Application: Analogue output floating point/value B00A/0.1

Executable from mask version: 7.1
Number of addresses (max): 200   **dynamic table handling**   Yes ☒   No ☐

Number of assignments (max): 200   **maximum number of assignments**   200

Communication objects   50

Object no.		Function	Name	DP type	Format	Flags
☐→	0	Analog input	Alarm object [1]	1.001	1 bit	C, T
☐→	1 … 4	Analog input	Measuring value input 1 … 4 [3]	9.0xx	2 bytes	C, T
☐→	1 … 4	Analog input	Measuring value input 1 … 4 [3]	5.001	1 byte	C, T
☐→	5 … 12	Analog input	Limit value 1 / 2 input 1 … 4	1.001	1 bit	C, T
☐←	13 … 20	Analog input	External limit value 1 / 2 Input 1 … 4 [4]	9.0xx	2 bytes	C, W
☐←	13 … 20	Analog input	External limit value 1 / 2 Input 1 … 4 [4]	5.001	1 byte	C, W
☐→	21 … 24	Analog input	Open-circuit monitoring input 1 … 4 [2]	1.001	1 bit	C, T
☐→	25	Extension module	Alarm object [1] [5]	1.001	1 bit	C, T
☐→	26 … 29	Extension module	Measuring value input 5 [3] [5]	9.0xx	2 bytes	C, T
☐→	26 … 29	Extension module	Measuring value input 5 [3] [5]	5.001	1 byte	C, T
☐→	30 … 37	Extension module	Limit value 1 input 1 [5]	1.001	1 bit	C, T
☐←	38 … 45	Extension module	External limit value 1 / 2 Input 5 … 8 [4] [5]	9.0xx	2 bytes	C, W
☐←	38 … 45	Extension module	External limit value 1 / 2 Input 5 … 8 [4] [5]	5.001	1 byte	C, W
☐→	46 … 49	Extension module	Open-circuit monitoring input 5 8 [2] [5]	1.001	1 bit	C, T

[1] Objects are visible only if the "Alarm analog input" or "Alarm extension module" parameter is set to "Transmit alarm bit".

[2] Objects are visible only if open-circuit monitoring is active for an input with a 4 … 20 mA signal.

[3] Objects can optionally transmit 8-bit values or 16-bit values depending on the setting of the "Transmit format …" parameter.

[4] Objects can optionally receive 8-bit values or 16-bit values depending on the setting of the "Format of external limit-value object …" parameter.

[5] Objects are visible only if the "Extension module available" parameter is set to "Yes".

Object description

◻➔	0, 25	Alarm object	1-bit object to indicate when on one of the inputs an overvoltage has been detected or when the voltage supply for external sensors has been overloaded. Object value = "0": no alarm Object value = "1": alarm
◻➔	1 … 4 26 … 29	Measuring value input...	1-byte object or 2-byte object for output of current measuring value.
◻➔	5 … 12 30 … 37	Limit value …	1-bit object to indicate when the limit values are exceeded or underrun.
◻↵	13 … 20 38 … 45	External limit value …	1-byte or 2-byte objects for limit value correction by other bus devices (e.g. touch sensor as value transmitter, visualization) These values overwrite the parameterized values.
◻➔	21 …25 46 … 49	Open-circuit monitoring	1-bit object for reporting whether a fault has occurred in the electrical connection of a sensor with 4 … 20 mA signal. The value of the object for open-circuit monitoring is presettable.

1 Functional Description

1.1 Measuring value settings

Among the most important settings is the decision, whether the measuring values are to be transmitted as 8-bit or as 16-bit values. The choice is basically dependent on the other devices working with the data. 8-bit values can be processed by many devices, although with limited resolution. 16-bit values are perfectly suited for display purposes, e.g. in visualization software. They have a significantly higher resolution.

These settings are made on the "Measuring value …" parameter filecard

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These settings are made on the "Measuring value …" parameter filecard

When 8-bit values are used, the following parameters are available: "Measuring value for 0% of measuring signal" and "Measuring value for 100% of measuring signal".

If the measuring values are to be transmitted as 8-bit values, an ouput value between 0 and 255 can be selected for the minimimum and the maximum value of the analog input range respectively. The minimum output value must be less than the maximum output value.

1.3 Transmission criteria

The values measured can be transmitted automatically after a value has changed or after a certain period has elapsed since the last telegram.

To prevent unnecessary loading of the bus, the parameter "Transmit measured value after a change by..." can be used to define how big the change must be for a telegram to be transmitted. The selection offered is "0.5%", "1%", "3%", "10%" and "no transmission".

If the measured values are to be transmitted cyclically, the cycle time is preset with the parameter "Cyclical transmission factor". In conjunction with the fixed base of 10 seconds, factors from 0 to 255 permit the selection of cycling times up to 42.5 minutes. Factor 0 means no cyclical transmission of measured values.

1.4 Limit values and hysteresis

For each analog measuring value, the analog input / analog sensor interface has two limit values which can be preset on the parameter filecard "Input …". For each limit value there is a parametrizable hysteresis with the possibility of fixing the response when the value is exceeded or not reached.

Example:
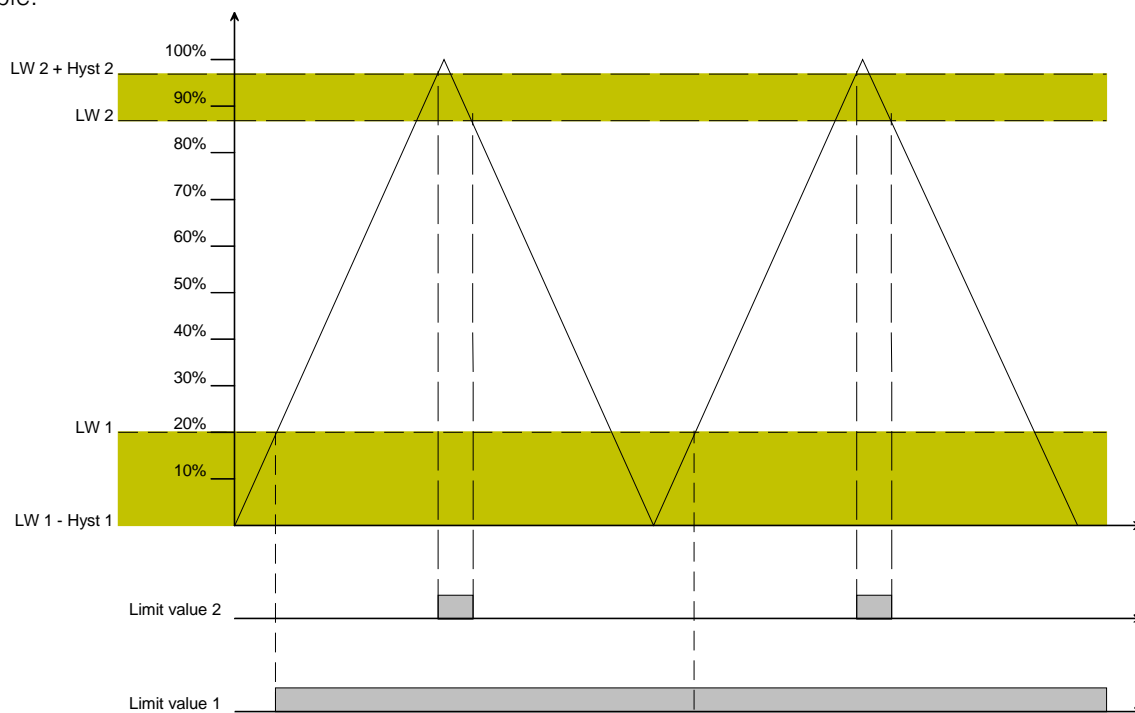
The limit values and the hysteresis characteristics are specified as a percentage of the full measuring range. When setting the limit values and the pertaining hysteresis, a safety margin of about 1% from the minimum value (0%) and from the maximum value (100%) should be observed. Or else the signals cannot underrun or exceed the respective thresholds. In this case, the limit-value object can transmit at maximum one telegram as shown for limit value 1.

1.5 External limit values

If the parameter "External limit-value object …" is set to "Yes", the ETS shows an additional communication object that can be used for changing the preset limit value during operation. The following parameter "External limit-value format …" determines whether 16-bit floating point values or 8-bit percentage values are to be transmitted to this communication object.

In both cases, it is necessary to limit the predefined values in the devices used as limit-value transmitters in such a way that in consideration of the hysteresis a corresponding safety margin is always ensured.

> An external value overwrites the internal value. Only after a new download of the project will the internal value be reactivated. A readout of the object values yields correct results only after data have been written into the objects at least once via the bus after a reset.

1.6 Alarm in case of overvoltage or overload

A common alarm object can be activated for the four inputs of the analog input / analog sensor interface in case of an overvoltage at an input or if an overload occurs at the terminal for the supply of the sensors. This communication object does not permit drawing conclusions on the direct cause of the fault.

If the analog input / analog sensor interface is connected to an analog input module, a separate alarm object is available for this extension module.

2 Connection of analog weather sensors

The analog input / analog sensor interface can also be connected to weather sensors sensing each a separate physical quantitiy. For these analog weather sensors, the following data point types of the communication objects are defined in the KNX standard:

Sensor	Unit	Data point type
Brightness	lux	9.004
Twilight	lux	9.004
Wind	m/s	9.005
Temperature	°C	9.001
Humidity	% r.h.	9.007
Air pressure	Pa	9.006

The parameter settings described in the following sections permit a simple adaptation to the respective measuring ranges. The limit and hysteresis values indicated are to be considered as typical examples which can be easily adapted to the special situation in the building.

2.1 Wind speed

For determination of the wind force, the wind sensor is equipped with a vane which is heated as a protection against icing. The measuring range of the sensor covers 0 … 40 m/s. For use with the analog input / analog sensor interface, the following parameters are recommended:

Parameter	Setting	corresponds to
Measuring value for 0% of the measuring signal:	0	0 m/s
Measuring value for 100% of the measuring signal:	4000	40 m/s
Measuring range factor:	0.01	
Limit value 1:	25 %	10 m/s
Hysteresis 1:	8 %	3.2 m/s
Limit value 2:	30 %	12 m/s
Hysteresis 2:	8 %	3.2 m/s

2.2 Brightness

The brightness sensor is equipped with a probe which is normally installed in vertical position in front of the building wall. The measuring range of the sensors covers 0 … 60,000 lux. For use with the analog input / analog sensor interface, the following parameters are recommended:

Parameter	Setting	corresponds to
Measuring value for 0% of the measuring signal:	0	0 lux
Measuring value for 100% of the measuring signal:	+6000	60000 lux
Measuring range factor:	10	
Limit value 1:	33%	20000 lux
Hysteresis 1:	5%	3000 lux
Limit value 2:	83%	50000 lux
Hysteresis 2:	5%	3000 lux

2.3 Twilight

The twilight sensor is equipped with a probe which is normally installed in vertical position in front of the building wall. The measuring range of the sensors covers 0 … 255 lux. For use with the analog input / analog sensor interface, the following parameters are recommended:

Parameter	Setting	corresponds to
Measuring value for 0% of the measuring signal:	0	0 lux
Measuring value for 100% of the measuring signal:	+25500	255 lux
Measuring range factor:	0,01	
Limit value 1:	40 %	100 lux
Hysteresis 1:	10 %	25 lux
Limit value 2:	80 %	200 lux
Hysteresis 2:	10 %	25 lux

2.4 Temperature

The temperature sensor senses the temperature of the ambient air. The measuring range of the sensor extends from –30 to +70 °C. For use with the analog input / analog sensor interface, the following parameters are recommended:

Parameter	Setting	corresponds to
Measuring value for 0% of the measuring signal:	–3000	–30°C
Measuring value for 100% of the measuring signal:	+7000	+70°C
Measuring range factor:	0,01	
Limit value 1:	30 %	0 °C
Hysteresis 1:	2 %	2 K
Limit value 2:	35 %	5 °C
Hysteresis 2:	2 %	2 K

2.5 Rain

The rain sensor is equipped with a meandering conductor track and evaluates the conductivity of rain water. For use with the analog input / analog sensor interface, the following parameters are recommended:

Parameter	Setting	corresponds to
Measuring value for 0% of the measuring signal:	0	
Measuring value for 100% of the measuring signal:	+1000	
Measuring range factor:	0,01	
Limit value 1:	60 %	Regen
Hysteresis 1:	20 %	Kein Regen
Limit value 2:		
Hysteresis 2:		

Contrary to the other weather sensors, the rain detector does not supply analog measuring values but toggles between 0 volt and 10 volts so that displaying an analog value makes no sense. For this reason, the object "Measuring value" should not transmit neither in case of a change at the input nor cyclically.

The settings for 0% of the measuring range, 100% of the measuring range and the measuring range factor are necessary for the limit value detection to function properly. The suggested parameters for the limit value ensure that the switching threshold is always safely detected.

2.6 Humidity

The humidity sensor senses the relative humidity of the air and the room temperature. Both measuring values are made available in the form of analog voltages. The measuring ranges of the sensor extend from 0 to 100 % of relative humidity and from –30 to +70 °C. For use with the analog input / analog sensor interface, the following parameters are recommended:

Parameter	Setting	corresponds to
Measuring value for 0% of the measuring signal:	0	0 % r. h.
Measuring value for 100% of the measuring signal:	10000	100 % r. h.
Measuring range factor:	0,01	
Limit value 1:	40 %	40 % r. h.
Hysteresis 1:	5 %	5 % r. h.
Limit value 2:	70 %	70 % r. h.
Hysteresis 2:	5 %	5 % r. h.
Measuring value for 0% of the measuring signal:	–3000	–30°C
Measuring value for 100% of the measuring signal:	+7000	+70°C
Measuring range factor:	0,01	
Limit value 1:	50 %	20 °C
Hysteresis 1:	2 %	2 K
Limit value 2:	55 %	25 °C
Hysteresis 2:	2 %	2 K

2.7 Air pressure

For an air pressure sensor with an input range of 70.000 … 120.000 Pa which is converted to 0 … 10 volts, the following parameters are recommended for use with the analog input / analog sensor interface:

Parameter	Setting	corresponds to
Measuring value for 0% of the measuring signal:	7000	700 hPa
Measuring value for 100% of the measuring signal:	12000	1200 hPa
Measuring range factor:	10	
Limit value 1:	60 %	1000 hPa
Hysteresis 1:	2 %	10 hPa
Limit value 2:	64 %	1020 hPa
Hysteresis 2:	4 %	20 hPa

3 Connection of an analog input module

An analog input module permits enlarging the number of analog sensors from four to eight.

3.1 Settings of the analog input module

The device software offers the same settings for the four channels of the analog input module as for the four inputs of the analog input.

A common alarm object can be activated for all inputs of the analog input module. This object is activated, for instance, in case of an overvoltage at one of inputs or if an overload occurs at the terminal for the supply of the sensors. This communication object does not permit drawing conclusions on the direct cause of the fault.

3.2 Electrical connection

During the installation of an analog input module, the following points must be observed:

- Only one analog input module can be connected to the device.

- If defective, an analog input module can be replaced by one of the same type while the system is in operation (disconnect voltage supply from module!). After the replacement, the analog input makes a reset after abt. 25 s.. This action re-initializes all inputs and outputs and resets them to their original state.

- Removal or addition of modules without adapting the project and subsequent downloading into the analog input is not permitted as this will result in system malfunctions.

- The U_s and GND terminals of the analog input module must not be connected to the corresponding terminals of another device, e.g. of the analog input, to prevent problems caused by ground loops.

- Sensors connected to the inputs of the analog input module must not get their power supply from the analog input. Sensors connected to the inputs of the analog input must not get their power supply from the analog input module.

4 Commissioning

The analog input / analog sensor interface is programmed with the help of the ETS.

Initialization / status indication

After switching on the device for the first time the analog input / analog sensor interface starts a module scan (status LED: "Orange / on"). As a new device comes by default without configuration, the status LED switches thereafter to "Red / flashing fast".

A connected analog input module shows that it is ready for operation by setting its own status LED to "Flashing fast".

After downloading a project into the analog input/ analog sensor interface, the status LED shows "Green / on". The module switches its own status LED off.

Parameter		
Description	**Values**	**Remarks**
📁 General parameters		
Signal input …	No sensor	This parameter determines whether a sensor and which sensor is connected to one of the inputs.
	Sensor 0 … 10V Sensor 0 … 1V Sensor 0 … 20mA Sensor 4 … 20mA	The format and the scaling factor of the measuring values for the sensor types can be set on a special parameter filecard.
		On another filecard, two limit values per input and the response when exceeded or underrun can be adjusted.
Open-circuit detection	**No detection** continuity = 0, open-circuit = 1 continuity = 1, open-circuit = 0	When a sensor with 4 … 20mA ouput is used, this parameter permits reporting if the electrical connection is interrupted. This is done by enabling a 1-bit communication object.
Alarm analog input	**No transmission** Transmit alarm bit	An alarm message can be transmitted if the device detects a fault in one of the analog inputs or in the sensor supply. When the parameter is set to "Transmit alarm bit", the "Alarm object" is activated.
Extension module	**No** Yes	This parameter determines whether an analog input module is used in addition. In this case, further parameter cards and communication objects for the four inputs of the extension module are activated.
📁 Extension module		
Signal input …	No sensor	The parameter determines whether a sensor is connected to one of the inputs and what type of sensor.
	Sensor 0 … 10V Sensor 0 … 1V Sensor 0 … 20mA Sensor 4 … 20mA	The format and scaling of the measuring values for the sensor types can be adjusted on a special parameter filecard. Two limit values per input can be fixed and the reactions when exceeded and when not reached be defined on another card.
Alarm extension module	No transmission Transmit alarm bit	An alarm can be transmitted, if the device detects a fault in one of the four analog inputs or in the supply of the sensors. If the parameter is set to "Transmit alarm bit" the "alarm object" is activated.

📂	Measuring value	
Measuring value transmission format	**16-bit EIS5** 8-bit EIS6	The parameter defines whether the measuring values of this input are transmitted in the form of signed floating point numbers or as unsigned relative values. Depending on this parameter, further parameters for the adaptation and scaling of measuring values are shown.
Measuring value format = 16-bit value		
Measuring value for 0% of measuring signal Measuring value for 100% of measuring signal Measuring range scaling factor	-32768 … (**0**) … 32767 -32768 … (**1000**) … 32767 **x 0.01** x 0.1 x 1 x 10 x 100	With the three parameters "Measuring value for 0%", " Measuring value for 100%" and "Factor" of measuring range, the analog input / analog sensor interface can adapt itself to the actual measuring range of the sensor used. To achieve a high resolution, the two base values should be selected in such a way that a good coverage of the measuring range of the sensor is obtained with a scaling factor as low as posssible
Measuring value format = 8-bit value		
Base value 0% of measuring value Base value 100% of measuring value	**0** … 255 0 … **255**	With these two parameters, the analog input / analog sensor interface can convert the analog input signal to value range of the 1-byte communication object.
Transmit measuring value in the event of a change by...	No transmission 0.5% 1% **3%** 10%	The parameter defines the percentage of change required with respect to the previous object value for the new value to be transmitted. In a sensor with a measuring range extending from 0 … 10V, a measuring value difference of 3% corresponds to 0.3V. When the last telegram had a value of 4V, a new telegram will be transmitted when the actual measuring value is below 3.7V or above 4.3V. If "No transmission" is selected, the measuring value is transmitted only cyclically or after a WRITE request.
Measuring value cyclical transmission factor (base 10s, 0 = no cyclical transmission)	**0** … 120	The parameter fixes the time after which the actual measuring value is being transmitted, even if the difference with the respect to the previous value has not yet been reached. In the "0" standard setting, the measuring value is not transmitted cyclically.

📁	Input …		

Limit value … (in % of measuring range)
 	
Limit value hysteresis …
 	
Limit value (LV) activation …
	0 … 100%
	
	0 … 100%
	
	above LV = ON,
	    below LV-hysteresis = OFF
	above LV = OFF,
	    below LV-hysteresis = ON
	below LV = ON,
	    above LV+hysteresis = OFF
	below LV = OFF
	    above LV+hysteresis = ON
		These three parameters define the thresholds which – when exceeded or underrun – generate the corresponding switching telegrams.
		
		To make sure the thresholds can be safely execceded or underrun it is necessary to respect a reasonable safety margin from the extreme values of 0% and 100% when selecting the limit values and the hysteresis.	

External limit value object LV …	Yes **No**	The parameter defines whether an object for external change of the limit value is to be activated.	
Format of external limit value object LV …	**16-bit EIS5** 8-bit EIS6	The parameter enables either a 2-byte or a 1-byte object which permits changing the limit value while in operation.	
Limit value cyclical transmission factor (base 10s, 0 = no cyclical transmission)	**0** … 120	The parameter fixes the time after which the actual limit value is being transmitted. In the "0" standard setting, the limit value is not transmitted cyclically.	