Title:	DDC Technical Specification	ID:
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Digital Display Control (DDC)

Easy to use display board for the Rotronic HygroClip sensor with interface to PC and PLC

Technical Specifications

Features

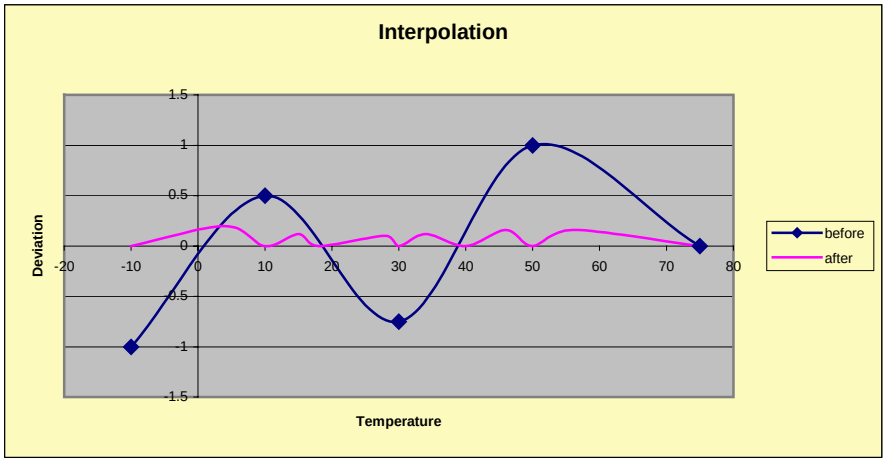
- **Integrated Filtering, Linearization and Adjustment**
  On-board filtering and linearization. Convenient adjustment from PC over a simple RS-232 connection
- **Reliable and Accurate**
  Digital data input from sensor - no precision loss
  Verification of sensor data
- **Interface to PC and PLC**
  Convenient connection to PC and PLC (standard D-SUB connectors)
- **Excellent Appearance**
  Evenly light LED display with high light output.
- **Compact and Flat**
  Dimensions: 87x80x13 mm
  Bottom Layer completely in SMD

Figure 1: Front View

Description

Firmware Features

The firmware of the DDC offers data evaluation which compromises filtering, linearization and adjustment of both temperature and humidity. Thus it can be used as a standalone device as



well as in conjunction with a PC and / or PLC.

Interpolation is based on bearing points that can be programmed to the Flash-ROM. The bearings as well as the intervals can be freely chosen.

Adjustment

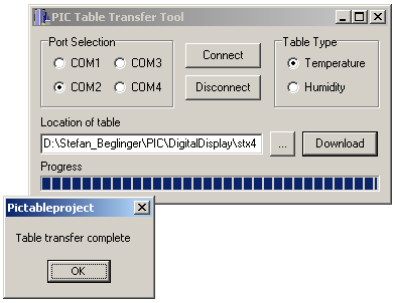


Figure 2: Table Transfer Tool

The DDC comes with a user friendly tool to adjust temperature and humidity curve for applications where this is needed. This can be the case if the sensor cannot be placed at a position where it is supposed to be and thus there will be a slight deviation between the actual value and the value from the sensor.

Electrical Specifications

The DDC requires a DC Power supply but allows a wide range of input voltage between 6.5 VDC and 40 VDC. Power consumption depends on how many LED-segments are switched on. Average consumption is less than 5 Watts which results in a current of less than 200mA.

Communication Protocol Between DDC and PLC

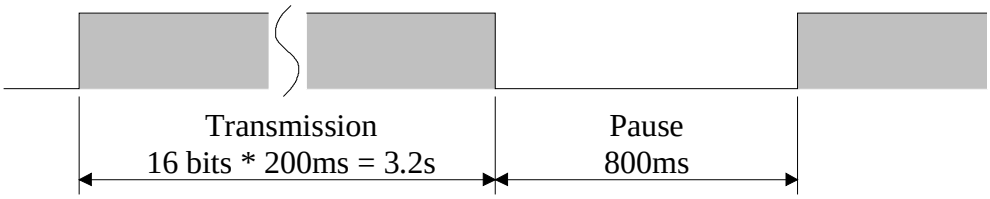


Figure 3 Overview: Communication Cycle with PLC

The DDC uses a proprietary asynchronous protocol to communicate with a PLC. This has the advantage that the PLC can still be connected over the RS-232 port to another device such as a PC. The Display offers two independent outputs for temperature and humidity with galvanic separation.

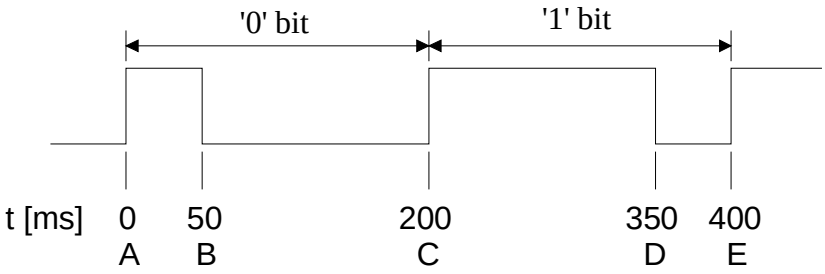


Figure 4 Detailed View: Protocol

Time interval	Description	Duration
t_{AB}	On-time ‘0’-bit	50 ms
t_{BC}	Off-time ‘0’-bit	150 ms
t_{CD}	On-time ‘1’-bit	150 ms
t_{DE}	Off-time ‘1’-bit	50 ms

The board reduces the required processing power of the PLC and converts the data into a suitable format. The PLC only needs to divide the received 16-bit value by 32 (which can easily be done by shifting five times) to receive the value in 1/10 of either °C or % humidity. Since the values are unsigned, an offset of 50°C is added to the temperature to avoid negative temperatures.

Example: $59E9_{hex} \Rightarrow 23017 \Rightarrow 719 \Rightarrow 21.9°C$