

8B0C0320HC00.B00-1

1 General information

Regenerative auxiliary supply module 8B0C0320HC00.B00-1 is used for the power supply of external DC consumers. It is equipped with a DC output with two connections, whose output voltage can be continuously configured between 42 VDC and 58 VDC, and a POWERLINK V2 interface. It is ideally suited as a power supply for ACOPOStrak transport systems.

Using 8B0C0320HC00.B00-1 for the power supply of ACOPOStrak transport systems is only permitted starting with revision B0 of 8F1I01 ACOPOStrak segments.

The module offers the following additional functions:

- Voltage measurement of an external battery
- Configurable cutoff limit for output current monitoring

Information:

A maximum of 13 8B0C auxiliary power supply modules are permitted to be used per 8BxP power supply module in ACOPOSmulti drive systems; the following general conditions must be observed:

- **A maximum of 12 8B0C0320Hx00.B00-1 auxiliary supply modules per 8BxP power supply module are permitted to be used.**
- **No more than 5 8B0C auxiliary supply modules are permitted to be other than model 8B0C0320Hx00.B00-1.**

2 Order data


| Order number | Short description | Figure |
|--------------------|--|---|
| | Cold-plate or feed-through mounting |  |
| 8B0C0320HC00.B00-1 | ACOPOSMulti auxiliary supply module, 35 A, AS, cold plate or pass-through mounting, 42...58 VOut | |
| | Required accessories | |
| | Terminal block sets | |
| 8BZ0C032000.0B0-1A | Screw clamp terminal block set for 8B0C0320Hx00.B00-1 ACOPSMulti modules: 1x 8TB4104.208P-10, 1x 8TB2112.2010-00, 1x 8TB2104.2010-00, 1x 8TBB104.201A-00 | |
| 8BZ0C032000.0B0-1C | Push-in terminal block set for 8B0C0320Hx00.B00-1 ACOPSMulti modules: 1x 8TB4104.228P-10, 1x 8TB2112.2210-00, 1x 8TB2104.2210-00, 1x 8TBB104.221A-00 | |
| | Optional accessories | |
| | Fan modules | |
| 8BXF001.0000-00 | ACOPOSMulti fan module, replacement fan for ACOPSMulti modules (8BxP/8B0C/8BVI/8BVE/8B0K) | |
| | POWERLINK/Ethernet cables | |
| X20CA0E61.00020 | POWERLINK/Ethernet connection cable, RJ45 to RJ45, 0,2 m | |
| X20CA0E61.00050 | POWERLINK/Ethernet connection cable, RJ45 to RJ45, 0,5 m | |
| X20CA0E61.00100 | POWERLINK/Ethernet connection cable, RJ45 to RJ45, 1 m | |
| X20CA0E61.00500 | POWERLINK/Ethernet connection cable, RJ45 to RJ45, 5 m | |
| X20CA0E61.01000 | POWERLINK/Ethernet connection cable, RJ45 to RJ45, 10 m | |
| X20CA0E61.1000 | POWERLINK/Ethernet connection cable, RJ45 to RJ45, 100 m | |
| | Shield component sets | |
| 8SCS000.0000-00 | ACOPOSMulti shield component set: 1x shield plate 1x type 0, 1x hose clamp, B 9 mm, D 12-22 mm | |
| 8SCS002.0000-00 | ACOPOSMulti shield component set: 1x clamping plate, 2x clamp D 4-13.5 mm, 2x screws | |
| 8SCS009.0000-00 | ACOPOSMulti shield component set: 1x ACOPSMulti holding plate SK8-14, 1x shield connection clamp SK14 | |
| 8SCS010.0000-00 | ACOPOSMulti shield component set: 1x ACOPSMulti holding plate SK14-20, 1x shield connection clamp SK20 | |
| | Terminal blocks | |
| 8TB2104.2010-00 | 4-pin screw clamp terminal block, 1-row, pitch: 5.08 mm, label 1: Numbered consecutively | |
| 8TB2104.2210-00 | 4-pin push-in terminal block, 1-row, pitch: 5.08 mm, label 1: Numbered consecutively | |
| 8TB2112.2010-00 | 12-pin screw clamp terminal block, 1-row, pitch: 5.08 mm, label 1: Numbered consecutively | |
| 8TB2112.2210-00 | 12-pin push-in terminal block, one-row, pitch: 5.08 mm, label 1: Numbered consecutively | |
| 8TB4104.208P-10 | 4-pin screw clamp terminal block, one-row, pitch: 10.16 mm, label 8: GND, OUT, GND, OUT coding G: 1011 | |
| 8TB4104.228P-10 | 4-pin push-in terminal block, one-row, pitch: 10.16 mm, label 8: GND, OUT, GND, OUT coding G: 1011 | |
| 8TBB104.201A-00 | 4-pin screw clamp terminal block, one-row, pitch: 3.81 mm, label 1: Numbered consecutively | |
| 8TBB104.221A-00 | 4-pin push-in terminal block, one-row, pitch: 3.81 mm, label 1: Numbered consecutively | |

Table 1: 8B0C0320HC00.B00-1 - Order data

3 Technical data

| Order number | 8B0C0320HC00.B00-1 |
|---|---|
| General information | |
| Cooling and mounting type | Cold plate |
| Certifications | |
| CE | Yes |
| UKCA | Yes |
| UL | cULus E225616 Power conversion equipment |
| DC bus connection | |
| Voltage | |
| Nominal | 750 VDC |
| Operating range in continuous operation | 260 to 800 VDC |
| Full continuous power | 550 to 800 VDC |
| Continuous power consumption | Max. 2120 W |
| Power dissipation with continuous power ¹⁾ | 15 W (0% continuous power) 30 W (50% continuous power) 90 W (100% continuous power) |
| DC bus capacitance | 1.2 µF |
| Variant | ACOPOSMulti backplane |

Table 2: 8B0C0320HC00.B00-1 - Technical data

| Order number | 8B0C0320HC00.B00-1 |
|---|--|
| 24 VDC output | |
| Quantity | 1 |
| Output voltage | |
| DC bus voltage (U _{DC}): 260 to 315 VDC | 25 VDC * (U _{DC} /315) |
| DC bus voltage (U _{DC}): 315 to 800 VDC | 24 VDC ±6% |
| Fuse protection | 250 mA (slow-blow) electronic, automatic reset |
| Variant | |
| 24 VDC, COM | Connector |
| 24 VDC internal system power supply | |
| Input voltage | 25 VDC ±1.6% |
| Input capacitance | 47 µF |
| Max. power consumption | 7 W + P 24 VDC Out |
| Variant | ACOPOSmulti backplane |
| 58 VDC output | |
| Quantity | 1 ²⁾ |
| Output voltage | |
| Nominal | 58 VDC |
| Workspace | 42 to 58 VDC |
| Residual ripple | Typ. 200 mV _{SS} |
| Input stability ³⁾ | Typ. <50 mV (dynamic) |
| Load stability ⁴⁾ | 250 mV _{SS} (dynamic) |
| Continuous power ⁵⁾ | (Output voltage / 58 VDC) * 2030 W |
| Continuous current | ±35 A |
| Peak current | ±60 A (max. 2 s) |
| Reduction of continuous current | |
| Depending on ambient temperature | 0.2 A/K (starting at 40°C) |
| Depending on installation elevation | 3.5 A per 1000 m (starting at 500 m above sea level) |
| Depending on the input voltage | 0.0732 A/V * (550 V - Input voltage) |
| Depending on cooling type | No reduction |
| Reduction of peak current | |
| Depending on the input voltage | 0,136 A/V * (600 V - Input voltage) |
| Startup delay | Max. 8 s |
| Startup time | Typ. 300 ms |
| Protective measures | |
| No-load proof | Yes |
| Overload-proof | Yes |
| Short-circuit proof | Yes |
| Feedback protection | Yes <63 V |
| Overtemperature protection | Yes |
| Output/Input isolation | PELV |
| Variant | Connector |
| Shield connection | Yes |
| Connection | Parallel connection on output: Not permitted Serial connection on output: Not permitted |
| Max. cable length | 30 m |
| Fieldbus | |
| Type | POWERLINK V2 controlled node (CN) |
| Variant | 2x RJ45, shielded, 2-port hub |
| Line length | Max. 100 m between 2 stations (segment length) |
| Transfer rate | 100 Mbit/s |
| Digital inputs | |
| Quantity | 1 |
| Modulation compared to ground potential | ±38 VDC |
| Circuit | Sink |
| Input current at nominal voltage | Typ. 10 mA |
| Switching threshold | LOW: <5 VDC HIGH: >15 VDC |
| Input voltage | |
| Nominal | 24 VDC |
| Maximum | 30 VDC |
| Electrical isolation | Yes |
| Switching delay | |
| Rising edge | 52 ±0.5 µs (digitally filtered) |
| Falling edge | 53 ±0.5 µs (digitally filtered) |
| Shielding | No |
| Max. cable length | 30 m |
| Signal loop through | |
| Quantity | 2 pairs |
| Voltage | Max. 30 VDC |

Table 2: 8B0C0320HC00.B00-1 - Technical data

| Order number | 8B0C0320HC00.B00-1 |
|--|------------------------------------|
| Current | Max. 100 mA ⁶⁾ |
| Electrical isolation | Yes |
| Loop through for STO | Yes |
| Shielding | No |
| Variant | Pair1_1, Pair1_2, Pair2_1, Pair2_2 |
| Max. cable length | 30 m |
| Battery voltage measurement ⁷⁾ | |
| Quantity | 1 |
| Electrical isolation | Yes |
| Input voltage | |
| Maximum | 10 V |
| Measurement | |
| Load pulse | 3 mA |
| Pulse duration | Max. 500 ms |
| Threshold value for undervoltage warning | 5.2 V ⁸⁾ |
| Idle current | Max. 10 µA |
| Variant | Connector |
| Shielding | No |
| Max. cable length | 30 m |
| Support | |
| Motion system | |
| mapp Motion | 5.13.1 and higher |
| ACP10/ARNC0 | All versions ⁹⁾ |
| Operating conditions | |
| Permissible mounting orientations | |
| Hanging vertically | Yes |
| Horizontal, face up | Yes |
| Standing horizontally | No |
| Installation elevation above sea level | |
| Nominal | 0 to 500 m |
| Maximum | 4000 m |
| Pollution degree per EN 61800-5-1 | 2 (non-conductive pollution) |
| Overvoltage category per EN 61800-5-1 | III |
| Degree of protection per EN 60529 ¹⁰⁾ | IP20 |
| Ambient conditions | |
| Temperature | |
| Operation | |
| Nominal | 5 to 40°C |
| Maximum | 55°C |
| Storage | -25 to 55°C |
| Transport | -25 to 70°C |
| Relative humidity | |
| Operation | 5 to 85% |
| Storage | 5 to 95% |
| Transport | Max. 95% at 40°C |
| Mechanical properties | |
| Dimensions ¹¹⁾ | |
| Width | 53.5 mm |
| Height | 317 mm |
| Depth | |
| Cold plate | 212 mm |
| Weight | 2.6 kg |
| Module width | 1 |

Table 2: 8B0C0320HC00.B00-1 - Technical data

- 1) Output 58 V
- 2) 2 separate connections.
- 3) U_{DC} : 250 to 800 V
- 4) Output current slope: 500 A/ms
- 5) Applies to supply and regenerative operation.
- 6) External fusing recommended.
- 7) Battery voltage measurement must be explicitly triggered by the user. After the measurement takes place, re-triggering is blocked for 0.6 s.
- 8) The value is designed to measure the voltage of two 3.6 V Li-ion batteries connected in series.
- 9) 8B0C0320Hx00.B00-1 auxiliary supply modules are only permitted to be used in ACOPOS multi drive systems with 8B0P0110Hx00.000-1 power supply modules if the power supply modules have operating system version ACP10 V5.10.0 or higher.
- 10) The specified degree of protection is only provided if suitable terminals are connected to all connectors on the module and all fans are installed.
- 11) These dimensions refer to the actual device dimensions including the respective mounting plate. Additional spacing above and below the devices must be taken into account for mounting, connections and air circulation.

4.3 RDY, RUN, ERR - LED status indicators

| Label | Color | Function | Description | |
|-------|--------|----------|----------------|--|
| RDY | Green | Ready | Solid green | The module is ready for operation and the power stage can be enabled (operating system present and booted, no pending permanent or temporary errors). |
| | | | Blinking green | The module is not ready for operation. Examples: <ul style="list-style-type: none"> No signal on CR_OK DC bus voltage outside the tolerance range Overtemperature of power section Overtemperature of air flow Output voltage outside the tolerance range Disturbance on network |
| RUN | Orange | Run | Solid orange | The module's power stage is enabled. |
| ERR | Red | Error | Solid red | There is a permanent error on the module. Example: <ul style="list-style-type: none"> Data in EPROM not valid |

Table 4: RDY, RUN, ERR - LED status indicators

Information:

The ACOPOSmulti drive system has no way of detecting whether the fans in the fan modules of the mounting plate or the module-internal fans are actually rotating.

5 Dimension diagram and installation dimensions

8B0C0320HC00.B00-1

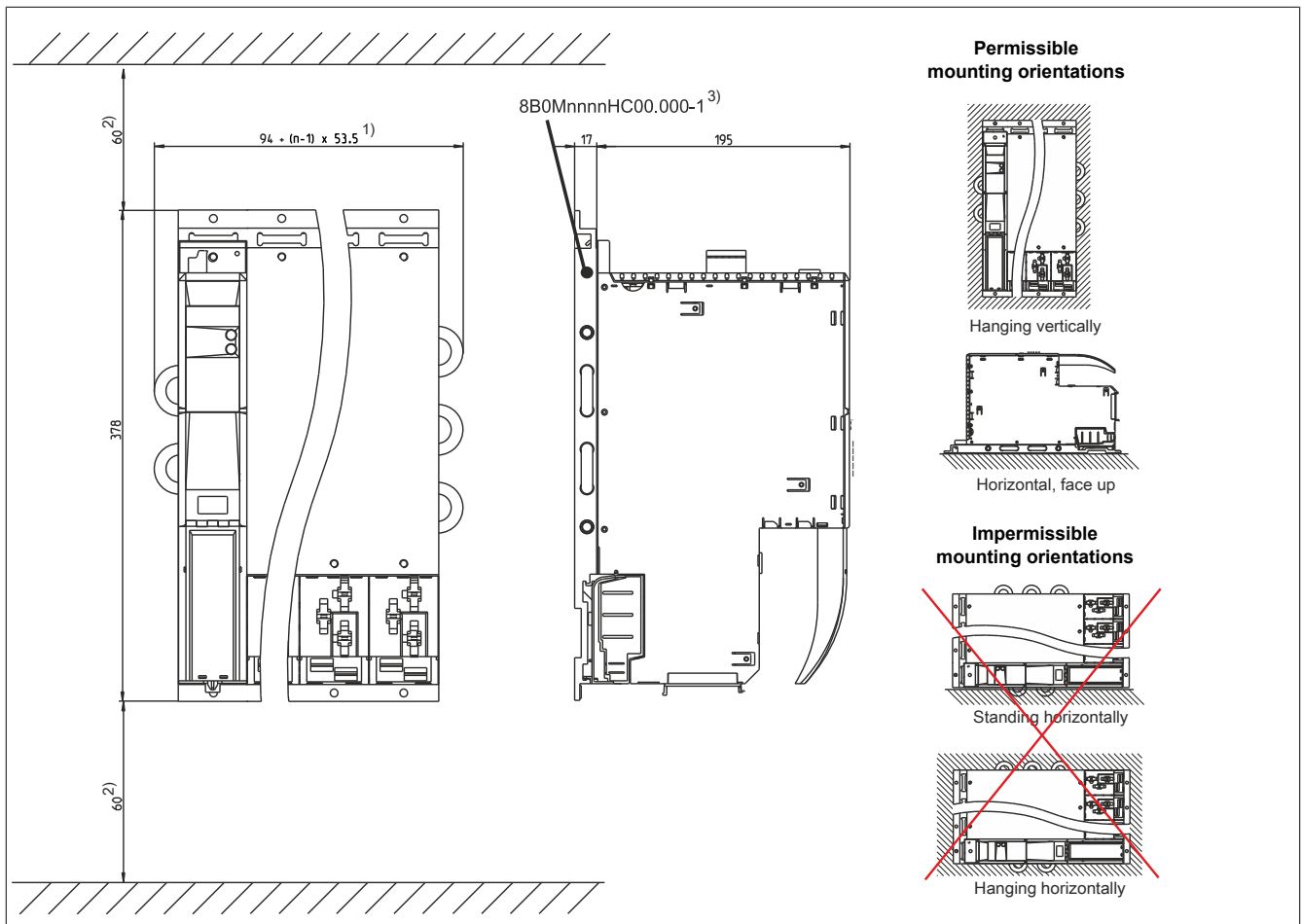


Figure 2: 8B0C0320HC00.B00-1 - Dimension diagram and installation dimensions

- 1) n... Number of width units on the mounting plate
- 2) For sufficient air circulation, a clearance of at least 60 mm must be provided above the mounting plate and below the module.
- 3) nnnn indicates the number of slots (e.g. 0160 refers to 16 slots).

6 Wiring

6.1 Pinout overview

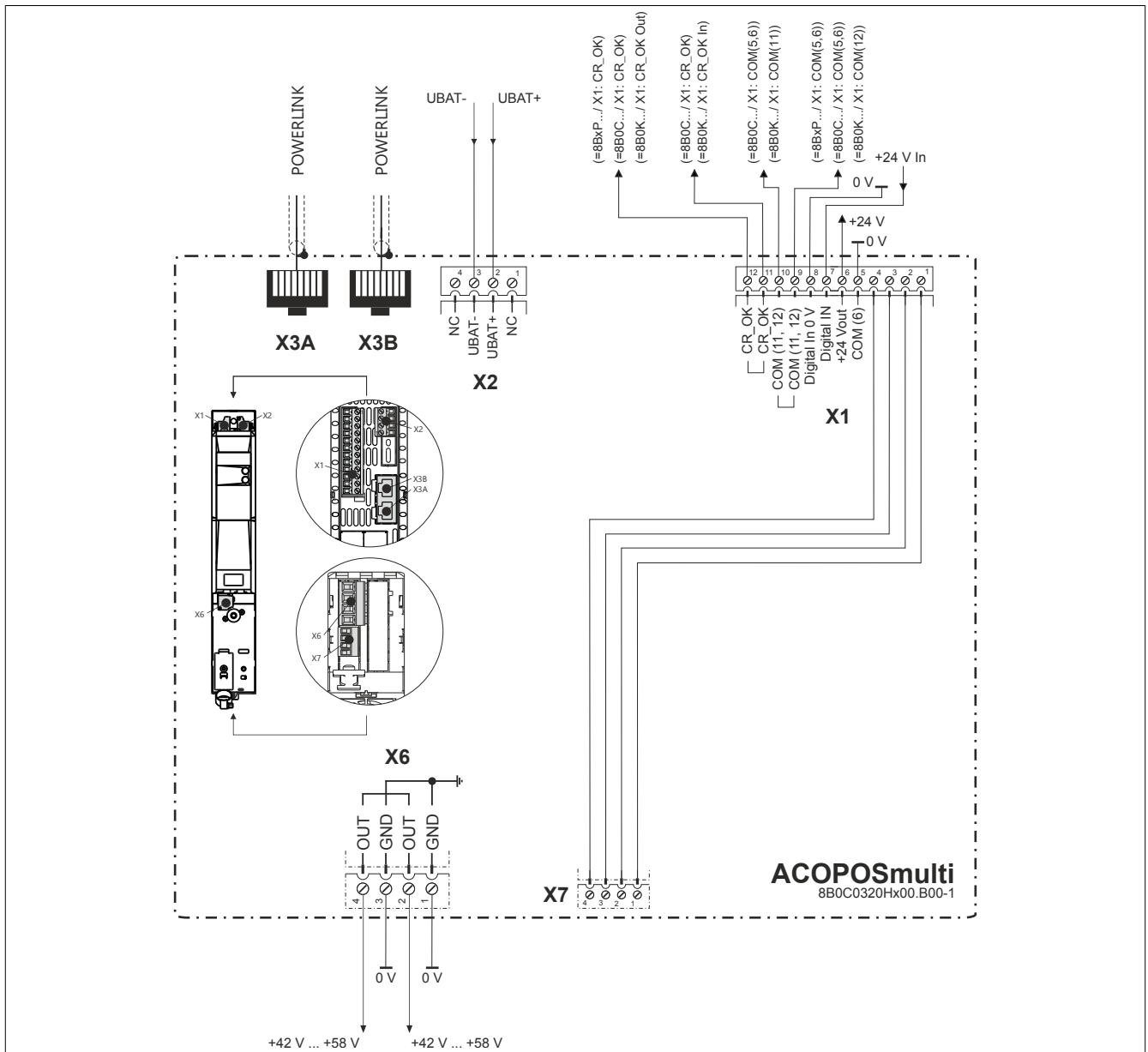


Figure 3: 8B0C0320Hx00.B00-1 - Pinout overview

Information:

For the POWERLINK connection to X3A/X3B, see [POWERLINK wiring](#).

6.2 Connector X1 - Pinout

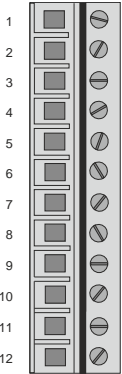
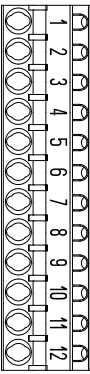
| X1 | | Pin | Name | Function |
|--|--|-----|----------------|---------------------|
|  8TB2112.2010-00 |  8TB2112.2210-00 | 1 | Pair1_1 | Pair 1, pin 1 |
| | | 2 | Pair1_2 | Pair 1, pin 2 |
| | | 3 | Pair2_1 | Pair 2, pin 1 |
| | | 4 | Pair2_2 | Pair 2, pin 2 |
| | | 5 | COM (6) | +24 V output 0 V |
| | | 6 | +24 V Out | +24 V output |
| | | 7 | Digital IN | Digital input +24 V |
| | | 8 | Digital IN 0 V | Digital input 0 V |
| | | 9 | COM (12) | 0 V |
| | | 10 | COM (11) | 0 V |
| | | 11 | CR_OK Out | DC bus ready out |
| | | 12 | CR_OK In | DC bus ready in |

Table 5: Connector X1 - Pinout

| Terminal cross section | [mm ²] | [AWG] |
|--|--------------------|---------------------|
| Solid core / Multiple-conductor lines | 0.2 to 2.5 | 24 to 12 |
| Flexible, multiple wire line | | |
| Without wire end sleeves | 0.2 to 2.5 | 24 to 12 |
| With wire end sleeves | 0.25 to 2.5 | 24 to 12 |
| Approbation data | | |
| UL/C-UL-US (push-in/screw connection) | | 24 to 12 / 24 to 12 |
| CSA (push-in/screw connection) | | 24 to 12 / 24 to 12 |
| Tightening torque for the terminal screws [Nm] | 0.5 to 0.6 | |

6.3 Connector X2 - Pinout

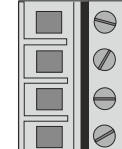
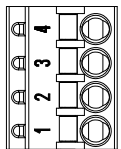
| X2 | | Pin | Name | Function |
|--|--|-----|-------|-------------------|
|  8TB2104.2010-00 |  8TB2104.2210-00 | 1 | NC | NC |
| | | 2 | UBAT+ | Battery voltage + |
| | | 3 | UBAT- | Battery voltage - |
| | | 4 | NC | NC |

Table 6: Connector X2 - Pinout

| Terminal cross section | [mm ²] | [AWG] |
|--|--------------------|---------------------|
| Solid core / Multiple-conductor lines | 0.2 to 2.5 | 24 to 12 |
| Flexible, multiple wire line | | |
| Without wire end sleeves | 0.2 to 2.5 | 24 to 12 |
| With wire end sleeves | 0.25 to 2.5 | 24 to 12 |
| Approbation data | | |
| UL/C-UL-US (push-in/screw connection) | | 24 to 12 / 24 to 12 |
| CSA (push-in/screw connection) | | 24 to 12 / 24 to 12 |
| Tightening torque for the terminal screws [Nm] | 0.5 to 0.6 | |

6.4 Connectors X3A, X3B - Pinout


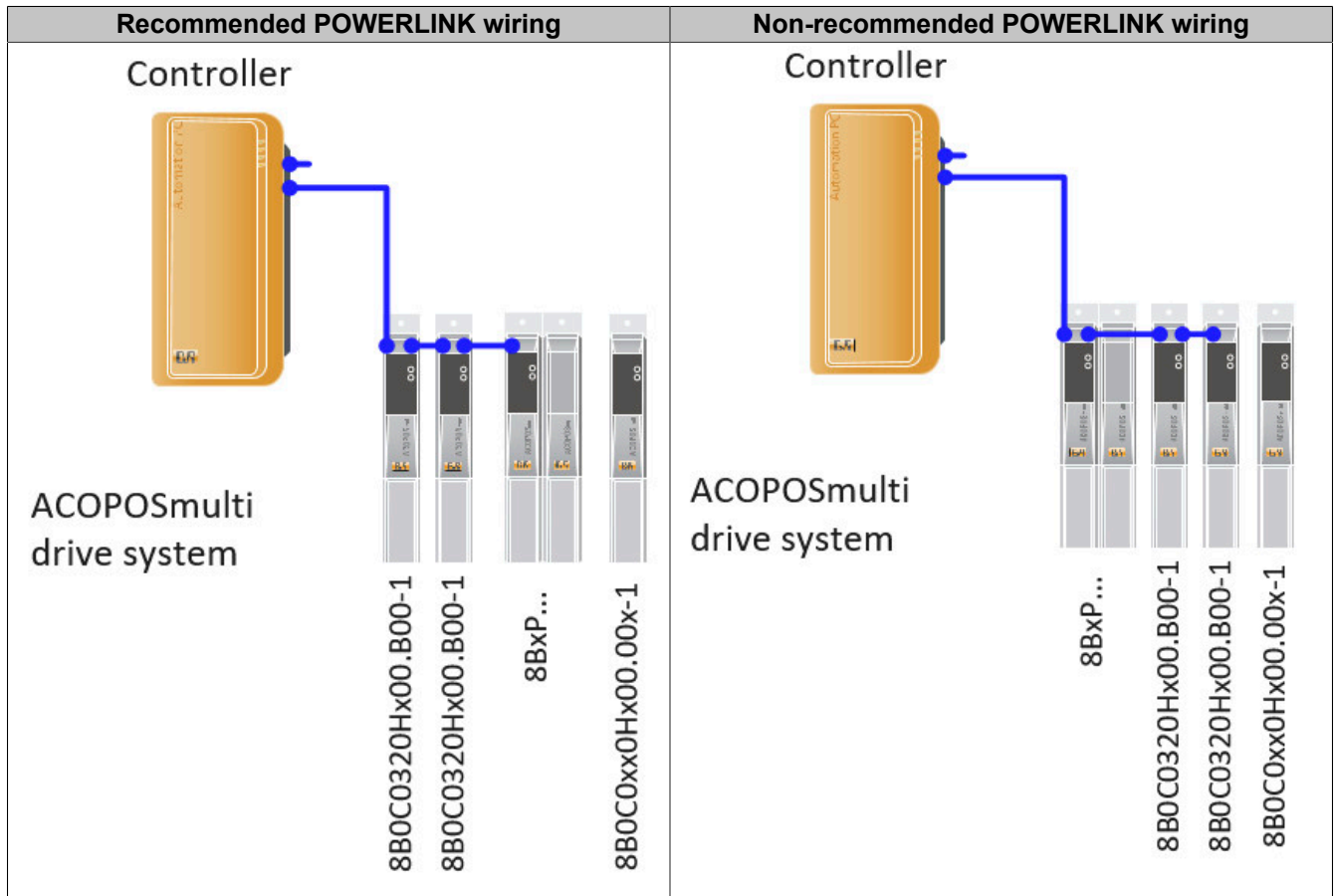
| X3A, X3B | | Pin | Name | Function |
|--|---|--------|--------------------------|----------|
|  1 | 1 | RXD | Receive signal | |
| | 2 | RXD\ | Receive signal inverted | |
| | 3 | TXD | Transmit signal | |
| | 4 | Shield | Shield | |
| | 5 | Shield | Shield | |
| | 6 | TXD\ | Transmit signal inverted | |
| | 7 | Shield | Shield | |
| | 8 | Shield | Shield | |

Table 7: X3A, X3B connectors - Pinout

6.4.1 POWERLINK wiring

If DNA is enabled on at least one station in the POWERLINK network, the hub port of drives and power supply modules is briefly disabled after a warm restart of the CPU, even if they have a permanent node number. This can result in network communication failure for the following bus stations.

In this case, placing power supply module 8B0C320Hx00.B00-1 in the first position after the controller is recommended.



6.5 Connector X6 - Pinout

| X6 | | Name | Function |
|------------------------|------------------------|------|-----------------|
| <p>8TB4104.208P-10</p> | <p>8TB4104.228P-10</p> | GND | 0 V |
| | | OUT | +42 ... 58 Vout |
| | | GND | 0 V |
| | | OUT | +42 ... 58 Vout |
| | | OUT | +42 ... 58 Vout |

Table 8: Connector X6 - Pinout

| Terminal cross section | [mm ²] | [AWG] |
|--|--------------------|---------|
| Solid core / Multiple-conductor lines | 0.75 to 16 | 18 to 6 |
| Flexible, multiple wire line | | |
| Without wire end sleeves | 0.75 to 16 | 18 to 6 |
| With wire end sleeves | 0.75 to 16 | 18 to 6 |
| Approbation data | | |
| UL/C-UL-US | | 18 to 6 |
| CSA | | 18 to 6 |
| Tightening torque for the terminal screws [Nm] | 1.7 to 1.8 | |

6.6 Connector X7 - Pinout

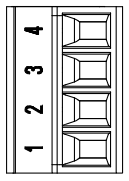
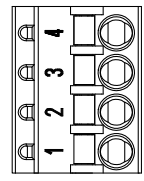
| X7 | | Pin | Name | Function |
|--|--|-----|---------|--------------------|
|  8TBB104.201A-00 |  8TBB104.221A-00 | 1 | Pair1_1 | First pair, pin 1 |
| | | 2 | Pair1_2 | First pair, pin 2 |
| | | 3 | Pair2_1 | Second pair, pin 1 |
| | | 4 | Pair2_2 | Second pair, pin 2 |

Table 9: Connector X7 - Pinout

| Terminal cross section | [mm ²] | [AWG] |
|--|--------------------|---------------------|
| Solid core / Multiple-conductor lines | 0.14 to 1.5 | 26 to 16 |
| Flexible, multiple wire line | | |
| Without wire end sleeves | 0.14 to 1.5 | 26 to 16 |
| With wire end sleeves | 0.25 to 1.5 | 26 to 16 |
| Approval data | | |
| UL/C-UL-US (push-in/screw connection) | | 26 to 16 / 28 to 16 |
| CSA (push-in/screw connection) | | 26 to 16 / 28 to 16 |
| Tightening torque for the terminal screws [Nm] | | 0.22 to 0.25 |

6.7 8B0C0320Hx00.B00-1 - Input/Output circuit diagram

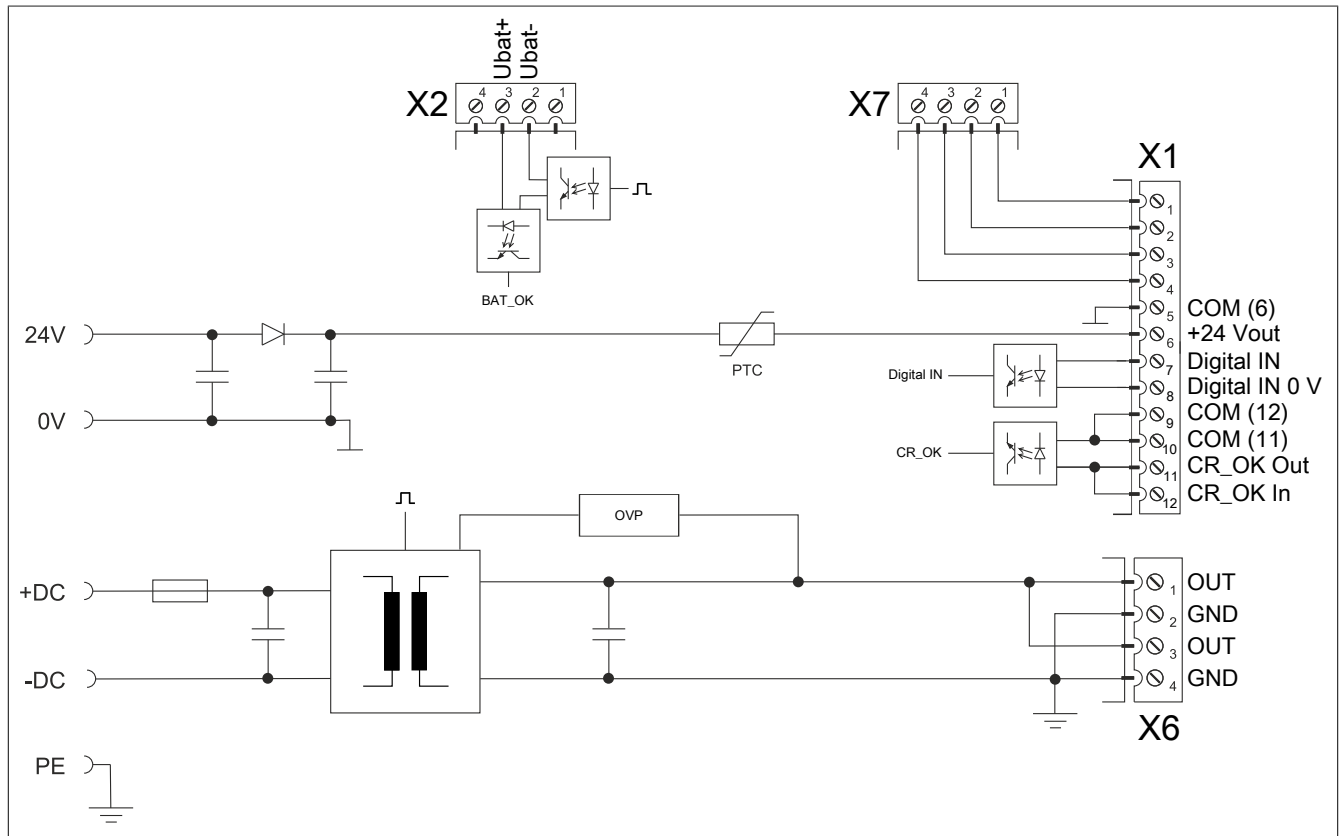


Figure 4: 8B0C0320Hx00.B00-1 - Input/Output circuit diagram

7 POWERLINK node number setting

The POWERLINK node number can be set using the two hexadecimal coded rotary switches located behind the module's black cover:



| Figure | | Coded rotary switches | POWERLINK node number |
|--|---|-----------------------|-----------------------|
|  <p>Cover closed</p> |  <p>Cover open</p> | 1 | 16s position (high) |
| | | 2 | 1s position (low) |
| <p>A change to the POWERLINK node number only takes effect the next time the ACOPOSmulti drive system is switched on.</p> <p>Information:</p> <p>In principle, node numbers between \$01 and \$FD are permitted. However, node numbers between \$F0 and \$FD are intended for future system expansions. To ensure compatibility, these node numbers should be avoided.</p> <p>Node numbers \$00, \$FE and \$FF are reserved and are therefore not permitted to be set.</p> | | | |

Table 10: Setting the POWERLINK node number

Information:

Dynamic node allocation (DNA) is not supported.

8 Configuration in Automation Studio

8.1 Configuration with mapp Motion (function model "Motion configuration")

When using mapp Motion, the module is configured with "Motion configuration".

| Name | Value | Unit | Description |
|-------------------------|----------------------|------|---|
| 8B0C0320HW00.B00-1 | | | |
| Function model | Motion configuration | | Module operating mode |
| General | | | |
| Module supervised | off | | Service mode if there is no hardware module |
| POWERLINK configuration | | | |
| POWERLINK parameters | | | |
| Power section | | | |
| Axis reference | | | Name of the power supply module component |
| Output parameters | User defined | | Output parameters selection |
| Voltage | 58.0 | V | Output voltage |
| Current limitation | Not used | | Current limitation |
| Output voltage on | Yes | | Output voltage is on after start-up and error reset |

Figure 5: Selecting function model "Motion configuration"

For details, see Automation Help.

8.2 Configuration without mapp Motion (function model "Direct control")

Without using mapp Motion, the module is configured with "Direct control".

Output voltage

| Name | Value | Unit | Description |
|-------------------------|----------------|------|---|
| 8B0C0320HW00.B00-1 | | | |
| Function model | Direct control | | Module operating mode |
| General | | | |
| Module supervised | on | | Service mode if there is no hardware module |
| POWERLINK configuration | | | |
| POWERLINK parameters | | | |
| Power section | | | |
| Output parameters | | | |
| Voltage | 58 | V | Output voltage |
| Current limitation | Not used | | Current limitation |
| Output voltage on | off | | Default output state |

Figure 6: Configuration of the output voltage in function model "Direct control"

The output voltage of the module can be configured between 42 V and 58 V.

Overload shutdown ("Current limitation")

| Name | Value | Unit | Description |
|-------------------------|----------------|------|--|
| 8B0C0320HW00.B00-1 | | | |
| Function model | Direct control | | Module operating mode |
| General | | | |
| POWERLINK configuration | | | |
| Power section | | | |
| Output parameters | | | |
| Voltage | 58 | V | Output voltage |
| Current limitation | Used | | Current limitation |
| Current limit | 31 | A | Maximum allowed output current |
| Current limit time | 20 | s | Monitoring time for output current limit |
| Output voltage on | off | | Status of the output after successful POWERLINK connection establishment |

Figure 7: Configuration of output current monitoring and switch-on behavior in function model "Direct control"

Overload shutdown monitors the maximum permissible output current [A_{rms}] of the module. Overload shutdown is disabled by default and only becomes active by selecting "Used".

Configuration parameters

- Current limit OUTPUT_CURRENT_LIMIT_I_OUT_MAX (I_{LIM}): Max. permissible output current [A_{rms}]
- Current limit time OUTPUT_CURRENT_LIMIT_FILTER_TIME (T_{LIM}): Filter time for the output current

Monitoring takes place using the time-filtered root mean square (RMS) value of the output current. This is calculated from a PT1 characteristic, where time constant τ is selected as follows:

$$T_{LIM} = 5 * \tau$$

If the output current rises sharply from 0 to I_{peak} , tripping time T_A is calculated as follows:

$$T_A = \frac{1}{5} T_{LIM} * \ln\left(\frac{I_{peak}}{I_{peak} - I_{LIM}}\right)$$

- No overload shutdown occurs with output currents $< I_{LIM}$.
- With an output current of approx. $1.07 * I_{LIM}$, the overload shutdown occurs after monitoring time T_{LIM} .
- With output currents $> 1.07 * I_{LIM}$, overload shutdown takes place correspondingly faster (see also the tripping characteristic for overload shutdown).

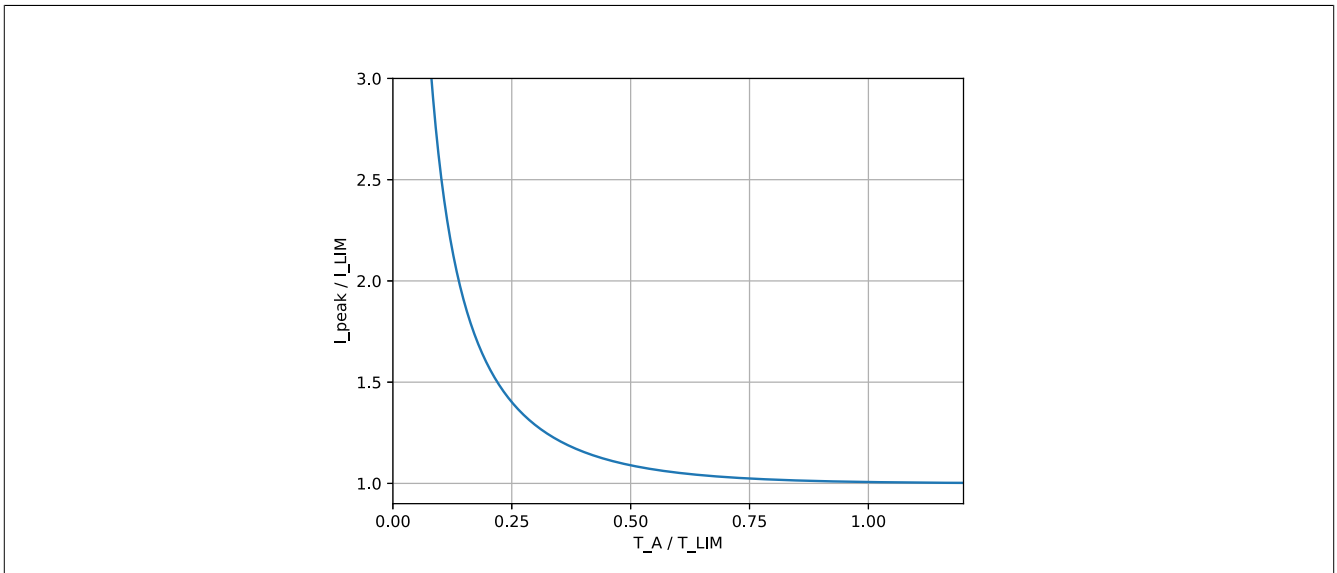
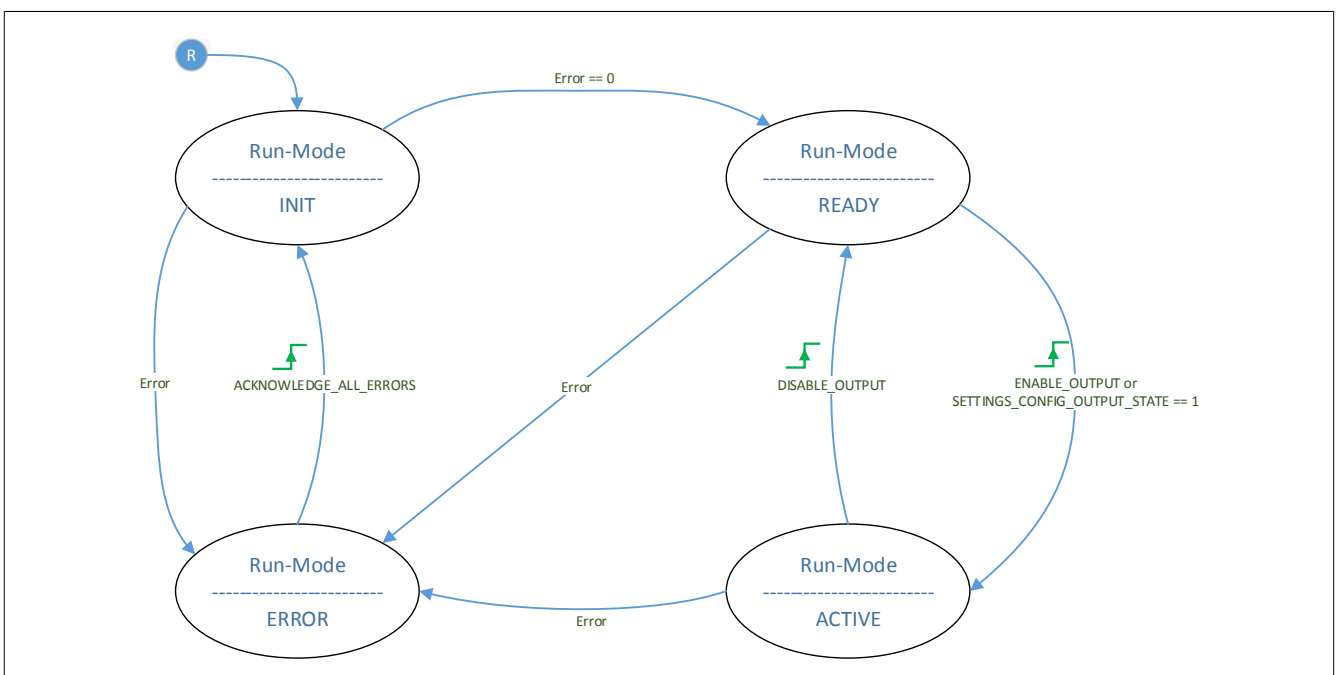


Figure 8: Tripping characteristic for overload shutdown

The behavior of overload shutdown is similar to that of conventional melting fuses. Monitoring time T_{LIM} thus specifies whether the overload shutdown is "fast-acting" or "slow-blow".

9 Operation

Central sequential control (state diagram)



After the 24 V auxiliary supply is applied to the module (boot), an initialization phase (INIT) is run through (duration approx. 8 s). If no errors are present, the module then switches to state READY.

The output voltage can be switched on starting from state READY. The module changes to state ACTIVE (power output stage is switched on), and the output voltage is ramped to the setpoint over a period of approx. 0.3 s. Bits OUTPUT_ENABLED and OUTPUT_STABLE indicate the state of the output voltage. While bit OUTPUT_ENABLED is active immediately after the power output stage is switched on, bit OUTPUT_STABLE only becomes active after the configured setpoint has been reached.

When the output voltage is switched off, the power output stage is switched off, thus preventing the flow of power to/from the output of the module. In the case of regenerative consumers, the output voltage may rise!

In the event of error, the module changes to state ERROR. The power output stage is also switched off in this state. An interruption of the POWERLINK connection during operation (including warm restart or service mode of the controller, for example) does not result in an error and does not switch off the output voltage.

Switching on the output voltage automatically

With configuration "Output voltage on", the output voltage of the module is switched on by the controller immediately after the configuration is complete.

Automatic restart after an error is not possible with this configuration. The error must therefore be handled in the application.

Switching the output voltage on and off manually

Operation with mapp Motion

Switching on and off, monitoring the status, warning and error messages as well as resetting errors are performed with mapp function blocks. For details, see Automation Help. The module information is also available in the I/O mapping.

Operation without mapp Motion

Switching on and off, monitoring the status, warning and error messages as well as resetting errors are performed in the I/O mapping. The inputs are edge-sensitive.

Information:

The output voltage can no longer be manually switched on/off if automatic switch-on of the output voltage has been configured.

10 Register description

| Object | | Name | Data type | Read | | Write | |
|--------|----------|----------------------------------|-----------|--------------|---------------|--------------|---------------|
| Index | Su-index | | | Cyclic (PDO) | Acyclic (SDO) | Cyclic (PDO) | Acyclic (SDO) |
| 0x2000 | 1 | CTRL_REG | UINT16 | • | | • | |
| 0x2001 | 0 | STATUS_REG | UINT8 | | | | |
| | 1 | STATUS_REG_SUB_GENERAL | UINT16 | • | | | |
| | 2 | STATUS_REG_SUB_RUNMODE | UINT8 | • | | | |
| 0x2002 | 1 | ErrorsPacked | UINT32 | • | | | |
| 0x2003 | 1 | WarningsPacked | UINT32 | • | | | |
| 0x2005 | 0 | ACT_MEAS | UINT8 | | • | | |
| | 1 | ACT_MEAS_U_OUT | REAL | | • | | |
| | 2 | ACT_MEAS_I_OUT | REAL | | • | | |
| | 3 | ACT_MEAS_P_OUT | REAL | | • | | |
| | 4 | ACT_MEAS_U_IN | REAL | | • | | |
| 0x2006 | 0 | SETTINGS | UINT8 | | • | | |
| | 1 | SETTINGS_U_OUT [mV] | UINT32 | | • | | • |
| | 2 | SETTINGS_CONFIG_OUTPUT_STATE | UINT8 | | • | | • |
| 0x2008 | 0 | TEMPS | UINT8 | | • | | |
| | 1 | TEMPS_T_HEATSINK | INT16 | | • | | |
| | 2 | TEMPS_T_AIR_IN | INT16 | | • | | |
| | 3 | TEMPS_T_AIR_OUT | INT16 | | • | | |
| | 4 | TEMPS_T_TRAFO | INT16 | | • | | |
| | 5 | TEMPS_T_COIL | INT16 | | • | | |
| 0x2009 | 0 | BAT_MEAS | UINT8 | | • | | |
| | 1 | BAT_MEAS_CMD | UINT8 | | | | • |
| | 2 | BAT_MEAS_STATE | UINT8 | | • | | |
| 0x200A | 0 | OUTPUT_CURRENT_LIMIT | UINT8 | | • | | |
| | 1 | OUTPUT_CURRENT_LIMIT_I_OUT_MAX | UINT32 | | • | | • |
| | 2 | OUTPUT_CURRENT_LIMIT_FILTER_TIME | UINT16 | | • | | • |
| | 3 | OUTPUT_CURRENT_LIMIT_ACTIVE | UINT8 | | • | | • |

10.1 Control register CTRL_REG (0x2000/1)

The control register can be used to switch the output of the module on and off and to acknowledge errors and warnings.

| Bit | Name | | Description |
|-----|------------------|---|---|
| 0 | ENABLE_OUTPUT | 1 | The output is switched on with a rising edge. |
| 1 | ACK_ALL_ERRORS | 1 | All pending errors are acknowledged with a rising edge. |
| 2 | ACK_ALL_WARNINGS | 1 | All pending warnings are acknowledged with a rising edge. |
| 3 | DISABLE_OUTPUT | 1 | The output is switched off with a rising edge. |

10.2 Status register STATUS_REG

Status bits STATUS_REG_SUB_GENERAL (0x2001/1)

| Bit | Name | Description |
|---------|----------------|--|
| 0 | CR_OK | DC bus ready Signal from the power supply module (PSM) |
| 1 | DIGITAL_IN | Digital input for general use (general purpose input) |
| 2 | OUTPUT_ENABLED | Power output stage switched on |
| 3 | --- | Reserve |
| 4 | --- | Reserve |
| 5 | OUTPUT_STABLE | Output voltage stable when the power output stage is switched on |
| 6 to 15 | --- | Reserve |

Run mode status STATUS_REG_SUB_RUNMODE (0x2001/2)

| Value | Name | Description |
|-------|--------|---|
| 0 | INIT | Module initialization procedure in progress |
| 1 | READY | Module ready for switching on |
| 2 | ACTIVE | Power output stage switched on |
| 3 | ERROR | Error pending |

Error register ErrorsPacked (0x2002/1)

| Bit | Name | Description |
|-----|----------|---|
| 0 | U_OUT_OV | Overvoltage: Output side |
| 1 | U_OUT_UV | Undervoltage: Output side |
| 2 | U_IN_OV | Overvoltage: Input side |
| 3 | U_IN_UV | Undervoltage: Input side |
| 4 | I_IN_OC | Overcurrent: Input side |
| 5 | I_OUT_OC | Overcurrent: Output side (short circuit) |
| 6 | AUX_UV | Overvoltage/Undervoltage: 24 V auxiliary supply |

| Bit | Name | Description |
|----------|--------------------|---|
| 7 | TEMP_AIR_IN | Overtemperature: Input air flow (sensor) |
| 8 | TEMP_AIR_OUT | Overtemperature: Output air flow (sensor) |
| 9 | TEMP_TRAFO | Overtemperature: Transformer (sensor) |
| 10 | TEMP_HEATSINK | Overtemperature: Heat sink (sensor) |
| 11 | PEAK_OVERLOAD | Overload: Peak (60 A, 2 s) |
| 12 | CONT_OVERLOAD | Overload: Duration (35 A rms) |
| 13 | --- | Reserve |
| 14 | --- | Reserve |
| 15 | CR_OK_LOW | CR OK signal from power supply module interrupted |
| 16 | --- | Reserve |
| 17 | --- | Reserve |
| 18 | --- | Reserve |
| 19 | SELFTEST | Device defective |
| 20 | I_OUT_CUSTOM_LIMIT | Overload: Configured limit |
| 21 | TEMP_COIL | Overtemperature: Choke (model) |
| 22 to 31 | --- | Reserve |

Each of the listed errors causes the module to change to state ERROR. In state ERROR, the output voltage (power output stage) is switched off and cannot be switched on again.

All pending errors are acknowledged by setting bit ACK_ALL_ERRORS (edge-sensitive). After acknowledging the errors, it is possible to switch on the output again.

Information:

Error SELF_TEST_ERROR cannot be acknowledged by the user since in this case the module has detected a serious and permanent system error.

2.3.4 Warning register WarningsPacked (0x2003/1)

| Bit | Name | Description |
|---------|--------------------|---|
| 0 | TEMP_AIR_IN | Overtemperature: Input air flow (sensor) |
| 1 | TEMP_AIR_OUT | Overtemperature: Output air flow (sensor) |
| 2 | TEMP_TRAFO | Overtemperature: Transformer (sensor) |
| 3 | TEMP_HEATSINK | Overtemperature: Heat sink (sensor) |
| 4 | CONT_OVERLOAD | Overload: Duration (90% of the error limit) |
| 5 | U_IN_OV | Overvoltage: Input side |
| 6 | PEAK_OVERLOAD | Overload: Peak (90% of the error limit) |
| 7 | I_OUT_CUSTOM_LIMIT | Overload: Configured limit (90% of the error limit) |
| 8 | TEMP_COIL | Overtemperature: Choke (model) |
| 9 to 31 | --- | Reserve |

Warnings have no direct influence on the operation of the module but indicate that a specific value has exceeded a warning limit. If no intervention takes place, this can subsequently result in an error and to the module being shut down.

All pending warnings are acknowledged by setting bit ACK_ALL_WARNINGS (edge-sensitive).

10.3 Gate sizes ACT_MEAS (0x2005)

Output voltage ACT_MEAS_U_OUT (0x2005/1)

Current output voltage (instantaneous value) in V

Output current ACT_MEAS_I_OUT (0x2005/2)

Current output current (instantaneous value) in A

Output power ACT_MEAS_P_OUT (0x2005/3)

Current output power (arithmetic 5 ms average) in W

Input voltage ACT_MEAS_U_IN (0x2005/4)

Current input voltage (instantaneous value) in V

10.4 Configuration parameter SETTINGS (0x2006)

Output voltage SETTINGS_U_OUT (0x2006/1)

Default value for output voltage in mV

This register is not normally needed since the output voltage is set via the module configuration in Automation Studio (see "Output voltage" on page 12) and written automatically during startup.

Automatic switch-on SETTINGS_CONFIG_OUTPUT_STATE (0x2006/2)

When value 1 is written to this register (bit 0 is set), the power output stage is automatically switched on by the controller after complete configuration. See [Configuration in Automation Studio](#).

10.5 Temperatures TEMPS (0x2008)

Temperature of the heat sink TEMPS_T_HEATSINK (0x2008/1)

Measured temperature at the heat sink in °C

Temperature of the input air flow TEMPS_T_AIR_IN (0x2008/2)

Measured temperature of the input air in °C

Temperature of the output air flow TEMPS_T_AIR_OUT (0x2008/3)

Measured temperature of the output air in °C

Temperature of the transformer TEMPS_T_TRAFO (0x2008/4)

Measured temperature at the transformer in °C

Temperature of the choke TEMPS_T_COIL (0x2008/5)

Model-based temperature of the choke core in °C

Battery measurement BAT_MEAS (0x2009)

Writing value 1 to subindex 1 BAT_MEAS_CMD (**USINT**) performs the battery measurement once. The state of the battery measurement can be read out via subindex 2 BAT_MEAS_STATE (**USINT**). This is interpreted as follows:

| Value | State | Description |
|-------|------------|---|
| 0 | UNKNOWN | Battery measurement never performed |
| 1 | BUSY | Battery measurement active |
| 2 | BAT_OK | Battery voltage OK (battery voltage >5.2 V) |
| 3 | BAT_NOT_OK | Battery voltage not OK (battery voltage ≤5.2 V) |

For the duration of the measuring procedure, the battery is loaded with a low current. Since the measurement is physically implemented as gate measurement, the measurement duration varies. The maximum value is about 500 ms.

Configurable overload shutdown OUTPUT_CURRENT_LIMIT (0x200A)

In addition to the module-specific overload shutdowns for continuous and peak load, the module has a configurable overload shutdown that is designed to protect connected components. The configurable overload shutdown thus has the function of an electronic fuse. See also [Overload shutdown \("Current limitation"\)](#).

| | |
|--|--|
| Subindex 1 OUTPUT_CURRENT_LIMIT_I_OUT_MAX (UDINT): | Monitoring limit in A (I_LIM) |
| Subindex 2 OUTPUT_CURRENT_LIMIT_FILTER_TIME (UINT): | Monitoring time window in s (T_LIM) |
| Subindex 3 OUTPUT_CURRENT_LIMIT_ACTIVE (USINT): | Enable (0...Inactive, 1...Active) |

Cyclic data points

A selected part of the objects described in [Register description](#) is transferred in the cyclic POWERLINK frame. These cyclic objects (process data objects, PDOs) are listed in the module's I/O mapping and represented in AS as follows:

| Channel Name | Data Type | Description [1] |
|-------------------------|-----------|---|
| ModuleOk | BOOL | Module status (1 = module present) |
| SerialNumber | UDINT | Serial number |
| ModuleID | UDINT | Module ID |
| HardwareVariant | UDINT | Hardware variant |
| FirmwareVersion | UINT | Firmware version |
| EnableOutput | BOOL | Switch powersupply on (edge sensitive) |
| AcknowledgeAllErrors | BOOL | Acknowledge all pending errors (edge sensitive) |
| AcknowledgeAllWarnings | BOOL | Acknowledge all pending warnings (edge sensitive) |
| DisableOutput | BOOL | Switch powersupply off (edge sensitive) |
| Iout | REAL | Actual Output current (A) |
| Uout | REAL | Actual Output voltage (V) |
| CrOk | BOOL | State Charging relay |
| DigitalIn | BOOL | State 24VDC Input |
| OutputEnabled | BOOL | State Output voltage (active / not active) |
| OutputVoltageStable | BOOL | State Output voltage (within / outside tolerance range) |
| StatusRunMode | USINT | Operating mode (0 = INIT, 1 = READY, 2 = ACTIVE, 3 = ERROR) |
| ErrorsPacked | UDINT | ErrorsPacked |
| ErrorOvervoltageUout | BOOL | Error: Output voltage too high |
| ErrorUndervoltageUout | BOOL | Error: Output voltage too low |
| ErrorOvervoltageUin | BOOL | Error: Input voltage too high |
| ErrorUndervoltageUin | BOOL | Error: Input voltage too low |
| ErrorOvercurrentIn | BOOL | Error: Input current too high |
| ErrorOvercurrentIout | BOOL | Error: Output current too high |
| ErrorAuxVoltage | BOOL | Error: Auxiliary logic supply faulty |
| ErrorTempAirIn | BOOL | Error: Overtemperature @ Sensor Air-In |
| ErrorTempAirOut | BOOL | Error: Overtemperature @ Sensor Air-Out |
| ErrorTempTrafo | BOOL | Error: Overtemperature @ transformer |
| ErrorTempHeatsink | BOOL | Error: Overtemperature @ heatsink |
| ErrorPeakOverload | BOOL | Error: Peak load too high |
| ErrorContinuousOverload | BOOL | Error: Continuous load too high |
| ErrorCrOk | BOOL | Error: CR_OK |
| ErrorSelftest | BOOL | Error: Selftest-Error |
| ErrorOutputCurrentLimit | BOOL | Error: Configured output current limit exceeded |
| ErrorTempCoil | BOOL | Error: Overtemperature @ coil |
| WarningsPacked | UDINT | WarningsPacked |
| WarningTempAirIn | BOOL | Warning: Overtemperature @ Air-In |
| WarningTempAirOut | BOOL | Warning: Overtemperature @ Air-Out |
| WarningTempTrafo | BOOL | Warning: Overtemperature @ transformer |
| WarningTempHeatsink | BOOL | Warning: Overtemperature @ heatsink |
| WarningContinuousLoad | BOOL | Warning: Continuous load high |
| WarningHighUin | BOOL | Warning: Input voltage high |
| WarningPeakLoad | BOOL | Warning: Peak load high |
| WarningCurrentLimit | BOOL | Warning: Warning-Limit for configured output current limit exceeded |
| WarningTempCoil | BOOL | Warning: Overtemperature @ coil |

Figure 9: I/O mapping with all cyclically available data points

Information:

"Iout - Actual output current (A)" is displayed in the I/O mapping as 5 ms arithmetic average value.