleshooting**

  - The WEA 11M indicates errors for each MotorLine independently as well as a common error indication for the controller. Whenever a MotorLine error is indicated the common error is also indicated. It may therefor be sufficient only to monitor/visualize the common error and investigate the MotorLine error objects, only when the common object is in error.

    The error indications are binaries values. When troubleshooting an error you have to decode the *Motor_Status_Line_X* status objects to obtain detailed information about the error type.

    Errors and error types are indicated by KNX objects but also by the Green, Yellow and Red LED's on the controller. See a detailed description of the LED's above in this document.

  - **Error indication objects**
    - *Motor_error_Line_X[True / False]* — MotorLine X error indication

  - **Status objects**
    - *Motor_Status_Line_X* — See possible values in ETS Application document
    - *Error_Status* — See possible values in ETS Application document
    - *Hand_Status* — See possible values in ETS Application document

Important objects in details

- **Communication errors**
  - The WEA 11M constantly communicates with its actuators. Sporadic failures in this communication will be indicated as communication errors when their number exceed a threshold, determined by a parameter. The threshold should be set high in a noisy environment. Communication error indication can also be disabled if this information is of no interest to the BMS system.

    Communication error indications are being reset (set to False) by the controller when communication with the actuators succeeds and the number of failed communications fall bellow the threshold.

  - **Parameter**
    - *Line communication error threshold* — Sets the tolerance level for sporadic communication errors. Default value = “Normal”

Hands on

Configuration and operation example - WEC 16M 040A

A single Team-Size 1 actuator is connected on MotorLine 1

- **Set parameter** Controller type **=** WEA11M
- **Configuration. One motor on motor line 1.**
  - Set parameter MotorLine1.Number of window actuators = 1, single-actuator (-1) default = Don't care .
    Set Other unused motor lines = Disabled
  - Set parameter MotorLine1.Number of locking actuators = None. default = None
  - Set /check parameter Objects to monitor = None. default = None
  - Set /check Max_Position_Input_Line_1 = 100%. default = 100%
- **Now you should be good to go, Check.**
  - Status LED on WEA PCB — Should be Green.
  - Motor_status_Line_1 — Present Value should be 32787 if actuator is closed and no errors are indicated.
- **Test the MotorLine by.**
- Set Auto_position_Line_1 = 50 — The motor goes to 50% at auto speed
- Set Hand_relative_position_Line_1 = 10 — The motor moves + 10% from last position at Hand speed .

At the same time the temporary hand - timer (30 min by default) will start counting. In this hand timer period, all auto commands will be ignored. Safety, Close All commands and Max limitation will override the Hand_relative_position_Line_1 commands.
The active hand timer is now showing active status on object Hand_timer_active_Line_1. It is possible to stop the timer, from the KNX field bus, with the object Clear_hand_ timer_Line_1.

Hands on

Configuration and operation example WEC 16M 040A

- **Any comfort position commands are limited to the lowest value of**
  - Parameter Comfort (hand or auto.) max. Position [%] — See, Operation functionality above
  - Max_position_input_Line_1 — See, Operation functionality above
  - Close all — See, Operation functionality above
  - Close_Line_1 — See, Operation functionality above

Now it's up to the system integrator/designer to use the different control objects, but normal procedure would be to use.

- **Auto commands.**
  BMS system commands. This will give you low noise movement due to slow Auto Speed.
- **Hand commands.**
  Commands from user controlled keypads or software keypads. This will give you faster movement with higher noise level, so that the user can see and hear a reaction, when the button is activated (Hand Speed).
- **Close all.** Safety like rain, very high wind, etc. This will give you the fastest movement.
- **Limitations.** To minimize opening due to high wind, safety when building is empty etc.

KNX Application Parameters

Parameter Name	Description	Default value	Units
Number of window actuators	**1: Line disabled** **2:** 1 single-actuator (-1) **3:** 2 not synchronised single-actuators (-1) **4:** 3 not synchronised single-actuators (-1) **5:** 4 not synchronised single-actuators (-1) **14: Don't care** - 0 to 4 actuators in valid combinations **16: Normal** (use value in window actuators, if no actuators are present an error is indicated)	Don't care	
Number of locking actuators	**1: None**. No locking actuators are expected. **2:** 1 locking actuator is expected. **3:** 2 locking actuators are expected. **14: Don't care** - 0 to 2 locking actuators are accepted.	None	
Hand speed [%]	This non-volatile parameter sets the speed of the actuators during hand operation.	75	%
Automatic speed [%]	This non-volatile parameter sets the speed of the actuators during automatic operation.	30	%
Heat & smoke speed [%]	This non-volatile parameter sets the speed of the actuators during Heat and Smoke operation.	100	%
Comfort (hand or auto.) max. position [%]	This non-volatile parameter sets the maximum opening allowed during normal (comfort) operation.	100	%
Heat & smoke max. Position [%]		100	%

KNX Application Parameters

Parameter Name	Description	Default value	Units
Open input configuration	This parameter configures the use of the physical local input (terminal 1/5/9/13) for the MotorLine. **1: Normal** – Use the input for a push-button for opening. **2: Use active input to limit position** – An active open input will limit the position. **3: Use active input to limit position** - An inactive open input will limit the position.	Normal	
Maximum opening activated by local open input [%}	The opening limitation when the local open input is active or inactive depending on configuration.		%
Actual position min. transmit interval time [s] (0= disable)	This parameter sets the minimum retransmit interval of Actual Position for all motor lines.	15	Seconds
Objects receive monitor time out [min.]	This parameter determines how often updates on monitored objects must be received.	15	minutes
Objects to monitor	**1. None**: No objects are monitored. (The function is disabled) **2. Maximum position**: The maximum position object for each motor line is monitored. **3. Close**: The close object for each motor line is monitored. **4. Max. position and close**: The maximum position object and the close object for each motor line are monitored.	None	
Line communication error threshold	**1. Commissioning**: Any disturbance is handled as an error. **2. Normal**: Normal tolerance towards sporadic errors. **3. High**: High tolerance towards sporadic errors – to be used in noisy environments. **4. Very high**: Even higher tolerance towards sporadic errors – to be used in very noisy environments. **5. Disabled**: No communication errors shown.	Normal	

Tools

- “WMaMotorParamTool” by WindowMaster A/S
  - For updating firmware in the WEA 1xM controller
  - Reading and changing actuator parameters
  - Reading controller parameters for inspection

- “ETS 4” KNX configuration and monitoring tool by KNX organisation. www.KNX.org
  - Assigning physical address and commissioning
  - Changing controller parameters
  - For linking and manipulating objects
  - Checking status
  - Monitoring objects

- Any generic KNX “OPCServer”
  - For testing and trouble shooting

Troubleshooting

- Successful and efficient troubleshooting requires good understanding of actuators and controller behavior. Please study carefully this manual as well as User and Installation manuals for the WEC 16M, the WAT 100 and the actuators in question before attempting any troubleshooting.
- The details of how to operate the WAT 100 in order to perform the tasks described bellow can be found in the WAT 100 User Guide.
- The details of how to calibrate an actuator can be found in the Installation instructions document of the actuator.
- Switch off Mains to the WEC 16M before connecting/disconnecting a MotorLine. Failing to do so may damage the WEA 11M and may blow the fuse, protecting the MotorLine output.
- Reset the WEA 11M, using the S1 push button, after connecting/disconnecting MotorLines, to make sure the controller acknowledges the new configuration.

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Troubleshooting

Behavior/Indication	When trying to read parameters from actuators, using the WAT 100, it indicates “Communication error”. The WAT 100 will indicate this error if it cannot communicate with all of the expected actuators.
Likely problem	Cable connection error between controller and one or more actuators.
Solution	Check and correct cable continuity, ,cable short, junction box assembly or plug fittings on all 3 leads. **Note:** You cannot check for continuity while actuators are connected. **Note:** The normal voltage on a MotorLine is: Between terminals x.1 and x.3 - ~ 29V Between terminals x.1 and x.2 - ~ 16V Between terminals x.2 and x.3 - ~ 12V

Behavior/Indication	WBA 11M indicates a “Configuration error” or WAT 100 indicates an “Expected WMX” no. which does not correspond to the no. of actuators connected on the MotorLine.
Likely problem	One or more actuators, with a wrong Team-Size parameter value, are mounted on the MotorLine.
Solution	Use the WAT 100 to program all actuators with the correct Team-size parameter value.

Troubleshooting

Behavior/Indication	A window is not opening but no error is indicated by the WEA 11M controller. When running the window with the WAT 100 it may be possible to observe that some of the actuators are actually moving up to 5, 6 mm before stopping.
Likely problem	The window is physically blocked or the chain bracket, mounted on the window, is not in line with the chain opening of the actuator. A window can be blocked because it was screwed to the frame in transport and the screw was not removed. A window can be blocked if the friction between the window and its frame is very high due to too much sealing rubber or other window construction problems. **Note:** When a window is blocked there is a risk that the actuators establish a very short actual “Max chain length” during the window calibration process.
Solution	1. Disconnect the chains from their brackets and manually open the window. 2. Remove any obstacles or correct any window construction or mounting faults. 3. With WAT 100, run the actuators when they are free from the window. If the actuators still don’t run, read their parameters and then write the parameters back to the actuators. By doing that you reset the actual “Max chain length” parameter, in the actuators, to factory default values. 4. Run the actuators out, connect the chains to their brackets on the window and perform a new window calibration.

Troubleshooting

Behavior/Indication	A window is nut running and the voltage across the x.1 and x.3 terminals of the MotorLine reads close to 0V.
Likely problem	The fuse, protecting the MotorLine output, is blown.
Solution	Change the fuse.