Advanced digitalization, simplified
ABB Novolink™ smart modules for AF contactors
The all-new ABB Novolink™ devices help digitalize your motor starting solutions and gain insights into the connected loads. They’re easy to design into existing wiring plans and connect to standard AF contactors.

Installation is fast and simple, thanks to reduced wiring and fewer components, so your engineering efforts are minimized.

Novolink devices enable predictive maintenance to reduce downtime, as well as increasing efficiencies and boosting cost savings. They’re fully integrated into the B&R automation system. And the possibilities open up even more with full remote access to your data, creating new maintenance service and revenue opportunities.

So to simplify engineering, optimize operations, save time and cut costs, think Novolink.
Table of contents

Motors - the key driver of world industry
Digital capabilities to deliver Industry 4.0
A closer look at smart devices
The link between motors and digitalization
Ease of design and commissioning

Innovation through digitalization
Optimized operations and maintenance
ABB Safety solutions in the B&R ecosystem
Ordering details
Technical details
Motors - the key driver of world industry
An introduction to digitalization and its crucial role in motor maintenance

Motors make the industrial world go round. With the latest digitalization innovations, the control of your motors can achieve even higher levels of efficiency with benefits such as real-time data monitoring and predictive analytics.

300 million electrical motors are currently installed worldwide*
90% are in full-speed applications*
47% of global electricity is used by motor systems*

* own estimations
Digitalize one of the best motor starting portfolios on the market

Decide for yourself how you want to digitize your motor starting solutions - with the new Novolink modules even advanced motor protection and equipment monitoring is fast and easy.

Zero
need to replace existing AF contactors

ABB’s market-leading contactors have an advanced, electronically-controlled magnet system that covers the complete power range. Our contactors are complemented by a full list of accessories.

Novolink devices are compatible with 24 V DC coil contactors – from AF09 up to AF96 in screw & from AF09 up to AF38 in Push-In Spring.

The choice is yours:
select and mix as needed
From conventional to digital

With the Novolink devices’ enhanced capabilities, you can move from corrective to predictive maintenance, continually optimizing your process.

**Limited to**
- Hard-wired remote control
- Protection and metering functions with conventional devices

**Collecting data**
- Measurements such as current, voltage, power
- Diagnosis information and maintenance counters

**Connection**
- Seamless integration into the B&R automation studio
- Built-in X2X communication

**Control & supervision**
- Remote control
- Condition monitoring

**Delivering solutions**
- Enabling predictive maintenance, data analysis and new business models
- Analyze and adapt throughout machine’s lifecycle to improve long-term performance
- Cloud connectivity via B&R solutions for remote service and access
Digital capabilities to deliver Industry 4.0
Fire safety and general electronic requirements

Digitalization is no longer optional. Novolink devices offer a smart, competitive edge, improving reliability and reducing maintenance costs.

Smart devices enhance traditional control gear with digital capabilities. They enable the predictive maintenance, remote control, fault diagnostics and data analytics required for Industry 4.0. Monitoring is taken to a new level, using collected information to analyze performance data – including current levels, operating cycles and load levels.

This allows operation and maintenance managers to effectively improve reliability and reduce maintenance costs. With B&R PLCs, monitoring can even be managed from a remote location, eliminating the need for maintenance personnel to conduct regular on-site checks.
Novolink devices in low voltage motor applications
Explore a world of potential, from control to distribution panels

Novolink's ease of commissioning and functionality creates enormous opportunities for a wide range of industrial applications. Applications include:

- Pump
- HVAC
- Hoisting
- Agitator
- Fans
- Heating
- Lighting
- Conveyors
A closer look at smart devices

Smart function device SFM1
This contactor module snaps onto contactors from AF09 to AF96 with 24 V DC operated coil. It is seamlessly integrated into the B&R automation system via the X2X bus.

- Provides relevant maintenance counters like motor operating hours, trip counters and more
- Allows monitoring of short circuit protection devices using a digital input
- Helps to detect problems in load, supply and feeder side in order to solve problems as quickly as possible

Smart current voltage device SCV10
This high-end motor protection device provides an optional extension to the contactor module. This allows assessment of the status of connected equipment.

- Measure line voltages, phase currents, power, frequency, total harmonic distortions and other relevant parameters
- An advanced thermal model of the motor is calculated for selectable trip classes from 5E - 30E. Time to trip, time to cool and the actual thermal load level are available for optimized control
- Integrated current transformers up to 40 A nominal current
- Integrated voltage measurement up to 690 V AC
- Cos-phi and real power allows to monitor and protect pumps and other connected loads
- Earth fault and frequency measurement
- Measures load situation in each phase
The link between motors and digitalization

By effortlessly connecting the factory floor to the cloud, Novolink is essential to increase overall equipment effectiveness.

100% Data availability

1st entirely B&R compatible motor starting solution

Several devices can be connected - with or without sensor module

Asset management solutions
HMI Application
The link between motors and digitalization

**Engineering efficiency**
- only two configurable components cover a wide range of applications, reducing devices where otherwise auxiliary devices are needed.

**Preventive machine maintenance**
uses live data from relevant motor parameters

**Speed of installation**
Reduction of control side wiring. Integration of multiple functions into one device. Reduction of required PLC I/O signals.

**Digitalization allows remote contactor control and condition monitoring**
The link between motors and digitalization

B&R advanced application integration
Data from the Novolink devices can be used directly with a wide range of B&R system applications including SCADA, HMI application, audit trail, ERP/MES and cloud infrastructure.

Transform your existing portfolio with B&R Automation Studio
The B&R Automation Studio offers an integrated software development environment with tools for every project phase. This includes a wide selection of diagnostics for system optimization. You can access extensive target system information via the web with the System Diagnostics Manager. Better still, the controller, drive, communication and visualization are all configurable in one environment, reducing integration time and maintenance costs.

Effortless commissioning with B&R PLCs
The B&R Automation Studio offers an integrated software development environment with tools for every project phase. This includes a wide selection of diagnostics for system optimization. You can access extensive target system information via the web with the System Diagnostics Manager. Better still, the controller, drive, communication and visualization are all configurable in one environment, reducing integration time and maintenance costs.
Ease of design and commissioning
A closer look at the key benefits
Innovation through digitalization
Guiding you on your journey to a digital future

Enhanced analytics for improved performance
Create new business models
100% data availability
Optimized operations and maintenance
Increase your efficiency through innovation

- Reduce downtime
- Service-on-demand
- Enable preventive maintenance
B&R provides industrial automation solutions and is the global center for machine and factory automation within ABB since 2017. B&R offers PLCs with integrated safety for processing lines or machines automated with B&R.

Compatible safety products from ABB Jokab Safety
The safety products from ABB Jokab Safety are tested, verified and certified to be connected directly to the B&R safety system. This makes ABB able to offer well-tried and proven safety solutions together with B&R.

Safe solutions
Reaches the highest level of safety (up to PL e/Cat 4). Certified, verified & reliable safety solutions. Extensive fault detection. Several different types of safety sensors and devices available to suit all safety needs.

The advantages of DYNlink
The DYNlink signal significantly reduces the required number of cables and safe input channels which leads to more cost-effective solutions.

Developed with installation in mind
Easy connection with M12 connectors. A wide range of adapters and connectors to simplify wiring. Minimum amount of cabling simplifies installation.

Smart and safe manufacturing with ABB safety products and B&R solutions
Do you think about safety?

ABB does - find more information on the ABB Jokab Safety offer, details about the products and their applications online.

**B&R safety controller**

In order to supervise ABB safety sensors using B&R controllers the following units are required:

- SafeLOGIC safety controller
- X20 CPU (since the SafeLOGIC is not a stand-alone PLC)
- Safe X20 I/O modules (to connect the safety devices)

---

**Dry contacts (potential free/zero volt)**

B&R supports all ABB Jokab Safety products with dry contacts. For this use case, the B&R safe I/O module provides a unique pulse signal which ensures best cable diagnostic.

**OSSD**

B&R supports all ABB Jokab Safety products with OSSD interface. For this use case, the B&R safe I/O module provides a filter to avoid influencing the application by the OSSD low phase.

**DYNlink**

B&R supports all ABB Jokab Safety products with DYNlink interface. (Available and TÜV-certified in B&R mapp Safety from version 5.12)
Ordering details

**Description**
ABB's Novolink devices consist of the smart function module SFM1 and the sensor module SCV10-40. They allow the remote control and monitoring of AF contactors via X20 bus from within a B&R PLC. The sensor module SCV10-40 is optional and can be connected to the SFM1 module and provides functions for motor and application protection. It provides data for measuring voltage, current, frequency and further derived physical quantities such as cos phi, real power etc.

The SFM1 can be snapped onto AF09...AF96 contactors with 24 V DC coil voltage. The module is equipped with two X2X interfaces for incoming and outgoing connections (daisy chain). The module and contactor are supplied via 24 V DC that are also used for the SCV10-40 module.

---

**Ordering details**

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Order code</th>
<th>Weight (1 pc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection cable from PLC to first SFM1 module</td>
<td>SFM-CAB-RJTB.1-500</td>
<td>1SVM823000R0500</td>
<td>0.192 kg (0.423 lb)</td>
</tr>
<tr>
<td>Connection cable from SFM1 to SCV10, length 50 cm</td>
<td>SFM-CAB-S.1-50</td>
<td>1SVM811000R0050</td>
<td>0.015 kg (0.0331 lb)</td>
</tr>
<tr>
<td>Connection cable from SFM1 to SCV10, length 25 cm</td>
<td>SFM-CAB-S.1-25</td>
<td>1SVM811000R0025</td>
<td>0.008 kg (0.0176 lb)</td>
</tr>
<tr>
<td>Smart current and voltage sensor module</td>
<td>SCV10-40.1</td>
<td>1SVM320010R0000</td>
<td>0.11 kg (0.243 lb)</td>
</tr>
<tr>
<td>Smart function module</td>
<td>SFM1-A11.1</td>
<td>1SVM120012R0000</td>
<td>0.23 kg (0.507 lb)</td>
</tr>
</tbody>
</table>
Technical details
Smart function module
Data at Ta = 25 °C and rated values, unless otherwise indicated

<table>
<thead>
<tr>
<th>Technical details</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Smart function module</strong></td>
<td></td>
</tr>
<tr>
<td><strong>AX Interface [X4, X5]</strong></td>
<td></td>
</tr>
<tr>
<td>Rated control supply voltage Uis</td>
<td>according to B&amp;R X20 system specification</td>
</tr>
<tr>
<td>Rated control supply voltage Uis tolerance</td>
<td>according to B&amp;R X20 system specification</td>
</tr>
<tr>
<td>Typical current / power consumption (delivered by AX link power supply output from X20BT9400)</td>
<td>30 mA / 600 mW</td>
</tr>
<tr>
<td>Recommended RJ45 cable</td>
<td>Cat 5e/UTP AWG 26 / 1:1 connection Cat 6/STP AWG 27 / 1:1 connection</td>
</tr>
<tr>
<td>Max. distance between nodes</td>
<td>20 m</td>
</tr>
<tr>
<td>Max. distance from X20-BT9400 to first SFM1</td>
<td>8</td>
</tr>
<tr>
<td>Max. length of total network from start to last module with 8 modules</td>
<td>160 m</td>
</tr>
<tr>
<td>Grounding</td>
<td>according to B&amp;R X20 system specification, the accessory SFM-CAB-RJTB provides the required grounding of shield</td>
</tr>
<tr>
<td>Minimum cycle time</td>
<td>300 µs</td>
</tr>
<tr>
<td><strong>Contactor supply circuit SFM (X6)</strong></td>
<td></td>
</tr>
<tr>
<td>Rated control supply voltage Uis</td>
<td>24 V DC</td>
</tr>
<tr>
<td>Rated control supply voltage Uis tolerance</td>
<td>22 ... 32 V incl. ripple</td>
</tr>
<tr>
<td>Typical current / power consumption (AF coil current not considered)</td>
<td>20 mA / 480 mW (digital input closed, without sensor module) 20 mA / 480 mW (sensor module)</td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>no</td>
</tr>
<tr>
<td>Short circuit protection of contactor control outputs</td>
<td>yes</td>
</tr>
<tr>
<td>Max. load current for AF contactor</td>
<td>coordinated with supported AF contactor types</td>
</tr>
<tr>
<td>Min. power failure buffering time</td>
<td>10 ms</td>
</tr>
</tbody>
</table>

**Digital input (X3)**

- **Number of digital inputs**: 1
- **Supply for digital inputs**: internal
- **Isolation**: no
- **Input signal bounce suppression**: configurable (see module parameters)
- **Typical input current at nominal supply**: 7.5 mA
- **Max. voltage loss at closed external auxiliary contact**: max. 2 V
- **Max. cable length**: 10 m

**General data**

- **MTBF**: on request
- **Duty time**: 100 %
- **Dimensions**: see dimensional drawings
- **Weight**: 0.11 kg
- **Mounting**: see dimensional drawings

**Materials and protection**

- **Material of housing**: UL 94 V0
- **Degree of protection**: IP20
Technical details

Smart function module & Smart voltage and current sensor module

### Electrical connection X1, X3

<table>
<thead>
<tr>
<th></th>
<th>X1</th>
<th>X3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Push-in</td>
<td>1x</td>
<td>1x</td>
</tr>
<tr>
<td></td>
<td>0.2...2.5 mm²</td>
<td>0.2...1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>24...12 AWG</td>
<td>24...16 AWG</td>
</tr>
<tr>
<td>Spring</td>
<td>1x</td>
<td>1x</td>
</tr>
<tr>
<td></td>
<td>0.2...2.5 mm²</td>
<td>0.2...1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>24...12 AWG</td>
<td>24...16 AWG</td>
</tr>
<tr>
<td></td>
<td>1x</td>
<td>1x</td>
</tr>
<tr>
<td></td>
<td>0.2...2.5 mm²</td>
<td>0.2...1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>24...12 AWG</td>
<td>24...16 AWG</td>
</tr>
</tbody>
</table>

### Push-In
- 1x 0.2...2.5 mm² 24...12 AWG
- 1x 0.2...1.5 mm² 24...16 AWG

### Spring
- 1x 0.2...2.5 mm² 24...12 AWG
- 1x 0.2...1.5 mm² 24...16 AWG

### Screwdriver type
- 0.6 x 3.5 mm
- 0.4 x 2.5 mm

### Tightening torque
- 10 mm
- 8 mm

### Electrical connection X2
- Use ready-made cables, see accessories

### Max cable length
- 0.5 m

### Basic insulation
- 300 V

### Ensure safe distance from motor wires and other high voltage cables.

### Smart function module

#### Input circuit
- Nominal frequency: 50/60 Hz (45...65 Hz)
- Measurement method: true RMS (up to 13th harmonics)
- Number of phases: 1/3
- Nominal measuring range current: 0.2 to 40 A AC

#### Nominal voltage range
- 3 phase: 150 to 690 V AC ± 10%
- 1 phase: 90 to 400 V AC ± 10%

#### Measurement accuracy
- When given at Ta=25 °C, 50/60 Hz

- **Irms**
  - (range 0.2 * Ie ≤ 0.75*Ie) ± 3 %
  - (range 0.75 * Ie ≤ 2*Ie) ± 1.5 %
  - (range >2*Ie ≤ 15*Ie) ± 3 %
- **Urms** ± 1.5 %
- **Power factor** ≥ 0.5  (inductive) typ. ± 1.5% (Ims > 3 A)
- **Apparent power** typ. ± 1.5 %
- **Active power (cos phi > 0.5)** typ. ± 1.5 %
- **Frequency (50/60 Hz)** ± 1.5 %
- **Current imbalance** typ. ± 10 % (condition: I mot > 150 mA)
- **Voltage imbalance** ± 10 %
- **Voltage total harmonic distortion (THD)** ± 5 %
- **Current total harmonic distortion (THD)** ± 20 % (condition: I mot ≥ 1 A)

### Nominal current and voltage range
- Earth fault current
  - Ie = 1.0 A: ± 25 % (condition: I mot = 100 mA and I mot > 40 mA)
  - Ie = 1.0 A: ± 10 % (condition: I mot = 200 mA and I mot > 200 mA)

### Supported network types
- 1/3 phase, grounded networks

### Trip classes, selectable by parameter
- 5E, 10E, 20E, 30E

### Tripping time for phase loss
- Determined by parameter CurcPhaseLossDelayPar. Adjustable from 0 ... 25.5 s

### Load per phase
- Approx. 30 mCl

### Short-circuit protection
- Provided by an external short-circuit protection device, e.g. MO, MCCB, MCCB or fuse. Refer also to ABB coordination tables available here: [www.lowvoltage-tools.abb.com/soc/](http://www.lowvoltage-tools.abb.com/soc/)

### Max cross-section of wires
- Use insulated wires only!
- 16 mm²
## Smart voltage and current sensor module & common technical data

### Technical details

#### Input circuit

- **Conductor holes in the current transformers**: 13 mm
- **Performance under short-circuit conditions**:
  - Coordination type 2
  - \( I_{\text{q}} \): Rated conditional short circuit current
  - 80 kA
  - 200 A gG

#### Performance under short-circuit conditions

- **Fuse**: 200 A gG

#### Additional information relating to cULus approval

- Suitable for use on circuits capable of delivering not more than 100 kA rms, symmetrical, 600 V AC maximum, when protected by 100 A class K5/RK5 fuses, use fuses only.

#### Electrical connection X1

<table>
<thead>
<tr>
<th>Connecting capacity</th>
<th>Stripping length</th>
<th>Screwdriver type</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 0.2...2.5 \text{ mm}^2 ) 24...12 AWG</td>
<td>8 mm</td>
<td>0.6 x 3.5 mm</td>
<td>0.5...0.6 Nm</td>
</tr>
</tbody>
</table>

### Common technical data

#### Environmental data (common)

<table>
<thead>
<tr>
<th>SFM1</th>
<th>SCV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ambient temperature ranges</strong></td>
<td>operation</td>
</tr>
<tr>
<td>-25 to +60°C</td>
<td>-40 to +70°C</td>
</tr>
<tr>
<td><strong>Damp heat, cyclic (IEC/EN 60068-2-30)</strong></td>
<td>6 x 24 h cycle, 55 °C, 95 % RH</td>
</tr>
<tr>
<td><strong>Climatic class</strong> (IEC/EN 60721-3-3)</td>
<td>3K3 (no condensation, no ice formation)</td>
</tr>
<tr>
<td><strong>Relative humidity</strong> 5 % - 95 %, no condensation</td>
<td></td>
</tr>
<tr>
<td><strong>Vibration, sinusoidal</strong></td>
<td>4 g, 5-200 Hz</td>
</tr>
<tr>
<td><strong>Shock</strong></td>
<td>15 g, 11 ms</td>
</tr>
<tr>
<td><strong>Isolation data of contactor module in combination with contactor (and sensor module)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Rated insulation voltage ( U_i )</strong> acc. to IEC 60947-4-1</td>
<td>690 V</td>
</tr>
<tr>
<td>acc. to UL / CSA</td>
<td>600 V</td>
</tr>
<tr>
<td><strong>Rated impulse withstand voltage ( U_{\text{imp}} )</strong> SFM: Control supply, bus / mains contactor</td>
<td>6 kV</td>
</tr>
<tr>
<td>SCN: X2 (voltage input) to control supply, bus</td>
<td>6 kV</td>
</tr>
<tr>
<td><strong>Pollution degree</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Pollution degree</strong> 3 L/N: 277 V AC</td>
<td></td>
</tr>
<tr>
<td><strong>Pollution degree</strong> 2 L/L: 480 V AC</td>
<td></td>
</tr>
<tr>
<td><strong>Pollution degree</strong> 3 L/N: 400 V AC</td>
<td></td>
</tr>
<tr>
<td><strong>Pollution degree</strong> 2 L/L: 690 V AC</td>
<td></td>
</tr>
<tr>
<td><strong>Rated overvoltage category</strong></td>
<td>III</td>
</tr>
<tr>
<td><strong>Installation altitude without derating</strong></td>
<td>max. 3000 m</td>
</tr>
<tr>
<td><strong>Deratings at high altitudes</strong></td>
<td>on request</td>
</tr>
</tbody>
</table>
# Technical details

## Common technical data

<table>
<thead>
<tr>
<th>Standards / Directives</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standards</strong></td>
<td>IEC/EN 60947-4-1:2019</td>
</tr>
<tr>
<td><strong>Standards</strong></td>
<td>UL 60947-4-1:2014 (Ed. 3)</td>
</tr>
<tr>
<td><strong>Standards</strong></td>
<td>UL 60947-1:2013 (Ed. 5)</td>
</tr>
<tr>
<td><strong>Low Voltage Directive</strong></td>
<td>no. 2014/35/EU</td>
</tr>
<tr>
<td><strong>EMC Directive</strong></td>
<td>no. 2014/30/EU</td>
</tr>
<tr>
<td><strong>RoHS Directive</strong></td>
<td>no. 2011/65/EU Inc 2015/863/EU</td>
</tr>
</tbody>
</table>

## Electromagnetic compatibility

<table>
<thead>
<tr>
<th>Emission requirements</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>radio interference voltage</td>
<td>EN 61000-6-4 X</td>
</tr>
<tr>
<td>radio interference field strength</td>
<td>CISPR 11 class A            X</td>
</tr>
</tbody>
</table>

## Immunity requirements

<table>
<thead>
<tr>
<th>Electrostatic discharge</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 61000-4-2</td>
<td>6 kV contact 8 kV air</td>
</tr>
<tr>
<td>EN 61000-4-3</td>
<td>10 V/m (50-6000 Hz)</td>
</tr>
<tr>
<td>EN 61000-4-4</td>
<td>2 kV (power supply lines) 1 kV (signal lines)</td>
</tr>
<tr>
<td>EN 61000-4-5</td>
<td>1 kV / 0.5 kV (DC-supply) 2 kV / 1 kV (measurement lines)</td>
</tr>
</tbody>
</table>

## Performance data

<table>
<thead>
<tr>
<th>Cycle time in contactor module, “switch on signal”</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>received via X2X until contactor control voltage set</td>
<td>typ. 5 ms</td>
</tr>
<tr>
<td>to 24 V DC</td>
<td></td>
</tr>
</tbody>
</table>

| Update rate of measurement values provided          | Details                                                                 |
| from sensor module and available for X2X communication | typ. 25 ms                                                             |
Technical diagrams

Assembly
Technical diagrams

Dimensional drawings
in mm and inches

Smart Function Module SFM1

Smart Current and Voltage Sensor Module SCV10-40

Smart Function Module SFM1 together with AF09...AF16 contactors
Technical diagrams

Dimensional drawings in mm and inches

Smart Function Module SFM1 together with AF26...AF38
Smart Function Module SFM1 together with AF40...AF65 contactors
Smart Function Module SFM1 together with AF80, AF96 contactors
Technical diagrams

Tripping curves for warm motor for three-phase and single-phase symmetrical loads

Tripping curves for cold motor for three-phase and single-phase symmetrical loads
Digitalize motor starting solutions with the all-new ABB Novolink™ devices while simplifying engineering and optimizing operations.