PROCENTEC

Technical Data ComBricks Fiber Optic Ring MM1 (101-201530)

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	0º to +60º Celsius (for mounting position see manual) 32º to +140º 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 400 mA (at 5.72 VDC) 600 mA (at 5.72 VDC) 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 ring structure	$T_{SLOT} \geq Max_{TSDR} + ((FO_{length} \times FO_{delay}) + (N_{FO\text{-}modules} \times N_{delay})) \times 2$ FO_{length} = Total length of fiber optic cable in the ring 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 the ring 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} [Tbit]
12 Mbps	800	60	47
6 Mbps	450	30	25
3 Mbps	250	15	14.5
1.5 Mbps	150	7.5	9
500 kbps	100	2.5	5
187.5 kbps	60	0.94	4.5
93.75 kbps	60	0.47	4.5
45.45 kbps	400	0.23	4.5
19.2 kbps	60	0.1	4
9.6 kbps	60	0.05	4

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

Example 1: 1.5 Mbps, 5 km FO cable (total ring length), 6 FO ring modules
$T_{SLOT} \geq Max_{TSDR} + ((FO_{length} \times FO_{delay}) + (N_{FO\text{-}modules} \times N_{delay})) \times 2$
$T_{SLOT} \geq 150 + ((5 \times 7.5) + (6 \times 9)) \times 2 \geq 333$ bit times

Example 2: 6 Mbps, 25 km FO cable (total ring length), 10 FO ring modules
$T_{SLOT} \geq Max_{TSDR} + ((FO_{length} \times FO_{delay}) + (N_{FO\text{-}modules} \times N_{delay})) \times 2$
$T_{SLOT} \geq 450 + ((25 \times 30) + (10 \times 25)) \times 2 \geq 2450$ bit times

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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 1310 nm
Cable type	Multimode Fiber G62.5 (50) / 125 µm (OM1)
Cable length	Max. 5 km (baudrate independent)
Optical budget	13dB
Optical Loss	2dB per km
Connectors	4 x ST/BFOC (2 channels)
Topologies	Ring, point-to-point (direct, hub, split, star)
Cascading depth	No limit, only busparameter limitation of the master

Dipswitches
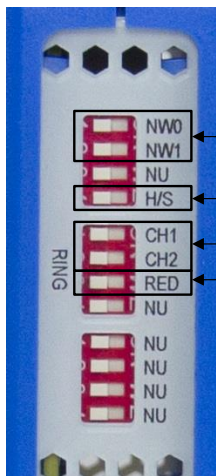
Network selection
Network 1: NW0 = Left, NW1 = Left
Network 2: NW0 = Right, NW1 = Left
Network 3: NW0 = Left, NW1 = Right
Network 4: NW0 = Right, NW1 = Right

Use dipswitches or server settings (Left = DIP, Right = SERVER)

Enable or disable channel 1 or 2 (Left = ON, Right = OFF)

Ring Redundancy or Line (Left = RING, Right = LINE)

NU = not used

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.	A fiber optic cable is connected and link is established correctly
LV1 / LV2	Signal quality is good, or channel is off.	Not possible	Low signal, received messages can still be decoded
ER1 / ER2	No errors, or channel is off.	Not possible	No baudrate detected or no connection/signal

Standard and approvals

CE	EMC Directive 2014/30/EU, class B Digital Device RoHs Directive 2011/65/EU
FCC	47 CFR 15, Unintentional Radiator, class B 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	1.288 and higher