

## 1.1 General technical data

<b>General Data – 8024GPS</b>	
Installation position:	On horizontal 35mm rail in accordance with DIN EN 60715 TH35
Protection type of the housing:	IP30
Protection class:	I, with PE connection
Housing design:	Aluminium, closed
Housing dimensions:	130x100x105mm (DxWxH) 130x135x105mm (DxWxH) with extended housing option
Weight:	Approx. 0.8 kg

<b>Ambient Conditions for 8024GPS and accessories</b>		
Temperature range:	Operation:	0°C to +55°C
	Storage:	-20°C to +75°C
Humidity:	Max. 95%, non condensing	

<b>CE Conformity for 8024GPS and accessories</b>	
<b>Electromagnetic Compatibility Directive – 2014/30/EU (formerly 2004/108/EC)</b>	
EN 55022:2010 / AC:2011	
EN 61000-3-2:2006 / A2:2009, EN 61000-3-3:2013	
EN 55024:2010	
<b>Low Voltage Directive – 2014/35/EU (formerly 2006/95/EC)</b>	
EN 60950-1:2006 / AC:2011	

<b>RoHS Directive – 2011/65/EU</b>
Directive of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Accuracy for 8024GPS	
Internal PPS pulse on GPS reception (after 5min. GPS reception):	<u>Standard crystal:</u> < ± 30ns  <u>VCTCXO crystal:</u> < ± 15ns
VCO control of the internal quartz base:	<u>Standard crystal:</u> < ±0.030ppm  <u>VCTCXO crystal:</u> < ±0.015ppm
Freewheel accuracy:	<u>Standard crystal:</u> < ± 0.1ppm after at least 5min. GPS reception / T = +20° C Drift for T = +20° C (constant): - after 1h: 0.36msec. - after 24h: 8.64msec.  <u>VCTCXO crystal:</u> < ± 0.02ppm after at least 5min. GPS reception / T = +20° C Drift for T = +20° C (constant): - after 1h: 0.72µsec. - after 24h: 1.73msec.
Internal back-up clock (RTC):	±25ppm / for T = +10° C to +50° C (constant)

GPS Data for 8024GPS	
Receiver type:	22 channel phase tracking receiver, C/A code
Evaluation:	L1 frequency (1575.42MHz)
Sensitivity:	Tracking: -161dBm Cold Start: -148dBm
Synchronization time TTF (Time to First Fix):	<ul style="list-style-type: none"> <li>• Warm start: &lt; 1 min.</li> <li>• Cold start: &lt; 5 min.</li> <li>• First initialization: &lt; 12.5 min. (without valid leap second information)</li> </ul>
Antenna connection:	<ul style="list-style-type: none"> <li>• Via BNC connector, female</li> <li>• For active antennas, Ub = 5V DC / max. 70mA</li> <li>• Antenna power feed via BNC connector, female of Module 8024GPS</li> </ul>

Status optical coupler for 8024GPS	
Resistive circuit-breaking capacity:	Max. 50mA / 80V DC
Connector:	3-pole pluggable screw terminal

Available Output Signals for 8024GPS	
PPS	pulse per second, pulse duration configurable (1 – 500 msec)
DCF77	time base configurable (UTC, standard time, local time)
IRIG-B	configurable for output of following output formats: <ul style="list-style-type: none"> <li>• B002 / B122 (time)</li> <li>• B003 / B123 (time, seconds of the day)</li> <li>• B006 / B126 (time, year)</li> <li>• B007 / B127 (time, year, seconds of the day)</li> <li>• IEEE C37.118 (previously IEEE 1344)</li> <li>• AFNOR NF S87-500</li> </ul>
Cyclic Pulse	configurable for output of the following pulses, pulse duration configurable: <ul style="list-style-type: none"> <li>• Pulses every second: every 1, 2, 3, 4, 5, 6, 10, 12, 15, 20 or 30 seconds</li> <li>• Pulses every minute: every 1, 2, 3, 4, 5, 6, 10, 12, 15, 20 or 30 minutes</li> <li>• Pulses every hour: every 1, 2, 3, 4, 6, 8, 12 or 24 hours</li> </ul>
Serial Data String	configurable for output of the following serial data strings: <ul style="list-style-type: none"> <li>• <b>hopf</b> Binary String</li> <li>• <b>hopf</b> time Universal</li> <li>• <b>hopf</b> Master/Slave-String</li> <li>• <b>hopf</b> Standard String (6021)</li> <li>• Trimble Time String (TSIP)</li> <li>• SINEC H1 Extended</li> <li>• SAT 1703 / SICAM RTU</li> <li>• ABB Melody (CR/LF)</li> <li>• ABB Melody (LF/CR)</li> </ul> Various other serial data strings and customer specific implementation of data strings available on request!

Fiber optical output(s) for 8024GPS and accessories	
Supports multi-mode optical fibre cables:	50/125µm, 62.5/125µm, 100/140µm or 200µm HCS @ Fibre
Wave length:	820nm
Connector:	F-ST design (Bajonett)
Optical output power P <sub>OUT</sub> [dBm] at multi-mode optical fibre cable (length = 1m, 50/125µm):	P <sub>OUT</sub> [dBm] = -15 dBm (± 0.2 dBm) ⇔ P <sub>OUT</sub> [µW] = 32 µW (± 0.7 µW)
Optical output power P <sub>OUT</sub> [dBm] at multi-mode optical fibre cable (length = 2.5m, 62.5/125µm):	P <sub>OUT</sub> [dBm] = -11 dBm (± 0.2 dBm) ⇔ P <sub>OUT</sub> [µW] = 80 µW (± 0.7 µW)
Optical output power P <sub>OUT</sub> [dBm] at multi-mode optical fibre cable (length= 2000m, 62.5/125µm):	P <sub>OUT</sub> [dBm] = -18 dBm (± 0.2 dBm) ⇔ P <sub>OUT</sub> [µW] = 16 µW (± 0.7 µW)
Max. transmit frequency:	<= 10MHz
Switch on / switch off delay:	< 10nsec

Fiber optical input(s) for accessories	
Supports multi-mode optical fibre cables:	50/125µm, 62.5/125µm, 100/140µm or 200µm HCS ® Fibre
Wave length:	820nm
Connector:	F-ST design (Bajonett)
Min. optical receive power:	$P_{IN}$ [dBm] = -25 dBm ( $\pm 0.2$ dBm) $\Rightarrow$ $P_{IN}$ [µW] = 3.2 µW ( $\pm 0.7$ µW)
Max. optical receive power (overdrive):	$P_{IN}$ [dBm] = -9 dBm ( $\pm 0.2$ dBm) $\Rightarrow$ $P_{IN}$ [µW] = 126 µW ( $\pm 6$ µW)
Max. receive frequency:	$\leq 5$ MHz
Signal delay:	$< 75$ nsec (at -21 dBm)

## 1.2 Technical data for wide-range power supplies.

	<i>hopf</i> type: AC-M05-D	<i>hopf</i> type: AC-M10-D
Nominal input voltage	100-240V AC 110-250V DC (wide input range)	100-240V AC 110-250V DC (wide input range)
Input voltage range	85-264V AC 110-250V DC	85-264V AC 110-250V DC
Frequency	47-440Hz 0 Hz	47-440Hz 0 Hz
Current consumption (at nominal values)	approx. 0.15A (120V AC) 0.10A (230V AC)	approx. 0.30A (120V AC) 0.20A (230V AC)
Inrush current	typ. 15A ( $I_o = 100\%$ ) 120V AC typ. 30A ( $I_o = 100\%$ ) 230V AC	typ. 15A ( $I_o = 100\%$ ) 120V AC typ. 30A ( $I_o = 100\%$ ) 230V AC
Hold-up time at nominal load	$> 20$ msec. ( $> 100$ V AC)	$> 20$ msec. ( $> 100$ V AC)
Start-up time after connected mains voltage	$< 1$ sec.	$< 1$ sec.
Transient overvoltage protection	Overvoltage protection III (EN 60664-1)	Overvoltage protection III (EN 60664-1)
Protection supply, internal	400 mA slow blow (device protection)	400 mA slow blow (device protection)
Recommended back-up fuse (AC)	Circuit breaker 6A 10A characteristics B (EN 60898)	Circuit breaker 6A 10A characteristics B (EN 60898)
Leakage current against PE	$< 0.5$ mA (60Hz, according to EN 60950)	$< 0.5$ mA (60Hz, according to EN 60950)
Input isolation voltage / PE	2000V AC, 1 minute, leakage current = 10mA, 500V DC, 50MΩ min. (at room temperature)	2000V AC, 1 minute, leakage current = 10mA, 500V DC, 50MΩ min. (at room temperature)



Front view of module 8024GPS with AC power supply and 4x output for fiber optic multimode

## 1.3 Technical data for DC power supplies.

	<b>hopf</b> type: <b>DC24-M15-D</b>	<b>hopf</b> type: <b>DC48-M15-D</b>
Nominal input voltage	24V DC	48V DC
Input voltage range	18-36V DC	36-76V DC
Current consumption (at nominal values)	approx. 0.69A	approx. 0.35A
Start-up time after connected mains voltage	< 200msec.	< 200msec.
Protection supply internal (Device protection)	2A fast blow	1A fast blow
Input isolation voltage Input / Output	1,500V DC 1 minute, 500V DC 50MΩ min. (20°C ±15°C)	1,500V DC 1 minute, 500V DC 50MΩ min. (20°C ±15°C)

## 1.4 Special System Configurations for SIPROTEC protection devices.

<b>FG8024GPS/AC/D01/54/24V (power supply 100 – 240V AC / 110 – 250V DC)</b>	
<b>FG8024GPS/DC24/D01/54/24V (power supply 24V DC)</b>	
<b>FG8024GPS/DC48/D01/54/24V (power supply 48V DC)</b>	
Signal output:	IRIG-B (pre-configured for output format B007)
Number of outputs:	2
Output level:	24V
Load current:	max. 40mA per output
Connector:	2x 3-pole pluggable screw terminal



Front view of module 8024GPS with AC power supply and 2x output for active 24V DC signal (FG8024GPS/AC/D01/54/24V)

<b>FG8024GPS/AC/D01/54/05V</b> (power supply 100 – 240V AC / 110 – 250V DC)	
<b>FG8024GPS/DC24/D01/54/05V</b> (power supply 24V DC)	
<b>FG8024GPS/DC48/D01/54/05V</b> (power supply 48V DC)	
Signal output:	IRIG-B (pre-configured for output format B007)
Number of outputs:	2
Output level:	5V (+/- 10%)
Load current:	max. 200mA per output
Connector:	2x 3-pole pluggable screw terminal

<b>FG8024GPS/AC/D01/50</b> (power supply 100 – 240V AC / 110 – 250V DC)	
<b>FG8024GPS/DC24/D01/50</b> (power supply 24V DC)	
<b>FG8024GPS/DC48/D01/50</b> (power supply 48V DC)	
Signal output:	IRIG-B (pre-configured for output format B007)
Number of outputs:	1
Output:	fiber optic for FO multimode, wave length 820nm
Connector:	F-ST (Bajonett)

<b>FG8024GPS/AC/D01/51</b> (power supply 100 – 240V AC / 110 – 250V DC)	
<b>FG8024GPS/DC24/D01/51</b> (power supply 24V DC)	
<b>FG8024GPS/DC48/D01/51</b> (power supply 48V DC)	
Signal output:	IRIG-B (pre-configured for output format B007)
Number of outputs:	2
Output:	fiber optic for FO multimode, wave length 820nm
Connector:	F-ST (Bajonett)

<b>FG8024GPS/AC/D01/52</b> (power supply 100 – 240V AC / 110 – 250V DC)	
<b>FG8024GPS/DC24/D01/52</b> (power supply 24V DC)	
<b>FG8024GPS/DC48/D01/52</b> (power supply 48V DC)	
Signal output:	IRIG-B (pre-configured for output format B007)
Number of outputs:	3
Output:	fiber optic for FO multimode, wave length 820nm
Connector:	F-ST (Bajonett)

<b>FG8024GPS/AC/D01/53</b> (power supply 100 – 240V AC / 110 – 250V DC)	
<b>FG8024GPS/DC24/D01/53</b> (power supply 24V DC)	
<b>FG8024GPS/DC48/D01/53</b> (power supply 48V DC)	
Signal output:	IRIG-B (pre-configured for output format B007)
Number of outputs:	4
Output:	fiber optic for FO multimode, wave length 820nm
Connector:	F-ST (Bajonett)

**Up to 4 additional outputs are available on request with extended housing option!**

## 1.5 Signal converter for 5V active / 5V TTL signal.

The **hopf** signal converters for 5V active / 5V TTL signal convert the input signal received from fiber optic input to electrical 5V active / 5V TTL signal outputs. All converters have one (1) fiber optical input for FO Multimode design F-ST (Bajonett).

article no.	power supply	number of outputs	connectivity	max. load current per output	housing dimensions
<b>FGTP4800AC-99/C02</b>	AC-M05-D	2	screw terminal	200mA	130 x 64.5 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C20</b>	AC-M05-D	4	screw terminal	200mA	130 x 100 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C11</b>	AC-M10-D	6	screw terminal	200mA	130 x 100 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C21</b>	AC-M10-D	8	screw terminal	200mA	130 x 135 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C16</b>	AC-M10-D	10	screw terminal	150mA	130 x 135 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C17</b>	AC-M05-D	2	BNC female connector	200mA	130 x 64.5 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C22</b>	AC-M05-D	4	BNC female connector	200mA	130 x 100 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C18</b>	AC-M10-D	6	BNC female connector	200mA	130 x 100 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C23</b>	AC-M10-D	8	BNC female connector	200mA	130 x 135 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C19</b>	AC-M10-D	10	BNC female connector	150mA	130 x 135 x 105 mm (D x W x H)

Output level	
High:	5V (+/- 10%)
Low:	0V

The 5V version of converter is suitable	
for devices ...	... which require 5V active signal. ... which require signal at 5V TTL level.

## 1.6 Signal converter for 24V active signal.

The **hopf** signal converters for 24V active signal convert the input signal received from fiber optic input to electrical 24V active signal outputs. All converters have one (1) fiber optical input for FO Multimode design F-ST (Bajonett).

article no.	power supply	number of outputs	connectivity	max. load current per output	housing dimensions
<b>FGTP4800AC-99/C01</b>	AC-M05-D	2	screw terminal	40mA	130 x 64.5 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C24</b>	AC-M05-D	4	screw terminal	40mA	130 x 100 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C04</b>	AC-M10-D	6	screw terminal	40mA	130 x 100 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C25</b>	AC-M10-D	8	screw terminal	40mA	130 x 135 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C05</b>	AC-M10-D	10	screw terminal	30mA	130 x 135 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C06</b>	AC-M05-D	2	BNC female connector	40mA	130 x 64.5 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C26</b>	AC-M05-D	4	BNC female connector	40mA	130 x 100 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C07</b>	AC-M10-D	6	BNC female connector	40mA	130 x 100 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C27</b>	AC-M10-D	8	BNC female connector	40mA	130 x 135 x 105 mm (D x W x H)
<b>FGTP4800AC-99/C08</b>	AC-M10-D	10	BNC female connector	30mA	130 x 135 x 105 mm (D x W x H)

Output level	
High:	24V (+/- 10%)
Low:	0V

The 24V version of converter is suitable	
for devices ...	... which require 24V active signal.



## 1.7 FO-StarCoupler accessories for SIPROTEC protection devices.

The **hopf** FO-StarCoupler 4811 multiplies an optical signal received at the input for up to seven optical outputs.

<b>FG4811AC/IN-1/OUT-4 (power supply 100 – 240V AC / 110 – 250V DC)</b> <b>FG4811DC24/IN-1/OUT-4 (power supply 24V DC)</b> <b>FG4811DC48/IN-1/OUT-4 (power supply 48V DC)</b>	
Housing dimensions:	130x100x105mm (DxWxH)
Signal input:	1x fiber optic input for FO multimode, wave length 820nm
Input connector:	F-ST (Bajonett)
Number of outputs:	4
Output:	fiber optic for FO multimode, wave length 820nm
Output Connector:	F-ST (Bajonett)

<b>FG4811AC/IN-1/OUT-7 (power supply 100 – 240V AC / 110 – 250V DC)</b> <b>FG4811DC24/IN-1/OUT-7 (power supply 24V DC)</b> <b>FG4811DC48/IN-1/OUT-7 (power supply 48V DC)</b>	
Housing dimensions:	130x100x105mm (DxWxH)
Signal input:	1x fiber optic input for FO multimode, wave length 820nm
Input connector:	F-ST (Bajonett)
Number of outputs:	7
Output:	fiber optic for FO multimode, wave length 820nm
Output Connector:	F-ST (Bajonett)

Referring to the information in this data sheet: After the editorial deadline of this publication, December 1, 2017, changes may have been made to the product. Subject to changes of structural or design changes, changes to the scope and scale of discounts by the manufacturer during the delivery period as long as the changes or deviations are reasonable under consideration of the interest of the seller to the buyer. Errors and technical data are subject to change without prior notice.

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