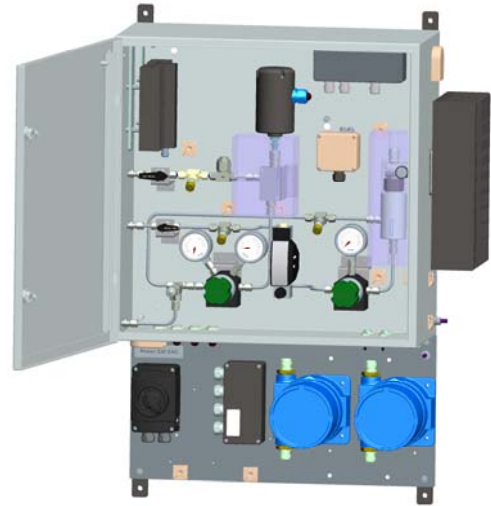


## Data sheet

# HYGROPHIL HCDT

## Measuring system for determination of hydrocarbon dewpoint in natural gas

- Determination of hydrocarbon dewpoint
- Measurement of trace humidity in gases
- Combined humidity and temperature sensor
- Application of sample conditioning system in explosive areas (zone 1)
- Maintenance-free and long-term stable



### Description

The humidity sensor, type L166x, consists of a robust multilayer of optically high and low refractive layers connected to the evaluation unit via two fiber-optic cables. Due to the special coating, light coupled into the sensor is changed in the spectrum, depending on the humidity. An integrated PT100 allows a temperature-compensated measurement.

The HCDT sensor type 1510-11 works according to the dewpoint mirror principle, based on the new method of total internal reflection.

As the pressure can be adjusted, the sample system type 5985-7x/-8x/9x allows to measure the hydrocarbon condensation at the cricondentherm point under constant gas flow.

### Application

Hygrophil HCDT combines the established water dewpoint measurement and the hydrocarbon dewpoint sensor to detect the moisture content, the temperature and the hydrocarbon dewpoint of the measured medium. Apart from the very robust construction of the sensors, it is the measuring method itself that provides a number of decisive advantages.

Some advantages of this measurement principle protected by patents are:

- High measuring certainty including precision, reproducibility and low hysteresis
- Long-term stability of sensors
- Measurement of HCDT at the cricondentherm point (pressure reduction)
- Measurement of DT on high pressure side (pressure dewpoint!)
- Application in explosive area
- Simple installation (standardized connections)

HYGROPHIL HCDT has been designed especially for the field of natural gas.

As the materials that are applied are of very high quality, the sensors are extremely robust.

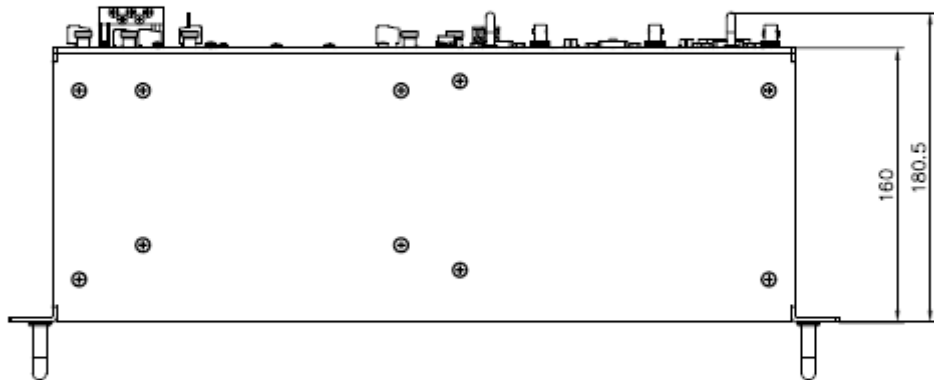
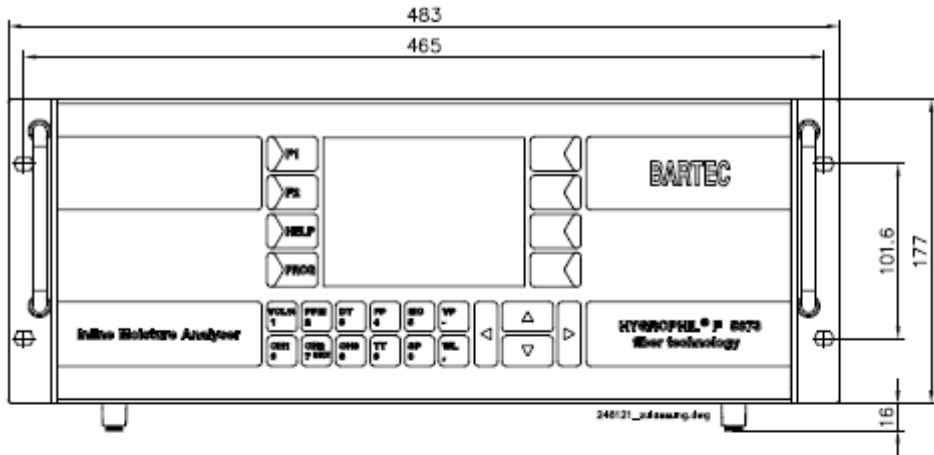
### Features

- **Measured variables:**  
DT: -80 ... +20 °C  
mg/m<sup>3</sup>: 0.5 ... 10.000  
HCDT: -20 ... +5 °C (+30 °C)
- **Values that can be displayed:**  
DT, FP, PPMV/PPMW, Vol %, VP, MC, TT, SP, HCDT, lb/MMscF
- **Calculation of water content according to DIN EN ISO 18453**
- **Graphic-capable display**
- **Data logger**
- **Distance of up to 200 m between sample system and analyzer**
- **Ethernet**
- **Modbus**
- **RS 232**
- **Profibus**
- **USB**
- **3 x 0/4-20 mA**

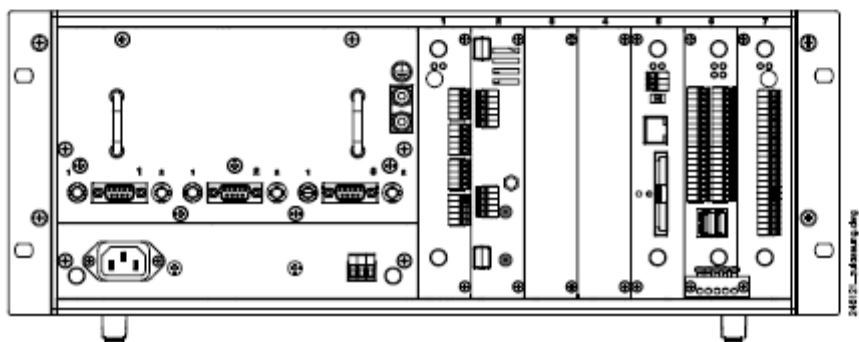
| Technical data of evaluation unit                |   |                       |                          |
|--|---|-----------------------|--------------------------|
| Device-specific data                             |   |                       |                          |
| Display ranges<br>(no measurement range)         | <i>Measurand</i>  | <i>Start of range</i> | <i>End of range</i>      |
|  | Vol%  | 0 %                   | 100 %                    |
|  | PPMV  | 1 ppm                 | 25.000 ppm               |
|  | VP  | 0 mbar                | 250 mbar                 |
|  | MC  | 0 mg/m <sup>3</sup>   | 30.000 mg/m <sup>3</sup> |
|  | DT/FP   | -100 °C               | +100 °C                  |
|  | HCDT  | -30 °C                | +30 °C                   |
|  | SP  | 0 bar                 | 250 bar                  |
| TT   | -50 °C  | +100 °C               |                          |
| Display  | Graphic display with 320 x 240 pixel  |                       |                          |
| Keyboard   | Touch-screen with red background illumination   |                       |                          |
| Electrical data                                  |   |                       |                          |
| Auxiliary energy                                 | DC 10 - 36 V max. 60 W (Si 6.3 A T)<br>AC 100 - 240 V max. 110 VA (Si 3.15 A MT)  |                       |                          |
| Auxiliary values                                 | The temperature (TT) at the measuring point is captured via a measurement sensor integrated in the humidity probe or entered manually. The pressure (SP) is captured via a 4-20 mA signal from an external pressure transmitter or entered manually. The CO <sub>2</sub> content (0 - 100 %) is entered via a 4-20 mA signal or entered manually.   |                       |                          |
| Measuring channels                               | 1 x DT, 1 x HCDT  |                       |                          |
| Measurement rate                                 | Maximum 3 measurements /minute DT<br>6 measurements / hour at 5 °C HCDT (first measured value after 30 min)   |                       |                          |
| Inputs   | Light conductor connection for optical humidity probe<br>9-pole D-Sub connector for calibration data connector<br>Terminal connection for PT-100 measurement sensor in the sensor head<br>Terminal connection for signal from a pressure transmitter 4 - 20 mA<br>Terminal connection for signal 4 - 20 mA (e.g. CO <sub>2</sub> content)<br>Terminal connections for HCDT sensor<br>All inputs Ex ia, galvanically separated |                       |                          |
| Analog output<br>(on analog IO Ex type 5673-114) | Terminal connection 0/4 - 20 mA, Ex ia galvanically separated<br>Sink or source, intrinsically safe<br>Resolution 0.0003 mA<br>Load max. 500 Ω<br>Precision 0.03 mA<br>Temperature drift < 0.001 mA/°C  |                       |                          |
| 3 x analog output on<br>COM plug-in unit         | Terminal connection 0/4 - 20 mA, galvanically separated<br>Source, not intrinsically safe<br>Resolution 0.0003 mA<br>Load < 800 Ω<br>Precision ± 0.15 % (0.03 mA)<br>Temperature drift < 0.001 mA/°C  |                       |                          |
| Control outputs                                  | 8 relay changeover contacts, 30 V/1 A<br>Connection via plug-in terminals<br>2 switching outputs for "ERROR" and "LIMIT"  |                       |                          |
| Interfaces                                       | Ethernet, RS 232, RS 485 Modbus, Profibus, USB  |                       |                          |
| Ambient conditions                               |   |                       |                          |
| Operating temperature                            | 0 ... +50 °C  |                       |                          |
| Storage temperature                              | -20 ... +60 °C  |                       |                          |
| Climatic class                                   | IWI in accordance with DIN 40040  |                       |                          |
| Approval certificates                            | ATEX, CSA, GOST   |                       |                          |

| Mechanical data |   |
|-----------------|---|
| Weight          | Approx. 8.5 kg  |
| Dimensions      | Width x height x depth 483 x 192 x 212 mm               |
| Casing material | Suitable for 19" built-in version and as desktop device |

Dimensions of evaluation unit: 19" built-in version / desktop version ( class I / div. 2 ), dimensions in mm  
**Type: 5673-10, 5673-12      Order no.: 284492, 246119**



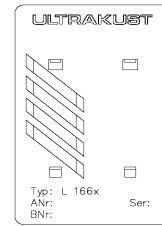
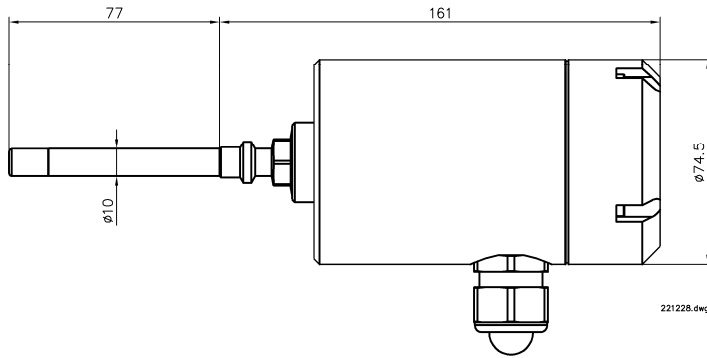
Rückensicht



### Technical data of humidity measurement probe L 166x

|                                       |   |
|---------------------------------------|---|
| Admissible working temperature        | -30...+ 60 °C   |
| Admissible storage temperature        | -30...+ 60 °C   |
| Integr. Pt100                         | DIN IEC 751, 4 conductor class A                              |
| Calibratable range                    | -80 ... +20°C DT  |
| Precision                             | +/- 1K  |
| Maximum admissible operating pressure | 100 bar, 200 bar against test certificate (gas pressure test) |
| Material                              | Shaft: 1.4571<br>Sensor head: POM                             |
| Protection type                       | IP 65 (built-in version)                                      |
| Approval certificates                 | ATEX, CSA, CRN, GOST  |

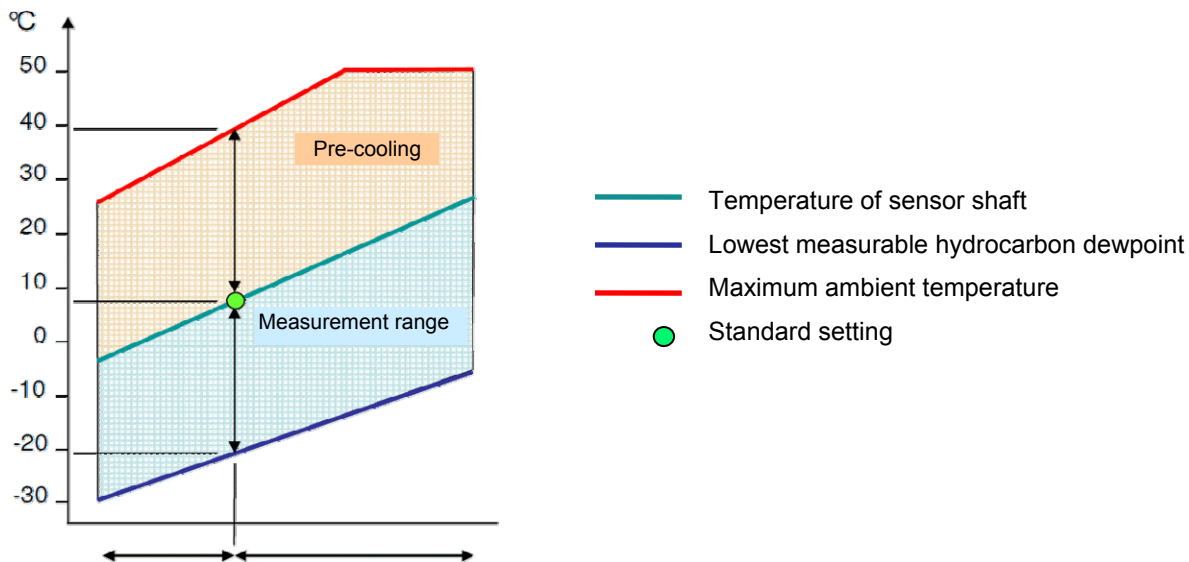
Dimensions in mm



### Technical data of HCDT sensor type 1510-11

| Device-specific data                         |               |
|--|---------------|
| Application range of HCDT                    | -30 ... +30°C |
| Calibratable range (standard)                | -20 ... +5°C  |
| Maximum cooling-down compared to pre-cooling | Up to 35 K    |
| Precision of HCDT                            | +/- 1K        |

Range of application and measurement



Factory-set preselectable sensor shaft temperature defines the dewpoint measurement range

|                  |  |
|------------------|--|
| Measurement rate | approx. 6 measurements / hour at 5 °C HCDT<br>approx. 2 measurements / hour at -10 °C HCDT |
|------------------|--|

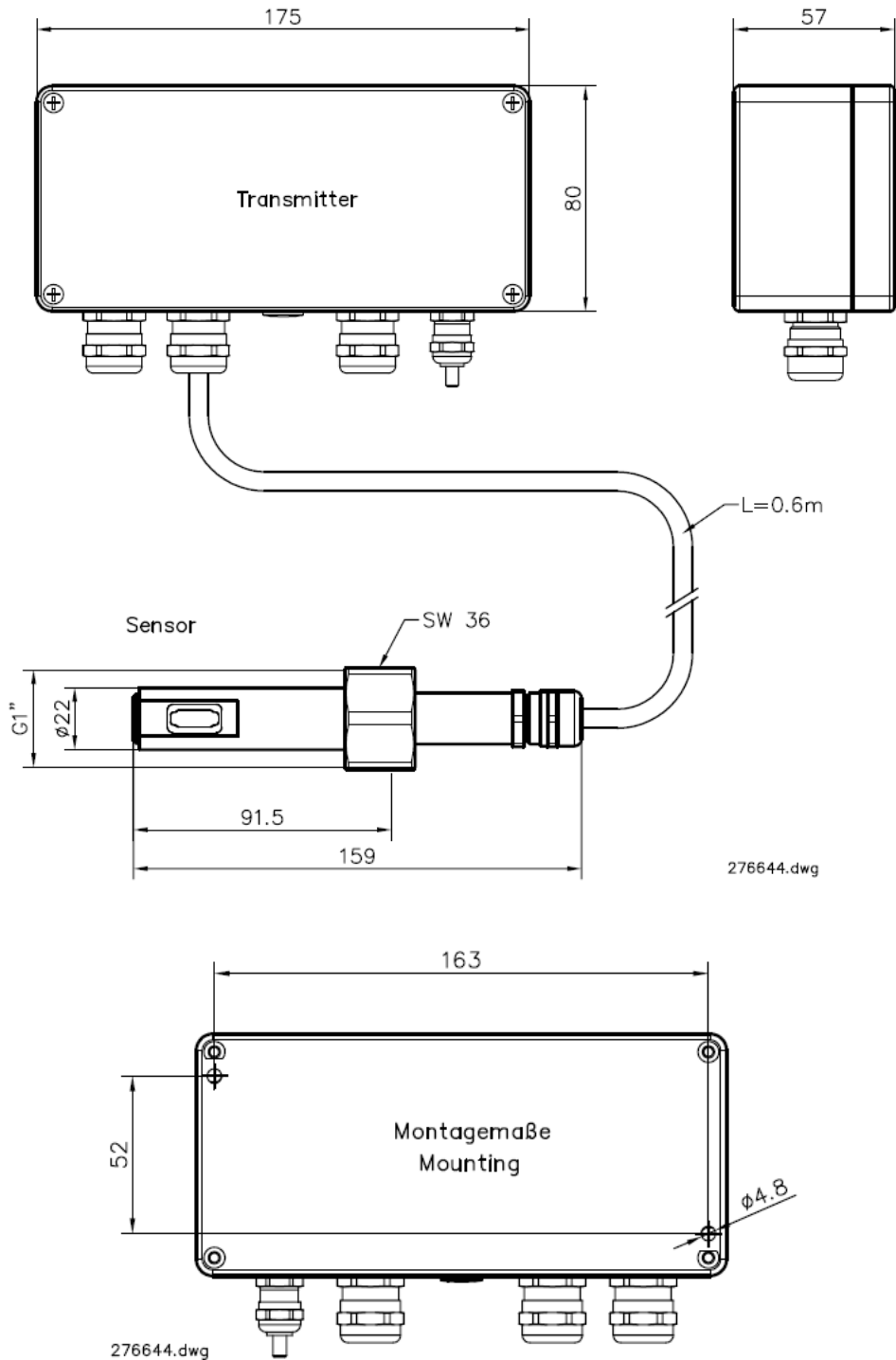
**Ambient conditions**

|                         |             |
|-------------------------|-------------|
| Pressure range of probe | Max. 40 bar |
|-------------------------|-------------|

**Mechanical data**

|                           |                               |
|---------------------------|-------------------------------|
| Material of casing        | Aluminum, coated              |
| Material of sensor shaft  | Nickel-plated copper 10 $\mu$ |
| Protection type of casing | IP 65                         |
| Approval certificates     | ATEX, CSA                     |

Dimensions in mm



## Technical data of power supply unit type 1510-100

### Electrical data

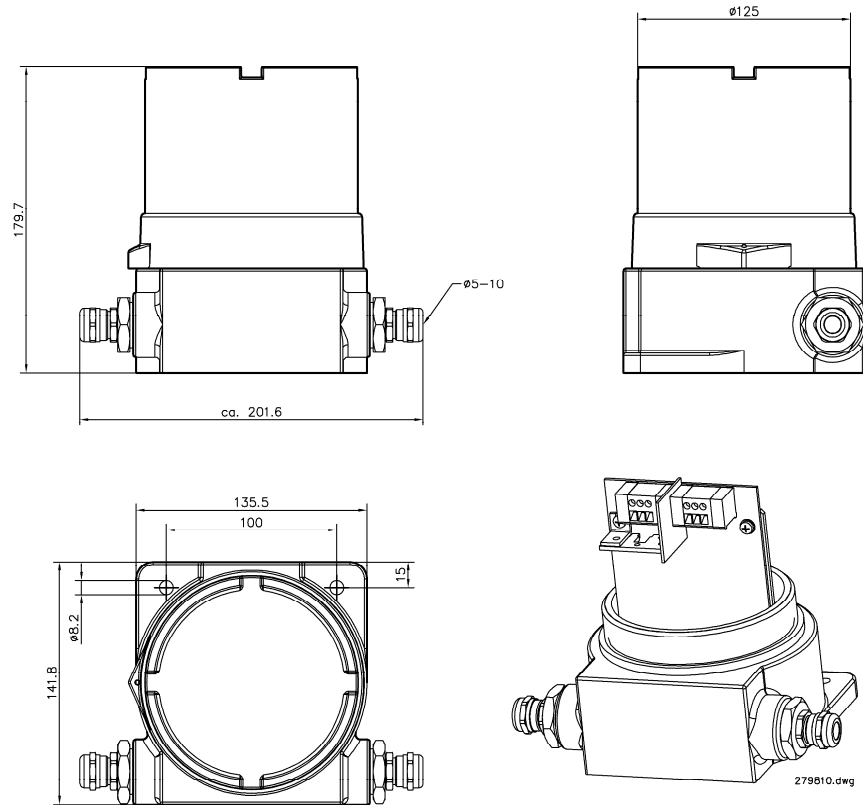
|                |   |
|----------------|---|
| Supply circuit | Connections / terminals (0V, 24 V)                    |
|                | Input voltage DC 24 V $\pm$ 10%                       |
|                | Input current 0.3 A @ DC 24 V                         |
|                | Input power 7.2 W                                     |
|                | Maximum voltage under error conditions $U_m$ AC 250 V |

### Ambient conditions

|                     |             |
|---------------------|-------------|
| Ambient temperature | -20...+60°C |
|---------------------|-------------|

### Mechanical data

Dimensions in mm



|                           |                           |
|---------------------------|---------------------------|
| Material of casing        | Cast aluminium, coated    |
| Protection type of casing | IP66, EN 60529, (NEMA 4x) |

## Technical data of power supply unit type HCDT 1510-101

### Electrical data

|              |                  |                            |
|--------------|------------------|----------------------------|
| Input        | Terminals (L, N) |                            |
|              | Input voltage    | AC 100 V ...240 V          |
|              | Input power      | max. 140 W                 |
| Output       | Terminals 3, 4   |                            |
|              | Output voltage   | 12 V pulse-width modulated |
|              | Output current   | max. 5 A                   |
| Pt100 sensor | Terminals 5, 6   |                            |
|              | Sensor current   | 3 mA                       |

### Ambient conditions

|                     |             |
|---------------------|-------------|
| Ambient temperature | -20...+60°C |
|---------------------|-------------|

### Mechanical data

|                           |  |
|---------------------------|--|
| Dimensions in mm          | <p>138 mm</p> <p>127 mm</p> <p>103 mm</p> <p>Ø 8 mm Diameter Mounting Lugs</p> <p>1/4 NPT</p> <p>143 mm</p> <p>152 mm</p> <p>181 mm</p> <p>102 mm</p> <p>4 1/2 -12 UN, 2A / 2B fit</p> |
| Material of casing        | Cast aluminium, coated   |
| Protection type of casing | IP66, EN 60529, (NEMA 4x)  |

| Technical data of power supply unit type HCDT 1510-102 |   |
|--|---|
| <b>Electrical data</b>                                 |   |
| Input  | Terminals (IN,+, -)<br>Input voltage DC 18V .. 36V<br>Input power max. 70 W   |
| Output   | Terminals 3, 4<br>Output voltage 12 V pulse-width modulated<br>Output current max. 5 A  |
| Pt100 sensor   | Terminals 5, 6<br>Sensor current 3 mA   |
| <b>Ambient conditions</b>                              |   |
| Ambient temperature                                    | -20...+60°C   |
| <b>Mechanical data</b>                                 |   |
| Dimensions in mm                                       | <p> <math>138\text{ mm}</math><br/> <math>127\text{ mm}</math><br/> <math>103\text{ mm}</math><br/> <math>\varnothing 8\text{ mm}</math> Diameter Mounting Lugs<br/> <math>\frac{1}{4}\text{ NPT}</math><br/> <math>143\text{ mm}</math><br/> <math>181\text{ mm}</math><br/> <math>152\text{ mm}</math><br/> <math>102\text{ mm}</math><br/> <math>4\frac{1}{2}\text{ -12 UN, 2A / 2B fit}</math> </p> |
| Material of casing                                     | Cast aluminium, coated  |
| Protection type of casing                              | IP66, EN 60529, (NEMA 4x)   |



## Sample system type 5985-7x/-8x/-9x

### Description

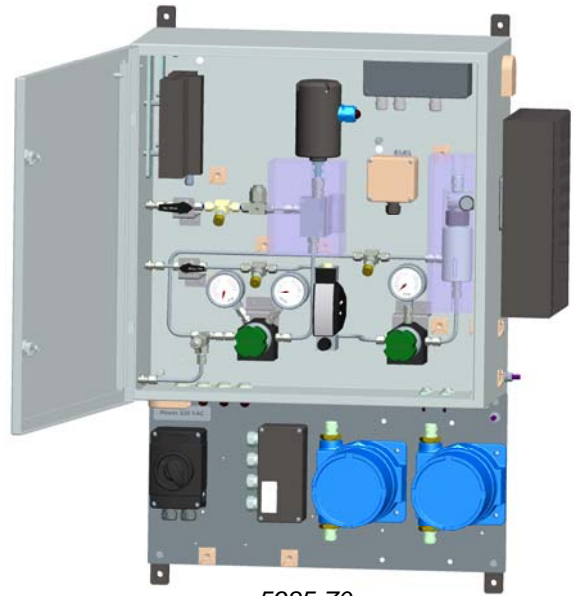
The sample system type 5985-7x/-8x/-9x is designed to accommodate the sensors for the measurement of the hydrocarbon dewpoint.

Within the sample system, the natural gas is conditioned, i.e. pressures are reduced, the flow rate is regulated and temperatures are monitored.

It includes the gas humidity sensor L166x to measure the water dewpoint under line pressure, and the HCDT sensor type 1510-11 to measure the hydrocarbon dewpoint at the cricondentherm point.

The system is available in variants for explosive areas in accordance with ATEX zone 1 (type 5985-7x) and with CSA class 1 division 2 (5985-8x).

All parts in contact with gas are made of stainless steel. The system is modular and can be equipped with a heating if required.



5985-70

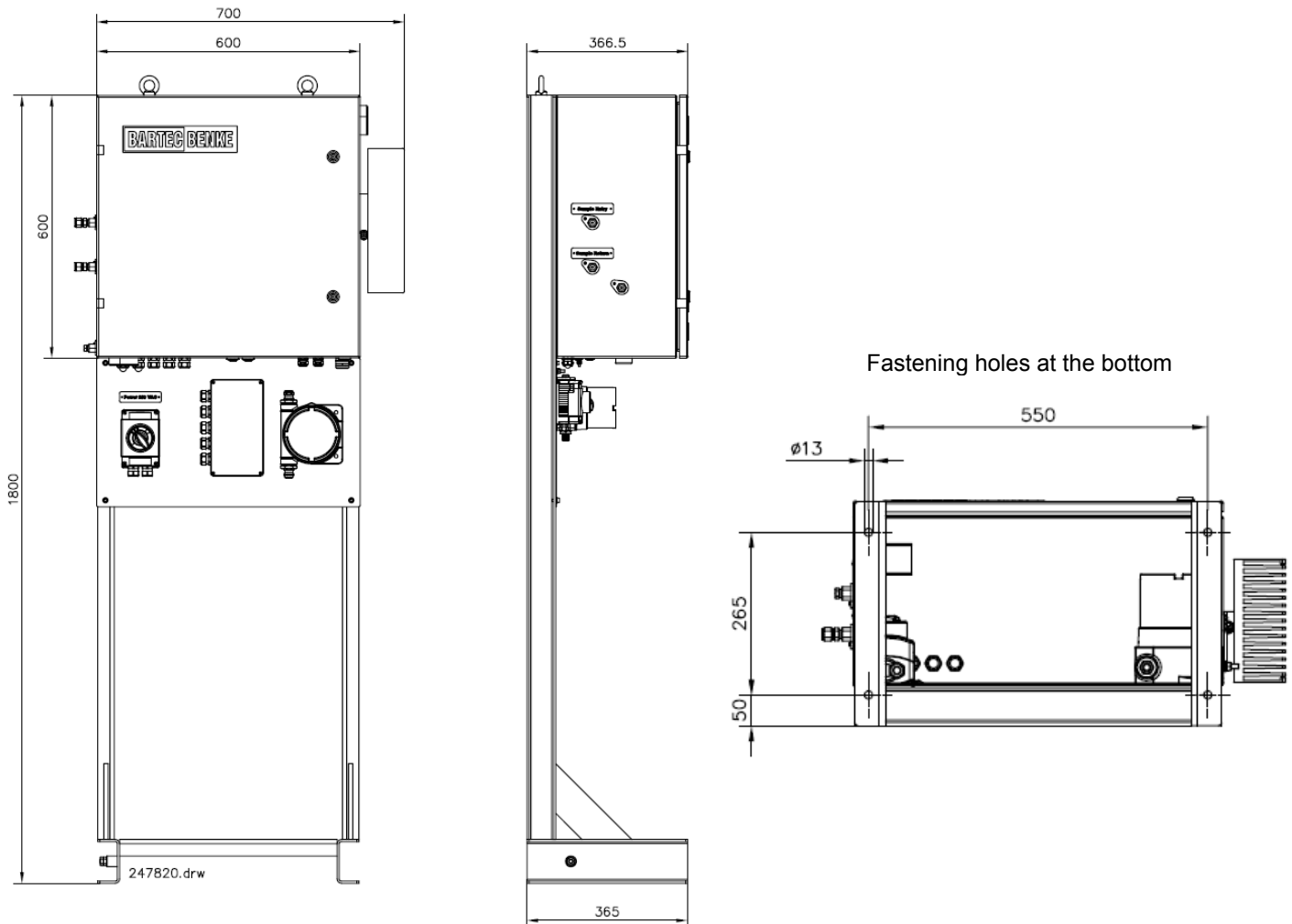
| Technical data   |   |
|--|---|
| <b>Electrical data</b>                                 |   |
| Connections for inlet and outlet                       | Swagelok, pipe connection Ø 10 mm or internal thread ½"                                     |
| Input pressure   | Max. 150 bar  |
| Cricondentherm pressure                                | 2 ... 35 bar rel.   |
| Overflow valve   | 35 bar rel.   |
| Outlet pressure  | 0.5 ... 2.5 Bar rel.  |
| Gas flow rate  | 0.5 ... 3 NL/min.   |
| Counterpressure at the outlet                          | Max. 1.0 bar rel.   |
| Filter   | 15µ   |
| Operating temperature                                  | 0°C *1 ... +50°C *2   |
| Overall cooling-down at 30 bar with additional cooling | -55K  |
| <b>Mechanical data</b>                                 |   |
| Dimensions   | See dimensional drawing   |
| Material of casing                                     | Stainless steel   |
| Protection type of casing                              | IP 65   |
| <b>Sample system with ATEX approval</b>                |   |
| Type   | 5985-70   |
| Order no.  | 247820  |
| <b>Sample system with CSA approval</b>                 |   |
| Type   | 5985-80   |
| Order no.  | 282101  |
| <b>Sample system special model</b>                     |   |
| Type   | 5985-91   |
| Order no.  | 304222  |
| Special features                                       | ATEX approved, switchable pre-cooling (enhanced HCDT measurement range), coalescence filter |
| Type   | 5985-92   |
| Order no.  | 308861  |
| Special features                                       | CSA approved, switchable pre-cooling (enhanced HCDT measurement range), coalescence filter  |

|  |  |
|--|--|
| <b>Peltier cooling</b>                     |  |
| Type                                       | 5985-103 + power supply unit 1510-101/-102 |
| Order no.                                  | 283265 + 286340 / 306836                   |
| Cooling-down of sensor environment         | Max. -30 K                                 |
| Supply voltage                             | AC 100 ... 240 V / DC 10 ... 36 V          |
| Power consumption                          | Max. 140 W                                 |
| Nominal temperature at sensor cell         | +10°C                                      |
| <b>Optional heating with ATEX approval</b> |  |
| Current supply                             | AC 230 V                                   |
| Power consumption                          | Max. 500 W                                 |
| Nominal value of internal temperature      | +40°C                                      |
| <b>Optional heating with CSA approval</b>  |  |
| Current supply                             | AC 120 V                                   |
| Power consumption                          | Max. 250 W                                 |
| Nominal value of internal temperature      | +40°C                                      |
| <b>Accessories</b>                         |  |
| Pedestal, stainless steel                  | 246019                                     |
| Pedestal, zinc-coated                      | 274205                                     |
| Top, stainless steel                       | 274206                                     |
| <b>Spare (wearing) parts</b>               |  |
| Filter insert SS-4TF-15                    | 246645                                     |

\*1 with heating    \*2 with additional cooling

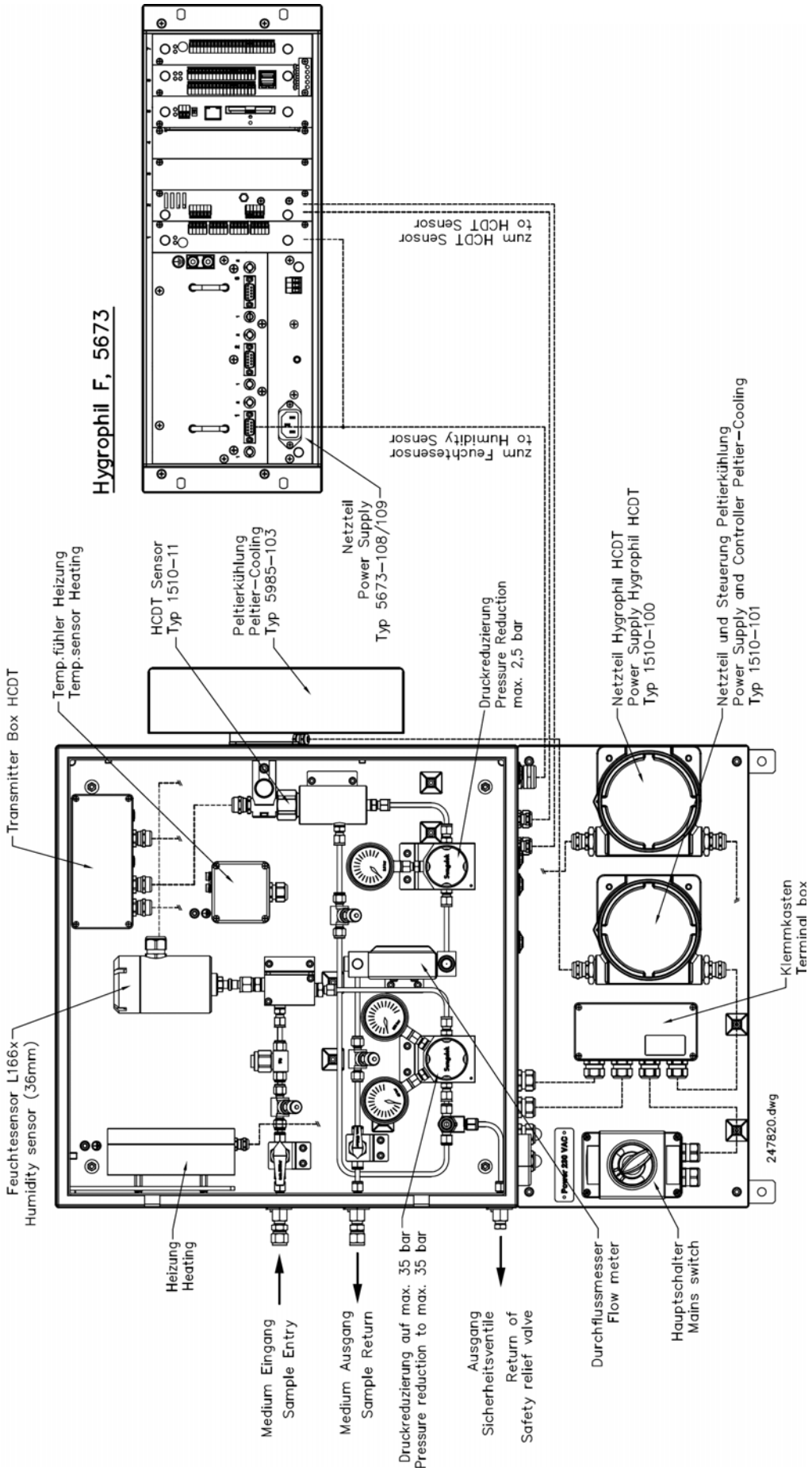
## Dimensions of sample system with pedestal

(dimensions in mm)



Sample system with Peltier cooling and heating

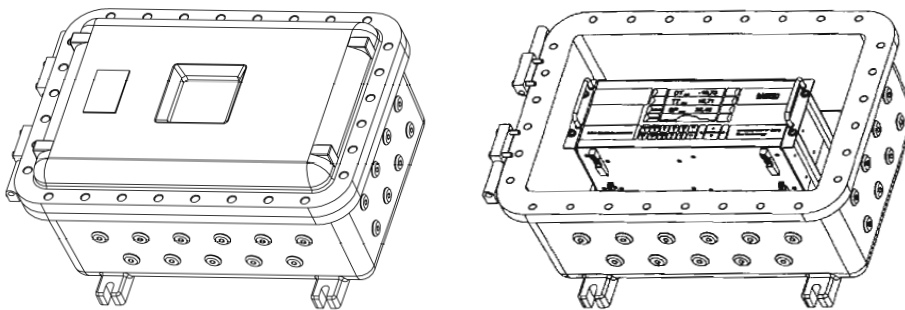
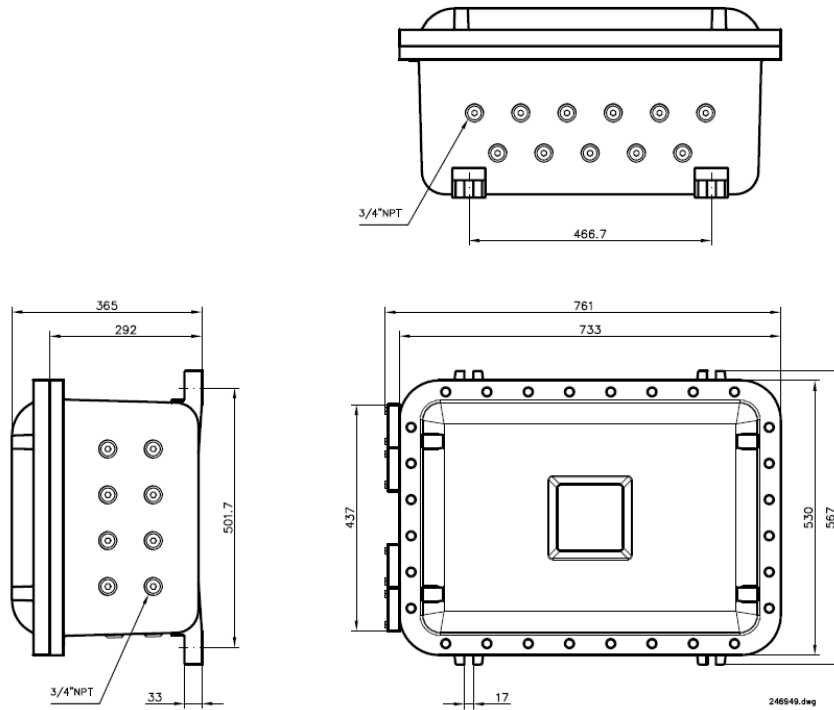
Sample System, 5985-7x



## Accessories

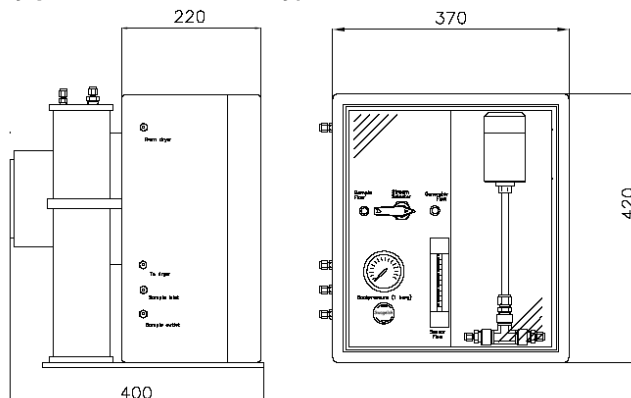
### EEx-d casing (Class I / Div. 1), Aluminium unpainted, dimensions in mm

Type: 5673-111 Order no.: 283504



3D view with built-in Hygrophil F 5673

### Humidity generator (optionally portable or stationary), dimensions in mm



Type: DPG-59 Order no.: 239611

| <b>Ordering details</b>  |             |   |                  |
|--|-------------|---|------------------|
| <b>Name</b>  | <b>Type</b> | <b>Specification</b>  | <b>Order no.</b> |
| <b>Evaluation unit</b>   |             |   |                  |
|  | 5673-10     | AC 100...240 V Class1/Div.2<br>1 channel installed  | 246 121          |
|  | 5673-11     | AC 100...240 V Class1/Div.1 in EEx-d casing<br>1 channel installed  | 242 057          |
|  | 5673-12     | DC 10...36 V Class1/Div.2<br>1 channel installed  | 246 119          |
|  | 5673-13     | DC 10...36 V Class1/Div. 1 in EEx-d casing<br>1 channel installed   | 242 056          |
| <b>Accessories for evaluation unit</b>   |             |   |                  |
|  | 5673-110    | Interface plug-in unit  | 281 686          |
|  | 5673-114    | Channel plug-in unit  | 287 836          |
|  | 5673-115    | Relay plug-in unit  | 289 079          |
|  | 5673-106    | Plug-in card for für HCDDT sensor   | 242 082          |
|  | 5673-107    | Wall bracket / mounting plate   | 246 120          |
| <b>Sensor for determining the hydrocarbon dewpoint</b>   |             |   |                  |
|  | 1510-11     |   | 276 644          |
| <b>Humidity measurement probe with integrated Pt 100</b>   |             |   |                  |
| Measuring tube diameter 10 mm, 100 bar, calibrated from -80...+ 20 °C  |             |   |                  |
|  | L 1660      | Immersion depth 36 mm   | 221288           |
|  |             | Special calibration in NATURAL GAS (with DAP test certificate, calibrated from -20...0° DT, at 40 bar)                    | 232340           |
|  |             | Special calibration in hexane (measurement range freely selectable)   | 232165           |
|  |             | Special calibration in different gases and liquids (measurement range freely selectable)                                  | 239 022          |
| <b>Fiber-optic combination cable</b>   |             |   |                  |
| Including ST connector and adapter, 2 optical fibers + 6 copper cables for Pt 100 and pressure sensor, shielded, protected and flame-retardant in accordance with IEC 332-3A, suitable for field use |             |   |                  |
|  | 1631-112    | Length 2 m  | 242 445          |
|  |             | Length 5 m  | 247 283          |
|  |             | Length 10 m   | 245 449          |
|  |             | Length 20 m   | 240 821          |
|  |             | Length 100 m  | 239 945          |
|  |             | Special lengths in steps of 5 m, up to 100 m<br>Special lengths in steps of 10 m, 100 m and more<br>Maximum length: 200 m |                  |
| <b>Accessories</b>   |             |   |                  |
| HCDDT sample system  | 5985-7x     | ATEX approved   | 247 820          |
| HCDDT sample system  | 5985-8x     | CSA approved  | 282 101          |
| Power supply unit  | 1510-100    | DC 24 V   | 279810           |
| Power supply unit  | 1510-101    | AC 100...240 V  | 286340           |
| Power supply unit  | 1510-102    | DC 18 V...36 V  | 306836           |
| Fuse T 2A  |             | Fuse SI 1 for power supply unit 1510-100<br>Ø5x20mm, Littlefuse p/n 218   | 106626           |
| Fuse T 1A  |             | Fuse SI 6 for power supply unit 1510-100<br>Ø5x20mm, p/n Littlefuse no. 215   | 120463           |
| Gas / liquid separator   | 5985-00-003 |   | 246 082          |
| <b>Testing equipment</b>   |             |   |                  |
| Humidity generator   | DPG-59      | Approx. 20ppm / 50ppm / 100ppm  | 239 611          |