

# MOUNTING AND INSTRUCTION MANUAL

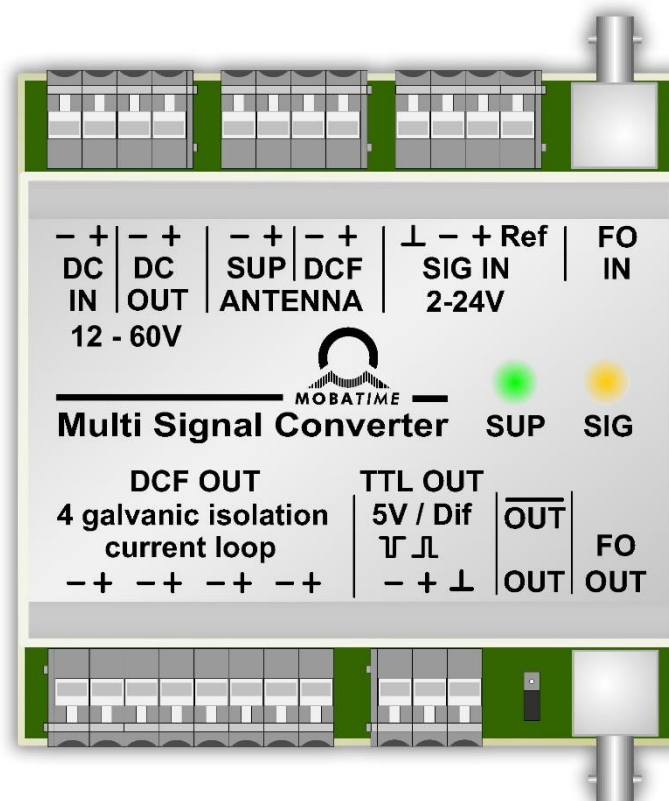
## Multi Signal Converter MSC

Cascadable Signal-Converter / Distributor

Article No. 133286 without fiber optic (FO)

Article No. 133287 with fiber optic input and output (FO IN, OUT)

Please read these instructions carefully before installation.



## Product Certification



### STANDARDS

The Multi Signal Converter was developed and produced in accordance with the EU Guidelines

2004 / 108 / EC

96 / 48 / EC

### References to the Instruction Manual

1. The information in this Instruction Manual can be changed at any time without notice. The current version is available for download at [www.mobatime.com](http://www.mobatime.com).
2. This Instruction Manual has been composed with the utmost care, in order to explain all details in respect of the operation of the product. Please do not hesitate to contact us if you have any questions. Thank you for reporting any possible mistakes.
3. We do not answer for direct or indirect damages which could occur when using this manual.
4. Read the instructions carefully. Only start setting-up the product if you have understood the information for installation and operation.
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# 1 Safety

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## 1.1 Safety instructions





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Read this chapter and the entire instruction manual carefully and follow all instructions listed. This is your assurance for dependable operations and a long life of the device. Keep this instruction manual in a safe place to have it handy every time you need it.

## 1.2 Symbols and Signal Words used in this Instruction Manual

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	<b>Danger!</b> Please observe this safety message to avoid electrical shock! There is danger to life!
	<b>Warning!</b> Please observe this safety message to avoid bodily harm and injuries!
	<b>Caution!</b> Please observe this safety message to avoid damages to property and devices!
	<b>Notice!</b> Additional information for the use of the device.

## 1.3 Intended use

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The **Multi Signal Converter** is a device, which can be used to convert and distribute DCF signals.

However, it can also be used for other types of signals. The limitation is given by the frequency of the signals and the signal form. Ideally, the device is used for digital signals. See also chapter 7 Technical data.

Please refer to section - 3.3 Function description - for a detailed function description.



#### 1.4 Observe operating safety!

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- Never open the housing of the device! This could cause an electric short or even a fire, which would damage your device. Do not modify your device!
- The device is not intended for use by persons (including children) with limited physical, sensory, or mental capacities or a lack of experience and/or knowledge.
- Keep packaging such as plastic films away from children. There is the risk of suffocation if misused.

#### 1.5 Consider the installation site!

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- To avoid any operating problems, keep the device away from moisture and avoid dust, heat, and direct sunlight. Do not use the device outdoors.
- The Multi Signal Converter is designed for DIN rails and should only be operated installed on a DIN rail.



**Danger! Make sure**

that you wait before using the device after any transport until the device has reached the ambient air temperature. Great fluctuations in temperature or humidity may lead to moisture within the device caused by condensation, which can cause a short.



#### 1.6 Observe electromagnetic compatibility!

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The device complies with the requirements of EMC directive 2004/108/EC and 96/48/EC

## 2 Maintenance

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### 2.1 Troubleshooting: Repairs

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If you cannot rectify the problems, contact your supplier from whom you have purchased the device.

Any repairs must be carried out at the manufacturer's plant.

Disconnect the power supply immediately and contact your supplier, if ...

- liquid has entered your device
- the device does not properly work and you cannot rectify this problem yourself.

### 2.2 Cleaning

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- Please make sure that the device remains clean especially in the area of the connections, the control elements, and the display elements.
- Clean your device with a damp cloth only.
- Do not use solvents, caustic, or gaseous cleaning substances.

### 2.3 Disposing

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#### Device

At the end of its life cycle, do not dispose of your device in the regular household rubbish. Return your device to your supplier who will dispose of it correctly.



#### Packaging

Your device is packaged to protect it from damages during transport. Packaging is made of materials that can be disposed of in an environmentally friendly manner and properly recycled.

### 3 General Information: Introduction

#### 3.1 Scope of delivery

Please check that the delivery is complete and notify your supplier within 14 days of receipt of the delivery if it is not complete.

In the package purchased by you, you have received:

- Multi Signal Converter for DIN rail mounting

#### 3.2 Appropriate accessories - Mains power supply

Mains power supply suitable for Multi Signal Converter for mounting on DIN rails:

HDR 15-24 from Meanwell (24VDC / 15W)

HDR 30-24 from Meanwell (24VDC / 30W)

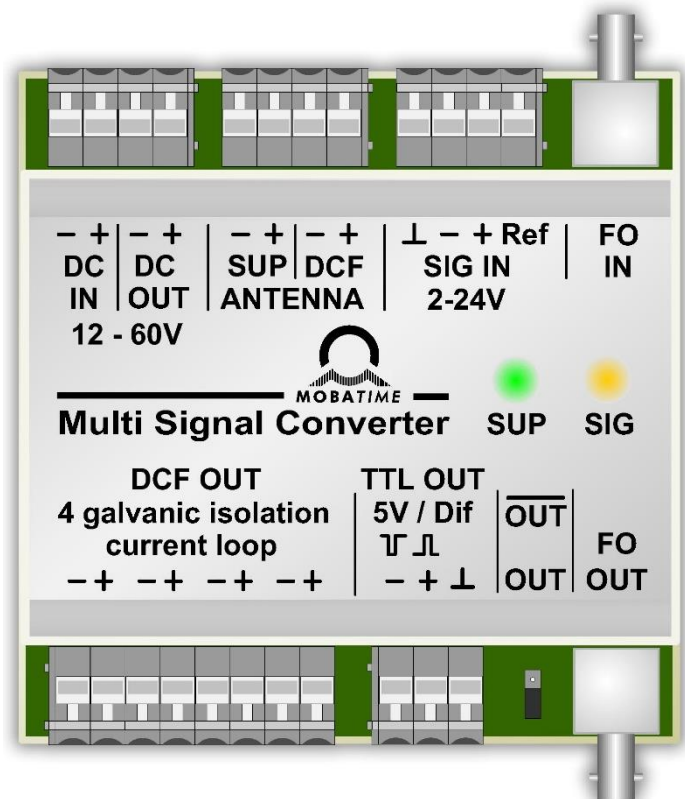
Other power supply can also be used.

Minimum requirements: 24VDC smoothed und stabilized, min. 100 mA



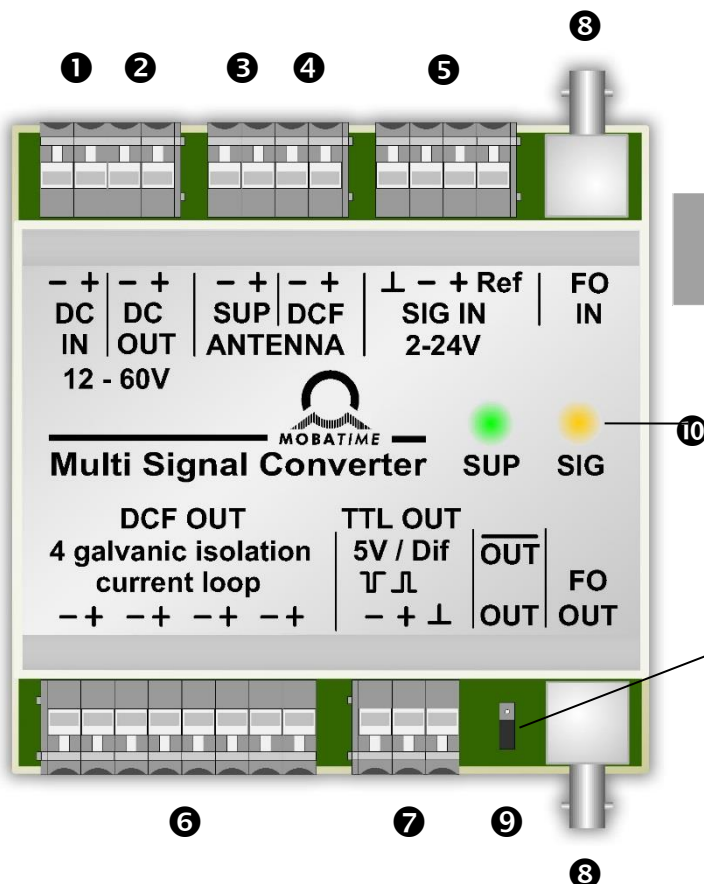
#### 3.3 Function description

- Wide power input voltage range 12 – 60 VDC. Either via DC Input or external DIN Rail Power Supply.
- Several inputs, current or voltage controlled. Option: optical input (820nm / ST Port)
- 4 galvanically separated outputs for current or voltage interfaces, 1 TTL or RS422 output (single or differential useable). Option: optical output (820nm / ST Port)
- Cascading possible, without relevant delay of the current loop outputs
- Very low signal propagation delay
- DC Out for GNSS receiver or cascaded devices, limited to 30V (@ UIN >30V).
- 2 LEDs for supervision: power and input signal
- Replaces DCF-Multi-4 and 10x-DCF-Multi-plexer



## 4 Configuration, Displays and Connections

①	DC IN	Power input, nom. 24VDC / < 100mA (12V-60V) <i>Remark: Correct +/- polarity required. Internal thermal fuse</i>
②	DC OUT	Directly wired to DC IN. Used for power cascading to next converter.
③	SUP ANT	Power output for power supply of the GPS/GNSS receiver. Same voltage as DC IN but limited to 30VDC.
④	DCF ANT	DCF input, active current loop input. For the connection of a GNSS receiver (with DCF current loop out) or any other DCF source. 30V / 30mA, current limited, min signal level: approx. 6 mA
⑤	SIG IN	Voltage signal input 2-24V, potential against GND, inverted (-) resp. none-inverted (+), or differential connection (RS422) Ref.: Out 2.5VDC, used to define the unused input (+ or -)
⑥	DCF OUT	4 galvanically separated outputs for current or voltage interfaces: - Passive current loop interface 12mA max. 30V - "Open Collector" application 3-30V
⑦	TTL OUT	Signal output 5V, transparent resp. inverted or as RS422 output Signal cascading to next "Multi Signal Converter"
⑧	FO IN / OUT	<b>Option:</b> Fiber optic in- and output 1Hz - 10MHz (820nm / ST Port)
⑨	SIG INV	Inversion of the output signals "DCF OUT" and "FO OUT" Jumper position: "OUT" = Signal transparent, "OUT" = Signal inverted
⑩	LED's	<b>green:</b> power supply <b>yellow:</b> signal activity (DCF, SIG IN, FO IN). Flashes to the beat of input signal or with approx. 20Hz at higher frequency



### Important !

The signal inputs are "OR" connected. This means, only one input must be used.

### Signal-Inversion

The "Multi Signal Converter" works in transparent mode by default, i.e. the signal polarity at the output is the same as at the input. The jumper for signal inversion should only be repositioned in special cases. The inversion only takes place for "DCF OUT" and "FO OUT". The output "TTL OUT" is not affected since the signal is already available in inverted form (-).



## 5 Application examples and circuits

**DCF-Distributor with DIN rail power supply (24V) or external 24V supply**

**DCF-Distribution with cascading of additional distributors.**  
Signal input: DCF 4500 (two wires) or GPS/GNSS 4500 with power supply (4 wire connection). 24V supply cascaded.

**Connection of 2 Systems via optical fiber: RS422 signal**  
IN: PPS, IRIG digital, frequency  
OUT: Signal according input

**Connection of a GNSS receiver via optical fiber for the DCF synchronization of one or more systems**

**Schematic representation of the inputs and outputs**

**DCF ANT: Current-loop active**

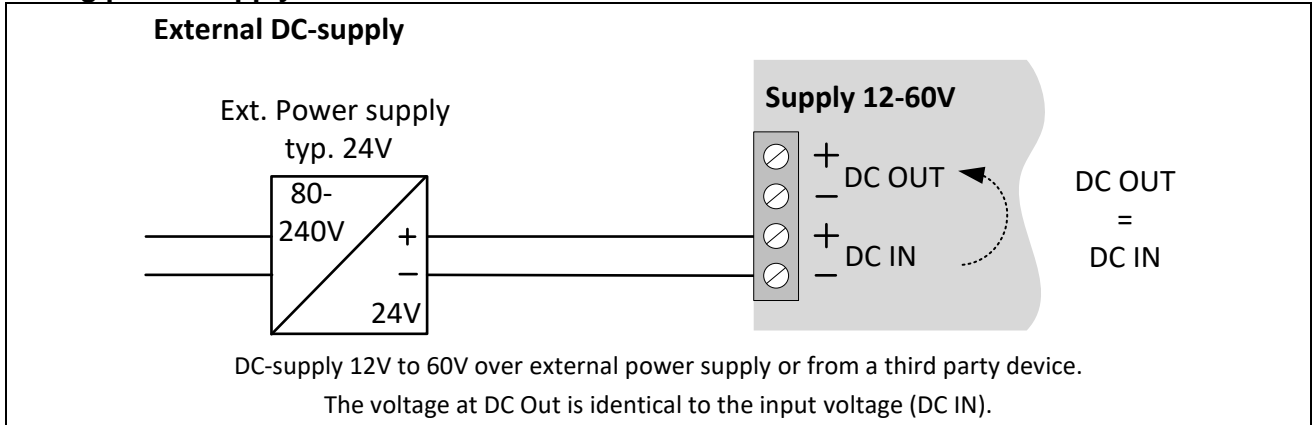
**DCF OUT: Current-loop passiv**

**SIG IN: 2-24V**

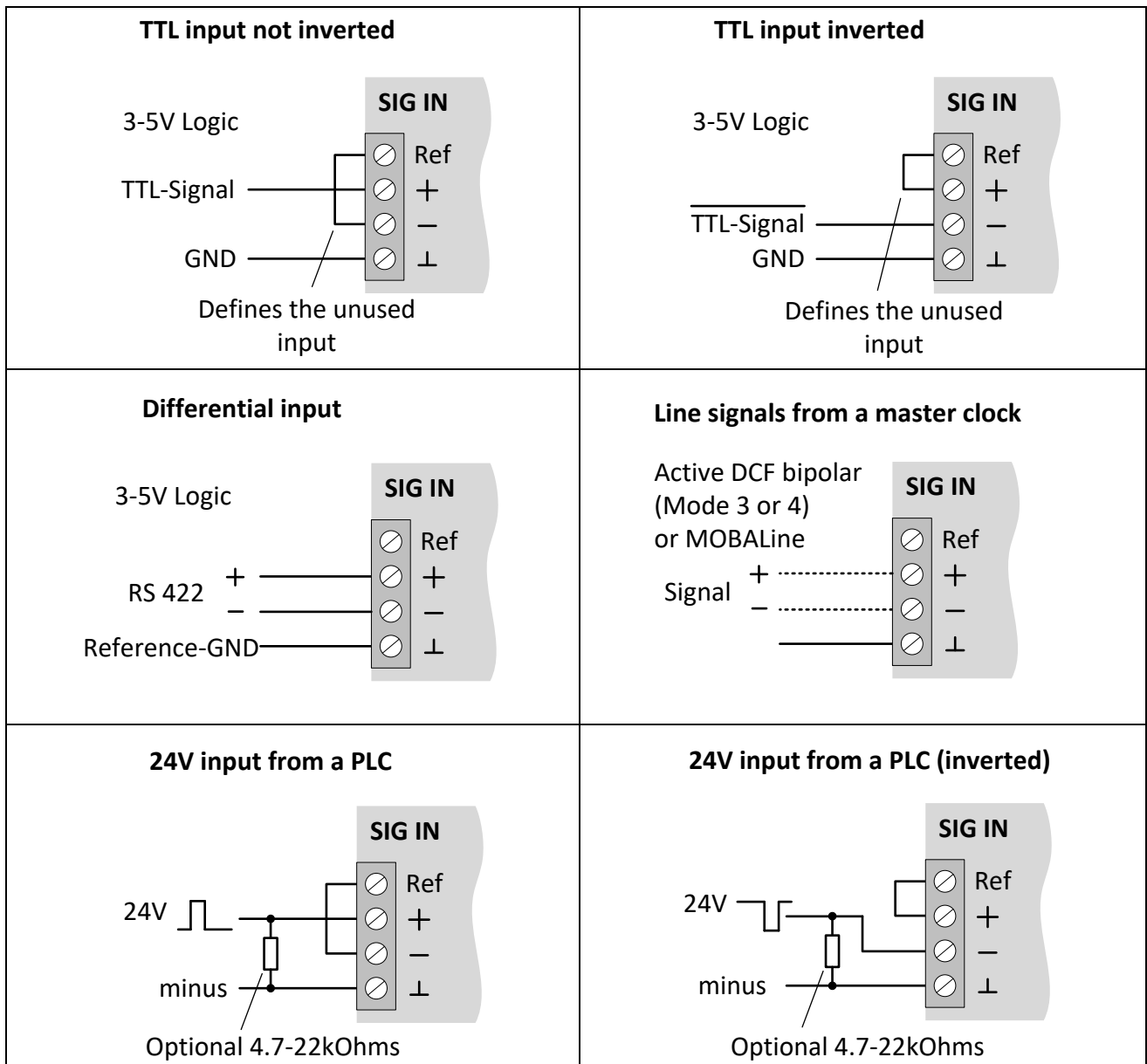
**SIG OUT: 5V TTL**

## 6 Detailed wiring examples of the inputs and outputs

### Wiring power supply

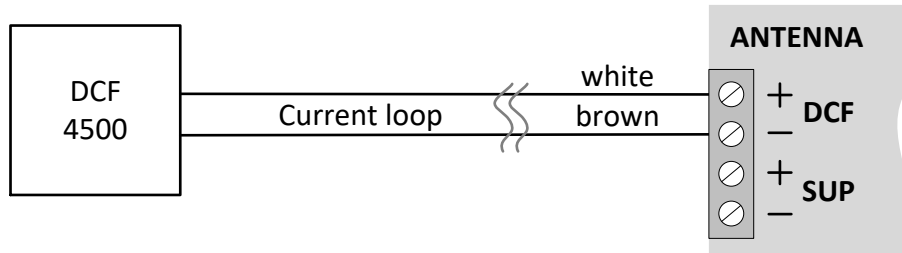


### Wiring of the signal input (voltage controlled)



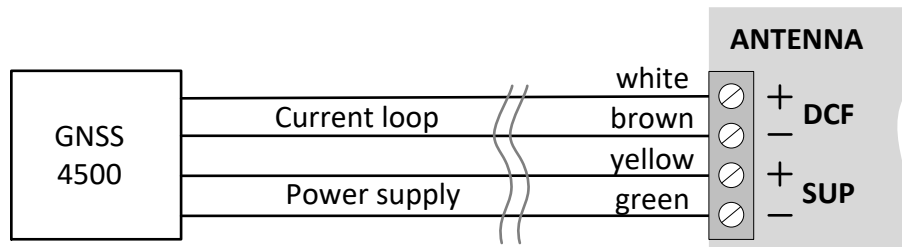
## Wiring receiver input (current controlled)

### DCF receiver (2-wire)



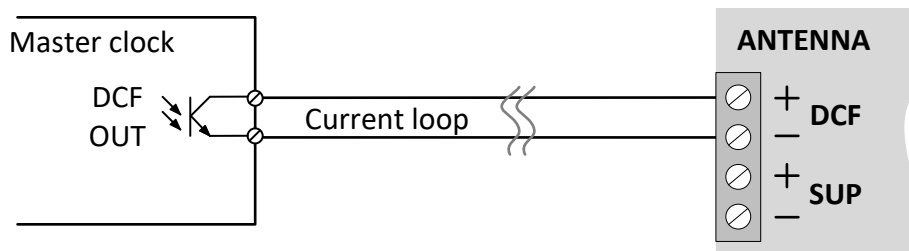
The current loop-voltage corresponds to the DC input voltage (DC IN), but it is limited to 30V, if input voltage is higher.

### Satellite receiver (GNSS) (4-wire)



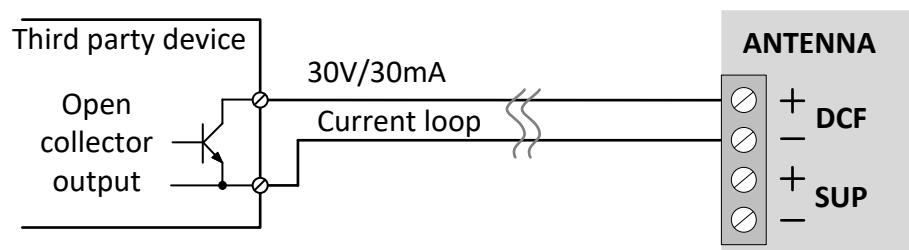
The current loop-voltage corresponds to the DC input voltage (DC IN), but it is limited to 30V, if input voltage is higher.

### DCF OUT from a master clock (2-wire)

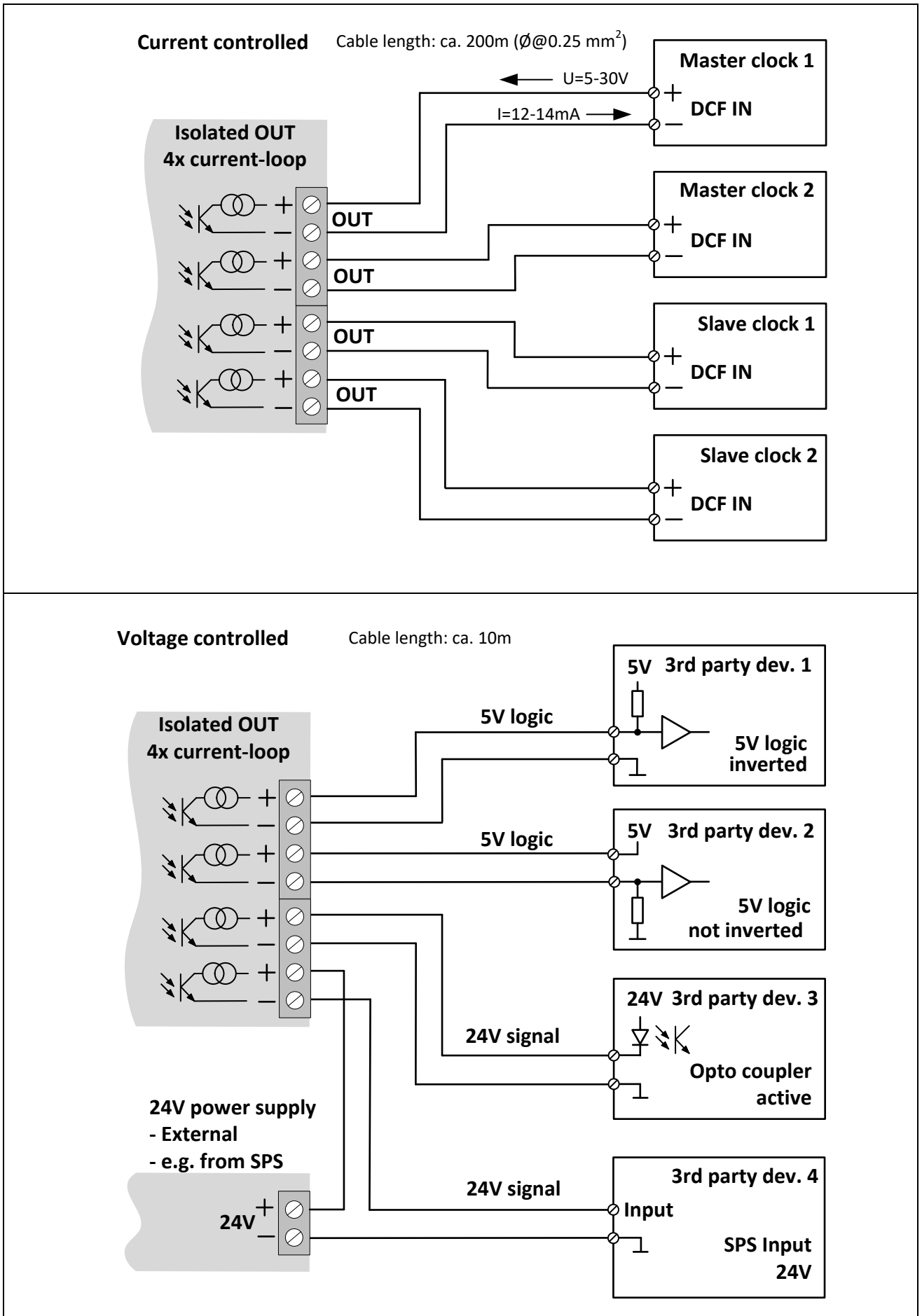


Operating threshold of the current detection: ca. 6mA.  
Short-circuit current: ca. 30mA.

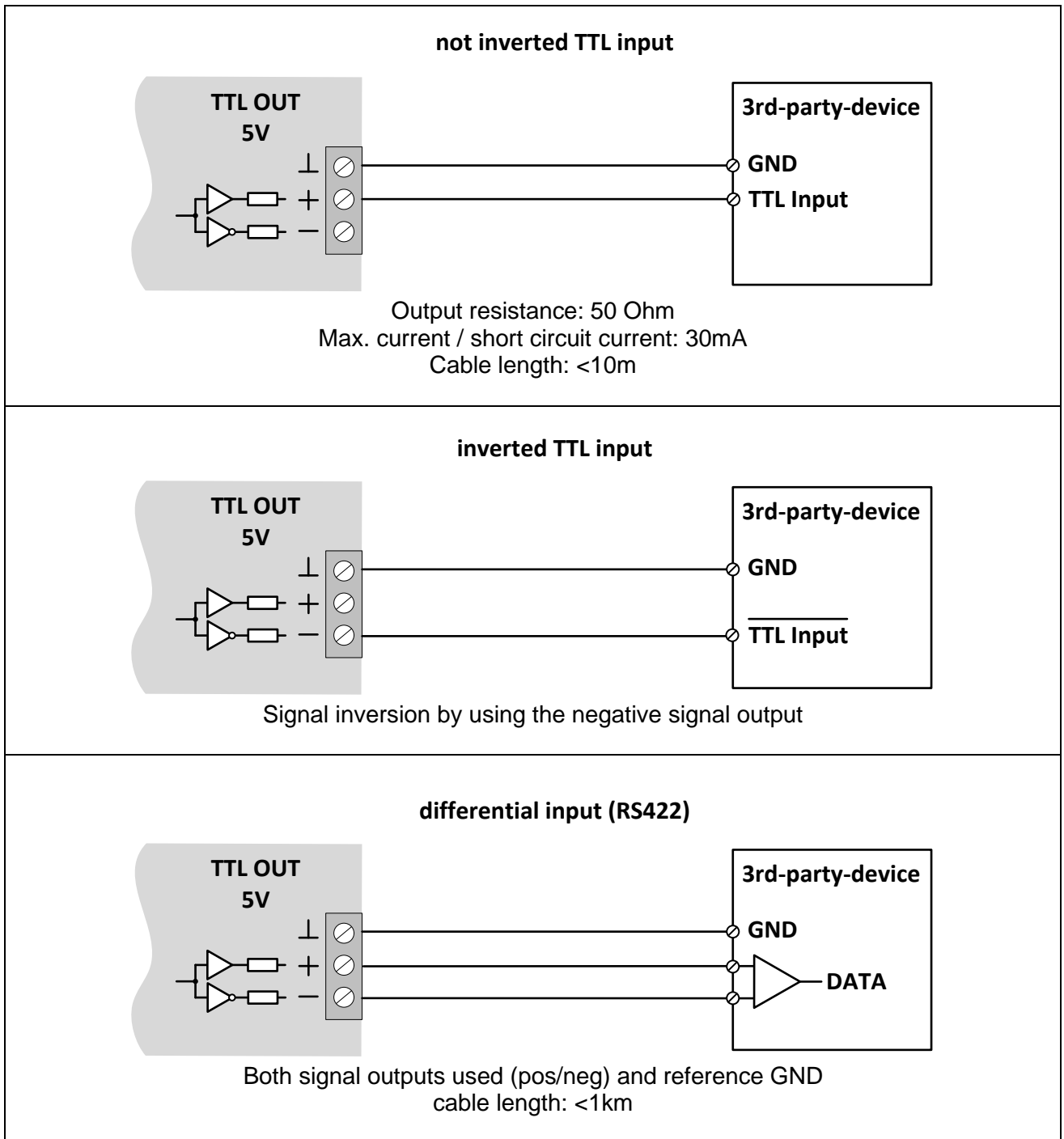
### Current loop from a third party device



## Wiring of the optocoupler outputs



## Wiring of the TTL Output



## Possibilities for signal conversions:

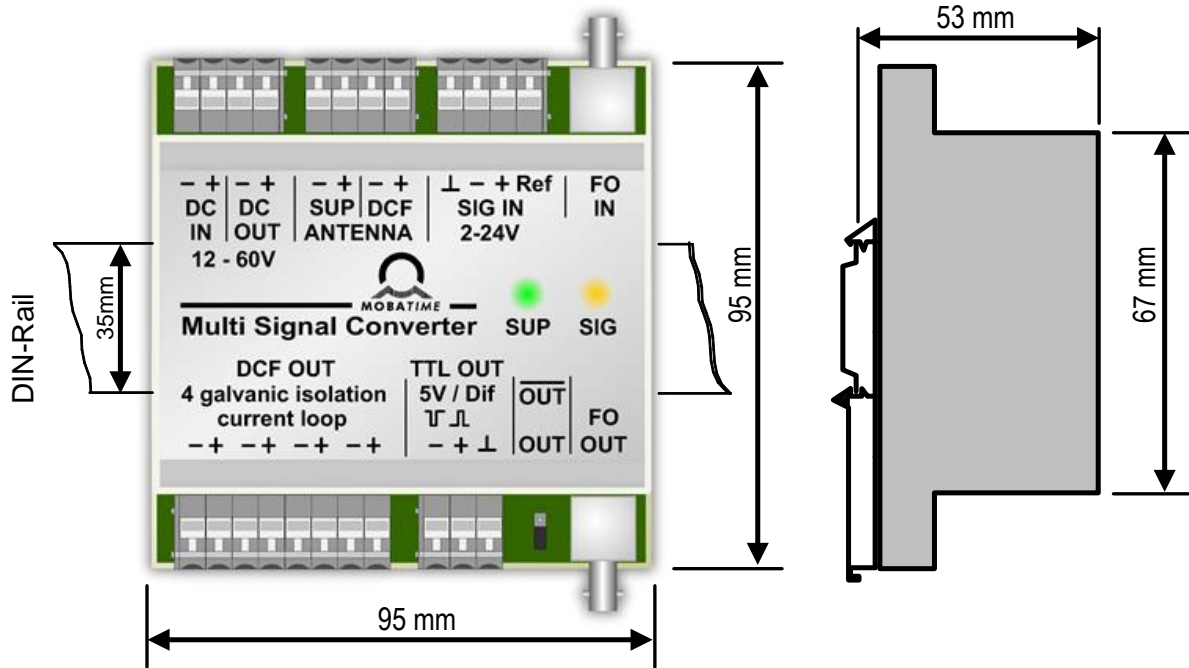
The inputs and outputs can be combined as desired, thus a variety of signal conversions can be created. Following some examples:

Current – current converter/distrib.	<i>DCF IN → 4xDCF OUT (with possibility of cascading)</i>
Current – voltage converter	<i>DCF IN → 24V PLC</i>
Current – fiber-optic converter	<i>DCF IN → Optical transmission to 2. Multi Signal Converter</i>
Voltage – voltage converter	<i>TTL IN → 24V PLC</i>
Voltage – current converter	<i>Clock line (e.g. DCF active) → CurrentLoop OUT</i>
Data – fiber-optic converter	<i>RS 422 → Optical transmission to 2. Multi Signal Converter</i>
FiberOptic – data converter	<i>FiberOptic FO IN → RS 422 OUT resp. TTL OUT</i>
FiberOptic – current converter/distr.	<i>FiberOptic FO IN → 4xDCF OUT</i>

## 7 Technical data

	Multi Signal Converter
<b>Power input: DC IN</b>	
Input voltage	nom.24VDC, 12-60V $\pm$ 10%
Max input current consumption	50mA / with option FO: 100mA
Typical current consumption	10mA / with option FO: 50mA
Internal fuse	200mA (self-healing)
<b>Power outputs:</b>	
Output voltage (DC OUT)	equal to DC IN
GNSS receiver DC out (SUP ANTENNA)	equal to DC IN, limited to 30V
Reference Output (REF - SIG IN)	approx. 2.5VDC (high impedance 50 k $\Omega$ )
<b>SIG IN input:</b>	
Signal input (SIG IN: +/GND or - /GND)	>2.5V - 24VDC against GND (<1mA)
Signal input (SIG IN: differential + / -)	3-6V (<1mA)
Option: Fiber Optic Input (FO IN)	Multimode 820nm / ST Port
<b>ANTENNA input:</b>	
DCF (current loop) U <sub>loop</sub>	equal to DC IN, limited to 30V
DCF (current loop) I <sub>loop</sub>	limited to 30mA
DCF Signal current level	6mA $\pm$ 10%
<b>Outputs:</b>	
DCF outputs (DCF OUT)	4 x Opto coupler, current limited to 12mA / 3-30V
Signal output (TTL OUT)	5V/50 $\Omega$ transparent, inverted or differential
Option: Fiber Optic Output (FO OUT)	Multimode 820nm / ST Port / up to 2.7km
<b>Signal propagation delay:</b>	
Delay SIG IN -> TTL OUT	25ns
Delay DCF ANTENNA -> DCF OUT	1 $\mu$ s
Delay cascading	25ns
<b>Frequency ranges:</b>	
SIG IN and FO IN	1Hz – 10MHz
DCF ANTENNA	current signal (current loop): 0 – 10MHz
DCF OUT	current signal (current loop): max. 500kHz voltage signal (open collector): max. 50kHz
<b>Technical parameters:</b>	
Temperature range	-20 .. +70°C
Dimensions L x B x H	94mm x 94mm x 60mm
Mounting	DIN rail 35mm
Weight	200g

## 8 Dimensions



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