

FLEXtra multiRepeater 4-/6-way

700-972-4AA02/700-972-6AA02

Instruction Manual

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Note:

We have checked the content of this manual for conformity with the hardware and software described. Nevertheless, because deviations cannot be ruled out, we cannot accept any liability for complete conformity. The information in this manual is regularly updated. When using purchased products, please heed the latest version of the manual, which can be viewed in the Internet at www.helmholz.de, from where it can also be downloaded.

Our customers are important to us. We are always glad to receive suggestions for improvement and ideas.

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1 Safety Information


The safety information indicates possible hazards and provides information about how you can avoid hazardous situations. Therefore please observe the safety information given for your own and other people's safety.


1.1 General


FLEXtra multiRepeater is only used as part of a complete system.

 *The operator of a machine system is responsible for observing all safety and accident prevention regulations applicable to the application in question.*

 *During configuration, safety and accident prevention rules specific to the application must be observed.*

 *Emergency OFF facilities according to EN 60204 / IEC 204 must remain active in all modes of the machine system. The system must not enter an undefined restart.*

 *Faults occurring in the machine system that can cause damage to property or injury to persons must be prevented by additional external equipment. Such equipment must also ensure entry into a safe state in the event of a fault. Such equipment includes electromechanical safety buttons, mechanical interlocks, etc. (see EN 954-1, risk estimation).*

 *Never execute or initiate safety-related functions using the operator terminal.*

1.2 Restriction of access



Only authorized persons must have access to the FLEXtra multiRepeater!

FLEXtra multiRepeater is an open item of equipment and must only be installed in electrical equipment rooms, cabinets or housings. Access to the electrical equipment rooms, barriers, or housings must only be possible using a tool or key and only permitted to personnel having received instruction or authorization. See also Chapter 2.

1.3 Target group for these instructions

These instructions are addressed to project planners and installers of FLEXtra multiRepeater.

It is intended as a reference work for project planners. It provides the installing technician with all the necessary data.

FLEXtra multiRepeater is intended for use in a PROFIBUS network only. For that reason, the configuring engineer, user, and installing technician must observe the standards, safety and accident prevention rules applicable in the particular application. The operator of the automation system is responsible for observing these rules.

1.4 Use as intended

FLEXtra multiRepeater must only ever be used as described in these instructions.

1.5 Avoiding use not as intended!

Safety-related functions must not be controlled using FLEXtra multiRepeater alone.

1.6 Symbols used

The following symbols are used in this manual.



Caution, indicates hazards and sources of error



Hazard, general or specific



*Danger of **electric shock***



Gives information

2 Installation and Mounting

FLEXtra multiRepeater must be installed according to VDE 0100 IEC 364. FLEXtra multiRepeater has degree of protection IP20.

Ambient temperature: 0 °C – 60 °C.



Before you start installation work, all system components must be disconnected from their power source. Danger of electric shock!



During installation, the safety and accident prevention rules that apply to the specific application must be followed (e.g. protection against static discharges).

FLEXtra multiRepeater is supposed to be installed on a top-hat-rail.

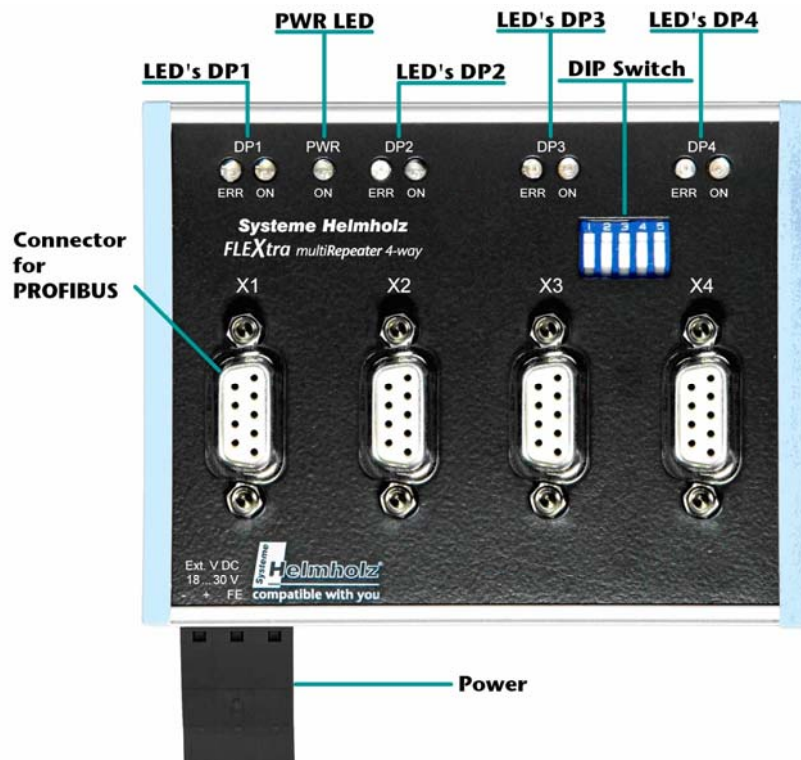


Fig. 2-1:
System function
overview

FLEXtra multiRepeater is supposed to be used with PROFIBUS plugs.

The Sub-D female connectors are arranged in a way that the cables of PROFIBUS are routed downward out of the repeater housing. Here needs to be room for PROFIBUS cables.

If FLEXtra multiRepeater is at the end or the beginning of a segment, the termination at PROFIBUS plug must be ON.


3 Short Description of FLEXtra multiRepeater

3.1 Application and function description

FLEXtra multiRepeater is above all a normal PROFIBUS Repeater with additional 3 (for the 4-way) or 5 (for the 6-way) segments. This extension allows e.g. the easy establishment of a PROFIBUS star network. From an electrical view FLEXtra multiRepeater regenerates the electric signal that comes in via a bus line and then sends it again. The signals are restored in terms of gauge, rate of change, and pulse duty factor. At the same time FLEXtra multiRepeater separates the receiving and the sending line galvanically. There is a DIP-switch to deactivate the repeating function on the separate ports. Furthermore it is possible to use the last DIP, DIP 5 (4-way) or DIP 7 (6-way), to turn off all segments.

These functions can be used

- 1.) To add a further segment to an existing PROFIBUS. This increases the possible number of stations on PROFIBUS up to 4×31 for the 4-way, that is a total of 124, and 6×31 for the 6-way respectively, that is a total of 186.
- 2.) To cover long cable distances without any reduction in data transmission rate.
- 3.) To set up a star structure very easily.

 PROFIBUS can handle a maximum of 126 stations!

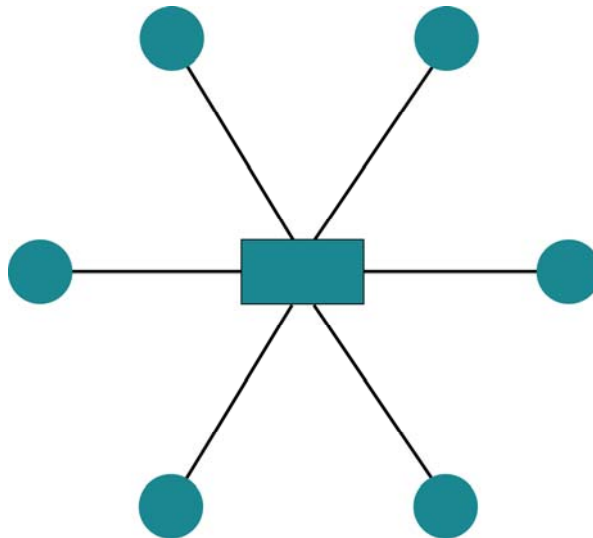



Figure 3-1:
Star topology diagram

FLEXtra multiRepeater is looped into PROFIBUS in place of a normal PROFIBUS connector. This permits the extension, segmentation or branching of PROFIBUS without extensive installation. FLEXtra multiRepeater needs to be run by an external power supply.















































FLEXtra multiRepeater permits transmission rates of 9.6 Kbps to 12 Mbps.


 If no baud rate is detected, the repeater restarts every 8 seconds. The restart takes about 2 seconds.

3.2 The LED displays/switches and their meaning

On the front of the housing of FLEXtra multiRepeater you will find the LED displays that show you the operating status of FLEXtra multiRepeater and the connected PROFIBUS segments 1 to 4 (4-way) and 1-6 (6-way) respectively.

Meanings:

Description	LED				DIP Switch	
	PWR (ON) Green	DP x (ERR) Red	DP x (ERR) Green	DP x (ON) Yellow	1-4 (4-way) 1-6 (6-way)	ALL OFF 5 (4-way) 7 (6-way)
Baud rate is searched, the repeater is restarted						
Automatic restart e.g. after signal loss						
Repeater ready for use, baud rate identified						
Segment switched off						
Repeat function deactivated for all segments						
Repeat function switched off for all segments + individual segments						
Erroneous telegrams are received						
A short circuit has occurred						
Data is received				 		

 → LED flashes slowly

 → LED flashes quickly

 → DIP Switch ON

 → LED ON

 → LED OFF

 → DIP Switch OFF

3.3 Connections

PROFIBUS is connected to FLEXtra multiRepeater via the SUB-D female connector. PROFIBUS plugs for each segment are necessary to do so, see Fig. 3-2. Because the Repeater can be embedded via PROFIBUS plug, PROFIBUS plugs with PG socket can be used as well. Therefore, it is possible to connect e.g. a PROFIBUS Analyzer to all segments (DP1 to DP4/DP6), depending on the circuitry at the respective segment end, in the middle or at the beginning of the segment.



Note that you need to switch off the PROFIBUS connector of the concerned port via the DIP switch, before you plug or unplug it.

Fig. 3-2:
FLEXtra 4-way
multiRepeater with
PROFIBUS connectors



Segment 1	DP1/X1
Segment 2	DP2/X2
Segment 3	DP3/X3
Segment 4	DP4/X4
Segment 5	DP5/X5 (only 6-way)
Segment 6	DP6/X6 (only 6-way)

Pin assignment

Pin	PROFIBUS / SUB D connector 9-way X1 to X6
1	-
2	-
3	DATA B
4	RTSAG / RTSPG
5	GND
6	+5V
7	-
8	DATA A
9	-

3.4 Examples of circuits



*Ring compounds
between the segments
must not occur!*

The combinations that are possible to derive bus structures can be derived from the simplified diagram, see Fig. 3-3:

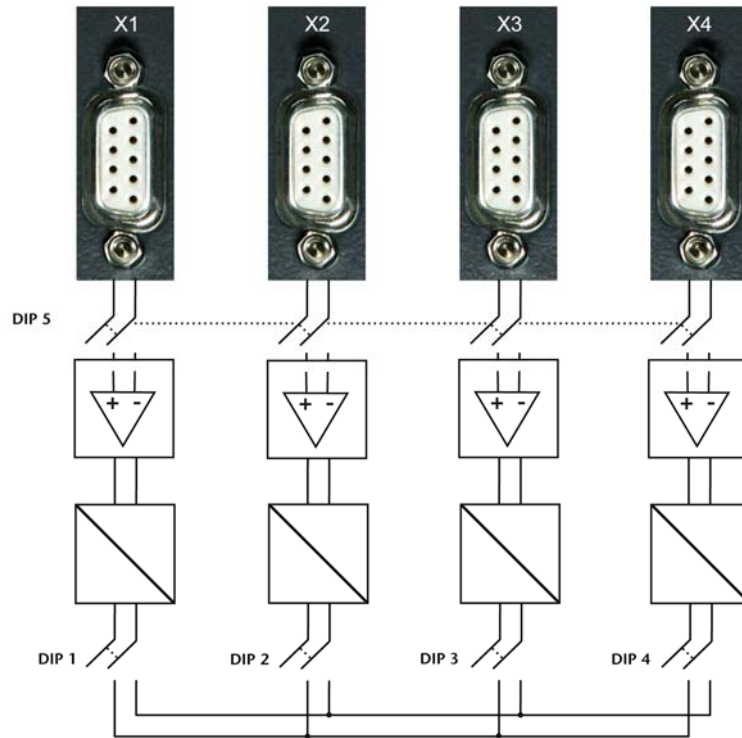


Fig. 3-3:
Simplified diagram of 4-
way repeater

For long bus lines, repeaters can be connected in series (up to three repeaters):

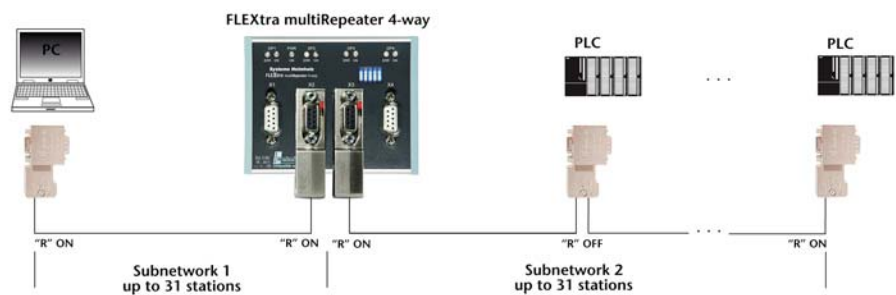


Fig. 3-4:
Application example of
a long bus line

For complex bus structures, the bus can be constructed in tree structure using repeaters.

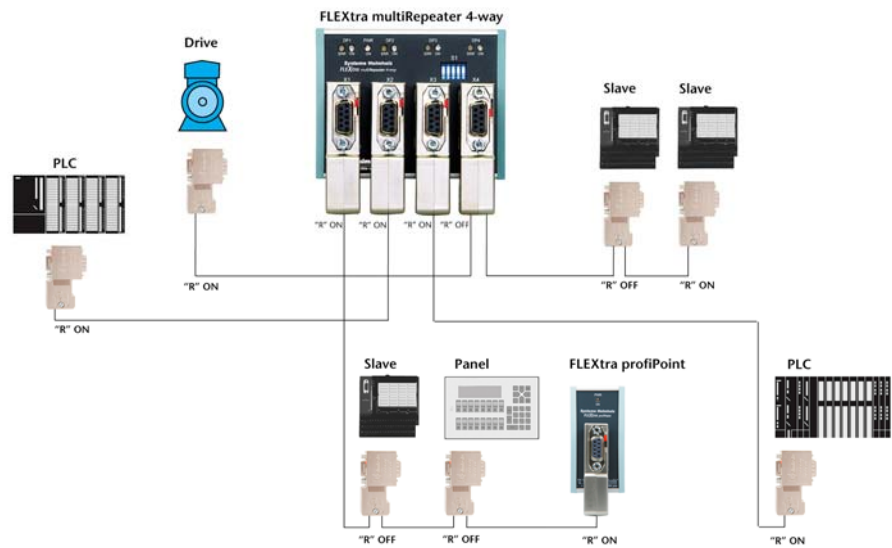


Fig. 3-5:
Application example of
more than 32 stations

Up to 31 stations can be connected to one repeater in a segment. By using FLEXtra multiRepeater 4-way it is possible to establish 4 segments. Accordingly it is possible to establish 6 segments with the FLEXtra multiRepeater 6-way.

For particular applications the bus can be constructed in star structure using the FLEXtra multiRepeaters.

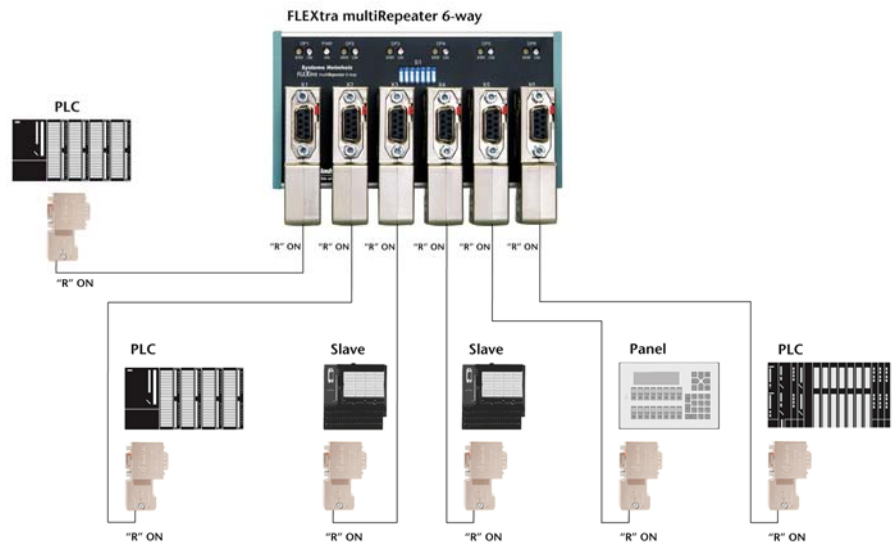


Fig. 3-6:
Application example for
star topology

In this figure you see how you can “expand” FLEXtra multiRepeater by an additional segment using Compact Repeater. By using it both connectors of Compact Repeater become new segments. Thereby you can create a 5-way repeater from a 4-way repeater and so forth.

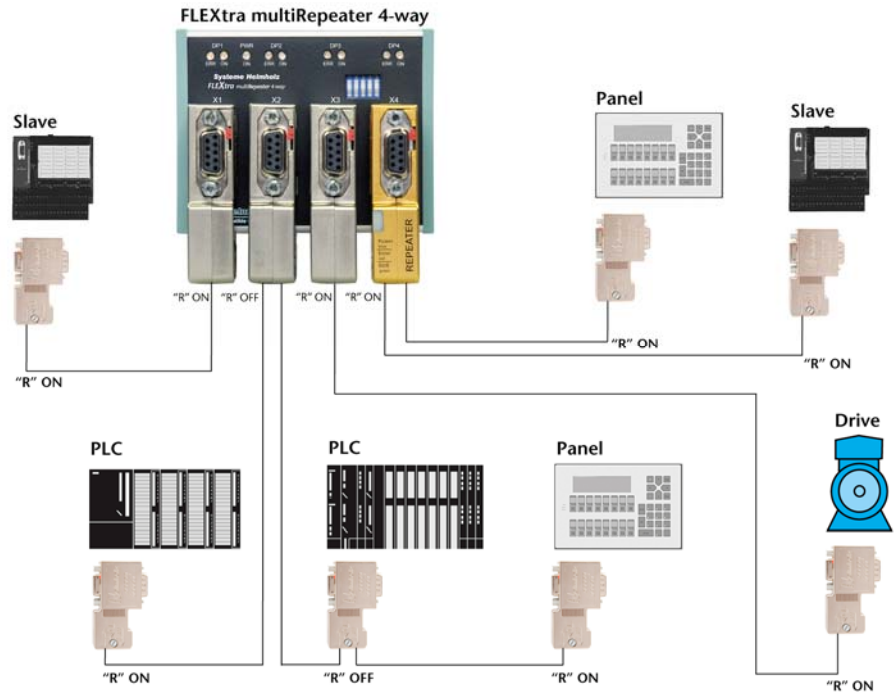


Fig. 3-7:
Application example for
the expansion of a
FLEXtra multiRepeater
array

The maximum number of Compact Repeaters that can be connected to FLEXtra multiRepeaters depends on their number of segment connectors. Therefore, at most an 8-way repeater can be realized with a 4-way and at most a 12-way repeater with a 6-way.

4 Technical Data

4.1 Operating conditions (4-way)

Dimensions in mm (LxWxH)	72 x 94 x 35 mm
Weight	Appr. 180 g
Housing	Protective class IP 20
Power supply	
Voltage	+18 - 30 VDC
Output voltage	5 V, 150 mA per segment
Potential separation	500 V
Current consumption	Max. 280 mA
Permissible ambient conditions	
• Ambient temperature during operation	0 °C ... +60 °C
• Temperature during transportation and storage	-25 °C ... +75 °C
PROFIBUS interface	
Transmission rate	9.6 Kbps to 12 Mbps, automatic detection
Protocol PROFIBUS DP	per EN 61 158 - 2
Connector	SUB D 9-way

4.2 Operating conditions (6-way)

Dimensions in mm (LxWxH)	72 x 137 x 35 mm
Weight	Appr. 275 g
Housing	Protective class IP 20
Power supply	
Voltage	+18 - 30 VDC
Output voltage	5 V, 150 mA per segment
Potential separation	500 V
Current consumption	Max. 400 mA
Permissible ambient conditions	
• Ambient temperature during operation	0 °C ... +60 °C
• Temperature during transportation and storage	-25 °C ... +75 °C
PROFIBUS interface	
Transmission rate	9.6 Kbps to 12 Mbps, automatic detection
Protocol PROFIBUS DP	per EN 61 158 - 2
Connector	SUB D 9-way

4.3 Transmission rates

The transmission rates on the bus segment are automatically detected by FLEXtra multiRepeater.

Transmission rate	Max. segment length
9.6 Kbps	1000 m
19.2 Kbps	1000 m
45.45 Kbps	1000 m
93.75 Kbps	1000 m
187.5 Kbps	1000 m
500 Kbps	400 m
1.5 Mbps	200 m
3 Mbps	100 m
6 Mbps	100 m
12 Mbps	100 m

4.4 Accessories

Manual, German/English 900-972-4AA02/de
900-972-4AA02/en

Power supply adapter with plug 700-751-SNT01
Input: 100-240 V AC / 47-63 Hz / 400 mA
Output: 24 V DC / 625 mA

EasyConnect® PROFIBUS connector without PG	700-972-0BA50
EasyConnect® PROFIBUS connection with PG	700-972-0BB50
EasyConnect® PROFIBUS connector for flexible cables, without PG	700-972-0FA50
EasyConnect® PROFIBUS connector for flexible cables, with PG	700-972-0FB50
EasyConnect® PROFIBUS connector axial for solid cable	700-972-0CA50
EasyConnect® PROFIBUS connector axial for flexible cable	700-972-0CF50
EasyConnect® PROFIBUS connector with diagnostic LED without PG	700-972-7BA50
EasyConnect® PROFIBUS connector with diagnostic LED with PG	
Bus connector for PROFIBUS 90° without PG	700-972-0BA12
Bus connector for PROFIBUS 90° with PG	700-972-0BB12
Bus connector for PROFIBUS 35° without PG	700-972-0BA41
Bus connector for PROFIBUS 35° with PG	700-972-0BB41
Bus connector for PROFIBUS axial	700-972-0CA12

Bus connector for PROFIBUS with Atex approval, without PG, Ex-Zone 2	700-973-0BA12
Bus connector for PROFIBUS with Atex approval, with PG, Ex-Zone 2	700-973-0BB12
PROFIBUS connector diagnostics without PG	700-972-7BA12
PROFIBUS connector diagnostics with PG	700-972-7BB12
PROFIBUS Compact Repeater	700-972-0RB12
Insulation stripping tool for PROFIBUS	700-972-6AA00

5 Further Documentation

Internet: www.helmholz.de, www.profibus.de

Siemens Manuals: "Installing and Wiring the S7-300/S7-400", "S7-300 Module Data"

"Profibus DP/DPV1", Manfred Popp, Hüthig Verlag

"Profibus-Handbuch", Max Felser, Berner Fachhochschule, CH-3400 Burgdorf,

<http://www.profibus.felser.ch/planung/installation/PROFIBUSInstallation%20D11.pdf> (in German)

Notes