ABB i-bus® EIB

Time Switch, 4-channel, MDRC SW/S 4.5, GH Q605 0061 R0001

The 4-fold week time switch with a day, week and year program is a DIN rail mounted device for insertion in the distribution board. Connection to the EIB is carried out via the bus connecting terminal at the front of the device.

There are 324 memory locations available with free weekday block formation. Using a program for use during holidays, the execution of the programming can be interrupted for up to 45 days. A lead time of up to 21 days until the start of the holiday program can be entered. With a quick adjustment, the clock can be put forward or back by 1 hour (conversion to summertime). The time switch has a priority switching operation (single operation) for special days and Bank Holidays. It is also possible to program switching impulses (1 to 59 seconds).

The cover in front of the keypad and the display can be sealed.

The time switch can send switching or value telegrams to EIB actuators at the specified times.

Technical Data

Power supply	– EIB	24 V DC, via the bus line
Operating and display elements	– Red LED and push button	for assigning the physical address
	– 15 push buttons	for setting the time
	– LCD	for displaying the time and the switching state
Connections	– EIB	Bus connecting terminal
Type of protection	– IP 20, EN 60 529	
Protection class	– II	
Ambient temperature range	– Operation	- 5 °C ... 45 °C
	– Storage	-25 °C ... 55 °C
	– Transport	-25 °C ... 70 °C
Design	– Modular installtion device, pro*M*	
Housing, colour	– Plastic housing, grey	
Mounting	– on 35 mm mounting rail, DIN EN 50022	
Dimensions	– 86 x 108 x 64 mm (H x W x D)	
Mounting depth/width	– 68 mm / 6 modules at 18 mm	
Weight	– 0.340 kg	
Certification	– EIB-certified	
CE norm	– in accordance with the EMC guideline and the low voltage guideline	
Special features	– Memory locations	324
	– Time base	Quarz
	– Accuracy	< 1 s per day
	– Min. switching interval	1 second
	– Switching accuracy	exact to the second
	– Power reserve	Lithium cell, approx. 1.5 years
	– Programming of the clock	via the keypad or with PC software and memory card

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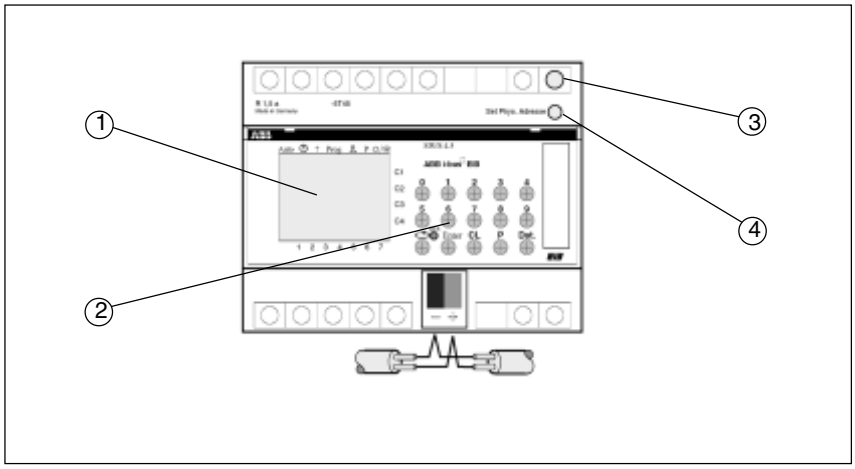
Application programs	Number of communication objects	Max. number of group addresses	Max. number of associations
Switch Value Cyclic /1	7	8	8
Switch Value Priority Cyclic /2	8	10	10
Switch Value Cyclic /2	6	8	8

Circuit diagram



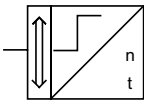
1 LCD
2 Keypad for setting the time
3 Programming LED
4 Programming button

Note

The programming of the clock can be carried out at the device. It is however also possible to program it via software using a PC and a memory card. The programming set is also required. The switching programs can be read out with a memory card. The data can also be transferred from one time switch to another using the memory card.

Further information about the handling and operation of this device can be found in the operating instructions or in the manual that is supplied with the device. You can likewise find this information on our EIB CD-ROM.

Switch Value Cyclic /1



Selection in ETS2

– ABB
  └Timer
    └Clock switch

The time switch has four channels which each have the same parameters. ETS2 displays various communication objects depending on the parameter selection.

The communication objects of the four channels send telegrams in accordance with their switching programs at the times that are programmed in the clock. It is also possible to select separately for each channel whether its telegrams should be sent cyclically. The channels that send telegrams cyclically use the common parameter “Interval for cyclical sending”.

It is possible to define the switching times so that the clock functions “ON” and “OFF” are not used alternately. A channel can also send several telegrams in succession with the same value of “ON” or “OFF”.

Switch

If the parameter “Function” of the channel is set to “Send telegr. switch”, the channel has a 1 bit communication object.

The value of the communication object (“0” or “1”) is defined via the parameter “Reaction if clock switches” and is dependent on the programmed switching function of the clock application module.

Value

If the parameter “Function” of the channel is set to “Send telegr. value”, the channel has a 1 byte communication object.

The values of the communication objects (“0” to “255”) are defined via the parameters “If clock -> OFF” or “If clock -> ON” at various intervals and are dependent on the programmed switching function of the clock application module.

Priority

If the parameter “Function” of the channel is set to “Send telegr. priority”, the channel has a 2 bit communication object.

With this 2 bit communication object, the clock can operate a switch output via priority control. Actuators with this function have a 1 bit communiction object (switching object) and a 2 bit communication object (priority object). There are three different states:

– The priority object has the value “3”. The value of the switching object is not significant. The actuator is switched on through priority control.
– The priority object has the value “2”. The value of the switching object is not significant. The output is switched off through priority control.
– The priority object has the value “1” or “0”. The output is not priority controlled. Operation is carried out via the switching object.

If an output is priority controlled, changes to the 1 bit object are stored, even if the current switching state has not been directly changed as a result. When the positive drive operation has finished, a switching operation takes place according to the current value of the switching object.

The value of the priority object of the clock can be defined at fixed intervals according to this function of the actuator.

Send time and date

The clock has a 3 byte object that can send telegrams with the current time including the day of the week. It also has a 3 byte object that can send telegrams with the current date.

These two objects always send in sequence. The telegrams can be sent cyclically and/or at specific times on request. The cyclical sending can take place at intervals of 1 minute, after each full hour has elapsed or daily at 24:00. The date or time request is carried out with the 1 bit communication object “Date/time - Send request”. If this object receives a telegram with any value, the clock sends the date and the time to the corresponding communication object.

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Communication objects

No.	Type	Object name	Function
0	1 bit	Channel 1 - Switch	Telegr. switch
1	1 bit	Channel 2 - Switch	Telegr. switch
2	1 bit	Channel 3 - Switch	Telegr. switch
3	1 bit	Channel 4 - Switch	Telegr. switch
4	3 byte	Time	Telegr. time
5	3 byte	Date	Telegr. date
6	1 bit	Date/time	Send request

Communication objects
for value function

No.	Type	Object name	Function
0	1 byte	Channel 1 - Value	Telegr. value
1	1 byte	Channel 2 - Value	Telegr. value
2	1 byte	Channel 3 - Value	Telegr. value
3	1 byte	Channel 4 - Value	Telegr. value
…			

Communication objects
for priority function

No.	Type	Object name	Function
0	2 bit	Channel 1 - Priority	Telegr. priority
1	2 bit	Channel 2 - Priority	Telegr. priority
2	2 bit	Channel 3 - Priority	Telegr. priority
3	2 bit	Channel 4 - Priority	Telegr. priority
…			

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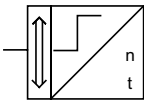
Parameters
The default setting for the values is **printed in bold type.**

General:	
– Interval for cyclical sending	approx. 3 min / approx. 5 min / **approx. 10 min** / approx. 15 min / … / approx. 60 min
– Date and time	only send on request send every minute send every hour **send every day**
Separate for channels 1 … 4:	
– Function	**send telegr. switch** send telegr. value send telegr. priority
Only for switch function:	
– Reaction if clock switches	clock ON -> ON / clock OFF -> OFF clock ON -> OFF / clock OFF -> ON
Only for value function:	
– If clock -> OFF	**50**
– If clock -> ON	**200**
Only for priority function:	
– If clock -> OFF	**FREE** OFF ON
– If clock -> ON	FREE OFF **ON**
– Cyclical sending	**no** yes

Switch Value Priority Cyclic /2



Selection in ETS2

– ABB
  └Timer
    └Clock switch

The time switch has four channels, three of which have the same parameters. Channel 4 can be used in addition to these parameters to control a scene with up to four objects. These four objects then have the same setting options as the first three channels.

ETS2 displays various communication objects depending on the parameter selection.

The communication objects of the four channels send telegrams in accordance with their parameter assignments at the times that are programmed in the clock. It is also possible to select separately for each channel whether its telegrams should be sent cyclically. The channels that send telegrams cyclically use the common parameter “Interval for cyclical sending”.

As it is possible to define the switching times in the application module so that the clock functions of “ON” and “OFF” are not used alternately, a channel can also send several telegrams with the same value in succession.

Switch

If the parameter “Function” of the channel is set to “Send telegr. switch”, the channel has a 1 bit communication object.

The value of the communication object (“0” or “1”) is defined via the parameter “Reaction if clock switches” and is dependent on the programmed switching function of the clock application module.

Value

If the parameter “Function” of the channel is set to “Send telegr. value”, the channel has a 1 byte communication object.

The values of the communication object (“0” to “255”) are defined via the parameters “If clock -> OFF” or “If clock -> ON” at various intervals and are dependent on the programmed switching function of the clock application module.

Priority

If the parameter “Function” of the channel is set to “Send telegr. priority”, the channel has a 2 bit communication object.

With this 2 bit communication object, the clock can operate a switch output with priority control. Actuators with this function have a 1 bit communication object (switching object) and a 2 bit communication object (priority object). There are three different states:

– The priority object has the value “3”. The value of the switching object is not significant. The actuator is switched on through priority control.
– The priority object has the value “2”. The value of the switching object is not significant. The output is switched off through priority control.
– The priority object has the value “1” or “0”. The output is not priority controlled. Operation is carried out via the switching object.

If an output is priority controlled, changes to the 1 bit object are stored, even if the current switching state has not been directly changed as a result. When the positive drive operation has finished, a switching operation takes place according to the current value of the switching object.

The value of the priority object of the clock can be defined at fixed intervals according to this function of the actuator.

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Scene

If scene control is selected for the channel 4, it is possible to create a scene with up to four objects via this channel. The scene objects have the same setting options as the first three channels.

Disable

It is possible to define separately for each channel or for each scene object of channel 4 whether a lock-out is permitted by object no. 7 “Channel 1...4 - Disable”. If an object is disabled, it is possible to set that it still sends telegrams. When the lock-out is removed, the objects immediately send a telegram with their current value, in accordance with the switching program of the clock.

If the disable object is activated, cylical sending no longer takes place.

Communication objects

No.	Type	Object name	Function
0	1 bit	Channel 1	Telegr. switch
1	1 bit	Channel 2	Telegr. switch
2	1 bit	Channel 3	Telegr. switch
3	1 bit	Channel 4	Telegr. switch
7	1 bit	Channel 1 … 4	Disable

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Communication objects
for channel 4 with 4 objects

No.	Type	Object name	Function
…			
3	1 bit	Channel 4 - Object 1	Telegr. switch
4	1 bit	Channel 4 - Object 2	Telegr. switch
5	1 bit	Channel 4 - Object 3	Telegr. switch
6	1 bit	Channel 4 - Object 4	Telegr. switch
7	1 bit	Channel 1 … 4	Disable

Communication objects
for value function

No.	Type	Object name	Function
0	1 byte	Channel 1	Telegr. value
1	1 byte	Channel 2	Telegr. value
…			

Communication objects
for priority function

No.	Type	Object name	Function
0	2 bit	Channel 1	Telegr. priority
1	2 bit	Channel 2	Telegr. priority
…			

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

General:	
– Interval for cyclical sending	approx. 3 min / approx. 5 min / **approx. 10 min** / approx. 15 min / … / approx. 60 min
– Should channel 4 have several objects?	**no** yes
If “yes” is selected:	
– How many objects should channel 4 have?	**2 objects** 3 objects 4 objects
Separate for channels 1 … 4:	
– Function	**send telegr. switch** send telegr. value send telegr. priority
Only for switch function:	
– Reaction if clock switches	clock ON -> ON / clock OFF -> OFF clock ON -> OFF / clock OFF -> ON
Only for value function:	
– If clock -> OFF	**50**
– If clock-> ON	**200**
Only for priority function:	
– If clock -> OFF	**FREE** OFF ON
– If clock -> ON	FREE OFF **ON**
– Cyclical sending	**no** yes
– Disable channel … via object 7	**no** yes
If “yes” is selected:	
– When disabled, channel ... sends	no telegram **one telegram once**
Only if “one telegram once” is selected:	
–	**as defined for clock OFF** as defined for clock ON

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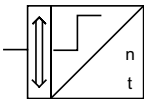
Switch Value Cyclic /2



Selection in ETS2

– ABB
  └Timer
    └Clock switch

The time switch has four channels which each have the same parameters. ETS2 displays various communication objects depending on the parameter selection.

The communication objects of the four channels send telegrams in accordance with their parameter assignments at the times that are programmed in the clock. It is also possible to select separately for each channel whether its telegrams should be sent cyclically. The channels that send telegrams cyclically use the common parameter “Interval for cyclical sending”.

As it is possible to define the switching times so that the clock functions “ON” and “OFF” are not used alternately, a channel can also send several telegrams with the same value in succession.

Switch

If the parameter “Function” of the channel is set to “Send switch telegr.”, the channel has a 1 bit communication object.

The value of the communication object (“0” or “1”) is defined via the parameter “Reaction if clock switches” and is dependent on the programmed switching function of the clock application module.

Value

If the parameter “Function” of the channel is set to “Value”, the channel has a 1 byte communication object.

The values of the communication objects (“0” to “255”) are defined via the parameters “If clock -> OFF” or “If clock -> ON” at various intervals and are dependent on the programmed switching function of the clock application module.

Priority

If the parameter “Function” of the channel is set to “Send telegr. priority”, the channel has a 2 bit communication object.

With this 2 bit communication object, the clock can operate a switch output via priority control. Actuators with this function have a 1 bit communiction object (switching object) and a 2 bit communication object (priority object). There are three different states:

– The priority object has the value “3”. The value of the switching object is not significant. The actuator is switched on through priority control.
– The priority object has the value “2”. The value of the switching object is not significant. The output is switched off through priority control.
– The priority object has the value “1” or “0”. The output is not priority controlled. Operation is carried out via the switching object.

If an output is priority controlled, changes to the 1 bit object are stored, even if the current switching state has not been directly changed as a result. When the positive drive operation has finished, a switching operation takes place according to the current value of the switching object.

The value of the priority object of the clock can be defined at fixed intervals according to this function of the actuator.

Temperature

If the parameter “Function” of the channel is set to “Send telegr. temperature”, the channel has a 2 byte communication object.

With this 2 byte communication object, the clock can for example send preselected temperature values for room thermostats. The temperature values can be set in the ranges
– from 5 °C to 20 °C
  with a resolution of 1 K
– from 20 °C to 23 °C
  with a resolution of 0.5 K
– from 23 °C to 30 °C
  with a resolution of 1 K.

If the temperature value for a room thermostat for example is stored in an EEPROM, the telegram should not be sent cyclically.

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16 bit value

For special applications, it is also possible in principle to enter 16 bit values. To do so, the required value must be converted according to the following formula:
S * 0.01 * (M1 + M2) * 2^exp.

S represents the sign. In the case of positive values, S must be set to “+1” while for negative values it must be set to “-1”. The total of the values M1 and M2 forms the mantissa. The abbreviation “exp.” stands for the exponent.

Different values for the “OFF” and “ON” function of the clock can also be set in the 16 bit function.

The setting procedure is explained in detail below using the numbers +3000 and -3000 by way of example.

In the case of positive numbers such as the whole number +3000, the value S must be set to “+1”. Due to the division into 0.01 steps, the value that is to be set must then be multiplied by 100.
3000 * 100 = 300000
The result is then repeatedly divided by 2 until the value is less than 2048.
1. 300000 :2 = 150000
2. 150000 :2 = 75000
3. 75000 :2 = 37500
4. 37500 :2 = 18750
5. 18750 :2 = 9375
6. 9375 :2 = 4687.5
7. 4687.5 :2 = 2343.75
8. 2343.75 :2 = 1171.875

If the number of divisions are added together, you obtain the exponent for the number 2. As the number 300000 was divided 8 times by 2, the exponent in this case is 8.
The so-called mantissa is composed of the total of the two values M1 and M2. M1 can accept fixed values between 0 and 1792 (0, 256, 512, 768, 1024, 1280, 1536 and 1792). The largest possible number is always used for M1. In our case, M1 equals 1024.
The value M2 is formed by subtracting the value of M1 from the residual value. In our case:
M2 = 1171.875 - 1024 = 147.875
As it is only possible to set whole numbers, the result is rounded up or down. M2 therefore equals 148.

The number +3000 is thus represented as follows:
+3000 = (+1) *0.01 *(1024 + 147) *2^8

If a negative number such as -3000 should be set, the process is similar to that used for positive numbers. The value S must now be set to “-1”. The value that is to be set must again be multiplied by 100 and the result is then repeatedly divided by 2 until the value is less than 2048.
The mantissa is now however derived from adding together the two‘s complements of the values of M1 and M2. The best way of calculating this value is as follows:
Enter the residual value (1171.875) into a calculator and select a binary display (you can also use the Windows calculator). Write down the binary value and then replace every “1” by a “0” and vice versa. Then increase the resulting value again by 1:
$1171.875_{dec.} = 10010010011_{bin.}$
Two‘s compl. $= 01101101100_{bin.} + 1_{bin.}$
$= 01101101101_{bin.}$
Enter the two‘s complement again into the calculator and switch to the decimal display.
$01101101101_{bin.} = 877_{dec.}$
The value 877 is now again derived from the total of M1 and M2.
M1 = 768
M2 = 877 - 768 = 109

The number -3000 is thus represented as follows:
-3000 = (-1) *0.01 *(768 + 109) *2^8

Receive date and time

With the two communication objects “Set time” and “Set date”, it is possible to synchronise the time or the date of the time switch via the bus.

The following points should however be noted during the bus synchronisation:

– Every day, there are two time slots available between 1:58:44 and 2:13:00 as well as between 2:58:44 and 3:13:00, during which the clock is ready to receive time and date telegrams.

– If the synchronisation of the time and date could not take place within the time slots specified above, the time switch remains ready to receive until it can be synchronised by a valid time and date telegram.

– A further possibility is to conduct a manual transmitter call. By pressing the button “Dat” for 3 seconds, a time slot of 14 minutes is opened. Within this period, the time switch is ready again to receive time and date telegrams (as often as required). Once this period has elapsed, the clock is once again only ready to receive time and date telegrams independently.

– If the day of the week in the time telegram differs from the day that is set in the time switch by +/- a day, the date is also adapted. Time telegrams with a deviation of more than one weekday are not accepted.

– However, if there is no day of the week in the time telegram, the telegram is accepted. The use of time telegrams without a specified weekday is not recommended as problems may arise if a day is carried over.

– If the time switch is also synchronised by a DCF signal, the synchronisation to the DCF signal always takes place approx. 14 minutes after the bus synchronisation.

Once the time switch program or the time has been modified (only if a manual circuit selection has been entered), the program is automatically reviewed. The device then adopts the switching state that is preset by the time switch program (only applies to the channels that were previously switched manually). The following points should however be noted for this procedure:

– As manual switching operations are not maintained in the memory device for switching times, the manual operation can be lost during the review under certain conditions.

– Impulses (transient switching operations that are programmed in the application module) that occurred in the past are likewise not recognised during the review.

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Communication objects

No.	Type	Object name	Function
0	1 bit	Channel 1	Telegr. switch
1	1 bit	Channel 2	Telegr. switch
2	1 bit	Channel 3	Telegr. switch
3	1 bit	Channel 4	Telegr. switch
4	3 byte	Clock	Set time
5	3 byte	Clock	Set date

Communication objects
for value function

No.	Type	Object name	Function
0	1 byte	Channel 1	Telegr. value
1	1 byte	Channel 2	Telegr. value
2	1 byte	Channel 3	Telegr. value
3	1 byte	Channel 4	Telegr. value
…			

Communication objects
for priority function

No.	Type	Object name	Function
0	2 bit	Channel 1	Telegr. priority
1	2 bit	Channel 2	Telegr. priority
2	2 bit	Channel 3	Telegr. priority
3	2 bit	Channel 4	Telegr. priority
…			

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Communication objects
for temperature function

No.	Type	Object name	Function
0	2 byte	Channel 1	Telegr. temperature
1	2 byte	Channel 2	Telegr. temperature
2	2 byte	Channel 3	Telegr. temperature
3	2 byte	Channel 4	Telegr. temperature
…			

Communication objects
for 16 bit value function

No.	Type	Object name	Function
0	2 byte	Channel 1	Telegr. 16 bit value
1	2 byte	Channel 2	Telegr. 16 bit value
2	2 byte	Channel 3	Telegr. 16 bit value
3	2 byte	Channel 4	Telegr. 16 bit value
…			

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

General:		
– Interval for cyclical sending		approx. 3 min / approx. 5 min / **approx. 10 min** / approx. 15 min / … / approx. 60 min
Separate for channels 1 … 4:		
– Function		**send telegr. switch** send telegr. value send telegr. priority send telegr. temperature send telegr. 16 bit value = (S * 0.01 * (M1 + M2) * 2^exp)
Only for switch function:		
– Reaction if clock switches		clock ON -> ON / clock OFF -> OFF clock ON -> OFF / clock OFF -> ON
Only for value function:		
– If clock -> OFF		**50**
– If clock -> ON		**200**
Only for priority function:		
– If clock -> OFF		**FREE** OFF ON
– If clock -> ON		FREE OFF **ON**
Only for temperature function:		
– If clock -> OFF		5 °C / 6 °C / … / **15 °C** / … / 30 °C
– If clock -> ON		5 °C / 6 °C / … / **21 °C** / … / 30 °C
Only for 16 bit values:		
Structure of 16 bit value		S * 0.01 * (M1 + M2) * 2^exp.
– If clock -> OFF	Sign (S)	**+1** / -1
Only for positive sign:		
–	Mantissa 1 (M1)	**0** / 256 / 512 / 768 / 1024 / 1280 / 1536 / 1792
–	Mantissa 2 (M2)	**0** … 255
Only for negative sign:		
– Two's complement of mantissa 1 (M1)		**0** / 256 / 512 / 768 / 1024 / 1280 / 1536 / 1792
– Two's complement of mantissa 2 (M2)		**0** … 255
–	Exponent (exp)	**0** … 15
– If clock -> ON	Sign (S)	**+1** / -1
Only for positive sign:		
–	Mantissa 1 (M1)	**0** / 256 / 512 / 768 / 1024 / 1280 / 1536 / 1792
–	Mantissa 2 (M2)	0 … **255**
Only for negative sign:		
– Two's complement of mantissa 1 (M1)		**0** / 256 / 512 / 768 / 1024 / 1280 / 1536 / 1792
– Two's complement of mantissa 2 (M2)		0 … **255**
–	Exponent (exp)	**0** … 15
– Cyclical sending		**no** yes

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