



# Fiberoptic Router

## **CG-FL/CMD**

User Manual

User manual for CAN fiberoptic router CG FL1000/CMD, CG FL4000/CMD

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Our products are continuously improved. Due to this fact specifications may be changed at any time and without announcement.

**IMPORTANT - READ THIS FIRST**

**FDA:** This is a Class IIIb rated laser device that emits electromagnetic radiation. Exposure to Class IIIb laser radiation can result in ocular as well as skin damage. Under no circumstances should this device be activated until it has been installed per installation instructions in the user manual, or if there is a chance of human exposure to the laser radiation.

**FCC:** This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:(1) This device may not cause harmful interference, and (2) this device must accept any interference received.

**Warning:** CG FL/CMD hardware and software may not be used in applications where damage to life, health or private property may result from failures in or caused by these components.

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# 1 Overview

## 1.1 Attributes

- Optical fiber based router for the connection of CAN subnetworks
- Powerful 32-bit microcontroller Philips LPC2119 with internal CAN controller
- Abolition of the extension/datarate restrictions between two CAN bus segments
- Supports CAN protocol 2.0A
- Optical fiber extension up to 4 km
- Automatic baud rate detection
- Low latency time

## 1.2 General Description

The router CG FL/CMD transmits data between CAN network segments using optical fiber. Extensions up to 4km are possible depending on the version of the product.

Utilizing a 32-bit microcontroller of type LPC2119 with 128kByte Flash and 16kByte RAM CG FL/CMD supports 29bit and 11bit CAN identifiers by ensuring a low latency time for data exchange.

After power up both linked devices start their baud rate detection by waiting to successfully receive a CAN message. If a CAN message could be received the used baud rate is propagated to the linked CG FL/CMD, which will use it, unless no own baud rate has been detected so far.

CG FL/CMD may also be configured to use a fixed baud rate. Configuration is accomplished by a CAN message using 29bit identifier 0x7E5. At least three different CAN messages with different data content have to be received to set CG FL/CMD in configuration mode. All received messages with extended ID 0x7E5 are propagated unchanged. This identifier may be configured to a different value.

CG FL/CMD may be reconfigured by the user, but a CAN interface of EMS Dr. Thomas Wünsche is needed for this purpose. Please contact <support@ems-wuensche.com> for more information.

### 1.3 Ordering Information

12-20-530-xx	<b>CG FL-1000/CMD</b> CAN fiberoptic router, range up to 1km
12-20-531-xx	<b>CG FL-4000/CMD</b> CAN fiberoptic router, range up to 4km

**Note:** xx denotes language of delivery:

- 10 German
- 20 English

## 2 Electrical Characteristics

### 2.1 Absolute Limiting Values

Parameter	Min.	Max.	Unit
Storage temperature	-25	+70	°C
Operating temperature	0	+60	°C
Supply voltage	-100	+35	V
Voltage on the bus connections	-30	+30	V
$P_{\text{laser}}^*$	-	120	mW

\* Valid under the assumption of a defective diode resistor, will destroy device after short period of time.

Any (also temporary) stress in excess of the limiting values may cause permanent damage on CG FL/CMD and connected devices. Exposure to limiting conditions for extended periods may affect the reliability and shorten the life cycle of the device.

### 2.2 Nominal Values

Nominal Values CG FL-1000/CMD:

Parameter	Min.	Typ.	Max.	Unit
Supply current	-	30	45	mA
Supply voltage	+10	+24	+30	V
Switchable termination resistor	118,8	120	121,2	$\Omega$
Optical damping	-	-	7	dB
Admissible fibre length	-	1000	-	m
Wavelength	-	850	-	nm
$P_{\text{laser}}^{**}$	-	-	20	mW

Typical values are valid for a supply voltage of +24V and an operating temperature of 20°C.

\*\* Hard limited to  $P_{\text{laser}}$  per section 2.1 Absolute Limiting Values

Nominal Values CG FL-4000/CMD:

Parameter	Min.	Typ.	Max.	Unit
Current consumption	-	30	45	mA
Supply voltage	+10	+24	+30	V
Switchable termination resistor	118,8	120	121,2	$\Omega$
Optical damping	2	-	12	dB
Admissible fibre length	-	4000	-	m
Wavelength	-	850	-	nm
$P_{\text{laser}}^{**}$	-	-	20	mW

\*\* Hard limited to  $P_{\text{laser}}$  per section 2.1 Absolute Limiting Values

Typical values are valid for a supply voltage of +24V and an operating temperature of 20°C

CG FL1000/CMD and CG FL4000/CMD are equipped with ST connectors and intended for use with multimode fibers (62.5/125  $\mu\text{m}$  or 50/125  $\mu\text{m}$ ).

## 2.3 Safety Warnings



**LASER RADIATION  
AVOID EXPOSURE TO BEAM  
CLASS 3B  
DIN EN 60825-1:2008-05**

$\lambda = 850\text{nm}$   
 $P_0 < 20\text{mW}$

## 3 Operating Instructions

### 3.1 Installation

The CG FL/CMD is for use solely as a component within a CAN Bus communication product and therefore does not comply with the appropriate requirements of US Code of Federal Regulation (CFR) 1040.10 and 1040.11 for complete laser products. It is the customer's responsibility to ensure that the incorporation of the device into a complete laser product is done so in compliance with US federal regulations applicable to products utilizing Class IIIb lasers.

Installation of CG FL/CMD routers should only be conducted when they are powered down, there is no chance of the device(s) being activated during the installation procedure, and should NEVER be connected to or used with activated CAN bus networks unless the fiber optic connections are established with another CG FL/CMD router and there is no chance of human exposure to laser radiation. Please see the Class IIIb Laser Safety Warning on the inside cover of this manual.

#### **Fiber Optic Connection**

CG FL/1000/CMD and CG FL/4000/CMD are equipped with ST connectors and intended for use with multimode fibers. Two fiber connections are required, one each to connect from the Tx output of one of the devices, to the Rx input of the other.

Ensure that the fiber optical cable ST connectors are securely fitted to the respective connectors on each of the CG FL/CMD devices and there is no chance of human exposure to laser radiation.

#### **CAN Bus Connection**

Ensure that the CAN Bus segments that the CG FL/CMD routers are to be connected to are power down and the fiber optic connections are securely established, then connect each CG FL/CMD to its respective CAN Bus network or network segment via the D-Sub male or female connector (Ref: 3.2 Pin Configuration of CAN Connector).



### 3.2 Pin Configuration of CAN Connector

CG FL/CMD has a D-Sub 9 male and a D-Sub 9 female connector with identical pinout.

Pin	Name	Description
Pin 1	-	No internal connection
Pin 2	CAN_L	CAN bus line, dominant low
Pin 3	GND	Ground
Pin 4	-	No internal connection
Pin 5	-	No internal connection
Pin 6	GND	Ground
Pin 7	CAN_H	CAN bus line, dominant high
Pin 8	-	No internal connection
Pin 9	VCC	Power supply +24V

## 4 Maintenance and Servicing

There are no maintenance or service procedures required to assure performance of the CG FL/CMD. However there is a switchable 120 Ohm termination resistor for the CAN bus connection. The switch is located at the male SUB-D9 plug and labeled with ON and OFF.

There are no servicable parts within the CG FL/CMD, and under no circumstances should the CG FL/CMD be opened.

In case of malfunction correct installation should be confirmed and if problems remain, please check with the manufacturer or authorized distributor.

## **5 Appendix**

### **5.1 Instruction for Disposal**

#### **Electronic Equipment Act (WEEE)**

EMS is selling its products exclusively to commercial customers. This is the reason why all devices are designed for commercial use and have to be disposed appropriately. In accordance to § 10 para. 2 clause 3 Electronic Equipment Act (WEEE) the disposal of EMS products is regulated the following way. The equipment must not be disposed at the public collection points.

In accordance with the applicable law the disposal has to be done by the customer for own account. The same applies to products, which have been sold to third parties, if those parties do not take care of a disposal in accordance to the applicable law. As an alternative the products can be returned to EMS free of charge.

### **5.2 FCC Statement**

CG-FL/CMD has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## 5.3 CE Conformity

### Declaration of Conformity



The manufacturer

**EMS Dr. Thomas Wünsche e.K.**  
**Sonnenhang 3**  
**85304 Ilmünster**  
**Germany**

hereby declares, that the following products:

Name	Article Number
SBR FL-1000/CMD	12-20-520-xx
SBR FL-4000/CMD	12-20-521-xx
CG FL-1000/CMD	12-20-530-xx
CG FL-4000/CMD	12-20-531-xx

meet the requirements of the following standards:

#### **Electromagnetic Immunity**

EN 55024; 2003-10 – Information technology equipment – Immunity characteristics – Limits and methods of measurement (IEC/CISPR 24:1997, + A1:2001 + A2:2002); German version EN 55024:1998 + A1:2001 + A2:2003

#### **Electromagnetic Emission**

EN 55022; VDE 0878-22:2008-05 – Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement (IEC/CISPR 22:2005, modified + A1:2005); German version EN 55022:2006 + A1:2007

and therefore conform with the EU requirements on:

#### **Electromagnetic compatibility (2004/108/EG)**

In accordance with the above mentioned EU directives, the EC declarations of conformity and the associated documentation are held at the disposal of the competent authorities.

#### **RoHS 2 EEE**

The RoHS 2 Directive (2011/65/EU) commits manufacturers of „Electrical and Electronic Equipment“ (EEE) to secure compliance with the RoHS Directive before placing a CE mark.

Based on technical documentation and to the best of our knowledge, we hereby confirm that the above mentioned products do not contain any of the restricted substances according to Article 4 of the RoHS Directive in excess of the maximum concentration values tolerated by weight in any of their homogeneous materials.

Ilmünster, 02.08.2011

Dr. Thomas Wünsche



