ABB i-bus® EIB

2-fold switch sensor solo®, FM
Type: 6126-xx

The application module 2-fold switch sensor solo® is placed on a flush-mounted bus coupler, switch actuator or switch/dimming actuator.

The 2-fold switch sensor solo® can send e.g. switching, dimming or shutter control telegrams to EIB actuators.

The switch sensor has two contacts under the rocker and a light-emitting diode which can light up red or green.

In addition, a cover frame in the chosen colour in either the Solo or future design is required together with a flush-mounted bus coupler and a bus connecting terminal.
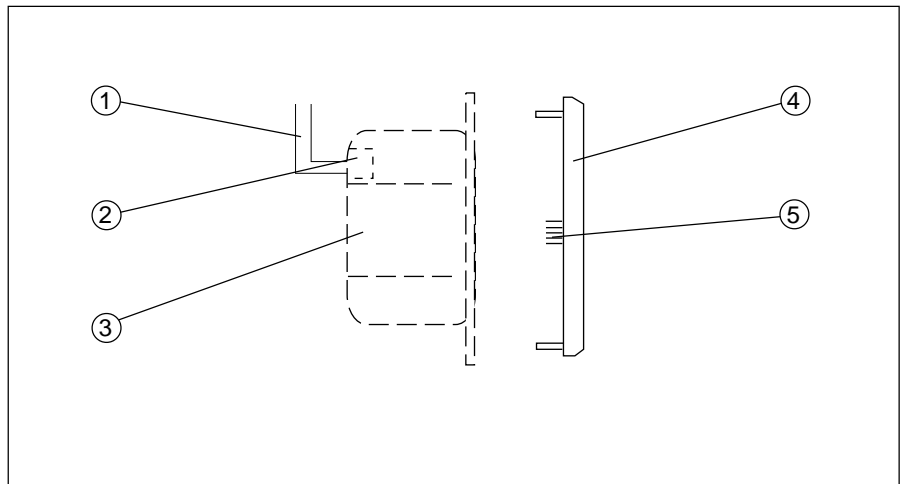
Technical Data

Power supply	– EIB	24 V DC, via the bus line
Operating and display elements	– 2 rocker, each with 2 push button contacts	
	– 2 x two-colour LED	red / green
Connections	– Bus coupler FM (6120 U-102-500)	10-pole plug connector
	– Switch actuator FM (6110 U-101-500)	
	– Switch/dimming actuator FM (6114 U-500)	
Type of protection	– IP 20, EN 60 529, placed on a flush-mounted insert	
Ambient temperature range	– Operation	- 5 °C … 45 °C
	– Storage	-25 °C … 55 °C
	– Transport	-25 °C … 70 °C
Design	– solo®	– future
Colour	– savanna / ivory davos / studio white manhatten / graphite samoa / light green toscana / crimson red attica / blue-grey	– savanna / ivory davos / studio white manhatten / graphite stone / light grey
Mounting	– latched onto flush-mounted insert	
Dimensions	– 63 x 63 mm (H x W)	
Weight	– 0.04 kg	
Certification	– EIB-certified	
CE norm	– in accordance with the EMC guideline and the low voltage guideline	

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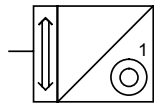| Application programs	Number of communication objects	Max. number of group addresses	Max. number of associations
For **Bus coupler FM, Switch actuator/sensor FM and Switch/dimming actuator FM:**			
Switch sensor 2f TP/1	15	15	15

Operation with the various flush-mounted devices is defined on the "General" parameter page. If the switch sensor has been placed onto a flush-mounted switch actuator or switch/dimming actuator, it is not necessary to insert a further device from the database in ETS2.

Circuit diagram

1 Bus cable   4 Application module
2 Bus terminal   5 10-pole plug
3 Bus coupler FM

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Switch sensor 2f TP/1

Selection in ETS2

– ABB
 └Push button solo
  └Push button, 2-fold

The 2-fold switch sensor Solo can be placed on a flush-mounted bus coupler, switch actuator or a switch/dimming actuator. The respective flush-mounted device on which the 2-fold switch sensor Solo has been placed, must be set first of all on the parameter page "BCU type". Only then are the parameters for the various flush-mounted actuators enabled in the ETS2 program.

The following section describes the functions of the rocker. These functions are always identical, regardless of the flush-mounted device that is used.

Switch sensor

If the operation mode of the rocker is defined as "Switch sensor", the switch sensor sends "ON" or "OFF" telegrams via the relevant 1 bit object "Rocker - Switch".

In the default setting, the switch sensor sends "TOGGLE" telegrams when the right or left rocker is pressed. This means that an "ON" command is sent first followed by an "OFF" command after a push button action and then an "ON" command if the rocker is pressed again.

Via the parameter "Working mode of rocker", the rockers can also be set so that the right rocker sends "ON" commands and the left rocker sends "OFF" commands or vice versa.

Dimming sensor

In the operation mode "Dimming sensor", an "ON" or "OFF" command is sent to the 1 bit communication object "Rocker - Switch" when one of the rockers is pressed briefly. If the rocker is pressed for a longer period, the switch sensor sends commands for dimming brighter or darker to the 4 bit object "Rocker - Dimming". If the rocker is released after a long push button action, the switch sensor sends the command "Stop dimming".

In the default setting, the switch sensor sends "TOGGLE" telegrams after a short operation of the right or left rocker. A long operation of the left rocker dims down the brightness level while a long operation of the right rocker dims up the brightness level.

This behaviour is adapted if required via the parameter "Working mode of rocker".

Shutter sensor

In the operation mode "Shutter sensor", the switch sensor has the 1 bit communication objects "Move shutter" and "Adjust shutter". After a long operation of the rocker, the switch sensor sends telegrams to the connected shutter actuators to raise or lower the shutter. After a short operation, it sends telegrams to stop the shutter movement or for louvre adjustment.

The setting "Working mode of rocker" defines whether the shutter is raised or lowered after operation of the right or left rocker.

Flexible assignment

With the application "Flexible assignment", the right and the left side of the rocker of the switch sensor each have their own 1 bit communication object "Rocker - Switch" available. It is possible to send "ON", "OFF" or "TOGGLE" telegrams on the EIB via this object.

Each pulse edge of the rockers can therefore be set individually. The switch sensor can thus be adapted to a wide variety of applications. If e.g. inching mode should be implemented, the setting "rising = ON, falling = OFF" should be selected.

With the parameter setting "no reaction", it is possible to completely deactivate a rocker.

LED

The relevant LED of the rocker can display the current status of the object "Rocker ..." or serve as an orientation light.

If the LED is used for status display, the colour changes when the object value changes. It can freely selected whether the LED lights up "green" or "red" in the OFF state or "red" or "green" in the ON state.

The LED can light up "green" or "red" as an orientation light.

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Actuator functions

The following section describes the actuator functions of the flush-mounted switch actuator and the switch/dimming actuator.

Switch actuator FM (6110 U-101-500)

The switch actuator has a 1 bit communication object "Output - Switch" which is used to switch the relay. In the default setting, the output switches on following the receipt of a telegram with the value "1" and switches off after a telegram with the value "0". If the parameter "Behaviour of contact" is set to "normally closed contact", the relay is closed following the receipt of a telegram with the value "0" and opened after a telegram with the value "1".

The relay contact is opened on bus voltage failure. The behaviour of the relay contact on mains voltage recovery can be set. By default, the relay is "opened". Further options are "closed" or "restore previous state". If the output should carry out defined switching on/off, the actuator takes into account the parameter "Switching behaviour".

Logic (Switch actuator FM, 6110 U-101-500)

With the parameter "Logic operation", it is possible to set an AND or an OR function. In both cases, the ETS2 program displays a further 1 bit communication object "Output - ... function" for the output. The output links the values of communication objects no. 0 and no. 1 and switches the relay according to the result.

A corresponding parameter is available for preselecting a defined input signal on bus voltage recovery.

Status (Switch actuator FM, 6110 U-101-500)

If the parameter "Status response" is set to "yes", the ETS2 program displays a further 1 bit communication object "Output - Status response". This communication object sends a telegram each time the actuator is switched. The value "1" means that the relay has adopted the active state in accordance with the parameter "Behaviour of contact".

Staircase lighting function (Switch actuator FM, 6110 U-101-500)

In the operation mode "Staircase lighting function", the output is switched on immediately following the receipt of an "ON" telegram. Once the period that was set in the time base and factor parameters has elapsed, the relay is automatically opened. If the output receives further "ON" telegrams before the period has elapsed, the time restarts.

If the staircase lighting function and the logic operation are activated, the time setting only has an effect if the actuator is switched via object no. 0 "Output - Switch".

In addition to the staircase lighting function, it is also possible to activate an ON delay. The corresponding parameter must be activated. The ON delay is again defined with a time base and factor.

Timing function (Switch actuator FM, 6110 U-101-500)

With the operation mode "Timing function", it is possible to activate an ON and/or OFF delay. The two periods can be of varying lengths and are defined with a time base and factor.

The delay periods only influence the switch object. If e.g. an OR function has been selected in addition to an ON delay, the time delay is only active if an ON command is received via the switch object. If the ON command is however sent directly to the logic object, the actuator switches directly to the state that was preselected in the parameter "Behaviour of contact".

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Switch/Dimming actuator FM (6114 U-500)

The output of the switch/dimming actuator FM can be switched on and off via the 1 bit communication object no. 0 "Output - Switch". The same communication object also sends a telegram if the output changes its state because e.g. the 4 bit object no. 1 "Dimmer - Rel. dimming" or the 1 byte object no. 2 "Dimmer - Brightness value" has received a telegram.

If the output objects of several dimming actuators/sensors use the same group addresses, the parameter "Mode for parallel operation ....." must be taken into account. Only one device may then be set to "master". The other devices must use the setting "slave". If this is not observed, the devices may send telegrams continually to each other.

The brightness value which the flush-mounted switch/dimming actuator uses when switching on, is defined in the parameters. Either a constant value between 10 % brightness and 100 % brightness can be selected or the actuator stores the value of the object "Brightness value" at the point when it was switched off via the switch object. When the device is switched on again, the value is restored.

Dimming (Switch/dimming actuator FM, 6114 U-500)

With the 4 bit communication object "Dimmer - Rel. dimming", the connected luminaire can be dimmed in accordance with EIS 2. If the actuator is switched off, it can be dimmed on via the 4 bit object.

The period for passing through the dimming range can be defined with the two parameters "Time base ..." and "Factor ...". The actuator uses the formula
Total time = Base * Factor.

With the 1 byte communication object no. 2 "Dimmer - Brightness value", the luminaire can be preassigned one of 256 brightness values which range from 0 = switched off to 255 = full brightness. Via the parameter "Behaviour on change in the brightness value", it is defined whether the new value should be set immediately ("jump to value") or at the selected dimming rate ("dim to value").

Status (Switch/dimming actuator FM, 6114 U-500)

If the parameter "Status response" is set to "yes", the ETS2 software displays a further 1 bit object "Status response". As soon as the switch/dimming actuator is switched on, a telegram with the value "1" is sent, regardless of the brightness value. If the actuator is switched off again, a "0" is sent.

Logic (Switch/dimming actuator FM, 6114 U-500)

With the parameter "Logic operation", it is possible to set an AND or an OR function. In both cases, the ETS2 program displays a further 1 bit communication object for the output. The actuator links the values of communication object no. 0 "Output - Switch" and no. 3 "Output - ... function" and then switches the output. In this case, the parameter "Status response" also enables precise monitoring of the actual output state.

Staircase lighting function (Switch/dimming actuator FM, 6114 U-500)

In the operation mode "Staircase lighting function", the output is switched on immediately following the receipt of an "ON" telegram. Once the period that was set in the time base and factor parameters has elapsed, the relay is automatically opened. If the output receives further "ON" telegrams before the period has elapsed, the time restarts. In the case of the flush-mounted switch/dimming actuator, it is also possible to integrate an extension of the staircase lighting function.

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If the staircase lighting function and the logic operation are activated, the time setting only has an effect if the actuator is switched via object no. 0 "Output - Switch".

In addition to the staircase lighting function, it is also possible to activate an ON delay. The corresponding parameter must be activated. The ON delay is again defined with a time base and factor.

Timing function
(Switch/dimming actuator FM,
6114 U-500)

With the operation mode "Timing function", it is possible to activate an ON and/or OFF delay. The two periods can be of varying lengths and are defined with a time base and factor.

If e.g. an OR function has been selected in addition to an ON delay, the time delay is only active if an ON command is received via the switch object. If the ON command is however sent directly to the logic object, the actuator switches directly to the state that was preselected in the parameter "Behaviour of contact".

Read-only memory
(Switch/dimming actuator FM,
6114 U-500)

The actuator has an additional 1 bit communication object "Read-only memory ...". Two values can therefore be set using the possible object values "0" and "1". The parameters "Value for read-only memory ..." are used for this purpose. The number of read-only memory devices that are actually used is defined with the parameters "Number of objects" and "Behaviour on receipt of an OFF telegram".

Bus voltage failure/recovery
(Switch/dimming actuator FM,
6114 U-500)

On bus voltage failure, the flush-mounted switch/dimming actuator switches off the connected luminares. On bus voltage recovery, the luminaires normally remain switched off. It is however also possible to set the minimum or maximum brightness or the last stored brightness value before the voltage failure.

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	No.	Type	Object name	Function
Communication objects when used as a switch sensor	6	1 bit	Rocker 1	Switch
	8	1 bit	Rocker 2	Switch

	No.	Type	Object name	Function
Communication objects when used as a dimming sensor	6	1 bit	Rocker 1, short	Switch
	7	4 bit	Rocker 1, long	Dimming
	8	1 bit	Rocker 2, short	Switch
	9	4 bit	Rocker 2, long	Dimming

	No.	Type	Object name	Function
Communication objects when used as a shutter sensor	6	1 bit	Rocker 1, long	Move shutter
	7	1 bit	Rocker 1, short	Adjust shutter
	8	1 bit	Rocker 2, long	Move shutter
	9	1 bit	Rocker 2, short	Adjust shutter

	No.	Type	Object name	Function
Communication objects with flexible assignment of the rockers	6	1 bit	Rocker 1, right	Switch
	7	1 bit	Rocker 1, left	Switch
	8	1 bit	Rocker 2, right	Switch
	9	1 bit	Rocker 2, left	Switch

	No.	Type	Object name	Function
Communication objects when used as a switch sensor with flush-mounted switch actuator, AND function and status response	0	1 bit	Output	Switch
	1	1 bit	Output	AND function
	2	1 bit	Output	Status response
	6	1 bit	Rocker 1	Switch
	8	1 bit	Rocker 2	Switch

	No.	Type	Object name	Function
Communication objects when used as a switch sensor with flush-mounted switch actuator, OR function and status response	0	1 bit	Output	Switch
	1	1 bit	Output	OR function
	2	1 bit	Output	Status response
	6	1 bit	Rocker 1	Switch
	8	1 bit	Rocker 2	Switch

	No.	Type	Object name	Function
Communication objects when used as a switch sensor with flush-mounted dimming actuator, AND function, status response and preset object	0	1 bit	Output	Switch
	1	4 bit	Dimmer	Rel. dimming
	2	1 byte	Dimmer	Brightness value
	3	1 bit	Output	AND function
	4	1 bit	Dimmer	Status response
	5	1 bit	Dimmer	Preset
	6	1 bit	Rocker 1	Switch
	8	1 bit	Rocker 2	Switch

	No.	Type	Object name	Function
Communication objects when used as a switch sensor with flush-mounted dimming actuator, OR function, status response and preset object	0	1 bit	Output	Switch
	1	4 bit	Dimmer	Rel. dimming
	2	1 byte	Dimmer	Brightness value
	3	1 bit	Output	OR function
	4	1 bit	Dimmer	Status response
	5	1 bit	Dimmer	Preset
	6	1 bit	Rocker 1	Switch
	8	1 bit	Rocker 2	Switch

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Parameters

The default setting for the values is **printed in bold type.**

BCU type:	
Bus coupler / flush-mounted actuator	**Flush-mounted bus coupler (6120 U-102)** Flush-mounted switch actuator (6110 U-101) Flush-mounted dimming actuator (6114 U)
Parameters of rocker …:	
– Operation mode of rocker	**Switch sensor** Dimming sensor Shutter sensor Flexible assignment
Only for switch sensor:	
– Working mode of rocker	**TOGGLE** left = OFF, right = ON left = ON, right = OFF
– Operation mode of LED	**indicates value of object "Rocker"** orientation light
Only if the value is displayed:	
– Colour of the LED	**OFF = green, ON = red** OFF = red, ON = green
Only if orientation light is selected:	
– Colour of the LED	**always green** always red
Only for dimming sensor:	
– Working mode of rocker	**left=darker/TOGGLE, right=brighter TOGGLE** left = brighter/TOGGLE, right = darker TOGGLE left = darker/OFF, right = brighter/ON left = brighter/ON, right = darker/OFF
– Operation mode of LED	**indicates value of object "Rocker, short"** orientation light
Only if the value is displayed:	
– Colour of the LED	**OFF = green, ON = red** OFF = red, ON = green
Only if orientation light is selected:	
– Colour of the LED	**always green** always red
Only for shutter sensor:	
– Working mode of rocker	**left = UP, right = DOWN** left = DOWN, right = UP
– Operation mode of LED	indicates value of object "Rocker, long" **orientation light**
Only if value is displayed:	
– Colour of the LED	**UP = green, DOWN = red** UP = red, DOWN= green
Only if orientation light is selected:	
– Colour of the LED	**always green** always red

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Only for flexible assignment:	
– Reaction on right rocker	**TOGGLE** defined switching
Only for defined switching:	
– Switch function of right rocker	**no reaction** rising = OFF falling = OFF rising = OFF, falling = OFF rising = ON falling = OFF rising = ON, falling = OFF rising = OFF, falling = ON rising = ON, falling = ON
– Reaction on left rocker	**TOGGLE** defined switching
Only for defined switching:	
– Switch function of left rocker	**no reaction** rising = OFF falling = OFF rising = OFF, falling = OFF rising = ON falling = OFF rising = ON, falling = OFF rising = OFF, falling = ON rising = ON, falling = ON
– Operation mode of LED	**indicates value of object "Rocker left"** orientation light
Only if value is displayed:	
– Colour of the LED	**UP = green, DOWN = red** UP = red, DOWN = green
Only if orientation light is selected:	
– Colour of the LED	**always green** always red

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Parameters
The default setting for the values
is **printed in bold type.**

Additional parameters when used with switch actuator FM (6110 U-101):	
Switch actuator - General:	
– Behaviour of contact	**normally open contact**
	normally closed contact
– Contact on mains voltage recovery	**opened**
	closed
	restore previous state
Switch actuator - Operation modes:	
– Operation mode	**Normal operation**
	Staircase lighting function
	Timing function
Only for staircase lighting function:	
– ON delay	**no**
	yes
Only if "yes" is selected:	
– Time base for ON delay	**approx. 130 ms** / … / approx. 520 ms / … / approx. 1.2 h
– Factor for ON delay (2…127)	**10**
– Time base for staircase lighting function	**approx. 130 ms** / … / approx. 520 ms / … / approx. 1.2 h
– Factor for staircase lighting function (2…127)	**10**
Only for timing function:	
– ON delay	**no**
	yes
Only if "yes" is selected:	
– Time base for ON delay	**approx. 130 ms** / … / approx. 520 ms / … / approx. 1.2 h
– Factor for ON delay (2…127)	**10**
– OFF delay	**no**
	yes
Only if "yes" is selected:	
– Time base for OFF delay	**approx. 130 ms** / … / approx. 520 ms / … / approx. 1.2 h
– Factor for OFF delay (2…127)	**10**
– Logic operation	**no logic operation**
	AND function
	OR function
Only if a logic operation is selected:	
– Value of logic operation on mains voltage recovery	**OFF "0"**
	ON "1"
– Status response	**no**
	yes

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Additional parameters when used with dimming actuator FM (6114 U):

Dimming actuator - General:

– Behaviour on change in the brightness value	**jump to value** dim to value
– Brightness value for ON telegram	final value **parameterised value**
Only for parameterised value:	
– Initial brightness value	OFF / 10 % / … / 90 % / **100 %**
– Brightness value on mains voltage recovery	10 % brightness 100 % brightness final value **OFF**
– Mode for parallel operation of several flush-mounted dimming actuators	**master** slave

Dimming actuator - Operation modes:

– Operation mode	**Normal operation** Staircase lighting function Timing function
Only for staircase lighting function:	
– ON delay	**no** yes
Only for ON delay:	
– Time base for ON delay	**approx. 130 ms** / … / approx. 520 ms / … / approx. 1.2 h
– Factor for ON delay (2…127)	**10**
– Time base for staircase lighting function	**approx. 130 ms** / … / approx. 4.2 s / … / approx. 1.2 h
– Factor for staircase lighting function (2…127)	**43**
– Enable time extension	**no** yes
Only if "yes" is selected:	
– ON delay	**no** yes
Only if "yes" is selected:	
– Time base for ON delay	**approx. 130 ms** / … / approx. 520 ms / … / approx. 1.2 h
– Factor for ON delay (2…127)	**10**
– OFF delay	**no** yes
Only if "yes" is selected:	
– Time base for OFF delay	**approx. 130 ms** / … / approx. 520 ms / … / approx. 1.2 h
– Factor for OFF delay (2…127)	**10**
– Logic operation	**no logic operation** AND function OR function
– Status response	**no** yes

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Dimming rate:	
– Time base for passing through the dimming range	**approx. 0.5 ms** approx. 8.0 ms approx. 130 ms approx. 2.1 s approx. 33 s
– Factor for passing through the dimming range	**20**
– Note: Time base * Factor * 255	

Read-only memory:	
– Number of objects	**none** 1
Only if "1" is selected:	
– Behaviour on receipt of an ON telegram	**set preselected brightness value**
– Brightness value for read-only memory (object no. 5 = ON)	OFF / 10 % / … / **30 %** / … / 100 %
– Behaviour on receipt of an OFF telegram	**no reaction** set preselected brightness value
Only for preselected brightness value:	
– Brightness value for read-only memory (object no. 5 = OFF)	**OFF** / 10 % / 20 % / … / 100 %