



# HUB Profibus DP IP-66/67

## HDP-610





# Introduction

Thank you for choosing the HUB Profibus DP IP-66/67 HDP-610. To ensure proper and efficient use, it is essential to read this manual thoroughly before operating the equipment.

## About this manual

1. This manual should be provided to the end user of the HUB Profibus DP IP-66/67 HDP-610;
2. The contents of this manual are subject to change without prior notice;
3. All rights reserved. No part of this publication may be reproduced in any form without the written permission of DLG;
4. The specifications contained in this manual are limited to standard models and do not include bespoke products;
5. Every care has been taken in preparing this manual, to ensure the quality of the information contained herein.

## CAUTION!

The instrument described in this technical manual is a device to be used in a specialized technical area. Products supplied by DLG undergo strict quality control. However, electronic industrial control equipment can cause damage to the machines or processes controlled by them in the event of improper use or possible faults, and may even endanger human lives. The user is responsible for configuring and selecting the instrument parameters. The manufacturer warns of the risks of damage both to people and goods as a result of the incorrect use of the instrument.

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## Presentation

The HUB Profibus DP IP-66/67HDP-610 enables the extension and consequent regeneration of the RS-485 communication signal, amplifying the data signal and coupling Profibus DP network segments in a branched form. It has termination circuits built into both channels, removing the need for active terminators, and can be mounted on a standard 35mm DIN rail.



Here are some of its features:

- 24V Power supply
- 5 galvanically isolated master channels
- Amplification of the data signal
- Anti-glitch filter for signal reception
- Total of 32 devices per segment
- Maximum cable length of 1200m. (for a baud rate of 9.6kbps)
- Auto Baud Rate compatible with: 9.6kbps to 12Mbps
- Supports Profibus DP and FMS protocols
- Addressing is not needed
- Cable: Type A ac. EN50170
- 1 power indication LED
- 2 bus status LEDs, for secondary and master channels
- 1 DB9 front Profibus DP connector for master and secondary channels
- 2 screw connectors for A/B SD, SI, A/B' SD 'and SI' signals for the master terminals
- 1 screw connector for A/B SD and SI signals for the secondary channel terminals
- Compact and low profile
- Short circuit protection between channels.

## Typical Applications

The HUB Profibus DP IP-66/67 HDP-610 should be used in the following situations:

- If there are more than 32 nodes connected to the bus.
- If the segments cannot be connected to a particular common EARTH.
- If the maximum cable length estimated by the baud rate configuration is reached.
- If the bus needs to be branched in multiple buses in different directions.

Figure 1 illustrates a typical application of the HDP-610.

Because the characteristic impedance of the RS-485 transceivers is around  $12K\Omega$ , a maximum of 32 nodes should be used per network segment, so as not to compromise the communication channel (each HDP-610 channel should be interpreted as one node in each network). Therefore, repeaters must be used to increase the scale of the network.

In some circumstances, ground "loops" present in the network segment should be canceled, because the HDP-610 repeater's isolated communication channels solve various problems of the physical layer.

When the maximum cable distance for communication speed is reached, the HDP-610 repeater assists in the configuration of long, fast networks, amplifying the data signal.

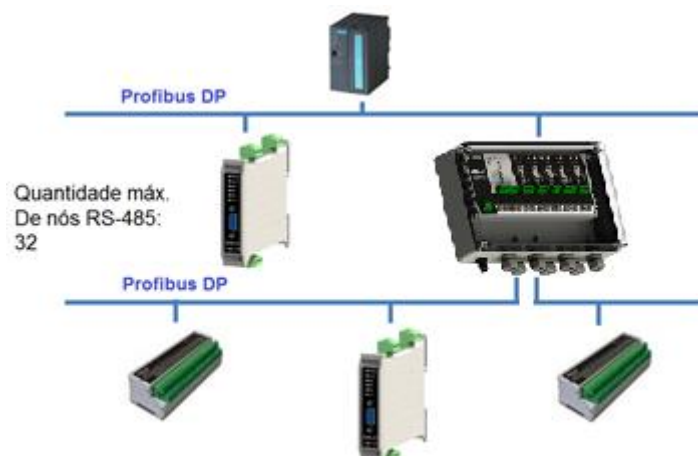


Figure 1 - HDP-610 Application

## Technical Specifications

### General Characteristics

Type	Notes
<b>Communication</b>	RS-485 PROFIBUS protocols: (DP, DP-V1, DP-V2, PROFIdrive, MPI, etc.) and FMS protocols
<b>Insulation</b>	Galvanic max. 450Vp
<b>Baud Rates</b>	9.6k, 19.2k, 45.45k, 93.75k, 187.5k, 500k, 1.5M, 3M, 6M and 12M
<b>Profibus Cable</b>	Type A acc. EN50171
<b>Operation Temperature</b>	0°C to 60°C
<b>Storage Temperature</b>	-40°C to 70°C
<b>Thermal Stability</b>	±0.005% / °C of the span @ 25°C
<b>Relative humidity</b>	Up to 90%
<b>Degree of Protection</b>	IP-66/67 (EN 60529)
<b>Power</b>	9 to 28.8 Vdc
<b>Consumption</b>	max. 200mA
<b>Construction</b>	ABS housing and transparent polycarbonate cover
<b>Fixation</b>	Via 4 M4 screws
<b>Electrical Connection</b>	Cable up to 2.5mm <sup>2</sup> with connectors fixed to screws
<b>Approximately Weight</b>	1.2kg
<b>Dimensions</b>	175 x 250 x 75 mm. (Height x Width x Depth)

### Dimensions

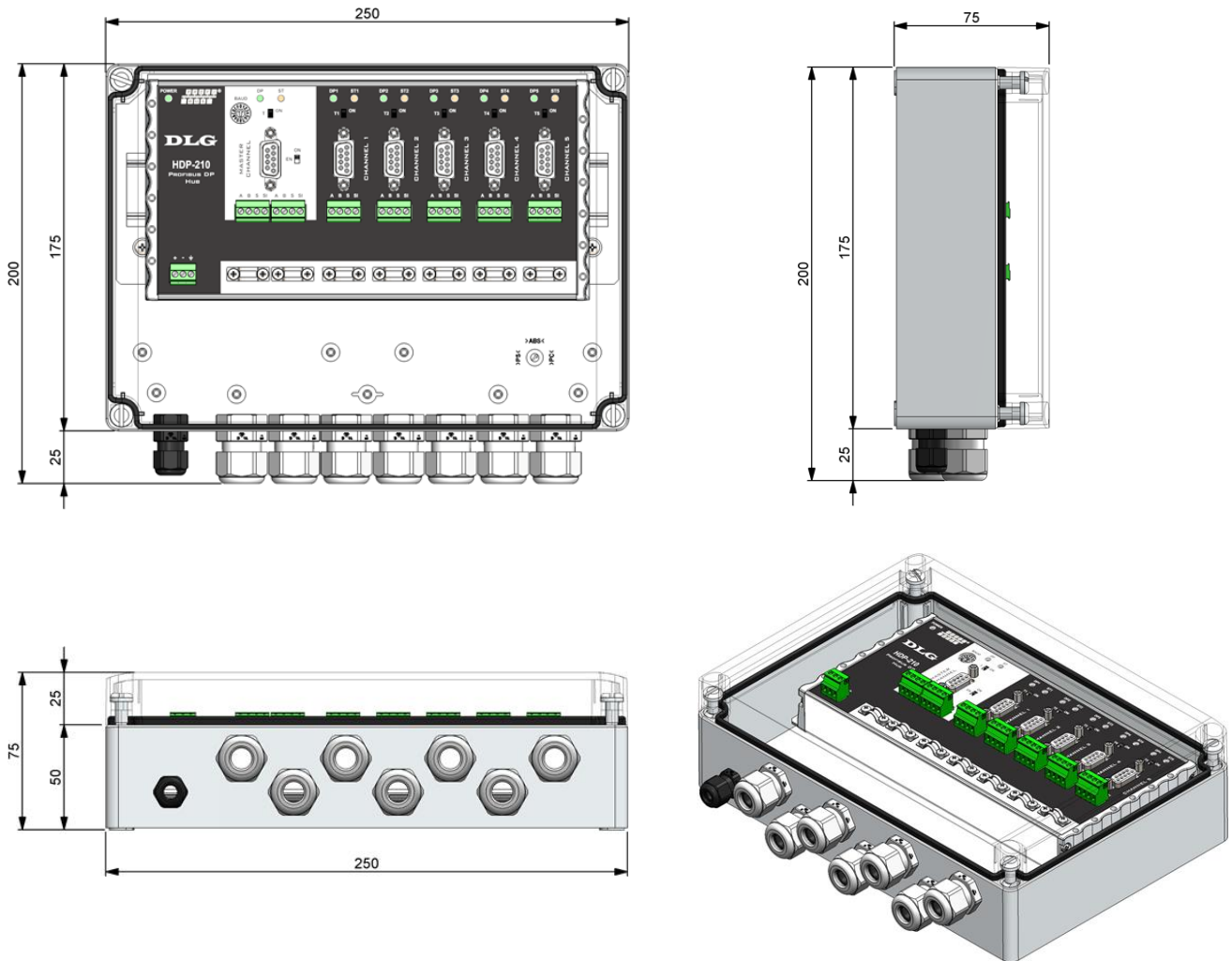


Figure 2 - Size for assembly (dimensions in millimeters)



### Front



Switch	Pos.	Description
Enable	ON	All 5 Profibus DP channels will be coupled to the master when the switch is set to "ON"
	OFF	All 5 Profibus DP channels will be uncoupled, with all the buses remaining isolated and with high impedance.
T	ON	Only the master channel bus will be terminated by the 390-220-390 resistor network. The leads in the A/B terminals will not be connected
	OFF	The leads of the master channel in the A/B terminals are connected without terminators
T1..5	ON	The respective bus of the selected channel will be terminated by the 390-220-390 resistor network. The leads in the A/B terminals will not be connected
	OFF	The leads of the respective secondary channel in the A/B terminals are connected without terminators
BAUD	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F	Communication speed selection (baud rate): <b>1</b> = 9.600 Kbps; <b>2</b> = 19.200 Kbps; <b>3</b> = 45.45 Kbps; <b>4</b> = 93.75 Kbps; <b>5</b> = 187.5 Kbps; <b>6</b> = 500 Kbps; <b>7</b> = 1.5 Mbps; <b>8</b> = 3 Mbps; <b>9</b> = 6 Mbps; <b>A</b> = 12 Mbps; <b>B/C/D/E/F/0</b> = Auto baud rate.
LED	Color	Description
PWR	Green	(Power) Indicates that the power supply is functioning. LED continuously on indicates proper functioning of the power source.
DP/DP1..5	Green	When the Profibus transaction is successful the DP and DP1..5 LEDs will flash, indicating two-way data transfer. When only the LED of the master channel is flashing, it indicates that the master is trying to establish communication, but with no response from any other station.
ST/ST1..5	Yellow	Any abnormal behavior in the profibus communication can be monitored by the ST and ST1..5 LEDs. ST: On startup the lights will turn on, indicating baud rate location. During operation, it indicates a collision with any of the 5 channels. ST1..5: All lights on indicates a change of baud rate. One light on for 3 secs indicates a collision with the master, or transient noise. ST1..5: During a short-circuit of the channel, the corresponding ST LED will be on until normalization. At this time the shorted channel will be disabled by the HUB.

## Functions

The HDP-610 is designed to be fully transparent to all Profibus network segments. It has 5 RS-485 isolated communication channels with built-in active terminators and the option to uncouple channels with the "ENABLE" switch.

The HDP-610 has an auto baud rate and auto flow control, comprising communications of 9600bps to 12Mbps, with no need for external operation. Localization of the auto baud rate can take from 5 to 30 seconds, depending on the noise conditions. Supports Profibus DP and FMS protocols. The device limits can reach up to 32 nodes per Profibus segment, respecting a maximum distance of 1200m for 9600bps.

It has an anti-glitch filter that attenuates the presence of noise on the bus, in order to minimize the effects of noise present on all channels. The anti-glitch filter will function whenever noise lower than  $\frac{1}{2}$  Tbit is present. Thus, the signal is completely regenerated and remains isolated on a noisy channel.

For example: When communication is at 500Kbps and there is noise higher than  $\frac{1}{2}$  Tbit (1us), the filter will not have enough information to filter it. The filter's efficiency will therefore be reduced, compromising the channels, and communication failures can occur. In this case, a reasonable solution is to decrease to the next lowest available rate, or 187500Kbps.

### Electrical Installation

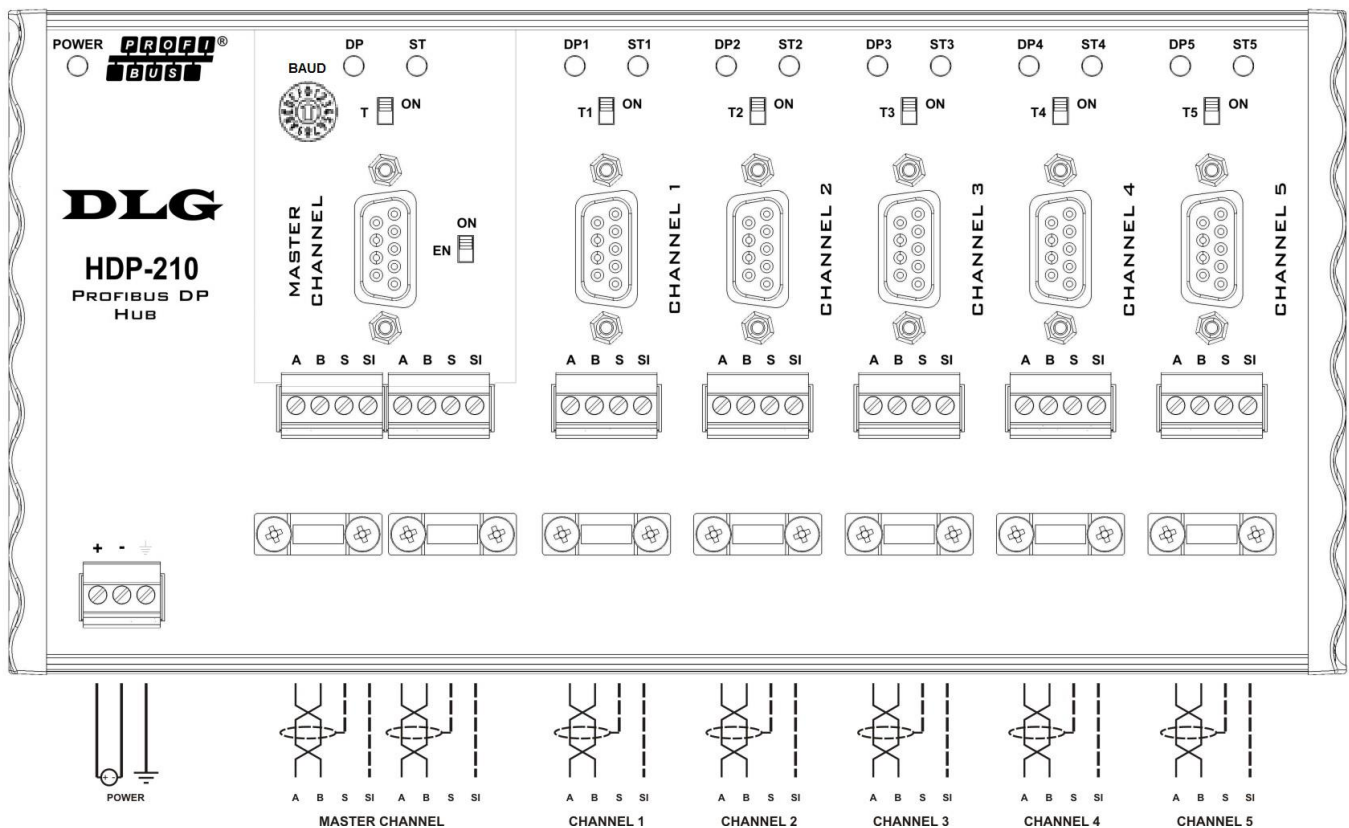
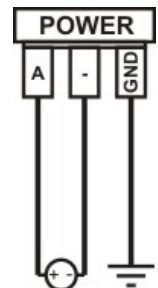


Figure 3 – HDP-610 Electrical Connections

**Attention:** all cables must be "crimped" with eyelet terminals for cables up to 1.5 mm<sup>2</sup> when not specified. For the interconnection of communication signals, the use of shielded cable is recommended for "shielding", and the shield should be grounded at the **S** terminals and other grounding points at the ends of the bus. For special cases where the shielding does not need to be connected to the ground, use the **SI** terminals.

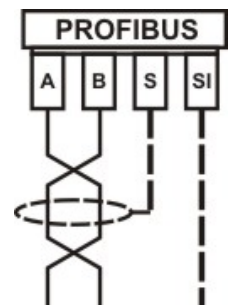
## Power

The HDP-610 must be powered through the + and - terminals with a voltage of 2 V within a range of 9 to 28.8 Vdc. The GND terminal is used for grounding to the panel and the use of 1.5mm<sup>2</sup> power cables and 2.5mm<sup>2</sup> grounding cables are recommended. The wiring diagram is shown to the side.



## Profibus DP Communication

The HDP-610 has 5 serial communications channels using the Profibus DP protocol via the RS-485 physical environment. The channels can be accessed by the equipment screw terminals: positive (B), negative (A), shield (S) and indirect (SI), as shown in **Figure 3 – HDP-610 Electrical Connections**.

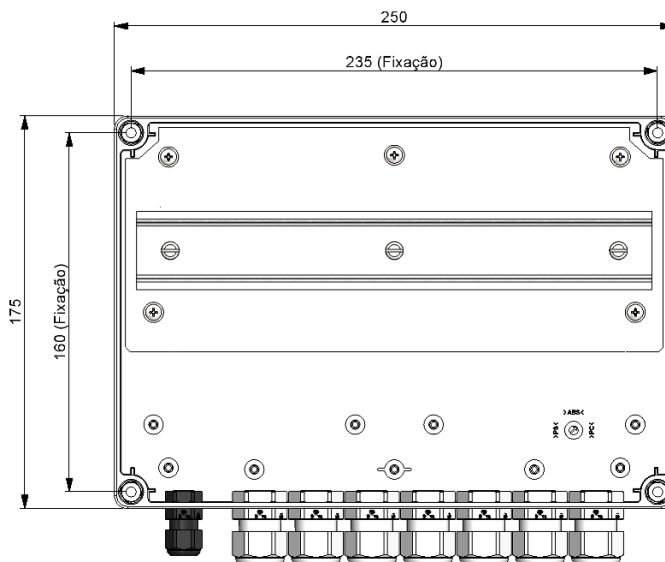


All channels can be accessed with standard DB9 connectors to the Profibus DP protocol via the front.

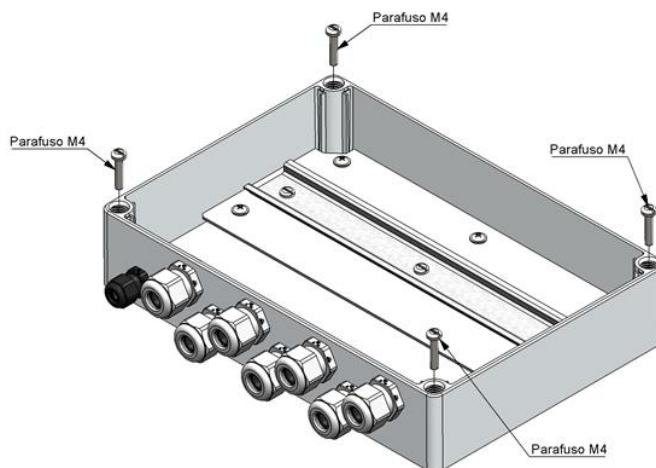
The DB9 connector and the terminals of the channels are internally connected, and can be used together. For example, the HDP-610 can be connected to Profibus master terminals with a screw connector and a network analyzer can be connected simultaneously to its DB9 connector, without disturbing the operation of the equipment.

### Mechanical installation

- Use the 160 and 235mm measurements to mark the holes where the HDP-610 will be attached, as shown in the drawing to the side;







- Then, remove the transparent cover, place the HDP-610 on the location marked in the previous step and fix with the 4 (four) mounting screws (M4);



- After fixing the equipment, simply perform the electrical installation and close the transparent cover.

## Recommendations

It is recommended that the user use only suitable tools and equipment for the installation and maintenance of the HDP-610.

<p>For the connection terminals it is essential to use a "terminal" or 1/8 type screwdriver with a maximum diameter of 3 mm, because it is the ideal format and will not damage the HDP-610 connection hole.</p>	 <p>Screwdriver not recommended</p>	 <p>Screwdriver recommended</p>
<p>It is recommended to crimp all wires connected to the HDP-610 with pre-insulated needle terminals or eyelet terminals for 0.5 ~ 1.5mm<sup>2</sup> cables.</p>	<p>Needle terminal</p> 	<p>Eyelet terminal</p> 

## Warranty

The manufacturer's warranty assures the owner of the equipment, identified through the purchase invoice, of a warranty for 1 (one) year, under the following terms:

1. The warranty period begins on the date of issue of the invoice.
2. Within the warranty period, the labor and components applied in repairing defects that arise from normal use will be free.
3. For any repairs, send the equipment, together with the shipping invoices, to the address of our factory in Sertãozinho, SP, Brazil. The DLG address is given at the end of this manual.
4. Transport costs and risks are borne by the owner.
5. The warranty will be automatically suspended if changes are made to the equipment by any person not authorized by DLG, defects caused by mechanical shock, exposure to unsuitable conditions of use or violations of the product.
6. DLG shall not bear any costs relating to unauthorized repairs or replacements due to failures caused by external agents, its improper use, or resulting of unforeseeable circumstances or major forces.
7. DLG guarantees full operation of the equipment described in this manual as well as all existing operations.



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<p>DLG reserves the right to change the content of this manual without prior notice, in order to keep it up to date with the latest product developments.</p>		