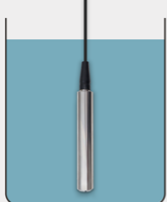# Level measuring system for liquids SK80-F

SK80-F

Sensor Hydrostatic

SK80-F-T-PM-5
max. 5 m
Temperature Sensor
Cable length: 10 m

SK80-F-T-PM-10
max. 10 m
Temperature Sensor
Cable length: 15 m

SK80-F-PM-5
max. 5 m
Cable length: 10 m

Sensor Ultrasonic

SK80-F-U-5
max. 5 m
Cable length: 10 m

Table of Contents		
Device description	Controls	Local settings
Tank parameter	ETS applikation	ETS parameters
ETS objects	Specifications	Commissioning
Imprint		

Subject to change

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1. Device description

The KNX level measuring system SK80-F from ARCUS-EDS GmbH measures and regulates the filling and water levels from water cistern or oil tanks of different shapes and with KNX connection.

The measuring system consists of a Sensor, either ultrasound (US) or hydrostatic (HS) and the KNX coupler with integrated display.

Not suitable for corrosive and explosive environments.

1.1 Data KNX-coupler

SK80-F	
Protection class	IP65
Supply voltage	KNX 21 .. 32V DC
Additional voltage:	Without
KNX power load:	20MA
Sensors:	Hydrostatic or ultrasound.
Input area:	0-1V/0-5V/0-10V 4-20mA (with shunt 100R) Modbus RTU (RS485)
Supply for sensor head	13V / 20MA max
Switch output:	20mA/5-230V AC/DC

1.2 Data ultrasonic sensor with temperature measurement

U-5	Htsl-es
Protection class	IP65
Supply voltage	12V DC
Output signal	ModBUS RS485
Measuring range / accuracy:	5m / 0.5% FS
Cable length:	10m
Dimensions DXL	68x80mm
Menu selection	Ultrasonic ModBUS+T

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1.3 Data hydrostatic level sensor (5m)

PM-5	BGT-GL801
Protection class	IP68
Supply voltage	12V DC
Output signal	0-5V
Measuring range / accuracy:	5m / 0.5% FS
Cable length:	10m
Dimensions DXL	30x120mm
Menu selection	Hydrostatic 5V/5m

1.4 Data hydrostatic level sensor with temperature measurement (5m)

T-PM-5	BGT-GL802
Protection class	IP68
Supply voltage	12V DC
Output signal	Modbus RS485
Measuring range / accuracy:	5m / 0.5% FS
Cable length:	10m
Dimensions DXL	30x180mm
Menu selection	Hydrostatic ModBUS+T

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1.5 Data hydrostatic level sensor with temperature measurement (10m)

T-PM-10	BGT-GL802
Protection class	IP68
Supply voltage	12V DC
Output signal	Modbus RS485
Measuring range / accuracy:	10m / 0.5% FS
Cable length:	15m
Dimensions DXL	30x180mm
Menu selection	Hydrostatic ModBUS+T

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1.6 Device elements

The following operating and connection elements are available on the device
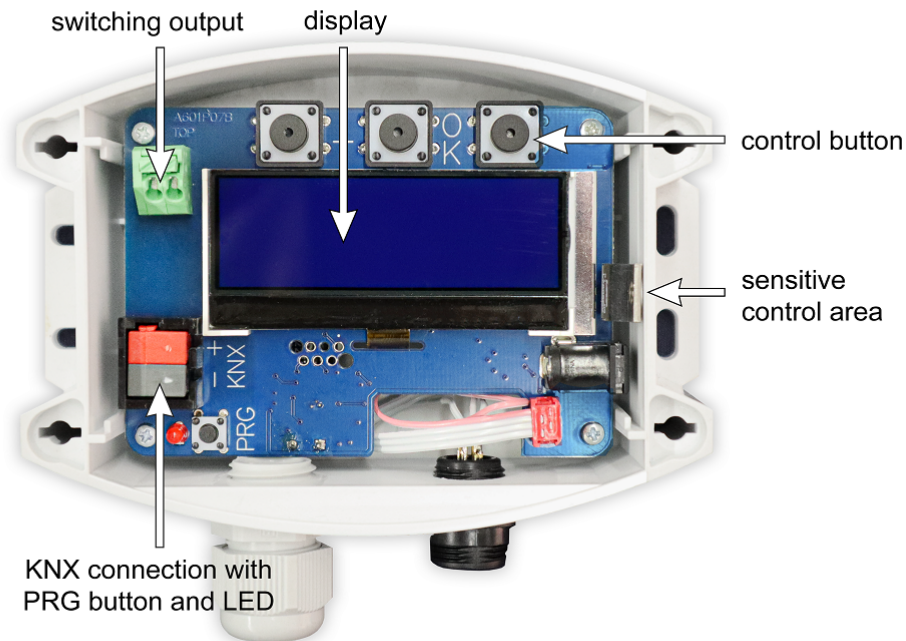
- KNX connection
    - Programming button
    - Programming LED
- LCD display
- Control button (+), (-), (ok)
- Sensor connection
- Device clamp for galvanically separate switching exit 20mA/5-230V
- Sensitive area to switch the displayed values

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1.7 Displayed values on the device

The current values are displayed on the device and output on the KNX bus.

LCD display normal view
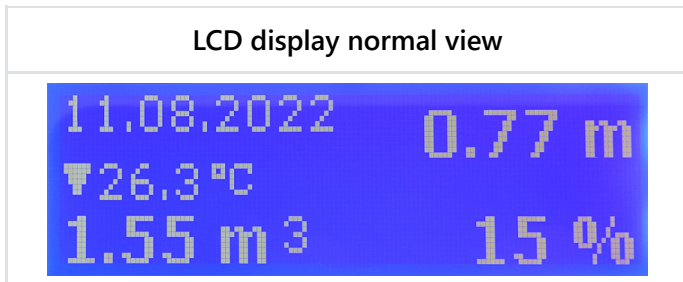
- Current date
- Current level
- Current content
- Percentage content
- Water temperature (if it is transmitted as a value)
- Level below Lower limit ↓
- Upper limit is exceeded ↑
- Switching output active ⚡

Alternatively, the minimum/maximum values can be displayed.

LCD display min/max view
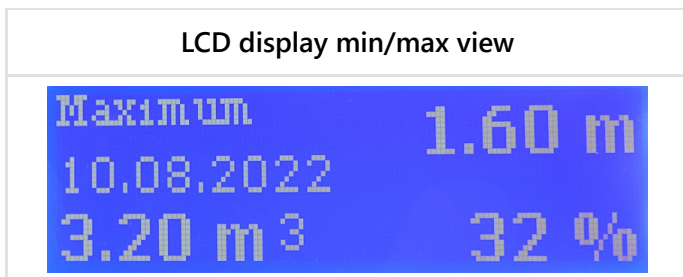
- Minimum/maximum date
- Min/max level
- Min/max content
- Min/max percentage content

Switching takes place via the side sensitive surface (alternatively via the keys (+) or (-)).

The minimum/maximum values can also be reset over these.

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1.8 Device parameters (local settings)

All parameters can be set via the ETS application or stationary on the device.The stationary settings are made via button (+), (-), (ok).

LCD-Display Einstellungen (Lokale Einstellungen)
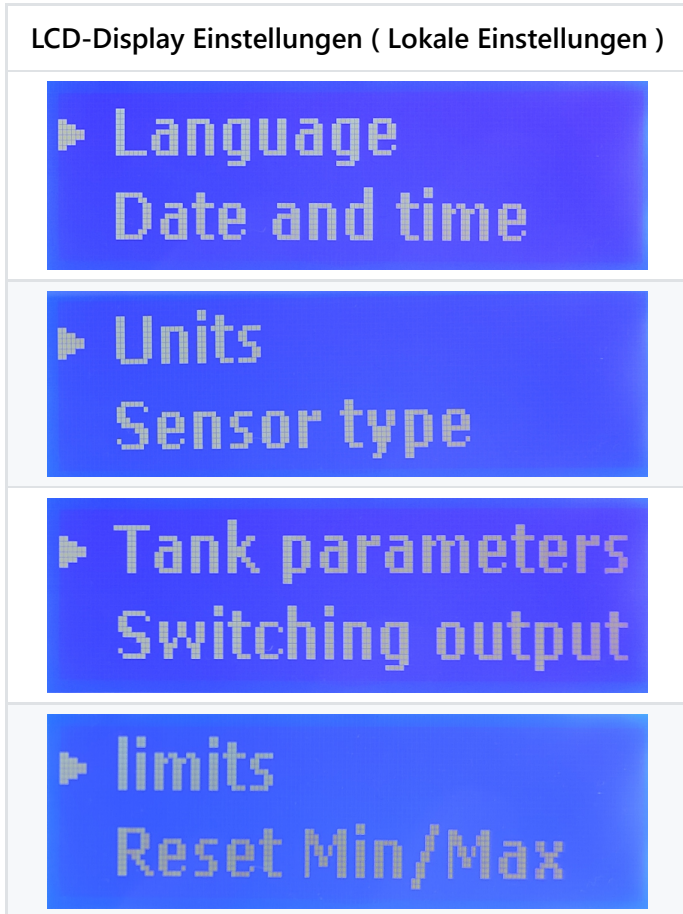
Operation via the buttons:

- Activity of the button (OK) calls the settings.
- Short activity of the button (OK) enters the next menu item, only goes next digit or will accept the current value.
- Long activity of the button (OK) leaves the current menu item without a change or goes to the previous number
- The buttons +/- select the previous/next menu item or in/decrease the current number.

Changes to the parameters must be confirmed via a dialog (accept/cancel)

The following settings can be made using the control buttons:

- Language
  - English
  - German
- Date / time

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The date and time are only used for the display and the time stamps of the minimum/maximum values

LCD-Display settings (example: date)
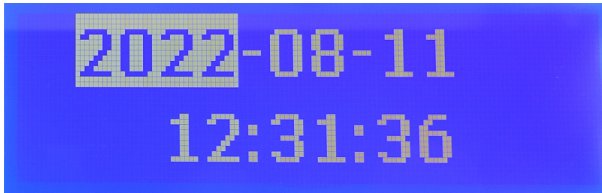
- Units (only affects the advertisement, the KNX objects are not affected)
  - l, m³
  - mm, cm, M

Changes to the units change the readings on the display, so an unfavorable choice can lead to poor legibility

- Used sensor type with different maximum levels
  - Hydrostatic with and without temperature measurement
  - Ultrasound with and without temperature measurement

The Sensor types Modbus and Modbus+T refer to the sensors offered by Arcus-EDS

LCD-display Settings (example: sensor types)
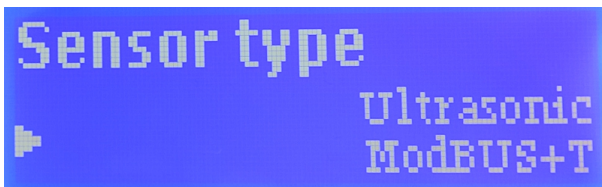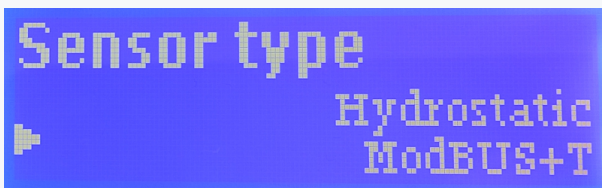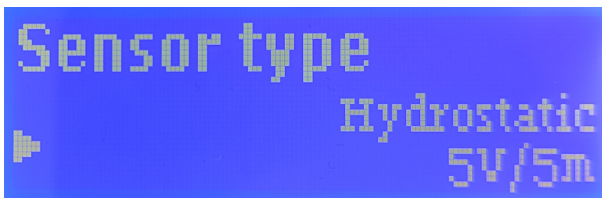
- Tank parameter
  - Tank shape
    - Cylindrical
    - Round
    - Conical

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- Free shape
  - Maximum content
  - Maximum filling height
  - Minimal sensor distance ("full" with ultrasonic sensor)
  - Minimal filling height ("empty" with hydrostatic sensor)
  - Filling points (only with "free shape" and up to 8) with each
    - Fill level
    - Contents

  > The filling points are sorted in the device if necessary. However, higher levels must also have larger content otherwise an error will be displayed.

- Switching output
  - Active at the upper level
  - Active with lower level
  - Maximum timeout

  > If within the timeout time the over/under-level condition does not change, the output is switched off

- Limit values
  - Content or filling height
  - Value for the lower limit
  - Value for upper limit
  - Hysteresis

  > When changing the reference variable (content <-> filling height), the limit values must be re-entered

- Reset min/max

  > The minimum and maximum values are deleted and set to the current measured values.

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1.9 Tank parameters (local and ETS settings)

The tank geometries (vertical cross-section) can be chosen between cylindrical (simplest shape), round, conical and free shape

Tank shapes
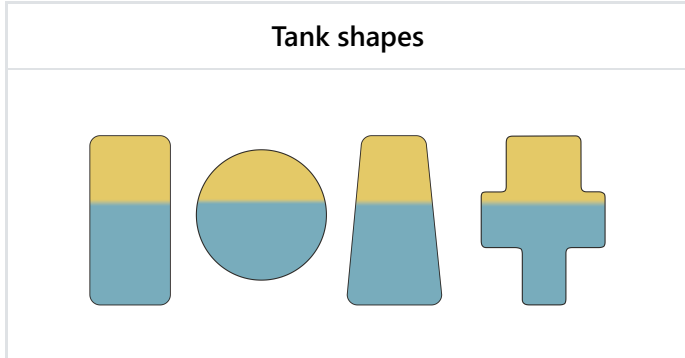
The necessary information, regardless of geometry, are:

- The content if the tank is 100% filled
- The filling height when the tank is full
- Possibly the filling height if the tank is empty (only HS sensor and if the sensor is below the intake pump)
- If the ultrasonic sensor is used, the minimum sensor spacing is to be determined in the "full" state, this must be at least 30 cm

Sensor position ultrasound	Sensor position hydrostatic
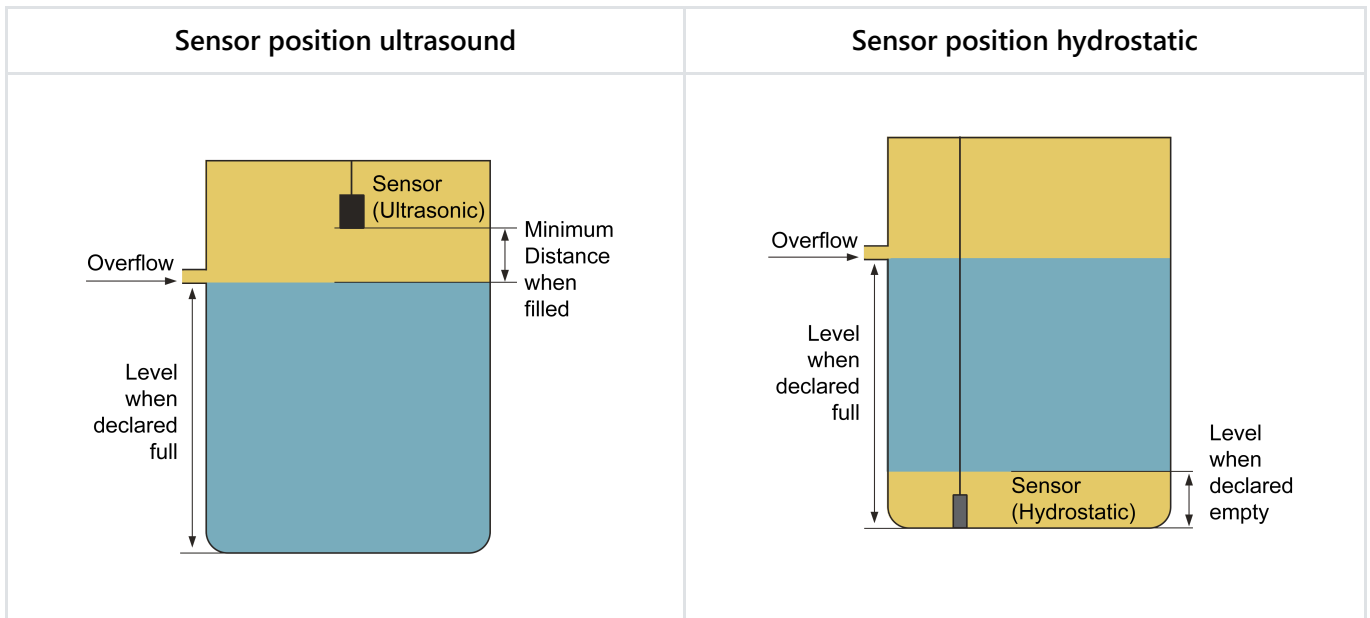
Tank geometry conical

If the tank geometry is chosen as conical, the ratio of lower to the upper diameter has to be entered.

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Tank geometry conical
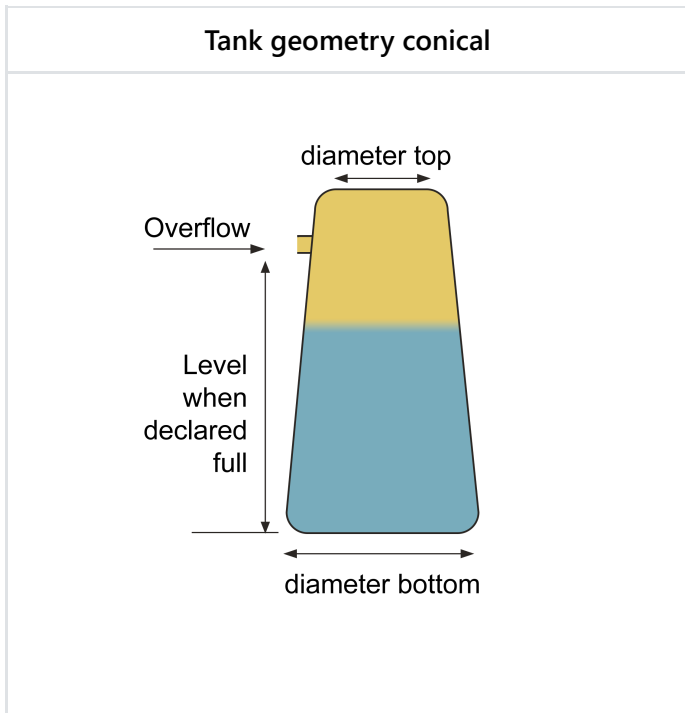
Example: lower diameter 2.5m upper diameter 1m so the ratio is 2.5, this value must then be entered.

Tank geometry free shape

For the selection of tank geometry "free shape", several filling points must be determined that put the filling height with the content in the evidence
Example:

No	Level	Content
1	1m	0,5m³
2	2m	0.8m³
3	2.5m	1.5m³
4	3m	2,5m³
5	4m	3m³

The points for "full" and "empty" are already taken over by the basic settings

> The filling points are sorted in the device if necessary.However, higher levels must also have larger content Otherwise an error (locally on the display) is displayed.

> If the number of filling points is to be reduced, the following filling point must be entered 0 at level or content

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2. Application description

2.1 The principle of action and areas of application

With the help of the ultrasonic sensor or a pressure sensor, the SK80-F measuring system captures the filling and water levels in Water cistern or oil tanks of different shapes. The measurement of the filling and water levels is based on a runtime measurement of the ultrasonic impulses that are output by the sensor, which are reflected from the surface of the medium and recorded again by the sensor. The hydrostatic sensor captures the pressure of the water column Standing over it and calculating the level from it. The conversion of the level into content takes place internally based on the entered tank geometry. All parameters that do not refer to KNX communication can be entered on the device on site. Alternatively, all values can be parameterized in the ETS.

Upper and lower limit values are recorded and can activate a switching output. Minimal and maximum filling stands are recorded and alternatively displayed and output via KNX. The KNX sensors are commissioned via the ETS (Tool Software) in connection with the associated Application program. The delivery state of the devices is unprogrammed.

2.2 Functions

Filling measurement with output of:

- Filling level in m (display also in cm or mm)
- Distance (surface to sensor head)
- Content in m³ (display also in l)
- Content in %
- Water temperature (if available as a measured value)
- Current date
- Minimum/maximum with date/level/content
- Upper limit with alarm
- Lower limit with alarm
- Switching exit (internally or externally controlled)

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2.3 Parameter

- General Settings

2.2.1 SK80_F > General settings

General settings	Overwrite local settings — ○ Keep local settings ● Overwrite
Tank parameters	Sensor type — ● Hydrostatic ○ Ultrasonic
Limits	Sensor range — ModBUS+Temperature ▼
Switching output	Level send on change — 1% ▼
	Level — ○ No ● Yes
	Volume — ○ No ● Yes
	Content — ○ No ● Yes
	Distance — ○ No ● Yes
	Level send cyclical — ● Minutes ○ Hours / 0
	Temperature send on change — 0,1° ▼
	Temperature send cyclical — ● Minutes ○ Hours / 5
	Min/Max send on change — 1% ▼
	MinMax send cyclical — ● Minutes ○ Hours / 60
	Limits send cyclical — ● Minutes ○ Hours / 60
	Date/Time Object — ● Combined Datetime object / ○ Separate Date/Time objects

- ○ Overwrite local settings

  > If local settings are to be preserved, only the parameters relevant for KNX communication can be changed in the ETS.

- ○ Sensor type
  - Hydrostatic/ultrasonic
  - 5m/0..5V
  - 10m/0..5V

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- 5m/4..20mA
- 10m/4..20mA
- 5m/0..10V
- 10m/0..10v
- Modbus
- Modbus+temperature

○ Send the fill level when changing

- 0 (no automatic sending at a level change) 1% .. 10%

If sending is active in the event of a change, the objects to be sent can be selected

- Send the fill level when changing
- Send content when changing
- Send content (%) when changing
- Send distance when changing

○ Send the level cyclical

- 0 (do not send cyclical) up to 60
- Minutes or hours

If cyclically send is active, the objects to be sent can be selected

- Send the level cyclical
- Send content cyclical
- Send content (%) cyclical
- Send distance cyclical

○ Send temperature when changing

If a sensor with temperature recording is selected, automatic sending can be activated

- 0.1 ° .. 5 °

○ Send the temperature cyclically

- 0 (do not send cyclical) up to 60
- Minutes or hours

○ Send minimum/maximum when changing

- 0 (no automatic sending when changing) or 1% .. 10% of the maximum content

○ Send minimum/maximum cyclical

- 0 (do not send cyclical) up to 60
- Minutes or hours

○ Send the limit value under/exceeded cyclical

- 0 (do not send cyclical) up to 60
- Minutes or hours

○ Date/time object

The date and the time can be entered locally, setting the system time via a central KNX time provider is advised

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- Separate objects for date/time
- Common object for date/time

> The following parameters are only visible if the local settings are to be overwritten

- Tank Parameter

- Tank shape
  - Cylindrical
  - Around
  - Conical
  - Free shape
- Maximum content (in liters)
- Maximum level (in mm)
- Minimal sensor distance (with ultrasonic sensor in mm)
- Minimal level ("empty" with hydrostatic sensor in mm)
- Ratio upper to lower in diameter (only for conical tank shape)

> If the tank cross-section is evenly growing or decreasing from top to bottom, the conical tank shape can be selected, then the ratio of the lower to the upper diameter must be specified here Example: Upper diameter 0.6 m lower diameter 3 m -> Input 3/0.6 = 5

- Filling points (only with "free shape" and up to 8) with each
  - Fill level (in mm)

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- Content (in L)

> The filling points are sorted in the device if necessary.However, higher levels must also have larger content Otherwise an error (locally on the display) is displayed.

- Limit values

- Limit value setting level (mm) or content (L)
- Upper limit in mm or l
- Lower limit in mm or l
- Hysteresis for limit values (% of the maximum)

- Switching Output

- Active for lower limit
- Active for crossing upper limit
- Timeout for switching output 0 (without timeout) up to 60 minutes

> If within the timeout time the over/under-level condition is not ended, the output will still be switched off. This should prevent costly malfunctions due to defective lines/connections etc.

> If the switching output is neither activated for the upper nor for the lower limit, it can be used as an actuator via the switching object

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2.4 KNX-Objects

	Number	Name	Object Function	Description	Length	Data Type
	1	Output, Level (m)	Level	Level	4 bytes	length (m)
	2	Output, Distance (m)	Level	Distance	4 bytes	length (m)
	3	Output, Volume (m³)	Level	Volume	4 bytes	volume (m³)
	4	Output, Content (%)	Level	Content	1 byte	percentage (0..100%)
	5	Output, Temperature	Temperature	Temperature	2 bytes	temperature (°C)
	6	Output, Minimum level	Minimum/maximum	Minimum level	4 bytes	length (m)
	7	Output, Minimum volume	Minimum/maximum	Minimum volume	4 bytes	volume (m³)
	8	Output, Minimum level (%)	Minimum/maximum	Minimum level%	1 byte	percentage (0..100%)
	9	Output Minimum date	Minimum/maximum	Minimum date	3 bytes	date
	10	Output, Maximum level	Minimum/maximum	Maximum level	4 bytes	length (m)
	11	Output, Maximum volume	Minimum/maximum	Maximum volume	4 bytes	volume (m³)
	12	Output, Maximum level (%)	Minimum/maximum	Maximum level%	1 byte	percentage (0..100%)
	13	Output Maximum date	Minimum/maximum	Maximum date	3 bytes	date
	14	Input, Reset MinMax	Minimum/maximum	Reset	1 bit	reset
	15	I/O, Upper limit value	Limits		4 bytes	volume (m³)
	16	I/O, Lower limit value	Limits		4 bytes	volume (m³)
	17	Output, Upper limit overrun	Limits	Upper limit	1 bit	alarm
	18	Output, Lower limit underrun	Limits	Lower limit	1 bit	alarm
	19	I/O, Switching Output	Switching output	Switch	1 bit	switch
	20	Input, Datetime	Date/time	Datetime	8 bytes	date time

	IO	Name	Function	Datapoint type
1	Exit	Fill level in m	Height of the water level above the set 0 point	DPT 14.39
2	Exit	Distance in m	Distance in M between the water level and the sensor [1]	DPT 14.39
3	Exit	Content in m³	Current content of the tank	DPT 14.76
4	Exit	Content in %	Current content of the tank in % of the maximum content	DPT 5.1
5	Exit	Content temperature	Current temperature	DPT 9.1
6	Exit	Fill level minimum	Minimal level in m since the last reset	DPT 14.39

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	IO	Name	Function	Datapoint type
7	Exit	Content minimum	Minimal content in m³ since the last reset	DPT 14.76
8	Exit	Fill level minimum	Minimal level in % since the last reset	DPT 5.1
9	Exit	Date minimum	Date of the last measured minimum	DPT 11.1
10	Exit	Fill level maximum	Maximum level in m since the last reset	DPT 14.39
11	Exit	Content maximum	Maximum content in m³ since the last reset	DPT 14.76
12	Exit	Fill level maximum	Maximum level in % since the last reset	DPT 5.1
13	Exit	Date maximum	Date of the last measured maximum	DPT 11.1
14	Entrance	Reset Min/Max	Minimum and maximum values are on the current values of law	DPT 1.15
15	I/O	Upper limit The current limit can be read and set [2]	DPT 14.76 DPT 14.39	
16	I/O	Lower limit	The current limit can be read and set [2]	DPT 14.76 DPT 14.39
17	Exit	Limit value crossing	The upper limit is exceeded	DPT 1.5
18	Exit	Limit value underray	The lower limit is below DPT 1.5	
19	I/O	Switch output	The current switching condition can be read or set	DPT 1.1

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	IO	Name	Function	Datapoint type
20	Entrance	Date/time	Combined date/clock time tab [3]	DPT 19.1
20	Entrance	Time	Object for the central setting of the system time [3]	DPT 10.1
21	Entrance	Date	Object for the central setting of the system date [3]	DPT 11.1

[1]: In the case of ultrasonic sensors, the distance of the sensor to the surface is displayed, for hydrostatic sensors the current measured value minus the minimum height in the parameter field. [2]: Limit values can be specified in m³ or in m, depending on the parameter setting. [3]: Date/time can be parameterized as single objects or as a combined object.

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3. Technical specifications

SK80-F-XXX	Filling measuring system Technical data
Measurement values	Fill level in cubic meters level distance fill level in %
Send options	No sending, sending cyclical, sending when changing
---	---
Limit values	Upper limit value Lower limit value
Switch output	Upper limit value lower limit value object
---	---
Among ambient temperature SK80-F	Operation -20 .. +55 ° C Storage -20 .. +85 ° C
Environmental moisture	0 .. 95% RF not condensing
---	---
Among ambient temperature sensor	Ultrasound head -10 .. +50 ° C hydrostatic head 0 .. +60 ° C
Measurement area sensor	US 5: 300 mm ... 5000 mm HS 5: 0 .. 5000 mm HS 10: 0 .. 10000 mm
Accuracy of the sensors	0,5% of FS
Resolution fill level	1mm
---	---
Supply voltage	KNX bus voltage 21 .. 32VDC, 20MA
Performance consumption	400MW
Auxiliary voltage	Without
Bus coupler	Integrated

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SK80-F-XXX	Filling measuring system Technical data
Switch output	Potential free 20mA/5v..230V AC/DC
Commissioning	SK80_F.knxprod
Connections	2-pin KNX clamp (red-black)
Protection type	IP65
Installation SK80-F	Assembly with 2-4 screws soaked out
Housing	Plastic gray with a clear cover
Dimensions SK80-F	120 x 90 x 50 mm

Variants

Description	Description	Maximum filling height	Cable length	Order number
SK80-F	SK80-F Without sensor head	---	---	30807000
SK80-F-U-5	SK80-F with ultrasonic sensor head with temperature recording	5m	10m	30807105
SK80-F-PM-5	SK80-F with hydrostatic sensor head	5m	10m	30807205
SK80-F-T-PM-5	SK80-F with hydrostatic sensor head with temperature recording	5m	10m	30807305
SK80-F-T-PM-10	SK80-F with hydrostatic sensor head with temperature recording	10m	15m	30807310

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Individual sensors as spare parts

Name	Description	Maximum filling height	Cable length	Order number
U-5	Ultrasound head	5m	10m	90800105
PM-5	Hydrostatic pressure sensor BGT-GL801	5m	10m	90800205
T-PM-5	Hydrostatic pressure sensor BGT-GL802 Modbus with temperature recording	5m	10m	90800305
T-PM-10	Hydrostatic pressure sensor BGT-GL802 Modbus with temperature recording	10m	15m	90800315

Extension for level sensors

Description	Description	Cable length	Order number
SK80-F-E15	Extension for level sensor	15m	90800015
SK80-F-E30	Extension for level sensor	30m	90800030

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4. Commissioning

SK80-F View of the controls and connections

The KNX sensor is commissioned via the ETS (Tool Software) in conjunction with the associated application program. Delivery takes place in the untreated state.All functional rates are parameterized and programmed via the ETS. All parameters not relating to the KNX communication can also be set locally on the device, the lid must be loosened and open. Please note the documentation belonging to the ETS
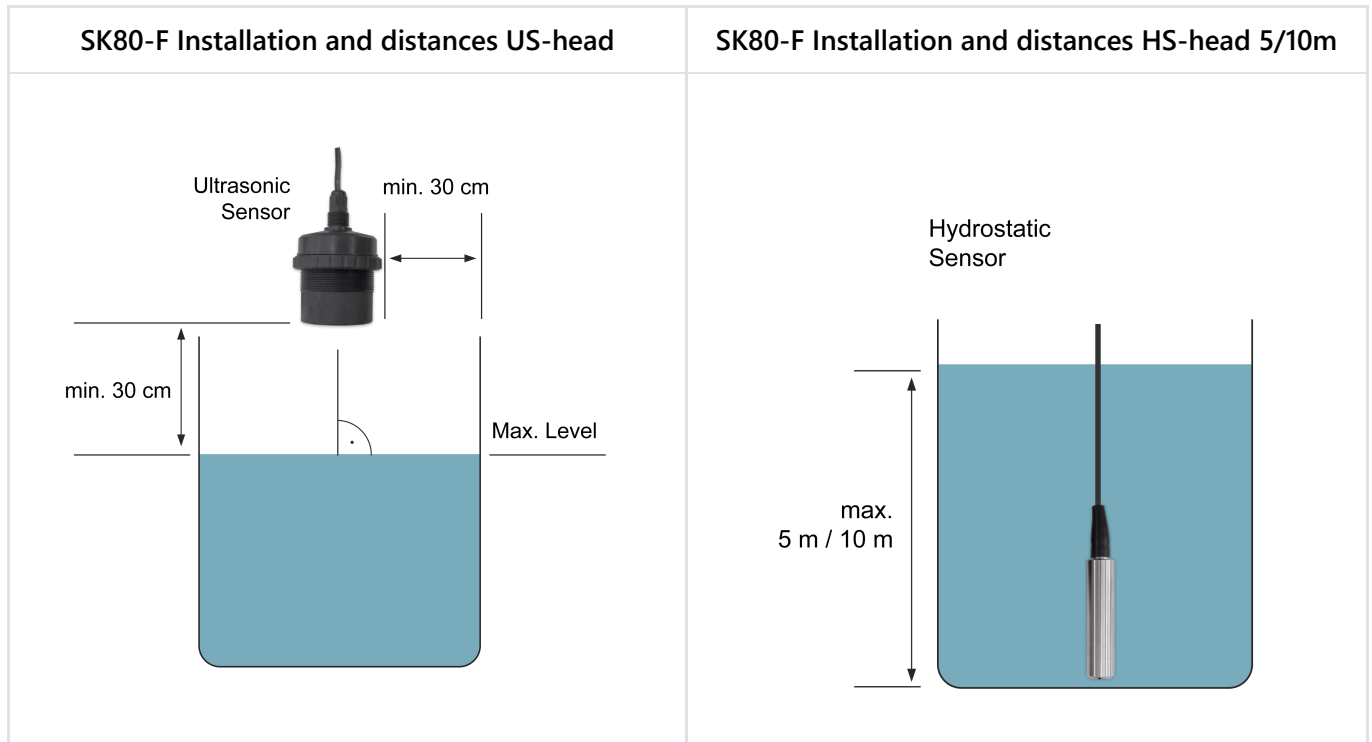
Assembly

The SK80-F sensor is intended for assembly outdoors and in the (also damp) interior. It fulfills the protection class IP54/65. The assembly takes place with four screws on the wall.The lid of the measurement converter is dissolved by turning the fastening screws. In order to meet protection class IP65, the supplied sealing ring must be carefully inserted into the lid. Make sure that the electronics are not damaged by tools and cable ends when installing. The sensor head used is connected and secured via a screwable plug connection to the evaluation unit.

Sensor heads

Ultrasonic measuring head

The sensor can be hung with a assembly chain in the cistern or attached to the edge with a pipe clamp (sanitary retail).The installation is also possible in the case of extremely unfavorable conditions, even if the filter, influx, pipes, swimmers, cables could (could) interfere with the measuring range of the sensor.To do this, the measuring impulse of the sensor must be "guided" - this happens in a simple way with a PU tube.The external size of the sensor is 65 mm and can therefore be plugged directly into a commercially available 80 mm PU pipe.The pipe should range to the cistern base and be in one piece.It is only important that a small ventilation hole is drilled shortly before the sensor to avoid under- or overpressure in the pipe.

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SK80-F Installation and distances US-head	SK80-F Installation and distances HS-head 5/10m
Ultrasonic Sensor · min. 30 cm · min. 30 cm · Max. Level	Hydrostatic Sensor · max. 5 m / 10 m

Hydrostatic measuring head

The sensor is sunk to the floor in the tank.The cable must be protected against mechanical injuries and high tension.

Cable extension

Extensions are equipped with connectors on both sides and are inserted between the sensor head and the display unit.

Behavior in the event of bus voltage recovery

All changes made to the settings and the values changed via the KNX bus are retained in the event of a bus voltage loss. The internal time is saved in the event of a voltage failure and continued when restarted. In the event of a short term voltage failure, the system time does not need to be re set.

Resetting the sensor and deleting the Program

In order to delete the programming (project planning) or to put the module back into the delivery state, it must be switched without supply (disconnecting the KNX bus clamp). Now keep the programming button down while connecting the KNX bus clamp and wait until the programming LED lights up (approx. 1-2 seconds). Now you can let go of the programming button and the module is ready for a new project planning. If you let go of the programming button too early, repeat the procedure.

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5. Imprint

Editor: Arcus-EDS GmbH, Rigaer Str. 88, 10247 Berlin Responsible for the content: Hjalmar Hevers, Reinhard Pegelow Reprint, also in part, only permitted with the approval of Arcus-EDS GmbH. All information without guarantee, technical changes and price changes reserved.

Liability

The selection of the devices and the determination of the suitability of the devices for a certain intended use are only in the buyer's responsibility. For this there is none liability or warranty assumed. The information in the catalogs and data sheets is not an assurance of special properties, but result from experience and measurements. Liability for damage caused by incorrect operation/project planning or malfunctions of the devices is excluded. Rather, the operator/projector must ensure that incorrect operation, misconceptions and malfunctions cannot cause any further damage.

Safety regulations

Danger! Installation and assembly of electrical devices may only be carried out by an electrical specialist. Compliance with the corresponding safety regulations of the VDE, TÜV and the responsible Energy supply companies must be ensured by the buyer/operator of the system. No guarantee is assumed for defects and damage caused by improper use of the devices or by not observing the operating instructions.

Warranty

We provide warranty within the scope of the legal provisions. In the event of a malfunction, please contact us and send the device with an error description Our company address mentioned below.

Manufacturer

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Disposal

The symbol of the crossed -out garbage bin on the device or the packaging means that the product at the end of his service life may not be disposed of with other general waste.

Registered trademarks

The CE sign is a free traffic sign that turns exclusively to the authority and none Assurance of properties.

Registered trademark of the Konnex Association

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