PROCENTEC

Terminator T1 PEPPER

Installation manual

Disclaimer of Liability

We have checked the contents of this manual as much as possible. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the content in this manual is reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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Important information

Purpose of the manual
This user manual provides information how to work with the compact IP66 Repeater D1.

Recycling and Disposal
The parts of the compact IP66 Repeater D1 can be recycled. For further information about environment-friendly recycling and the procedure for disposing your old equipment, please contact:

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6 Certificates ..... Fout! Bladwijzer niet gedefinieerd.

1 Introduction

The T1-Pepper provides active and reliable adjustable termination for PROFIBUS segments which use non-PROFIBUS cable. By using this component it is possible to use UTP cable, telephone cable or other non-PROFIBUS cable. This can save on installation time and cabling costs when extending or refitting your automation network.

This product has a couple of special features which makes it a very useful infrastructure component; it has two adjustable terminating resistors. The ‘Pull up’ rotary switch is used to adjust the idle voltage level (normally 1V), which means you can raise the idle voltage for improved EMC defense. The ‘Middle’ rotary switch is used to change the impedance value for the cable.

It also features a redundant power supply and diagnostic LEDs to indicate the status of each power source.

The T1-Pepper can be installed on a standard DIN-rail.

2 Installation instructions

Location

The T1-Pepper can be installed everywhere in a non-hazardous area that complies with IP 20 (DIN 40 050) and the specified temperature range of -20 to +60 ^{o} Celsius.

Position

The T1-Pepper can be installed in every position, but it is recommended to install it with the green PROFIBUS connector pointing down. In this position it is easier to read the status display.

Mounting and dismounting

The T1-Pepper has to be mounted on a 35 mm DIN-rail with a minimum width of 60 mm. Fig. 1 and Fig. 2 illustrate how to mount and dismount the T1-Pepper on and from the DIN-rail.

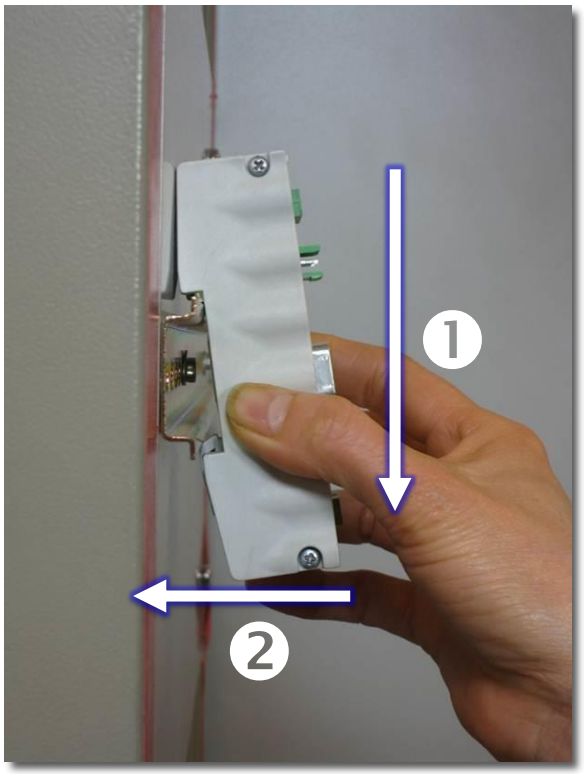


Fig. 1 Mounting; pull-down and push

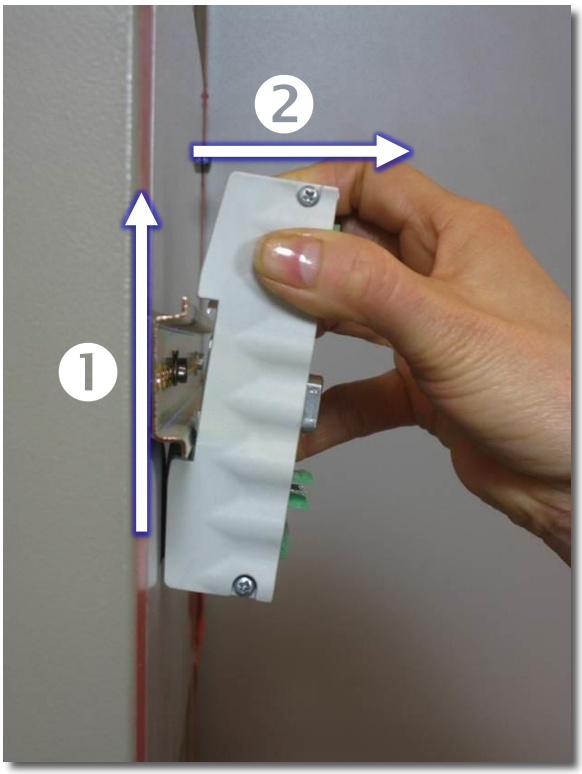


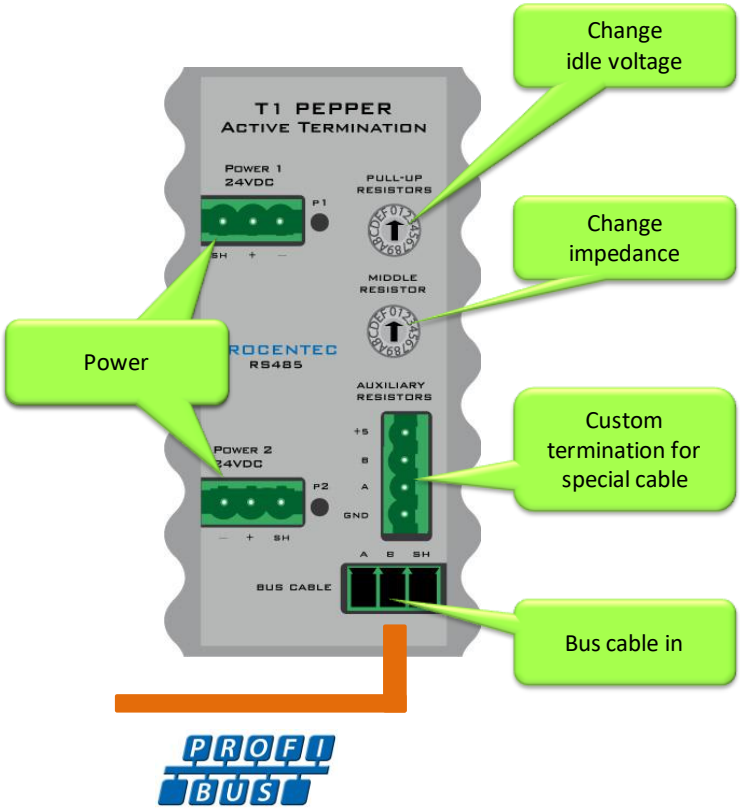
Fig. 2 Dismounting; Push-up and pull

3 Power supply

Parameters
The power supply has to comply with the following specifications:
Voltage: 19 to 28 VDC
Current: Min. 65 mA

Wiring
The leads of both power connectors have to be wired as follows:
"-" = 0 V
"+" = Positive Voltage
SH = Earth

Power redundancy
Both power connectors are linked 1-on-1 to the internal power supply of the T1-Pepper. If 1 power supply would fail, the other takes over without delay time. When redundancy is not required, it is sufficient to use 1 power connector. When the T1-Pepper is flipped 180 °, the connectors can be used without alteration. Fig. 3 illustrates the location of the power supply connectors.



4 PROFIBUS

Middle resistor
Change the 'middle resistor' by rotating this switch. Select the required impedance in the table on page 5, or use our convenient software tool TermCalc.

Pull-up Resistors
Change the 'pull-up resistors' by rotating this switch. Select the required idle voltage in the table on page 6, or use our convenient software tool TermCalc.

Auxiliary resistor connection
In some very special cases, you can attach a custom termination for cable with specifications not covered by this product. If you choose to do this, the rotary switches must both be set to 0.

Screw terminal
The T1-Pepper has one Bus Cable connector, this is where the DP segment ends.

Bus cable pin layout
Pin "A": Green wire
Pin "B": Red wire
Pin "SH": Direct cable shielding

Ground Clip
It is recommended to use the supplied GC-01 ground clip to attach the cable shield to the screw connector, as shown in figure 4, for easier shield connection and better strain relief.
The Ground Clip GC-01 can be ordered separately per 25pcs with order code 101-00201B.

Fig. 4 Using the Ground Clip

Diagnostic LEDs

	OFF	Blinking	ON
P1	😐 Power is OFF or an internal failure. Check if P2 is on.	☹ Power supply not stable or an internal failure. Check if P2 is on.	☺ Power supply OK.
P2	😐 Power is OFF or an internal failure. Check if P1 is on.	☹ Power supply not stable or an internal failure. Check if P1 is on.	☺ Power supply OK.

Technical Data Compact PROFIBUS DP Repeater D1	
Dimensions and weight	
Dimensions L x W x H (mm) Weight	106 x 55 x 33 mm (without plugs) 106 x 55 x 55 mm (with plugs) Approximately 125 g
Ambient conditions	
Operating temperature Isolation class	-20 to +60° Celsius IP 20 (DIN 40 050)
Protocol specifications	
Supported Protocols Transmission speed	DP-V0, DP- V1, DP-V2, FDL, MPI, FMS, PROFIsafe, PROFIdrive and any other FDL based protocol. 9,6 kbps to 12 Mbps (including 45,45 kbps), depending on the cable quality.
PROFIBUS cable specifications	
Cable lengths	Depending on cable quality: 1200 m at 9,6 kbps to 93,75 kbps 1000 m at 187,5 kbps 400 m at 500 kbps 200 m at 1,5 Mbps 100 m at 3 Mbps to 12 Mbps

Wire diameter Wire type Termination range (MIDDLE) Idle voltage range (PULL-UP)	< 2,5 mm^2 Stranded or Solid core 94 .. 940 Ohm (DC) 57 .. 1500 Ohm (AC) 0 .. 5 V Download our software tool to calculate the correct settings for the rotary switches from www.procentec.com/downloads
Power supply specifications	
Nominal supply voltage Current consumption Power dissipation Redundancy Power LED Reverse polarity protection Wire diameter	19 to 28 VDC 65 mA at 24 VDC Max. 2 W Yes (Power 1 OR Power 2) Power 1 OR Power 2 Yes < 2,5 mm^2

Table 1 - Impedance value

	Pull-Up 0	Pull-Up 1	Pull-Up 2	Pull-Up 3	Pull-Up 4	Pull-Up 5	Pull-Up 6	Pull-Up 7	Pull-Up 8	Pull-Up 9	Pull-Up A	Pull-Up B	Pull-Up C	Pull-Up D	Pull-Up E	Pull-Up F
Middle 0	OPEN	1500	1200	667	560	408	382	304	270	229	220	192	182	162	158	143
Middle 1	940	578	527	390	351	284	272	230	210	184	179	160	153	139	135	124
Middle 2	780	513	473	359	326	268	256	219	201	177	172	154	148	134	131	121
Middle 3	426	332	315	260	242	208	201	178	165	149	145	132	128	118	115	107
Middle 4	360	290	277	234	219	191	185	165	154	140	137	125	121	112	110	102
Middle 5	260	222	214	187	178	159	155	140	133	122	119	111	107	100	98	92
Middle 6	246	212	204	180	171	154	150	136	129	119	116	108	105	98	96	91
Middle 7	195	173	168	151	145	132	129	119	113	105	104	97	94	89	87	83
Middle 8	182	162	158	143	137	126	123	114	109	101	100	93	91	86	85	80
Middle 9	152	138	135	124	120	111	109	102	97	92	90	85	83	79	78	74
Middle A	148	134	131	121	117	108	106	99	95	90	88	83	82	77	76	73
Middle B	128	118	115	107	104	97	96	90	87	82	81	77	75	71	71	67
Middle C	121	112	110	102	99	93	92	87	84	79	78	74	73	69	69	66
Middle D	107	100	98	92	90	85	84	79	77	73	72	69	67	65	64	61
Middle E	105	98	96	90	88	83	82	78	75	72	71	68	66	64	63	60
Middle F	94	89	87	83	81	77	76	72	70	67	66	63	62	60	59	57

Remarks:

- Example - Standard PROFIBUS cable: Pull-Up 6 and Middle 6 (150 Ohm and 1.22 V)
- Termination without power: Pull-Up 0
- No termination: Pull-Up 0 and Middle 0
- Software can be downloaded from our website to assist with defining the proper rotary positions

Table 2 - Idle voltage

	Pull-Up 0	Pull-Up 1	Pull-Up 2	Pull-Up 3	Pull-Up 4	Pull-Up 5	Pull-Up 6	Pull-Up 7	Pull-Up 8	Pull-Up 9	Pull-Up A	Pull-Up B	Pull-Up C	Pull-Up D	Pull-Up E	Pull-Up F
Middle 0	OPEN	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Middle 1	0.00	1.19	1.41	2.07	2.28	2.68	2.76	3.03	3.18	3.36	3.40	3.55	3.60	3.72	3.74	3.83
Middle 2	0.00	1.03	1.23	1.85	2.05	2.44	2.53	2.81	2.95	3.15	3.19	3.35	3.41	3.53	3.56	3.66
Middle 3	0.00	0.62	0.75	1.21	1.38	1.72	1.79	2.06	2.21	2.41	2.46	2.63	2.70	2.84	2.87	2.99
Middle 4	0.00	0.54	0.65	1.06	1.22	1.53	1.60	1.86	2.00	2.20	2.25	2.42	2.49	2.63	2.66	2.79
Middle 5	0.00	0.40	0.49	0.82	0.94	1.21	1.27	1.50	1.63	1.81	1.86	2.02	2.08	2.22	2.26	2.38
Middle 6	0.00	0.38	0.47	0.78	0.90	1.16	1.22	1.44	1.57	1.75	1.79	1.95	2.02	2.16	2.19	2.31
Middle 7	0.00	0.31	0.38	0.64	0.74	0.97	1.02	1.21	1.33	1.49	1.53	1.68	1.74	1.88	1.91	2.03
Middle 8	0.00	0.29	0.35	0.60	0.70	0.91	0.96	1.15	1.26	1.42	1.46	1.61	1.67	1.80	1.83	1.94
Middle 9	0.00	0.24	0.30	0.51	0.60	0.79	0.83	1.00	1.10	1.25	1.29	1.42	1.48	1.60	1.63	1.74
Middle A	0.00	0.23	0.29	0.50	0.58	0.77	0.81	0.98	1.07	1.22	1.25	1.39	1.44	1.56	1.59	1.70
Middle B	0.00	0.20	0.25	0.44	0.51	0.68	0.72	0.87	0.96	1.09	1.12	1.25	1.30	1.41	1.44	1.54
Middle C	0.00	0.19	0.24	0.42	0.49	0.65	0.68	0.83	0.91	1.04	1.08	1.20	1.25	1.36	1.38	1.48
Middle D	0.00	0.17	0.21	0.37	0.44	0.58	0.62	0.75	0.83	0.95	0.98	1.09	1.14	1.24	1.26	1.36
Middle E	0.00	0.17	0.21	0.36	0.43	0.57	0.60	0.73	0.81	0.93	0.96	1.07	1.12	1.22	1.24	1.34
Middle F	0.00	0.15	0.19	0.33	0.39	0.52	0.55	0.67	0.74	0.85	0.88	0.98	1.03	1.12	1.15	1.24

Remarks:

- Example - Standard PROFIBUS cable: Pull-Up 6 and Middle 6 (150 Ohm and 1.22 V)
- Termination without power: Pull-Up 0
- No termination: Pull-Up 0 and Middle 0
- Software can be downloaded from our website to assist with defining the proper rotary positions

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6 About PROCENTEC

PROCENTEC is a specialist in PROFIBUS and PROFINET technology and develops products to optimize the production processes of end users. Our innovative solutions ensure that our customers successfully operate in the world of industrial automation and enjoy maximum results from their process.

PROCENTEC globally supplies all the components required to install a measurable and steerable network. We develop and produce all products in the Netherlands and they are exported through our worldwide distribution network. At PROCENTEC, we have a professional team of qualified support engineers who provide technical support on-site and online. Our professionals have more than 20 years of experience with PROFIBUS and PROFINET technology. They provide the necessary support to end users during implementation procedures, certification processes, audits and malfunctions. PROCENTEC also is the international accredited Competence and Training centre for PROFIBUS and PROFINET. We provide training courses that help employees using those techniques optimally for their business objectives.

Products

- ProfiTrace
- ComBricks
- ProfiHub
- PROFINET tools
- Cables and connectors
  - Competence centre

Services

- On-site & Online Support
- Network Audit
- Network Certfication
- Consultancy
- Testlab & Democenter

Training courses

- PROFIBUS training courses
- PROFINET training courses
- Product training courses

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