KNX I4-ERD

Evaluation Unit for Ground Sensors

Item number 70310

elsner elektronik

Installation and Adjustment

Installation, inspection, commissioning and troubleshooting of the device must only be carried out by a competent electrician.

This manual is amended periodically and will be brought into line with new software releases. The change status (software version and date) can be found in the contents footer. If you have a device with a later software version, please check **www.elsner-elektronik.de** in the menu area "Service" to find out whether a more up-to-date version of the manual is available.

Clarification of signs used in this manual

Safety advice.

Safety advice for working on electrical connections, components, etc.

DANGER! ... indicates an immediately hazardous situation which will lead to death or severe injuries if it is not avoided.

WARNING! ... indicates a potentially hazardous situation which may lead to death or severe injuries if it is not avoided.

CAUTION! ... indicates a potentially hazardous situation which may lead to trivial or minor injuries if it is not avoided.

STOP **ATTENTION!** ... indicates a situation which may lead to damage to property if it is not avoided.

ETS In the ETS tables, the parameter default settings are marked by underlining.

1. Description

The **KNX I4-ERD evaluation unit** monitors ground temperature and humidity. You can control an automatic watering system objectively with the data. Up to four TH-ERD sensors can be connected to the evaluation unit. The two **KNX I4-ERD** threshold-value dependent switching outputs for humidity and temperature are available for each sensor channel.

KNX I4-ERD evaluation unit receives external readings via the bus and reconciles these to composite values with proprietary data. In this way, you can work with an overall temperature or an overall humidity reading for each channel.

Functions:

- Reception of **temperature and humidity information from** up to **four external sensors**
- **Composite readings** for each sensor channel variable from proprietary measured and external readings (percentage variable)
- **2 thresholds per channel** for temperature and humidity, adjustable by parameters or via communication objects

Configuration is made using the KNX software ETS. The **product file** can be downloaded from the Elsner Elektronik website on **www.elsner-elektronik.de** in the “Service” menu.

1.1. Deliverables

- Evaluation unit in series installation housing

You will *additionally* require (not included in scope of delivery):

- TH-ERD sensors (no. 70312), 1-4 units

1.2. Technical data

Housing	Plastic
Colour	White
Assembly	Series installation on mounting rail
Protection category	IP 20
Dimensions	approx. 107 x 88 x 60 (W x H x D, mm), 6 modules
Weight	approx. 300 g
Ambient temperature	Operation -20…+70°C, storage -55…+90°C
Ambient humidity	max. 95% RH, avoid condensation
Operating voltage	230V AC, 50 Hz
Power consumption	approx. 1.6 W without sensors, approx. 2.8 W with 4 sensors
Power	on bus: 10 mA
Inputs	4 x sensor inputs for TH-ERD (+/-/A/B)

Max. cable length Sensor inputs	100 m
Data output	KNX +/- Bus connector terminal
BCU type	own microcontroller
PEI type	0
Group addresses	max. 156
Assignments	max. 156
Communication objects	129

The product conforms with the provisions of EU directives.

2. Installation and Commissioning

2.1. Installation notes

Installation, testing, operational start-up and troubleshooting should only be performed by an electrician.

DANGER!
Risk to life from live voltage (mains voltage)!
There are unprotected live components within the device.

- VDE regulations and national regulations are to be followed.
- Ensure that all lines to be assembled are free of voltage and take precautions against accidental switching on.
- Do not use the device if it is damaged.
- Take the device or system out of service and secure it against unintentional use, if it can be assumed, that risk-free operation is no longer guaranteed.

The device is only to be used for the intended purpose described in this manual. Any improper modification or failure to follow the operating instructions voids any and all warranty and guarantee claims.

After unpacking the device, check it immediately for possible mechanical damage. If it has been damaged in transport, inform the supplier immediately.

The device may only be used as a fixed-site installation; that means only when assembled and after conclusion of all installation and operational start-up tasks and only in the surroundings designated for it.

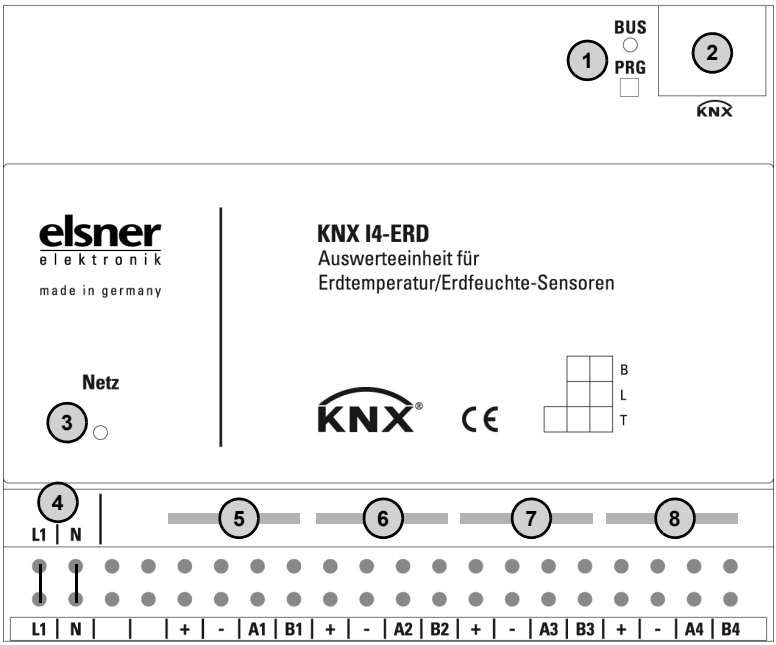
Elsner Elektronik is not liable for any changes in norms and standards which may occur after publication of these operating instructions.

2.2. Installation location

The device must only be installed and operated in dry, indoor spaces. Avoid condensation.

The **KNX I4-ERD evaluation unit** is designed for series installation on mounting rails and occupies 6 modules.

2.3. Device design/sensor connection



1) Programming LED and programming buttons (PRG)
2 Bus terminal slot (KNX +/-)
3) Network LED (power)
4) Supply voltage input 230V AC L/N (top and bottom connections bridged internally)
5) Input 1 for TH-ERD sensor
6) Input 2 for TH-ERD sensor
7) Input 3 for TH-ERD sensor
8) Input 4 for TH-ERD sensor

Sensor connections are not protected against reverse polarity!
Pin assignment:
+ ➔ brown (+4...24V DC)
- ➔ white (ground)
A ➔ green (RS485 lead A)
B ➔ yellow (RS485 lead B)

2.4. Notes on mounting and commissioning

Never expose the device to water (e.g. rain) or dust. This can damage the electronics. You must not exceed a relative humidity of 95%. Avoid condensation.

After the bus voltage has been applied, the device will enter an initialisation phase lasting a few seconds. During this phase no information can be received or sent via the bus.

3. Addressing of the device at the bus

The device is supplied with the bus address 15.15.255. You can program another address into the ETS by overwriting the 15.15.255 address or by teaching via the programming button.

4. Disposal

After use, the device must be disposed of or recycled in accordance with the legal regulations. Do not dispose of it with the household waste!

5. Transfer protocol

Units:

Temperatures in degrees Celsius
Humidity in %

5.1. List of all communications objects

K1 Channel 1 (Sensor 1)
K2 Channel 2 (Sensor 2)
K3 Channel 3 (Sensor 3)
K4 Channel 4 (Sensor 4)

Abbreviation flags:

C Communication
R Read
W Write
T Transfer
U Update

No.	Name	Function	DTP	Flags
0	Software version			
1	K1 malfunction	Output	1.001	C R T
2	Reserve			
3	K1 Temp. measured value outdoors	Input	9.001	C W
4	K1 Temp. measured value indoors	Output	9.001	C R T
5	K1 Temp. measured value total	Output	9.001	C R T
6	K1 Temp. min/max value criterion	Input	1.017	C W
7	K1 Temp. minimum measured value	Output	9.001	C R T
8	K1 Temp. maximum measured value	Output	9.001	C R T
9	K1 Temp. reset min/max value	Input	1.017	C W
10	K1 Humidity measured value outdoors	Input	9.001	C W
11	K1 Humidity measured value indoors	Output	9.001	C R T
12	K1 Humidity measured value total	Output	9.001	C R T
13	K1 Humidity min/max value criterion	Input	1.017	C W
14	K1 Humidity minimum measured value	Output	9.001	C R T
15	K1 Humidity maximum measured value	Output	9.001	C R T
16	K1 Humidity reset min/max value	Input	1.017	C W
17	K1 Temp. threshold value 1: Absolute value	Input/Output	9.001	C R W T
18	K1 Temp. threshold value 1: (1:+ | 0:-)	Input	1.006	C W
19	K1 Temp. threshold value 1: Switching output	Output	1.001	C R T

No.	Name	Function	DTP	Flags
20	K1 Temp. threshold value 1: Switching output block	Input	1.006	C W
21	K1 Temp. threshold value 2: Absolute value	Input/Output	9.001	C R W T
22	K1 Temp. threshold value 2: (1:+ | 0:-)	Input	1.006	C W
23	K1 Temp. threshold value 2: Switching output	Output	1.001	C R T
24	K1 Temp. threshold value 2: Switching output block	Input	1.006	C W
25	K1 Humidity threshold value 1: Absolute value	Input/Output	9.001	C R W T
26	K1 Humidity threshold value 1: (1:+ | 0:-)	Input	1.006	C W
27	K1 Humidity threshold value 1: Switching output	Output	1.001	C R T
28	K1 Humidity threshold value 1: Switching output block	Input	1.006	C W
29	K1 Humidity threshold value 2: Absolute value	Input/Output	9.001	C R W T
30	K1 Humidity threshold value 2: (1:+ | 0:-)	Input	1.006	C W
31	K1 Humidity threshold value 2: Switching output	Output	1.001	C R T
32	K1 Humidity threshold value 2: Switching output block	Input	1.006	C W
33	K2 Malfunction	Output	1.001	C R T
34	Reserve			
35	K2 Temp. measured value outdoors	Input	9.001	C W
36	K2 Temp. measured value indoors	Output	9.001	C R T
37	K2 Temp. measured value total	Output	9.001	C R T
38	K2 Temp. min/max value criterion	Input	1.017	C W
39	K2 Temp. minimum measured value	Output	9.001	C R T
40	K2 Temp. maximum measured value	Output	9.001	C R T
41	K2 Temp. reset min/max value	Input	1.017	C W
42	K2 Humidity measured value outdoors	Input	9.001	C W
43	K2 Humidity measured value indoors	Output	9.001	C R T
44	K2 Humidity measured value total	Output	9.001	C R T
45	K2 Humidity min/max value criterion	Input	1.017	C W
46	K2 Humidity minimum measured value	Output	9.001	C R T
47	K2 Humidity maximum measured value	Output	9.001	C R T
48	K2 Humidity reset min/max value	Input	1.017	C W
49	K2 Temp. threshold value 1: Absolute value	Input/Output	9.001	C R W T
50	K2 Temp. threshold value 1: (1:+ | 0:-)	Input	1.006	C W

No.	Name	Function	DTP	Flags
51	K2 Temp. threshold value 1: Switching output	Output	1.001	C R T
52	K2 Temp. threshold value 1: Switching output block	Input	1.006	C W
53	K2 Temp. threshold value 2: Absolute value	Input/Output	9.001	C R W ?
54	K2 Temp. threshold value 2: (1:+ | 0:-)	Input	1.006	C W
55	K2 Temp. threshold value 2: Switching output	Output	1.001	C R T
56	K2 Temp. threshold value 2: Switching output block	Input	1.006	C W
57	K2 Humidity threshold value 1: Absolute value	Input/Output	9.001	C R W T
58	K2 Humidity threshold value 1: (1:+ | 0:-)	Input	1.006	C W
59	K2 Humidity threshold value 1: Switching output	Output	1.001	C R T
60	K2 Humidity threshold value 1: Switching output block	Input	1.006	C W
61	K2 Humidity threshold value 2: Absolute value	Input/Output	9.001	C R W T
62	K2 Humidity threshold value 2: (1:+ | 0:-)	Input	1.006	C W
63	K2 Humidity threshold value 2: Switching output	Output	1.001	C R T
64	K2 Humidity threshold value 2: Switching output block	Input	1.006	C W
65	K3 Malfunction	Output	1.001	C R T
66	Reserve			
67	K3 Temp. measured value outdoors	Input	9.001	C W
68	K3 Temp. measured value indoors	Output	9.001	C R T
69	K3 Temp. measured value total	Output	9.001	C R T
70	K3 Temp. min/max value criterion	Input	1.017	C W
71	K3 Temp. minimum measured value	Output	9.001	C R T
72	K3 Temp. maximum measured value	Output	9.001	C R T
73	K3 Temp. reset min/max value	Input	1.017	C W
74	K3 Humidity measured value outdoors	Input	9.001	C W
75	K3 Humidity measured value indoors	Output	9.001	C R T
76	K3 Humidity measured value total	Output	9.001	C R T
77	K3 Humidity min/max value criterion	Input	1.017	C W
78	K3 Humidity minimum measured value	Output	9.001	C R T
79	K3 Humidity maximum measured value	Output	9.001	C R T
80	K3 Humidity reset min/max value	Input	1.017	C W

No.	Name	Function	DTP	Flags
81	K3 Temp. threshold value 1: Absolute value	Input/Output	9.001	C R W T
82	K3 Temp. threshold value 1: (1:+ | 0:-)	Input	1.006	C W
83	K3 Temp. threshold value 1: Switching output	Output	1.001	C R T
84	K3 Temp. threshold value 1: Switching output block	Input	1.006	C W
85	K3 Temp. threshold value 2: Absolute value	Input/Output	9.001	C R W T
86	K3 Temp. threshold value 2: (1:+ | 0:-)	Input	1.006	C W
87	K3 Temp. threshold value 2: Switching output	Output	1.001	C R T
88	K3 Temp. threshold value 2: Switching output block	Input	1.006	C W
89	K3 Humidity threshold value 1: Absolute value	Input/Output	9.001	C R W T
90	K3 Humidity threshold value 1: (1:+ | 0:-)	Input	1.006	C W
91	K3 Humidity threshold value 1: Switching output	Output	1.001	C R T
92	K3 Humidity threshold value 1: Switching output block	Input	1.006	C W
93	K3 Humidity threshold value 2: Absolute value	Input/Output	9.001	C R W T
94	K3 Humidity threshold value 2: (1:+ | 0:-)	Input	1.006	C W
95	K3 Humidity threshold value 2: Switching output	Output	1.001	C R T
96	K3 Humidity threshold value 2: Switching output block	Input	1.006	C W
97	K4 Malfunction	Output	1.001	C R T
98	Reserve			
99	K4 Temp. measured value outdoors	Input	9.001	C W
100	K4 Temp. measured value indoors	Output	9.001	C R T
101	K4 Temp. measured value total	Output	9.001	C R T
102	K4 Temp. min/max value criterion	Input	1.017	C W
103	K4 Temp. minimum measured value	Output	9.001	C R T
104	K4 Temp. maximum measured value	Output	9.001	C R T
105	K4 Temp. reset min/max value	Input	1.017	C W
106	K4 Humidity measured value outdoors	Input	9.001	C W
107	K4 Humidity measured value indoors	Output	9.001	C R T
108	K4 Humidity measured value total	Output	9.001	C R T
109	K4 Humidity min/max value criterion	Input	1.017	C W
110	K4 Humidity minimum measured value	Output	9.001	C R T

No.	Name	Function	DTP	Flags
111	K4 Humidity maximum measured value	Output	9.001	C R T
112	K4 Humidity reset min/max value	Input	1.017	C W
113	K4 Temp. threshold value 1: Absolute value	Input/Output	9.001	C R W T
114	K4 Temp. threshold value 1: (1:+ | 0:-)	Input	1.006	C W
115	K4 Temp. threshold value 1: Switching output	Output	1.001	C R T
116	K4 Temp. threshold value 1: Switching output block	Input	1.006	C W
117	K4 Temp. threshold value 2: Absolute value	Input/Output	9.001	C R W T
118	K4 Temp. threshold value 2: (1:+ | 0:-)	Input	1.006	C W
119	K4 Temp. threshold value 2: Switching output	Output	1.001	C R T
120	K4 Temp. threshold value 2: Switching output block	Input	1.006	C W
121	K4 Humidity threshold value 1: Absolute value	Input/Output	9.001	C R W T
122	K4 Humidity threshold value 1: (1:+ | 0:-)	Input	1.006	C W
123	K4 Humidity threshold value 1: Switching output	Output	1.001	C R T
124	K4 Humidity threshold value 1: Switching output block	Input	1.006	C W
125	K4 Humidity threshold value 2: Absolute value	Input/Output	9.001	C R W T
126	K4 Humidity threshold value 2: (1:+ | 0:-)	Input	1.006	C W
127	K4 Humidity threshold value 2: Switching output	Output	1.001	C R T
128	K4 Humidity threshold value 2: Switching output block	Input	1.006	C W

6. Parameter settings

6.1. Behaviour on power failure/power restoration

Behaviour on bus or auxiliary power failure:

The device sends nothing.

Behaviour on bus or auxiliary voltage restoration and following programming or reset:

The device sends all measurement values as well as switching and status according to their send behaviour set in the parameters with the delays fixed in the "General settings" parameter block. The "Software version" communications object is sent once after 5 seconds.

6.2. General settings

Set basic characteristics for the data transfer.

Send delays after power-up and programming for	
Measured values	5 s • ... • 2 h
Threshold values and switching outputs	5 s • ... • 2 h
Maximum telegram rate	• 1 message per second • ... • 5 messages per second • ... • 20 messages per second

Select which channels you would like to use.

Use channels 1...4	Yes • No

6.3. Channel 1...4

In the menus for channels 1 to 4, set the measured value transfer and the threshold values for temperature and humidity.

6.3.1. Measured values

The setting possibilities for the temperature and humidity measured values are identical.

Using **Offsets** you can adjust the measured values to be sent.

Offset in 0.1°C	-50…+50; 0

The unit can calculate a **mixed value** from its own reading and an external value. Set the mixed value calculation if desired.

Use external measured value	Yes • No
Ext. Reading proportion of the total reading	5% • 10% • ... • 50% • ... • 100%
Send internal and total reading	• never • periodically • on change • on change and periodically

On change of *(if sent on change)*	0.1°C • 0.2°C • ... • 5.0°C (for temperature) 0.10% • ... • 2% • ... • 25% (for humidity)
Send cycle *(if sent periodically)*	5 s • ... • 2 h

The **minimum and maximum readings** can be saved and sent to the bus. With the object "Channel X temp. reset min/max value" respectively "Channel X humidity reset min/max value" the values can be reset.

Use minimum / maximum values	Yes • No

6.3.2. Temperature threshold value 1/2

Activate the threshold value if required.

Use threshold value 1	Yes • No

Threshold value:

The threshold value can be set directly in the application program using parameters, or be defined via the bus using a communications object.

Threshold value setpoint using parameter:

Set the threshold values and hysteresis directly.

Threshold value setpoint using	**Parameter** • Communication objects
Threshold value in 0.1°C	-300 … 800; 200
Hysteresis of the threshold value in %	0 … 50; 20

Threshold value setpoint using a communication object:

Beforehand, enter how the threshold value will be received from the bus. Basically, a new value can be received, or simply a command to increase or decrease.

During initial commissioning, a threshold value must be defined which will be valid until the first call with a new threshold value. For units which have already been taken into service, the last communicated threshold value can be used.

A set threshold value will be retained until a new value or a change is transferred. The current value is saved in EEPROM, so that this is retained in the event of a power supply failure and will be available once the mains power is restored.

Threshold value setpoint using	Parameter • **Communication objects**
The last communicated value should	• not be retained • be retained after power restoration • be retained after power restoration and programming
Start threshold value in 0.1°C valid until first call	-300 … 800; 200
Type of threshold value change	Absolute value • Increase/decrease

Step size *(upon increase/decrease change)*	0.1°C • ... • 1°C • ... • 5°C
Hysteresis of the threshold value in %	0 ... 50; 20

Switching output:

Set the behaviour of the switching output when a threshold value is exceeded/undercut.

When the following conditions apply, the output is (TV = Threshold value)	• TV above = 1 | TV - Hyst. below = 0 • TV above = 0 | TV - Hyst. below = 1 • TV below = 1 | TV + Hyst. above = 0 • TV below = 0 | TV + Hyst. above = 1
Delays can be set via objects (in seconds)	No • Yes
Switching delay from 0 to 1	none • 1 s ... 2 h
Switching delay from 1 to 0	none • 1 s ... 2 h
Switching output sends	• on change • on change to 1 • on change to 0 • on change and periodically • on change to 1 and periodically • on change to 0 and periodically
Send cycle *(is sent only if "periodically" is selected)*	5 s ... 2 h

Block:

The switching output can be blocked using an object. Define specifications here for the behaviour of the output when blocked.

Use switching output block	No • Yes
Analysis of the blocking object	• At value 1: block | At value 0: release • At value 0: block | At value 1: release
Blocking object value before first call	0 • 1
Behaviour of the switching output	
On block	• Do not send message • send 0 • send 1
On release (with 2 seconds release delay)	[Dependent on the "Switching output sends" setting]

The behaviour of the switching output on release is dependent on the value of the parameter "Switching output sends" (see "Switching output")

Switching output sends on change	• Do not send message • Send switching output status
Switching output sends on change to 1	• Do not send message • if switching output = 1 ➔ send 1
Switching output sends on change to 0	• Do not send message • if switching output = 0 ➔ send 0

Switching output sends on change and periodically	Send switching output status
Switching output sends on change to 1 and periodically	if switching output = 1 ➔ send 1
Switching output sends on change to 0 and periodically	if switching output = 0 ➔ send 0

6.3.3. Humidity threshold value 1/2

Activate the threshold value if required.

Use threshold value 1	Yes • No

Threshold value:

The threshold value can be set directly in the application program using parameters, or be defined via the bus using a communications object.

Threshold value setpoint using parameter:

Set the threshold values and hysteresis directly.

Threshold value setpoint using	**Parameter** • Communication objects
Threshold value in 0.1%	0 … 1000; 250
Hysteresis of the threshold value in %	0 … 50; 20

Threshold value setpoint using a communication object:

Beforehand, enter how the threshold value will be received from the bus. Basically, a new value can be received, or simply a command to increase or decrease.

During initial commissioning, a threshold value must be defined which will be valid until the first call with a new threshold value. For units which have already been taken into service, the last communicated threshold value can be used.

A set threshold value will be retained until a new value or a change is transferred. The current value is saved in EEPROM, so that this is retained in the event of a power supply failure and will be available once the mains power is restored.

Threshold value setpoint using	Parameter • **Communication objects**
The last communicated value should	• not be retained • be retained after power restoration • be retained after power restoration and programming
Start threshold value in 0.1% valid until first call	0 … 1000; 250
Type of threshold value change	Absolute value • Increase/decrease
Step size *(upon increase/decrease change)*	0.10% • ... • 2% • ... • 25%
Hysteresis of the threshold value in %	0 … 50; 20

Switching output:

Set the behaviour of the switching output when a threshold value is exceeded/undercut.

When the following conditions apply, the output is (TV = Threshold value)	• TV above = 1 | TV - Hyst. below = 0 • TV above = 0 | TV - Hyst. below = 1 • TV below = 1 | TV + Hyst. above = 0 • TV below = 0 | TV + Hyst. above = 1
Delays can be set via objects (in seconds)	No • Yes
Switching delay from 0 to 1	none • 1 s ... 2 h
Switching delay from 1 to 0	none • 1 s ... 2 h
Switching output sends	• on change • on change to 1 • on change to 0 • on change and periodically • on change to 1 and periodically • on change to 0 and periodically
Send cycle *(is sent only if "periodically" is selected)*	5 s ... 2 h

Block:

The switching output can be blocked using an object. Define specifications here for the behaviour of the output when blocked, released and during the block.

Use switching output block	No • Yes
Analysis of the blocking object	• At value 1: block | At value 0: release • At value 0: block | At value 1: release
Blocking object value before first call	0 • 1
Behaviour of the switching output	
On block	• Do not send message • send 0 • send 1
On release (with 2 seconds release delay)	[Dependent on the "Switching output sends" setting]

The behaviour of the switching output on release is dependent on the value of the parameter "Switching output sends" (see "Switching output")

Switching output sends on change	• Do not send message • Send switching output status
Switching output sends on change to 1	• Do not send message • if switching output = 1 ➔ send 1
Switching output sends on change to 0	• Do not send message • if switching output = 0 ➔ send 0
Switching output sends on change and periodically	Send switching output status

Switching output sends on change to 1 and periodically	if switching output = 1 ➔ send 1
Switching output sends on change to 0 and periodically	if switching output = 0 ➔ send 0

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