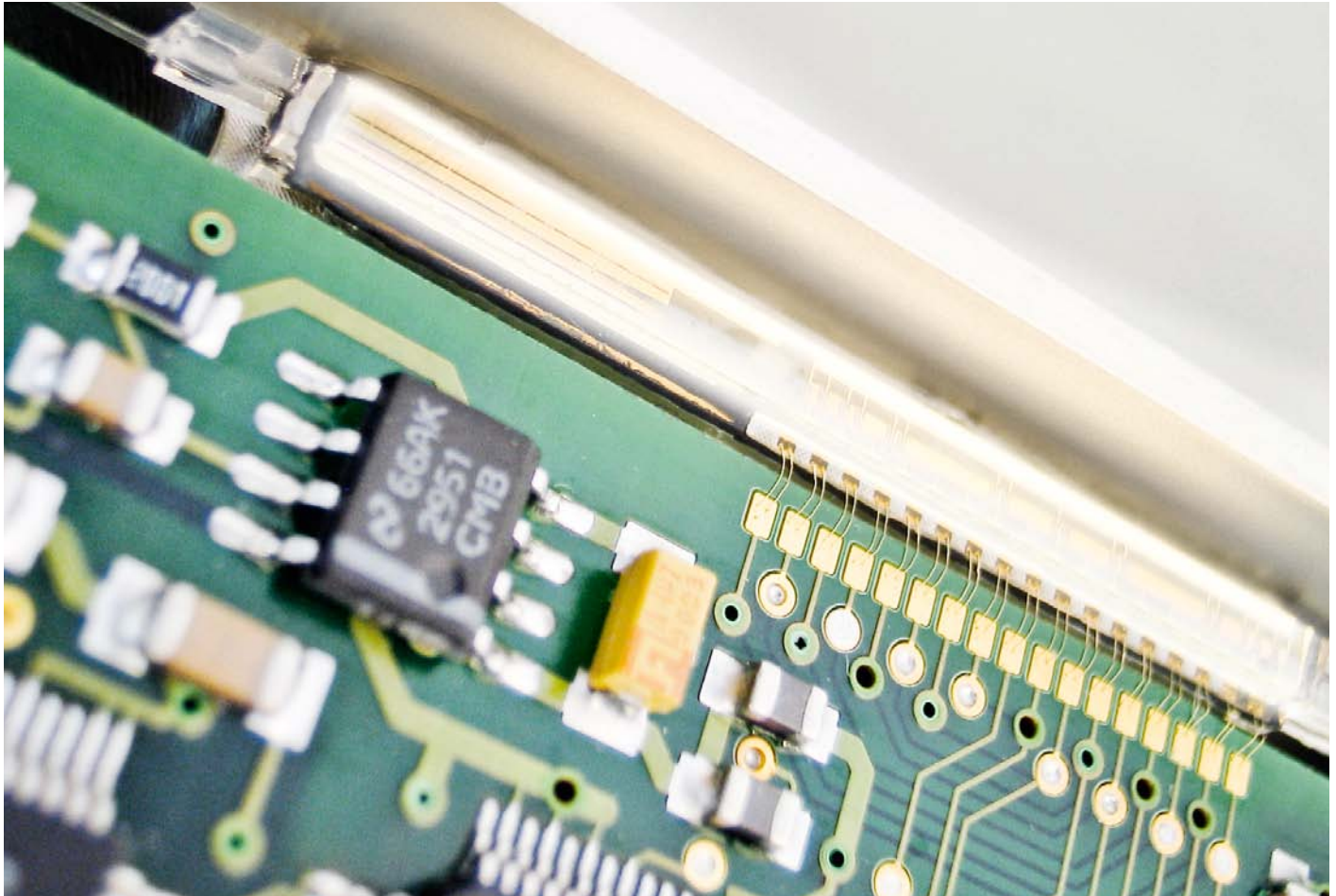


# FOCS – Fiber-Optic Current Sensor

## Make light work of DC current measurement

# FOCS – Fiber-Optic Current Sensor

Use light, the best choice for precision high-current measurements



Do you want maximum availability and top accuracy in your process control and measurements? Do you require a reliable and easy-to-install precision high-current measurement device?

Then FOCS – the Fiber-Optic Current Sensor from ABB – is your choice. FOCS combines highest performance based on pure fiber-optic measurement with a stunning and slender design that is specially suited to harsh industrial environments.

No bulky structures, no tedious tuning – simply install the lightweight frame at almost any location in next to no time. What's more, FOCS is immune to magnetic interference.

## **Optical technology solves magnetic problems**

Compared to magnetic systems, this well-proven, field-tested optical technology brings radical benefits. The result is exceptional accuracy and reliability. Based on the magneto-optic effect, FOCS can measure uni- or bidirectional DC currents of up to 600 kA with an accuracy of +/- 0.1 % of the measured value.

FOCS can be positioned anywhere along the busbar, with no need for recalibration – neither after installation nor at any time during its lifetime.

FOCS offers the highest metering signal disturbance immunity available for complex industrial processes. It is unaffected by stray magnetic fields at the plant, so time-consuming magnetic centering of the sensor head is a thing of the past. And thanks to purely optical signal acquisition, the saturation of magnetic elements in the sensor electronics and sensor head is completely eliminated.

# FOCS – Fiber-Optic Current Sensor

## Depend on light, and benefit from unmatched performance

As the world's leading supplier of state-of-the-art solutions, we have a unique insight into the requirements of process technology. We have designed FOCS specifically to meet the needs of industrial control in adverse locations.

### Highly dependable, exceptionally accurate

FOCS offers an accuracy of  $\pm 0.1\%$  and a linearity of  $\pm 0.1\%$  of the measured value from 1 to 120% of the rated current, combined with  $\pm 0.02\%$  repeatability. With no drop in accuracy, the DC current can easily be regulated through the entire range of a running production process.

### DC measurement and integrated protection

The measurement range up to  $\pm 600\text{kA}$  is combined with DC current protection. FOCS features instantaneous or inverse time overcurrent protection to maintain a safe production process at all times. Reverse current protection is a further option.

### Much simpler installation and commissioning

FOCS is really quick and simple to install. With a sensor head weighing less than 15 kg that comes in seven standard sizes as well as customized solutions, FOCS is easy to fit around any busbar. And with only a single fiber-optic cable between the sensor head and the sensor electronics, cable routing is kept to a minimum.

- No need for special on-site modifications.
- No need for on-site calibration.
- And no need for re-calibration when relocating FOCS in the case of a plant redesign.

### Easy integration into external control systems

Any control system can be used to process the sensor signals.

FOCS comes with two unidirectional or bidirectional analog outputs as standard. Three status relays with changeover contacts are provided for signaling purposes.

ABB PowerLINK is used to create a straightforward digital interface between the sensor electronics and ABB's AC 800PEC controller. Other digital interfaces are available as options in order to connect FOCS to any third-party system.

### Designed for the harshest environments

An IP 67 protection class for the optical fiber ensures unbiased signal transmission in the harsh environment of electrochemical and other industrial processes. Additionally, the electronics boards are coated to protect them from dirt and dust from the production environment. The rugged and lightweight design of the sensor head housing protects the optical fiber from mechanical damage.



# FOCS – Fiber-Optic Current Sensor

## Technical data

Sensor performance	
Full-scale rated current (I <sub>r</sub> )	0 to ±500 kA
Overcurrent capacity	20 %
Max. measurable current	±600 kA (including overcurrent)
Sampling rate	4 kHz
Accuracy (1 % to 120 % of I <sub>r</sub> )	±0.1 % of measured value
Linearity (1 % to 120 % of I <sub>r</sub> )	±0.1 %
Repeatability	±0.02 %
Temperature sensitivity	< ±0.002 %/°C

Sensor outputs	
Analog outputs of I <sub>r</sub> (unidirectional)	0 to 1 V and 0 to 20 mA or 0.2 to 1 V and 4 to 20 mA
Analog outputs of I <sub>r</sub> (bidirectional)	±1 V and ±20 mA
Bus communication	ABB PowerLINK (standard) PROFIBUS DP slave (optional)
Relays	Changeover contacts for alarm/ trip signaling

Ambient conditions	
Sensor head	-40° C to +80° C
Sensor electronics (with forced air cooling)	-25° C to 65° C
Sensor electronics (w/o forced air cooling)	-25° C to 55° C
Temperature sensor head and electronics (storage)	-40° C to 70° C
Min. temp for PROFIBUS DP slave module in use	0° C to 55° C/65° C
Humidity (compliant with EN 61131-2)	RH= 5–95 %
Pollution degree (compliant with IEC 60664)	Degree 2
Altitude (compliant with IEC 60068-2-13)	< 4000 m

Protection class	
Sensor electronics	IP 00, always to be mounted in a control cubicle
Optics and fiber cable	IP 67

### Models and ratings

Current rating (kA)	Main type code	Current rating (kA)	Main type code
20	ABB FOCS-20	180	ABB FOCS-180
30	ABB FOCS-30	225	ABB FOCS-225
45	ABB FOCS-45	260	ABB FOCS-260
60	ABB FOCS-60	300	ABB FOCS-300
80	ABB FOCS-80	350	ABB FOCS-350
100	ABB FOCS-100	400	ABB FOCS-400
130	ABB FOCS-130	450	ABB FOCS-450
155	ABB FOCS-155	500	ABB FOCS-500

Power supply	
Standard input	24 VDC, -15 % to +20 %
Power consumption	< 60W

Physical dimensions	
Sensor electronics dimensions (WxHxD)	450 mm x 101 mm x 136 mm
Sensor electronics weight	< 5 kg
Sensor head	7 standard sizes or on request
Sensor head weight	< 15 kg
Sensor fiber cable	15 m to 70 m

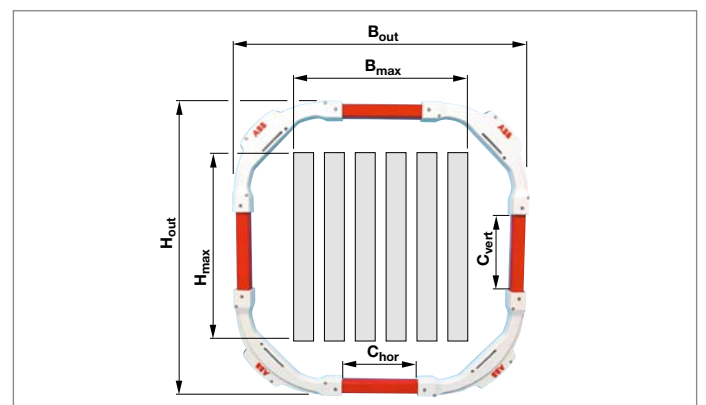
Selectable protection features	
Instantaneous overcurrent detection	
Inverse time overcurrent detection	
Instantaneous reverse current detection	

Additional features	
Optional process panel PP820	Current indication and setting changes
Ah and kAh counter pulses	over PROFIBUS DP and PowerLINK

### Sensor head type code

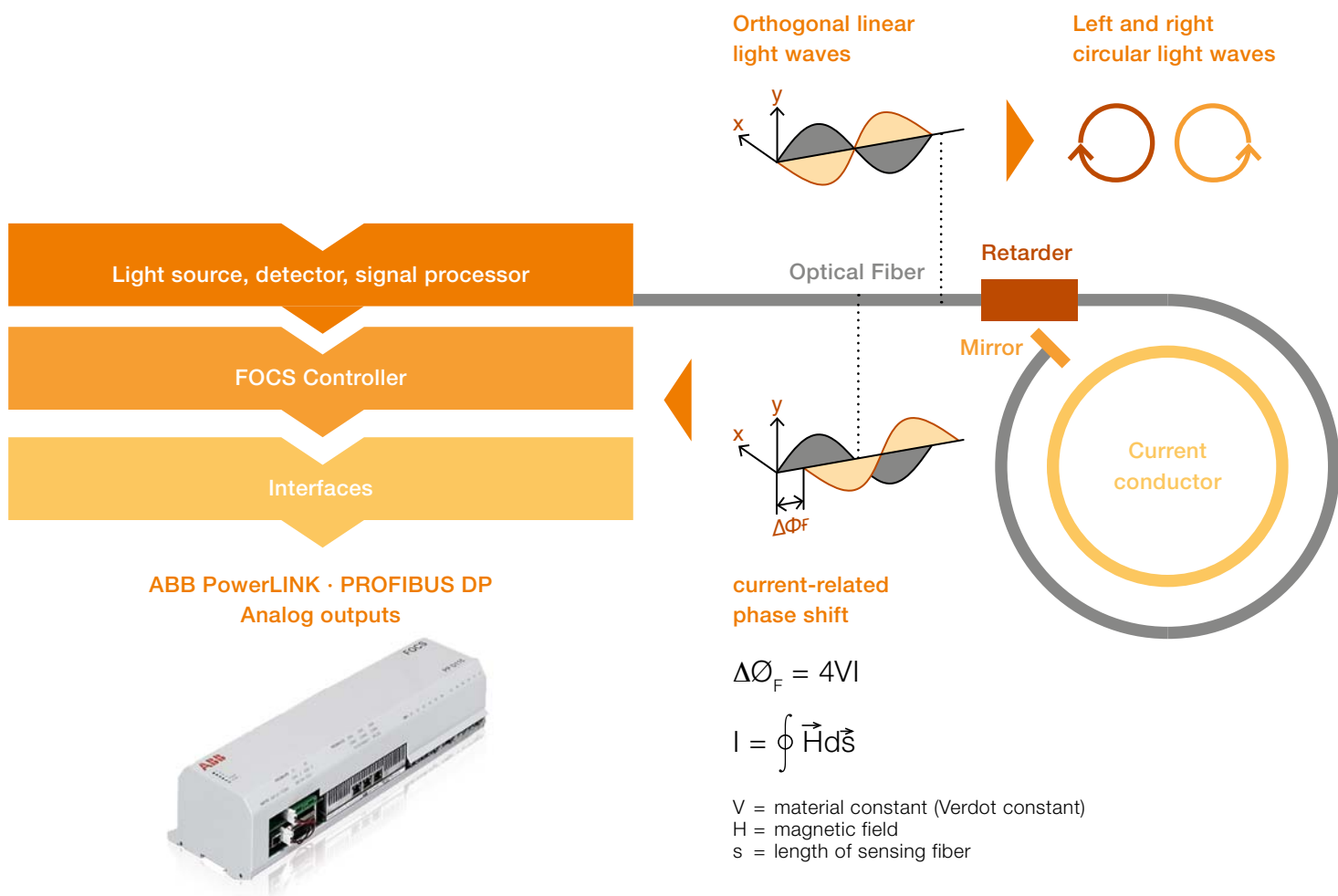
Standard sensor head dimensions (other sizes may be available)

Head-type code	B out [mm]	H out [mm]	B max. [mm]	H max. [mm]	C Seg. hor. [mm]	C Seg. vert. [mm]
H-1	855	855	441	441	105	105
H-2	1250	1250	836	836	500	500
H-3	1750	1250	1336	836	1000	500
H-4	1750	1750	1336	1336	1000	1000
H-5	2250	1750	1836	1336	1500	1000
H-6	2750	1750	2336	1336	2000	1000
H-7	3250	1750	2836	1336	2500	1000



# FOCS – Fiber-Optic Current Sensor

## Based on light. The science behind FOCS



### The right physics for highest accuracy

The FOCS system utilizes the Faraday effect to measure current. A simple loop of optical fiber is wound around the busbar in place of the complicated and bulky sensor head of conventional transducers.

The Faraday effect can be observed when polarized light waves are exposed to a magnetic field. As a result, the waves accumulate a phase difference.

In the FOCS system, the right and left circularly polarized light waves travel through the coil of the sensing fiber. At the end of the fiber, they are reflected (and their polarization direction is swapped) and then retrace their optical path to the sensor electronics. If a DC current is flowing, they accumulate a phase difference which is proportional to the line integral of the magnetic field along the sensing fiber. This difference is therefore a direct and highly precise measure for the current.

### Straightforward design for easy application

The sensor electronics contain the light source, optical phase detection circuit and digital signal processor. The sensor's technology has been proven in highly demanding applications such as navigation systems in the air, on land and at sea. The digital signal processor within the module converts the optical phase difference directly into a digital signal, which can then be transmitted for analysis wherever required.

The sensor head is connected to the sensor electronics via a non-detachable fiber-optic cable.

FOCS is delivered ready to use with standard firmware installed. All data-conditioning and monitoring functions provided by ABB FOCS, including scaling and calibration, have been preset and tested at the ABB factory. No software engineering is necessary on site.

# Contact us

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