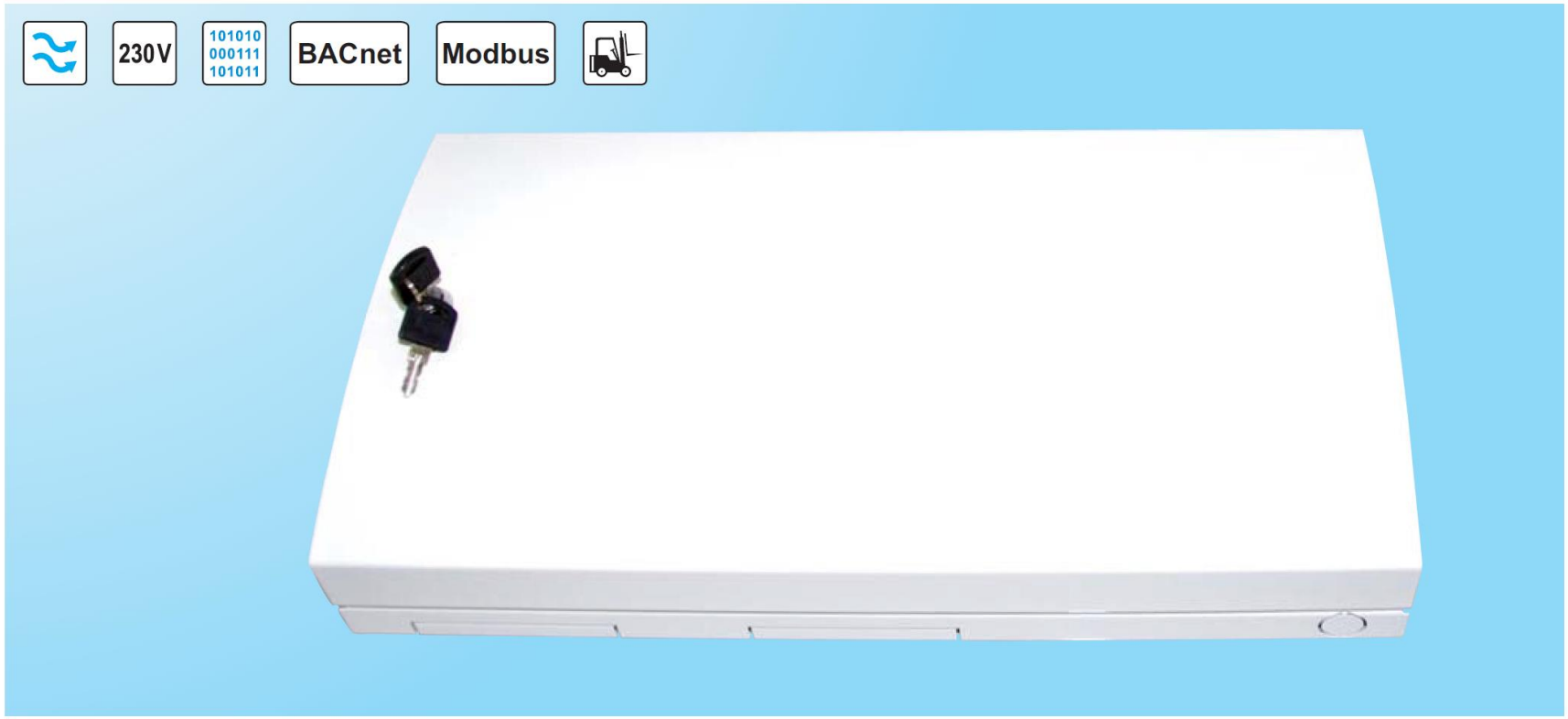
WBC16M Commissioning Guide

Vedbæk, 10 July 2014

MotorController

WBC 16M 040A / 080B*

MOTORCONTROLLER BACnet

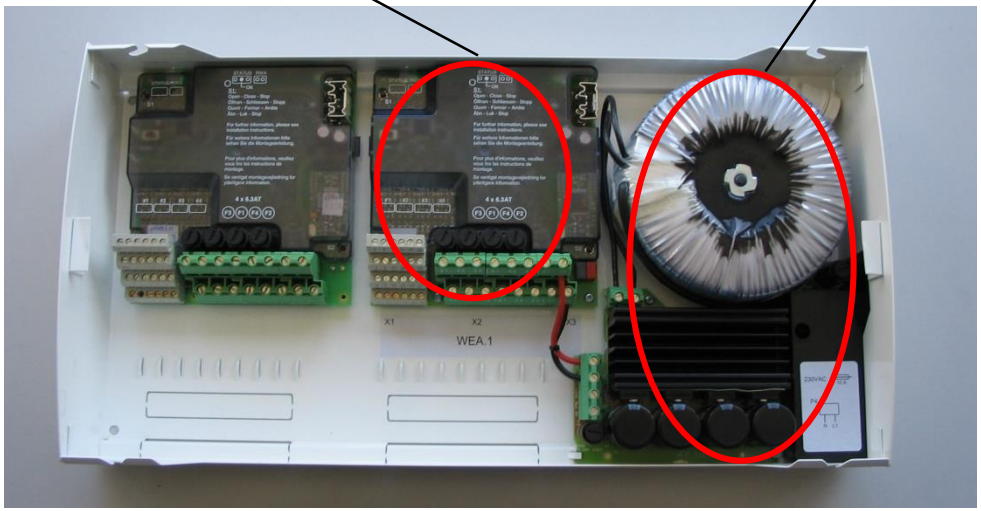


* The guide applies to both 230V and 120V version of the BACNet motor controller

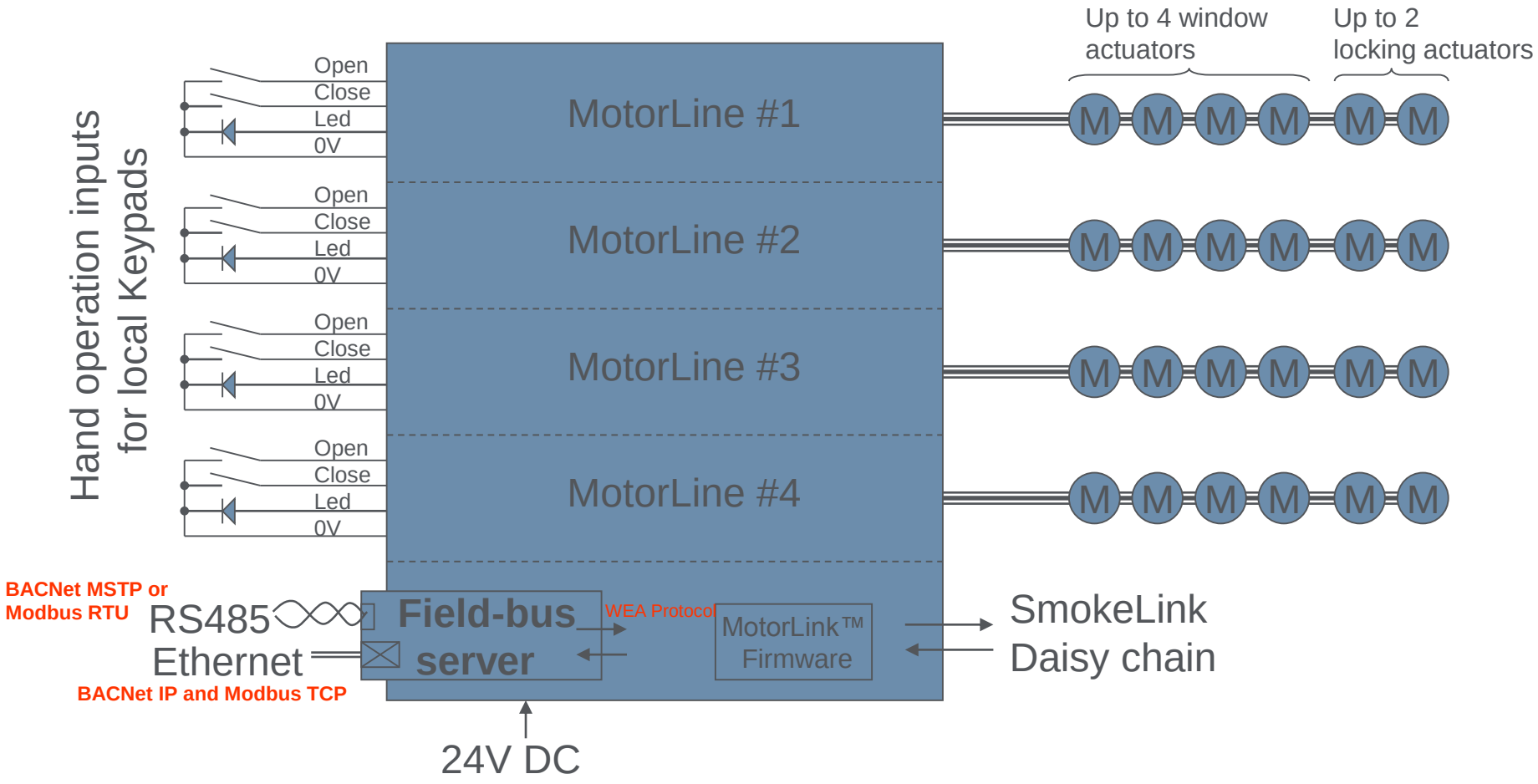
MotorController WBC 16M 080B

WBA 11M BACNet 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

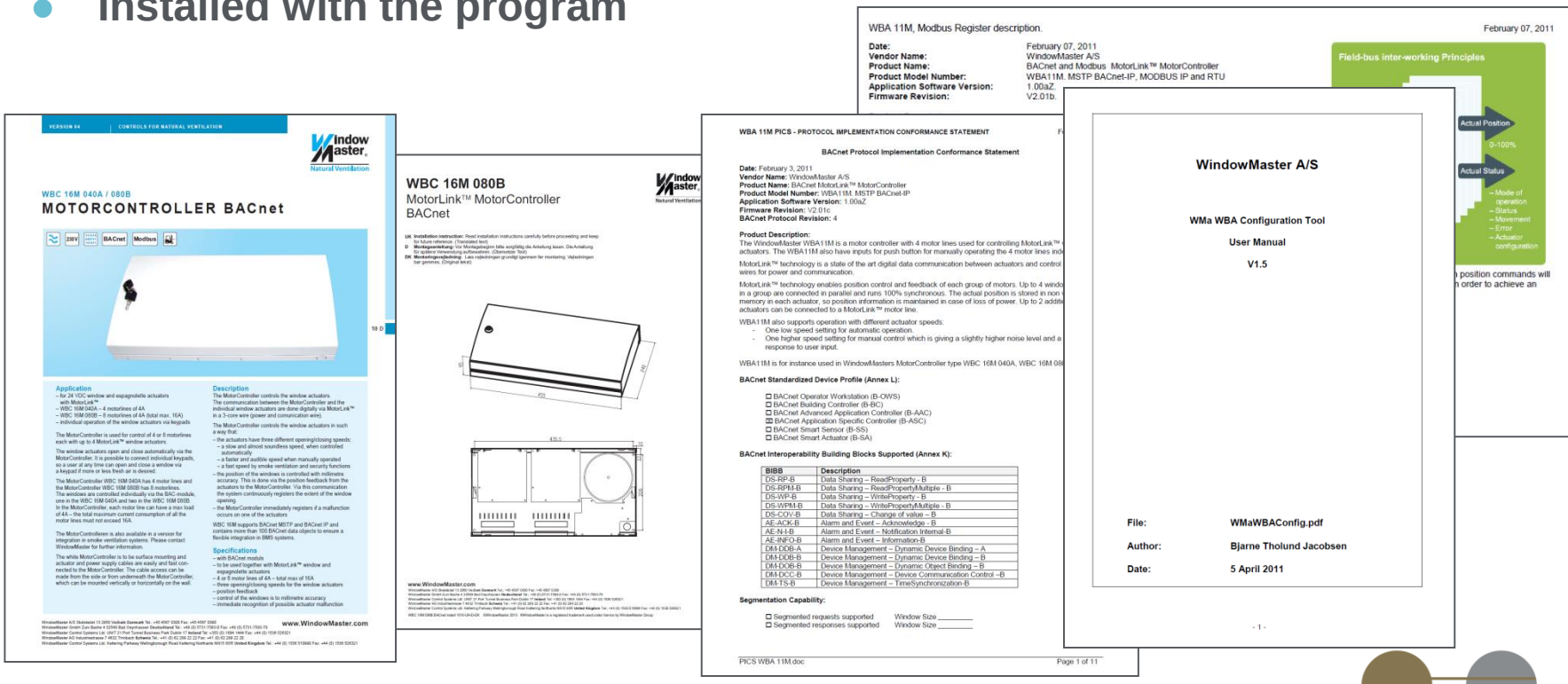


WBA 11M Overview

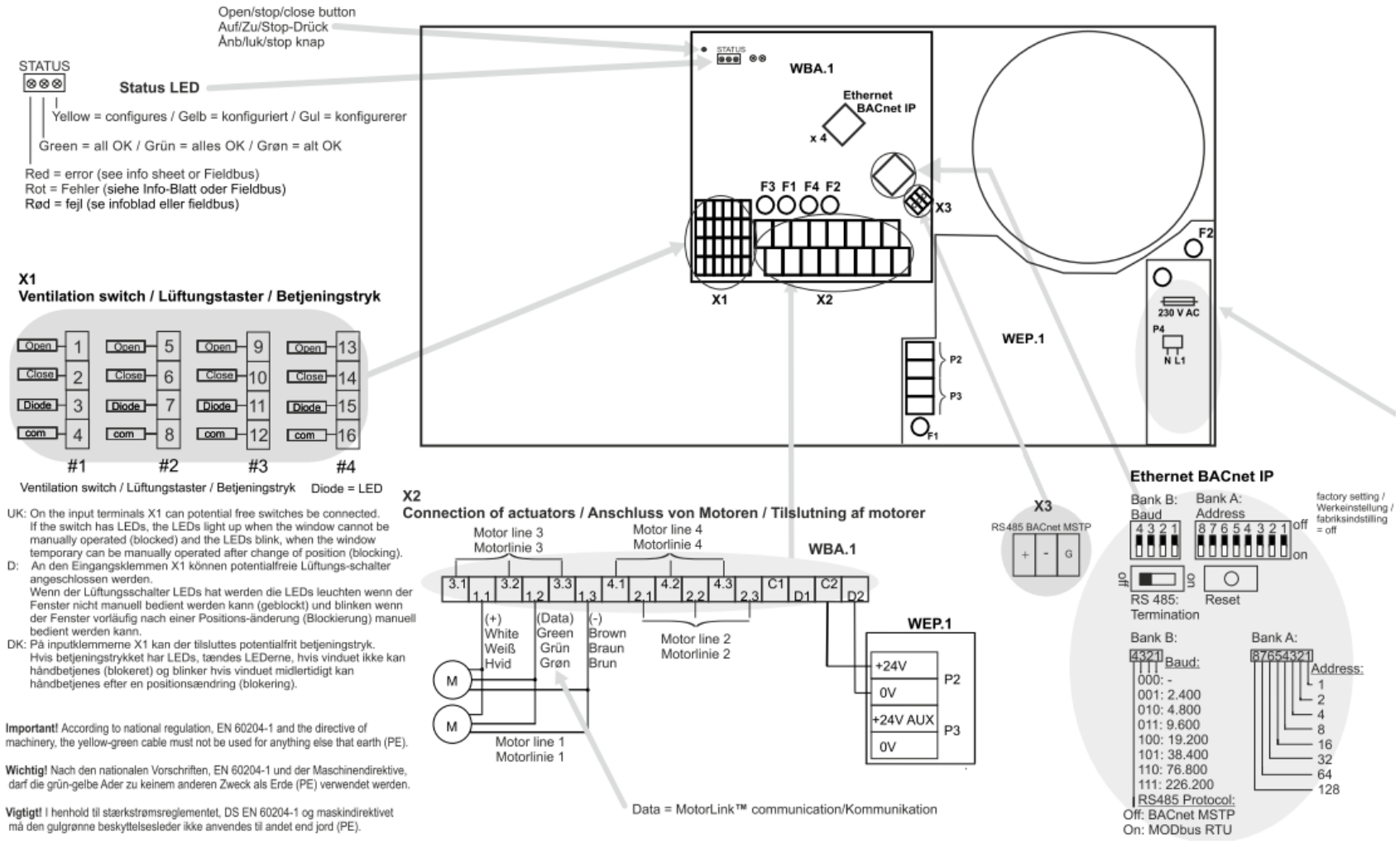


Documentation

- Found at: http://www.windowmaster.com
  - PICS - Protocol Implementation Conformance Statement
  - Modbus Register description
- WBA Configuration Tool User Manual
  - Installed with the program



Connections



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.

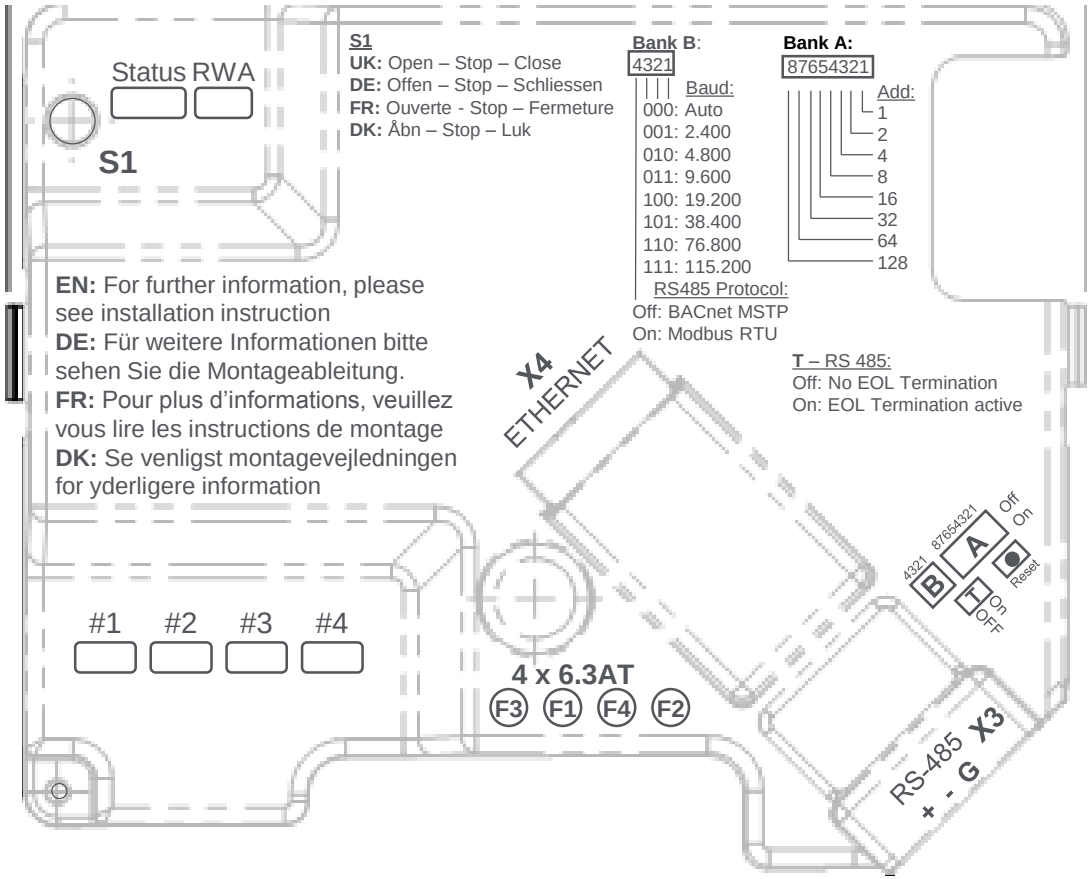
DK: På inputklemmerne X1 kan der tilsluttes potentialfrit betjeningstryk. Hvis betjeningstrykket har LEDs, tændes LEDerne, hvis vinduet ikke kan håndbetjenes (blokeret) og blinker hvis vinduet midlertidigt kan håndbetjenes efter en positionsændring (blokering).

Important! According to national regulation, EN 60204-1 and the directive of machinery, the yellow-green cable must not be used for anything else that earth (PE).

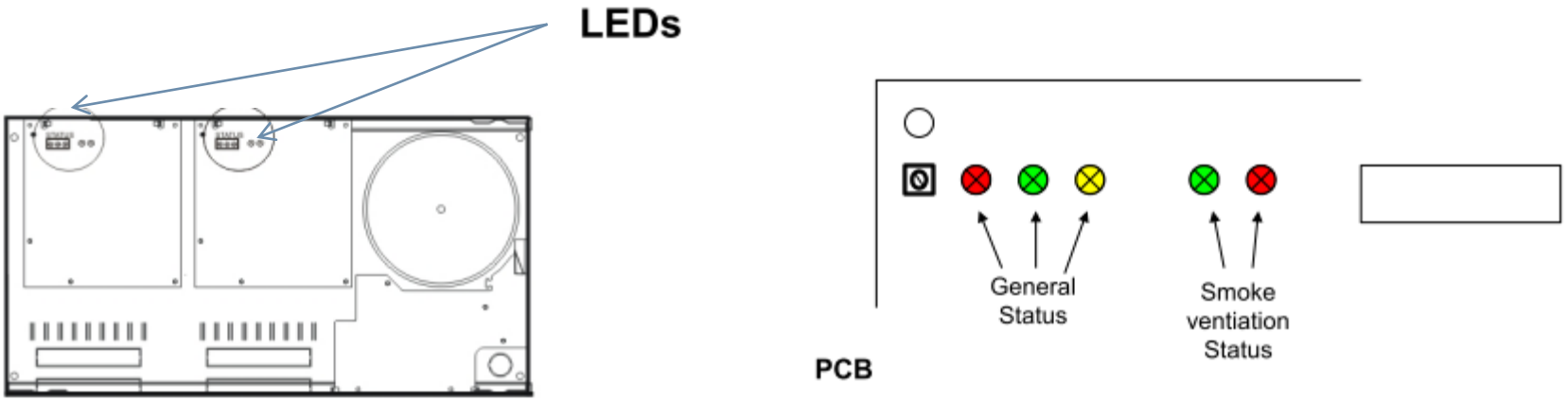
Wichtig! Nach den nationalen Vorschriften, EN 60204-1 und der Maschinendirektive, darf die grün-gelbe Ader zu keinem anderen Zweck als Erde (PE) verwendet werden.

Vigtigt! I henhold til stærkstrømsreglementet, DS EN 60204-1 og maskindirektivet må den gulgrønne beskyttelsesleder ikke anvendes til andet end jord (PE).

WBA 11M DIP switches



WBA 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)

Continues on next page

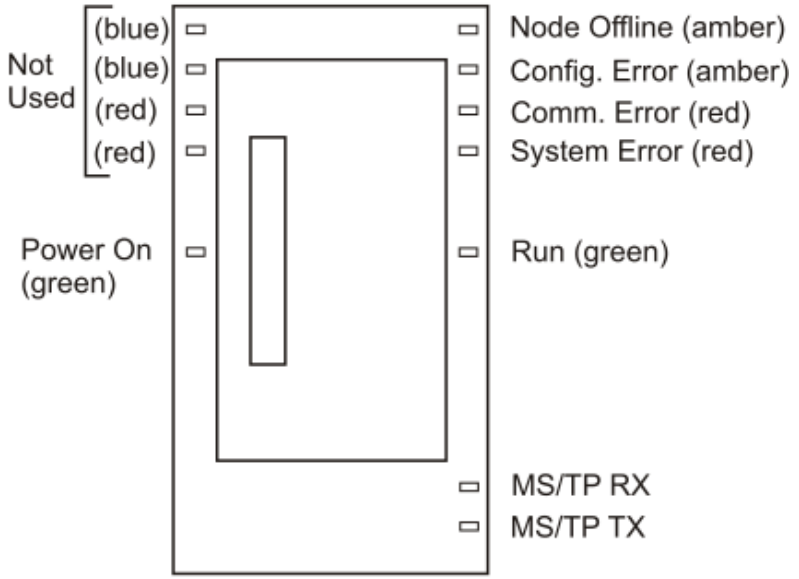
LEDs information:

		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

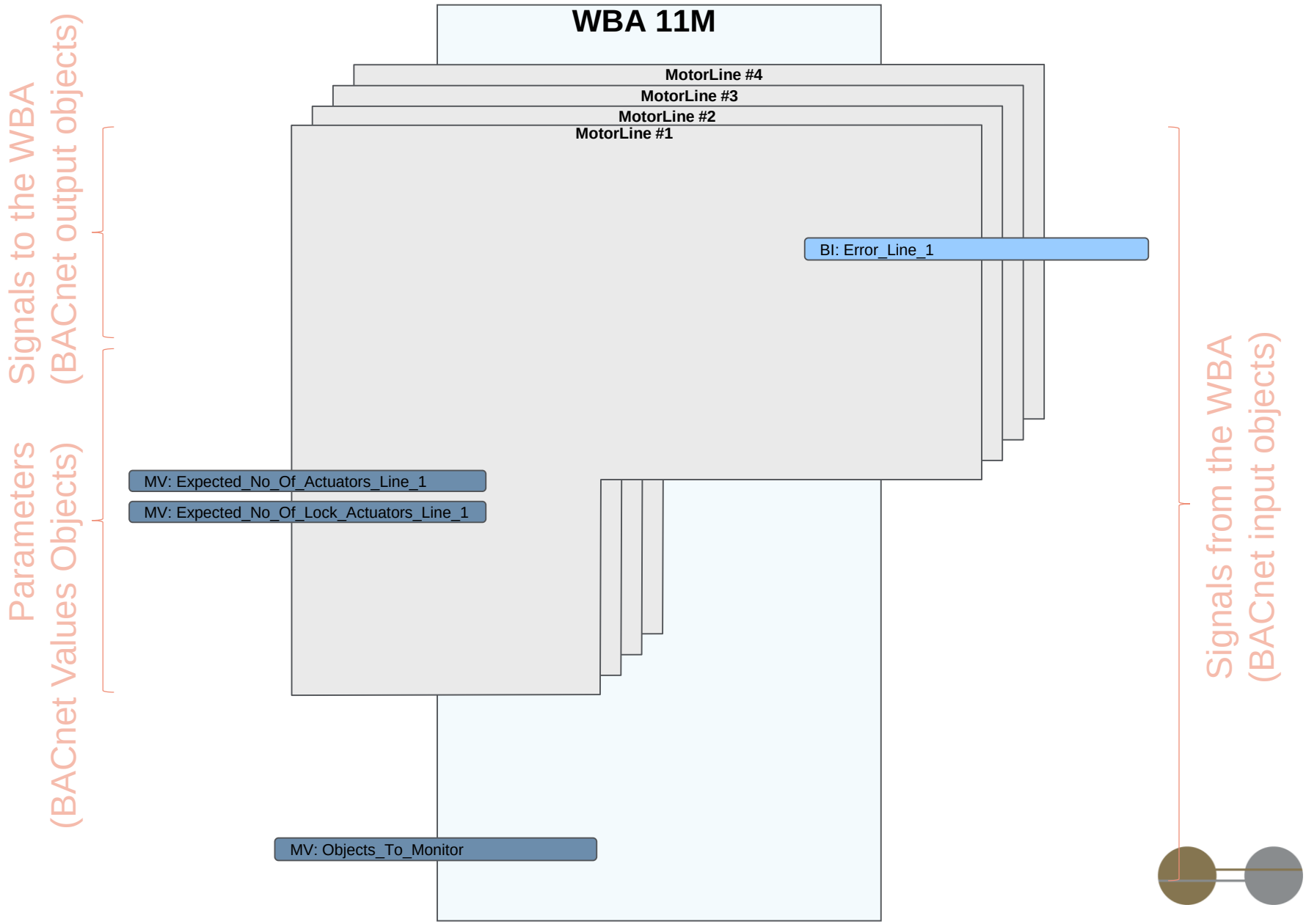
BACNet fieldbus interface Status LEDs

- Fifteen seconds after power up, all the communication LEDs (excluding the MS/TP LEDs) will illuminate for 5 sec. after which they illuminate as detailed in the table below:

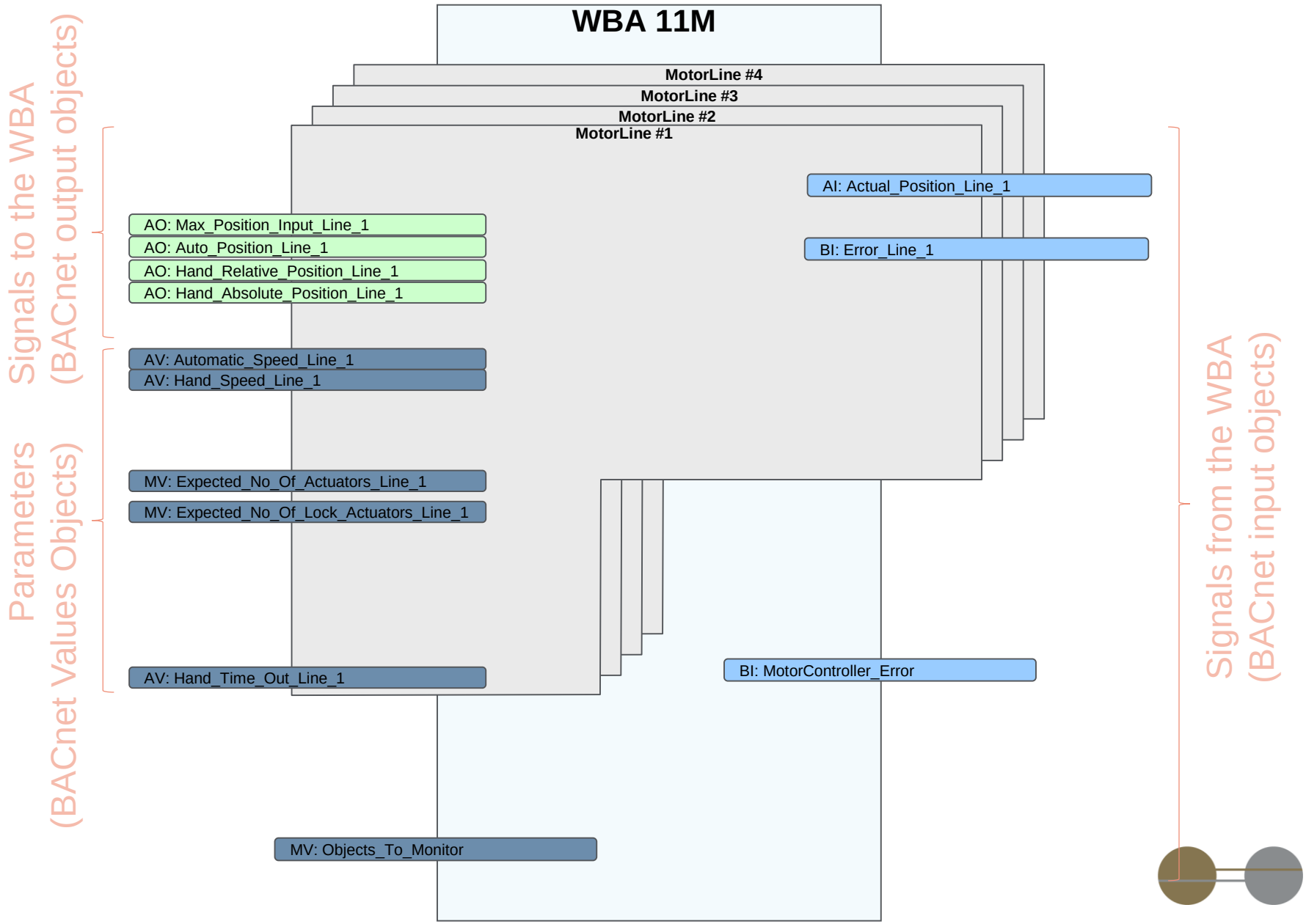
LED	Colour	Description
Power On	green	Should show steady green when power is on
Node Offline	amber	Steady amber light indicates node offline
Config. Error	amber	Steady amber light indicates configuration error
Comm. Error	red	Steady red light indicates communications error
System Error	red	Steady red light indicates system error
Run	green	Should show steady green when unit is running
MS/TP RX		Flashes when message is received from MS/TP port
MS/TP TX		Flashes when message is transmitted to MS/TP port



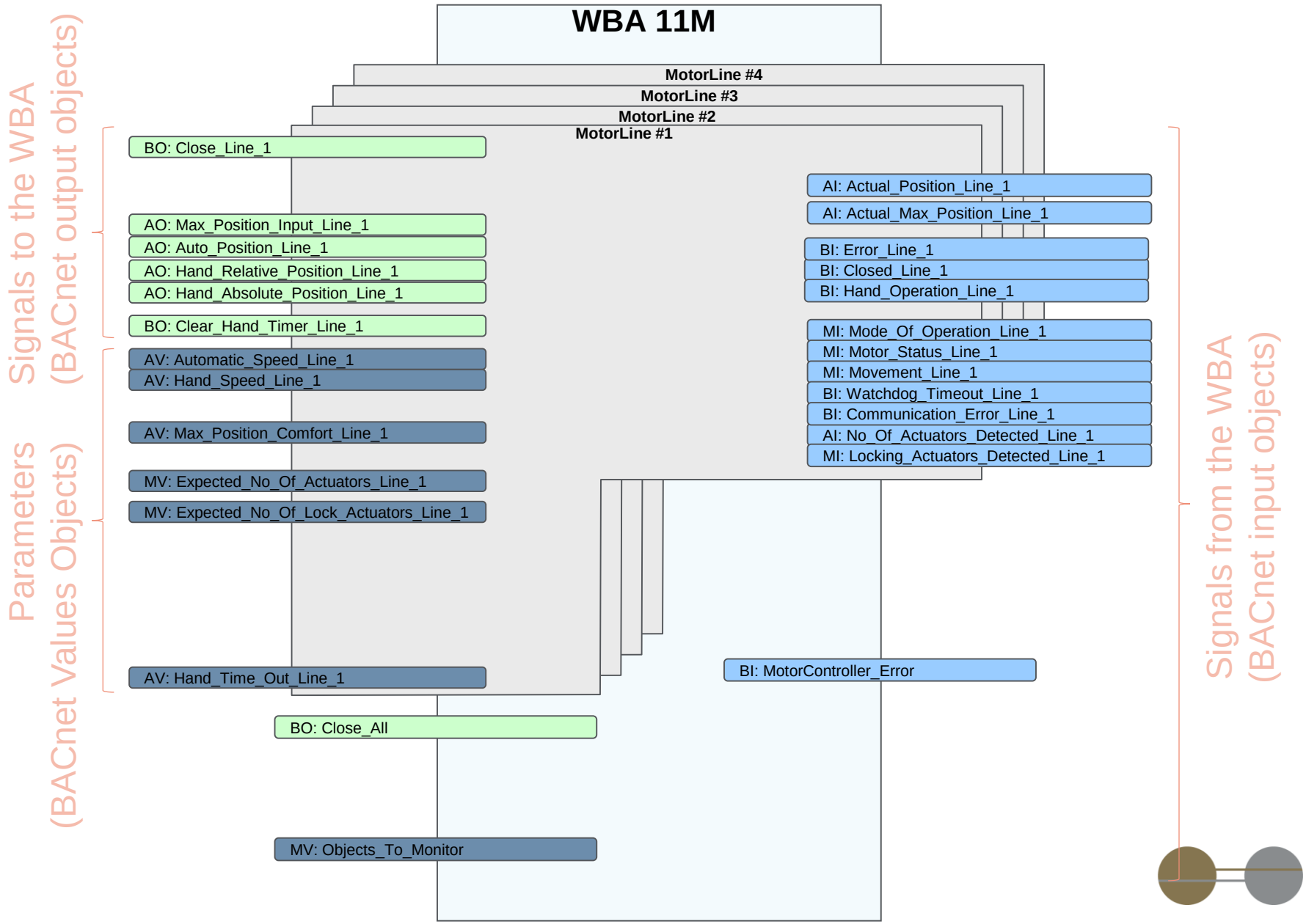
WBA 11M – Essential BACNet Objects



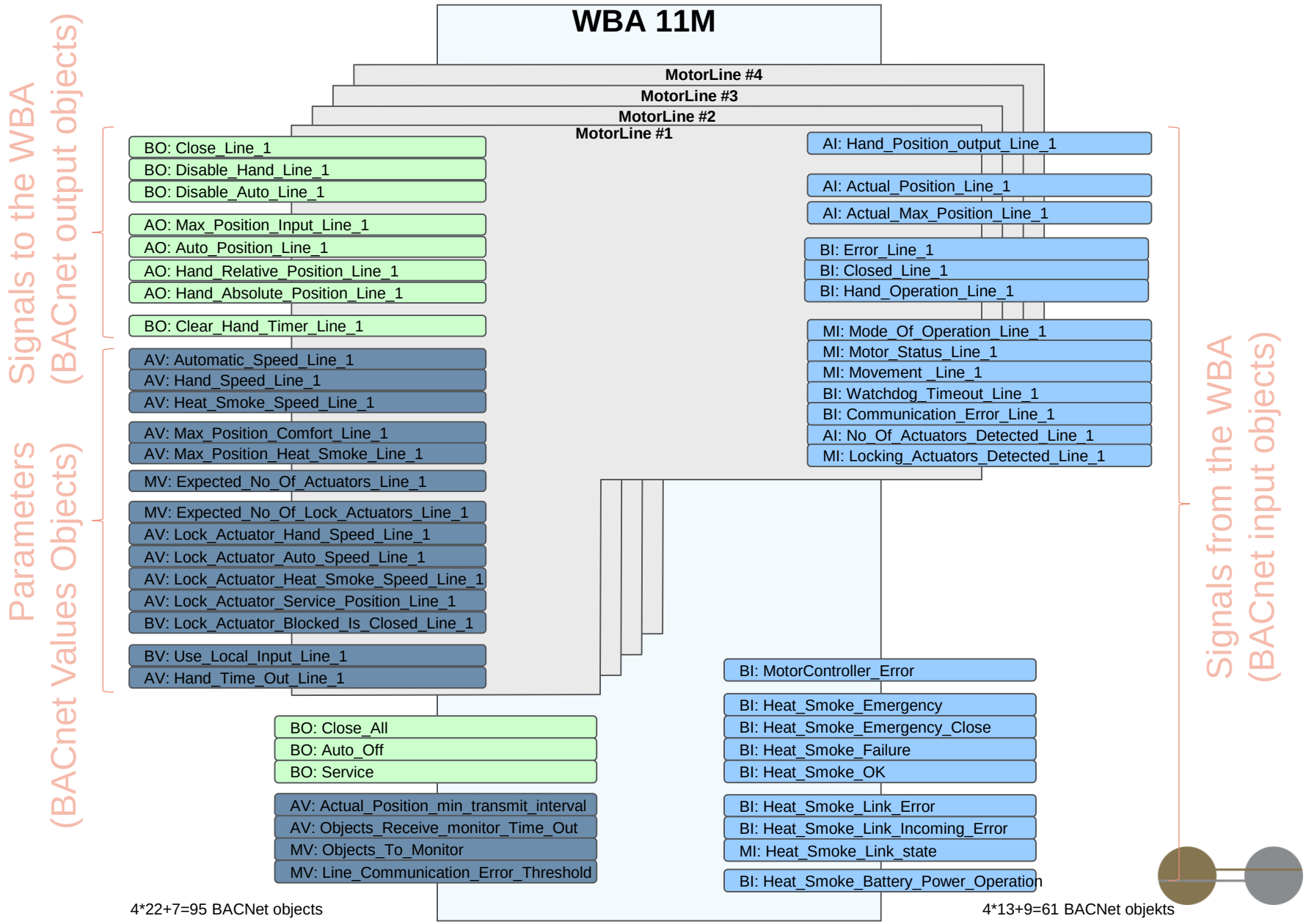
WBA 11M – Most used BACNet Objects



WBA 11M – Typical BACNet Objects



WBA 11M – All BACNet Objects



Hands on

- **Commission a WBC 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 Data Sheet 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 WBC 16M – BACNet configuration**

For each WBA 11M in the WBC 11M panel do the following:

- Connect 230V power (or 120V if UL version).
- Connect the WBA to an IP network.
- Use the WMaWBAConfig tool to browse the WBA11M's on the network.
- Note the MAC address given in a label on the field bus module to identify "your" WBA11M.
- Update the firmware in the field bus module if applicable. Refer to the WMaWBAConfig User Guide for instructions.
- Set the IP address of the WBA 11M if needed. Refer to the WMaWBAConfig User Guide for instructions.
- Configure the number of motors on the MotorLines using your BACNet configuration tool. See the description of the "*Expected_No_Of_Actuators_Line_x" BACNet object bellow.*
- Observe that the WBA11M reconfigures after the parameter value is changed.
- Observe that there are no error indications on the WBA 11M.
  If errors are indicated use either the "Motor_Status_Line_x" BACNet object or the LED's Status to debug.
- Run the window actuators using the your BACNet tool.

See detailed BACNet objects and WBA 11M functionality descriptions bellow.

Important objects in details

- **Objects**
  - All values of **BV**, **AV** and **MV** type objects - objects representing parameters – are saved in a “Non-volatile” memory and therefor only need to be set once during commissioning.
  - The “State Text” property holds the possible values and descriptions of the “Multiple Input” - **MI** and “Multiple Value” – **MV** objects.
  - The “Relinquish Default” property holds the default value of an object. See bellow a table with default values of all **O**utput and **V**alue type objects.

Important objects in details

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

The WBA 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 WBA 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 *Expected_No_Of_Actuators_Line_x objects in the* PICS document bellow.

- **Opening actuators configuration** – **The WBA 11M compares**
  - ***MV 1, 3, 5, 7****; Expected_No_Of_Actuators_Line_x* **Must be set from BACNet**

With Default value = "Don't care" (14)

  - ***AI 13 – 16****; No_Of_Actuators_Detected_Line_x* **Is read from the controller**

and indicates an error if the values of the 2 objects do not indicate the same number of actuators.

- **Locking actuators configuration - The WBA 11M compares**
  - ***MV 2, 4, 6, 8****; Expected_No_Of_Lock_Actuators_Line_x* **Must be set from BACNet**

With Default value = "None" (1)

  - ***MI 13 – 16****; Locking_Actuators_Detected_Line_x* **Is read from the controller**

and indicates an error if the values of the 2 objects do not indicate the same number of actuators.

Important objects in details

- **Bus communication Watchdog configuration**
  - **Function**
    - To make sure windows are not staying opened in case of BACNet communication failure, a watchdog timer is running on the controller. The timer is restarted whenever a BACNet 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 BACNet line. It will then close the windows by setting "**Max_Position" = 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 want to use this safety function you must
      - a. Set object MV9; "**Object_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: **MV9** *Objects_To_Monitor*
      - **1**; None. (Function is disabled) Default value
      - **2**; Max position (**AO 1 – 4** *Max_Position_Input_Line_x*)
      - **3**; Close (**BO 4 – 7** *Close_Line_X)*
      - **4**; Max position and Close

    - Time out is specified by: **AV 42** *Objects_Receive_Monitor_Time_Out* [minutes]

      Default value = 30 min.

Important objects in details

Operation functionality

- **Operation** - The WBA 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 WBA is used within a WBS smoke panel.*
  - *Limiting operations*
  - *Manual operations*
  - *Automatic operations*

- **Parameters** - A set of parameters (**V**alue type objects) 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 (**I**nput type 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.

Important objects in details

- **Operation functionality**
  - **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**" 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 BACNet. 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 an Open 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***
    - ***BO 1*** *Close_All [True/False]* Closes all MotorLines
    - ***BO 4 – 7*** *Close_Line_X [True/False]* Closes MotorLine X
    - ***AO 1 – 4*** *Max_Position_Input_Line_X* [0-100%] Limits the opening of MotorLine X, if Value=0[%], only smoke opening is possible

  - **Parameters:**
    - ***AV 3, 13, 23, 33*** *Heat_Smoke_Speed_Line_X* Speed used when moving to a limited position. Default value = 100%

  - **Actual status objects** (applies to all operation levels)
    - ***AI 9 – 12*** *Actual_Max_Position_Line_X* Show the actual limitation status. If more than one limitation is active the lowest is always in effect
    - ***BI 9 – 12*** *Closed_Line_X [True/False]* Indicates that a MotorLine is closed.
    - ***MI 1 – 4*** *Mode_Of_Operation_Line_X* See possible values in PICS document bellow
    - ***MI 5 – 8*** *Motor_Status_Line_X* See possible values in PICS document bellow
    - ***MI 9 – 12*** *Movement_Line_X* See possible values in PICS document bellow
    - ***AI 5 – 8*** *Actual_Position_Line_X* Shows the actual position of MotorLine X in %

Important objects in details

- **Operation functionality**
  - **Manual operation level**
    - Medium level operations are the Manual Override commands. Manual Override commands can be initiated either from BACNet 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 altered from BACNet. 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**
    - ***AV 1, 11, 21, 31*** *Hand_Speed_Line_X* Sets the speed of the actuators when in manual operation.

      Default value = 75%
    - ***AV 4, 14, 24, 34*** *Max_Position_Comfort_Line_X* Sets the max position allowed when in **manual or auto** operations.

      Default value = 100%
    - ***AV 10, 20, 30, 40*** *Hand_Time_Out_Line_X* Sets the duration of time after a manual command where auto commands are ignored.

      Default value = 30 minutes

Important objects in details

- **Operation functionality**
  - **Auto operation level**

    - The lowest level operations are the Automatic commands. Automatic commands can only be initiated from BACNet and are used by the BMS for comfort ventilation.

  - **Auto operation object**
    - ***AO 5 – 8*** *Auto_Position_Line_X [0 – 100%]* Auto operation to an absolute position.

  - **Parameter**
    - ***AV 2, 12, 22, 32*** *Automatic_Speed_Line_X [0 – 100%]* Sets the speed of the actuators when in auto operation.

      Default value = 30%
    - ***AV 4, 14, 24, 34*** *Max_Position_Comfort_Line_X* Sets the max position allowed when in **manual or auto** operations.

      Default value = 100%

Important objects in details

Errors indications and Troubleshooting

- The WBA 11M indicates errors independently for each MotorLine as well as a common error indication for the controller. Whenever a MotorLine error is indicated the common error is also indicated. Fore the same reason it can be sufficient, only to monitor the common error and then poll 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 poll the **M**ultistate **I**nput status objects to obtain detailed information on the error type.

  Errors and error types are indicated by BACNet 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**
  - ***BI 17 – 20*** *Error_Line_X [True / False]* MotorLine X error indication
  - ***BI 21*** *MotorController_Error [True / False]* Common error indication

- **Status objects**
  - ***MI 1 – 4*** *Mode_Of_Operation_Line_X* See possible values in PICS document bellow
  - ***MI 5 – 8*** *Motor_Status_Line_X* See possible values in PICS document bellow
  - ***MI 9 – 12*** *Movement_Line_X* See possible values in PICS document bellow

Important objects in details

- ## Communication errors
  - The WBA 11M constantly communicates with its actuators. Sporadic failures in this communication will be indicated as communication errors when they 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 failed communications fall bellow the threshold.

  - ### Error indication object
    - ***BI 5 – 8*** *Communication_Error_Line_X [True / False]* MotorLine X communication error

  - ### Parameter
    - ***MV 10*** *Line_Communication_Error_Threshold* Sets the tolerance level for sporadic communication errors.
      Default value = “Normal”
      See possible values in the PICS document bellow.

Hands on

Configuration and operation example WBC 16M

- **Configuration: One motor on motor line 1:**
  - Set MV 1: Expected_No_Of_Actuators_Line_1 = 2 (1 single actor). Relinquish default = 14.**Set Other unused motor lines = 1 (Disabled)**
  - Set MV 2: Expected_No_Of_Lock_Actuators_Line_1 = 1 (None). Relinquish default = 1
  - Set /check MV 9: Objects_To_Monitor is set = 1 (None). Relinquish default = 1
  - Set /check AO1: Max_Position_Input_Line_1 is set = 100%. Relinquish default = 100

- **Now you should be good to go, Check:**
  - MI 1: Mode_Of_Operation_Line_1 Present Value should be: 4 (normal)
  - MI 5: Motor_Status_Line_1 Present Value should be: 1 (normal)

- **Test the MotorLine by:**
- Set AO 5 : Auto_Position_Line_1 = 50 The motor goes to 50% at auto speed
- Set AO 9 : Hand_Relative_Position_Line_1 = 10
  The motor moves + 10% from last position at Hand speed . At the same time the Temporary hand - timer AV10: Hand_Time_Out_Line_1 (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.

Hands on

Configuration and operation example WBC 16M

- **Any comfort position commands are limited to the lowest value of**
  - AV4 Max_Position_Comfort_Line_1 — See, Operation functionality above
  - AO1 Max_Position_Input_Line_1 — See, Operation functionality above
  - BO1 Close All — See, Operation functionality above
  - BO4 Close_Line_1 — See, Operation functionality above

- **Now it's up to the system integrator/designer how 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.

Objects giving access to controller parameters are only set once during commissioning or not at all, because the relinquish values suits most common projects.

PICS - Analog Output Objects

ID	Objects Name	Description	Unit	Present Value Access
AO 1	Max_Position_Input_Line_1	Sets the maximum allowed position for motor line 1	Percent	C
AO 2	Max_Position_Input_Line_2	Sets the maximum allowed position for motor line 2	Percent	C
AO 3	Max_Position_Input_Line_3	Sets the maximum allowed position for motor line 3	Percent	C
AO 4	Max_Position_Input_Line_4	Sets the maximum allowed position for motor line 4	Percent	C
AO 5	Auto_Position_Line_1	Sets the target position with auto speed for motor line 1	Percent	C
AO 6	Auto_Position_Line_2	Sets the target position with auto speed for motor line 2	Percent	C
AO 7	Auto_Position_Line_3	Sets the target position with auto speed for motor line 3	Percent	C
AO 8	Auto_Position_Line_4	Sets the target position with auto speed for motor line 4	Percent	C
AO 9	Hand_Relative_Position_Line_1	Hand relative position for motor line 1	Percent	C
AO 10	Hand_Relative_Position_Line_2	Hand relative position for motor line 2	Percent	C
AO 11	Hand_Relative_Position_Line_3	Hand relative position for motor line 3	Percent	C
AO 12	Hand_Relative_Position_Line_4	Hand relative position for motor line 4	Percent	C
AO 13	Hand_Absolute_Position_Line_1	Set the target position of motor line 1 using Hand speed	Percent	C
AO 14	Hand_Absolute_Position_Line_2	Set the target position of motor line 2 using Hand speed	Percent	C
AO 15	Hand_Absolute_Position_Line_3	Set the target position of motor line 3 using Hand speed	Percent	C
AO 16	Hand_Absolute_Position_Line_4	Set the target position of motor line 4 using Hand speed	Percent	C

PICS - Binary Output Objects

ID	Objects Name	Description	Active / inactive Text	Present Value Access
BO 1	Close_All	Set that all motor lines must be closed	Close all motor lines / Inactive	C
BO 2	Auto_Off	Set whether automatic control is active	Automatic control disabled / Automatic control enabled	C
BO 3	Service	Set to disable all actuator movements	Movements not allowed / Movements allowed	C
BO 4	Close_Line_1	Set that motor line 1 must be closed	Motor line must be closed / Normal operation	C
BO 8	Disable_Hand_Line_1	Set to disable manual control for motor line 1	Disable manual contol / Enable manual control	C
BO 12	Disable_Auto_Line_1	Set to disable automatic control for motor line 1	Disable automatically control / Enable automatically control	C
BO 16	Clear_Hand_Timer_Line_1	Clears the timer for manual movement of motor line 1 When cleared automatic control takes precedence	Clear/expire timer / No action	C

PICS - Analog Input Objects

ID	Objects Name	Description	Unit	Present Value Access
AI 1	Hand_Position_Output_Line_1	Local hand command cascade output for motor line 1	Percent	R
AI 2	Hand_Position_Output_Line_2	Local hand command cascade output for motor line 2	Percent	R
AI 3	Hand_Position_Output_Line_3	Local hand command cascade output for motor line 3	Percent	R
AI 4	Hand_Position_Output_Line_4	Local hand command cascade output for motor line 4	Percent	R
AI 5	Actual_Position_Line_1	Contains the actual position for Line 1	Percent	R
AI 6	Actual_Position_Line_2	Contains the actual position for Line 2	Percent	R
AI 7	Actual_Position_Line_3	Contains the actual position for Line 3	Percent	R
AI 8	Actual_Position_Line_4	Contains the actual position for Line 4	Percent	R
AI 9	Actual_Max_Position_Line_1	Contains the maximum allowed position of Line 1	Percent	R
AI 10	Actual_Max_Position_Line_2	Contains the maximum allowed position of Line 1	Percent	R
AI 11	Actual_Max_Position_Line_3	Contains the maximum allowed position of Line 1	Percent	R
AI 12	Actual_Max_Position_Line_4	Contains the maximum allowed position of Line 1	Percent	R
AI 13	No_Of_Actuators_Detected_Line_1	Indicates no of actuators detected on Line 1		R
AI 14	No_Of_Actuators_Detected_Line_2	Indicates no of actuators detected on Line 2		R
AI 15	No_Of_Actuators_Detected_Line_3	Indicates no of actuators detected on Line 3		R
AI 16	No_Of_Actuators_Detected_Line_4	Indicates no of actuators detected on Line 4		R

PICS - Binary Input Objects

ID	Objects Name	Description	Active / inactive Text	Present Value Access
BI 1	Watchdog_Timeout_Line_1	Indicates Watchdog timeout on line 1	Watchdog timeout / No timeout	R
BI 5	Communication_Error_Line_1	Indicates communication error status for Line 1	Communication error / No communication error	R
BI 9	Closed_Line_1	Indicates Closed / Not closed status for actuators on Line 1	All actuators at their closed position / Not closed	R
BI 10	Closed_Line_2	Indicates Closed / Not closed status for actuators on Line 2	All actuators at their closed position / Not closed	R
BI 11	Closed_Line_3	Indicates Closed / Not closed status for actuators on Line 3	All actuators at their closed position / Not closed	R
BI 13	Hand_Operation_Line_1	Indicates Hand operation Status for line 1	Hand operation active / Not Hand operation	R
BI 17	Error_Line_1	Indicates error condition for Line 1	Error detected / No error	R
BI 21	MotorController_Error	MotorController Error Status	Motor controller error / No error	R
BI 22	Heat_Smoke_Emergency	Heat and smoke Emergency	Emergency active / Emergency not active	R
BI 23	Heat_Smoke_Emergency_Close	Heat and smoke Emergency Close	Emergency close active / Emergency close not active	R
BI 24	Heat_Smoke_Failure	Heat and smoke failure	Heat and smoke failure / No heat and smoke failure	R
BI 25	Heat_Smoke_OK	Heat and smoke ok	Heat and smoke OK / Heat and smoke not OK	R
BI 26	Heat_Smoke_Battery_Power_Operation	Heat and smoke Battery Power operation	Battery power operation / Normal Power	R
BI 27	Heat_Smoke_Link_Error	Heat and Smoke link error	Link communication failure / Link communication ok	R
BI 28	Heat_Smoke_Link_Incoming_Error	Heat and smoke link Daisy chain incoming error state	Link incoming error bit / No incoming error bit	R

PICS – Multistate Input Objects

ID	Objects Name	Description	Present Value Access
MI 1	Mode_Of_Operation_Line_1	Mode of operation for the motor line: 1. Only maximum opening limit active: Both hand operation and automatic operation are disabled. 2. Hand operation: Automatic operation is disabled. 3. Only automatic operation: Hand operation is disabled. 4. Normal: Both hand and automatic operation are enabled. 5. Emergency: Motor line operated by a heat and smoke emergency input. No other operation possible. 6. Emergency closed: Motor line operated by a heat and smoke emergency close input. No other operation possible. 7. Close: Close command active. Hand and automatic operation are disabled. 8. Open: Open command active. Hand and automatic operation are disabled. 9. Position locked: Service input object active. No operation possible. 10. Manually operated: The motor line has been operated by hand. Time out determined by non-volatile parameter. 11. Disabled: The motor line is disabled by non-volatile parameter.	R
MI 5	Motor_Status_Line_1	This object contains the motor line status: 1. Normal operation. 2. Under configuration: The motor line is being configured. The actuator(s) will not move. 3. Hand operation blocking: A hand operation blocked state is pending, but in this state hand operation is still possible. 4. Hand operation blocked: It is not possible to operate the motor line by hand operation commands (hand operation disabled).	R

PICS – Multistate Input Objects cont.

MI 9	Movement_Line_1	This object contains the actuator movement status: 1. Normal: Actuator configuration is valid and no problems detected during last operation of the actuators. 2. Configuration error: Inconsistency between non-volatile parameters and actual actuators detected or configuration ongoing. 3. Obstacle detected during opening: Problem detected during last opening operation of the actuators. 4. Obstacle detected during closing: Problem detected during last closing operation of the actuators.	R
MI 13	Locking_Actuators_Detected_Line_1	This object contains the detected locking actuator configuration: 1. No Locking actuator present. 2. Locking actuator no. 1 has been found on the motor line. 3. Not valid 4. 2 Locking actuators have been found on the motor line.	R
MI 17	Heat_Smoke_Link_State	This object contains information about the heat and smoke daisy chained communication link. 1 = No priority override. 2 = Close. 3 = Open. 4 = Open (and Close). 5 = Emergency Close. 6 = Emergency Close (and close). 7 = Emergency Close (and open). 8 = Emergency Close (and open and close. 9 = Emergency Open. 10 = Emergency Open (and close). 11 = Emergency Open (and open). 12 = Emergency Open (and open and Close). 13 = Emergency Open (and emg. close). 14 = Emergency Open (and emg. close and close). 15 = Emergency Open (and emg. close and open). 16 = Emergency Open (and emg. close and open and close).	R

PICS – Binary Value Objects

ID	Objects Name	Description	Active / inactive Text	Present Value Access
BV 1	Lock_Actuator_Blocked_Is_Closed_Line_1	This non-volatile parameter sets whether obstacles during locking situation must be judged as a mal function or a normal situation on line 1	Use overcurrent or switch / Use switch	W (Note 1)
BV 2	Use_Local_Input_Line_1	This non-volatile parameter sets whether local input must be active	Use and transmit / Transmit only	W (Note 1)
BV 3	Lock_Actuator_Blocked_Is_Closed_Line_2	This non-volatile parameter sets whether obstacles during locking situation must be judged as a mal function or a normal situation on line 2	Use overcurrent or switch / Use switch	W (Note 1)
BV 4	Use_Local_Input_Line_2	This non-volatile parameter sets weather local input must be active for line 2	Use and transmit / Transmit only	W (Note 1)
BV 5	Lock_Actuator_Blocked_Is_Closed_Line_3	This non-volatile parameter sets whether obstacles during locking situation must be judged as a mal function or a normal situation on line 3	Use overcurrent or switch / Use switch	W (Note 1)
BV 6	Use_Local_Input_Line_3	This non-volatile parameter sets weather local input must be active for line 3	Use and transmit / Transmit only	W (Note 1)
BV 7	Lock_Actuator_Blocked_Is_Closed_Line_4	This non-volatile parameter sets whether obstacles during locking situation must be judged as a mal function or a normal situation on line 4	Use overcurrent or switch / Use switch	W (Note 1)
BV 8	Use_Local_Input_Line_4	This non-volatile parameter sets weather local input must be active for line 4	Use and transmit / Transmit only	W (Note 1)
BV 9	Retransmit_Local_Input_Line_1	This non-volatile parameter determines whether the local input is only sent when the status is changed or also sent cyclically.	Do not retransmit unchanged status / Retransmit status	W (Note 1)

PICS – Analog Value Objects

ID	Objects Name	Description	Unit	Present Value Access
AV 1	Hand_Speed_Line_1	This non-volatile parameter sets the speed of the actuators during hand operation	Percent	W (Note 1)
AV 2	Automatic_Speed_Line_1	This non-volatile parameter sets the speed of the actuators during automatic operation	Percent	W (Note 1)
AV 3	Heat_Smoke_Speed_Line_1	This non-volatile parameter sets the speed of the actuators during Heat and Smoke operation	Percent	W (Note 1)
AV 4	Max_Position_Comfort_Line_1	This non-volatile parameter sets the maximum opening allowed during normal (comfort) operation	Percent	W (Note 1)
AV 5	Max_Position_Heat_Smoke_Line_1	This non-volatile parameter sets the maximum opening allowed during Heat and Smoke operation	Percent	W (Note 1)
AV 6	Lock_Actuator_Hand_Speed_Line_1	This non-volatile parameter sets the speed of the locking actuators during hand operation	Percent	W (Note 1)
AV 7	Lock_Actuator_Auto_Speed_Line_1	This non-volatile parameter sets the speed of the locking actuators during automatic operation	Percent	W (Note 1)
AV 8	Lock_Actuator_Heat_Smoke_Speed_Line_1	This non-volatile parameter sets the speed of the locking actuators during Heat and Smoke operation	Percent	W (Note 1)
AV 9	Lock_Actuator_Service_Position_Line_1	This non-volatile parameter sets the service position of the actuator when the locking actuator is in service position		W (Note 1)
AV 10	Hand_Time_Out_Line_1	This non-volatile parameter sets the duration of time after hand operation, where automatic commands are ignored	Minutes	W (Note 1)
AV 41	Actual_Position_Min_Transmit_Interval	This non-volatile parameter sets the minimum retransmit interval of Actual Position for each motor line	Seconds	W (Note 1)
AV 42	Objects_Receive_Monitor_Time_Out	This non-volatile parameter determines how often updates on monitored objects must be received	Minutes	W (Note 1)

PICS – Multistate Value Objects

ID	Objects Name	Description	Present Value Access
MV 1	Expected_No_Of_Actuators_Line_1	WBA11M examines the actual actuator configuration on the motor line. The controller in each MotorLink™ actuator includes information about how many fellow actuators that is needed in order to have a valid configuration. This non-volatile parameter determines how to handle discrepancies in the actuator configuration. Please note that normally actuators are exchanging actual position in order to keep synchronised positions - independent of tolerances and different loads. If position differs the actuators will automatically wait for the slowest one. If one or more actuators fail to respond, the operation is stopped in order to avoid damage on the window. This synchronisation feature is used if more actuators are needed in order to operate a large or heavy window. If more windows - each equipped with a single actuator (-1) are connected to the same motor line, this synchronisation feature is disabled. Depending on the demand for detection of configuration or run time failures, non-volatile parameters must be selected in order to fit the expected number of actuators or a don't care value, where no check of the number of actuators is in action. Valid values are: 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) 6-13: Normal (use value in window actuators) 14: Don't care 1 to 4 not synchronised single-actuators (-1) Default value 15-16: Normal (use value in window actuators) Attention 1. Windows may be damaged if the actuators mounted on them are of an invalid combination and the controller is being run with the "Don't care" parameter value. Always ensure a valid combination before switching on the power to the controller. 2. When configured with the "Don't care" value, the MotorController is unable to detect and report an error in case of invalid combinations, including the situation where no actuators are connected to the MotorLine or when some or all actuators connected malfunction. This is particularly important where the MotorController is used in Smoke panels such as the WSC xxM. Always ensure to configure the MotorController with the parameter value representing the combination of actuators actually connected to the MotorLine.	W (Note 1)

PICS – Multistate Value Objects cont.

MV 2	Expected_No_Of_Lock_Actuators_Line_1	This non-volatile parameter determines the expected configuration of locking actuators. Possible values are: 1. None: No locking actuators are present. Default value 2. One locking actuator must be present. 3. Two locking actuators must be present. 3-13. Not used. 14. Don't care: Any number of locking actuators are accepted.	W (Note 1)
MV 9	Objects_To_Monitor	This non-volatile parameter determines which objects to monitor for cyclic updates. 1. None: No objects are monitored. Default value 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.	W (Note 1)
MV 10	Line_Communication_Error_Threshold	Sporadic communication errors can appear in the communication between WEA11M and the MotorLink™ actuators. This non-volatile parameter determines how tolerant the WBA11M must be before an error is transmitted. Range: 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.	W (Note 1)

Default parameter values

ID	Object Name	Description	Default value	Units
MV 1	Expected_No_Of_Actuators_Line_1	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	
MV 3	Expected_No_Of_Actuators_Line_2		Don't care	
MV 5	Expected_No_Of_Actuators_Line_3		Don't care	
MV 7	Expected_No_Of_Actuators_Line_4		Don't care	
MV 2	Expected_No_Of_Lock_Actuators_Line_1	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	
MV 4	Expected_No_Of_Lock_Actuators_Line_2		None	
MV 6	Expected_No_Of_Lock_Actuators_Line_3		None	
MV 8	Expected_No_Of_Lock_Actuators_Line_4		None	

Default parameter values

ID	Object Name	Description	Default value	Units
AV 1	Hand_Speed_Line_1	This non-volatile parameter sets the speed of the actuators during hand operation.	74,9	%
AV 10	Hand_Speed_Line_2		74,9	%
AV 21	Hand_Speed_Line_3		74,9	%
AV 31	Hand_Speed_Line_4		74,9	%
AV 2	Automatic_Speed_Line_1	This non-volatile parameter sets the speed of the actuators during automatic operation.	29,8	%
AV 12	Automatic_Speed_Line_2		29,8	%
AV 22	Automatic_Speed_Line_3		29,8	%
AV 32	Automatic_Speed_Line_4		29,8	%
AV 3	Heat_Smoke_Speed_Line_1	This non-volatile parameter sets the speed of the actuators during Heat and Smoke operation.	100	%
AV 13	Heat_Smoke_Speed_Line_2		100	%
AV 23	Heat_Smoke_Speed_Line_3		100	%
AV 33	Heat_Smoke_Speed_Line_4		100	%
AV 4	Max_Position_Comfort_Line_1	This non-volatile parameter sets the maximum opening allowed during normal (comfort) operation.	100	%
AV 14	Max_Position_Comfort_Line_2		100	%
AV 24	Max_Position_Comfort_Line_3		100	%
AV 34	Max_Position_Comfort_Line_4		100	%
AV 5	Max_Position_Heat_Smoke_Line_1	This non-volatile parameter sets the maximum opening allowed during Heat and Smoke operation.	100	%
AV 15	Max_Position_Heat_Smoke_Line_2		100	%
AV 25	Max_Position_Heat_Smoke_Line_3		100	%
AV 35	Max_Position_Heat_Smoke_Line_4		100	%

Default parameter values

ID	Object Name	Description	Default value	Units
AV 6	Lock_Actuator_Hand_Speed_Line_1	This non-volatile parameter sets the speed of the locking actuators during hand operation.	74,9	%
AV 16	Lock_Actuator_Hand_Speed_Line_2		74,9	%
AV 26	Lock_Actuator_Hand_Speed_Line_3		74,9	%
AV 36	Lock_Actuator_Hand_Speed_Line_4		74,9	%
AV 7	Lock_Actuator_Auto_Speed_Line_1	This non-volatile parameter sets the speed of the locking actuators during automatic operation.	29,8	%
AV 17	Lock_Actuator_Auto_Speed_Line_2		29,8	%
AV 27	Lock_Actuator_Auto_Speed_Line_3		29,8	%
AV 37	Lock_Actuator_Auto_Speed_Line_4		29,8	%
AV 8	Lock_Actuator_Heat_Smoke_Speed_Line_1	This non-volatile parameter sets the speed of the locking actuators during Heat and Smoke operation.	100	%
AV 18	Lock_Actuator_Heat_Smoke_Speed_Line_2		100	%
AV 28	Lock_Actuator_Heat_Smoke_Speed_Line_3		100	%
AV 38	Lock_Actuator_Heat_Smoke_Speed_Line_4		100	%
AV 9	Lock_Actuator_Service_Position_Line_1	This non-volatile parameter sets the service position of the actuator when the locking actuator is in service position.	30	counts
AV 19	Lock_Actuator_Service_Position_Line_2		30	counts
AV 29	Lock_Actuator_Service_Position_Line_3		30	counts
AV 39	Lock_Actuator_Service_Position_Line_4		30	counts
AV 10	Hand_Time_Out_Line_1	This non-volatile parameter sets the duration of time after hand operation, where automatic commands are ignored.	30	minutes
AV 20	Hand_Time_Out_Line_2		30	minutes
AV 30	Hand_Time_Out_Line_3		30	minutes
AV 40	Hand_Time_Out_Line_4		30	minutes

Default parameter values

ID	Object Name	Description	Default value	Units
BV 1	Lock_Actuator_Blocked_Is_Closed_Line_1	This non-volatile parameter sets whether obstacles during locking situation must be judged as a mal function or a normal situation.	FALSE	
BV 3	Lock_Actuator_Blocked_Is_Closed_Line_2		FALSE	
BV 5	Lock_Actuator_Blocked_Is_Closed_Line_3		FALSE	
BV 7	Lock_Actuator_Blocked_Is_Closed_Line_4		FALSE	
BV 2	Use_Local_Input_Line_1	This non-volatile parameter sets whether local input must control motor line 1 or only transmitted.	TRUE	
BV 4	Use_Local_Input_Line_2		TRUE	
BV 6	Use_Local_Input_Line_3		TRUE	
BV 8	Use_Local_Input_Line_4		TRUE	
BV 9	Retransmit_Local_Input_Line_1	This non-volatile parameter determines whether the local input is only sent when the status is changed or also sent cyclically.	FALSE	
BV 10	Retransmit_Local_Input_Line_2		FALSE	
BV 11	Retransmit_Local_Input_Line_3		FALSE	
BV 12	Retransmit_Local_Input_Line_4		FALSE	
AV 41	Actual_Position_Min_Transmit_Interval	This non-volatile parameter sets the minimum retransmit interval of Actual Position for all motor lines.	15	seconds
AV 42	Objects_Receive_Monitor_Time_Out	This non-volatile parameter determines how often updates on monitored objects must be received.	15	minutes
MV 9	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	
MV 10	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

- “WBA Configuration Tool” (only BACnet IP)
  - For updating firmware in the fieldbus module
  - Changing IP network settings
  - Changing BACNet object identifier offset
  - Has a detailed manual, please read it
  - Available at http://www.windowmaster.com

- Any generic BACNet configuration and monitoring tool
  - For manipulating objects
  - Checking status
  - Monitoring objects

Important to know

- By default DHCP is enabled, but the WBA11M reverts to IP address 192.168.1.24 if no DHCP server is present
  - More details in the WBA Configuration Tool User Manual

- Normally the BACNet device object's Object_Identifier property value is set directly by the DIP-switch on the WBA board (1 - 254).
  - If needed the device object's Object_Identifier property can be offset. The offset on IP and MSTP is set independently.
    Actual Object_Identifier = DIPswitch setting + Offset
  - More details in the WBA Configuration Tool User Manual

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 WBC 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 WBC 16M before connecting/disconnecting a MotorLine. Failing to do so may damage the WBA 11M and may blow the fuse, protecting the MotorLine output.
- Reset the WBA 11M, using the S1 push button, after connecting/disconnecting MotorLines, to make sure the controller acknowledges the new configuration.

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 WBA 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.