Anybus ComBricks PROFIBUS Multi-Mode Fiber Optic Ring

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The Anybus ComBricks is the first PROFIBUS based automation system that unites repeaters and permanent monitoring in a web browser. With an evolving industry using more mixed architecture networks, users are able to integrate ComBricks into their PROFINET network via Osiris, allowing to monitor everything from one single cross-platform.

The ComBricks Fiber Optic Ring module for multi-mode technology (ComBricks FO Ring MM) ensures reliable optical data transmission in PROFIBUS networks. This multifunctional module is specifically designed by PROCENTEC to create optical redundant ring topologies with multimode fiber optics. It allows long cable distances up to 5 km and a galvanic isolation between devices and segments. The ComBricks FO Ring MM module is especially suitable for applications in heavy EMC environments such as oil & gas, waste treatment and cranes.

The ComBricks FO Ring MM module contains diagnostic LEDs which indicates the detection of a low level on the optics. Just like any other communication module, the channels are connect directly to the ProfiTrace OE core in the Head Station. An advanced email functionality will alert you when faults like low level or broken ring arise. Because busmonitor data is directly available in the web server, it allows technicians to optimal maintain a PROFIBUS installation.

ComBricks FO Ring MM can be placed side by side with repeater modules allowing spur line diagnostics. It can also easily be used as a fully dedicated fiber optic modules mixed with copper segments. The advanced 12 Mbps core of the fiber optic module can be cascaded unlimited with other fiber modules.

Distinctive features
- Suitable for up to 5 km multimode cable.
- Long cable distances
- Galvanic isolation between devices and segments
- Suitable for point-to-point, star, bus, & ring topologies.
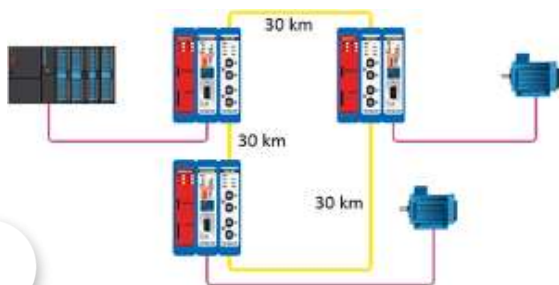- EKS, Compatible with our ProfiHub F.optic modules

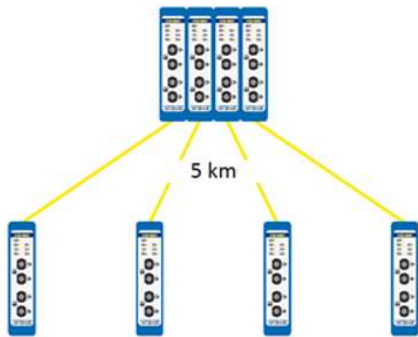Figure 1 – Ring structure with multi-mode fiber optics

5 km

Figure 2 – Point-to-point in a hub topology with multi-mode fiber optics

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 $+60^o$ Celsius (for mounting position see manual) 32° to $+140^o$ Fahrenheit
Isolation class	IP 20 (IEC/EN 60529, DIN 40050)

Backplane

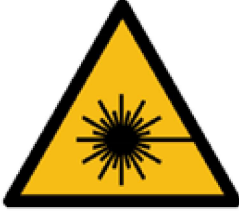| PROFIBUS networks	4 (set by dipswitches or web server)
Modules	Max. 10 (positioned in the first 10 slots)
Power supply	Provided through the backplane
Typical backplane current at 5.75 VDC	400 mA (at 5.72 VDC)
Max. backplane current at 5.75 VDC	600 mA (at 5.72 VDC) At this current consumption the module 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
Head Station firmware	1.288 and higher

Protocol specifications

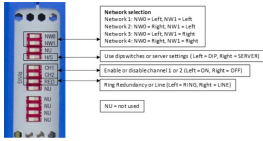| Supported Protocols	DP-V0, DP- V1, DP-V2, FDL, MPI, FMS, PROFIsafe, PROFIdrive and any other FDL based protocol
Address	No bus address required
Transmission speed	9.6 kbps ... 12 Mbps (including 45.45 kbps)

Transmission speed detection time	Auto detect (< 10 s detection and 50 s baudrate switchover time)
Total delay ring structure	(see below)

$T_{SLOT} \geq Max_{TSDR} + ((FO_{length}$

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)

$N_{FO-modules}$ = 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

$T_{SLOT} \geq Max_{TSDR} + ((FO_{length} \times FO_{delay}) + (N_{FO-modules} \times N_{delay})) \times 2$

$T_{SLOT} \geq 150 + ((5 \times 7.5) + (6 \times 9)) \times 2 \geq 333$ bit times

Example 2: 6 Mbps, 25 km FO cable (total ring length), 10 FO ring modules

$T_{SLOT} \geq Max_{TSDR} + ((FO_{length} \times FO_{delay}) + (N_{FO-modules} \times N_{delay})) \times 2$

$T_{SLOT} \geq 450 + ((25 \times 30) + (10 \times 25)) \times 2 \geq 2450$ 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 1310 nm
Cable type	Multimode Fiber G62.5 / 125 μm (OM1 compatible) Multimode Fiber G50 / 125 μm (OM2, OM3, OM4, OM5 compatible)

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

Safety of laser products
► The devices of the product contain LED / laser components in accordance with IEC 60825-1:2014: Class 1 laser/LED-product.

Warning!
► Do not look into in the beam of the optical transceivers with optical instruments (eg, lenses, microscope)! Ignoring this warning may result in eye damage.
► Do not look into the optical transmitter. The bundled and - dependent on the wavelength - visible or invisible light can cause eye damage.

Dipswitches

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
	Complies with 21 CFR 1040.10 and 1040.11, Class 1 (I) except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007

File	Version	Size	Read online

Ordering Information

Order Codes	101-201530
Included Components	Anybus ComBricks, backplane socket
Warranty	1 year