# Profibus DP HUB

# HDP-210

# Introduction

Thank you for choosing our Profibus DP Repeater HDP-210. To ensure the proper and efficient way of usage, it's very important to read all this manual sequentially to understand how to operate and install the HDP-210, before putting it into operation.

## About this Manual

1. This manual should be delivered to the end user of the Profibus DP HUB HDP-210;

2. The contents of this manual may be changed without notice;

3. All rights reserved. No part of this manual may be reproduced in any kind without DLG's permission;

4. All the specifications in this manual are limited to the standard products models and do not cover special products or made by order;

5. This manual was prepared with all precautions taken in order to guarantee the quality of information.

## CAUTION!

The instrument described in this technical user manual is a device suitable for application in a specialized technical area. DLG's products are submitted to a strict quality control process. However, industrial control electronic equipment can cause damage to machinery or processes controlled by them in the event of any failure or improper uses and may even endanger human lives. The user is responsible for setting and selecting values of the parameters of the instrument. The manufacturer warns of the risks of incidents with injuries to both people and goods, resulting from the incorrect use of the instrument.

# Contents

# Presentation

The Profibus DP HUB HDP-210 permits expansion and subsequent regeneration of the RS-485 communication signals, amplifying data signals and coupling Profibus DP segments in a ramified way. Terminating circuits has been incorporated in both channels, eliminating the use of active terminators and can be mounted on standard 35mm DIN rails.

Below we highlight some features:

- Power supply for 24V;
- 5 channels galvanic isolated from the master;
- Amplification of data signals;
- Anti-glitch filter for signal's reception;
- Total of 32 Devices per segment;
- Maximum cable length: 1200m at 9.6kbps;
- AutoBaudrate supports 9.6kbps to 12Mbps;
- Compatible with Profibus DP and FMS protocols;
- No address necessary;
- Cable: type A according to EN50170;
- 1 Power supply indicator led;
- 2 Bus status leds per secondary channel and for master;
- 1 Profibus DP frontal DB9 Connector per secondary channel and for master;
- 2 Screw connectors for A/B and A'/B' signals and shield protectors circuits for the master;
- 1 Screw connector for 2 A/B signals and shield protector for secondary channels;
- Compact and low profile;
- Short circuit protection.

# Typical Applications

The Profibus DP HUB HDP-210 should be used in the following situations:

- If More than 32 connected nodes in the bus;
- If the segments can't be connected in any manner at a given shield or common ground;
- If the maximum cable length estimated by the baud rate of the configuration has been reached;
- If there is a need to branch the bus on multiple buses in different directions.

In the Figure 1 a typical application of the HDP-210 is illustrated.

Due to the characteristic impedance of RS-485 transceivers to be around 12KΩ, care must be taken to use a maximum of 32 nodes per network segment, to not compromising the communication channel. Therefore, to increase the scale of the network repeaters should be used.

In some circumstances, ground loops are present in the bus segments and must be canceled, thus as the HDP-210 HUB has 5 isolated communication channels, its is possible to solve many problems of the physical layer.

When the cable length limit by the communication speed is reached, the HDP-210 HUB assists in the configuration of fast and big networks, with amplifying and regenerating the data signal.

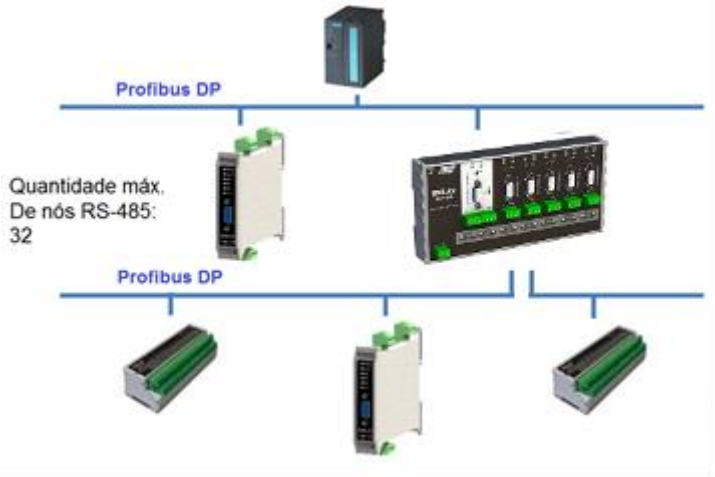



Figure 1 - HDP-210 Application.

# Technical specifications

## General Characteristics

| Tipo | Observações |
|---|---|
| **Communication** | RS-485 PROFIBUS: (DP, DP-V1, DP-V2, PROFIdrive, MPI, etc.) and FMS Protocols |
| **Isolation** | 5 Galvanic interfaces max. 450Vp |
| **Baud Rates** | 9.6k, 19.2k, 45.45k, 93.75k, 187.5k, 500k, 1.5M, 3M, 6M e 12M |
| **Profibus Cable:** | Type A acc. EN50171 |
| **Operation Temperature** | 0 ºC a 60 ºC |
| **Storage Temperature** | -40 ºC a 70 ºC |
| **Thermal Stability** | ±0,005% / °C do span @ 25°C. |
| **Relative humidity** | Up tp 90% |
| **IP Protection** | IP-20 (DIN EN 60529 VDE 0470) |
| **Power Supply** | 9 a 28.8 Vcc |
| **Power Consumption** | max. 200mA |
| **Case Material** | ABS |
| **Placement** | DIN35 trail (DIN EN 60715 TH35) |
| **Electric connection** | Maximum Cable 2.5mm² with screw connectors. |
| **Aprox. Weight** | 0,2Kg |
| **Dimensions** | 75,4 x 104 x 58,5 mm. (Height x Width x Depth). |

# Dimensions

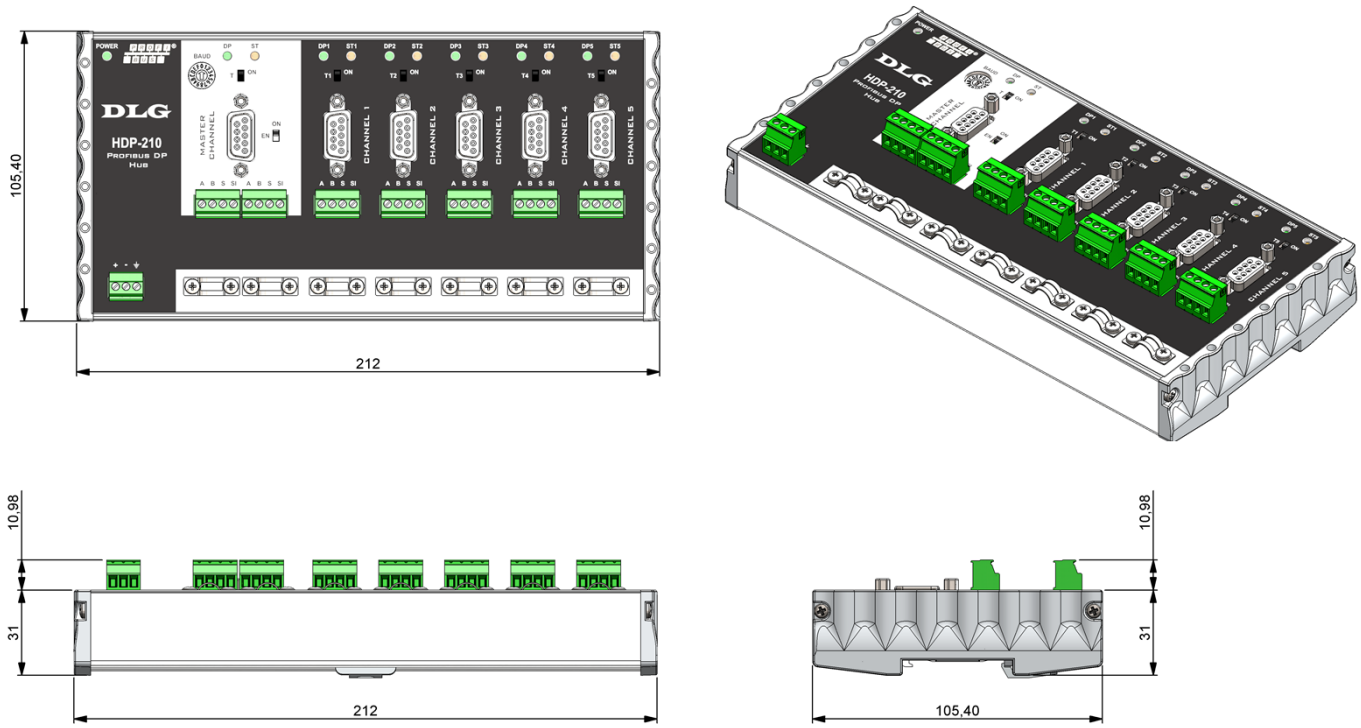
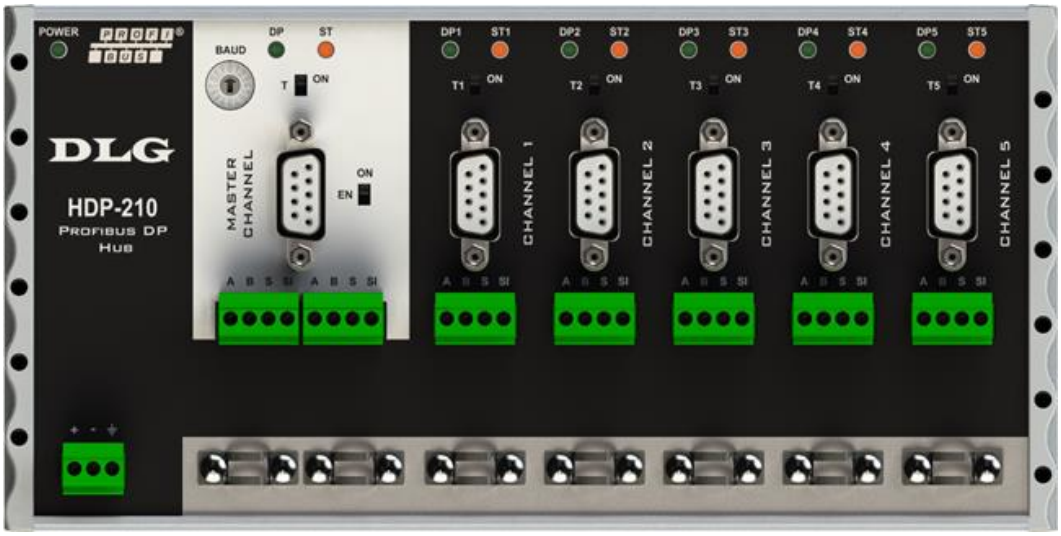



Figure 2 - Dimensions for assembly (in millimeters)

# Frontal




| Chave | Pos. | Descrição |
|---|---|---|
| Enable (EN) | ON | All the 5 Profibus DP channels will be coupled to the master when the switch is “ON” |
| | OFF | All the 5 Profibus DP channels will not be coupled to the master when the switch is “OFF” and all remains with high impedance between them. |
| T | ON | Just the Master Channel will be terminated with the resistors 390-220-390. The derivations in the connectors A0/B0 are not connected. |
| | OFF | The derivations in the Master Channel connectors A0/B0 are connected without terminators. |
| T1..5 | ON | The respective selected bus channel will be terminated with the resistors 390-220-390.<br>The derivations in the respective connectors A0/B0 are not connected. |
| | OFF | The derivations in the respective secondary channel connectors A0/B0 are connected without terminators. |
| BAUD | 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F | Baud rate selection:<br>**1** = 9.600 Kbps; **2** = 19.200 Kbps; **3** = 45.45 Kbps; **4** = 93.75 Kbps; **5** = 187.5 Kbps;<br>**6** = 500 Kbps; **7** = 1.5 Mbps; **8** = 3 Mbps; **9** = 6 Mbps; **A** = 12 Mbps;<br>**B**/**C**/**D**/**E**/**F**/**0** = Auto baud rate. |
| **LED** | **Cor** | **Descrição** |
| PWR | Green | (Power) Indicates that the power supply is on. LED continuously on shows the correct state of the power supply. |
| DP/DP1..5 | Green | When the Profibus DP transactions are successful, the DP1, DP2, DP3, DP4 and DP5 leds will be on in the two way of data. When just the DP leds blinks, it indicates that the master is trying to establish communication, but no answer of any salve.<br>When a master is not connected or not operant and leds DP1 or DP2 blinks, it should be an impropriate installation. |
| ST/ST1..5 | Yellow | The ST leds will flash during about 2 seconds if any abnormality occur, both on ST and ST1..5.<br>ST/ST1..5 Any anormal situation in profibus communication can be monitored by status leds ST e ST1..5.<br>ST: At startup stage, it will be on until baudrate has been found. During operation, it will indicate collision between master and any of the 5 channels.<br>ST1..5: All on indicates baudrate change. Any other condition during 3 seconds, indicates collision between master or transient noise.<br>ST1..5: In case of channel short-circuit, the channel’s ST led will flash until the channel reaches normalization. From this moment, the shorted channel will be disabled by the HUB. |

# Operation

The Profibus DP HUB HDP-210 has been created in a manner that it can been totally transparent for all the segments of the Profibus that he is inserted. With 5 RS-485 isolated communication channels and active terminators integrated, it can decouple all the bus segments through the “ENABLE” switch.

The Profibus DP HUB HDP-210 has autobaudrate and automatic flow control, which is compatible with 9600bps to 12Mbps, with no further configurations needed. The autobaudrate may take between 10 to 30s to find the correct rate, which depends on noise-coupled condition. Both Profibus DP and MPI or any other kinds of FMS protocol are supported. The limit of devices is up to 32 nodes per segment, keeping the maximum distance of 1200m to 9600bps.

The HDP-210 incorporate an anti-glitch filter which attenuates the presence of noise on the bus and minimize the effects of noise present in all channels. The anti-glitch filter will activate every time a noise-coupled less than ½ TBit is present. At this level, the signal will be completely regenerated and will remain isolated in the bus-noised channel. For example: The communication is configured with a 500Kbps rate and with presence of noise-coupled greater than ½ TBit (1us), so the anti-glitch filter won’t have enough information to attenuate it and the filter may be compromised, causing a faulty communication system. Thereby, a reasonable solution is configure the baud rate with the next slowest one like 187,5Kbps.

# Electric Installation

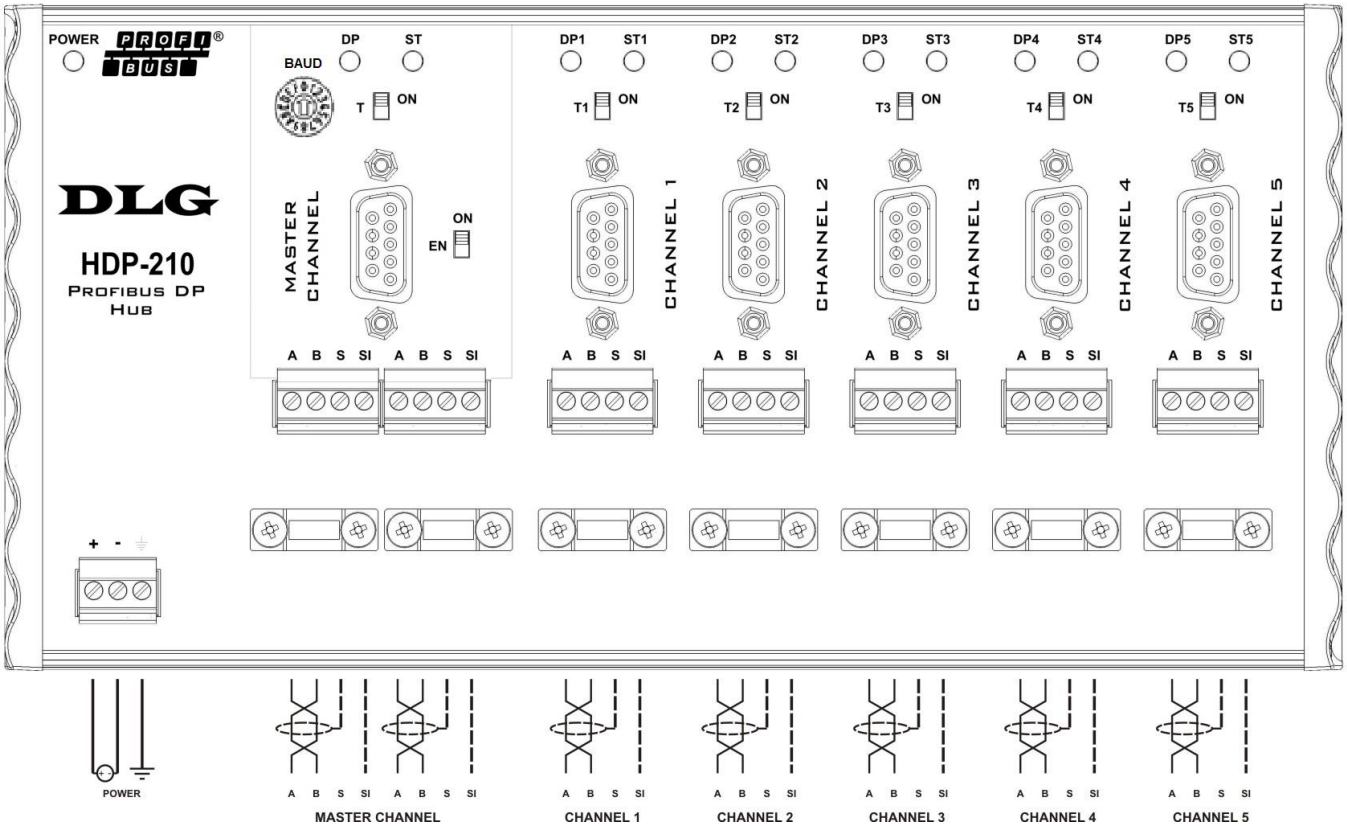
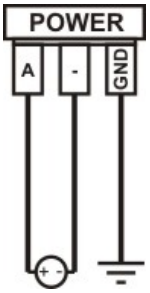



Figure 3 - HDP-210 Electric connections.

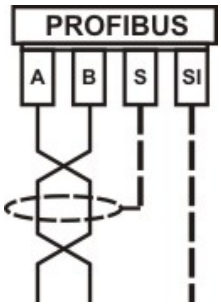
***Atention:*** *All the cables shall be crimped with proper terminals to 1.5mm² when not specified. For the interconnection of communication signals, we recommend using standard Profibus cables with "shield" and grounding should be done in S connector and every other ground points existing till the end of the bus. For some special cases where the shield connection to ground shall not be done, the SI connectors may be used.*

## Power supply




The HDP-210 shall be energized through the + and - terminals with a voltage of 24 V with a range of 9 to 28.8 Vdc. The GND terminal is used for grounding to the panel and the recommended cables are 1.5mm² and 2.5mm² to ground. The wiring diagram is described aside.

## Profibus DP Communication




The HDP-210 has 5 serial communication channels using the Profibus DP protocol with a RS-485 physical layer. The channels can be accessed by terminal screw connectors: positive (B), negative (A), shield (S) and indirect (SI), as illustrated in the right hand side.

The Channels can also be accessed with conventional DB9 connectors to the Profibus DP protocol through the frontal.

The DB9 connector and the terminals of the channels are connected internally and both can be used simultaneously. For example, the HDP-210 can be connected to the Profibus master by the screw connectors and a protocol analyzer can be used to the DB9 connector, without causing any disturbing to the correct operational.

**Connect the cable's shielding on the bracket**

# Mechanical Installation

First place the HDP-210 in the top DIN rail.

Push the HDP-210 down until yout hear a “click”. Now the HDP-210 is placed in the rail.

To release the HDP-210 from the rail, just push it to the botton and next to up and pull the top out.

# Recommendations

It's high recommended to the user that just use proper tools and equipment for the installation and maintenance of the HDP-210.

<table>
<tr><td>For the screw connectors it is essential to use screwdriver for 1/8" with a maximum diameter of 3mm. It is the ideal format and will not damage the connector's hole of the HDP-210.</td><td>  <br>No recommended switch</td><td>  <br>Recommended switch</td></tr>
<tr><td>We recommend to crimp all the wires that will be connected to the HDP-210 with needle terminals for cables of 0.5 to 1.5 mm² like the figure aside.</td><td colspan="2">Needle terminals<br>   </td></tr>
</table>

# Warranty

The manufacturer assures to the equipment owners, identified by the purchase invoice, warranty of 1 (one) year as follows:

1. The warranty period begins on the date of the invoice issue;

2. Within the warranty period, the labor and parts used for repairing damage occurred in normal use are free;

3. For repairs, send the equipment along with the shipping invoices to our factory in Sertãozinho, São Paulo, Brazil. DLG's address is available at the end of this manual;

4. The owner is responsible for transportation costs and risks;

5. Warranty will be automatically suspended if changes were made to the equipment by personnel not authorized by DLG, defects caused by mechanical shock, exposure to conditions unfit for use or tampering with the product;

6. DLG disclaims any charge relating to unauthorized repairs or replacements due to failures caused by agents external to the equipment, the improper use of them and as a result of unforeseeable circumstances or major forces;

7. DLG ensures full operation of the equipment described in this manual and all existing operations.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