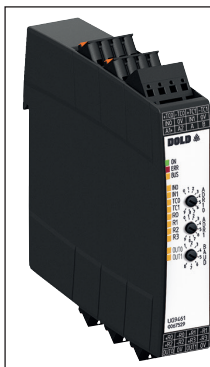


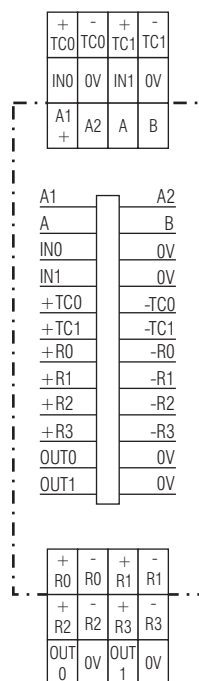
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Product Description

The universal Input / Output module UG 9461 has analogue inputs and 2 analogue outputs. It can be used to connect thermocouples and thermistors and offers 2 configurable measuring inputs 0-10V or 0-20mA. Via Modbus the input status can be read and the output status can be set. For the analogue outputs a DC 01 ... 10 V interface is available.

Circuit Diagram



Your Advantages

- Widely used measuring and automation protocol
- Compact structure
- Easy installation
- Easy appliance
- Pluggable clamps
- TWIN- connection terminals to loop auxiliary supply and Bus

Features

- According to IEC/EN 61131-2
- Modbus RTU-interface
- 2 configurable analogue inputs: 0 ... 10 V, 0... 20 mA
- 2 K-Thermal element inputs
- 4 Thermistor inputs for Pt1000 sensors
- 2 Analogue outputs: 0 ... 10 V
- 3 potentiometer for setting the modbus adress and baud rate
- 13 LEDs for status indication
- Width: 22.5 mm

Approvals and Markings



Connection Terminals

Terminal designation	Signal description
A1 (+)	Auxiliary voltage + DC 24 V
A2	Auxiliary voltage 0 V
A	Modbus signal A
B	Modbus signal B
IN ₀ , IN ₁	Analogue input +
0V	Analogue input ground
+TC ₀ , +TC ₁	Thermal element +
-TC ₀ , -TC ₁	Thermal element -
+R ₀ ... +R ₃	Thermistor +
-R ₀ ... -R ₃	Thermistor -
OUT ₀ , OUT ₁	Analogue output +
0V	Analogue output ground

Applications

The universal Input / Output module UG 9461 is used to collect Temperature and other analogue values.

Via the analogue outputs voltage signals of DC 0 ... 10 V can be offered to be used in connected systems. The analogue outputs are partly configurable.

Indicators

- Green LED "On": Permanent on - Supply connected
- Red LED "ERR": Flashing - Failure code of the device
- Yellow LED "Bus": Flashing - When receiving or transmitting Modbus data
- Yellow status-LEDs
"IN₀ IN₁ TC₀ TC₁ R₀ R₁ R₂ R₃
OUT₀ OUT₁":
On , when on a connected analogue input or output a valid signal is available.
- Failure code :
9 - Modbus communication failure
10 - Checksum failure EEPROM
- 9*) - 10*) = Number of flashing pulses in sequence

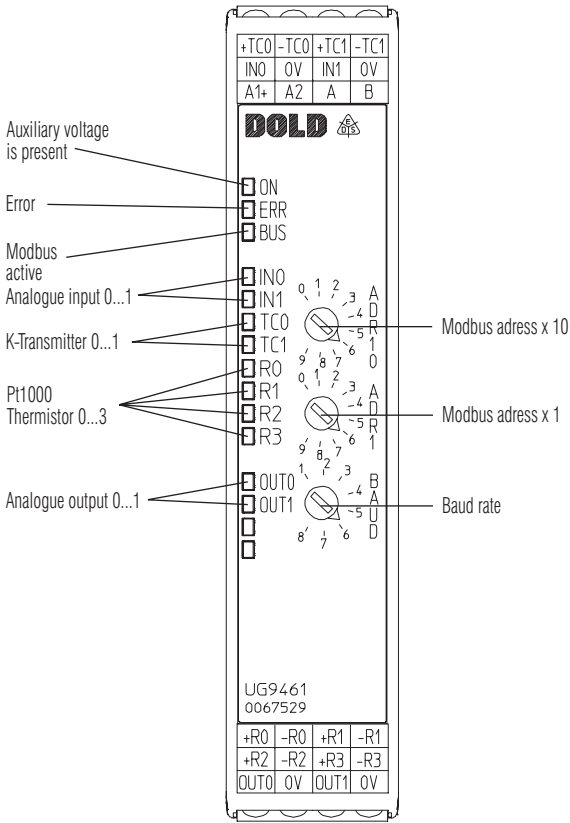
Reset Function

By sending a reset command a reset can be operated via Modbus

Modbus RTU

For communication between input / output module and a supervising control the Modbus RTU protocol according to Specification V 1.1b3 is used.

Setting



M12521

Position	1	2	3	4	5	6	7	8
Potentiometer								
BAUD								
Baud rate	1200	2400	4800	9600	19200	38400	57600	115200
Baud								
Response Time	< 50 ms	< 25 ms	< 12 ms	< 10 ms	< 5 ms	< 5 ms	< 5 ms	< 5 ms

Technical Data			
Auxiliary voltage			
Auxiliary voltage U _H A1/A2:	DC 24 V		
Voltage range:	0,8 ... 1,1 U _H		
Nominal consumption:	2 W DC 24 V		
Inputs			
Inputs	0 ... 10 V, 0 ... 20 mA configurable	Pt 1000 Thermistor meas. current 0.25 mA	K-Thermo- element
Measuring range:	0.1 ... 19.90 mA 0.050 ... 9.950 V	- 50° C ... + 200 °C	- 180° C ... + 1350 °C
Resolution internal	10 bit	24 bit	24 bit
Accuracy at 25 °C:	3 % v. E.	± 0.5 °C	± 0.5 °C *)
Measuring principle:	integrating	integrating	integrating
Update time	4 ms	650 ms	650 ms
Input resistance:	≥ 100 kΩ	≥ 1 MΩ	≥ 1 MΩ
Sensor wire break detection:	-	yes	yes
Connection:	2-wire- technology	2-wire- technology	2-wire- technology
Noise suppression:	-	70 dB at 50 Hz / 60Hz	70 dB at 50 Hz / 60Hz
Voltage input max. input voltage:	DC 15 V		
Current input max. input current:	DC 30 mA		

*) the internal failure on the cold connection spot is ± 3.0°C.
This has to be added to the accuracy measured value in the table.

Please note that the tolerance values are only valid after a time period of 15 min when the unit is warmed up. Also ventilation changes on the terminals of the thermocouples can cause measuring faults.

When the PT 1000 temperature sensor is missing the maximum positive temperature is indicated in the corresponding measured value Modbus register.

If the thermocouple is missing, the minimum negative temperature is indicated in the corresponding measured value Modbus.

The measuring failure on PT1000 inputs caused by line resistance is approx. 0.4°C at 2 x 1 Ohm wire resistance

Outputs DC 0 ... 10 V

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If the thermocouple is missing, the minimum negative temperature is indicated in the corresponding measured value Modbus.
The measuring failure on PT1000 inputs caused by line resistance is approx. 0.4°C at 2 x 1 Ohm wire resistance

Outputs DC 0 ... 10 V

Voltage range:	DC 0 ... 10 V, short circuit proof
Resolution:	10 bit
Regulating time:	100 ms (95 % of the new value)
Accuracy:	± 1 % of end value
Load impedance:	≥ 2000 Ω

Technical Data	
General Data	
Operating mode:	Continuous operation
Operation:	- 20 ... + 50 °C (see derating curve)
Storage:	- 25 ... + 75 °C
Relative air humidity:	93 % at 40 °C
Altitude:	≤ 2000 m
EMC	
Electrostatic discharge:	8 kV (air) IEC/EN 61000-4-2
HF-irradiation	
80 MHz ... 1.0 GHz:	10 V / m IEC/EN 61000-4-3
1.0 GHz ... 2.5 GHz:	3 V / m IEC/EN 61000-4-3
2.5 GHz ... 2.7 GHz:	1 V / m IEC/EN 61000-4-3
Fast transients:	4 kV IEC/EN 61000-4-4
Surge voltage between	
Wires for power supply:	1 kV IEC/EN 61000-4-5
Between wire and ground:	1 kV IEC/EN 61000-4-5
HF wire guided:	10 V IEC/EN 61000-4-6
Voltage dips	IEC/EN 61000-4-11
Interference emission	
Wire guided:	Limit value class B IEC/EN 61131-2
Radio irradiation:	Limit value class B IEC/EN 61131-2
Degree of protection	
Housing:	IP 40 IEC/EN 60529
Terminals:	IP 20 IEC/EN 60529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94
Vibration resistance:	Amplitude constant 3,5 mm, Frequency 5 ... 8.4 Hz, Acceleration constant 1.0g Frequency 8.4 Hz ... 150 Hz IEC/EN 61131-2 20 / 050 / 04 IEC/EN 60068-1 DIN 46228-1/-2/-3/-4
Climate resistance:	
Wire connection:	
Pluggable cage clamp terminals (PC):	0.25 ... 1.5 mm ² solid or 0.25 ... 1.5 mm ² stranded wire with sleeve
Insulation of wires or sleeve length:	12 mm
Wire connection:	
Bus and auxiliary supply pluggable Twin-cage-clamp-terminal (PT):	0.25 ... 1.5 mm ² solid or 0.25 ... 1.5 mm ² stranded ferruled
Insulation of wires or sleeve length:	8 mm
Mounting:	DIN rail IEC/EN 60715
Weight:	220 g
Dimensions	
Width x height x depth:	22.5 x 105 x 120.3 mm

Standard Type

UG 9461PM DC 24 V 8 AI/2 AO	
Article number:	0067529
• With Modbus RTU interface	
• 8 analogue inputs	
• 2 analogue outputs	
• Auxiliary voltage U_H :	DC 24 V
• Baubreite:	22.5 mm

Setting Facilities

Potentiometer ADR10: - Unit adress x 10

Potentiometer ADR1: - Unit adress x 1

Potentiometer BAUD: - Baud rate

The module address and baud rate is only read after connecting the auxiliary supply!

Setting and Adjustment

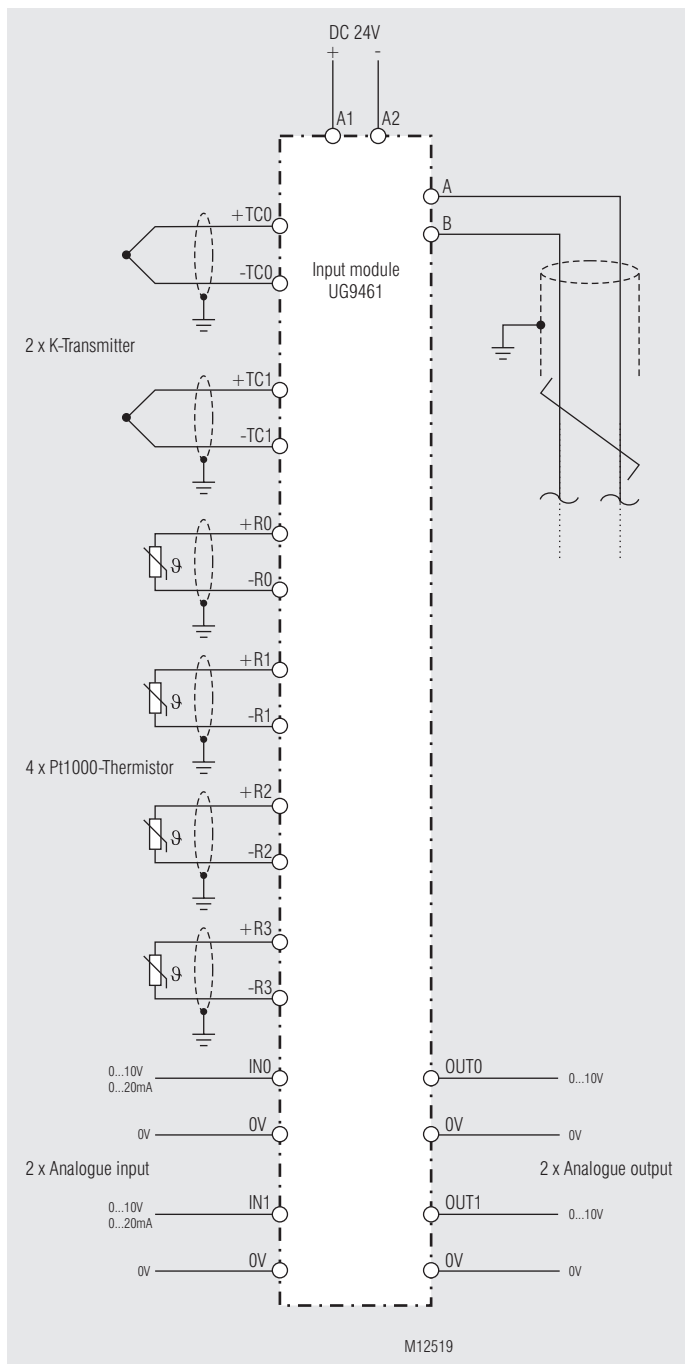
Set-up procedure

1. Connect device according to application example.
2. Setting unit adress and Baud rate via potentiometer.
3. Power up the unit.
4. Parametrization via Modbus.

Safety Notes

- Never clear a fault when the device is switched on
- The user must ensure that the device and the necessary component are mounted and connected according to the locally applicable regulations and technical standards (VDE, TÜV, BG).
- Adjustments may only be carried out by qualified specialist staff and the applicable safety rules must be observed.
- Touch proof security is only provided when the power connection terminals are plugged into the unit.

Application Examples



Bus Interface

Protocol	Modbus Seriell RTU
Address	1 bis 99
Baudrate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud
Data bit	8
Stop bit	2
Parity	None

More information about the interface, wiring rules, device identification and communication monitoring can be found in the Modbus user manual.

Function-Codes

At UG 9461 the following function codes are implemented:

Function-Codes	Name	Beschreibung
0x03	Read Holding Register	Device parameter read word by word
0x04	Read Input Register	Actual values read word by word
0x05	Write Single Coil	Outputs write individually
0x06	Write Single Register	Device parameter write word by word
0x10	Write Multiple Register	Device parameter write in blocks

Device configuration

If required the device configuration data can be saved permanently by setting the the Bit "Write configuration to EEPROM". The data is copied from the EEPROM to the relevant register when connecting the auxiliary voltage. As the numbers of write cycles of an EEPROM are limited, the writing must not be done in cycles. In addition it is not possible to receive modbus telegrams during a period of 50 ms while writing the EEPROM.

Parameter tables

Every slave owns an output- configuration- and actual value table. In these tables it is defined under which address the parameters can be found.

Single Coils (Control signals):

Register-Adresse	Protokoll-Adresse	Name	Value range	Description	Data type	Access rights
1	0	Reset	0x0000 0xFF00	0: No function 1: Device reset	BIT	write
2	1	Write configuration to EEPROM	0x0000 0xFF00	0: No function 1: Save parameter	BIT	write

Holding Register:

Register-Adresse	Protokoll-Adresse	Name	Value range	Description	Data type	Access rights
40001	0	Control word 1	0 ... 2	Bit 0 = Reset Bit 1 = Write configuration to EEPROM	UINT16	write / reading
40002	1	Analogue input 0 configure	0 ... 1 *)	0 = 0 ... 10 000 mV 1 = 0 ... 20 000 µA	UINT16	write / reading
40003	2	Analogue input 1 configure	0 ... 1 *)	0 = 0 ... 10 000 mV 1 = 0 ... 20 000 µA	UINT16	write / reading
40004	3	Analogue output	0 ... 10000	Voltage in mV	UINT16	write / reading
40005	4	Analogue output1	0 ... 10000	Voltage in mV	UINT16	write / reading
40006	5	Timeout release	0 ... 1	0 = Disable 1 = Enable	UINT16	write / reading
40007	6	Timeout	1000 ... 10000	Timeout value in ms	UINT16	write / reading

*) Parameters can be stored permanently in the EEPROM by setting the Bit "Write configuration to EEPROM"

Input Register (Gerätestatus- und Messwerte):

Register-Adresse	Protokoll-Adresse	Name	Value range	Description	Data type	Access rights
30001	0	State word 1 Device failure	0 ... 10	0: No failure 7: Temperatur circuit fault 9: Communication fault Modbus 10: Checksum failure EEPROM	INT16	read
30002	1	State word 2 Device state	0 ... 2	0: Device initialize 1: Device ready 2: Error mode	INT16	read
30003	2	Analogue input 0	0 ... 10000 0 ... 20000	mV uA	INT16	read
30004	3	Analogue input	0 ... 10000 0 ... 20000	mV uA	INT16	read
30005	4	Thermal element0	-1800 ... 1350	1/10°C	INT16	read
30006	5	Thermal element1	-1800 ... 1350	1/10°C	INT16	read
30007	6	Thermistor0	-500 ... 2000	1/10°C	INT16	read
30008	7	Thermistor1	-500 ... 2000	1/10°C	INT16	read
30009	8	Thermistor2	-500 ... 2000	1/10°C	INT16	read
30010	9	Thermistor3	-500 ... 2000	1/10°C	INT16	read
30011	10	Sensor state	0 ... 255	Bit7 =1, Eingang IN0 o.k. Bit6 =1, Eingang IN1 o.k. Bit5 =1, Sensor TC0 o.k. Bit4 =1, Sensor TC1 o.k. Bit3 =1, Sensor RTD0 o.k. Bit2 =1, Sensor RTD1 o.k. Bit1 =1, Sensor RTD2 o.k. Bit0 =1, Sensor RTD3 o.k.	INT16	read
30012	11	cold junction-compensation	-500 ... 2000	1/10°C	INT16	read
30013	12	IC-4-Temperature	-500 ... 2000	1/10°C	INT16	read

