KELLER DCX Data Loggers
DCX-22 Product Line

- DCX-16 / DCX-22 G
- DCX-16 / DCX-22 SG
- DCX-22 AA
- DCX-16 / DCX-22 VG
- GSM-1 / GSM-2
- DCX-RC (RainCatcher)

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**DCX-16** (Ø 16 mm) / **DCX-22** (Ø 22 mm)

- Absolute
- Variable installation depth
- Read-out by communication cable
- Accuracy 0,1 %FS (DCX-16: 0,2 %FS)
- All channels can be logged
- Suitable for level an baro measurements
- Autonomous device: all is integrated
- Needs a second device for measuring baro pressure

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DCX-22 SG

- Absolute
- Diverse cable lengths
- Read-out by communication cable
- Accuracy 0.1 %FS
- All channels can be logged
- Suitable for level measurements
- Battery down under, read out on top of borehole
DCX-22 VG

- Barometric compensated by capillary
- Diverse cable lengths
- Read-out by communication cable
- Accuracy 0.1 %FS
- All channels can be logged
- Suitable for high accuracy and low range level measurements
- Battery down under, read out on top of borehole
DCX-22 AA

- Barometric compensated
- Fixed cable length
- Read-out by communication cable
- Accuracy 0,1 %FS
- All channels can be logged
- Suitable for 2 major applications
- Level sensor down under, electronics, battery and baro sensor on top in battery pot

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Sewage

Sewage is the dumping of over-load of drain water into natural water sources. It’s like an over-pressure valve for the drain system.

During a sewage, water-levels are measured and later converted into flow.

This data gives good insight information on the sewerage and serves a better pollution management.

Groundwater Level

Monitoring of changes in groundwater level.

Important for efficient water management like soil hydration, water saving, dyke fixation and intake of drinking water.
DCX-22 AA used as a sewer

- Registration of dumped sewage
- Installation in sewerage
- Activation by event trigger
- Automatic sewage report
- Combinable with RainCatcher

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What is a sewage?

- Level sensor is mounted at a certain distance from the topside of the wall, i.e. 1 m.
- This distance is set in the software as activation trigger.
- A log frequency during the event is also set (i.e. 1 minute).
- Sewage fills after rainfall. When flow is too big, an emergency outlet is used for carrying off the surplus into natural water.
- When water level reaches this level, the sensor starts to register every minute a water level. This value is stored in memory.
- When the water level decreases under trigger level, the logger is deactivated again.

DCX-22 AA used as a Sewer

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DCX-22 AA used as a Sewer

How is the event trigger set in the software?

![Event Trigger Configuration](image-url)
DCX-22 AA used as a Sewer

How is the data converted to a sewage report?

1. Data from logger is converted to waterlevel
2. From all water levels the event trigger is subtracted
3. All values < 0 are eliminated from the datasheet
4. The remaining waterlevels are converted to flow with Poleni’s formula: \( Q = m \times b \times h^{3/2} \)
5. The total time is calculated by subtracting end and beginning of the sewage
6. Average flow \([m^3/min]\) is calculated
7. Average flow is multiplied with duration of the sewage. The quantity \([m^3]\) can be reported.
DCX-22 AA used as a Sewer

Example of a Sewage Report

**Overstortrapportage**

Datum: 02.04.2003  
Tijd: 10:38:12  
Gemeten met KELLER datalogger

Type: 5.5  
Versie: 2.35  
Serienummer: 966

Opmerking

#E

**Datalogger configuratie**

Soortelijk gewicht water: 988,000 kg/m³  
Trigger aan (P_aan): 0.100 m (0,010 bar)  
Trigger uit: 0.070 m (0,007 bar)  
Gravitatie (g): 9,80665 m/s²

Hoepte (h): [P-P_aan]/dg

**Overstortgegevens**

Vormfactor (m): 1  
Breedte (b): 1 m

Formule: Q=1.7*m*b*(h+1.5)

**Overstort overzicht**

<table>
<thead>
<tr>
<th>Overstort Nummer</th>
<th>Aanvang</th>
<th>Einde</th>
<th>Duur D:H:M:S</th>
<th>Q[m³/s]</th>
<th>m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25.03.2003, 09:26:59</td>
<td>25.03.2003, 09:27:19</td>
<td>0:00:00:20</td>
<td>0.0102</td>
<td>0.2043</td>
</tr>
<tr>
<td>2</td>
<td>25.03.2003, 09:30:09</td>
<td>25.03.2003, 10:08:09</td>
<td>0:00:38:00</td>
<td>0.0209</td>
<td>47.6673</td>
</tr>
<tr>
<td>3</td>
<td>25.03.2003, 10:24:49</td>
<td>25.03.2003, 13:40:09</td>
<td>3:03:15:20</td>
<td>0.0197</td>
<td>230.5647</td>
</tr>
</tbody>
</table>

Totale overstort 278,4363 m³

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DCX-RC (RainCatcher)

Why a rain datalogger?

• Reason of sewage data logging is to limit the pollution of natural water.

• If too many sewages take place, the capacity of the sewerage is too small and a local government is forced to invest in a bigger sewerage.

• ….. Unless one can proof that extraordinary precipitation caused the sewage.

• Our DCX-RC (RainCatcher) registrates the rainfall and helps the customer to visualise the quantity of precipitation.

• The pressure from the integrated baro sensor can also be used to compensate DCX-22 G / SG.

• With our new Multiviewer software, we can plot the data of both Raincatcher and DCX level logger in the same graphic.
DCX-16, DCX-22 AA / DCX-22/VG/SG used as a Ground Water Level Datalogger

- Registration of ground water level
- Installation in borehole
- Activation by timer
- Event trigger for special measurements

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DCX-16, DCX-22 AA / DCX-22/VG/SG used as a Ground Water Level Datalogger

Measuring modes / features

• Regular level measurement with a fixed interval
• Regular level measurement with a fixed interval, related to head of borehole or sea level
• Level measurements during pumping (delta p, equals a logarithmic time axis)
• Activation of the logger when level exceeds a preset value (prevents logging zero-values in dry season)
• In combination with our GSM-1 also alarm functionality is offered

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DCX-16 / DCX-22: Commercial Aspects

Advantages DCX-16 / DCX-22 Level Data Loggers

- Barometric compensation in the data logger
- Readout facility on top of borehole
- User-friendly software
- Software available for Windows and WindowsCE (PocketPC) devices
- Complete package delivery: everything the customer needs (cable, software, batteries) is included in the delivery
- Rugged and compact design
- Battery life 10 years
- Battery can be changed by the user
- Very complete productline: Modem (GSM data transfer), rain data logger

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DCX-16 / DCX-22: Commercial Aspects

Differences between DCX22-AA and DCX16 / DCX22-VG

**DCX-22 AA**
- Limited and fixed cable length
- Accuracy 0,1 %FS
- Lowest range 5 mWC
- IP68

**DCX-16 / DCX-22 VG**
- Unlimited cable length
- Accuracy 0,1 %FS
- Lowest range 2 mWC
- IP65
- Very stable
## DCX-22 Application Guide

<table>
<thead>
<tr>
<th>Application</th>
<th>DCX-22 AA</th>
<th>DCX G</th>
<th>DCX SG</th>
<th>DCX-16 VG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borehole</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Borehole which can be flooded</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>Borehole which is permanently flooded</td>
<td>-</td>
<td>x</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>Borehole with baro comp</td>
<td>x</td>
<td>-</td>
<td>-</td>
<td>x</td>
</tr>
<tr>
<td>Regular level measurement with high acc</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>x</td>
</tr>
<tr>
<td>Regular level measurement with baro comp</td>
<td>x</td>
<td>-</td>
<td>-</td>
<td>x</td>
</tr>
<tr>
<td>Low range measurement</td>
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<td>-</td>
<td>-</td>
<td>x</td>
</tr>
<tr>
<td>Sewage</td>
<td>x</td>
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