BW 25 Quick Start

Displacer Level Transmitter for heavy-duty level or interface applications
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Warnings and symbols used

DANGER!
This information refers to the immediate danger when working with electricity.

DANGER!
These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator’s plant.

WARNING!
Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator’s plant.

CAUTION!
Disregarding these instructions can result in damage to the device or to parts of the operator’s plant.

INFORMATION!
These instructions contain important information for the handling of the device.

HANDLING

• This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

 RESULT
This symbol refers to all important consequences of the previous actions.

Safety instructions for the operator

CAUTION!
Installation, assembly, start-up and maintenance may only be performed by appropriately trained personnel. The regional occupational health and safety directives must always be observed.

LEGAL NOTICE!
The responsibility as to the suitability and intended use of this device rests solely with the user. The supplier assumes no responsibility in the event of improper use by the customer. Improper installation and operation may lead to loss of warranty. In addition, the “Terms and Conditions of Sale” apply which form the basis of the purchase contract.

INFORMATION!

• Further information can be found on the supplied CD-ROM in the manual, on the data sheet, in special manuals, certificates and on the manufacturer’s website.

• If you need to return the device to the manufacturer or supplier, please fill out the form contained on the CD-ROM and send it with the device. Unfortunately, the manufacturer cannot repair or inspect the device without the completed form.
2.1 Intended use

**CAUTION!**
Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.

**INFORMATION!**
The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

The level meter is suitable for measuring liquids and separation layers in liquids. The devices are especially well suited for the measurement of:

- Liquids
- Water
- Chemicals with low corrosiveness

**DANGER!**
For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

**WARNING!**
Responsibility for the use of the measurement devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator. The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose. Do not use any abrasive or highly viscous media.
2.2 Scope of delivery

**INFORMATION!**
Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

**INFORMATION!**
Do a check of the packing list to make sure that you have all the elements given in the order.

**INFORMATION!**
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

![Figure 2-1: Scope of delivery](image)

1. Measuring device (with options as specified in the customer order)
2. For indicator M40 – key
3. Handbook
4. Certificates and calibration report (as specified in the customer order)
2.3 Storage

- Store the device in a dry and dust-free location.
- Avoid lasting direct exposure to the sun.
- Store the device in its original packing.
- The permissible storage temperature for standard devices is -40...+80°C / -40...+176°F.

2.4 Installation conditions

**CAUTION!**
When installing the device, the following points must be observed:
- Before installation, compare the serial number of the display (nameplate) with the serial number on the displacement rod, the flange and the magnet.
- In the case of level displays with a bypass chamber, the BW25 serial number on the bypass chamber should be compared with the serial number on the display.
- Avoid combining parts with differing serial numbers.
- Ensure the material compatibility of the parts in contact with the product.
- Screws, bolts and gaskets are to be provided by the customer and must be selected in accordance with the pressure rating of the mounting flange or the operating pressure.
- Align the gaskets. Tighten the nuts with the tightening torques of the appropriate pressure rating.
- Do not lay signal cables directly next to cables for the power supply.
2.5 Installation

The sealing surface of the tank flange must be horizontal to ensure the perfect function of the level measurement unit.

- Insert the spring suspension pin in the flange system and secure it with a retaining ring 1.
- Install the retaining ring 1 properly and check for a correct seat all round.
- Place the seal on the tank flange.
- suspend the displacer body on the spring suspension pin.
- Tighten the locking elements of the quick-action lock 2 (standard) or, with the variant, 3 and 4 and check for a tight fit.
- Insert the displacer element and the spring suspension pin into the tank through the tank flange or into the preinstalled bypass chamber.
- Tighten the flange connection.

Figure 2-2: Installation

1 Lock ring
2 Quick-action lock
3 Retaining screw
4 Cover stop
3.1 Safety instructions

**DANGER!**
All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

**DANGER!**
Observe the national regulations for electrical installations!

**DANGER!**
For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

**WARNING!**
Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

**INFORMATION!**
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.
3.2 Electrical connection indicator M9

3.2.1 Limit switch

Indicator M9 can be equipped with a maximum of two electronic limit switches. The limit switch functions with a slot sensor which is operated inductively through the semicircular metal vane belonging to the measuring pointer. The switching points are set through the contact pointers. The position of the contact pointer is indicated on the scale.

Limit switch module

The connecting terminals have a pluggable design and can be removed in order to connect the lines. The built-in contact types are shown on the nameplate of the indicator.

Electrical connection of the limit switches

<table>
<thead>
<tr>
<th>Contact</th>
<th>MIN</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal no.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Connection 2-wire NAMUR</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Connection 3-wire</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Connection Reed SPST</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>
Setting is carried out directly via contact pointers 1 and 2:

- Slide the scale away
- Loosen the locking screw 3 slightly
- Slide the scale back to the latching point
- Set contact pointers 1 and 2 to the desired switching point

After setting has been carried out: Fix the contact pointers with the locking screw 3.
Switch contact definition

If the measuring pointer vane goes into the slot an alarm is triggered. If the pointer vane lies outside the slot sensor, a wire break also causes the alarm to be triggered.

The 3-wire limit switch does not have any wire break detection

Definition MinMin – MaxMax

Current consumption in the position shown:

<table>
<thead>
<tr>
<th>Contact</th>
<th>Type</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN 1</td>
<td>NAMUR</td>
<td>≤ 1 mA</td>
</tr>
<tr>
<td>MIN 2</td>
<td>NAMUR</td>
<td>≤ 1 mA</td>
</tr>
<tr>
<td>MAX 1</td>
<td>NAMUR</td>
<td>≥ 3 mA</td>
</tr>
<tr>
<td>MAX 2</td>
<td>NAMUR</td>
<td>≥ 3 mA</td>
</tr>
</tbody>
</table>
3.2.2 Electrical signal output ESK2A

The connecting terminals of the ESK2A have a pluggable design and can be removed in order to connect the cables.

![Figure 3-6: Electrical schematic for ESK2A current transmitter](image)

- ESK2A current transmitter
- Power supply 12...30 VDC
- Measuring signal 4...20 mA
- External load, HART® communication

The circuitry for connection to other devices such as digital evaluator units or process control equipment must be designed with special care. In some circumstances, internal connections in these devices (e.g. GND with PE, ground loops) may lead to impermissible voltage potentials, which can compromise the function of the device itself or a connected device. In such cases a protected extra-low voltage (PELV) is recommended.

![Figure 3-7: Electrical schematic for ESK2A with a protected extra-low voltage (PELV) circuit](image)

- Terminal connection
- Converter supply isolator with electrical isolation
- Power supply (see supply isolator information)
- Measuring signal 4...20 mA
- External load, HART® communication

**HART® communication**

When HART® communication is carried out with the ESK2A, this will not in any way impair analogue measured-data transmission (4...20 mA). Exception: multidrop operation. In multidrop operation a maximum of 15 devices with HART® function can be operated in parallel, whereby their analogue outputs are switched inactive. (I approx. 4 mA per device).
Power supply

**INFORMATION!**
*
The supply voltage has to be between 12 VDC and 30 VDC. This is based on the total resistance of the measuring loop. To determine this, add up the resistances of each component in the measuring loop (not including the level meter).
*

The required supply voltage can be calculated using the formula below:

\[
U_{\text{ext.}} = R_L \times 22 \text{ mA} + 12 \text{ V}
\]

where

\[
U_{\text{ext.}} = \text{the minimum supply voltage and}
\]

\[
R_L = \text{the total measuring loop resistance.}
\]

**INFORMATION!**
*
The power supply has to be able to supply a minimum of 22 mA.
*

Load for HART® communication

**INFORMATION!**
*
For HART® communication a load of at least 250 ohms is required.
*

The maximum load resistance is calculated as follows:

\[
R_L = \frac{U_{\text{ext.}} - 12 \text{ V}}{22 \text{ mA}}
\]

**DANGER!**
*
Use a twisted two-core cable to prevent electrical interference from impeding the DC output signal. In some cases a shielded cable may be necessary. The cable shield may only be earthed (grounded) at one place (on the power supply unit).
*

Configuration

The ESK2A can be configured via HART® communication. DD (Device Description) as well as a DTM (Device Type Manager) are available for configuration (go to download centre at www.krohne.com).

With the integrated HART® communication, the current level can be transmitted. Two limit values can be monitored.
3.3 Electrical connection indicator M40

3.3.1 Indicator M40 – limit switches

The M40 indicator can be fitted with a maximum of two limit switches. The limit switch works as a slot sensor which is inductively activated via the semi-circular metal vane of the pointer. The switching points are set using the contact pointer. The position of the contact pointer is displayed on the scale.

Limit switch module

![Limit switch module diagram](image)

Figure 3-8: Limit switch module

1. Min. contact
2. Max. contact
3. Locking screw
4. Maximum pointer
5. Terminal block

The connecting terminals have a pluggable design and can be removed in order to connect the cables. The built-in limit switch types are shown on the indicator.

Electrical connection of the limit switches

<table>
<thead>
<tr>
<th>Contact</th>
<th>MIN</th>
<th>MAX</th>
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</thead>
<tbody>
<tr>
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<td>+</td>
</tr>
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<td>+</td>
<td></td>
</tr>
<tr>
<td>Connection Reed SPST</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>
Limit switch connection terminals

Figure 3-9: Limit switch connection terminals

1. 2-wire limit switch NAMUR
2. 3-wire limit switch
3. Limit switch Reed SPST
4. Terminal connection min contact
5. Terminal connection max contact
6. 3-wire load
7. NAMUR isolated switching amplifier
8. 3-wire power supply

Limit setting

Figure 3-10: Limit switch settings

1. Contact pointer MAX
2. Contact pointer MIN
3. Locking screw

Setting is carried out directly via contact pointers 1 and 2:

- Slide the scale away
- Loosen the locking screw 3 slightly
- Slide the scale back to the latching point
- Set contact pointers 1 and 2 to the desired switching point

After setting has been carried out: Fix the contact pointers with the locking screw 3.
Switch contact definition

![Figure 3-11: MIN and MAX contacts on the switch](image)

1. MIN contact  
2. MAX contact  
3. Pointer vane with switching vane

If the measuring pointer vane goes into the slot an alarm is triggered. If the pointer vane is outside the slot sensor, a wire break in a NAMUR contact also triggers the alarm.

The 3-wire limit switch does not have any wire break detection.

Definition MinMin – MaxMax

![Figure 3-12: Definition MinMin – MaxMax](image)

1. MIN 2 contact or MAX 1 contact  
2. MIN 1 contact or MAX 2 contact

Current consumption in the position shown:

<table>
<thead>
<tr>
<th>Contact</th>
<th>Type</th>
<th>current</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN 1</td>
<td>NAMUR</td>
<td>≤ 1 mA</td>
</tr>
<tr>
<td>MIN 2</td>
<td>NAMUR</td>
<td>≤ 1 mA</td>
</tr>
<tr>
<td>MAX 1</td>
<td>NAMUR</td>
<td>≥ 3 mA</td>
</tr>
<tr>
<td>MAX 2</td>
<td>NAMUR</td>
<td>≥ 3 mA</td>
</tr>
</tbody>
</table>
3.3.2 Current output ESK4/ESK4A

The connecting terminals of the ESK4/4A have a pluggable design and can be removed in order to connect the cables.

![ESK4 connection diagram](image1)

Figure 3-13: Electrical schematic for ESK4 connection

1. ESK4/4A current output
2. Power supply 14...30 VDC
3. Measuring signal 4...20 mA
4. External load, HART® communication

**Power supply M40 with electrical isolation**

Wiring must be planned with great care when it comes to connecting other devices such as evaluation units or process control. Internal connections in these devices [e.g. GND with PE, mass loops] may lead to non-permitted voltage potentials which could impair the function of the converter itself or that of a device connected to it. In such cases, protected extra-low voltage (PELV) with electrical isolation is recommended.

![ESK2A with PELV circuit diagram](image2)

Figure 3-14: Electrical schematic for ESK2A with a protected extra-low voltage (PELV) circuit

1. Terminal connection
2. Converter supply isolator with electrical isolation
3. Power supply (see supply isolator information)
4. Measuring signal 4...20 mA
5. External load, HART® communication
Power supply

**INFORMATION!**
The feed voltage must be between 14 VDC and 30 VDC. It conforms with the entire measuring loop resistance. To calculate this, add together the resistance of each component in the measuring loop (not the device).

The required supply voltage can be calculated using the formula below:

\[ U_{\text{ext.}} = R_L \times 24 \text{ mA} + 14 \text{ V} \]

where

- \( U_{\text{ext.}} \) = the minimum supply voltage and
- \( R_L \) = the total measuring loop resistance is.

**INFORMATION!**
The power supply has to be able to supply a minimum of 30 mA.

HART® communication

When HART® communication is carried out with the ESK4/4A, the analogue measured data transmission (4...20 mA) is not impaired in any way.

Exception for multidrop mode. In multidrop mode, a maximum of 15 devices with HART® function can be operated in parallel, whereby their current outputs are switched inactive (I approx. 4.5 mA per device).

Load for HART® communication

**INFORMATION!**
For HART® communication a load of at least 250 ohms is required.

The maximum load resistance is calculated as follows:

\[ R_L = \frac{U_{\text{ext.}} - 14\text{ V}}{24 \text{ mA}} \]

**DANGER!**
Use a twisted two-core cable to prevent electrical interference from impeding the DC output signal.
In some cases a shielded cable may be necessary. The cable shield may only be earthed (grounded) at one place (on the power supply unit).
Configuration
The ESK4/4A can be configured via HART® communication. DD [Device Description] and a DTM [Device Type Manager] are available for configuration (go to download center at www.krohne.com).

The current flow rate can be transmitted using the integrated HART® communication. Two limit values can be monitored. The limit values are assigned to level values.

Self monitoring – Diagnostics
During both start-up and operation, a wide variety of diagnostic functions are performed cyclically in the ESK4, in order to guarantee function reliability. When an error is detected, a failure signal (high) is activated [current> 21 mA, typically 22 mA]. In addition, more detailed information can be requested via HART® [CMD#48]. The failure signal is not activated for information and warnings.

Diagnostic functions (Monitoring):
- Plausibility of FRAM data
- Plausibility of ROM data
- Working range of internal reference voltages
- Signal detection of the measuring range of the internal sensors
- Temperature compensation of the internal sensors
- Calibration corresponding the application
- Plausibility of physical unit, system and selected unit
3.4 Grounding

Figure 3-15: Grounding terminals

1. Grounding on the flange
2. Grounding indicator M9
3. Grounding connection in the indicator M40
4. External grounding connection M40

**DANGER!**
The grounding wire may not transfer any interference voltage. Do not use this grounding wire to ground any other electrical devices.
3.5 Protection category

The measuring device meets all requirements of protection category according to EN 60529 / IEC 60529.

M9 IP65 – M40 IP66/IP68

DANGER!
After all servicing and maintenance work on the measuring device, the specified protection category has to be ensured again.

- Use only original gaskets. They must be clean and free of any damage. Defective gaskets must be replaced.
- The electrical cables used must be undamaged and must comply with regulations.
- The cables must be laid with a loop upstream of the measuring device to prevent water from getting into the housing.
- The cable feedthroughs must be tightened.
- Close the unused cable feedthroughs using blanking plugs.

Figure 3-16: How to make the installation agree with protection category IP65 (M9) or IP66/IP68 (M40)
4.1 Technical data

**INFORMATION!**
- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website [Downloadcenter].

### Measuring system

<table>
<thead>
<tr>
<th>Application range</th>
<th>Level measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating method / measuring principle</td>
<td>Displacement principle</td>
</tr>
<tr>
<td>Measured value</td>
<td>Level, separating layer</td>
</tr>
</tbody>
</table>

### Measuring accuracy

<table>
<thead>
<tr>
<th>Standard</th>
<th>&lt; 1.5% full scale value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. measuring range</td>
<td>0.3 m / 12&quot;</td>
</tr>
<tr>
<td>Max. measuring range</td>
<td>6 m / 20 ft</td>
</tr>
<tr>
<td>Medium</td>
<td>Liquids</td>
</tr>
<tr>
<td>Density</td>
<td>≥ 0.45 kg/l / 28.1 lbs/ft³</td>
</tr>
</tbody>
</table>

### Materials

<table>
<thead>
<tr>
<th>Housing</th>
<th>Aluminium, powder coated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing option</td>
<td>Stainless steel (indicator M9R, M40R) 1.4408 / CF8M</td>
</tr>
<tr>
<td>Displacer rod</td>
<td>Stainless steel 1.4404 / 316L</td>
</tr>
<tr>
<td>Displacer rod option</td>
<td>Titanium</td>
</tr>
<tr>
<td>Spring</td>
<td>Stainless steel 1.4571 [T_m &lt; 100°C / 212°F]</td>
</tr>
<tr>
<td>Spring option</td>
<td>ATS-340 / 2.4632 [T_m &gt; 100°C / 212°F]</td>
</tr>
<tr>
<td>Flange</td>
<td>Stainless steel 1.4404 / 316L</td>
</tr>
<tr>
<td>Pressure sleeve</td>
<td>Stainless steel 1.4404 / 316L</td>
</tr>
</tbody>
</table>

### Process connections

<table>
<thead>
<tr>
<th>Max. operating pressure</th>
<th>40 barg / 580 psig – optional to 400 barg / 5802 psig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard flange</td>
<td>DN50 – PN40 / 2” ASME 300 lb</td>
</tr>
<tr>
<td>Optional flange</td>
<td>...DN100...PN400 / ...4” ASME ...2500 lb</td>
</tr>
</tbody>
</table>
Approvals

<table>
<thead>
<tr>
<th>Product or Flange Temperature</th>
<th>M9 and M40 without Electrical Installations</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40°C to +400°C</td>
<td>-40°F to +752°F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ambient Temperature $T_{\text{amb}}$</th>
<th>M9 and M40 without Electrical Installations</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40°C to +60°C</td>
<td>-40°F to +140°F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product or Flange Temperature</th>
<th>M9 and M40 with Electrical Installations</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20°C to +295°C</td>
<td>-4°F to +563°F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ambient Temperature $T_{\text{amb}}$</th>
<th>M9 and M40 with Electrical Installations</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40°C to +60°C</td>
<td>-40°F to +140°F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage Temperature</th>
<th>M9 and M40 with Electrical Installations</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40°C to +60°C</td>
<td>-40°F to +140°F</td>
</tr>
</tbody>
</table>

Technical Data, Indicator M9 – M40

<table>
<thead>
<tr>
<th>Cable Gland</th>
<th>Material</th>
<th>Cable Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>M16 × 1.5 Standard 1</td>
<td>PA</td>
<td>3...7 mm</td>
</tr>
<tr>
<td>M20 × 1.5 2</td>
<td>PA</td>
<td>8...13 mm</td>
</tr>
<tr>
<td>M16 × 1.5 1</td>
<td>Nickel-plated brass</td>
<td>5...9 mm</td>
</tr>
<tr>
<td>M20 × 1.5 2</td>
<td>Nickel-plated brass</td>
<td>10...14 mm</td>
</tr>
</tbody>
</table>

1 M9
2 M9 and M40
### M9 – M40 limit switches

<table>
<thead>
<tr>
<th>Terminal connection</th>
<th>2.5 mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit switch</td>
<td>I7523.5-N  SC3,5-N0</td>
</tr>
<tr>
<td>NAMUR</td>
<td>yes</td>
</tr>
<tr>
<td>Connection type</td>
<td>2-wire</td>
</tr>
<tr>
<td>Switching element function</td>
<td>NC contact</td>
</tr>
<tr>
<td>Nominal voltage U₀</td>
<td>8 VDC</td>
</tr>
<tr>
<td>Pointer vane not detected</td>
<td>≥ 3 mA</td>
</tr>
<tr>
<td>Pointer vane detected</td>
<td>≤ 1 mA</td>
</tr>
<tr>
<td>Continuous current</td>
<td>—</td>
</tr>
<tr>
<td>No load current I₀</td>
<td>—</td>
</tr>
</tbody>
</table>

1 safety oriented

### Current output ESK2A – ESK4/4A

<table>
<thead>
<tr>
<th>Terminal connection</th>
<th>2.5 mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>12...30 VDC</td>
</tr>
<tr>
<td>Min. power supply for HART®</td>
<td>18 VDC</td>
</tr>
<tr>
<td>Measuring signal</td>
<td>4.00...20.00 mA = 0...100% level value in 2-wire technology</td>
</tr>
<tr>
<td>Power supply influence</td>
<td>&lt; 0.1%</td>
</tr>
<tr>
<td>Dependence on external resistance</td>
<td>&lt; 0.1%</td>
</tr>
<tr>
<td>Temperature influence</td>
<td>&lt; 10 µA/K</td>
</tr>
<tr>
<td>Max. external resistance / load</td>
<td>800 ohms (30 VDC)</td>
</tr>
<tr>
<td>Min. load for HART®</td>
<td>250 ohms</td>
</tr>
<tr>
<td>ESK2A / ESK4/4A</td>
<td></td>
</tr>
<tr>
<td>Manufacturer name [code]</td>
<td>KROHNE Messtechnik [69 = 0x45]</td>
</tr>
<tr>
<td>Model name</td>
<td>ESK2A (226 = 0xE2) HART 5</td>
</tr>
<tr>
<td></td>
<td>ESK4 (214 = 0xD6) HART 5</td>
</tr>
<tr>
<td></td>
<td>ESK4 (17854 = 0x45BE) HART 5</td>
</tr>
</tbody>
</table>

### Process variable

<table>
<thead>
<tr>
<th>Process variable, level</th>
<th>Values [%]</th>
<th>Signal output [mA]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over range</td>
<td>+102.5 (± 1%)</td>
<td>20.24...20.56</td>
</tr>
<tr>
<td>Device error identification</td>
<td>&gt; 106.25</td>
<td>&gt; 21.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>131.25</td>
<td>25</td>
</tr>
<tr>
<td>Multi-drop operation</td>
<td>—</td>
<td>4.5</td>
</tr>
<tr>
<td>Min. Uₑₓᵗ</td>
<td>12 VDC</td>
<td></td>
</tr>
</tbody>
</table>

1 M40
### ESK4-FF (pending)

<table>
<thead>
<tr>
<th>Physical layer</th>
<th>IEC 61158-2 and FISCO model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication standard</td>
<td>H1 FOUNDATION™ fieldbus protocol</td>
</tr>
<tr>
<td>ITK version</td>
<td>5.2</td>
</tr>
<tr>
<td>Power supply</td>
<td>Bus supply</td>
</tr>
<tr>
<td>Nominal current</td>
<td>16 mA</td>
</tr>
<tr>
<td>Error current</td>
<td>23 mA</td>
</tr>
<tr>
<td>Starting current after 10 ms</td>
<td>&lt; Nominal current</td>
</tr>
</tbody>
</table>

### ESK4-PA (pending)

<table>
<thead>
<tr>
<th>Physical layer</th>
<th>IEC 61158-2 and FISCO model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication standard</td>
<td>Profibus PA profile 3.02</td>
</tr>
<tr>
<td>PNO ID</td>
<td>4531 HEX</td>
</tr>
<tr>
<td>Power supply</td>
<td>Bus supply</td>
</tr>
<tr>
<td>Nominal current</td>
<td>16 mA</td>
</tr>
<tr>
<td>Error current</td>
<td>23 mA</td>
</tr>
<tr>
<td>Starting current after 10 ms</td>
<td>&lt; Nominal current</td>
</tr>
</tbody>
</table>
KROHNE – Process instrumentation and measurement solutions

- Flow
- Level
- Temperature
- Pressure
- Process Analysis
- Services

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