

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

Use of the application program

Product family: Input/Output
Product type: Binary/Analogue
Manufacturer: Siemens

Name: Universal I/O unit N 670
Order no.: 5WG1 670-1AB03

1. Functional description	1
1.1 Analogue output	1
1.2 Binary output	1
1.3 Analogue input	2
1.1 Binary input	2
1.4 Explanation of threshold value and hysteresis	2
1.5 PT1000 sensor inputs	2
1.6 Relay	2
1.7 Group addresses and associations	2
2. Parameters and communication objects	3
2.1 General: Parameters	3
2.2 Analogue output: Communication objects	3
2.2.1 Analogue output: Parameters	3
2.3 Binary output: Communication objects	4
2.3.1 Binary output: Parameters	5
2.4 Analogue input: Communication objects	6
2.4.1 Analogue input: Parameters	7
2.4.2 Input A Thresholds: Parameters	8
2.5 Binary input: Communication objects	9
2.5.1 Binary input: Parameters	9
2.6 PT1000 sensor inputs: Communication objects	12
2.6.1 Sensor A: Parameters	13
2.6.2 Sensor A Thresholds: Parameters	14
2.7 Relay: Communication objects	15
2.7.1 Relay A: Parameters	15

1. Functional description

All the functions of the universal I/O unit N 670 can be set using the application program "20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501". When the universal terminals are parameterised in ETS, only the parameters and communication objects that correspond to the functionality of the universal terminal are displayed; e.g. communication objects for analogue threshold values are only displayed if "analogue input" has been selected. Objects can also have different types or object numbers can have multiple assignments.

Further parameters and objects for the temperature sensors are only displayed in ETS if "enabled" has been selected in the parameter "Evaluation". Parameters and communication objects are always available for the relays.

The following should be noted for all the object values that are established by the unit (e.g. analogue input voltage, binary input value, threshold switches etc.): The actual instantaneous value of the input variable is only contained in telegrams which the I/O unit sends itself (cyclically or after a change). If the object value is queried externally (e.g. using a bus monitor, "Object value read" or "Send on request"), a value is returned from the bus coupler of the unit which can differ from the current value (e.g. the applied voltage).

The reason for this possible deviation is that the value that has been stored temporarily in the bus coupler has been received. This value is only updated after each transmission process and otherwise every 5 seconds (without the value being sent).

1.1 Analogue output

Analogue voltages in a range of 0-10 V can be output for example to operate continuous air damper mechanisms. The upper and lower limits of the output voltage can be parameterised. It is also possible to specify setpoint values for bus voltage failure and recovery. The analogue output can only supply the correct voltage to passive loads.

1.2 Binary output

A universal I/O unit with the functionality of a binary output can be used for a switch function with an additional override switch; e.g. for controlling an external monostable relay. The voltage levels that are assigned for the switching values can be adjusted. It is also possible to assign parameters to the behaviour on bus voltage failure and recovery (or after a reset of the unit's bus coupler e.g. during programming with ETS). The binary output can only supply the correct voltage to passive loads. The parameterisation and the objects for the binary output are similar to those used in the application program "11 A4 Binary 540101".

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

1.3 Analogue input

Analogue voltages in a range of 0-10 V which can be supplied e.g. by sensors with corresponding interfaces, are measured and made available on the bus as EIS 5020 or EIS 6 values.

The generation of telegrams can be event-driven or time-dependent.

The monitoring of 2 threshold values with corresponding threshold switch objects is also possible. It is possible to send the threshold switches cyclically together with the voltage value; otherwise any overrange or underflow in the threshold values are reported immediately, depending on the parameters assigned.

When measuring the voltage, the input resistance at the terminals should be observed.

1.1 Binary input

If the function of "binary input" is assigned, it is possible for example to detect signalling contacts with a scanning voltage of up to 10 V, whereby the scanning voltage is supplied from an external power source. The binary 0/1 differential of the voltage level as well as the debounce time can be parameterised.

A distinction must be made between the signal status (high or low detection) and the switching value of the communication object (ON or OFF) to understand the function. Various switching value changes can be assigned to the signal events via the parameter "Edge evaluation" (e.g. a change from low to high detection leads to switching value OFF while a change from high to low detection does not change the switching value).

A change in the level at the input can trigger the sending of telegrams. It is also possible to send the telegrams cyclically in a set time reference. A sending filter determines whether only ON, only OFF or both switching status appear cyclically on the bus.

The parameterisation and the objects for the binary input are based on those used in the application program "11 S4 BinCycl 240504".

1.4 Explanation of threshold value and hysteresis

The following statement is used to interpret the terms "threshold value" and "hysteresis" for the universal I/O unit:

- The value is considered above the threshold, if the voltage exceeds the value determined by the threshold
- The value is considered below the threshold, if the voltage falls below the value determined by the threshold minus the hysteresis

When the unit is started, the initial determination of an underflow or an overrange in the threshold value is always calculated without a hysteresis.

It must be noted when assigning parameter settings that the threshold minus the hysteresis may not be less than

the smallest possible measured value. For example, if the threshold value is set at 1 V and the hysteresis at 2 V, there would only be an underflow in the threshold value at -1 V. Since however in this case the smallest possible measured value is 0 V, this status could never be achieved and the threshold switch would never be reset.

1.5 PT1000 sensor inputs

The universal I/O unit enables the connection of PT1000 temperature sensors via a two-wire cable. The sensors thus receive a pulsed current. The resistance and temperature are determined from the voltage that is set at the input. The temperature range of -25 to 45°C is detected with a resolution of 0.1 K and an accuracy of $\pm 0.5^\circ\text{C}$.

The temperature value is made available on the bus as an EIS 5001 object, whereby transmission telegrams can be generated cyclically or after a change in temperature by an adjustable value.

The monitoring of 2 threshold values with corresponding threshold switch objects is also possible. The threshold values can be dynamically modified via an EIB object. It is also possible to send the threshold switches cyclically together with the temperature value; otherwise any overrange or underflow in the threshold values are reported immediately, depending on the parameters assigned.

1.6 Relay

There are two bistable, high-capacity relays in the universal I/O unit which can be used for pure switch functions and for switching with an override switch. It is possible to assign parameters to the behaviour on bus voltage failure and recovery (or after a reset of the unit's bus coupler e.g. when programming with ETS). It is also possible to assign the relay mode of normally open or normally closed contact to the value of the corresponding communication object.

1.7 Group addresses and associations

Max. number of group addresses:	40
Max. number of associations:	40

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

2. Parameters and communication objects

2.1 General: Parameters

General	Input/Output A	Input/Output B	Sensor A	Sensor B	Relay A	Relay B
Limit number of telegrams	enabled					
Maximum telegram rate	127 telegrams per 17 sec					

Parameters	Settings
Limitation of telegram rate	disabled enabled
Using this parameter, it is possible to limit the number of telegrams that are sent per time period so that e.g. a defective push button does not generate uninterrupted switching commands. "disabled": The number of telegrams that are sent per time period is not limited. "enabled": It is possible to limit the telegram rate which is set in the parameter "Maximum telegram rate".	
Maximum telegram rate	30 telegrams per 17 sec 60 telegrams per 17 sec 100 telegrams per 17 sec 127 telegrams per 17 sec
The maximum telegram rate per 17 seconds can be set here.	

2.2 Analogue output: Communication objects

Phys. Addr.		Program	
no.	Function	Object name	Type
01.01.102	20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501		
0	16-bit Value (EIS 5020)	Voltage, Output A	2 Byte
3	16-bit Value (EIS 5020)	Voltage, Output B	2 Byte
...

Note:

The view of the objects can be arranged individually i.e. this view can vary.

Obj	Function	Object name	Type	Flag
0	16-bit Value (EIS 5020)	Voltage, Output A	2 Byte	CRWTU
This object is assigned to terminal A as an analogue output. The object value represents the voltage applied at the output. The type of the object can be selected as EIS 5020 or EIS 6.				
3	16-bit Value (EIS 5020)	Voltage, Output B	2 Byte	CRWTU
This object is assigned to terminal B as an analogue output. The object value represents the voltage applied at the output. The type of the object can be selected as EIS 5020 or EIS 6.				

2.2.1 Analogue output: Parameters

General	Input/Output A	Input/Output B	Sensor A	Sensor B	Relay A	Relay B
Operating mode	Output analogue					
Type of communication object no. 0	Voltage in mV (EIS 5020)					
Minimum output voltage unit mV (0-10000)	0					
Maximum output voltage unit mV (0-10000)	10000					
Value on bus voltage failure unit mV (0-10000, 0: no change)	0					
Value on bus voltage recovery unit mV (0-10000, 0: no change)	0					
Behaviour on bus voltage recovery	no action					

The parameters and settings of the parameter windows "Input/Output A" and "Input/Output B" are identical.

Parameters	Settings
Operating mode	not used Output analogue Output binary Input analogue Input binary
This parameter specifies the function of the terminals of the universal I/O unit. Only the relevant parameters and communication objects are displayed, depending on the setting selected. "not used": The terminal is deactivated. "Output analogue": The terminal is switched as an analogue output. "Output binary": The terminal is switched as a binary output. "Input analogue": The terminal is switched as an analogue input. "Input binary": The terminal is switched as a binary input.	
Type of communication object no. 0	Voltage unit mV (EIS 5020) Percent (0...100%, EIS 6)
This parameter determines the format of the voltage value at the analogue output when it is made available on the bus (object no. 0 or object no. 3): "Voltage unit mv (EIS 5020)": The voltage value is of type EIS 5020 with the unit mV. For example an EIS 5020 value of 500.16 (2E1Bh) corresponds to a voltage of 0.50 volts. "Percent (0...100%, EIS 6)": The voltage that is applied in a range between the minimum and maximum output voltage is shown as a linear value in the EIS 6 range from 1 to 255. This produces the following correlation: $U = \text{lower limit} + ((\text{upper limit} - \text{lower limit}) * (x-1)/254).$ A sending value of 0 disconnects the output voltage. It should further be noted that the nominal resolution of 8 bit (value range of 1...255) can possibly no longer be achieved with small detectable voltage ranges (i.e. the differential between the upper and lower limit of the output voltage). The effective resolution of the device is approx. 15 mV, so that a voltage range of $255 \times 15 \text{ mV} = 3.8 \text{ V}$ can still be triggered with 8 bit. A range of 1 V would though only be triggered with approx. 66 steps.	

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

Parameters	Settings
Minimum output voltage unit mV (0-10000)	0
<p>A lower limit for the output voltage is determined in this parameter. The value is indicated in mV. Telegrams which set lower values assign the value that is specified here to the output voltage.</p> <p>Exception: The parameters "Value on bus voltage failure" and "Value on bus voltage recovery" are not governed by this limit.</p> <p>The value that is entered here must always be smaller than the specified upper limit. Moreover it must also be noted that there will be a reduction in the resolution if the voltage range (differential between the upper and lower limit) is too small.</p>	
Maximum output voltage unit mV (0-10000)	10000
<p>An upper limit for the output voltage is determined in this parameter. The value is indicated in mV. Telegrams which set higher values assign the value that is specified here to the output voltage.</p> <p>Exception: The parameters "Value on bus voltage failure" and "Value on bus voltage recovery" are not governed by this limit.</p> <p>The value that is entered here must always be greater than the specified lower limit. Moreover it must also be noted that there will be a reduction in the resolution if the voltage range (differential between the upper and lower limit) is too small.</p>	
Output voltage for 0% unit mV (0-10000)	0
<p>The lower limit of the output voltage is set here which corresponds to the EIS 6 scaling of "0%" (8 bit value = 1). Output voltages that are smaller than the lower limit that is indicated here are likewise sent as "0%".</p> <p>This parameter is only visible if the parameter "Type of communication object no. 0" has been set to "Percent (0...100%, EIS 6)".</p>	
Output voltage for 100% unit mV (0-10000)	10000
<p>The upper limit of the output voltage is set here which corresponds to the EIS 6 scaling of "100%" (8 bit value = 255). Output voltages that are larger than the upper limit that is indicated here are likewise sent as "100%".</p> <p>This parameter is only visible if the parameter "Type of communication object no. 0" has been set to "Percent (0...100%, EIS 6)".</p>	
Value on bus voltage failure unit mV (0-10000; 0: no change)	0
<p>The voltage value that will be assigned on bus voltage failure is set here. If 0 is selected, the last specified value is maintained. The smallest parameter value that can be assigned for the output voltage on bus voltage failure is therefore 1 which corresponds to a voltage of 1 mV.</p> <p>This value is not governed by the specified upper and lower limit of the output voltage.</p>	

Parameters	Settings
Value on bus voltage recovery unit mV (0-10000; 0: no change)	0
<p>The voltage value that will be assigned on bus voltage recovery is set here. If 0 is selected, the last specified value is maintained. The smallest parameter value that can be assigned for the output voltage on bus voltage failure is therefore 1 which corresponds to a voltage of 1 mV.</p> <p>This value is not governed by the specified upper and lower limit of the output voltage.</p> <p>If the external supply to the unit fails and recovers but the bus voltage is maintained, the value for the output voltage that remained in the bus coupler is assigned.</p>	
Behaviour on bus voltage recovery	no action send value
The parameter controls the initial sending of the voltage value that is specified at the output on bus voltage recovery.	

2.3 Binary output: Communication objects

Phys. Addr.	Program	no.	Function	Object name	Type
01.01.102	20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501	0	On / Off	Switch, Output A	1 Bit
		1	2-bit Value (EIS 8)	Positive drive, Output A	2 Bit
		3	On / Off	Switch, Output B	1 Bit
		4	2-bit Value (EIS 8)	Positive drive, Output B	2 Bit
...

Note:

The view of the objects can be arranged individually i.e. this view can vary.

Obj	Function	Object name	Type	Flag
0	On / Off	Switch, Output A	1 Bit	CWRTU
<p>This object is assigned to terminal A as a binary output. The switching telegrams are sent via the group addresses in this object.</p> <p>If the Positive drive is active (object no. 1), the switching information in this object has no meaning.</p>				
1	2-bit Value (EIS 8)	Positive drive, Output A	2 Bit	CWTU
<p>This object is assigned to terminal A as a binary output. The switching telegrams for the Positive drive of output A are received via the group addresses in this object. The Positive drive is not active if the object value is 0 or 1. Switching object no. 0 determines the switching status. Object value 2 switches off with priority control while object value 3 switches on with priority control. This Positive drive the status selected via switch object 0. Deactivation of the override switch with the value 1 or 0 causes the output to be switched according to the status that was specified by switch object 0.</p>				

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

Obj	Function	Object name	Type	Flag
3	On / Off	Switch, Output B	1 Bit	CWRTU
<p>This object is assigned to terminal B as a binary output. The switching telegrams are sent via the group addresses in this object.</p> <p>If the Positive drive is active (object no. 4), the switching information in this object has no meaning.</p>				
4	2-bit Value (EIS 8)	Positive drive, Output B	2 Bit	CWTU
<p>This object is assigned to terminal B as a binary output. The switching telegrams for the Positive drive of output B are received via the group addresses in this object. The Positive drive is not active if the object value is 0 or 1. Switching object no. 3 determines the switching status. Object value 2 switches off with priority control while object value 3 switches on with priority control. This Positive drive the status selected via switch object 3. Deactivation of the Positive drive switch with the value 1 or 0 causes the output to be switched according to the status that was specified by switch object 3.</p>				

2.3.1 Binary output: Parameters

General	Input/Output A	Input/Output B	Sensor A	Sensor B	Relay A	Relay B
Operating mode		Output binary				
Output voltage for Off unit mV (0-10000)		0				
Output voltage for On unit mV (0-10000)		10000				
Behaviour on bus voltage failure		no action				
Behaviour on bus voltage recovery		no action				
Behaviour on bus voltage recovery (initial value)		no action				

The parameters and settings of parameter windows "Input/Output A" and "Input/Output B" are identical.

Parameters	Settings
Operating mode	not used Output analogue Output binary Input analogue Input binary
<p>This parameter specifies the function of the terminals of the universal I/O unit. Only the relevant parameters and communication objects are displayed, depending on the setting selected.</p> <p>"not used": The terminal is deactivated.</p> <p>"Output analogue": The terminal is switched as an analogue output.</p> <p>"Output binary": The terminal is switched as a binary output.</p> <p>"Input analogue": The terminal is switched as an analogue input.</p> <p>"Input binary": The terminal is switched as a binary input.</p>	

Parameters	Settings
Output voltage for Off unit mV (0-10000)	0
The output voltage for Off is defined in terms of its value in mV e.g. the value 500 represents a voltage of 0.5 volts.	
Output voltage for On unit mV (0-10000)	10000
The output voltage for On is defined in terms of its value in mV e.g. the value 5000 represents a voltage of 5.00 volts.	
Behaviour on bus voltage failure	no action switch off switch on
<p>The behaviour of the output voltage on bus voltage failure can be set here.</p> <p>"no action": The output voltage maintains its instantaneous value.</p> <p>"switch off": The output voltage with switching value Off is selected.</p> <p>"switch on": The output voltage with switching value On is selected.</p>	
Behaviour on bus voltage recovery	no action switch off switch on
<p>The behaviour of the output voltage on bus voltage recovery or after a reset of the bus coupler can be set here. In the setting "no action", the output voltage maintains its instantaneous value provided of course that the 24 V supply is also maintained. After a complete restart i.e. failure and recovery of both the unit and the bus voltage, the output voltage always takes on the level for switching value Off.</p> <p>If "switch off" or "switch on" are selected, the output voltage with switching value Off or On is selected.</p> <p>Regardless of the setting that is selected here, it must be ensured that the relevant communication object only has the correct value on bus voltage recovery if its initial value is sent.</p>	
Behaviour on bus voltage recovery (initial value)	no action send value
The parameter controls the initial sending of the switching value that is specified on bus voltage recovery.	

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

2.4 Analogue input: Communication objects

Phys. Addr.		Program	
no.	Function	Object name	Type
01.01.102	20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501		
0	16-bit Value (EIS 5020)	Voltage, Input A	2 Byte
1	On / Off	Threshold switch 1, Input A	1 Bit
2	On / Off	Threshold switch 2, Input A	1 Bit
3	16-bit Value (EIS 5020)	Voltage, Input B	2 Byte
4	On / Off	Threshold switch 1, Input B	1 Bit
5	On / Off	Threshold switch 2, Input B	1 Bit
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Note:

The view of the objects can be arranged individually i.e. this view can vary.

Obj	Function	Object name	Type	Flag
0	16-bit Value (EIS 5020)	Voltage, Input A	2 Byte	CRTU
This communication object is assigned to terminal A as an analogue input. The type of the object can be selected as EIS 5020 or EIS 6 (via parameter "Type of communication object no. 0"). The object value represents the voltage applied at the input.				
1	On / Off	Threshold switch 1, Input A	1 Bit	CRTU
This object detects whether there is an overrange or underflow of threshold value 1, whereby it is possible to specify the value that is sent when the threshold is exceeded (On or Off) (via parameter "Threshold switch 1: sent values if input is above threshold 1"). Any change in the status of the threshold switch is immediately sent to the bus according to the conditions specified in the parameter "Threshold switch 1: send condition". It is also possible to send the status cyclically via the parameter "Cyclical sending of threshold switches".				
2	On / Off	Threshold switch 2, Input A	1 Bit	CRTU
This object detects whether there is an overrange or underflow of threshold value 2, whereby it is possible to specify the value that is sent when the threshold is exceeded (On or Off) (via parameter "Threshold switch 2: sent values if input is above threshold 2"). Any change in the status of the threshold switch is immediately sent to the bus according to the conditions specified in the parameter "Threshold switch 2: send condition". It is also possible to send the status cyclically via the parameter "Cyclical sending of threshold switches".				

Obj	Function	Object name	Type	Flag
3	16-bit Value (EIS 5020)	Voltage, Input B	2 Byte	CRTU
This communication object is assigned to terminal B as an analogue input. The type of the object can be selected as EIS 5020 or EIS 6 (via parameter "Type of communication object no. 0"). The object value represents the voltage applied at the input.				
4	On / Off	Threshold switch 1, Input B	1 Bit	CRTU
This object detects whether there is an overrange or underflow of threshold value 1, whereby it is possible to specify the value that is sent when the threshold is exceeded (On or Off) (via parameter "Threshold switch 1: sent values if input is above threshold 1"). Any change in the status of the threshold switch is immediately sent to the bus according to the conditions specified in the parameter "Threshold switch 1: send condition". It is also possible to send the status cyclically via the parameter "Cyclical sending of threshold switches".				
5	On / Off	Threshold switch 2, Input B	1 Bit	CRTU
This object detects whether there is an overrange or underflow of threshold value 2, whereby it is possible to specify the value that is sent when the threshold is exceeded (On or Off) (via parameter "Threshold switch 2: sent values if input is above threshold 2"). Any change in the status of the threshold switch is immediately sent to the bus according to the conditions specified in the parameter "Threshold switch 2: send condition". It is also possible to send the status cyclically via the parameter "Cyclical sending of threshold switches".				

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

2.4.1 Analogue input: Parameters

Relay A		Relay B	
General	Input/Output A	Input/Output B	Sensor A
Operating mode		Input analogue	
Type of communication object no. 0		Voltage in mV (EIS 5020)	
Send behaviour: send on change at input		disabled	
Cyclical sending		disabled	
Behaviour on bus voltage recovery		no action	

The parameters and settings of the parameter windows "Input/Output A" and "Input/Output B" are identical.

Parameters	Settings
Operating mode	not used Output analogue Output binary Input analogue Input binary
<p>This parameter specifies the function of the terminals of the universal I/O unit. Only the relevant parameters and communication objects are displayed, depending on the setting selected.</p> <p>"not used": The terminal is deactivated.</p> <p>"Output analogue": The terminal is switched as an analogue output.</p> <p>"Output binary": The terminal is switched as a binary output.</p> <p>"Input analogue": The terminal is switched as an analogue input.</p> <p>"Input binary": The terminal is switched as a binary input.</p>	
Type of communication object no. 0	Voltage in mV (EIS 5020) Percent (0...100%, EIS 6)
<p>This parameter determines the format of the voltage value at the analogue input when it is made available on the bus:</p> <p>"Voltage in mV (EIS 5020)": The voltage value is of type EIS 5020 with the unit mV. An EIS 5020 value of 500.16 (2E1Bh) for example corresponds to a voltage of 0.50 volts.</p> <p>"Percent (0...100%, EIS 6)": The voltage that is applied in a range between the lower limit (0%) and the upper limit (100%) is shown as a linear value in the EIS 6 range from 1 to 255. This produces the following correlation:</p> $e = (254 * (U_{in} - \text{lower limit}) / (\text{upper limit} - \text{lower limit})) + 1$ <p>if "e" denotes the EIS 6 value. The smallest possible value is thus 1, a 0 value is not achieved. Voltage values above or below the set limits are sent as 100% or 0% values respectively.</p> <p>It should further be noted that the nominal resolution of 8 bit can possibly no longer be achieved with small detectable voltage ranges (i.e. the differential between the upper limit and the lower limit of the input voltage). The effective resolution is approx. 15 mV, so that a voltage range of $255 \times 15 \text{ mV} = 3.8 \text{ V}$ is still triggered with 8 bit. A range of 1 V would though only be triggered with approx. 66 steps.</p>	

Parameters	Settings
Input voltage for 0% unit mV (0-10000)	0
<p>The lower limit of the input voltage is set here which corresponds to the EIS scaling of "0%" (8 bit value = 1). Input voltages that are smaller than the lower limit that is indicated here are likewise sent as "0%".</p> <p>This parameter is only visible if the parameter "Type of communication object no. 0" has been set to "Percent (0...100%, EIS 6)".</p>	
Input voltage for 100% unit mV (0-10000)	10000
<p>The upper limit of the input voltage is set here which corresponds to the EIS scaling of "100%" (8 bit value = 255). Input voltages that are larger than the upper limit that is indicated here are likewise sent as "100%".</p> <p>This parameter is only visible if the parameter "Type of communication object no. 0" has been set to "Percent (0...100%, EIS 6)".</p>	
Send behaviour: send on change at input	disabled enabled
<p>This parameter defines whether the voltage value is sent if it has been modified since the last time it was sent. If "disabled" is selected, the voltage value is not sent after a change. In the setting "enabled", if the voltage value has changed by at least the selected value, a telegram is generated with the new value.</p>	
Voltage change for sending unit mV (50-10000)	1000
<p>The necessary change in the value is indicated in mV which is the minimum requirement for the parameter "Send behaviour: send on change at input".</p> <p>If the parameter "Send behaviour: send on change at input" is set to "disabled", the input screen for this parameter is not displayed.</p>	
Cyclical sending	disabled enabled
<p>It is determined via this parameter whether the voltage value should be continually sent to the bus according to the interval for cyclical sending. The setting that is selected here also applies to the cyclical sending of the threshold switches.</p> <p>If "disabled" is selected, no telegrams are sent cyclically. The threshold switches are also not sent cyclically.</p> <p>If "enabled" is selected, the object value is sent cyclically to the bus with the set cyclic time. The threshold switches are also sent cyclically if the relevant settings are selected in the parameters "Threshold switch 1: send condition" or "Threshold switch 2: send condition".</p>	
Interval for cyclical sending unit seconds (1-65535)	5
<p>The telegrams for the voltage value at the input and for the threshold switches are sent continually to the bus according to the cyclic time that is specified here in seconds.</p> <p>If the parameter "Cyclical sending" is set to "disabled", the input screen for this parameter is not displayed.</p>	

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

Parameters	Settings
Cyclical sending of threshold switches	disabled enabled
<p>This parameter determines under which conditions the threshold switches that are assigned to thresholds 1 and 2 are sent cyclically together with the value of the input voltage. If "disabled" is selected, the threshold switches are not sent cyclically. If "enabled" is selected, the threshold switches are sent cyclically provided that this option is not restricted in the parameters "Threshold switch 1: send condition" and "Threshold switch 2: send condition". If the parameter "Cyclical sending" is set to "disabled", the input screen for this parameter is not displayed. The threshold switches are therefore only sent after a change in status under the conditions set in the parameter "Threshold switch x: send condition" on the parameter page "Input A (B) Thresholds".</p>	
Behaviour on bus voltage recovery	no action send value
<p>This parameter controls the sending of the input value and threshold switches on bus voltage recovery.</p> <p>"no action": Neither the input value nor the threshold switches are sent.</p> <p>"send value": The voltage value and the status of the threshold switch of the respective input are sent once to the bus on bus voltage recovery.</p>	

2.4.2 Input A Thresholds: Parameters

Relay A		Relay B	
General	Input/Output A	Input/Output B	Sensor A
Input A Thresholds			
Threshold 1: evaluation		enabled	
Threshold 1: voltage unit mV (50-10000)		5000	
Threshold 1: hysteresis unit mV (50-10000)		1000	
Threshold switch 1: sent values if input is above threshold 1		On	
Threshold switch 1: send condition		above or below threshold	
Threshold 2: evaluation		enabled	
Threshold 2: voltage unit mV (50-10000)		5000	
Threshold 2: hysteresis unit mV (50-10000)		1000	
Threshold switch 2: sent values if input is above threshold 2		On	
Threshold switch 2: send condition		above or below threshold	

The parameters and settings of parameter windows "Input A Thresholds" and "Input B Thresholds" are identical.

Parameters	Settings
Threshold 1: evaluation	disabled enabled
<p>It can be determined with this parameter whether threshold 1 should be evaluated. If "enabled" is selected, the parameter window changes and the various parameters for threshold 1 are displayed.</p>	

Parameters	Settings
Threshold 1: voltage unit mV (50-10000)	5000
<p>The voltage value for threshold 1 is selected in this parameter in mV. A value of 5000 means e.g. a voltage of 5.00 volts. The smallest parameter value that can be selected therefore is 50, which corresponds to a voltage of 0.05 volts.</p>	
Threshold 1: hysteresis unit mV (50-10000)	1000
<p>The hysteresis for threshold 1 is set in this parameter in mV. The smallest permitted parameter value is 50 which corresponds to a voltage of 0.05 volts.</p>	
Threshold switch 1: sent values if input is above threshold 1	On Off
<p>If threshold 1 is exceeded, it is possible to specify in this parameter the value that the relevant threshold switch object receives.</p> <p>"On": If threshold 1 is exceeded, the threshold switch receives the value On. If the value falls below threshold 1, the threshold switch receives the value Off.</p> <p>"Off": If threshold 1 is exceeded, the threshold switch receives the value Off. If the value falls below threshold 1, the threshold switch receives the value On.</p>	
Threshold switch 1: send condition	above or below threshold above threshold only below threshold only disabled
<p>The sending of threshold switch 1 can be limited or disabled with this parameter, as this setting influences whether the threshold switch is sent cyclically (parameter "Cyclical sending of threshold switches") and whether the value is sent once after a change.</p> <p>"above or below threshold": The value of threshold switch 1 is sent regardless of whether it is above or below threshold 1. Each change of status appears as a bus telegram.</p> <p>"above threshold only": A bus telegram (cyclical or after a change) is only sent for the threshold switch if the relevant threshold is exceeded. If the value subsequently drops below the threshold, the threshold switch object is not sent.</p> <p>"below threshold only": A bus telegram (cyclical or after a change) is only sent for the threshold switch if the value drops below the relevant threshold. If the threshold is subsequently exceeded, the threshold switch object is not sent.</p> <p>"disabled": The threshold switch object is not sent.</p>	
Threshold 2: evaluation	disabled enabled
<p>It can be determined with this parameter whether threshold 2 should be evaluated. If "enabled" is selected, the parameter window changes and the various parameters for threshold 2 are displayed.</p>	
Threshold 2: voltage unit mV (50-10000)	5000
<p>The voltage value for threshold 2 is selected in this parameter.</p>	

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

Parameters	Settings
Threshold 2: hysteresis unit mV (50-10000)	1000
The hysteresis for threshold 2 is set in this parameter.	
Threshold switch 2: sent values if input is above threshold 2	On Off
If threshold 2 is exceeded, it is possible to specify in this parameter the value that the relevant threshold switch object receives. "On": If threshold 2 is exceeded, the threshold switch receives the value ON. If the value falls below threshold 2, the threshold switch receives the value Off. "Off": If threshold 2 is exceeded, the threshold switch receives the value OFF. If the value falls below threshold 2, the threshold switch receives the value On.	
Threshold switch 2: send condition	above or below threshold above threshold only below threshold only disabled
The sending of threshold switch 2 can be limited or disabled with this parameter.	

2.5 Binary input: Communication objects

Phys. Addr.	Program	no.	Function	Object name	Type
01.01.102	20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501	0	On / Off / Toggle	Switch, Input A	1 Bit
3		3	On / Off / Toggle	Switch, Input B	1 Bit
...	

Note:

The view of the objects can be arranged individually i.e. this view can vary.

Obj	Function	Object name	Type	Flag
0	On / Off / Toggle	Switch, Input A	1 Bit	CWTU
This object is assigned to terminal A as a binary input. The switching telegrams are sent via the group addresses in this object. The setting in the parameter "Edge evaluation" determines which signal status at the input generates ON or OFF telegrams.				
3	On / Off / Toggle	Switch, Input B	1 Bit	CWTU
This object is assigned to terminal B as a binary input. The switching telegrams are sent via the group addresses in this object. The setting in the parameter "Edge evaluation" determines which signal status at the input generates On or Off telegrams.				

2.5.1 Binary input: Parameters

General	Input/Output A	Input/Output B	Sensor A	Sensor B	Relay A	Relay B
Operating mode		Input binary				
Debounce time		100 milliseconds				
Edge evaluation		rising On, falling Off				
Starting value for edge evaluation on bus voltage recovery		Off				
Send condition: send on change at input		on rising and falling edge				
Sending condition: cyclical sending		disabled				
Interval for cyclical sending unit seconds (1-65535)		5				
Max. input voltage for low detection unit mV (0-10000)		1000				
Min. input voltage for high detection unit mV (0-10000)		4000				
Behaviour on bus voltage recovery		no action				

The parameters and settings of the parameter windows "Input/Output A" and "Input/Output B" are identical.

Parameters	Settings
Operating mode	not used Output analogue Output binary Input analogue Input binary
This parameter specifies the function of the terminals of the universal I/O unit. Only the relevant parameters and communication objects are displayed, depending on the setting selected. "not used": The terminal is deactivated. "Output analogue": The terminal is switched as an analogue output. "Output binary": The terminal is switched as a binary output. "Input analogue": The terminal is switched as an analogue input. "Input binary": The terminal is switched as a binary input.	
Debounce time	10 ms, 50 ms, 100 ms , 150 ms, 200 ms, 300 ms, 400 ms, 500 ms, 1.0 s, 1.5 s, 2.0 s, 2.5 s
When a contact is operated, a short bounce occurs whereby the contact closes and opens several times until it finally remains closed. The duration of the contact bounce depends on the push button action that is used. Due to the fact that the application software is able to scan the inputs rapidly, any multiple push button operations would be detected and several switching telegrams are therefore sent. The debounce time prevents this. For a change in the status at the binary input to be accepted, the voltage level must be maintained for at least for the duration of the debounce time. Only then is the modified input signal processed further. Values up to 2.5 seconds are permitted for the debounce time which enable the evaluation of slowly adjustable processes while taking a minimum detection period into account.	

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

Parameters	Settings
Edge evaluation	disabled rising On, falling no action rising Off, falling no action rising Toggle, falling no action rising no action, falling On rising no action, falling Off rising no action, falling Toggle rising On, falling Off rising Off, falling On rising Toggle, falling Toggle
<p>This setting determines which switching value is assigned to the object when there is a change in the signal status at the input.</p> <p>"disabled": A change in the signal status at the input does not modify the object value. The switching value of the communication object can only be changed via the receipt of a bus telegram.</p> <p>"rising On, falling no action": A rising edge assigns the value On to the object. A falling edge does not change the object value. If the initial input voltage of the unit is greater than the level set for high detection, the initial value is On. If the input voltage lies below this level, then the initial value set in the parameter "Initial value for edge evaluation on bus voltage recovery" is used.</p> <p>"rising Off, falling no action": A rising edge assigns the value Off to the object. A falling edge does not change the object value. If the initial input voltage of the unit is greater than the level set for high detection, the initial value is Off. If the input voltage lies below this level, then the initial value set in the parameter "Initial value for edge evaluation on bus voltage recovery" is used.</p> <p>"rising Toggle, falling no action": The object value is inverted each time there is a rising edge. A falling edge does not alter the object value. If the initial input voltage of the unit is greater than the level set for high detection, then the initial value is inverted. If the input voltage lies below this level, then the initial value set in the parameter "Initial value for edge evaluation on bus voltage recovery" is used.</p> <p>"rising no action, falling On": A falling edge assigns the value On to the object. A rising edge does not change the object value. If the initial input voltage of the unit is less than the level set for low detection, the initial value is On. If the input voltage lies above this level, then the initial value set in the parameter "Initial value for edge evaluation on bus voltage recovery" is used.</p> <p>"rising no action, Off": A falling edge assigns the value Off to the object. A rising edge does not change the object value. If the initial input voltage of the unit is less than the level set for low detection, the initial value is Off. If the input voltage lies above this level, then the initial value set in the parameter "Initial value for edge evaluation on bus voltage recovery" is used.</p>	

Parameters	Settings
<p>"rising no action, falling Toggle": The object value is inverted each time there is a falling edge. A rising edge does not alter the object value. If the initial input voltage of the unit is less than the level set for low detection, then the initial value is inverted. If the input voltage lies above this level, then the initial value set in the parameter "Initial value for edge evaluation on bus voltage recovery" is used.</p> <p>"rising On, falling Off": A rising edge assigns the value On to the object while a falling edge assigns the value Off. If the initial input voltage of the unit is greater than the level set for high detection, the initial value is On; if the voltage is less than the level set for low detection, the initial value is Off. If the input voltage lies between the two levels then the initial value set in the parameter "Initial value for edge evaluation on bus voltage recovery" is used.</p> <p>"rising Off, falling On": A rising edge assigns the value Off to the object while a falling edge assigns the value On. If the initial input voltage of the unit is greater than the level set for high detection, the initial value is Off; if the voltage is less than the level set for low detection, the initial value is On. If the input voltage lies between the two levels then the initial value set in the parameter "Initial value for edge evaluation on bus voltage recovery" is used.</p> <p>"rising Toggle, falling Toggle": The object value is inverted each time there is a change in the signal status from high to low detection or from low to high detection. If the initial input voltage of the unit is greater than the level set for high detection or less than the value set for low detection, then the initial value is inverted. If the input voltage lies between the two levels then the initial value set in the parameter "Initial value for edge evaluation on bus voltage recovery" is used.</p> <p>For edge evaluations with an inverse function ("rising Toggle, falling no action", "falling Toggle, rising no action", "rising Toggle, falling Toggle"), two failure modes are taken into account which determine the initial value after a restart: On bus voltage recovery (or reset of the bus coupler e.g. when programming with ETS): The initial value is taken from the parameter "Initial value for edge evaluation after bus voltage recovery".</p> <p>Failure of unit supply (bus voltage is maintained): Provided that it has already been communicated internally with the bus coupler (approx. 5 seconds after the supply voltage has been connected), the unit uses the information that has been stored in the bus coupler; i.e. the value stored in the relevant object is used as an initial value.</p>	
Starting value for edge evaluation on bus voltage recovery	On Off
<p>On bus voltage recovery or after a reset of the bus coupler (e.g. when programming with ETS), the first switching value is assigned with this parameter. It is only evaluated under specific preconditions which have been set in the parameter "Edge evaluation".</p>	








20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

Parameters	Settings
Send condition: send on change at input	disabled on rising and falling edge only on rising edge only on falling edge
<p>It is defined in this parameter whether a telegram is sent immediately after a change in the signal status at the input (while taking the debounce time into account). The switching value of the telegram is specified in the parameter "Edge evaluation".</p> <p>"disabled": No telegrams are sent when there is a change in the signal status.</p> <p>"on rising and falling edge": A telegram is sent after every change.</p> <p>"only on rising edge": A telegram is sent only if the signal status at the input changes from high to low detection. A change from low to high detection does not produce a bus telegram.</p> <p>"only on falling edge": A telegram is sent only if the signal status at the input changes from low to high detection. A change from high to low detection does not produce a bus telegram.</p>	
Send condition: cyclical sending	disabled On and Off only if On only if Off
<p>It is determined via this parameter whether the switching value of the communication object should be sent to the bus again and again according to the set interval for cyclical sending.</p> <p>"disabled": No telegrams are sent cyclically.</p> <p>"On and Off": Each switching value is sent cyclically on the bus. If the switching value is modified as a result of a change in the level at the input or the receipt of a bus telegram, the new value is sent cyclically.</p> <p>"only if On": Only the switching value On is sent cyclically on the bus. If the switching value is modified as a result of a change in the level at the input or the receipt of a bus telegram after Off, the cyclical sending of telegrams stops.</p> <p>"only if Off": Only the switching value Off is sent cyclically on the bus. If the switching value is modified as a result of a change in the level at the input or the receipt of a bus telegram after On, the cyclical sending of telegrams stops.</p>	
Interval for cyclical sending unit seconds (1-65535)	5
<p>Telegrams are continually sent to the bus according to the cyclic time that is specified here in seconds.</p> <p>If the parameter "Send condition: cyclical sending" is set to "disabled", this setting has no meaning.</p>	

Parameters	Settings
Max. input voltage for low detection unit mV (0-10000)	1000
<p>The voltage level is specified here which the input voltage must fall below in order to be rated as low detection (logic 0). The unit used is mV. For example, a value of 1400 corresponds to 1.40 volts.</p> <p>The value that is entered here must always be less than the parameter setting "Min. input voltage for high detection". Between these two values lies the "forbidden zone" for binary signals.</p>	
Min. input voltage for high detection unit mV (0-10000)	4000
<p>The voltage level is specified here which the input voltage must exceed in order to be rated as high detection (logic 1). The unit used is mV. For example, a value of 4500 corresponds to 4.50 volts.</p> <p>The value that is entered here must always be greater than the parameter setting "Max. input voltage for low detection". Between these two values lies the "forbidden zone" for binary signals.</p>	
Behaviour on bus voltage recovery	no action send value
<p>This parameter specifies whether the specified switching value is sent once on bus voltage recovery:</p> <p>"no action": The switching value is not sent.</p> <p>"send value": The switching value for the input is sent.</p>	

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

2.6 PT 1000 sensor inputs:
Communication objects

Phys. Addr. Program						
no.		Function			Object name	Type
	01.01.102	20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501				
	6	16-bit Value (EIS 5001)			Temperature, Sensor A	2 Byte
	7	On / Off			Threshold switch 1, Sensor A	1 Bit
	8	On / Off			Threshold switch 2, Sensor A	1 Bit
	9	16-bit Value (EIS 5001)			Temperature, Sensor B	2 Byte
	10	On / Off			Threshold switch 1, Sensor B	1 Bit
	11	On / Off			Threshold switch 2, Sensor B	1 Bit
---		---			---	---

Note:

The view of the objects can be arranged individually i.e. this view can vary.

Obj	Function	Object name	Type	Flag
6	16-bit Value (EIS 5001)	Temperature, Sensor A	2 Byte	CWTU
The temperature value measured in °C by sensor A is made available via this communication object.				
7	On / Off	Threshold switch 1, Sensor A	1 Bit	CWTU
This object detects whether there is an overrange or an underflow of threshold 1 of temperature sensor A. It is possible to specify the value that is sent when the threshold is exceeded (via parameter "Threshold switch 1: sent values if input above threshold 1"). Any change in the status of the threshold switch is immediately sent to the bus under consideration of the parameter "Threshold switch 1: send condition". It is also possible to determine if the threshold switches are sent cyclically via the parameter "Cyclical sending of threshold switches".				
8	On / Off	Threshold switch 2, Sensor A	1 Bit	CWTU
This object detects whether there is an overrange or an underflow of threshold 2 of temperature sensor A. It is possible to specify the value that is sent when the threshold is exceeded (via parameter "Threshold switch 2: sent values if input above threshold 2"). Any change in the status of the threshold switch is immediately sent to the bus under consideration of the parameter "Threshold switch 2: send condition". It is also possible to determine if the threshold switches are sent cyclically via the parameter "Cyclical sending of threshold switches".				

Obj	Function	Object name	Type	Flag
9	16-bit Value (EIS 5001)	Temperature, Sensor B	2 Byte	CWTU
The temperature value measured in °C by sensor B is made available via this communication object.				
10	On / Off	Threshold switch 1, Sensor B	1 Bit	CWTU
This object detects whether there is an overrange or an underflow of threshold 1 of temperature sensor B. It is possible to specify the value that is sent when the threshold is exceeded (via parameter "Threshold switch 1: sent values if input above threshold 1"). Any change in the status of the threshold switch is immediately sent to the bus under consideration of the parameter "Threshold switch 1: send condition". It is also possible to determine if the threshold switches are sent cyclically via the parameter "Cyclical sending of threshold switches".				
11	On / Off	Threshold switch 2, Sensor B	1 Bit	CWTU
This object detects whether there is an overrange or an underflow of threshold 2 of temperature sensor B. It is possible to specify the value that is sent when the threshold is exceeded (via parameter "Threshold switch 2: sent values if input above threshold 2"). Any change in the status of the threshold switch is immediately sent to the bus under consideration of the parameter "Threshold switch 2: send condition". It is also possible to determine if the threshold switches are sent cyclically via the parameter "Cyclical sending of threshold switches".				

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

2.6.1 Sensor A: Parameters

Sensor B Thresholds		Relay A		Relay B	
General	Input/Output A	Input/Output B	Sensor A	Sensor A Thresholds	Sensor B
Evaluation			enabled		
Offset cable resistance unit 0.1 Ohms (-128...127)			0		
Send behaviour: send on change at input			disabled		
Cyclical sending			disabled		
Behaviour on bus voltage recovery			no action		

The parameters and settings of parameter windows "Sensor A" and "Sensor B" are identical.

Parameters	Settings
Evaluation	disabled enabled
This parameter determines whether the sensor input should be activated ("enabled") or deactivated ("disabled"). Communication objects and parameters are displayed depending on this setting.	
Offset cable resistance unit 0.1 Ohms (-128...127)	0
This parameter makes it possible to correct the distorting influence of incoming sensor cables. To do this, the total resistance of the incoming and return cables of the sensor must be entered here in terms of its value in 0.1 Ohm [Ω]. 127 is the maximum permitted value so that an incoming resistance of up to 12.7 Ω can be corrected. It is also possible to enter negative values here (max. -128 permitted), in order to calibrate e.g. the temperature measurement for a sensor with pinpoint accuracy. A constant temperature shift can thus be achieved on the basis of a specific measuring system. The temperature coefficient of the PT1000 sensors is approx. 4 Ω per °C, in a detected temperature range so that the temperature value that is sent can be corrected by a maximum of ± 3.2°C.	
Send behaviour: send on change at input	disabled enabled
This parameter defines whether the temperature value is sent if it has been modified since the last time it was sent. In the setting "disabled", the temperature value is not sent after a change. If "enabled" is selected, if the temperature value has changed at least by the set value, a telegram is generated with the new value.	
Temperature change for sending unit 0.01K (10-10000)	100
The necessary change is indicated here which is the minimum requirement for the parameter "Send behaviour: send on change at input". The smallest permitted parameter value is 10 which corresponds to a temperature change of 0.1 degrees. If the parameter "Send behaviour: send on change at input" is set to "disabled", this input screen is not displayed.	

Parameters	Settings
Cyclical sending	disabled enabled
It is determined via this parameter whether the temperature value is continually sent to the bus according to the interval for cyclical sending. The setting that is selected here also applies to the cyclical sending of the threshold switches. "disabled": No telegrams are sent cyclically. The threshold switches are also not sent cyclically. "enabled": The object value is sent cyclically to the bus with the set interval for cyclical sending. If the relevant parameters are selected in the parameters "Cyclical sending of threshold switches" and "Threshold switch 1: send condition" or "Threshold switch 2: send condition", the threshold switches are also sent cyclically.	
Interval for cyclical sending unit seconds (1-65535)	5
The telegrams for the temperature value at the input and the threshold switches are sent continually to the bus according to the cyclic time that is specified here in seconds. If the parameter "Cyclical sending" is set to "disabled", the input screen for this parameter is not displayed.	
Cyclical sending of threshold switches	disabled enabled
This parameter determines under which conditions the threshold switches that are assigned to thresholds 1 and 2 are sent cyclically together with the temperature value. "disabled": The threshold switches are not sent cyclically. "enabled": The threshold switches are sent cyclically provided that this option is not restricted in the parameters "Threshold switch 1: send condition" and "Threshold switch 2: send condition". If the parameter "Cyclical sending" is set to "disabled", the input screen for this parameter is not displayed. The threshold switches are therefore only sent after a change in status under the conditions set in the parameter "Threshold switch x: send condition" on the parameter page "Input A (B) Thresholds".	
Behaviour on bus voltage recovery	no action send value
This parameter controls the sending of the temperature value and threshold switches on bus voltage recovery. "no action": Neither the temperature value nor the threshold switches are sent. "send value": The temperature value and the status of the threshold switch of the respective input are sent once to the bus on bus voltage recovery.	

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

2.6.2 Sensor A Thresholds: Parameters

Sensor B Thresholds		Relay A		Relay B	
General	Input/Output A	Input/Output B	Sensor A	Sensor A Thresholds	Sensor B
Threshold 1: evaluation			enabled		
Threshold 1: temperature unit 0.01°C (-2500...4500)			0		
Threshold 1: hysteresis unit 0.01K (10-10000)			100		
Threshold switch 1: sent values if input is above threshold 1			On		
Threshold switch 1: send condition			above or below threshold		
Threshold 2: evaluation			enabled		
Threshold 2: temperature unit 0.01°C (-2500...4500)			0		
Threshold 2: hysteresis unit 0.01K (10-10000)			100		
Threshold switch 2: sent values if input is above threshold 2			On		
Threshold switch 2: send condition			above or below threshold		

The parameters and settings of parameter windows "Sensor A Thresholds" and "Sensor B Thresholds" are identical.

Parameters	Settings
Threshold 1: evaluation	disabled enabled
This parameter determines whether threshold 1 should be evaluated. If "enabled" is selected, the parameter window changes and the various parameters for threshold 1 are displayed.	
Threshold 1: temperature unit 0.01°C (-2500...4500)	0
The temperature value for threshold 1 is selected in this parameter in 0.01°C. A value of -2150 is equivalent to a temperature of -21.50°C. Threshold 1 is not evaluated if 0 is selected.	
Threshold 1: hysteresis unit 0.01K (10-10000)	100
The hysteresis for threshold 1 is selected in this parameter in 0.01 K. The smallest permitted parameter value is 10 which corresponds to a temperature of 0.1 K.	
Threshold switch 1: sent values if input is above threshold 1	On Off
If threshold 1 is exceeded, it is possible to specify in this parameter the value that the relevant threshold switch object receives. "On": If threshold 1 is exceeded, the threshold switch receives the value ON. If the value falls below threshold 1, the threshold switch receives the value OFF. "Off": If threshold 1 is exceeded, the threshold switch receives the value OFF. If the value falls below threshold 1, the threshold switch receives the value ON.	

Parameters	Settings
Threshold switch 1: send condition	above or below threshold above threshold only below threshold only disabled
The sending of threshold switch 1 can be limited or disabled with this parameter, as this setting influences whether the threshold switch is sent cyclically and whether the value is sent once after a change. "above or below threshold": The value of threshold switch 1 is sent regardless of whether it is above or below threshold 1. Each change of status appears as a bus telegram. "above threshold only": A bus telegram (cyclical or after a change) is only sent for the threshold switch if the relevant threshold is exceeded. If the value subsequently drops below the threshold, the threshold switch object is not sent. "below threshold only": A bus telegram (cyclical or after a change) is only sent for the threshold switch if the value drops below the relevant threshold. If the threshold is subsequently exceeded, the threshold switch object is not sent. "disabled": The threshold switch object is not sent.	
Threshold 2: evaluation	disabled enabled
This parameter determines whether threshold 2 should be evaluated. If "enabled" is selected, the parameter window changes and the various parameters for threshold 2 are displayed.	
Threshold 2: temperature unit 0.01°C (-2500...4500)	0
The temperature value for threshold 2 is set in this parameter.	
Threshold 2: hysteresis unit 0.01K (10-10000)	100
The hysteresis for threshold 2 is set in this parameter.	
Threshold switch 2: sent values if input is above threshold 2	On Off
If threshold 2 is exceeded, it is possible to specify in this parameter the value that the relevant threshold switch object receives.	
Threshold switch 2: send condition	above or below threshold above threshold only below threshold only disabled
The sending of threshold switch 2 can be limited or disabled with this parameter.	

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

2.7 Relay: Communication objects

Phys. Addr.	Program		
no.	Function	Object name	Type
01.01.102	20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501		
...
12	On / Off	Switch, Relay A	1 Bit
13	2-bit Value (EIS 8)	Positive drive, Relay A	2 Bit
14	On / Off	Switch, Relay B	1 Bit
15	2-bit Value (EIS 8)	Positive drive, Relay B	2 Bit
...

Note:

The view of the objects can be arranged individually i.e. this view can vary.

Obj	Function	Object name	Type	Flag
12	On / Off	Switch, Relay A	1 Bit	CWRTU
The switching telegrams for relay A are received via the group addresses in this object. If the override switch is active (object no. 13), the switching information in this object has no meaning.				
13	2-bit Value (EIS 8)	Override switch, Relay A	2 Bit	CWTU
The switching telegrams for the override switch of relay A are received via the group addresses in this object. The override switch is not active if the object value is 0 or 1. Switch object no. 12 determines the switching status. Object value 2 switches off with priority control while object value 3 switches on with priority control. This overrides the status selected via the switching object. Deactivation of the override switch via a telegram with the value 0 or 1 causes the relay to be switched to the status that was specified by switch object 12.				
14	On / Off	Switch, Relay B	1 Bit	CWRTU
The switching telegrams for relay B are received via the group addresses in this object. If the override switch is active (object no. 15), the switching information in this object has no meaning.				
15	2-bit Value (EIS 8)	Override switch, Relay B	2 Bit	CWTU
The switching telegrams for the override switch of relay B are received via the group addresses in this object. The override switch is not active if the object value is 0 or 1. Switch object no. 14 determines the switching status. Object value 2 switches off with priority control while object value 3 switches on with priority control. This overrides the status selected via the switching object. Deactivation of the override switch via a telegram with the value 0 or 1 causes the relay to be switched to the status that was specified by switch object 14.				

2.7.1 Relay A: Parameters

General	Input/Output A	Input/Output B	Sensor A	Sensor B	Relay A	Relay B
Relay mode		normally open contact				
Behaviour on bus voltage failure		switch off				
Behaviour on bus voltage recovery		switch off				
Behaviour on bus voltage recovery (initial value)		no action				
Updating target position periodically (approx. every 10 seconds)		disabled				

The parameters and settings of parameter windows "Relay A" and "Relay B" are identical.

Parameters	Settings
Relay mode	normally open contact normally closed contact
This parameter determines the position of the relay contact. The contact status "Behaviour on bus voltage failure" and "Behaviour on bus voltage recovery" are also influenced by this setting. In the setting "normally open contact", the contact is closed when there is an On telegram and opened when there is an Off telegram. In the setting "normally closed contact", the contact is opened when there is an Off telegram and closed when there is an On telegram.	
Behaviour on bus voltage failure	no action switch off switch on
The behaviour of the relay contact on bus voltage failure can be set here (precondition: 24 V power supply is maintained). "no action": The relay contact maintains its instantaneous switching status on bus voltage failure. "switch off": The relay contact is opened on bus voltage failure. "switch on": The relay contact is closed on bus voltage failure. If the 24 V power supply should fail at the same time as the bus voltage, the switching status of the relay is maintained as it has a bistable design.	

20 CO Uni I/O Unit 2IO 2Rel 2Pt 900501

Parameters	Settings
Behaviour on bus voltage recovery	no action switch off switch on
<p>It is possible to set the behaviour of the relay contact on bus voltage recovery or after a reset of the bus coupler (e.g. when assigning parameters in ETS).</p> <p>“no action”: The relay contact maintains its instantaneous switching status after a bus voltage recovery. If the 24 V power supply is maintained in the meantime, the relevant communication object of the bus coupler is initialised with the corresponding value and its value is sent.</p> <p>If the 24 V power supply should also fail, the last status of the contact is maintained due to the fact that it is a bistable relay. It should however be noted that the object that is in the bus coupler always indicates the value Off, while the contact position can correspond to Off or On. The relay status and object value only match again once a switching telegram has been received.</p> <p>“switch off”: The relay contact is opened on bus voltage failure.</p> <p>“switch on”: The relay contact is closed on bus voltage failure.</p> <p>If the 24 V power supply should fail at the same time as the bus voltage, the switching status of the relay is maintained as it has a bistable design.</p> <p>If the 24 V power supply for the unit should fail and recover but the bus voltage is maintained, the value that has either been maintained in the bus coupler or has been updated in the meantime is used for the position of the contacts. The parameter settings have no influence in this case. The relevant switching object in the bus coupler is only updated and its value sent if the parameter “Behaviour on bus voltage recovery (initial value)” is set to “send value”.</p>	
Behaviour on bus voltage recovery (initial value)	no action send value
<p>This parameter controls whether the switching value that is assigned on bus voltage recovery is sent once (see “Behaviour on bus voltage recovery”).</p> <p>“no action”: The switching value of the relay contact is not sent.</p> <p>“send value”: The switching value of the relay contact is sent.</p>	
Updating target position periodically (approx. every 10 seconds)	disabled enabled
<p>The built-in relays are bistable in design so that the coil only needs to be energised once after a change in the switching status.</p> <p>For applications in which the universal I/O unit can be exposed to mechanical vibrations, it is a good idea to repeat the switch operation in the target position: this prevents the relay contact from possibly falling over due to mechanical influences.</p> <p>“disabled”: There is no periodic switching in the target position. The relay coils are triggered once after a change in the switching status.</p> <p>“enabled”: The relay coil for the desired switching status is triggered periodically (approx. every 10 seconds). Operating noises can thus become audible even if the contact does not change its status.</p>	

Notes: