PROCENTEC

Technical Data ComBricks 2 Channel Fiber Optic type 1 module (101-201510)

Dimensions and weight	
Dimensions L x W x H	146 x 25 x 101 mm (including backplane)
Weight	121 g (excluding plug-able fiber optic connector and packing material)
Mounting DIN-rail type	35mm × 7,5mm (EN 50022, BS 5584, DIN 46277-3)
Ambient conditions	
Operating temperature range	0° to +60° Celsius (for mounting position see manual) 32° to +140° Fahrenheit
Isolation class	IP 20 (IEC/EN 60529, DIN 40050)
Backplane	
PROFIBUS networks	4 (set by dipswitches or web server)
Modules	Max. 10 (positioned in the first 10 slots)
Power supply Typical backplane current at 5.75 VDC Max. backplane current at 5.75 VDC	Provided through the backplane 360 mA 510 mA (At this current consumption the module is switched OFF from backplane. Occurs when module is faulty, e.g. internal short circuit.)
Compatible backplane units	101-200011, 101-200022, 101-200023, 101-200024, 101-200027

Protocol specifications	
Supported Protocols	DP-V0, DP- V1, DP-V2, FDL, MPI, FMS, PROFIsafe, PROFIdrive and any other FDL based protocol
Address	No bus address required
Transmission speed	9.6 kbps ... 12 Mbps (including 45.45 kbps)
Transmission speed detection time	Auto detect (< 10 s detection and 50 s baudrate switchover time)
Total delay (Normal and Robust mode)	$T_{SLOT} \geq Max_{TSDR} + ((FO_{length} \times FO_{delay}) + (N_{FO\text{-}modules} \times N_{delay})) \times 2$ FO_{length} = Total length of fiber optic cable in km FO_{delay} = Delay of fiber optic cable per km in bit times (see table) $N_{FO\text{-}modules}$ = Number of fiber optic modules in a line N_{delay} = Delay of one fiber optic module (see table) The delay time is multiplied by 2 for a request and response message.

Baudrate	**Max_{TSDR}** [Tbit]	**FO_{delay}** [Tbit/km]	**N_{delay} Normal mode** [Tbit]	**N_{delay} Redundant mode** [Tbit]
12 Mbps	800	60	7	16
6 Mbps	450	30	5	16
3 Mbps	250	15	4.5	15
1.5 Mbps	150	7.5	4	15
500 kbps	100	2.5	3	14
187.5 kbps	60	0.94	3	14
93.75 kbps	60	0.47	3	14
45.45 kbps	400	0.23	3	14
19.2 kbps	60	0.1	3	14
9.6 kbps	60	0.05	3	14

Note
$FO_{delay} = (FO_{cable\_length} / FO_{cable\ latency}) / Bit_{time}$
example FO_{delay}, 1km, 1.5Mbps:
$FO_{delay} = (1000\ m / 200\ \mu sec/m) / 0.666\ \mu sec = 7.5\ Tbit/km$

Example 1: 1.5 Mbps, 3 km FO cable, 2 FO modules normal mode
$T_{SLOT} \geq Max_{TSDR} + ((FO_{length} \times FO_{delay}) + (N_{FO\text{-}modules} \times N_{delay})) \times 2$
$T_{SLOT} \geq 150 + ((3 \times 7.5) + (2 \times 4)) \times 2 \geq$ **211 bit times**

Example 2: 1.5 Mbps, 3 km FO cable, 2 FO modules redundant mode
$T_{SLOT} \geq Max_{TSDR} + ((FO_{length} \times FO_{delay}) + (N_{FO\text{-}modules} \times N_{delay})) \times 2$
$T_{SLOT} \geq 150 + ((3 \times 7.5) + (2 \times 15)) \times 2 \geq$ **255 bit times**

Example 3: 6 Mbps, 10 km FO cable (total line length), 10 FO modules in line
$T_{SLOT} \geq Max_{TSDR} + ((FO_{length} \times FO_{delay}) + (N_{FO\text{-}modules} \times N_{delay})) \times 2$
$T_{SLOT} \geq 450 + ((10 \times 30) + (10 \times 5)) \times 2 \geq$ **800 bit times**

Jitter per message frame	0.0625 Tbit at 9.6 Kbps - 3 Mbps 0.125 Tbit at 6 Mbps 0.25 Tbit at 12 Mbps

Deviation	2 Tbit times for received messages is allowed and is corrected to nominal speed when transmitted (*over the complete message*)

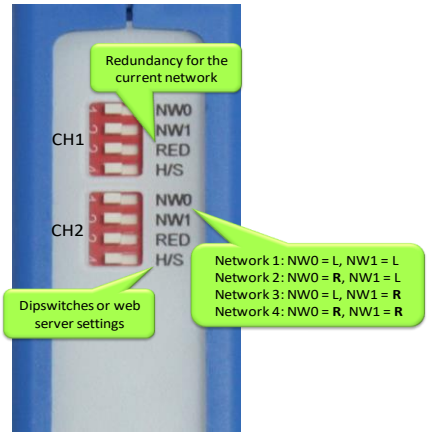
Fiber optic specifications	
Fiber Optic wavelength	Multimode 850 nm (Compatible with most other vendors in 3rd party compatibility mode)
Cable type	Multimode Fiber G62.5 (50) / 125 µm (OM1)
Cable length	Max. 3 km (baudrate independent)
Connectors	4 x ST/BFOC (2 channels)
Topologies	Point-to-point, Star and Bus
Cascading depth	No limit, only busparameter limitation of the master
Redundancy	Maximum 10 cables activated by Dip-Switch

DIP-Switches

NW0	NW1	PROFIBUS Network
LEFT	LEFT	1
RIGHT	LEFT	2
LEFT	RIGHT	3
RIGHT	RIGHT	4

RED	Redundancy
LEFT	OFF
RIGHT	ON

H/S	Settings
LEFT	Hardware
RIGHT	Software



LEDs			
	OFF	**Blinking**	**ON**
RDY	 Module has NOT been powered / initialized yet.	 Head Station is initializing or updating the module.	 Module has been initialized and is operational
RX1 / RX2	 NO signal, or NO valid telegrams detected on this channel, or channel is off.	 1 or more devices are communicating on this channel.	 1 or more devices are communicating on this channel.
ER1 / ER2	 No errors, or channel is off.	 Problem in the cabling / communication has been detected on this channel.	 No baudrate detected or no connection/signal

Standard and approvals	
CE	EMC Directive 2014/30/EU, class A Digital Device RoHs Directive 2011/65/EU
FCC	47 CFR 15, Unintentional Radiator, class A Digital Device.
UL	Report reference: E468970 Standards for safety: UL 508 - Industrial Control Equipment CSA C22.2 No. 142-M1987 - Industrial Control Equipment
Others	
Head Station firmware	1.264 and higher