

# HCV-E-S Electrical level indicators

with MIN level electrical sensor, temperature sensor and probe, transparent technopolymer



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## MATERIAL

Transparent polyamide based (PA-T) technopolymer. Highly resistant to shocks, solvents, oils with additives, aliphatic and aromatic hydrocarbons, petrol, naphtha, phosphoric esters.

Avoid contact with alcohol or detergents containing alcohol.

## SCREWS, NUTS AND WASHERS

Zinc-plated steel.

## PACKING RINGS

Step-shaped for the seal on the reservoir walls and NBR synthetic rubber O-ring screw underneath.

Suggested roughness of the packing ring application surface  $R_a = 3 \mu m$ .

## FLOAT

Glass-fibre reinforced polyamide based (PA) technopolymer, black colour, with a built-in magnetic element to activate the electric contact when the float reaches the contact threshold indicated in the drawing (data referred to mineral oil type CB68, according to ISO 3498, temperature 23°C).

Floating is ensured by fluids with densities higher than 800 kg/m<sup>3</sup>.

## BRACKET WITH MALE CONNECTOR

Perfectly watertight, incorporating the relay (reed) with two output conductors (NO and NC version) and/or with MAX temperature sensor (80°C) and/or temperature probe.

- DIN 43650 C connector in glass-fibre reinforced polyamide based (PA) technopolymer, black colour.

- 4-pole M12x1 connector, with threading in glass-fibre reinforced polyamide based (PA) technopolymer certified self-extinguishing UL-94-V0, black colour, matte finish.

For a correct assembly see Warnings (on page 1227).

## FEMALE CONNECTOR (DIN 43650 C)

With built-in cable gland and contact holder. Front or axial output (high or low) ensuring protection against water sprays (protection class IP 65 according to table EN 60529 on page A-19).

## CONTRAST SCREEN

White lacquered aluminium. The housing, in the appropriate external rear slot, guarantees the best protection from direct contact with fluid.

It can be taken out from the inclined side, before assembly to allow the insertion of level lines or words.

## STANDARD EXECUTIONS

See configuration table.

## MAXIMUM CONTINUOUS WORKING TEMPERATURE

90°C (with oil).

## TECHNICAL DATA

In laboratory tests carried out with mineral oil type CB68 (according to ISO 3498) at 23°C for a limited period of time, the weld stood up to: 18 bar (HCV.76), 18 bar (HCV.127) and 12 bar (HCV.254).

For use with fluids other than mineral oils and under particular different pressure and temperature conditions, please contact ELESa Technical Department.

In any case we suggest to verify the suitability of the product under the actual working conditions.

## SPECIAL EXECUTIONS ON REQUEST

- Level indicators with stainless steel screws, nuts and washers.
- Level indicators HCV.76 with screws M12.
- Level indicators for use with fluids containing alcohol.
- UV resistant transparent technopolymer level indicators.

## ACCESSORIES ON REQUEST

FC-M12x1: extensions with 4 pole M12 female axial connector.



ELESa Original design

## FEATURES AND PERFORMANCES

The HCV-E-S level indicators, in addition to the visual level indicator, also provide an electrical signal when the minimum fluid level value is reached.

The HCV-E-ST indicators also provide an electrical signal when the maximum preset temperature value (60°C, 70°C or 80°C) is reached.

The HCV-E-STL indicators provide an analogue electrical signal of the oil temperature.

The lateral connector output allows the level of intervention of the sensor to be minimised.

Ultrasound welding to guarantee a perfect seal.

Maximum fluid level visibility even from side positions.

Lens effect for a better visibility of the fluid level.

In case of use of an extension with angled connector, the direction of the cable output is shown in Fig. 1.

Fig.1  
HCV-E-ST-KN  
HCV-E-STL-KN

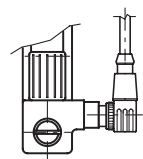
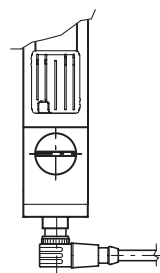


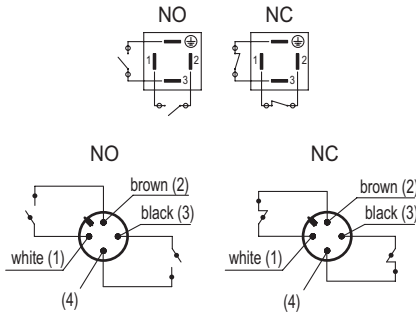
Fig.1  
HCV-E-ST-AX-KN  
HCV-E-STL-AX-KN



FUNCTIONING OF THE SENSORS

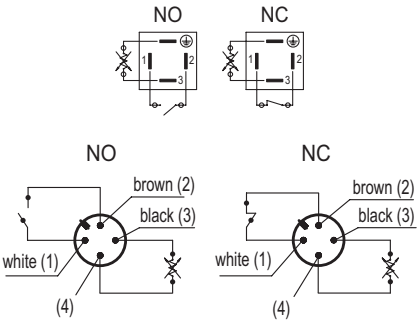
- NO: Electrical contact closes when the minimum and/or preset temperature of 80°C is reached.
- NC: Electrical contact opens when the minimum and/or preset temperature of 80°C is reached.

HCV-E-ST - HCV-E-ST-AX



\*The colours refer to the use of the FC M12x1 extension  
\*\* contact 1-2 electric level sensors

HCV-E-STL - HCV-E-STL-AX



\*The colours refer to the use of the FC M12x1 extension  
\*\* contact 1-2 electric level sensors

| HCV-E-ST - HCV-E-ST-KN - HCV-E-ST-AX - HCV-E-ST-AX-KN        |                                             |                                              |                       |
|--------------------------------------------------------------|---------------------------------------------|----------------------------------------------|-----------------------|
| Electrical features                                          |                                             | MIN level sensor                             |                       |
| Power supply                                                 |                                             | AC/DC                                        |                       |
| Electric contacts                                            |                                             | NO normally open<br>NC normally closed       |                       |
| Maximum applicable voltage                                   | NO: 140 Vac, 200 Vdc<br>NC: 140Vac, 150 Vdc |                                              | DIN 43650 C<br><br>KN |
|                                                              | 30 Vac, 30 Vdc                              |                                              |                       |
| Voltage range (Type KN)                                      |                                             | <30 Vac, <30 Vdc                             |                       |
| Maximum switching current                                    |                                             | 1 A                                          |                       |
| Maximum current                                              |                                             | NO: 1.2A<br>NC: 2A                           |                       |
| Maximum commutable power                                     |                                             | NO: 10 Va<br>NC: 20 Va                       |                       |
| Cable gland (only HCV-E-ST - HCV-E-ST-AX)                    |                                             | Pg 7 (for cables in sheath with Ø 6 or 7 mm) |                       |
| Conductors cross-section (only HCV-E-ST - HCV-E-ST-AX)       |                                             | Max. 1.5 mm2                                 |                       |
| Connector (only HCV-E-ST-KN - HCV-E-STL-AX-KN)               |                                             | M12x1                                        |                       |
| Do not mount this indicator in proximity to magnetic fields. |                                             |                                              |                       |

| HCV-E-ST - HCV-E-ST-KN - HCV-E-ST-AX - HCV-E-ST-AX-KN        |  |                                              |                                        |
|--------------------------------------------------------------|--|----------------------------------------------|----------------------------------------|
| Electrical features                                          |  | MAX temperature sensor                       |                                        |
| Power supply                                                 |  | AC/DC                                        |                                        |
| Electric contacts                                            |  | NO normally open<br>NC normally closed       |                                        |
| Voltage /<br>Maximum current                                 |  | 250 Vac - 2 A                                | (resistive loads)<br>DIN 43650 C<br>KN |
|                                                              |  | 115 Vac- 3A                                  |                                        |
|                                                              |  | 24 Vdc - 3 A                                 |                                        |
|                                                              |  | 12 Vdc - 4 A                                 |                                        |
|                                                              |  | 30 Vac, 30 Vdc                               |                                        |
| Voltage range (Type KN)                                      |  | <30 Vac, <30 Vdc                             |                                        |
| Minimum current                                              |  | 500 mA                                       |                                        |
| Cable gland (only HCV-E-ST - HCV-E-ST-AX)                    |  | Pg 7 (for cables in sheath with Ø 6 or 7 mm) |                                        |
| Conductors cross-section (only HCV-E-ST - HCV-E-ST-AX)       |  | Max. 1.5 mm2                                 |                                        |
| Connector (only HCV-E-ST-KN - HCV-E-ST-AX-KN)                |  | M12x1                                        |                                        |
| Do not mount this indicator in proximity to magnetic fields. |  |                                              |                                        |

| HCV-E-STL - HCV-E-STL-KN - HCV-E-STL-AX - HCV-E-STL-AX-KN    |                                              |                  |  |
|--------------------------------------------------------------|----------------------------------------------|------------------|--|
| Electrical features                                          |                                              | MIN level sensor |  |
| Power supply                                                 | AC/DC                                        |                  |  |
| Electric contacts                                            | NO normally open<br>NC normally closed       |                  |  |
| Maximum applicable voltage                                   | NO: 140 Vac, 200 Vdc<br>NC: 140Vac, 150 Vdc  | DIN 43650 C      |  |
|                                                              | 30 Vac, 30 Vdc                               | KN               |  |
| Voltage range (Type KN)                                      | <30 Vac, <30 Vdc                             |                  |  |
| Maximum switching current                                    | 1 A                                          |                  |  |
| Maximum current                                              | NO: 1.2A                                     |                  |  |
|                                                              | NC: 2A                                       |                  |  |
| Maximum commutable power                                     | NO: 10 Va                                    |                  |  |
|                                                              | NC: 20 Va                                    |                  |  |
| Cable gland (only HCV-E-STL - HCV-E-STL-AX)                  | Pg 7 (for cables in sheath with Ø 6 or 7 mm) |                  |  |
| Conductors cross-section (only HCV-E-STL - HCV-E-STL-AX)     | Max. 1.5 mm2                                 |                  |  |
| Connector (only HCV-E-STL-KN - HCV-E-STL-AX-KN)              | M12x1                                        |                  |  |
| Do not mount this indicator in proximity to magnetic fields. |                                              |                  |  |

| HCV-E-STL - HCV-E-STL-KN - HCV-E-STL-AX - HCV-E-STL-AX-KN    |                                              |
|--------------------------------------------------------------|----------------------------------------------|
| Electrical features                                          | Temperature probe                            |
| Power supply                                                 | AC/DC                                        |
| Maximum current                                              | 1mA                                          |
| Cable gland (only HCV-E-STL - HCV-E-STL-AX)                  | Pg 7 (for cables in sheath with Ø 6 or 7 mm) |
| Conductors cross-section (only HCV-E-STL - HCV-E-STL-AX)     | Max. 1.5 mm2                                 |
| Connector (only HCV-E-STL-KN - HCV-E-STL-AX-KN)              | M12x1                                        |
| Do not mount this indicator in proximity to magnetic fields. |                                              |



Accessories for hydraulic systems

# FUNCTIONING OF THE TEMPERATURE ELECTRICAL PROBE (STL)

The working principle of the temperature probe is to measure the variation of resistance of a platinum element: 100 ohm = 0°C, 138.4 ohm = 100°C.

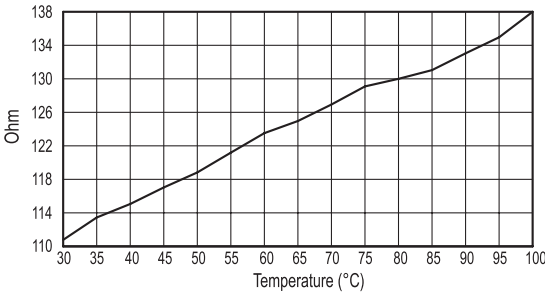
The function between temperature (T) and resistance (R) is approximately linear over a small temperature range: for example, if you assume that it is linear over the 0° to 100°C range, the error at 50°C is 0.4°C. For precision measurement, it is necessary to linearise the resistance to give an accurate temperature. The most recent definition of the function between resistance and temperature is International Temperature Standard 90 (ITS-90). The function between resistance and temperature, obtained in laboratory tests, measuring directly the resistance value on the contacts is shown in the graph. We suggest, anyway, to set the system in order to compensate both heat dissipation and cable resistance.

The temperature variation of 1°C causes a 0.384 ohm variation in the probe resistance. Therefore, even a small error in the resistance measurement (for example, if the resistance of the cables connecting to the probe were not considered) translates into a significant error in the temperature measurement.

Because of the low signal levels, it is important to keep any cables away from electric cables, motors, switchgear and other devices that may emit magnetic or electrical noise. Using screened cable, with the screen grounded at one end, may help to reduce interference.

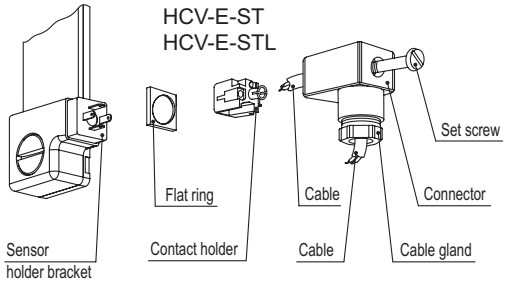
Furthermore, if long connection cables are used, make sure that the signal measurement and reception device is designed to compensate for the resistance of the cables themselves.

Resistance / temperature conversion graph

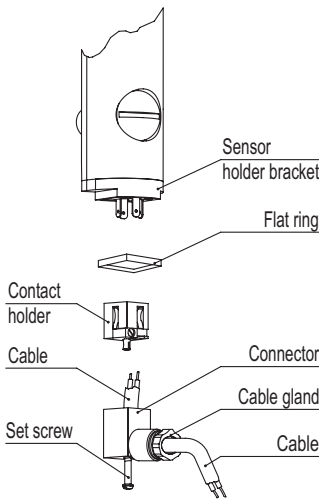


# FEMALE CONNECTOR ASSEMBLY INSTRUCTIONS

1. Remove the connector from the indicator by unscrewing the set screw placed on the connector, take the contact holders out and loosen the cable gland.
2. a) HCV-E-ST: insert the cable into the connector (standard connector) and connect the wires to terminals 1 and 2 for the operation of the MIN level sensor, to terminals 3 and ground (4) for the operation of the MAX temperature sensor. b) HCV-E-STL: insert the cable into the connector (standard connector) and connect the wires to terminals 1 and 2 for the operation of the MIN level sensor, to terminals 3 and ground (4) for the operation of the temperature probe.
3. Assemble by pressing the contact holder into the connector in the required position.
4. Screw the connectors to the indicator and then tighten the cable glands.



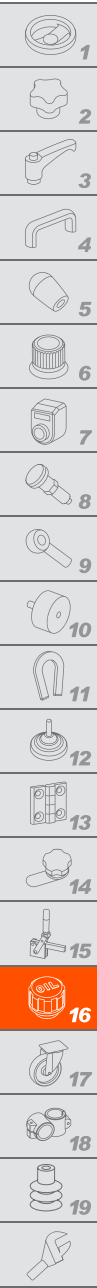
# HCV-E-ST-AX HCV-E-STL-AX





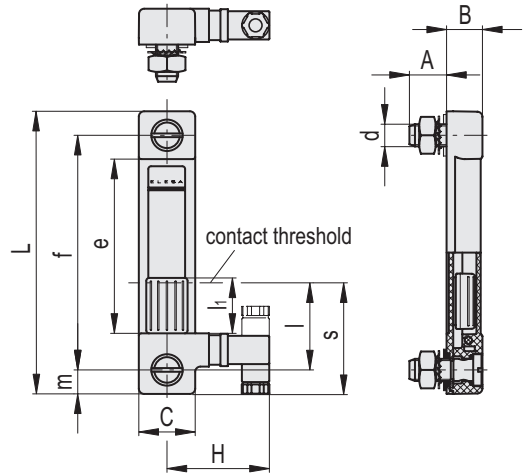
| TABLE FOR STANDARD EXECUTIONS SET-UP |       |                                                                                                                 |     |   |   |   |    |   |    |   |    |   |     |   |    |
|--------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------|-----|---|---|---|----|---|----|---|----|---|-----|---|----|
| HCV.                                 |       | -                                                                                                               | 127 | - | E | - | ST | - | AX | - | NO | - | M12 | - | KN |
|                                      |       |                                                                                                                 | ①   |   |   |   | ②  |   | ③  |   | ④  |   | ⑤   |   | ⑥  |
| ① Centre distance (f)                | 76    | 76 mm                                                                                                           |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | 127   | 127 mm                                                                                                          |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | 254   | 254 mm                                                                                                          |     |   |   |   |    |   |    |   |    |   |     |   |    |
| ② Temperature Sensor / Probe         | ST    | MAX temperature electrical sensor                                                                               |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | STL   | PT 100 temperature electrical probe                                                                             |     |   |   |   |    |   |    |   |    |   |     |   |    |
| ③ Sensor position                    |       | Side                                                                                                            |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | AX    | Axial (for execution 127 of paragraph 1 and executions NO-80 and NC-80 of paragraph 4).                         |     |   |   |   |    |   |    |   |    |   |     |   |    |
| ④ Electrical contact                 | NO    | Normally open electrical contact that closes when the MIN level is reached (for STL execution in paragraph 2).  |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | NC    | Normally closed electrical contact that opens when the MIN level is reached (for STL execution in paragraph 2). |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | NO-60 | Normally open electrical contact that closes when the MIN level and/or preset 60°C temperature is reached.      |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | NC-60 | Normally closed electrical contact that opens when the MIN level and/or preset 60°C temperature is reached.     |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | NO-70 | Normally open electrical contact that closes when the MIN level and/or preset 70°C temperature is reached.      |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | NC-70 | Normally closed electrical contact that opens when the MIN level and/or preset 70°C temperature is reached.     |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | NO-80 | Normally open electrical contact that closes when the MIN level and/or preset 80°C temperature is reached.      |     |   |   |   |    |   |    |   |    |   |     |   |    |
| ⑤ Screw threading                    | M10   | M10 (for execution 76 in paragraph 1).                                                                          |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | M12   | M12                                                                                                             |     |   |   |   |    |   |    |   |    |   |     |   |    |
| ⑥ Connector                          |       | DIN 43650 C, adjustable front or side output.                                                                   |     |   |   |   |    |   |    |   |    |   |     |   |    |
|                                      | KN    | 4-pole male M12x1                                                                                               |     |   |   |   |    |   |    |   |    |   |     |   |    |

VITON® Registered trademark by DuPont Dow Elastomers.

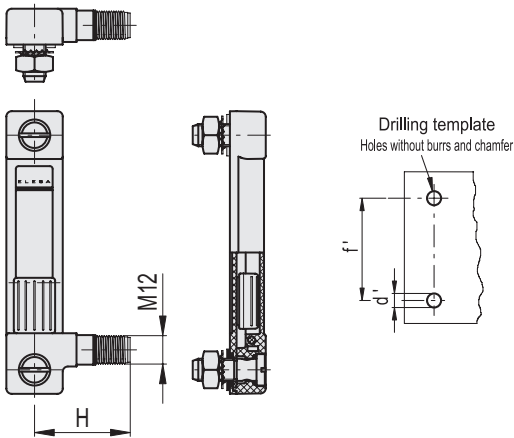


Accessories for hydraulic systems

HCV-E-ST  
HCV-E-STL



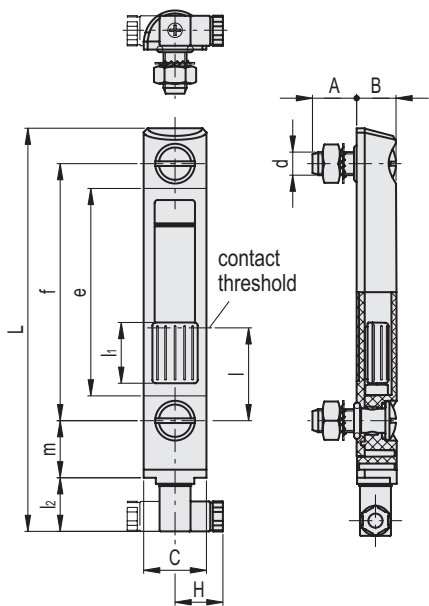
HCV-E-ST-KN  
HCV-E-STL-KN



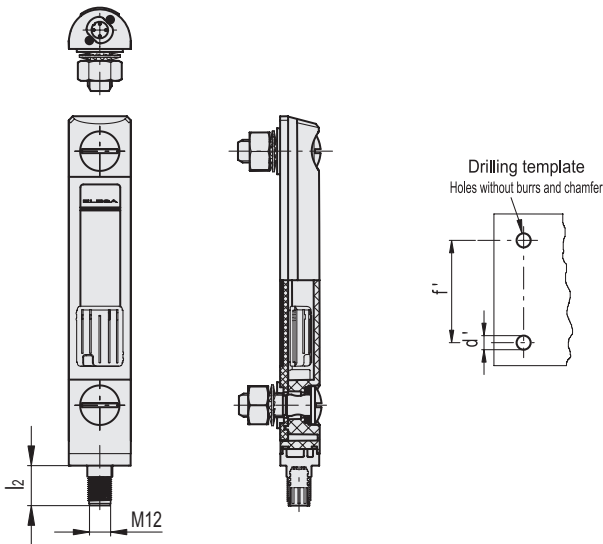
| HCV-E-ST - HCV-E-STL |     |    |      |      |    |     |      |    |    |    |    |        |       |            |                                                                                   |
|----------------------|-----|----|------|------|----|-----|------|----|----|----|----|--------|-------|------------|-----------------------------------------------------------------------------------|
| f                    | d   | A  | B    | C    | H  | L   | e    | l  | l  | m  | s  | d'-0.2 | f±0.2 | C#<br>[Nm] |  |
| 76                   | M10 | 20 | 19.5 | 30.5 | 55 | 102 | 43.5 | 40 | 20 | 13 | 53 | 10.5   | 76    | 12         | 133                                                                               |
| 127                  | M12 | 20 | 19.5 | 30.5 | 55 | 153 | 97   | 50 | 30 | 13 | 63 | 12.5   | 127   | 12         | 153                                                                               |
| 254                  | M12 | 20 | 19.5 | 30.5 | 55 | 280 | 224  | 50 | 30 | 13 | 63 | 12.5   | 254   | 12         | 180                                                                               |

| HCV-E-ST-KN - HCV-E-STL-KN |     |    |      |      |    |     |      |    |    |    |    |       |       |            |                                                                                     |
|----------------------------|-----|----|------|------|----|-----|------|----|----|----|----|-------|-------|------------|-------------------------------------------------------------------------------------|
| f                          | d   | A  | B    | C    | H  | L   | e    | l  | l1 | m  | s  | d-0.2 | f±0.2 | C#<br>[Nm] |  |
| 76                         | M10 | 20 | 19.5 | 30.5 | 47 | 102 | 43.5 | 40 | 20 | 13 | 53 | 10.5  | 76    | 12         | 133                                                                                 |
| 127                        | M12 | 20 | 19.5 | 30.5 | 47 | 153 | 97   | 50 | 30 | 13 | 63 | 12.5  | 127   | 12         | 153                                                                                 |
| 254                        | M12 | 20 | 19.5 | 30.5 | 47 | 280 | 224  | 50 | 30 | 13 | 63 | 12.5  | 254   | 12         | 180                                                                                 |

HCV-E-ST-AX  
HCV-E-STL-AX



HCV-E-ST-AX-KN  
HCV-E-STL-AX-KN



| HCV-E-ST-AX - HCV-E-STL-AX |     |      |    |    |      |       |    |    |    |    |    |        |       |            |                                                                                     |
|----------------------------|-----|------|----|----|------|-------|----|----|----|----|----|--------|-------|------------|-------------------------------------------------------------------------------------|
| f                          | d   | A    | B  | C  | H    | L     | e  | l  | l1 | l2 | m  | d'-0.2 | f±0.2 | C#<br>[Nm] |  |
| 127                        | M12 | 21.8 | 20 | 31 | 25.5 | 201.5 | 97 | 50 | 30 | 29 | 28 | 12.5   | 127   | 12         | 223                                                                                 |

| HCV-E-ST-AX-KN - HCV-E-STL-AX-KN |     |      |    |    |       |    |    |    |    |    |        |       |         |     |
|----------------------------------|-----|------|----|----|-------|----|----|----|----|----|--------|-------|---------|-----|
| f                                | d   | A    | B  | C  | L     | e  | l  | l1 | l2 | m  | d'-0.2 | f±0.2 | C# [Nm] | Δ   |
| 127                              | M12 | 21.8 | 20 | 31 | 194.5 | 97 | 50 | 30 | 20 | 30 | 12.5   | 127   | 12      | 223 |