OTT netDL Datalogger – Industrial Communication

OTT netDL 500

OTT netDL 1000

General

The OTT netDL series IP-enabled dataloggers are designed to be used for safely handling hydrological or meteorological data. These units may be used in a multitasking environment and feature high memory capacity and very efficient power management. They provide a large variety of communication options.

Redundant communication paths ensure high data availability. The modular design allows the dataloggers to be configured for each particular application. The station operator needs to purchase just the modules (hardware and software) required for his/her measuring task. Standardized sensor interfaces are flexibly configurable through software. Together with the plurality of supported transmission protocols (HTTP, HTTPS, FTP, SMTP…), this flexibility ensures the investment to be future-proof.

Irrespective of all that, the loggers are easily operated. Control information may conveniently be retrieved on site using the display. A laptop or USB device may be used to access the datalogger via the USB interface in an easy manner.

For hydrological applications, connections to industrial platforms are required as well. Typically, these platforms are programmable logical controllers (PLC) or process control systems (SCADA).

This document describes the options for connecting the dataloggers to the above-mentioned systems and making them an integral component of the entire application this way.

Today, major applications are found in hydropower applications, dam-controlled waterways, lock management, dam control, municipal water supply, etc.

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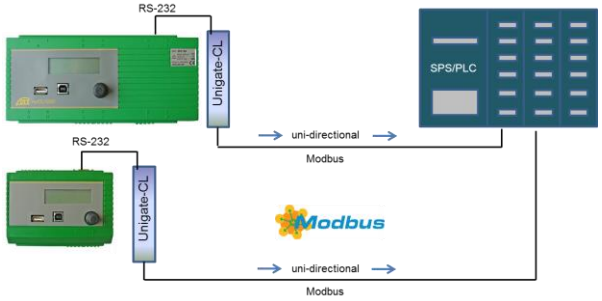
1 Connecting the OTT netDL via Modbus

(OTT netDL operating as a Modbus slave)

Modbus protocol is a communication protocol that is based on a master/slave or client/server architecture. Using Modbus, a master (e.g. a PLC in this particular case) and several slaves (the datalogger in this case) may be connected.



1.1 What is required for a Modbus slave connection

Item	Item No.	Description
OTT netDL 1000	55.552.001.9.0	OTT datalogger, all versions
OTT netDL 500	55.553.001.9.0	OTT datalogger, all versions
UNIGATE CL-RS	97.970.104.9.5	UNIGATE interface converter
External fieldbus SW option	56SLA01MO4	Activation code in OTT netDL
RS-232 cable	55.552.110.4.2	Cable for connecting the UNIGATE to the OTT netDL

Note: The cable for connecting the UNIGATE to the control system is not supplied.

1.2 Modbus slave description

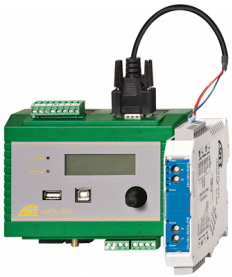
- The UNIGATE CL-RS is connected to the RS-232 port of the netDL 500 or netDL 1000.
- The UNIGATE CL-RS includes an OTT script that handles interface conversion.
- The Modbus address for the slave is set at the UNIGATE CL-RS.
- The UNIGATE CL-RS is powered by the same mains adapter as the datalogger.
- Data is provided for the Modbus master by the netDL in Modbus registers. Communication is unidirectional, i.e., no data is transmitted to the netDL on this path.
- Communication is configured in the "Data Logger Operating Program".
- Optionally, the UNIGATE CL-RS may be connected to the Modbus via RS232 or RS485 (Modbus RTU).
- Modbus function code 0x03 (Read Holding Register) is the only function code supported.
- The minimum communication cycle between netDL and Unigate is 1 minute.

Note:

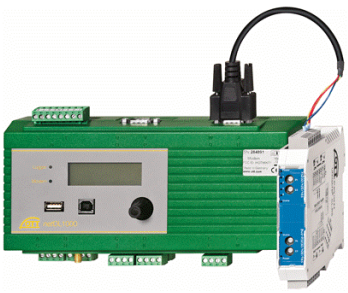
For programming and connection of the Modbus Master, the customer must provide a PLC expert. OTT Hydromet will not do provide support programming the Modbus Master.

Note:

The OTT netDL also provides a Modbus master interface. The existing RS485 interface (C12) of the OTT netDL (already included in the datalogger standard model) is used for this purpose. This interface is used to connect sensors to the OTT netDL as Modbus slaves.



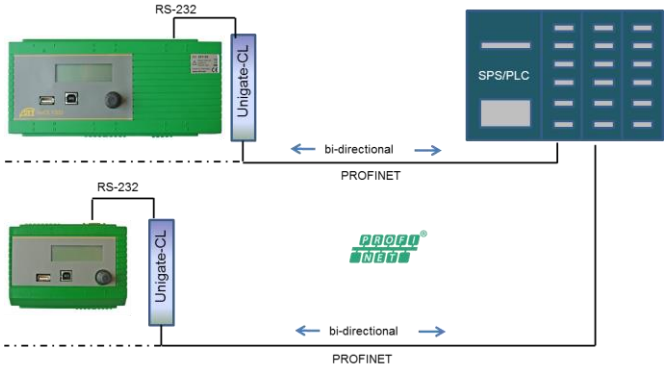
netDL 500 mit UNIGATE CL-RS



netDL 1000 mit UNIGATE CL-RS

2 Connecting the OTT netDL via PROFINET

PROFINET is an open Industrial Ethernet standard for automation developed by *Profibus & Profinet International*. PROFINET utilizes TCP/IP and IT standards, is Realtime Ethernet enabled, and allows fieldbus systems to be integrated.



2.1 What is required for a PROFINET connection

Item	Item No.	Description
OTT netDL 1000	55.552.001.9.0	OTT datalogger, all versions
OTT netDL 500	55.553.001.9.0	OTT datalogger, all versions
UNIGATE CL-PROFINET	97.970.103.9.5	UNIGATE interface converter
External fieldbus SW option	56SLA01MO4	Activation code in OTT netDL
RS-232 cable	55.552.110.4.2	Cable for connecting the UNIGATE to the OTT netDL

Note: The cable for connecting the UNIGATE to the control system is not supplied.

2.2 Description of the PROFINET connection

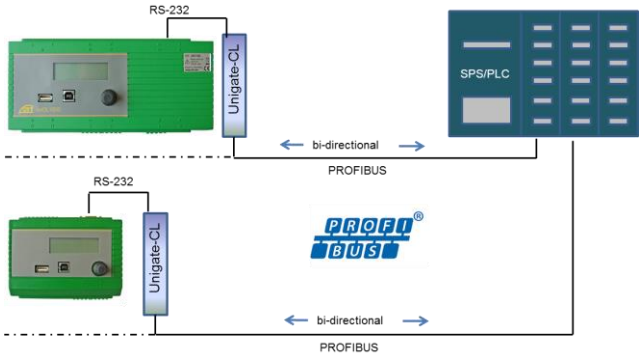
- The UNIGATE CL-PROFINET is connected to the RS-232 port of the OTT netDL 500 or OTT netDL 1000.
- The UNIGATE CL-PROFINET includes an OTT script that handles interface conversion.
- The UNIGATE CL-PROFINET is PROFINET certified.
- The UNIGATE CL-PROFINET is powered by the same mains adapter as the datalogger.
- Data is transmitted from the netDL to the control system via PROFINET and may be received as well. Communication is bidirectional.
- Communication is configured in the *"Data Logger Operating Program"*.
- Optionally, the UNIGATE CL-PROFINET is connected to the PROFINET network through TCP/IP (10/100BASE-T).
- The minimum communication cycle between netDL and Unigate is 1 minute.

Note:

For programming and connection of the PLC, the customer must provide a PLC expert. OTT Hydromet will not do provide support programming the PLC.
The timing of the output of the parameter from PLC to Unigate CL Profinet should be ≥ 500ms.

3 Connecting the OTT netDL via PROFIBUS DP

PROFIBUS (Process Field Bus) is a standard for fieldbus communication in automation. PROFIBUS DP (decentralized periphery) is used in manufacturing technology for controlling sensors and actuators by a central control system. Data rates up to 12 Mbit/s are possible.



3.1 What is required for a PROFIBUS DP connection

Item	Item No.	Description
OTT netDL 1000	55.552.001.9.0	OTT datalogger, all versions
OTT netDL 500	55.553.001.9.0	OTT datalogger, all versions
UNIGATE CL-Profibus	97.970.125.9.5	UNIGATE interface converter
SW Option ext. Fieldbus	56SLA01MO4	Activation code in OTT netDL
RS-232 Kabel	55.552.110.4.2	Cable for connecting the UNIGATE to the OTT netDL

Note: The cable for connecting the UNIGATE to the control system is not supplied.

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3.2 Description of the PROFIBUS DP connection

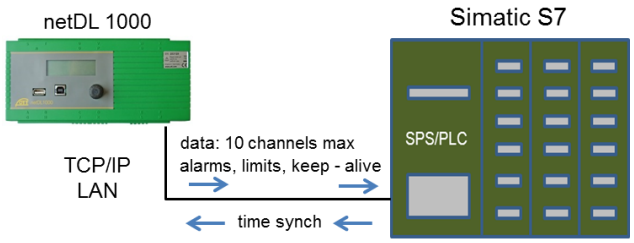
- The UNIGATE CL-PROFIBUS is connected to the RS-232 port of the OTT netDL 500 or OTT netDL 1000.
- The UNIGATE CL-PROFIBUS includes an OTT script that handles interface conversion.
- The UNIGATE CL-PROFIBUS is certified by the PROFIBUS user organisation (PNO).
- UNIGATE CL-PROFIBUS is powered by the same mains adapter as the datalogger.
- Data is transmitted from the netDL to the control system via PROFIBUS and may be received as well - communication is bidirectional.
- Communication is configured in the *"Data Logger Operating Program"*.
- Connection of the UNIGATE CL-PROFIBUS to the PROFIBUS network is realized via RS485.
- The minimum communication cycle between netDL and Unigate is 1 minute.

Note:

For programming and connection of the PLC, the customer must provide a PLC expert. OTT Hydromet will not do provide support programming the PLC.

4 Connecting the OTT netDL via S7-Link

Using the S7-Link software option, an OTT netDL 1000 may be directly connected to a Simatic S7 system providing an Ethernet interface. In such a configuration, the OTT netDL directly writes onto a Simatic S7 module. This type of communication mandatorily requires an **OTT netDL 1000** as well as a **Siemens Simatic S7-300 with CP 343-1** system to be used. An external interface converter is not necessary.



4.1 What is required for an S7-Link connection

Item	Item No.	Description
OTT netDL 1000	55.552.001.9.0	OTT datalogger, all versions
S7 PLC SW option	56SLA01MO3	Activation code in OTT netDL
PLC module description		Provided by OTT.

4.2 S7-Link description

- The Simatic S7-300 system and the OTT netDL 1000 are connected using an Ethernet-based network (TCP/IP).
- Data is directly transmitted from the OTT netDL 1000 to the Simatic S7-300 system. Communication is unidirectional, i.e., no data is transmitted to the netDL on this path.
- 10 OTT netDL channels may be transmitted. If transmission is interrupted these channels will be post processed.
- 10 additional channels for the current, last stored data
- Limits and alarms may be transmitted.
- Communication is configured in the *"Data Logger Operating Program"* and the Simatic S7-300 system must be configured accordingly.

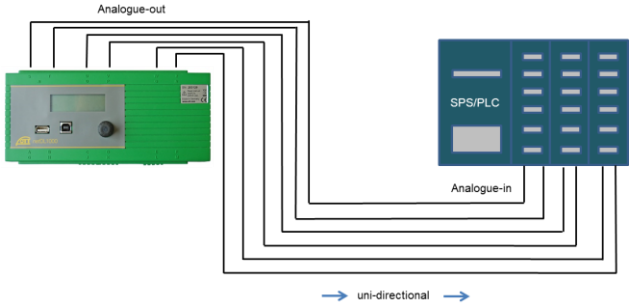
Note:

The application was realized and tested with a Siemens Simatic S7-300 with CP 343-1 communication processor. For different controllers OTT Hydromet will not guarantee the functionality.

For programming the Simatic S7-300 system, the customer must provide a PLC expert. OTT Hydromet will not do support programming of the PLC.

5 Connecting the OTT netDL via analog outputs

Analog output cards may be used to connect the OTT netDL to the analog inputs of a control system. Typically, such inputs are 0/4...20mA inputs, but also voltage inputs of the control system may be driven.



5.1 What is required for an analog connection

Item	Item No.	Description
OTT netDL 1000	55.552.001.9.0	OTT datalogger
OTT netDL 500	55.553.001.9.0	OTT datalogger
Analog output card		An OTT netDL model

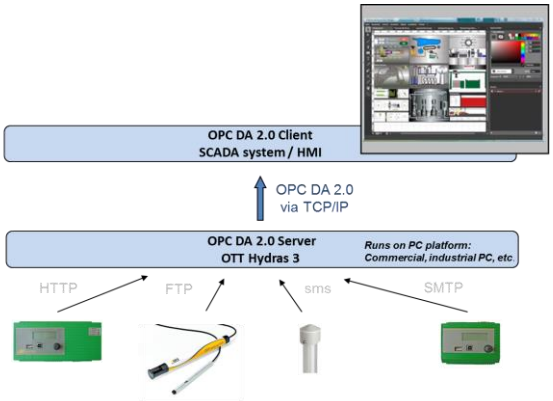
5.2 Analog communication description

- In the OTT netDL, analog output cards are required:
  - OTT netDL 500 – up to 4 analog outputs (2 output cards)
  - OTT netDL 1000 – up to 6 analog outputs (3 output cards)

6 Connection to process control systems using OPC DA 2.0

OPC is a standard for manufacturer-independent communication in automation technology. OPC is used where sensors, controllers, and control systems from different manufacturers are combined to establish a flexible network.

Using a software gateway, OTT provides the option of passing data that is available in Hydras 3 to a process control system (SCADA system) via OPC DA 2.0. Thus, this solution is independent of any upstream measuring equipment.



6.1 What is required for an OPC DA 2.0 connection

Item	Item No.	Description
OTT Hydras 3 Basic	56.570.000.9.7	OTT user software for hydrology and meteorology.
OTT Hydras 3	56.570.001.9.7	
OTT Hydras 3 Pro	56.570.002.9.7	
OTT OPC DA gateway	56.570.005.9.7	Activation code for the OPC server in Hydras 3, V 2.90 or later

6.2 OPC DA 2.0 server functionality description

- The OPC DA 2.0 server (gateway) within Hydras 3 provides the most recent measured value for the OPC client.
- No time series are transferred.
- The OPC client retrieves the measured values from the Hydras 3 unit in configurable intervals.
- The data gets into the Hydras 3 unit via:
  - Auto Import feature
  - Automatic retrieval (important: "Last Saved Value" option must be enabled)
- Hydras 3 and the OPC client are located within the same Windows network.

7 List of acronyms / References

Modbus

http://www.modbus.org/

PROFINET/PROFIBUS

http://www.profibus.org/

GSD

The characteristic communication features of a Profinet/Profibus device are defined in an electronic device datasheet (General Station Description file, GSD file). GSD files are to be provided by the manufacturer of a Profinet/Profibus device (UNIGATE CL-Profinet in this case).

PLC

A Programmable Logic Controller, PLC is a device to control a machine or equipment in open-loop or closed-loop manner and which is programmed on a digital basis.

Simatic S7-300

Siemens PLC

Siemens CP 343-1

Communication processor foe Siemens Simatic S7-300

S7-Link

System to directly connect the OTT netDL 1000 to Simatic S7-300 via TCP/IP

SCADA

Supervisory Control and Data Acquisition (SCADA) is a system for monitoring and controlling technical processes using a computer system.

OPC

Now: Open Platform Communications, formerly called OLE for Process Control (OPC), is the name for standardized software interfaces that are designed to allow data exchange in automation technology between applications from different manufacturers.
(OLE stands for Object Linking and Embedding)
OPC specifications:

- OPC DA (Data Access)
- OPC A/E (Alarms and Events)
- OPC HDA (Historical Data Access)
- OPC DX (Data eXchange)
- OPC Command: Specification for executing commands.
- OPC UA (Unified Architecture)

UNIGATE CL-..

Interface converter to incorporate OTT netDL dataloggers in industrial communication.

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